MOTOR CYCLE MECHANICS

SEPTEMBER 1977 40p

Win A YAMAHA XS 250

GRANT'S GREAT TT RIDE

KAWASAKI KE125: Mixing business with pleasure

TOMORROW'S WHEELS? SPX 500/QUASAR

MOTOR CYCLE MECHANICS
SEPTEMBER
Vol 20 No. 12

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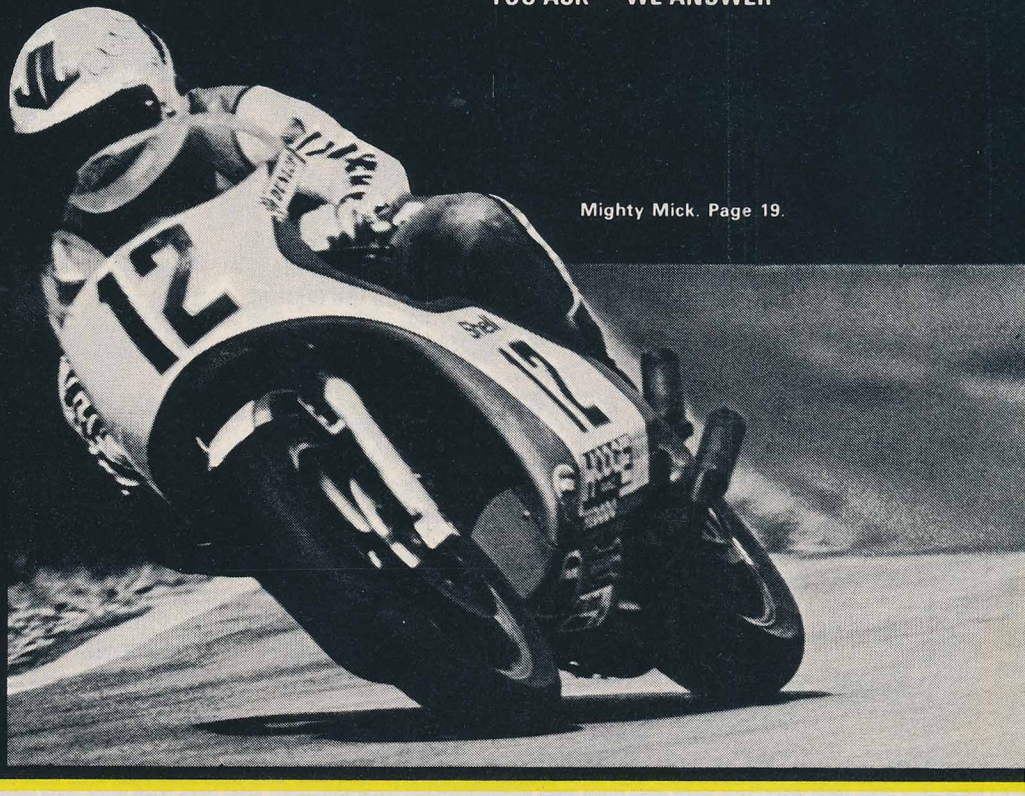

Mighty Mick. Page 19.

PLUS: WIN A YAMAHA XS 250

Competition details on page 17.

ROADRUNNERS RULE IN THE RAIN.

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BIKE ON AVON


Dave Walker tells the story behind the building of our big banger sports Honda
CIBIE
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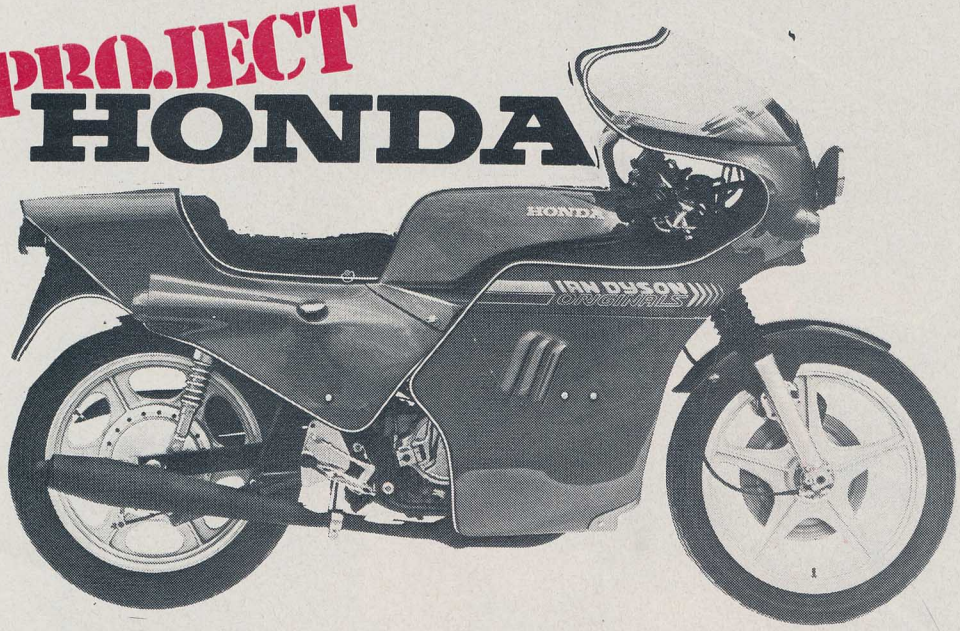
IAN DYSON ORIGINALS
PROJECT HONDA
Anyone can improve on a poor product, so improving on the Honda CB750 is not as simple as it might at first appear. When a machine has been developed over the years, as this one has, it becomes a pretty good compromise between performance and economy as well as style and comfort.
For this reason when converting any machine you have to have a pretty good idea of what you are trying to achieve. The target with our Honda was a road burner that would make no concessions to the touring concept at all.

PROJECT HONDA



When formulating plans for engine tuning it is all too easy to get carried away with sheer performance, fitting the ultimate in this and that and ending up with massive top end power output and a bike that is almost unrideable on the road. A well proved route to extra power, spread right throughout the rpm range, is to increase the capacity of the motor and with this in mind we finally opted for a Paul Dunstall 900cc conversion. Since the RCB racers are based on the CB750 bottom end we felt confident about going for a big power increase without fitting any special bits to the bottom end.

The first task was to remove the engine from the frame in order to remove the cylinder block for boring. After draining the oil there is a certain amount of stripping to do before the unit can be removed.

First, the exhaust pipes and silencers were removed and junked. We intended to fit a four into one system to help power output, to save weight and because they look nice. The carbs were removed and put to one side as they were going to be retained. Fitting larger carbs would certainly have helped the bigger bores to breathe but they are not essential. As we proved in our carb feature back in November last year the big Honda is still running on its pilot jets up to 70mph so the extra demand on the carb may well go unnoticed on the road. With the control cables and wiring disconnected, not to mention the oil pipes, the motor can be removed from the offside of the frame.

It's very tempting at this stage to start ripping the motor apart in order to get at the bores but every minute saved in this way will add ten to the rebuild time. Wash the engine down first, it makes life easier and avoids the very real possibility of wrecking the bottom end by dropping lumps of manure into it.

After removing the cam cover you can inspect the camshaft lobes. If they are in good condition and you are going to re-use the camshaft then you must label the followers so that they go back into their respective homes. It is possible to mix them up and this won't help camshaft life. After removing the camshaft and carriers the rubber "O" rings are lifted out and stored, as are the oil feed "jets" and their seals.

If you are using the official Honda manual, as I was, it tells you to remove the head bolts in reverse number order and then tap the head with a soft mallet. But nothing happens; The manual does not mention the umpteen little head bolts located inside the head casting and covered with rubber-bungs. If you want to remove the head in the same way I did, remove the little hidden head bolts and try again. Taking a firm grip on the head, and attempting to lift it, you then tap the head with the mallet working your way around the fins looking for the more solid sections to tap.

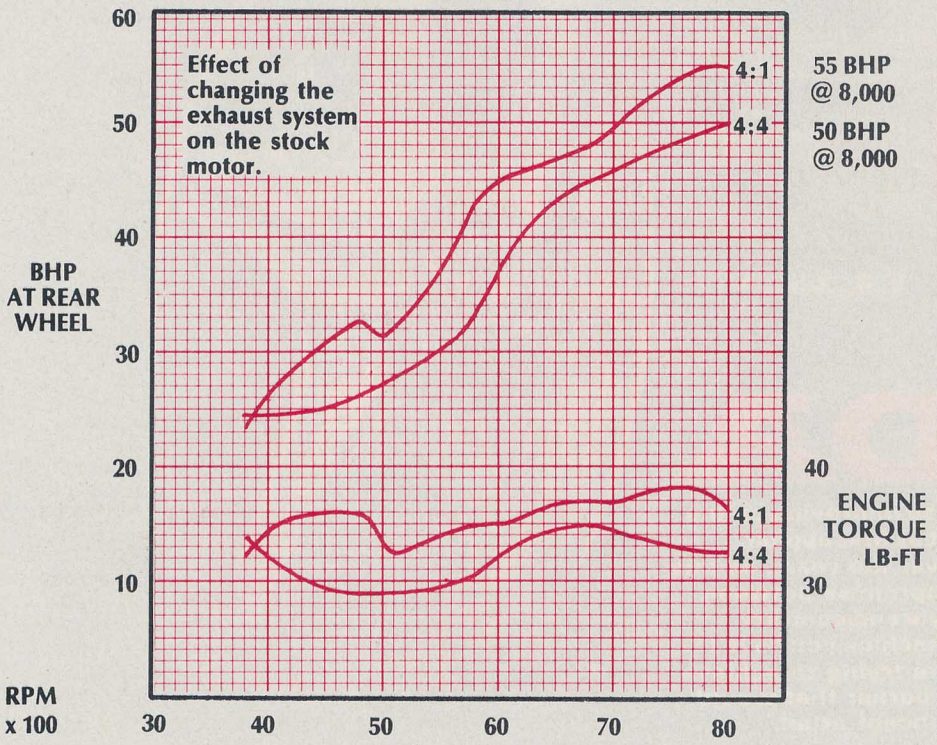
Once the head gasket seal is broken the head can be lifted off and put to one side. Assuming that you have already removed the cam chain tensioner the barrels can also be lifted off. Try to catch the rods as they emerge from the bore so that they do not clonk onto the crankcase. Next, lift out the slipper tensioner which will have a groove worn in it. Don't worry about this grooving, these tensioners hardly ever wear out and the groove appears after only a couple of miles running.

With the barrels de-greased and tucked under your arm you can make your way to the home of Paul Dunstall at Crabtree Manorway, Belvedere, Kent DA17 6AZ. Place your bores on the counter and part with £95 inc VAT and the Paul Dunstall organisation will do the rest.

Opening up the bores is definitely not a DIY proposition. The first stage of the operation is to remove the existing liners with a press and then turn out the block to take the new sleeves. As you can see from the photographs the block is machined pretty near the limit in places and small breakthrough points are not uncommon. Once the block is opened up the new liners are pressed in and then bored to size.

When we last tested a Dunstall Honda 900 back in September 1976 we complained about excessive oil consumption. For this reason the oil control rings on the Dunstall big bore have been altered and, hopefully, our motor will not suffer the same thirst for oil as the test machine.

A lot of the potential power increase from the bigger bores will be wasted if the cylinder head is not modified correctly. There is a lot of talk about "gas flowing" of cylinder heads but very few heads are ever developed on a flow meter and even then any power gains have to be proved on the brake. Experience counts for a lot when porting any head and for this reason we went to Jim Boughen to get ours done correctly. Jim ports the heads on the Dunstall machines although his speciality is the Norton engine. Jim gained most of his experience working for the Norton factory race shop and was responsible for preparing the race winning motors in the Gus Kuhn Nortons.



Jim reckons that the biggest mistake that most people make when porting the big Honda head is to overdo things, making the ports too large and grinding down the valve guide boss too far. When Honda designed the head for the 750 they allowed for the rough cast finish by making the ports slightly larger. If you just polish out the port you are already effectively making the port larger.

The idea is to keep to the standard shape as far as possible and shape all the ports the same. The slight step where the port meets the inlet stub can be smoothed out and the boss, or hump, where the valve guide protrudes can be reduced but not removed altogether. Although a smooth finish is all that is really necessary. Jim still likes to get a mirror finish on his heads to help delay carbon build up.

Once the ports are shaped and polished you can turn your attention to the combustion chamber. The basic shape is fine but the finish on the standard head is very poor. All the sharp edges should be smoothed off with a scraper paying particular attention to the area around the spark plug. Deep scores in the chamber itself should be eliminated with course grade paper.

Before proceeding to the next stage fit the valve guides and install the valves. The guides we used were made up for us by Leon Moss of Lincs Engine Developments. They were turned from aluminium/bronze and are slightly shorter than the standard item. You may have some trouble finding a local engineering company that can produce these guides because the Honda stem size is a bastard size. Leon is quite willing to turn up guides for £20 a set of eight. His address is: Lincs Engine Developments, 10 School Lane, Baston, near Peterborough.

With the new guides installed you must re-cut the valve seats. This operation should, ideally, be entrusted to your local Honda Five Star dealer. He should have a set of seat cutters having the required angles for the interior and exterior areas of the seat insert. Our local dealer did not possess cutters so we had to resort to a local engine reconditioners for this operation.

After seat cutting the valves can be lapped in and fitted to the head. Valve springs should be renewed as a matter of course. There are some very fine springs on the market made by Webco which will control valve bounce up to around a million rpm. These springs are fine if you are fitting a super hairy (and super hard) camshaft that needs this type of spring. For road use with a standard or reprofiled camshaft you should stick with the standard springs.

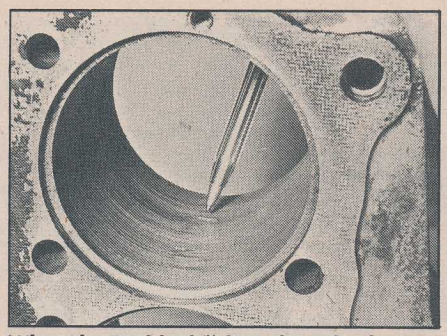
When we compiled the spec for our engine we opted to retain the standard camshaft. Honda are well known for their production engineering skills and, running true to form, their camshafts are just as hard as they need to be and no more. Since the depth of hardness was only adequate we decided not to fit a re-profiled camshaft which would reduce the life of the component or even worse break down in operation. We considered cams made from new blanks but they are far too hairy for general road use and they cost the earth!

Since rebuilding the engine Jock Kerr has come into the market with a re-profiled camshaft that avoids grinding away the weaker areas of the standard cam and is also docile enough for road use. Having a slightly bigger overlap and lift than the standard item it can be fitted without any cam carrier mods and retains the standard valve springs. The engine torque is slightly lower at the bottom end but the power output improves once the revs reach 5,500. The cam costs £24 exchange from Jock Kerr at Unit 11, Roydon Industrial Estate (Mushroom Farm), Harlow Road, Roydon, Essex.

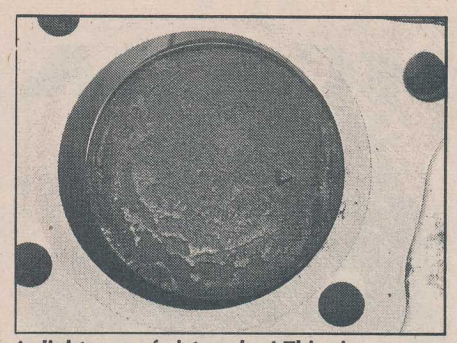
Meanwhile, back at the cylinder head, the next job is to balance the volume of the combustion chambers.

To do this you need a burette and a piece of Perspex large enough to cover one combustion chamber. The idea is to drill a small hole in the Perspex and then fit it over the combustion chamber to be measured, sealing it with a smear of grease. Paraffin is now dribbled into the chamber from the burette until the chamber is full and the paraffin level is just to the top of the hole in the Perspex. Repeat this operation for all four cylinders and compare the volumes.

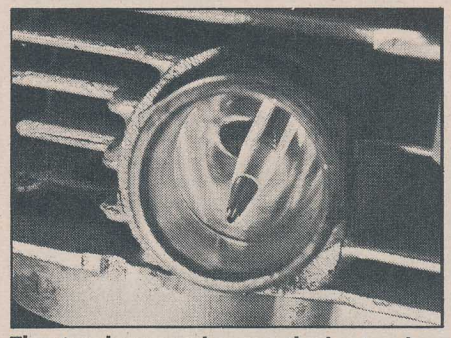
With a little luck they should all be around the same size but any variation above .5cc should be eliminated by enlarging the smaller volume chambers to that of the largest. Once this has been done give the head a final polish reducing the grade of abrasive paper until you have a shiny finish.



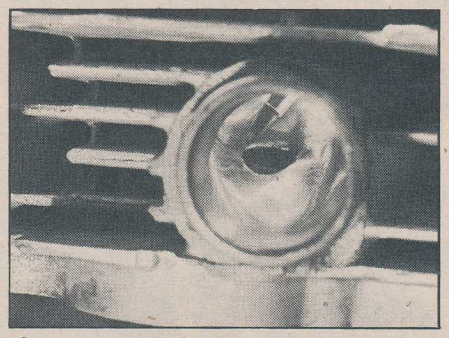
When the 750 block is bored to take the 900 liners small breakthrough points like this are inevitable.



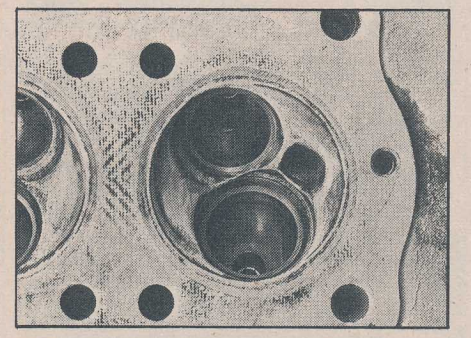
A slight case of piston slap! This gives an idea of the bore size increase to expect.

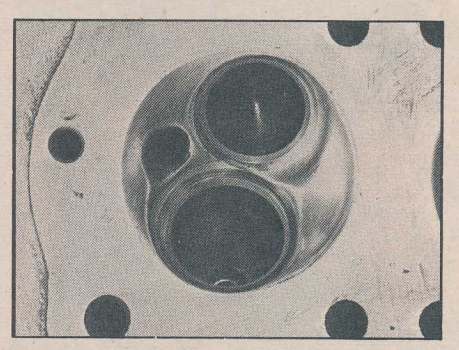


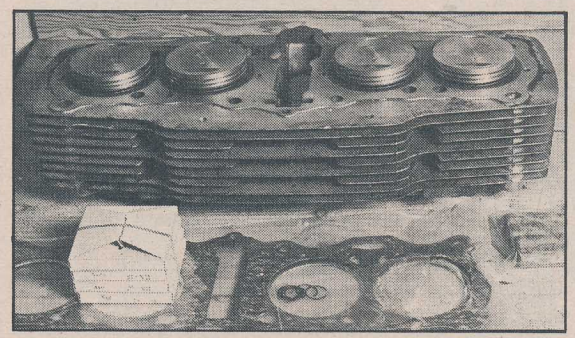
The step, here, can be smoothed out and blended into the port to ensure a smooth flow from the carb.



The area around the valve guide can be ground down but not eliminated entirely.





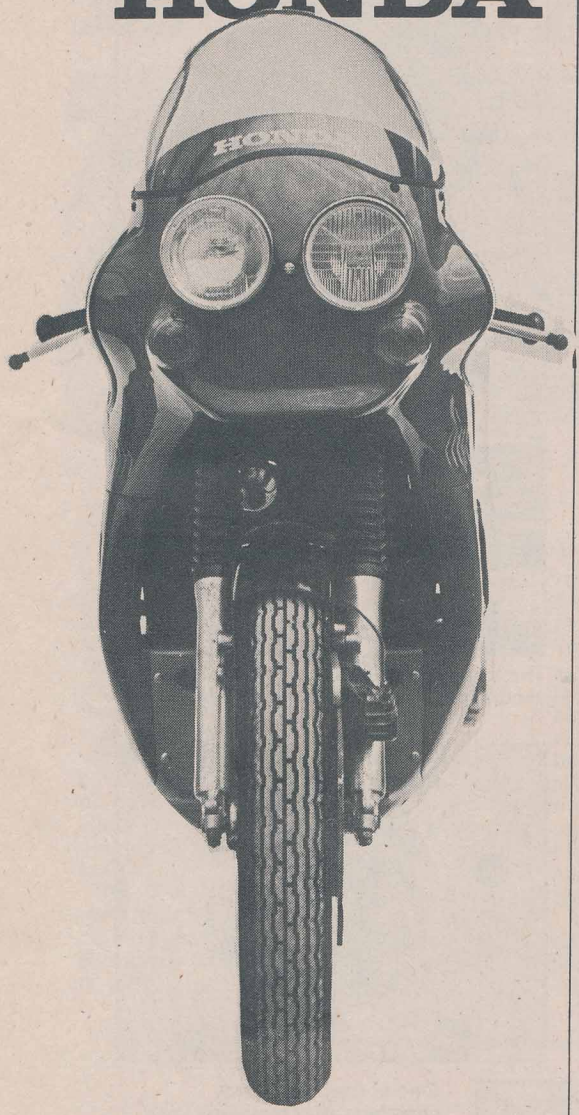


One of the combustion chambers after removing the sharp edges but prior to balancing and polishing.

The finished chamber smoothed out and polished. The seat widths have not yet been reduced.

Yours for just £95 the complete 900cc big bore kit from Paul Dunstall comes complete with gaskets.

PROJECT HONDA



Before assembly of the pistons it is as well to check the ring end gaps. Remove the rings from the pistons and keep them in order. Place each ring in the bore in turn squaring it up with a piston. Now check the gap between the ends of the rings using a feeler gauge. As a rough guide you should have four thou clearance for every inch of bore. The gaps should be correct but it is as well to check them at this stage rather than being sorry later. Any tight rings should have the ends dressed down to give an adequate clearance.

With the rings fitted to the pistons you can begin the rebuild by fitting the pistons to the rods, using the new circlips supplied with the kit. The arrows cast into the crowns should point to the front. If you have any difficulty with tight gudgeon pins then the pistons can be warmed in hot water prior to assembly.

Fitting the cylinder block back onto the pistons can be a very tricky operation single handed. There is no easy answer but it does help considerably if you have a second pair of hands and some decent ring clamps. Don't forget to refit the slipper tensioner or put the rubber "O" rings back in place.

A new head gasket is supplied in the kit and the rest of the rebuild should be a piece of cake if you have laid all the bits out, in order, on the strip down and labelled all the interchangeable parts.

Once the top end is built up set the tappets, timing and chain tension before lugging the lump back into the frame.

With the motor back in the frame the carbs were hooked up and the drain tubes reconnected. After looking at the air filter for some time I decided to discard it in favour of four open bell mouths. The reason for doing this was that the intake area of the filter looked incredibly small and I reasoned that the intakes were probably only just as large as they needed to be for the 750cc motor. The intake area could have been opened up but then you would not get the lovely induction roar as the throttles are opened! Looking around for some suitable bell mouths I came across some very neat black rubber jobs which had a step to mate up with the carb intake and so ensure a very smooth passage into the engine. Another big plus point is that they won't cost you money since they are to be found inside the standard air filter!

Having gone to a lot of trouble to make sure plenty of gas goes into the engine you now have the problem of removing it via the exhaust system. The system used on our Honda was developed by Lincs Engine Developments, and as you can see from the power graphs the increase in output and torque is a pretty useful one.

The only way to arrive at the right pipe lengths is to put your engine on a test bed and then start cutting and welding up pipes until you arrive at the correct length. This is exactly what Leon Moss did with our Honda.

The standard pipe length feeding four separate silencers was thirty inches, which gave a working length of thirty-three inches when you add the length of the exhaust port. This set up produced the power curve marked 4:4 on the graph. The pipes are resonating at the top end of the rpm scale leaving a hole in the torque curve between four and six thousand.

Now for the clever bit. If you join the four pipes together and then add a secondary pipe, of the correct length, you can superimpose a second wave pattern onto the first and this helps the power at the lower end, tending to fill in the hole. This can clearly be seen in the curve marked 4:1 in the graph. If your luck is really in this second wave will boost the primary one and the power output will increase all the way up the rev range.

The best primary pipe length turned out to be 27ins giving a working length of 30ins with the exhaust port. A 27 inch secondary pipe produced good power in the middle of the rev range but only 52bhp at max rpm. A 26 inch pipe boosted the top end to 56bhp but lost out in the mid range by one bhp. A compromise 26½ inch pipe gave the most power in the mid range with 34bhp on tap at just under 5000rpm and still retained just over 55bhp at 8000. This difference in output with only a half inch pipe variation was recorded repeatedly and was not just a one-off fluke reading.

A word of warning about the secondary length pipe. If it is not close enough to the primary pipe intersection, with a relatively small volume at the junction, the secondary wave will not couple across to boost the primary pipes. If, in fact, you join your four primary pipes into a chamber of sufficient volume, as on the Honda 750F1, the pipes will see the large silencer volume as atmosphere and will act like a four-into-four set up.

This brings us to the unusual looking flying bomb which is bolted to the exhaust on our machine. Like all good ideas this one is patented and there are plans to produce a version of this silencer for sale through a leading accessory manufacturer. To avoid a massive section at the pipe joint the primary pipe length is doubled inside the silencer (so it still resonates at the same frequency) and then it feeds into a large volume which acts as atmosphere, reflecting the wave. The gases are then passed back towards the engine through a number of smaller chambers with drillings sized and spaced to silence the sound waves. It then turns once more towards the silencer outlet and discharges via an annular discharge section. Some low frequency sound is left unsilenced to produce a nice woffle which sound very sporty but under running conditions it is no noisier than the standard set up. Under test conditions the standard pipes produced 90/91 dBA and the four into one produced 89/98 dBA.

If you really want to use an open megaphone lined with loft insulation then make sure that the initial taper is in excess of 11½° so that it is non active and will not interfere with the correct working of the tuned length system. Any reduction in back pressure that you get with this type of silencer will not improve the power output in any way. There isn't room here to go into lengthy detail but we have proved on the brake that when the pipes are "on song" the power is not effected by back pressure in the silencer.

A huge power output is of no use if the bike just doesn't handle so this was the next task on our project Honda.

You don't have to buy a complete new frame to improve on the standard Honda's handling. There are many small improvements that can be made to tailor handling to suit your riding style. We dealt with most of them in last month's mag. so I won't repeat them here.

The most common way of improving the rear end is to change the dampers for Koni or Girling units. To be different we decided to try a Dave Degens box section swinging arm unit. The one we fitted was the same length as standard but longer ones are available for drag racers etc. Apart from being torsionally very stiff the arm is very light and light alloy rear spacers and adjusters are used to avoid adding any unnecessary weight. The whole thing is mounted on sealed for life taper roller bearings.

We had no fitting problems at all because we let Dave Degens do it himself! All the same it is quite a straight forward change over and after fitting the pivot bolt the nut was tightened to set the bearing play and locked in place with Loctite. The only slight problem was the rear shock mountings which needed dressing down slightly on our arm. This was a one off problem and later units should be spot on straight out of the box.

The front steering head bearings were showing signs of wear so these were replaced with some taper roller jobs also supplied by Dave Degens of Dresda Autos.

If you want a special swinging arm or even a complete frame the address to write to is: Dresda Autos, 139 Putney Bridge Road, London, SW15.

Eat your hearts out all those that didn't enter the competition for this bike! The real thing is a far cry from the cartoon drawing in the competition entry form. Although it took a long time coming the glass fibre work on the project bike is superb and whatever your taste in customising the bike looks impressive.

Ian Dyson put a lot of thought into designing the glass fibre fairing and seat unit and it turned out exactly the way we wanted, a style something like the Honda works racers. The full fairing is high enough to protect the rider but still looks right. The lower section can be removed in ten minutes for access to the engine. In order to stop the large screen and side panels, from flapping about a side section is brought out from the tank and the upper and lower fairing sections are sandwiched either side of it.

With ease of access in mind the tank cover is hinged at the seat base and can be lifted up to remove the fuel tank for carb work. The seat is strictly a single seater and by not trying to compromise, as BMW have on their R100RS, Ian has come up with a seat that really offers some support to the back-side with the hump fitting snugly where it should.

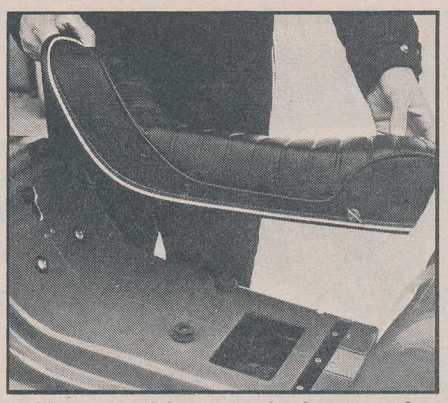
The finish of the glass fibre would do credit to a spray job. It is so smooth and glossy that you have to look twice to realise that it has not been sprayed. A nice point with this set up is that should you drop the bike, any one section of the fairing can be bought and replaced separately. Ian Dyson does a range of fairings for most Japanese bikes so if you want something similar write to him at: Unit 9, Belgic Square, Padholme Road, Peterborough. The handlebars and foot rest kit were supplied by Ian and made by John Tickle. The bars are a clip-on type mounting on an inverted "U" bar.

As a final complement to the fairing we fitted some neat cast alloy wheels made by CMA of Southgate Avenue, Industrial Estate, Mildenhall, Suffolk, IP28 7AT. They market a wide range of wheels for most machines all of which are made in England. The best thing about these wheels is that they can be fitted straight on, retaining the original rear drum brake and cush drive arrangement. You exchange your rear hub for one that has already been fitted inside the rear wheel and just bolt it in place. The front wheel takes the speedo drive and the original disc or discs and comes complete with new wheel bearings.

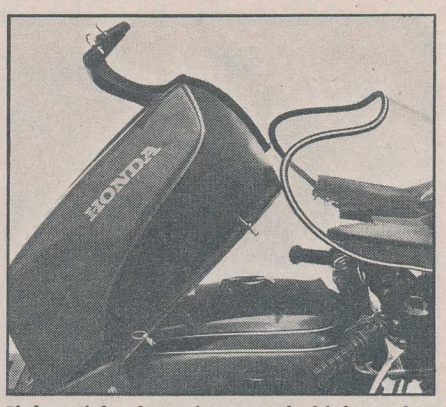
If you make arrangements beforehand you can go to the CMA factory with your bike and they will fit wheels for you while you wait including changing over the tyres. The cost of two wheels, including fitting the rear hub and postage is £108, plus VAT.

Finally we fitted some nice fat Dunlop Red Arrows. We used this wheel rubber in our twenty four hour Kawasaki test and on the Dunstall Suzuki in the Poundshrinkers feature and consider them among the best tyres that money can buy.

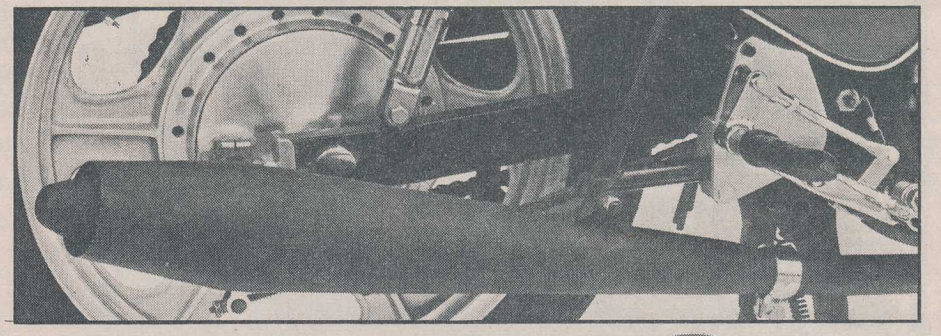
So that sums up the Project Honda that Richard Wosiek of Brixton, London SW2 has won for himself, a big bore sportster for the man with a power complex and a deep pocket. Now I can start on our next conversion; a Yamaha RD250.

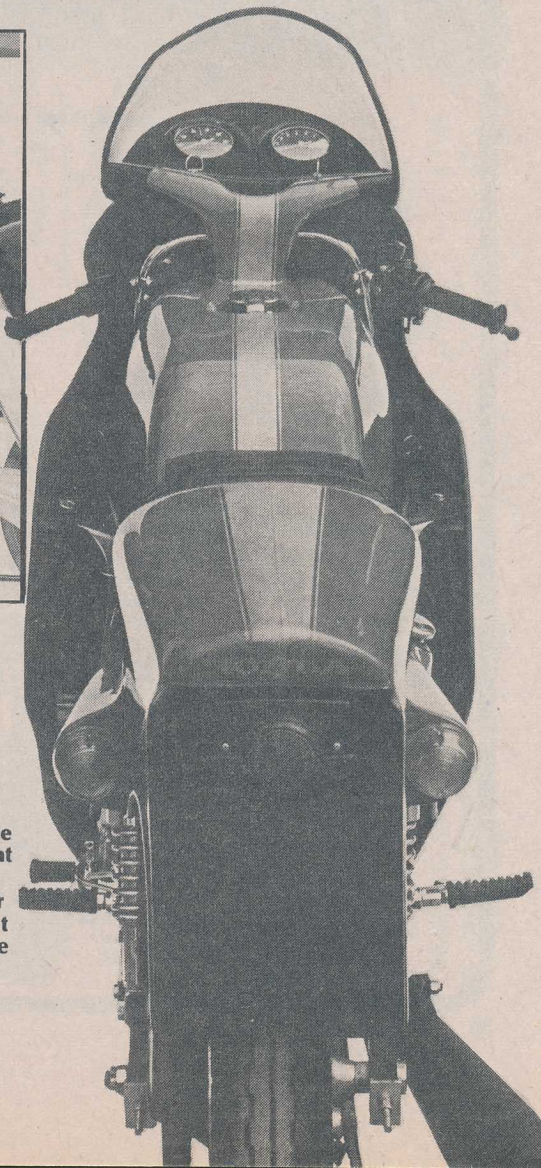


Unlike some of the customised seats on the market this one has enough padding for long distance comfort. Three quick release catches and it lifts off to reveal the battery.



Eight quick release fasteners hold the tank cover section in place. The side and top projections help to support the fairing and prevent it flapping about.





The number plate section is finished in matt black and provides some subtle camouflage to add to the racer look. The flying bomb silencer and the CMA cast wheels add to the sports look. Like the works Honda the fairing has a slotted front panel which helps rigidity and looks neat finished in gold. With three fasteners either side, the panel is a bit of a pig to remove but you can't have everything. From the rear the indicators blend in with the bodywork but are still spaced far enough apart.