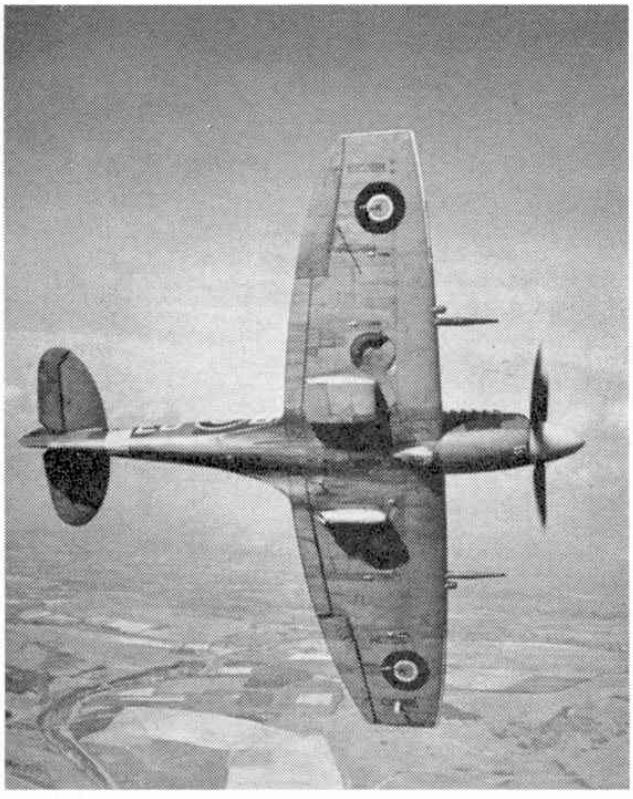


# THE BRITISH TOY THAT BEAT THE LUFTWAFFE

John W. R. Taylor describes the historical events that led up to the design and development of the most famed fighter aircraft of all time—the Supermarine Spitfire.

**At left: The first of the Griffon-engined Spitfires, the Mk XII had clipped wings to increase its speed at low altitudes. Below: The Schneider Trophy. Lessons learned in winning this helped to make the Spitfire an outstanding fighter. The Supermarine S.6B, winner of the Schneider Trophy, first aircraft to set up an over 400 m.p.h. speed record, and ancestor of the Spitfire.**

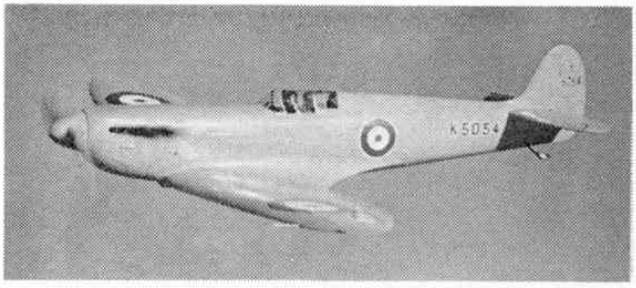
THE AIR Attaché from the German Embassy in London was not impressed when he saw a Spitfire for the first time, at an air display in June 1936. Accustomed to the more angular, aggressive lines of *Luftwaffe* warplanes, he refused to believe that anything so small and dainty as the Spitfire could be a hard-hitting fighter, and referred to it as a toy.

Major Alexander de Seversky, the famous American designer, was a little more enthusiastic. After flying both a Spitfire and a Messerschmitt Bf 109 in the summer of 1939, he wrote that the British fighter seemed the better of the two, but was more difficult to maintain and not so fast as the Bf 109.

The R.A.F. knew, and the *Luftwaffe* was soon to discover to its cost, that the Spitfire was really faster than the Bf 109, and no toy. But there were moments when even the most enthusiastic pilots found their "Spits" rather a handful. At least four experienced pilots, brought up on biplanes with a fixed undercarrige, forgot to lower their wheels when landing and ended up feeling rather foolish, surrounded by a bent aeroplane.

One sergeant-pilot at Duxford did this in front of a huge crowd at the 1939 Empire Air Day display. Intent on winning a spot-landing competition, he touched down bang (literally !) on the spot marked on the airfield, with his wheels still retracted. Right up to the last moment, the public thought it was a prearranged stunt and that the airmen who dashed on to the airfield, waving their arms in a desperate but vain atempt to attract the pilot's attention, were all part of the act. Instead of winning the prize, the unfortunate sergeant was fined £5 for negligence.

For the R.A.F. such accidents were serious. War with Germany seemed more and more likely, and Fighter Command needed every aircraft it could get. But the Spitfire's high performance stemmed from the fact that it was a highly-advanced design, with a complicated wing structure and an all-metal semi-monocoque rear fuselage, and deliveries were at the rate of only one aircraft a week, at first. By comparison, the Hawker Hurricane was much easier to build, as its




**K5054, the Spitfire prototype, which flew for the first time on March 5th, 1936. Note the very much changed lines of the Mk 5 and Mk 9 on the cover.**

construction differed little from that of the biplane fighters it replaced; but it was slower than either the Spitfire or the Bf 109.

Looking back, after nearly thirty years, we realise that it was these differences between the British fighters, rather than their many similarities, that enabled the R.A.F. to win the war in the air.

Sufficient Hurricanes had been delivered by the start of the Battle of Britain to equip 29 squadrons, compared with 19 Spitfire squadrons. Had there been only 19 squadrons of each, the outcome of the battle might have been very different. In the years that followed, the Hurricane was switched to specialised duties such as ground attack and anti-tank operations, armed with bombs, rockets and even a pair of 40-mm. cannon as big as Bofors anti-aircraft guns. In this way, it was able to play a major role in defeating Rommel's armour at Alamein and the Japanese in India and Burma, without having to match itself too often against later, much improved enemy fighters.

The Spitfire, on the other hand, became a better and better fighting aircraft as the war progressed. It ended up with an engine more than twice as powerful as that with which it started, a top speed nearly 100 m.p.h. higher and a tremendously increased fire-power, enabling it to hold its own against the best enemy piston-engined machines.

It is wrong for anyone to suggest that the Spitfire was better than the Hurricane, or vice versa. The R.A.F. had the right numbers of each type, in the right place at the right time, often doing different jobs, and together they made the greatest fighter team of World War II.

To learn the secret of the Spitfire's long life and high performance, we have to go right back to 1922. On 12th August that year, a British Supermarine Sea Lion flying-boat won the sixth contest for the coveted Schneider Trophy. Had it not done so, the Italians would have gained a third consecutive victory and the Trophy would have been theirs for keeps; in which event their might never have been a Spitfire.

Supermarine's brilliant young chief designer, Reginald Mitchell, knew that the clumsy-looking Sea Lion would not be good enough to win again. It put a good show in 1923, but the contest was won by an American Curtiss seaplane. The engine installation and floats of the winning machine were so neat and well-streamlined that the whole aircraft had a very small frontal area. Mitchell learned a lot by studying these features of the Curtiss, but already knew how to produce something far better.

Like the Sea Lion, the Curtiss was a biplane. The racer he wanted to build would be a small, incredibly " clean " cantilever monoplane—the smallest seaplane, in fact, that could be designed around a 700 h.p. Napier Lion engine, with no wing struts, bracing wires or unnecessary bumps to reduce its speed.

The Supermarine directors had such faith in Mitchell's ability that they gave him a free hand to develop his revolutionary aircraft. There was no contest in 1924. By March 1925, Mitchell and his design team had completed the drawings of the racer, known as the Supermarine S.4. It was built in only five months and flew in August. On 13th September, it set up a world seaplane record of 226 m.p.h., proving itself the fastest aircraft built in Britain up to the time.

Before it could compete in the 1925 Schneider contest, the S.4 developed wing flutter and crashed; but nobody doubted any longer that Mitchell's ideas could produce a world-beater. Up to that time, Supermarine and Napier had borne the whole cost of building and flying the aircraft they entered in the Schneider Trophy contests, despite the fact that most of the foreign entries were heavily subsidised. Victory in the contest had assumed such importance that the prestige of entire national aircraft industries hung in the balance at each race. The British government could no longer stand aloof and ordered seven specially-built high-speed seaplanes, of which three were to be improved versions of the S.4.

It is hardly necessary to recall what followed. A Supermarine S.5 won the 1927 contest at a speed of 281.6 m.p.h. Two years later the S.6 not only repeated the success but set up a new World Speed Record of 357.7 m.p.h. There were no contests in 1928 and 1930, so when an S.6B won the 1931 event Britain gained the Trophy outright. Shortly afterwards, another S.6B raised the World Speed Record to 407.5 m.p.h., becoming the first aircraft ever to exceed 400 m.p.h.

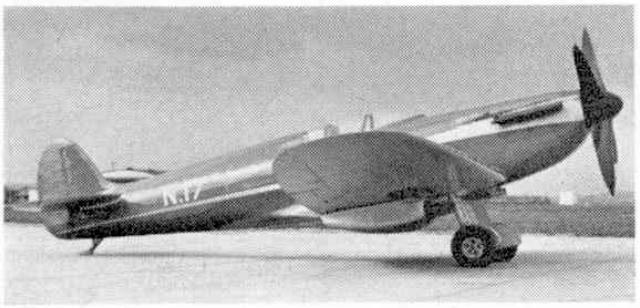
The S.6B was a remarkable aircraft, powered by a Rolls-Royce engine giving no less than 2,300 h.p. Although its racing days were over and its job done, it had pioneered many new ideas in the design and construction of airframes and earo-engines, and Mitchell wasted no time in making use of the experience gained.

When the Air Ministry issued Specification F7/30, outlining the kind of fighter they needed to re-equip the R.A.F., he produced a design based as closely as possible on that of the S.6B. Unfortunately, the Specification recommended use of the 660 h.p. Rolls-Royce Goshawk, which proved to be one of the few disappointing products of the world's greatest aero-engine company. Mitchell's F7/30 had a top speed of only 230 m.p.h. and none of its competitors, produced by other firms, showed any greater promise; so the Air Ministry decided to abandon them all and ordered instead the Gladiator, a conventional radial-engined biplane based on the well-proven Gloster Gauntlet.

However, Specification F7/30 was not a complete failure. It inspired British designers to be more adventurous and led to a doubling of the fire-power of R.A.F. fighters which, until then, had continued to carry the same two Vickers machine-guns as their predecessors of World War I.

Having discovered the shortcomings of official specifications, Mitchell and his counterpart at Hawkers, Sydney Camm, decided to design the sort of fighters they thought the R.A.F. should have. The results, in due course, were the Spitfire and Hurricane, evolved in very similar ways.

Mitchell began by replacing the big-span " inverted gull " wing of the F7/30 with a more conventional wing. He added an enclosed cockpit for the pilot and drew a retractable undercarriage in place of the " trousered " main wheels of the F7/30. By this time, there had been two important developments. The Air



**The Speed Spitfire built in 1939 for an attempt on the World Speed Record.**

Ministry had issued Specification F5/34, calling for a fighter very like Mitchell's new machine, with an armament of six or eight machine-guns, a reflector gun-sight, retractable undercarriage, wheel-brakes, enclosed cockpit, an oxygen system for the pilot, and a performance which included a ceiling of 33,000 feet and speed of 275 m.p.h. at 15,000 feet. Rolls-Royce had under test an engine that would make such a performance possible; known as the PV-12, it gave promise of 1,000 h.p. and was to become, in due course, the Merlin.

Mitchell refined his design, found room for eight guns inside its thin, elliptical wings, replaced the original Goshawk with the PV-12, and submitted the design to the Air Ministry. They were so impressed by it that they issued a new Specification, F37/34, based on the Supermarine fighter, and ordered a prototype, with the serial number K5054. Work began in January 1935 and K5054 made its first flight on 5th March 1936. The Spitfire had been born.

From the start there was no doubt that Mitchell had produced an outstanding fighter. Finished in highly-polished cream seaplane enamel, it could fly at 349 m.p.h. and handled beautifully. On 3rd June, only three months after the prototype left the ground, the Air Ministry ordered 310 Spitfire Mk.Is, little realising that by the time the last "Spit" came off the line in October 1947 production would total an incredible 20,351, to which must be added 2,408 Seafire naval fighters.

Few advanced aircraft are easy to put into production and service, and the Spitfire presented its share of problems. The relatively new stressed-skin fuselage construction required expensive jigs and tools and the distinctive elliptical wings were far less simple to manufacture than a rectangular or tapered wing. In the end, a total of 339,400 man-hours of design work went into the Spitfire Mk.I and no fewer than 800,000 man-hours were required to produce the jigs and tools on which it was built.

This was only the start. Between 1938, when the first Spitfires were delivered, and the end of the war in 1945, nearly 1,100 major changes were made to the design and countless minor modifications. Altogether, nineteen basic new Marks were evolved, each requiring anything from 3,685 to 168,500 additional design man-hours and up to a quarter of a million man-hours on jig and tool work. This was part of the cost of keeping the Spitfire in the front line. The cost in terms of money was astronomical.

Reginald Mitchell never saw a production Spitfire. He died on 11th June 1937, when he was only 42 years old, but he left his little fighter in the capable hands of "Joe" Smith—another of Britain's truly great aircraft designers.

What a fighter it was. The standard Mk.I Spitfire had a top speed of 355 m.p.h. at 19,000 feet when powered by a 1,030 h.p. Merlin II engine. Its eight Browning guns were installed in the wings, outside the propeller "disc", so that any aircraft caught in a two-second burst of concentrated fire was shattered by 276 bullets.

Supermarine felt confident that they had the finest fighter in the sky; they decided to prove that they also had a basic design able to outfly any aeroplane ever built, by setting up a new World Speed Record. The 48th production airframe, K9834, was fitted with a specially-boosted 2,160 h.p. Merlin III engine. Its wing span reduced from 36 ft. 10 in. to 33 ft. 8 in., a more streamlined cockpit hood was fitted and other changes were made, with the idea of making possible a speed of at least 410 m.p.h. Before the Speed Spitfire was ready for its attempt, the Germans set up a new record of 469.22 m.p.h. in a Messerschmitt Me 209, which has not been beaten to this day by any piston-engined aircraft.

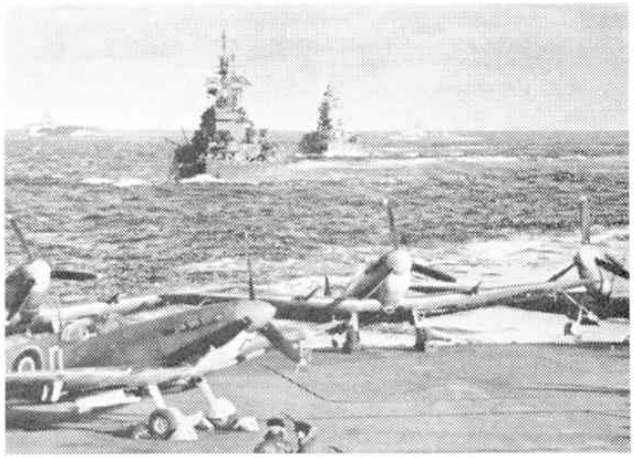
There was no time to feel disappointed. War was near and Spitfires were at last flowing off the assembly lines in satisfactory numbers. Supermarine was by now a division of Vickers-Armstrongs Ltd., and the vast production resources of this great company were supplemented by a huge "shadow factory" built at Castle Bromwich for operation by the Nuffield Organisation (Morris cars). Before long Westland Aircraft and innumerable subcontractors were brought into the programme to meet Fighter Command's ever-growing demands.

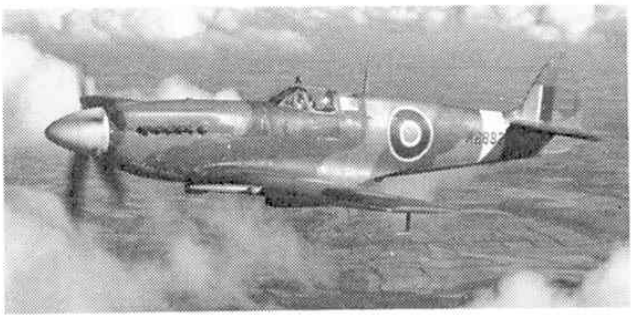
The war was six weeks old when Spitfires made their first kills. On 16th October 1939 fourteen Dornier Do 215 and Heinkel He 111 bombers attacked the Forth Bridge and warships at anchor nearby. Nos. 602 and 603 squadrons each destroyed an He 111, and these were the first German aircraft shot down over Britain since 1918. If Hitler had realised how many more would be added to the tally in the Battle of Britain, in the summer of 1940, he would never have started it.

It is usually claimed that during the Battle the Hurricanes tackled the German bombers while the Spitfires dealt with the higher-flying Bf 109 fighters that were supposed to protect the bombers. This may have been the idea, but it seldom worked in practice, as there was not usually time to form up a balanced force of the two types of British fighters to launch against a particular attack. Everything with black crosses on its wings and fuselage and swastikas on the tail was fair game for both the Hurricanes and the Spitfires, and they swept the once-invincible *Luftwaffe* from the daylight skies over Britain in just seven weeks.

Britain, and the world, had been saved by about a thousand young men in R.A.F. blue—some speaking strange languages, for in addition to pilots from the Commonwealth many survivors of the Polish, Czech and other vanquished air forces escaped to fly and fight in Spitfires and Hurricanes. Between 10th July and 31st October, 1,733 German aircraft were destroyed, for the loss of 915 R.A.F. machines, and the *Luftwaffe* never recovered from the loss of so many of its best airmen.

After the Battle of Britain, it was inconceivable that this country would lose the war. As it dragged on for five more years, the Spitfire protected Allied ground and air forces almost everywhere they fought throughout the world. Huge sand filters were added under the graceful nose of aircraft flying over the deserts of North Africa. Arrester hooks and folding wings converted Spitfires into Seafires for operation from carriers of the Royal Navy. Two (and later four 20-mm. cannon were packed into the wings to increase fire-





Above: Another view of a Griffon-engined Mk XII as shown in the heading photo. At left: Seafires on board a British carrier of Naval Force H, nearing the Algerian coast during the Allied invasion of North Africa in November 1942.

power, and bomb racks were fitted so that Spitfires could harrass ground targets when there were few enemy to fight in the air. Most important of all, the airframe was adapted to take the 1,735/2,050 h.p. Griffon engine—a direct descendant of the S.6B's racing engine—when this became available.

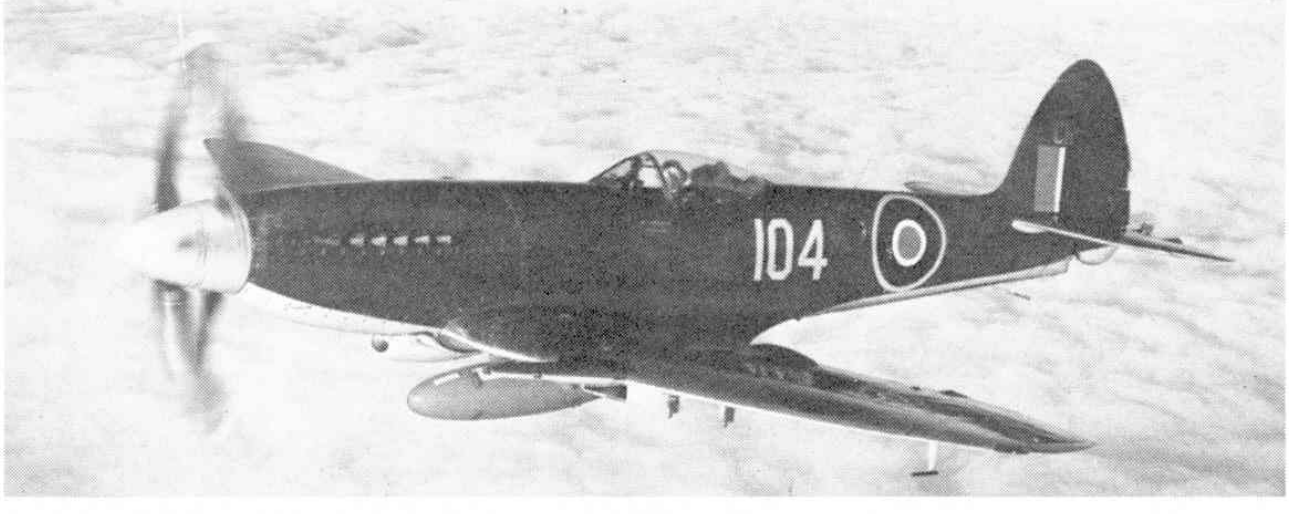
First version of the "Spit" fitted with a Griffon was the Mk.XII, and it came just in time. Earlier Marks were being outflown by the *Luftwaffe's* new Focke-Wulf Fw 190 fighter-bombers which were making regular hit-and-run raids on targets in Britain in 1942-43. Wingtip-to-wingtip with the Hawker Typhoon, the Spitfire XIIs soon remedied the situation. Their top speed was 393 m.p.h. at 18,000 feet, but they usually flew low and had the "clipped" squared-wingtips that identified versions intended for operation at low altitude. By comparison, Spitfires used at very high altitudes had extended and more pointed wingtips.

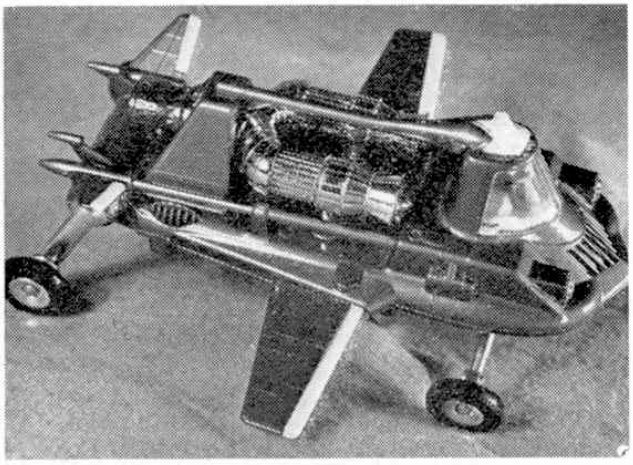
Not all Spitfires were used for fighting. In fact, some of the bravest of all Spitfire pilots were those who had no opportunity of firing at the enemy as their aircraft were unarmed. These were the men who flew deep into enemy territory on reconnaissance flights, searching out targets for Bomber Command and photographing the results of its raids. Relying on speed alone for defence, they usually flew very high; but some times the need for close-up pictures demanded a dash over a heavily defended target area almost at ground level.

Alone of all Allied fighters, the Spitfire remained in continuous production throughout World War II. The final versions, Marks 21, 22 and 24, had a new wing of different shape. In addition some Mark 21s had contra-rotating propellers, while the 22s and 24s had enlarged tail surfaces and "blister" type cockpit canopies. Some pilots claimed that these versions no longer looked like Spitfires, but they certainly behaved like "Spits". Even after Germany and Japan had been defeated, they still made life unpleasant for Britain's enemies in Malaya and elsewhere, while Seafires of the Royal Navy continued to operate against bandit hide-outs in Malaya and to play their part in the Korean War until 1950. Nor was this the end of the story, for many foreign air forces received and flew Spitfires, not least those of Russia and America, and some small nations kept their "Spits" in service long after the R.A.F. had re-equipped with jets.

Today the Spitfire is almost a legend. Glimpses of airworthy examples at air displays are becoming more and more rare; even the once-familiar "gate guardians" parked by the entrance to R.A.F. stations diminish in number year by year. But, in an age when some fighters cost £2½ million, we can still marvel at Reginald Mitchell's supreme creation, which was reckoned to cost a mere £5,000 in the wartime years when youngsters were proud to give pennies of their pocket money to "Spitfire Funds" and so help to buy the "toys" that beat the *Luftwaffe*.

The final version of the Seafire for the Royal Navy was the Mk 47, with a 2,375 h.p. Griffon 85 and contra-rotating propellers.





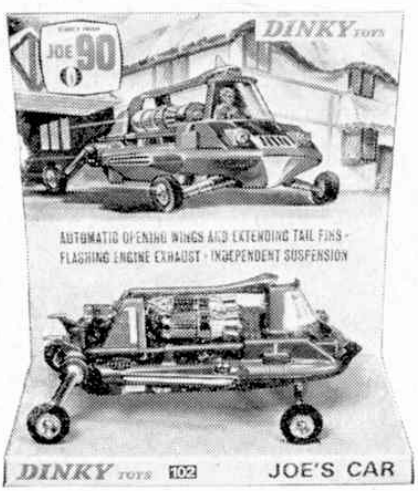
# THE DINKY WORLD OF JOE 90

by Chris Jelley

FANTASY AND smash television hits—that seems to be the result of the inventive genius of Gerry Anderson and his back-up generation, Century 21.

Think of world famous T.V. puppet series " Thunderbirds " or the equally famous " Captain Scarlet and the Mysterons " and you are thinking of the work of Gerry Anderson. He has revolutionised puppetry with his detailed stories, his lavish sets and his futuristic outlook, but perhaps more important, his past successes have not drained him of ideas. On the contrary, he has now produced yet another equally clever, drama-packed show, " Joe 90," currently running on commercial television.

In a nutshell, " Joe 90 " depicts the work of the World Intelligence Network—W.I.N. for short. Star of the show is top secret agent Joe McClaine, code-named Joe 90 who, within the context of the show, is the adopted son of Mary and Ian McClaine, the latter a Professor of Electronics. Professor McClaine has developed a complex electronic brain capable of transferring the knowledge, personality and skills of any chosen individual to Joe, and it is by taking over somebody's " life " in this way that Joe is able to perform his tasks. Once he has absorbed the desired knowledge, Joe is able to tune into it, when necessary, by donning a pair of special glasses into which electrodes are built. Without the glasses, he is his normal self.




**Dinky Toy No. 102 Joe's Car, is based on one of the vehicles in the highly popular television series " Joe 90 ". Joe's Car is sold complete with a special display platform, but, because of storage deterioration, the battery for the flashing engine exhaust is not included.**

Anyone who has seen the T.V. Show will know that it bristles with fantastic machinery, equipment and vehicles, the most interesting example of the last being Joe's car itself.

According to Century 21, this was hand-built by Professor McClaine and designed for efficiency rather than appearance. Powered by fully-exposed twin turbine aero-engines, the car travels not only on land but also flies at some 300 m.p.h., and can take to the water where it had a speed of 70 knots. Land speed is 200 m.p.h.

Century 21 might describe Joe's Car as being designed more for efficiency than appearance, but I personally think that its appearance is far more intriguing than any car model to be seen today. Rugged, functional and, above all, entirely different, it has the added attractions of extending wings and a pair of fold-up fins on telescopic trailing arms. For road and sea travel, the wings retract into the body.

The success of Gerry Anderson's previous series " Thunderbirds " and " Captain Scarlet " was matched by the success of Dinky Toys models of vehicles appearing in the two series. In the first case we had FAB 1 and Thunderbird 2 with Thunderbird 4 while, in the second case, we had the S.P.V., the S.P.C. and the M.S.V. Now with a new series on the screens, Dinky have not been slow in upholding their reputation. As I write this, in fact, just beginning to come of the Binns Rd. production lines is a fabulous model of—wait for it—Joe's Car ! (As if you hadn't guessed !)

" Fabulous " is the word I used here and " fabulous " is the word I meant. I was quite honestly captivated by this brand new Dinky. It is, as far as I can tell, an exact reproduction of the T.V. original in general detail, with the same rugged appearance and twin turbine engines as well as the long undercarriage legs, the correct fluting, struts and " projections," and the enclosed cabin—complete with a miniature Joe at the controls ! Features don't stop here, however. Admittedly, when the model is taken out of its box it is dressed for road travel, but, if a little button built into the left-hand side of the body is pressed, two wings shoot out of the sides and, at the same time, the fins on their extending rods shoot rearwards.

It's all very fascinating, but there's even more to come. The simulated turbines, with a bright plated finish, feed into a single exhaust chamber that, at first glance, appear to have a rather dull red aft-section. However, if a small switch in the underside of the model is moved, this aft section lights up and, after a few seconds, suddenly begins to flash, thus simulating a realistic engine exhaust. The light is powered by a Vidor V16 or equivalent battery which fits into a cavity in the base. Because of the danger of deterioration, the battery is not sold with the model, but is readily obtainable from any electrical suppliers.

Marketed under Sales No. 102, Joe's Car is finished in a metallic blue-green colour with white leading edges to the wings and fins and plated undercarriage legs which, incidentally, are all sprung. Jewelled headlamps just give the final touch to a really great Dinky Toy.