

australasian **DIRT BIKE**

JULY/AUGUST, 1981 \$2.00*

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SUZUKI'S THUMPERS

DR400 and DR500

MUSCLE POWER

PE400X vs IT465H

MOTOCROSS WARS

Honda's CR250RB and Yamaha's YZ250H

ADB TALKS TO THE MAN IN THE DIRT

Feedback on Ten Bikes

JULY/AUGUST 1981
VOL. 5 NO. 6

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PEOPLE SLAVING TO GET THIS THING OUT ON TIME

EDITOR: Geoff Eldridge
 CONTRIBUTING EDITORS: Ray Ryan, Chris Blethyn, Dave Ewins, Geoff Udy, Murray Watt, Terry Dodd, Ian Palmer M.I.A.M.E.
 PHOTOGRAPHY: Peter Fischmann, Terry Dodd, Geoff Eldridge, Alan Tomlinson
 ARTWORK: Iain Wilson and Geoff Eldridge
 Advertising: Alan Tomlinson (NSW, 699 7861), Walter Keating (Melbourne, 699 2851)



COVER: Geoff Udy idles the DR Suzuki along on the back wheel in an attempt to persuade the world into turning four-stroke. Photography by the everpresent lens of Peter Fischmann, who operates largely on Flex-itime.

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Getting the mail on CHAINS

by IAN PALMER, M.I.A.M.E.

It doesn't really matter about the condition of the rest of your bike if your chain is going to break within ten minutes. To ride anywhere the power created by your engine has to be transmitted to the rear wheel, which makes the chain one of the most important items on your bike. By its nature it is a very technical piece of equipment made to precision tolerances. But its location, stretched between two sprockets and slung way out there in the open, makes it more vulnerable to premature wear and destruction than nearly everything else. It's important that you understand more about your chain: after all, who wants to walk home?

At one time or another we've all had chain problems: they break, they stretch out of all proportion to their cost, they dry out too quickly, they wear out sprockets and so on. I'm sure there isn't any one of us who hasn't at one time or another wanted to go back to the shop and wrap his chain around the spare parts guy's head. But wait. Why is it that you can never make the chain "stretch" the distance?

Most of us try a succession of different brands, searching for perfection in our one-hundred-and-ten links. After a while, convinced they are all as bad as each other, we give up and buy whatever looks like a bargain.

But is a \$10 chain really a bargain if it only lasts 1/3rd of the distance that a \$20 chain would last? More to the point, would it still be a bargain if it snapped and ate up \$100 worth of crankcases?

Did you know that YZ125 Yamahas use the same size chain as their big brother, the YZ465? But it's obvious to anyone that the strength requirements of the two differ incredibly, because it is the job of the chain to transfer power to the rear wheel: and no way is a 125 going to make as much power as a 465. Why does Yamaha do this?

If you look further into chains other questions arise. The D.I.D. company, for instance, manufactures four different non-O-ring chains in the 428 size, ranging in price from around \$15 up to \$70: which one is right for your RM125? What about O-ring chains? Do they really work and are they worth the big price difference? If they are, why doesn't everyone use them? A chain's life is only as long as the life of its sprockets, so what's the story with these nylon sprockets? Or those hardened aluminium sprockets?

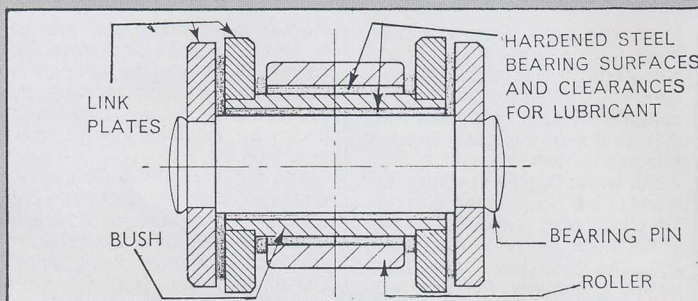
What about lubricants? Which ones work? Grease is messy and hard to use, pressure pack cans cost the earth and engine oil is thrown off before you get out of first gear.

A few more questions like this and it would appear that suicide is the best answer. Either that or a BMW shaft drive R80G/S, if you can pay the price.

Let's begin by studying the construction of motorcycle chains: understanding this is half the way towards knowing how to keep them in good condition.

CONSTRUCTION

A hundred-link chain is made up of 50 roller links, 49 pin links and one joining link. If you count them a 100-link chain fresh from the packet will have 100 pins including the joining link. In order to see



Motorcycle chain is a series of roller-links and pin-links connected by pins. The pin is important in that it articulates in the bushing and bears the entire chain load. The bushing articulates and acts as a bearing on the pins, and protects the pin from the impact shock

where your money goes, have a look at the photos and you'll see a roller link. It is built up of two side plates, a bush and a roller at each end and then the whole shaft-bang is precision pressed together.

The pin link is just like a joining link except it is pressed together and the pins are peened over to keep it that way. Most chains have two flat spots stamped on the pins but some quality chains such as D.I.D., TR and Tsubaki brands have quad-staked pins to help prevent twisting and distortion. Slight variations on the design, such as dimensions, quality of material and accuracy of machining and assembly, are what determine the quality of the chain.

The distance from centre to centre of the pins, the diameter of the rollers and the minimum width between the link plates is what governs the size rating of a chain, e.g., 420, 428, 520, 525, 530, etc.

STRENGTH

Quality features such as shouldered pins which butt up against the link plates to help prevent kinking, solid precision-machined bushes instead of rolled sheet metal and solid rollers instead of sheet metal split rollers are just some of the design features which allow D.I.D.'s TR racing chain, for example, to have twice the horsepower rating of some of the el-cheapo chains on the market today. If you spot a chain with split rollers you know by just looking at it that this \$10 special isn't really a special at all.

Chains with shouldered pins, solid bushes and rollers are also claimed to have 1/3 less wear under identical conditions and have twice the fatigue resistance to sudden loading and unloading conditions.

The quality of machining and assembly, the type of steel used and its hardening process and the

with the sprocket. The rollers are not tension members of the chain, but act as shock absorbers and permit a rolling contact with the sprocket teeth. The linkplate is the primary tensile load member and holds the pins and bushings in place.

physical dimensions of the link plates and pins obviously have a lot to do with the tensile strength or maximum load rating of a chain.

Most manufacturers publish a catalogue showing the tensile strength ratings of their chains. For example, a 520G D.I.D. brand chain is rated at 2,700 kg, EK's 520 SH-TM is rated at 3,700 kg, Izumi's 520H 6,700 lbs and Tsubaki's 520 QR has a rating of 8,000 lbs. Quite a difference, but as any good accountant will tell you, figures can lie. A closer look at the catalogue will reveal that D.I.D. use a minimum strength system when talking about their chains, EK use an average strength in kilograms and Izumi and Tsubaki use an average in pounds.

As tricky as these figures seem, they are still your guide-lines to longer chain life. For example, if you were using an EK 520 standard chain on your RM465X and one day you discovered that the throttle turns half a turn further than you thought and as a result the chain breaks, you could have a look in the catalogue and find that a SH-TM series chain is not much dearer and has 400 kilograms higher tensile strength rating. No need to change brands, just the rating.

WEAR

It is impossible to stop wear so the best we can hope to do is to minimise it and in the majority of cases quite a lot of saving can be achieved.

Despite what one company would have us believe almost all chain manufacturers pre-stretch or pre-stress their chains to settle all the parts into their maximum unworn length. Any increase in chain length after that process is wear-occurring between the pin and the bush inside the chain. The maximum allowable wear in a chain is reached when its length is

increased by 3% or more for trail riding and 2% for racing.

For example: A 428 chain would be replaced if the distance between twenty pin centres, when stretched, reaches 10 5/16 inches and a 520 chain 12 7/8 inches. For racing reduce those figures to 10 1/4 and 12 3/4 inches respectively.

CHAIN LIFE

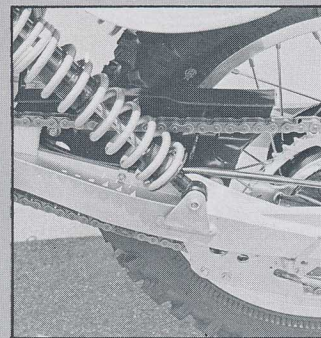
Dirt is a chain's second worst enemy, second only to the owner who doesn't lubricate it. Some chain manufacturers are building chains, especially for motocross, which are more abrasion resistant than their street bike counterparts. This is mainly a result of special bushes inside the roller links.

A technique used by many people to extend chain life is that of using two chains, alternating the one in service each week with another which was being greased in special chain grease. Using this method a near new, properly lubricated chain is in service and will not be wearing out the sprockets anywhere as fast as a worn chain would.

Chain and sprocket wear is like the old chicken-or-the-egg story. Does a worn chain wear out the sprocket or does a worn sprocket wear out the chain? By using the above method the chain and sprocket lives are prolonged together. Changing chains is simply a matter of joining the serviced chain to the old one and feeding it onto the sprockets while pulling the old out.

A dry chain can wear out up to 300 times faster than a properly lubricated chain, but lubrication is the topic of another chapter so we will leave it till then.

As was mentioned earlier, dirt is a major problem for chain life. The majority of dirt that contacts the chain is ironically pumped onto it by the bike itself. That is, the rear tyre near the front of the swinging arm throws dirt, mud and dust par-



A good chain guide system is far more effective at stopping derailments than a chain tensioner. This PE is a good example. The chainguard is also good.

ticles onto the chain. A simple cover of sheet metal protects the chain, increasing chain life tremendously. Such a guard is standard equipment on late model IT Yamahas and Maico enduros, and is considered a blessing. Hopefully one day all manufacturers will learn to supply this component.

"O"-RING CHAINS

Almost the ultimate in reliability, O-ring chains are favoured amongst Six Day riders. These chains gain their reliability by the use of O-rings inserted behind the side plates to seal out abrasives, such as dirt, and seal in the factory fitted lubricant.

Disadvantages: Initial purchase cost isn't really that great a problem because in the majority of cases it pays for itself in service life. But its size certainly is a problem on some bikes. That is, O-ring chains are generally 5 to 7 mm wider than their normal counterparts. On a lot of bikes this means that the chain won't pass through the chain guide and may even foul the crankcase. Nasty stuff.

Furthermore, its increased friction and weight steal up to 2 hp and that's usually 2 hp too many. However, in a muddy event when a normal chain starts to run dry and wears out, the O-ring chain doesn't notice the difference in environment and it is here that it has the power advantage.

The last problem is a hard one to avoid, and that is the tensile strength rating of the O-ring chains. In order to keep the already too wide width of O-ring chains down to an acceptable length, some models of O-ring chains steal some of the space required for the O-ring by downsizing other components of the chain. So be warned — check the tensile strength rating if you have any doubts about the quality of the chain suiting your machine. There's no point in having a chain that doesn't "wear" out if it's going to snap in half.

Prices on O-ring chains vary, but it is usually between \$80 and \$100 and the tensile strength from brand to brand drops (approx.) 200 kilos.

Conclusion: Because of the weight and horse power problems, O-ring chains are best left to use on 250cc and larger machines, if there is clearance to allow it.

SELF-LUBRICATING CHAINS

These specialised chains were hoped to save the world a few years ago, but they never really caught on. Basically, instead of using bushes made out of a solid piece of material these chains use

a sintered bush. That is, a bush made up of millions of "dust" particles of metal with a special lubricant trapped inside the finished condensed bush. The idea was that as the porous bush wears it releases its own lubricant.

But two things went wrong: the worst of the two was the cost and the other being related to the first in so much as in an attempt to keep the cost down some companies cheapened the quality to the point where it started to give them all a bad name.

There are two basic types of self-lubricating chains. One type is conventional in construction but uses a sintered bush instead of a solid or split bush inside the roller link. The other type, however, uses no roller in the roller link and uses an oversized sintered bush to do all the work. The idea here is that the bush can lubricate the chain and the sprocket at the same time.

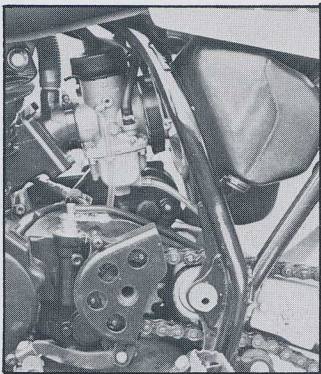
The disadvantage of a self-lubricating chain is that it is usually rated low in tensile strength.

Unfortunately, finding the perfect chain lube is like finding the perfect chain: everybody wants one which lasts forever without drying out or flinging off, and which costs nothing.

The oil companies are the only people in this whole chain lubrication business who come out ahead: no matter what quality lube you decide to use, and no matter how you do it, you still must use the lube frequently.

What you should be aiming for when you lubricate a chain is to lubricate the wearing parts. This means those parts which rub against others where the friction causes a heat buildup which decreases chain life. The main components to reach are the pins, bushes and rollers, all **inside** the chain.

This is where the pressure pack lubes claim the advantage, because the main lubricating agent in the can is thinned out by a fast evaporating solvent. The thinned-out lubricant penetrates to the



inner surfaces much better than oil or grease by itself, and when the solvent evaporates the lubricant is designed to become increasingly tacky so that it tends to stay where it can do the most good, rather than fling off.

You should remember this point, and also consider that different brands of pressure pack chain lubes use different solvents, all of which have different drying times. Obviously, if you start riding as soon as you spray on a lube whose solvent takes ten minutes to dry,



When applying spray or squeeze lubes, direct it at the lower run of the chain and as close to the sprockets as possible. Allow sufficient time for solvents to evaporate if using a spray lube.

then most of the lube is still thin enough to be flung off again: which means you have wasted both your time and your money, and the chain hasn't benefited at all.

Some popular brands can take up to 12 minutes to dry out to their tacky maximum. This means that no matter what quality ingredients a chain lube may have in the way of molybdenum disulphide, you still need to give the solvent time to evaporate.

Any chain lube must possess the following qualities if it is to stand a chance of doing the job for which it was intended:

- It must have excellent penetrating qualities and very low surface tension to allow it to penetrate to the inner surfaces of the chain.
- It must have excellent clingability to resist the removal of the oil film due to the high centrifugal force that exists on the surface of a chain.
- It must provide good corrosion protection.
- It must reduce the coefficient of friction to help reduce wear.
- It must have excellent film strength and anti-weld properties to resist excessive wear and prevent welding of the wear surfaces and stiffening of the chain when occasional excessive loads are applied to the wear areas.

While researching this article I

came across some interesting information published by an independent testing laboratory. They had tested two leading brands of chain lube, Heavy Duty PJ-1 and Bel-Ray's Racing Chain Lubricant, both available here in Australia, and had found a big difference in their abilities to do the job. The procedures used were based on well recognised chain testing procedures; both lubes were claimed to be best grade and suitable for racing motorcycle chains.

Both passed the penetrating test and the resistance to flingoff test, and both passed the exposure to distilled water test (Procedure A). However, PJ-1 failed the test when exposed to salt water, which means that its corrosion value is only acceptable but not excellent.

After this, both lubes were evaluated on the Falex Wear Tester, a standard lab instrument used to evaluate the coefficient of friction, anti-wear properties, fill strength, etc. PJ-1 lube had a film strength failure point at 1750 lbs, using a 4,500 lb gauge. At this load level it totally welded the wear surfaces because of extreme galling. The lab had previously tested a number of lubes and had set the level of load-carrying ability of a good lube at a minimum of 2,500 lbs, at which level there should be no welding or wear after the test period.

The outcome of the test was the PJ-1, although claimed to be heavy duty and suitable for racing, was acceptable only for mild or normal use. And this doesn't mean an average trailride in muddy conditions. Another interesting point was that despite a claim on the label that the lube contained molybdenum disulphide, there were no traces of the material after an examination of the contents. This serves to illustrate that you shouldn't always believe what you see on a label.

The Bel-Ray lube was tested to the same procedure and was found to have almost double the load-carrying ability and a much lower coefficient of friction with excellent anti-wear properties, even at loads as high as 3,000 lbs on the Falex Wear Tester.

Although research material such as this is readily available, most buyers don't know where it can be found, or else they haven't the time to investigate everything on the market for suitability to their needs. If you spent hours researching every product you used on your bike, you wouldn't have the time left to earn the money to buy them anyway. This makes the job of increasing chain life doubly difficult: you may only **think** you

are lubricating your chain.

Squeeze bottle type lubricants usually don't contain any solvents or carriers and they are designed to rely on quantity of oil used to better their chances of penetrating to the vital wear areas inside the chain. They also have the advantage in the eye of the beholder of looking like they are working because the stuff is everywhere and the chain **looks** black and oily rather than white and dry. They are cheaper to buy, too, which means people are more likely to use them frequently.

Finally, what about chain greases such as Duckhams? They



Grease systems of lubing chains are effective but messy. Always clean as much dirt off the chain before you boil it up.

have been around for years, but they are still as messy to use now as they were way back when they were first introduced. With this type of lubricant, you buy a big flat container filled with a greasy lubricant and you place it over heat until the lubricant melts to a boiling liquid, and the cleaned chain is placed into this goop to allow the lubricant to penetrate inside the chain. Once the chain has been in there a while, it is fished out with a hook of wire and hung up to drip off and cool down. Once cool, the inner surfaces are coated with a film of greasy lubricant which resists flinging off.

Generally, these 'grease' methods are used by the chain manufacturers and they have proven themselves to be a good lubricant, even if a bit messy. All the same, you still need to apply either a pressure pack lube or a squeeze bottle lube during the ride at frequent intervals.

In the pits of any motocross meeting you'll always find that self-proclaimed expert who has his own theory of chain lubrication. One version of this expert thinks that dust will only stick to the lube and the resulting paste only speeds up the wear of the chain, so he advocates leaving the chain dry. Another version of this expert

thinks that on wet days the water you ride through only washes the lube off so why waste your money putting it on in the first place? — save it to buy a new chain.

Unfortunately, there is a grain of truth in what both of them say, but neither of them understands the construction of a chain or the things which cause premature wear. As you now know, having waded through this article, it is largely friction between wearing parts which causes heat buildup and rapid wear. Lubrication is all-important.

HOW TO LUBRICATE YOUR CHAIN

After you have accepted the need to apply a lubricant and have understood the gains and disadvantages of the various types of lubricant available, how do you put it on the chain?

I've already basically explained the use of grease type lubricant: the important thing to remember is that you should get the chain as clean as possible after each ride. If it is dry (it shouldn't be, though, should it?), use a wire brush to remove most of the external dirt particles. Then use petrol and the same wire brush to wash out as much of the remaining dirt as you can. Leave the chain to dry. Then use the grease. I'd recommend grease as the product to use (and I mean chain lube grease available from motorcycle shops rather than normal grease, because it has additives suitable for the job) between rides, and the other types of lube during rides.

During your ride (meaning, during your **dirt** ride — for obvious reasons a road ride doesn't get a chain as dirty and doesn't need as much lubrication of the chain) it is important to remember the basic aim of lubing the chain — to get the oil inside the chain to the wear surfaces. The only openings in the chain which allow you to do this are at the ends of the rollers and between the inner and outer sideplates.

If you use a pressure pack lube, you can modify the plastic snorkel that comes with the can by heating the last inch or so to about 45°. This makes the job of spraying the other side of the chain much easier. Oil flows a lot easier when warm, so oiling a warm chain betters your chances of getting the oil to where it counts. It is therefore best to oil your chain as soon as possible after the last moto for this reason; as well, it gives the solvents extra time to dry out before you use the bike again.

The best way to spray the contents of chain lube cans onto the chain is to put the bike on a

centrestand (if it has one) or on a crate or box so that the rear wheel is off the ground. Rotate the rear wheel in the direction of travel and aim the spray can at the bottom run of the chain as close as possible to a sprocket — either one will do. This puts the bulk of the lube on the inside of the chain so that the centrifugal force created when you start riding will tend to fling the lube into the chain further if it isn't there already.

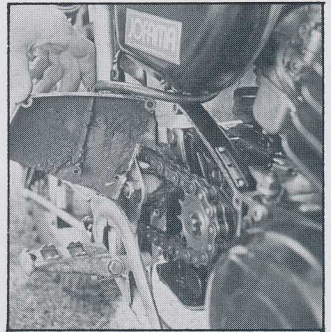
Don't worry as much about the outer sides of the sideplates as much as the rollers and the inner sides of the sideplates.

When you are applying a squeeze type lube the same things apply.

CHAIN OILERS

Most of the top enduro riders use chain oilers on their bikes. Since these guys know the importance of getting to the finish of an event with a minimum of mechanical problem it is a clear lesson: chain oilers help extend the lifetime of chains under the worst possible conditions.

There are several methods of putting a chain oiler onto your bike, the most exotic of which is used by Dave McDonell, of Nowra, NSW: he rides a Kawasaki KDX175, which has an aluminium



Chain oilers fixed to the bikes are the best way to keep a chain oiled. There are a few methods to use — see the story.

swingarm. Dave drilled a hole in the swingarm after making sure the rest of it was airtight, and tapped a valve into it. He then pumps in air, which is used to force out his reservoir of chain oil onto the chain just like a permanent spray can, and it works as he rides along. This is not only saves the chain, but it saves time in controls.

A simpler method is to mount a spray can on the left side of the bike near the carburettor — rubber bands around a frame tube will do.

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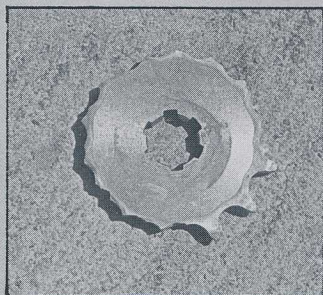
You mount it on the left so that you can still use the throttle while pressing the lube button. A rubber tube is connected to the nozzle of the can and runs down to the countershaft sprocket cover, where it fits onto a piece of metal tube bent so that its end points at the rear teeth of the sprocket. When you press the button the lube is sprayed out at the spinning teeth, which grab it and fling it onto the inside of the chain, where the centrifugal action of the chain puts it even further into where it does the most good.

Other people use a drip-feed system, where they mount a reservoir filled with oil and fitted with an on-off valve. A hose runs from this valve down onto the top or bottom run of the chain in the vicinity of the countershaft sprocket, where there is less up and down play of the chain. A constant drip of lubricant is fed to the chain for the duration of the ride.

Chain oilers are the best system of all (except on motocross bikes, obviously), because they allow you to re-oil the chain after a creek crossing or a mud hole without having to take the time to stop and dig out the lube. The chain tends to be better and more often lubricated as a result.

SPROCKETS

Sprockets are as important to chain life as correct lubrication. If the teeth of either sprockets or both are rounded and worn, then



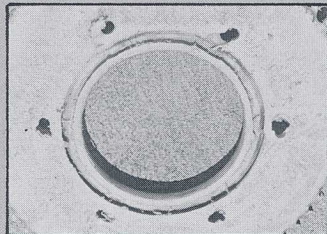
This is a good example of a worn out countershaft sprocket. The teeth have broken off because the material used is poor quality, and the chain was allowed to deteriorate.

the chain is quickly damaged. You should always check the condition of your sprockets whenever you replace your chain: generally, you'll need to replace the countershaft sprocket, if not both of them. For the best chances you should theoretically replace both sprockets **every** time you replace your chain, but most people never do this for cost reasons. In the long run, however, it probably ends up costing you more if you don't re-

place sprockets.

Rear sprockets wear out more slowly than countershaft sprockets because they have more teeth and therefore a greater radius.

Three materials are used to make sprockets: steel, hardened aluminium and plastic (nylon).



This plastic sprocket was used with a new chain, believe it or not. Getting plastic sprockets to withstand the whip loads and other chain stresses is still difficult.

Plastic sprockets are the most recent on the market and have created wide interest and a lot of controversy. Manufacturers of these sprockets all claim to use the latest space-age materials which give X times the life of a conventional sprocket and which tend to extend chain life because they have built-in lubricating qualities, unlike metal ones which only cause wear.

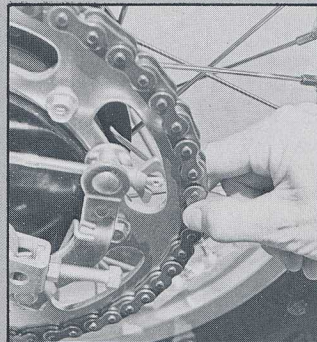
During the course of writing this article I received several plastic sprockets which had failed in use either by rounding or ripping off the teeth, or by having the mounting studs pull right through the plastic. With plastic sprockets, the problem of failures seems to occur mainly on the smaller chain sizes, although Italjet has been successfully using a plastic rear sprocket on their smaller horsepower range for quite some time now.

Plastic technology is improving at an almost frightening rate: the ability exists to make plastic crankcases, wheels and handlebars already, and Mazda is testing a new plastic for use as rotors in their rotary-engined cars.

But generally speaking, plastic sprockets have a fair way to go before I'd recommend them for general use. Perhaps the saying "let the other guy try it first" exists in this case, because such a different material has really got to be proven before people will overcome their psychological fears of it. In low stress applications such as street riding on small capacity trailbikes or casual, low speed trailriding, a case for plastic sprockets exists. But in high stress applications they need a lot more refining.

ADJUSTMENT AND DERAILING

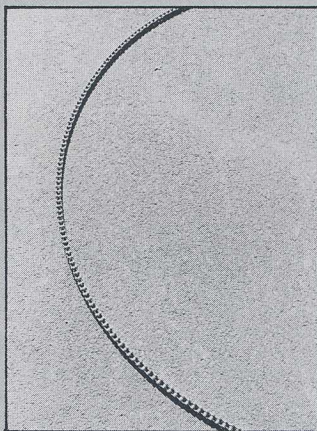
Most people don't know it, but a chain cannot derail off the sprockets unless it travels sideways first. That obvious point combined with the equally as obvious



A quick, effective way to check for chain stretch is to pull the chain off the rear sprocket like so. If it comes up more than halfway on the sprocket teeth, it is too stretched.

point that a chain can't go sideways if there is a strong, well thought out guide system to hold it in line is the secret to curing many a problem with chain derailments.

Some bikes, an example being the PE175X, have excellent chain guide systems but others such as Honda's XL250 are bloody hopeless. Many people mistakenly fit a chain tensioner to their bikes in an attempt to cure thrown chain problems, but this is only a token help as it only steadies a little of the whip which swings the chain out of line with the sprocket. A chain guide simply doesn't allow the



Another method of checking for excessive chain wear is to lay the chain out on the ground like this. If it curves too far, replace it.

chain to get out of line.

Chain derailing can also be caused by bent chainguides (which means that the guides you use must be substantial), misaligned or buckled sprockets and a twisted or damaged chain.

Chain tension is important, too. When you buy your bike you'll receive information on the freeplay allowable when the chain is perfectly adjusted. Stick to this measurement through thick and thin. If you change the suspension travel on your bike, or if you buy a bike second-hand, you may need to determine the chain adjustment from scratch.

To do this, place the bike on a crate or drum so the rear wheel is



direction attaching patched clips



direction of running of chains

This is the right way to install a connecting link: the closed end should face the direction of travel of the chain when the motorcycle is going forwards.

off the ground, remove both shocks (or undo the monoshock, Uni Trac, Full Floater or Pro-Link...), and swing the rear wheel up and down several times until you have found the tightest point of the chain. Then you adjust the freeplay of the chain until there is only 1/2" of it at this point in the wheel travel. Reassemble the bike, and remember the measurement always. To simplify things, measure the freeplay of the bike when the shocks are fully extended (unloaded), so that next time you want to adjust the chain all you need to do is get off the bike, put it on the sidestand and check the freeplay.

Also remember that chains can have tight and loose spots, so rotate the rear wheel until you have found the tight spot before you measure it. This is caused by uneven lubrication and hence uneven wear.

SAVING MONEY

Care when shopping can save you a lot of money, but a few clues are necessary to do it.

Firstly, bear in mind that extended chain/sprocket life can be had by proper care during your riding: this means correct lubrication and plenty of it, correct chain adjustment, good chain guides, attention to sprocket bolts and countershaft nuts, attention to sprocket wear, and the choice of the right grade of chain for your use. Never buy a chain which is low grade if you intend to use it for severe applications, because it is false economy.

When you are in a shop ready to buy a chain, don't be afraid to ask about the specifications which apply to the various brands you are being offered. If a seller declines to tell you the specs for a certain type of chain then it could be because there is something to hide. Generally, if you stick with the better known, reputable names such as D.I.D., Reynolds, Izumi, TK, Tsubaki, you should have no worries; just make sure that the grade of these chains is the one you need. Beware of chains with split rollers, because these usually spell trouble.

If in doubt, remember the features to look for as mentioned in this article: solid rollers, shouldered pins, solid precision machined bushes. Obviously, the best guide is the tensile strength rating, so look for this where it is available.

Steel sprockets may be heavier than alloy or plastic sprockets, but they generally last longer and retail at about half the price of the others.

Other savings can result from careful preventive maintenance during the lifetime of the chain and sprockets: this means lubrication and all the things mentioned above, but it also means keeping an eye on sprocket bolts so that loads transferred by the chain don't rip the hub apart. A chain which is too tight can put too much load on the countershaft, either breaking it off or damaging gearbox bearings.

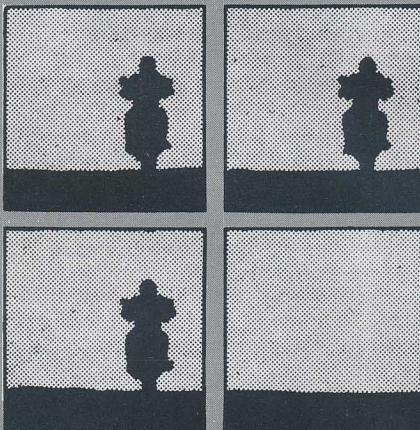
And keeping your chain cleaner by using a chainguard can extend its life even further.

Above all, have a little sympathy for the job your chain has to do. After all, it is stuck way out there in the elements and is subjected to enormous loads. Without it, you might as well burn the rest of the bike.



TYRE SEALANT

-it works!



Punctures can be sudden . . . and devastating

I'VE BEEN OKO'd

WHAT IS OKO?

OKO is a water based liquid tyre sealant which is harmless to the skin as well as to rubber and paintwork. When placed inside a tyre, it will remain liquid indefinitely until the tyre is punctured, when the solid ingredients are forced by air pressure into the hole and immediately coagulate to form a strong permanent seal. OKO contains a dye to give immediate visual indication of a puncture having occurred. If used in accordance with these instructions, OKO will permanently seal all holes in the contact area up to 5 mm in diameter. OKO will not affect wheel balance and dissipates tyre heat, a factor in overall tyre life.

WHAT DOES IT DO?

Amazing OKO Tyre Sealant seals 99% of all punctures in the contact area instantly, with no loss of pressure. This means you can actually prevent punctures and feel that much safer on your machine. OKO is guaranteed to seal all holes up to 5 mm — that's a 5" nail! It also slows the escaping air from holes much larger. So you can forget that nagging worry about sudden deflation with all the stops out. And OKO no way affects wheel balance or handling characteristics.



1 Shake the OKO bottle thoroughly for one minute before use.



2 Rotate wheel so that valve is at 9 o'clock position



3 Remove valve to deflate tyre.



4 Clip off the tip of the nozzle on the OKO bottle and push on the short plastic tube provided.



5 Push the other end of the plastic tube over the valve casing.



6 Inject the correct quantity of OKO as indicated in the table below, by gently squeezing the bottle.



7 Replace the valve and reinflate the tyre. If the tyre is already punctured, immediately rotate the wheel to seal the puncture, having first removed puncturing object.

YOUR TYRE IS NOW PERMANENTLY PUNCTURE PROOF

In the interest of safety, tyres should be inspected periodically and any puncturing objects removed.

OKO . . . the Number 1 tyre sealant — ask for it by name, OKO.

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