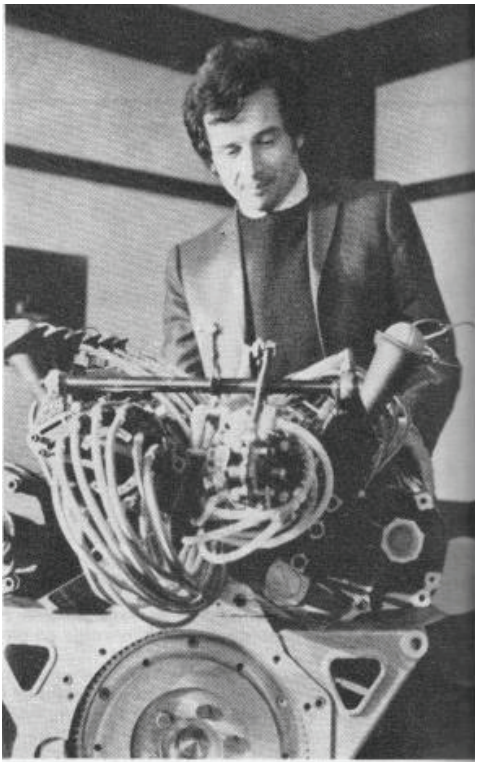
MOTEUR MATRA

The French company enter Formula 1 with their own 420 bhp V12 engine

Courtesy of Motor Racing Magazine

On Thursday, January 11, Matra Sports unveiled their new Formula 1 power unit at the Villacoublay-Vélizy research and development centre near Paris. This engine represents a major step towards the production of the first serious all-French Grand Prix car since the 2.5-litre Gordini 'eight' of 1955. Initially the team will use Hewland gearboxes, but from their reticence in answering questions on the subject, it seems certain that Matra are developing their own transmission to make the car an all-French effort, even to its Elf fuel company backing.



Jean-Pierre Beltoise, number one GP driver for Matra this season, examines the new engine at its Villacoublay unveiling. The mounting brackets, alternator, distributor and metering unit can be seen here, with a plate blanking off the fuel pump drive on the right-hand bank exhaust camshaft end.

The Matra engine is a 60-degree V12, with twin overhead camshafts to each bank and four valves per cylinder. Nine engines are being built, and so far, three of them have been completed. In designing the unit (a task which Matra's Director General, Jean-Luc Lagardère, describes as a team effort, unattributable to any individual), the company plumped for this configuration due to the inherent balance of a V12, its possibilities for development into a prestige road car power unit, and the narrowness of the 60-degree vee allowing it to be easily fitted into a slender Matra monocoque.

On the initial engines of the batch, the blocks have been cast in AS9KG aluminium alloy for simplicity's sake, but magnesium alloy will later be used to lighten the unit. The crankshaft runs in seven large diameter main bearings, and TA6V titanium con rods carrying aluminium alloy pistons are used. The bore and stroke measurements of 79.7 mm x 50 mm give each cylinder a capacity of 250 cc, and also allow a lot of room for four large valves in the pent roof cylinder heads. The nicromonic steel inlet valves are 29 mm in diameter, while the exhaust values are of steel and are 27 mm across. A single sparking plug per cylinder is let into the

centre of each group of four valves. Compression ratio is 11:1 and valve operation is via small cylindrical cam followers direct from the twin overhead camshafts to each bank. The camshafts are driven by a train of 12 gears at the front end of the engine in a similar fashion to BRM's V12. Many types of cam were tried on a specially-built test rig before Matra finally decided which they should use.

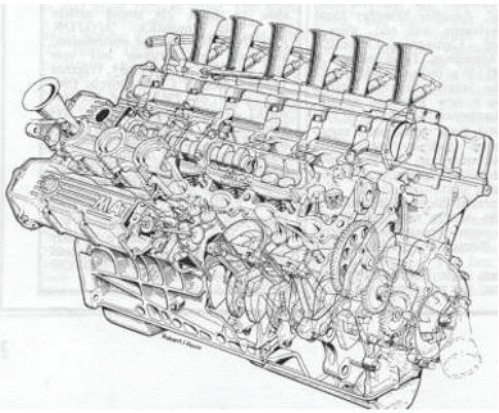
Various ancillaries are driven off the rear end of each camshaft, with the exhaust and inlet shafts of the left-hand bank operating the alternator and Ducellier distributor; and the right-hand bank inlet and exhaust shafts driving the Lucas fuel metering unit and high-pressure injection pump respectively.

Coolant is circulated by a centrifugal pump gear-driven off the front end of the crankshaft, running through an internal gallery in the centre of the vee, circulating around the wet liner of each cylinder before being pumped into each head and then exiting to the radiator through a fabricated tubular conduit between the inlet cam boxes.

A full dry sump lubrication system is used, with a single gear-driven pressure pump and two scavenge pumps for circulation. The scavenge pumps are placed at either end of the sump, and between them have a capacity of 29-litres of oil per 1,000 rpm of the engine. The pressure pump has a design capacity of 19-litres per 1,000 rpm. A full-flow oil filter is used.

Lucas indirect fuel injection is used, and the throttle slide linkage is rose jointed to give a very smooth and progressive throttle control. This point seems typical of Matra's attention to detail and finish in this their first racing engine design, for it is a very neat and attractive looking unit indeed. If it comes up to their expectations it should also be a competitive engine, for with a 12,000-rpm rev limit it is hoped to give around 420 bhp. M.Lagardère would not give any test bed figures, but with BRM's current circa 380 bhp with their V12, Matra must have done very well indeed if they have got near the published figure. All-up weight of the aluminium engine is about 380 lbs.

The Matra MS11 monocoque is being built at the moment to accept the first V12 engine, and it is expected to be complete and ready to start testing sometime in March. Jean-Pierre Beltoise will, of course, be number one driver for the team, and when two cars become available Henri Pescarolo will be his number two. Pescarolo is doing his 18 months national service with the French army at the moment but is in a special sportsmen's regiment based at Joinville and is allowed unlimited

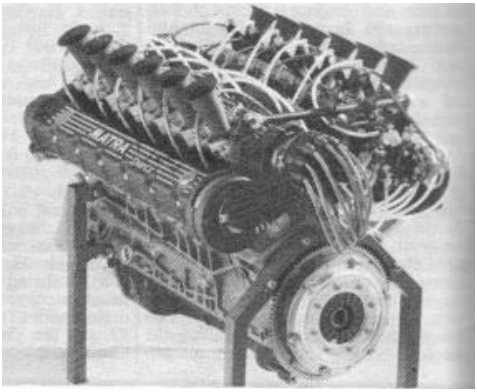


leave for his sporting pursuits. Johnny Servoz-Gavin will do some of the testing and may get the odd race if he is lucky, but poor Jean-Pierre Saussaud seems to have been left out in the cold this season with only the vaguest promise of a possible drive in '69.

Meanwhile, Ken Tyrrell's Matra International team is having two MS10 cars built to accept his Ford V8 engines. Jackie Stewart's retirement from the South African GP in the MS9 was apparently due to a valve spring breaking, dropping the valve, breaking rods and writing off both the block and one head of the £7,500 engine. Tyrrell now has five of them however and will use the MS9 as a tyre test vehicle for the rest of the year, with Stewart running one of the MS10s in the GP series and keeping the other as a spare. The MS10 differs from the MS9 mainly in having the scuttle tank removed and replaced by another one between the driver's back and the engine bulkhead, while the 10s will differ from the 11s in having a tubular subframe to carry the rear suspension instead of the full-length monocoque to be used with Matra's unstressed-block V12.

In addition to the F1 programme, the V12 will be dropped into the existing Group 6 Matra for long-distance races like Le Mans. At the time when the decision was taken to build the engine, the CSI had not dropped their 3-litre Group 6 limit bombshell, and so the engine was designed to accept enlargement to 4-litres. Now they needn't bother, however, and a 'Matra-Matra' will be running at Le Mans this season. Next year this part of their racing programme will be taken much more seriously, and something 'very revolutionary' in the way of Group 6 chassis design is promised for '69.

Matra Sports, as part of the Engins Matra aerospace combine, is a young and enthusiastic organisation, not afraid to make mistakes, and with the money and know-how either to make up for them or avoid them altogether. Since their creation in October 1964, they have come a long way, finally to dominate Formula 3 and provide tremendous opposition in Formula 2 last season. Now they are concentrating on the F1 and Group 6 projects and for the first time in 12 years of GP racing we had better look out for that French blue again.



Page 2: *This sectioned view of the engine shows the camshaft drive and head arrangement well; note the water conduit in the centre of the vee.*
This page: *All the auxiliaries are driven off the clutch end of the engine; plugs and injection nozzles are between the cam boxes with exhaust ports underneath, outside the vee. The crankcase is not stressed to take suspension loadings as with the Ford V8 or BRM H16.*