Brabham BT44, 1974

Introduction

The Brabham BT44 raced during the 1974 Formula One Grand Prix season, achieving great success in the hands of Argentinian Carlos Reutemann and Brazilian Carlos Pace. This was one of the first Formula One cars designed by Gordon Murray, now most famous for designing the outstanding McLaren F1 (1994) and Mercedes McLaren SLR (2003) road cars. Gordon began as assistant designer to Ralph Bellamy and when the latter moved-on in 1973, Gordon took his place, throwing out all the previous compromise designs (BT34, BT37) and started with a clean sheet.

Putting into practice his desire to make as small a hole in the air as possible, the pyramid-section monocoque was conceived and born in the 1973 BT42. Establishing himself at the forefront of contemporary design, Gordon developed the idea further for the 1974 BT44 with inboard front suspension activated by pullrods. This neat and light car won with Reutemann driving, in South Africa, Austria and at Watkins Glen in the U.S., coming close to challenging Jody Scheckter, Clay Regazzoni and Emerson Fittipaldi in the Title showdown at Watkins Glen, subsequently won by Fittipaldi. For 1975, the B-spec car came with all new sponsorship in the form of Martini and Fina. New higher downforce nose section, narrower front suspension and stiffened monocoque enabled them to keep up with the opposition, (especially Niki Lauda's Ferrari 312T) and win in Brazil (Pace) and in Germany (Reutemann).

Tamiya released a model of the 1975 BT44B which is fabulous and very faithful to the original. On close inspection of the Pace's winning BT44B/2, the model naturally compromises on some of the detail here and there and in overall execution the monocoque dimensions are often a little smaller than that of the real car. Detailing is one thing, however monocoque correction (as opposed to a scratch-built monocoque) is unnecessarily risky.

Gordon Murray's preferred car was the BT44 in pure white, with minimal sponsor decaling. In particular, he had a liking for the car driven at Watkins Glen 1974, where everything went right and a class-act won the day. This being the subject of the commission, much research was required because if anyone was going to appreciate accuracy and detail, then the designer himself certainly would. To that end, Gordon assisted where he could remember, for many Brabhams had followed that second car with a spell in the McLaren F1 team from 1987 before beginning the McLaren F1 road car project. A six-month opportunity to study the rebuild of BT44B/2 was a real blessing and contact with a race car owner in the U.S. who had his own BT44, engineering and racing it, was also vital to my understanding.

So I set about correcting all the deficiencies of the Tamiya 1975 model and also converting the chassis back into that of the previous year, 1974. This wouldn't have been possible without a set of 1/12 decals produced by MTR Speed. To this end, a

four A4 page list of detail differences describing the changes made, was completed prior to delivery to the new owner.

Materials and Methods

The model was made using plasticard, Milliput resin, aluminium tube, steel and brass rod, a variety of adhesives, Holts Knifing Putty, Alclad lacquers, Humbrol enamels and a range of automotive of Acrylic sprays.

Monocoque

The monocoque was constructed as per Tamiya's instruction, additionally altering the front aspect in respect to the various internal steel bulkheads and suspension footings. Challenges included incorporating the appearance of 4 degrees of anti-dive within the lower front wishbone; this required filling in the Tamiya's rear lower wishbone pick-up point and re-locating it a little higher within the monocoque. This I could judge with precision having spent time with Pace's BT44B/2, for the monocoques of the BT44 and BT44B were to all intents and purposes, identical. The same approach was invaluable in converting the trackrod exit points from square in the model to circular in the real car. A circular hole for an external battery jump-plug fitting was made in the right handside of the monocoque just behind the front suspension. Adjustments to the monocoque skin over the bulkhead pickup point of the lower forward wishbone limb was vital to maintain a plausible appearance here. These areas were now devoid of Tamiya's moulded rivets and so aftermarket rivet replacements were used before spraying with grey, then white primer and top coat of gloss Appliance White.

To complete the forward monocoque changes, detailing the front bulkhead and aluminium closing panel was necessary. This mainly involved drilling-out lightening holes and providing Dzus-fastener brackets for bodywork.

The rear monocoque closing panel required a lot of super-detailing to account for a fuel valve, fuel outlet/return fittings on the left internal fuel tank access panel, re-profiling of the fittings for oil pressure, forward radiator bleed line, clutch and rear brake. The oil catch tank breather arose on the back of the monocoque, allowing passive feed from the oil tank placed between the engine and seat-back fuel cell. A scratch-built oil catch tank was constructed with inlet/outlet fittings, a drain plug and sight tube, affixing the finished item to the right rear monocoque closing panel above the right exhaust bank. Detailing the fuel-tank top was essential and involved routing an oil temperature sender cable, all the cockpit cabling, electric cable bundle to the ignition box in the 'vee' and beyond. The double valve on the fuel tank hatch enabled atmospheric venting of the fuel tank and bypass return to the metering unit in the 'vee'. The medical air bottle had some electrical connections and a flexible pipe to the driver's helmet added.

Interestingly, at Brabham the roll-over bar had a multifunctional role in venting the fuel tank, but otherwise, it was a case of applying new thought to the roll over bar anchoring points. In Tamiya's model, these anchor points are insufficiently spread apart and insert in erroneous locations. This may be for simplicity, after all, this detail is hidden by the seat. Spreading the roll-over bar and providing a new attachment method was a worthwhile challenge. The fire extinguisher ring-pull emerged from a tube welded into the hollow roll-over bar, activating the cockpit fire extinguisher via largely concealed cabling, which emerged at the left footing of the main roll-over bar, thence travelling towards the dashboard area.

Cockpit detailing involved getting rid of what looks like upholstery on the sides of the inner cockpit, changing the gear lever linkage etc, drilling correct routing holes for cabling etc, providing a throttle cable, replacing the steering rack and fitting a more natural steering column. The rack and pinion steering was fashioned from concentric sizes of aluminium tubing, being careful to replicate the central steering box accurately. The appearance of rollover bar anchorage points were carefully remade and fitted over the spread ends of the roll-over bar with a new backplate with lightening holes between. Attention to the dashboard bulkhead anchor points was helpful and a thorough overhaul of the dashboard wiring made for authenticity in an important area on a model. The battery was correctly placed and wired into the dashboard, fire extinguisher and back to the engine for distribution from there. The seat was remade from Milliput resin and sprayed gloss black to replicate the fibreglass original. Aftermarket seatbelts and hardware helped finish the seat properly. A more complex linkage system for the gear lever was copied from the car and along with the nearby chassis plate improved realism in this important area.

The front end of the car was approached with equal consideration. The water radiators and their subframe became more realistic and fitting a bleed-line from the radiators back through the tub could be traced back to the water header tank.

The front suspension was essentially out of the box, as were the wheels, though tyre valves were fitted. The coil-damper unit upper mounting points were very simply represented in the model and were cut out in order to effect a completely new approach, replicating that seen on the real car. This accounted for the decreasing height of the chassis as one moved forwards and so these fittings were inclined upward relative to the surrounding bodywork to maintain a horizontal plane for the coil-damper fixing points. The rear suspension was also standard, attaching to a moderately super-detailed Cosworth DFV engine. This required adding a fuel valve, then fuel pressure, brake and clutch lines. An electric cable-bundle was made which split up to provide individual wiring of the rear light, starter motor earth etc, the live coming from the back of the monocoque. The tachometer cable was terminated on the right cam cover. Within the hollow roll-over bar, was a ball valve to prevent fuel leakage (retro-flow via the fuel breathers) in the event of the car turning over in an accident. There was a one-way fuel valve connected to atmosphere via the roll-over bar, situated on the left rear cam cover. The rear monocoque closing panel was a complex area of live interaction between the monocoque itself containing the oil tank,

bilateral fuel tanks, fuel collector pot, fuel delivery systems, the numerous cabling and electrical wiring interconnections from the forward water radiator and cockpit activities, where the human interface with the hardware of the car was all-important. This rear monocoque surface cried-out for super-detailing, centering on the robust rigid connection to the stressed DFV, the electrical fuel pump, fuel valve and connections to the mechanical fuel pump and filter on the front of the engine. Then there were the uprated connectors for clutch, brakes, oil pressure and radiator bleed lines. The forward water radiator bleed line, overflow and downward feed to the main water pipe below, were fitted to the water header-tank. Careful observation and understanding of the real car under re-build, greatly assisted in the execution of these details.

The gearbox plumbing was taken from that seen on BT44B/2. The rear brake callipers required a refashioned cooling duct which would fit-in to that within the airbox, when fitted. Privately sourced photographs of the car at Watkins Glen 1974 were very helpful here (thank you Phil R). A standard spec Tamiya Hewland FG400 gearbox was employed, though later aspirations to improve this came along in time for the second generation BT44 model, completed two years later.

When considering bodywork, only the front nose-section required a significant amount of work. Otherwise, there was a scattering of cockpit surround and airbox detailing to enable these to fit together as in the real car. The rear wing only required inward profiling of the lower aspects of their end-plates, characteristic of the later BT44's.

The nose-section was a little less aerodynamically effective in this car than the later BT44B and this was reflected in the model. The 44B's NACA duct was removed and the nose-section main surface re-shaped which necessitated removing the old sideboxes and re-aligning them whilst removing the moulded kick-ups on their rear aspect. Later, the fixed trim-tabs would be added, as well as providing an earlier alternative version of cooling slots in the main top surface. The forward edge cooling slots for the front brakes were enlarged and soon the piece was ready for priming, filling and sanding etc. The undersurface was treated to super-detailing too, with a newly revised transverse bar to take aerodynamic downforce through to the subframe and then into the monocoque. The brake-cooling ducts fed to small boxes, which would be applied to an opening in the subframe cross-plate when the nose-section was in-place. The nosecone was the single-most important part to perfect in order to make sure the model had the right 'look'. After painting, a revised aerodynamic splitter plate was fitted to the forward under surface and then stone guards fitted to protect the water radiators behind.

As can be seen from the above, taking an off the shelf Tamiya model and wanting to build the previous year's car, required some changes to the detailed engineering. However, my own exacting desire to reproduce everything as accurately as possible meant a whole lot more changes were necessary. Adding the need to finally present the model to the original designer, called for even more accuracy to be strived for. It is

this level of interest and the generosity of various ex-mechanics and others who run historic racecar workshops that makes such a project a thrill and hopefully an inspiration to others.