


# HISTORY OF NORDEC MODEL RACING ENGINES 1948- 1950


**Tony Dalton**

# NORDEC MODEL IC ENGINES

Some time back in the 1950's I purchased a model IC petrol engine (mail order) for about £5 with the intention of putting it into a model MTB. The engine was air cooled so I made a water jacket (at Marconi's as an apprentice) to replace the cooling fins which fitted under the cylinder head, and a flywheel. The model boat was never completed but I am still in possession of the 10cc NORDEC petrol Engine see picture below.

Recently I was in the process of having a clear out and I came across the engine and decided it was time to sell it. It is very unlikely that I will construct a model using an IC engine. Firstly it needed a good clean, so I stripped it down and cleaned all the individual parts including the brass flywheel before re-assembly. Before advertising the item I decided to look up some details about the engines history and came across the following internet article by Ronald A Chernich which, I think makes interesting reading. For the record my Nordec is Serial No 316 with a Letter 'T'.

The term "The Real McCoy" has passed into general use in the English-speaking world as an expression denoting 'the real thing' or 'the genuine article'. The term has always had a special connotation among power modelling enthusiasts of 'classic' vintage (like myself!), since it immediately brings to mind the deservedly famous McCoy line of model racing engines originally designed in the mid and late 1940's by the legendary Dick McCoy and used with great success by competition modellers the world over for the subsequent two decades.

Here we focus on an engine that is most definitely not the Real McCoy in a modelling sense, although at first sight one might almost (but not quite) be forgiven for mistaking it for the genuine article. This is the British-made Nordec 10 cc racing engine of the late 1940's, which was an all-British product in manufacturing terms but undeniably drew its inspiration from the designs of Dick McCoy.

During the early post-war years, British power modellers wishing to participate at a competitive level in all-out racing of tethered models (whether aircraft, hydroplanes or cars) quickly encountered a common problem, lack of readily-available commercial racing engines. Prior to 1948 such individuals faced a choice between constructing their own engines or somehow contriving to obtain suitable examples from the USA, where the commercial development and manufacture of racing power plants had resumed at a rapid pace following the conclusion of WW2.

Some of the home-constructed engines dating from this period possessed considerable merit. As an example, Gerry Buck's somewhat crudely-executed model car engine patterned on the Hornet 60 remained one of the engines to beat in Britain for some years after the conclusion of WW2, holding its own against the American imports right up to 1950 or thereabouts.

However, many individuals who were interested in competitive modelling were in no position to construct their own engines since they lacked the required combination of available equipment and technical know-how to do so. Even if they did possess the requisite skills, the purchase of even a basic lathe was beyond the financial means of many individuals in the cash-starved post-war British economy. As a result, successful participation in the competitive fields of model aircraft, car or hydroplane racing was open only to the relatively small number of individuals having the required combination of means, contacts and expertise.

The racing engine supply picture began to improve in 1948, when a handful of British manufacturers threw their hats into the racing engine ring more or less simultaneously. These being the Rowell and the Ten-Sixty-Six ventures, the third commercial British racing engine series to make its debut in 1948 were the Nordec 10 cc models.

Before we embark upon our story, I wish to thank my friend and colleague Alan Strutt, who provided an immense amount of help in the preparation of this article. I couldn't have completed this study without Alan's generous assistance, and I'm pleased to acknowledge it here. Several others, including my valued friend David Owen, have also greatly assisted by providing serial numbers and images.

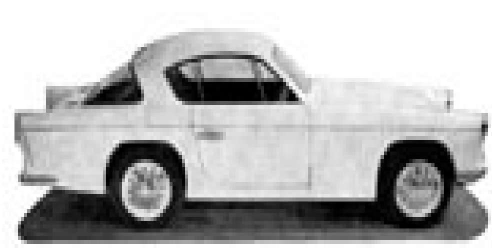
**BACKGROUND**

The Nordec model engines were manufactured by the North Downs Engineering Company Ltd (referred to hereafter as "Nordec"), which operated at the time in question from premises on Godstone Road in the quaintly named district of Whyteleafe in Surrey. This was in effect a sub-district of the community of Warlingham, which lies a little to the south of Croydon in South London.

The Nordec company had its origins in the pre-war period, when an engineer named Leslie Ballamy (1904—1991) established a firm known as L. M. Ballamy, Consulting and Experimental Engineers. Ballamy was a well known figure in full-sized car racing since the primary focus of his business was the development of automotive suspension components and after-market performance add-ons. He is best remembered for developing the concept of the twin swing-arm front suspension.

In 1939 Ballamy relocated his premises to Wapses Lodge, a component of a former army base on Godstone Road in Whyteleafe. He re-named this facility "The Research Laboratory", continuing his automotive development work there. However, the onset of WW2 quickly put an end to Ballamy's work on automotive performance components since the facilities of his company were needed for war production. To maintain his involvement with the cars which were his first love, Ballamy took over an existing business known as the Westway Garage on Chaldon Road in nearby Caterham, renaming the facility L. M. Ballamy, Motor Engineers.

So far, so good, but there was a complication in all of this, Ballamy was not the outright owner of either of these companies. They had in fact been financed by Major Richard Sheepshanks, a wealthy landowner and businessman from Eyke, near Woodbridge in Suffolk. As a result, Sheepshanks' name appeared beside that of Ballamy as co-holder of a number of patents despite the fact that these patents essentially represented Ballamy's unaided efforts. This understandably led to friction between the two, the result being that in 1946 Ballamy resigned from both businesses, taking with him a number of key technical staff members.



Ballamy and his colleagues relocated to nearby Guildford in Surrey, where he established a new company named LMB Components. He continued to develop and market innovative chassis and suspension components, finally collaborating in 1961 with Edwards Brothers of Stoke to produce some fifty examples of a stylish coupe named the LMB Debonair, which later formed the basis for the well-known Reliant Sabre. Ballamy retired from the automotive industry in 1962.

Following Ballamy's 1946 departure, Major Sheepshanks reorganized the two Ballamy companies into a single entity named the North Downs Engineering Co (Nordec), retaining the premises at both Whyteleafe and Caterham. According to a friend of Alan Strutt's who lived at Caterham at the time in question, Nordec's main business at their Caterham location was car sales. The parents of Alan's friend apparently bought several new cars from them following WW2.

NORDEC

However, Nordec also retained a strong presence in the automotive engineering field, maintaining their design and manufacturing activities at the Godstone Road location in Whyteleafe. In addition to their suspension upgrade kits, they became well known for supplying supercharger kits for a number of popular cars. These kits were based on the use of a Marshall low-pressure Rootes-type compressor along with suitable hardware manufactured by Nordec to marry the system to a variety of standard road cars of the period. The production and installation of these kits involved precision engineering of a very high order. Consequently, the company had built up a solid reputation and a steady business on the strength of these products.


Nordec clearly entertained visions of expanding their manufacturing range, eventually going so far as to make a few examples of a Ford 10-based sportscar under the Nordec name in 1949. This vehicle was the subject of a detailed review in the March 25th, 1949 issue of "Autocar" magazine. It must have been quite a performer since it featured both Ballamy's patented "split beam" independent front suspension and one of Nordec's supercharger kits. However, Major Sheepshanks was unwilling to make the additional investment which would have been required to put this vehicle into series production.

In the latter part of 1947 a series of staff resignations dealt a severe blow to the company's technical capabilities. A number of Nordec engineers left to form a competing company, Wade Superchargers, following which both the chief designer Ken Roberts and the works manager Marcus Chambers departed in turn. As if this wasn't enough, a number of post-war regulations regarding the uses to which materials and manufactured items could be put seriously constrained the range of activities which the company was permitted to undertake. This not only put paid to plans for a new factory at Godstone Road but also left the company with existing production capacity which it could not fully utilize.

It was at this point that circumstances conspired to steer the company towards model engine production. Following the departures of Ken Roberts and Marcus Chambers, the positions of chief designer and works manager were combined in the person of John Wood, by now the senior remaining technical staff member and hence a person of some influence within the company. It so happened that Wood was a member of the Croydon and District Model Aircraft Club, with a strong interest in the burgeoning activity of control line speed flying.

Wood clearly recognized that fate had dealt him an opportunity to combine both his business and hobby interests by designing a model racing engine which could be manufactured using some of North Down's surplus production capacity. He was evidently successful in getting Major Sheepshanks to agree to this proposal, the caveat being that development and start-up expenditures were to be kept to a minimum.

As of mid 1948 when the Nordec model engines were introduced, the company was completely new to the manufacture of model engines. However, it will have become clear from the above discussion that this was no start-up effort by a brand-new manufacturer! The company's work in developing and producing the Marshall-Nordec supercharger kits had given them a solid grounding in precision engineering in addition to requiring the assembly of a good inventory of machine tools along with a high level of expertise in its use. These capabilities were well matched to the requirements of model engine manufacture.

The fact that Wood chose to enter the new field of endeavour with something as specialized as a 10 cc racing engine is a bit puzzling—engines of this displacement, purpose and cost could not reasonably be expected to generate mass sales at any time. This was particularly true of the late 1940's British market, which was deeply embedded in a relatively cash-starved post-war economy. Even if this had not been the case, the fact that the British model engine market was so small by comparison with that in the USA would surely have argued against Nordec generating any significant additional cash flow from a model engine venture based upon a large racing design.

It was presumably for these reasons that other British model engine manufacturers of the period had steered clear of the 10 cc racing field prior to the 1948 advent of the Nordec and its two British competitors, the 1066 Conqueror from Worcester and the Rowell 60 from Dundee in Scotland. Of course, the consequence of this was that at the time of the Nordec's introduction it had minimal direct competition from other British manufacturers. Accordingly, there may have been a not unreasonable perception that a market niche existed. The make-or-break issue was the potential size of that market niche. In the end, Wood's adoption of the 10 cc racing engine concept was most likely based purely upon his own personal interests at the time, perhaps a case of a designer following his heart rather than his head.

From a strictly financial standpoint, the decision to enter the model engine field was doubtless eased considerably by the fact that Nordec already had both the necessary production capacity and a well-established cash flow based upon the thriving supercharger and car sales businesses. Hence their entry into the new market area was by no means a "do or die" venture in economic terms. Indeed, the company was to survive in business long after the relatively short-lived production of model engines ceased, as we shall see in due course.

It's also clear that the company had no intention of subsidizing its customers by selling the engines at a price which did not allow them to reap a fair return for their time and effort. Indeed, the notion of a selling price which incorporated a reasonable profit margin was almost certainly one of Major Sheepshanks' key stipulations in agreeing to have the company embark upon the new line of business. The list price of the original Nordec models was £12 10s 0d (£12.50) for the spark ignition R10 and £12 even for the RG10 glow-plug model. This was a small fortune in those far-off days of the immediate post WW2 period in Britain when a man earning £8 per week would have been considered relatively well-off. Imagine buying a single model engine that cost over 40% of your gross monthly pay-packet ...try that on the wife!

It appears that the company philosophy was to produce a quality product, sell it at a price which allowed a reasonable economic return and see if the market would respond. If it did, the company would make a nice little bit of extra income. If it didn't, that was OK too—there were other fish to fry! Either way, the company had little to lose.

The practical challenge of getting the company's new manufacturing effort underway was doubtless further eased by the fact that Wood very sensibly saw no need to spend the time and money normally required to develop a new design from scratch. Indeed, Major Sheepshanks had clearly declared himself unwilling to invest any substantial funds in the development of what must have been seen as something of a marketing try-out. However, there was little real difficulty here! Having decided to enter the field with a 10 cc racing engine, the company only had to look across the Atlantic Ocean to find a proven prototype already developed and in production. This was of course the 1946-48 version of the highly successful McCoy 60 Red Head racing engine, which was then in full-scale production by the Duro-Matic Products Company of Hollywood, California and was already establishing itself as a design to be reckoned with in the highly competitive performance fields of control line speed flying and model car racing.

Seeing no need to re-invent the wheel, and clearly wishing to impose a minimal strain upon their development budget, Nordec quite logically took the line of least resistance by unashamedly "borrowing" the majority of the design features of their new offering from the McCoy model. This allowed them to get their new offering into series production very much faster and less expensively than would have been the case if they had had to develop their own design from the ground up.

At first sight, it might seem a little odd for Nordec to have elected to go so openly head to head and hence invite direct comparison with an established line like McCoy, particularly in a rather specialized field in which there was already strong competition from the likes of Hornet, Dooling, Ball, Orr, Bungay, Hassad and others. However, an understanding of this matter requires that it be looked at from the contemporary British perspective. The American designs included in the above list were competing amongst each other for a share of a vast and well-heeled domestic market in the USA. The continental United States had been spared the direct impacts of war upon its civilian population and domestic infrastructure. Hence post-war America was booming, in contrast to war-ravaged Britain and Europe. So there were potential domestic buyers for all the engines that American industry could produce, without the need to look to a minor export market like that which then existed in Britain.

As a result, large American racing engines were essentially unknown in late 1940's Britain when Nordec was planning their market entry with such a model. Few British modellers at the time would have so much as seen a McCoy 60, Hornet 60 or Dooling 61, let alone a Ball, Hassad or Bungay, so there was considerably less opportunity for direct comparison than might be imagined. The relatively few American racing engines that did reach Britain during this period were either brought over by American service personnel or were personally imported by a select few British modellers having both the means and contacts to do so.

The consequence of this was that there was really very little competition for the Nordec at the time of its arrival, either domestically or through the import route. It is true that the excellent Rowell 60 racing engine from Dundee in Scotland was introduced at more or less the same time to meet a similar market niche, but even that fine engine represented relatively minimal competition in an aero modelling sense because it was primarily intended for model racing car use. Indeed, its weight of 19 ounces represented a near-insuperable impediment to its successful use in model aircraft. That said, I have a personal recollection of seeing one of my club-mates in Sheffield still using a heavily-modified Rowell in around 1961 in a C/L speed model, albeit with rather indifferent results by the standards of the day. But that's another story.

There was also the 1066 Conqueror 10 cc racing model from Worcester, which exhibited a mixture of American and Westbury influences. However, in performance terms the Conqueror was never really in the running in a competitive sense. Moreover, it too was primarily designed for model car racing.

So the Nordec more or less had the British 10 cc model aircraft racing engine market to itself at the time of its introduction. Viewed from that perspective, it becomes a little easier to see why John Wood was able to persuade Major Sheepshanks that there was a market niche to be filled in that displacement category. Let's look at the initial products with which the Nordec Company hoped to tap into this niche.

**EARLY NORDECS**

We have noted that the Nordec engines were very much based upon the tried and tested design of the contemporary McCoy 60 model. At this point, it's important to recall that in early 1948 when the original Nordec designs were being developed, the contemporary McCoy was not the later all-conquering Series 20 model which appeared in the latter part of 1948 but was still the spark-ignition 1946-48 Red Head 60 with black-anodized case, red head, rear disc induction and relatively restricted porting by later standards. John Wood clearly took a long hard look at this version of the McCoy, basing his design very much upon that motor. However, he did introduce a number of changes of varying effectiveness.

One factor requiring consideration (which McCoy and Dooling were even then in the process of evaluating) was the issue of the ignition system. During the period when development of the Nordec was in progress, the miniature glow-plug had only just been refined by Ray Arden into its commercial form in the USA. Even at the time of the Nordec's eventual release in August 1948 modellers were still very much divided on the subject of whether or not the new form of ignition was in fact superior in strictly performance terms, particularly for all-out competition applications. The very precise ignition timing adjustment permitted by the use of an adjustable timer was a factor which many saw as a performance advantage of the spark ignition configuration, although the elimination of the weight penalty of the spark ignition system was of course widely recognized as a major benefit of glow-plug ignition, particularly for aircraft service.

The weight penalty of the spark ignition components was of course very much less of a factor in relative terms for the large and heavy 10 cc racing engines of the day, especially those used in cars or hydroplanes. Consequently, decisions regarding the form of ignition used in those engines were relatively less affected by weight considerations. Despite this, events were to prove that the glow-plug swept the spark ignition engine aside and became the standard very quickly. Sixty-five years later, it's all too easy to forget that this outcome was not yet obvious in 1948.

Naturally, the attractions of the new form of ignition with its greatly reduced complexity were by no means lost upon British modellers. British engine manufacturers were quick to respond, although they did so rather tentatively for the most part by adapting existing diesel or spark-ignition designs to glow-plug operation rather than developing new tailor-made designs. E.D supplied a glow-plug conversion kit with their 2.49 cc Mk. III diesel which first appeared in March 1948, while International Model Aircraft rapidly developed a glow-plug version of their FROG 175 spark ignition engine which appeared in mid 1948 as the FROG 160. Davies Charlton Limited offered an E.D.-inspired glow-plug conversion head for their 5 cc Wildcat diesel, and in general the profile of the glow-plug engine was on the rise in British modelling circles, albeit lagging somewhat behind the level of interest in America.


The rising interest in glow-plug ignition was not lost upon British accessory manufacturers. A reliable indication of the rapid development of a demand for glow-plugs among British modellers may be derived from the fact that by the latter part of 1948 no fewer than three British firms were engaged in the manufacture and/or marketing of glow-plugs. The first and most significant of these was the large and well-established automotive firm of Smith's Motor

Accessories Ltd, who found it worthwhile in mid 1948 to have their subsidiary KLG Sparking Plugs Ltd, commence production of the famous ball-headed "Miniglow" plugs in various sizes. These were to become something of an icon in British modelling circles, remaining on the market throughout the 1950's. In his January 1949 book entitled *Model Glow Plug Engines*, Colonel CE Bowden reported that as of late 1948 British-made glow plugs were also being offered under the McCoy Hotpoint label as well as by the then-emerging firm of Kiel Kraft. The identities of the actual manufacturers of the latter two plug brands are obscure at this distance in time.

All of this clearly highlighted glow-plug ignition as an emerging factor in the British modelling scene that could not be ignored by a new manufacturer wishing to start off on a forward-looking basis. Consequently, although the Nordec 10 cc racing engine was introduced in spark ignition form, this model was accompanied from the outset by a glow-plug ignition version. Nordec actually appears to have been ahead of McCoy in this respect, since the production glow-plug version of the Series 20 McCoy 60 did not appear until 1949. Interestingly enough, both the spark ignition and glow-plug ignition models of the Nordec were offered concurrently for the engine's entire production life, indicating that there remained a market niche for the sparker even after the general acceptance of glow-plug ignition.

The two models which resulted from this approach were designated the Nordec R10 (spark ignition) and Nordec RG10 (glow-plug) respectively. Based upon the attached illustration from Ron Warring’s early 1949 book entitled ‘Miniature Aero Engines’, the prototypes looked even more like the McCoy than the later production models, since they used what appeared to be a standard McCoy timer, in contrast to the Dooling-pattern timers used on the subsequent production versions. The prop driver assembly and needle valve also appeared to be standard McCoy components. The engines also lacked the black finish of the production models. Field testing of these prototypes appears to have begun quite early on in the 1948 flying season, with some very encouraging results being recorded in the contemporary modelling media.

A well publicised highlight from the development period was John Wood’s appearance at the Northern Heights Gala in June of 1948, at which he put on an

RG10 powered demonstration flight for the then queen Elizabeth with her daughter Princess Margaret

The Queen was reportedly very pleased to hear that the engine used for this apparently-impressive flight was British-made! Wood continued his success at the 1948 West Essex meet, establishing the inaugural British Class D record at 95.3 mph. All of this undoubtedly raised expectations in the collective mind of the British modelling public.

The R10 and RG10 were officially unveiled to the public at the Model Engineer Exhibition in August 1948, with deliveries expected later that month. The two models were identical in almost all respects, the only real differences being in the front housings. As a result of the close similarity between the two, it will be convenient to describe them together, noting the differences at the appropriate points. Before doing so, it is necessary to point out that the descriptions which follow are based upon detailed examination of my own unmodified examples of the R10 and RG10 which are in the configuration in which the engines seem to have been offered for

the greater part of their short production life. It appears that the engine as first introduced differed in detail from these examples.

The attached illustration taken from Bowden's previously-mentioned book shows the RG10 engine in its original production form. The cooling jacket, venturi and prop driver are all slightly different from their counterparts on the later examples, and the engine is assembled with the exhaust stack on the left. This was not a one-off—both the prototype illustrated by Ron Warring (see above) and the one tested by Lawrence Sparey in early 1949 for Aero modeller magazine were similarly arranged. Later models are uniformly seen with their stacks on the right. But these differences are largely cosmetic in nature and do not affect the validity of the following descriptions.

The engines were supplied in a sturdy cardboard box with extensive labelling. The papers which came with the engine included an instruction manual, a factory test report slip showing the starting needle setting, a parts list, some recommendations regarding such matters as suitable props, flywheel, fuel, plugs, etc, and a guarantee registration form to be returned to the factory upon purchase of the engine.


Having covered their development and introduction, we're now ready to embark upon our detailed description of the Nordec engines. However, before we do so, we'll take advantage of a unique opportunity to get a close look at the way in which Nordec went about their manufacture.

**EDGAR T WESTBURY VISITS NORDEC**

Few regular visitors to this site will be unfamiliar with the name of Edgar (1896—1970), one of the true pioneers of model internal combustion engine design and construction. Born in humble circumstances, Westbury received only a primary level education supplemented by evening classes before entering service in the Royal Navy in 1915 as an 18 year old stoker. Following demobilization in 1922 with the rank of Chief Petty Officer (mustering as an Engine Room Artificer), he spent a few years in the civilian engineering field before rejoining the military in a civilian capacity as a laboratory assistant at the Cranwell training establishment.

It was during his time at Cranwell that Westbury began to publish articles on model engineering, focusing upon miniature internal combustion engines. By 1932 his list of published articles and model engine designs was truly impressive. In that year, following a successful collaboration with Captain (later Colonel) CE Bowden in establishing a new world record for power duration models, he joined the staff of *Model Engineer* magazine as technical assistant to Managing Editor Percival Marshall. By 1945, Westbury had risen to become the magazine's Technical Editor.

Along with his other duties, Westbury contributed a regular column to *Model Engineer* under the title *Petrol Engine Topics*. Unsurprisingly given his interest in promoting model engineering as a hobby, he was an unswerving proponent of amateur home construction of model I/C engines, tending to take a somewhat condescending view of commercially-produced designs. This was particularly true of the imported models which began to reach British shores in increasing numbers following the conclusion of WW2. Westbury viewed the increasing availability of commercial products as a deterrent to the pursuit of home construction, which thus ran counter to his own interests and those of the magazine. By his own candid admission, he was known to express himself "rather strongly" on this issue!

Not surprisingly, there were many who resented Westbury's attitude towards commercially-produced engines. These individuals felt that Westbury tended to make insufficient allowance for the fact that most modellers were not in a position to make their own engines even if they wanted to do so. Indeed, Westbury's own intense interest in model engine construction was seen as tending to blind him to the fact that the majority of modellers were far more interested in building and operating models than in constructing engines for them. This being the case, the progression of commercial model engine manufacture was inevitable from the outset.

During the latter part of 1948, Westbury evidently felt that it was time for him to answer his critics. His defence took the form of an article which appeared as part of his regular *Petrol Engine Topics* series in the December 2nd, 1948 issue of "Model Engineer", which was a weekly publication at that time.

Westbury began with a spirited clarification of his views regarding commercially-manufactured engines. He stated very directly that he was not opposed to them—indeed, he had provided technical and promotional assistance to a number of commercial manufacturers in the past (1066 being a notable example). He simply believed that commercial engines should be viewed as supplementary to home-constructed units rather than as replacements for them.

Westbury went on to make it clear that his major concern with regard to commercially-manufactured engines centred upon the imports. He saw them as a real threat to the development of competitive British designs, both commercial or otherwise. He admitted that some of them were very good, but expressed the view that British manufacturers could do just as well if given the opportunity together with the necessary support from the modelling public.

In fairness to Westbury, it must be said that he was far from alone in holding such views on imported engines. As an example, the insertion of the Dooling 61 into the British model hydroplane racing scene in 1949, when George Stone immediately extended the existing speed record of 51.7 mph by an unprecedented 18.4 mph (35%), created such a backlash against the US imports that a separate class was established strictly for engines of British origin. Things went even further than this in the tethered car field—a number of prominent competitors actually retired from competition rather than having to compete with the imports, while a division of classes similar to that in the hydroplane field were also implemented. The fact that all of this was a pretty clear admission of the superiority of the American products—if you can't beat 'em, ban 'em!—seemingly didn't count for much! In fact, the main result of these machinations was to marginalize the British efforts—the American products quickly became the dominant standard in both fields, with the McCoy 60 Series 20 ruling the hydroplane world while both the Dooling 61 and 29 swept all before them in tethered car racing, leaving the British efforts on the sidelines.

In support of his stated views regarding the capabilities of British manufacturer, Westbury stated that he had recently arranged an opportunity to visit the workshops of one of several British manufacturers who were then manufacturing 10 cc racing engines. The recipients of his visit were of course none other than our friends at Nordec (the other contemporary such manufacturers being 1066 and Rowell). During this visit, Westbury was afforded complete freedom to observe manufacturing operations in progress, take photographs and interview staff. A number of his photographs appear as illustrations to the present article. His detailed observations provide us with a uniquely close-up look at the manner in which Nordec approached the challenge of manufacturing the engines which we are now discussing.

Westbury's article makes it abundantly clear that the Nordec workshops were both very well equipped and adequately staffed. An interesting observation in the latter respect is the fact that a number of the employees seen in the photographs taken by Westbury were women. The requirement for skilled industrial workers during WW2 when much of the male population was occupied with military duties had opened many previously-closed doors to women, providing them with technical skills and experience upon which they were able to capitalize following the conclusion of the war. However, it was a regrettable fact of the times that women received less pay for equal work than men, a situation that was not finally resolved until 1970 when the Equal Pay Act was passed by the British Parliament. Like many other firms, Nordec clearly took advantage of the inequitable situation which existed in 1948.

Westbury recorded the fact that the available equipment included turret lathes, centre lathes, multiple-spindle drilling machines, universal grinders, surface grinders, gang mills and Delapena honing equipment—everything in fact that a model engine manufacturer could require! His observations also enabled him to clarify a number of aspects of the engine's construction. Somewhat unusually, all of the work was apparently done in-house. The main castings (crankcase, main bearing housing, backplate, disc valve, timer frame) were sand-cast in DTD 424 aluminium alloy, being heat-treated prior to machining. The pistons were gravity die-cast in low-expansion piston alloy, after which their working surfaces were diamond-turned. The cylinder bores were Delapena-honed. The crankshaft was of composite construction, being press-fitted and then brazed together from three components (main journal, crankweb and crankpin). Following this assembly, the journal and crankpin were case-hardened. Finally, the piston rings were also made in-house, being surface-ground on the sides and cylindrically-ground under compression on the working faces.

Westbury's photograph of the assembly bench shows a young lady completing engines from components. There appear to be ten complete engines at the far end of the bench, while another is in the hands of the assembler. In addition, the image includes some eleven sets of components awaiting attention for a total of twenty-two engines in all. Based upon reported serial numbers, this represents around 35% of Nordec's average monthly output of these units. The image was likely posed for the camera, but nonetheless the implication is that production of the engines was undertaken in batches within the company's overall work schedule, as dictated by demand.

Westbury observed several finished engines being tested, reporting that although no actual measurements were taken, the levels of performance appeared to him to be "well up to the standard of most engines in the 10 cc racing class which I have so far encountered". Overall, he was clearly quite impressed with the manner in which Nordec went about their business. It seems worth quoting his summation in full:

*"I can now say without hesitation that the engines are a conscientious job, produced from good and suitable materials, by sound machining methods, to limits of accuracy which are at least as high (to my certain knowledge) as those observed in the standard productions of some of the most highly reputed foreign engine manufacturers".*

Quite an endorsement from one of the most respected model engineers of his or any other day! Westbury concluded by advising his readers to "Build your own engine if you can; but if you decide to buy engines—buy British!"

The publication of this article by Westbury clearly represented a major step towards his open acceptance of the concept of model engine manufacture as a viable and indeed inevitable adjunct to the broader modelling hobby, even if it did tend to remove the pressure upon modellers to construct their own engines. The scope of Westbury's crusade had now expanded from the promotion of home construction to include the promotion of British commercial construction, although he understandably continued to favour the former approach. The one area in which he seems to have remained out of step with the views of many others was his opinion regarding the future of the spark ignition engine. His position was well summarized as follows:

*"Although there have been very many people only too ready to publish the obituary notice of the miniature petrol engine, both in this country and abroad, I feel that these announcements are very premature, and that in the larger sizes of racing models, at least, this form of engine is as yet without a serious rival".*

History tells us just how mistaken Westbury proved to be in holding this opinion! Within a year or so of his writing the above words, the spark ignition engine was history apart from a few die-hard users of larger racing engines who soldiered on for another year or two using spark ignition. Within two years of the publication of Westbury's article, even the majority of these die-hards had abandoned spark ignition in favour of the glow-plug, at least in the aero modelling field.

So much for our look at Nordec through the eyes of a supremely well qualified contemporary observer. Having established the manufacturing credentials of the Nordec series, it's now time for us to take a close look at their construction.

**NORDEC R10 and RG10 DESCRIBED**

We may as well start out by summarizing a few vital statistics. The bore and stroke measurements of both Nordec models were 0.940" and 0.875" respectively for a displacement of 9.95 cc. And yes, if you know your McCoy's you'll recognize these measurements as being exactly those of the McCoy 60! The R10 spark ignition version weighs in at 17.21 ounces (488 gm) compared with the 17.00 ounces (482 gm) of the 1946-48 McCoy 60 sparker. The RG10 is naturally a little lighter at 15.87 oz. (450 gm), very close indeed to the weight of 15.75 oz. for the glow version of the McCoy 60 Series 20. Near enough—so far, so similar!

There are other direct similarities to the McCoy. The engine is based upon a very sturdy sand-cast crankcase with integral exhaust stack normally assembled on the right hand side. Although we have noted that some of the earlier examples of the Nordec appear to have been assembled with their stacks on the left, the previously-attached image of the Nordec assembly bench taken in late 1948 clearly shows the engines being assembled with their stacks on the right. The majority of examples encountered today display this orientation.

Like the McCoy "original", the crankcase displays a very durable black finish on its un-machined surfaces. The mounting holes are identically spaced, meaning that the Nordec and McCoy are directly interchangeable in the same model. Perhaps Nordec were entertaining heady visions of making a few converts both at home and abroad.

The cylinder porting and timing are more or less identical to those of the 1946-48 McCoy, with both transfer and exhaust ports consisting of a series of small square openings separated by thin pillars to prevent ring snag. There are four transfer port openings and six exhaust openings. Two additional round ports are provided on the transfer side which align at bottom dead centre with skirt ports in the piston to augment the flow of gas into the bypass passage. The bypass passage of the Nordec, which is cast into the main crankcase as on the McCoy, is somewhat smaller in area than its McCoy counterpart and probably needs all the assistance that the skirt ports can give it! The port openings in the Nordec liner are also of slightly smaller height than those in the McCoy.

The Nordec's gravity die-cast light alloy piston is of a very similar design to that of the McCoy, with two well-fitted cast iron compression rings and a contoured crown incorporating a baffle. The crown on the Nordec is considerably less elevated than that of the McCoy, presumably to better conform to the very different combustion chamber configuration (of which more later).

Induction arrangements are also more or less identical, with a sand-cast aluminium alloy disc valve mounted on a steel shaft which in turn is very well supported in a bronze bushing pressed into the centre of the cast aluminium alloy backplate. This is timed (on my examples at least) to open around 45 degrees after bottom dead centre and close approximately 55 degrees after top dead centre—a generous induction period of 190 degrees. The venturi is a separate component which mounts onto the backplate, just as on the McCoy. A surface jet needle valve assembly is used with a gland nut for needle tension, again very similar to that employed on the McCoy.

The crankshaft is carried in two ball bearings which are mounted in a detachable front housing held in place by four high-quality 4 BA Allen head screws. Apart from the thread used, this again follows McCoy practise exactly. A bobbin-style prop drive is used, and this too follows McCoy practise in being secured to the shaft using a Woodruff key. The early Nordecs used a driver with two studs protruding from the drive face to grip the prop as opposed to the milled striations which were used on the later models.

OK, so much for the similarities! What about the differences? Well, as it turns out, there are actually more of these than we might expect from a mere ‘clone’

Starting at the top, the plain aluminium alloy cylinder head of the original Nordec R-series models is not a casting as used in the McCoy but instead is machined from solid bar. This has one rather unfortunate effect—it presents a significant production challenge in connection with the contouring of the underside of the head to match the piston crown, given that the ideal shape is significantly asymmetrical. And indeed no attempt has been made to create a matching shape and hence a more efficient combustion chamber. The underside of the cylinder head is simply turned into a bowl shape with a narrow and clearly ineffective "squish band" at the edge and a broad slot milled across at the appropriate point to provide baffle clearance. This head conforms only marginally to the piston crown, and the resulting inefficient low-swirl combustion chamber with multiple "gas pockets" remote from the ignition source was to prove to be one of the Achilles heels of the Nordec in performance terms.

There were two distinct head configurations available for the Nordec. Externally, these appear identical. However, the combustion chamber "bowls" of the two head types were cut to different depths to give a choice of compression ratios. The low-compression head naturally had a deeper bowl machined into its underside to increase the combustion chamber volume at top dead centre. This had the effect of reducing the head thickness available for the plug threads. Consequently, the low compression head was intended for use with a shorter-reach plug than the high compression version. The low compression head is externally identified by having a letter "S" stamped into the horizontal surface of the plug recess. The high compression head is externally unmarked.

The instruction manual makes a particular point of this, stating that heads having the letter "S" stamped into them should be fitted with a plug having no more than a 5/32" reach, while unmarked heads may be fitted with a longer-reach plug having a reach of 7/32" I have engines fitted with both types of head. Based upon my own volumetric measurements, the high compression head checks out at around 10:1, while the low-compression item is in the 8.5:1 range. The cylinder heads on both engines are fitted without gaskets, the contact surfaces being lapped together to create a good seal.

Moving on downwards, we come to one of the major structural design differences between the McCoy and the Nordec. It isn't at all apparent until you take one apart, but the Nordec's finned cooling jacket is not integral with the main crankcase casting. It is in fact a separate turning which slips over the lower cylinder liner and supports the flange at the top of the liner. The lower end of this jacket rests on the upper surface of the main casting, which is turned flat at the top of the wide turned band visible above the top surface of the exhaust stack. Hold-down stresses are transferred to the top of the main casting through this separate cooling jacket, with the Meehanite liner itself remaining unstressed apart from the flange at the top.

Naturally, this requires the six 4 BA Allen-head hold-down bolts to pass completely through both head and cooling jacket to thread directly into the main casting below the jacket. It's not completely clear why the Nordec designer made this change, but it does make the main casting a little smaller and also eases the task of forming the cooling fins on a simple lathe setting using solid bar—less machining on the main casting with its more complex lathe set-up. I suspect that the decision to adopt this arrangement was production-based.

Incidentally, the Allen-head bolts used in the Nordec engines were the famous Unbrako-brand items, which were of a far higher quality than those used in most competing model engines. The Unbrako company actually featured the Nordec engines in their advertising for a time. The company remains very much active in the fastener business today, still supplying socket-head cap screws of the very highest quality.

The cooling fins on the early Nordecs seem to have been turned to a uniform outside diameter which matched the cylinder head. This can clearly be seen in Bowden's illustration reproduced above. Later models like my own illustrated examples featured a slightly tapered form applied to the fins so that they matched the head diameter at the top and the slightly smaller case diameter at the base.

The rest of the cylinder/piston/rod set-up is more or less similar to the McCoy, down to the sturdy forged con-rod with bronze-bushed big end and nominally-identical working length between centres. For our next set of differences, we must look to the front end assembly. Here we immediately notice one production change of some significance—as reported by Westbury (see above); the Nordec crankshaft is a built-up item rather than a one-piece item as used on the McCoy. The crankweb is a separate component which is press-fitted onto the crankshaft journal. The crankpin is also pressed-in. This assembly can be clearly seen in the comparison view of the McCoy and Nordec crankshafts, as can the different shape of the counterbalance portions of the two crankwebs. Following assembly, the three components were brazed together for added security, after which the crankshaft journal and crankpin were case-hardened.

The front housing of the Nordec is not fabricated from the solid as one might suppose upon first acquaintance but is machined from a sand-casting of more-or-less identical section to the front face of the crankcase. This casting is machined virtually all over, the original as-cast surface being visible only at the edge of the mounting flange on the glow-plug model. It's interesting to note that the castings used for the glow-plug and spark ignition models were completely different—the casting for the spark ignition version incorporated the opening for the cam follower as cast, whilst that for the glow-plug model naturally omitted this opening. On the sparker, the original as-cast surface is exposed in the cam follower opening as well as around the rim of the mounting flange. The spark ignition front end also featured a shoulder machined aft of the cam follower opening to accept the Dooling-pattern automotive timer which was employed.

The front housing mounting holes of the Nordec and McCoy engines are identically spaced, the consequence being that the McCoy front end can be bolted right onto the Nordec case. However, you couldn't run it this way—the locating spigot which extends into the case and contains the rear bearing is very slightly smaller on the McCoy than it is on the Nordec, so the McCoy front end is inadequately supported in the Nordec case for running purposes. The Nordec unit is a very accurate plug fit in the case, thus offering excellent shaft support when assembled.

The Nordec bobbin-style prop driver extends further forward than that of the McCoy, which could be an advantage for speed model installations. Like the McCoy, this driver is locked to the 0.375" diameter front portion of the shaft with a Woodruff key, which is of very generous proportions on the Nordec. However, the method of prop mounting is rather different, at least on the later Nordecs. The McCoy uses the familiar sleeve nut which passes through the prop hub, screws onto an externally threaded extension at the front of the shaft and enters the bore of the prop driver, thus locating the prop very securely. The early Nordecs like the one illustrated by Col. Bowden used a similar set-up. However, subsequent examples of the Nordec used a seemingly rather inadequate 2 BA hexagonal-head bolt with a thin steel washer. The bolt threads into a tapped hole in the centre of the crankshaft. This arrangement appears on all of my own examples as well as on the example tested in March 1949 by Sparey, also being consistently seen in contemporary photographs of these models. One can only wonder why.

The 0.187" outside diameter of the 2 BA bolt is of course totally inadequate for the mounting of a suitable prop for this rather large engine, and it's quite clear that the intent was for the user to incorporate an alloy tube which was drilled out internally to accommodate the prop bolt and turned externally to a close fit in the 0.375" diameter bore of the prop driver bobbin, thus locating the prop hub very securely relative to the bobbin driver and shaft without relying on the bolt for lateral security. This tube is generally missing from examples of this engine encountered today, but its use is not really optional if a secure prop mounting is desired. All of my examples have such fittings, as did another example which I had years ago but then sold. I would not run a Nordec without it.

The final differences are to be found at the rear of the engine The intake venturi is not threaded directly into the backplate as on the McCoy but instead is turned to an easy plug fit in a socket machined concentric with the intake, where it is secured using a 4 BA set screw. Both slot-head screws and Allen-head items are encountered serving this latter purpose. This arrangement is actually superior to the McCoy system when it comes to adjusting the position of the needle to suit different installations.

As supplied, the bore of the venturi on the Nordec is marginally smaller than that of the 1946/48 McCoy at 5/16" (0.312 in.), actually appearing to be significantly undersized for a racing engine of this displacement. This doubtless contributes to the Nordec's undeniably inferior performance in comparative terms. The intent was presumably to create sufficient suction to allow for easy bench-testing and break-in of the engine without the need to arrange for pressure fuel feed.

It seems highly likely that designer Wood anticipated that a knowledgeable user of one of these engines would drill out the venturi bore to suit the purpose for which the engine was to be used. Removal of metal is easy—replacing it is less so! Hence starting small and working up makes perfect sense. The amount of metal which forms the spigot section of the venturi is easily sufficient to allow for an enlargement to 11/32 in (0.344 in.) or even a little more. One of my examples has been modified very capably by a previous owner, including the boring-out of the venturi to 0.350"—an increase in throat area of around 25%. Although I have yet to undertake a comparative test, preliminary indications are that this work has released significantly more power at the expense of a degree of suction.

The needle valve assembly is pretty much a clone of the McCoy set-up, using a separate fuel jet which screws into one side of the venturi and a needle mounting which screws into the opposite side. A straight needle is used, with a knurled brass knob at the outer end. A gland nut is used for needle tension.

Finally, the Nordec venturi itself is a little shorter than that on the McCoy, which has the benefit of allowing the engine to be mounted a little closer to the main firewall. It's also worth noting in passing that the early Nordecs used a venturi which was externally far more bell-shaped than the later models. Once again, Bowden's illustration reproduced above shows this clearly.

So the Nordec undoubtedly borrowed a great deal from the McCoy, but it does show evidence of a certain amount of original thinking, if only in production terms for the most part. The engines are beautifully made throughout, with fits of the highest order and those high-quality steel Unbrako Allen-head screws used for assembly. The sand-castings are a bit rough-surfaced, but certainly sound and well up to the job. Overall, these are very well-made engines which should give excellent service. So how do they work in reality? Let's find out.

**PERFORMANCE AND FURTHER DEVELOPEMENT**

The tragedy of the Nordec (if it deserves that term!) is that it was in effect copied from a prototype (the 1946/48 McCoy Red Head 60) which was in the process of being drastically upgraded at the very time when the Nordec first reached the market. As a result, its performance was immediately overshadowed by the vastly improved Series 20 version of the McCoy 60 which was introduced in the latter part of 1948 to replace the model from which the Nordec was copied.

As far as the British modelling press was concerned, the Nordec got off to a very promising start. We saw earlier that the engine's public appearances during its development phase were duly recorded in the contemporary media, as were its appearance at the 1948 Model Engineer exhibition along with its early success in setting that inaugural British Class D record of 95.3 mph at the 1948 West Essex meet.

The engines were supplied with a very clear set of instructions which included a wiring diagram for the spark ignition models. The leaflet also included a warranty statement to the effect that any defects due to faulty workmanship or materials would be rectified free of charge provided the engine was returned to the factory within 60 days of purchase, that the engine had not been dismantled and that a warranty card had previously been registered with the company.

Somewhat unusually, the instructions did not include any recommendations regarding appropriate airscrew sizes. In his previously-mentioned 1949 book "Miniature Aero Motors", Ron Warring suggested a 12x8 for free flight and a 10x8 for control line when applied to the R10 sparker. For the RG10 glow-plug model, he made no recommendation for a free flight prop, instead confining himself to suggesting a 10x10 for control line. In his March 1949 test of the RG10 (see below), Lawrence Sparey included somewhat different recommendations, suggesting 12x12 for running in, 10x10 for sport flying (!) and 9x10 for control line speed.

Bowden made much of the Nordec in his January 1949 book *Model Glow Plug Engines*, stating that the engine filled "a long-felt want in this country". He praised the quality of construction of his own example, and in this at least both Westbury's comments and examination of surviving examples fully bear him out. He reported using his Nordec in a 44 inch long high-speed boat, an illustration of which appeared in the book. Finally, he noted the Nordec's establishment of the previously-mentioned British control-line speed record at a shattering 95.3 mph. Nothing there to make Dick McCoy or Tom Dooling choke on their coffee, but as noted earlier there were few if any McCoys or Doolings in Britain at the time for the Nordec to compete with. Just as well, perhaps...

Following the release of Bowden's book, the RG10 glow-plug version of the Nordec was tested by Lawrence Sparey, the report being published in the March 1949 issue of Aero modeller magazine. This was in one respect a historic test—although it was the eleventh evaluation undertaken by Sparey for the magazine, it was his first-ever test of a glow-plug model engine. This illustrates the fact that interest in the glow-plug engine in diesel-minded Britain had lagged well behind that in the United States, where glow-plug ignition had been all the rage for a year or so prior to this date.

For a first test of a glow-plug engine, things went very well and Sparey was unstinting in his praise for the engine. He characterized starting as "exceptionally easy" and running qualities as being "free from all fussiness". As a past Nordec user and occasional present-day tester myself, I would endorse both those comments. Sparey praised the engine's response to adjustments of the needle, while commenting also on its prodigious thirst! He referred most favourably to the quality of the engine's construction and summarized its performance as *"excellent, if not remarkable"*.

The latter statement must be read in the context of measured performances of other contemporary British models. It has to be said that performance standards in Britain at the time generally lagged well behind those in America, particularly in relation to their glow-plug models. The Nordec was entirely typical in this regard and hence was little if any worse than most other contemporary British glow-plug engines in terms of its specific output. The actual peak power measured by Sparey was only 0.48 BHP at 11,200 rpm using a straight 75-25 percent fuel mix of methanol and castor oil. No doubt things would have improved quite substantially if a proportion of nitromethane had been added. But at this time in Britain nitro was almost impossible to obtain and prohibitively expensive when it was available, so Sparey was fully justified in using a straight fuel—most British modellers of the period would have had no other option.

Even so, this could scarcely be classified as a true "racing" performance! And it must be said that the figure seems a little suspect to me—an original Nordec RG10 which I actually flew many years ago gave the impression of doing a bit better than this. Mind you, I used a proportion of nitro in my fuel, which would certainly have improved matters quite a bit. It's also true to say that for racing applications most owners would have bored out the rather constrictive venturi, as mentioned earlier.

Even so, there's no question at all that the Nordec failed to approach the performance of the McCoy original. Even the 1946-48 black-case version of the McCoy developed a measured power output in the order of 1.0 BHP at around 13,000 rpm, and the Nordec certainly didn't approach these figures. To make matters worse, the Series 20 McCoy 60 introduced in 1948 more or less concurrently with the original Nordec R-series models performed at a far higher level than its 1946/48 predecessor upon which the Nordec was based. In essence, the Nordec was out of date in design and performance terms as soon as it was released.

Not to be outdone, ‘Aeromodeller's’ rival British magazine ‘Model Aircraft’ published a test of both the R10 and RG10 models which appeared in its June 1949 issue. Although the latter test was unattributed, it was almost certainly conducted by Peter Chinn. A somewhat superior power figure to that obtained by Sparey was recorded, the published figures being just over 0.6 BHP at 12,000 rpm on glow-plug ignition. But this more or less confirms the fact that the Nordec in its original form was a less-than-stellar performer by comparison with its competitors, albeit a well-made and fine-handling unit.

Coupled with the rather undersized intake and relatively small bypass passage, the inefficient combustion chamber design noted earlier almost certainly had a great deal to do with the documented shortfall in the Nordec's performance. Despite the more restrictive breathing arrangements, the rest of the engine followed the McCoy design sufficiently closely that one would objectively expect a somewhat narrower performance gap than that which actually resulted. The implication is that the combustion chamber design was a major culprit here.

That said, there's no doubt that the original Nordec was (and is) a very nice engine to handle, especially for such a large unit. Experience fully justifies Sparey's comment that it starts very well for a racing engine and runs very smoothly with excellent needle response. The one which I myself flew for a while many years ago (just to be different!) was always a pleasure to operate if one could accommodate the noise levels and afford to fill the tank!

Despite the use of a surface jet needle valve set-up, suction was actually quite reasonable, doubtless due to the relatively small venturi section. Consequently, the Nordec was used in applications which stretched well beyond those normally expected from a racing motor. Notwithstanding its rather excessive weight, it was actually used in large control line stunt models by a few deaf modellers with deep enough pockets to afford the fuel bills. Its running characteristics were surprisingly well suited to this application, particularly if a spraybar was fitted in place of the surface jet system.

The Nordec RG10 was featured as the "plan" engine in the large biplane stunt model "Yoicks" which was published in October 1949 as Aero modeller plan no. CL334. This was designed by John Coasby, who worked as a draftsman for Aero modeller Magazine and was a pioneer of the large stunt model in Britain. Coasby seem to have been a fan of racing engines in large stunt models, since his 67 inch span "Icarus" design of April 1951 (plan no. CL422) featured a McCoy 60 as the "design" power unit!

But the Nordec had of course been intended all along for racing applications. Its natural metier was the control line speed model which was its designer's first love, although it was also applicable to the then-popular sports of tethered hydroplane and model car racing as well. The Nordec company offered a well-made flywheel and clutch set-up for use with the engine in a racing car application, along with an aluminium spur-drive mount. However, tethered hydroplane and model car historian Hugh Blowers advises that the Nordec was quickly found to be at best an indifferent performer in these fields, hence being almost completely ignored by the hydro and car racing fraternity.

In standard form, it must be said that the engine could scarcely be considered a world-beater in the all-out racing field. However, it soon received some attention from the tuning experts who were an evolving breed at the time. The legendary tuner Fred Carter was among those who tried their hand at getting more out of the Nordec than its original configuration allowed.

Carter was among those who recognized the combustion chamber configuration as a major stumbling block to the achievement of the engine's full potential. He focused on this area, making a new piston and head for his Nordec together with a new venturi and front housing. The results of his efforts were quite tangible—at a time when the stock engine was good for perhaps 100 mph under ideal conditions, Carter's Nordec-powered "Little Rocket" consistently turned in speeds of around 116 mph, a fine performance by then-current British standards. This success marked the beginning of Carter's long run of pre-eminence as a racing engine tuner in Britain. Amazingly enough, the Carter-Nordec Special still exists today, albeit no longer mounted in the Little Rocket.

However, even Carter's sterling efforts paled beside those of the renowned Czech expert (and founding director of the MVVS organization) Zdenek Husicka. Having somehow obtained an example of the Nordec 60 from behind the Iron Curtain, Husicka achieved a speed of 129.56 mph at a contest in Brno in September 1952 using this engine. As far as I'm able to determine from the records currently at my disposal, this was the fastest speed ever officially recorded by a Nordec in competition. The engine may well have been a very competently-tuned example of one of the later Nordec Special models to be described next—surely no-one ever got the original Nordec RG10 to go that fast!

Naturally, the results of the efforts of Carter and his compatriots were not lost on John Wood, nor was the lesson missed regarding the inadequacies of the original combustion chamber design. In late 1949 Nordec developed their own revised head design to address this issue, together with a reconfigured piston having a far taller crown. The new head was a casting instead of the machined unit formerly used, and this allowed the creation of a combustion chamber contour which more correctly matched that of the piston crown, thus minimizing the problem of "gas pockets", promoting improved swirl and hence improving combustion efficiency. The plug was angled to bring the actual ignition point over towards the transfer side, thus promoting the more rapid involvement of the portion of mixture behind the baffle in the overall combustion process. Basically, the revised design was pretty much a clone of the tried and tested McCoy configuration. Most of these heads were anodized black.

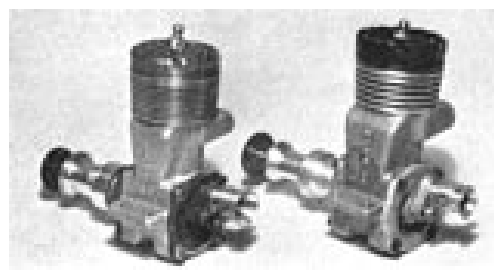
The company released an updated version of the engine designated the "Nordec Special" in December of 1949, still in both glow-plug and spark ignition forms. The only structural change from the earlier models was the incorporation of the revised piston and head. Measurements taken from my own spark ignition example of this model indicate that the new head also incorporated a significantly higher compression ratio of around 13:1. Although by no means unprecedented, this was pretty high for the period, no doubt being tailored to the specified use of a straight methanol-based fuel as opposed to petrol. While probably fine for spark ignition use on a methanol fuel, this ratio seems excessively high for glow-plug operation—perhaps the glow-plug versions featured a lower ratio.


One interesting feature of Nordec Special number 1137 is the use of a slightly modified timer. The basic Dooling-pattern unit was unchanged, but a control arm was added to facilitate timing adjustment while the engine was running. Such an adjustment naturally required that the clamp screw which normally secured the timer against cam-induced rotation be slackened off. To prevent the timer from "walking off" its shoulder in a forward direction and thus allowing the cam follower to foul the front bearing housing, an annular groove was neatly machined into the timer mounting shoulder opposite the timer arm location. A small brass screw extended through a tapped hole in the timer casting to engage with this groove, thus keeping the timer in the correct fore-and-aft location while adjustments were being made. Other examples of the Special do not display this feature, so it may have been a specific customer request.


The sole advertisement for this model appeared in various modelling publications in January 1950. The price of the revised models remained unchanged at £12 even for the glow-plug version and £12 10s 0d (£12.50) for the sparker. Interestingly enough, it appears that the company still held unsold inventory of the original R10 and RG10 models, since these were offered in the same advertisement at a £2 discount. It's also worth noting in passing that this advertisement referred to Nordec's Caterham address, possibly presaging the impending consolidation of the company's operations at that location (see below).

It's also worth mentioning at this point that this was one of only three advertisements which were placed by Nordec during the entire production lifetime of the series. The other two placements appeared in various publications in March and June of 1949. It appears that the budgetary limitations which Major Sheepshanks had imposed upon the overall project did not include much of an allocation for promotional purposes!

The revised cylinder head and piston doubtless combined with the higher compression ratio to improve combustion efficiency somewhat. However, the relatively restrictive porting and induction system remained unaltered, the consequence being that the performance of this version still lagged far behind that of the vastly-improved Series 20 McCoy Red Head 60 and the mighty Dooling 61. As a result, the original Nordec Special could hardly be termed a success in performance terms. The marketplace evidently agreed with this assessment, and sales were not brisk.



To its great credit, the company was once again quick to recognize the residual problems with their product, and in the spring of 1950 John Wood decided to go whole hog by developing a completely revised model which was quite openly based on the Series 20 McCoy, featuring far less restrictive induction and porting arrangements to go along with its improved combustion chamber design. The result was an entirely new model, the Nordec Special Series II. It appears to have been constructed only as a glow-plug model.

As one might expect given the engine's heritage, the performance of this design was a huge improvement over that of the earlier RG10 and Nordec Special Series I models. Peter Chinn tested the prototype of this variant for the manufacturers and covered both the Series I and Series II versions of the Special in a test report published in the June 1950 issue of *Model Aircraft*. Published output of the latter model was a highly creditable 1.23 BHP at 15,200 rpm. Now that's more like it!

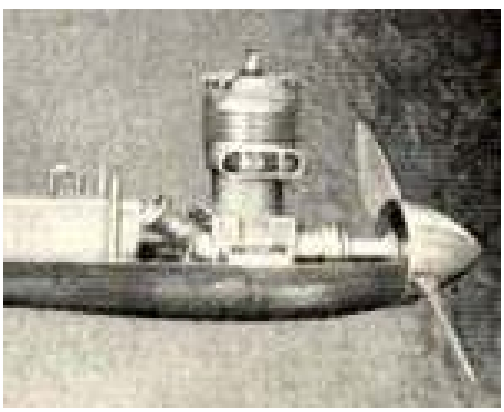
By way of comparison, Chinn's published November 1951 test of the Series 20 McCoy 60 found 1.52 BHP at 16,100 rpm. Although this certainly bettered the performance of the Nordec Special Series II, it's clear that the latter had finally made it into the same ball-park as its American rival, performance-wise. It had always been a match for the McCoy in terms of quality, so it appeared that Nordec finally had the product that they needed to succeed.

However, it was a case of too little, too late, since the writing was already on the wall for the Nordec series. Sales of large racing engines in Britain were never brisk, a fact which should come as no real surprise. A further matter for concern may well have been the flagging momentum of the legal case presented by the model trade to have

British-made model goods exempted from Purchase Tax. The eventual failure of this challenge in late 1950 put a serious dent in the profit and pricing picture for model engine manufacturers in Britain. It's doubtful that Nordec were making much on the model engine side even before the failure of the case.

An additional challenge facing Nordec at this time was the need to undertake a consolidation of their operations. At some point in early to mid 1950, the Godstone Road premises at Whyteleafe were abandoned, with all activities being consolidated at the Caterham location. This move may have been made necessary by the construction of the Wapses Lodge roundabout along with the Caterham Bypass. The loss of Nordec's Whyteleafe manufacturing facility at which the Nordec engines had been constructed most likely sounded the death knell for the production of the Nordec engines regardless of any other considerations.

For all of these reasons, the company decided very soon after the development of the Nordec Special Series II that there was little point in continuing in the field. The Nordec Special Series II was therefore abandoned—indeed, production of the Nordec engines appears to have ceased entirely by mid 1950. Consequently, the Nordec Special series engines are relatively rare today. It's actually probable that the Series II Special never made it past the prototype stage—certainly, to date there has been no report of a genuine surviving example.



So the Nordec racing engine was gone, after a production life of some twenty months or so. John Wood had been tinkering with some further development ideas, coming up with a new model which was described in July 1950 as being his own design. It showed a mixture of Dooling and McCoy influences along with a good dash of Nordec, naturally. My mate David Owen has what appears to be an example of this engine, built around Nordec case number 899. However, this variant appears never to have entered series production, although another example has been reliably reportedly from New Zealand, demonstrating that a few of them were assembled, likely from existing examples of earlier models. Wood continued to campaign his modified Nordecs for some time, actually taking a class win at the 1951 Isle of Man rally.

The abandonment of their model engine line was by no means a body blow to the Nordec company, which remained active in the automotive business long after the cessation of model engine production. It is presently unclear how long the company continued in operation, but it certainly remained in business as of 1959, still operating from its Caterham location. At that time it was promoting a revised supercharger system known as the Godfrey-Nordec system in addition to the well-established Marshall-Nordec installation, and was offering kits for such apparently unlikely "muscle cars" as the Austin A35!

The company later turned to car sales and vehicle rentals under the name Westway Motor Rentals Ltd (recalling the name of the original garage at the Caterham site). It would appear that this was not a success since the business finally succumbed to financial difficulties, being wound up in the High Court in December 1963. During those proceedings, the former North Downs Engineering Company was characterized as "Motor Car Dealers"—no mention of model engines! No more was heard of North Downs Engineering after that date.

**SERIAL NUMBERS AND PRODUCTION FUGURES**


Although there are exceptions to this, the vast majority of Nordec engines carried serial numbers stamped into the outer end of the transfer-side mounting lug. The presently-reported range of serial numbers for the original Nordec R-series models extends from a low of 6 (which appears on a used case in the possession of Alan Strutt) to a high of 870, which appears on an R10 spark ignition model which has been converted to glow-plug ignition.

The interesting thing about these numbers is the fact that they are randomly distributed between the R10 sparker and the RG10 glow-plug model. This raises the question of whether the glow and spark models each had their own consecutive parallel serial numbering system starting at engine number 1 or if they were simply numbered sequentially as they came off the line, regardless of type. Only the finding of two engines of different types bearing the same numbers would confirm the former system. I must confess to a strong feeling at this point in time that the latter system in fact prevailed. It would have the considerable advantage of avoiding the duplication of serial numbers on two engines (one glow and one spark) which would inevitably result from the maintenance of parallel numbering sequences without the use of a letter prefix.

If the parallel numbering system had been adopted, one would logically expect to find a prefix in front of the numbers to designate which of two engines having the same number was the glow and which was the sparker. As it is, I suspect that the cases were sequentially numbered and the ignition system of each completed engine was recorded in the factory ledger for reference in the event of a servicing requirement. Quite likely it was the state of the order book that determined the relative production of the two variants in any given batch. The selection of the ignition system could easily be made at the final assembly stage on the basis of the order book without upsetting production—all that was required was to fit the appropriate front end to the rest of the engine.

A further factor which suggests that the engines were numbered consecutively regardless of ignition type is the fact that the spark ignition version is considerably less commonly encountered today than the glow-plug model. Even so, the highest currently-recorded serial number for an original R10 sparker is 870, while the RG10 glow-plug models only go up to my own engine number 849. If there were two parallel numbering sequences, this would imply if anything that the sparkers outnumbered the glow versions. In fact, the relative scarcity of surviving spark ignition models suggests that this was not the case. The observed data are most readily explained by the notion of a single numbering sequence covering both types, with the majority being glow-plug models.

The serial number is not the only mark found on the engines. All of my lower serial-numbered examples (both spark and glow) up to engine number 513 also have a letter "T" stamped into the top of the transfer-side mounting lug, and a similar stamping has frequently (but not universally) been reported by others. It thus appears that this was a standard marking, at least in the initial stages of production. I would assume that this most probably confirmed that the engine in question had been tested at the works. All engines were apparently tested prior to despatch, and this may well be the meaning of this particular mark. A departure to this marking system is Alan Strutt's spark ignition engine number 201, which is marked "TEST no. 4" for some obscure reason. Most later examples do not feature this mark in any form, so the practise was evidently abandoned at some point.

An engine which seems to fall between the cracks here is David Owen's previously-mentioned spark ignition example bearing the number 899. This features the Dooling-style downdraft intake and upgraded head which reportedly were features of the modified unit(s) developed by John Wood during 1950. It seems likely that David's engine was a test unit which was simply pulled out of the production line or removed from unsold stock and fitted with the modified components. There's no way of knowing whether it was originally an R10 or a Special Series I—either is possible. Another interesting engine is RG10 engine number 220 which forms part of Alan Strutt's collection. This example has been fitted with a Special series piston and head. This must surely be either an owner upgrade or a factory experiment.

Examples of the Special Series 1 are far less common than the original R10 and RG10 models discussed earlier. Indications are that the serial number sequence continued without a break when the Special Series 1 was introduced. Engine number 1040 of this type appeared as part of the Walton Collection when that wonderful assemblage was auctioned off. Alan Strutt's collection includes engine number 1126, which is equipped with the optional Nordec flywheel and clutch for car use. The highest serial number of my personal acquaintance for one of these engines (or indeed for any Nordec engine) is my own spark ignition example number 1137. This engine is also significant in that it confirms that the spark ignition option remained available right to the end of Nordec production.

Although it must be admitted that this is very far from being a statistically-reliable sample, these numbers imply that no more than 250 examples of the Special Series 1 were likely manufactured. The true number may actually be somewhat less—perhaps as few as 200 or even less. The relative rarity of surviving examples certainly supports such a possibility.

When it comes to the Special Series II variant tested by Peter Chinn, we enter a complete information vacuum. This is due to the fact that despite an intensive worldwide search by a number of enthusiasts, not a single confirmed example of this variant has come to light. If anyone out there happens to have one, we'd be no end grateful for some information! As it is, we are forced to the conclusion that this variant most likely never saw actual production despite its encouraging performance in prototype form.

So how many were made in total? Impossible to say for sure, but present indications based on known serial numbers are that perhaps 1150 engines of all types were produced in total over the twenty months or so during which production continued. The resulting average production rate of just under 60 units monthly appears to confirm that model engine production at Nordec never rose above sideline status.

Of those which were manufactured, it appears that at most some 250 or so were of the "Special" variety—quite possibly fewer. If more data become available in the future, it may be possible to revise these figures somewhat, but they are unlikely to be far out. Whatever the number, it's clear that sales cannot have been all that brisk, since otherwise arrangements for continued production would doubtless have been made.

**CONCLUSION**

The Nordec engines were extremely well-built and consequently very durable as well as being rather too large to simply "lose". Allied to the fact that there was relatively little scope or incentive for their use after the early 1950's, these factors have ensured that a significant proportion of the engines which were produced have survived to the present day. They are still encountered from time to time on offer from dealers, at swap meets and on eBay, changing hands for respectable but as-yet by no means outlandish prices.

One noteworthy observation regarding the Nordec engines is the relatively large proportion of present-day survivors that remain in unmodified and seemingly little-used condition. Generally speaking, racing engines were subject to a variety of modifications either to improve performance or to make them fit a given aircraft, car or boat. Moreover, racing service is extremely hard on the mechanical components of any engine, generally leaving its mark. Despite this, it's an indisputable fact that a remarkably high proportion of surviving Nordecs are free from any evidence of owner intervention, nor do most of them appear to have had much hard use. The inescapable inference is that the engines quickly acquired a reputation in their day for being under-performers, hence being either re-sold or consigned to the odd ‘n sods box quite early on.

Accordingly, it's actually not that uncommon for examples of the original Nordec R10 and RG10 models to be offered for sale in very good original condition. We saw earlier that the Nordec Special appears to have been produced in very limited quantities indeed by comparison with the earlier R10 and RG10 models. Consequently, the vast majority of Nordec motors which do turn up are the R10 and RG10 models described above in detail—examples of the Special series are quite rare.

Anyway, there we are, a brave and quite worthy British attempt to take on the McCoy and its relatives in the racing engine field, and one which was both very well-made and at the end was actually approaching a comparable level of performance to its American rivals. It's sad to reflect that the Nordec disappeared just when it had finally been developed into a truly competitive engine. It was a combination of time and place rather than any major deficiencies in the design, especially in its fully-developed form that killed the Nordec series. On their intrinsic merits, these engines undoubtedly deserve our favourable remembrance.

For the record, my NORDEC is Serial Number 316 and is stamped with a letter ‘T’

Tony Dalton