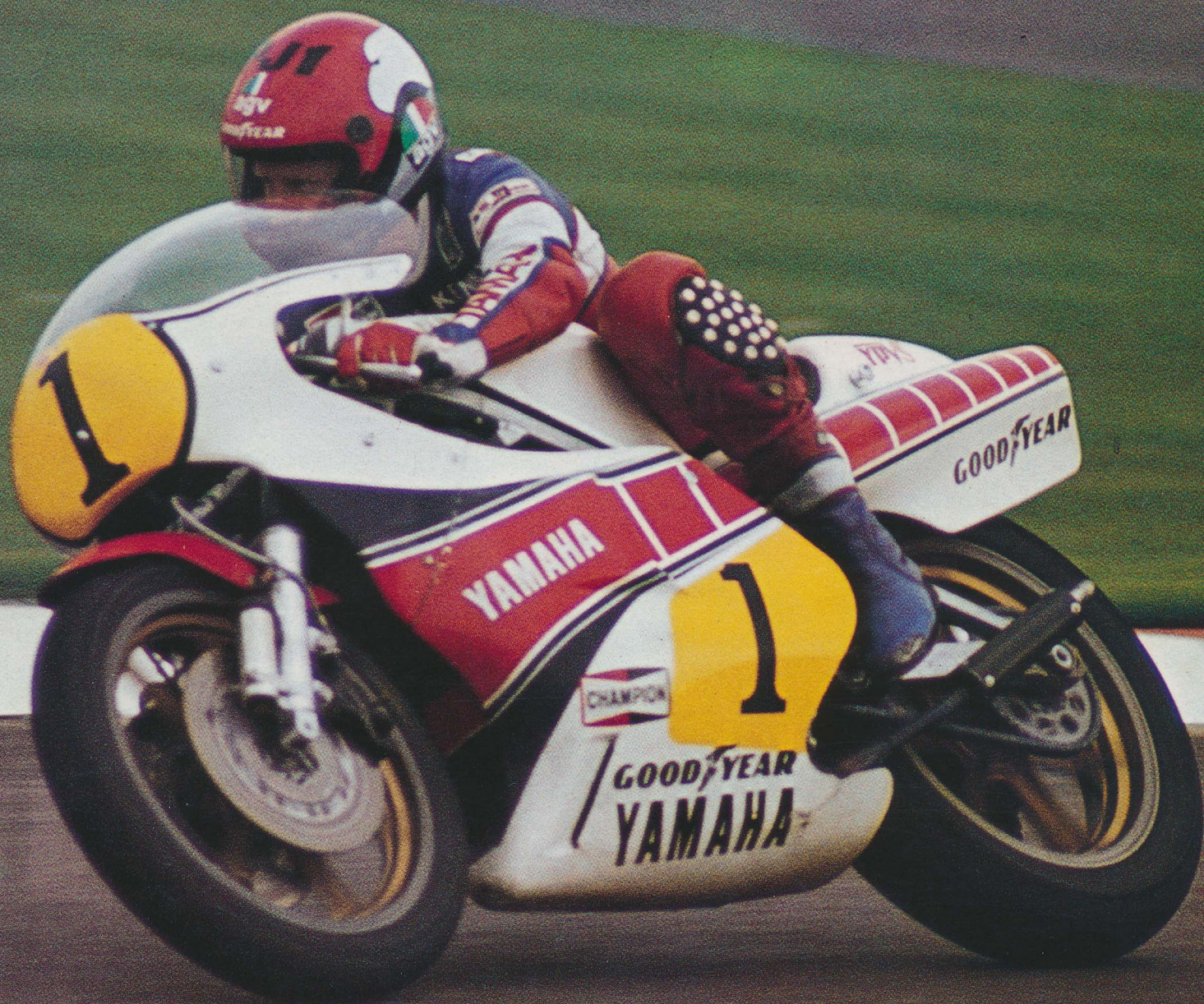


# CIRCUIT



JUNE/JULY 1981 50p



**SQUARE FOUR SENSATION! Yamaha GP winner colour close-up**  
**DOUBLE TEST SPECIAL! The XV750 in Europe and America**  
**VEE-TWIN DEVELOPMENT AND IN-DEPTH TECHNICAL FEATURE**



# SQUARE FOUR SENSATION

It has always been acknowledged that the precisely-controlled induction timing allowed by a rotary valve geared to the engine crankshaft gives more horsepower than the more conventional piston-controlled method.

Indeed, back in the nineteen-sixties Yamaha won five World Championships in 125 and 250cc road racing classes with rotary valve twin cylinder and vee-four machines. That was in the days when the rival Suzuki 250cc square four was nicknamed "Whispering Death" by its rider Jack Ahearn because of its quiet engine coupled with a notorious proclivity for engine seizures!





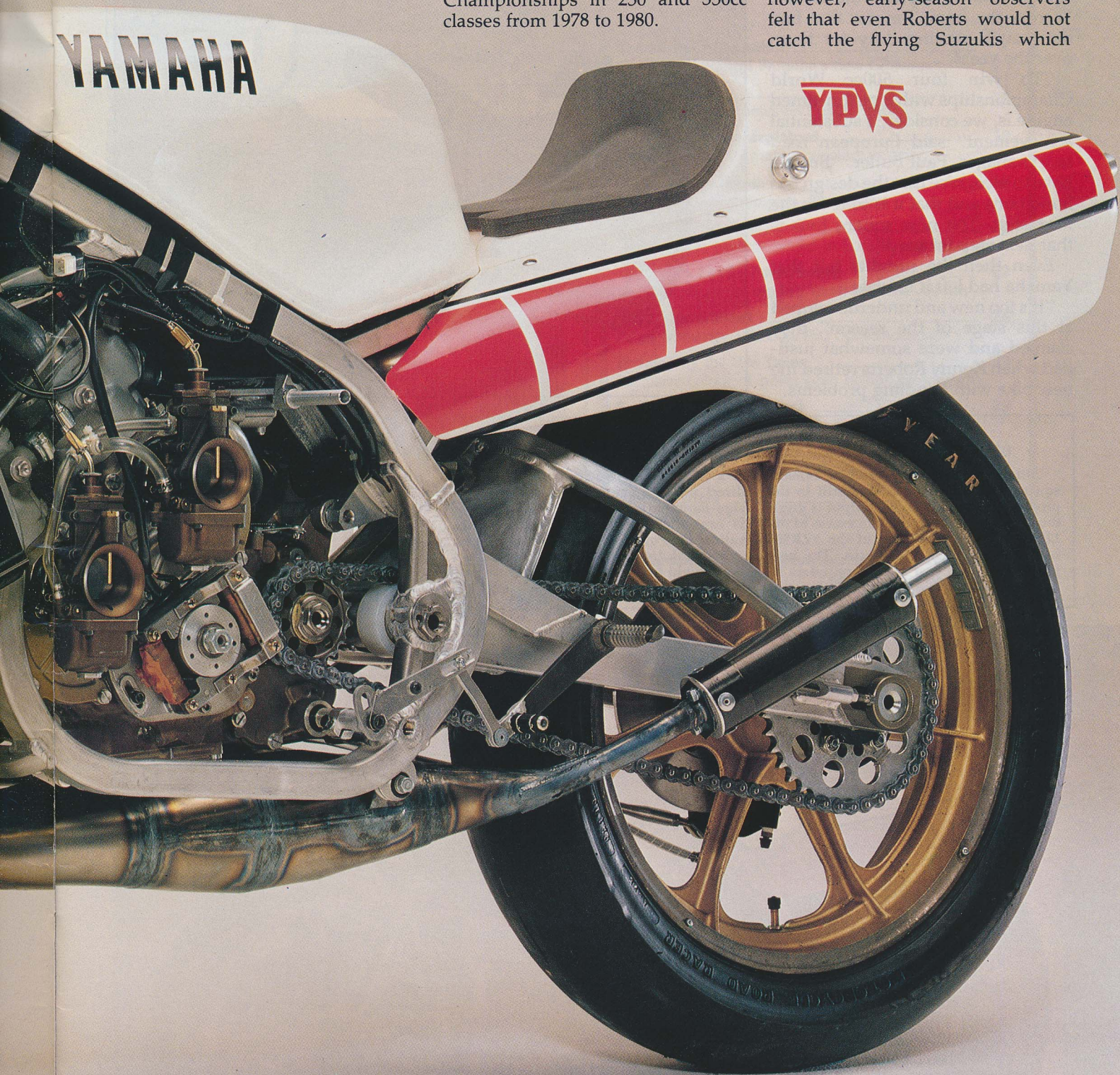
The fact that Yamaha had the rotary valve technology on tap – and that it is an admittedly superior induction method in sheer horsepower terms – makes the company's achievements in the nineteen-seventies and eighties even more amazing. While both Suzuki and Kawasaki went direct to rotary valves for their factory road racers, Yamaha remained faithful to the same piston and reed-valve controlled induction that is featured on

their street machines. They felt that to be winning races with the identical system to their production bikes was a far more significant achievement.

But Yamaha did more than just win races . . . as the title tally throughout the past decade shows. The complex rotary valve Suzuki fours won two World Championships – in 1976 and 1977. The "factory rider only" Kawasaki rotary valve twins won five World Championships in 250 and 350cc classes from 1978 to 1980.

With relatively-simple, piston-timed engines, Yamaha won an amazing 25 titles from 1970 through 1980! These came in 125cc, 250cc, 350cc, 500cc, 750cc and Sidecar classes and the largest percentage of them were won by "privateer" riders on production racing machines.

In the 500cc "glamour" class, Yamaha were aided by the riding brilliance of first Giacomo Agostini and then Kenny Roberts. This year, however, early-season observers felt that even Roberts would not catch the flying Suzukis which





proved obviously faster than the Yamahas in pre-GP competition.

They reckoned without two things. They failed to realise that Yamaha had seen the writing on the wall and that the company had all of the technology available to build a rotary valve winner . . . a fact which had been amply proved almost 20 years ago!

At the opening Grand Prix in Austria there was sensation when Yamaha wheeled out a rotary valve square four to replace the in-line "across the frame" motor that had done such sterling duty for them over the years.

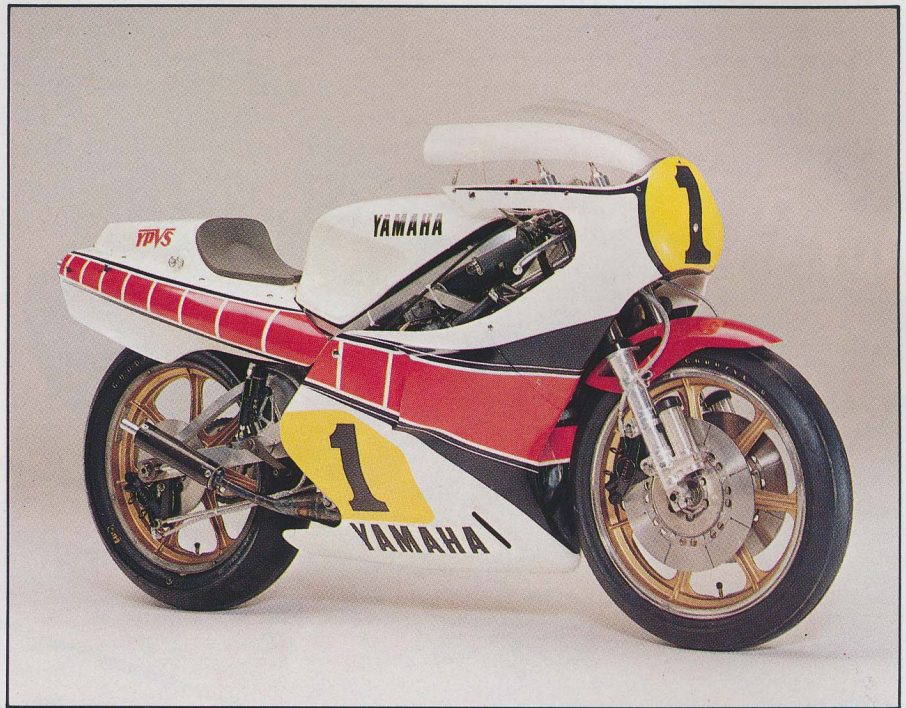
"To win four 500cc World Championships with a piston-timed engine is, we consider, a substantial achievement" said European road race manager, Paul Butler. "But we have to recognise that the design has limitations and that it is time for the next step. The new square four is that next step forward".

Even then the pundits felt that Yamaha had left it too late.

"It's too new and underdeveloped at this stage of the season" they claimed and were somewhat justified when Kenny Roberts retired the new bike with handling problems.

A week later, however, on the ultra-fast Hockenheim track, Roberts proved able to match the Suzukis pace for pace and sensationally won the German Grand Prix . . . on just the second outing of the new Yamaha square four!

In the recent history of motorcycle World Championship road racing, no new design has proved itself a winner in such a short space of time. More evidence of Yamaha's unsurpassable capabilities in the world of two-stroke engineering.



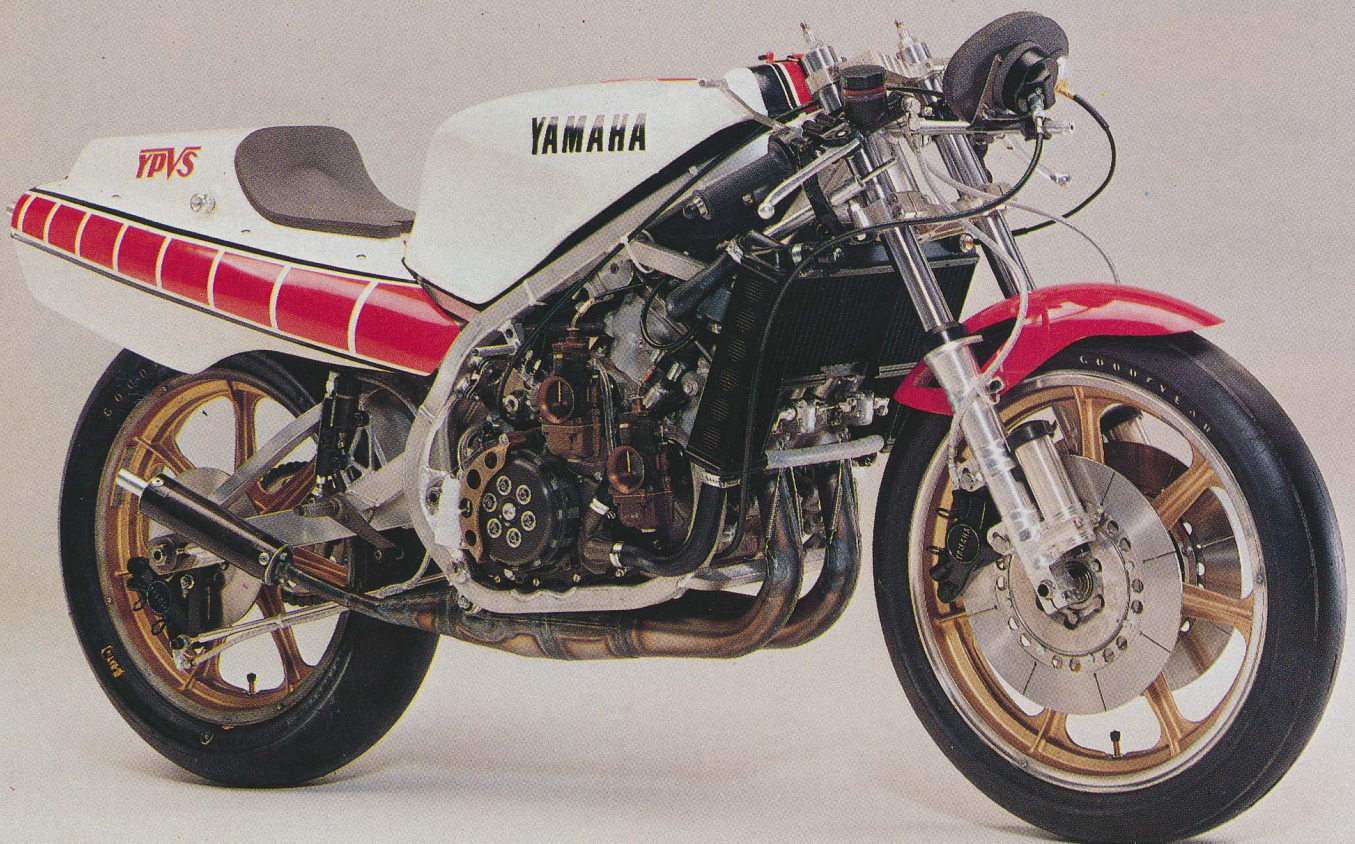
#### TECHNICAL BRIEF - THE YAMAHA SQUARE FOUR PROTOTYPE

Little is being revealed about the Yamaha square four sensation as it is still in the prototype stage. No power output is given though it is obviously well in excess of the 120bhp-plus at 10,500rpm of the YZR500 in-line four which it replaces. The new power pack has two sets of cylinders in "square four" formation, inclined forward

at a slight angle. Rotary valve induction direct into the crankcase is utilised with side-mounted carburetors. Exhaust timing is controlled by another Yamaha innovation, the Power Valve System in which a cylindrical drum in the exhaust port links port height to throttle opening. This combination of precisely-timed inlet and

exhaust porting is unique to Yamaha.

Transmission on the new unit is basically similar to the previous engine and it is mounted in the same square-tube chassis which now has a combination of mono-shock and rocker arm to give the Yamaha a rising rate suspension.



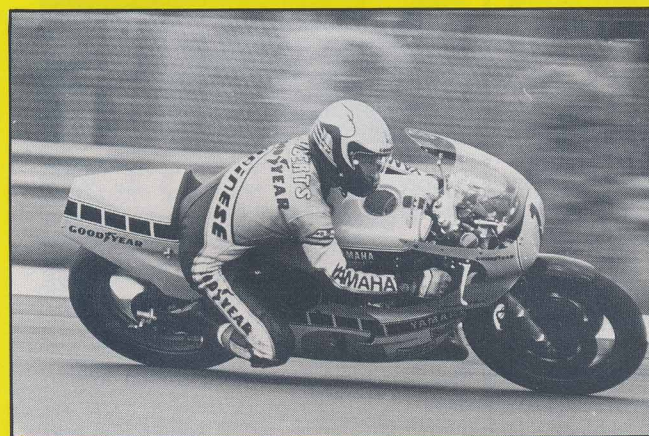
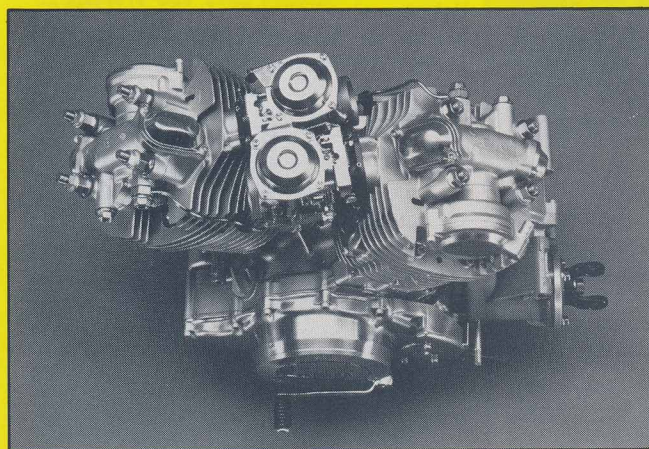
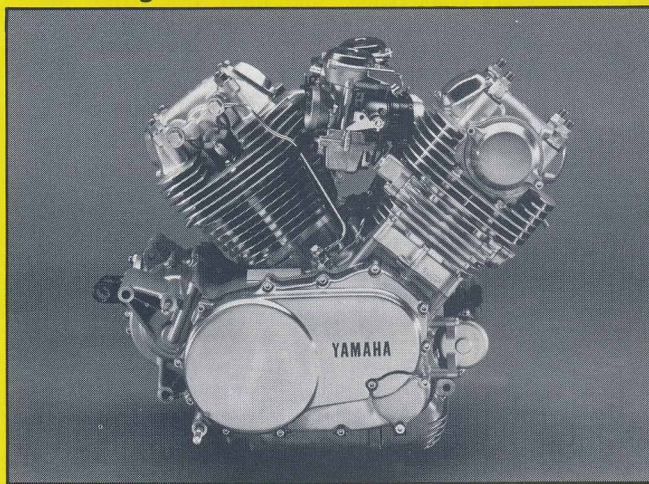


# CIRCUIT

JUNE/JULY 1981



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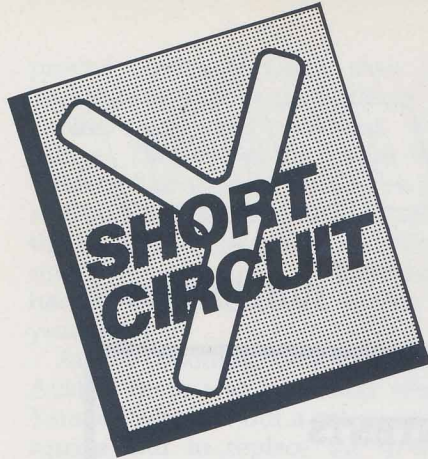
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### COVER PICTURE:

Kenny Roberts confounded his critics by winning the German Grand Prix on the new Yamaha square four ...only its second race ever! Before that event at Hockenheim, press and pundits were so impressed by the speed of the new Suzukis that they had virtually written off Yamaha for 1981. When the brand new Yamaha outsped the opposition the scribes were forced into silence. It's difficult to speak when you're eating your previous words!





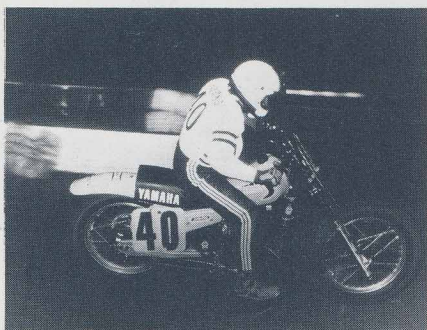
## CAR RACING CECOTTO

Former World 350 and 750 Champion, Johnny Cecotto, has now turned full time to car racing and has secured a drive in the European Formula Two Championship with the factory Minardi team. It looks as though Cecotto might make as much of an impact on four wheels as he did on two, for in his very first Formula Two Championship race, at Thruxton on Easter Monday, he finished in a solid third place with one of the Minardi team's BMW-powered machines. Things could get even better for Cecotto as the BMW engines are not the first strings to the Minardi bow. The team have an agreement with Ferrari to use that factory's potent V6 engines this season and are currently awaiting delivery. To all practical purposes, the Minardi team will be the 'official' Ferrari squad in F2.

Traditionally, motorcyclists have done well in F2. Mike Hailwood won the F2 Championship for Team Surtees in 1972 and, coincidentally, Bill Ivy finished third in his first-ever F2 race, behind Graham Hill and Jochen Rindt at an Easter Monday Thruxton race in 1969.

## ALDANA'S SURPRISE

American flat-trackers got a shock when the qualifying times for the TT National at Ascot Park, California in April were announced. "TT Racing" to an American is a smooth dirt-track with right and left bends plus a spectacular single jump. Sort of a combination of motocross and flat-track. Hitherto, the sport has been the province of 500cc four-strokes such as the Yamaha XT500 or big 750 twins like Harley Davidsons, Triumphs or Yamaha's XS650 in bored-out form. Imagine everyone's surprise, therefore, when fastest qualifier turned out to be the irrepressible Dave Aldana on what was a virtually stock YZ465 motocrosser! Only change was to fit street-type tyres instead of the knobbles as they



Dave Aldana sliding the YZ465 in TT trim

are better suited to the smooth-sliding style of TT racing.

Aldana followed this up with a second place in his heat race and seventh in the main event following a first-lap multiple pile-up and a slow restart! Aldana's effort was enough to get discussions started about banning the two-strokes from TT events if they started to get the extra development they seem to warrant. Too many successful two-strokes would change TT racing into little more than a smooth motocross and, quite rightly, US officials are anxious to preserve the character of this unique sport. The AMA figure that if the fans want to see motocross bikes in action, then they can to a motocross ... and that's the way they want to keep it!

## NEW MOCKETT FAIRING

Yamaha have plans to considerably expand their clothing and accessories ranges this year, a start having already been made with the introduction of a new fairing, luggage equipment and numerous items of clothing, including leathers.



A new glassfibre touring fairing, designed by John Mockett and imported from Holland, is initially intended to fit the XJ650, although further versions will be appearing later for other machines. Its main feature is that its three-piece design allows the lowers to hinge forward for access to the engine, leaving the separate handlebar fairing undisturbed.

Also intended for the XJ650 plus the new XJ550 and, later, the new V-twins, a set of 25 litre touring panniers are now available. Finished in black only, they have locking lids and a security system that allows both panniers to be locked to the pannier carriers.

In the clothing department Mitsui have just entered the leathers market introducing one and two-piece Yamaha leathers. Other new clothing lines include quilted winter overalls and ladies' white denim jeans.

## PRO-AM RD350 BATTLE

"Best race I've seen in years" was how veteran road race reporter, Norrie Whye, described the opening round of the Yamaha RD350 Pro-Am Series at Donington in April. The series pits 10 pros against 10 amateurs on identical RD350LC water-pumpers and, to make things even more competitive, the riders draw lots

before each race to see which of the Yamaha-prepared machines they will ride.

The series will have a thousand pounds hard cash for each round and circuits which will stage races throughout 1981 include Donington, Mallory Park, Brands Hatch, Snetterton, Oulton Park, Cadwell Park and Knockhill.

The opening round at Donington saw five riders battle throughout the ten laps with positions changing on every bend. Three-tenths of a second covered the first five riders at the checkered flag with victory going to Kevin Clementson. Tragically, Kevin was killed in a racing accident at Mallory Park a week later.

## PASSOLA CHARITY RUN

A team of four motorcyclists completed a challenging marathon ride over the weekend to help launch a new voluntary medical service.

The sponsored trip took them from Chessington to Land's End and back, a distance of over 650 miles. But it wasn't easy. For they were using 50cc scooter capable of just over 30 mph!

It was aimed at raising funds to start a new night service transporting blood, drugs and medical supplies between hospitals in Epsom, Carshalton, Tooting and Kingston, which at present are carried by the costly method of hiring taxis.

The idea of providing the new service was started by Keith Vater of Mitcham last November, and with the aid of sponsorship won over the weekend hopefully amounting to over £1,000 the operation called SERV (Service by Emergency Rider Volunteers) will start from a base in New Malden on April 27th. By the weekend nearly £350 had already been raised.



Much of the costs of running SERV are in renting an office to house the radio base and to garage a 250cc Kawasaki supplied for the service by Ian Brown Motorcycles of Raynes Park, says Keith. "But we are hoping for a grant from the Kingston Lottery as well", he says.

Leader of the four riders on the Moped, Paul McCann, who works for an import company in Hampton, detailed how the team managed to get to Land's End and back.

"We used a 50cc Yamaha Passola



supplied by the importers Mitsui Machinery Sales in Chessington and supported by a Mitsui van.

We set off at 8am on Saturday morning and the four riders spent about an hour and a half each in turns on the bike, covering between 45 and 60 miles.

It all went without a hitch and we got back to Chessington on Sunday evening at 9pm".

### STREAMLINED SPARES SERVICE

Mitsui Machinery Sales (UK) Ltd have just opened their new 27,000 square feet custom-built Yamaha spare parts depot at Davis Road, Chessington which will streamline the delivery of parts to the 15 Yamaha spares distributors throughout the United Kingdom. A modern high rise stacker truck which can stack as well as select spares will also increase efficiency and a new computer specifically designed to meet the needs of the spares set-up will soon be fully operational to give Britain's Yamaha owners an unbeatable spares back-up.



### "WE KNOW YOU'RE GONNA LIKE IT ... DOWN ON THE FARM!"

Mitsui Machinery Sales (UK) Limited recently announced the introduction of the Yamaha AG100 Farm Bike, the first true agricultural motorcycle to be sold in the UK by any manufacturer.

This 100cc two stroke machine has already successfully proven itself in Australia and New Zealand and after extensive research involving farmers all over Britain a decision was made to introduce it into the U.K.



Unlike some other machines which have been marketed as farm bikes the Yamaha AG100 is a specialist machine, not a modified trail bike. It is the 'Land Rover' of the motorcycle world.

Aimed at all types of farmers, the AG100 provides a quick, safe economical and rugged alternative to a four wheeled vehicle on a farm.

The machine will be available from a special farm bike dealer network throughout the United Kingdom from the spring of 1981, and will retail at around about £600 inc. VAT.

### COINING IT!

Joey Dunlop's record-shattering ride in last year's TT has been commemorated in an unusual, and possibly unique way. Joey, aboard his 750 Rea Yamaha is depicted on the reverse side of a new Isle of Man 50 pence coin.

The new coin, which will be introduced in time for this year's TT races is available in a special case for just one pound. In addition to being minted as a normal 50 pence coin it will also be available in either silver or platinum.

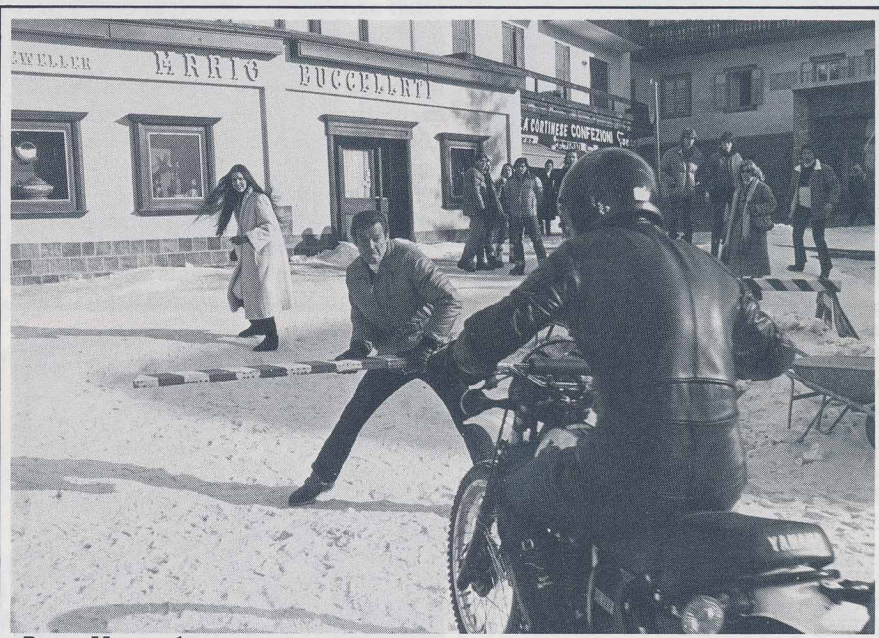


### YAMAHA XS650 CLUB

If you're the satisfied owner of a Yamaha XS650 twin, you'll be interested to know that there is actually a Yamaha 650 Society to link owners worldwide. The society is based at Box 1, Princeville, Illinois 61559, U.S.A.

### JUNIOR JET

Jim Filice, riding for Team Kenny Roberts, is too inexperienced to hold an AMA racing licence for the big road race class and is restricted to 250cc competition for this season. Evidence of his potential came in the Lightweight race at Daytona when he ran a close second to another young American superstar in the making, Kawasaki factory rider Eddie Lawson. Putting things even more in perspective from a European viewpoint is the fact that Lawson and Filice were both well ahead of World 250cc Champion Anton Mang on his factory Kawasaki. To emphasise that his effort was no fluke, Filice also won the initial Lightweight heat race, beating both Lawson and Mang in the process.



Roger Moore shapes up to unseat an XT500-mounted "baddie"

### 007 versus XT500

Due for release this summer the new James Bond film 'For Your Eyes Only' features a dramatic downhill sequence filmed in Cortina, Italy, in which agent 007 dons a pair of skis and is pursued by two baddies riding Yamaha XT500's.

The chase involves some incredible riding and ski-ing and the climax is when the remaining rider and Bond literally drop in to a bobsled run, both wiping out in a big way.

After riding the machines into shop windows, off restaurant balconies and through wooden shacks the stunt team managed to get through eight Yamaha XT500s - when you see the stunts you will see why!

### TEAM ROBERTS DEBUT

Three-time World 500cc Road Race Champion Kenny Roberts has never lost his affection for the American dirt-track scene, of which he was such a spectacular part for several seasons. Kenny, who was American Grand National Champion in 1973 and 1974, is retaining a link with his chosen sport by sponsoring a two-man team in this year's Winston Pro series (the American National Championship which covers both dirt-track and road racing).

Kenny's team is a well-blended mixture of youth and experience. Team leader is Mike Kidd, long a top runner on the National circuit and winner of many dirt-track events. He is teamed with young Jim Filice . . . another little Californian

Continued over ... ►



## SHORT CIRCUIT



"Team Roberts" leader Mike Kidd slides his YZ250 short-tracker at Houston.

cast in the Kenny Roberts/Randy Mamola mould. Either are capable of winning a National and will use YZ250-powered bikes on the short-tracks, XT500 engines in their TT machines and specially-prepared XV750 vee-twins on the mile and half-mile dirt ovals.



First-year expert Jim Filice flies a TT500 to third place in his National Championship debut at the Houston TT!

Young Filice, just starting his Championship career, could hardly have better tutors. As well as being able to follow the on-track example of Mike Kidd, Jim can solicit advice from three National Champions working with "Team KR." There's Kenny himself, Dick Mann who is responsible for chassis development, and Mert Lawwill who will manage total machine preparation and construction. Between them, this trio have a total of five National Championship titles and 72 National race wins!

### AKSLAND OPERATION

American road racer Skip Aksland is well known to British race fans for his efforts in the TransAtlantic Trophy races. In practice for the Italian GP last year, Skip crashed and injured a shoulder which is still giving him problems. He just had a third operation to try and correct the positioning of the bone and is postponing any decision on a return to racing until he is fully fit.

### CHAMPION'S COMEBACK

Steve Eklund, American Grand National Champion in 1979, had a dismal 1980 season—suffering numerous machine problems plus a spell of off-form riding. This year, however, looks like being different as Steve burst back with a vengeance in the opening dirt-track of the U.S. Championship year. Under the roof of the giant Houston Astrodome Stadium, Steve kept his 500cc Yamaha XT ahead of the 750cc Harley of another ex-Champ on the comeback trail, Jay Springsteen, to win the TT event. TT racing is a unique American sport that is similar to motocross over a smooth, graded dirt track. Third and fourth in the Houston TT were Jim Filice and Mike Kidd of "Team Kenny Roberts" (more of which later).

On the previous evening to the TT event, was a National short-track for 250cc machines on a one-eighth mile dirt oval.

Springsteen won that one for Harley but Yamaha rider Scott Pearson was a very close second with Eklund adding more Championship points with a fourth place on his YZ250-powered flat-tracker.

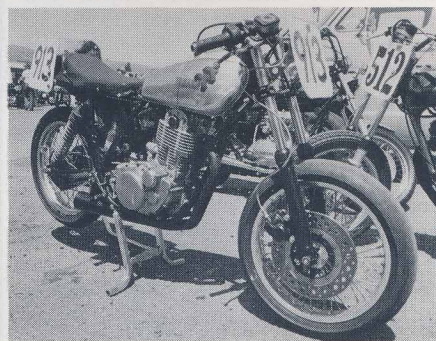


Former US Grand National Champion Steve Eklund back on winning form with his Yamaha TT500 at Houston.

### TARMAC THUMPER

British journalist John Hutchinson spotted this slick-tyred "trail bike" in the pits at a Sears Point road race while in California recently. In fact, tuned versions of Yamaha's XT500 are popular in American club racing. They can be made to put out over 45bhp (as good as the old Manx Nortons and G50 Matchless racers of the sixties) and are quite competitive on tight tracks, even with racing two-strokes or four-cylinder "superbikes."

Riders tend to scorn fairings so that they can broadslide the thumpers around tight corners in flat-track style!



### DOMINATION AT DAYTONA

Despite an initial challenge by the 1000cc four-strokes from the Honda factory and Yoshimura Suzuki, it was Yamaha TZ750 racers which filled the top nine places in the Daytona 200. Freddie Spencer of Team Honda, Wes Cooley and Graeme Crosby (Suzukis) all ran fast on their four-strokes early on but the bikes couldn't last the pace and all expired before half-distance. From then on, it was a Yamaha battle with 1979 winner Dale Singleton doing it again. Second was Frenchman Marc Fontan, from U.S. Road Racing Champion, Rich Schlacter and Dave Aldana. A surprise fifth was young Dan Chivington, who had never ridden a 750 before the Thursday of race week. He took over an injured rider's machine for his impressive big-bike debut.

Kenny Roberts had his usual bad luck at the Florida speedbowl. He retired his Yamaha TZ750 with jammed throttle slides after the third lap.

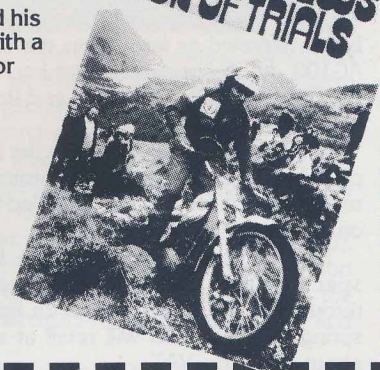
## "THE MICK ANDREWS BOOK OF TRIALS" on special offer to "CIRCUIT" readers

This year Mick Andrews returned to the Yamaha factory Trials Team and immediately celebrated his comeback with a win in the British round of The World Championship! We celebrate his return with a special offer to fans - your own copy of "The Mick Andrews Book of Trials" - delivered to your door for just £2 including packaging and postage.

"THE MICK ANDREWS BOOK OF TRIALS" is a comprehensive look at off-road trials and enduro riding by one of the greatest all-round dirt riders ever, two-time World Championship winner, Mick Andrews. The book has over 400 photographs in its 224 pages, including superb step-by-step shots of riding techniques. A unique picture section of off-road bikes from 40 years ago to present times is included along with a section on star riders, personal and machine preparation procedures and an in-depth biography on Andrews' long and varied career in international trials, moto-cross and enduro riding. A superb gift for any occasion.

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## THE MICK ANDREWS BOOK OF TRIALS





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Send now for this unique souvenir and memento of the TT Classic, and start a coin collection which could become a valuable asset in years to come, as you add each new Victor's Double-Crown... year-by-year.

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22ct Gold PROOF <sup>4</sup>	£485	6 x £88	L020745		£	£
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<b>OR CHARGE MY CREDIT CARD ACCOUNT</b>	(Tick)	(7) Visa	with the total sum of (monthly for 6 months if instalment purchase)	£
		(8) Access		
		(9) American Express		
		(10) Diners Club		

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# C.V. Carburetors—More Economical, Less Polluting

The carburetors used on early motorcycles were very basic and usually performed remarkably well. They were easy to adjust, clean and modify, but at times they were just not that efficient.

As the world became concerned with air pollution problems and energy conservation, one of the first areas to be looked at was the internal combustion engine used on motorcycles and automobiles. The carburetor was one of the first components to receive development time to help remedy these problems. The mechanically operated carburetor could easily make the fuel/air mixture too rich. This resulted in a residue of unburned fuel escaping from the engine to enter the air as hydrocarbons. Not only was this harmful to clean air, it also led to poor fuel economy. Some changes definitely had to be made.

In Japan in the early 1960s, a new type of carburetor had been developed and was being tried on some automobiles. This was the forerunner of the present-day constant-velocity carburetor used on all Yamaha four-stroke street motorcycles.

Unlike the mechanically operated carburetor, the constant-velocity type works more in unison with the engine and its needs as well as to the operator's commands. It operates "cleaner" in regard to air pollution and more efficiently in terms of delivering better fuel economy.

On the mechanically-operated carburetor, the venturi throttle valve (slide) is operated directly by the rider and the throttle cable. When the throttle is opened, the throttle cable raises the slide and needle, thus allowing more fuel to enter the airstream of the carburetor. At this point the air pressure differential between the vacuum inside the engine and the atmospheric pressure outside may not be great enough to allow the correct amount of air to enter the carburetor. This can create an over-rich fuel/air mixture, causing the engine to "load up" and resulting in fuel particles that are not completely burned. These unburned particles are exhausted into the atmosphere, causing

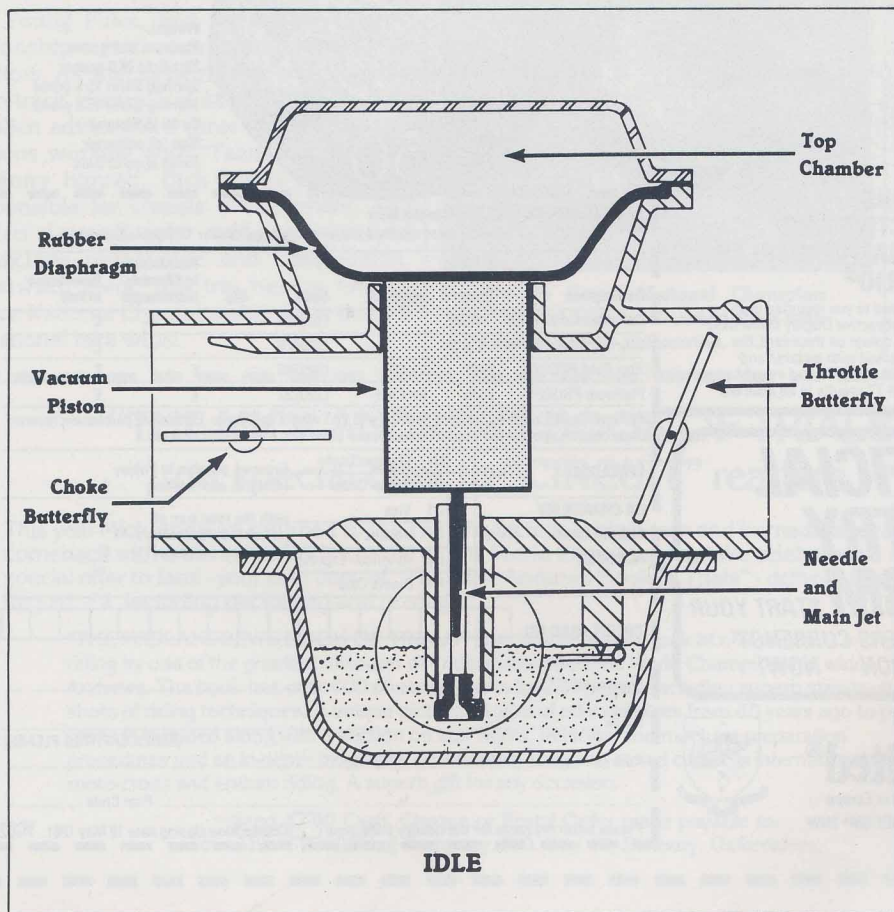
air pollution and resulting in poor fuel mileage.

The C.V. carburetor (constant velocity or constant vacuum, as it is sometimes referred to) was developed to help solve both of these problems. This type of carburetor works more efficiently with the demands of both the engine and the rider. When the rider wants to go faster or slower, he simply "tells" the engine and carburetor of his desire via the throttle. The carburetor does the rest—almost automatically—by sensing air flow through the carburetor venturi.

The C.V. carburetor is basically the same as the mechanical carburetor with the major exception being in the area of the throttle valve or slide. The C.V. carburetor has a vacuum piston which is a unit constructed of a rubber diaphragm and a metal piston. The metal piston functions the same as the throttle valve in that it moves up and down in the carburetor body, so changing the area of the venturi. The rubber diaphragm works within a chamber on top of the carburetor body and its up and down movements are controlled by the air pressure differential between the top and bottom sides of the rubber diaphragm. The outside air pressure is introduced to the bottom of the vacuum diaphragm through a hole in the inlet side of the venturi area. The venturi pressure is introduced to the top of the rubber diaphragm either through a hole in the center of the piston or through a hole in the carburetor body.

Attached to the bottom of the vacuum piston is a needle that is similar to that used on a mechanical type carburetor. As the piston moves up, the needle moves up with it and is partially withdrawn from the main nozzle. The needle has a diminishing taper and the higher it is lifted from the main nozzle, the more fuel is siphoned into the venturi area.

When the hand throttle is operated, the throttle cable does not pull up the vacuum piston but instead operates the throttle butterfly. As the butterfly opens, the venturi pressure drops due to increased air flow. The lowered air pressure means there is now less air pressure on top of the vacuum piston than on the bottom. This pressure differential causes the vacuum piston to rise, pulling the

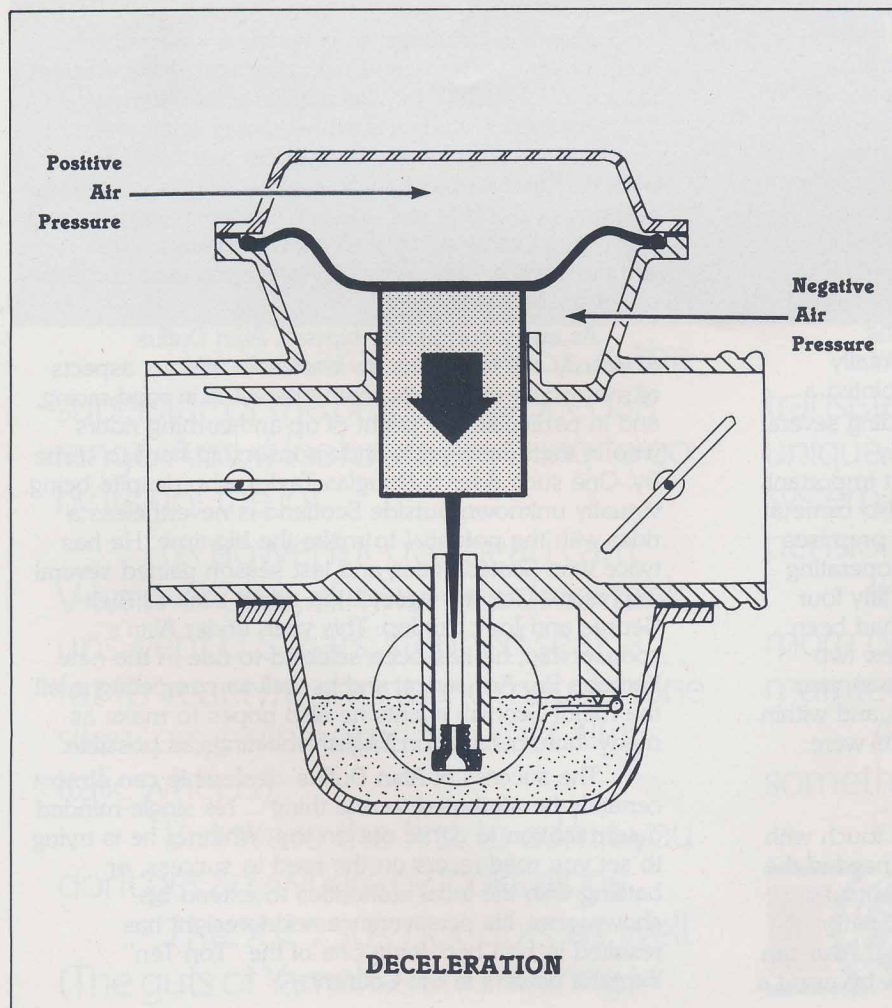
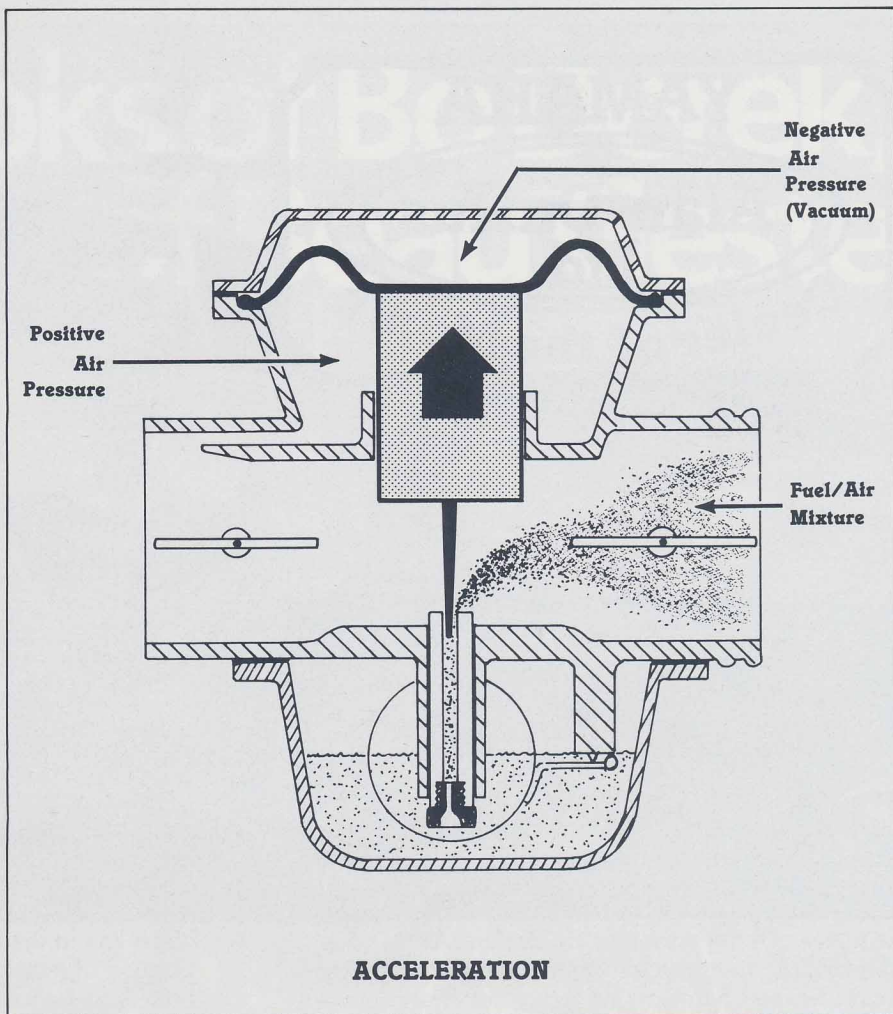




needle up with it. It allows more fuel to enter, thus increasing engine speed. One negative aspect of this type of carburettor is that frequently there is a lag between the time the hand throttle is moved and when the vacuum piston actually moves up. On some recent models, an accelerator pump system has been added to help alleviate this problem.

When the throttle is opened and held constant, the engine speed will increase and also hold constant. The vacuum piston and needle will stay in this position allowing the correct amount of fuel to be mixed with the incoming air. The vacuum piston and needle combination do have some weight but are held steady in suspension by the equal air pressure on both sides of the vacuum diaphragm.

For deceleration, the carburettor works on the same principle. As the throttle butterfly is closed, the incoming air flow is decreased, thus increasing venturi air pressure. The air pressure in the top of the vacuum piston is now greater than that on the bottom, thus causing the vacuum piston to lower. As it lowers, the needle slides down into the main nozzle, decreasing the amount of fuel being siphoned into the venturi, and the engine speed decreases.

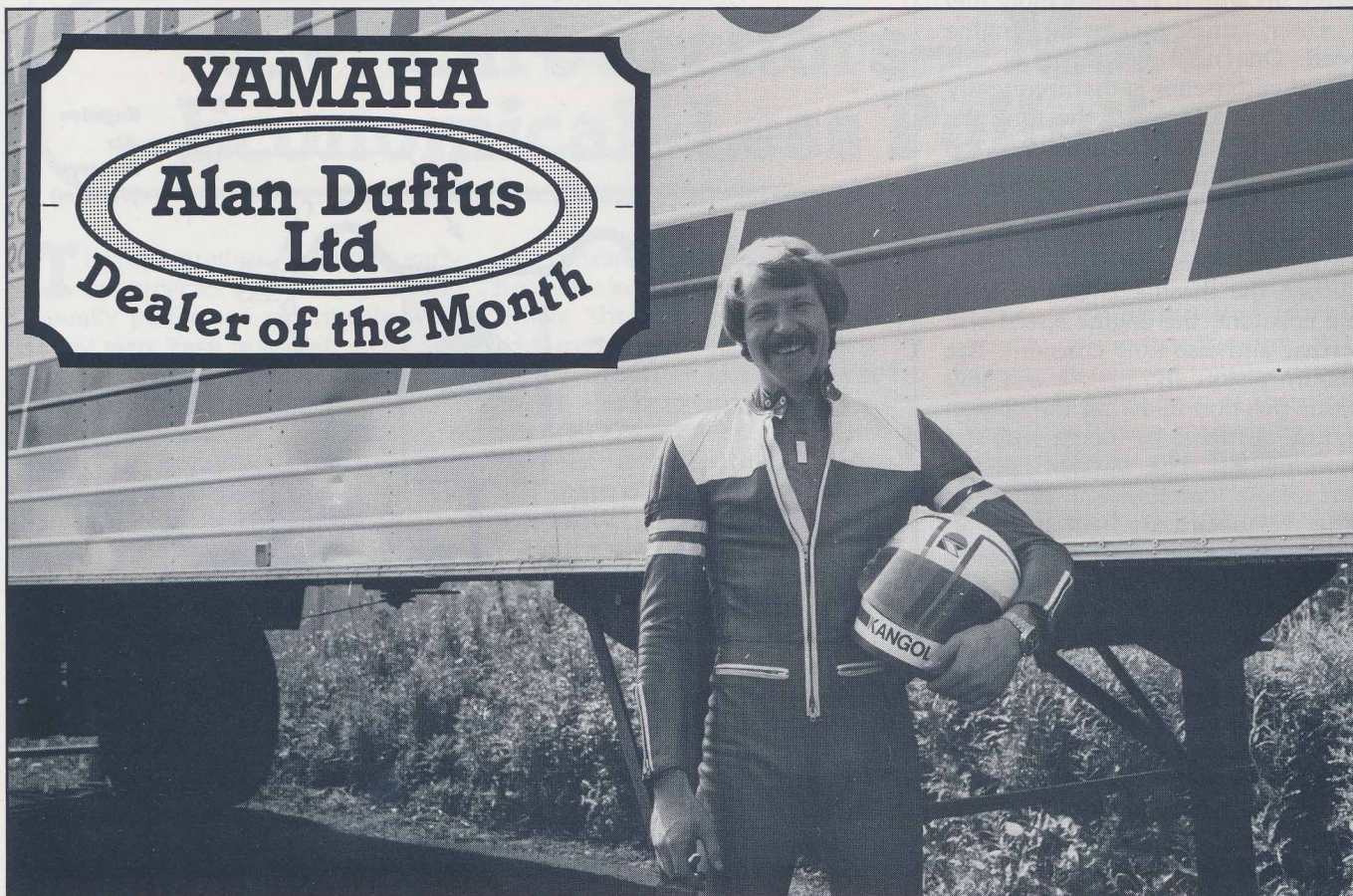


Most modern street motorcycles, including all Yamaha four-strokes, are equipped with constant velocity carburetors. Engines so equipped are often poor starters and perform poorly when cold. This is due to the fact that they are jetted very weak to comply with air pollution standards enforced by various countries.

The C.V. carburetor is therefore equipped with a starter or choke system for starting a cold engine. This system provides a richer than usual fuel/air mixture to be used until the engine reaches its normal operating temperature. It consists of an additional butterfly and sometimes an additional jet.

One big advantage that is seldom mentioned about the C.V. carburetor is that it adapts very well to various altitudes where the motorcycle may be ridden. The air pressure differential on the vacuum piston is still the same whether the atmospheric pressure is high (as at sea level) or low (as when riding in the mountains). This makes it almost unnecessary to change carburetor jet size when operating the motorcycle in higher or lower than normal altitudes for any prolonged time. □





Like many of today's motorcycle dealers, Alan Duffus' first interest in motorcycles was a competitor. He was Scottish Speed Champion five years out of six between 1973 and 1978 and also gained the North of England and Midland titles during this same period. It was a natural progression after many years in the sport to open a dealership, and the go-ahead firm of Alan Duffus Ltd was opened for business in February 1977. Within six months they were appointed official Yamaha dealers, and since that date, have steadily expanded to become one of the leading dealers north of the border.

Lack of space was always a problem and just one year later Alan opened a second branch in Kircaldy, specialising in accessories and clothing as well as carrying a mixed range of bikes. The following two years were ones of steady expansion until the beginning of this year, when the dealership really blossomed. Alan began 1981 by being appointed a spares distributor for Yamaha as well as adding several important accessory franchises to his already comprehensive range, but perhaps the most important event in the short history of the company also came at the beginning of the year. Since the original premises in Glenrothes were opened, Alan had been operating from a showroom that measured a miserly fifty four square yards, and as long ago as 1979 he had been negotiating with the local authorities for a new two storey showroom on the same site. After a two year fight he at last got the necessary permission and within the last couple of weeks the new showrooms were officially opened.

With the appointment of his spares distributorship, Alan decided that to keep in touch with his own, and Mitsui's spares availability, he needed the services of a computer. So with the help of Mitsui's computer expert, Terry Croft, he installed a Sperry computer. The result of this investment is that Alan can very quickly assess his own stocks and also, by using a

direct line to the importers system, find out the delivery position of replacement parts. If, in the unlikely event of both Alan Duffus and Mitsui being out of stock, he can also discover the projected date of arrival of spares en route from Japan.

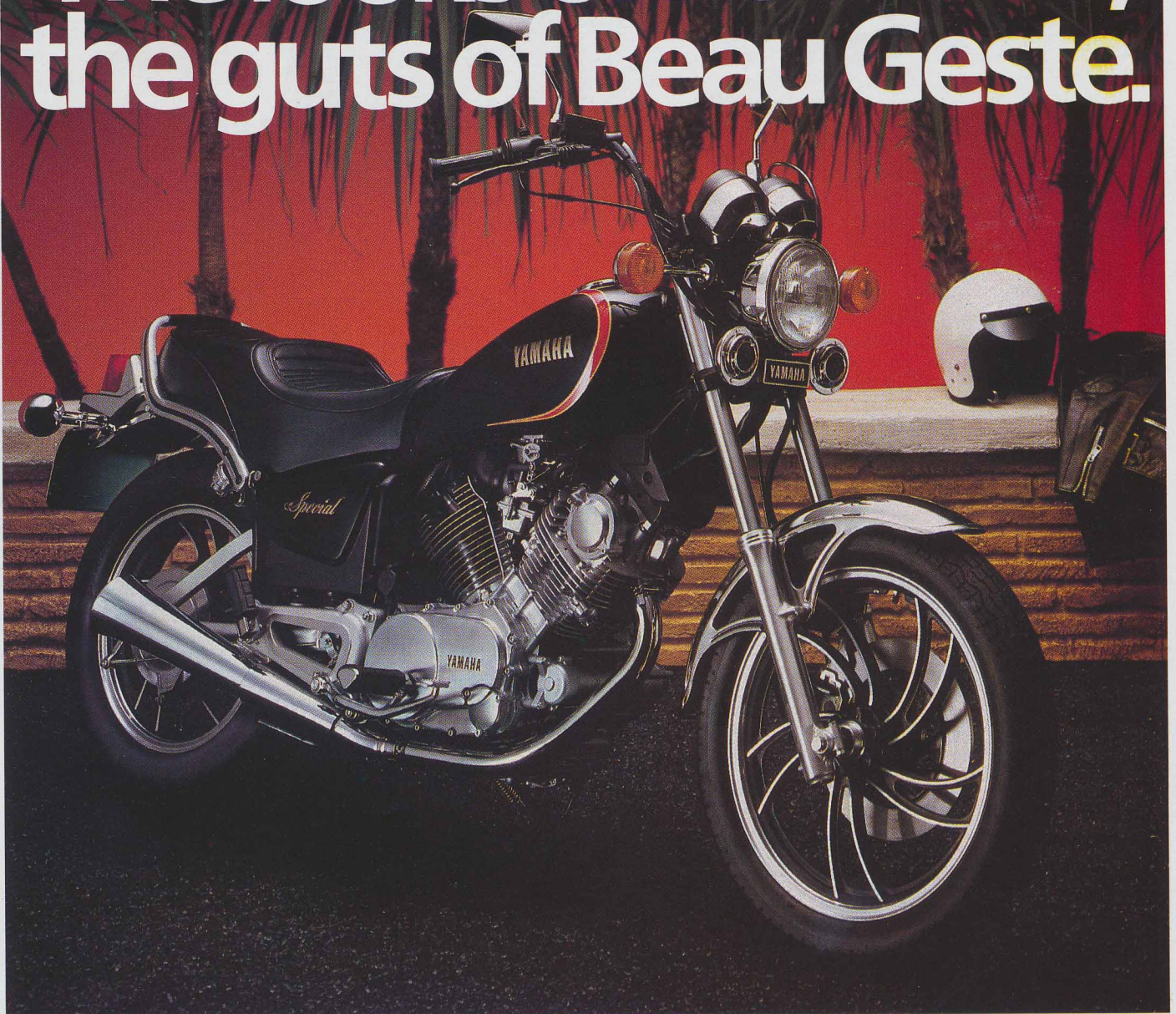
Alan is a firm believer in having a well-trained team of service mechanics using the correct equipment for the job. In 1980, he was appointed a "Team Yamaha Dealer" and as such he carries a full range of Yamaha specialist service equipment and has a team of factory trained mechanics to put it to good use. This emphasis on highly trained staff, proper equipment and a comprehensive stock of **all** spares ensures a fast efficient service with no delays to the customer because of out-of-stock parts.

As an ex-competitor himself, Alan Duffus obviously still maintains an interest in various aspects of motorcycle sport. His main interest is in road-racing, and in particular, the plight of up-and-coming riders who in their early years find sponsorship hard to come by. One such rider is Douglas Taylor who despite being virtually unknown outside Scotland is nevertheless a rider with the potential to make the big time. He has twice won Scottish titles and last season gained several impressive victories against top riders such as Alex George and Joey Dunlop. This year, under Alan's sponsorship, he has been selected to ride in the new Yamaha Pro-Am series, and as well as competing in all the major Scottish events he also hopes to make as many 'border raids' on English meetings as possible.

The success of Alan Duffus' dealership can almost certainly be attributed to one thing ... his single-minded determination to come out on top. Whether he is trying to set you road-racers on the road to success, or battling with the local authorities to extend his showrooms, his perseverance and foresight has resulted in him becoming one of the "Top Ten" Yamaha dealers in the Country.



# The looks of Bo Derek, the guts of Beau Geste.



The Yamaha XV 750 SE is the 'superstar' of the brand new Specials range. And, if looks are anything to go by, it's got the lot.

(A powerful, overhead cam. V-twin engine, slimline teardrop tank, upswept U.S. bars, stepped seat, a fat 16" rear tyre, shortcone megaphone silencers, twin horns and cast alloy Italic wheels.)

But we're the first to admit you don't get anywhere by looks alone.

The XV 750's got guts as well.  
(The guts of Yamaha's engineering.)

For instance, it's fitted with a transistorised ignition and Yamaha's unique mono-shock suspension system (in our eyes anyway, one suspension system is better than two).

It's even got shaft drive which more or less elbows all those 'tricky' maintenance problems.

All in all, the XV 750's simply something else.

Eat your heart out Bo.





# KNOCK-OUT UPPERCUT IN THE

Our Guest Test in this issue is a unique "double-feature" giving two very different, but very relevant, viewpoints on the new leader of the Yamaha "Special" Range — the XV750. This new vee-twin is styled in the U.S. "custom" idiom and sold simultaneously both in Europe and the U.S.A. Therefore, we thought it would be interesting to present the feelings of testers on leading magazines on both sides of the Atlantic—"Moto Journal" in France and "Cycle Guide" in the U.S.A.





# T THE CUSTOM-BIKE BATTLE!

**Y**amaha has always been willing to take chances with innovative design and marketing ideas, and it is an attitude that has earned them a great deal of success over the years. Their "DT-Series" were the first dual-purpose "trail" bikes—suitable for either street or off-road use; they

brought back the big single when they announced the XT500 four-stroke "Thumper"; the sensational

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Reprinted courtesy of "Moto Journal," France. Edited from translation by Patrick Behar.

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liquid-cooled RD twins are the only super-sporting two-strokes on the market, and it was Yamaha who brought the "chopper" look to mass production motorcycles with the advent of their U.S.-custom styled range of "Specials."





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**Guest Test Double-Feature:  
The Yamaha XV750 As Seen  
From Both Sides Of The Atlantic**

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The XV750 is the start of another new wave—a machine specifically designed in the custom style, rather than just a modification of existing models. It draws from all over the world for its design features and is difficult to compare directly with any other machine on the market except possibly the Honda CX500 custom—and that would be a very vague comparison indeed.

From the Italians the XV750 took the slim profile and immense torque for which Latin vee-twins have been justly famous.

From America came that “chopper” line; the large handlebars, the “teardrop” petrol tank and the split-level seat.

Finally, from Japan came that country’s characteristically ingenious detail fittings, clean functioning and smooth engine power.

This makes for a very special international blend. An American “chopper” well adapted for the demands of European riders.

Even the smallest rider will have no problem getting both feet on the ground with the XV750. The stepped seat puts you down almost with the lowest of them—the Harley Davidson “Low Rider.” On the Yamaha you are well-installed on a thick seat with the central step giving you firm back support. The XV750 handlebars are not so swept-back as those on other “Specials” and we prefer it this way.

Whatever the rider’s physical size, his first impression on sitting astride the XV750 will be a good one. Everything seems to “fit”—an impression rarely found on other “custom” bikes in our experience.





The impression of comfort will still be with the rider even after covering long distances. No cramps in the legs or pains in the back—which stays straight, like it should be, rather than slumping into a curved posture.

This is remarkable enough to be singled out for special mention, for no other "chopper" we have tried pleased us with its long-distance comfort or riding position.

The Yamaha XV750 is the first U.S.-custom style bike on which we were immediately comfortable—and on which we still felt comfortable after half a day's hard riding.

The only inconvenience is that the switches seem a little too far from the fingertips but that is made up for by the superb clutch operation and smoothly-progressive, quarter-turn throttle.

Smoothness is the hallmark of the engine. Ducati and Moto Guzzi may be beautiful vee-twins, but they just don't have the silky-smooth engine response that comes from constant-vacuum carburetors and the ingenious Yamaha linkage that operates both throttle valves via a single cable.

First sensation on riding the XV750 is a curious one to riders brought up on the big multi-cylinder touring bikes. Something seems to be missing, and after a few moments you realise what it is. You can't see the engine when you are in the saddle—its profile is that slim!

Don't worry, however, the "Big Vee" soon makes its presence felt when you open the throttle! When you drop the clutch, the motor immediately gives you a distinct push in the back . . . the sensation of torque. It's not a sensation to be simply compared to acceleration, though obviously the two are close.

A good 750cc four-cylinder will probably launch you quicker than the XV750—provided that you are in the correct gear and with the engine spinning high in the rev-band.

The XV750 doesn't demand that sort of precision in return for good acceleration. You can be in just about any gear, using 7000 or 7500 rpm maximum, and there will still be that heavy "push in the back" feeling as the vee-twin gets smartly into its stride.

A comparison soon becomes obvious when riding the bike—it's a "Double XT"! Even though it weighs 140 pounds more, the XV750 has the same responsive feel. It is low, well-balanced and does not become choppy at low speeds. Turning radius is great and allows you to turn

in narrow spaces without a lot of reversing.

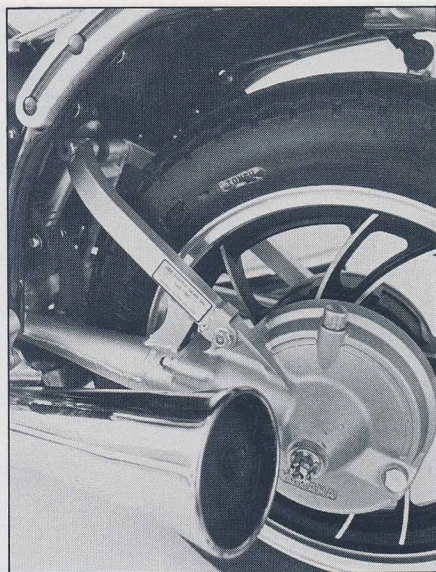
With a little imagination, you can picture the marriage of a Harley-Davidson and a big trail bike. The XV750 has the torque of one and the manoeuvrability of the other. The engine noise is pleasing to the rider without upsetting other people and the gearbox is smooth-changing—despite a slight grinding when selecting first gear on a cold engine.

In city traffic the XV750 is great but soon we were on twisty mountain roads climbing up from the seashore at our Spanish test location.

Along with Jean-Claude Olivier of French Yamaha Importers, Sonauto (fastest importer on two wheels!) and friends from other magazines, the inevitable happened! The test became almost a race and all we saw of the scenery was guardrails and open sky on one side and rocks on the other!

Bend followed bend without any relief, and the XV750 took them all in third or fourth gear. We laughed to ourselves as we utilised that marvelous torque and forgot the gearbox!

It's really not normal to have that much fun with a custom-style cruiser. In fact, it's the first time we have really enjoyed riding a "chopper" anywhere other than on the boulevard. The big handlebars feel good—



like a trail bike, in fact. The narrow tank allows you to tuck in and steer the bike with your knees. The seat locates you firmly but still allows you to hang off the inside if you cannot lean the bike over any more.

Don't let the "chopper" line confuse you with its relaxed profile—the XV750 knows how to deal with mountain roads and main highways just as well as cruising city streets.

Ground clearance is limited by the side-stand on the left and the exhaust pipe on the right. That point, however, is more than enough for most!





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**Guest Test Double-Feature:  
The Yamaha XV750 As Seen  
From Both Sides Of The Atlantic**

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We do criticise the Bridgestone tyres, which slid too easily. They are just not made for aggressive riding.

Then again, Yamaha does offer the 1000cc TR1 for more sporting vee-twin riders and that has tyres to match its capabilities.

The brakes of the XV750 are good without being outstanding, and the big pistons of the vee-twin mean that shutting off the engine is also a great aid to rapid deceleration.

The gearbox and the shaft-drive (even better than Yamaha's previous models) are so good that you can simply forget about them. In fact, with an engine that pulls from 3000 to 7000 rpm, you hardly need a gearbox at all.

To sum up the XV750's performance on tight mountain roads, it is just like its half-brother, the XT500. Really a nice bike, all the responsiveness of the single but with more horsepower, more torque and more brakes.

After a while our mountain road opened out. Just as many bends but faster ones—taken at 80 to 90 mph! It is here that the XV750 begins to show its limits, weaving on the soft suspension.

Is there a cure? Certainly! The XV750 has fully adjustable suspension front and rear.

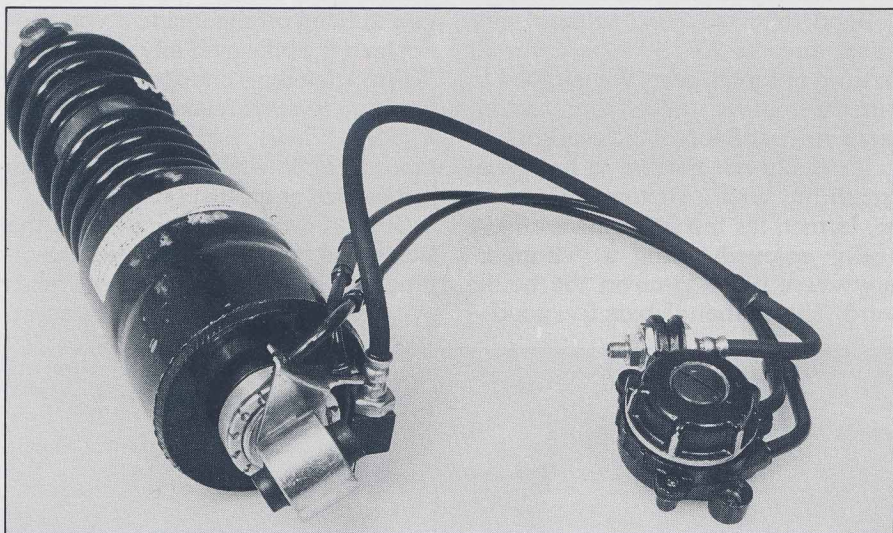
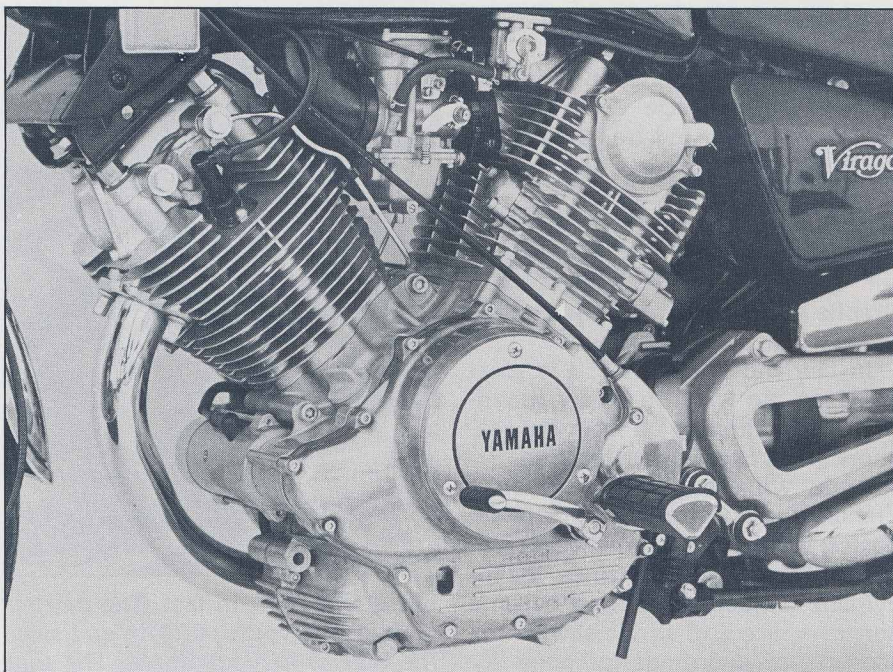
If you do mostly fast riding, then you will need to carry an accurate pressure gauge with you and re-set front fork air pressure. Incidentally, a connecting air tube between the two fork legs would help get exactly equal pressure.

At the rear it is even easier. You can set the suspension simply by turning a knob—and you can even do it while actually riding!

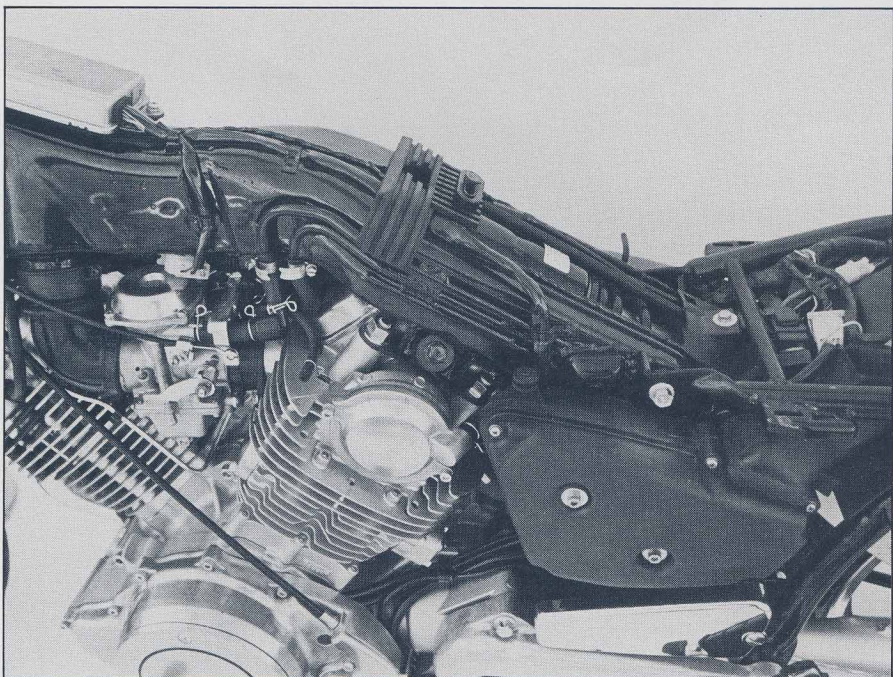
The knob is below your thigh on the right side (we would actually prefer it on the left so that adjustments can be made without letting go of the throttle).

Turning the knob allows you to stiffen the suspension for faster riding or carrying more weight. This is done by changing the damping characteristics—much better than simply increasing spring tension, the usual means of tuning street-bike suspension systems.

If you are riding slowly, then you can have the suspension on its softest, most comfortable setting. When you decide to "attack" the road, two turns on the knob will stiffen the suspension sufficiently.



The monoshock unit with its cable-operated remote control damping adjustment, plus rubber hose for setting the pressure of the air-spring.



Cool air is ducted through the pressed-steel chassis backbone and via flexible rubber hoses into the carburetors.



The XV750 doesn't have more suspension travel than a lot of other street bikes. The rear shock can still be made to bottom on bumps and heavy braking can still compress the forks to their limit. Where the bike does have the advantage is that you can cure these problems by adjustment under all but the severest conditions.

Tuning your suspension might seem complicated, but the motorcycle has to cope with more variations in load and use than other vehicles. For example, the same bike often has to be both utility transport and sporting machine. No one has yet made a shock absorber which will perfectly handle all these variations. Yamaha's adjustment for driving style and machine function is the closest anyone has come to this ideal.

Manageable and torquey, efficient and agreeable on tight or fast country roads, the XV750 gained a "touring bike" status from us that we have never awarded to any other "custom" machine we have tested previously. It has the capability of taking you miles and miles on your holidays and providing pleasure all the way.

There are drawbacks, of course. Beyond 80 to 90 mph, wind pressure becomes a problem and you can't really tuck down as you are prevented from changing your riding position by the step in the seat.

Then there is the fuel range (an inherent problem on all "choppers," with their small tanks). We got an average of 100 miles to a tankful of petrol. Constant need for fill-ups will slow you down and perhaps force you to stop altogether at night. A pity, for the big halogen headlight allows you superb after-dark visibility.

The XV750 is a curious cocktail. It is a "boulevard cruiser" custom bike but with just about all the capabilities of a touring bike, especially if you are prepared to tour in a relaxed manner.

Suspension and riding position are well-adapted for European riders, despite the American styling. Mechanically, the XV750 has more of a European "feel" to it than any Japanese bike we have tested so far. It has nothing to fear, in respect of character, from Ducati, Triumph or any European manufacturer.

As a relaxed touring motorcycle, the XV750 is truly a success. If you like the idea of a vee-twin but want something more sporting, don't worry. The Yamaha TR1 is on the way with a 1000cc engine, 10 bhp more and true European styling and riding position! □





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**Guest Test Double-Feature:  
The Yamaha XV750 As Seen  
From Both Sides Of The Atlantic**

**H**ere it comes. A one-two punch to America's solar plexus, the knockout blow in Yamaha's decade-long struggle to convince us that it understands our unique enthusiasm for motorcycles better than any other company. Yamaha first put on the gloves in 1970 when it created the Triumph-like 650cc XS-1, took the offensive in 1978 with the XS750 Special and proved its championship caliber in 1980 with the XS Eleven Midnight Special. And now Yamaha has cut loose with the Virago, the knock-out uppercut, the fruition of a 10-year commitment to the American style of riding. Combining the modern technology of shaft drive and single-shock rear suspension with the traditional virtues of the vee-twin engine, the Virago hits you with a double-barreled thump that's as American as the Dallas Cowboys. It's what riding a motorcycle in the U.S. is all about.

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This road test of the Yamaha "Virago"—as the XV750 is known in America—is reprinted courtesy of "Cycle Guide" Magazine, U.S.A.

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You don't have to look far to understand that the trademark of the Virago's accomplishment is its tandem vee-twin engine. Assuredly, a lot of people will size up this 750cc motor as nothing more than an overhead cam clone of a Harley-Davidson engine; but that's not the REAL story behind the Virago's vee, for there's more at stake here than just another stab at achieving classic form. The thump-thump of the Virago's staggered pulsebeat signals Yamaha's turn to a different set of performance parameters than those offered by the ubiquitous multi-cylinder motorcycle. Because whatever cosmetic impact this engine might have, its performance assets are as verifiable as a computer print-out and as provocative as the smell of hot oil. After all, even Harley-Davidson's success is founded as much on the hard rock of vee-twin reality as it is on any mystique that goes with the H-D territory.

(Continued on Page 34)

## XV750SE SPECIFICATIONS

### ENGINE

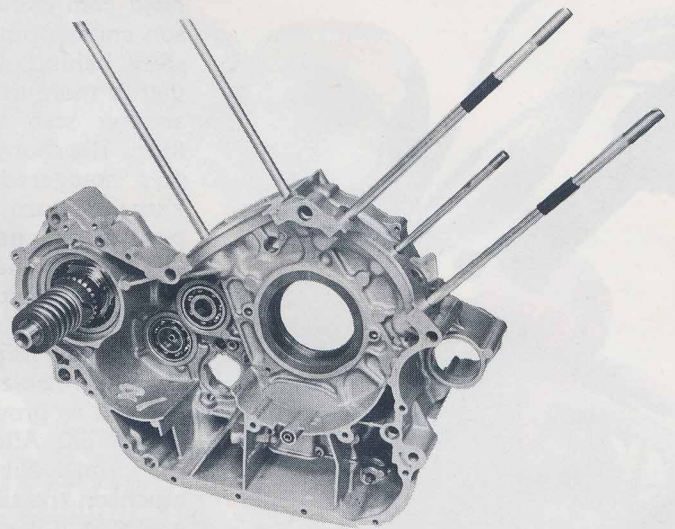
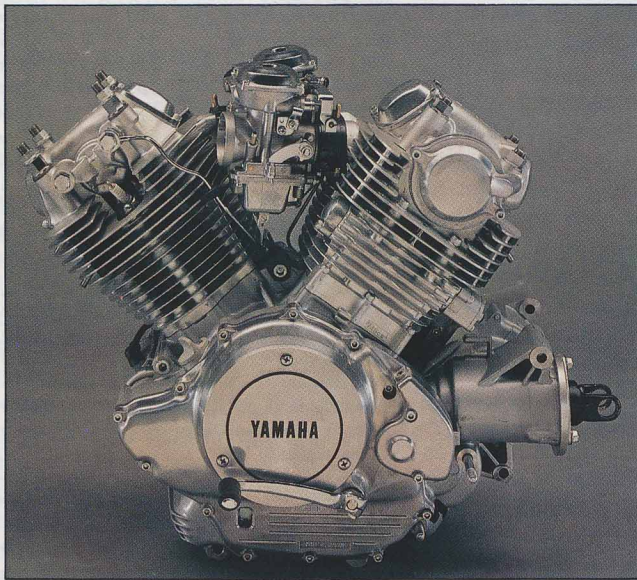
Type of engine	4-stroke, SOHC, 2 valve
Cylinder arrangement	V-twin cylinder
Displacement	748 cm <sup>3</sup>
Bore & stroke	83 mm x 69.2 mm
Compression ratio	8.7 : 1
Max. horsepower	60.9 ps (7.000 rpm)
Max. horsepower	44.8 kW (7.000 rpm)
Max. torque	6.6 kg-m (6.000 rpm)
Max. torque	65.4 Nm (6.000 rpm)
Lubrication system	Wet sump
Starting system	Electric
Ignition system	Transistor
Fuel tank	12 l.
Engine oil	3.6 l.
Transmission	5 speed

### DIMENSIONS

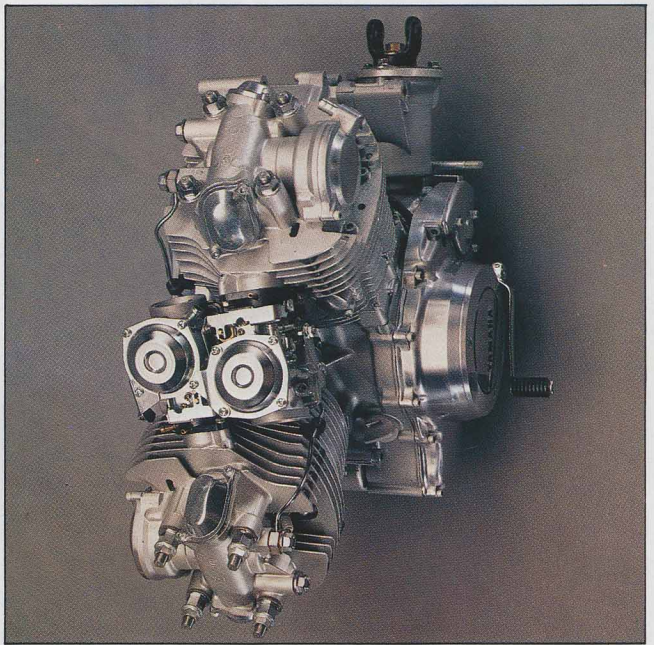
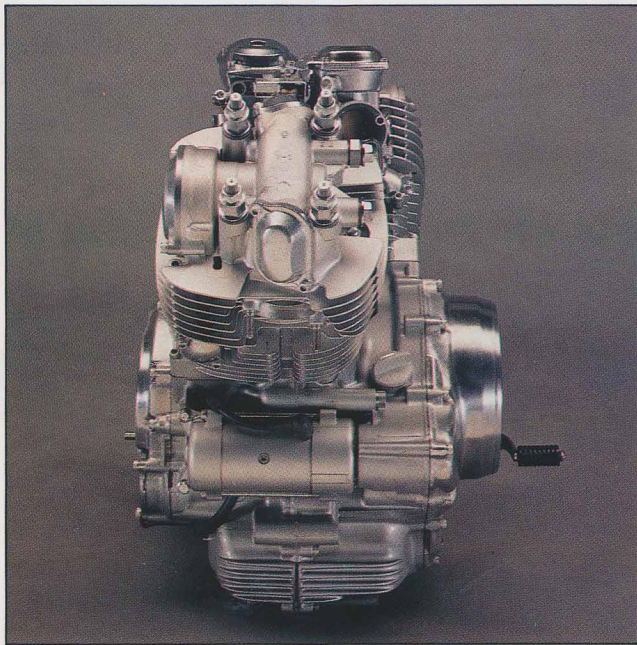
Overall length	2230 mm
Overall width	840 mm
Overall height	1210 mm
Seat height	745 mm
Wheelbase	1520 mm
Min. ground clearance	145 mm
Dry weight	212 kg
Tyre front	3.50-H19-4PR
Tyre rear	130/90-16-67H
Brake front	Single disc
Brake rear	Drum



# Inside the XV750 Powerhouse



Long through bolts run from cylinder heads into the crankcase to aid rigidity of the complete engine block. This is most important as the engine unit is an integral stressed part of the chassis design.



## Guest Test Double-Feature: The Yamaha XV750 As Seen From Both Sides Of The Atlantic

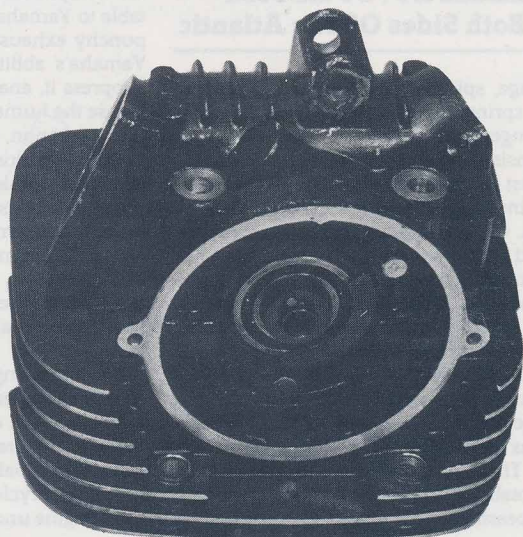
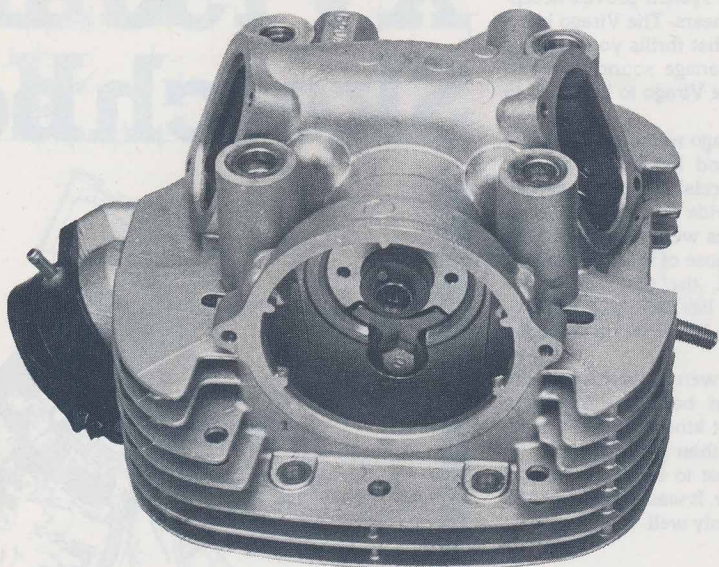
Yamaha's new XV750 engine was not exactly designed from a clean sheet of paper. Before the Iwata R&D engineers took up their pencils, they were given a set of very specific performance parameters. You see, Yamaha's talks with the sort of people likely to become Virago enthusiasts—traditionalists in the mold of XS650 riders—revealed that the look of the engine was crucial. Indeed, the optimum angle between cylinders could be nailed down at 60 to 75 degrees. Furthermore, these traditionalists wanted an engine narrow enough to keep from interfering with the riding position. Simplified maintenance and shaft drive were also important.

Iwata R&D's work with vibration control and computer modeling on vee-twin engines uncovered a natural balance at a cylinder angle of 75 degrees, an angle which also would keep the Virago's length reasonably short. After this decision was made, the execution of the rest of the engine was actually quite conventional, with few of the tricks you'd expect from an all-new design.

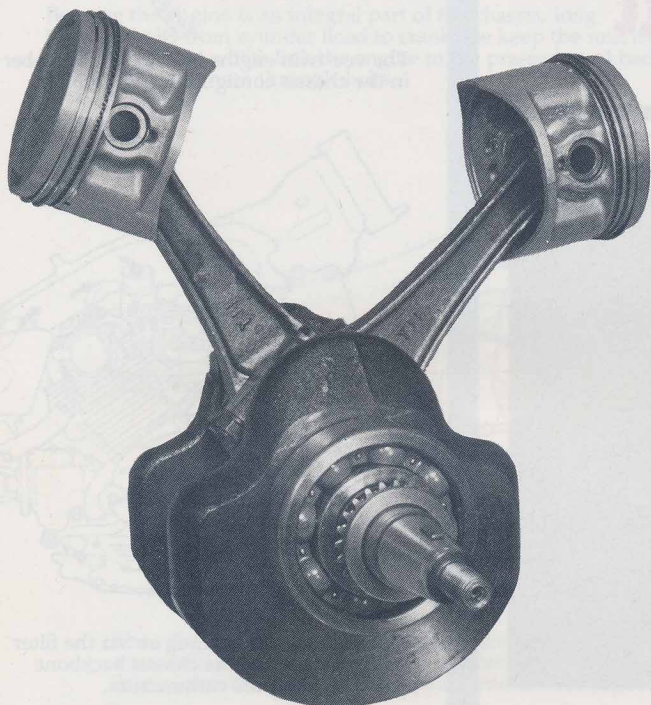
To begin with, the engine is fairly oversquare to reduce engine height and so permit the use of both a wet sump and Monoshock suspension. The jugs are offset by 24mm, the width of a Virago connecting rod at its big end, and they are identical in design. Each cylinder head carries a single overhead cam that operates the valves through rocker arms. The use of Allen-head screws in the valve adjusters, instead of square-head screws, should insure their long life despite the frequent 2,500-mile recommended adjustment intervals.

Few surprises lurk in the bottom end, either. The one-piece forged crank carries a straight-cut primary gear at one end and a permanent-magnet alternator (for more flywheel inertia than the variable-field type) at the other. The engine spins backwards like the XS Eleven's in order to get the shaft drive turning in the right direction without adding another jackshaft to the transmission—a result of the decision to use all-g geared primary drive and to keep the engine narrow. The primary gear spins the clutch at a comparatively fast rate to permit the use of a smaller clutch assembly and a less-beefy gearbox. Yamaha's usual anti-chatter washer and precise pushrod engagement mechanism in the clutch also ease the connection between sensitive shaft drive and the powerful pulses of a vee-twin engine. A crossover shaft incorporating a cushdrive connects the transmission's output shaft with the spiral-bevel gears of the shaft drive.





The XV750 cylinder head (left) shares basic design similarities with the XT250/SR250 unit at right.



The XV750 cylinders are set at a 75-degree angle, as shown by this shot of the crankshaft assembly.



Side-by-side spring-loaded gears mesh with one another and are pre-loaded in opposite directions to maintain tension and so eliminate free play between the camshaft drive and idler gears. This cuts down both on wear and noisy "gear clatter" in the cam drive.

As it turns out, the interesting aspects of the XV750 were developed as a result of the special requests of the potential Virago enthusiasts, not the problems of the vee-twin engine itself. For example, Yamaha made the XV motor a stressed element of the Virago's frame so that no downtubes would detract from the engine's appearance. The motor is attached to the pressed-steel frame backbone at three points, the rearmost of which uses a small amount of rubber to allow for thermal expansion (but not for vibration isolation). The engine's components are also ruggedly built in stress areas to withstand structural loads, and they're bolted together as snugly as possible. That's why the engine has one-piece cylinder heads without rocker covers and why the diameter of the cylinder-head studs (10mm) is larger than it would be otherwise. The same goes for the special cylinder-head and base gaskets. The heads use narrow, sandwich-type asbestos gaskets and the metal-

to-metal contact area is much wider than usual to provide even more structural rigidity. The cylinder base gasket also has a broad metal-to-metal contact area, although a rubber O-ring is used as a seal.

The task of making the XV engine as narrow as possible required some design tricks as well. The location of the intake plumbing posed the largest problem. In order to keep any part of the intake system from fouling the rider's legs, air is drawn into the frame backbone from an airbox under the seat. Twin rubber airhorns within the backbone funnel air to the two Hitachi constant-velocity carbs. Because the rear cylinder usually runs cooler than the front cylinder (air wraps around the front tire at speed and hits the rear cylinder first), the two carbs use different jetting. The front carb has a stiffer spring on the vacuum-operated throttle slide as well as a leaner needle to forestall richer running as the cylinder heats up. The intake manifold for the front

cylinder also is fitted with an anti-backfire valve like the SR500s to keep the forward jug from popping when the throttle is closed suddenly at speed.

The task of narrowing the engine didn't end here, though. Yamaha decided that spinning the two camshafts from a central power take-off on the crank would make the motor an unacceptable inch wider. So each camshaft is driven by a silent chain through separate idler gears. In addition, this cam-timing gear employs an innovative design that eliminates free play and reduces gear clatter in the cam drive. Each gear is actually two side-by-side gears spring-loaded so that the teeth of one are staggered about a half-tooth from those of the other. When the gear is fitted in place, the teeth are aligned but preloaded in opposite directions so they try to spring apart. This in turn eliminates any freeplay between the cam idler gear and its drive gear. This device is backed up by cam-chain tensioners that each



## Guest Test Double-Feature: The Yamaha XV750 As Seen From Both Sides Of The Atlantic

use a huge, spiral, watch-type spring instead of a coil spring. Because the spiral springs are much longer, tension on the adjuster will be more consistent over a longer period of time.

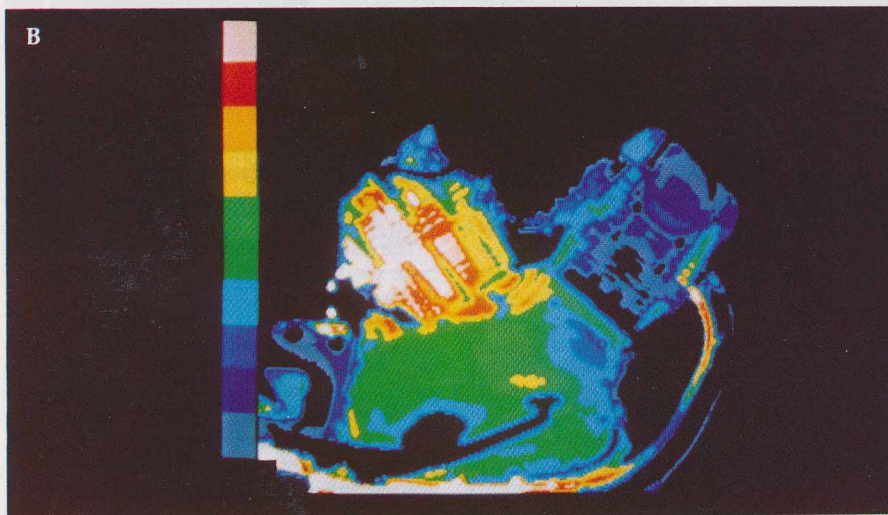
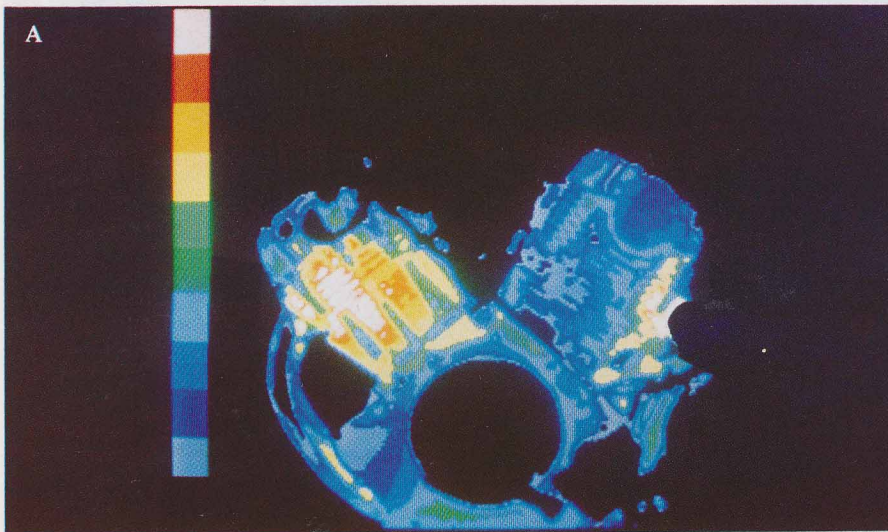
One last goal the Yamaha engineers wanted to meet involved the right tone of voice for a vee-twin. Ordinarily the poor sound-isolation produced by two separate cylinders plus whirling cam chains would have incurred the wrath of the anti-noise pollution people. Yamaha could have coped with the potential noise problem by strangling the Virago's exhaust as it did with the SR500. But since the right sound was so important, other solutions had to be found. That's why so much importance has been placed on proper cam-chain tension. That's why the cams themselves ride in replaceable insert bushings instead of noisier ball bearings. That's why the oil pump is

driven through an adjustable chain and why the left side-cover is insulated. And that's why the complicated intake system proved acceptable to Yamaha's engineers. The Virago has a punchy exhaust note that thrills you because Yamaha's ability to manage sound, not just suppress it, enabled the Virago to be tuned to please the human ear.

In operation, the Virago motor proves wonderfully economical and flexible. It has no cold-start problems or rideability glitches. Still, the engine doesn't provide much power, even though the cam profiles were changed at the last minute to match those of the forthcoming 920 vee-twin. Indeed, the dyno curve reveals that more power lies beyond the 7000-rpm redline—although it will be up to racers to find it.

Yamaha's engineers were satisfied with the Virago's power output because they were interested in a different kind of performance, the kind where more than peak power is at stake. The goal was not to build an uncommon motorcycle engine. It was to build a common engine uncommonly well. □

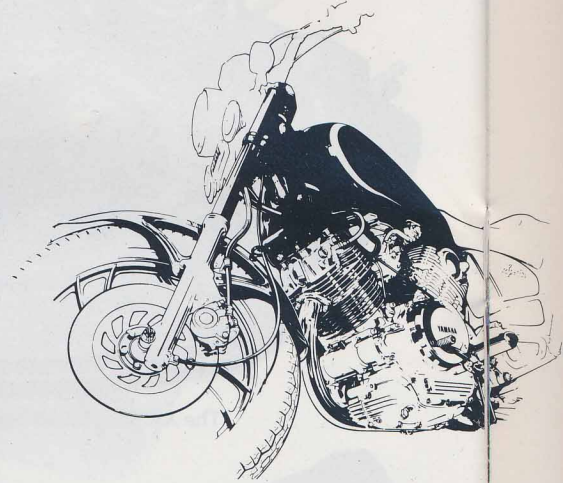
## VEE-Twin Heat Generation



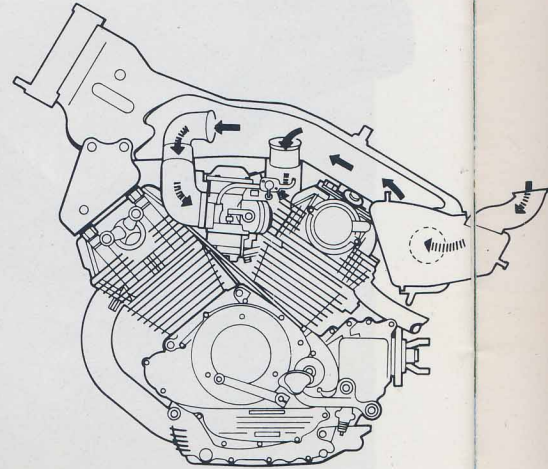
Interesting infra-red photography showing the areas of maximum heat generated by the Yamaha vee-twin engine. The colour-graduated scale goes from blue for cold, up to white for extreme heat.

Picture A depicts the front cylinder and Picture B, the rear. In both cases it can be seen that most of the engine stays remarkably cool, apart from in the area of the exhaust port where obviously the maximum heat is generated.

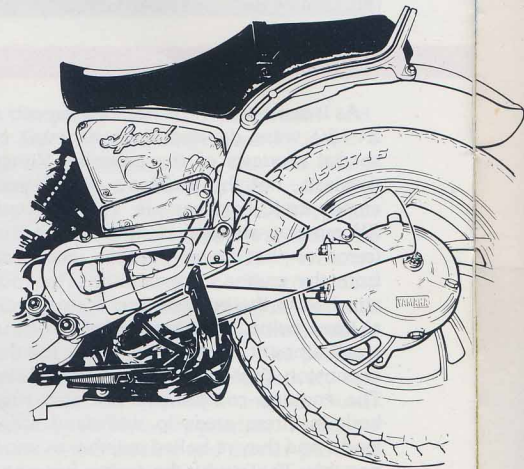
# XV750 Det Sketchbook



The vee-twin engine is a stressed member in the chassis configuration.

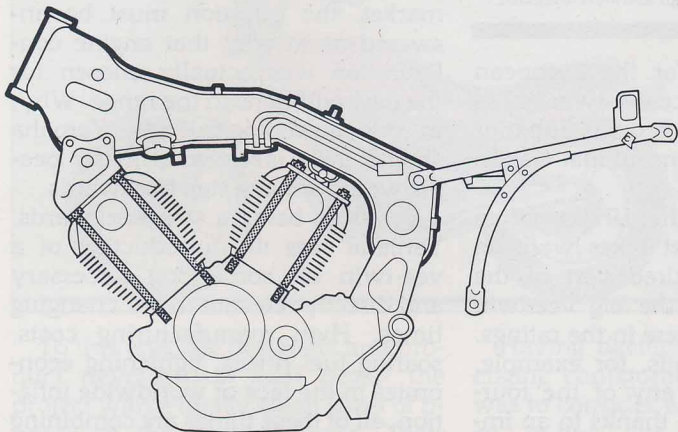


Routing of cool incoming air via the filter through a tube in the chassis backbone and direct into the carburetors.

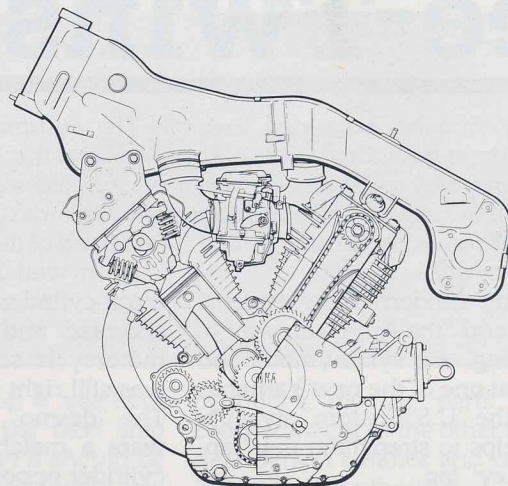


Detail of the monoshock chassis pivoting sub-frame and how the shaft drive system is integral with it.

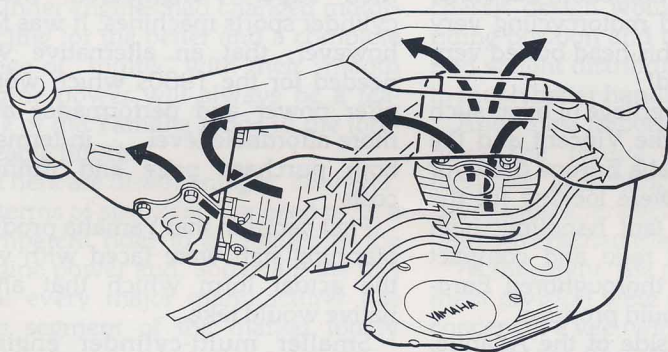




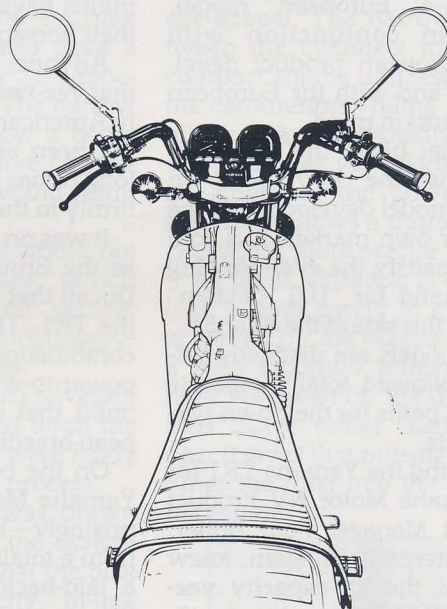
Because the engine is an integral part of the chassis, long through-bolts from cylinder head to crankcase keep the unit itself rigid. The plates which link the engine to the pressed-steel backbone mount direct to these through-bolts.



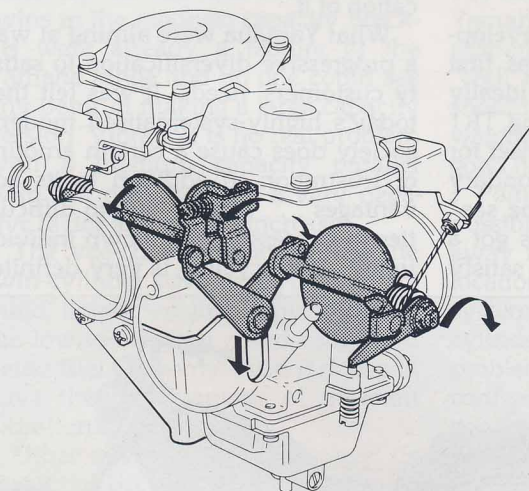
Exploded view of the XV750 showing valve train operation.



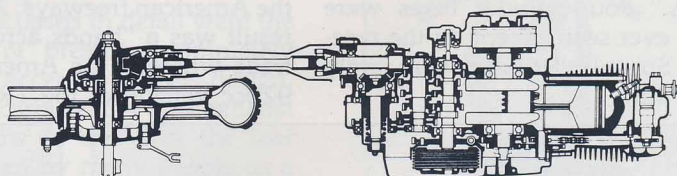
The offset cylinders of the big "vee" allow cooling air (white arrows) to swirl around the rear cylinder. Hot air from the engine (black arrows) rises and is dissipated into the atmosphere.



Cutaway top view showing the pressed steel chassis backbone.



Clever linkage allows both throttle valves to be opened simultaneously by a single cable.



Power train of the XV750.



# Developing the Vee-Twins

The sketches accompanying this feature are Yamaha design staff "concept drawings" for the vee-twin range, produced as visual options prior to the start of actual design and development.

**W**hen Yamaha expanded their 1981 range with the addition of two brand new vee-twins, it was inevitable that someone would make the comparison with existing American motorcycles.

To many modern motorcyclists, vee-twins and "the American way of motorcycling" are synonymous and the fact that one of the new Yamahas is built in the "U.S. Custom" style obviously helps to strengthen the "Japanese Harley" tag.

In actual fact, nothing could be further from the truth. Number One in the Yamaha vee-twin line-up is the 980cc TR1—a "European" model, conceived in conjunction with Yamaha's European product development staff and with the European market foremost in mind.

On the other hand, the second of the vee-twins—the XV750—is an "American" model developed via the USA for their own market. It is sold in Europe to satisfy the ever-growing popular demand for "U.S. Custom" style bikes on this side of the Atlantic.

The two models are distinctly different and followed totally separate development paths for their own particular markets.

In developing the Yamaha TR1 for Europe, Yamaha Motor NV Product Development Manager Paul Butler, and his counterparts in Japan, knew full well that the big-capacity vee-twin has ALWAYS played a significant part in European motorcycling.

For almost forty years—right into the 1960s—the big vee-twin occupied the same place at the top of the sporting motorcycle scale that is currently held by the high performance "multis." Four-cylinder bikes were hardly ever seen except on the race-tracks. Six-cylinder bikes were rarely seen at all!

The "ultimate" for the European rider was the 1000cc vee-twin . . . as personified by the Brough Superior and the amazing Vincent that was so far ahead of its time.

Even well into the 1970s, when multi-cylinder street bikes were an accepted and admired part of the motorcycle scene, the big vee-twin was still right up there in the ratings. The "desmo" Ducatis, for example, were a match for any of the four-cylinder opposition thanks to an impeccable combination of handling and power to weight ratio. It has only been in the past five years that the multis have been able to press home their horsepower advantage.

Anyone, therefore, who thinks that vee-twin motorcycles are a purely American phenomenon has either not been around motorcycling very long or has had his head buried very firmly in the sand!

It was on the heritage of bikes such as the Brough, the Vincent and the Ducati that Yamaha Europe drew for the TR1. They were looking for the combination of taut handling, high power-to-weight ratio and compact build that only thoroughbred European breeding could produce.

On the other side of the Atlantic, Yamaha Motor USA were—not surprisingly—looking at the vee-twin from a totally-opposite viewpoint . . . a laid-back, comfortable cruiser in the accepted American idiom. Hence the construction of the XV750.

The result of this parallel development, half a world apart, was first and foremost a vee-twin to ideally suit each market. The sporting TR1 for Europe and the XV750 cruiser for the American freeways. A secondary result was a "hands across the sea" trade whereby the Americans got a 920cc version of the TR1 to satisfy

U.S. vee-twin enthusiasts with a more sporting nature and the Europeans got the XV750 to head up the increasingly-more popular range of U.S. custom-styled "Specials."

Having established that Yamaha did not develop new vee-twins simply to accommodate the American market, the question must be answered as to why that engine configuration was actually chosen for the new additions to the range. Why, in this technological age, Yamaha should have taken what many people would see as a step backwards.

Far from being a step backwards, Yamaha sees the introduction of a vee-twin as something necessary and directly relevant to our changing times. High manufacturing costs, soaring fuel prices, tightening economies in the face of worldwide inflation, all of these things are combining to mean that we are in grave danger of being strangled by our own technology. Not everyone can afford to pay the price for the technical ultimate.

For those people willing and able to pay the price, Yamaha still offers their superbly-engineered, multi-cylinder sports machines. It was felt, however, that an alternative was needed for the 1980s which would offer power and performance at a more affordable level . . . in terms of both purchase price and running costs.

First decision that Yamaha product planning staff were faced with was the actual form which that alternative would take.

Smaller multi-cylinder engines were already in the Yamaha pipeline (the XJ400 and XJ550) but it was felt that the need was for something totally different from the multi-cylinder concept rather than just a modification of it.

What Yamaha were aiming at was a progressive diversification to satisfy customers' needs. It was felt that today's highly-systematised modern society does cause a certain amount of frustration in addition to its advantages . . . mainly due to difficulties in expressing one's own individuality. Motorcycling is very definite-



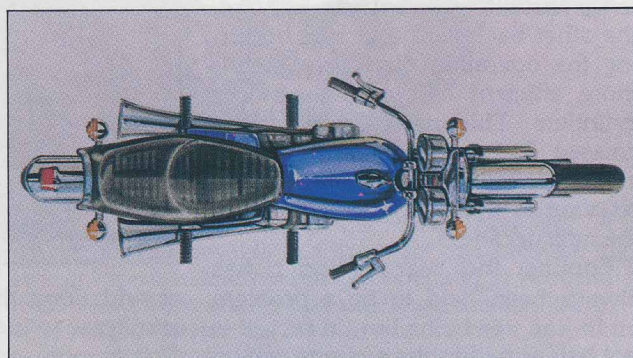


ly a form of self-expression to many people and, therefore, Yamaha felt that the machine which would take the company "into the '80s" should be as different as possible from anything else on the market.

twin or the turbine smoothness of the multi, the vee-twin transmits its power impulses to the rider through seat and handlebars. The vee-twin rider truly feels a "part of his machine."

Beginning with the engine, the first major decision was to make the unit a 75-degree vee-configuration.

Actually, it is well-known that the best-balanced layout for any twin-cylinder unit is a 90-degree vee. One



To this end, the designers and product development staff began the project with a totally clean sheet of paper on the drawing board. Their only design parameters were that the bike should be highly individual, responsive and controllable and should have low fuel consumption to cope with present and future energy restrictions.

No one could deny that multi-cylinder engines had changed motorcycling for the better and a complete range of "multis" with their smooth engine power will always be a feature of the Yamaha range in the foreseeable future.

There are disadvantages, however, in terms of size, cost, the need to be a competent rider to do justice to the engine power and, above all, the fact that every major manufacturer has this segment of the market totally covered.

Bearing all this in mind, the Yamaha development group turned their interest to a twin-cylinder machine and it didn't take long to focus exclusively on the vee-twin. Parallel twins in the medium capacity brackets were already a feature of the Yamaha range and no one could see any point in making a large capacity version. Vibration is no real problem with a medium capacity parallel twin but does become a very negative factor as capacity increases.

The vee-configuration has all the twin-cylinder advantages of compact build, lighter weight, ample torque in the low-to-medium speed range and better fuel economy. And it does not have the disadvantage of inherent vibration.

Other advantages of the "vee" is that it has occupied a place in motorcycle history right from the very beginning and it has an exhaust note and "feel" to the engine that is truly exciting to the rider. Instead of the annoying vibration of the big parallel

Having decided upon a vee-twin engine configuration, the next step was to consider whether it should be an "in-line" vee or horizontally opposed.

The advantages of the "in-line" layout soon became obvious. It enabled designers to make the total machine lean and narrow, and also gave a more dynamic side view . . . especially of the engine itself. The narrow chassis design would allow a better riding position and the more centralised weight distribution would result in much better handling.

And, most important, it would not have the torque reaction which hampers gearchanges and general riding characteristics of horizontally opposed engines.

At this point, the product development division were agreed upon the concept of a vee-twin and were ready to begin the final design process.

A list of "desirables" was drawn up to be incorporated in the design. The designers were told that the bike should be a large-capacity, in-line vee-twin, should include "exclusive" Yamaha features such as monoshock suspension, should have a dynamic "feel" to engine power delivery, and should be a simple, slim and lightweight chassis design with extra-good handling.

Points discussed in detail were the possibility of breaking completely away from accepted chassis design, location of carburetors and exhaust systems, how to best cool the rear cylinder (seen by many people as a problem with the in-line vee-twin configuration) and how to achieve good emission controls which are so necessary in this motorised age.

Also discussed were the use of alternative chain or shaft final drive systems, and how to avoid the long wheelbase that detracted from the handling abilities of certain in-line vee-twins.

cylinder's moving parts act as a counterweight to the other to provide near-perfect balance and consequent lack of heavy vibration.

Yamaha, however, went to the 75-degree vee for a number of reasons. First and foremost it was a case of eye-appeal. The narrower angle between the cylinders makes a more compact engine unit, especially with the carburetors "filling in" the angle of the vee. Additionally, the use of the 75-degree vee shortens the overall length of the power unit and, therefore, allows a shorter wheelbase chassis for more precise handling.

As far as vibration is concerned, it is at a level barely in excess of that achieved by the 90-degree twin and a little vibration transmitted to the rider was seen by the designers as a plus factor rather than a negative one. It gives that pulsing "feel" which tunes the rider into the behaviour of his engine.





Still aiming at a compact "engine block," Yamaha mounted two SU-type carburetors in the angle of the vee and perfected an ingenious mechanism to synchronise their operation via a single cable. One butterfly throttle valve opens forward, the other backward and synchronising the operation obviously means more efficient carburation of both cylinders. This naturally gives increased fuel economy and cleaner exhaust emissions . . . both vitally relevant to the ecological climate of the next decade.

Cooling the rear cylinder has always been held to be a problem on in-line vee-twins but, in fact, it is not half as bad as the average person thinks. In fact, it's probably less of a problem than cooling the centre two cylinders of a typical parallel four, where cooling airstream hits only the front and, to an even lesser degree, rear portions of the inner pair of cylinders.

At least with the vee-twin layout, the cylinders are independent of one another so that the airstream at least cools all the faces of them. Basically, it is a question of directing air around them . . . not a difficult problem to solve. Additionally, solving the problem is made easier by modern materials and technology.

In designing the Yamaha TR1 chassis, with its pressed-steel monococque as the main frame member, Yamaha saw a way to utilise it as a cooling aid. The chassis box member is used as an air passage to deliver cool air to the carburetors and the rear cylinder. The TR1 side panels are also sculpted to act as air scoops to draw air around the cylinder and the "wide open" rear end allowed by the monoshock suspension means that hot air which has passed over the cylinders is easily disposed of out of the rear of the machine. A conventional chassis unit tends to "hold in" that warm air, thus slowing down the cooling process.

As well as utilising nature as a cooling aid, Yamaha have also enlisted "the wonders of modern science"! The latest alloys and technology combine to eliminate any cooling worries.

The cylinder heads are of aluminium and the cylinder is of the same material but with a cast iron sleeve for longer bore wear. Cylinders and heads are joined without the use of a gasket. Instead, an "O"-ring is used, which means a much larger joint surface between cylinder and head. This results in faster heat transfer between the two components and, therefore, quicker overall heat dissipation. Cylinders and heads are clamped togeth-



er with long through bolts into the crankcase to increase engine rigidity. This is most important as the engine acts as a stressed unit in the chassis design.

Having the cast-iron cylinder liner shrunk into the alloy barrel, rather than being a simple press fit, also aids the cooling process by allowing fast heat transfer between the parts. In addition the area of the piston around the second ring (which bears the greatest thermal load) is coated with a special anti-friction and anti-thermal compound. A special oil pump which completely scavenges the integral wet sump keeps lubricant temperature down and, finally, the exhaust port has been shortened to increase heat dissipation at one of the most critical points in the engine's temperature zone.

The new Yamaha vee-twin motor was kept as slim as possible and has a width of only 377mm . . . just 83mm wider than Yamaha's single cylinder XT500! The journals of the crankshaft are set at 180 degrees (opposite one another) and the cylinders are slightly offset to accommodate the positioning of the connected rods on the common crankshaft. Cylinders and heads on each cylinder are interchangeable (an important factor in keeping down the cost of tooling and spare parts).

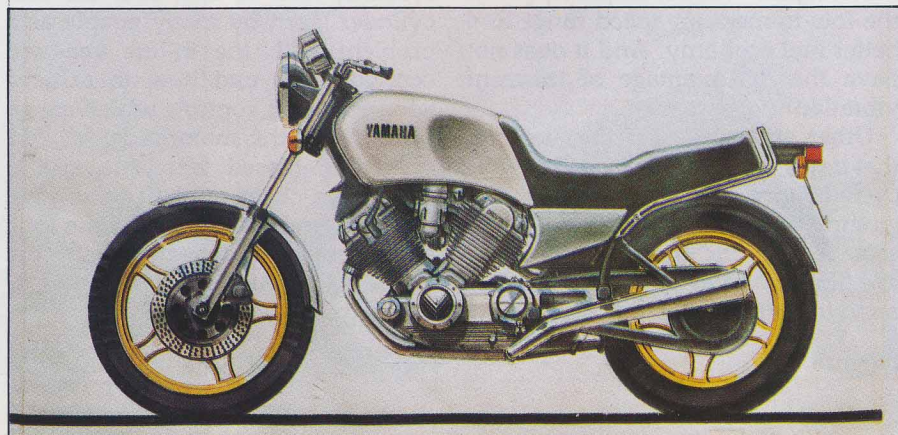
Some people are of the opinion that the high torque of the vee-twin engine and the hefty mass of its reciprocating parts place a great stress on the final drive train. Therefore, Yamaha designers were asked by the product development team to place

particular emphasis on strength in this region.

What they came up with were two alternatives. A shaft drive for the American-style "cruiser" and a new style of chain transmission for the European sportster. The new chain is carried in a completely sealed oil-bath, packed with lithium grease to give extended chain life and simplified maintenance.

The new vee-twin engine unit was then integrated by the designers into the first big street version of Yamaha's famous monoshock chassis. A pressed-steel monococque box section and the engine unit itself form the main chassis unit from which is suspended the triangulated rear sub-frame. The single, large-capacity De Carbon damper has an automatic temperature-compensating device to cope with the heating of the damper fluid under continuous use and its damping effect can be adjusted through six different stages via a remote control setting on the exterior of the machine. Re-positioning the remote control cables on the shock absorber gives even more adjustment possibilities.

The result of all of this innovation and design expertise is the addition to the Yamaha range of two machines ideally suited to the new decade. Individualistic and ecologically-sound in terms of both energy consumption and low air pollution. Socially responsible machines that depart from the conspicuous consumption of the 1970s but which still deliver their own particular brand of high excitement. □





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With the notable exception of World Champion Jock Taylor very few of the top Scottish national road-racers ever break into the International scene. There are several reasons for this, but the main one must be the lack of top-class international competition in Scotland itself. Apart from one or two meetings, anyone living north of the border has no other option than to make the long trek south if he wants to progress into the international road race scene.

The recent acquisition of the Knockhill circuit in the east of Scotland could change this sad state of affairs, and at last give Scotsmen the chance of competing at the very highest level without having to make a round trip of anything up to six hundred miles.

Although Knockhill has already become established as the leading circuit in Scotland, Alan wants to take it just one step further. As well as playing host to a variety of national meetings he also hopes that the circuit will be able to attract top riders from all over Europe to a series of International invitation events. In addition to attracting top class opposition to Knockhill, Alan will also be staging the Scottish rounds of several major National Championship series. These include the exciting new Yamaha Pro-Am series and the The Vladivar Championship, and he will also be promoting an all new Shell Super Oil Scottish 500 series with a prize purse of £1,000. All three races in this new Championship will be staged at Knockhill, with the final round being part of a meeting on October 18th which is rumoured to be the biggest road-race meeting ever staged in Scotland.

As an ex road-racer Alan will obviously be looking forward to a full season of motorcycle racing at Knockhill, but other sports on both two and four wheels are equally well catered for. During 1981, Knockhill will be the venue for the Scottish round of the British rallycross championship, and is also likely to attract a large crowd of spectators to a special stage of the International Car Rally. In fact, the circuit is one of the few special stages where spectators can get a long look at their heroes in action. Motocross and karting are also catered for with a 1.3 mile motocross course and a short circuit designed for high-speed kart racing.

Motorcycle racing is often regarded by the public as a noisy, dirty sport to be avoided at all costs, but by improving the spectator facilities at Knockhill, Alan hopes to turn the circuit into a pleasure centre designed with the whole family in mind. Proper viewing facilities are obviously the first priority, but eventually Knockhill could become an entertainment centre unrivalled in the east of Scotland. A variety of attractions, including play areas, a mini-zoo, fun-fairs etc, are under consideration, all designed to make Knockhill a genuine 'family day out'.

The potential for future expansion is virtually unlimited and the increasing sales of motorcycles plus the growing amount of leisure time available to every family means that Alan's plans for Knockhill are by no means unrealistic. In fact, if his past record as Scotland's leading Yamaha dealer are anything to go by Knockhill can look forward to a highly successful future.



# KINGS OF SPEED

## YAMAHA'S KINGS OF SPEED

A three-part series on the superstars who brought World Road Racing Championships to Yamaha.

## CONCLUSION: 1976-1980

In the past seventeen racing seasons there have only been three in which Yamaha did not field at least one World Champion . . . 1966, 1969 and 1976. And in one of those years (1976), they had the consolation of taking the FIM Formula 750 Championship prize, a series which was to move to full World Championship status a year later. In that seventeen-season span, seventeen riders and four sidecar passengers have earned a total of 27 World Championship medals with Yamaha. Plus three FIM F750 prizewinner's medals in the three-year existence of that series.

This three-part feature gives "Circuit" readers a look at those Yamaha "kings of speed."

The past five years of World Championship road racing have been significant for three things as far as Yamaha are concerned. First, the emergence of young American racers as true superstars; next, total domination of the Formula 750 class; and, finally, entry into Championship sidecar racing and eventual domination of that category as well.

The latter half of the past decade (1976-1980) began slowly for Yamaha . . . 1976 was the first season in eight years that they did not win a front-ranking World Championship.

There was, however, consolation in the form of Spaniard, Victor Palomo's winning of the FIM Formula 750 prize. This was, in effect, the equivalent of a World title for 750cc machines and, in fact, was to be given full World Championship status for the following year.



Victor Palomo was 1976 winner of the F750 Championship, Spain's only titleholder in the bigger capacity classes.

After such a slow year in 1976, Yamaha approached the following season with apparently greater resolve.

The real superstar of 750cc racing in 1976 had been a skinny, bespectacled youngster from America's

Pacific Northwest by the name of Steve Baker. He had made only infrequent visits to Europe with his official Yamaha Canada machinery, which is why he did not figure particularly high in the actual FIM prize ratings. However, Steve dominated road racing in the U.S.A. and Canada and, when he did visit Europe, was a absolutely sensational. He won the Imola 200, took four of the six races in the British TransAtlantic Trophy Series, split the victories in the two-race British F750 GP at Silverstone with Barry Sheene and won F750 title races in Venezuela and Laguna Seca, California. He climaxed the 1976 year by clashing with Barry Sheene (then at the peak of his Championship form) and soundly beating him in the "Race of the Year" at Malory Park.

Small wonder, then, that it was Baker who was chosen to spearhead the Yamaha effort in 500cc and 750cc World Championship racing.

For the first time, the 750cc class was an "official" FIM World Championship and Steve continued his complete mastery of the fastest category in motorcycle racing.

He won the classic Daytona 200, won again at Jarama in Spain and at Brands Hatch, once more at the Austrian Salzburgring and then clinched

the title with an easy win at Zolder in Belgium.

Of the remaining three races in the Championship series; Steve took second to Kenny Roberts at Imola, lost the Champion Classic at Assen by less than half a second when Marco Luchinelli won a desperate gamble by running the race without a pit stop for gas and then took a safe third behind local aces, Christian Estrosi and Philip Coulon on the unfamiliar Dijon track in France.

With this steamroller F750 season, Steve made history by becoming America's first World Road Racing Champion. It was the start of a new era that was soon to be continued by a craggy little Californian by the name of Kenny Roberts!

In the 500cc category of the 1977 season, things were rather tougher for Baker. The Yamaha in that class was still not as highly developed as Suzuki's square four, Barry Sheene was on peak form, Steve was not as familiar with the regular GP tracks as he was with those used for 750cc racing, and this combination of circumstances kept him second in points to Sheene at the season's end. Even so, one World title win and second in another category was hardly a disappointing debut in Championship racing!



Steve Baker—America's first World Road Race Champion.



## YAMAHA ROAD RACING WORLD CHAMPIONS

1964	Phil Read	250cc
1965	Phil Read	250cc
1967	Bill Ivy	125cc
1968	Phil Read	125cc
	Phil Read	250cc
1970	Rod Gould	250cc
1971	Phil Read	250cc
1972	Jarno Saarinen	250cc
1973	Dieter Braun	250cc
	Kent Andersson	125cc
1974	Kent Andersson	125cc
	Giacomo Agostini	350cc
1975	Giacomo Agostini	500cc
	Johnny Cecotto	350cc
1977	Steve Baker	750cc
	George O'Dell and Cliff Holland	Sidcar
	Takazumi Katayama	350cc
1978	Kenny Roberts	500cc
	Rolf Biland and Ken Williams	Sidcar
	Johnny Cecotto	750cc
1979	Kenny Roberts	500cc
	Rolf Biland and Kurt Waltisberger	Sidcar
	Patrick Pons	750cc
	Bruno Holzer and Klaus Meirhaus	3-Wheeler
1980	Kenny Roberts	500cc
	Jon Ekerold	350cc
	Jock Taylor and Benga Johansson	Sidcar

### FIM FORMULA 750 PRIZE

(This series preceded the 750cc World Championship. Yamaha winners are listed along with the capacity of machine they used in the series.)

1974	John Dodds	350cc
1975	Jack Findlay	750cc
1976	Victor Palomo	750cc

For reasons that have still never really been explained, the mild-mannered Baker seemed to fall out of favour with Yamaha at the end of the season. He was not re-signed for 1978 and moved to the Olío Nava Fiat/Suzuki team in Italy. After dropping to seventh place in the standings, Steve tragically broke an arm and a leg in a crash at Mosport that killed American rider Avram Gudel'sky in the final race of the F750 Championship. This crash effectively ended Steve's career, for he had broken the leg four seasons previous in another race crash.

Steve made a tentative comeback in 1979, having a couple of good exploratory rides in the TransAtlantic Trophy Series and other British events. Then he crashed at Brands Hatch, re-broke his arm and decided that enough was enough. A great shame . . . the motorcycle fans in Europe saw Steve's massive ability for really only one complete season on truly competitive machines.

Steve was a great favourite with European fans during his career over here, so many people are wondering what he's doing now . . . a retired ex-World Champion at still only 28 years old!

The answer is that he's doing very nicely, thank you, back in his hometown of Bellingham, Washington, close to the Canadian border and the Pacific Ocean. He's involved with a local motorcycle dealership and is currently busy building a new house. As far as sport goes, Steve still likes to go trail riding but also enjoys riding in a far different style. He and beautiful wife, Bonnie, are keen horse riders and follow the "show circuit" in the Northwest, exhibiting and riding four-footed instead of two-wheeled mounts!

While Steve was doing his stuff in the bigger classes, Japan's Takazumi Katayama was busy annexing the World 500cc Championship for 1977 in his usual spectacular style.

He was supported in his bid by Yamaha Motor NV, Amsterdam . . . a sort of second-level factory ride . . . on a stock TZ350 twin and an unusual three-cylinder two-stroke developed entirely in the Amsterdam workshops. It used TZ250 cylinders and pistons with a special ultra-short stroke crankshaft giving 54mm x 50.8mm bore/stroke measurements and a capacity right on the limit at 349.9cc. The cylinders were welded into a single block and the special crankcase was mated to a TZ350 six-speed transmission.

The triple was extremely fast and netted Katayama three GP wins during the season, including a memorable debut for the bike when Katayama and Agostini finished 1-2 in the German GP.

On tighter circuits the triple's weight proved to be a disadvantage and it was less manoeuvrable than the stock twin.

Therefore, Katayama used a twin on the tight tracks but, fittingly, finished his season on the triple just as he had begun it in Germany. He used the three-cylinder to win the Finnish GP and so clinch the World 350cc title . . . first (and, so far, only) Championship win for a Japanese rider.

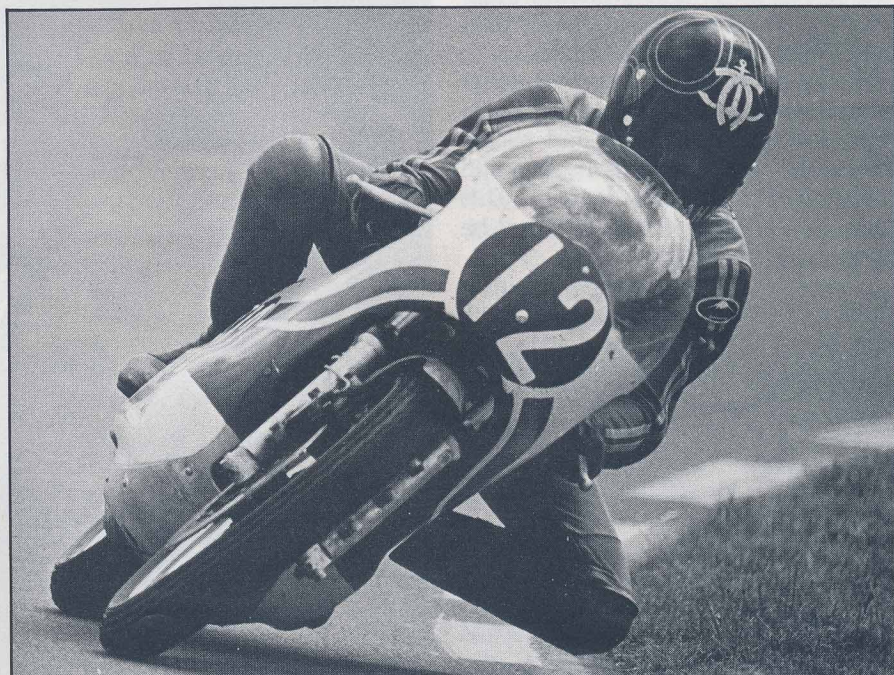
There was another "first" for Yamaha in 1977—a World Sidcar Championship went to a team using Yamaha motive power.

For some years British riders had been using the TZ750 and TZ700 four-cylinder Yamaha engines for British sidcar racing, which has a 1000cc capacity limit. One or two riders had also been replacing the cylinder barrels with TZ250 components to arrive at a 500cc power unit for Grand Prix events, notably a young Swiss by the name of Rolf Biland.

By 1977, the Yamaha engine was beginning to realise its true potential in the three-wheeled class, though many Continental riders preferred to stick to the Konig flat-fours (actually outboard motorboat engines) and other similar power units which had held sway in the class since the venerable BMW flat-twins "ran out of steam" late in the 1960s.

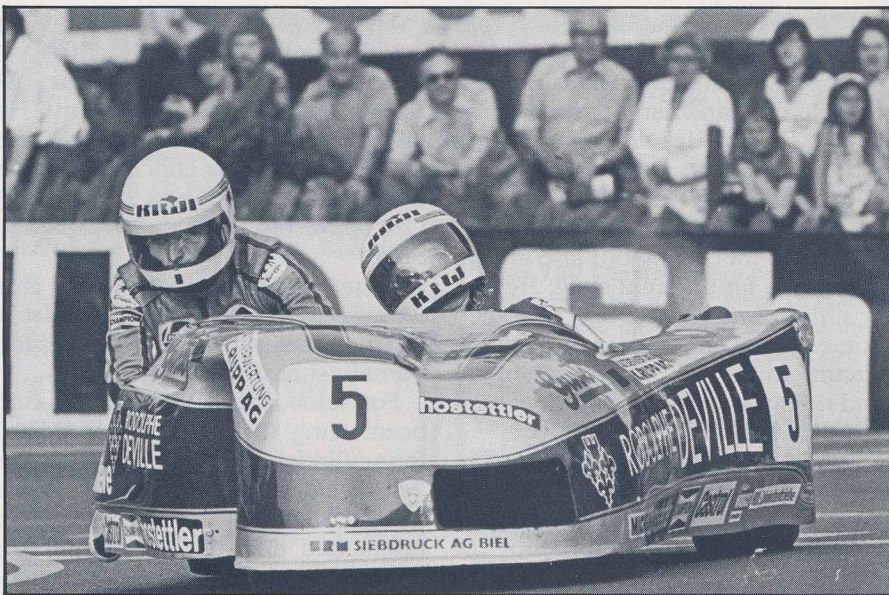
Biland's outfit, in particular, was reaching a high pitch of development. It looked like a flying saucer, featured adjustable suspension in racing car fashion and used hub-centre steering for more precise control adjustments and lower height.

The young Swiss was actually the most successful sidcar rider of 1977 but he did not win the World title despite winning more Grand Prix than any of the opposition.



Takazumi Katayama—Japan's only World Champion.





Rolf Biland, Ken Williams and the infamous "BEO."

What Biland lacked was the consistency of British duo, George O'Dell and passenger Cliff Holland.

O'Dell never won a Grand Prix during the entire season but he was never far from the front and finished EVERY Championship qualifier. George had two outfits to choose from in 1977. A Seymaz hub-centre steering device similar to Biland's 1976 machine and an "old-fashioned" British Windle chassis with normal front fork steering. Some tracks suited the old style bike better, some the later projectile. George was able to switch mounts whenever necessary and felt that having two competitive machines available was the major factor in his consistent high-point scoring and eventual World Championship.

Tragically, George took his own life earlier this year.

Biland used just that approach in 1978 but, as is typical of the innovative Swiss, he went one better than any of the opposition dreamed.

Rolf began the season with what was by now a "conventional" outfit with hub-centre steering and all the latest development tweaks but still very much a "sidecar outfit." This was the TTM-Yamaha and with it he won the Austrian GP.

Furore was to follow at the next round when Biland appeared with the BEO-Yamaha . . . a device that was essentially a three-wheeled racing car. Steering was via the centre of a single front wheel but the engine was rear-mounted, positioned between the two rear wheels. These were on a common axle, driven via a differential just like a car.

Passenger Kenny Williams had nothing to do except lie on his back alongside the driver! He was so unhappy about this reduction in his workload that he retired at the end of

the season but at least he was able to do so with a World title to his credit.

The Biland/Williams team won the Championship with wins in Austria, France and Italy, second places in England and Czechoslovakia and third place in Belgium.

Following that, such a howl of protest went up from his rivals that the FIM banned such machines from future competition.

Actually, neither the rivals nor the FIM really took into account the fact that Frenchman Alain Michel was only three points behind with a "conventional" outfit and that the BEO only won two Grands Prix to the six taken by normal sidecars. They also forgot that one of Biland's own GP wins was with a "conventional" TTM. Frightened by this glimpse of

the future, the FIM banned the machine by decreeing that no wheels should be on a common centreline.

They also banned hub-centre steering but then another howl of protest went up from the rank and file . . . most of whom had gone halfway along Biland's development path but had not had the daring or engineering foresight to go all the way to the edge of the rules framework.

The result of all the decisions and protests was a farcical split World Champions with two categories. One for regular outfits with front forks and one for the hub-centre steering "threwheelers."

For 1979, Biland and his new passenger, Kurt Waltisberger, elected to emphasise their superiority by winning both titles!

And came within a hairsbreadth of doing so!

Though they took no points at all from the opening rounds in Austria and Germany, Biland and Waltisberger came on strong to win in Holland and then pushed Rolf Steinhausen out of the points lead by winning the last two races of the year in England and Czechoslovakia. That took care of the "standard" sidecar category and gave Biland the satisfaction of beating his detractors right on their home ground.

In the "three-wheeler" class, it seemed a foregone conclusion that Rolf would achieve his aim of winning two titles in one season. He had won four out of the five Grands Prix in this category by the time the final round came due at Assen in Holland and was seemingly unbeatable.



The late George O'Dell and Cliff Holland.



Fate acts in strange ways, however, and Biland flipped the three-wheeler on one of Assen's fast curves, breaking his arm and losing the title in the bargain.

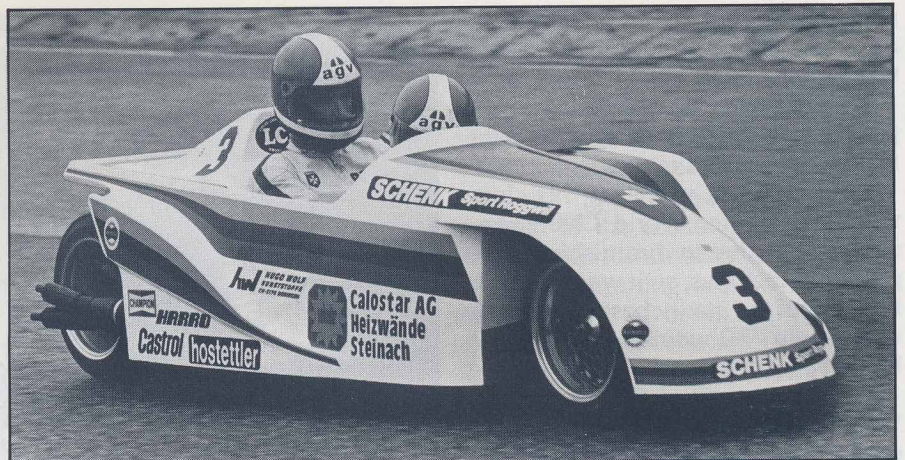
If it was any consolation, the title went to Rolf's teammates on the LCR-Yamaha team, Bruno Holzer and Karl Meierhaus. This pair could hardly have been more consistent. They took the second sidecar (or three-wheeler) title by scoring second-place finishes in every one of the five qualifying rounds!

Finally, the FIM ended the sidecar squabbles by setting just a single set of rules for 1980 . . . a sensible compromise between the two categories of 1979.

And, as any red-blooded Britisher knows, Biland relinquished his title to 26-year-old Scotsman Jack Taylor and his baby-faced Swedish passenger, Benga Johansson.

Jock came up the hard way, struggling in British club racing with old equipment and limited support. Graduating from this "school of hard knocks," he acquired support from giant British Yamaha dealers, Fowlers of Bristol, and backed by tuner Dennis Trollope and no less than 15 superbly-prepared engines, Jock bested the sidecar world in 1980.

Turning back now to the solo scene, the biggest news of the late 1970s was the arrival on the scene of Kenny Roberts at the start of the 1978 season. "KR" had given up the struggle of keeping converted Yamaha street engines competitive against full-on Harley Davidson racers on the American dirt-track National trail and had decided to take a crack at the World 500cc Championship. European fans knew that this tough little American superstar had won two U.S. Grand National Championships (encompassing dirt and road racing) in 1973 and 1974. They had also seen him in devastatingly successful 750cc action at Imola, the Trans-Atlantic Trophy Series and so on. But how would he fare in the actual week-in, week-out grind of the Grand Prix season, far from his familiar and beloved California farmland?



Brund Holzer was history's only "three wheeler" champion.



Scottish/Swedish partnership—Jock Taylor and Benga Johansson.

Everyone now knows the answer. Roberts has now completed three GP seasons in Europe and has won three World 500cc Championships. There is nothing more to say on that point!

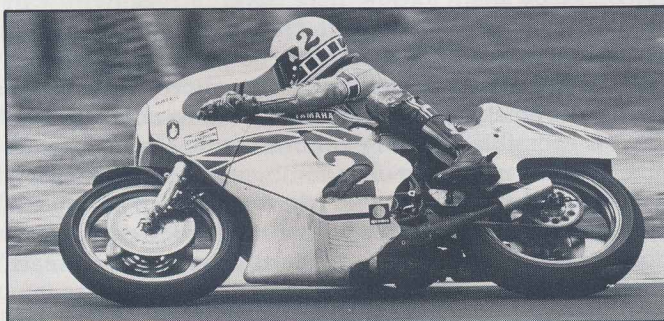
When Kenny came to Europe he planned to try and win three titles—the 250cc, 500cc and 750cc. However, even he realised that this was just too ambitious. Not only from the riding point of view but also in terms of keeping a vast stable of racing machinery at the ultimate competitive level. Midway through the 1978 season, he bowed out of the 250cc class after winning the Dutch TT at Assen. This was where, appropriately enough, he made his GP debut on a two-fifty back in 1975. At that time he was dicing for the lead with World Champion Walter Villa, crashed near the end of the race but remounted to finish third. Assen, 1978, was

the last time that Roberts was seen on a lightweight.

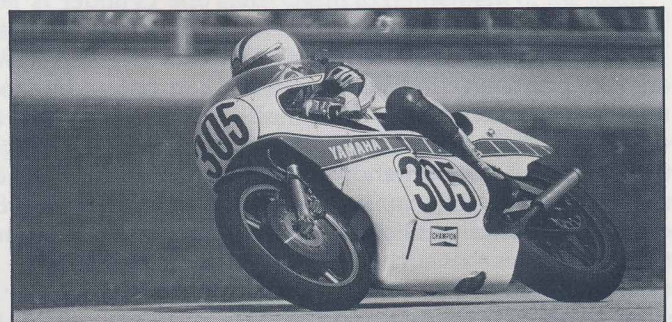
During the 1978 season Kenny did continue to contest the 750cc class and, in fact, won more GP's in that category than any of his rivals. He took four wins in the 10-race series but failed to finish on three occasions.

That, plus the rejuvenated riding of ex-350cc champion Johnny Cecotto, was enough to limit Roberts' 1978 bag to a single title.

Cecotto, the temperamental Venezuelan, rode extremely well in 1978. Teaming with Roberts on the factory team, he bested his partner in the opening rounds at Imola and Paul Ricard, then followed him home in the next three races. Another win at Zolder, third place at Assen and a safe, steady ride to fifth place in torrential rain at Mosport, Canada, was



"King Kenny"—three titles in three tries.



Johnny Cecotto—back from the doldrums to the 750cc title in 1978.



all that he needed to put himself back on to the World Champion's pedestal.

The following year, Roberts dropped out of the 750cc category except for certain selected events.

It was the last year that this class was to count for World Championship points, due to diminishing support from factories, so it was fitting that one of the staunchest supporters of Formula 750 would reap the final benefits.

The Sonauto/Gauloises team from Yamaha's French importers are massive supporters of the sport at all levels and had been one of the mainstays of F750 racing. Therefore, everyone was delighted to see personable young Frenchman Patrick Pons become his country's first World Champion. Following this 1979 season, Patrick scored another of the biggest wins of his career when he won the Daytona 200 in the spring of 1980. Six months later he was dead . . . tragically killed in a crash at the British Grand Prix.

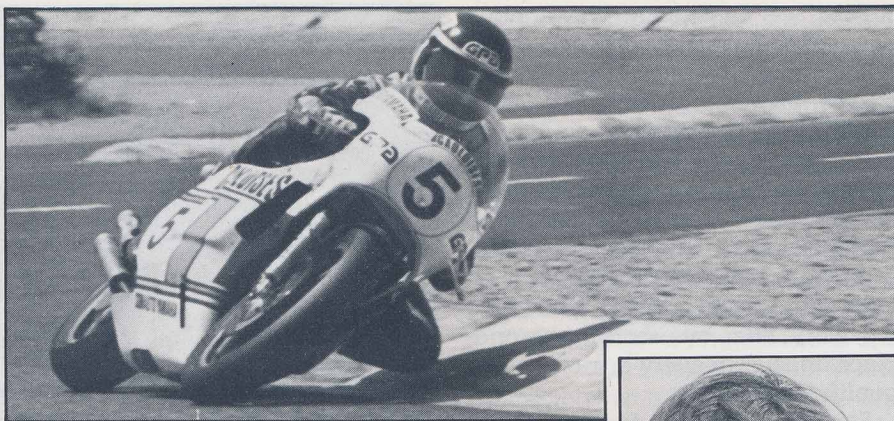
Yamaha's final success of the 1976-1980 period came at the last race of the 1980 season . . . the West German Grand Prix on the Nurburgring.

South African "privateer" rider Jon Ekerold was pitting his stock Yamaha TZ350 twin against factory Kawasaki of Germany's Anton Mang to decide the World 350cc Championship.

On paper, Mang had all the advantages . . . factory bikes, the psychological edge of being in front of his "home" fans, the fact that he had already clinched the World 250cc title, and so on.

Ekerold had a stock machine and a burning desire to see five tough years as a Grand Prix gypsy pay off.

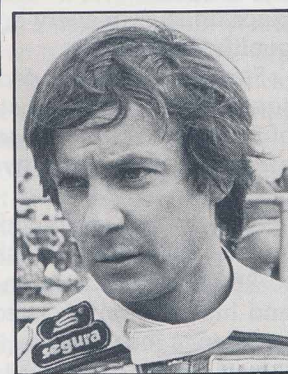
Desire won the day. After a truly epic struggle that lasted throughout the race, Jon beat his rival to the flag and took a title that has never been more well-deserved.



Patrick Pons, F750 Champion in 1979, tragically killed in 1980.

That, then, wraps up our three-part history of Yamaha's involvement with World Championship road racing. Seventeen years and 30 individual titles to their credit and an involvement in racing for 1981 that is as strong as ever.

This year it's Kenny Roberts and Barry Sheene combining on the factory team for the 500cc class—certainly the toughest pairing in Grand Prix racing and likely to continue the Yamaha success story of the past two decades. □



Jon Ekerold—World title reward for a tough privateer.

## Guest Test Double-Feature: The Yamaha XV750 As Seen From Both Sides Of The Atlantic

(Continued from Page 21)

Those clear-cut vee-twin virtues are very persuasive indeed, and for a number of reasons. First, the simplicity of two cylinders is appealing in the face of the current trend toward a multiplicity of cylinders, valves and camshafts, not to mention the maintenance hassles that such complexity can bring. And of all possible two-cylinder configurations, none make as much good sense as a vee as a

means of propelling a motorcycle. For one thing, any vee with a spread of between, say, 60 and 120 degrees offers low levels of vibration simply because the primary imbalance from one cylinder is largely offset by the secondary imbalance of the other, and vice-versa. What's more, a vee can be made about as narrow as a single, meaning that an extremely low center of gravity is possible through a low engine placement. That engine location is also why a tandem vee can permit an unusually low seat height.

Then there are the power aspects of a twin. It's a proven fact that the thrust from two large pistons can

push a motorcycle forward at low rpm with authority while the three or four or six small pistons in a multi are still struggling to get their legs beneath them. We're talking real torque here, and a vee-twin can churn out enough of it throughout the rpm range to produce incredible flexibility. Furthermore, due to its having a more favorable surface area-to-volume ratio, a twin wastes less of its combustion energy through heat loss than a multi, so it can squeeze more mpg from every drop of fuel. And let's not underestimate the way in which a vee-twin's peculiar low-frequency vibrations can tap a subtle undercurrent of enthusiasm



in your soul, even if you're dedicated to teacup-size engines with 20,000-rpm redlines. In other words, a vee-twin is really MADE for a motorcycle.

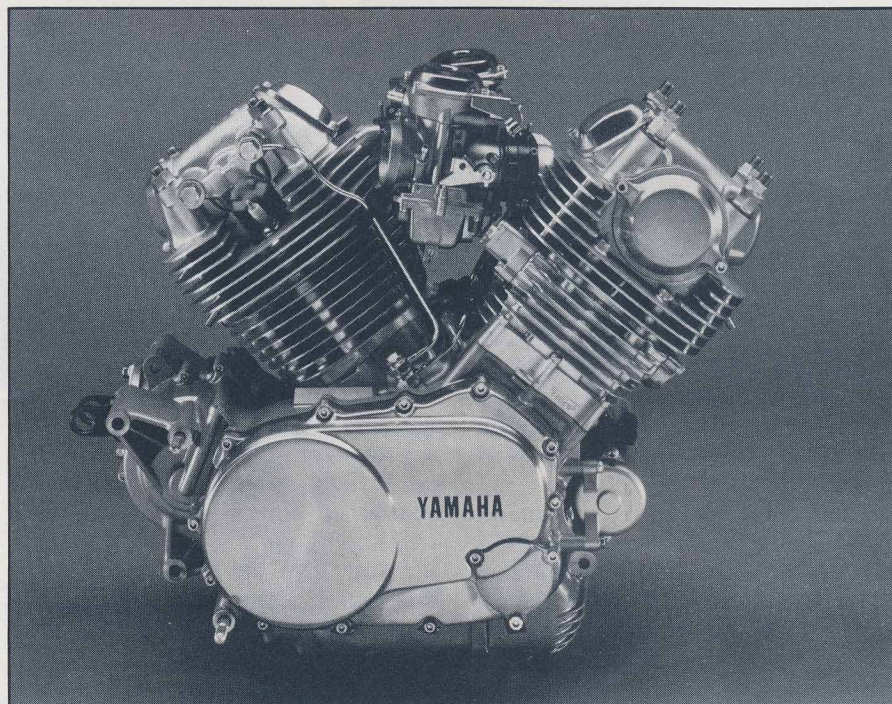
The engine Yamaha created to satisfy our latent lust for vee-twin power isn't particularly high-tech in broad outline. There's a 75-degree angle between the two slightly offset jugs (a Harley's are at 45 degrees; a Ducati's at 90 degrees), and a single overhead cam in each cylinder head operates two valves through conventional rocker arms. So as a hunk of metal, the engine's execution is quite ordinary. Yet in detail, Yamaha has hammered this vee-twin into a shape that will be palatable to riders too sophisticated to tolerate less than the best.

To begin with, the engine is a stressed member of the chassis, so it hangs beneath the unusual-looking pressed-steel backbone frame without a downtube to mar its appearance. Yamaha solved one of the vee-twin's traditional problems—intake plumbing—by routing air from the airbox beneath the seat, through the frame backbone and into separate rubber intake tubes for each 36mm Hitachi constant-velocity carb. Even more interesting is that the crankshaft rotates "backwards" (clockwise as viewed from the left). This was done mainly to allow proper direction of output-shaft rotation using a geared primary drive and only one jackshaft; but a secondary benefit is that the backward rotation also transmits the engine's residual vibrations to a rearward segment of the frame that, according to Yamaha, absorbs those vibes more effectively than the front of the frame. So although the Virago's vee is, in many ways, a thoroughly conventional engine, it is one which has been updated to meet the expectations of the '80s.

After the starter grinds and the Virago's engine comes to life—a distinctive rumble spilling from the twin pipes—you'll be forced to agree that this engine has soul, no matter how jaded you might be. You can thumb the grip-mounted choke to the off-position within 30 seconds and the vee settles into a consistently uneven cadence, its systolic and diastolic vibrations hooking up with the natural rhythms of your own pulse. Better yet, you register the motor's vibes only through the footpegs and the pit of your stomach, rather than through the rubber-mounted handlebar and the seat of your pants. For Yamaha, of course, it's nothing new to get an engine's sensations exactly right—gruff, reassuring, but never vulgar. Yamaha understands as no

other manufacturer does the subjective mechanical inputs a bike should deliver; it understands the difference between good vibes and bad vibes. The XS850 and XS1100 engines attest to it.

What IS surprising, though, is the Virago's real performance advantage over other engines. The motor opens up a new world of motorcycle motivation as soon as you get underway. Admittedly, you do have to ease the bike into motion with a clutch, because it lets the drivetrain lurch a bit at the end of its travel. But once you're rolling, you've immediately got real power on your hands. The engine is at its best when you use 5500 rpm as a shift point and 4000 rpm as cruising speed, so you rarely feel the urge to extend the motor to its 7000-rpm redline. There's plenty of power up there if you're after it, of course.



Lots of revs produce a fair amount of noise and footpeg vibration, but the engine doesn't try to shake itself apart. Still, you'll be happiest lugging the Virago engine somewhere below 2000 rpm, then grabbing the loud handle and revelling in the engine's smooth, stumble-free acceleration into a relaxed canter.

According to its dyno numbers, the Virago twin isn't as powerful as other 750s, but its tremendous flexibility gives the illusion of 1000cc-motor capacity. There's never any need for lots of revs and frantic gear shifting. Since Americans seem to place a premium on gentle but precise throttle control, that's what the Virago delivers. So smooth, effortless and refined is the Yamatha vee-twin that at 4000 rpm you feel

as though you're riding a surfboard locked into an invisible wave of horsepower. Only when the gas pump gives you the 50-mpg good news will you be reminded that the Virago's jugs displace only 750cc.

It's one thing to produce the soothing beat of the archetypal vee-twin that all American motorcyclists seem to have swimming around in their subconscious, of course, and quite another to furnish the accoutrements of modern-day motoring. That's why the Virago is so admirable. It has dragged the vee-twin concept into the modern era. Yamaha figures that Virago guys will be more interested in freedom than fiddling, so shaft drive was the obvious choice to connect the engine with the bike's fat, 130/90-16 Bridgestone rear tire. Furthermore, this Yamaha shaft has better manners than previous ones from the tuning-fork factory. The up-

and-down rear-end jacking typical of shafties is still present at low speeds, but on the open road the connection between your wrist and the rear wheel is far more direct than before. Having fewer power pulses per revolution than a multi helps reduce rear-end antics; but Yamaha also gives credit to refinement of the shaft drive since its original design for the XS750 in 1976 by Getrag, the German transmission company.

The Virago's good rear-wheel manners are also reinforced by the use of Monoshock suspension for the first time on a four-stroke street bike. Ordinarily, the adaptation of Monoshock requires profound compromises in airbox configuration and seat height, but because the vee-twin affords a low seat—and because



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**Guest Test Double-Feature:  
The Yamaha XV750 As Seen  
From Both Sides Of The Atlantic**

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Yamaha created a special induction system for this bike—fitting a Mono-shock to the Virago posed few problems.

A quick inspection of the Virago's shock shows it to be a de Carbon-style unit that bears a familial resemblance to a YZ motocross damper. It does, however, have a number of features expressly designed for street riding. For instance, despite having only a straight-wind coil spring, the shock achieves a progressive wheel rate through the use of a separate air-adjustment chamber. It allows the rate of progression and the spring preload to be easily altered; an air line connects the shock to a valve stem located beneath the right-rear segment of the seat rail. Then the shock itself incorporates 20 rebound-damping settings which are selected by a large external wheel connected to the actual adjustment rod in the damper through a push-pull cable system. Actually, the adjuster wheel only covers six of the 20 possible settings at any given time, but repositioning the cable pulley atop the adjuster rod allows a different six-setting portion of the damping range to be selected. Any span of six settings, incidentally, delivers about a 20 percent difference in damping rates between the lowest and highest positions.

There are a number of advantages to a single-shock rear suspension, but the one Yamaha seems most interested in is the reduction in unsprung weight and the resultant improvement in suspension compliance. This same consideration also is reflected in the use of a lightweight drum brake at the rear wheel and a single disc at the front. Moreover, the front

fork is calibrated for a soft ride.

Truthfully, very little about the Virago is much like other Yamahas—or ANY other motorcycle, for that matter—including the way it performs. That's something you can't estimate just by looking at this motorcycle. Because the true picture of the Virago's performance only comes into focus when you take a seat and let the road unroll toward the horizon, for it relishes relaxed cruising over terrain that features gentle curves and broad vistas. Part of the reason lies in the engine's ability to lope along for hours without frazzling your nerves. Too, the vee-twin configuration has helped make for a long wheelbase (about 60 inches) and the steering geometry is deliberately slow, both of which establish the Virago's tendency to favor the straight and narrow rather than the tight and twisty. Still, when an invigorating corner DOES come along, the XV750 manages to glide around it with little effort on your part, although it exhibits minimal cafe-racer potential.

Ironically, the very things that make the Virago pleasing beyond the city limits also make it enjoyable within them. There's no better engine, bar none, for urban terrain. And the narrowness of the motorcycle, not to mention its short 29-inch seat height, makes the Virago a pleasant mount at stoplights as well. And because the steering is slow, Yamaha used ball bearings in the steering stem instead of tapered rollers to lighten steering effort at low speeds. In sum, the thrill in town with the Virago is to coast around the turns at ultra-low rpm and then let the engine squirt you down to the next corner, usually without even thinking about the shift lever.

Still, the Virago can provide a fair amount of fun in the corners if you pick your spots. The handlebar positions your hands close to where they

would be with a more conventional bar, so it's easy to control the front end. The Monoshock suspension adds to the bike's stability in the corners, while the tread designs of the Bridgestone tires keep them from initiating any sort of a weave. The bike is reasonably light, but the engine still won't generate much in the way of warp-speed between corners, and the front brake feels mushy under severe braking (although its stopping distances are quite good). So you're better off being aggressive in long, high-speed sweepers than in switchbacks. You can, of course, enjoy yourself on back roads at a relaxed pace, but tossing the Virago into corners like a racer is all wrong.

In the end, though, the Virago has its priorities straight, for it comes through with the American rider's preferences arranged in the right sequence: a comfortable ride, minimal maintenance hassles, the right look and the proper amount of mechanical soul—with a side-order of contemporary technology, to boot. It's a motorcycle that finally completes the turn away from absolute speed toward more subtle measures of performance. This is the precise look that all previous "custom" motorcycles aspired to, whoever the manufacturer. More importantly, this is the kind of performance they all aspired to. But without that glistening hunk of vee-twin alloy stuffed in its midst, every one of them was incomplete, an unfinished symphony, if you will.

It's tempting, of course, to categorize the Virago as simply a Japanese-built Harley-Davidson, but to do so would unfairly overemphasize the engine and underplay the rest of the motorcycle. Because the Virago is more than just a vee-twin motor. It's a complete motorcycle that has tapped the very wellspring of American motorcycle fever. □





## Yamaha Road Show

During the next two months the Yamaha Road Show will begin its summer-long tour of the British Isles. A special custom-built coach will be visiting dealers all over the country giving the public the chance to see the very latest Yamaha machinery.

Demonstration bikes will be available (dependent on age and riding experience) and other attractions include static displays, free competitions and video shows. At certain venues free road safety checks will also be available.



### MAY:

- Saturday 23rd. .... Ian Mansfield Motorcycles,
- Sunday 24th. .... New Milton
- Saturday 30th .. Paul Wolfe Motorcycles, Crewe.
- Sunday 31st. .... Vin Duckett, Blackpool.

### JUNE

- Sunday 14th. .... John Stewart Motorcycles, Barrow-in-Furness
- Saturday 20th. ... Granby Motors Ltd, Beeston
- Sunday 21st.
- Saturday 27th. .... Lee Bros, Sowerby Bridge.
- Sunday 28th. . Terry Sylvester Ltd. Huddersfield.



The Isle of Man TT Races are the highlight of the racing season for literally thousands of motorcycling fans and Yamaha intend to keep them fully occupied during the evening and on non-racing days. Static displays of the Yamaha range of machines will be on display at the Villiers Hotel, where a full programme of racing and general interest motorcycling films will be open to the public. For the more energetic there will also be a trail park where off-road fans can try their hand at trials-type riding.

Yamaha are also looking at the possibility of coach tours of the island circuit, using Mitsui team members to give their views of the course and to point out the places of interest en-route.

Other major events throughout the year will also be visited by the Yamaha Promotions team including road-races, motocross events and Enduros.

It's no coincidence that many of Britain's top trials and enduro riders are farmers by profession. A motorcycle is the ideal vehicle for cross-country work and to demonstrate the versatility of two-wheeled transport around the farm, Yamaha are visiting several County Agricultural Shows throughout the Summer.

### MAY

- Wednesday 20th. } The West Midlands Show.
- Thursday 21st. }

### MAY

- Sunday 24th. .... 250cc British Motocross Championship, Corsham
- Sunday 24th. .... 125cc A.M.C.A. International Event, Shepshed.
- Monday 25th (Bank Holiday) . Yamaha Pro-Am Championship, Cadwell Park

### JUNE

- 1-7th. .... Isle of Man TT Races
- Sunday 21st. .... 250cc World Motocross Championship, Hawkestone Park.
- Thursday 25th. .... Welsh Two Day Enduro
- Friday 26th. .... Llandindron Wells
- Sunday 28th. .... 250cc British Motocross Championship, Stroud.
- Sunday 28th. . Yamaha Pro-Am Championship Knockhill, Scotland.

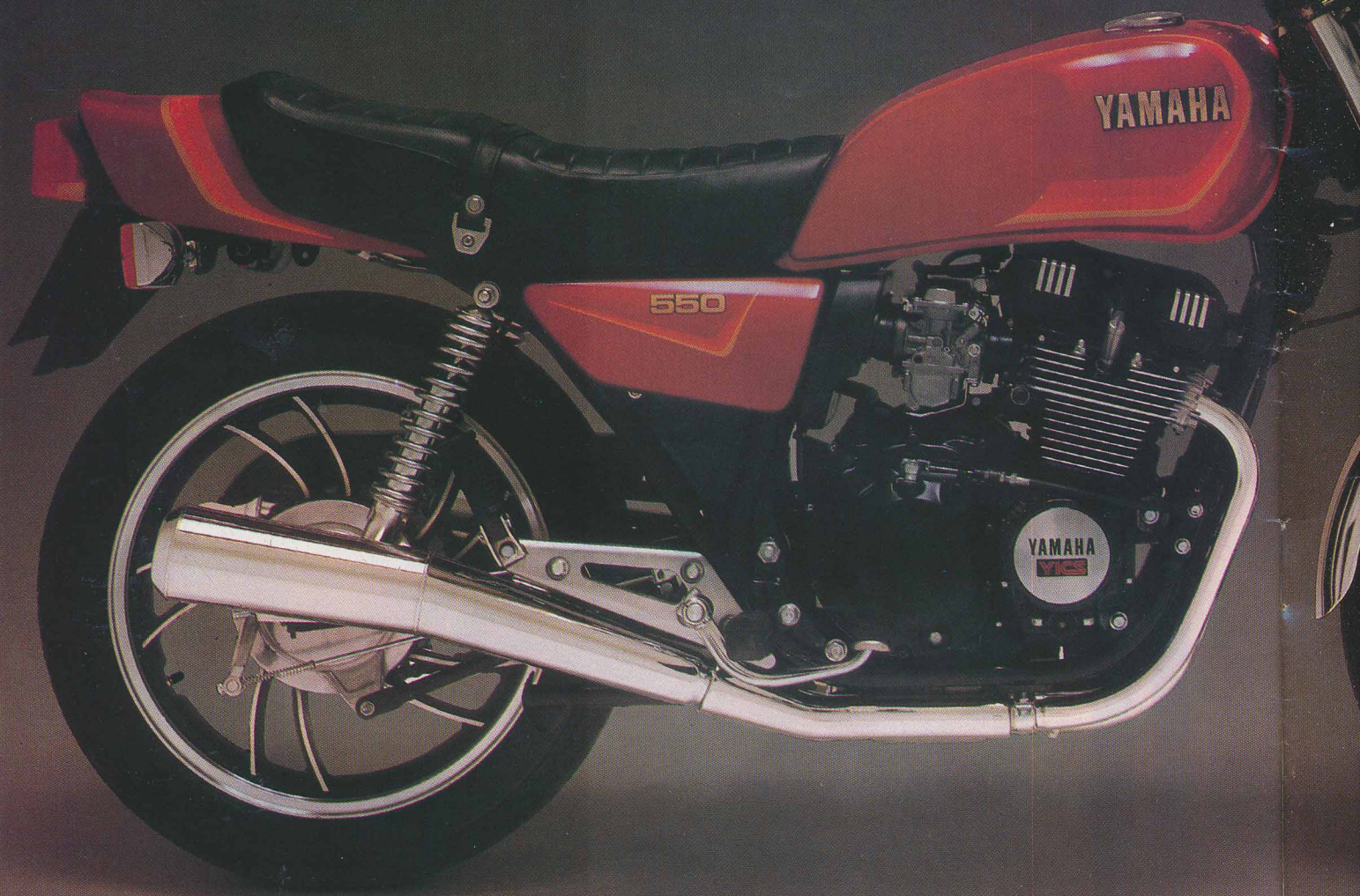
### JUNE

- Tuesday 16th. } The Three Counties Show,
- Wednesday 17th. } Malvern
- Thursday 18th. }
- Wednesday 24th. } The Lincoln Show
- Thursday 25th. }

This Diary Page will be a regular feature of "Circuit" magazine, giving advance notice of sporting and social events likely to be of interest to both Yamaha owners and motorcyclists in general.

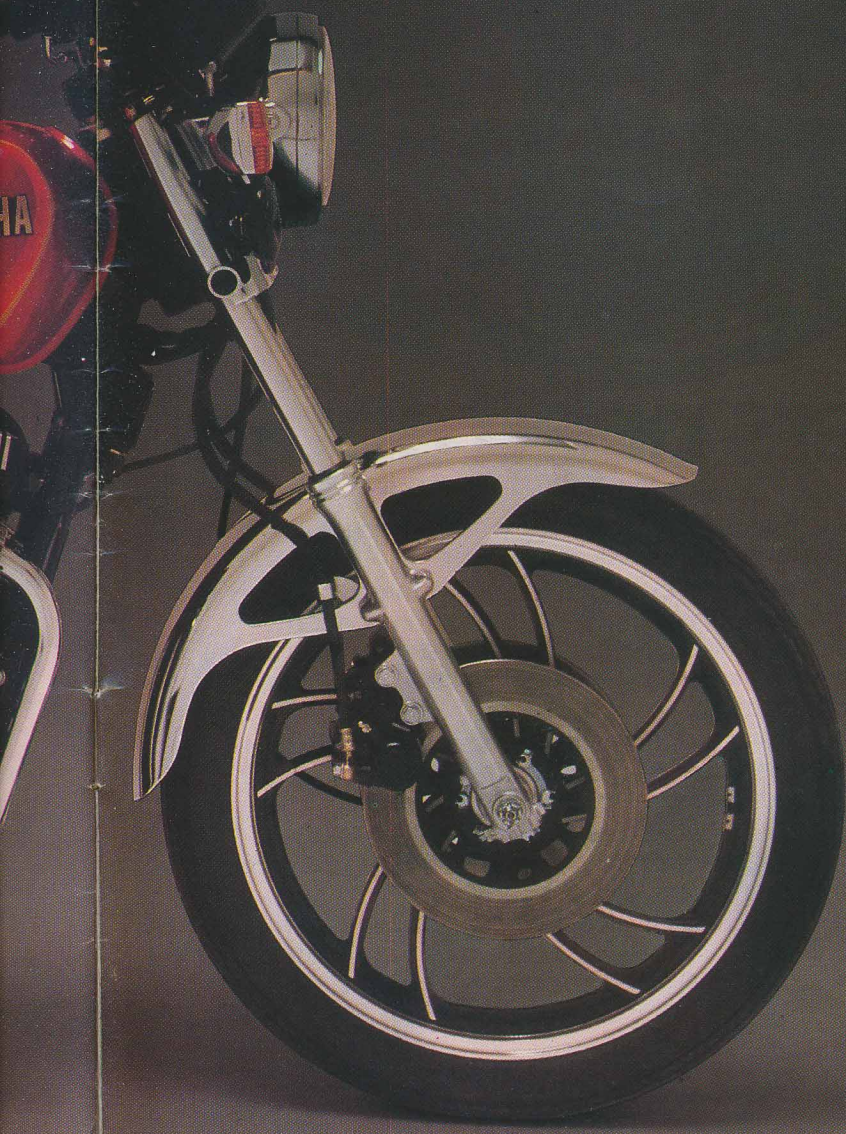


# The XJ550 Little brother big mother





# 550. ther or ther?



Don't turn your nose up at the c.c., the XJ 550 will leave a lot of bigger 4-strokes standing.

Oh yeah? Yeah.

Because it's the only Yamaha machine in the U.K. fitted with the Yamaha Induction Control System.

A simple, yet ingenious device which ensures that not one iota of power is wasted (unbelievably, it reduces fuel consumption by approximately 10% at the same time).

What's more, a traditional chain drive puts every ounce of that precious power to use.

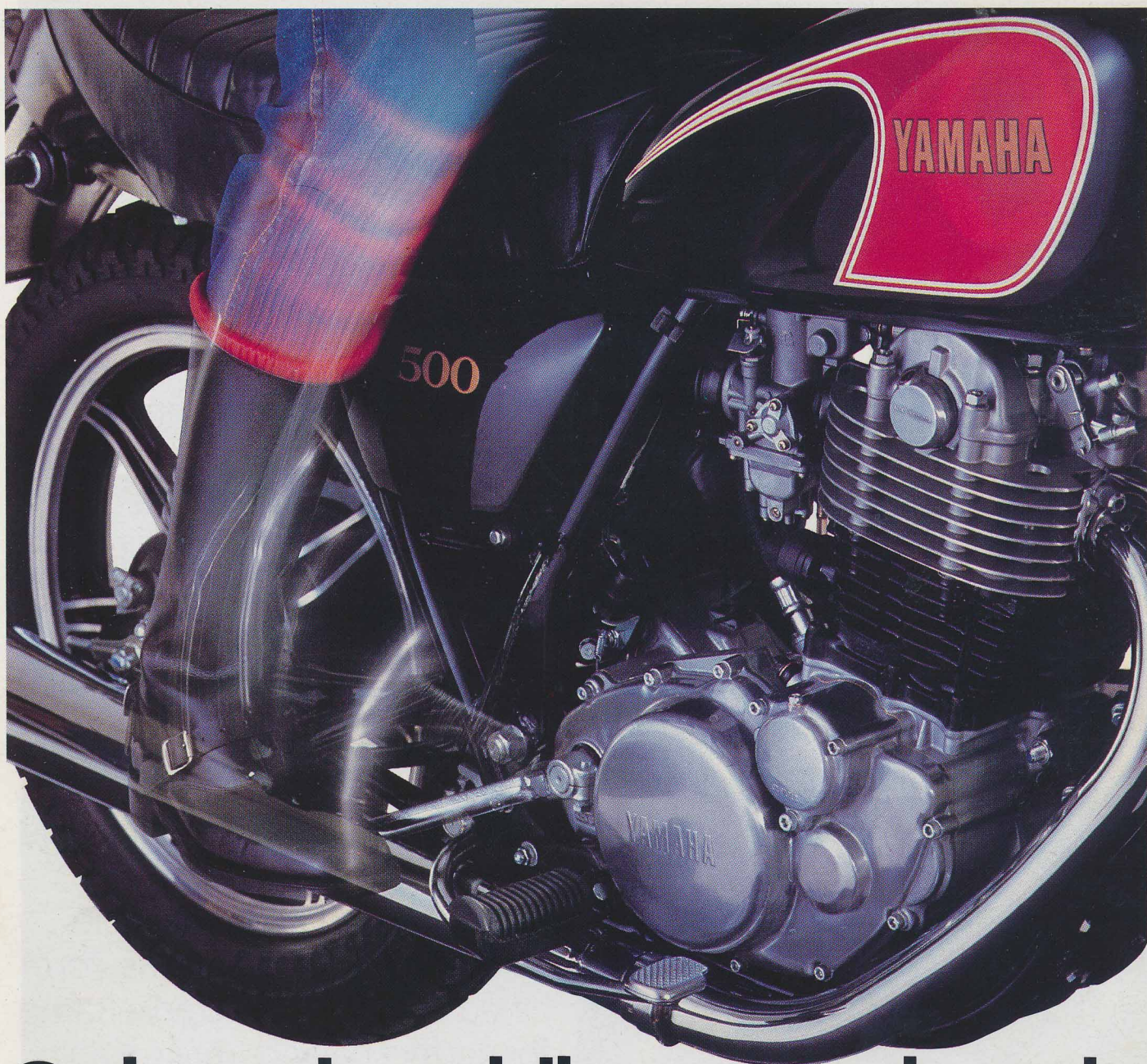
Just like its big brother the XJ 650, the XJ 550 is a true thoroughbred. Its remarkable narrowness and lightness combined with a double cradle frame for perfect balance make it an absolute doddle to handle.

Other features include 6 gears, transistor controlled ignition, adjustable rear suspension, teflon-lined front forks, an excellent braking system, sporty Italic wheels and believe it or not, even a fuel gauge.

So, if you're going to pick on a little brother, we don't think you could make a better choice.







# Only serious bikers need apply.

Whatever the SR500 hasn't got, she certainly has more than her share of character.

Too much character, perhaps, for some of today's cossetted commuters.

But for our engineers, building the SR500 was a labour of love — an act of homage, if you like, to the great traditions of motorcycling.

She doesn't bristle with new-fangled gadgets. (If you can't kick-start a motorbike, don't fool around with an SR500. It'll only end in tears).

But when you do start her, she certainly lets you know about it. Big singles generate a lot of torque in widely-spaced bangs, and you'll notice a difference if you're used to multi-cylindereed machines.

Be all this as it may, the SR500 is not completely lacking in the refinements bestowed by modern Yamaha technology.

She does 68.3\* miles to the gallon, for one thing. Try getting that out of your old Gold Star.

And while there's a definite knack to kicking her off, a manual compression release and electronic ignition eliminate a lot of the frustrations of yesteryear. After a bit of practice, you should be able to start her first time, even on cold mornings.

Her cast wheels have no spokes to tighten and her designers were not such purists as to leave off the self-cancelling indicators and the quartz halogen headlamp.

In their excellent review of the SR500, 'Cycle Magazine' compared her to an old castle: "A chunk of an exciting past brought forward to the present."

But they summed her up perfectly when they wrote: "If you had a castle, you'd want it to have modern plumbing.

"Yamaha's SR500 has the plumbing."



**YAMAHA**