A Tale of Two F1 Matras

Part 1 (Matra MS11)

Introduction

It is possible to build a 1968 Matra MS11 after a fashion, using the Tamiya 1/12 kit released originally in 1969 and re-released in 1999. The kit was reviewed in *Scale Auto Modeller Vol 1 Issue 11, Sept 1999*. The most recent re release is notable, in that the Box Art has been corrected, with Jean Pierre Beltoise at the wheel. Originally and until thirty years later, it was Jackie Stewart driving the MS11 on the box, which he never did, in fact. Had it been a very short print-run of box art covers before being corrected later in 1969, this may have equated to a rarity with additional value, like a faulty Penny Black perhaps! Building an MS11 well, as per instructions, with or without sidetanks, results in a rather non-specific generic and fictional racecar, the prospect of which didn't fill me with nearly as much pleasure as aiming for accuracy and fact. Having said that, I am very aware it is impossible to build a Grand Prix car that is truly accurate, with race to race variations meaning that a true representation can be beyond finding out. Also, my Formula One scratch-builds like anyone else's are an artistic interpretation of what I see and can reasonably research, not a rivet counting exercise. Tamiya models are superb and always provide an ideal base upon which to develop a chosen subject; however, the earlier kits are understandably a little limited in their detail and accuracy.

The MS10 has not been released in 1/12 kit form, but it is possible to modify the existing MS11 chassis to produce the car driven by Jackie Stewart in the 1968 season. Afterall, this was exactly what Ken Tyrrell did in order to enter a Formula One car for Grands Prix with his driver, Jackie Stewart who had driven Tyrrell's Matra F2 car in 1967. Tamiya fortunately provided a decal sheet that could be used for both drivers, assuming both drove the MS11. Hence, an MS10, once otherwise researched, was a real possibility. The Matra MS10 will be covered in detail in Part 2 of this article.

History

Matra is the abbreviated name given to the French aeronautics, missile and arms manufacturer originally founded pre-war – *Mecanique Aviation Traction*. ***Matra Sports*** was a later post-war division of this company given over to motorsport after interested parties invested money in the company for this purpose.

Matra MS11

The MS11 was a charismatic car with huge engine and spectacular exhaust note to go with it, especially in its original form at Monaco '68. Here, the chromed pair of triple tail pipes contributed to this extrovert debut. The car did not generally go well owing to its

heavy construction, thirsty and down-on power engine. Changing from a six to a four tail-pipe system improved the power curve and performance. However, in changeable weather conditions at Zandvoort in 1968, Jean Pierre Beltoise drove magnificently to claim fastest lap and bring the car into second place behind the MS10 of Jackie Stewart, from sixteenth place on the grid. This best ever placing for the MS11, was at least in part due to a particular choice of Dunlop tyres used by both cars, coping better than the competitors' rubber.

Materials and Methods

For the MS11, I effectively rebuilt my original MS11 to far more exacting standards having acquired research data from many sources, particularly LAT (London Art Tech, digital photographic archive), History of the Grand Prix Car 1966-1985, Doug Nye 1986 (Hazleton Publishing) and History of the Grand Prix, Alan Henry 1990 (Bison Books for WH Smith).

The nuts and bolts as it were, of 'materials and methods' are described in the Hesketh 308 article in *Scale Auto Modeller, Volume 3, issue 9*, but details will be referred to where relevant in this text. Essentially, aluminium tube/brass rod, plasticard, various adhesives, Milliput, model fillers and Halfords acrylic spray paints were the basis of the materials used.

Inspiration is a key blessing and this came from Richard Hewer's beautiful rendition of an MS11, shown at a number of shows in the late 1990's. Richard's presentation of this car opened my eyes to a whole new way of approaching these kits, realising they can be made much more accurately and with a beautiful paint finish as well. Richard's version looked far more likely to have been entered in a race than the original Tamiya version, built straight from the box.

Research

Having decided to model both the MS11 and MS10 based on entries for the 1968 Dutch Grand Prix, I set about searching out photographs of both cars at this Grand Prix, also paying attention to their appearance at other races that year, in order to have a more rounded perspective of Matra cars in that year. The most useful sources were the books by Alan Henry and Doug Nye. One very useful overhead engine shot of MS11 at Zandvoort came from Richard Hewer, original source being unknown. The most detailed photographs I bought from LAT, though expensive, proved good value for money when considering the project as a whole.

Steve Humble of a racecar restoration firm in the South of England, patiently worked-out the details of the complex fuel system of the MS11 based on the photographs and his experience working on the same engine used in Matra Sportscars of the same period.

For this model, I had no access to the real car. Motorsport suggested as recently as Spring 2001, that an MS11 would possibly be competing in an historic championship series of races.

Matra MS11

MS11 Chassis and Bodywork

Having dismantled my own MS11 built about ten years earlier, I set about modifying the lower body which was of monocoque type, though this was with a specific aeronautics approach. This was in contrast to the double D-section boxes linked by bulkheads and skinned in aluminium sheet with a stressed floor panel as in the Lotus 25 and later in the Lotus 49. Matra's approach involved manufacturing a multi-subdivided riveted aluminium monocoque whose side pontoons were internally spray-sealed and contained the fuel directly, unlike the safer bag tanks used by Lotus. Monocoque modification involved filling-in some of the external pipework locating holes, to allow more ideal placement. A typical example was that of the lower right hand side water feed pipe from

the radiator, which dives into the monocoque too far back, compared with that in photographs of the car. More obvious, were the changes to the shape and angulation of the tunnels for the lower rear radius-rods. The original horizontal rectangular holes were filled-in and recut at an angle with an additional inner skin to provide the same blue painted background as in the photographs. At the new angle, the radius-rods could more naturally rise and fall with suspension bump and droop. There were two other holes, one round and one square in the same vicinity which may have provided access to some internal components, possibly the electric fuel pumps and to the lower radius-rod pick-up points. These were drilled/cut to further improve realism here. The sidetanks were discarded and their chassis locating holes, were filled in and sanded smooth. The inner chassis of the original kit incorporated a battery compartment which I had removed when the kit was originally built. This area was tidied up to improve the footwell area in front of the seat. Three holes were drilled in the first of two forward bulkhead panels to allow passage of push-rods from the brake and clutch pedals to the mastercylinders, which would be later mounted on the front of the second forward bulkhead. At the same time, the battery compartment lid was made invisible on the underside of the lower chassis. The lower chassis, bulkheads and rearward pontoon panels, inner chassis and seat etc were then primed and sprayed Ford Electric/Monza Blue.

The nosecone had the screw slots filled-in, for later use of 1/12 Dzus-style fasteners, rather than use the inappropriate Philips screws supplied by Tamiya for fixing the nosecone to the main body. The slots/holes for the front wings were filled and sanded.

The small air intake on top of the nosecone was removed and replaced with a more accurate version made from small pieces of plasticard; using aftermarket rivets, this item served to improve the look of the nosecone further. The nosecone was then sanded and filled until all blemishes were removed before priming and spraying Ford Electric/Monza Blue. I was unconvinced by the sunken disc on the front of the nosecone for the Matra logo, so this was also filled-in. A radiator grill was formed from soft aluminium mesh, shaped over a card template, primed and sprayed Satin Black. This was then secured ahead of the radiator, in the nosecone itself.

The very important upper bodywork supporting the windscreen and mirrors was very carefully remade, deserving more specific description later on.

MS11 Rolling Chassis

The various chassis components were brought together as per Tamiya instruction manual, except that I preferred to leave out the seat-cum-inner chassis until some of the internal wiring/plumbing had been sorted.

In order to complete a rolling chassis, only the suspension and wheels were required to be fitted and these were built-up as Tamiya originally intended except for the upper and lower rear radius-rods which were made from 1.75mm aluminium tube. I decided to make my own radius rods because those in the kit were plastic, flexible and had a poor

finish on them. In order to do this, aluminium tube was cut to correct length and then bonded to the plastic rose-joint ends by way of short brass wire inserts, having drilled at a slow speed to avoid melting the plastic. Primer and Satin Black acrylic spray finished these off well, looking just like those in the photographs of the actual car. The front upper rockers were spoilt by the aerodynamic appendages from the kit, so these were removed before filling and sanding the surface to make a perfectly smooth rocker. These were sprayed with an aluminium coloured acrylic spray to good effect. However, if I were making these again, I would use the more recently available Alclad Chrome paint. The wheel rims had tyre valves made and fitted and then a rolling chassis was complete. Brake lines would be fitted later to both front and rear brakes. A rear anti-roll bar was visible in this car and so the small black kit version was discarded, replacing this with a more realistic and much broader item formed from 1mm stainless steel rod, based on the LAT photos.

MS11 Inner Chassis and Dashboard

This was made as in the kit with every possible enhancement re wiring. Each instrument and switch had a representative wire/cable attached with cyano-acrylate via small holes drilled into the rear face. These were then routed either forward or backwards towards the engine. Each wire or group was wired down onto the inner chassis horizontal side sections, to provide a tidy secure appearance. Later these would be individually

terminated on items within the engine area or on relevant ancillaries. I tried to make sense of these by taking the fuel pressure line to the metering unit, the oil temperature sender to the forward oil tank etc. The kit steering wheel was supplemented by a section of 2.25mm stainless steel rod to act as the steering column. The gear shift was enhanced by using stainless steel rod and the gear shift linkage along the right side of the seat was added using a piece of aluminium tube. The appearance of the outer edge of the gear shift gate was improved by the addition of chrome, Bare Metal Foil.

The seat was sprayed Satin Black after carefully masking off the surrounding blue chassis sides. An improved gear lever was added and seat belts were not applied, as I can find no evidence that Jean-Pierre Beltoise used them at this time. In 1969, they became mandatory, but drivers' preference was still observed in 1968. Some pedals were acquired from the spares box and a throttle cable was fitted and routed back through the cockpit on the right, towards the engine. Clutch and rear brake lines were routed back along the left chassis floor underneath the seat. Next to the clutch pedal, a fuel fitting was made to accept a fuel line which drained fuel down into the left side tank from a reserve tank in the cowling above the driver's knees. Perhaps behind the seat back, a balance-tube kept left and right tanks at similar levels. More about this reserve tank, when the upper bodywork is described later. The two fuel tank caps were placed as usual, one on each side of the cockpit.

One of the characteristics of Matra engine plumbing, was a complex externally visible arrangement of engine oil de-aeration. A large cylindrical tank for oil de-aeration, was mounted above the gearbox and into this came various large bore corrugated tubes, one of which came back from the forward oil tank. In the MS11, this tube originated from the right side of the oil tank, mounted ahead of the chassis. I replicated this tube by selecting a suitably wide and flexible plastic tube and applying a continuous winding of thick nylon thread, secured by Superglue. This was then sprayed matt white (White Primer) and then dusted with matt black to give a slight grey appearance. This tube was then wired down in position on the right side of the inner chassis section, so as not to obstruct the future outer cockpit cowling, yet to be made and fitted. The tube was long enough to extend from the forward oil tank and into the engine bay for later attachment to the oil de-aeration tank.

MS11 Forward Oil Tank and Radiator.

Essentially, this area was built as per Tamiya's instructions with the additions of scratch built mastercylinders (plumbed to the front and rear brakes and clutch), a rack and pinion steering system (two concentric sliding sections of aluminium tube affixed to the front bulkhead via the moulded brackets already present) and alterations to the input/output pipes on the oil tank and radiator. This radiator enabled cooling of both water and oil, so due consideration as to how this should be plumbed, was needed. Having observed the

construction of these items from actual photographs, various small details were made from plasticard to replicate the original metal parts, all serving to enhance the busyness and authenticity of this area. The oil temperature sender wire was fitted on the left side of the oil tank at this point, supplying information back to the dashboard.

MS11 Engine and Gearbox

Before fitting the engine, the heat resistant metal cladding was fixed to the top surface of the rearward engine pontoons as heat protection from the cylinder heads. This was achieved with aluminium Bare Metal Foil. The main purpose of these pontoons appears to have been to support a heavily constructed diaphragm encircling the region of the bell housing, between engine and gearbox. The rear suspension then had something robust through which to direct its forces into the chassis. It is unclear whether these pontoons had any engine bearing function, probably not. They were more likely a continuation of the aluminium riveted chassis providing further rigidity when affixed to the rear diaphragm. The engine may have been attached to mounting points on a spaceframe within the pontoons, as in the 1968 Ferrari 312 which I have personally observed and studied. These pontoons may have been otherwise completely empty, or possibly contained the low pressure electric fuel pumps on each side of the car. These fuel pumps would have then fed the fuel collector pot and then the main electric fuel pump, situated on the right side of the gearbox.

The engine in the kit is a real beauty, but on close inspection may be a little too high when compared with the original. However, this engine can be super detailed very nicely. This involves an improvement of the arrangement for fuel injection and addition of oil de-aeration tubes out of the cam covers. I made new injector nozzles from plasticard, aftermarket rivets and brass wire to reproduce the appearance of the injectors on the close-up photos. Next some new spark-plug tops were fashioned and placed on an aluminium strip (plasticard in origin) which further increased realism. Short sections of corrugated piping were attached to fittings on each cam-cover, which later met in the 'vee' to finally arrive at the de-aerator oil-pot, from which de-aerated oil returned to the both sides of the engine to enable a continuous recycling of oil blown from the cylinder heads and oil tank particularly. Carburettor trumpet covers were fashioned from suitable brass mesh (annealed to improve flexibility). It helps to make a male and female tool from Milliput to simplify a consistent batch of covers for each engine type (ie a twelve cylinder engine as opposed to the larger trumpets for an eight cylinder engine).

The ignition leads were tied down in the same way as those in one of the research photos and yellow lead was chosen to keep consistent with these archive shots. The electronics were removed from the engine 'vee' to be located on a platform above the gearbox. The throttle cable was attached to the metering unit via a fine wire and the tachometer cable fitted to a rev' gear on the rear face of the left cylinder bank.

The most obvious change to the engine was in the exhausts. Here I simply tried to copy the originals as in the photographs, bearing in mind their routing out of the engine was slightly different and the final tail pipes (4.75mm aluminium tube) were shorter. The separation between the primary pipes and the tail pipe triple fitting, was carefully sculpted with a division marked, to reflect the fact that each tail pipe was separate. Exhaust clamps were made from plasticard and rivets and the whole arrangement was sprayed in matt white to achieve the look of 'Sperex' heat resistant finish, frequently applied to exhausts of that time. The shorter exhaust system contributed to the 'butch' look of this no-nonsense appearing engine.

The Hewland gearbox was sprayed matt black with highlighted bolts and a simple wash of very thin Humbrol aluminium to give the item depth. The matt black appearance aided in heat radiation to help cool the gearbox in an era when specific gearbox oil coolers weren't routinely used. Even in the early 70's, F1 cars sometimes utilized gearbox cooling and sometimes not. As demands on the transmission increased with faster engine speeds, gearbox coolers became more standard. Hewland gearboxes were cast in magnesium in the interest of weight saving and then given a chromated (blackened) finish, primarily to prevent corrosion.

The drive-shafts were improved by incorporating 4.75mm aluminium tube in place of the plastic item (the latter which were split horizontally). The standard Hardy-Spicer universal joints (UJ's) were tidied up. Then an additional inboard Rotaflex rubber

coupling was made from plasticard parts and Milliput, to imitate the rubber component in this UJ-combination, which would have provided additional flexibility.

At this point, the engine and gearbox assembly was fitted into the chassis and the half-shaft arrangements carefully encouraged to submit, to allow the rear suspension and wheels to be united to the drivetrain. The 1.75mm aluminium tube rear suspension toplinks were the last to fit to keep the suspension in accurate alignment. The anti-roll bar discussed earlier, completed the rear suspension requirements.

MS11 Plumbing/wiring

Water feed and return pipes between forward radiator and engine were made from 3.25mm annealed brass rod and these were carefully worked into shape and cut to length. These were then sprayed with a primer and then Ford Electric/Monza Blue. Simulated rubber sleeves were placed at strategic positions and metal clamps replicated from Bare Metal Foil over these. Small brass wire pins, with 0.5mm protrusion from small spacers placed on the body surface were fixed into place at the correct mounting positions along the monocoque. Araldite Rapid was used to affix the pipes by way of narrow slots cut into the brass onto these small pins.

Oil pipes were made from slimmer brass rod and ran forwards and backwards along both lower sides of the car. There was an additional small oil cooler used for this race which was scratch-built and placed on the left side of the car between the tub and the engine. This supplementary oil cooler was characteristic of the car which Beltoise drove at Zandvoort. Fitting this oil cooler added race-specific realism for this Dutch Grand Prix entry by Equipe Matra Elf.

Behind the Satin Black roll-over bar, a scratch built water header tank was made with connection to the left external main water pipe returning water to the radiator. Connection to the dashboard (water temperature sender) and the necessary water overflow pipe below the kit-supplied high pressure coolant cap, completed the header tank arrangement. Just behind the right aspect of the roll-over bar, a curious Matra blue sculpted metal fitting, called for explanation. This I found out was the cooling duct for the alternator which was driven by the front cam-drive on the right, in the Matra engine. This was replicated in plasticard and sprayed the appropriate blue colour before fixing into place.

The really busy business-end of the MS11 tended to look overcomplicated and untidy. However, the way the car was presented was typical of many late 60's F1 cars and Matra seemed to be able to lay claim to having probably the most complex of arrangements. It was almost as if the organisation of the engine wiring, fuel plumbing and cooling, displayed a continuous add-on feel, as ever more requirements had to be fulfilled when shortcomings came to light. Engines like this, almost seemed to be mobile laboratories,

the engineers constantly attempting to modify them whenever raced or driven in practice, no definitive arrangement ever being achieved. There appeared to be minimal regard for aerodynamics and efficient shortest possible runs of wiring and pipework, the sheer length of which may have further reduced overall efficiency of the powerplant. Nonetheless, the characteristic appearance of all this, was endearing of a by-gone age and I felt it important to reproduce these aspects as faithfully as possible to preserve 'the feel'.

I decided to replace the Tamiya support hoops for battery and oil tanks etc and 1mm stainless steel wire was ideal for this. Once secured, the battery was placed in a purpose-built basket on the left of the gearbox with a support tray across the gearbox for the ignition components. Another support was affixed to the right side onto which the fuel collector pot, the high-pressure electric fuel pump and the fuel filter would be fitted later. The battery was supplemented by an extra, though smaller battery (6 volts probably), no doubt because the drain on a regular 12 volt unit was too great for the conventional starter with such large engine inertia. At least Matra kept their electric wiring runs from these batteries to a minimum, saving on voltage drops, unlike some later F1 cars which kept their batteries right up front, in the nose cone subframe, perhaps for weight distribution reasons. The smaller battery sat on a small shelf and was secured against the larger battery by elastic bungee cord, as was the main battery cover. These bungee cords, I replicated, to improve realism.

The fuel system components were plumbed together as per photographs and the aforementioned fuel-system diagrams. Fuel could be seen to have a logical route from each side tank (pumped by hidden low pressure electric fuel pumps), to the collector pot right at the back, then to the higher pressure electrical fuel pump and fuel filter, eventually passing through a high pressure mechanical fuel pump on the right rear cam and then into the metering unit. In parallel there was an extra item, the fuel pressure regulator valve connected between the collector pot and the metering unit.

The oil catch tank was constructed from plasticard and placed on the left side of the gearbox behind the battery. Into this, drained any overflow from the oil de-aerator and gearbox. There were two other possible attachments, but at Zandvoort that weekend, these appeared to be blanked-off. The electrics were wired-up as far as possible, as was evident from the LAT photographs. This involved linking the batteries, the various electronic components over the gearbox and the ignition system including the distributor and spark plugs.

MS11 Cockpit Cowling

This was a key area to get right involving re-profiling in order to accommodate the extra fuel tankage above the drivers knees. This arrangement was relied upon at various races in 1968 and made for a car with a quite different feel and one with a somewhat

pugnacious appearance. The carriage of the wingmirrors was an important one to replicate; equally vital was the siting of the central fuel filler with cut-outs for easy hand-access to the lower side tank fillers, without the need to remove the whole cockpit surround. The manufacture of this major item with characteristic features is best described by the photos, save to say that much sanding and filling of Milliput was required and the use of a section of glass tube of ideal internal diameter provided a means to produce a perfectly circular top fuel filler recess.

Acetate sheet was cut from a template of thin card, the latter which had been perfected for shape on the otherwise finished cockpit surround. The acetate sheet windscreen was then attached by means of very thin wire ties. The narrow black strip at the windscreen/ cowling interface was made from Tamiya masking tape painted black. This represented the use of tape used on the original car, perhaps improving airflow onto the screen. The wingmirror stalks were made from Milliput built-up over a piece of brass wire, adding further variation and character to these items. The finishing touches were application of ring-style Dzus fasteners. These were made from brass rod and wire circle additions to aftermarket Dzus photo-etch parts.

<u>MS11 Concluding details</u>

The final details included the wheels for which the tyres themselves had to modified, including the removal of the central tread as on the original tyres used on the day. The wheels and tyres still do not look quite right as the diameter of the originals were larger which meant that a wider tyre could be used to correct the appearance of proportion of tyre width and height. Short of having correct wheels and tyres made, use of those provided in the Tamiya kit was sufficient.

Decals were applied from the sheet as appropriate and additional Ferodo, Ducallier and S.E.V.Marchal decals (brakes and ignition/spark plugs respectively) were made.

Conclusion Part 1, Matra MS11

Revisiting the Tamiya 1/12 scale Matra MS11 was a great thrill. This modelling project provided tremendous satisfaction in bringing about an enhanced level of engineering within a challenging re-profiling of an already highly sought after 1/12 scale model. If you enjoyed reading about this and have often wondered about the Stewart car, look no further than the next instalment in Part 2. This covers the making of the Matra MS10 in the same style as the MS11, so that they appear comfortably side-by-side, as if at Zandvoort 1968. The MS10 is a neat and typically British car in general appearance, no doubt due to the combination of the Cosworth DFV and Hewland gearbox. In reality, it's chassis is French with British influence, the whole car contrasting well with the apparently less tidy MS11 and it's abundant excess, in terms of powerplant.