APRIL, 1978 $1.00*

two wheels

TWO WHEELS AUSTRALIA

EXCLUSIVE
ASPES 125MX FLIER

HOW TO HOT XT/TT500 Yams

INTERNATIONAL VINTAGE RALLY PREVIEW

3 BIKES TESTED

two wheels

VOLUME 18, No. 2, APRIL 1978

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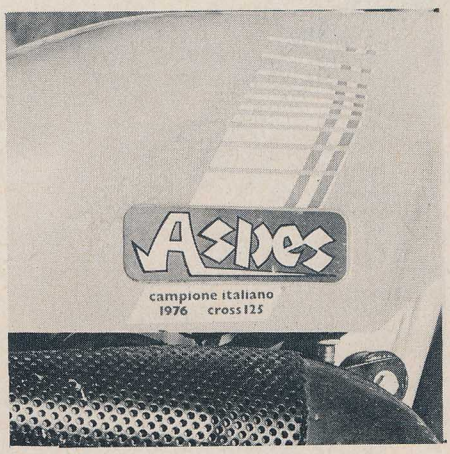

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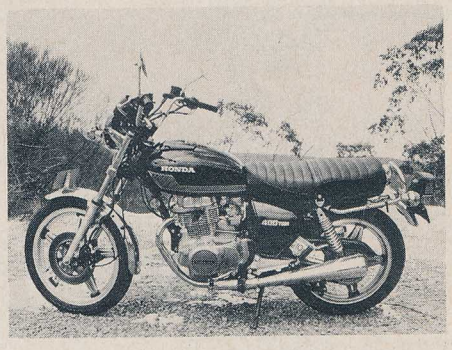

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COVER: The Aspes 125 (test p10) through a crystal stream. Photo by BARRY ROSS.

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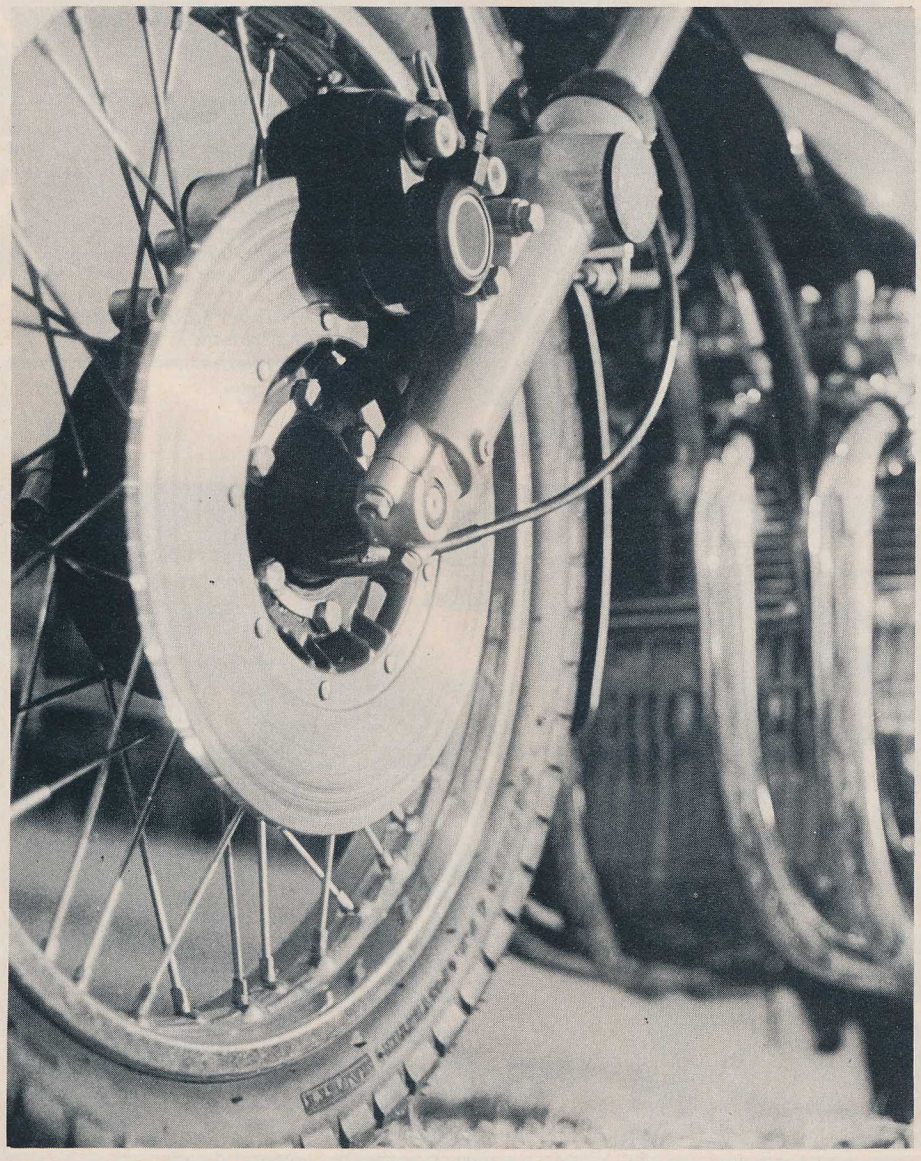
AFTER THE REVOLUTION ~DISC BRAKES

Disc brakes are a fact of life but they still aren't as good as they should be. Tech Editor BRIAN WOODWARD discusses a few simple brake facts, tells you how to improve stopping power on Japanese machinery and maintain a disc brake system.



FOR SOME reason best known to themselves, most Japanese bike makers adopt an exotic principal, bring in the stylists and degrade the concept to one of sales appeal instead of sound engineering. This doesn't mean that Japanese bikes aren't soundly engineered, just that a European maker would have a much better product using the same ideas.

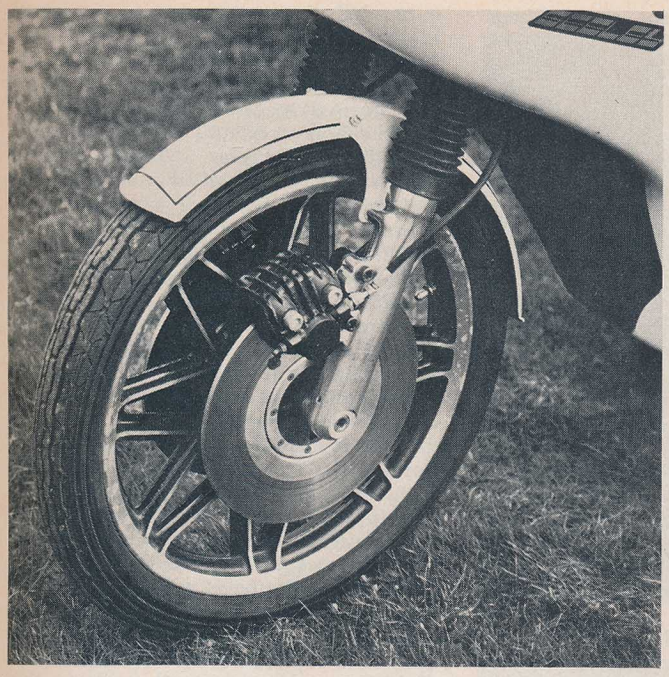
Disc brakes, for example, seemed the obvious form of brake for a motorcycle, but the Japanese adopted stainless discs because of their better appearance, regardless of its inferior braking ability. It has been said that a good European drum brake works every bit as well as a Japanese disc brake.

In 1972 the US Transportation Department carried out tests on cars and bikes. Both were stopped from 100 km/h under the most adverse load. In cars the braking distances ranged from 44.5 metres to a whacking 76.2 metres. On bikes the figures ranged from 45.7 metres for the old Triumph T100R to 63.4 metres for the Harley SX350.

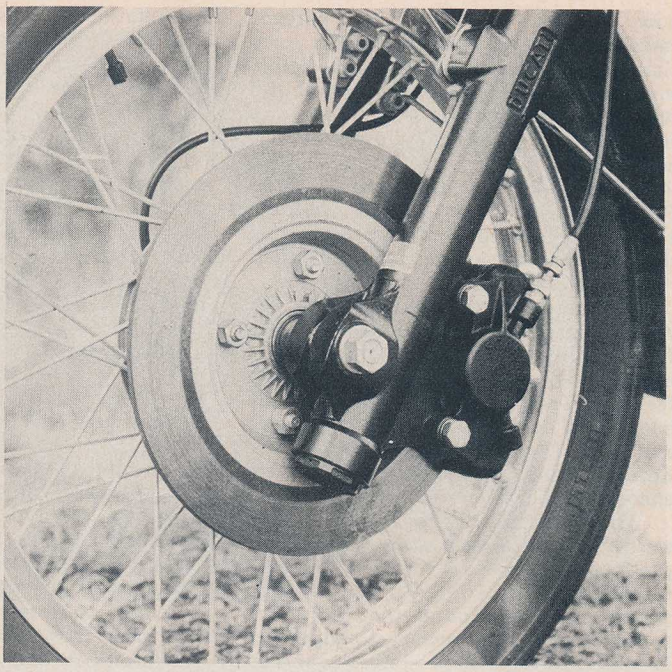
These figures show two important points. First, it doesn't matter what sort of brakes you have, it's the technology and craftsmanship that go into manufacture which determines how well they work. Secondly, in 1972, bikes had better brakes than cars — they were in less need of development. Since then car brakes have improved considerably and bikes have started using discs.

Some European makers use tiny 200 mm discs using best quality materials and cast iron discs. Japanese makers, on the other hand, have been known to use massive 280 mm discs that are less effective.

The reason for this preamble is largely to lead into another aspect of having a fully-imported motorcycle market in Australia. There's no way a technical writer can be fully aware of the finer points of manufacture and design without visiting the factory. As there are no motorcycle factories in Australia, we rely on "bought" information for an explanation of a motorcycle. Brakes have been one area



Double discs can balance the front end, but for road use they're generally not needed. They cost more than a good single system to fit and maintain.



Tiny discs and lightweight calipers on the Duke — always a good stopper — proves the worth of good design and cast iron discs.

where the science and technology has largely escaped Australia because most changes are subtle. A percentage point here and a fraction of a millimetre there is all it takes to change disc brakes from one characteristic to another.

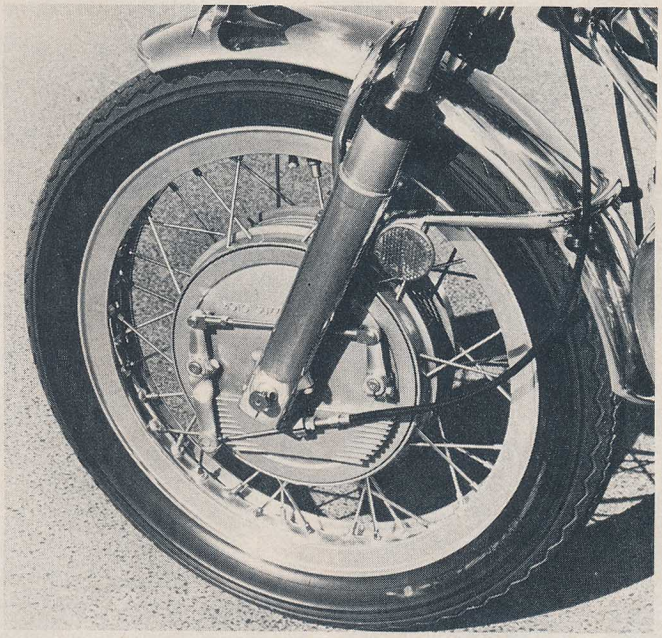
The reason this is so must be due to the over-braked design of most motorcycles. Basically all modern bikes have brakes capable of stopping a fully loaded freight train. Any change during production is only likely to alter the behavior of the brake under hard stopping conditions, not the stopping distance. In fact, brake design has reached the stage where stopping distance depends on tyres and road surface more than anything else.

Wet weather handling has improved more in the world of tyres than brakes. Stainless steel has the terrifying disadvantage that it loses friction when wet.

The easiest way to overcome this problem is to drill the discs. We have seen several home grown conversions and the Kawasaki 1000 Z1R has drilled stainless discs. The most effective of the home grown conversion we have seen used 10mm diameter holes spaced about 22mm between centres (or slightly further). The edges of the holes had been countersunk, although a correctly cut radius would be better. The bike we saw was converted after a template had been made to fit over the disc so all the holes could be drilled accurately and evenly.

As a conversion, drilling the discs can improve wet weather performance out of sight. However, it does increase pad wear and still doesn't equal the performance of a cast iron disc.

With all of these opinions and facts under our belt, it came as a pleasant surprise to receive a phone call from Hardie-Ferodo with an invitation to inspect the brake pad research and manufacturing facilities at its Sydney factory.



A top quality drum is almost as good as a disc, and frequently better in the wet.

In case you weren't aware of Hardie-Ferodo, it is a reasonably large company making brake lining materials for cars, bikes and, would you believe, railway carriages.

And in case you weren't aware that Hardie-Ferodo was into the bike disc pad scene, Joe Eastmure's BMW was fitted with handmade pads using Hardie's DP11 racing material in last year's Six Hour.

The Sydney factory covers nine hectares (22 acres), of which 2.6ha (6½ acres) is under one roof. It's big!

A considerable amount of research went into the locally manufactured disc pads so they would suit local conditions, requirements, and remain compatible with the inferior Japanese discs. The end product is an exciting disc pad which can stop well and give a sense of feel to Japanese disc brakes that conventional pads cannot.

If you're up for pad replacement

now, we can say with 90 percent certainty you'd do well to try Hardie-Ferodo pads. They are available through most Repco stores, Bennett and Wood, Better Brakes or almost any Hardie-Ferodo dealer. If the retailer is a car-nut and thinks bikes are not in his line, refer him to the Hardie-Ferodo Friction News-letter dated August, 1976. This gives application notes for all the machines for which H-F makes pads — and that's most of them.

The reason we say 90 percent is that we have a set on long-term test now. We fitted them to the office Z650 and noted an immediate improvement in feel and response as soon as they bedded in correctly. Fitting was quick and easy (by the long-suffering Tech Editor) and no problems were encountered.

While we were at Hardie-Ferodo we were taken for a walk along the disc pad production line. First task is mixing the formulation according to the requirements. H-F has found that only two formulations are necessary to cope with local conditions. These are very good on stainless steel and magic on cast iron. Euro-bike owners can save money and fit a really good product when the time comes for a brake pad change.

After the mixture has been formulated with asbestos, metal filings and various additives, it is blended and mixed to form the rough material. This is placed over the metal backing plate and compressed under a hydraulic ram to form a very positive bond.

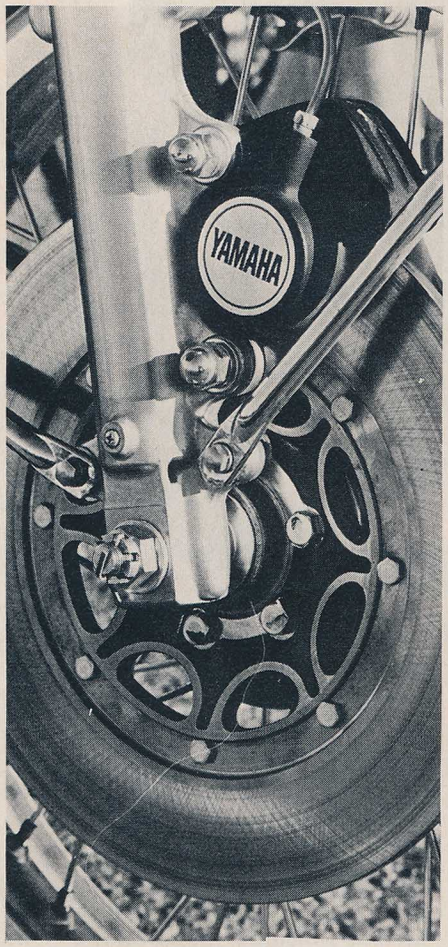
When we compared the H-F pads with the standard Kawasaki pads fitted to the Z650, we were surprised at the lack of pad flow-through on the Japanese part. We'll explain this. When the pad material is pressed on to the metal back, a certain amount of flow and air expelling takes place because the hydraulic pressures are so great. If the pad wad is designed well and compressed correctly it will flow right through the relief holes in the plate and need to be trimmed afterwards. The Japanese pad showed some deformation into the hole, but it hadn't reached the rear surface of the plate. Either Kawasaki skimps on pad material, has formulated the lining to be very hard, or uses inadequate pressure.

After compression has taken place the pads are dressed to remove the rough edges and random samples are taken for quality control. The pads are then boxed and shipped out.

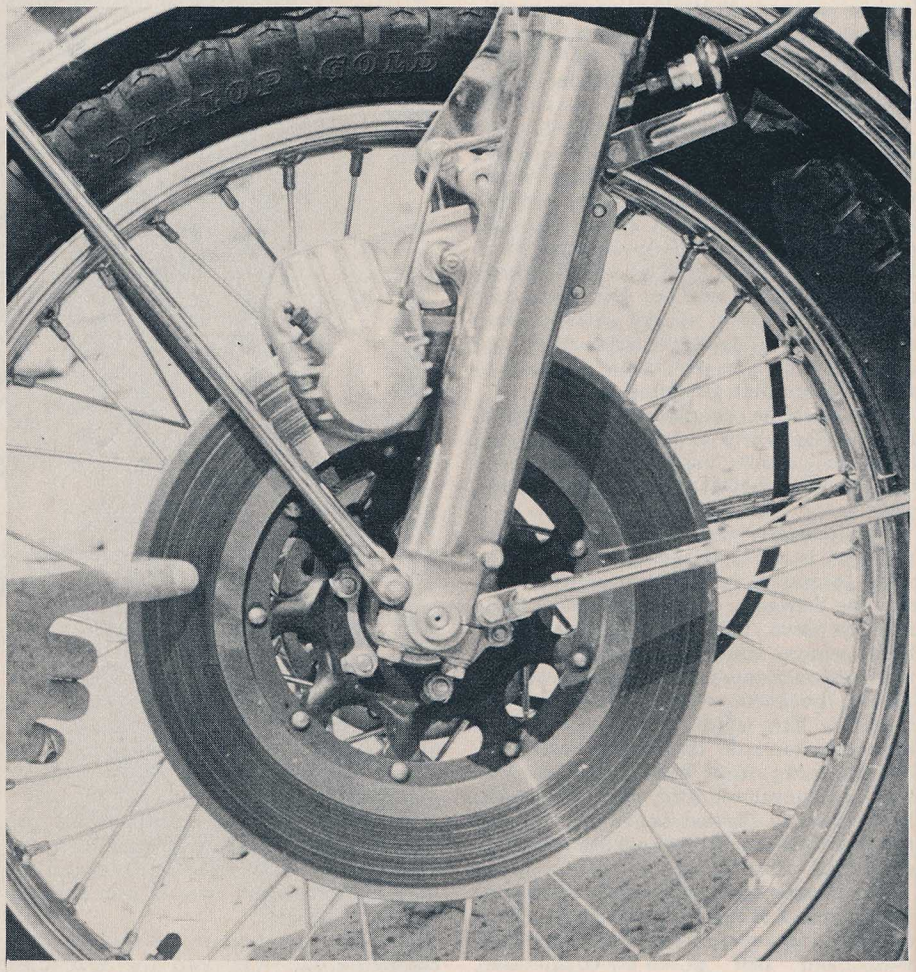
Hardie-Ferodo then provided us with some interesting technical material from Australia and from the Ferodo company in the UK. From this we have extracted the Brake Efficiency table, shown in this feature. Remember that the figures relate to the period after reaction time. The normal reaction time of the rider and the brake system (for fluid to move through the master cylinder to the caliper and to move the caliper into contact with the disc) is around one second. Remember also that at 160 km/h, this one second adds a massive 45 metres to the stopping distance.

Although disc brakes are generally very reliable, there are a few factors which need to be mentioned. We'll make these under the headings of the various component parts which make up a disc brake system.

Master cylinder. The main problem here is that you will have to tilt the handlebars to make the reservoir level for topping up. A certain amount of fluid will be needed as the pads wear and if you spill fluid on the paintwork of the tank, the paint will fall off. Brake fluid is highly corrosive. The best position for riding may not be the best position for topping up. The amount of fluid you add is a good guide to the wear of the front pads. Keep the cylinder and lever mechanism clean as grit will wear components very quickly. Never kink the flexible pipe as it could



Machined stainless steel will work well for a time, until the pads have polished it smooth again.



Scoring is a common problem. If the discs are scored, don't just change pads. Have the disc resurfaced first, then try different pad material.

reduce braking power with a worn pipe.

Hydraulic pipes. These must be inspected carefully for signs of cracking or chafing. At the first sign of either, replace them. A blown hydraulic hose or pipe will leave you with no brakes and it is most likely to fail under hard braking — when you need brakes most. Check connections where hoses and pipes enter or leave the master cylinder, distribution block (on the triple clamp, usually) and at the caliper. If there is any trace of weeping, check the union for tightness or replace the washer.

Caliper. If you intend making repairs to the caliper, other than replacing the pads, use extreme caution. Wash all parts with fresh, clean, brake fluid and never use a sharp instrument to remove seals or washers. Nylon or wooden probes are best for this as the slightest scratch on the cylinder wall can lead to leaks. We won't tell you how to overhaul a caliper here because there're many different types of caliper and a general feature just isn't good enough. As soon as we've been able to stitch up the major makers for free workshop manuals and some equipment, we'll try again.

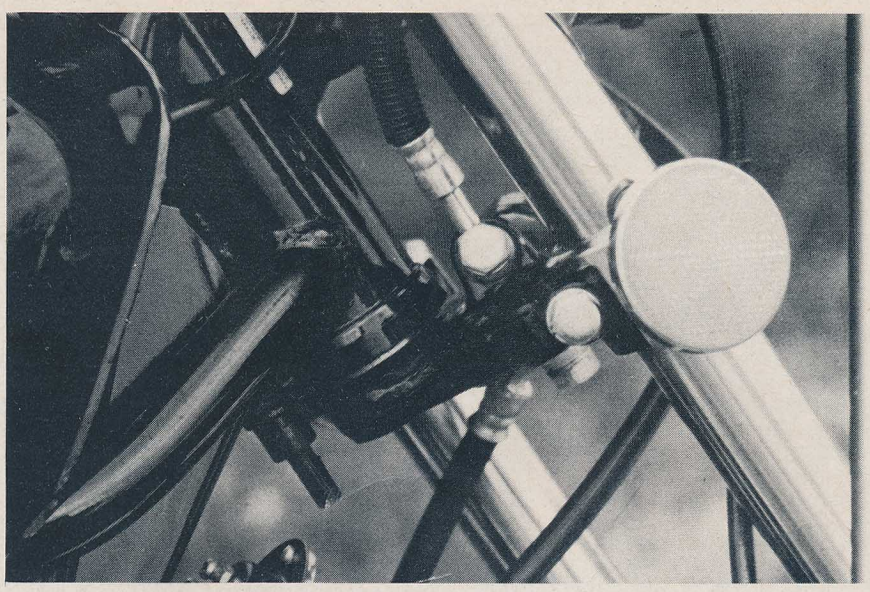
Pads. Replacing pads is a cinch, but make sure the bolts you undo are those for removing the caliper from its mounting, not those which hold the caliper together. Never split a caliper. Again we can't show you a simple method of changing all pads, but generally you won't have any trouble.

Discs. You can drill the disc if you want, but you'll need to make a template. Check out the figures we mentioned earlier, or if you don't trust us ask a brake specialist. The discs have to dissipate a fair amount of heat and this runs straight to the wheel bearings. Check the condition of the wheel bearings every time you replace pads. Grease them if possible, replace them if they are worn and always use a disc brake grease — unless the maker specifies something else.

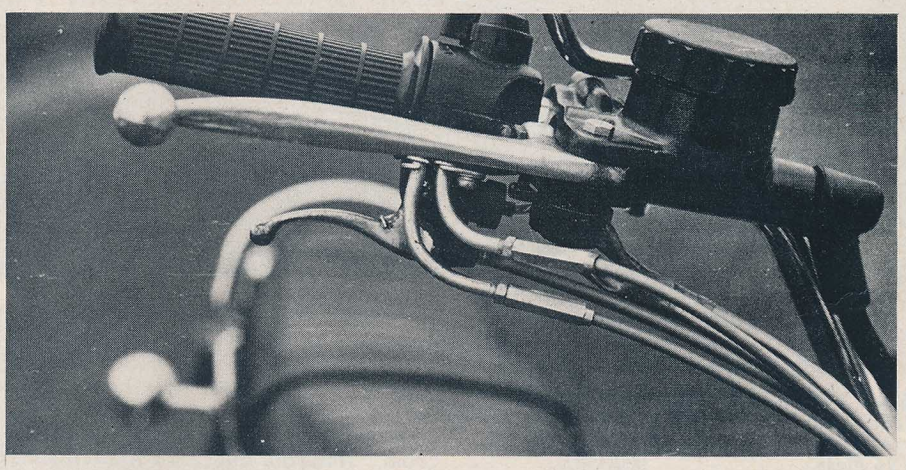
Conversions. Making a disc brake system for an older model machine isn't beyond the scope of most adept mechanics. Renault R8 discs and calipers are the most popular and they're quite easy to fit with a little plumbing. However, the easiest method of converting to discs is to buy a second-hand front end from a stacked machine and overhaul the system before fitting it to yours.

Finally, a word of warning. Brakes aren't toys. If you play around, you'll run into trouble. Work by the book, keep parts clean and disc brakes will last longer and give less trouble than most drum brakes. Experiment with pads if your machine doesn't stop and perform the way you like.

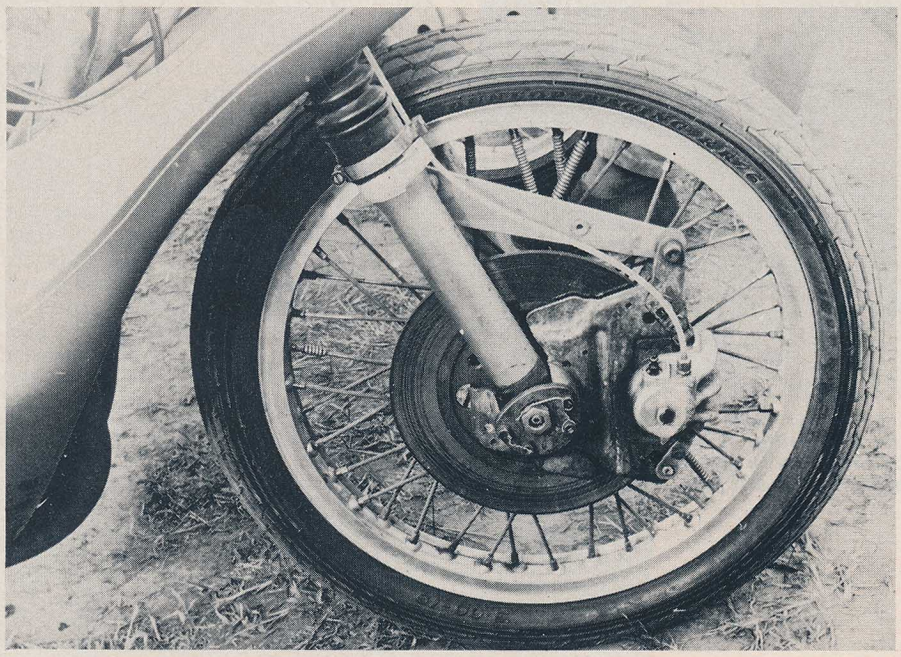
Stopping is important (three cheers for the genius) and a little concern and a few alterations will give the average bike a much improved braking system. Then you'll be looking for better tyres to take advantage of the good brakes. *



Check the condition of hydraulic hoses frequently.



Always keep the master cylinder and hoses clean.



Do-it-yourself conversions frequently use Renault R8 parts.