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THE MIGHTY MGs

The Twin Cam, MGC, MGB GT V8 Stories

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The Birth of the Twin-Cam

Although the MGA Twin-Cam model was announced in 1958, there are two separate development stories to be considered in the years which led up to the launch: the evolution of the twin overhead camshaft engine itself, and that of the car which eventually received it. In previous MG books it has never been made clear that the two projects were not always inextricably linked, but came together at a rather later stage. Certain known, and authenticated, dates make this quite obvious, however. Although the MGA sports car had been designed (around the old-type Nuffield XPAG/XPEG engine and transmission) in 1952, it was almost immediately shelved. It was not until it was revived in 1954 that the new BMC B-Series engine became a part of the design. The twin-cam engine, on the other hand, started life in 1953 as a paper proposal, sketched out by Gerald Palmer, who was then chief engineer of Morris Motors (Cars Branch) at Cowley, a post which included responsibility for new MG models. At the time, therefore, the only obvious place for the twin-cam engine was in the still secret MG Magnette ZA saloon!

If it were not for the fact that the BMC merger, announced in the winter of 1951/2 and only just beginning to take practical effect, had thrown the entire Austin and Nuffield design and management scene into considerable turmoil, I would have found it very difficult to believe, or understand, the illogical events which took place in the months which followed. However, as I was not merely an observer, but was actually in, or very close to, the motor industry of the day, I can bear witness to the many strange decisions taken by the new BMC management, most of which, I must admit, were taken in the interests of rationalisation. For the MG management team—of whom John Thornley was the most important, and the most notable—it must have been a very difficult time.

Briefly, therefore, I ought to review the way in which the engine itself, and the motor car which it was eventually to power, came into existence, and I ought also to spell out the events which preceded them.

MG had come into existence in the 1920s, as a concern totally and privately owned by William Morris. By 1935 Morris had become Lord Nuffield, and for a variety of practical and financial reasons he decided to create the Nuffield Group from Morris Motors, Wolseley, MG, Morris Commercial, and several other component supply concerns which had grown up with Morris Motors. At that point, the design office at MG's Abingdon works was closed down, and responsibility for new-model development passed to the main Nuffield design office at Cowley. After the end of the Second World War, there was only a tiny development department at Abingdon, which was headed by Syd Enever.

In 1949, Gerald Palmer, who had designed the Jowett Javelin during the war and seen it go into production at Bradford in the years which followed, moved to Cowley to become chief designer of MG and Riley, with an extraordinarily wide brief. Very soon he was not only proposing new Wolseley models as well but was also taking a hand in the styling, as well as the engineering, of the new range of cars. MG (and Syd Enever), however, were not entirely stifled. In 1951 Enever produced a remarkably beautiful *and* aerodynamically efficient body shell for George Phillips's Le Mans MG TD, and early in 1952 he designed an all-new box-section chassis frame to mate with the new style, allowing a much lower driver's seating position to be provided. That, in effect, was the birth of the MGA project, to which I shall return a little later.

In the meantime, great corporate changes had taken place. From the 1920s to the end of the 1940s, the two giants of the still-strong British motor industry were Austin and Morris. Both companies were controlled by the individuals who had given their names to the cars built, and by the late 1930s both the eminent founders had been ennobled—as Lord Austin and Lord Nuffield. One other remarkable character linked the two—Leonard Lord, who had achieved fame and considerable status with Nuffield, quarrelled violently with Lord Nuffield in 1936 and walked out on him, stayed out of the industry for a time, and then joined Austin as the heir apparent in 1938. Lord Austin died in 1941 and immediately after the war Leonard Lord became the guiding genius behind the expansion of Austin.

By 1948 Lord had become convinced that Austin and Morris ought to merge (on his terms, naturally—he was not prepared to become subservient to Lord Nuffield for a second time). But early approaches to Nuffield resulted only in partial co-operation about systems, costing, design, and production methods, which were dissolved in July 1949. The definitive merger proposal was delayed until the end of 1951, and became operational early in 1952. For a few months—theoretically at least—Lord Nuffield was the supremo of the new British Motor Corporation, but he could never have been content and, in the autumn of 1952, he retired to become BMC's Honorary President.

Right from the start, Leonard Lord set out on a ruthless course of mechanical rationalisation. He wanted to reduce the cost and complication of building a real *mélange* of Austin, Morris, and Wolseley-type engines and their related transmissions. With Austin nominated as design leaders for new projects (no BMC spokesman ever satisfactorily explained whether the ADO project codes meant *Austin* Drawing Office or *Amalgamated* Drawing Office, although both titles were used in the years which followed), he directed that three new engines should replace all others: the small A-Series engine, based on the unit designed for the 1951 Austin A30, the B-Series, a developed and enlarged version of the Austin A40 1,200cc engine, first seen in 1947, and a new straight six-cylinder engine, to be designed at the Morris Engines Branch factory in Coventry, and intended to use some components common with the B-Series design. There would be A-, B-, and C-Series gearboxes and axles to suit—with some new units actually being designed at the Nuffield office in Cowley.

This policy had an immediate effect on the cars being built, or planned, at MG. In 1952 the MG cars in production were the TD sports car and the YB saloon, both of which used derivations of the XP-Series four-cylinder engine, a Nuffield gearbox, and a Nuffield hypoid bevel axle. All of these had effectively been sentenced to death by the design projects emanating from the BMC merger.

In 1952/3—at which time all MG design work was still controlled from Cowley—Gerald Palmer was told to instal the B-Series engine and transmissions in any MGs which were brewing. In a way, this was very aggravating, because his team had already completed layout work on the Wolseley 4/44 and MG Magnette

ZA duo. The 4/44 was ready, and tooled up, for production too early for the edict to take effect, and went on sale with a single-carburettor version of the old engine, but the ZA Magnette had to be speedily re-designed. There were no immediate plans to update the TD (the all-enveloping design which we now know as the MGA had already been rejected by Leonard Lord, don't forget), so this and the facelifted TF which followed it in the autumn of 1953 were also allowed to continue using the old engine.

In effect, it was the re-design for the Magnette, with a tuned version of the B-Series Austin engine installed, which led directly to the birth and evolution of a twin-cam engine. Gerald Palmer, who was above all a motoring enthusiast first, and a 'corporation man' second, knew not only that John Thornley was itching to get MG back into serious competition—racing in particular—but also that BMC engineers were having difficulty in getting much more than 60bhp, with acceptable reliability, from the 1,489cc B-Series overhead valve engine which was scheduled for use in the ZA Magnette from the autumn of 1953. Somehow or other, therefore, it was Palmer himself who found time to sit down at his drawing board, consider the various alternatives, and scheme out a proposed twin overhead camshaft conversion of the B-Series engine. As drawn up by Palmer, its two lines of valves were symmetrically disposed at an included angle of 90 degrees, and it was intended to use as many as possible of the B-Series engine's existing components.

Several points arise. One was that this was one of the very first attempts to marry a twin-cam head to an existing pushrod overhead-valve cylinder block design (no other sizeable concern had tackled such a job). Another was that there were very few precedents, as the *only* two twin-cam engines currently in any sort of quantity production were being built by Alfa Romeo in Italy, and by Jaguar in Coventry.

Palmer's layout was certainly influenced by these engines, and by the Grand Prix fashion of the day. In 1952/3 the outstanding GP engine was the four-cylinder 2-litre Ferrari unit, which had an included angle of 58 degrees between lines of valves, while those of the Jaguar and the Alfa Romeo were 70 degrees and 90 degrees respectively. Even then, the trend was gradually to reduce the angle between lines of valves (it made the gas-flow characteristics easier to optimise, and it made the head casting itself more

compact), so in this respect Palmer's design can be seen as a little behind the times. The Nuffield chief engineer, however, did not pretend to be an engine design specialist, and was happy to turn it over to James Thompson, chief engineer of the Morris Engines Branch, for consideration. But it is important to realise that the general layout proposed by Palmer, including the 'Jaguar-type' inverted bucket style of valve gear operation, was never substantially changed for production units.

An official project to produce a twin-overhead camshaft conversion on the basis of the B-Series engine was approved by George Harriman (BMC's deputy managing director—and Leonard Lord's right-hand man) early in 1953, and several sources confirm that work began in March 1953. Incidentally, in spite of what might have been suggested in other books, this twin-cam engine was definitely not originally suggested by John Thornley, though it is true to say that Thornley embraced its possibilities just as soon as he heard about its existence and knew that the B-Series engine would have to be fitted into the next MG sports car. His reasoning was simple, and very straightforward:

> We wanted the engine purely for competitions. . . . We aimed at a limited market. We wanted to make 25 a week. Then we could steer them around to those enthusiastic people who would know how to handle them throughout the world.

James Thompson, ably assisted by his development chief in Coventry, Eddie Maher (who had originally made his reputation with Riley in the 1930s when that firm was still independent and still actively involved in motor racing), set about productionising Palmer's idea, which was clearly a good one, and after taking advice from Harry Weslake, who had been an Austin Motor Co. consultant for some years and was now retained by BMC, reduced the included valve angle to 80 degrees, not only to make the head a touch narrower, but to tidy up the air-flow possibilities, and to make the combustion process rather more predictable. It was the problem of achieving satisfactory combustion which was to plague the Twin-Cam engine throughout its life, and one which directly led to its demise.

While all this was going on, Leonard Lord indulged in one of his periodic flights of whimsy. He decided that there was nothing to beat the spirit of competition in his new group, and he encour-

aged the engine designers at Longbridge—the original 'Austin' team—to produce a twin-cam engine of their own. Their brief was more simple than that given to Morris Engines—their design could be unique from end to end, and top to bottom. (One previous source suggests that the Austin engine was also a B-Series 'conversion', but this has never been backed up by any other reference.)

The result of this design competition is now well known. Both engines were revealed to the public in September 1955, a few days before the MG team cars left Abingdon to compete in the Tourist Trophy race at Dundrod in Northern Ireland, when it was intended to run one of each engine in the race alongside a third car fitted with a pushrod B-Series engine in Le Mans race tune. Over the years there has been great confusion as to which engine (or both, or neither) actually raced in the Dundrod TT, for almost every written source differs from its contemporaries. I even made an error myself in another book, and I am now happy to correct it from a most unimpeachable source—by consulting the then Competition Manager of BMC, Marcus Chambers. In a recent letter to me, Marcus states:

> Only one twin-cam engine raced [in the TT]. It was the Morris Engines one. This was because the rev limit on the Longbridge engine was no better than the standard (pushrod) engine. There were also carburettor problems.

The story is quite conclusive, and the fortunes of the team cars in this race are described more fully in Chapter 4. At this point, however, I merely note that the 'Austin' (or 'Longbridge') engine had been developed by a team headed by H. V. Appleby, who had been a junior member of the design group behind the twin-overhead-camshaft single-seater Austin racing car of 1936–9. It has even been suggested, on rather tenuous grounds, that there were superficial similarities between the 1955 1.5-litre Austin 'twin-cam', and the 1936 supercharged 750cc racing unit.

Although the new Morris Engines twin-cam design achieved no success in the Dundrod TT (it is a long and complicated story), it was obviously considered promising enough. The competition between the Austin and Morris camps ceased forthwith, the Austin engine was never seen again and, as far as is known, has not even been preserved for posterity. In spite of the brief

The rebodied MG TD Le Mans car of 1951, ready to race. This Abingdon shot features Alec Hounslow at the wheel, with designer Syd Enever (in suit) alongside him. This car was broken up many years ago (*BL*)

and unsuccessful appearance of the Morris Engines design in the prototype MGA at Dundrod, it was decided that this could form the basis of a new production car, and serious development then got under way.

Which brings me neatly to consideration of the car itself. There is little point in describing the birth and concept of the original MGA in any detail, but I should concentrate on the Twin-Cam model itself. As every MG enthusiast now knows, the MGA story began with the design by Syd Enever of a full-width two-seater sports car body (coded EX172 at Abingdon) for fitment to a race-prepared TD chassis frame, so that *Autosport* photographer George Phillips could have a competitive machine to use at Le Mans in 1951. This style was refined with the help of the Armstrong-Whitworth aeroplane wind tunnel near Coventry, and was very effective at Le Mans, though its effect was partly nullified

by the need to seat Phillips or his co-driver on top of, rather than alongside, the main chassis side members.

This irritated Syd Enever considerably, and in February 1952 (with the connivance of, but with no active encouragement from, the Cowley design office) he designed a new and altogether more suitable chassis frame to suit. This frame, and mechanical layout, coded EX175, featured box section side members widely swept outwards around the passenger compartment, and the result was that the seats could be dropped down between the side members and the transmission tunnel, thus reducing the frontal area considerably.

Two prototype frames were purchased from John Thompson Motor Pressings of Wolverhampton, and one was built up into a complete car, powered by a 1,250cc MG TD engine and also using the TD's gearbox and hypoid bevel back axle, and registered HMO 6. The only minor blemish in the entire design was that a bonnet bulge was needed to provide clearance for the rather tall TD engine.

It was such an outstanding car, so 'right' with almost no development, that John Thornley decided to demonstrate it to Leonard Lord, and ask for approval, and funds, for it to be put into production, to replace the traditionally-styled MG TD. However, as he has said on several occasions, 'it was shown to Leonard Lord three days too late', for Lord had already seen the original Healey 100 (which used redundant Austin A90 engines and transmissions, and was therefore a very attractive commercial proposition), had agreed to adopt it as the Austin-Healey 100, and was in no mood to commission yet another BMC sports car project for the time being.

Thornley and Enever, therefore, had to retire hurt for a time. They had to carry out a rushed and not altogether successful face lift on the TD (which resulted in the TF), and in 1953 and 1954 they saw their market leadership not only attacked from within the corporation, by the Big Healey, but also from Standard-Triumph, with the TR2. It was not until June 1954, with MG sports car sales suffering badly, that BMC gave Thornley the go-ahead to develop and put into production the new car—on the basis that it was to use the BMC B-Series engine and transmission, as already fitted to the ZA Magnette saloon. The new project became EX182, and the time-scale (which looked extremely difficult at the time,

After the 1955 Le Mans race, when three pushrod-engined MGA prototypes raced, and two finished, LBL 303, which had taken 17th place, was fitted with full all-weather equipment, windscreen, and a more suitable gearbox and axle ratio, and loaned to *Autocar* for trial. Harold Holt is at the wheel (*Autocar*)

and proved to be impossible in practice to achieve) envisaged that the first production cars would be ready for announcement before June 1955. Body shells were to be supplied by the Morris Bodies Branch in Coventry, chassis frames from John Thompson, and the power train from Austin factories in and around Birmingham.

Before the end of 1954, BMC also decided officially to re-enter motor sport, opened a Competitions Department at Abingdon, and appointed Marcus Chambers as its manager. Rallying was to be a principal activity, but it was also decided to enter a team of MGAs for the Le Mans 24-hour sports car race in June 1955. At first, it was hoped to have production cars on the market by then, but there were delays in completing the body tooling, and the Le

Mans cars had to be called 'prototypes'. One car crashed badly at Le Mans. Nevertheless, as we have seen, the team was also present at Dundrod, for the Tourist Trophy race, and it was there that the twin-cam engines made their first appearance.

The development of the Twin-Cam MGA, therefore, really stems from that first racing appearance, even though the car eventually put on sale to the public was by no means the same car which had raced. In particular, the wheels and the brakes used on production Twin-Cams never made an appearance in public, not even on a competition car, though if Thornley and Marcus Chambers had had their way this would certainly have come to pass.

Two horrifying accidents—one involving an MG team driver, Dick Jacobs, at Le Mans, and one resulting in drivers being killed during the Dundrod Tourist Trophy race—influenced BMC management very much, and following the second of these events it was decided that BMC's future competition effort should be confined to rallying, and to record breaking. Any racing which did take place would have to be financed (or *nominally* financed, at least) by private individuals, or by BMC concessionaires in the countries involved overseas.

This decision rather threw MG's planning out of synchronisation, as for the 1956 season not only had they wanted to use prototype twin-cam engines in relatively standard MGA models, but they also had two rather specialised project cars—EX183 and EX186—under consideration. EX183 combined a new tubular-chassis design under the skin of a light-alloy look-alike MGA body with a twin-cam engine, while EX186 used a relatively standard MGA frame (with De Dion rear suspension) and a twin-cam engine with an all-new body style. In each case, MG were thinking of using more advanced wheel and braking equipment—centre-lock disc wheels looking superficially like those by the racing Jaguar D-Types of 1954 and 1955, allied to four-wheel Dunlop disc brakes. It was this configuration, of course, which was eventually to be adopted for the production Twin-Cam, but, as it happened, any racing experience which might have assisted the production-car design engineers was lost, and all prototype testing had to be carried out on normal road cars.

This is, however, an appropriate place to analyse why these 'corners' were chosen in favour of the MGA's standard equipment. The ordinary MGA, of course, was offered only with drum

For the Tourist Trophy Race of 1955, one of the lightweight Le Mans MGAs was fitted with Girling front-wheel disc brakes, reprofiled front wings, Riley Pathfinder small-diameter auxiliary 'headlamps', and a prototype Morris Engines Twin-Cam engine of 1,489cc. The car was forced to retire when hastily made inlet manifolds developed hair-line cracks, air leaks, and ruined the carburation (*BL*)

brakes at front and rear (in the autumn of 1955, when it was revealed, Europe's only—brand-new—production car to have disc brakes was the very advanced Citroen DS19 saloon), and the choice of pressed-steel bolt-on disc wheels, or centre-lock wire-spoke wheels. Neither the existing brakes, nor the choice of wheels, was considered to be up to the job demanded of them for a twin-cam-equipped road car.

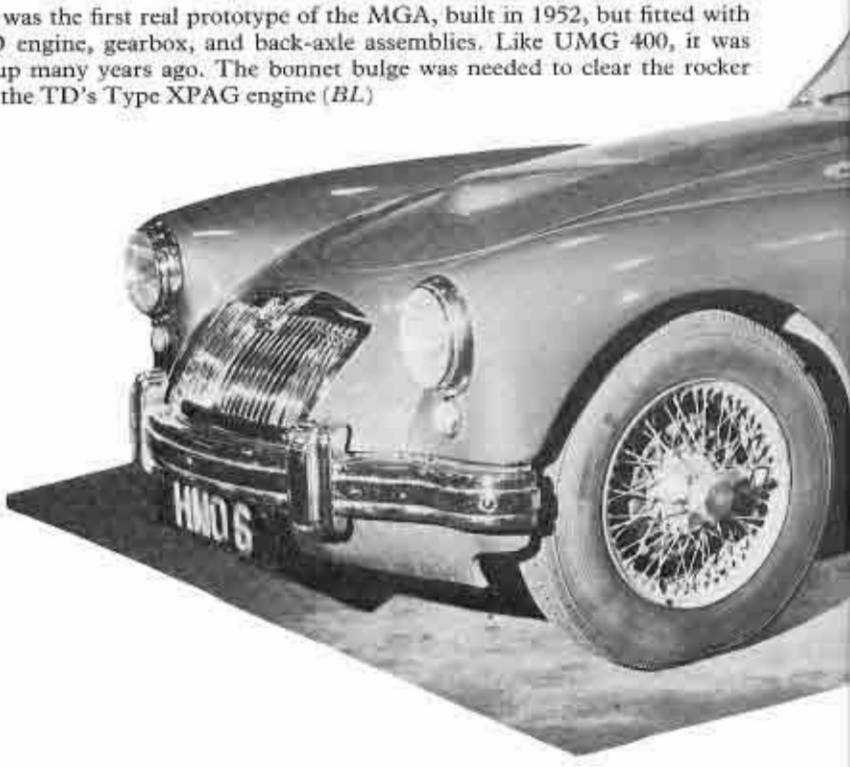
The steel disc wheels were—or could be made—strong enough, but it was thought that most enthusiasts (particularly those interested in racing or rallying their cars, and they were likely to form the majority of Twin-Cam customers) would want some sort of knock-off, centre-lock wheels. Conventional wire-spoke wheels not only tended to get dirty remarkably quickly, but they were not

laterally rigid, and often began to suffer from loose or broken spokes at quite low mileages.

Fortunately for MG, the newly designed centre-lock Dunlop disc wheels had been designed specifically for Jaguar and the D-Type in 1953/4, and had proved to combine the merits of both established types of wheel. (At the time, it should be recalled, no cast-alloy wheel was available at a commercially acceptable price.) The wheels used by Jaguar featured light-alloy centre pressings, but these would have been too expensive for MG to offer for a road car, so it was decided to use pressed-steel centres, which were perhaps a little heavier but offered considerably better value for money.

The choice of brakes was more complex. MG, like Jaguar, Austin-Healey and Triumph, were faced at this time with the fact that three British concerns—Dunlop, Girling and Lockheed—were all nearly ready to offer disc-brake equipment for road cars, and all were looking for business. As far as MG were concerned, a strictly commercial choice between these firms had to be coloured by the fact that they had chosen Lockheed drum brakes for

HMO 6 was the first real prototype of the MGA, built in 1952, but fitted with MG TD engine, gearbox, and back-axle assemblies. Like UMG 400, it was broken up many years ago. The bonnet bulge was needed to clear the rocker cover of the TD's Type XPAG engine (*BL*)



the MGA production car when it was introduced in 1955. Further complications were that Dunlop were pushing ahead with four-disc brake installations whereas Girling and Lockheed were both concentrating on front disc/rear drum systems, and that Lockheed development was lagging somewhat behind the other concerns.

The agony of choice which faced manufacturers like MG was indicated by the fact that the 1955 Le Mans Triumph TR2s ran with two different types of disc-brake installation (one car used Dunlop, and two others used Girling brakes), that MG used Girling front disc brakes on the Twin-Cam car entered for the 1955 Tourist Trophy race, that it was Dunlop who gained all the early publicity when their brakes were used on C-Type and D-Type Jaguars, and that it was Girling who gained the contract to brake the 1957-model Triumph TR3, which made its public debut in October 1956.

MG, having analysed all this information, having seen the way in which the makers of true performance cars—like Jaguar and Jensen—chose the four-wheel Dunlop disc braking system, and having decided that this was the 'purest', in engineering terms,

layout, settled on the Dunlop layout, and became only the third *quantity-production* manufacturer in Britain to offer disc brakes as standard. Jaguar and Triumph were the other two concerns which beat MG to the post. (Incidentally, when it became time to offer disc brakes on the MGA 1600, and on the Austin-Healey 3000, both of which were assembled at Abingdon in 1959, Lockheed brakes were chosen for the MGA and Girling brakes for the Big Healey!)

While all this was going on, the original twin overhead camshaft engine was being developed, and refined, into a machine suitable and capable of relatively limited quantity production. From time to time (as detailed in Chapter 4), prototype units appeared once again in MG record cars, but behind the scenes at the Morris Engines factory in Coventry efforts were being made to turn the basic unit into a reliable machine, for high-mileage road use.

All the initial testing and development was of 1,489cc engines—on the assumption that this was not only the size used in the pushrod-engined MGA and the Magnette saloon but in almost every other B-Series equipped BMC car, and also on the assumption that the cylinder block to be used for the Twin-Cam should, and could, be machined on existing transfer machinery at Longbridge. It was not long, however, before it became necessary to move the location of the cylinder-head holding-down studs, to make modifications connected with the removal of the distributor from its position on the offside of the cylinder block to one on the front cover of the Twin-Cam, to make changes . . . no, the list is too long to detail here. Suffice it to say that the production cylinder block was already looking very non-standard (and in need of special machining operations before being ready for assembly) even before the decision was taken to enlarge the engine itself, from 1,489cc to 1,588cc.

This came at quite a late stage. At one point it had been hoped to introduce the Twin-Cam to the public in the autumn of 1957, but well before this MG came under pressure not only from their dealers but also from the BMC Competitions Department, to take full advantage of the 1.6-litre International sporting class limit. To do this, it was thought advisable to increase the cylinder bore rather than the crankshaft stroke. The 1,489cc engine's bore was 73.025mm (2.875in), and this was therefore increased to 75.39mm (2.968in). The fact that a 75.68mm cylinder bore would have

resulted in a 1,599cc capacity has no relevance here, for BMC's engine builders were still firmly wedded to the idea of using nominal dimensions in Imperial measure—the 1,489cc bore was $2\frac{7}{8}$in, and that of the 1,588cc Twin-Cam was $2\frac{31}{32}$in!

Even though the bore increase was limited to a mere 2.36mm, or 0.093in, it was not possible to achieve this without making changes to the cylinder block casting (which was already, I remind you, considerably different from the push-rod block). Coring changes were made by arranging to 'siamese' the two end pairs of cylinders, thus sacrificing the space between them for water cooling.

An immediate effect of this was that the entire, and very ticklish, question of piston-to-cylinder wall clearances had to be re-assessed and re-developed, as had the profile of the pistons (being finalised for the use of a 9.9:1 compression ratio), along with all the other complications—finalisation of valve timing, ignition timing, oil flow, carburettor settings, for example—which a change of engine capacity inevitably drags along behind it. It might even be suggested that this late change was partly responsible, at least, for the early problems which afflicted the production cars; it certainly delayed the launch of the production car by at least nine months.

By the spring of 1958, however, BMC, and MG, decided that they were indeed ready to take the rather momentous step of offering BMC's (and MG's) first-ever twin overhead camshaft engine to the public. The engineers had done their best, and the sales force were ready to do theirs. Now it all depended on us—the public.

2

Twin-Cam–The Technical Analysis

As I have already made clear in the previous chapter, the MGA Twin-Cam which was finally put on sale in July 1958 was a much more specialised car than it looked. It was also a much more specialised car than the project which BMC's bosses had approved back in 1954/5. At first it had looked easy enough to develop what was really no more than a twin overhead camshaft engine conversion on the basis of the MGA production car, but as work progressed a series of modifications made almost every aspect of the car somewhat different from the pushrod MGA itself. Indeed, between 1958 and 1960, further changes would be made, which would make the Twin-Cam even less like the conventional MGA.

Although the layout of the massively strong chassis frame was exactly the same as that of the pushrod MGA from which it was derived, there were several differences of detail sufficient to make them non-interchangeable. The most notable of these was connected with steering rack position, which had had to be altered to provide clearance from the bulkier twin-overhead camshaft engine. As with the normal MGA, the rack housing was bolted to the front chassis cross-member (and poked out towards each wheel through holes in the front chassis extension); the Twin-Cam engine, though mounted in the same position in the chassis, featured a large and bulky cast-alloy front cover, and this resulted in the fan belt pulley also being further forward, near the base of the radiator. This meant that the rack had to be mounted further forward than on the pushrod cars—about one inch—and although the rack itself is the same, the pinion is different since it is longer than that fitted to the pushrod cars, and allows the same steering column to be retained.

Elsewhere on the chassis frame itself, the changes are minor. To suit the installation of the Dunlop disc brakes, there are different brake pipe/flexible hose mounting brackets, the front engine

mounting detail on the right is unique to the Twin-Cam, and there is a different bracket for the mounting of the SU electric fuel pump, towards the rear. Finally, and there is no really vital reason why this should be so, the Twin-Cam chassis frame has a different series of bolt hole spacings across the top of the chassis bulkhead rail ahead of the passenger compartment.

It follows from this description that it was easy enough for a Twin-Cam car to be re-converted back to a pushrod engine specification, especially if the Twin-Cam wheels, brakes and steering were left undisturbed—and this explains why the 1600 De Luxe model appeared so smartly when production of the Twin-Cam itself had ceased. It also explains why some of the surviving cars which originated as Twin-Cams have retrospectively become 'private-enterprise' De Luxes.

Compared with the pushrod MGA, the main front suspension links, the lever-arm shock absorbers (and settings), and the vertical links were all similar, as was the steering rack itself, but the hubs were entirely special, and the steering arms themselves differed from those fitted to the MGA 1500 because they not only had to take account of the new (forward) steering rack position but also had to provide clearance for the brake discs.

The brakes, of course, were Dunlop discs, and were different from any other type of brake ever fitted to MG production sports cars. I have already detailed how the choice of Dunlop brakes was made, and why MG were not able to continue to patronise Lockheed, who supplied the drum brakes for the MGA 1500. The caliper actually used was what I would call the 'standard' Dunlop product of the period, and was supplied, at the same time, to concerns as eminent as Ferrari, Aston Martin (for the DB4), and Jaguar (for the XK150s and for the 3.4-litre/3.8-litre saloons). There was a huge increase in brake rubbed area compared with the MGA 1500 (495sq in for the disc-braked Twin-Cam, 134sq in for the drum-braked MGA 1500), and for this reason it was not necessary to specify a brake servo of any sort. Independent road tests confirmed that the pedal pressures were acceptable, and that retardation was strictly comparable with the MGA 1500. The great advantage, of course, was that the disc-brake installation could be hammered really hard without showing signs of fade, whereas the drum-brake installation of the MGA was by no means as resilient.

(*Above*) For the Earls Court Motor show of 1958, MG showed off a partly sectioned example of the MGA Twin-Cam coupe on a revolving turntable. The rear-wheel disc brakes and rear suspension, the window-winding mechanism, and the detail of body roof construction were all displayed to perfection; (*opposite*) the front half of the same car showed the massive engine, special wheels, Dunlop disc brakes and chassis layout (*both Autocar*)

As with other Dunlop disc-brake installations of the day, the handbrake, operating through a cable linkage, worked on the rear discs by a separate caliper with small pads. This worked well so long as it was kept clean and well lubricated, and so long as the caliper mounted pivots were not allowed to seize up. A badly neglected Twin-Cam handbrake, however, could virtually cease to operate altogether—and this sort of failure tended to occur when the car had been stored for a considerable period.

Although the centre-lock Dunlop wheels were not unique, they were a real rarity. No other true quantity-production car ever specified such wheels, though similar (but light-alloy) wheels were to be found on BRM Grand Prix Cars, and the Jaguar D-Type sports-racing cars, both of which were in use when the Twin-Cam

was being developed. Later, I understand, the limited-production Gordon-Keeble also used such wheels, and these are interchangeable with the Twin-Cam variety. Such wheels, of course, feature peg drive into special hubs, rather than driving through splines.

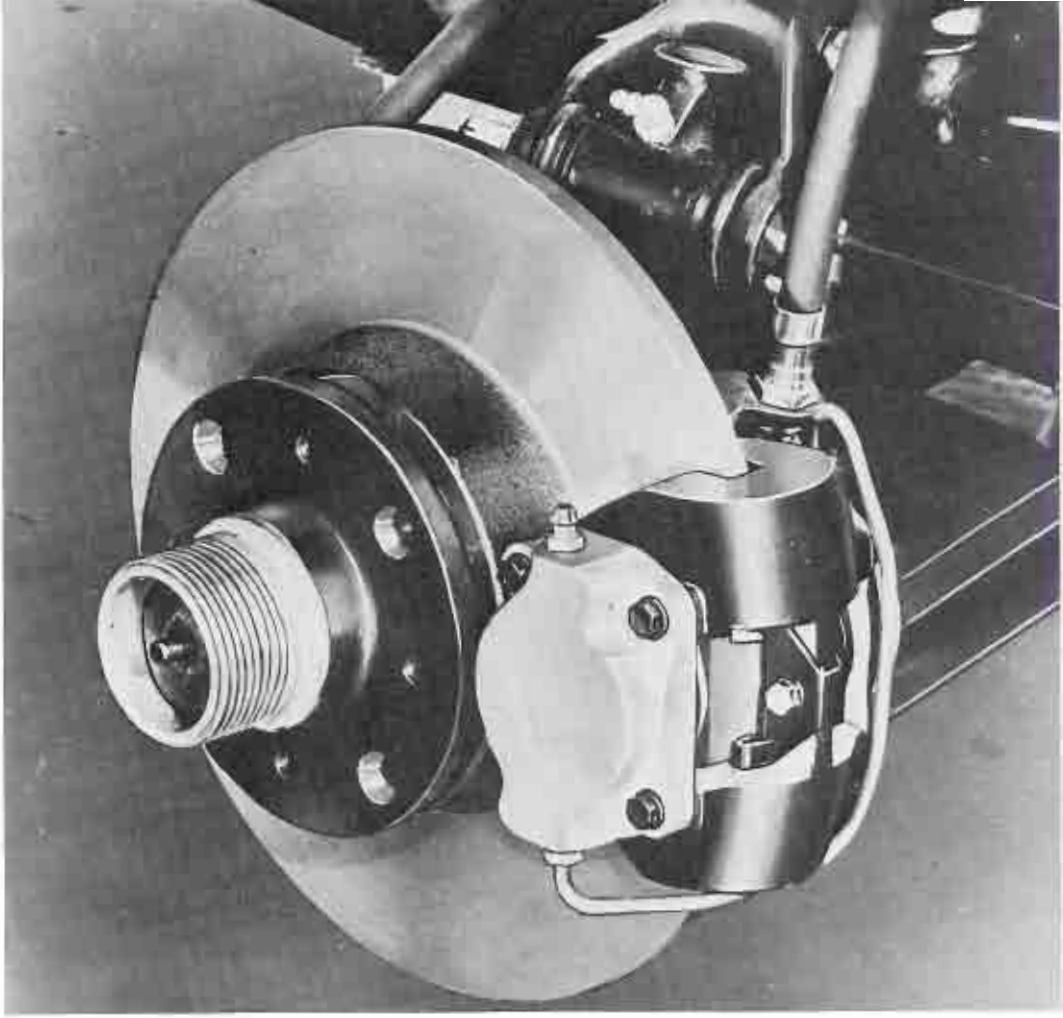
The tyres specified for the Twin-Cam were 5.90–15in Dunlop RS4 Road Speeds, which we would now look upon as somewhat archaic items, but which were then thought to be a good compromise between the behaviour of a high-speed racing tyre and the comfort and long-life potential of a normal road tyre. The MGA 1500, of course, was fitted with normal 5.60–15in Dunlops, but the uprating had been made necessary by the vastly increased performance of the Twin-Cam, whose maximum speed was about 115mph, compared with perhaps 96–98mph for the pushrod-engined car.

For the original Twin-Cam of 1958, there were virtually no external differences in the body compared with the MGA 1500, and both open Tourer and closed Coupe styles were available. Visually, indeed, from the exterior the only recognition marks were the centre-lock wheels and the discreet little 'Twin-Cam'

badges screwed to the bonnet surround panel, immediately behind the air vents from the engine bay, and to the boot lid below the familiar MG octagon badge. It was never obvious, however (and does not seem to have been noted by previous writers about Twin-Cams), that the bonnet panel itself was given a slightly different profile to provide clearance for the rather more bulky Twin-Cam engine. Unlike the MGC, there was no need for a separate and rather obvious bulge to be incorporated into the panel; it was merely given a more obvious curvature from side to side, and was thus slightly humped towards the centre of the car. This bonnet, incidentally, was in light alloy as usual, and when the MGA 1500 was replaced by the MGA 1600 in 1959 (ie, while the Twin-Cam was still in production), the new-style bonnet was commonised across the range.

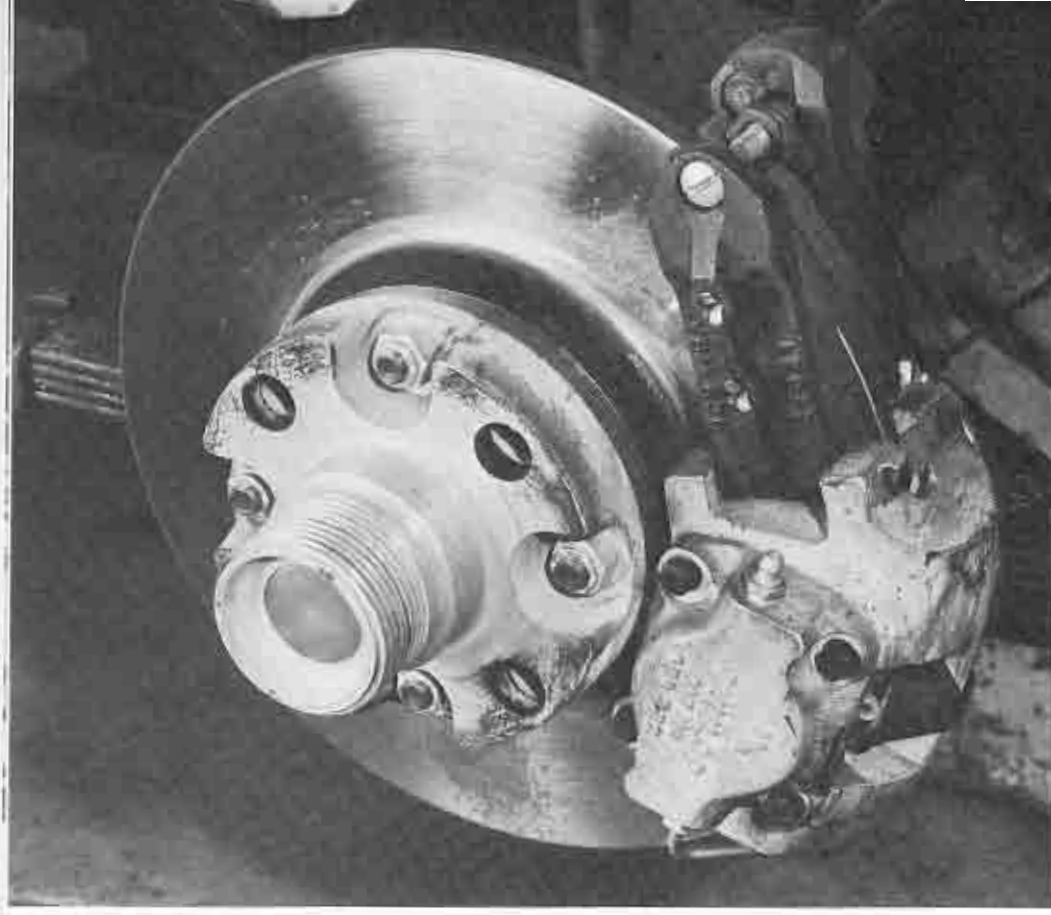
Inside the cockpit, the instrument panel was almost the same as that of the MGA 1500, except that the speedometer and revcounter were both recalibrated to take account of the higher performance and revving capabilities of the new engine. As something of a 'product planning' feature, the Twin-Cam was also given a leather-covered facia panel. Even with this car, incidentally, you still had to pay extra for the heater and screen washer. A careful comparison between car types shows that the heater in the Twin-Cam was slightly displaced to one side compared with the pushrod-engined cars being built at the same time. Some cars, for sure, were built without a heater, or even without the 'fresh-air kit' option, and have blanking plates on the bulkhead to this day.

There were, incidentally, two types of seats, which sometimes cause confusion. Twin-Cam roadsters, the open variety, were normally supplied with bucket seats identical with those of the MGA 1600, which had asymmetrically styled back rests whose top profile matched the curve of the bodywork immediately behind them, while Coupes had rather larger and more sumptuous seats with squared-up backrests and a padded roll around their cushions to provide more support. One way or another these Coupe seats became known as De Luxe seats, and could also be supplied on open cars; such cars are immediately recognised by the style of the seats themselves, and by the fact that they do not conform to the curve of the body panels behind them. (There were, also, what are known as 'Competition De Luxe' seats, but these were very rare, and were normally only fitted to cars built for racing or rallying.)



A feature of the MGA Twin-Cam was the use of Dunlop disc brakes at front and rear. This is the front suspension and brake installation, which also details the peg-drive location of the centre-lock disc wheels (*BL*)

Hidden away out of sight were further body-shell changes connected with the installation of the bulky new engine. The radiator had had to be moved forward to clear the engine, which resulted in new mountings being needed. New inner wheel arch panels (or engine bay valances, if you prefer an alternative description) were provided to increase space around the carburettor air cleaners and the more expansive exhaust system, while the bulkhead panel had different piercings to suit the modified heater position and the different brake master cylinder arrangements. Nothing, it seemed, was simple and logical at BMC at this time.



The Dunlop disc calipers on the Twin-Cam were mounted behind the line of the back axle, and the handbrake had its own separate mechanical disc-gripping arrangements pivoting to the hydraulic foot-brake caliper itself; this only works well if kept well lubricated and free from corrosion (*BL*)

A description of the engine must come next, because this was the centre of the whole design, indeed the reason for its existence in the first place. By the time the Twin-Cam went on sale, the engine was by no means the simple conversion of the pushrod unit which had originally been intended, but was almost entirely special.

When it was announced, the 1,588cc engine capacity of the MGA Twin-Cam was unique at BMC. Every other B-Series engine in series production had a capacity of 1,489cc, which was the original size introduced with the Morris Oxford/MG Magnette models of the early 1950s. The Twin-Cam's 1,588cc capacity had been reached by specifying a larger cylinder bore, which in turn had necessitated changes to the cylinder block casting, and

The steel-disc centre-lock wheels for the Twin-Cam were provided by Dunlop, and were never used on any other production car, though those fitted to the Gordon-Keeble of the 1960s were of a similar basic design. Dunlop Road Speed tyres were standard on the Twin-Cam; radial-ply Michelin Xs were never offered (*BL*)

this meant that the casting was very different indeed from those being machined for the mass-production 1,489cc cars. Almost all the advantages of mass-production tooling, therefore, had been lost. The *Autocar* technical analysis of 18 July 1958 summarises perfectly what had been done, and how manufacture was carried out:

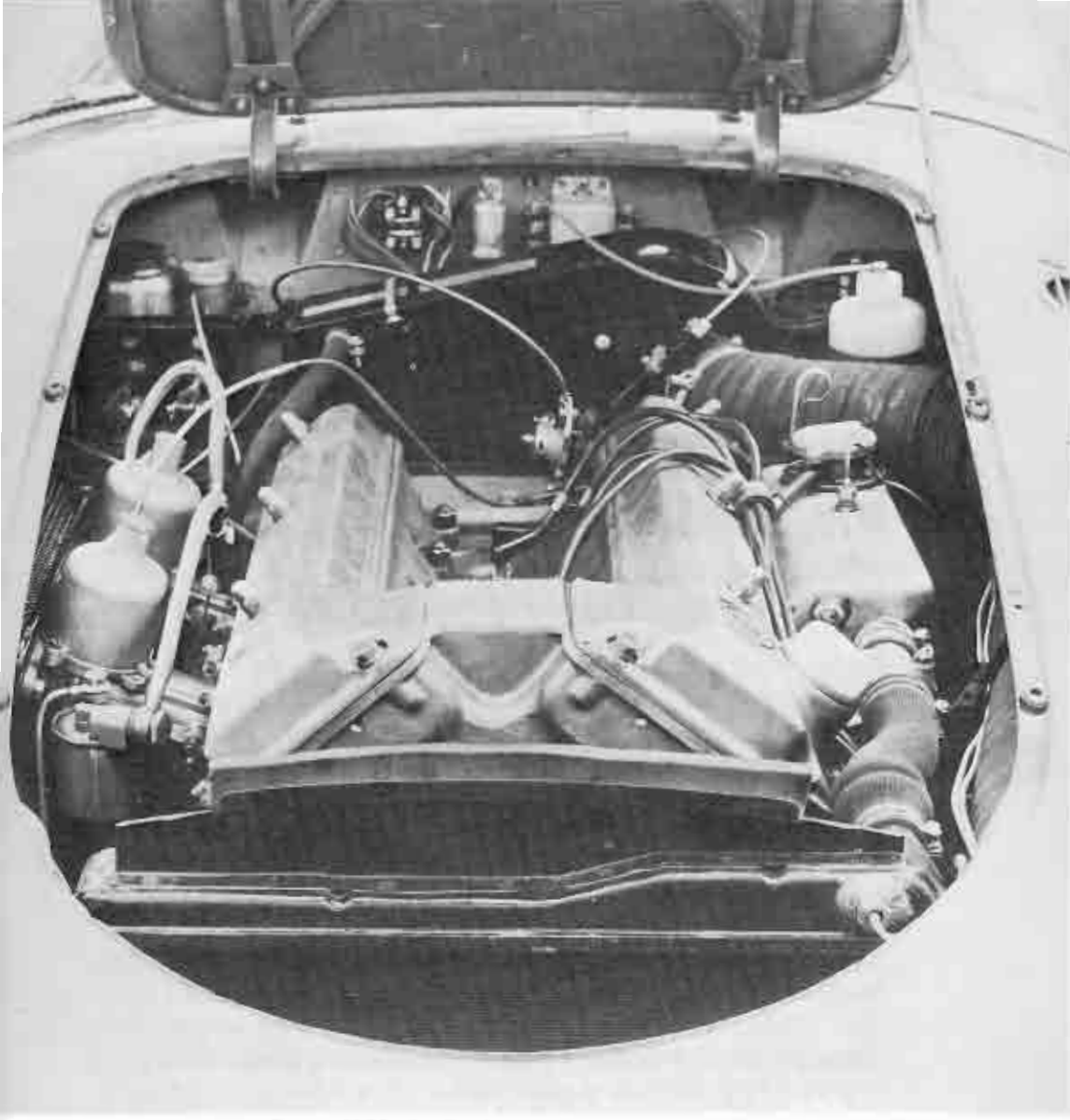
> For ease of production, certain parameters were placed on the design of the cylinder block which, although outwardly resembling the standard B-Series unit, is made from entirely new pattern equipment. Location of main faces from the crankshaft centre line, and main bearing bores are identical. Thus the basic machining can be undertaken on the transfer-matic machines of the production line at the

Austin works at Longbridge (with consequent reduction in costs), and the units are then despatched for finishing at the Morris engine works at Coventry where, in fact, the design and development was undertaken.

So far, so good. Very little common machining could, in fact, take place, for almost everything of the Twin-Cam engine in detail was different. The question of different cylinder block coring, repositioned cylinder head holding-down studs, and larger cylinder bore have all been mentioned already. There was also the fact that the location of the various auxiliaries had been re-shuffled, that camshaft drive details were entirely special, and that the crankshaft was completely different as well.

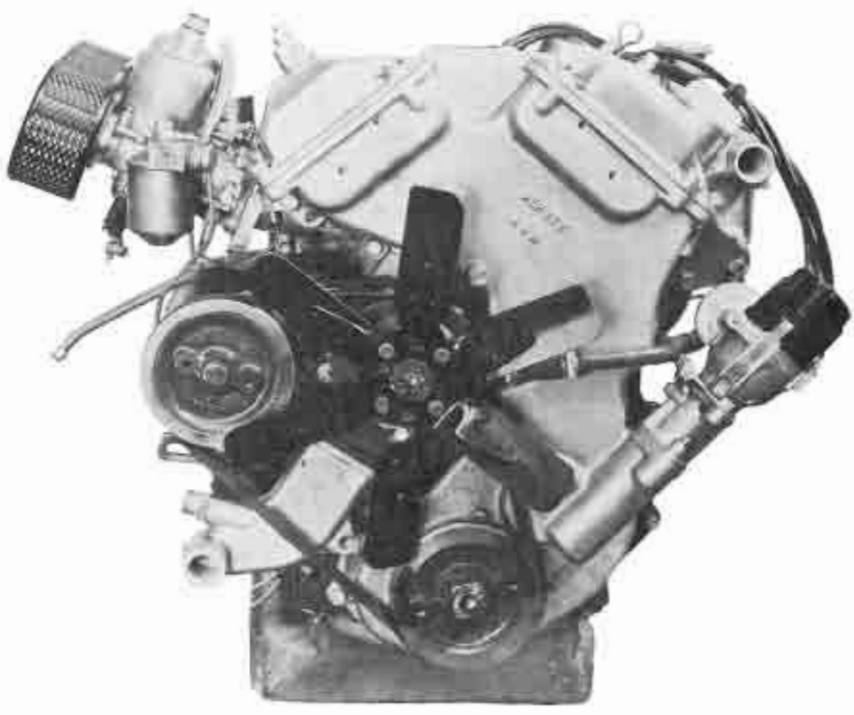
The light-alloy cylinder head had gone through several stages of development before being put into production. The road car's engine, therefore, was equipped with what I will call the 'classic' type of twin-cam valve gear, whereby the valves themselves were operated from the cam lobes through the intermediary of inverted bucket tappets, which enclosed the valve springs. This, of course, was the arrangement already adopted for engines as diverse as the Jaguar XK six-cylinder unit, any variety of modern twin-cam Alfa Romeos, and the Coventry-Climax FWA and FPF engines which had already made such an impact on the modern motor racing scene. Nowadays, no self-respecting twin-cam engine would use any other method, and MG were absolutely right to adopt it for themselves. There was one slight oddity which was to have serious implications for the engine's reputation in service; instead of arranging for the bucket tappets to operate inside slim sleeves pressed in to the light-alloy head casting (in the way adopted by Jaguar, for instance), MG's engine had them operating direct in machined barrels in the head casting itself.

Because the valves were large, and equally disposed around the centre line of the cylinders at an included angle of 80 degrees (Jaguar used 70 degrees, by the way), a capacious and almost entirely hemispherical combustion chamber was provided. To achieve the planned maximum output of 68bhp/litre, therefore, it had been necessary to use a very high compression ratio of 9.9:1. Because of the inescapable geometric realities of the hemispherical combustion chamber, this meant that steeply domed pistons had to be specified, and a consequence was that the mixture's initial burning space was effectively crescent-shaped, and with a large



A real bonnetful of engine! The Twin-Cam engine's cylinder head and carburation was a bulky assembly, but there was no installation problem at Abingdon, as the engine was fitted to the rolling chassis before the body shell was dropped on top of it (*Peter Wood*)

surface area. BMC's engineers realised that this made the use of 100-octane fuel almost mandatory, and that strict attention to correct ignition timing would be needed, but they thought that Twin-Cam owners *and* dealers could be persuaded to keep their engines in proper working order.



Front view of the early Twin-Cam production engine, showing that it was at least as wide as it was deep. The distributor drive was located in the new cast front cover (*BL*)

There were short separate inlet manifolds, and two SU H6 carburettors, with 1¾in diameter throats, were mounted at a semi-downdraught angle of 22½ degrees. Even though cost limitations meant that cast-iron exhaust manifolds had to be used, their shape was really very efficient; there were two separate castings, one linking cylinders Nos 1 and 4, the other linking 2 and 3, and from the flanges there were separate down pipes, the layout being designed to produce the minimum amount of back pressure and the maximum of extractor effect.

Although the front of the cylinder block itself was much like that of the pushrod engine, it was hidden by a large and complex light-alloy front cover hiding the camshaft drive, the distributor drive, and other details. The camshaft of the pushrod engine was not required to be fitted in the side of the block, but its tunnel was retained, and in that tunnel was a half-speed shaft (or jackshaft), driven from the nose of the crankshaft by single helical gears, and which itself provided a skew gear for driving the oil pump, which

was hidden away inside the block on that side of the engine.

The overhead camshafts were then driven by a single, long, Duplex chain originating from that jackshaft. An idler gear was mounted to a pivot on the front cover itself, and there was a chain tensioner also positioned inside the front cover. In laying out the twin-cam cylinder head, the carburettors and inlet manifolds had been positioned on the right side of the unit. Although, as on the pushrod engine, there was still space for the dynamo and the starter motor to be placed on that side, the distributor and its drive had had to be moved; this found a home in the front of the timing case, and was driven by a skew gear from the front of the half-speed shaft.

Not only was this a powerful engine, but it was a powerful-*looking* engine, for there was a big, ribbed, cast-alloy sump, polished light-alloy camshaft covers, and all the attention to detail which goes with a truly exclusive high-performance engine. The fact that it was not only powerful but also rather bulky was a handicap which had to be accepted. When installed in the car, and with the body shell in place, the Twin-Cam appeared to have a 'bonnet-full' of power. This was good for the ego, but bad for the servicing and maintenance aspects, and it was for this reason that two detachable panels were later added to the engine bay valances in the body shell, above and behind the line of the front suspension cross-member.

Behind the engine, there was a specially uprated clutch to look after the increased speed and torque which could be developed by the Twin-Cam engine (its maximum torque was 104lb ft at 4,500rpm, compared with 77lb ft at 3,500rpm for the MGA 1500's pushrod engine, and the Twin-Cam engine produced its maximum power at no less than 6,700rpm). Apart from that, however, the gearbox itself, its wheels, cogs, bearings, and ratios, were all absolutely the same as those used on the normal MGA.

Because of the special hubs needed to accept the rear wheel disc brakes of the Twin-Cam and the peg drive for the centre-lock road wheels, the axle was different, and rather special, compared with the normal B-Series unit fitted to MGA 1500s. The casing had to be special, to pick up on disc brake caliper adaptor mountings, and the half shafts themselves had to be special to match the hubs. The same 4.3:1 crown-wheel-and-pinion ring gear was used, as, at first, was the differential itself, but later in the life of the Twin-

Cam the smaller differential gears also became special, and were never specified on any other type of MGA. (On the MGA 1600 De Luxe—a car which is described in greater detail in the next chapter—the axle was even more strange, because MGA wire-wheel type shafts were used, not Twin-Cam shafts, and they matched the wire-wheel car's differential gearing in the final drive itself.)

At this stage, I should point out that several items of 'competition' equipment were optionally available. MG never offered any engine tune-up items (the engine, in all truth, was really a de-tuned racing engine already, and not very de-tuned, at that), but the close ratio gears which had been used on the 'works' racing and rallying MGAs were on offer, while there was the possibility of a telescopic, adjustable, steering column, a detachable hardtop (with sliding side-screens instead of the flap opening type normally fitted to Twin-Cam tourers), a low competition windscreen, and an optional oil cooler. The oil cooler, in fact, was by no means the same as that optional on pushrod-engined MGAs, but had a different mode of mounting and of positioning in the bodywork at the front of the car. Yet again, it seemed, this was a case where sensible commonisation of parts should have been applied, but where a special kit for the Twin-Cam was developed.

This, then, was the Twin-Cam MGA which was revealed in the summer of 1958, but it soon became clear that the specification had still not entirely been settled, nor was the car completely reliable in every detail. Changes began to be made almost at once, but consideration of these changes, and the points at which they were introduced, truly belongs to the next chapter, when the car's production and service life are described. As it happened, the Twin-Cam would have a production life of just about two years, and the majority of the 2,111 cars built were assembled in the winter of 1958 and the first half of 1959. As far as the MG factory at Abingdon was concerned, it was a short-lived phenomenon, but as far as today's enthusiast is concerned, it is a very special car which will live, in fact and in legend, for many years to come.

Note

When the Twin-Cam engine was announced, it was the only 1,588cc B-Series-derived unit built by BMC, and final assembly,

at the Morris Engines Branch factory in Coventry, was on a special production line, at the rate of about five units a day.

From May 1959, however, the MGA 1500 pushrod-engined car gave way to the MGA 1600 which, among other important improvements, was given an enlarged and more powerful pushrod engine of 1,588cc. This, unfortunately, was not part of a wholesale rationalisation of engine capacities by BMC, but merely recognition of the fact that pushrod as well as Twin-Cam MGs had to compete in the 1.6-litre competition class. It was a convenient way, too, of providing the MGA customer with an excuse for changing his car for the 'new model' (the MGA 1500, after all, had been on sale since 1955 without important change), and it resulted in an increased power output of 80bhp (nett) at 5,600rpm.

I should make it clear, even so, that the pushrod 1,588cc engines continued to be machined and assembled at Longbridge, and that no other BMC car was given that capacity. The across-the-range change of size occurred in 1961 when not only the MGA but cars like the Morris Oxfords and 'Farina-styled' MG Magnettes were given 1,622cc engines.

3

Twin-Cam in Production – A Two-year Life

After a great deal of experimental and development work, and late delays caused by the decision to increase the size of its engine from 1,489cc to 1,588cc, the MGA Twin-Cam model finally went into production in the spring of 1958. It took time, however, for engine supplies to build up, and it was not until September that true series production was achieved.

What happened next was a source of great frustration to every enthusiastic MG employee, and has been the cause of discussion—and disappointment—among Twin-Cam devotees ever since. Production built up steadily during the winter of 1958/9, and reached a peak of 313 cars a month in February 1959. Within months, however, it became clear that the demand for Twin-Cams was simply not there, and production of the car was cut back to balance the situation. By October 1959—only fifteen months after the Twin-Cam had been publicly launched—serious production was virtually over. In the last nine months of the Twin-Cam's life, only 90 cars were built, and it was all over by June 1960. In less than two years, only 2,111 Twin-Cams were sold. So what happened, and what should MG and BMC have done to save the day?

There is no point in trying to hide the facts, for every Twin-Cam owner, past and present, knows the story: it was all a question of reliability, and the reputation built up by the car's early problems. The fact that, by the end of 1959, the Twin-Cam was a vastly better, if not quite as fast, car, was neither here nor there. All over the world, it seemed, potential Twin-Cam customers had heard about early cars burning their pistons, greedily consuming oil, and needing constant care and attention to keep them going, and decided not to join such an exclusive club. The fact that the service, development and production engineers had combined to bring

Table 3.1 *MGA Twin-Cam—Month-by-month production figures, 1958–60*

1958	May	4	
	June	31	
	July	3	(Month in which car announced)
	August	12	
	September	109	
	October	116	
	November	98	
	December	135	Total for Year 508
1959	January	148	
	February	313	
	March	261	
	April	216	
	May	208	
	June	172	
	July	79	
	August	24	
	September	92	
	October	7	
	November	14	
	December	16	Total for Year 1,550
1960	January	16	
	February	13	
	March	15	
	April	8	
	May	—	
	June	1	Total for Year 53 Grand Total 2,111

Note: Each monthly figure represents the number of cars rolling off the *finishing* line at Abingdon.

MGA 1600 De Luxe production began in June 1960—see Table 3.2 (p. 55) for details.

about a transformation, such that the later Twin-Cams were altogether more docile, and completely reformed characters, was not taken into consideration. A very efficient campaign of character assassination, helped along, I'm sure, by jealous rivals whose cars were neither as fast nor as exciting as the Twin-Cam, had been carried out. Only massive expenditure in the form of a re-launch, with stunts carried out to prove the latest model, and with a competition programme to prove the point in the full glare of publicity, would have done the trick. But by this time too much money had already been spent on what was only a limited-production model by BMC's Longbridge standards, and the Twin-Cam was allowed to die.

There was also the question of its price, and the fact that not

every Twin-Cam was as fast as it was claimed to be, nor as its specification promised that it *should* be. The clincher, though, was probably the fact that the Big Healey—the definitive Big Healey, that is, the 3000 with the the 2,912cc engine—went on sale in 1959, at a very competitive price, and with a lusty trouble-free performance which made it ideal for development by BMC's Competitions Department. Without the Big Healey, perhaps, the Twin-Cam might not only have become a successful competition car, but might also have had a longer production life.

While researching material for this book, I was lucky enough to be allowed to consult the actual Twin-Cam production records, which are now lodged with BL Heritage Ltd, and which give a fascinating amount of detail about the cars themselves. Extracted from those records is the summary given in Table 3.1 of how production progressed.

At this point, I should review the way in which the various components for the MGA Twin-Cam came together, and should reiterate that almost no actual manufacture ever took place at Abingdon in this period. The pressings for chassis frames came from John Thompson Motor Pressings in the industrial Midlands. The body shells—open Tourers or closed Coupes—were pressed, assembled, and painted at the Morris Bodies Branch in Coventry. The engines were assembled at the Morris Engines Branch in Coventry (which was, incidentally, several miles away from the Bodies Branch). The gearboxes and the rear axles were machined and assembled at BMC transmissions plants in Birmingham. Tyres came from Dunlop in Birmingham, wheels came from Dunlop Rim and Wheel in Coventry, and the Dunlop disc brakes also came from a corner of that Dunlop factory in Coventry, which at this point in history was still the 'Detroit of Britain'.

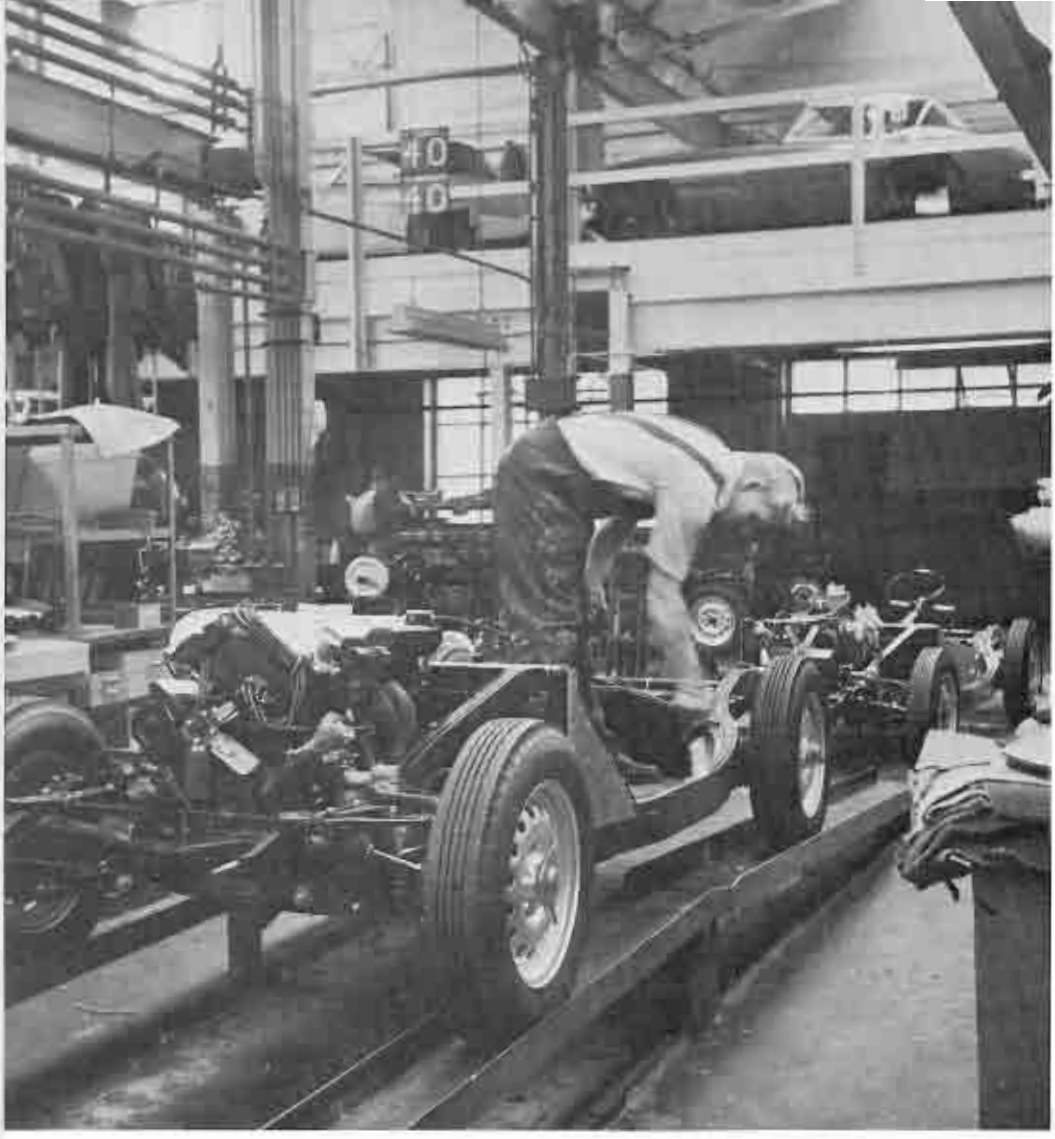
At Abingdon, the whole rolling chassis was completed before the appropriate body shell was lowered into place, which explains, but does not excuse, the fact that the Twin-Cam went into production with a serious accessibility problem (for mechanics and Do-It-Yourself owners) to almost every item on the engine below cylinder-head level. This problem should have been picked up at the development stage, when engines were no doubt being craned out, and re-assembled, in the experimental department at Abingdon.

When the cars were completed—and in February 1959, on

MG's Abingdon factory in 1958, where the final finish area is crowded with MGA Twin-Cams, Austin-Healey 100-Sixes, and Austin-Healey Sprites, not to mention a large number of pushrod-engined MGAs (*BL*)

average, that meant that 15 new Twin-Cams rolled off the simple assembly lines every working day—they were all taken out on the road for a short shake-down test. That sort of thing could never be tackled by a firm making many thousands of identical 'bread-and-butter' cars, but at MG it was still something of a tradition. The author remembers with pleasure how, as an undergraduate at Oxford, he bicycled the few miles south to see the constant stream of gleaming new MGAs threading their way in and out of the MG factory, all on trade plates, and all clearly being on test.

By the time the Twin-Cam was revealed, on 16 July 1958, its existence had become something of an open secret among the motoring press, and in the industry as a whole. With BMC once again on the crest of a profitable wave, the only surprise was that it should have been delayed for so long. (One reason, for sure, was



A Twin-Cam at the start of the body-mounting line at Abingdon—with Big Healey body/chassis units in the gallery above and behind the Twin-Cam chassis (*Peter Wood*)

that in the autumn of 1957 MG's production planners were busily getting ready to build Austin-Healey 100-Six models—final assembly being moved down the road from Longbridge—and that in the spring of 1958 they were getting ready to launch the cheeky and characterful Austin-Healey Sprite, which had been prepared in something of a hurry from a design dreamed up in 1956 by Donald and Geoffrey Healey.)

MGA production at Abingdon in 1959/60, with the body of a Twin-Cam just having been lowered on slings to mate with the chassis. Very few Twin-Cams were being built by this stage—all the other cars 'in shot' have pushrod engines (*Peter Wood*)

Although BMC's publicity machine operated in a very efficient manner—not only did the authoritative publications all carry full descriptions and cutaway drawings of the engine in that first week, but *The Autocar* and *The Motor* also published road tests of the car as well—there were very few Twin-Cams to be sold at first. The first four cars were finished in May 1958, the next 31 followed in June, but only three followed in July. When the car was released,

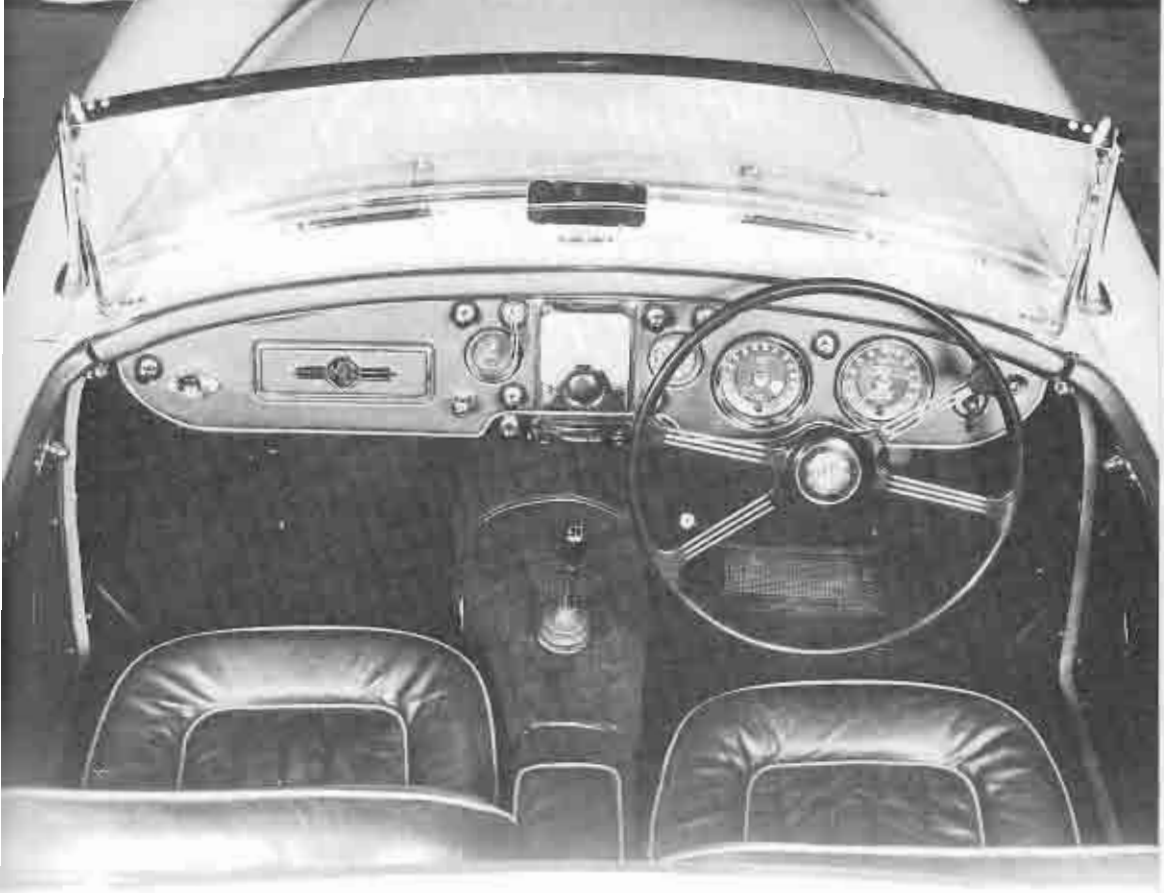
therefore, apart from the experimental models under the control of the MG experimental department, there were only about 35 Twin-Cams in existence. (All of which, incidentally, helps to explain why the car's 'works' rallying debut was delayed until the Liège–Rome–Liège rally of August 1958.)

It went on sale at a basic price, in Britain, of £843 for the open Tourer, and £904 for the Coupe, and it is important at this juncture to compare those prices with the British competition. MGA 1500s with pushrod engines were on sale at £663 for the Tourer and £724 for the Coupe, which meant that the Twin-Cam was being sold at a premium of 27 per cent, which was a considerable but (in terms of the performance increase) justifiable difference.

The two-seater Austin-Healey 100-Six (Type BN6), which was newly announced and being assembled at Abingdon when the Twin-Cam was launched, was nominally offered for £817, but that price did not include overdrive and wire wheels. Thus equipped, a BN6 sold for £924, or £1,014 if the optional hardtop was also specified. At first glance, however, a sports car enthusiast was being offered an intriguing choice of cars for a similar amount of money. The Big Healey's top speed was about 111mph, and its standing ¼-mile time was 18 seconds; the best of the Twin-Cam tests published showed a top speed of 113mph, and the standing ¼-mile sprint in 18 seconds. In Britain the other obvious competition came from the Triumph TR3A. It might not have been as fast in a straight line (its top speed was about 105mph and it took nearly 19 seconds to reach the quarter mile), but it was a rugged and well-proven car, recently updated, splendidly braked since Girling disc brakes had been adopted in 1956/1957—and its basic price was only £699.

The situation was worse in the United States, where it was hoped that the Twin-Cam might find success. The Tourer was priced at $3,345, or $3,495 for the Coupe (a much smaller differential than in the case of the British-market price), while Austin-Healey 100-Six prices started at only $3,087, and it is surely relevant that the elephantine, but rapid, Chevrolet Corvette also sold for $3,631.

MG, therefore, went into the market place with a hefty price tag on the Twin-Cam, one that they thought justified by the very special nature of the specification and all the work which had gone into developing it. The press, as a whole, gave it a generous



The facia and instrument panel of the Twin-Cam—virtually the same as that specified for pushrod-engined MGAs of the period, except that the speedometer and rev counter have been recalibrated. On this pre-production car, the rev-counter is 'yellow-lined' at 6,500rpm, and 'red-lined' at 7,000rpm (*BL*)

welcome, and brief comments from those two paragons of motoring journalism, *Autocar* and *Motor*, serve to illustrate how it was received.

The Autocar's technical analysis suggested that: 'The price to be paid for the extra performance and increased braking is not unreasonable, and this latest product from Abingdon must rank among the world's outstanding sports cars ...', while in their road test they commented that: '... The car is quite happy at 100mph for long stretches on Continental roads'. However, one cautionary note was struck, which must surely have chilled the hearts of MG development engineers:

> All maximum speed and acceleration tests were carried out with 100 octane petrol. With this, and Belgium premium petrol (89 research

octane rating), the engine tended to 'run on' after being switched off. It also used a considerable amount of oil; five pints were added to the sump during one journey of 800 miles, and an overall oil consumption figure of 1,020mpg was recorded.

Motor, like *Autocar*, mentioned in their road test that the Twin-Cam was a relatively noisy beast, particularly in terms of mechanical clamour from the engine bay. On the other hand, they went overboard about their car's performance (which was, in fact, considerably more impressive than that supplied to *Autocar*—see Appendix E (p. 216) for further details): '... of all the cars so far tested by *Motor* only machines built specifically for sports-car racing would keep pace with this 1,600cc touring two-seater in a standing start match to speeds of 60, 70 or 80mph.' Unhappily, they also discovered that they could make the engine 'pink' on German 97-octane fuel, that it 'ran-on' when switched off, no matter what fuel was being used, and that it consumed one pint of oil every 120 miles, which equates almost exactly to *Autocar*'s experiences.

Clearly no accusations of bias, or partiality, could be levelled at either team of testers, for with different cars (PMO 326 for *Autocar*, PMO 325 for *Motor*, both being Tourers) they recorded the same subjective impressions. Both teams, incidentally, loved the handling, enthused over the brakes, and enjoyed the ambience of this type of sports car motoring.

They had, however, put their collective fingers on the major service problem which soon faced MG. Almost every early Twin-Cam, whether used in Britain, in North America, or in Europe, seemed to suffer from an acute sensitivity to ignition timing and to the type of fuel being used, and all of them seemed to consume a great deal of engine oil. It was not long, indeed, before the first reports of piston burning began to filter back to the factory and, since the behaviour of these cars was closely watched by other enthusiasts all over the world, the word soon got around that the Twin-Cam's engine was not to be trusted.

The story of the Twin-Cam over the next eighteen months, therefore, is the story of the fight to sort out the behaviour of the engine, a fight which was eventually won by the development engineers, but one which went on too long to allow the car to survive. Thus, even before I describe the events, and the other modifications in the short career of the Twin-Cam, I must detail

The very neat exterior handle detail of the MGA Coupe's doors. The same feature was, of course, used on Twin-Cam coupes. Tourers never had exterior handles of any type (*BL*)

the engine problems, and the modifications made.

First there was the problem of the oil consumption, which was not directly responsible for any of the engine failures (not, that is, if the Twin-Cam owner checked his dipstick at every fuel halt, when he usually found that he had to pour two pints into the engine for every 10 gallons of fuel bought). Intrinsically, this was caused by the rush to develop the piston and ring profiles to suit the enlarged (1,588cc) engine, which had only been decided upon

at a late stage in the evolution of the model. It is by no means easy to arrive at an acceptable compromise between cylinder bore wear, piston ring-to-cylinder wall friction, and piston shape even when development can be taken at a measured pace.

The original engines had oil scraper piston rings without expanders, and the eventual solution was to substitute a new ring giving more adequate sealing qualities; these rings had expanders inside, and were fitted from Engine No 16GB/U/2057 to the end of Twin-Cam production. This change, incidentally, took place in cars assembled from May 1959. Even so, the new rings (which carry BMC Part No AEH 672) did not cure the problem completely, and it was a lucky Twin-Cam owner who ever drove his car quickly and recorded better than 2,000mpg of oil.

Sorting out the pre-ignition problem—for this is what it was—took time, and several distinctly different changes. The fact was that the original Twin-Cam engine was extremely sensitive to ignition timing and to the quality of fuel used. All Twin-Cam engines should really have been treated to a diet of 100-plus-octane fuel, which was available in Britain and the United States, but not available at all in Europe and most parts of the world.

The initial combination of Champion N5 plugs, over-advanced ignition, lower-grade fuel and a 'top-limit' compression ratio—or even not all of these items—could soon result in pre-ignition or 'pinking', and sometimes even in the piston crowns being holed, with disastrous consequences. The short-term answer was to change the grade of plug (from N5 to N3—interestingly enough, *Motor*'s test car of July 1958 *had* N3s), to make sure that the static ignition setting was always Top Dead Centre and not a degree earlier, and also to plead with the owner to use the best possible grade of fuel. A Service Bulletin, dated 21 April 1959 (which appeared far too late—it was almost a case of bolting the stable door after the horse had gone) recommended the use of N3 sparking plugs 'which give better heat conditions at the piston crown', and assured dealers that warranty claims would be accepted in respect of this change—which presumably included the rebuilding of the engines with new pistons!

Months after that (it was actually notified on 31 December 1959, by which time series production of the Twin-Cam was over) BMC Service Ltd issued a terse little pamphlet entitled 'Getting the Best from your MGA Twin-Cam', whose front page was pla-

carded with PLEASE READ BEFORE DRIVING. This rather laboured the points already made earlier in this chapter, and made the point that '...fuels with an octane rating below 93 are **not** suitable', and that: 'It is recommended that fuel with an octane rating between 95 and 98 be used under normal touring conditions but when optimum performance is required the use of fuel rated between 99 and 101 octane will be found beneficial.' Later they mentioned the sparking plug story, the choice of N58R plugs for competition work, and the need for accurate ignition setting. In bold print, in the last words of the pamphlet, they insisted that **'Under no circumstances should the ignition be advanced beyond TDC.'**

While all this was going on, several different piston crown shapes were being tried (the Twin-Cam Parts Book is accurate, and comprehensive, on this point), but in the end BMC engineers had to bow to the inevitable truth—that the compression ratio had always been too high and the combustion space by no means ideal, and that the ratio would have to be reduced. For Engine No 2251 (fitted to a Twin-Cam built in June 1959) and all subsequent engines, a reduced compression ratio piston was specified. The new ratio was 8.3:1—just the same as that of the pushrod-engined MGAs, incidentally—and it allowed normal premium, as opposed to super premium, fuels to be used. Many engines were subsequently rebuilt using these low-compression pistons, which resulted in a drop in maximum power, from 108bhp to 100bhp, and in a dramatic improvement in reliability.

There was one other engine problem which should be mentioned—a problem which has almost certainly been eradicated on all surviving units. Almost as soon as the car had gone out on sale, it was discovered that there were circumstances where the inverted bucket tappets surrounding the valves in the cylinder head could slightly tilt, jam, and cause destruction of the valve gear. This was because they were too short, so from Engine No 1087 (ie, after 586 engines had been built) the tappets were lengthened from 1.25 to 1.50in. Finally to sort out the valve gear, from Engine No 1587—after a further 500 engines had been built—slim steel sleeves were inserted into the cylinder head so that the tappets could work up and down without tending to 'pick-up' in the aluminium head casting itself.

Now to the good news, for, apart from the well-publicised

Many Twin-Cams, such as this 1959/60 model (sporting MGA 1600 styling features) found their way to North America. This car carries a Maryland registration plate and has modern-style Michelin radial-ply tyres (*Peter Wood*)

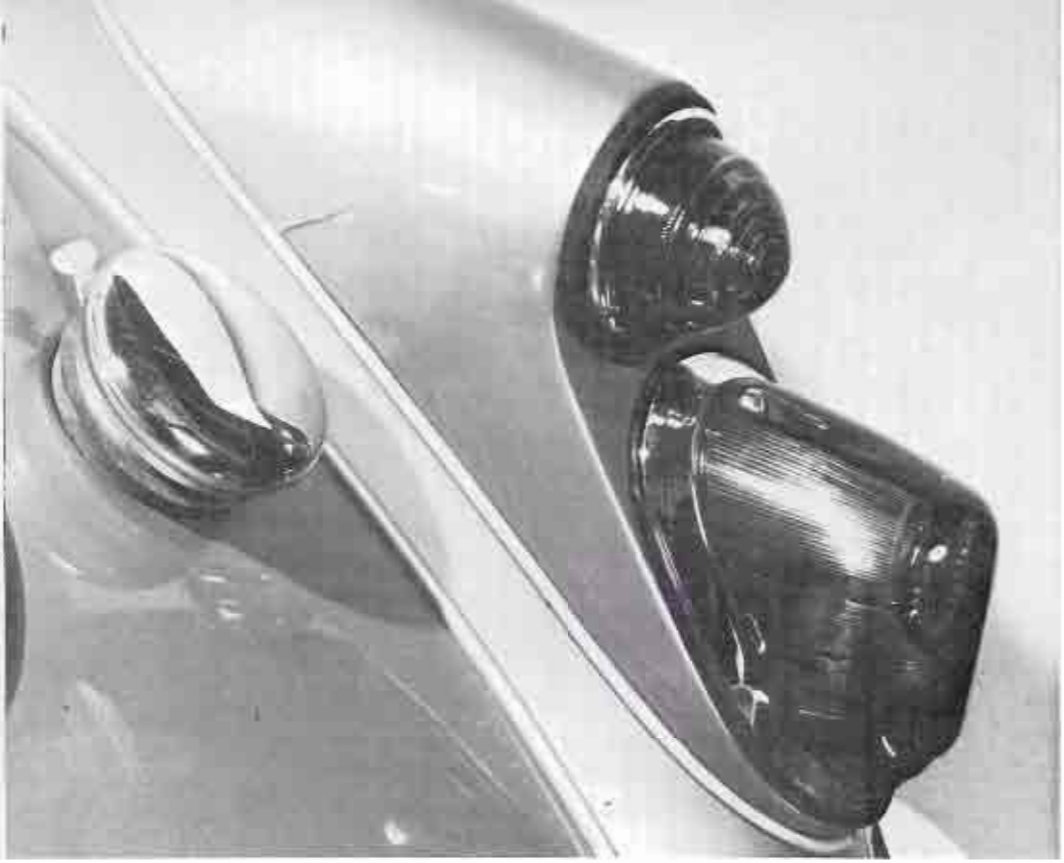
engine problems, the Twin-Cam led a robust and reliable life. Changes made to the chassis, and to the bodywork, were only introduced to make it easier to work on, or to bring it in line with changes being made to pushrod-engined MGAs. As I have already mentioned, early operating experience with Twin-Cams had shown that access to things like the dynamo and starter, the oil filter, the distributor, and other accessories hidden from view under the massive twin-cam head and carburettors, was poor. Therefore, from Chassis No 592 (ie, after only 91 production cars had been built, in September 1958), body shells began to be fitted with two louvred access panels which followed the same profile as the inner wheel arches, or engine bay valances, but which could be unscrewed and put to one side. These were positioned above and behind the line of the front suspension cross-member, and improved the servicing aspect considerably. As they were not needed on pushrod-engined cars, they were never standardised on the other models.

The only chassis specification change of any note came at Chassis No 2275 (for cars built from June 1959), when the front anti-roll bar which had been optional for competition purposes became standard equipment. This, however, was not a minor change, for it also entailed a new front chassis extension (the pressing which bolted up to the front cross-member) to mount the bar, and new lower wishbones were also needed for the bar's links to connect up to the suspension linkage. At the same time, incidentally, this modification became optional (though not standard) on the pushrod-engined MGAs.

The Twin-Cam models received one significant visual change, when the new front and rear lamp details for the MGA 1600 were phased in for the Twin-Cam as well. These involved a new yellow and white side lamp/flashing indicator assembly at the front, and a new lighting plinth at the rear incorporating a separate indicator lamp above a combined stop/tail lamp unit. Introduction points were Chassis No 2193 (Tourer) and 2292 (Coupe), the change taking place in June 1959.

And now, briefly, to the important cars, and the important junctures, in the two-year life of the MGA Twin-Cam. The identity of the Twin-Cam prototypes is not known to me, but it seems from the production records held by BL Heritage that, although there were no pre-production 'proving cars' as such, the first few 'production cars' were used for just that purpose. The very first production Twin-Cam carried Chassis No 501, and started down the assembly lines on 22 April 1958. (MG, no doubt, would have liked it to have the number of 251, which used to be a traditional 'first number' at Abingdon, because it was MG's telephone number, but all such sentimental nonsense had been stopped by BMC when the MG TF was announced in 1953. On the other hand, why should it have been 501? No-one now remembers ...) No 501 was not the first Twin-Cam to be completed, however, for four other cars were finished in May, whereas 501 was not ready for delivery until the first week of June. 501 and 502, incidentally, were both destined for use as demonstration cars, although they were not actually registered for road use until the end of July.

The first 50 Twin-Cams were all Tourers, this number including all the cars to be used for test by the press, other demonstration cars, two cars (one red, one green) for the Competitions Department, and examples for delivery to British racing enthusiasts like



One identification point which pinpoints a late-model, 1959/60, Twin-Cam is the tail-lamp cluster, which was brought into line with the cluster specified for pushrod-engined MGA 1600s in the summer of 1959 (*BL*)

Colin Shove (525), Geoff Dear (526) and Ted Lund (527).

The first batch of Coupes started with Chassis No 551, which was finished on 16 September 1958, and went to Geoff Holt. A few days later 573 (a Tourer) went to Dick Jacobs, 596 (a Coupe) was delivered to Competitions, and 652 (a Tourer) was delivered to John Gott, who was not only BMC's rallying team captain, but was also the Chief Constable of Northamptonshire.

After the Earls Court Motor Show of October 1958, when a partly sectioned sandy gold Twin-Cam Coupe was put on display on a revolving turntable, production began to swing more purposefully into gear. 98 cars were finished off in November, and 135 in December, but no less than 148 followed in January 1959, and an astonishing 313 in February—the best-ever monthly figure, in the shortest month of the year! True series production of 1959-calendar-year models began soon after Chassis No 1000,

for 508 cars were completed during 1958. In the week before Christmas, incidentally, a quartet of Coupes had been allocated to the Competitions Department, and these were eventually prepared for racing at Sebring in March 1959.

The rush of Twin-Cam production in the early months of 1959 is obvious from Table 3.1 above, and from these facts:

Ch No 1000 was finished on 31 December 1958
Ch No 1500 followed on 27 February 1959
Ch No 2000 was completed on 29 April 1959.

But by this time the Twin-Cam was well over its peak, due to the rapid erosion of its reputation by the engine problems experienced on earlier cars. In July 1959, for the first time in ten months, Twin-Cam production at Abingdon plunged below 100 cars a month, and it never recovered. After a brief resurgence in September, October production dropped like a stone to a mere seven cars, and the life of the Twin-Cam was effectively over.

The first 1960-calendar-year car to be completed carried the Chassis No 2558. On 16 February 1960 five British Racing Green Tourers—2571 to 2575 inclusive—were delivered to the Competitions Department, for speedy preparation as Sebring 12-hour race cars, and on 13 April the last series-production car of all, 2610, a Tourer, rolled off the production line.

An astonishing thing then happened. Mike Ellman-Brown, an MG enthusiast through and through, got to know that the Twin-Cam was to be discontinued, determined to have the last one of all, and badgered John Thornley for it. 2610, however, had already left the factory, and in the end Thornley agreed that one further example should be built. Six weeks later, therefore, Chassis No 2611, a Tourer (noted as: Reference Mr J. W. Thornley in the production records) made its way down the tracks among a flood of MGA 1600s, was completed on 3 June 1960, and was collected there and then by its doting owner. Ellman-Brown was as faithful to his new car as he had been to its reputation for, more than twenty years later, he still owns that car.

In some ways, however, the spirit of the Twin-Cam refused to die, for in the next two years a very shadowy and somewhat mysterious model—the 1600 De Luxe—came to be produced.

How and why this car, with its roots in the Twin-Cam layout, came into existence is now related in the following note.

Note: The MGA 1600 De Luxe—a mystery solved at last

Previous books about MG cars have acknowledged the existence of an MGA 1600 De Luxe model, but have not been able to pinpoint all the details of its life, or how many of each type were built. The mystery is now solved. A truly painstaking look through the MGA production records, now preserved for all time by BL Heritage, has allowed me to identify the De Luxes, how many were made, when, and in what condition. The details follow.

There has never been any mystery about the origins of the model. After the last MGA Twin-Cam was built in the late spring of 1960, MG found themselves with stocks, or unbreakable forward commitments, of Twin-Cam chassis frames and all the special suspensions, steering, brakes and road wheels appropriate to that car. Accordingly, they decided to market, on a very low-key basis, a car which they called De Luxe, which effectively used these Twin-Cam parts but was powered by the perfectly standard 1600 pushrod overhead valve engine of the day. As with other MGAs, the De Luxe was available in open Tourer or as a closed Coupe.

The very first De Luxe was Chassis No 91240. It began its journey down the chassis line on 28 April 1960—in other words, *after* series production of Twin-Cams had ended, but *before* work began on the final Twin-Cam which Mike Ellman-Brown bought in June 1960. In fact, the completion of that first production-line De Luxe was delayed until 9 June 1960, which was, neatly and tidily, *after* the very last Twin-Cam had been driven out of the building. That first car was identified in the production records as a Demonstrator, in Home Market condition, after which series production (in limited numbers) got under way. The last De Luxe of all was Chassis No 108652, and was finished off on 1 June 1962, just a week before MGA production finished altogether.

I ought to make it clear that not all De Luxes were built to the same Twin-Cam chassis specification, and not all had the same number of optional extras fitted to the early De Luxe models at least. Indeed, by the spring of 1962, it is clear from the production records that the production planners at Abingdon were trying very hard to use up whatever stocks of parts they retained, before MGA

production was finally stopped altogether. A look at the statistical evidence shows that 164 so-called De Luxes were built in the last ten weeks of MGA production—a massive 42 per cent of all De Luxe production—which was certainly not occasioned by a last-minute upsurge in demand for the cars.

This is how production of De Luxes progressed:

Table 3.2 *MGA 1600 De Luxe production—1960 to 1962*

—at first with 1,588cc engine			Tourer	Coupe	
1960	June		16	1	
	July		7	—	
	August		6	—	
	September		2	1	
	October		4	—	
	November		15	1	
	December		—	1	
1961	January		3	3	
	February		3	2	
	March		12	3	
	April		2	—	
—changeover then made to 1,622cc engine, and Mk II style and detail specification.					
	June		2	—	
	July		33	1	
	August		34	1	
	September		16	—	
	October		7	7	
	November		18	2	
	December		6	1	
1962	January		7	3	
	February		2	6	
	March		1	2	
	April		86	—	
	May		66	—	
	June		12	—	
Totals		1600 De Luxe	70	12	82 in all
		1600 Mk II De Luxe	290	23	313 in all
Grand Total			360	35	395 in all

I should also make it clear that a true De Luxe should not have had the special Twin-Cam body shell details (such as the extra

engine bay access panels in the valences), but should have been based on the normal MGA 1600 or MGA 1600 Mk II shell. Mechanically, a De Luxe should have had the Twin-Cam chassis, suspension, brakes, steering and wheels, but it had the normal pushrod engine and gearbox appropriate to the 1600 or 1600 Mk II model of the day. Detail of the hybrid back-axle specification has already been mentioned in Chapter 2.

An MG Service Bulletin, dated 30 August 1960, states that: 'Disc brakes (front and rear) and centre lock wheels are now made available as optional extras. Steering assembly, front suspension and rear axle are modified to suit.' This makes it quite clear that the De Luxe was never really meant to be a regularly advertised extra model, and it explains why I have not been able to trace a price, in the UK or in North America, for such cars.

Observant statisticians will already have added the total of 395 De Luxes to 2,111 Twin-Cams, and come up with the figure of 2,506. Apart from the fact that this includes five cars built in Competitions, I am convinced that this means that the *original* Twin-Cam 'sanction' (a motor industry term for the number of components ordered for production of a particular car) was 2,500, and that this was a tidy way of getting rid of parts already ordered or even delivered when Twin-Cam production ended.

It is interesting to note that there were so very few Coupes—only 12 1600s, and 23 1600 Mk IIs—and it is also interesting to note that there were many more Mk IIs than ordinary 1600s. The probable reason for this, however, has already been explained.

Seven of the 35 Coupes were 'works' competition cars. Chassis Numbers 104428 and 104429 were delivered to the Competitions Department in October 1961, but only one of them, 104429, was actually used as a rally car, and was the famous 1962 Coupe, registered 151 ABL. Three other cars—Chassis Numbers 106073, 106074 and 106075—were actually built up in the Competitions Department, rather than along the production lines, and were the 1962 Sebring race cars. The two 1961 De Luxe Coupes were not noted in MG chassis records as De Luxes, but it is significant that 100148 and 100149 were for Sebring, and were built in March 1961.

The production records show not only that the De Luxes were given whatever chassis numbers were conveniently available at the time (the only way that they could be identified in the records was

that the details of their body and trim colours were written down in a different colour of ball point pen by the records clerk), but that most of them were loaded up with other extras such as special seats, close ratio gearboxes, different axle ratios, and oil coolers.

How many of the *true* De Luxes now survive?

4

Twin-Cams in Motor Sport

It would not be practical for me to summarise the competition record of every twin-cam engined car built by MG in the 1950s and 1960s—space simply does not allow this—but MG's own factory involvement in record-breaking, racing and rallying was very significant, and deserves study. I have already shown, in Chapter 1, the way in which the twin overhead camshaft MG engine evolved, and was developed. Now it is time to detail the way in which the unit figured in record-breaking and racing expeditions even before it was put on sale to the public.

Normally, when a radically new design is being developed, the British motor industry finds it difficult to hold the secret, and leaks like a sieve. Somehow, in the case of the BMC twin-cam engine developments, this did not happen. Therefore, when not one, but two, engines were revealed for use in the prototype EX182 MGAs in the Tourist Trophy race of September 1955, it was a real surprise, not only for the general public, but for MG's competitors as well. Indeed, there is evidence to suggest that Standard-Triumph's intention to design a twin overhead camshaft engine for use in Triumph TRs effectively stems from that time.

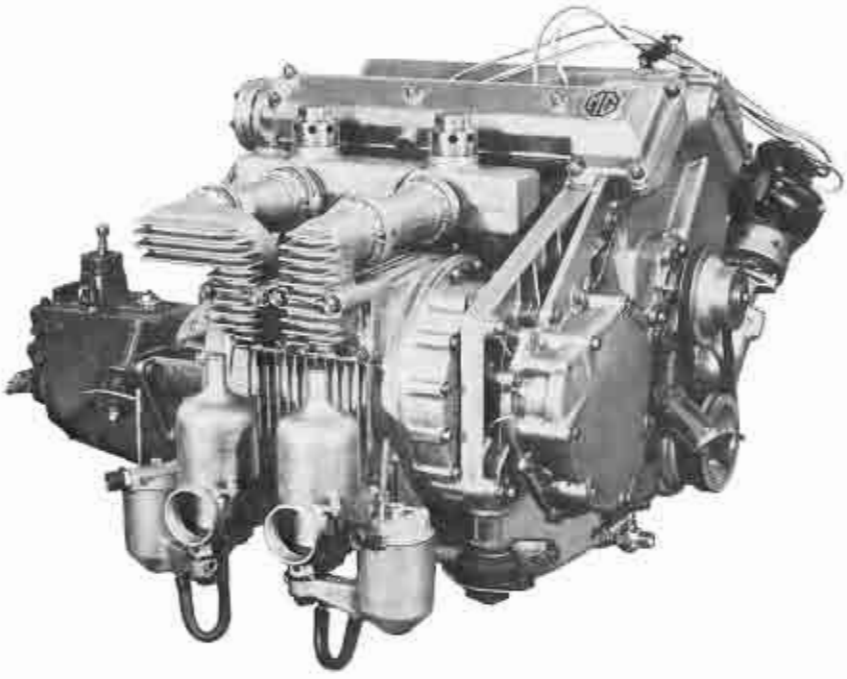
To summarise, MG had built four prototype MGAs earlier in 1955, with light-alloy bodies and with special cross-flow Weslake cylinder heads for their B-Series pushrod engines. Three cars raced at Le Mans in June 1955. Two finished strongly—in twelfth and seventeenth places. One, unhappily, was wrecked in a high-speed accident at White House corner, and its driver, Dick Jacobs, was grievously injured. For the Tourist Trophy race in Northern Ireland, around the Dundrod road circuit, three cars were entered, one was more or less equipped to road-car standards and used the Le Mans type of pushrod overhead valve engine, the two others, with full lightweight bodies and other modifications, were fitted with twin overhead camshaft engines, one of the Gerald Palmer/

Morris Engines design, the other of the Appleby/Longbridge design. The Morris-engined car was also fitted with Girling front-wheel disc brakes and was given reprofiled front wings, in which the much smaller 'headlamps' were mounted very low down. Those lamps, incidentally, would never have been pronounced legal by British authorities, as they were much too close to the ground. In any case, they were too small to be effective—in fact they were the auxiliary lamps normally fitted to the Riley Pathfinder saloons currently being assembled at Abingdon! The Austin-engined car, on the other hand, looked much more like the MGA production car, announced the following week, except that it had a rather angular bonnet bulge to provide clearance over the top of the special Austin engine.

It is here, incidentally, that the futility of always identifying a competition car by its registration number becomes apparent. The Morris-engined TT twin-cam was pictured, at Abingdon, as LBL 301; on the other hand, the car which had been totally and absolutely wrecked at Le Mans had also carried the number LBL 301 before the 24-hour race! One other source has suggested that the TT car was actually LBL 304, 'which had finished twelfth at Le Mans', though I have always understood that this was the spare car for Le Mans, and that it was LBL 302 which took twelfth place. In any case—and therefore how are we to prove *anything*?—the Le Mans and TT cars actually raced without numbers of any description!

The fate of the Austin twin-cam engine is easily related. Pre-race testing showed that it produced very little more power than the Le Mans pushrod B-Series engine, because its rev limit was the same. Marcus Chambers also told me that there were problems with the twin-choke Solex carburettors. The engine, therefore, was removed before the car actually left for Northern Ireland, and a Le Mans-type pushrod engine was fitted in its place.

The Morris-designed twin-cam showed much more promise, and it was the late decision to fit Weber carburettors instead of Solex which probably sealed its fate. To make the swap, special fabricated inlet manifolds were needed, but their welded joints had hair-line cracks which expanded as the engine got hot, let in air downstream of the carburettors themselves, weakened the mixture, and caused misfiring. (This problem, in fact, was only identified *after* the car returned to Abingdon.) The result was that



In 1957 and again in 1959, BMC sent the mid-engined MG EX181 record car to the Bonneville Salt Flats in Utah, USA, to establish straight-line speeds of 245 and 254mph respectively. In each case the engine used was a mightily supercharged derivative of the Twin-Cam engine, the 'blower' being supplied by Shorrock (*BL*)

although the new engine produced more power, and gave the car more performance, than the pushrod engine used in the other two machines, it did not last, and had to be retired after 34 laps of the 84-lap, seven-hour race.

The Austin-design twin-cam engine was never seen again, and it is thought that no further development was carried out. The Morris-designed unit, which henceforth I will now call the Twin-Cam engine, also went into hiding for a time, but periodically reappeared in record cars built by MG at Abingdon.

In August 1956, the 1954 record car, EX179, was sent to the Bonneville Salt Flats in Utah, USA, to attack sprint and endurance targets. EX179, incidentally, was based on the chassis frame and suspensions of the prototype EX175 (or MGA project) of 1952, in fact this being the second prototype frame which Syd Enever had

had built. For EX179, it was liberally drilled. The shape of EX179 was very similar to that of the famous (1938-vintage) reincarnation of EX135, though the two shells were quite different in size and detail. In 1954 form, EX179 had had a TF-type of engine, and was left-hand-drive. For 1956, and with the need to channel the prototype Twin-Cam engine's exhaust gases out of the bonnet on the left side of the car, it was converted to right-hand-drive, which effectively meant that the driving seat, steering wheel and pedals swapped sides with the big fuel tank (which occupied the 'passenger seat'), and the driver's headrest was re-arranged to suit.

Two different prototype Twin-Cam engines were used, one in 'sprint' and one in 'endurance' tune—the 'sprint' engine having no less than 120bhp. Camshaft and piston profiles were obviously still at the experimental stage, but both engines were of 1,489cc, both were unsupercharged, and both used normal high-octane pump fuel. Since, by this time, the MGA production car was already on the market and selling well, particularly in North America, BMC publicity staff thought they could reasonably stretch the truth a bit. For this purpose, EX179 was described as a modified MGA, having a special version of the B-Series engine, and a streamlined body!

With the 'sprint' engine installed, EX179 took the International Class F Flying 10-mile record at 170.15mph, which was 16mph better than was achieved with the TF-engined EX179 in 1954, and only 6.5mph slower than the old EX135 record car had achieved, post war, in 1948 when fitted with a prototype *two-litre* Jaguar engine. The Twin-Cam engine, clearly, had deep-breathing lungs already. All that was really necessary was to prove its endurance.

In 1956 this proved to be more difficult, but it was no fault of the engine. First time out, the 'endurance' car ran for 5¼ hours before a rear hub bearing failed. Second time out, however, on 15 August, there was no mistake, and EX179 blared its way consistently around the circular 10-mile course for more than twelve hours, taking a total of 16 International Class F (1,500cc) records; the twelve hours were completed at 140.71mph. Taking American National records into consideration, the Twin-Cam engined EX179 came away with no fewer than 64 new record marks to its credit.

No other endurance records were ever attempted, or achieved,

by a Twin-Cam engined car. In 1957 and 1959, on the other hand, MG produced a far more exciting record car. There was no question of this one ever being called a modified MGA by BMC staff, as it was almost entirely special from end to end. Apart from the use of a much modified Twin-Cam engine, it had a tubular chassis frame, the engine was mounted behind the driver, and it had the most remarkable aerodynamic profile ever to be seen on a special MG.

By any standards—and even by the standards of the 1980s, which is getting on for a quarter of a century after it was designed—the new car, coded EX181, was a phenomenal design. Conceived in 1956 by Syd Enever, and designed for him by Terry Mitchell of the MG design staff, EX181 used a mid-engined layout at a time when no post-war manufacturer of racing cars except for John Cooper had done the same. It also exhibited what has since been known as a 'tear-drop' shape which made no concessions whatsoever to the components to be packed into it, and it must have been one of the very first competition cars ever laid down where the shape of the body came first, and took priority over all else. There was a superficial resemblance (but it *was* only superficial) to John Cobb's Railton Special Land Speed Record Car, which is to say that the car was at its widest near the nose, and that there was a long and tapering tail. Indeed, it was this shape, allied to its tiny size, which more or less determined the mechanical layout, with the central driving position up front, and the engine located behind him.

The Twin-Cam engine was central, not only in the design, but *to* the design. The main frame was based on two large-diameter longitudinal tubes, with MGA-type independent front suspension and rack and pinion steering, while there was De Dion rear suspension, with springing by splayed-out quarter-elliptic cantilever leaf springs, and further fore-and-aft location by radius arms. The wheelbase was 8ft 0in, the overall length including a very long tail was 15ft 1.5in, while the overall height was a mere 2ft 6in to the top of the main shell and 3ft 2.25in to the top of the cowl over the driver's helmet. The most remarkable statistic of all concerned the drag coefficient, which was quoted as $K=0.000292$ (as near to perfect as could be arranged if a vehicle has to have wheels on the ground), and which required a mere 145bhp to reach 200mph. The flat-out target of this sprint car, however, was four miles a

The team captain calculates his time schedule! John Gott, who drove this Twin-Cam coupe, RMO 101, on the 1959 Monte Carlo Rally, waits time at a control in France. The equipment on this 'works' rally car includes Dunlop Weathermaster tyres and snow mats (*Autocar*)

minute, or 240mph, at which speed it was calculated that 240bhp would be required. To accelerate the car up to this speed, a conventional four-speed synchromesh gearbox was mounted in unit with the engine (but not the normal B-Series box—in essence it was a Riley RMA box), and the special spiral bevel final drive had alternative ratios of 1.94:1 or 1.825:1. Very special small-diameter Dunlop tyres were needed, on conventional five-stud fixing 15in road wheels.

The engine itself, which may have started life as an experimental Twin-Cam unit, was very special indeed. True, it was still of 1,489cc, and used the basic Twin-Cam cylinder head and breathing arrangements, but it had a specially stiffened cylinder block (the ribs are obvious in pictures of the unit), a compression ratio of 6.75:1, and a huge supercharging installation developed for MG by Chris Shorrock around a commercial vehicle unit he had

already designed. This eccentric vane supercharger was gear-driven from the nose of the enlarged and stiffened crankshaft, drew its intake air through two SU carburettors with $2\frac{3}{16}$in throats, and pushed mixture into the cylinders at a maximum pressure of 2.2 atmospheres, or 32 psi. In his *Autocar* analysis of the project, Harry Mundy made the point that the 1955 and 1956 Twin-Cams had used valve gear rather like the designs used in Wolseley 6/80 and 6/90 engines of the late 1940s and early 1950s (which is to say that inverted tappets were screwed into the large-diameter hollow valve stems), but that this special record engine had bucket tappets sliding up and down inside sleeves cast integral with the valve guides. (Even this, be it noted, was not the final layout of production Twin-Cams, whose tappets slid up and down in direct contact with the light-alloy cylinder heads at first, or inside thin-wall sleeves after a certain point.)

Although the maximum power output target had been 280bhp, this was exceeded in testing at Coventry. The engine installed in EX181 produced no less than 290bhp at 7,300rpm, with a remarkable maximum torque figure of 216lb ft at 5,600rpm, and the back-up engine was reputed to be even slightly stronger than that!

Stirling Moss had been contracted to drive EX181 at the Bonneville Salt Flats, immediately after he had driven the Vanwall in the Pescara Grand Prix in Italy (a race which, incidentally, he won—the Vanwall's first World Championship success outside Great Britain), and the driving compartment had been tailored around his rather short frame. The American Phil Hill did all the pre-attempt testing, which included assessing the possibilities of 36.2mph/1,000rpm or 38.6mph/1,000rpm gearing. As it happens, Hill achieved the necessary target speeds before Moss arrived from Europe (though it was decided not to claim these figures, as the publicity machine was all angled towards the combination of Moss and MG), and the 36.2mph/1,000rpm gearing was used, with which the much-boosted Twin-Cam engine was turning over at about 6,800rpm, some 500rpm below its peak.

Things were nearly ruined on 17 August, when heavy rain flooded the marked straight track on the Salt Flats, and since the course had only been booked for a further week (and since, in any case, Stirling Moss would shortly have to leave for another racing engagement) it looked at one time as if the attempt would have to be abandoned. By Friday, 23 August, however, the track had dried

John Gott, navigated by Ray Brookes, urging his 'works' Twin-Cam coupe around a corner close to the Col de Braus where his rally came to a premature end in the 1959 Monte (*Autocar*)

out sufficiently, Moss duly took EX181 out for the attempt, and set up five new International Class F (1,500cc) sprint records, the best speed being the Flying kilometre at no less than 245.64mph.

Even so, MG thought they could not only go faster, but pick up some different records as well. No record attempts were made in 1958 (the whole of the MG workforce at Abingdon were occupied in getting the MGA Twin-Cam, the Austin-Healey Sprite, and further derivations of the Big Healey into production), but in 1959 the same team returned to Utah for another go. This time the supercharged Twin-Cam engine had been enlarged to 1,506cc—by the simple expedient of boring out by 0.015in, to a new (metric) dimension of 73.426mm cylinder bore—and the target was Class E (2,000cc maximum) records. It will be recalled that MG did this on a previous occasion—in 1939, when Major 'Goldie' Gardner's EX135 was over-bored, quite literally overnight, so that it could tackle 1,500cc targets soon after setting up new 1,100cc speeds on a German autobahn.

1600 'De Luxe' models were rare, and were really Twin-Cams with pushrod MGA engines fitted. These two cars were 1,588cc De Luxe Coupes raced at Sebring in 1961, having been prepared by the Competitions Department at Abingdon. They took first and second places in their capacity class (*BL*)

The engine's power output had been increased slightly, to 303bhp at 7,300rpm, but a more significant improvement was to *EX181's already excellent aerodynamics. The vertical stabilising fins, so strongly recommended by Captain George Eyston, were* removed, and it was found in the Armstrong-Whitworth wind tunnel that a reduction of seven per cent in the drag had been achieved. On this occasion Stirling Moss was not available, so Phil Hill drove the car, and set up six new Class E records—the fastest being the Flying kilometre, at 254.91mph. The existing records, incidentally, had been held by EX135, and had been set up in 1951, when the ageing but very versatile car had been fitted with a special 2-litre version of the six-cylinder Wolseley 6/80's engine.

It was after this, with EX181 clearly at its limit, that John Thornley was no longer able to justify the chasing of more and

yet more records, most of which were held by an MG car in any case. EX181's 254.91mph, therefore, was the last, and the most phenomenal, of all the MG records set up between 1930 and 1959. No further MG record attempts have ever been made.

In the meantime, of course, there had been changes in corporate policy regarding BMC cars and competitions activity. By the time the MGA Twin-Cam production car was put on sale, in the summer of 1958, the BMC Competitions Department had been given the job of making BMC a world-class contender in rallying, without restriction on the type of cars they could choose. Accordingly, the 'Big Healey' became available to them for the very first time.

This could not have happened at a worse time for the Twin-Cam, which also became available for rallying use just a few months later. While the Twin-Cam was still at the prototype stage, the Competitions Department was struggling to achieve credibility, and was mainly using pushrod-engined MGAs. There had always been the promise of homologated quantity-production Twin-Cams, first before the end of 1957, and then before summer 1958, but the sudden availability of the 'Big Healey' almost sealed the fate of the Twin-Cam, even before it had properly been committed to a development programme. Even though it was only fitted with a very ordinary pushrod six-cylinder engine, the Big Healey had so much more potential.

In his autobiography, *Seven Year Twitch*, published in 1962, Marcus Chambers, who was BMC's Competitions Manager from

The Lund-Escott 'private' Twin-Cam at Le Mans in 1959, immediately after it had collided with a dog at high speed, and immediately before the transmission seized owing to overheating. The damage done to the grille and the undertray in the accident is obvious (*Autocar*)

1955 to 1962, said: 'We had, at one time, hoped to enter five twin-cam MGAs [for the 1958 Alpine Rally], but for a number of reasons this was not possible and at the last minute we decided to enter the same number of Austin-Healey 100-Sixes.' The 'number of reasons' included the fact that the Alpine Rally started on 7 July, whereas the Twin-Cam's public launch was eventually delayed until 16 July, so it could not possibly be used, for homologation for sporting purposes was needed, and there was no 'prototype' class on this particular event.

'Comps', however, lost no time in taking delivery of Twin-Cams for future use. The records show that cars numbered 524 (a green Tourer), 528 (a red Tourer), and 596 (a red Coupe) all went 'across the yard' to the department in the first few months. 524 was delivered in June 1958, before the Twin-Cam was officially announced, but it was 528, delivered in August, which was the first Twin-Cam to appear in an event. Registered as PRX 707, and given a detachable black hardtop, it was entrusted to John Gott and Ray Brookes for the gruelling Liège–Rome–Liège Rally.

There had been very little time to prepare the car for the event—Marcus Chambers' book tells us that it was standard apart from a 20-gallon fuel tank, special seats, extra lamps and instruments, under-shielding and a few other details—so it could not be expected to dispute the top few places. As it happened, the car finished ninth overall—there were only 22 finishers out of 98 starters in an exceptionally rough and tough four-day non-stop event which was routed deep into the uncivilised interior of Jugoslavia (and, in spite of its title, went nowhere near Rome!)—and it proved to be almost completely reliable.

Starting from Competition Number 78, Gott was always faced with the problem of passing slower competitors on the rough and often dusty tracks and, like all good team captains, he also stopped on more than one occasion to offer help to stranded team-mates. At one point, it was thought that the car had dire engine trouble, as it began misfiring, but this problem was traced to a loose distributor, cured by BMC rally mechanics, and resulted in a far more healthy car. Even though 23 cars had started in the Twin-Cam's capacity class, and although Gott had been told to 'finish at all costs', the Twin-Cam was fourth in its class behind three of the rugged and rally-developed rear-engined Porsches. Not only that, but Gott beat two of the team's four Austin-Healey 100-Six cars

which formed BMC's main assault on the Liège that year!

It was a promising start, but from this point luck began to turn against the 'works' Twin-Cams in rallying. The next outing was on the Monte Carlo Rally, in January 1959, by which time the red Coupe had been registered RMO 101, was driven by Gott and Brookes, and started the traditionally snowy event from Glasgow. Compared with the 1958 rally, one so badly affected by snow that it had been something of an achievement even to struggle through to the finish, the 1959 event was much easier, and nearly 70 per cent of the huge (321 car) entry arrived in Monte Carlo on schedule. Everything, it seemed, would be settled around the 270-mile mountain circuit, by precise time-keeping. It was a real shock, therefore, for those of us following the fortunes of the event, to hear that Gott had crashed the Twin-Cam on the descent of the Col de Braus, less than an hour after the start of the test. Although the car was not badly bent (it was driven all the way back to Abingdon afterwards), it had slid down a bank after Gott had swerved to avoid a boulder, and was only stopped by a stout sapling. Two trucks were needed to haul it out.

Both cars were re-prepared for the Tulip rally of 1959, with John Gott and Chris Tooley driving PRX 707, the roadster, and John Sprinzel and Stuart Turner driving the repaired Coupe. Neither figured in the awards, and in neither case was it the fault of a Twin-Cam. Both Tooley and Stuart Turner (Turner, of all people, probably the most professional navigator of them all at the time!) made navigational errors, both cars lost a great deal of time, and neither could make up for it.

The following month, BMC tried again, when the Coupe, RMO 101, was entered in the fast and demanding Greek Acropolis Rally, for John Sprinzel to drive. On this occasion his co-driver was Richard Bensted-Smith of *The Motor*, a writer noted for his dry sense of humour, and his calm acceptance of unexpected events. On this occasion he needed it. Not long after the start, and when the oversteering Twin-Cam had been improved by the simple expedient of discarding the second spare wheel carried on the boot lid, Bensted-Smith commented (in a reminiscent feature article) that: 'Somewhere on the way to Kelli there is a place at the bottom of a downhill which looks like a wet right-hand corner until you get closer to it, when it looks like a *sharp* wet right-hand corner with *loose gravel* on the outside....' As wet Greek roads are

For 1960 Ted Lund's Twin-Cam (which was effectively a clandestine 'works' car) was converted to this hardtop specification—screen, doors, and wind-up windows were all normal Twin-Cam Coupe items, but the fast-back style was specially developed for this race (*Autocar*)

incredibly slippery, the result was inevitable. The Twin-Cam flew off into thin air, crashed in a meadow alongside a Porsche which had just completed the same trick, and was joined by two other cars in the next few minutes. There was no escape, and yet another Twin-Cam outing ended in retirement, with the car completely blameless.

After such a disappointing start to the Twin-Cam's rallying career, the Competitions Department discarded it altogether, and disposed of the cars. It was just about the time that the Austin-Healey 100-Six was giving way to the Austin-Healey 3000, and that the development of this fine and rugged machine was coming to fruition. Marcus Chambers could see no further use for the Twin-Cam in rallying, and never used one again.

There was, however, one rather belated postscript to the story. For 1962, having homologated the car on rather flimsy production evidence, Chambers's successor, Stuart Turner, had a 1600 Mk II De Luxe Coupe prepared for rallying. This, of course, was

effectively a Twin-Cam Coupe fitted with the 1,622cc pushrod ohv engine, and in this case the engine was fitted with all possible competition equipment including a twin-choke Weber carburettor.

It was used just three times. In the 1962 Monte Carlo Rally, an event where the flat-out stages were mainly dry and little affected by snow, and in which a handicapping system which considered engine capacity was in use, it was driven by the Morley twins, won its (2-litre) capacity class, and finished second overall in the Grand Touring category behind David Seigle-Morris's Abingdon-built Austin-Healey 3000.

In the Tulip Rally, held in May, it was driven by Rauno Aaltonen and Gunnar Palm, and once again won its 2-litre class against a team of three 'works' Triumph TR4s, which had full 2-litre engines. The fact that Aaltonen's test times made him the sixth fastest car in the event did not help, for there was a particularly involved 'class-improvement' handicap in use. The

The rear end of SRX 210, the 'not-quite-works' Twin-Cam which raced at Le Mans between 1959 and 1961. In 1960 and 1961 it had this fastback coupe style, with a central fuel-filler location (*Graham Norman*)

stupidity of it all is illustrated by the fact that Aaltonen finished ahead of the Morley Twins' Big Healey, in spite of the fact that their 3-litre car was the fastest car in the event!

The third and last outing for this Coupe, registered 151 ABL, was the Liège-Sofia-Liège, where John Gott and Bill Shepherd pitted it against the dust, rocks, and impossible time schedules of the world's most difficult rally. Like most of the cars in the event, the MGA was forced to retire, having banged a hole into its fuel tank on two separate occasions. MG lovers (and rally historians) may take heart from the fact that the same fate befell 'works' MGBs in the later events.

As far as the racing of Twin-Cams was concerned, the Competitions Department were somewhat hampered by BMC corporate policy, which stated that there should be no factory involvement in European racing. This did not, however, preclude them from building cars for use by Hambro Automotive in North America. It was something of a tradition, too, that BMC Cars—MGs or Austin-Healeys—should be entered for the most prestigious of North American events, which was the 12-hour Sports Car race at the Sebring airfield circuit.

For 1959, no fewer than four Twin-Cam Coupes were prepared at Abingdon, and sent out to compete in the Sebring race. These were Chassis Numbers 935, 936, 937, and 938, originally built in December 1958. Three cars started, and pictures of the cars in the pits before the start of the race show two to have been 'registered' as PRX 707 and MJB 167. Both were legitimate Abingdon numbers, but if you'll believe the registrations you'll believe anything, for PRX 707 was still a rally car, and was about to do the Tulip Rally, while MJB 167 had originally been registered as an MGA 1500, with pushrod engine, in 1956!

Let's not go into the doubtful legality of using false, or misleading, registration plates on racing cars, but merely record that two cars took second and third places in the 1,600cc Grand Touring class, driven by Gus Ehrman-Ray Saidel-Sherman Decker, and by Jim Parkinson-John Dalton respectively. They should surely be excused for not winning their class, for this was dominated by the very special twin-cam Porsche Carrera of Huschke von Hanstein and Count Carol de Beaufort, which also took second overall in the entire GT category.

A year later, just before the Twin-Cam dropped out of produc-

tion altogether, Sebring was graced with the entry of several Tourers (fitted with aluminium detachable hardtops). No fewer than five cars were race-prepared at Abingdon (Chassis Numbers 2571 to 2575 inclusive, *very* near the end of the run), three of which were semi-official entries, registered UMO 94, UMO 95, and UMO 96 respectively. Messrs Hayes and Leavens were third in their class, while Parkinson and Flaherty took fourth place.

However, as with rallying, so with racing; the pushrod-engined 1600 De Luxe concept proved to be very useful at Sebring in the next two years. In March 1961 two Coupes were sent over to the United States, where they battled throughout the 12-hour event with the works-prepared Sunbeam Alpines for the 1,600cc class. Persistence, in the end, was rewarded, for Jim Parkinson and Jack Flaherty won the class, with Peter Riley, Sir John Whitmore and Bob Olthoff behind them, in second place. These cars were beautifully prepared, if not outstandingly fast, and featured radiator grilles reduced in size by a blanking plate, twin air intakes—one on each side of the grille, like those used as long ago as 1955 on the TT cars—and the removal of the bumpers.

For 1962, with the 1,622cc MGA 1600 Mk II in production, it might have been necessary for the cars to be entered in an unsuitable class, but Stuart Turner was far too experienced to fall into that trap. Three new De Luxe Coupes—Chassis Numbers 106073, 106074 and 106075—were built up, from scratch, in the department, but were given modified Mk I style radiator grilles and special tail lamps, old-type 1,588cc pushrod engines, and called Mk I De Luxe models! Thus it was that Jack Sears, Andrew Hedges, Jim Parkinson, Jack Flaherty, Sir John Whitmore and Bob Olthoff all managed to finish the event running strongly, but the might of Porsche, and on this occasion the Harper–Procter Sunbeam Alpine, were too fast for them.

Though the factory was not supposed to be involved in European racing, they wriggled out of this ban. In 1959 a rather special Twin-Cam was prepared for the Le Mans 24-hour sports car race, even though it was entered by the North-West Centre of the MG Car Club. The story behind this car stems from 1956, when Ted Lund was supposed to be driving a tubular-framed prototype, having a Twin-Cam engine and a standard-looking light-alloy body shell. BMC's racing ban put a stop to that, but it was Lund who eventually persuaded John Thornley to back him in 1959. A

new car, registered SRX 210 (a real giveaway, this, for the 'RX' series of letters were often seen on Abingdon-owned cars) was built up on the basis of a standard Twin-Cam chassis, but with a light-alloy body shell which was part of the 'left over' material from the earlier MGA racing programme. This was of the open variety, and was given the reduced height, full-width, competition windscreen, and an extra carburettor intake on the right.

In 1959 the drivers, Ted Lund and Colin Escott, were out of luck. After completing 185 laps—well over half the distance they could have been expected to notch up during the 24-hour race—they were unfortunate enough to strike a large dog at high speed, which killed the poor animal at once and inflicted great damage to the Twin-Cam's nose and cooling system. Since the car was running with a full-length undertray, and very little hot air could escape from the engine bay or transmission tunnel, it was something of a toss-up as to which failed first. In the end, the gearbox oil boiled, the seals blew, most of the oil was deposited on the undertray, and the transmission seized; the engine was about to boil, and failure could not have been far behind. While running, the Twin-Cam set a fastest lap at 99.47mph, which was little slower than the 160bhp prototype 2-litre twin-cam Triumph TR3Ss, and it had looked to be very reliable.

For the 1960 race, the regulations had been changed, and demanded a much deeper windscreen. Accordingly, it was decided to convert the car into a Coupe, still with all-alloy panels, but with a special fastback body style in which the usual 'bubble-top' roof was swept smoothly down to the tail, to incorporate a large rear window, extra rear quarter windows, and to have a recessed housing for the fuel filler cap. Don Hayter, later to become MG's chief engineer in the late 1970s, was responsible for this.

Ted Lund had now bought the car from the factory, with an engine bored out to 79.4mm (1,762cc) and fitted with two dual-choke Weber carburettors, and running a 4.1:1 axle ratio instead of the original 3.9:1 (the standard car, incidentally, had a 4.3:1 ratio). In the race itself Lund and Escott kept going throughout the 24 hours, finished twelfth out of twenty surviving cars, and averaged 91.12mph. Their fastest lap was at 99.12mph, very slightly slower than in 1959, which tends to support the view that the revised body shell exerted more drag than the original Tourer, although it was still capable of at least 130mph in a straight line.

It is not generally realised, incidentally, that in 1960 the Twin-Cam not only won its class (1,601 to 2,000cc) at Le Mans, but that it also defeated the entire Triumph TRS team of cars—cars which not only had all-aluminium prototype 160bhp engines but glass-fibre body shells not even based on that of a production Triumph. All in all, Ted Lund and Colin Escott put up a remarkable performance.

The fastback Coupe started one more Le Mans race, in 1961, this time with a modified nose style, having headlamps pushed a few inches back into the front wings, and with a much smaller, almost unrecognisable, radiator air intake. The engine power had been boosted to 128bhp, which made the car capable of 140mph. On this occasion, however, the 24-hour race proved too much for the unit. After the car had lapped at 101.66mph, but had completed only 14 laps, the engine threw a connecting rod, and destroyed itself. Ted Lund and his new co-driver, Bob Olthoff, had the doubtful distinction of being the first crew to retire.

Mention of Bob Olthoff, incidentally, brings to the surface his own Twin-Cam Tourer, imported back to Britain in 1960. This had already achieved great success in South Africa (as the very first CKD Twin-Cam to be assembled there) and was used by Olthoff in Europe until the end of 1961. However, even though the young South African took a job at Abingdon for a time, and even though his car was registered as YRX 310 (a local Abingdon number, of course), this was never a 'works' racing car, and should not be considered as such.

However, there is no doubt that Olthoff, once his driving talents became clear, received quite a lot of clandestine support from the MG factory, as indeed did Dick Jacobs (an MG dealer from Woodford, East London) with a couple of Twin-Cam Tourers registered 1MTW and 2MTW. These last two cars won their class in the *Autosport* championships of 1959 and 1960 and won no less than 30 places in 32 events. In view of this, it comes as no surprise to know that Dick Jacobs, who had so nearly lost his life in a Le Mans crash in one of the 1955 prototype MGAs, was one of Abingdon's favourite sons.

The real 'works' competition life of Twin-Cam engined cars was short, however, for once the production car had been discontinued in mid-1960 the factory rather lost interest in it. On the one hand, the Competitions Department had refined the Big Healeys

to a high standard of performance and reliability, such that they were potential *and* actual rally winners, and on the other hand the forthcoming unit-construction MGB would not be carrying a Twin-Cam option. And yet, as the record-breaking achievements of EX181 prove, the basic engine had a great deal of potential. It is a great shame that the time never seemed to be ripe for a full-blooded programme of development for the Twin-Cams to take place.

5

The Twin-Cam Today

Even though the last MGA Twin-Cam was built at Abingdon in 1960, and even though BMC turned their backs on it almost immediately, MG enthusiasts all over the world never allowed it to become a forgotten car. The Twin-Cam's reputation may have been somewhat shaky while the car was still actually on sale, but it seems to have been improving ever since. More and more Twin-Cams continue to be rebuilt, restored, or even re-constructed, which is a great credit to the specialists who have managed to assemble, or to remanufacture, the parts to make this possible. There is no hope of getting Twin-Cam parts through dealer channels, of course, for BMC stopped supporting its preservation many years ago.

Between 1958 and 1960, a total of 2,111 Twin-Cams were built, but how many of these still survive? It is almost impossible to do more than make an educated guess, but on the evidence available the situation is encouraging. The Twin-Cam Register of the MG Car Club has positively located about 500 genuine Twin-Cams, now known to be on the road (or recently to have been in use) all over the world. It is also known that more are being re-constructed (usually by the reinstatement of a Twin-Cam engine, removed so many years ago), prior to being put back on the road. Since it is now virtually impossible to find new cylinder head or cylinder block castings (at least, not without a long wait, and at great expense), it is something of a miracle that the total stock is slightly increasing, rather than decreasing.

Of those 500 surviving Twin-Cams, perhaps 200 are still in Britain, which is really remarkable, when one considers how few were actually registered here when the model was in current production. Many of the others are in North America (where half the cars were originally delivered), and there is a thin sprinkling in many other countries, notably South Africa, Australia and (of all places) South America.

One or two cars, incidentally, appeared to have been synthesised, and although they have been given Twin-Cam engines and the Twin-Cam wheel and disc brake installations, they are nevertheless not genuine and original Twin-Cams built by MG at Abingdon. Some years ago, the question of originality was not considered important by the buyers of ageing thoroughbred cars, but with the rise of the 'classic car' movement this trend has been sharply reversed. (I mention, merely as an example, a car I inspected not long ago, which its owner said was an MGA 1600 Mk II De Luxe. In fact the car had a Twin-Cam chassis, brakes and wheels, along with a Twin-Cam's removable inner wheel arch panels, but it had an MGA 1600 engine, and a chassis number plate which placed it well before the first of the De Luxes had ever been built, and a number which had nothing whatever to do with the obvious Twin-Cam origins of the chassis!)

Unless a Twin-Cam owner finds a dealer who stocked parts for the MGA Twin-Cam when it was in production, and who has not got rid of the remnants of his old stock, it is highly unlikely that any parts are now available through 'normal channels', either here or in North America. The single significant exception is that certain MGB front suspension parts are the same as those used on the Twin-Cam, and certain others can be modified to do the same job. Even the gearbox internals, which were shared with the earlier MGB models, are now extremely difficult to locate. In every case, incidentally, I would recommend that an owner goes looking for a part *by its part number*, and that he does not mention the Twin-Cam when doing so. The point here is that, invariably, if 'Twin-Cam' is mentioned, then the response from a parts salesman is a blank-faced 'No'. At least if a part number is quoted, he will have to consult his microfilm records to see if any such items still exist.

It would be very easy at this point to start mentioning specialists' names and locations, but as a book like this is likely to stay in print for some time, and as some of these firms may wilt, die away, or close down completely, it would be a counterproductive process. My overall advice, therefore, is that a Twin-Cam owner should try to cultivate the acquaintance of another Twin-Cam owner as soon as possible, so that he can take advice on the suppliers with the most expertise, and the best stocks. He should, in any case, join the major MG owners' club in his particular country. In Britain this is certainly the MG Owners' Club, and in other coun-

tries there will usually be a specialist national organisation, either with links to the British MG Car Club Ltd (which is more of a sporting body than one which concerns itself with preservation of olders MGs), or with the MG Owners' Club.

Even though the chassis frames were always extremely sturdy, they can begin to rust away in certain areas, and it is all too easy to distort their alignment when making welding repairs (or after the renovation of a frame following accident damage). It is possible, at great expense, to find new frames in some countries, and it is even possible to modify that of a pushrod-engined MGA to Twin-Cam specification. Incidentally, because the Twin-Cam had a solid separate chassis frame, it almost always provided a feasible base for the 'ground-up' restoration of a badly neglected motor car, whereas the rusty remains of an MGC or an MGB GT V8 monocoque can often be much too far gone to make this possible.

Getting parts for the body shell is feasible, though in many cases patience, shopping around, and a lot of judicious bargaining may be needed. As I have already made clear in an earlier chapter, the panels fitted to a Twin-Cam are sometimes different in subtle ways from those used by pushrod-engined cars, and it is far too easy to be fobbed off with the wrong item by an uncaring or inexpert supplier. Skin panels in general are available, some off new tooling and very accurate, some made by craftsmen's methods. If originality is of no importance to an owner, he can certainly get glass-fibre skin panels, which are a whole lot cheaper than steel panels, but which reduce the eventual re-sale value of the car (and ensure that it can never win prizes in Concours events if the judges are at all alert).

There is really no shortage of decorative items, badges, brightwork and the like, while there is a goodly supply of glass, some new and some secondhand. Even the sharply curved Coupe windscreen, and the rear windows for the optional 'works' hardtops can be located if you know where to look.

In fact, if the structural basis of the car's body shell is present (preferably in sound condition), a good deal of time, searching around and—inevitably—money will certainly result in the immaculate restoration of the looks of the machine. There is no problem, incidentally, in obtaining the correct colours, for their formulae are all known, and can be duplicated exactly by the specialists in paint supply.

However, if the body shell and its condition governs the looks of the Twin-Cam, its entire *raison d'être* is bound up in the twin overhead camshaft engine. Although experience tells us that the cylinder block and head of these engines can be surprisingly resistant to frost damage, and to neglect, it is a fact that the light-alloy head might have suffered badly from internal corrosion. Only in one or two places, and then only for a great deal of money, are replacement castings available. All manner of major renovation *can* be carried out on the engine, even including the repair of frost damage to the cylinder head. Most engines have now been converted to the final 8.3:1 compression ratio, achieved by the use of lowered-compression pistons. Now that 100-plus octane fuel has virtually disappeared from the world's forecourts, it is recommended that any Twin-Cam rebuild should include this work these days, and that the 9.9:1 ratio pistons should be reserved for special fuel blends, and for competitions.

For reliability and durability reasons, it is also recommended that the cylinder head should be converted to the final build specification, which is to say that the long tappets should be fitted, and that the tappet guide sleeves should be inserted into the cylinder head casting itself. All the valve gear items, but not many standard camshafts, are available, and this extends to Renolds drive chains, sprockets, and other related details. Badly worn crankshafts (which are not the same as the pushrod-engined car's crank) can be restored to their former glory, by the redepositing of metal, and by regrinding. Several grades of oversize pistons, incidentally, are available in 8.3:1 compression ratio, but it is also quite usual to bore out, then sleeve back, a cylinder block to its original nominal dimension.

The single most difficult area of supply for the engines concerns connecting rods, for which new supplies appear to have dried up. Most surplus stock in the early 1960s, it seems, was used in race-prepared MGA or MGB engines, and no new supplies were manufactured to take their place. The normal MGA 1600 connecting rods are not the same, and are by no means as sturdy for their job.

In general, transmissions can be rebuilt, for the gearboxes had much in common with the pushrod-engined MGAs of the day, and some supplies of new or reconditioned parts can be found both in Britain and in North America. Some cars, incidentally, have been converted from coil spring to diaphragm spring

clutches, which is technically advisable, and since the Concours judges cannot see inside the bell housing we see no reason why this should not be done by everyone renovating a Twin-Cam.

The braking system, when in good condition, gives a very good performance, and fortunately it is possible to renovate almost any Twin-Cam's brakes to their rightful state. Supplies of discs are available to replace old ones badly worn or corroded, and Girling (who took over the rights to manufacture Dunlop disc brakes in the mid-1960s) are very helpful indeed in supplying parts for the disc calipers themselves. The calipers are basically the same as those used on several other cars of the 1950s and 1960s (including, for instance, the Jaguar XK150, Mk II saloons and other derivatives, the Jensen 541R and its descendants, and several limited-production European GT cars). A word of warning, however, is that a reconditioned Twin-Cam caliper should be re-assembled *exactly* as it originally was—it might be dangerous, for instance, to use other hydraulic pipe runs which could be vulnerable to flying stone damage; when they arranged the original system, MG engineers knew what they were doing.

The wheels are now extremely difficult to find, although with a great deal of care it is possible to reconstruct Twin-Cam wheels which have been bent by 'kerbing', though this is not recommended in every case. Clearly the rim itself is a standard profile item (and is 4.5 inches wide—*not* the same, incidentally, as that used on the Gordon-Keeble, although that car looks the same), but the centre pressing is very special. Because these wheels feature 'peg drive' they cannot be replaced by normal disc wheels, nor by wire wheels—in any case such a move would destroy the originality of the car being restored or maintained.

Many cars being revived from long neglect and storage need complete electrical renovation, so for Twin-Cam buyers it is good to know that wiring looms, instruments and switchgear are all either available, or can be re-built and repaired. The rev counters, however, had unique markings, and new spares are no longer available, though such instruments (which were mechanically driven from the half-speed shaft on the engine) can be re-built by the instrument specialists in Britain or North America.

In summary, a Twin-Cam is always worth rebuilding if it is mechanically complete, in whatever condition, with the proviso that the engine must be structurally sound. The key to the

rejuvenation of Twin-Cams is the engine itself, for as I have made clear there are virtually no supplies of spare castings, and it is highly unlikely that anyone else is going to break a Twin-Cam for spares these days and make another engine available.

The question we have never posed, so far, in this chapter is—is it worth doing at all? And what sort of car do you get when all the work is done? There is a short and very sweet answer to all this—that a properly built, and carefully maintained MGA Twin-Cam is a real joy to own, a thoroughbred by almost any standards. Even with the lower-compression engine, it will be much quicker than any pushrod-engined MGA, quicker than any MGB, quicker *and* better handling than any four-cylinder engined Triumph TR, and a much more desirable car, in almost every way, than the average run-of-the-mill Alfa Giulietta, which was both more common and much more difficult to make structurally sound. It was the only MG ever to be put on sale with a twin overhead camshaft engine, and the only MG ever to have four-wheel disc brakes. It was different, and it was distinctive. The pity of it all was that, at the time it was actually on sale, its reputation was not sufficiently high. Nowadays there are hundreds, if not thousands, of previous Twin-Cam owners who wish they had held on to these interesting cars.