Press information – NOJ 393

Background history, technical inspection and restoration information supplied by: Joe Jarick, Austin-Healey Special Test Car and 100S historian, with contribution from Steve Pike, proprietor, Marsh Classic Restorations

Today Bonhams welcomes to its London galleries fresh from restoration NOJ 393, the 1953-55 Donald Healey Motor Company Special Test Car. Today is a celebration of the return of this Austin-Healey to its 1955 Le Mans start line specification, after more than 40 years in hibernation.

The December 2011 Bonhams sale saw a world record price paid for an Austin-Healey, a Works Special Test Car, in 'barn find' condition. The new owner is a European collector who has a particular preference for Healeys and Austin-Healeys, and the 100S in particular. Upon acquisition, he shipped the Austin-Healey, UK registration mark NOJ 393, to Australia for its restoration.

This Austin-Healey has the distinction of being a pre-production Austin-Healey 100 and the third of four Special Test Cars built at Warwick by the Donald Healey Motor Company (DHMCo) in very early 1953 to launch their development and competition program to support the launch of the new Austin-Healey sports car. It is particularly significant as it is the only survivor of the two 1953 Special Test Cars subsequently converted to 'Works' 100S specification. (Further reference: Bonhams Sale Catalogue Number 19293, Lot 433)

Easter saw this Austin-Healey's return to the United Kingdom fresh from the comprehensive restoration by marque specialist Marsh Classic Restorations located in Victoria, Australia.

Specific Details:
1953 Austin Healey 100 Special Test Car
Chassis No. SPL 226/B
Body No. AHR/7
Engine No. SPL 261 BN
First registered by Austin Motor Company on 24 April 1953.
Registration No. NOJ 393

As a Donald Healey Motor Company DHMCo) Special Test Car and therefore a Works entry, NOJ 393 has the distinction of having run in many of the World Sports Car Championship races as an integral part DHMCo's racing and prototype development program.
NOJ 393's exemplary pedigree compares to almost any works sports racing car with entries in some of the great endurance races of the post-war period.

Actual entries are as follows;

- 1953 Le Mans 24 Hours (Gordon Wilkins/Marcel Becquart) 14th Overall, 3rd in Class.
- 1954 Sebring 12 Hours (Lance Macklin /George Huntoon) 3rd Overall, 1St in Class.
- 1954 Carrera PanAmericana Road Race (Lance Macklin) Retired – Ignition fault.
- 1954 Bahamas Speed Week, Nassau (Lance Macklin) 100 Mile Bahamas Cup, 6th Overall and 200 Mile Nassau Trophy 25th Overall.
- 1955 Le Mans 24 Hours (Lance Macklin/Les Leston) Accident caused retirement.

Following agreement between Leonard Lord of Austin and Donald Healey whereby the Austin Motor Company would underwrite the new sports car, take over production and distribution, leaving Donald Healey and his team at Warwick to focus on development and racing. So the Special Test Car program came into being with the description 'Special Test Car', an attempt to thinly disguise that the Austin Motor Company were building racing cars.

Background:
To briefly revisit NOJ 393's pedigree, following the launch of the Austin-Healey 100 at Earls Court in October 1952, work began immediately between the DHMCo and Austin to put the new sports car into production. With this work underway the priority was to capitalise on the successful model launch and generate wider publicity through having the Austin-Healey 'seen' in its prospective markets. This was achieved through satisfying demand for the new sports car through Austin's worldwide dealer network and commencing a development and competition program to support sales.

To cater for the initial demand a small number of pre-production Austin-Healey 100 motor cars were built at DHMCo's Warwick premises. These were intended to have a purely promotional role, including the generation of publicity at a number of motor shows both in the USA and Europe.

In addition to the ‘standard’ cars, four Special Test Cars were included in the building program using the same basic components, but with an entirely different specification.

The development and competition role was part of Donald Healey’s agreement with Austin, very appropriate given their past success at Le Mans and elsewhere.

SPL 226/B (NOJ 393) was the seventh of the pre-production 100 built and third Special Test Car. The three being registered by Austin as follows;
SPL 224/B - NOJ 391
SPL 225/B - NOJ 392
SPL 226/B - NOJ 393
SPL 227/B, the fourth chassis was never registered as it was intended only for record breaking.

That SPL 227/B was identified at the build phase as having the role of a record breaker demonstrates that each Special Test Car had pre-determined roles and this helps to explain differences car to car at that point. While all the pre-production cars were hand built, the Special Test Cars were much more than that, apart from their competition specification, they were very carefully assembled.

The focus of Donald Healey’s competition program with the new Austin-Healey would be the World Sports Car Championship and what a baptism of fire this would prove to be.

World Sports Car Championship pedigree aside, NOJ 393 is one of only two surviving Special Test cars from 1953. Importantly, it is the only survivor which, competing for three seasons as a Works entry, is able to reflect development in prototype form across the full Austin-Healey 100 model range. That is from a pre-production 100, through to a 100M, in this form success at Le Mans in 1953 and from there as a 100S. At 1954 Sebring, where its wonderful result clarified both the 100S model name and specification.

Returning to the new owner’s restoration brief, to return the Healey to its final Works specification. In effect transporting the Healey back to that fateful moment in time in 1955, at precisely 4pm 11 June, when the car left the start line of the Les 24 Heures du Mans.

NOJ 393 was constructed shortly after the first batch of 20 pre-production cars for both racing and development testing.

Looking very little different to a standard Austin-Healey 100 sports car, NOJ 393, together with NOJ 392 (SPL225B), through their 1953 Le Mans 24 Hour Race results clarified what was to subsequently become the 100M model specification. Donald Healey achieved two Austin-Healeys in the top 14 finishers, a fantastic result for the debut of the new sports car in the big league of World Championship Sports Car Racing. Due to a pre-race accident to NOJ 391 its sister car, NOJ 393 was pressed into service and performed admirably, coming home 14th Overall and 3rd in Class. A Nash Healey also finished 11th Overall, making three in the top 14 placers for Donald Healey.

In March 1954 at Sebring, NOJ 393 ran with the prototype 100S engine featuring the eight port Westlake designed alloy cylinder head. The 3rd Overall and 1st in Class result was enough to launch the limited production 100S (S for Sebring) competition model. Deliveries commenced in January 1955 of just 50 ‘production’ sports racing cars, complete with an all alloy body and Dunlop disc brakes on all four wheels and similarly. These were powered by the same engine as the prototype featuring the Westlake cylinder head that helped to raise output to 132 horsepower.

In September NOJ 393 was entered with OON 441, a 1954 Special Test Car, as a prototype 100S for the Pan-American Road Race the former retiring with ignition problems. Some weeks later Lance Macklin drove the car at the inaugural Bahamas Speed Week in Nassau with good results for a prototype of the new model.

NOJ 393’s last entry, with the latest Works 100S specification, was for the 1955 Le Mans 24 Hour Race. The entry was not by the Donald Healey Motor Company, but by the French Austin importer AFIVA, at their request. The Austin-Healey was performing well until it became involved in the disastrous accident that remains the worst in motor racing history.

Following this accident NOJ 393 was impounded by police. Its release was only secured by DHMCo after 18 months and following the conclusion of the enquiry. The driver of NOJ 393, Lance Macklin, was exonerated from all blame. Following the car's return to DHMCo at Warwick it was repaired and sold into private hands. From there its racing career continued on British circuits until late 1964, at which point it was retired and essentially stored.

The Bonhams sale catalogue referenced provided further detail including, after disposal by the Works, the subsequent racing in private hands.

RESTORATION

Dismantling

The new owner entrusted the restoration of NOJ 393 to Marsh Classic Restorations Pty Ltd., located in Bacchus Marsh, Victoria, Australia. The principal of this company is Steve Pike and Steve oversaw and was directly involved in all aspects of the work. Marsh Classic has specialised in the restoration of Austin-Healey 100S motor cars for many years.

Following the sale in December 2011, NOJ 393 was air-freighted to Melbourne, Australia, arriving on 16 March 2012. The restoration commenced in late April 2012 following careful inspection and consultation between Steve Pike, Marsh Classic principal, and Joe Jarick, Austin Healey Special Test Car and 100S authority.

Over a number of weeks NOJ 393 was dismantled down to its bare chassis platform carefully documenting and photographing components and their condition. The chassis and substructures were found to be in excellent condition with essentially only surface rust. The only chassis section replaced was the bottom of the front cross member, entirely usual in most Austin-Healeys due to lifting jack damage during the car life.

Initial Assessment

As NOJ 393 presented it was painted deep metallic blue with a light gold flash, gold wheels and silver on the inner panels and underneath the car. The interior was dark blue with a vented 100S style seat for the driver and a 'standard' style Austin-Healey 100 seat fitted on the passenger side. Outwardly, the Healey looked complete but decidedly down at heel, this primarily being due to it being stored for decades in a range of situations.

The mismatching of trim and panels appeared to be at odds with the usual standard of DHMC presentation. However, considering NOJ 393 was returned to Healeys some six months after the launch of the new 100-Six model, it was quickly repaired and sold.

A combination of issues would support DHMCo moving this car on quickly. Not the least being the completion program was now six-cylinder based plus demand as an ex-works race car, usually keenly sought when they came on the market. However, there was a lack of availability of the correct gauge alloy panels for extensive repairs to the left side, so steel panels were used. Would the first private owner David Buxton, have cared if panels on the right were alloy and the panels on the left were steel? Most unlikely...

In terms of the desirability of a Works 100S in early 1957 when the team cars were sold, they had a solid record of goods results, Moss/Macklin at 1955 Sebring, Abecassis in the 1955 Mille Miglia, for example. With regard to NOJ 393 in particular, apart from having competed over three seasons, its respectable lap speeds at Le Mans supported any performance claims. It is worth noting that rather than DHMCo hiding NOJ 393's history, every private owner appeared to know relatively intimately its race history, supported by a number of letters from previous owners.

A detailed initial inspection was undertaken and whilst the chassis had apparent surface rust, it appeared straight and in generally good condition. The surface rust could be attributed to the Healey having been largely stored since the Sixties with no attempt at conservation. Similarly, the subframes showed only minor indication of corrosion. Consensus was that despite its trials and tribulations, the chassis and subframes were in very good condition and would be treated and retained with minor repair only.

It was generally believed that the engine had been seized since prior to Jack's Scott's purchase in 1969 and this proved to be true. To assist in freeing up the engine the spark plugs were removed and diesel fuel filled the bores and left for a week.

The rare alloy ‘angle face’ cylinder head was removed and appeared to be in very good condition showing no evidence of damage. The pistons and connecting rods were carefully removed, the former coming free from the bores without damage.

Various areas on each body panel were sanded through the blue to reveal the spruce green exterior paint colour, the colour in which the car ran at Le Mans in 1955. At that time a similar attempt was made to determine the original colour on areas within the inner wheel arches without conclusion as to that finish.

Joe Jarick, the appointed historical and technical advisor for this restoration, flew from Brisbane to Melbourne for a joint inspection in late April 2012. A report was developed including key issues requiring special treatment, further research and a list compiled of items requiring resolution.

This inspection was undertaken prior to the last time NOJ 393 was displayed in its ‘barn find’ condition. On Sunday 29th April NOJ 393 was displayed at the Victorian Austin-Healey Club stand at the RACV Motorfest British/European day at Flemington in Melbourne. Over 1,000 classic cars, including approximately 82 Austin-Healeys attended this event, NOJ 393 being one of the ‘stars’ of the show.

Monday 30th April the dismantling of NOJ 393 commenced in earnest with the bonnet and boot had the frames removed, frames media blasted and etch primed. From there the inside of bonnet and boot panels were paint stripped. The boot lid showed signs of the light metallic green while the bonnet was painted spruce green inside and out. The 20 gallon fuel tank lines were undone and the tank straps removed, followed by a rather reluctant fuel tank.

The interior seats were removed noting the driver’s side was directly bolted to the floor. Hinges on the floor indicated the seat may have been hinged at some time in the past. The seat base had four enlarged holes that matched the floor hinges. Curiously, when fixed to the hinges this seat was located very close to the tunnel which may have been relevant to one of the earlier gearboxes, the FX3 Taxi or DB S340 gearboxes.

On the passenger side of the Healey, the passenger seat was also affixed directly to the floor, unlike the normal production 100S which was hinged from the front to allow tilting forward to access the spare wheel. The seat base and back rest was made of alloy, the back rest being hinged to the base identical to a ‘standard’ Austin-Healey 100, in that way making the spare wheel accessible.

The gearbox tunnel and facing panel were removed, noting that the tunnel cover was painted light metallic green over the aluminium, and had green vinyl covering that had been over painted blue.

The radiator fitted was a ‘stock’ 100S type and this was removed along with the generator and two bladed fan, the latter tending to be used on with the earlier Special Test Cars.

The chassis around the rear of the gearbox shows evidence of three different gearbox mounts, the first 1953 with the FX3 Taxi gearbox, then 1954 with DB S340 gearbox where to facilitate the Plessey pump take-off there is a cut-out in the top of the chassis rail. The third being the 1955 mount, currently fitted, Austin Type ‘C’ non-overdrive gearbox, as fitted to a production 100S. (See photo No. 4)

The 100S engine and Austin Type ‘C’ gearbox were removed as a unit. The engine had been painted gold, similar to the colour of the body side flash and wheels. There were signs of light green paint on the engine mounts and dark green on the distributor pedestal.

The engine mount rubbers were unusual; being a rubber sandwiched in steel but curved over at the top, obviating the need for a separate buffer rubber. This was potentially a prototype configuration with the later ‘production’ two piece engine mount utilising a separate buffer on top being both easier to service and likely more economical in manufacture.

The clutch pressure plate was a 10 spring type and the clutch plate appeared to be near new. The flywheel was noted to be different as the centre was not machined out like later 100S. This different centre facilitated use of either the earlier gearboxes. The gearbox is number 1013 and it showed signs of oil leaking from rear seal.

Body dismantling

The headlights and park lights were removed and at this point it was found that the grille was not bolted into the shroud. Fortunately it was a tight fit and did not fall out in transit.

Dismantling continued with removal of the rear mudguards. The alloy vertical trim plates and door strikers were removed. Under the right trim plate was the Docker light metallic green paint (Healey Ice Green). A small amount of this light green was also on the left door shut face. A substantial amount of body deadener had been applied over the internal seams inside the boot.

Consistent with the 1953 Special Test Car specification, the alloy body panels were of 1.2mm thickness, between 16-17 gauge, as opposed to the 1.6mm used in the alloy of standard Austin-Healeys. For this reason, all three steel left hands panels would need to be hand-made in keeping with the brief to return NOJ 393 to its Le Mans specification.

Following the removal of the right alloy mudguard paint stripping commenced. As the boot lid was partly stripped the base colour revealed was the light metallic green, covered by primer and then Spruce green as prepared for Le Mans in 1955. This in turn was covered by light metallic blue and then dark blue being the last top colour.

As the top paint coats were stripped off, light metallic green was also noted on right rear mudguard area, below the swage line the green base was followed by white and then gold top colour. The left rear steel mudguard will be left as removed as it will not be reused in the restoration for the reason previously mentioned.

At that point, the rear shroud was removed, again revealing the light green on inside of the panel. The rear subframes are built up alloy prototype rather than production pressings. This would appear to indicate that the significant rear three quarter damage as a result of the accident was relatively easily repaired once the outer panels were removed as there was no attempt to repair with ‘standard’ rear scuttle panelling. The boot floor incorporated an overlap join panel across the rear further suggesting a relatively easy fix for the rear end damage.

The fuel tank as fitted was of the 100S style, 20 gallon capacity in steel with internal 3 inch quick release Enots Aston filler cap. Clearly, the Marston flexible bag fuel tank was damaged in the accident, but not pierced, it was not considered as a replacement item during repair. No other Marston tanks remained fitted to Special Test Cars at the time of disposal. The two fuel outlet pipes were in a different location to the production 100S tank indicating an ‘off the shelf’ 100S tank was either not used or would have been required to be modified.

The left hand door was steel and so it also would not be refitted in the restoration. Due to the accident damage the boot lid was a necessary replacement and the light metallic green base paint on its exterior was an interesting discovery. As it was the base colour that suggests the replacement boot lid was likely to have come from one of the 1953 Special Test Cars. These Healeys ran the same colour, but with no external fuel filler cap.

The boot area behind the fuel tank was painted light green, silver paint covered the rest of the boot area indicating this had been repainted at a later time with the fuel tank left in place. The silver underside painting to the boot lid would likely have occurred for two reasons, one to cover the light metallic green, the inner panel colour at time the Healey was painted blue and second, to bring it in line with the production 100S finish. Entirely appropriate for when NOJ 393 was sold off in March 1957 following the completion of repairs.

The overwhelming presence of the light metallic green colour noted during dismantling is consistent with NOJ 393 being a 1953 Special Test Car through 1954 and confirms the chassis and internal body panels should be painted in the light metallic Docker green colour. Once the light metallic green has been painted, the external body will be masked off and painted in spruce green as per Geoff Healey’s memo of instruction to workshop staff, dated May 20th 1955, just three weeks out from the Le Mans race date.

From there the removal of left front mudguard and then right front mudguard were undertaken. The left front mudguard was steel and fabricated in two sections and then welded over the wheel arch. The right front mudguard was alloy and showed signs of the light green paint. With these removed access to the front shroud and under bonnet detail became easier.

It was found the bonnet ‘hold down’ hook base on left side had three alloy packing pieces, one had been cut from a piece of alloy and painted in the light metallic green. This gave an excellent source for a match to the correct paint colour. On the right hand side there were no packing pieces present.

The front shroud had been cut below the grille and the area knocked in to allow cooler air to flow directly onto the Tecelamit combined oil cooler and filter. Originally the Healey was fitted with an alloy sheet air scoop below the nose to duct air up onto the cooler, but these tended to be quickly discarded as they severely restricted access for servicing. While this ‘slot’ modification for the oil cooler was a feature of many 100S including the 1956

Sebring Works 100S, this was not a feature of NOJ 393's Le Mans specification for 1955. Consequently, the 'slot' will require reinstatement during the restoration. The oil cooler had its fins ground down at the front to allow sufficient clearance between the brackets for earlier design oil cooler. These brackets had been removed.

The oil cooler was removed and it was found that both oil lines are that same type as the production 100S. The direction of oil flow is from the lower right hand side of the engine block, bottom outlet pipe, to the front of the oil cooler, pumping from the outside cavity, through the filter into the centre of the cooler. From there the filtered oil flows through the pipe fixed to the coolers right side and via that pipe it is taken back to the side of the engine block, through the top union.

With the right hand alloy mudguard removed the door hinge mounts were found to be cracked and the door needing substantial repair. Here again there were signs of the light green paint.

The differential was removed as a unit and it was noted there was a considerable amount of light surface rust that caused some difficulties in disassembly of all the ancillary components.

From there the differential housing was removed as a complete unit with the shock absorbers still attached as they were reluctant to let go. Based on that experience it was anticipated it would take a lot of heat on the bolts to remove the brakes parts. Unusually, it was noted that the buffer rubbers under the differential were welded to the chassis, where in production Austin-Healeys each buffer is fixed to the top of the chassis rail by two ¼ inch bolts.

The front and rear subframes are alloy and consist with the intricate built up assembly used with the small number of pre-production cars. The production Austin-Healey 100 utilised large pressings from sheet alloy.

A recess had been created in the rear bulkhead behind the driver and the crude nature of the work indicated a later modification in an attempt to either achieve more leg room or tilt the driver's seat back.

There were tonneau turnbuckles around the tunnel opening and this may have been a quick release tunnel for access to the gearbox, pedals, brake booster and associated parts in the engine bay.

The front bump rubbers were noted to be different from standard and the steering had welded in spacers however, the idler utilised the standard alloy spacer. The front springs are 10 inches free length with eight coils, 0.550 Inch (14 mm) wire diameter. Two 1/8 inch nylon type spacers were fitted in each side. The sway bar was held on with 5/16 inch BSF bolts, whereas production cars are UNF. The shocker absorbers had no arm resistance and will be reconditioned.

More evidence of the light metallic green paint on the front left wheel arch was found. The wiring loom runs over the when arch and all is coated in silver paint, when the loom is moved the green paint is evident. This confirms the view that the silver painting has occurred later.
In this Healey there are lots of cheese head screws used to hold wiring clips, with virtually no phillips head screws present.

The dashboard and wiring, the underfloor heat shield, driver's footwell, pedals, and linkages and other sundry brackets were then removed. The pedal assembly is clearly prototype, same for the accelerator pedal, with the swivel brackets being very basic. The fresh air box mounted to the firewall had no flap valve fitted inside and there appeared to be no reason for this.

The fuel line was easily removed as was the master cylinder and brake lines. The master cylinder is alloy and may have been a replacement. The brake booster was also removed and there is no evidence to suggest it was anything other than a later addition. The regulator and fuel box were removed and most of the screws holding the electrical and wiring to the firewall had to be drilled. Some of these were brass cheese head screws.

At this point the chassis was sprayed with truck wash and then a pressure wash was used to clean the chassis and subframes in preparation for further disassembly work.

The silver paint in the engine bay has been applied with the wiring and suspension in place and there has been little effort to protect the wiring and suspension from overspray. Paint stripper was applied to the remaining body panels to remove the various coats of paint and in places, filler.

All the suspension and steering assemblies were dismantled and cleaned in preparation for reconditioning. The shock absorbers were stripped and cleaned with a glass bead blast which provided a fine clean finish. The steering arms were dismantled and the rubber boots removed and ball joints cleaned for inspection. The steering and idler sector shafts were removed with pullers and these came free without the use of heat.

The front rear shroud had paint stripper applied and then scraped. Further coats of paint stripper were applied before washing off with water. The sidescreen sockets in the right hand door proved difficult to unscrew.

The Austin-Healey wings were fixed to the front shroud with glue on the studs. During stripping the front shroud showed signs of a 30 mm wide red painted band around the grille oval opening. The spruce green paint was evident under the blue paint on both shrouds. Also noted was that the left front guard flash was made as a solid casting, where the right side was the standard casting. The front guard has also been cleaned with 240 grit sanding and there was a lot of cleaning required on the inside of panels. Over fourteen litres of paint stripper were used up until the time the panels were ready for repair and panelling.

Reassembly

As the Healey was reduced to the bare chassis platform, one of the earliest ‘smooth’ 100 chassis, the development stages could be clearly seen. (See Photo No. 1a). For example, evidence of three different sets of gearbox mountings, including the chassis rail cut-out for the Plessey hydraulic pump attachment. This pump was tried as a way of improving brake efficiency. The original FX3 Taxi gearbox, the David Brown S340 and then the Austin Type ‘C’ gearbox. (See photo No. 4)

Continuing with the development role several brackets and attachments had the very much ‘after the fact’ look compared to an original chassis work with some welding not to the standard of welding at the manufacturing phase. A number of brackets had been welded on and taken off such as the oil cooler brackets and rear jacking points. The front jacking points had received the usual 100S graunching due to exposure to low gutters and potholes and would require reinstatement.

A month later the engine was completely dismantled. Though it had been seized it was found to be in surprisingly good condition. On investigation the camshaft numbers matched the dynometer sheet for NOJ 393’s engine as referenced on page 79 in Geoff Healey’s book ”The Healey Story” (See photo No. 9).

The suspension and brake parts were also cleaned, media blasted and prepared for finishing and painting. The original wiring loom had been messed with quite badly and this was sent to a local company, Vintage Wiring Harness, for them to replicate.

Inspection of the cylinder block revealed that the block was stamped 261BN and had been sleeved with chrome bores. The bore was 3.437 inches and as the motor sat the compression ratio was 9.44 to 1. Main bearings were standard and big end bearings were .030 undersize on 100S. The camshaft was stamped 9D 6324 and dated 10/4/54 ME, for Morris Engines who would usually prepare the race engines for the Donald Healey Motor Company. The camshaft Journal sizes were standard. The head gasket was a standard 100S copper/steel and stamped ‘Coopers .040 thick’ with a cylinder capacity of approx 9 cc.

The cylinder head, stamped to the front SPL 261BN, fitted is one of the rare aluminium angle face type, casting number 9D 5569. The average cylinder capacity measured 70cc. Spark Plugs installed were Champion N8. The inlet valve head Diameter was 1.750 Inches and the exhaust, 1.625 Inches. Port diameter was 1.5 Inches.

The crankshaft number is 1b1456 e7472 and it weighs 23 kilograms. A crankshaft spacer ring was fitted in the rear recess. The connecting rods are standard 100S, with fully floating gudgeon pins and are polished. The pistons fitted were flat top with three rings above the gudgeon. The flywheel weighs 13 kilograms and has a machined centre housing which may have been used to run a bearing for the DB S430 gearbox input shaft or the Taxi gearbox. A 12 spring pressure plate with 10 inch clutch plate was fitted.

Geoff Healey on page 179 of his book, “The Healey Story” included a copy of the dynometer test sheet record for the 1955 Le Mans 100S engine SPL261BN (for NOJ 393) indicated that it developed 140 Horsepower at 5000 rpm. This engine was running a 9.48:1 compression ratio and utilised a long period camshaft, part number 9D6324, with the following timing;

Inlet opens 30 deg BTDC EXH opens 60 Deg BBDC
Inlet closes 60 deg ABDC EXH closes 30 Deg ATDC for a 270 degree period with lift of 0.435 inch. The tappets are standard 100S as are the pushrods and cam followers. However the tappet cover has the enlarged petrol filler cap fitted, it has a wire locking tab brazed to the top.

Inlet Manifolds 9D 5599 are angled back to horizontal currently fitted with H6 carburettors. The cold air box is original with the rear end enclosed. Some cracks were evident and repaired.

Repair and paint
With the paint now removed, repair work commenced on the panels.

The owner's brief was to return NOJ 393 to its start line specification for the 1955 Le Mans 24 Hour Race. This brief included some minor post scrutineering modifications required. The detail provided below documents what was not retained of the vehicle as presented at the Bonhams sale in December 2011. In the main this related to the steel replacement panels used during the post-accident repairs.

Wheels: The wheels fitted for the 1955 Le Mans race were 54 spoke Dunlop wire wheels. Only one 54 spoke Dunlop wire wheel was present on NOJ 393 at the time of sale. New wheels were sourced in the UK from Turrino and these have been fitted with new 600L 15 Dunlop race tyres.

Steering: The original steering box, idler and steering arms re-conditioned and re-used. The original wood rim duralium steering wheel has been carefully refurbished ensuring its patina was retained.

Suspension: Front wishbone arms, springs and lower spring plates were reused. Front shock absorbers were reconditioned and the front sway bar and links replaced with 20 mm sway bar. In the interest of safety and racing, new front stub axles supplied by Dennis Welch and new kingpins fitted. Additionally, new front splined hubs and bearings were fitted in interest of safety for racing. The original rear springs dismantled, cleaned and re-assembled while the rear shock absorbers were re-conditioned and re-fitted.

Differential: The original differential banjo was quite rust pitted but was repaired and re-used as were the original hubs and original road axles following inspection. New rear splined hubs were also fitted in the interest of safety for racing. The original 2.9:1 ratio differential as fitted was re-built with new bearings and re-fitted.

Gearbox: The Austin 'C' Type gearbox, number 1013, was dismantled and was found to be in good condition. New bearings and seals and a gasket set fitted. A new brass bush was fitted in the rear gearbox housing.

Combined oil cooler and filter: The Tecalemit combined oil cooler/filter was cleaned and re-fitted with a new filter. New oil cooler lines have been fitted with the original banjo bolts re-used.

Engine block: The original engine block was dismantled and re-conditioned. New cylinder liners were fitted along with 88 mm Omega forged pistons. The original camshaft was profiled and re-ground to same specification and heat treated with new camshaft followers fitted. New engine bearings were fitted along with a new Roll master timing gear set. For greater reliability when racing a billet crankshaft and connecting rods were fitted.

Cylinder head: The original 'angle' face head was re-conditioned and re-fitted, in reconditioning, the compression has been raised slightly from 9.4:1 to 10:1. The original tappet gear and tappet cover have been re-fitted along with the light flywheel and diaphragm pressure plate. As the standard crankshaft pulley was broken, a new standard crank pulley and also a new water pump were fitted.

The original large capacity oil sump was badly dented and had been brazed and required extensive repair. The opportunity was taken to incorporate a modern seal in the front engine plate. The engine was built by M&W Engine Services of Wendouree in Victoria, Australia.

Components removed from the original engine will be incorporated into a usable spare engine and this is in the process of being completed. This engine will use the original crankshaft, connecting rods and pistons, flywheel and clutch, head studs, distributor and pushrods. All these components will be fitted to a converted 100 engine block.

The original 1¾ H6 SU carburettors were re-conditioned and re-fitted to the original inlet manifolds. The alloy cold air box with the car was cleaned, cracks welded, finished and then re-fitted. The original cast exhaust manifold required new studs and to complete the exhaust system, new exhaust pipes and a new muffler have been fitted.

All electrical equipment with the Healey was reconditioned and replaced.

As NOJ 393 ran at Le Mans in 1955 with one of the Works 100S alloy radiators, this was required to be constructed using the only known original alloy radiator as a sample. The radiator top and bottom tanks constructed by David Pike to Marston specs, then assembled into a new alloy core by Race Radiators of Dandenong in Victoria, Australia. Interestingly, the alloy radiator weight is 5kg compared to 11kg for the steel radiator tank. A new old stock 9D fan belt Ferogrip brand number V130, fitted and the original 2 blade alloy fan re-fitted.

Fuel system: The few poor pictures of the original Marston flexible bladder tank could not allow a clear determination of exactly how it was constructed. A considerable amount of research was undertaken including reviewing original correspondence between the Donald Healey Motor Company and Excelsior Marston. However, to achieve a completely authentic result, more research is required to determine exactly what approach to take and what material is available that will allow that to be achieved.

Consistent with the size of the tank fitted for 1955 Le Mans, a new 36 gallon alloy fuel tank was constructed by David Pike. The twin outlet pipes on the underside are connected to two new SU LSC fuel pumps. The low outlet picks up 10mm up from the bottom of the tank outlet sump, the high outlet picks up is 82mm up from bottom of fuel outlet sump. When fuel is exhausted on the high outlet, a switch on the dash and green indicator light illuminates when switched to the low pump where approximately 6 gallons of fuel is left for continued running up to approximately 75 miles. The original Enots fuel filler cap was carefully cleaned and re-used.

The fuel lines are made from 3/8 copper nickel tube bent to the original specifications. A new old stock genuine 100S Petroflex fuel-line was fitted in the engine bay. All the original brass “T” pieces were re-used.

Brakes: New discs were fitted along with the original callipers and calliper brackets. The calliper piston housings were re-sleeved in stainless steel. All original pistons re-used and were fitted with new rubber seals. The brake lines were remade from copper nickel tube. A new alloy master cylinder was fitted being the same type as that removed from the car, which was a replacement. New brake pads were glued to original backings and the retractor pins cleaned and re- fitted. The brake fluid used in the brake system is Dot 4.

Dash and Instruments: As presented the dashboard was a one piece pressed alloy panel, as used from body number 1855. Close inspection of the Le Mans photos showed that a two piece dashboard of the very early type was actually fitted, where the instrument nacelle was separate and cast in aluminium. In keeping with the brief to return the car to its 1955 Le Mans specification, an original two piece dashboard was sourced. The original one piece dash was repaired for return to the owner.

All the instruments were sent to Lionel Otto Instruments in Brisbane, Australia. The original faces were cleaned, gauges made functional, rims re-chromed. An additional dashboard mounted ammeter gauge and oil temp gauge holder was made up by David Pike, consistent with how the car was presented for Le Mans in 1955. The dashboard layout was copied from a very clear photograph of this Healey taken at Le Mans in 1955, to complete the dashboard, some new old stock switches were sourced and installed to complement the special Works only switches.

Wiring: The original wiring loom was sent to Vintage Wiring Harness located in Ringwood North, Victoria Australia, for interpretation and re-manufacture. As with their special build competition cars, Donald Healey Motor Company arranged for this wiring harness to originally be completed by Lucas Competition department at DHMCo's Warwick premises.
Vintage Wiring made a new loom using the lacquer braided wire, wrapped in a plastic tube. The RB310 regulator was cleaned, tested and re-fitted. The original RB 4 fuse block was cleaned and re-fitted. New old stock park light assemblies were sourced and fitted along with new old stock number plate and boot number/roundal lights. A new battery tray was made along with a new passenger footwell cover in alloy was made by David Pike of Marsh Classic.

The original headlight buckets were cleaned, painted and re-fitted and new Lucas ‘Le Mans 24’ lights and headlight rims fitted.

Chassis: Commencing 30 April 2012 the external bodywork and subassemblies were stripped from the chassis to the stage where the original chassis was stripped to the basic platform. Following careful inspection and assessment of the issues the bottom of front cross- member was replaced. The front jacking mounts, allow both wheels to be lifted together using the racing jack supplied new, on a 100S are vulnerable to damage on gutters.

On this Healey the situation was no different and so the front jacking mounts needed to be re-constructed.

Importantly, no attempt was made to clean up the original welding which looks poor in places primarily due to the development nature of this Healeys specification, rather than the primary build quality. Moving into the cockpit, the steel and alloy cockpit floors were replaced and on the rear sub-frames the boot floor was replaced. Curiously, the rear bulkhead vertical panel behind driver's seat had been cut out in an attempt to provide more room in the cockpit so this panel was reinstated. The left flat wheel arch panel had been joined likely as a partial post accident repair and so this was replaced.

The front sub-frame had the driver's front footwell panel replaced at the same time a lot of extra holes were welded, these tended to crack even with light use. For safety in racing the firewall panel was retained intact and covered with one piece of 1 mm alloy sheet instead of many small pieces to cover extra holes. The original firewall was retained as were the small over pieces. The front wheel arches were dismantled and lots of holes repaired and then re-assembled with new rivets. Sub-frames were primed and re-fitted with new alloy rivets where necessary.

Noting the weights of the different components;

- the chassis platform weighed 85 Kg
- the front sub-frame assembly weighed 15 Kg
- the rear sub-frame assembly weighed 15 Kg.

Consistent with the external body panels the sub-frames were fabricated from 1.2mm alloy where the alloy used on production cars was 1.6mm, resulting in considerable weight saving across the car.

Body: In the post-accident repair completed by DHMCo steel panels were used down the entire left side of the car as no replacement alloy panels were available of suitable gauge. Consistent with the owner's brief, the steel left front mudguard, rear mudguard and door were removed. New alloy mudguards made from 1.2 mm alloy sheet and these were patterned from the right side panels, shaped and wheeled by Colin Cass of Marsh Classic. The alloy left door frame, skin and door mechanism was patterned from the right door and made up by David Pike of Marsh Classic.

Due to damage the original front shroud required the bottom section below the grill to be re-placed. The original bonnet and its frame were re- used and the rear shroud had the tail light area redone to match the cars 1953 specification. The boot lid and the frame removed and the handle area finished to the cars 1953 Special Test Specification. To finish the boot lid, the hole for the fuel filler was identified and cut, the 1953/4/5 boot lid being lost in the Le Mans accident.

The alloy right hand front and rear mudguards had extensive re-working and were both retained. The right hand side door required a new skin to be fitted and the frame was retained. The original door sills were repaired and refitted. The entire body was prepared to a file finish prior to painting.

The individual body panel weights in primer were as follows;
- front shroud 12 KG;
- bonnet 4 kg
- bonnet frame 2 KG;
- front Guard 3.5 kg;
- door 5 kg;
- door Sill 1 kg
- rear Shroud 10 kg
- rear mudguard 3 kg.
- boot Lid 4 kg

The total weight of panels being 57 Kg.

The original door locks and strikers were like new and were inspected and re-fitted. The original alloy door trim plates were cleaned with phosphoric acid and re-fitted. Similarly, the original front air ducts were repaired, painted and re-fitted as were the door check straps. The alloy cockpit surrounds were repaired, rubbed with fine wet and dry paper, polished then anodised. The front surround and right door are original and stamped with factory number while the left hand door and rear alloy surround were replaced after the Le Mans accident.

Aeroscreen: As presented, the alloy aeroscreen fitted was different to the one used at Le Mans in 1955, photos clearly showing the later 'AH' type was actually fitted. However, the earlier type currently in place, identical except for the raised 'AH' capitals cast in the face, is a very rare item indeed as only a small number were fitted to the 1953 Special Test Cars On that basis the decision was made to retain the early non-badged aeroscreen. This aeroscreen was dismantled, cleaned and fully refurbished with new laminated glass cut from an Austin-Healey 100 windscreen, bevelled and fitted.

The curved perspex screen that provides additional protection was in poor condition and so a new screen frame was made, with new perspex and this assembled unit was fitted to the car. The original being returned to the owner in the event this may be refitted to NOJ 393 at some time in the future.

The original firewall identification plate and chassis number plate, the latter located on the right hand support brace, were cleaned and refitted. No attempt made to restore these original plates or alter the patina.

Painting of body: The bare panels were chemically cleaned and primed with a two pack etch primer filler, this was blocked then re-primed with polyester. This was then blocked, re done and blocked again and then primed. The panels were then removed from chassis and prepared inside. Further blocking and preparation and painted as original in light metallic green, then over painted in Spruce green. The body was then cut and polished. The lightness of the 1.2mm alloy panels added significantly to the difficulty in blocking down.

Painting of Chassis: The chassis was prepared, caulked then primed and blocked. The entire chassis was painted in light metallic green from a sample matched from original paint on right hand door shut face and checked with other areas including the bonnet hold packing piece. The chassis was masked off for painting the cockpit and boot area in spruce green, again matched from a period sample. Spruce Green being the colour this Healey appeared in its last entry for the works at 1955 Le Mans. The body was assembled on chassis and at that time new stainless guard piping was fitted.

Trimming: Period pictures of Le Mans 1955 do not show a passenger seat back. From this we concluded the passenger seat to not be of the 100S style with affixed back, but rather of the standard 100 type with the back pivoting forward out of sight. Unusually, the original passenger seat had an alloy base and back suggesting it was intended to see little use as Lance Macklin's preference was not to carry a co-driver. This was recovered in leather and re-fitted to the car.

The original driver's seat was of the fixed back 100S style, however this seat fitted on the driver's side it was actually a passenger seat. This seat is being returned to the owner untouched. A new 100S style driver's seat was supplied by Marsh Classic and recovered in green leather with white piping. David Pike made the tonneau fixing at the front passenger side from period pictures that allowed full coverage of the passenger side with no opportunity for it to come adrift at the front. Tim Ward of Sports and Specialist Trimming in Melbourne made the leathers seats and interior trim and tonneau.

Jamie Hine from Hine signs studied the period pictures of the car and felt the numbers would have been painted, not vinyl stickers. Jamie hand brush painted the circles, numbers and letters in proportion, placement and size of the pictures provided.

Re-conditioning of the suspension, brakes, steering, wiring fit up, engine final assembly, gearbox and differential re-conditioning fitting up and testing carried out by Steve Pike with David Pike assisting with assembly.

The majority of the many hours of work relates to the chassis, sub- frame and body repairs in order to save and restore as many original parts as opposed to replacement. The work involved in fabricating the new alloy front guards in 1.2 alloy and making the new door and door skins were time consuming when compared to fitting reproduction 1.6 mm panels made in the UK.

The painting process was challenging as the lighter gauge panels needed supporting on the inside when blocking the primers and paint. The chassis and body repairs were completed on February 8th 2013. The painting and final assembly being completed on March 26th 2013.
NOJ393 was delivered to Melbourne Airport that day for export on Wednesday March 27th 2013.

More than 1,000 pictures were taken during the restoration.

Joe Jarick with thanks to Steve Pike
April, 2013

NOJ-393 December 2011


NGJ 3


281 EN

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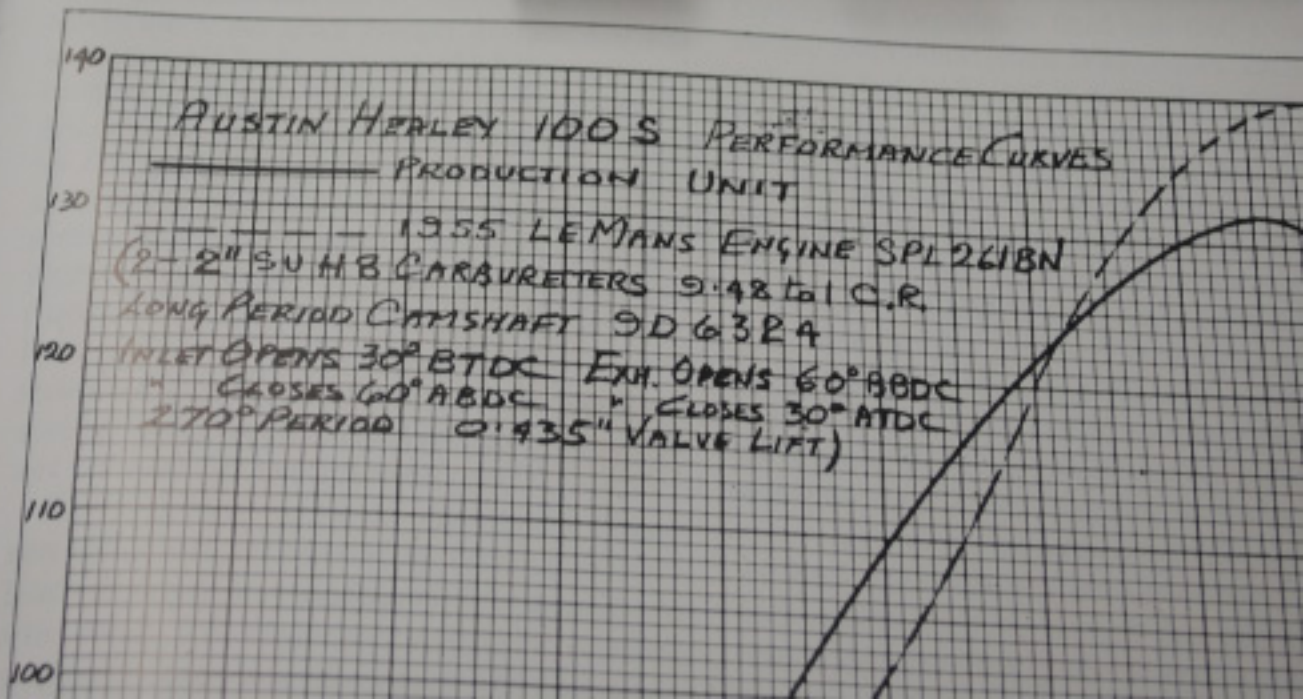
Figure 2: Austin-Healey 100S performance curves.

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