LAVERDA International Owners Club

TECHNICAL TOPICS

A series of technical tips and articles reprinted from La Vera Vista

ENGINE, GEARBOX, CLUTCH

&

Monty Frames, and other stuff

Contents

ALPINA HEADACHE by Alex Frost

The oil leak from the head gasket on Lynne's 500 had finally got beyond a joke and the time had come for tools to be spread out and hands dirtied. Alex and Ray (assisted by Lynne and Jane) offer this guide to what happens next.

Drain the oil (it was being changed anyway) by removing four sump nuts and note which way round the oil filter and the cam chain guide was fitted. Remove petrol tank, next the exhaust. Remove flange nuts, pillion footrests, loosen one end of the balance pipe and after much pulling, wriggling and swearing, the system will drop off (upending the bowl of old oil all over the floor). Keep an eye open for the split rings from each exhaust clamp and two squashed copper 'O' rings from the exhaust ports.

Remove the rubber hoses from the air cleaner and carbs and pull away from the crankcases the breather pipe. Slacken the clamps holding the carbs on (better to use a socket for this), remove the carbs and place them on top of the frame. Now, slacken off the Allen bolts holding on the camboxes (working from the centre outwards), remove the rev counter drive and take off the camboxes.

Rotate the engine forwards by means of top gear and the rear wheel until the cam chain split link appears in a position where it can be easily removed, (It is a good idea at this point to take time to have a good look at the valve timing, i.e. the relationship of the crankshaft position to the camshaft position). At this stage it is very advisable to tie off the ends of the cam chain with string, otherwise you will lose one—just like I did! Remove the split link, new or at least good pliers make this much easier.

(Redax: I have a set of Shoe Laces stored away in my toolbox for the tying off of the Cam Chain ends, very handy and don't fray from use.)

Next on the agenda is the removal of the cylinder head nuts and camshaft retainers, working from the centre outwards. Do not forget the front and rear external head nuts. (These appear to be very soft and easily butchered. The ones on Lynne's bike were butchered before I got to them. Since a 13mm spanner would not fit, the alternative-a 5/16 Whit, with a halfpence piece inserted or a 1/4 Whit, hammered on gently—finally got round the problem).

Now you will make a major discovery—the cylinder head does not come off with the engine in the frame! So, remove final drive sprocket cover, rear chain, disconnect the battery and clutch cable from beneath the engine. Remove the engine mounting bolts and lift the engine with a small jack under the sump. It is a good idea to place a piece of wood between the jack and the engine to protect the sump (fingers will not do as you will need them later). Using feet, hands, levers, sweat and tears, twist the engine up and out of the nearside of the frame. If you support the engine close to the frame, all wires can be left connected except the plug leads. Take care to note the position of the shims in the rear engine mounts.

You can now remove the cylinder head—a helper is necessary at this stage to take care of the cam chain as you thread it through the hole in the head. Note the position of the cam chain slipper behind the retaining pin in the crankcase.

The cylinders can now be pulled off, taking care not to let the pistons drop against the crankcases. This enabled us to change the offending cylinder base gasket and also to retrieve the cam chain

which was inadvertently dropped into the sump earlier in the proceedings. Take care when fitting the gasket to check that all the oilways match up with the holes in the gasket.

Now, as this was as far as we needed to go the cylinders could go back on. When threading the cam chain ends and pistons up their appropriate holes, the use of about 16 hands makes life easier. Head gasket and cylinder head go on next, ensuring that the cam chain slipper goes behind the retaining pin. Replace the engine in the frame by reversing the removal procedure (i.e. grunt backwards and swear in Italian). Don't forget to shim the rear engine mount correctly. Tighten up engine mounts, making sure that they are all good and tight so that the engine does not flop around and upset the handling.

The camshaft and head nuts can now go back on; make sure that all bearings seat correctly and that the inner head nut spacers fit properly into their recesses. Torque down the head nuts, working outwards from the centre, not forgetting the two centre ones. Torque settings for these are 1.5 then 2.0 and finally 2.5 Kg.m. (i.e. you go over them three times).

Note; make certain that the cylinder head spacer piece is clearing the Camshaft as you tighten it down, you will normally see rub marks on the machined surface where they have been fouling the Camshaft. Makes the Camshaft difficult to rotate.

Remove alternator cover and set crankshaft on TDC—mind that timing chain! Set both camshafts to their timed position on the sprockets. Refit cam chain and split link, turn the engine over forwards two crank revolutions and recheck the valve timing.

Now you can put back all the other bits that are strewn on the floor beside you (cam boxes, rev counter drive, exhaust system). Use new copper seal rings and don't forget the split rings in the clamps. Carb. and air cleaner connections go on. then the clutch cable which fits close to the sump, and the outer casing slots into drillings. Keep on putting pieces back in the reverse order to that which they were removed.

When the garage floor is empty and the bike looks much the same as it did before you started, you can reconnect the battery, turn on the fuel, ignition, and offering up a quick prayer, press the button. Watch out for jammed floats in the carbs as they have been disturbed, and they can stick, allowing petrol to spill onto the floor at an embarrassing rate. If all Is well then the engine will start—if noise is not forthcoming then you will have to go back to the drawing board!!

SFC TUNING, TWINS, by Phil Todd. nr.83

I've had so many people ask me to explain some of the tuning items that Tim Parker has talked about, so I thought I'd try to explain it in more detailed form within these pages. It seems Tim has found someone who actually has some technical knowledge, not the usual "bolt on" man who fits a load of mismatched parts because some joker says they are the bizz. Many of the observations Mr. Ferree has made have been touted by myself for many years. The dyno figures are high compared to English measurements, but the percentage increase is the figure to watch.

I'll go through the points in the order that Tim related them:-

The percentage increase after tuning and rebuild was 13%, this was without the original faults, so perhaps 8% is a more realistic figure. Still good, when only the original cam timing is being used.

For the American tuners, a flow bench is normal stock, if you haven't got one you're nobody. It's very easy to "prove conclusively" that modifications are required, but with a calculator, it's often just as easy (and cheaper) to calculate the valve size. For those of you who may want to do this yourself I'll use Tim's figures as an example:-

The mean gas speed suitable for many motors is 240ft/sec, the Laverda twin is no exception. To see if your valves are the correct size the formula is:-

$$\frac{\text{MEAN PISTON SPEED x PISTON AREA}}{\text{VALVE THROAT AREA}}$$

The mean piston speed is calculated in ft/sec by the formula:-

$$\frac{\text{STROKE IN INCHES x RPM x 0.166}}{60}$$

The rpm would be the maximum power figure.

I'll now apply these calculations to Tim's bike, using the 44mm valves and 7,900rpm maximum power figures:-

$$\frac{63.6 \times 5026.5}{1320.3}$$

This gives a mean gas speed of 242ft/sec—magic isn't it? I've assumed a valve throat area of 3mm less than the valve diameter—normal practice in most instances, the piston diameter is 80mm. These calculations also apply to the triple as it shares the same stroke, also the same piston diameter on the 1200. Unfortunately, a 44mm inlet valve is a little difficult to fit on a triple!

The porting job is usually the preference of whoever is doing it with Mr.Ferree's pedigree there should be no problems in that area. A word of advice to anyone reading too much into flow bench figures—they usually show a far greater percentage potential improvement, due to the fact that air is mechanically drawn through the item tested. On the bike itself conditions are far more varied, with various pulses rushing up and down the ports, often wreaking havoc with the gas flow. If you are contemplating a "head job" in conjunction with a flow bench, don't get talked into having your valve guides needlessly hacked away—on all but the latest high-tech motors it will only show as an improvement on the bench and not on the bike.

The 36mm carbs are too large on a stock motor; if you have the 750 with the 30mm carbs and want to tune it, use 32 or 34mm but no larger.

The bellmouths make no difference whatsoever. I make extensions that are flush fitting with the actual bore of the carb; these are very useful for ironing out flat spots-It's amazing what a small change in length can achieve.

The '75 cylinder head and pistons are superior to earlier, or standard 750SF set ups but the earlier heads can be made superior by careful choice of piston. I utilise the large flat area where the head

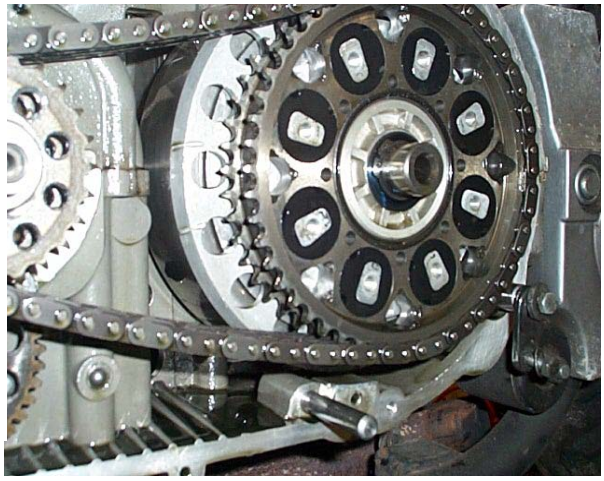
sits on the barrel spigots as a squish band, with pistons suitably machined to give a corresponding flat area, running very close at TDC. This causes more rapid burning of the mixture, with no offset between Inlet and exhaust valve to create swirl; the advantages of the squish set up are very worthwhile. Unfortunately, the largest size valve that is easily fitted is only 42mm.

The offset gudgeon pin caused most enquiries. You cannot just "centre" it, a new piston is required. It would be no good having a piston made with the pin in the middle, and retain the same overall dimensions as, due to the larger part of the offset being on the exhaust side, the piston would not reach the correct height at TDC. The most important point is the angle between con rod and crankshaft. Obviously, when this is at 90° it would be desirable to have the maximum force on the piston, generally recognised as being around 20° after TDC. Development engineers spend a lot of time playing around with rod lengths and piston pin offset. Short rods and no offset can cause excessive piston rattle, but on a racing machine this is not such a big point to consider. I use a piston with less offset than standard and the shorter rods from the triple, this brings the 90° angle closer to TDC, and so far no excessive noise has transpired. It also means that standard stock items can be used at a reasonable cost.

The ball valve breather does work, but when the ball swells up with oil contamination, it can fail. I stab an extra breather in over the gearbox to make sure that the pressure can relieve itself quickly in all parts of the motor. For those of you not wishing to go to those lengths, or the expense of a reed valve assembly, just remove the ball and fit the breather baffle from a Morini 3 1/2. In fact, the latest 120° motors have a similar system.

The adjustable cam timing is probably the most important aid to any tuning work. If Tim hasn't already coughed up a fortune for specially modified cams, he can contact me and I'll pass on my method of making this modification using only standard Laverda parts, but with a fair bit of machining work. This mod enables the overall timing and the timing between each cylinder to be adjusted quickly and simply—even with the motor in the frame. I've used this system for over a year now in my own machine and, so far, it's proved reliable. Strangely enough nearly every "tuned" Laverda is running around with cam timing miles out, robbing people of vast amounts of power; only a very few people who have been offered the chance to have theirs set up properly have done so.

I've machined sets of holes through my clutches to allow the subsequent increase in oil flow to cool them. The clutch on my racing triple is now in its third season, with no signs of slippage, even though the motor makes the same torque as a GSX-R 1100—It's torque that'll knock a clutch out, not BHP.



TROUBLE WITH A TRIPLE by Martin Key. nr.403

The trouble started when my 1977 Jota made knocking noises when warm. The machine had covered 9,000 miles and was two years old, so being long out of warranty, I stripped the motor down myself.

When the cylinder head was lifted off I found the first fault—a crack between the valve seats on every combustion chamber; going on further the gudgeon pin holes in the pistons had worn where the pins had been turning. By turning the pistons up, the pin would fall out under its own weight. The motor was then stripped completely and the crank tested by an independent engineer. Both myself and the engineer decided it was okay.

I then contacted Richard Slater to ask for some assistance with regard to technical advice and replacement parts. Unfortunately, Richard had left the country for some time, thus delaying the repair. However, just after Christmas '79 and many phone calls to Slaters and Tim Healey a cylinder head arrived, in good condition (although it was not the one I had sent to Slaters 5 months previously). The machine was put back together with new pistons and head, but the noise was still there. Starter freewheel, clutch, primary chain were all checked and double checked. And so.... back to Richard. He suggested I take my Jota to Phil Todd because if anyone could sort it out, he could. When Phil heard the knock, it had become louder and he thought it was a worn big end. When he stripped the motor he found nothing. Richard Slater wanted the crank pulled apart to measure up the bearings. This was done by Tim Healey, who said there was some slight wear on the centre main bearings; the crankcase was put back together and returned to Motodd. When Phil inspected the crank it was discovered that it was not mine (at least not the conrods). The small ends were in much better condition than mine and it had the Woodruff keys in the crank, something Phil always removes.

Anyway, the engine was rebuilt and it ran perfectly—so, was it faulty mains, or something else in the crank I wasn't told about?

In all fairness. Richard Slater was very helpful and sorted out the parts with no cost involved, for which I was very grateful. Phil Todd of Motodd, Croydon, did the repair at a very reasonable cost and remained neutral in this three-cornered negotiation with myself and Richard.

UNMATCHED CARBS? TRIPLES Slater Bros.

It has been pointed out by a sharp-eyed dealer that it is common for some triples to have incorrect, unmatched carburettors.

At first sight this appears to be a reasonable assumption in that viewing the carburettors from the rear on the air intake side, some bodies appear to have three holes, and some bodies only two holes, located immediately below the intake choke.

The fact is, however, that all carburettors have only two holes that are in operation. The third 'hole' is, in fact, non-operational in that it is completely blind. This drilling used to be used on bodies that did not use an accelerator pump.

However, it is becoming more common for the blind hole not to be drilled at all as it is a wasted operation. If you look closely at a two hole body, you will notice only a small dimple where the blind third hole has no effect on the carburettor and two and three hole bodies are not to be considered incorrectly matched if mixed on a bank of three units.

Jota's have always enjoyed excellent carburation, but the larger-engined models can on occasion be a bit patchy. Why 1200/Mirage models are really 'clean' whilst identically carburated sister machines can be 'woolly' is a mystery. 1200 cc engines have been at Dell'Orto for some time for them to clean up this occasional problem.

The common method of cleaning up a 'woolly' 1200 is to fit K1 needles from a Jota and/or a smaller pilot jet of 55 to 58 range, again, similar to Jota size.

These alternatives are not required on clean-running engines, only recommended suggestions for engines not 'clean' at low speed.

Further mystery comes from the fact that the K1 needle, whilst being much richer than the 'correct' needle, can reduce the larger engines' fuel consumption.

ELECTRICS; ALL MICROPROCESSOR-CONTROLLED IGNITION

Yes. it's true—someone has at last come up with a system that promises to remove that awful step advance Bosch lash-up that Moto Laverda have seen fit to inflict on us for years too long. Lurching around town should be a thing of the past from now on.

Uwe Witt, the German Laverda importer, has spent two years developing the unit together with copious technical information. Only problem is that it's (not unreasonably) all in German! You'll have to make do with what I've managed to cull from the diagrams— we are attempting to get a full translation made for the next issue, by which time I also hope to have evaluated the products. It could be the best thing since you discovered the marque!

Applicable to all Laverda 500/600 twins and triples, the system uses the original pick-ups for triggering the system, although a new rotor is used. The microprocessor control unit (30 x 80 x 108mm) replaces the BTZ amplifiers (or CDI black box) and fires into the original coils. CDI models therefore require two new coils (included in the kit). Although my understanding is far from complete, it looks as though the redundant HT coil can be changed to improve the alternator output for battery charging although I'm unclear as to whether this aspect is included in the kit price—I think so!

A total of 8 ignition curves are user-selected and guidance is offered in the comprehensive manual as to the optimum for a particular application. Some reference is made to lead-free petrol-this system should cope well with the current low-lead fuel we are using in the UK. The basic characteristic comprises 3 different advance rates spread across the full rpm range; the first knee point is at 3,000 rpm, the second depends on selection, but is typically 6,000rpm, the final advance rate is, in fact, constant, or a slight retardation for two characteristics. Maximum advance varies between 26° and 36° depending on selection—one curve even offers an inbuilt rev limiter! Price guide is £150 (£250 for CDI models), which includes a 6 months guarantee.

ALL DIGITAL IGNITION by Rob Bradbury

There are several reasons for junking Laverda's inadequate Bosch ignition and fitting Moto Witt's digital version—unobtainable CDI black boxes, expensive BTZ amplifiers, engine pinking, surging at low revs, inadequate alternator output—whatever your excuse for wanting to change, the results are astounding. My Corsa now doesn't lurch at 2,200rpm, pulls harder in the mid-range and seems smoother. Nor does it pink when hot at low speed under provocation. The novelty of riding smoothly without fuss at low revs still hasn't worn thin—it's difficult to imagine that spending less than £150 could transform riding pleasure so noticeably.

Versions are available for 500/600 twins and all triples—what's supplied depends on your model, but the principle is the same. Existing pick-up trigger coil output is used, although a new rotor needs to be fitted. You are left to decide on where to fix the box of tricks—the obvious place is where the original amplifiers are sited on the RGS/RGA and SFC series. You should then find that all the supplied leads are long enough—less connectors means improved reliability. From then on, installation is a matter of being able to understand a wiring diagram and use a soldering iron. The last item is vital for a reliable installation; there is no point fitting a hi-tech digital ignition system at the cost of frequent roadside breakdowns—the original Bosch BTZ equipment is at least dependable!

Uwe Witt, the German Laverda importer, supplies copious notes with his system. Not unreasonably written in German; ILOC has translated the installation manual so that you can easily follow the detailed advice. Copyright remains with Moto Witt—a manual is supplied with each order—but I can supply outline details from the same source if you wish to read more. I can also advise where to 'break in' to existing wiring on later 120s based on experience with my Corsa—really quite easy. I'm also happy to chat about the subject on the phone if you have a particular question.

Enquiries and orders should be sent to:-

Moto Witt GMBH Rheinauhafen Halle 7 5000 Koln 1. West Germany Tele : 0049 221 326332

Kits available are as follows—prices do not include German VAT (currently 14%) or post and packing. You'll have to send cash with order and this may mean a Banker's draft if you don't have any Eurocheques—German VAT is not payable on exported goods (outside EEC), so you may just have to find out the cost of P&P from Moto Witt before you can send the money for the kit required.

Equipment (Part Nr.)	Application	Price
LC2.1B (82 100 002)	Laverda 500/600 all models. Kit: computer, rotor, handbook.	385.09Dm
LC2.1 (82 100 001)	Laverda 1000—CDI models Kit: computer, rotor. 2 ignition coils, lighting coil, handbook.	609.65Dm
LC2.1B (82 100 004)	Laverda 1000/1200—late BTZ models Kit: computer, rotor, handbook.	385.09Dm
LC3.1	Laverda 1000/1200-all 120° models (Jota 120, RGA/RGS, SFC) Kit: computer, rotor, handbook.	393.85Dm

Just to emphasise how clever this digital ignition is consider the following points:-

1. Regulation of tickover by altering ignition timing.
2. Choice of eight different ignition curves—user selected.
3. Dwell angle control (limits current drain at low rpm).
4. Inbuilt rev limiter (fully retards ignition timing at 8,500rpm).
5. Automatic switch off when engine is not running (ignition coils consume current if ignition is inadvertently left switched on).

Moto Witt offer a six month guarantee and have installed over 100 units during the past year without problem. I wanted to retain the Bosch system as a back-up, but after riding the modified bike, any offers for 3 Bosch amplifiers?

The kit as supplied -includes replacement connector and pins for connecting to pick-up trigger wiring, as well as 'double-edged" ignition rotor.

For further information on available Ignition systems that are now on the market, download Chapter 3, Electrics. There is a detailed discussion on electronic ignitions in that Chapter.

TRIPLE TUNING TIPS by Paul LeClair. Calgary, Canada/LVV159

Tweaking and tuning continues on the "new" 84 RGS Executive. It now has about 1500 miles on it.

Replacing the stock ignition with the Witt unit made a huge difference. I think the primary improvement came from the removal of the three stock ignition pick-ups, and replacement with the single optical pick-up and machined rotor cup, which spaces the ignition pulses exactly 120° apart. The motor runs much smoother.

Of the three basic curves available on the Witt, there are 5 variations of each basic curve. I spent a couple of hours comparing the curves back to back, with side panel off the bike and the Witt unit zip tied to the side of the bike where I could easily get at the micro-switch for the ignition curve selections. The first curve (1 through 5) brings the advance in quickly and early. The second curve (6 through 9) delays the advance and extends the time before full advance is reached. If you are playing around with a Witt unit beware of curve number 6 which advances the ignition a full 36°—way too much for a stock motor. The third curve (10 through 15) is an even "flatter" curve. The third curve doesn't suit my RGS at all—low power, rough running, particularly in the mid-range.

The second curve is pretty good, particularly curve number 7, but it is "soft" In the 3,000-4,000 rpm range. The first curve is the "hot" set up for my RGS. The engine seems to like the advance to come in relatively early. Curve number 2 gives a strong bottom end, powerful mid-range, smooth in the 3,000-4,000 rpm range, and very strong top end. Within the first curve, curve number 2 is my current selection and transforms the bike. For my bike it is orders of magnitude better than any of the choices within the second or third curves.

For carb jetting, I have removed the air box restrictor "horn", but haven't yet drilled the air box. I have drilled 4 x 10mm holes in the end plate of each stock muffler to reduce back pressure. Neither modification has increased noise levels much, but made a huge improvement in performance.

The idle jets, at stock 65's, were way too rich and after trying 60's, I have now settled on 55's. Crisp and sharp, the plug readings at idle are now bang on. 65's were so rich the plugs and piston tops were wet and the exhaust stunk with unburnt fuel. For needles, I am on K1's in the middle notch. AB 265 needle jets, and number 60 slides. Stock main jets are 108's. which were ridiculously lean. No power whatsoever. The bike would just bog when it came onto the mains. I went up in small increments, right up to 128's, which were a little rich, and have now settled on 122 mains. Crisp throttle response, good top end, and the plug readings are good.

For additional wind protection I have installed a "plus 2 inch" screen from Gustafson in Florida. I had it made in bright blue. I like the looks and it is actually about 2 1/4" taller. It raises the wind blast to slightly above eye level without any moulding trim on it yet. I have had good experience with this product in the past. It is a "Vortex Generator" (it has a curved edge facing into the air flow that breaks up the air flow and quiets it down), which also raises air flow a few inches and usually dramatically reduces wind noise. I'll report on that when it arrives in a week or so and I install it on the Gustafson screen See it at: http://www.saeng.com/

POWER LOSS by Hal Kendall, LOG USA

For some time I had suffered a power loss problem, thankfully now resolved. The symptoms are presented here so that other Laverda owners need not go through the same grief as I did. Perhaps if I had a better equipped workshop or was in close access to qualified Laverda mechanics, the problem may have been diagnosed sooner.

The symptoms—start off okay with plenty of power, just like the old gal should be. If the journeys were relatively short, or if travelling on busy urban streets the power remained on top—but—if taken onto the freeway and held at half throttle or more, after about 6 or 8 miles the power would drop. Rolling on the throttle would only change the exhaust note. It was now sluggish. An occasional exhaust crackle would develop but it would continue running. After it cooled down the power was on top. In phone conversations with Perry Bushong and Roger Slater, both indicated this to be a classic case of fuel starvation. So it was through the carbs, the air cleaner, the fuel line, the hole in the fuel tank cap and so forth. No joy, the rig was used only for short runs until we could sort it out.

The rig was taken from Houston to Fort Worth for Perry to locate and correct the problem. The symptoms never appeared while Perry had it in his shop. Then the engine blew and the rig was taken back to Perry's shop. The engine was rebuilt but the electrics and the gremlins remained. This time it was caught by Perry, who now defined the problem as ignition and not carburation.

The ignition module was replaced. It seemed to cure the problem in Fort Worth. In Houston, the symptoms came back. I had earlier replaced one ignition module back in Chicago a year or so earlier (all carry different Bosch part numbers). All three work on the dual systems. It was definitely ignition, but what part? The stator unit? The ignition module? The coil? The plug wire? The spark plug? The spark plug cap? —or any of the several connections or wires in between?

By now the symptoms had increased. It cut out with the engine cold. It fired spasmodically. Sometimes it ran on three but now most often on two. Plug okay—new—a little sooty. Spark plug cap showed 1,000 ohms—the same as stamped on the cap. A timing light in series with the centre

plug showed that the spark was delivered, sometimes, and sometimes it was not. That I knew anyway. After a short run the single coil was warmish, the double coil remained cool. It most probably was the coil. Perry said these coils were nearly bullet-proof and never gave problems. It could be the Ignition module (again) or the stator coils. Both coils showed 620 ohms and Perry said he could not find any cracks on the coils when he inspected them. Roger was somewhere between California and Washington (in the process of moving lock, stock and barrel).

I trundled up to Hunziker Cycle Sales and asked the counter person if he had anything like the coil in my hand. The same tired story. Must have a make and model. What is a Laverda? A tractor? All Jap bikes have dual coils. What about their single cylinder dirt bikes? They won't fit. Get one anyway. With great reluctance he finally produced a coil for a Suzuki 125 RM. Kept saying it wouldn't work and I could not bring it back. A heck of a salesman! My mouth drooled. It was an exact clone of the one in my hand. I had to have it. He almost refused to part with it. The Suzuki part number is 33410-14120. My Visa card was lying on the counter as we played tug-o-war. The sales commission finally overcame his reluctance. Primary resistance was 1 ohm, probably because the Suzuki is battery less and uses a magneto voltage to trigger. The original has about 4 ohms.

However, upon installation, it worked—first time. All cylinders fire, it does not get warm. Joy. Happiness.

Alternative Ignition Coils that can be used are TEK KP-03, single lead coil, found on numerous Japanese motorcycles, in particular Kawasaki Ninja 250's. For the dual lead coil, use TEK MP-08 coils, found on CB750 Honda's for example. Both these coils are the same shape as the Nippon Denso units so will fit in the standard Laverda Coil plates.

To upgrade the Coils you can purchase Green Coils from Dynatek Performance. These are 3 ohm coils and numbers are DC1-1 for the twin lead coil and DC3-1 for the single lead coil.

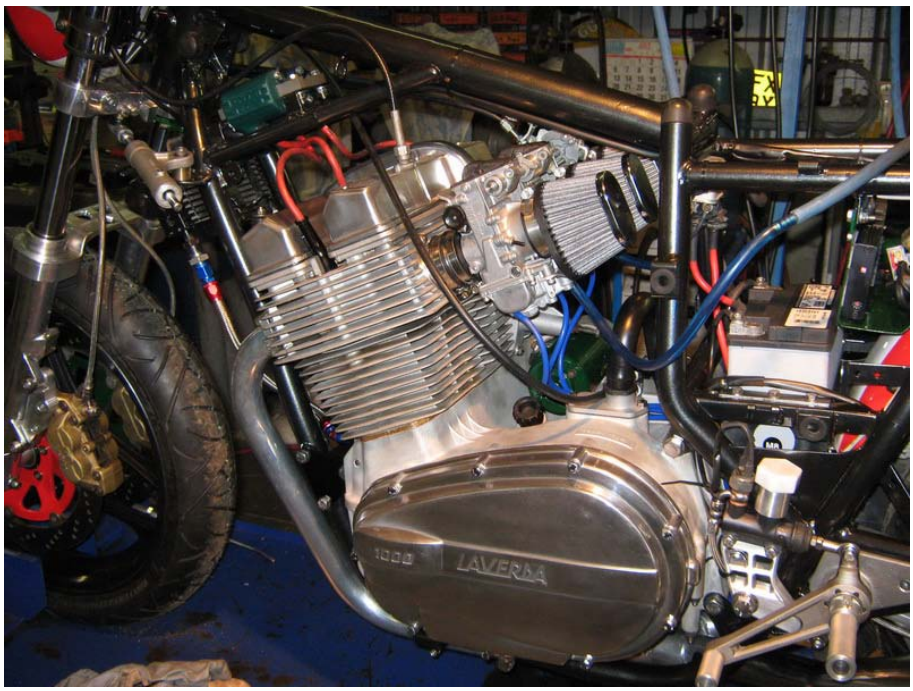


Photo shows a highly modified 77 triple with the Dyna green coils mounted in place.

IRIDIUM POWER FROM NIPPON DENSO by Henry Morgan/LVV159

Spark plug manufacturer Nippon Denso have launched a new spark plug called Iridium Power. It is a new generation, high performance plug with, it is claimed, the World's smallest centre electrode which is 0.4mm in diameter.

The Iridium Power plugs' centre electrode is in fact made of an alloy of Iridium and Rhodium for strength—Iridium on its own would shed and corrode in use. The electrode is welded all round to the base carrier using 'all round laser welding'.

A small centre electrode concentrates the electrical potential at the tip of the electrode, and the stronger the electrical field that affects required voltage the lower the required voltage. Combustion is improved for all types of driving, starting is enhanced and acceleration improves too. The Iridium Power plug incorporates the hallmark U-groove earthing electrode which is a long standing feature of N.D. spark plugs and many readers will be familiar with it. This earthing electrode is now taper cut to improve ignitability. providing less heat loss to the electrode by virtue of its smaller area.

Applications are as follows:-

97 onwards 750 models (also 650 and 668) use IXU27 Triples use IW24 (for B8EV NGK) or IW27 (for B9EV NGK)

Tracing supplies in the UK is difficult even though Nippon Denso is owned by the car giant Toyota.

ALL; EDTA YOUR BATTERY by Kevin Martin/LVV 119

In the late 1980's you may have read my article on a method of prolonging the life of vehicle batteries using the chemical additive EDTA to remove lead sulphate from battery plates. My suggestion was that by adding just a small amount of this chemical to ordinary lead-acid batteries, it was frequently possible both to extend the life of batteries in regular use, or to return to use batteries which had been neglected or discarded.

Many enthusiasts have since become regular users of EDTA in their batteries. For those who are still sceptical, I am happy to report on some progress and developments that have taken place over the last few years in the USA which very much support my original suggestion and now offer a 'built in' longer life in a newly available battery.

The American energy magazine Home Power has carried out a series of independent tests using EDTA in lead-acid batteries. Their results were spectacular and they have given permission for them to be quoted, provided they are given credit. Their address is Home Power. P.O. Box 520. Ashland, Oregon 97520. USA.

In the December 1990/January 1991 edition of the magazine they tested four lead-acid batteries which were intentionally completely discharged and then left flat and out of use for three months—this gives battery sulphating conditions far worse than those encountered by most motorists. Together the four batteries should have had a capacity of 350 Ampere-hours. When they were

recharged to capacity, they would only power a 28 watt rear light bulb for about 3 minutes—an estimated capacity of about 1.5 Ampere-hours. They were then treated with EDTA and tested intermittently over a month. At the end of this period, the capacity had increased to an astonishing 214 Ampere-hours. Home Power gave a page and a half of exhaustive data to substantiate these results.

The magazine invited reader feedback which is published in the February /March 1991 issue. This is all very positive and provides much more data to substantiate the improvements brought about by using EDTA as a battery additive in other situations and environments.

Perhaps the most interesting and potentially practical development to come through over the last few years has been the recent marketing in the USA by a large Japanese battery manufacturer of a lead-acid car battery with 'sulfate stop' added. This additive is in all probability EDTA, but if not it will almost certainly be a very similar 'chelating agent'. As far as I am aware, this type of battery is not yet available in the UK. It will be interesting to note how soon a similar battery becomes available here, and what increased battery life it provides.

If you would like more data and information on the above, or have any feedback on this subject which might be of use to others, I would be happy to hear from you at 8 Taylors Close Meppershall Shefford, Bedfordshire. SG17 5NH. Telephone : 01462-814827

How to treat your battery with EDTA

1. Remove the caps from the battery and add 3 grams (1 rounded teaspoon) of EDTA to each cell. (The quantity is relevant to battery size so for a car battery you need about 5 grams).
2. Leave the battery for a day. but agitate at frequent intervals if possible. This allows the EDTA to dissolve any sulphate in the battery. The battery can be in use during this period if you want.
3. After a day fully charge the battery. Hey presto, have you got the shiniest lead plates on the block or what?

If you want to try this out, EDTA can be obtained from any chemical supplier. However, they will probably want to sell you a 250 kg bag or something. If you just need a little bit and you can't find a supplier who will break a bulk bag for 6 teaspoons of the stuff, Kevin Martin will be happy to help you out. You can contact him at the address above.

Having said all this, I still don't think it hurts to remove the battery from the vehicle in Winter and bring it indoors where it won't suffer from the cold so much. A trickle charge every few weeks will keep it on its toes until you put it back on the bike in the Spring and ride off into the Summer.

FRAME AND BODY, MONTY MODIFICATIONS—PART 1 by Ross Haygarth

Let me begin by saying that I do not claim to be an "expert" on tuning 500 Laverda's and all information is given in good faith on the grounds that it has worked for my own machine to my satisfaction. I do not wish to be held responsible for what other members do to their own machines and, on this basis, I would say that if you do not feel 100% sure about doing some of the engine mods, get expert advice in your area. The reason that I do the bulk of the work myself is because I cannot get specialist services locally. I will start with the modifications to the chassis. Any 500 will

benefit from a front fork brace such as that made by Tarozzi. The forks are standard 35mm jobs having 180mm between stanchion centres. The brace prevents the sliders "walking" but will not prevent them from moving fore and aft relative to the stanchions. The only remedy for this is to have the stanchions re-chromed and ground to fit the bushes in the sliders. Unlike British machinery. Marzocchis do not have separate bushes. Instead they run directly in the alloy—not a good idea as it is more expensive to take up the wear which inevitably takes place. You cannot simply renew the bushes, which are made of bronze, and of course wear faster than the steel stanchions.

Fork Brace shown at left mounted onto a Monty. Brace is not one of the Tarozzi units as mentioned in this article.

This is a one piece Fork Brace as made by Redax Laverda Engineering in Australia.

Unit has a hidden clamping system consisting of two wedge locks mounted below the Brace on the underside.

Use 20w fork oil, approx. 20ml more than standard. Pre-loading the springs with 1/2" or so spacers will reduce dive, although this is up to individual taste. I personally do not like excessive fork dive and will try anything to remedy it. Also check that the head bearings are adjusted correctly as it is very easy to over tighten taper rollers, which in turn makes the steering like a "ratchet" in town, and usually wrecks the bearing journals as the rollers are forced into them, leaving a series of notches around each race.

I am told that shallow offset yokes have a beneficial effect on high speed cornering stability, but as these are almost impossible to get hold of, I cannot really comment on how good they are. I have tried, without success, to get some of these and I may get Hejira Racing Developments to make me some adjustable offset yokes over the Winter for approximately £100 per pair including stem tube and nuts.

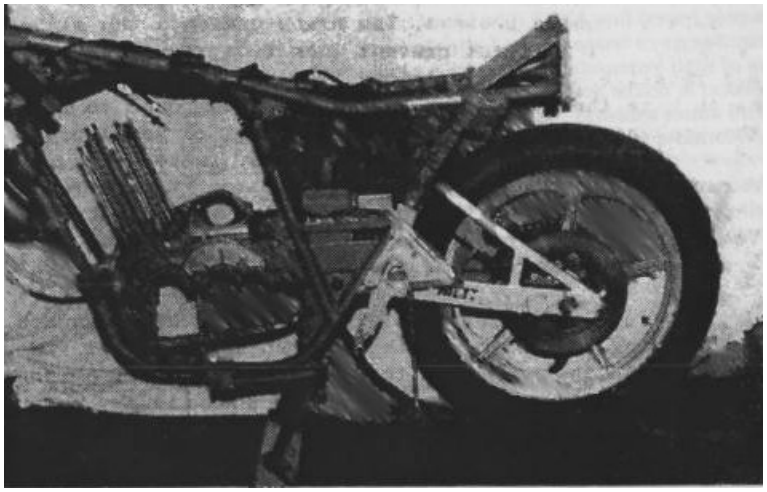
Moving to the back end the swinging arm is only marginal in its performance. Converting from rubber bushes will make it react to small movements more easily, but, better still, replace it with a box section item such as a JMC, with taper rollers and eccentric chain adjustment. A word of caution, however, if like me you have a JP Customs 2-into-1, you cannot fit one with either shallow or deep bracing as the exhaust will get in the way. If you are going to stick with a conventional twin shock arrangement, then get units with progressively-wound springs such as Konis, which give a soft initial movement progressively getting firmer as the unit compresses.

Adjustable damping is also desirable as the damping unit a unit possesses is only correct for one spring pre-load position, usually the softest. Try to avoid shocks which are oversprung, this is a common fault on lots of twin shock Italian bikes, not just Laverda's. Hard springs do not necessarily give good handling. A stiff, well-braced frame and swinging arm does, however. Indeed, soft

springing and correct rebound damping can give better handling as it allows the rear wheel to follow the road more precisely and also keeps the wheel on the road rather than spending half its time airborne!!

Now moving on to the actual modifications done to the rear end of my Monty. I have fitted a Motodd cantilever monoshock rear conversion in box section steel. The conversion comes as a complete "kit", all you have to supply is the shock and relocate the battery and electrics. The "kit" comes with the chain adjusters, taper roller bearings, dust caps, bearing spacers, upper shock mounting bracket, shock bolts, etc. and is in bare metal. The swinging arm is 2" x 1" box section steel, the sub-frames 1" x 1" box section and appears to be TIG welded. It is made by Saxon Racing who also make all of Motodd's triple frame kits. The upper shock mount is a split clamp which goes around the frame spine, directly below the point where the seat rails join the spine- The shock dimensions are 275mm between centres, 40mm of travel and approx. 7Kg spring.

I've been doing my homework regarding a suitable shock and it would appear that the best compromise between performance, reliability and cost would be the Hejira gas-pressurised unit at approximately £123 all in. These items are made to Hejira's specification by Spax but are quite different, so I'm told, to the other Spax units available.



Ross Haygarth's Motodd monoshock conversion.

The arm works on a 2:1 leverage ratio and so it is important to get a shock which is exactly 275mm between centres as any difference at the shock end is multiplied by two at the machine and could seriously affect the handling of the machine.

Also, make sure that the travel does not exceed 40mm or the subframe will hit the frame tubes on full compression!! With a 275mm shock, the back end does sit a bit higher than standard. It increases the seat height about 1" on my bike.

The shock that I've used is off a friend's FZR 1000. he's bought a remote reservoir Ohlins unit (£££s!!) so I got the De Carbon unit for £25 complete. I have made up a new top eye and shortened the unit by about 10mm. At the moment it still has the standard spring so it is very hard; I will get a Spax spring soon. It is an unusual unit as when I removed the spring I found hardly any rebound damping; indeed it has a return spring inside which pushes the damper rod back out but it has an enormous amount of compression damping—so much so that it is quite an effort to get the unit compressed. It now only has about 8mm of preload adjustment, so there is not much scope for altering springing without actually changing the spring itself for a different poundage.

The most difficult aspect of the conversion was relocating the battery and electrics. I had an excellent battery box/electrics tray made out of stainless steel because it was available and doesn't

rust, (alloy or mild steel would be okay). Doing it my way means no hacking up the wiring loom, but you need a new battery—a Yuasa model YB16AB, which I got from MRS. It is an expensive model, £39.95 inc. COD and it has to be specially ordered. The only alteration to the loom was lengthening the three wires to the rectifier, which sits on the mudguard just below the shock, also a separate earth wire to the rear master cylinder bracket (a Zanussi rectifier is fitted). If you still have the original Bosch unit fitted (unlikely), the earth wire goes onto one of the terminals, it then runs down a length of sleeve with the battery earth lead to the same bolt on the frame at the left-hand end of the battery. When doing the conversion, simply remove the sleeving, separate the earth wire and earth it in the same way as mentioned.

The monoshock conversion has greatly improved handling but highlights the deficiencies of the front forks, which are only marginal in the standard bike. I plan, over the Winter, a mechanical anti-dive and will report in due course with the results of my investigations into finding someone who is willing to do a one-off without charging a fortune.

MONTY MODIFICATIONS—PART 2 by Ross Haygarth

In this article I hope to finish up on the chassis mods done to my Monty. First of all I will tidy up a few points in my last article. When I mentioned converting from rubber swinging arm bushes I did not say what to! What I should have said was to fit bronze bushes from a triple swinging arm. This is quite a straightforward job. Indeed, a 180° swinging arm will fit straight into a 500 frame, although what the advantage is I'm not quite sure.

The standard rubber bushes are pretty hopeless, especially when they wear and the arm starts to move about whilst cornering. To convert to bronze bushed should cost no more than about £25. much cheaper than a box section swinging arm! If you're on a tight budget or own an Alpino and can't justify the expense, this is the way to go.

Moving on to the steering damper; this is a very good idea if you have a fairly standard chassis. My bike is getting to the stage where it is not really needed. The bracket is very simple and goes on the upper fairing bracket U bolt on a Mk II—there is also a spacer of the same thickness as the bracket on the lower 'U' bolt. You have to restrict the steering lock if you use a Kawasaki-type hydraulic damper because the damper's stroke is quite short. To do this drill and tap the steering stop on the frame M.6 and fit a short Allen screw and two plain washers on either side.

You can get the stanchion clamp from Harris for about £11 and I can make up the frame bracket. If you have a Mk I or Alpino get the 'U' bolt from your local car exhaust or motor spares shop. If you spend a bit more on the damper and get a Renntec or Tourmax . these items have more stroke and you might not have to restrict the steering stops. Mounting the damper on the left hand side means you can adjust the damper on the move. A general rule of thumb is to back it off completely in town and go straight to position 3 on the open road. If you need more than position 3 on the road, I suggest you start looking for something amiss in the chassis department—especially a rear tyre more than half worn (this guarantees a good weave!).

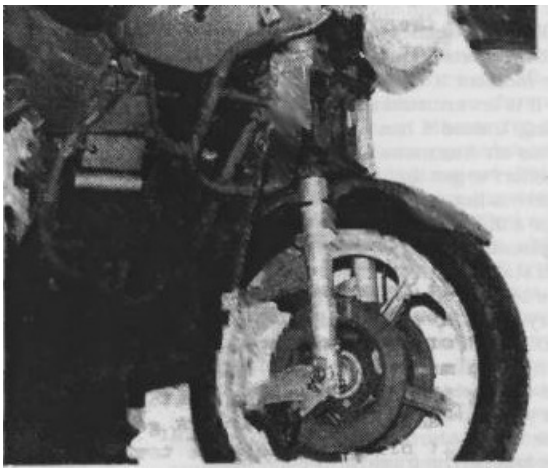
I remember at Donnington in '87, with a standard chassis going up a click every lap on the first session, I nearly fell off back in the pits, then I realised I had gone to position 7 to stop it weaving

round the right hander at the end of the start/finish straight. It made the hairpin rather interesting also! I think this could only happen on the track however.

On the subject of fork braces, if you have difficulty in locating one for a 500. a 500 Morini has the same forks etc....The box mine came in was marked Morini and cost £35 from Motodd two years ago. (Well worth the money)

My mechanised anti-dive is now finished except for the brake hose. In the photo it looks nice and simple, but believe me, making it presented lots of problems. The caliper mounting bracket was made by a firm in York, I made the rest in my workshop. The firm in York, who will remain nameless, took three months, went 40% over their quote and the finishing off left a lot to be desired.

The caliper swings on a double sealed ball race 12mm wide. The inside face of the fork slider is machined back to accommodate it. The bracket above it pivots on the old caliper lug on a shouldered brass bush.



The mechanical anti-dive as fitted to Ross Haygarth's Monty.

The inner plate is threaded M10 for adjustment. The rose joints are 10mm also. The linkage rods are 13mm diameter mild steel rod and the lower one is hollow. The stanchion clamp is machined from alloy billet and has a helicoil insert in it for the rose joint bolt!

The brake hose will be 25" long (635mm) compared with approx. 13" on the other hose. The stanchion clamp is very substantial and only just misses the fairing brackets on full right hand lock! It sits against the bottom yoke.

It is vital to have a fork brace with this set up otherwise you will twist the forks severely. This system was invented by Ron Williams of Maxton wheel fame, when he worked for Honda Japan's HRC. A doubled up set was used by the old air cooled twin-shock 1000cc fours that Ron Haslam and Alex George rode in the late seventies. The set up was pretty radical in '78 and '79 when they were being raced on the Isle of Man.

I got the 10mm rose joints from Harris for about £9 each. The whole job cost about £150 in total. Eventually. I will be able to make the whole set up 'in shop' and then will offer it to other club members on an exchange basis.

Moving on to the braking system, I have just fitted a set of Goodridge hoses to the bike. I chose stainless fittings for reasons of durability. Alloy fittings can snap easily if subjected to sharp knocks and are only really of benefit on the race track or at a Custom Show. The standard method of routing the front hoses on a 500 is rather untidy—I bent the junction box bracket so that the outlets point straight down towards the wheel. The hoses have straight connectors and go straight towards the

calipers. Here, I have straight connectors which swivel on the hose, and adaptors which screw into the calipers.

This system, although more expensive than banjos, is a lot neater and allows you to remove one hose easily and you don't have to have the banjos in perfect alignment as the swivelling connector is 'self aligning'. The top hose is standard spec., as is the rear hose. The hose on the anti-dive side has a banjo on the caliper because a stainless 90° elbow fitting is very expensive! One day maybe...

My bike is now 11 years old and the original Brembo hoses were only now starting to bulge—quite a tribute to their quality compared to Jap rubber hoses which start to go after the first year (I'm talking from experience). Although Brembos are good brakes, they are getting a bit dated now as regards feel and how progressive the action is.

A cheap way of upgrading them is to put in a set of 'Goldline' pistons. They are alloy Teflon-coated. The standard items are heavy steel that have been chrome-plated, the trouble being that chrome tends to flake off. The reasons for using 'Goldline' are simple; the lighter alloy pistons require less pressure to move and therefore more pressure can be directed at squeezing the disc between the pads. The Teflon coating reduces friction in the caliper body. The last time I checked with Richard at Slater Bros, the pistons were £12 per pair. A bit cheaper than a set of Lockheeds—needless to say I will be getting some soon.

Another good move is to fit a Lockheed Variable ratio' master cylinder so you can dial in how much front brake you require. A friend has one on an FZ Yamaha and reports a vast improvement on OE. Fitting a Brembo master cylinder from a triple will also give you more effect and they are made with two or three different sizes of piston, so I believe. With a set up as described, you will not be lacking in the stopping department, however fork dive will really be a problem, or maybe not?

The standard discs are very heavy and coupled with the weight of the original wheels makes for a hell of a lot of unsprung weight—a problem with all Lavs with factory cast wheels, I think. Getting the discs drilled is a good move—helps to shift water in the wet also. Eventually I will get some Spondon discs and Astralite wheels which will bring the weight down considerably. This is a department where modern Jap bikes have advanced in recent years. They have hollow-spoked wheels on some machines ('89 GSXR Ks etc.).

REBUILDING TIPS from Peter Porter/LVV117

I have been restoring a 1979 Mirage for the past 18 months or so. You may think this is taking a long time, but I am really enjoying the work and there is no rush to finish it. Last Autumn I took the frame and wheels along to Tyburn Road, Birmingham to be coated and they did a really great job. They do supply a leaflet which covers preparation, but here are some observations which may be useful.

(a) Mask off the wheel hubs where the disc spacers sit. Paint on these faces gives excessive disc runout, and it's a diabolical job scraping off the tough new enamel.

(b) When you put screws in to protect tapped holes in brackets, don't place the screws too far through otherwise you will have to saw the projecting bit off before you can get the screw out again.

(c) Clean out grease thoroughly. I fitted disc washers with a threaded rod through the swinging arm bearings but some melted grease leaked out and marked the paint finish.

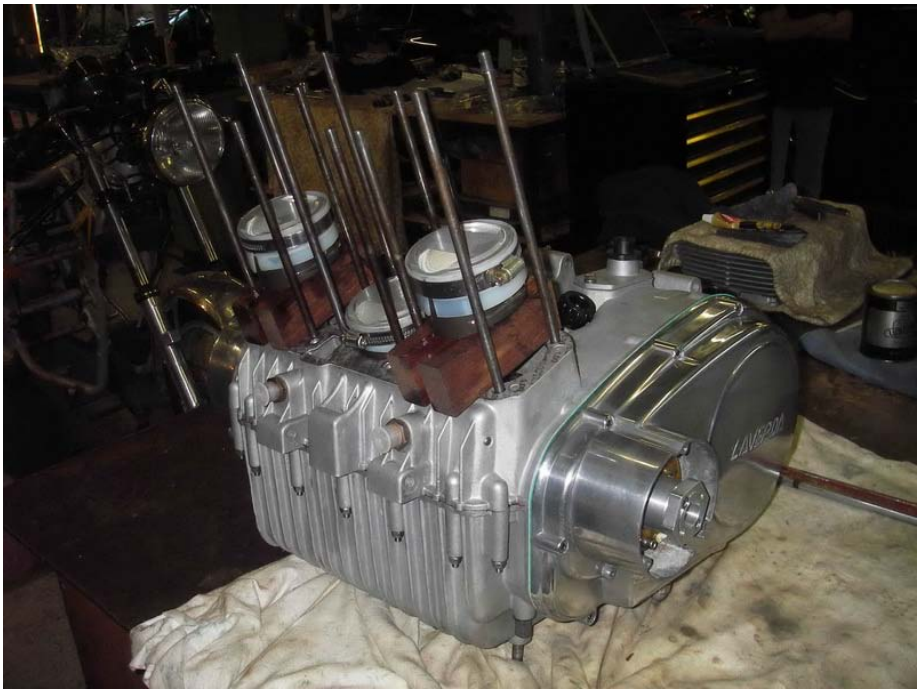
This project is now about 90% complete, but not quite at the exciting bit like firing it up and balancing the carbs, etc., and of course, riding it. Restoring any machine is always a bit of a voyage of discovery. Has a vandal tinkered with the mechanism before you? Some of my nasty discoveries were probably legitimate wear and tear like a cracked brake disc, corroded ball race in the starter clutch, two bent exhaust valves and one piston ring in about 15 bits. However, another couple of nasties were more sinister. A stripped thread in the head which allowed a camshaft bearing block to move up and down, and a damaged thread in a brake caliper bound up with PTFE tape! Luckily I have found no really expensive faults.

To finish, here are a couple of tips which may help other members. Of course, some may say 'everyone knows that' but here they are anyway.

(a) Having only one piston ring compressor, I fitted the barrels as follows (180°crank)—fit the three pistons into their cylinders without gudgeon pins, and with one circlip in each piston suspend the barrels over the crankcases on two of the long studs, with clamps to stop them sliding right down. Tap the centre piston down 'till the gudgeon pin hole can be accessed but the rings are still held in the cylinder. With the middle rod at TDC lower the barrels to line up the little end. Warm the middle piston by blowing a hot air gun around the skirt and on the crown. Push in the pin and fit the circlip. Lower the barrels further, allowing the crank to turn 'till all the little ends line up. Then tap down and heat the other pistons in turn and fit their pins and outside circlips.

(b) If you are installing the engine in a newly-painted frame single-handed, lay the engine on its left hand side, protecting the crank and clutch shaft ends. With the frame protected with masking tape at the appropriate places, lay it over the engine and insert some fixing bolts. Then tip the whole assembly upright.

The great thing about a long restoration programme is that it spreads over a larger number of pay days!



Quick, simple, cheap, ring compressors shown above. Three strips of Nylon cut to length to wrap around the pistons neatly. Make them approx 25mm wide, thickness is around 2-3mm. Three suitable hose clamps, tighten clamps up as tight as possible then back off 1 turn, should be able to turn the nylon strip and hose clamp on the Piston. Hose clamps should at the top of the strip, approx 2 mm from the top and even all around.

Cut two suitable lumps of timber as shown to hold the pistons parallel, check again nylon strips are still even all the way around the piston crown, slip barrels over the top, line pistons up with the bore, using two hands, strike down with both hands together one each side of the barrel, if everything is correct, barrels will go straight on into position.

Remove two outer Nylon strips and Hose clamps, rotate engine carefully so middle piston comes up towards TDC but stop before outer pistons reach the oil rings, you will have room below the middle piston to insert 2 x 3/16" strips of steel in under the side of the skirts in line with the Gudgeon Pins, line piston up, strike barrel with hands again, will slide straight down, remove hose clamp and nylon strip.

Sharp eyed readers will note that there is no Cam Chain in place even though the engine is obviously being rebuilt in this photo. That is correct, method I use is to build the complete engine and than once the head is on and bolted down (but not torqued) I roll the engine over and insert the Cam Chain last. I find this to be a lot easier way of building the engines.

STEERING MOD. by Terry Alexander

My thoughts in Autumn '81 were that the suspension and steering on my triple were far from okay. The steering, in my opinion, was far too sensitive and suspension operation not particularly good. In an endeavour to improve things, I tried fork oils from SAE 5 to SAE 20 and various preloads, but it did not solve the problem.

It was suggested to me that the weight ratio front to rear was incorrect—the wheelbase and trail too short. Great! Just where do you start? How many of you clever types can tell me just what is the ideal front : rear weight ratio? I decided to measure mine on the bathroom scales when the wife was out. The approximate weights were 270 lb front and 280 lb rear.

Having been used to a bike with a front end like the Forth Bridge and a rear end like a concrete mixer, the Laverda was a disappointment. The Vincent was basically stable. I approached Campbell Geometries (Renegade) of Dartford who have made several leading-link set-ups for various machines. After lengthy discussions. I decided to risk it.

Well, it may look like another Forth Bridge but the steering and front suspension is now superb. That isn't to say I haven't had a few trials and tribulations in the setting up.

The other point of interest was the swing arm shimming was suspect. I found that with the pivot nuts loose there was 0.030" float. This was shimmed out and the result is very rewarding. The final result is that I now have a motorcycle which steers extremely well and is no comparison to the original Laverda.

HANDLING from Alan Donald, nr.709

I, like a lot of Jota owners, have a handling problem with my bike. Despite following advice given by several wise buffs—including some from this esteemed publication— which seems certain, perhaps by the competence with which it was given, to solve my problem before you could say "wobble and weave". The handling remains as predictably bad as ever.

The problem is quite simple. On a wavy, rather than bumpy bend, taken at speed the bike will start to roll about a longitudinal axis drawn through the wheelbase. The feeling it imparts to me is of

impending doom about to become reality if I don't back off and a distinct tautener of nerves increasing in tension as each successive bend approaches.

So how have I attempted to solve the problem? Well, by trying every riding technique I know, fitting different section tyres—presently I have Phantoms 110/90 x 18 rear and 100/90 x 18 front, experimenting with tyre pressures, changing the rear suspension units to S&W air adjustables and trying every combination of air pressure and air volume reduction in them and trying different grades of fork oil. The wheels are aligned, the head bearings are fine, the swinging arm is in fine fettle as are the wheel bearings and balance, the frame is straight, and so are the forks.

Despite these efforts, I have failed miserably. All I am asking for is a Jota that will corner on wavy road surfaces whilst ridden solo at speed. I prefer riding without a pillion or 100 Ibs. of luggage strapped to the seat, which I know from experience will improve handling to a degree.

What is there left for me to try? Box section swinging arm, steering damper, fork brace, leading link forks, return the shocks to their pre '79 position, substitute a slightly larger 4.10 front boot.... new frame?! But will any of these make any difference?

Like a wife who inexplicably refuses to leave her drunken, battering husband, I've stuck by this bike since I bought it new in August '79 despite disintegrated crank main bearings and resultant snapped new cam chain. (Factory fault necessitating new crank and top end). Two "soft" heads or three including mine it would seem, a lifelong refusal to idle at all—even badly— and, in addition, the chronic handling problem. The engine has been to Slaters twice for rebuild and the bike has been to several agents all over the UK, so far fruitlessly.

My faith in Laverda is under severe strain and in imminent danger of cracking! Someone please restore it or I may just be tempted, against all my better inclinations, to have just a fleeting glance at a certain bike whose engine only has 860cc....

(Eds Comment: There ain't pleasin' some folk! But seriously, did I hear a murmur of SFC yokes fitting the Jota? Alan, check with your nearest dealer who KNOWS!)

Further to this (and rather late in the day!), I experienced similar problems with a 1984 RGA Jota which I purchased when only a few months old, and which still had all the factory settings.

I also tried many of the above "remedies" and quite by chance cured the handling problem when I bought a Crossbow (Three Cross) fairing to replace the existing handlebar fairing.

This would seem to suggest to me that the weight distribution or balance was biased rearwards, which in my opinion would certainly cause weave due to the front of the machine being too light.

I have also seen an old Dunlop film on the subjects of "wobble and weave" which confirmed that weight distribution was the principal cause, i.e. not enough weight on the front during heavy acceleration or high speed. Interestingly, tyre pattern or wear was not considered a significant factor. (David Pritchard, nr.4348)

WHEELS, TYRES, TRANSMISSION, BRAKES, CHAIN, CHAIN. CHAIN... AU,

from the IMOC's Italics magazine

The humble chain has been with us for a long, long time but these days it is not quite as humble a thing as it might once have been.

The chain is one of the most crucial parts on a motorcycle but despite being one of the easiest parts to maintain it remains one of the most frequently neglected parts.

So what's the point of having a chain—why doesn't every manufacturer use a shaft drive, or even a belt? The answer is of course that shaft drives sap far more power than chains or for that matter belts. Toothed belts work extremely well in relatively high power, low rev situations such as on the back of a Harley (obviously we're talking tuned Harley) or as drive for cams on a Ducati. Morini or Moto Guzzi Daytona. They are however relatively more expensive and more prone to going out of alignment than a chain; they also require a much wider sprocket which has implications as regards modern day rear tyres and wheels on a modern sports bike.

The chain remains, despite great improvements in shaft and belt technology, comparatively cheaper and far more efficient than either the belt or the shaft. The chain will also take more abuse. If left misaligned or dirty or dry the chain will function well for a lot longer than either of its rivals. The chain's technology has also advanced and today's OEM fitment O-ring chains need far less servicing and will last much longer than chains of old. By comparison, modern chains are practically maintenance-free and much, much cleaner.

All these improvements and benefits, however, can very quickly be negated if the chain is neglected beyond its normal service care.

Non O-ring chains need to be treated with as much loving care as any other part of your pride and joy. Don't skimp, use a good quality spray chain lubricant. Take the bike for a run to heat up the chain, don't spray it on a cold chain. Chock the back wheel up so that it is free to spin. Spin the back wheel and aim the spray from the can, using the straw, carefully first between the side plates being careful to do both sides, then spray between the inner plates and rollers. When satisfied you've done a good job. wipe off the excess with a cloth. DO NOT attempt the moron's short-cut of having the engine running on idle! You'll find it socially difficult to discretely pick your nose with several fingers missing, or worse still you might be mistaken for Jeremy Beadle!

The only lubricant an O-ring requires is something to make sure it doesn't rust. Use a lubricant especially formulated for the job or a good 30 weight oil or 6-in-One oil. If the chain gets wet, spray it down with WD40. Again, wipe off the excess with a cloth.

There are many options as regards how to clean a dirty or greasy non O-ring chain. One train of thought recommends first a wash down with paraffin, using a brush or rag— this is recommended by RK chains. Tsubaki chains recommend spraying WD4O onto the chain. NEVER use a detergent or a car wash hose, however, as water will get into the chain, promote rust and shorten the chain's life!

With an O-ring chain, avoid any sort of soaking in any solvent like paraffin, aniIndustrial parts washer or solvent tank. The solvent will be absorbed by the O-ring and will swell and destroy the chain's self-lubricating properties.

A chain should ideally be inspected before every ride, failing that, every 200 miles certainly. Whether it requires adjustment will depend on many factors including the weather riding conditions, the load on the chain, the age of the chain and your personal style of riding. It is important that before any adjustments are attempted that the chain is clean and well lubricated. The chain-slack should always be checked in the middle of the lower run and checked in several places by turning the wheel to reveal different sections of the chain. As a chain wears, especially if it has been misaligned, tight spots develop and the chain should be adjusted to give the necessary, specified movement at the tightest spot, not the loosest! In wet weather a non O-ring chain will need lubrication every 200 miles or so as the lubricant will be washed off the chain.

If a chain is rusty, has obvious tight spots or kinks, or if the stretch exceeds 3% then It needs to be replaced. To check for this, put the bike on its stand or paddock stand and put the engine in gear (ensuring that the ignition is off) and pull the wheel backwards to tension the chain. Measure the distance between 19 pins on the bottom run. For a 520 or 530 chain this distance should not exceed 12.125", whilst a 630 chain should measure 15.25" or less. Another method is, after checking that the chain is correctly adjusted to the manual's specification, to pull on a link in the middle of the sprocket. A new chain hardly moves at all; if the link pulls off enough to show more than half the sprocket tooth, the chain is worn out. It should go without saying that sprockets should always be replaced at the same time if they are showing excessive wear.

Sprockets front and rear should be checked for hooked teeth or shiny, worn patches, both of which are evidence of terminal sprocket wear, another test involves rotating the wheel with the bike on its stand, gearbox in neutral, looking for any tight spots. If the chain has a tight spot where play is noticeably less, mark the front and rear sprockets and rotate the wheel several more times to see if the marks correspond to the tight spot in the chain. If either does, then the sprocket is warped and must be replaced. If the tight spot does not correspond to either mark then the chain is worn and must be replaced. Check the sprockets for run-out using a steel rule or dial gauge, or remove them and place them on a flat surface. Run out of more than 0.005" means they should be replaced. If you have had two chains on a set of sprockets, regardless of apparent condition of the sprockets you should replace them.

With chains as with everything else in life you gets what you pays for—if you buy a cheap unknown chain, then you can expect it not to last as long as it should, probably to go out of tune more often, etc. You should not skimp on the chain, buy a good one. Make sure, at the very least, that it's equal in size and strength to the original chain. If your bike has an O-ring chain, only replace it with an O-ring chain! The O-ring chain will last longer, so pay the extra cost, as well as give greater peace of mind; look up the price of a set of crankcases which your cheap chain might wreck! During warranty such a change could also scupper any warranty claim. If your bike has a non O-ring chain and you'd like to change to an O-ring chain it might be possible, but check first. O-ring chains are wider so could foul on the chain guide.

Make sure that any battery breather tube doesn't go near the chain—even the fumes can be enough to have an effect regardless of the fact that one drop of acid is enough to ruin any chain. White powdery deposits or black stains could be an indication of just such a problem.

The greatest cause of chain wear is misalignment and lack of lubrication. If a chain is properly adjusted and maintained, it will last an amazingly long time.

A master link should only be used once. If for any reason a chain is split, replace the master link with a new one. If you must split an endless chain, a riveting link should be used.

Never shorten a chain unless it was too long when first fitted. Even if a change in sprocket size requires you to shorten the chain, it would be better to replace it. There is NO safe way to lengthen a chain! If it has used up all its adjustment it needs replacing.

To maximise chain life buy the best and look after it!

What does the future hold? Plastic! In the not too distant future we might well see totally maintenance-free plastic chains. They are already used for a variety of industrial applications!

What do all the different numbers 520, 532, 630 etc. mean? Briefly, if you want to know more get a book. The first digit refers to the pitch of the chain or the distance between pin centres in eight's of an inch (a 420 chain has 4/8ths of an inch pitch whilst a 520 chain has 5/8ths pitch). The second number gives the width of the rollers again in eight's of an inch (a 520 chain has rollers 2/8ths of an inch wide (between link plates) whilst a 530 chain has rollers 3/8ths of an inch wide). I'm not sure what the third number is for! Basically, the numbers don't matter as you can't fit the wrong chain as one chain won't fit properly or at all on another chain's sprocket!

Will a switch to a lighter non O-ring chain give a performance boost? The difference would be insignificant.

This article has by and large been plagiarised from a number of sources, most notably that wonderful American magazine Motorcyclist.

TRIPLES; EFFECT OF GEARING ON PETROL CONSUMPTION by Hal Kendall, LOG. USA

One of our US members who has a 1200 Laverda recently asked whether he could reduce his petrol consumption by increasing his gearing (numerically). He had been advised by his local mechanic that by getting his engine to run higher into the power band, it would result in a lower fuel consumption.

On the face of it. this may seem to have some merit. Consider that the specific fuel consumption is at its greatest when the engine is subjected to low loads since this is the ratio between idling losses (due to friction, leaks, non-uniform fuel distribution to cylinders) and the brake horsepower is most unfavourable.

Four stroke carburettor engines consume the least fuel at full load and medium speeds. At lower speeds, consumption increases because the fuel is not mixed as thoroughly with the air because of precipitation of fuel particles from the air flow at low air velocities and temperatures. At very high speeds, consumption increases since the fuel burns incompletely, the fractional losses become greater and the cylinder charge decreases as the result of Intake manifold restriction.

Erratic driving particularly increases consumption figures since intake manifold wetting is changed continuously.

—To reduce fuel consumption, reduce oil and sliding friction. As oil breaks down its viscosity and sliding friction increases, so use a top quality oil and change it regularly. —Increase compression ratio. Well, it was fun while it lasted, but now that the powers that be dictate the use of unleaded petrol (hence lower octane ratios) expect lower performance and higher fuel consumption.

Pressure charging helps but its effect is limited by octane number in a spark ignition engine. —More uniform and favourable mixture composition for all operating conditions. The specific fuel consumption is highly dependent on mixture ratio, regardless of Intake manifold vacuum and engine speed. The mixture range should be 1:15 or 1Kg of fuel to 15Kg of air for minimum fuel consumption. If it becomes leaner or richer, fuel consumption will rise.

—As a rule of thumb, one litre of fuel will be consumed for 100Kg of vehicle weight. Keep that extra weight out of your saddle bags.

—Reduce air resistance by use of an aerodynamic windshield and by maintaining a low profile.

—Make sure that your tyres are Inflated to their correct pressure. An under-inflated tyre consumes energy through sidewalls flexing, hence fuel consumption increases.

—Correct choice of gears. Get into the highest gear as quickly as possible, subject to road and driving conditions. More on this later.

—Maintain jet sizes to get the favourable fuel composition to 1 : 15.

—Replace spark plugs at least every 15.000km and be sure the ignition is properly timed.

Back to gearing—as long as the engine is not lugging you will get the lowest fuel consumption by driving in the highest gear where the engine is running the slowest.

To verify this I installed a fuel consumption read-out device accurate to 0.01 gallon, about 38ml. I then drove at a constant speed on a flat, straight and level road in both directions to cancel the effects of wind resistance. The chosen speed was 30mph because this speed could be obtained in any and all of the five gears. Normally, either second, third or fourth would be used according to conditions but first could be used at 30mph without going into the redline and fifth could be used at 30mph without lugging or chain-snatch.

The results were most interesting. In fifth gear, at 30mph. the mileage was almost 95mpg! At the same speed, but dropping down through the gears, the mileage dropped steadily and progressively until, by the time I was in first gear. I was consuming more than 25mpg. Is economy a function of engine speed? You better believe it is.

Typically, for the 1000 with its higher compression ratio, an average of close to 40mpg is often observed. For the 1200 with its lower gearing, the mileage is often closer to 30mpg. Increasing the number of teeth at the rear sprocket will certainly increase acceleration but will result in higher fuel consumption.

CAUTION—when looking at the standard specific fuel consumption versus rpm curves you will find a U-shaped curve that is higher at lower speed, is lowest in the mid-range and increases at high engine speed. Keep in mind that these are FULL throttle curves and are not part throttle. Part throttle tests can only be done, as I have, by instrumenting your machine and observing fuel consumption versus engine speed for a given road speed.

PNEUMATIC FANATIC from Henry Morgan

TUBED TYRES. The importance of being able to repair punctures cannot be overstated. Over the years I have on occasions tried those tins of pressurised sealant, but frankly remain sceptical that these work in anything but the smallest pinhole. In any case, they are temporary and that's no good if you are touring. If you fit decent tubes, there is no point squirting that rubbish into them.

MACHINE MAINTENANCE STATUS. Ensure the main wheel spindle nuts can be released using the spanners carried in the motorcycle toolkit. It is imperative that the spindle can be withdrawn from the wheel hub by pulling on one end with the fingers and that it returns using the ball of the hand. Pinch bolts and torque-arm linkages must be equally easy to dis- and re-assemble. I have checked my wheel spindle nut lock torque and found that I achieve a loading of 65Nm using the spanners in the original tool kit. I have seen people kitted out but sadly unable to release the spindle nuts—it all seems pointless.

ASSUMING YOU HAVE SURVIVED THE DEFLATION. Remove the affected wheel and withdraw the Schrader valve core using a valve key. It pays to buy and fit metal valve caps which incorporate a valve key facility. These are commonly found as original equipment on BMW and MZ. so agents should be able to supply. The bead seat at the tyre to rim joint can be broken as follows-position the wheel amidships on the ground with the machine on the centre-stand. Stand on the right side centre and pull the motorcycle towards you, thus lifting the nearside centre-stand leg into the air. Manoeuvre the wheel under the raised centre-stand leg by lowering the machine back down to the vertical: allow the centre-stand pad to exert pinpoint pressure on the tyre at the rim to tyre bead joint area. In most cases the bead will be broken. Repeat this operation after removing, inverting and repositioning the wheel, taking care to protect the brake discs if exposed. I advise people of short stature with heavy motorcycles who contemplate these manoeuvres to try and obtain the assistance of another during the operation.

VITAL EQUIPMENT. Two tyre levers are necessary to remove most tyres and I recommend the superb forged levers sold for the BMW motorcycle. They cost about £5 each and you will probably need to order them from your BMW agent, but they are on the official parts list for the twin cylinder models, so don't be fobbed off. Your rim edges can be protected using, for example, Kawasaki rim protectors at about £7 for three. These small sacrificial plastic mouldings act as an intermediary at the point of pivot for the tyre lever. Before removing the tyre, mark the valve location. A permanent mark can be made using white paint or one of those indelible white marker pens. Puncture repair outfits have a shelf life and are of dubious worth after a couple of years. You can buy separate tubes of rubber solution, and it might be worth changing it every year. I have a phobia about inner tubes. I don't think the offerings from the Far East are worth fitting because they fail to hold pressure over long periods and constantly require re-inflation. I recommend the use of tubes made by either Pirelli or Michelin. Ask for them by name, and it may even be necessary to order them, such is the market. Incidentally. Avon do not manufacture inner tubes.

Re-inflation of the tyre requires a good, strong pump, capable of going to high pressures to achieve seating of the rim seal. For this I have found the BMW tyre pump adequate and robust. It is a glorified concentric bicycle tyre design and may now cost around £15. It is original equipment on

Boxer models; beware of imitations. The most accurate method of checking pressures is by a stick-type gauge.

Re-seating of the tube on the rim is expedited by incorporating a lubricant smeared all round the tyre bead area. Washing up liquid, WD40. soft soap, hand cleaner, etc. are certainly not to be used under any circumstances for this purpose. Over a period they can rot the inner tube, especially if a residual quantity enters the tyre. Professional tyre fitters use a special lubricant applied by a brush from a tub. Each tub costs about £5, but your local independent tyre shop will I am sure, sell you a quantity. Once you have tried this, you won't want to consider anything else for tyre fitting.

TECHNIQUE. Remove one side of the tyre from the rim. working initially opposite the valve. Keep the opposed bead of the tyre into the well of the wheel rim to facilitate removal. Always ascertain the cause of the deflation. When refitting, a slight inflation of the tube can prevent nipping it as the tyre is eased onto the rim; watch the concentric lines of the tyre, near to the rim to tyre joint, for truth in relation to the rim edge. In case of difficulty it may be necessary to deflate and try again. Check before inflating that no tools or equipment are missing; this is not as daft as it sounds, considering I recently left a tyre lever inside a tyre. The lack of static balance gave the game away fortunately, but not until I had inflated the tube and had seated the bead did I realise. I'm not quite sure how I made the blunder, but it's just as well I'm not a surgeon, I suppose!!

To conclude, I have tried everything that I've written about here and know that it works, but I cannot stress too highly the point about taking care if you attempt bead breaking using the centre-stand technique. There is a proprietary bead breaking too on the market which is quite expensive and compact, designed to be small enough to carry in your touring kit; the only problem is it doesn't work, as I found out a few years ago.

GENERAL INTEREST, CRACKING UP WITH A 750 by "Dee Jay"

I thought it was about time I put pen to paper about racing matters, plus a few tips on some of the weak points to look for on 750s that have arisen from my experience whilst racing one over the past 3 years.

I/ CRANKSHAFTS—The only real problem here is the fact that after being pulled apart for balancing and bearing replacement, etc., when it is pressed back together the splines tend to bind up and can eventually break free, allowing the crank lobes to rotate with obvious consequences. To overcome this I had EDS of South Ockenden machine out the centre of the lobe and weld it to the centre of the crank. The crank was then dynamically balanced (well worth doing as it kills off most of those horrible big twin vibes). The rotating problem has only happened to some raced 750s and the problem doesn't seem to affect road bikes.

2/ THE FRAME—Two problems here :

a/ Keep ALL engine fixing bolts done up tight. Check them all monthly. If the bottom ones work loose it loads up the ones above the gearbox and will eventually break the top of the rear engine plates around the bolts.

b/ Stress cracks around the rear main tube on the drive side, above or below the engine plates. This is caused by heavy starts in racing and probably would not affect road bikes.

The above are the only main things I have come across so far, but a few other things to watch for are mostly down to maintenance. Clutch springs need checking annually, they don't so much wear out as stretch at differing rates giving uneven pull on the clutch, thus putting uneven wear on the clutch plates. It's cheaper to buy a set of springs than a set of plates.

Valve springs should also be given similar consideration.

Electronic ignition is also a worthwhile investment. Todd Laverda or Sporting Cycles can supply conversion kits.

There hasn't really been any other problems with the 750. It is a very tough motorcycle. It has been lobbed twice so far. both times at Brands, at quite high speeds and only suffered minor cosmetic damage. The engine is very reliable, being one of the quickest twins in Group 3 Production, even giving the Tridents a run for their money at certain tracks, and the handling is superb.

I hope to continue racing with the Classic Club for the next X number of year.....so why not come and see me and the other lads on Lavs at one of the meetings in '92 ?

A TALE OF THREE CYLINDERS from Nik Beavins, nr.1480

I've always loved three cylinder motorcycles (I think it's the sound) and in 1978 after several accidents I was eased into buying the first Mirage from Chris Morphy's as Tridents didn't seem to have enough performance for high 90s cruising.

After 9 weeks and 5,000 miles I was forced to sell due to external financial pressure and have always wanted another Laverda. Having had a 180° Lav, a 120° was an attractive proposition as it represented all that the Trident should have been.

Finding a Jota 120° proved harder than I'd expected and calls to all Laverda dealers known to me suggested that only 85 of the 120 imported were left on the road in the UK. For me. unknowing in the devious ways of the 120 triple, a second-hand one, dealer supplied, was favourite, and Jack Lilley's had one.

A test ride proved it to be a right handful (fistful?), but although unhappy with the engine's vibration level I part exchanged my Ducati for TEL 472X. the Jota 120. When I collected the bike from Lilley's a transformation had taken place due to a full service, but 300 miles later I decided that the handling was not up to scratch. I measured the wheel alignment with a BMW Jig and found the wheels to be 6mm out of line, but parallel.

Steve Lilley was most helpful and confirmed this, took the bike back and after lots of messing around Three Crosses Motoliner showed there to be a slight lean to the steering head. Past history of the machine was known to many as an ex-demonstrator (as tested by MCN etc.) so the inevitable conclusion was that it may have been wrongly manufactured.

Slaters sent Three Cross a new frame and stability is now much improved as it is tracking on white lines etc. so, how many frames could have been built in this way. Only a detailed measurement could tell, though I suspect mine to be a Friday afternoon job.

Some other things that have come to the fore during my 5,000 mile ownership include:-

1 / Knocking from forks over bumps—could be those very thin fork preload spacers.

2/ Carbs always going out of synch.—it didn't have RGS rubber inlet manifolds or the Corsa solid carb slides now fitted.

3/ Very heavy clutch—Motodd had put stronger springs in, hoping to make the clutch unit impervious to the childish 1/4 mile antics of journalists.

Other bits, even tips, discovered already (I haven't learnt so much for years). After its new frame was fitted, I tried to change the rear brake fluid but got a sticking piston in the master cylinder. It appears that overtightening the M6 bolts that hold the unit to the frame could distort the alloy body of the cylinder and cause the piston to seize.

Bleeding the clutch after a slave cylinder failure and a large air bubble can get trapped in the master cylinder due to the angle of the Jota bars, and also if the fluid level is allowed to drop sufficiently. Adjusting the bars whilst bleeding allowed a large bubble to float out.

That slave cylinder in the casing over the gearbox sprocket has an 'O' ring not a square seal usually found in such applications, and therefore most bearing factories can supply 'O' rings to suit. A British bike shop can also supply, if you ask for an Amal monobloc 376 series flange seal (your old one as a pattern is wiser, as then you can ask for "one of these", and then gently suggest, when met with the normal apathy, the above seal). All of this will identify you as a Laverda owner (Well you can't say what it's for, the Brit bikers often look heavy).

My Jota 120 is steadily getting to that 'menage a trois' that I'm told it should be.