E-type DIY restoration project

part one

The first in a series of articles by member **Mike Davison**, following the 10-year restoration of his 1970 S2 2+2

Where does one start when writing a few words on restoring one's E-type? If in places I seem to be teaching people to suck eggs, please excuse me. Over the last 15-20 years I have embarked on a number of different classic car restorations, as a hobby rather than doing them up specifically to sell. It started with a Mini bought from a friend of my youngest son (Andy). The aim was to build a Mini for both road use and hill climbs, and to rekindle the joy of driving Minis in the '70s. After about two years of working evenings, we ended up with a British Racing Green car fitted with adjustable shocks and camber, 6in Minilites, 45DCOE Weber carb, Kent cam, three-branch big-bore manifold and exhaust, nitrided crank, stage 3 head, oil cooler, electric fan, etc. It did go quite well! After a couple of times out on the road, sadly it was hit by a heavy goods vehicle and written off.

The settlement and sale proceeds of what was left of the Mini funded the purchase of a 1970 Triumph TR6. By this time I was bitten by the restoration bug. After four or five years restoring the TR, the bug bit again in 2005, and a 1966 chrome-bumper MGB GT was next on the restoration list, with a few challenges along the way thanks to previously bodged repairs.

With progress being made on the MG, a year on from buying it, and after watching a TV

E-type DIY restoration project

part two

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With my concerns about the valve seats and unleaded petrol resolved (see Part 1), work continued on the block and head.

The block had now been completely dismantled, which had unfortunately shown the bores to be not quite as good as first thought, as some degradation to the surface of the bores was evident. The pistons had been removed, which revealed a number of the rings to be broken and others to be seized in the piston groves. The crank main and big-end bearings were also suspect. Both the block and crank were sent to a machine shop to await diagnosis. New timing chains, chain guides and dampers were purchased as a matter of course, and a new timing-chain idler sprocket bush was fitted, since it was suspect. Main and big-end bearings would be obtained once the machine shop confirmed the correct crank regrind sizes.

Although the cylinder head looked OK, it too went to a machine shop to be checked over and pressure tested. Initial feedback was that the head was OK, but that the valve guides, and to a lesser extent the valve stems, were worn. In any event, the head was to be skimmed. A decision was taken to purchase new valve guides and circlips, together with a complete set of inlet and exhaust valves.

Something that I never contemplated was a debate over whether valve-guide bores should be knurled rather than replaced. I am more of the 'old school' and thought they should be replaced, either with cast-iron or phosphor bronze items, the latter being more expensive, but generally an improvement on cast-iron. Knurling the guides is an alternative to replacement, but also a practice used by some race-preparation specialists, since the knurling gives the valve-guide bores less surface area resulting in lower friction, allowing for improved lubrication. A downside, however, is that the guides do not last as long. In some quarters, it is seen as a quick fix. Reading various articles it appears to be more common in the US. Taking into account the fact that the car was only going to be used

- Top: Mike's splendid E-type sits proudly on his drive at the conclusion of its restoration
- Above: inspection of the block revealed the bores to be in poor condition, and so the block was sent to a machine shop for diagnosis

• Above: removal of the pistons revealed several broken rings. Eventually, new cast-iron cylinder liners (with standard bore size) were fitted, along with the original cleaned-up pistons and new rings.

• Left: a mixture of new and 'old' parts was used to rebuild the bonnet. The offside wing is seen here, but the nearside wing proved a challenge to align!

for social motoring and not for racing, a decision was made to purchase cast-iron guides.

Pistons and rings are fairly readily available, but again consideration has to be given to the car's end use. Forged, billet or cast pistons? It was not a race engine, so high-spec items were not thought necessary. As it turned out, the machine shop managed to release the piston rings from their grooves, so new pistons would not be required – only a new set of rings.

On detailed inspection of the block, it was evident some of the cylinder liners had dropped. There was also doubt whether, if rebored, they would move again during the machining process. As with the pistons, there were various options, including flanged liners which necessitate the tops of cylinders to be machined to accept the flange on the liner. This method prevents the liner from dropping. What material spec for the liner? The vast majority of liners are made from centrifugal-spun cast-iron, or spun ductile cast-iron, the latter being superior and typically used for race engines. It was considered the best solution in our case would be to replace the liners with non-flanged standard, centrifugal-spun cast-iron items.

The machine-shop work on the engine in total comprised: removing the valve guides and fitting new ones;

lapping in new valves; skimming the cylinder head; removing the cylinder liners, fitting new liners and honing the bores; skimming the top face of the block, together with the timing-chain cover; regrinding the crank main bearings and polishing the big ends.

With all this work completed, the engine was collected from the machine shop ready for reassembly. As mentioned previously, all the pistons were found to be OK, which resulted in a new set of standard piston rings being fitted, with the bores remaining a standard size.

Whilst the engine was away at the local machine shop, work resumed on the bonnet – more specifically trial-fitting it to the bodyshell. Since the bonnet was made up of new and 'old' parts, aligning it proved a task in itself, causing much trial and tribulation, not to mention a few choice words at times, but we eventually got there! The main problem was trying to get the nearside wing to fit correctly, in the end necessitating the sill closing edge

- Top: the bonnet components were sent for painting of their inside surfaces prior to reassembly and trial-fitting of the bonnet
- Above: the lower section of the bonnet assembly awaiting trial-fitting to the other bonnet components...

- Left: ...and now fitted to the bonnet upper section (supported inverted on trestles)...
- Below: ...before turning the assembly over and fitting the wings

to have a strip shaved off. At least the front bumper fitted fairly well!

By the spring of 2014, the shell had gone to the painters for stage one of the finishing process, to have the underside and the inside painted, together with the engine frame. Once complete, the front and rear suspension could be fitted, together with the doors and bonnet. The car was then returned to the paint shop for painting of the bonnet underside and its component parts, prior to complete external painting.

Meanwhile, engine reassembly commenced without any problems.

The rear drive shafts were partly assembled without too much trouble, however the prop shaft proved to be a headache! The new universal joints (UJs) did not fit, albeit they were the correct ones for the year/model, which led one to think that the prop shaft was not OEM. The search commenced for UJs that would fit.

New wheel bearings were fitted to the front and rear hubs, and Polybush components were fitted to the front and rear anti-roll bar drop-links, together with the upper and lower front and rear fulcrum blocks. Polybushes were also used for the front and rear anti-roll bar 'D' bushes.

At this stage, the front upper and lower wishbones had been trial-assembled, and the front stub-axle carriers had been fitted with new lower ball joints. These, however, were

- Above: the bonnet assembly, with bumper in place, trial-fitted to the shell
- Right and below: the shell was returned to the paint shop to be primed prior to final painting. The restoration was well on its way!

upgraded to the sealed type, as used on XJs, which meant removing the lower ball-pin spigot from the carrier to allow the XJ version to fit, still using the original bolting. New disc dust shields were fitted, and new upper balljoints would be fitted when the whole assembly was attached to the front suspension.

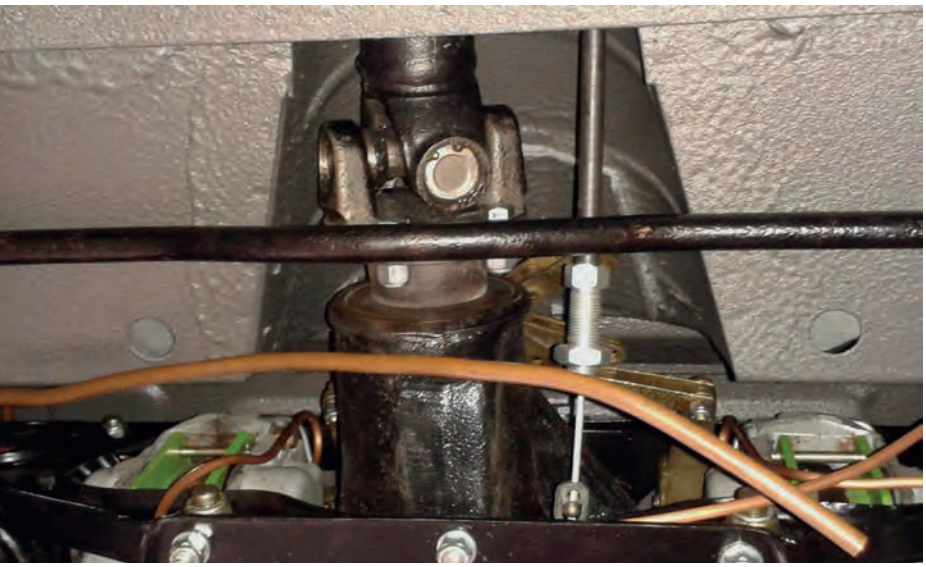
The front brake calipers were reassembled with new stainless-steel pistons and seals. Kevlar brake pads were fitted in preference to standard friction material. The brake components (with new discs), hubs and hub carriers were then assembled.

Assembly of the rear suspension was a somewhat more lengthy process.

The drive shafts were trial-assembled to the hubs to ascertain the required thickness for the hub spacer. The outer-fulcrum shafts were trial-assembled to the hub carriers, again to establish required shim thicknesses. The current outer-fulcrum repair kits utilise one long spacer tube, rather than two shorter tubes used in the early days.

The inner-fulcrum-shaft bearings were fitted with the shafts trial-assembled with the lower wishbones.

Both rear brake calipers were reassembled, again with new seals and stainless-steel pistons. As luck would have it, one caliper was found to be an E-type item, while the origin of the other was yet to be determined – possibly an XJ6 Series 3 or XJS. Not having previously owned an E-type,



- Top left: the shell was primed inside and out
- Above left: after initial problems, new prop-shaft universal joints were fitted
- Left: replacement Polybush components were fitted to the anti-roll-bar drop links
- Top and above: engine reassembly commenced without any problems, both the bottom-end and cylinder head going together smoothly

this was not immediately apparent when they were stripped some three to four years previously! After carrying out some research it became apparent that E-types could be fitted with either type. The principle difference is the outer dust seal for the pistons – the E-type version locates into a groove within the piston bore, whereas the XJ6 Series 3 or XJS type is located on an external collar. The piston dimensions, however, are the same. Rather than be faced with possible problems in the future, a replacement caliper was sourced to match the E-type version.

The various parts comprising the handbrake system were reassembled with mostly new parts and fitted to the calipers. Standard brake linings were used for the handbrake, whereas Kevlar pads were used for the main rear brakes.

The earlier hiccup concerning the prop-shaft UJs was resolved with the assistance of GKN, and the prop shaft was then reassembled with its new UJs and a new gaiter. I'm not quite sure what the previous owner was up to all those years ago!

Meanwhile, reassembly of the rear subframe

was progressing. I took the decision to scrap the old shock absorbers and springs some years previously. New GAZ adjustable shocks were fitted, together with new springs. New subframe mounts were also fitted.

At this stage (the summer of 2015), work on the front seats had also started. The covers were removed, only to reveal disintegrated seat and headrest foams, together with what was left of the diaphragms, which I suppose considering their age was only to be expected. New covers, foams, etc, would be purchased later. The seat-base frames were somewhat rusty, as were the reclining mechanism and seat runners. These would be refurbished, and new parts obtained aas necessary

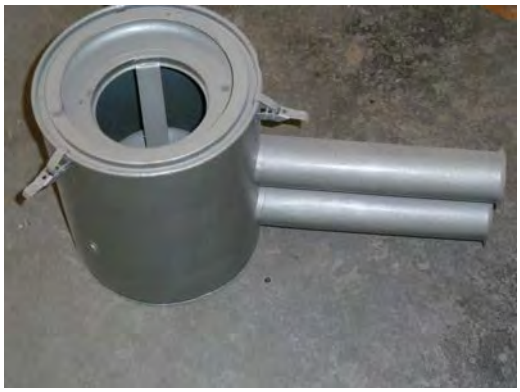
- Above left: The front upper and lower wishbone components were trial-assembled...
- Far left and left: ...along with the rear hubs and drive-shaft assemblies
- Bottom left: the rear calipers, complete with handbrake components, were reassembled using new seals and stainless-steel pistons. A replacement caliper was sourced to match the existing single E-type unit
- Below and bottom right: the front seats required substantial work. The covers were removed to reveal disintegrated foam and perished diaphragms, and the seat-base frames were rusty, as can be seen here

- Left: Mike's splendid E-type sits proudly on his drive at the conclusion of its restoration
- Below left: this series of photographs shows the car in its 'as sold' condition in Scotland before its move to County Durham for restoration. The bonnet had been removed and the interior (with the exception of the dashboard) had been stripped out of the body shell. Note the non-original six-branch exhaust manifold and the modified brake servo location. Among other components, the windscreen were alternator are missing
- Right, clockwise from top left: the poor condition of the boot floor can clearly be seen; the left-hand door showed signs of corrosion and previous repairs; the right-hand door frame was also badly corroded; with the fuel tank removed, the poor condition of the left-hand-side boot floor was revealed; the right-hand rear wheel arch with the sill removed, exposing more damage; the left-hand rear suspension would need attention and once again corrosion had taken hold; stripping of the left-hand door revealed more corrosion in the frame

programme on the world's most beautiful cars, the Jaguar E-type came onto the scene. I could not find an affordable E-type to restore until I found a 'cheap' one in *AutoTrader* which was located in Scotland. A trip to Ayrshire ensued, to discover that the car – a 1970 S2, 2+2 – was a rolling chassis, in primer, full of rust, but completely stripped of trim internally and alleged to have been in dry storage for some 20 years. It was a one-owner car with about 43K miles on the clock. We were assured all the bits were there, but were they? Should I or shouldn't I buy it? It was obvious that some serious work would be required to the floor, doors, bonnet and rear end, not mention mechanicals. (A quick check was done on some prices for spares, etc, in relation to the potential value when finished.)

Many people would have left it well alone, but nothing much put me off, having successfully restored the TR and MGB, so a deal was eventually struck, and about three months later we brought the car down to Egglescliffe, County Durham. Going down this route may seem daft to some people, but we had a good idea of what we getting into, as you hear so many tales about a fantastic-looking E-type being bought for thousands of pounds, only for the new owner to find it full of rot under the carpet or in the boot, or even discovering that it's an S2 when it was supposed to be a Series 1! Meanwhile, it was time for the TR to go, if for no other reason than to start funding the E-type.

The E-type sat on the drive for about three years, under a cover that leaked, while the MGB was finished. The Jaguar only moved into the garage, which had been extended, after the TR had gone and the drive had been block-paved! During this period, a numbers check was carried out with Jaguar Heritage, and a Heritage Certificate issued confirming originality. At the time of purchase, the only document apparently available was the car's V5.



- Above: the rear subframe assembly removed, ready to start work on the rear diff, suspension and brakes. With the rear tonneau panel removed from the body, internal corrosion due to a blocked drip tube can be seen
- Far left: the forward bonnet support frame removed for attention
- Left: the front bulkhead with engine and frame removed. Note the non-original bracket on the left-hand side of the bulkhead
- Far left: the restored differential and rear brake assemblies ready for fitting
- Left: the restored air-filter cannister, with a fresh coat of silver paint

I had previously watched several of Mark Evans's television series on helicopters, MGBs and E-types, and so his DVD on restoring an E-type, together with a Jaguar workshop manual and spares parts book, were procured to provide some background on what we were in for.

A fair amount of research was done on the web, though I found that there are few UK sites – most seem to be in the USA, which of course is where the majority of Jaguar's 80 per cent of export production went. As with other marques of classics, there are plenty of spares suppliers. Some spares were purchased early on: ie, new front wings, front floor pans, bonnet underpan, door skins, fuel tank (the top of the tank looked great, but once removed it was full of holes on the underside), and front windscreen which we knew was missing.

Restoration work started in earnest a couple of years after I'd taken early retirement. You may have gathered by now that it has not always been a one-man operation – two of my sons occasionally lend a hand. Andy has his own local garage – North East Auto Tech – whilst Mark lives in London and takes care of some of the small, fiddly bits.

- Far left: the partially stripped body on a rotisserie prior to shot-blasting
- Left: trial fitting the bonnet, new wings and underpan in July 2014
- Middle far left: the engine and gearbox removed for attention
- Below: removal and inspection of the flywheel revealed scoring

Following a gap of three or four months due to other commitments, work resumed on the restoration.

As one gets further into a restoration, and in my case because an 'affordable' E-type was bought, you have guessed correctly, more parts were found to be missing! What seem like little things at the time – such as alternator mounting bracket, rear door lock, heater duct on the bonnet, carburettor air-distribution box – although not necessarily hard to get hold of, when added up can start to run up costs that had not been specifically foreseen. This is one of the risks you take when opting not to buy a tatty, but complete, E-type.

Work progressed slowly during the winter months. The rear diff was now reassembled with new thrust washers, drive shaft bearings, and oil seals, and was painted black. The air-filter canister, which was in a poor state, was

shot-blasted, restored, and painted hammered silver to match the new air-distribution box.

The upper steering column had been cleaned up and painted. A steering lock/ignition switch was sourced, together with a new set of keys for both the switch and the door handles. The car had been fitted with a dash-mounted ignition switch which was not a standard fitment on an S2.

Most of the basic work on the shell had now been completed, and a decision was taken to seam-seal, prime and apply stone-chip protection to the underside, which then awaited a finish coat of Opalescent Gunmetal, its new colour! The bonnet still had a way to go, but was trial-assembled with its new under-pan, wings and headlight-diaphragm panels. Trial assembly showed up problems with the new wings, as they were not dimensionally the same, one being 10mm longer (wheel arch-to-bulkhead) than the other. Once the bonnet was finished however, and trial-fitted to the shell, all would be sent off for painting.

The engine and gearbox, having stood for a few years unloved, was in the process of being dismantled. The gearbox and bellhousing had been separated from the engine, and the flywheel and clutch had been removed, revealing a scored flywheel, necessitating a skim. A complete new clutch assembly was bought, together with a new thrust bearing.

The cylinder head was removed, and considering how long the car had stood, both the combustion chambers and the bores appeared to be in good condition. For the uninitiated, there are 14 head studs, comprising four different types, with 10 of them partly exposed to the cooling water within the block itself, which can lead to degradation to the surface of the studs over a period of time. For peace of mind, since some of the studs showed signs of deterioration, we decided to replace them.

- Above: the newly skimmed friction surface of the flywheel
- Right: removal of the cylinder head to inspect the block showed the cylinder bores to be in good condition

The camshafts appeared to be in good order, as did the bearings, but we decided to play safe and fit new bearings.

I had been concerned about the valve seats and the future ability to run on unleaded petrol, bearing in mind it is a 1970 car and hadn't been run for 25-plus years. After doing some research and talking to a couple of E-type experts, I was assured that the XK engine is quite capable of running on unleaded without the need to modify either the valves or seats, provided a fuel additive and ideally a higher-octane fuel is used. The S2 engine actually has harder valve seats than the Series 1, and in general Series 1 E-types appear to have gold-painted cylinder heads, whereas the S2 heads are silver, with the blocks for both painted black.

To be continued…

- Above: the old cylinder head studs were discarded
- Above right: the new studs in position in the rebuilt block
- Right: the cylinder head partly cleaned up after removal, prior to heading to the machine shop

E-type DIY restoration project

part two

The second in a series of articles by member **Mike Davison**, detailing the 10-year restoration of his 1970 S2 2+2

With my concerns about the valve seats and unleaded petrol resolved (see Part 1), work continued on the block and head.

The block had now been completely dismantled, which had unfortunately shown the bores to be not quite as good as first thought, as some degradation to the surface of the bores was evident. The pistons had been removed, which revealed a number of the rings to be broken and others to be seized in the piston groves. The crank main and big-end bearings were also suspect. Both the block and crank were sent to a machine shop to await diagnosis. New timing chains, chain guides and dampers were purchased as a matter of course, and a new timing-chain idler sprocket bush was fitted, since it was suspect. Main and big-end bearings would be obtained once the machine shop confirmed the correct crank regrind sizes.

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E-type DIY restoration project

part three

The third in a series of articles by member **Mike Davison**, detailing the 10-year restoration of his 1970 S2 2+2

As the autumn of 2015 approached, work continued on rear subframe reassembly, which was now basically complete and ready to fit to the shell. Certain bolts were left loose, as once the frame was fitted, it would be necessary to set camber angles, etc, which was likely to prove a task in itself. I was hoping that this particular process would not be complicated by virtue of me deciding to fit wider wheels (6in x 15in).

As fill-in jobs, reassembly of the cooling fan motors and fan cowl had been completed. These were stripped down and partly refurbished several years previously, and left as work in progress. One motor needed a new set of brushes and holders, and I managed to source these via eBay from a seller who specialises in reconditioning wiper motors and fan motors, amongst other things. Both motors needed new mounting rubbers, and the mounting brackets were shot-blasted and powder-coated. One fan-blade assembly was yellow, the other white, so another white assembly was sourced to provide a matching pair! Both motors were bench-tested and appeared to perform OK, despite them not having run for some 30 years.

The wiper motor had also been dismantled some time previously, so reassembly was now finally completed. The motor casing was dipped and plated, together with the windscreen wiper mechanism.

- Top: proving that all the hard work and effort was worthwhile, Mike's splendid E-type sits proudly on his drive at the conclusion of its restoration
- Above: the restored bare rear subframe assembly ready for reassembly prior to refitting to the shell

E-type DIY restoration project

part four

The fourth in a series of articles by member **Mike Davison**, detailing the 10-year restoration of his 1970 S2 2+2

By May 2016, the body shell was back from the paint shop looking resplendent in its new colour – I was beginning to wonder whether this day would ever arrive!

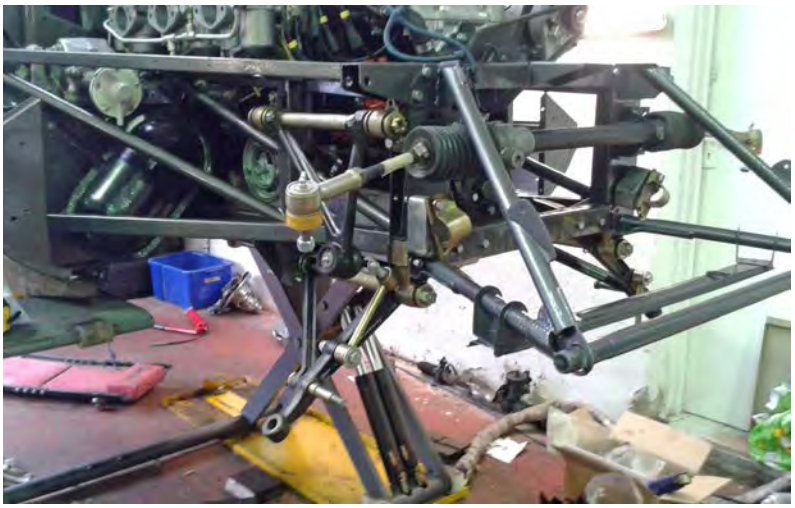
Before fitting the engine, we trial-assembled the brake vacuum cylinder, together with the brake servo, clutch and brake pedal box and the accelerator pedal box. We also trial-fitted the rear suspension, with final camber angles yet to be set.

Final checks were done on the engine prior to fitting it, as some jobs are easier to do with the engine out of the car. The starter motor was run just to make sure that the engine turned over. Rather than assemble the whole of the spaceframe, we left off the front crossmember and bonnet support frame to allow the engine and gearbox to 'slide' in, in more of a horizontal fashion, reducing the risk of scratching the paintwork. With the engine weight still on the hoist, the front crossmember was then partly bolted up and the engine finally lowered onto the mounts.

With the shell still on a scissors-lift, the front suspension was fitted, together with new Gaz adjustable shock absorbers, the front anti-roll bar, all-new bushings and the steering rack. We also established the torsion-bar settings, but the camber and castor angles were yet to be set. This then allowed the old road wheels to be fitted so that we could move the shell around once the steering column had been fitted. It will be noticed from one of the photographs that the radiator stay brackets were missing – we forgot about them! What a carry on to fit them later, as the relevant frame bolts were too long, fouling on the bonnet frame and necessitating a part strip-down and refit of the brackets. At this point we hoped the bolts were correct, as the brackets were missing from the original car!

With the radiator stay brackets finally fitted, together with the new horns, a minor problem surfaced regarding the radiator. It had two extra small hose connections at the bottom, and these would have to be satisfactorily blanked off, as they were redundant. This was another example of the car's shady past! It was possibly originally an automatic.

- Left: proving that all the hard work and effort was worthwhile, Mike's splendid E-type sits proudly on his drive at the conclusion of its restoration
- Below left: the brake vacuum cylinder...
- Right: ...and brake servo were trial-assembled before fitting the engine
- Far right: the front crossmember and bonnet support frame were left off until the engine and gearbox had been fitted
- Below: the engine and gearbox in place, with the front crosssmember now in position
- Bottom: the front suspension and steering components fitted, with the bonnet support frame now attached to the crossmember



Next, the heater and vacuum pipes behind the bulkhead were fitted, together with a new heater valve and radiator expansion tank. The oil filter bowl was fitted, painted green to give it a period look.

The brake-vacuum cylinder, together with the brake servo, clutch and brake pedal box, and accelerator pedal box were then fitted.

The brake and clutch fluid reservoirs were fitted, together with the clutch pipes and the majority of the brake pipes. I had to make a new mounting bracket for the second (left-hand-side) brake fluid reservoir.

By this time, the throttle linkage was also in place. With hindsight, it may have been better to have fitted some of these components, and the bulkhead pipes, prior to installing the engine, when access was easier. Stainless-steel braided hoses were used to connect to the front callipers.

At this point I also trial-assembled the wiper motor, wheel boxes and wiper linkages.

The steering column was fitted, and I made a metal bulkhead cover plate to replace the old plastic one. I also fitted a new wood-rim steering wheel, although not a genuine E-type one.

A new 'period' washer bottle was fitted, but as with the brake-fluid reservoir, a new mounting bracket had to be fabricated – two Club members had a 2+2, and so I was able to establish the shape and location of the bracket (most of the photographs I had seen of 2+2s were US LHD cars, which have the bottle mounted in a different position).

A section of fuel line to the luggage compartment bulkhead was installed – this had to be done prior to fitting the subframe due to

- Above left: new adjustable Gaz shock absorbers were fitted, along with the front anti-roll bar
- Above: Mike had to make a new mounting bracket for the left-hand-side brake fluid reservoir
- Left: now resting on its wheels, the car was really taking shape
- Below left: a front view of the car with engine, suspension, steering and brake components in place

access constraints. For the same reason, the prop shaft was also fitted at this stage.

Next, the rear subframe was finally fitted, using all-new mountings, and it was somewhat of a task to get all the respective bolt holes lined up. The rear anti-roll bar and drop links were fitted, with new mountings, together with the radius arms, again with new bushes. A stainless-steel braided hose was used for the rear brake line connection to the subframe, and the fuel line was also now in place.

I decided to purchase four new MWS 15in x 6in wire-spoked tubeless wheels, together with new 205/70 VR 15 tyres. These were trial-fitted to the rear axle, only to find the tyres were rubbing against the bump stops. As a result, the bump stops were turned inwards instead of outwards to help provide more

- Top left: the rear subframe was fitted, complete with suspension components
- Top: the inaccessible areas of the bonnet were painted prior to assembly
- Middle left: the retrimmed centre console, along with handbrake lever, in position
- Left: after fitting of the door internal components, the doors were trimmed
- Above: after trimming and fitting new boot boards, further retrimming of the interior was carried out

clearance with the tyre sidewall. Camber angles were now checked and required some adjustment by way of additional shims fitted between the differential and the driveshaft flanges. This seemed to resolve the problem.

On the bodywork side of things, the rear bumper was now in the process of being fitted – it's funny how everything seemed to fit when the shell was undergoing restoration!

By now it was July 2016, and I placed an order for a complete interior trim kit. Red was chosen to complement the Grey, both being standard E-type colours from 1961–64. There was a 6–8-week delivery schedule for the kit.

In mid-August 2016, we took the 'work-in-progress' car to the Raby Castle Classic Car Show – my criteria for taking it was that it had to be resting on four wheels, with a steering wheel fitted! It was a joy to watch a boxed three-axle car trailer being expertly reversed down the street to my son's garage to pick it up, despite somewhat restricted access with parked vehicles on both sides of the street! I think displaying the

car at the show gave visitors an insight into the amount of work involved in restoring a classic car.

Following the show, the bonnet went to the paint shop, initially for painting of the wing flanges, edges and other areas that would be inaccessible once assembled.

The car was now back in my home garage to do the wiring and various other jobs before going back to my son's garage.

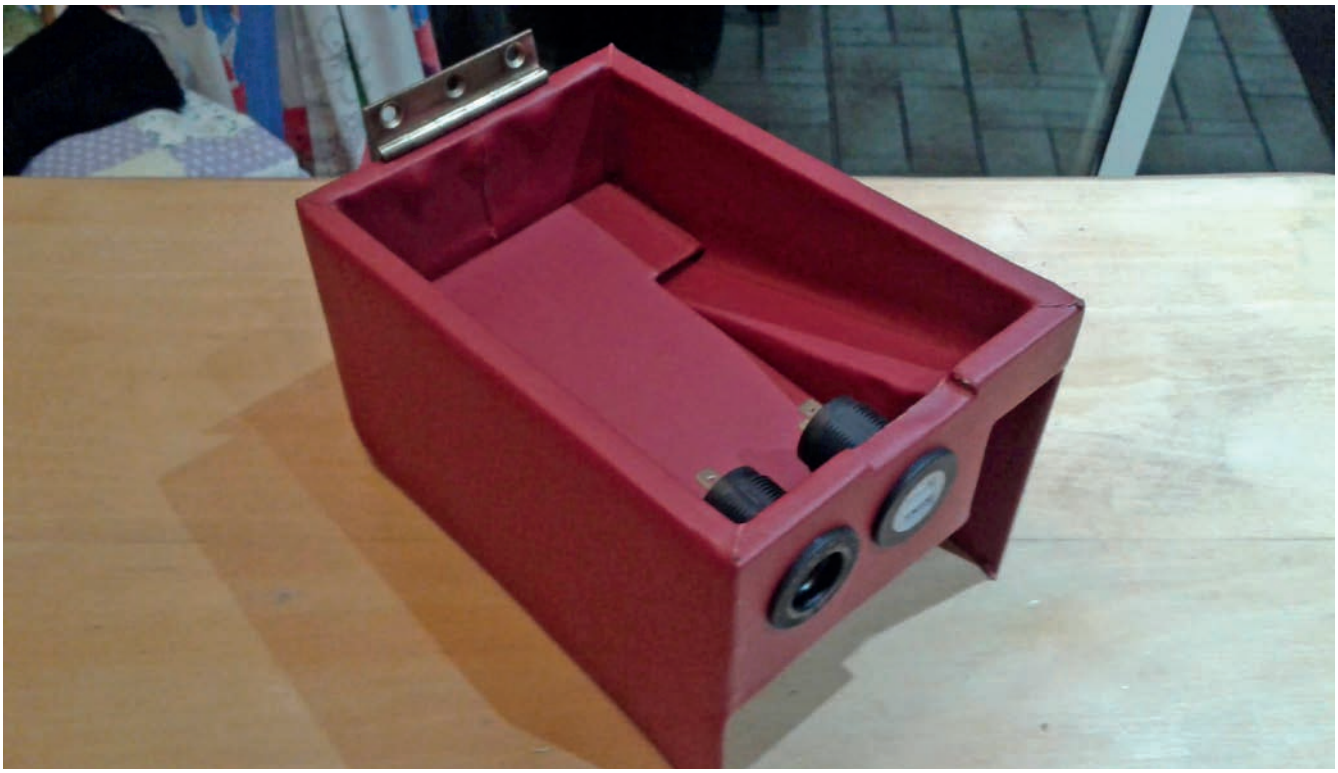
Positioning the radiator revealed that the new radiator stay brackets were too long! Fortunately, I was able to modify them to suit. Associated cooling hoses were also installed, along with the vacuum hoses.

With winter setting in, by November 2016 the new SU electronic fuel pump had been fitted, together with its associated fuel hoses and the internal fuel lines, and installation of the fuel tank was underway. Fitting of the fuel tank proved somewhat of a fiddly job, what with three tank vent hoses, a water drain hose from the fuel filler and vent-pipe connection from filler pipe, not to mention the hose connection from the filler to the fuel tank, all in a confined space.

The control cables for both the heater valve and heater flap were partially installed, along with the choke cable.

In terms of bodywork, the door handles and window-winder mechanisms were fitted, along

- Below: the new, trimmed boot boards fitted to complete the interior
- Bottom: Mike opted to fit both USB and 12V sockets in the glovebox



- Top left: the original rear lower seat-squab frame was stripped and cleaned prior to reupholstering
- Above: the newly cloth-covered seat-squab frame prior to the fitting of the leather upholstery
- Middle left: the completed rear upper seat squab, ready for fitting
- Left: the completed reupholstered rear seat assembly, resplendent in red leather

with the rear-door locking mechanism and its cable operating lever.

The wiring harnesses were still work in progress, and despite having a wiring diagram, fitting was not quite so easy as it looked. It was still necessary to check which wire went where from a continuity standpoint. Some wiring modifications had to made to cater for the ignition switch now being column-mounted rather than dash-mounted, the introduction of a ballast resistor on the ignition circuit to make it compatible with the later 1970 S2 models, an electric radio aerial and other modifications. The circuit resistor for the panel lights was found to have burnt out in its former life, but with the introduction of LED panel bulbs, the resistor wouldn't be needed. The alternator harness was also modified to cater for the 18ACR alternator. It has an inbuilt rectifier, rather than a separate external one as with the original fitment. New battery leads were also fitted.

Work on some of the exterior trim had also been started – door seals, rear quarter lights and seals, door handles, new gutter chrome trim and door/body chrome trims. Fitting of the chrome door trims to the door panels was also underway, and the interior trim kit from BAS had now been received and was awaiting fitment.

Meanwhile, the paint shop was working on the bonnet and rear door.

I started work on some aspects of the interior trim, such as the centre console, upper and lower cantrails, door cappings and boot boards, and I opted to fit both USB and 12v sockets in the glovebox.

As you will have come to expect, the saga of missing bits continued… It appeared that two sections of metal trim backing were missing – items that are no longer available – and needed to be fabricated! These were essentially extensions to the forward part of the wheel

arches up to the 'B'-post, and fill the gap between the edge of the rear seat and the side of the body on a 2+2.

The remaining two old boot boards (the third was missing anyway) were ditched and replaced with three new ones. Unfortunately, not all the original fittings – ie, locating pins, spring clips, pull rings and eight luggage rubber retainers – were present, which again meant sourcing new ones. It's always the little bits that cause frustration! In the box of bits that came with the car there was a length of formed metal strip, and I had often wondered what it was for… It turned out to be the support rail which is attached to the forward boot board – just another piece of the jigsaw!

In January 2017, with the three new boot boards fitted, work started on retrimming the rear seats. In the case of the upper squab base (rear seat back), this entailed a new leather back cover, two luggage boards and rubber retainers, two luggage side panels and trim to the top of the side panels. The right-hand bracket and links assembly was missing, so as part of the restoration a new assembly had to be fabricated using the left-hand one as a pattern.

The lower squab frame was cleaned up, the old foam padding replaced, and new leather covers fitted. The seat frame was also cleaned up. The moulded foam cushion, presumably the original, had deteriorated to the extent some areas had turned to 'dust'. These would be cut out and new foam introduced to try to maintain the original shape where possible. New leather covers would also be fitted.

The upper and lower squabs and seat were still work in progress, as I was trying to get rid of the remaining creases in the material.

New wing mirrors had now been fitted, and I tried to gauge the fitting positions from photographs of other S2, 2+ 2 cars.

The door top chromes were also fitted. These were quite fiddly, as there are four rivet clips, as well as two screws holding each chrome. Accurate positioning of the holes for the rivets was a must! (Unfortunately, the new door skins were minus the holes.)

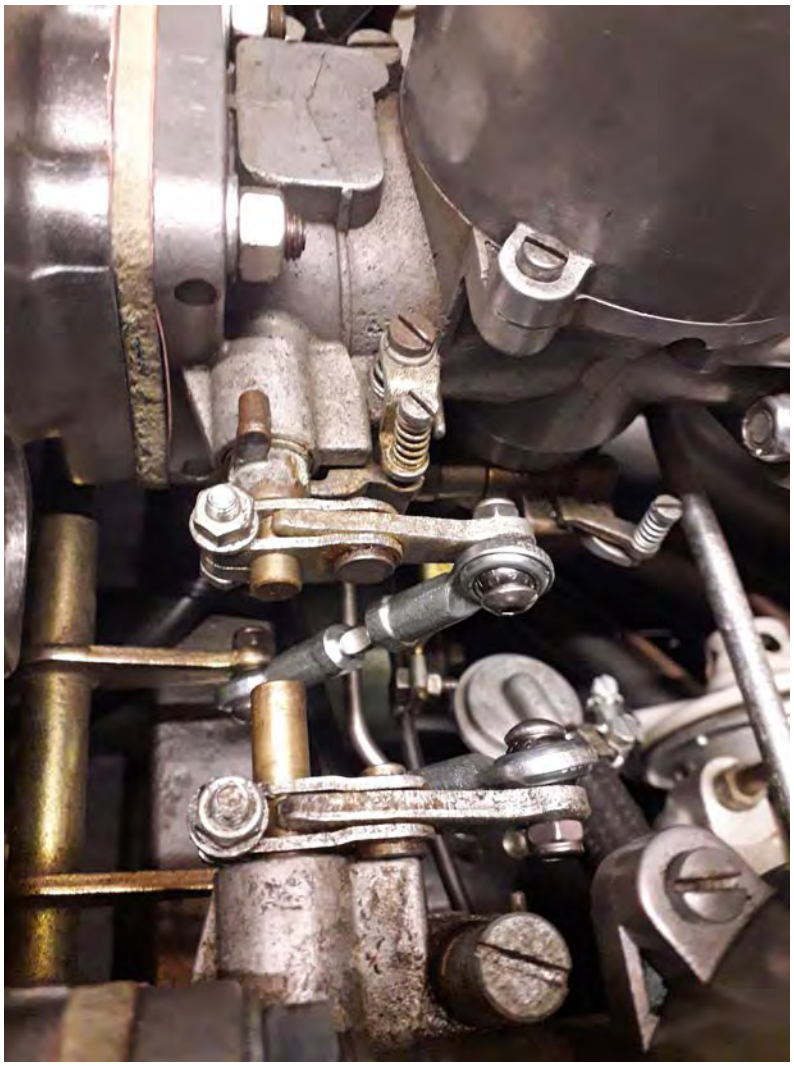
Work continued…

- Left: new wing mirror and door chrome in place – the door chromes proved tricky to fit
- Below: on the home stretch – the restoration enters its final phases

- Right: the cooling-fan motors were refurbished, new mounting rubbers were fitted and the mounting brackets were shot-blasted and powder-coated. One of the fan-blade assemblies supplied with the car was yellow, so was replaced with a new white assembly to provide a matching pair
- Below: The cooling-fan assemblies in place on the rear of the radiator

At this point, heater reassembly was also underway. The casing was in fairly poor condition, necessitating some repairs. The fan motor had also been completely dismantled and its casing dipped and plated. Unfortunately, I later dropped the motor and broke the permanent magnets, which resulted in it becoming defunct! To save the day, I had an old motor from an MGB heater which, with some slight modifications to its mountings, did the job as a replacement. The assembly was completed with a new heater matrix and fan. Again, the motor and fan were bench-tested.

The brake master cylinder and reaction valve had also been dismantled, and a service kit purchased. At this point, closer inspection of the master-cylinder piston bore indicated it was actually beyond being serviceable. Rather than purchasing a



complete new master cylinder, I decided to buy an exchange core unit – ie, a master cylinder that had been sleeved to provide a new piston bore. I went for a brass sleeve, but stainless-steel sleeves are also available.

The brake servo was dismantled and reassembled using a service kit, and this time the bore was serviceable.

Similarly, the clutch master cylinder was stripped, cleaned and then reassembled with a new service kit, but a new slave cylinder was bought, since the old one was beyond redemption!

The pedal box was also reassembled at this point. The pedals themselves were shot blasted, plated, painted black and fitted with new return springs and rubber pads.

Work on the seats continued, and the front seat-base frames were shot-blasted, painted and

- Top pair: refurbished brake system components
- Middle left: pedals were also refurbished
- Bottom left: cleaned clutch housing and gearbox
- Above: further throttle-linkage mods were made after around 1,000 miles

repaired, and new seat diaphragms fitted.

Meanwhile, various components of the trimmed centre console were stripped and painted prior to the console being retrimmed.

As mentioned in Part 1 of this series, my eldest son, Mark, was involved in refurbishing some of the smaller items, but as it turned out he had to leave them unfinished due to work commitments. The components in question included the carburettors. They were in a sorry state, seized and requiring a complete strip, clean and polish. As there are three carburettors, it was a time-consuming job. I understand some rather creative methods were used to bring them back to life! Service repair kits had to be obtained, and we had to go to the extent of making some new parts for the choke and throttle linkages. The difference in the before and after photos is quite striking!

The inlet manifold also received attention, and was sprayed with a high-temperature clear lacquer, which unfortunately seemed to discolour the alloy.

Attention then turned to the dashboard. All the instruments were dismantled as far as practical, cleaned up and tested. The speedo and rev counter had already been refurbished, and I went to the extent of fitting LED

- Left: the gearbox was stripped for inspection by a specialist, revealing damage to the layshaft and laygear
- Below left: the damaged laygear-shaft bearing surface proved a tricky problem to solve due to the availability of new components
- Below right: a decision was taken to hard-metal sleeve the laygear to solve the problem of the damaged bearing surfaces
- Bottom: a new clutch-release bearing was fitted before the rebuilt gearbox was mated to the engine

bulbs rather than the standard filament ones. I decided on this approach because I remembered that on both my TR6 and MGB, the old-style bulbs always used to cause problems and were not really particularly visible. The only problem at this point proved to be persuading the clock to work! The choke control warning light and heater warning light were replaced, as the old ones were broken. I also planned to install a complete new wiring harness.

Meanwhile, returning to the mechanical components, the exterior of the clutch housing and gearbox were cleaned up. The gear lever and selector rods were somewhat stiff due to lack of use, and so these were dismantled and cleaned. Since there is a tendency for bearing

- Left: a new clutch assembly was fitted to the refaced flywheel
- Right: engine reassembly underway. Sourcing the correct new plug leads and plug caps proved challenging
- Below right: a decision was made to spray the inside of the bodyshell in a base-colour of Raptor, with an additional lacquer coat in the boot area

ball-races to deteriorate over time when not used regularly, it was decided to send the gearbox to a local specialist for a complete strip-down, inspection and to have new parts fitted where necessary.

By the spring of 2016, I was liaising closely with the painter to agree on points such as door gaps etc. Since each E-type was essentially hand-built, no two were the same and consequently there is conjecture as to what constitutes the correct door gap. Most current restorations encompass new door skins, and more than likely new valances, and this in itself creates difficulties, aggravated by the wide variation in the quality of panels. At the end of the day, to me, if it looks right then it probably is, though die-hard purists would probably disagree.

• Above: spraying of the carefully prepared bodyshell underway

With the benefit of hindsight, the gearbox should probably have been sent to the specialist for strip-down and inspection earlier in the restoration process. I had previously taken off the top cover plate when trying to free up the selector rods, and on the face of it the gears looked fine. As with a lot of other things, as restoration progressed all was not what it seemed! The strip-down revealed everything to be in serviceable condition with the exception of the layshaft and laygear. In both cases, the respective needle-roller-bearing surfaces had picked up. This was likely due to wear and tear, and as a result of the gearbox shafts not having been turned over due to being idle for 30-plus years. I had thought it may have been the main bearing ball-races that would cause problems, but no, they were in order. Replacing the whole gearbox was not considered practical for cost reasons, so other options had to be investigated. Firstly, what to do with the layshaft and needle rollers. Fortunately, both these components are readily available as spares, and can be replaced with new parts either from a recognised classic spares stockist or a specialist Jaguar motorsport company. The laygear, however, is a different matter. Obtaining the laygear as a new individual part is nigh on impossible, primarily due to the small batch order quantities and slow stock turnover. It would normally have been sold as part of a kit, ie, as a set with its mating gears, as it is not recommended to replace a single gear on its own. It is possible to have a gear reverse-engineered, but again costs are prohibitive.

As with the layshaft, specialist motorsport companies market laygears, but primarily at a premium for race set-ups.

A couple of other options are available, but according to some are questionable. One is to get the laygear bearing surfaces hard-metal sleeved, and the other is to machine down the bearing surfaces, apply a hard-metal spray and then grind back to the original dimensions. However, this may lead to distortion of the laygear itself, so in the end I decided against the idea. I took the plunge and decided to go down the route of hard-metal sleeving. I had this done by a company in Bradford which also specialised in metal spraying. Once this work was completed, and the parts were returned to the transmission specialist, all was in order for the gearbox to be reassembled. Apart from the new layshaft, needle rollers and sleeved laygear, all the gearbox oil seals were replaced.

A new clutch slave cylinder and return spring were fitted. The previous owner had drilled out one of the bellhousing studs for the slave cylinder in order to fit a larger-diameter stud or bolt, presumably because he had stripped the threads. In order to retain the correct fitment, a helicoil was fitted to allow the use of the correct UNC stud.

On the engine side of things, as mentioned in Part 1 of this series, the face of the flywheel was very badly scored. In the intervening time, it had been refaced at a local machine shop and new dowel locating pins were fitted. The flywheel was then attached to the crankshaft (two bolts

had gone walkabout, necessitating the purchase of two more!). A new AP clutch plate, cover and release bearing were fitted, and so engine reassembly was basically complete, with the next job to mate it with the gearbox and fit the inlet and exhaust manifolds.

The new alternator bracket caused problems (the original was missing when I purchased the car), as after obtaining two new brackets, both had misaligned alternator pivot-bolt holes! A third attempt to resolve the problem also failed, and after resorting to the secondhand market, unbelievably, the same problem occurred again! This time we had no alternative but to try to modify the bracket. However, the original alternator turned out not to be serviceable in so much as it had a seized shaft and suspect stator windings. A decision was made to replace it with a later model (18ACR), which although the same rated output, has an integral voltage regulator. A note was made to look at possibly getting the original alternator refurbished and suitably upgraded for the future.

As part of the engine reassembly process, a kit comprising new plug leads, plug caps, etc had been purchased, together with an electronic distributor (from manufacturer 123). I went down the electronic route in an attempt to mitigate problems associated with contact points, which I found to my cost when running my TR6 some years ago and the MGB in more recent years. You've guessed it, the kit had spark plug caps that were a screw fitting for the HT leads, but with acorn nuts for the distributor. The 123 distributor cap, required 'push-in' HT-lead connections, not acorn, and so a visit to eBay to find leads with screw-type plug fittings and push-fit connectors at the distributor-cap ends!

New bushes were fitted to the rear engine stabiliser, and similarly to the rear gearbox mounting.

Returning to the bodywork, the original doors had not only required re-skinning, but also replacement of the bottom section of the door shell. Not realising it at the time because of their condition, we missed the minor detail of water drain holes! Reference to an American-based website provided a clue and a way to solve the problem. Similarly, it gave us an indication as to how the door-aperture sill weather strip was fitted (these were also missing when I bought the car).

Bodyshell painting had now started – how many different shades of Opalescent Gunmetal are there, despite quoting the Jaguar colour code? The underside had now been colour coated with Raptor on top of stone chip. It was decided to spray the inside with a base-colour of Raptor, but with an additional lacquered coat in the boot area.

The exterior of the bodyshell had been prepped and sprayed with base colour, followed by numerous coats of lacquer, all matted down and polished.

The next stage would be to fit the running gear and engine…

• Below: spraying is a laborious process, but the final result, in Opalescent Gunmetal, was worth it

• Above: removal of the pistons revealed several broken rings. Eventually, new cast-iron cylinder liners (with standard bore size) were fitted, along with the original cleaned-up pistons and new rings.

• Left: a mixture of new and 'old' parts was used to rebuild the bonnet. The offside wing is seen here, but the nearside wing proved a challenge to align!

for social motoring and not for racing, a decision was made to purchase cast-iron guides.

Pistons and rings are fairly readily available, but again consideration has to be given to the car's end use. Forged, billet or cast pistons? It was not a race engine, so high-spec items were not thought necessary. As it turned out, the machine shop managed to release the piston rings from their grooves, so new pistons would not be required – only a new set of rings.

On detailed inspection of the block, it was evident some of the cylinder liners had dropped. There was also doubt whether, if rebored, they would move again during the machining process. As with the pistons, there were various options, including flanged liners which necessitate the tops of cylinders to be machined to accept the flange on the liner. This method prevents the liner from dropping. What material spec for the liner? The vast majority of liners are made from centrifugal-spun cast-iron, or spun ductile cast-iron, the latter being superior and typically used for race engines. It was considered the best solution in our case would be to replace the liners with non-flanged standard, centrifugal-spun cast-iron items.

The machine-shop work on the engine in total comprised: removing the valve guides and fitting new ones;

lapping in new valves; skimming the cylinder head; removing the cylinder liners, fitting new liners and honing the bores; skimming the top face of the block, together with the timing-chain cover; regrinding the crank main bearings and polishing the big ends.

With all this work completed, the engine was collected from the machine shop ready for reassembly. As mentioned previously, all the pistons were found to be OK, which resulted in a new set of standard piston rings being fitted, with the bores remaining a standard size.

Whilst the engine was away at the local machine shop, work resumed on the bonnet – more specifically trial-fitting it to the bodyshell. Since the bonnet was made up of new and 'old' parts, aligning it proved a task in itself, causing much trial and tribulation, not to mention a few choice words at times, but we eventually got there! The main problem was trying to get the nearside wing to fit correctly, in the end necessitating the sill closing edge

- Top: the bonnet components were sent for painting of their inside surfaces prior to reassembly and trial-fitting of the bonnet
- Above: the lower section of the bonnet assembly awaiting trial-fitting to the other bonnet components...

- Left: ...and now fitted to the bonnet upper section (supported inverted on trestles)...
- Below: ...before turning the assembly over and fitting the wings

to have a strip shaved off. At least the front bumper fitted fairly well!

By the spring of 2014, the shell had gone to the painters for stage one of the finishing process, to have the underside and the inside painted, together with the engine frame. Once complete, the front and rear suspension could be fitted, together with the doors and bonnet. The car was then returned to the paint shop for painting of the bonnet underside and its component parts, prior to complete external painting.

Meanwhile, engine reassembly commenced without any problems.

The rear drive shafts were partly assembled without too much trouble, however the prop shaft proved to be a headache! The new universal joints (UJs) did not fit, albeit they were the correct ones for the year/model, which led one to think that the prop shaft was not OEM. The search commenced for UJs that would fit.

New wheel bearings were fitted to the front and rear hubs, and Polybush components were fitted to the front and rear anti-roll bar drop-links, together with the upper and lower front and rear fulcrum blocks. Polybushes were also used for the front and rear anti-roll bar 'D' bushes.

At this stage, the front upper and lower wishbones had been trial-assembled, and the front stub-axle carriers had been fitted with new lower ball joints. These, however, were

- Above: the bonnet assembly, with bumper in place, trial-fitted to the shell
- Right and below: the shell was returned to the paint shop to be primed prior to final painting. The restoration was well on its way!

upgraded to the sealed type, as used on XJs, which meant removing the lower ball-pin spigot from the carrier to allow the XJ version to fit, still using the original bolting. New disc dust shields were fitted, and new upper balljoints would be fitted when the whole assembly was attached to the front suspension.

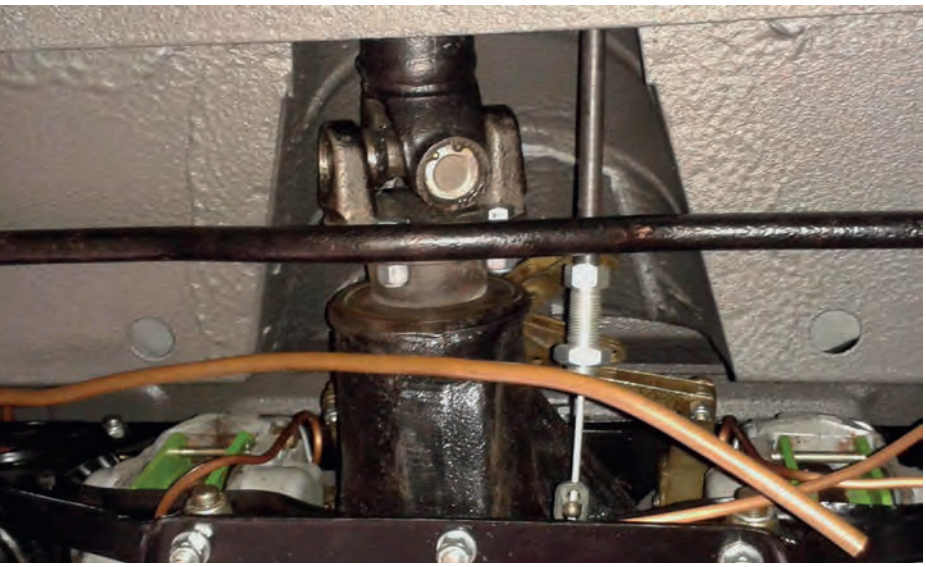
The front brake calipers were reassembled with new stainless-steel pistons and seals. Kevlar brake pads were fitted in preference to standard friction material. The brake components (with new discs), hubs and hub carriers were then assembled.

Assembly of the rear suspension was a somewhat more lengthy process.

The drive shafts were trial-assembled to the hubs to ascertain the required thickness for the hub spacer. The outer-fulcrum shafts were trial-assembled to the hub carriers, again to establish required shim thicknesses. The current outer-fulcrum repair kits utilise one long spacer tube, rather than two shorter tubes used in the early days.

The inner-fulcrum-shaft bearings were fitted with the shafts trial-assembled with the lower wishbones.

Both rear brake calipers were reassembled, again with new seals and stainless-steel pistons. As luck would have it, one caliper was found to be an E-type item, while the origin of the other was yet to be determined – possibly an XJ6 Series 3 or XJS. Not having previously owned an E-type,



- Top left: the shell was primed inside and out
- Above left: after initial problems, new prop-shaft universal joints were fitted
- Left: replacement Polybush components were fitted to the anti-roll-bar drop links
- Top and above: engine reassembly commenced without any problems, both the bottom-end and cylinder head going together smoothly

this was not immediately apparent when they were stripped some three to four years previously! After carrying out some research it became apparent that E-types could be fitted with either type. The principle difference is the outer dust seal for the pistons – the E-type version locates into a groove within the piston bore, whereas the XJ6 Series 3 or XJS type is located on an external collar. The piston dimensions, however, are the same. Rather than be faced with possible problems in the future, a replacement caliper was sourced to match the E-type version.

The various parts comprising the handbrake system were reassembled with mostly new parts and fitted to the calipers. Standard brake linings were used for the handbrake, whereas Kevlar pads were used for the main rear brakes.

The earlier hiccup concerning the prop-shaft UJs was resolved with the assistance of GKN, and the prop shaft was then reassembled with its new UJs and a new gaiter. I'm not quite sure what the previous owner was up to all those years ago!

Meanwhile, reassembly of the rear subframe

was progressing. I took the decision to scrap the old shock absorbers and springs some years previously. New GAZ adjustable shocks were fitted, together with new springs. New subframe mounts were also fitted.

At this stage (the summer of 2015), work on the front seats had also started. The covers were removed, only to reveal disintegrated seat and headrest foams, together with what was left of the diaphragms, which I suppose considering their age was only to be expected. New covers, foams, etc, would be purchased later. The seat-base frames were somewhat rusty, as were the reclining mechanism and seat runners. These would be refurbished, and new parts obtained aas necessary

- Above left: The front upper and lower wishbone components were trial-assembled...
- Far left and left: ...along with the rear hubs and drive-shaft assemblies
- Bottom left: the rear calipers, complete with handbrake components, were reassembled using new seals and stainless-steel pistons. A replacement caliper was sourced to match the existing single E-type unit
- Below and bottom right: the front seats required substantial work. The covers were removed to reveal disintegrated foam and perished diaphragms, and the seat-base frames were rusty, as can be seen here

E-type DIY restoration project

part five

The last in a series of articles by member **Mike Davison**, detailing the 10-year restoration of his 1970 S2 2+2

By the spring of 2017 progress had accelerated. Bitumen-based sound deadening had been stuck to the inside of the door skins, and the fitting of the window frames, glass and winder mechanisms was underway.

Following tests on the rear heated screen, I discovered that it could not be satisfactorily repaired, so a new, laminated screen was purchased.

Unfortunately, the sound-deadening material I initially bought proved too thick for the boot floor, which interfered with the satisfactory fitting of the fuel tank, so the tank was removed and thinner bitumen based pads were installed, which allowed the tank to fit properly.

After a modification to one of the heater brackets, the heater was installed and connected up to a battery to test the fan motor.

After some trial and error, a fix for the missing oil breather pipe was established – some 22mm copper pipe fittings and 22mm aluminium convoluted tube. Not perfect, but it did the job.

The car was then moved back to my son's garage, to enable work to be carried out underneath, such as clipping the fuel and brake lines in place, handbrake adjustment, plus fitting of the heat shields and exhaust.

By mid-summer, work turned to the brakes. Greenstuff brake pads were fitted at the front. The brake and clutch hydraulic systems were filled with fluid, but a minor hiccup with the clutch master cylinder necessitated a new set of seals. Other problems arose with the brakes, such as the rear brake caliper bleed nipples not sealing properly, so remote bleed nipples were fitted. This would have the additional benefit of making it far easier to bleed the brakes. Another problem arose when the rear brakes could be bled, but the front could not. It transpired that the front and rear brake lines running to the servo cylinder were the wrong way round. These were swapped round, but then the front could be bled, but not the rear! The problem was eventually put down to a sticking shuttle piston in the brake servo cylinder. A new service kit was fitted and the brakes then functioned correctly.

- Left: the finished result – Mike's E-type sits proudly on his drive at the conclusion of a 10-year DIY restoration project
- Below left: not a great deal of clearance between the exhaust downpipes and surrounding components, so spending time acheiving correct alignment was essential
- Right: a minor problem occurred due to no mounting kit being supplied for the rear tailpipes, though this was soon resolved
- Below: taking shape: the car sits with tailpipes now safely secured and bodywork painted, but rear door yet to be fitted

The main heat shield was fitted, allowing the exhaust (a Falcon stainless-steel system) to be fitted. Unfortunately, there was no bracket or mount for the rear tailpipes, though these were still available as spares.

In terms of the interior, heater and water-valve control cables were now fitted, together with the choke control cable. To continue the theme of things not exactly going to plan, when I removed the gear-lever knob to fit the gaiter, I snapped the threaded portion of the lever, as the knob had rusted solid on the threads. Both the lever and knob were replaced.

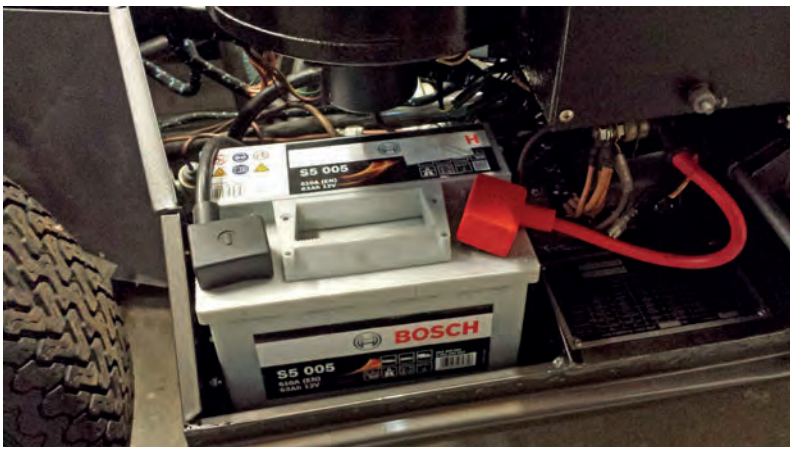
On the bodywork side of things, the inside of the underpan, plus the wheel arch and headlight areas of the wings were coated with Raptor before final painting. The underpan, centre panel and wing mating flanges received their final paint finish, while the bonnet was fully assembled and received its final coats of paint.

September 2017 saw further progress, and I fitted straight grease nipples for the inner fulcrum pivots on the rear suspension, as previously we had fitted angled ones, not realising at the time that it would not be possible to get a grease gun onto them.

The balance of small items that were painted at the same time as the bonnet were now fitted, including the rear number plate mount and the positive battery terminal/regulator bracket.

At this point, the only item left to come from the painters was the rear door. The wiring harness for the lights was installed, plus the two long chrome trims that run over the joins between the centre panel and wings, which had to be cut down to length. Fitting the chrome trims to the headlight scoops proved difficult! The chrome vent grille at the bulkhead end of the bonnet was fitted, together with the screenwash jet. Front side/indicator lights were also fitted, together with the wire mesh radiator grille, heater fresh-air inlet and bonnet locating pins. It was now starting to look like an E type bonnet!

The new wiring harnesses were not all they were cracked up to be. On the right-hand drive S2, there are two brake-fluid reservoirs, each of which has a low-level sensor. The harness only catered for one reservoir. Also, the wiring diagrams showed the ignition switch had a permanent positive feed direct from the battery, which was missing from the harness. We discovered that a loop wire had to be incorporated into the relay used for switching on the cooling fans via the Otter switch. Although the wiper motor worked on a bench test, once installed it would not function in all modes. The fault was eventually traced to the new panel switch for the wipers!



- Left: the bonnet taking shape, with front bumper, side/indicator lights and mesh radiator grille fitted
- Below left: the new Bosch 63Ah battery fitted and connected
- Below middle left: a separate cable was run from the ignition coil negative terminal to connect to the new rev counter circuit board. Additionally, the ballast resistor was moved closer to the coil
- Bottom: the completed instrument panel and new indicator stalk

I had initially installed the ignition-circuit ballast resistor behind the dashboard, but this was moved closer to the coil to reduce the risk of problems arising should it overheat. Again there was no white/blue wire incorporated in the wiring harnesses to cater for engine-bay positioning of the ballast resistor.

Unfortunately, problems arose with the indicator stalk. It was the original, and over the years of use the lever arm had become loose. I decided to replace it, but E-type stalks are expensive, if you can get hold of them. After tracking down the original Lucas model number (131A), I found that Rolls-Royce/Bentley used the same model number, although the push-button is slightly different in shape, and its function is to operate wash/wipe rather than the horn. Good used ones were readily available at about a third of the price of the E-type version, so I swapped some parts from the old stalk to the new to give a fully functioning stalk, albeit not a true E-type one.

After so many years idle, firing up of the engine finally occurred on 1 October 2017. Unfortunately, the oil pressure sender did not work, albeit fortunately there was oil at the filter, sender and camshafts. A new sender was obtained, and all was well, except that the radiator leaked under pressure. It was repaired and refitted, and the operation of the cooling fans was checked.

With the engine running, it felt as if we were on the home stretch…

By the spring of 2018, the rear door had been received back from the painters and had been fitted together with its three badges.

Because of the risk of cracking them, it was decided to entrust installation of the new front and rear heated screens to a specialist screen installer. Whilst the new front-screen bottom chrome fitted, the top one proved problematic in so much as the ends did not sit in the rubber correctly. Eventually the problems were resolved with the supplier, and new items were successfully fitted.

Fitting the chrome trims to the headlight scoops proved tricky, and two pieces of fabricated metal trim to fill in the area between the wheel arch and ‘B’-post were made using some photos received from a trim supplier as a guide. This allowed installation of the wheel arch vinyl trim.

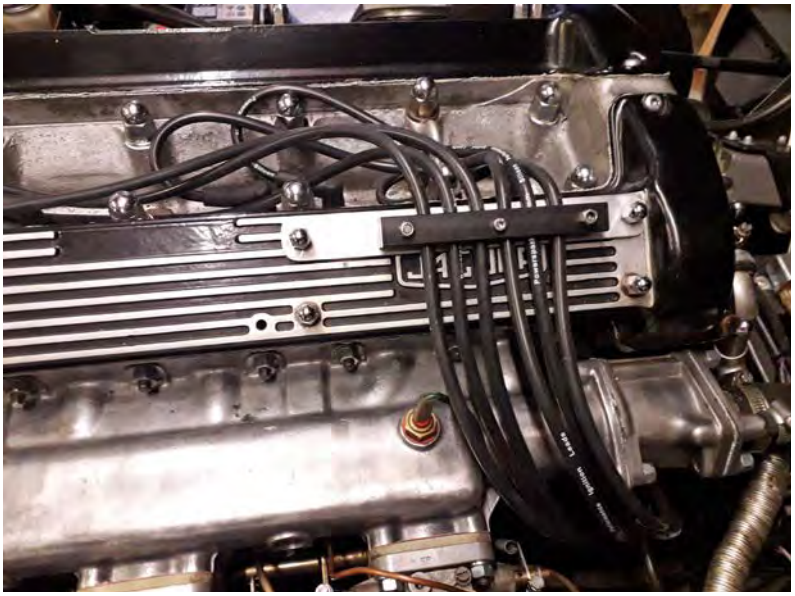
- Right: number plate and rear door now fitted
- Below left: heading towards the finishing touches with the fitting of the rear-door badges
- Bottom left: professional help was enlisted for fitting of the front and rear heated screens
- Bottom right: sound insulation fitted to the floorpan before fitting of the interior trim and seats

The headlining was installed, together with the windscreen header panel and rear-view mirror. Progress had been made with the interior trim and both top and bottom cantrails were fitted, together with the rear quarter panels and grab handle. The door cards were fitted, though a new glass channel for the window regulator had to be obtained for the right-hand door. Floor and tunnel sound insulation was now fitted, and carpet fitting started. The two sections making up the centre console were now fitted, but due to the thickness of the sound insulation on the gearbox tunnel, various areas of insulation had to be cut away to allow the console sections to fit.

I discovered that the fitting of inertia-reel front seat belts to an early S2, 2+2 is not recommended, since there is no sliding anchorage point on the 'B- post, so the belts I had bought two years previously were returned in exchange for static belts.

The sill trims and chromes were now fitted, but the rubber sill weather strips affected door closure and so were not fitted at this stage.

With some assistance from my sons, the assembled bonnet was fitted (one forgets how heavy they are!). After much tweaking it lined up reasonably well, but when we looked at the car side-on, the front seemed exceptionally low. A check on ride-height measurements indicated that the car was sitting some 3in too low, despite the front-suspension ride height having been set at 8 ¾in when originally assembled. The only solution was to readjust the torsion bars. Some calculations were done which suggested that rotating the



front torsion bar by one spline would give us the required result (the front torsion bar has 24 splines and the back 25). There is an aftermarket assembly which has an adjustable reaction plate with a cam adjuster to rotate the torsion bar without the need to take the suspension apart.

Many of you reading this will know DVLA changed the criteria for the MoT for classic (historic) cars in 2018. My E-type falls into the new category, and so does not legally require an MoT. So, with the completion of form V112 and a visit to the post office with the car's V5, it was taxed (in June 2018) for the first time since 1982! For peace of mind and insurance purposes, though not legally required, the car was submitted for an MoT in August 2018, and passed.

The car was now driven on public roads for the first time since restoration. However, our problems were still with us, as it was subsequently discovered that the suspension had dropped again. We eventually came to the conclusion that the bars must be the wrong way round – ie the left-hand and right-hand bars had been transposed. There were no identifying marks on the ends of the bars, which contributed to the problem. The bars were swapped round, but again they settled, and were subsequently reset, hopefully for the last time.

- Top left: the professionally leather-trimmed front seats ready for fitting
- Left: silicon HT leads were subsequently fitted, complete with DIY lead spacer
- Below: Mike proudly poses with the car after winning the JDC prize at Raby Castle in August 2018

After driving about 120 miles, the car was still unfortunately throwing up minor problems. The rev counter and horn stopped working, which was eventually traced to a fuse also protecting the cooling fans. One of the fans was faulty and was replaced.

We took the car along to an event at Raby Castle in August 2018 and much to our surprise were awarded JDC Area 11 Committee Best in Show, which was much appreciated after all our work.

As a late modification, a ballast resister had been incorporated in the ignition circuit, but it had not been appreciated that this would have had a knock-on effect on the coil. A standard coil had been utilised initially, and this was changed for a lower-resistance version. Standard Champion NC5 plugs had originally been used, but these were changed to a hotter plug – NGK BP5ES.

In June 2019, the car was awarded first prize at the Devonport Hotel Classic Car Wednesday event, run every month during the summer. 2020 and 2021 saw little activity due to the pandemic.

With about 1,000 miles on the clock since the first run, it was noticeable that all was not as it should be. Compression readings had been taken over time, which indicated that the cylinder pressures were lower than ideal. In the latter part of 2021 we investigated, after strange noises from the top end of the engine. The head was removed and stripped, and the opportunity was taken to replace the standard valve springs with new uprated ones, the head was cleaned up and reassembled. A leak test was then carried out which showed all valves to be leaking to various degrees, and further dismantling revealed worn valve guides and valve stems. The head was taken to a local machine shop, and the diagnosis of worn valve guides and stems was confirmed, along with bent valves, although new guides and valves were fitted when the engine was restored. The affected valves were replaced, and full set of new bronze guides was fitted. Additionally, all the valve seats were recut and the head reskimmed. It was subsequently found that the inlet manifold face also needed skimming.

Following reassembly, a modification was made to the throttle linkage, replacing the butterfly link rods with adjustable M5 rod ends. This took some of the slack out of the linkage, but necessitated fitting a shim under the right-hand front engine mount to improve the clearance between the rod ends and engine frame. New silicon spark-plug leads were also fitted.

As of February 2022, it is fair to say that now that it's all back together, with a few more miles on the clock, there is no more top-end noise and performance is improved.

After 10 years of work, hopefully we have some trouble free E-type motoring ahead! If asked if I would do it again, yes if I was younger. I'd advise aiming for a complete car as a starting point, even if a rust bucket, and you will probably need to double your original budget and time scale.

- Above and above right: the finished car looking pristine at Raby Castle.
- Right: the car won another prize at the Devonport Hotel Classic Car Wednesday event in June 2019 – a reward for all the hard work, trials and tribulations. Hopefully, many more miles of enjoyable E-type motoring lie ahead