MOTOR CYCLE MECHANICS

SEPTEMBER 1977 40p

Win A YAMAHA XS 250

GRANT'S GREAT TT RIDE

KAWASAKI KE125: Mixing business with pleasure

TOMORROW'S WHEELS? SPX 500/QUASAR

MOTOR CYCLE MECHANICS
SEPTEMBER
Vol 20 No. 12

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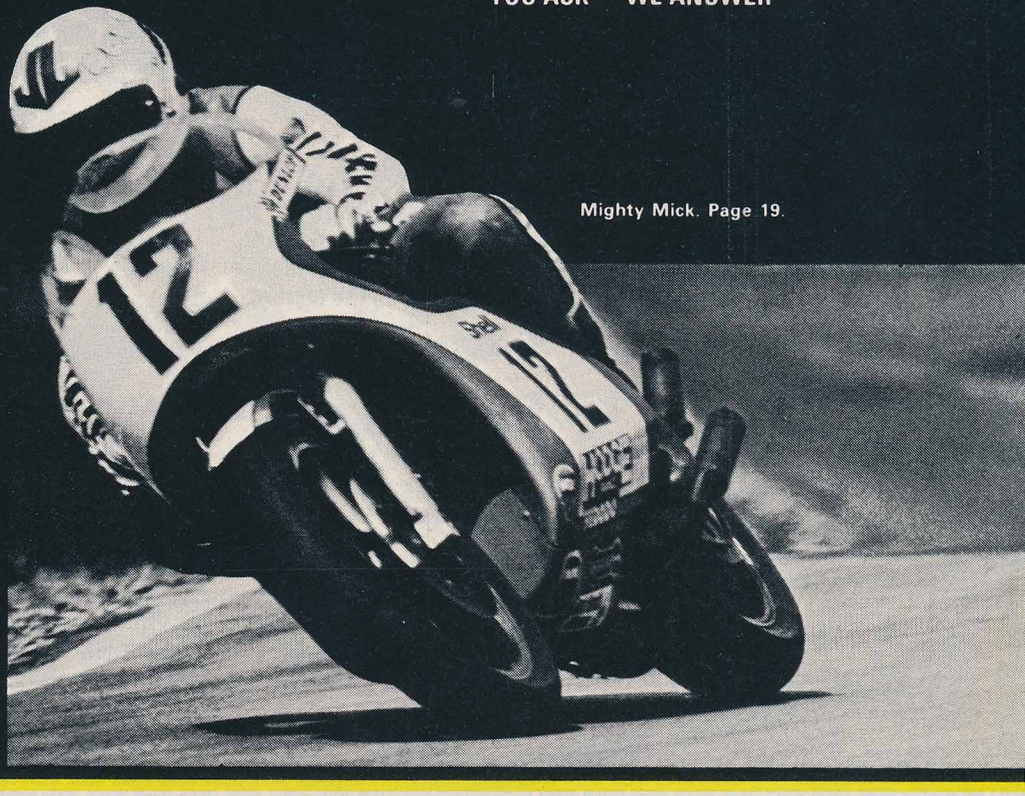
JULY—DECEMBER 1976,
111,692



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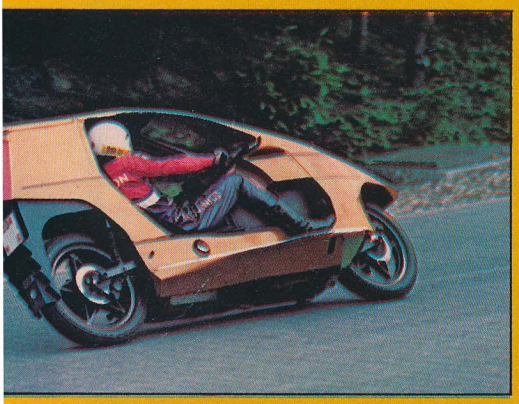
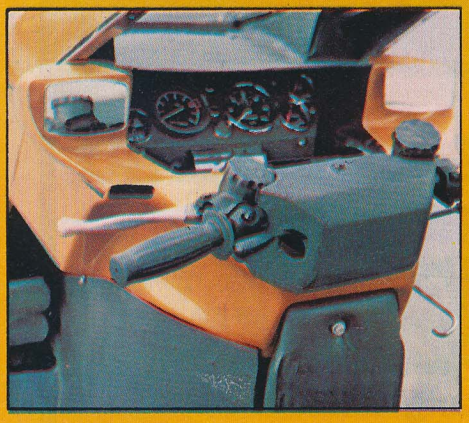




Now in production and available for £3,500, the Quasar is a pretty remarkable device. It took 14 years to get it from the drawing board and onto the road.

TOMORROW'S

The brainchild of two Royal College of Art students, the SPX500 introduces some novel but practical ideas to motorcycle design.

WHAT would happen if we persuaded, say, an aircraft designer to build a motorcycle? How would someone without the usual prejudice and bias of being involved with bikes apply sound engineering and the latest technology to a two-wheeler?

Designers who are too close to the industry tend to confine their innovations to detail improvements, one result being that bikes look and behave pretty much as they have always looked and behaved. Changes are so gradual that it is only when you can look back over 20 years that you see real differences. Even then radical alterations are often delayed because suitable materials are not available — one of the problems which hit the early Wankel engines.

If the design didn't have to be production-engineered down to a cost, someone with fresh thoughts and no preconceived ideas could produce a very interesting machine.

This is more or less what happened with the Quasar. It is a machine built by Malcolm Newell, who had been involved with racing cars, and Ken Leaman, who worked in the aircraft industry. They weren't complete strangers to motorcycles though, Malcolm used to have a Mach 1 Kawasaki and the two had some common ground in being ex-Vincent owners.

The concept which was to become the Quasar was a machine built purely on engineering principles, rather than contemporary fashion, to suit the broad spec of a comfortable, all-weather tourer with built-in safety and economy to match the performance instead of being set against it. In addition the designers insisted that all the components should be British and easily available.

A look at the layout shows the general design philosophy and the designers' keen interest on making the detail parts functional, improving on conventional motor-cycle practice in virtually every area. It's nice to see how the one follows from the other; how the stability of a low, forward mounted engine leads to the long 77 inch wheelbase — more stability — the short height which gives a small frontal area and lends itself to the aerodynamic shaping which in turn finishes in a tail fin. This takes the centre of pressure rearwards, another stabilising feature, incidentally providing a small luggage compartment and a tail light mounting which is high enough not to be obscured by car bonnets, armco barriers and the like. The ideas fit together so well it compels you to believe it is *right*.

But it is a long step from dreaming up the

TOMORROW'S WHEELS

ideas to building a working machine. Honda are reputed to have got the first 750 four off the drawing board in less than a year but it is generally accepted that a new model takes two or more years to get under way. It's not because it takes a long time to think up ideas or to make things; it does take time to run a development programme, to iron out initial problems and to get enough hours and miles on the prototypes to assess their reliability. There are other problems too. A designer, even with the back-up of an enormous works, spends much of his time convincing the production people it is viable, the sales people that it will be attractive, double checking impending legislation and so on. Working for a small concern with limited resources brings similar problems, as Malcolm and Ken discovered. Much of their time was absorbed in convincing people that they weren't cranks and that the thing would *work*, before the said people would offer the advice, information, components or financial backing that was necessary.

To give some idea of the scale of things, the Quasar was conceived in 1963. By 1973 there was enough financial backing and the machine made its first public appearance last year — 1976. Between then and now other prototypes have been made, a more sporting chassis designed and orders for the first ten production machines have been accepted.

Quasar 1, the machine we rode, had covered nearly 60,000 miles — or at least the rolling chassis had — and is stripped and torqued on to a jig every 10,000 miles to assess frame strain. Other items are also under long-term scrutiny, mainly the steering head bearings and the steering drag linkage and gearshift on which the rose joints have been prone to wear. Another machine has simultaneously been put through a series of what amounts to type approval tests at MIRA, including a programme of crashes.

The Quasar is powered by a Reliant four-cylinder motor, drives through the Reliant gearbox and final drive bevel gears which are mounted in a hub casting designed by Malcolm and Ken. The choice of powerplant is not without its disadvantages but it does have a lot going for it. It is British — not a universal criterion but one applied universally by Messrs Newell and Leaman — the parts are readily available, as are servicing facilities, at a modest price. Reliant have also been more than helpful with the development work and, via the 750 racing club, many performance parts are available which can take the motor from its stock 30 to 40 bhp up to more than 70 bhp. Because the Quasar should have far less bulk drag than a conventional machine, they can do things with 70 bhp which other people need maybe 90 bhp to achieve.

The Reliant is watercooled, which means it is mechanically quiet and that, having spent money to heat something up, it needn't all be wasted: inside the cowlings there are ducts and a blower which direct warm air at the rider's hands and feet.

The four-cylinder motor is lowly stressed, low revving and gives much torque. Its reliability is well proven, it is more than able to shove the heavy machine along — with a rider and fuel the Quasar weighs something near 900 lb. The single carb can give remarkable economy; the three-wheelers (over 1,100 lb with a payload) can achieve 70 mpg without too much trouble.

It is built for shaft-drive, thus suiting the clean lines, longevity and minimal maintenance objectives of the Quasar team.

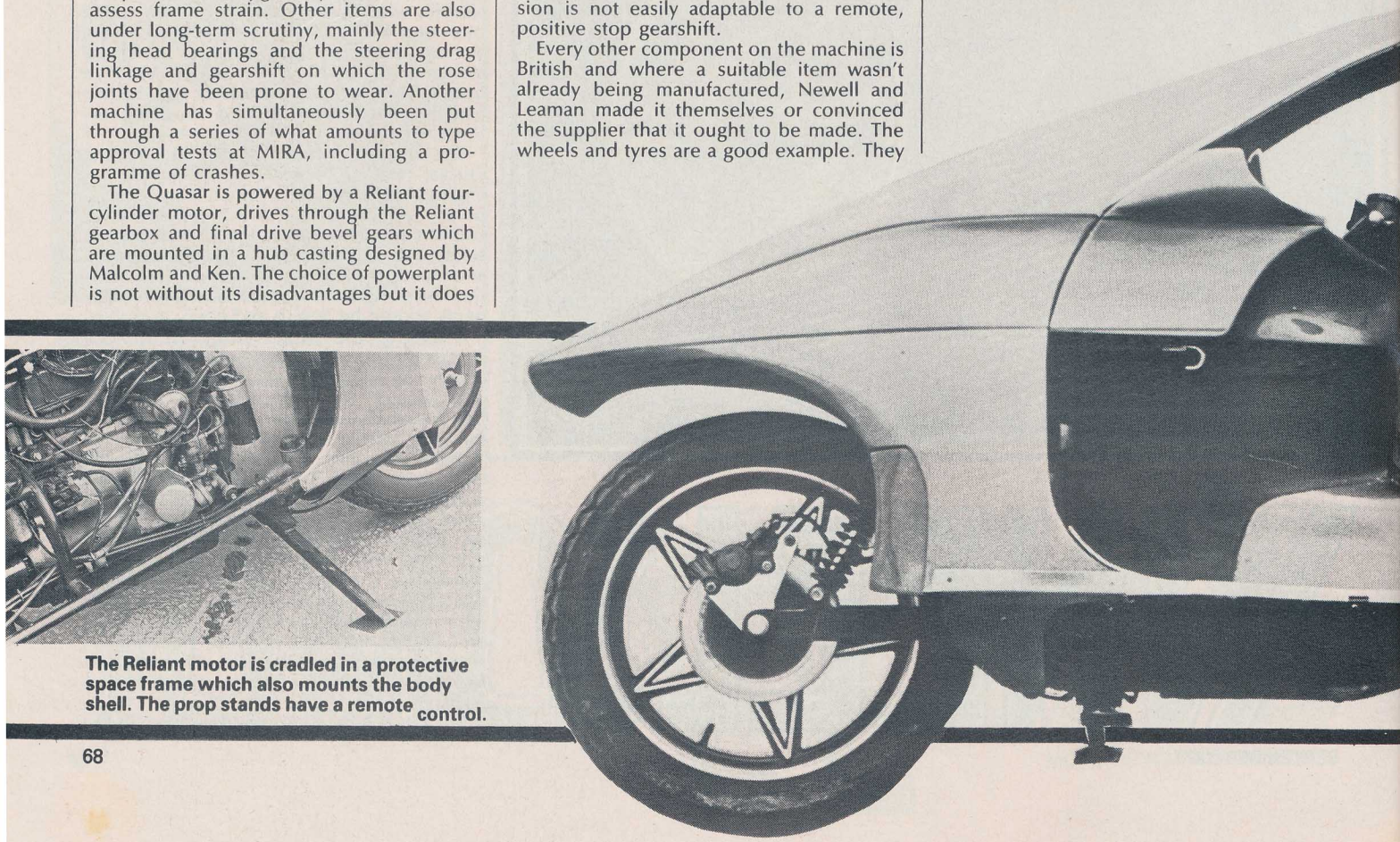
The advantages of the motor are immediately apparent from a brief ride in the Quasar, as are the disadvantages. These are mainly that the engine, for its output, is heavy, its power characteristics are more suited to a heavier vehicle and its transmission is not easily adaptable to a remote, positive stop gearshift.

Every other component on the machine is British and where a suitable item wasn't already being manufactured, Newell and Leaman made it themselves or convinced the supplier that it ought to be made. The wheels and tyres are a good example. They wanted a rigid assembly — which means cast wheels — but weren't happy with what was available, mainly because of bearing size and the inability of hubs to dissipate heat from the disc brakes. In the end they had to design their own. They also wanted tubeless tyres, as a safety feature — nearly all cars have them but they are not considered to work on motorcycles — and eventually Avon Tyres, having said initially that it couldn't be done, agreed that it could and went ahead and made some.

Avon's co-operation was something of a breakthrough for the Quasar. At last someone was listening and taking the project seriously. In fact once Avon had decided to lend their help they went out of their way to produce exactly what Newell and Leaman wanted. The 4.25/85H18 tyres are now being produced exclusively for Quasar but the rims will take conventional tubed tyres if necessary.

The machine also uses Girling gas shock units front and rear but they have had difficulty in setting up the right spring and damping characteristics and even more difficulty in getting technical information out of Girling. No-one there seems to have the necessary data, or if they have, will not listen to the Quasar's problems.

Financial backing finally came from Wilson and Sons, a precision engineering firm in Bristol, who have been involved in subcontract work for BAC. That at least guaranteed several prototypes and an initial production batch, after which the Quasar will presumably be on its own. Low production runs, minimal sales and promotion facilities put a different perspective on price. It is dictated not by what the Quasar costs to build (how would you evaluate 14 years of deep thought, persuasive argument and mileage work, anyway?) but by what it can be sold for, making enough profit to build



The Reliant motor is cradled in a protective space frame which also mounts the body shell. The prop stands have a remote control.

the next batch and feed its proprietors.

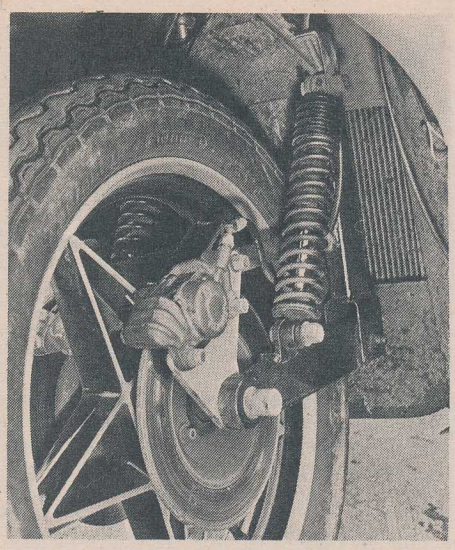
Malcolm reckoned they could sell the machine at £3,000 and show a profit. But to continue development and production, a price of £3,500 is necessary. The desirability of the Quasar is in the pocket of the beholder; it offers a lot, it costs a lot. One advantage is that, should sales take off and production progress, unit cost will come down and a smaller profit margin will also be acceptable; the price should remain constant while others, like BMW, catch it up and probably overtake it.

Another factor is that the Quasar is intended to have a long life. The motor could be expected to have an overhaul life of 80,000 miles while the rolling chassis development points to a similarly long interval.

The features which make the Quasar attractive as a long-term proposition are mainly in the attention to detail which follows the basic design. The general design philosophy calls for safety — which you can sell to a government or some other institution but not to an individual — comfort, weather protection, and effortless, economic performance.

The power plant is housed in a space frame and fully cowled. The chassis, on production models will be nylon dipped to give it a tough protective coating and carries the body shell, made of pressed aluminium. There is no chrome trim, the materials used are either steel, chrome steel, alloy or GRP.

Suspension is conventional swing arm, with leading link forks and all suspension struts in box section tubing. At the front, the twin disc calipers are mounted on a parallelogram linkage. They could presumably be carried on an asymmetric link to provide a measure of anti-dive although the low c of g and long wheelbase are not conducive to pitching under braking anyway.



Front suspension layout — square section leading link forks and Girling Gas Shock dampers. Avon tubeless tyres are used front and rear.

Leading link forks were chosen, rather than hub centre steering because of the latter's rigidity in impact. The forks will fold back, absorbing a lot of the energy of a head-on collision, as will the front section of the body.

One of the things which concerned me about the enclosed design, was the risk of trapping the rider and dragging him along in a crash. In a conventional machine the rider is either thrown clear or can easily step off whether the bike low-sides or high-sides and away from the bike is usually the best place to be. But an alternative is catered for in the Quasar. The body and the supporting space-frame will stop the bike falling right over on to its side, the very low mass will also prevent any tendency to roll further, so the rider's best bet is to hang on tightly and simply let the machine slide along until it stops. In fact seat belts are quite a realistic proposition. Obviously crashing is not safe but Malcolm convinced me that the Quasar offered better than usual odds.

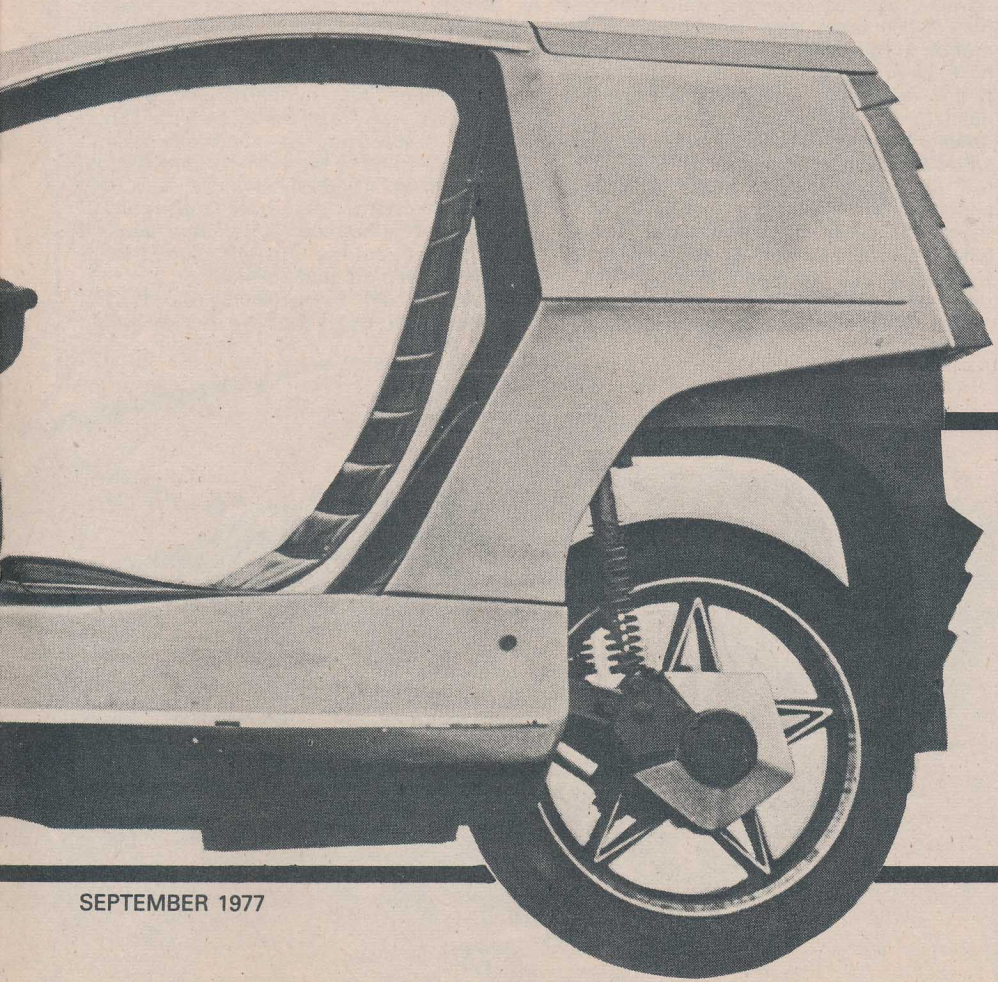
The shape provides a sitting-back riding position, with the rider suspended on an adjustable, hammock-like leather strap. Malcolm again claimed that passenger carrying was quite feasible but the passenger would certainly have to be the right size and shape.

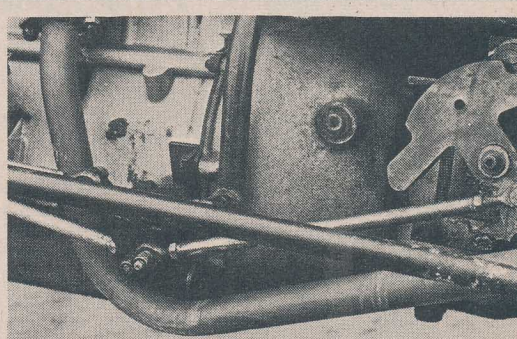
The fuel tank is located behind the gearbox, immediately under the rider, so the standard pump is necessary while fuel taps are not and the comprehensive instrumentation includes a fuel gauge. Basic controls are identical to a conventional machine with discrete hydraulic operation for both brakes and also the clutch.

The original steering head bearing was prone to wear, so now a massive 3-inch taper roller is fitted, the steering being connected to the handlebar via rose-jointed drag links. The linkage has a 1:1 ratio, and since the phosphor-bronze joints were found to wear, PTFE bushes have been used, apparently successfully. Different steering ratios can be used, although lighter steering restricts lock, while heavier steering isn't really desirable. However, in conjunction with the range of adustment offered by leading link forks it means that the optimum of steering effort, castor and trail should be easily found.

The rest of the design builds in the fairing and luggage carriers (rear panniers are available) as an integral part of the machine, which has to be better than sticking them on afterwards especially as it can then cope with other items, like the aerodynamic shape.

Good stability and low drag is the object of the overall shape. The flat, front screen is obviously subject to pressure and negative lift and its pillars act as fences, not unlike those on aircraft wings, to prevent the flow spilling over the sides and breaking up. The tail and side panels are also shaped to





Positive-stop gear linkage has cranks and tie-rods coupled with rose joints. The exhaust system is stainless steel.

discourage turbulence as far as possible and to keep the centre of pressure behind the machine's centre of mass. Although it looks nose heavy, static weight distribution is actually 50-50.

The nose cone carries twin 75W light units, which should be enough for most needs, while the front indicators are mounted behind GRP lenses flush with the side panels. The whole of the "louvred" rear panel is a GRP lens for the tail light, with indicator sections at the top. The maximum tail-light power legally allowed is 5w but tail lights present a problem. Either they cannot be seen at a distance or they are too bright close up and usually they are low enough to be obscured by furniture on the road.

The Quasar's answer is diffuse lighting. Three neon tubes live behind the tail light, giving a gentle 5W from each square inch of the red GRP moulding. It doesn't glare — in sunshine you can barely tell when it's on — but at night it can be seen four miles away! Stoplight power comes from four bulbs housed under the neon tubes. In both units individual bulb failure will not cause a light failure, and the unit is high enough to be seen in traffic.

Everything is flush with the body shell, including the mirrors, and all of the lenses are glass fibre, so in a crash nothing gets wiped off, nothing gets shattered. Malcolm claims that in a simple lay-down the machine shouldn't suffer more than scuffs and scratches and even something like exploring a ditch should leave the Quasar rideable afterwards.

The Reliant engine contributes most towards the low running costs; the exhaust system is a particular example to make big bike owners cringe. It is tucked away, so it doesn't have to be pretty, nor does it get bent in a crash, it's made of stainless steel (this one had been fitted for 58,000 miles with no signs of deterioration) and if a replacement is needed it only costs £32.

It is particularly satisfying to note the way all the design features click into place, each complementing the other but there are disadvantages as well, as I discovered on my first ride at the test track. It's hard to keep an open mind on a new design like this, we all have prejudices and, frankly, the appearance of the Quasar didn't turn me on. A heavy, long-wheelbase machine is not easy to get used to in any case, and one with such an unfamiliar riding position and remote steering probably needs a few days to fully adapt to its low-speed handling. So the fact that I felt relatively confident in it after an hour and a half is probably a compliment.

Getting into the device was the first problem — my head kept hitting the roof — and from an armchair position it is not easy to reach forward to do things like switch on the ignition. Malcolm maintains that this sitting position is the most natural and comfortable — I still prefer a leaning forward attitude but I'm willing to concede it may be blind prejudice and that, on a long motorway, his position may give maximum comfort.

The handlebar controls were just great: a starter, horn, indicator, wiper control and blower (for the ducted air) are all operated by two stalks needing no more than an idle twitch from either thumb. And both switches have a positive action, they cannot be pushed too far to go past the "on" position or be inadvertently cancelled.

The other controls are mounted up on a fascia with the instruments, above the tape deck, and reaching the ignition, lighting switch, choke, etc., was very difficult. There are plenty of places where these secondary controls could be more conveniently mounted.

The riding position puts your feet up and takes the weight off them, which is good in armchair design but armchairs do not go over bumps or fall over when they stop. Although the strap seat is comfortable, all bumps which arrive at the rider do so via the base of the spine. Instead of footrests there are running boards — good again because you can move your feet around on a long journey. The bad bit is that it is awkward to put your feet down to balance when the device has stopped or to manoeuvre in limited space. Obviously it would get easier with practice, but it is still difficult to get enough leg leverage to control the bike properly, except for paddling backwards.

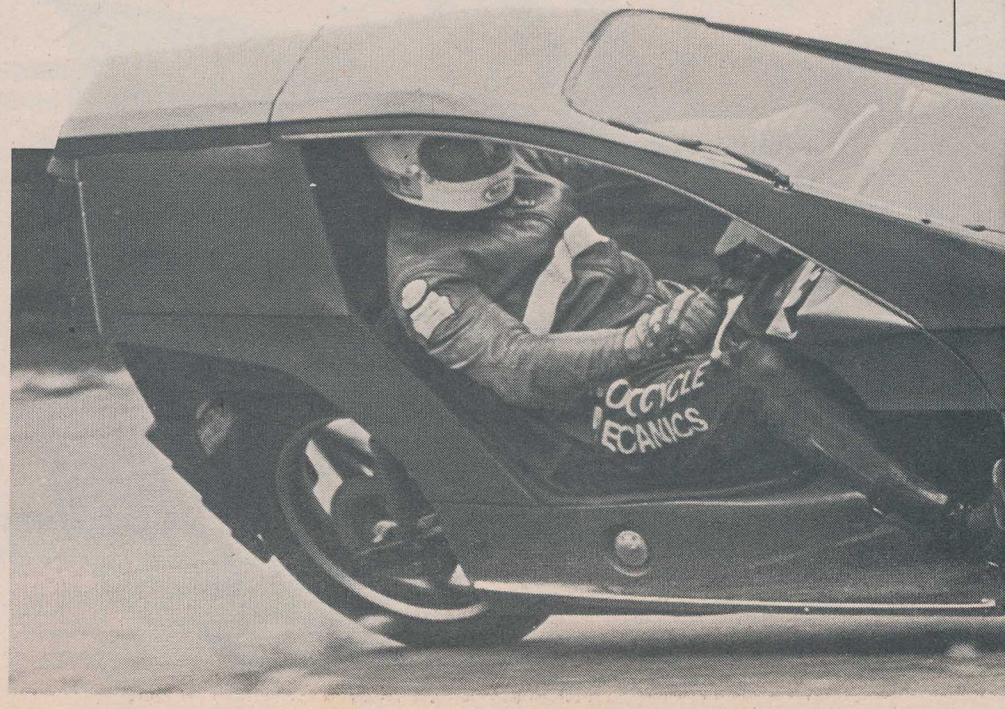
Gear selection was the next problem and lead to the only serious flaw in the machine. The Reliant box is not easily adapted to a remote, positive stop gearshift. This one had 58,000 miles wear and a lot of lost motion in its linkage so it presumably could have been slicker. There are two rocking pedals — shoving forward on the top one changes up, while the lower one changes down, but each has to be pushed a long way with considerable force in order to accomplish the change. It wasn't helped by a heavy clutch which was dragging slightly — I don't think this could be adjusted out either, when you consider you are exchanging 5 or 6 inches of foot movement for 2 or 3 inches of finger movement.

The wobbles, lurches, wild kicks and steering flutter which accompanied my first take-off were not typical but do emphasise the lack of fine control at very low speeds. It has a surprisingly good steering lock, although I never did manage a full lock turn because nearly all slow manoeuvres have to be done feet up and once you go below feet-up speed, you have problems.

Under way in second gear, everything settled down and the Reliant motor picked up with a deep rorty note from the exhaust which seemed very much in place. Three determined kicks on the top pedal secured third gear just as the Quasar entered the approach to the first turn at our test track. I was so pre-occupied with the gear shift that I hadn't noticed what the horizon was doing; when I did look, it was tipped up at quite an alarming angle, wavering about as I over-corrected the controls. All steering is done on the handlebars giving an unusual sensation because the steering effort comes from the wheel which is, of course, several feet in front of the bars. It was nothing to the sensation caused by the windscreen pillars though. The narrow screen and relatively wide pillars are fixed by your mind as its vertical reference; as the bike leans into a turn your mind rejects this and interprets it as the rest of the world tipping the other way, as if you are watching a film taken from a bike. After the initial shock, this had a charm of its own. All of the rest of the ride was marred by the gearshift's lack of precision but a gentle 60 to 70mph cruise certainly confirmed that the Quasar was a relaxing, pleasant machine to roll along, soaking up the miles. There's no doubt that in foul weather you wouldn't stay dry, but you wouldn't get soaked or suffer frozen extremities.

Before my ride I'd followed the Quasar round the track, on a KH400. Malcolm wasn't putting it through the turns particularly quickly, and showed a clear preference for the outer circuit rather than the handling course. I was surprised at how quickly it would trundle away from the turns, but into each one I had to back off on the Kawasaki in order to stay behind the Quasar. No doubt Malcolm could have gone quicker and the roadholding would have allowed this as well, but the Quasar's ground clearance was rapidly diminishing.

When it came to my turn I noticed that it was going through the turns some 10mph



slower than most roadsters — in fact the Quasar's speedo was accurate at 70mph so it was, on average 3 to 5mph slower — and occasionally touched its prop-stands down. There is rarely room to corner as fast as this on the road so there are no real complaints about the machine, it was certainly steady enough.

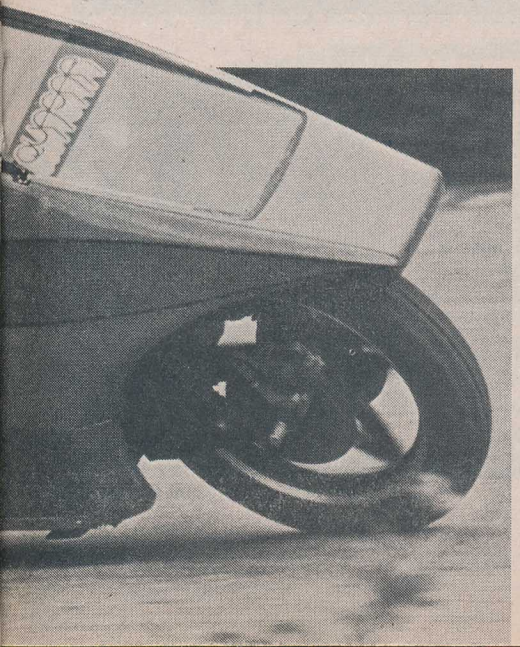
No doubt the aerodynamic bit works, judging from the Quasar's high speed performance pulling a grossly-overgeared top. There is virtually no buffeting in the riding compartment, the only effect being that a loose jacket will fill up and balloon out, rising up under your chin like an automatic life-jacket. But the screen pillars restrict vision going into turns and the aerodynamic flow up the screen could possibly be measured by the amount the screen wipers lifted.

What does restrict the machine is the gearbox. It's tempting to describe the Reliant as having a lot of torque at low revs and a wide spread of power, so it only needs the minimum of gears. It doesn't only produce torque at low revs, it *peaks* at low revs. Max horsepower comes at 5500. So to get a realistic top speed — say 100mph — top gear needs to be very high, at 18mph/1000rpm. Bottom gear needs to be low, first to propel the weight and second to allow it to be ridden slowly as clutch-slipping would spoil what low speed control there is.

So bottom gear is a crawler, top gear is very high, and if a relaxing overdrive effect is wanted, even higher; and there are only two gears to fill the gap in between. Although the motor is very tractable, its power band is only 4000rpm — nearly as narrow as a TZ750 — whereas most roadsters have a spread of about 7000 usable rpm. Then there is the fact that the Reliant has an all-synchromesh gearbox which means that gearshifts have to be slow and deliberate. In the state in which I rode the Quasar it had a high ratio final drive giving just over 90mph in top at 4500, 90 in third, and over 60 in second. Top gear was nice for motorways and probably good for optimum fuel consumption — say 70mpg — while third gear had to cope with just about everything else.

The big jumps between the wide ratios meant that it was not advisable to change down unless the machine was completely vertical, otherwise it would leap across the road, and this left it at a distinct disadvantage through the handling course.

The suspension was too hard, although Malcolm admitted they still haven't got it completely sorted out yet. It was uncomfortable over bumps and, following the Quasar, the rear wheel could be seen chopping over the sort of bumps that had our Kawasaki hingeing in the middle.



There was just one point about which I still have some reservations. I accept that the Quasar is safe if it has to be laid down. But often, when you slam on the brakes in an emergency, you overdo it and lose one wheel. Sometimes, on a conventional machine you can ease off and correct it feet up, and sometimes this would apply on the Quasar. Other times it reaches the point of no return and the only remaining control is a judicious kick with one foot to pick the machine up and get it into line again. This, as far as I can tell, is not much of a possibility with the Quasar — having lost it, you would have to let it fall over and slide on its side.

The Quasar has a whole list of advantages over conventional machines and the points which may appear as disadvantages are not so much faults as the specialised nature of the design. A conventional 750 is compromised to hell; the sheer power output makes it sporty while the riding position makes it a sedate tourer; it will fit all sizes of people who can reach the floor from a 32 inch seat height; it tries to be as good in heavy traffic as on a motorway and in spite of the generalised nature of the design it goes round corners reasonably well. It doesn't reach perfection in any of these aspects but it does all of them tolerably well. The only points which do stand out are mind-shattering acceleration and wallet-shattering fuel consumption.

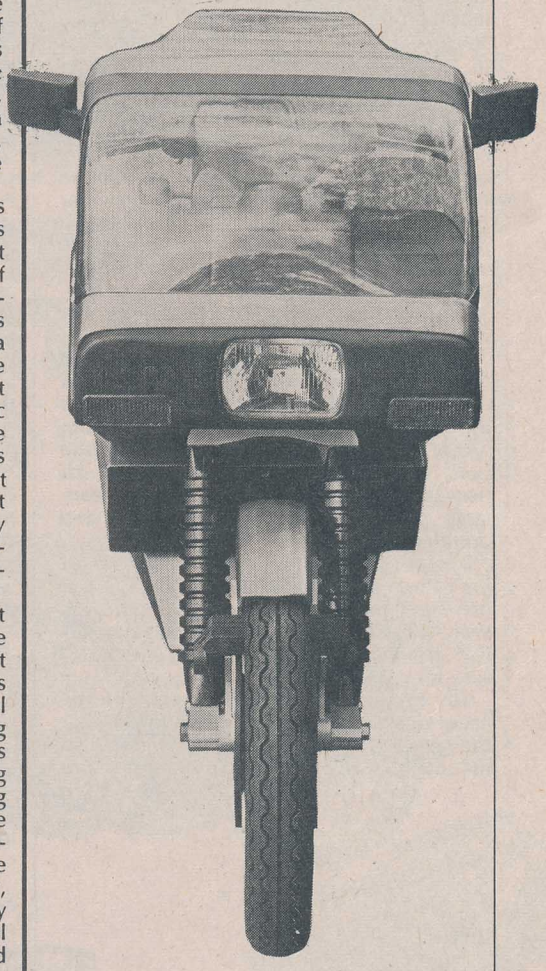
The Quasar has to be seen in a different light. By aiming at a higher standard in some aspects it inevitably loses out on others. It doesn't have shattering acceleration but this is more than compensated for by its fuel consumption. Handling and roadholding cause no complaints, except reservations about the suspension and if its cornering abilities were improved — by increasing ground clearance — its weight would be higher and it would lose some of its crash-safety features. It is designed as an ultimate tourer; 70 to 80 mph cruising in comfort, with good weather protection, a stability that is largely self-correcting and fuel economy. As a very good, open road machine it obviously isn't as good in town.

Despite Malcolm's claims about whizzing through traffic, there are problems both of visibility and of the width needed in which to put your feet down. The rider cannot see the front of the nose fairing, or its sides, which is the widest point on the bike. The only rearward view is that from the mirrors, the rider cannot turn or look back to any appreciable extent so anything in the mirrors' blind spots stays blind.

The best time of all on the Quasar was trundling around the track, treating it like an open road by only using the left half of the surface. At the necessarily reduced speeds, with the minimum of gearshifts — and of effort — the bike was both relaxing and fun to ride at the same time. Under these conditions it was hard to find fault with it and easy to understand the compliments paid to its handling in other reviews. And had it rained, no doubt the impression would have been better still.

JOHN ROBINSON

AN IMPOSSIBLE DREAM?



AFTER the Star Trek image of the Quasar the SPX 500 looks almost conventional, even ordinary. Looks, though, can be deceptive because in this case the designers started with a clean sheet of paper and no preconceived ideas about what the ideal touring bike should look like. As a result the SPX's sleek lines conceal some novel and highly practical features.

Andrew Michell and Tom Tivendale, the creators of the SPX, joined forces to produce their dream machine while studying industrial and engineering design at the Royal College of Art. It all started out purely as a design exercise but the wood and plastic mock-up has created enough interest to set its designers thinking about building a running prototype although it will not be possible to use the Bernard Hooper/John Favill stepped-piston two stroke engine around which the mock-up is built.

If looks are anything to go by this machine could be a winner, what is more it features a lot of practical ideas that could be incorpor-

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ated into existing designs. The switch gear is an excellent example and reflects the amount of thought that has gone into the ingenious design features of the SPX.

Anyone can throw a collection of surplus Lucas switches onto a piece of ⅞in handlebar, but not so Michell and Tivendale. To start with the flasher switches are mounted in a really ingenious way and, like most good ideas, it's so simple it's surprising someone has not thought of it before.

Two flasher buttons are used, one on either side of the handlebars. When turning right all you do is nudge the button with the outside of your thumb on the right hand bar and vice versa for left. With this setup it doesn't matter how big, or small your hands are you can still operate the switchgear without needing the finger span of a gorilla. The indicators would, of course, be self cancelling.

To operate the horn all that is needed is to firmly squeeze the bars together. Since this operation would invariably be accompanied by white knuckles, the inward pressure would probably be fear assisted and the horn would come on automatically! The left twistgrip, yes left hand, operates a headlamp flasher during daylight hours and doubles as a dipswitch at night.

The only time a rider would need to relax his natural grip on the bars would be to put on the lights or operate the engine kill switch. The switches have V shaped cut-outs with the major area of the V on the "ON" side for ease of operation.

The bars are designed to break off in the event of an accident and the same goes for the screen. The smooth contour of the front mounted panniers should ensure a smoother passage for the rider who parts company with the machine in a head-on accident.

At MCM we are always bemoaning the fitting of rear panniers and top boxes since this is not the ideal place to carry weight on a motor cycle. Tom and Andrew's answer has been to design two massive panniers which fit neatly up front where extra weight should be carried and blend in nicely to become part of the fairing. They can be unlocked from the machine and carried off with their own built in handles. Each one is wide enough to take a full face helmet. Positioned between the panniers is a neat, lockable, glove box for odds and ends like road maps, passport and wallet.

The lower section of the fairing incorporates a full width radiator for the water cooled engine, just imagine all that lovely warm air blowing over your legs in the winter. The radiator and lower section are angled downward as much for effect as for the downthrust, but the fairing has been tested, using a scale model, in a wind tunnel.

During the wind tunnel tests it was found that quite a large screen and "flip", at the top, were needed to direct the air flow completely over the rider and this looked ugly. So, by way of a compromise the screen was arranged so that the air was directed up to head level where the draught will clear a helmet visor of water spray.

Most seats have to adapt to the shape of the average backside but on this machine comfort is given a head start with the seat being contoured and moulded from polyurethene foam. A bonus is that it's completely water proof. Andrew and Tom recognise that not everyone is issued with a British Standard leg size and have allowed for this with a clever adjustable seat mechanism.

The seat is mounted on a subframe that can be swung in an arc to raise it and as it moves back at the same time this provides a longer push to the bars. It was designed to move in this manner since it is reasonable to assume that someone with longer legs will have correspondingly longer arms. The range of adjustment goes from around 29in up to 31in.

Suspension at the rear is quite conventional with a pivoted fork and only slightly inclined coil spring damper units. It's nice to see the pillion footrests mounted on the frame, rather than just tacked onto the suspension arm. Up front the suspension is anything but conventional as the bike proudly boasts a set of Dr Roe/Dr Thorpe leading link front forks as described in the July issue of MCM.

The frame on the full scale mock-up was made from box section tube and should make for a nice light machine. The fuel tank is carried under the seat, as on the Honda Gold Wing, and helps to keep the centre of gravity nice and low.

Since the battery can no longer follow conventional practice and live under the seat it has been shifted up front and now rests between the front panniers, just in front of the glove box.

The wheel base of the prototype is a longish 59in but on the running model this will very much depend on the type of power unit selected.

The power unit installed in the mock up is based on the Favill/Hooper stepped-piston, 500cc two-stroke twin with 180 degree crankshafts.

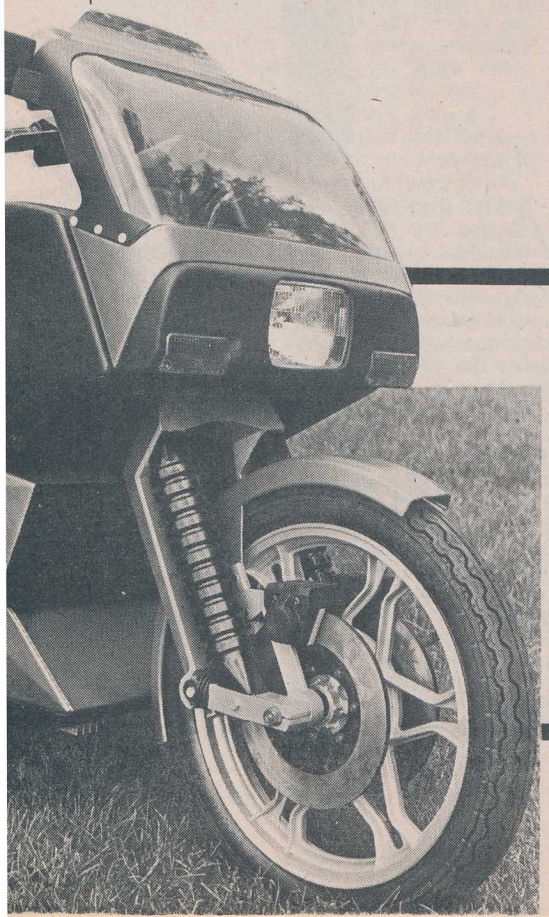
A two into one exhaust system feeds into an expansion chamber on the off-side of the bike. From the expansion chamber the gases pass under the machine and into a large volume silencer. The gases finally enter atmosphere via an annular discharge section on the end of the silencer.

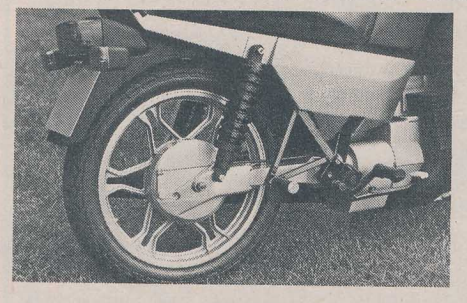
The complete engine/gearbox unit is rubber mounted so that "bad vibrations" would not reach the rider during a long journey.

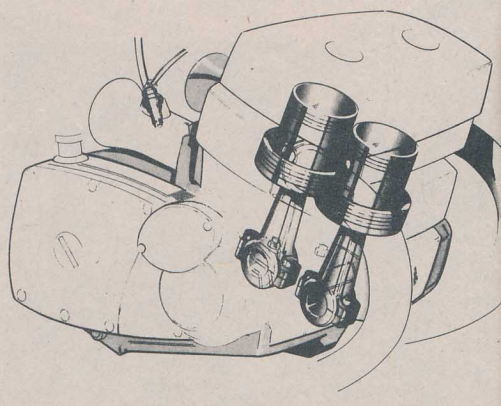
The brakes follow conventional lines the rear unit being a drum and the front double discs. The front calipers are single piston floating type and bite on cast iron discs. The front suspension would be arranged to limit nose dive when the brakes are applied in anger.

As far as turning this dream into a reality goes I just can't see it happening basically because there are no shaft drive engines at present on the market that could be adapted into the design. It's nice to see two keen young men applying their training in the direction of the two wheeled world, but I can't help thinking that they will both end up in an industry other than motorcycling.

DAVE WALKER







The mock-up of the SPX is built around a stepped-piston, 500cc, in-line, two stroke engine with drive to the rearwheel by shaft.