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MARCH 1977 35p

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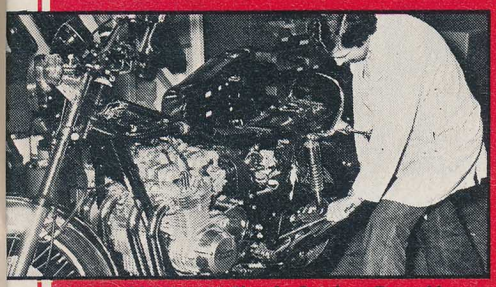
MOTOR CYCLE MECHANICS

MARCH



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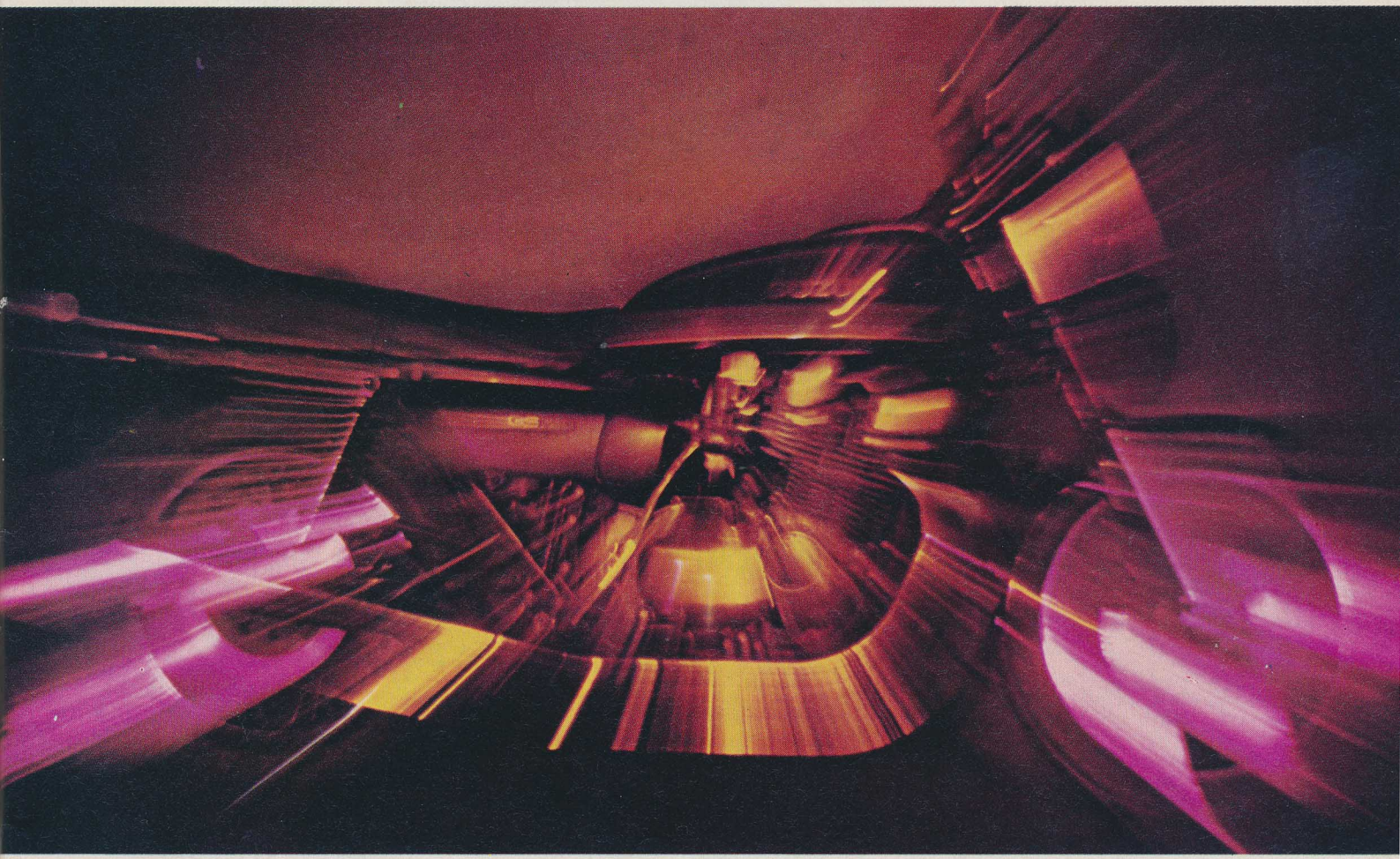
RIGHT FIRST TIME

ROAD TEST

SUZUKI GS750



by Bob Goddard

SINCE Honda first introduced the four-cylinder 750 back in the late 60 s there has really been very little development on Japanese 750s to produce a nicer motorcycle — until the Suzuki GS 750 appeared, hot on the heels of Yamaha's 750 triple.

Of course, Suzuki brought out their two-stroke, water cooled triple to grab a share of the superbike market, but it was too heavy and cumbersome to be much of an improvement, and although Honda have been steadily modifying their 750 through the years there has been little significant recent progress, some would even say the old K2 Honda was preferable to the latest F1.

With the GS750, Suzuki have made a very definite step forward in performance, handling, comfort and general rideability. In short, it is a much nicer motorcycle, and an excellent combination of the best features of Honda 750 and Kawasaki twin cam engine design, with a pinch of Suzuki finesse and originality thrown in.

It has a combination of speed, acceleration, tractability and fuel economy superior to any 750 that has gone before and fulfills both the sportster and tourer markets quite adequately. It trickles through traffic like a lightweight, takes bends like it was designed by a TT rider and is so comfortable to ride that a 150 mile non-stop run on a cold December night was a pleasure.

The GS looks a big hunk of metal, but once on board the seat is low enough to get both feet firmly on the ground, and the riding position is so comfortable that the bike feels more like a 500. Sitting well forward on the roomy dual seat and leaning slightly into the wind, the flat handlebars were in exactly the right place, and with knees gripping the sides of the nicely shaped tank, feet tucked behind the warm engine cases, the big Suzuki provided the most comfortable riding position of any bike I have ridden for years.

The impression that the bike was smaller than a 750 was enhanced by the light steering, and the bike's ability to change course quickly without heaving and straining on the bars. Unfortunately, the illusion was quickly shattered when putting the brakes on, especially in the wet, when the Suzuki's single disc stoppers front and rear showed themselves to be barely adequate for the bike's size and performance. The biggest shock came within

SUZUKI GS750

ROAD TEST

the first few hundred yards on a cold, wet winter morning. Approaching a T junction the brakes made no perceptible effort to slow the machine down and only by using engine braking and by going down through the five-speed gearbox, did I just manage to avoid discovering the absorption properties of a very large and very prickly hawthorn hedge.

Holding both brakes on for the next few hundred yards warmed the discs and dried the pads sufficiently for either wheel to be locked on the wet road surface. Thereafter I made a habit of gently waking the brakes up in this way each morning. Both brakes had a little more bite on dry roads, but still didn't have the confidence inspiring, breathtaking retardation of the double-disc Kawasaki set-up.

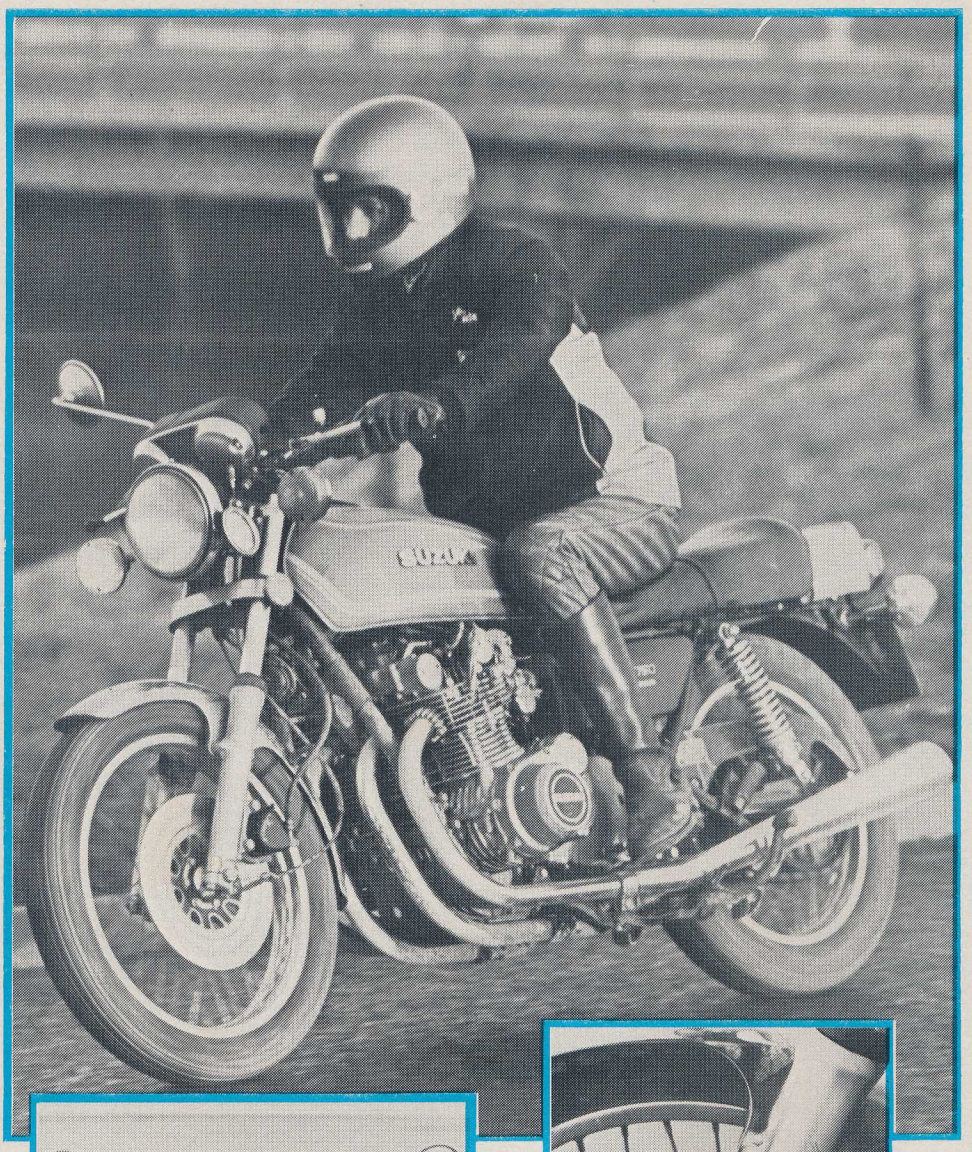
After a couple of days I got used to the brakes, made allowances for them, and didn't scare myself again. While on the subject, the brake light was only operated by the foot pedal, so when using only the front brake there is no warning to drivers behind. The US and Canadian spec models have a front brake lamp switch but they lose the handy head-lamp flasher, so it's as broad as it's long.

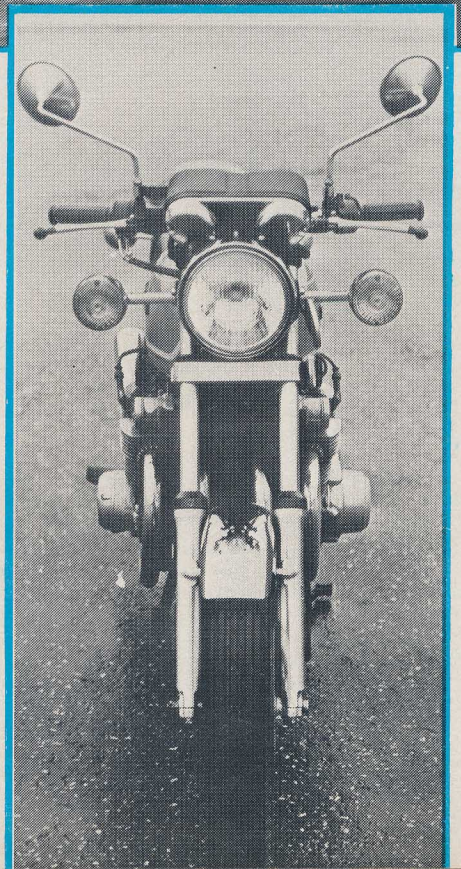
FINE CONTROL

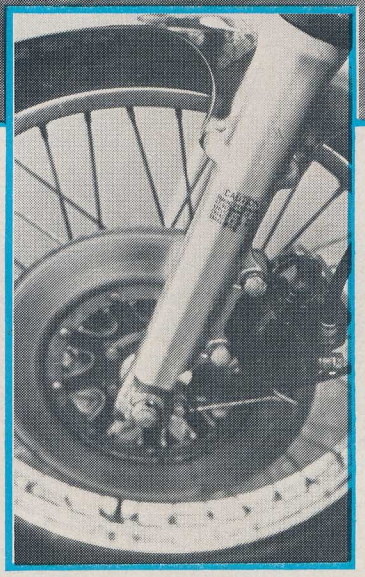
When swinging the bike through country lanes the brakes were rarely needed, so good was the Suzuki's handling. The bike could be taken into bumpy bends much too fast and on the overrun and could be picked up on the throttle at the apex and powered progressively out with the sort of fine control and stability you would expect from a racer. This was only let down as the motor switched from overrun to power, when there was a slight snatch which got past the rubber shock absorber in the rear hub. It only happened near the lower end of the rev range and when the motor was really singing the power came back in very smoothly.

Suspension front and rear was evenly matched and adequately damped. Bumps were absorbed with the minimum fuss, and the tyres didn't skip even when cranked hard into bumpy bends that I knew would make many bikes do peculiar things. Unlike the BMW's suspension which soaks up bumps without even informing the rider that they exist, the Suzuki's suspension passed on a wealth of information about the road surface to the rider's hands and backside. After a while I found that I could turn on the power going into bumpy wet bends until the rear wheel drifted an inch or two on each bump, and then hold the throttle there to execute some of the safest and fastest wet-road cornering I've ever dared.

A year or so ago, such riding on a Japanese 750 would have stunted your growth — not to mention your insurance company's — and the chassis improvement shows a new emphasis in development which, I under-







Warning sticker on the front forks reads like an apology for the brake's pathetic performance in the wet. When cold, the brake doesn't work at all.

For a 750, the Suzuki presents a very sleek frontal area, and the flat bars give an ideal riding position. Outer plug leads suffer from the wet.

stand, is equally evident in Kawasaki's Z650 and Yamaha's 750 three.

But the Suzuki's designers have not been so wrapped up in chassis design that they have overlooked the motor. In building their first four-stroke roadster the factory has spent some time getting the best features of current four-stroke technology into one tidy lump. As a result they have got their sums right first time.

Right down to 1,500 rpm the big dohc four stays tractable and smooth, and even snapping the throttle open, it will purr away smoothly without throwing any tantrums. Apart from a flat in the performance curve between 4,500 and 6,000 rpm, which can be measured on the dyno and detected by a vibration period, the motor picks its heels up from 2,000-4,000 rpm moving into a steady canter from 4,000-6,000, and breaking into a full gallop from there up to the 9,500 rpm red line.

It is difficult to say how much quicker or faster the Suzuki is than the Honda 750 without riding both on the same day and circuit, but it is a very quick bike and, unless you find Z900s tame, the GS750 should have enough power for most. The gears are well spaced and, like all Suzukis, the shift was faultless.

The 123 mph top speed and 13 second ¼ mile are a smidge better than the 750 Suzuki two-stroke triple, and compare very favourably with the Honda 750 and Kawasaki 650. But where the Suzuki beats them all is with the sound it makes. Subtly subdued below 4,000, the four-into-two exhausts emit a mellow drone as the revs rise and power soars, hardening to a racy howl towards the top end, and is sufficiently sharp to get the rider's adrenalin flowing without acting as a homing device for bored traffic cops looking for an easy kill.

DELICIOUS

Of the numerous configurations of pipes and silencers per cylinder devised by the Japanese over recent years, the delicious sound and clean lines of the Suzuki's four-into-two must make this system the best compromise of the lot.

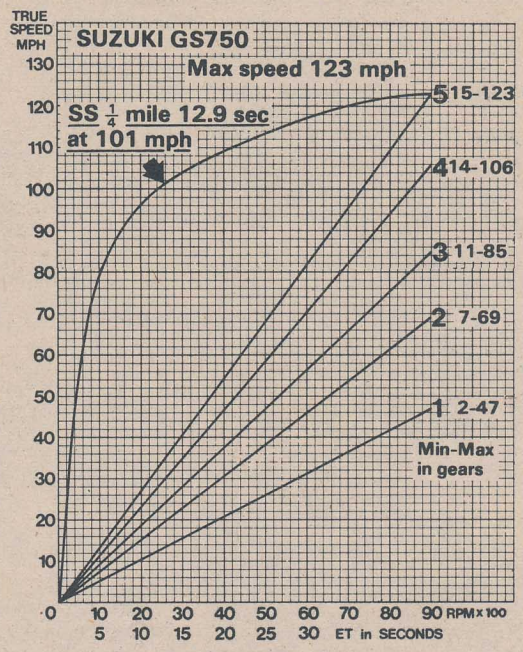
In filthy winter weather, the two outer plug leads which had metal plug shrouds, shorted out the spark before it got to the plug, and on several mornings I had to spray them with Damp-start to get the motor to run on four. Inevitably, one morning I was hurrying to work when the motor ran on to three. Seeing fat blue sparks jumping along the left hand plug shroud, I reached down and gave it a jiggle, and got a charge of several thousand volts up my arm as the motor chimed in on four on full throttle in second gear. In case you are ever tempted to try the same thing — forget it, it's not nearly as much fun as it sounds.

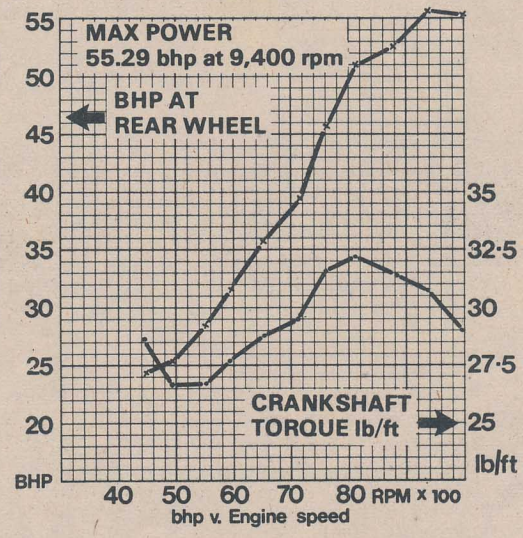
The 40/50 watt headlamp produced stacks of light, and most of it shone in the right direction but for some odd reason, the dip cut-away left a beam of light shining up the offside of the road instead of the nearside verge, which didn't please oncoming motorists. The instruments were illuminated by a warm red glow which didn't distract my attention, but brought several oohs and aahs from onlookers when I switched on and the comprehensive data bank lit up.

Now standard on Suzuki multis, the gear

continued on page 20

PERFORMANCE AND SPECIFICATION





HOW IT COMPARES

MODEL	Pr. inc. vat	max. spd	av. mpg	ss¼	dry wt.
Suzuki GS750	£1260	123	44	12.9	492
Honda CB750F	£1295	110	41	13.5	498
Suzuki GT750A	£1140	118	42	13.6	507
Ducati 860 GTS	£1599	107	43	13.1	506
Kawasaki Z750	£949	102	45	15.0	481
Moto-Guzzi 850T3	£1699	109	54	15.1	495

TRACK CONDITIONS

Raining, no wind, 41 degrees F

PERFORMANCE

maximum speed ..... 123 mph
braking from 30 mph 47ft 9in
fuel consumption: worst ..... 40 mpg
average over test: ..... 44 mpg
best ..... 51 mpg
speedo error ..... 6 mph fast at 70 mph
tacho error ... 500 rpm slow at 6,000 rpm
power to weight ratio ..... 0.1079 bhp/lb

ENGINE

Aircooled double overhead cam four cylinder fourstroke in-line across frame. Displacement 748cc, bore x stroke 65 x 56.4 mm. Compression ratio 8.7:1. Lubrication by trochoidal oil pump from wet sump. Three phase ac generator feeding 12v 14 ah battery, ignition by twin cb and coils. Carburation by four 26mm Mikunis.

Claimed power output at crankshaft.
68bhp at 8,500 rpm
Brake output at rear wheel
55.29bhp at 9,400 rpm

TRANSMISSION

Geared primary drive to wet multi-plate clutch and five speed constant mesh gearbox. Endless chain final drive with sealed-in grease lubrication.

primary drive ..... 2.152 gear
final drive ..... 2.733 chain
gearbox ratios:
2.571, 1.777, 1.380, 1.125, 0.961

CHASSIS

Telescopic oil damped front forks, and damped, five-position adjustable rear shocks on swing arm. Single disc brakes front and rear.

front tyre ..... 3.25 x 19 Bridgestone
rear tyre ..... 4.00 x 18 Bridgestone
wheelbase ..... 58.7 in
castor ..... 63 deg
trail ..... 4.21 in
ground clearance ..... 5.9 in
seat height ..... 31.5 in
overall length ..... 87.6 in
overall width ..... 34.3 in
overall height ..... 46.1 in
dry weight ..... 492 lb
test weight ..... 512 lb
fuel tank ..... 4 gall
inc reserve ..... 3.6 pts
oil sump ..... 6.4 pts

PARTS PRICES inc VAT

front mudguard £17.27
handlebar £8.06
speedo cable £3.15
cb points (two) £6.48
exhaust system (complete) £101.6
list price £1260

warranty: Six months/6,000 miles, parts and labour.

Importer: Heron Suzuki GB Ltd., 91 Beddington Lane, Croydon, Surrey.

SUZUKI GS750

ROAD TEST

RIGHT DOWN

CONVENTIONAL THEY MAY BE, BUT SUZUKI'S NEW 750

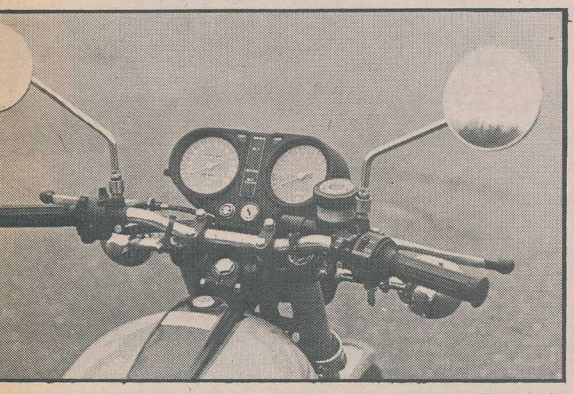
indicator quickly became unreadable after condensation got inside the glass.

A comfortable dual seat hinges up to reveal an average toolkit in a tray above the battery. There is storage space in the tail fairing big enough for a lightweight oversuit to be stashed.

The pleasantly smooth lines of the petrol tank belie its four gallon capacity which is enough to give a respectable touring range of a little under 200 miles from full to dry. I did get 51 mpg one day, but 45 mph riding seemed such a waste of a fast motorcycle. I soon reverted to my 42 mpg norm, giving 44 mpg overall. This isn't quite as good as the Honda 750 or Kawasaki 900, and way below the incredible MV 750.

The Suzuki used no oil at all, and apart from the occasional squirt of lube on the endless chain, which has grease sealed into the rollers, and one chain adjustment during the 900 mile test, the machine required no attention.

Two large rear view mirrors were isolated from any vibration reaching the short flat handlebars by rubber mountngs, and they gave a good clear view of the road behind. The paintwork, particularly on the petrol tank, was very glossy and smart, but closer inspection of the frame and swinging arm showed several places where the paint had flaked away. The depth of paint was very thin. Chromework was good, however, and all alloy parts highly polished.



Flight deck on the GS has standard Suzuki switchgear and excellent instrumentation.

Suzuki must be commended not only for building their first four stroke motor with all the performance and strength you would only expect from years of development, but for producing it in a frame that handles beautifully. The machine is surprisingly easy to ride, delightfully comfortable and handsomely appointed with high quality instruments and electrical equipment. The only real grumble is in the braking department — and Suzuki are by no means alone with brakes that don't work properly in the cold and wet. But the warning label on the fork leg is not good enough Suzuki — set a new example and lead your Japanese rivals with brakes that work under all weather conditions. □

SMART styling and arm-stretching performance are the ingredients Suzuki has mixed together for its GS750 four-stroke in-line four, now being billed as "the ultimate high-performance motor cycle" — a claim bound to be hotly contested.

Inside those gleaming aluminium castings, there's a lot of power waiting to be unleashed, and interestingly enough, many of the components, including the twin ohc valve gear, are used in the GS400 twin as well. So, we are looking at two sporters, and although the GS750 will steal the limelight, the GS400, with a balance shaft to reduce vibrations, its close relationship with the bigger bike, and its pleasant styling is likely to be much less a Cinderella than most 400s.

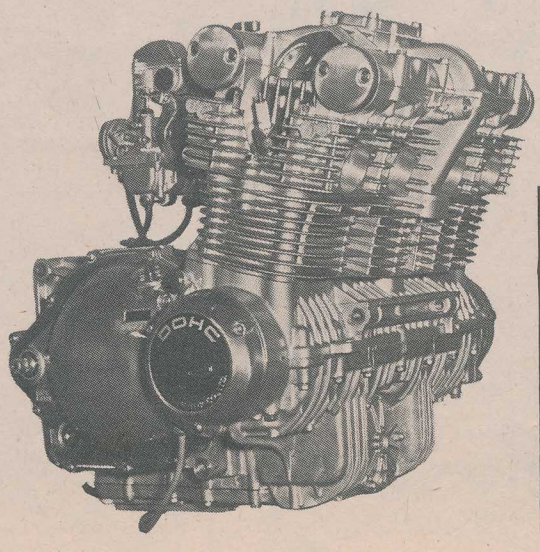
Why did Suzuki go four-stroke anyway? Their engineers give three reasons: good fuel consumption; "super high performance"; easy maintenance; quietly forgetting to mention the fact that two-strokes are going to be hard pushed to meet future air pollution regulations in the USA anyway. Mind you, they emphasise that two-stroke development continues, which means that riders now have a choice of Suzuki two-strokes, rotary engines and four-strokes, which can't be bad.

Although Suzuki go about their engineering in a very thorough way, they've gone straight down the middle with the four-strokes. It looks as if their idea of the ultimate superbike is something like a Kawasaki Z1, but a bit lighter, and with a bit better handling — in other words, they are responding to the market rather than looking for innovation. So, they have gone for a classic layout for the GS750 — an air-cooled, in-line four, mounted across the frame, with chain-driven twin overhead camshafts. To keep it in the family, as it were, the GS400 is an in-line twin.

Partly to keep weight down, and partly no doubt to get as close to the racing image as possible, Suzuki has opted for chain drive, at the same time making some effort to increase chain life without going to the extent of fitting a fully enclosed chaincase.

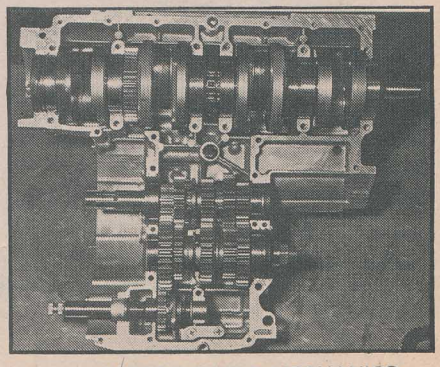
The basic advantages of the four, of course, are that it is in perfect primary balance, so with careful design, vibration can be almost eliminated. Then, because the cylinders are fairly small, it can rev freely, and so give a good power output. To take the aim for high revs to its logical conclusion, Suzuki have adopted a short stroke, so that the engine is oversquare, bore and stroke being 65 x 56.4, to give 748 cc, while the smaller engine has the same bore and a 60 mm stroke to give 398 cc. Although the trend with four-strokes has been towards "oversquare" engines with bores larger than the strokes, most of the Japanese motor cycle manufacturers have stuck with square dimenions — such as the 66 x 66 mm of the Z1, and 61 x 63 mm of the Honda CB750. With its stroke 0.87 of the bore, Suzuki are going some way to catch up with this trend, as incidentally, did Kawasaki with the Z650 which has an almost identical stroke: bore ratio.

Suzuki claim that the GS750 develops 68 bhp at 8,500 rpm, giving it the edge over its rivals — one bhp more than the Honda CB750, and four more than the Yamaha XS750. Maximum torque is 44lb ft at 7,000 rpm, just a bit less than the Yamaha, which emphasises that Suzuki has aimed for top end performance, whereas Yamaha went for a wider spread of power. The GS400 has a claimed output of 36 bhp at 8,500 rpm, with maximum torque of 23lb ft at 7,500 rpm. Both engines produce 90 bhp/litre, which is pretty good, but the GS750 does pale a bit in comparison with the claimed 98 bhp/litre of the Kawasaki Z650. An interesting point about the power



The GS750 has separate clutch contact breaker covers.

All the gears and crankshaft are assembled in the upper crankcase. Note how the position of the kick-start increases the length of the housing.



THE MIDDLE

ENGINE ANALYSIS

AND 400 FOUR-STROKES HAVE BEEN BUILT TO LAST

BY JOHN HARTLEY

curves of the two Suzukis is that the GS750 has a real hiccup between 4,000 and 5,500 rpm, which probably means that the useful speed range is 6,000 to 9,000 rpm, while the GS400 has a much smoother curve, but produces maximum torque at 7,500 rpm, 500 rpm higher than the 750. If anything, with its longer stroke, the smaller engine should produce maximum torque at a lower speed.

JAPANESE STANDARD

Just a glance at the bottom end of the GS750, shows that the motor is a "Japanese standard" with the chain drive for the camshafts taken off the middle of the crankshaft, the starter drive — a two-stage gear drive — and the alternator at the left-hand end, and the contact breakers at the right-hand end of the crankshaft. There is a gear primary drive, and the drive gear is mounted inboard of the right hand cylinder. Since the driven gear is inboard of the clutch, this arrangement prevents the clutch sticking out too far.

There is a five-speed gearbox, with the kick start gear being mounted directly behind the output shaft. Simple though that design is, the positioning of the kick start behind the gears is a disadvantage in two respects: first, it makes the engine longer than it need be; and secondly, it means that the swinging arm pivot must be quite a bit behind the drive sprocket for the chain. The further apart the sprocket and pivot, the more the chain is stretched and then released as the suspension moves, and the more rapid wear is likely to be.

Although the 400 twin follows the same basic layout as the 750, helical gears are used for the primary drive — presumably to cut the noise level — and these are outboard of the engine and six-speed gearbox, but inboard of the clutch. The big difference in the design of the two bottom ends is that the 400 has a balance shaft.

Suzuki has followed the lead of Yamaha's XS500 in choosing a 180 degree twin as a basis for a "balanced" twin. In a normal crankshaft, the counterweights balance a proportion of the reciprocating mass of the piston and gudgeon pin. Normally, on a single, the centrifugal force exerted by the counterweights is half the inertia force exerted by the piston and pin — in other words, at top dead centre, for example, there is a force of one unit pulling the connecting rod upwards, and a force of half a unit pulling downwards on the other end of the rod. That half unit results from the centrifugal force of the counterweight. With a 180 degree twin, there is one piston at TDC, and the other at BDC, so there is an out-of-balance force, equal to a half unit pulling upwards in one cylinder, and another pulling downwards in the other cylinder. Although those forces are balanced vertically, they are not opposite one another, but are offset. As a result, there is a rocking motion, tending to lift first one end of the engine, and then the other alternately once a revolution. It is that "couple" as it is called, that produces the distinctive, but by no means excessive, shaking vibration of the 180 degree twin.

To counteract this vibration, Suzuki has used an extra balance shaft, gear driven at a 1:1 ratio from the crankshaft. There are two counterweights on the shaft, one opposite the big-end of each cylinder, and spaced at 180 degrees relative to one another. Ideally, these should exert the same effective centrifugal force as the counterweights on the crankshaft, and it seems that Suzuki has been able to achieve this.

How does it work, then? Well, the counterweights on the balance shaft are arranged so that they are always facing in the opposite direction to the counterweights on the crankshaft. As a result, they exert a "couple" opposite to the out-of-balance couple of the engine. So, the two couples balance each other out at all times. This means that the twin is in primary balance, and so should vibrate no more than an in-line four. In both engines, there is a secondary vibration, but this is much less than the primary vibration, and is less noticeable. Incidentally, because of its shorter firing intervals, the four will always appear smoother than a balanced twin.

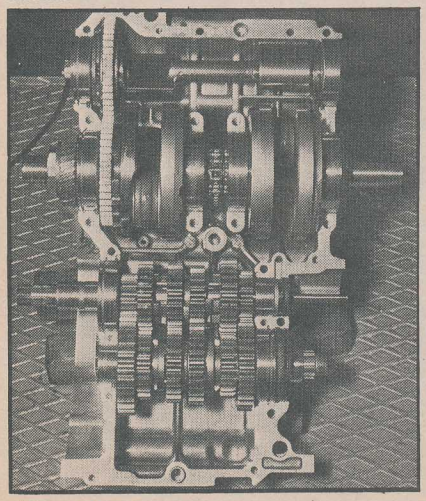
COMMON COMPONENTS

As I mentioned earlier, there are a host of components common to both engines, and these include connecting rods, bearings, pistons, the valve gear, except for the camshafts, of course, the chain timing drive, sprockets and tensioner arrangement, the oil pump, clutch pressure plate and discs — there are more discs on the 750 — and the starter and alternator. As a result, the combustion chambers and ports are also the same, so any high-performance modifications for the 750 will also suit the 400. It also means that from here onwards I can concentrate on the 750, mentioning the 400 where it differs significantly.

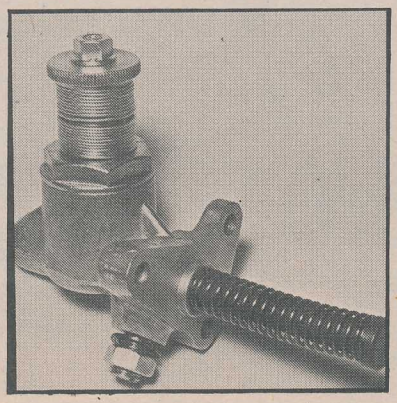
Inevitably, both engines have beautifully diecast aluminium crankcases, split on the axis of the crankshaft and gears, the 750 having a detachable sump plate on the bottom. There is an extra tunnel in the crankcase of the 400 to house the balance shaft, which is forward of the crankshaft, but at the same level — on the crankcase split.

Perhaps the most surprising thing about the bottom end on both bikes is that ball and

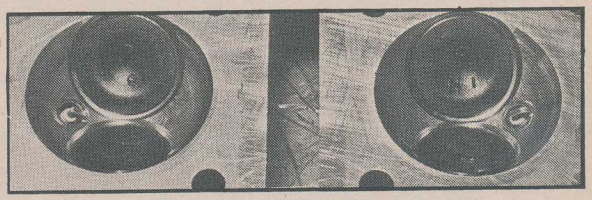
The compact layout of the GS400, with the balance shaft, with its two integral weights forward of the crankshaft.



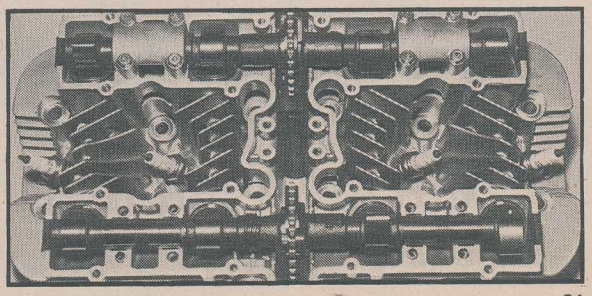
Suzuki's automatic chain tensioner.



The valves are as large as is practicable.



Each camshaft is carried in four bearings. There are only two caps.



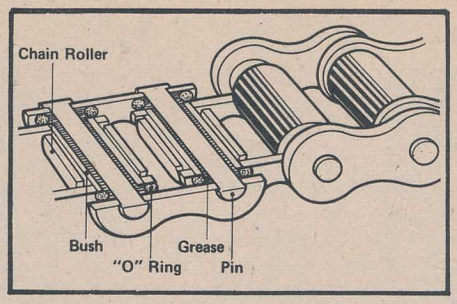
SUZUKI GS750 400 FOUR STROKES

ENGINE ANALYSIS

roller bearings are used for the crankshafts, and for the balance shaft. This, presumably, reflects Suzuki's experience with two-strokes, and their lack of experience with shell bearings. As a result, the crankshaft is big, heavy, and undoubtedly very expensive to make. On the other hand, it should last for ever, but if there is a failure, replacement is going to be very expensive. There are six main bearings on the four, and four on the twin.

Long through-studs retain the barrels and heads to the crankcase upper half. Deep fins cool the barrels, those for the inner cylinders being slightly longer than those for the other two, while there is an air space with few fins between the cylinders. To prevent "ringing", there are vertical ties between the fins, while rubber blocks are placed between the angled fins on the heads. Each head is basically a single casting, split on the axis of the camshafts so that there are separate bearing caps and cam covers.

Domed pistons with valve clearance cut-outs are fitted to the forged steel connecting rods, and each has three rings. The piston skirt to bore clearance is 0.05-0.06 mm (0.002-0.0024 in). One unusual feature here, though, is that the gudgeon pin is carried directly in the bore of the connecting rod — without a bearing or bush. Some car manufacturers use



Longer life is claimed for the new final drive chain which has greased and sealed rollers.

this combination, but they use a force fit between the pin and rod so that there is no relative movement. On the Suzukis, a small clearance of 0.008-0.02 mm (0.0003-0.0008 in) is used, so there is a steel-on-steel bearing — an inexpensive and unusual combination.

Combined with the domed piston is a part spherical combustion chamber giving a compression ratio of 8.7:1. The shape of the chamber is dictated by the included angle of the valves — in this case 60 degrees, which gives a pretty compact chamber. The 35.5 mm inlet valve, and the 30 mm exhaust valve seat in shallow recesses formed by chamfers, and are just about as big as can be installed, their edges coming very close indeed to the edges of the chamber.

Lift of the inlet is 8 mm, while the exhaust is lifted 7.5 mm, these figures being between those for the Z650 and the Yamaha 750 triple. Valve timing is: inlet opens 30 degrees BTDC, closes 70 degrees ABDC; exhaust opens 70 degrees BBDC, closes 30 degrees after TDC.

SPECIFICATIONS

	GS750	GS400
ENGINE	Air-cooled four-cylinder, in-line, four-stroke, twin ohc, wet sump	Air-cooled, twin-cylinder, in-line, four-stroke, twin ohc, wet sump
DISPLACEMENT	748 cc	398 cc
BORE X STROKE	65 x 56.4 mm	65 x 60 mm
COMPRESSION RATIO	8.7:1	9.0:1
IGNITION	Battery/coil, twin contact breakers	
CARBURATION	4 Mikuni VM26 SS piston valve	2 Mikuni BS34 constant depression
CLAIMED OUTPUT	68 bhp at 8,500 rpm	36 bhp at 8,500 rpm
CLAIMED TORQUE	44 lb ft at 7,000 rpm	23 lb ft at 7,500 rpm
TRANSMISSION	Spur gear primary drive, wet multi-plate clutch and five-speed constant-mesh gearbox	Helical gear primary drive, wet multi-plate clutch, and six-speed constant-mesh gearbox
PRIMARY REDUCTION RATIO	2.15:1 (99/46)	2.71:1 (76/28)
GEAR RATIOS, INTERNAL AND OVERALL		
First	2.57:1/15.12:1(36/14)	2.46:1/18.78:1(32/13)
Second	1.777:1/10.45:1(32/18)	1.777:1/13.56:1(32/18)
Third	1.38:1/8.11:1(29/21)	1.38:1/10.53:1(29/21)
Fourth	1.125:1/6.61:1(27/24)	1.125:1/8.59:1(27/24)
Fifth	0.961:1/5.65:1(25/26)	0.961:1/7.33:1(25/26)
Sixth	——	0.851:1/6.50:1(23/27)
SECONDARY REDUCTION RATIO	2.733:1(41/15)	2.81:1(45/16)
CHASSIS	Braced duplex frame with telescopic front forks swinging arm rear suspension. Disc brakes front and rear (GS750)	Braced duplex frame with telescopic front forks swinging arm rear suspension. Disc front and drum rear (GS400)
FRONT TYRE	3.25H-19	3.00S-18
REAR TYRE	4.00H-18	3.50S-18
WHEELBASE	58.7 in	54.5 in
OVERALL LENGTH	87.6 in	82.1 in
OVERALL WIDTH	34.3 in	32.9 in
DRY WEIGHT	492 lb	379 lb
CASTOR	63 deg	62 deg
TRAIL	4.21 in	3.70 in
FUEL TANK CAPACITY	3.97 galls	3.1 galls

Although the valve opening periods are almost identical to those of the Yamaha XS750, the overlap at 60 degrees, is 20 degrees less, which should give good performance at low speeds.

On the other hand, the inlet ports are 34 mm diameter, perhaps on the large side for low speed performance, but ideal for out-and-out power. On the GS750, the inlets are fed by four Mikuni VM26SS carburettors, while the GS400 breathes through a pair of Mikuni BS34 constant depression type carburettors — similar to SUs — and these could help smooth out the power curve compared with that of the 750. The main reason for using the BSs, no doubt, was to improve fuel consumption on the twin, since this is generally more important to the owner of a smaller bike.

AUTOMATIC TENSIONER

When it came to the cam drive and valve gear, Suzuki clearly decided that the GSs should need less maintenance than their competitiors. To start with, both runs of the chain are supported over virtually their complete lengths by steel blades with synthetic rubber facings and there is a jockey sprocket on the horizontal run between the camshaft sprockets. Then, there is the automatic tensioner, which needs no attention whatever unless the engine is dismantled.

The tensioner consists of a spring-loaded pushrod that bears on the tensioning blade on the rear chain run. The rear end of the pushrod is tapered to form a wedge. A lock shaft has a steel ball at its nose, and this ball bears on the wedge. As the chain stretches, so the pushrod moves outwards to take up the tension, and since the lock shaft is also spring loaded, it also extends, and the ball prevents the pushrod moving backwards.

To simplify assembly, the camshafts are marked 'IN' and 'EX', and 'R' and 'L' to identify which is which and which end goes where. They also have notched ends to ensure that the sprockets are fitted correctly. The camshafts run directly in the aluminium housings, and an interesting detail on the four is that there are four camshaft bearings, in two pairs, one cap being used for a pair of bearings. Although this simple design is fair enough for a road machine, it means that the shaft can deflect in the middle and at the ends, so it might not be adequate for the very high lift cams needed for racing. There are two caps per camshaft on the 400.

Inverted bucket type tappets are inserted between the camshaft and the valves, and again, these run directly in the head. Adjustment shims are inserted into recesses on the top of the tappet — as on the Yamaha XS750 and Kawasaki Z1000, but not on the Z650 — and these can be changed very quickly, thanks to a simple little tool that looks like a C spanner, and which is used to push down the tappet, leaving the shim free to be removed.

A neat little cam cover keeps the oil in, and on the 750 there is a scoop to direct some extra air down on the heads for the centre pair of cylinders. Those circular caps at the ends of the cam covers are purely for decoration.

To absorb vibrations, there is a coil spring cush drive in the driven primary drive gear, a similar device being incorporated in the driven gear for the balance shaft on the 400 as well. On the back of the primary driven gear is a little gear that drives the oil pump. The clutch is a conventional multi-plate design, but the lubrication system is

such that oil pressure helps disengage the clutch plates on the 750. The gearbox is relatively narrow on both machines, each shaft being carried by one ball bearing and one caged needle roller bearing unit. As shown in the specification, the ratios of both bikes are pretty close, the 750 reaching virtually the same speeds in the gears at peak power as the Yamaha XS750 — 43, 62, 80, 98 and 115 mph. With its six speeds, the GS400 has a slightly smaller gap between first and second, but interestingly enough, the actual internal ratios of second to fifth are identical. The faces of the 750 gears are naturally wider to take the extra torque.

Conscious of the problem of excessive chain wear, Suzuki has come up with a special chain for the 750, made by Takasago. Grease is forced into the gap between each pin and bush during assembly, and O-rings between the links prevent the grease leaking. Whether the grease will remain inside, or will be forced out by the driving force remains to be seen, but to start off with grease inside the bushes must be a step in the right direction. On the other hand, sheer engineering common sense would lead to the chain being enclosed, but here the manufacturers seem afraid of losing the sporting image an exposed chain gives.

NEW FRAMES

To complement these powerful engines and a hopefully long-life chain, Suzuki has designed new frames which appear to be exceptionally well-braced around the steering heads. The rear end is also reasonably stiff, while to keep deflection of its pivots to the minimum the swinging arm pivots on needle roller bearings. Disc brakes are used front and rear on the 750, and there is a disc/drum combination on the 400.

So how do the new Suzukis stack up? They are certainly nicely engineered and should be reliable and easy to service. Inevitably, the GS750 engine is wide, at 23 in, being 2.5 in wider than the Yamaha XS750, and 2 in wider than the Kawasaki Z650. But the engine is obviously not too heavy, since the complete GS750 weighs in at 492 lb, some 5 lb less than the Honda CB750, and 20 lb less than the Yamaha, whose shaft-drive accounts for some of the weight difference.

Nor is there any doubt about the performance potential, as the road test shows. Despite that wide engine, Suzuki claims a banking angle of 45 degrees is possible, and they have adopted a slightly longer wheelbase than their competitors to improve stability. No revolution perhaps, but Suzuki has certainly caught up with its rivals in the four-stroke battle, and in some respects, may well have got ahead. That chain tensioner is one of them, and the decision to combine a 180 degree crank and a balancer on the twin could well be another important advantage. □