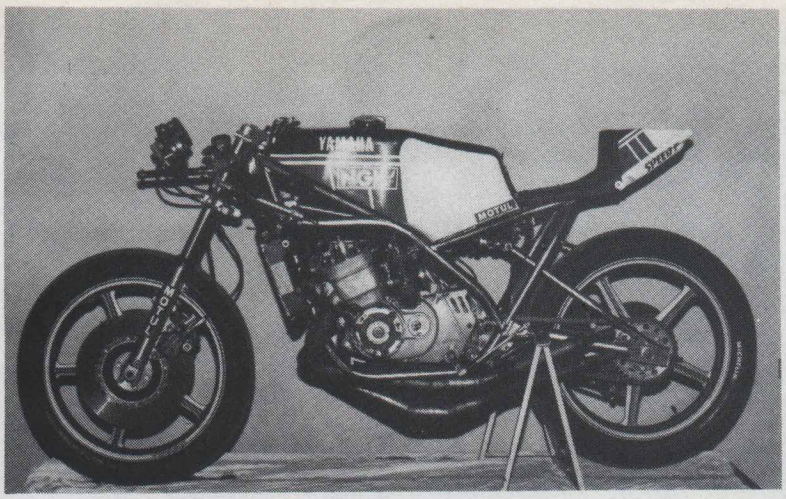
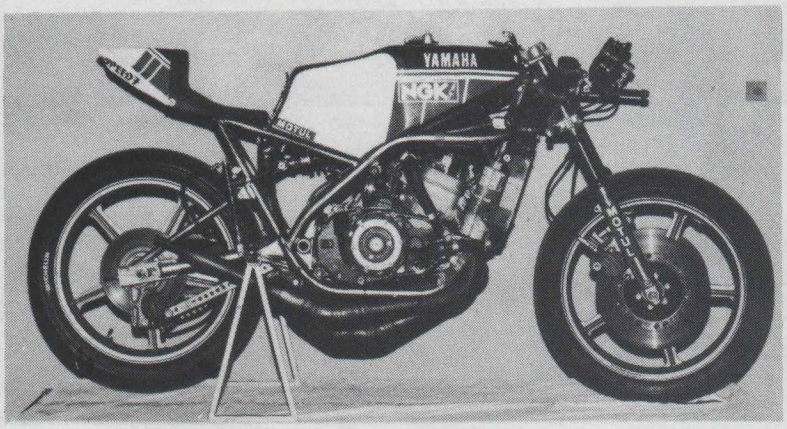
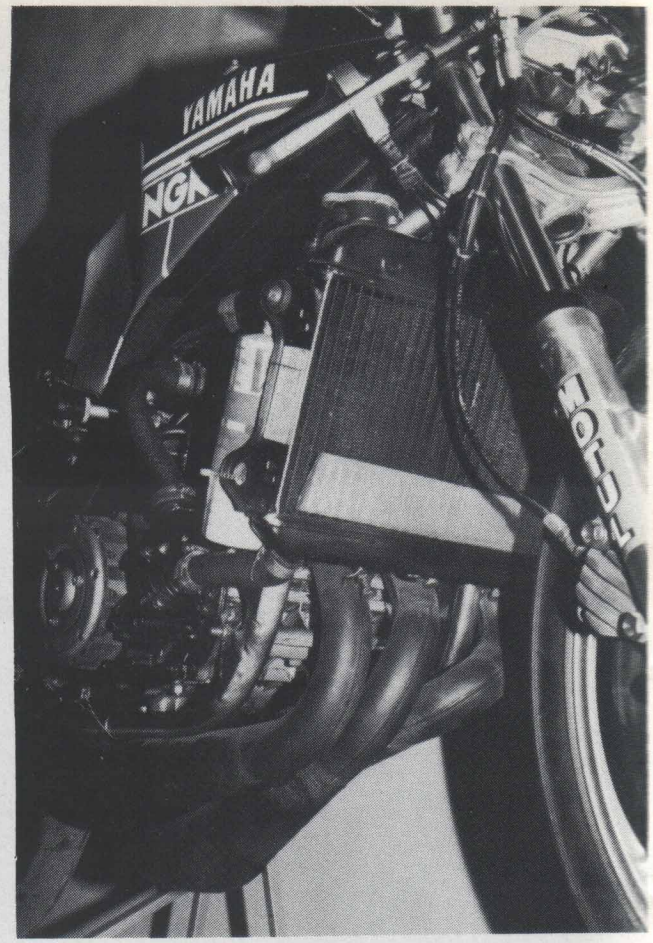
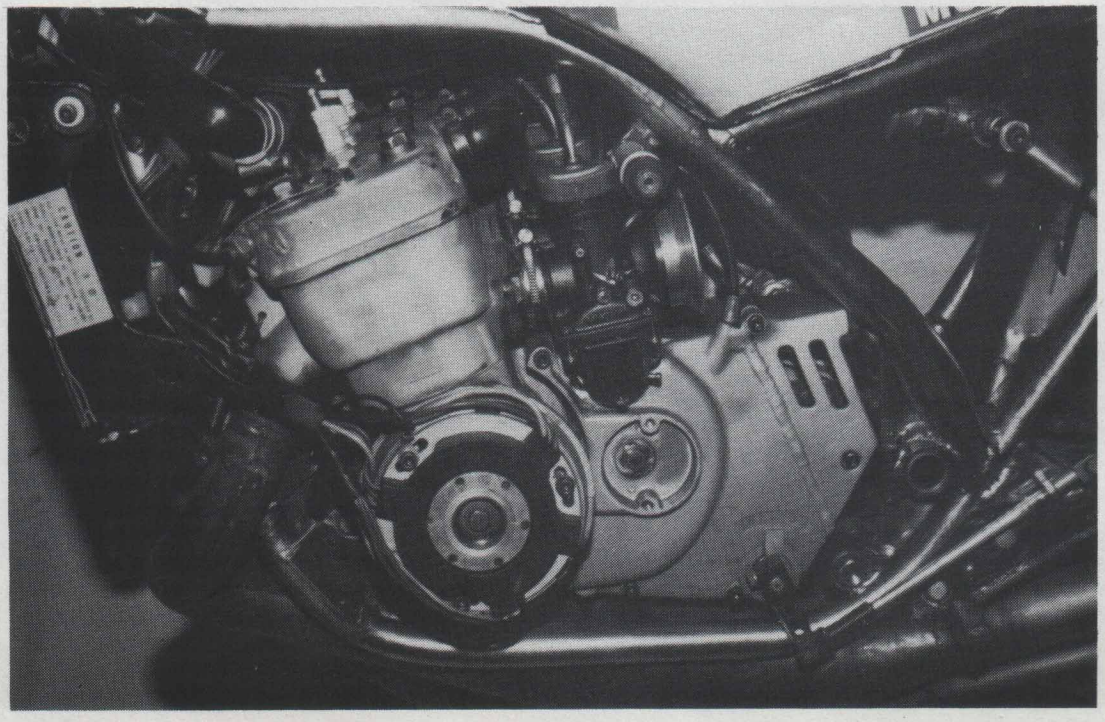






A WORLD CHAMPION IN ITS DEBUT YEAR!

YAMAHA 350 TRIPLE



When Takazumi Katayama took the chequered flag to win the 350cc Finnish Grand Prix last year it was an historic moment. The popular Japanese clinched the World 350cc Road Racing Championship with that victory and thus became the first Oriental rider ever to win a world title.

Katayama's win was the result of a unique effort launched at the beginning of the 1977 season by Yamaha Motor NV in Amsterdam, Holland....an attack on the 350cc title with a totally new 350cc three-cylinder engine.

With the actual factory effort from Japan concentrating on Johnny Cecotto and Steve Baker in the 500cc and 750cc classes, Yamaha management in Amsterdam decided to try and topple Harley Davidson from the 350cc throne. Private Yamaha riders with their TZ350cc twin cylinder 'production' racers had beaten the Harley factory effort in several Grands Prix during the previous two seasons but when it came to totalling up the Championship points, obviously a number of independent riders competing against one another as well as against the Harleys was no match for an intensive team effort by the Italian HD factory.

Therefore, Yamaha Motor NV decided to assist development of a novel Yamaha-based power unit that had first been made in 500cc form by Swiss sidecar racer, Rudi Kurth. That assistance finally grew over the winter into a full scale development program ready for a serious attack on the 1977 World 350cc Championship. Riders to pilot the new 350cc 'triples' were to be Katayama and 15-time World Champion, Giacomo Agostini.

At the end of the season, Yamaha Motor NV were able to look back with great satisfaction on a competition effort that began with mixed fortunes on a rainy March weekend at Tilburg in Holland. That was when Katayama wheeled out the triple for the first time and immediately set the fastest practice lap. However, race day dawned the next morning with pouring rain and Takazumi elected to use his TZ350 twin (he used it to win!) as his practice efforts with the triple had revealed some handling problems.

Next outing for the triple was at Mettet in Belgium on April 24th and it was sensational! There was no 350cc class, so Katayama ran the machine in the 500cc category. On the first lap it would not fire cleanly on all three cylinders and he came around in 18th place. Then the motor came on full song and by the end of the race Takazumi was in third place, passing numerous 500cc Suzuki fours and almost catching the leaders! The Belgian organisers were so astounded and thrilled at Katayama's crowd-pleasing effort that they gave him a special trophy for his performance!

The debut of the 350cc three-cylinder in World Championship racing was even more sensational. Both Agostini and Katayama rode the triples in the fast West German Grand Prix at Hockenheim and devastated the opposition. Katayama won the race with Agostini behind him....some Grand Prix debut for a completely new machine!

Katayama's engine was at this stage fitted into a standard TZ350 frame. Despite the win, he felt that the weight of the standard frame, plus the added weight of the bulkier motor (as compared to the TZ350 twin) was detracting from even more potential performance.

For the French Grand Prix (another fast one over the Paul Ricard circuit near Marseilles) he tried a British Spondon frame but, although he won race, he was not really satisfied with its handling.When that chassis was burned out in a fiery crash at Chimay in Belgium, Yamaha Motor NV commissioned a frame from Dutchman, Nico Bakker. He had earlier constructed the chassis which Agostini was using for his triple.

It was the Bakker monoshock chassis with which Katayama completed his World Championship season by winning the Finnish Grand Prix.

On his way to the title, the Japanese had won five Grands Prix....three of them on the triple and two on his regular TZ350 production twin. The TZ350 had proved better for tighter circuits as it had more power low down and consequently better acceleration out of slow turns.

Technically, the Yamaha three cylinder uses a conglomeration of standard Yamaha parts along with some specially-made components.

The crankcase is basically a TZ twin with an extra engine block welded to the lefthand side. The motor was offset 10mm in the standard TZ350 chassis to line up chain and sprockets.

The crankshaft is specially made by the Hoeckle company in Germany to take standard Yamaha TZ connecting rods and big end bearings.

With the standard TZ250 cylinder barrels and pistons installed, the three cylinder engine utilised a 54mm bore with a 50.8mm stroke, giving an actual capacity of 349.9cc!

The TZ250 barrels and heads were welded together to form an integral block for the three cylinders and this welding operation gave trouble in the early stages. The high temperatures of alloy welding were resulting in distortion of the cylinder bores but Rudi Kurth finally overcame this by using 'trial and error' methods to arrive at satisfactory welding temperatures and correct piston clearances.

The standard TZ350 six speed transmission and clutch are used as well as a TZ350 water pump. To allow more coolant to be carried, however, a TZ750 radiator replaced the TZ350 unit.

Horsepower of the triple was around 80bhp....some 10% higher than the TZ350 twin.

The added weight of the extra cylinder, however, meant that on slower circuits the triple was not as effective as it could have been. Its total weight this year was 126 kilograms and weight reduction is one of the prime targets of the coming season's development program. Yamaha Motor NV engineers are aiming at a total weight of 115 kilos for the 1978 machine as well as working on the engine to extract some more low-end power.

One way to reduce weight will be to revert to the smaller TZ350 radiator instead of the hefty TZ750 component. This year the engine ran cool enough to have allowed the use of the small radiator in most of the Grands Prix so the development men feel that the combination of the smaller radiator plus an improved water pump for better coolant circulation will be the way to go.

Other modifications for 1978 will be the use of separate cylinders and heads, which will achieve better cylinder base sealing as well as doing away with the problem of distortion caused by the welding process. The cylinders will be made by the Lyss Aluminium Co. in Switzerland and machined by Rudi Kurth. Bores will be Nicasil-plated. This is a special process by the Mahle Company in Germany which gives a longer life than chrome plating.

During 1977 both Mikuni and Lectron carburettors were tried, as well as Krober and Femsa ignition systems. The combination of Lectron carbs and Femsa ignition seems most likely, though testing in both of these areas is still going on.

Chassis specification for 1978 will almost certainly be just as the bike was in its final Finnish GP form: Nico Bakker monoshock frame, Marzocchi forks, Campagnolo cast wheels and Hunt alloy disc brakes.

The development team for 1978 will remain basically the same, although Dr Gordon Blair of Queens University, Belfast, now has an engine in Northern Ireland for testing and computerised investigations.

Former 125cc World Champion, Kent Andersson, has been involved with the engine development since Yamaha Motor NV took over the project and currently has a single cylinder test engine at his workshops in Sweden for porting experiments and so on.

The aim is for Dr Blair to take a theoretical approach to development and for Kent to take the practical route. Parallel courses towards the same goal!

The technician working on the machine during the racing season is Belgian, Francis Lothaire, while Mr M.Tanaka co-ordinates the whole effort for Yamaha in Amsterdam.

It is this development team that aims to provide Takazumi Katayama and the Yamaha 350cc triple with their second World Championship in 1978! ●