9.2 Overhauling the Birmingham Scotts

Yowl Supplement Part 1.

OVERHAULING THE BIRMINGHAM SCOTTS

(Much of the information contained will apply to Flying Squirrels, De Luxe, Sports Tourers, T.T. Replicas etc. from 1927 onwards.)

Reprinted from Motor Cycling of March 7th 1962.

Now manufactured in limited quantities by the Scott Motorcycle Co., 2 St. Mary's Row, Birmingham 4, the 596 cc Scott "Flying Squirrel" water-cooled two-stroke twin is, perhaps, the supreme example of an "enthusiast's machine," unique in that it continues the major design features originated by the late Alfred Scott. The top overhaul described here can be tackled by the private owner without expert aid or special tools apart from a gudgeon-pin extractor.

It is necessary to remove the petrol tank and radiator (which of course, must first be drained). In the course of dismantling, the oil-pump-cum-distributor-drive assembly must be removed but, provided that its parts are left in mesh, ignition timing will not be lost. The unit is driven by a peg on the offside crank assembly and it is virtually impossible to get the timing wrong when rebuilding the engine.

A certain amount of tuning is achieved by normal polishing of the ports. This process can be furthered by machining up to .070in. from the cylinder head. The compression ratio may then be adjusted by using, in addition to the standard gasket, one or more compression plates, available from the makers in thicknesses of 048, 030, and 015in.

It is advisable to rebore when maximum barrel wear exceeds .007in.

Dimensions

73mm bore by 71.4mm stroke = 596 cc.

Carburetter

Amal type 6/151, bore $1^{1}/_{16}$in, jet size 170, throttle slide 6/4, float chamber 14/092.

Oil-Pump Setting (adjustable)

Approximately 10 - 15 drops per minute.

Piston Ring Gap

.012/.015 in.

Standard Piston Size

At top, 2.861 in; at lower ring land, 2.866 in; at lower skirt, 2.8685 in.

Small-end Bush

O/D .815 in., bore .625 in. + .00075 to .001 in.

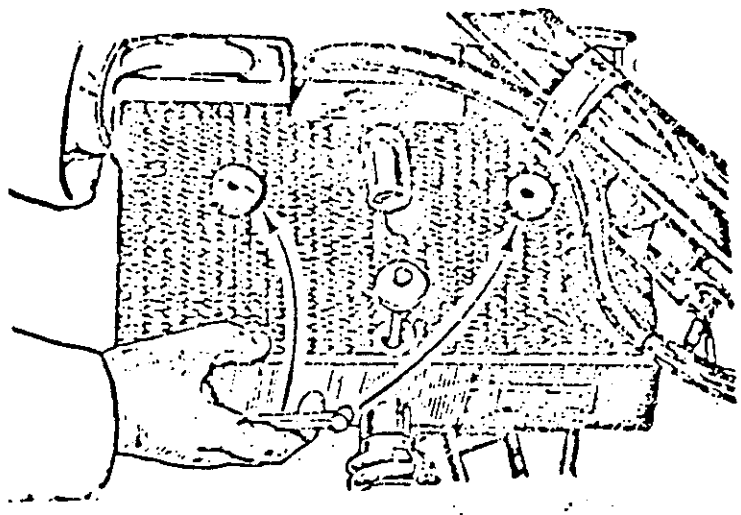


FIG 1

1 Undo the nuts holding the forward seat pillars; take out the tank nose and base fixings, slacken the handlebar clamps and swing the bars and seat out of the way to free the tank. Disconnect the fuel line, take off the radiator hoses and the three radiator mounting bolts (two side and one centre) and the sparking plugs. The radiator can now be gently pulled free.

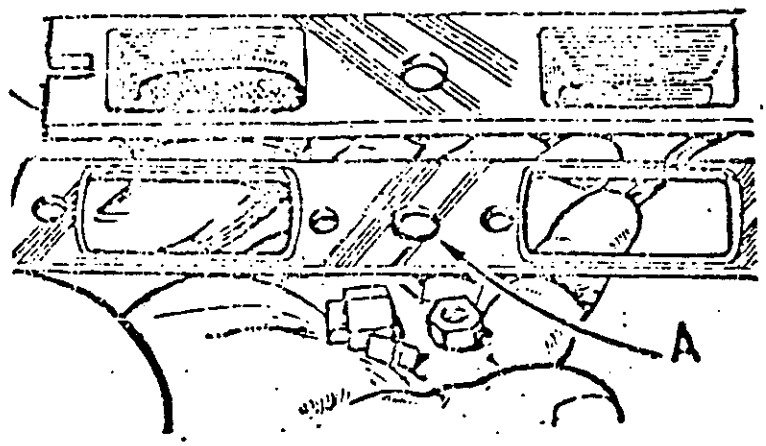


FIG 2

2 The exhaust manifold is located at the block by three studs. It is end-slotted to fit over the studs and is held at the extremities by nuts and washers. The centre stud, which is slightly offset, is accommodated by a similarly disposed hole in the middle of the manifold and a sleeve nut is used. Always renew the gasket and fit is so that the hole "A" registers properly.

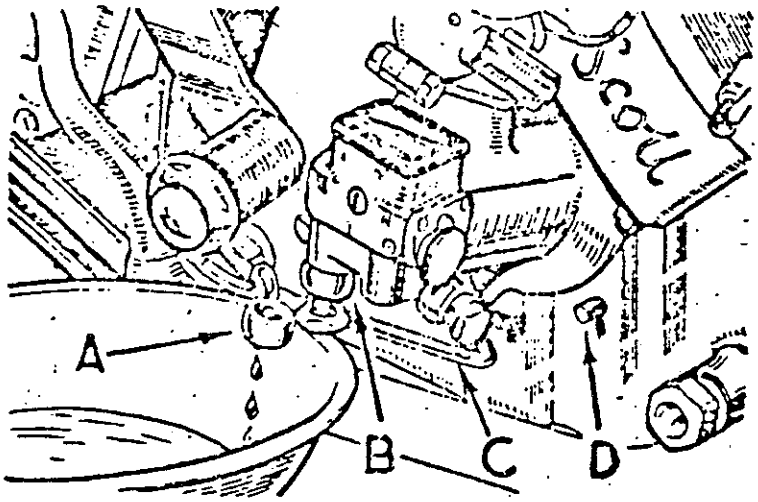


FIG 5

3 Access to the cylinder retaining bolts "A" on the left side of the engine is impeded by the generator, which is clamped to the crankcase by three metal straps, each retained by a single nut. Remove the straps and withdraw the generator as illustrated, noting the simple peg-drive with the crankshaft. If in good condition, the composition door seal can be used a second time. A three-way snap connector frees the generator entirely. (FIG 3)

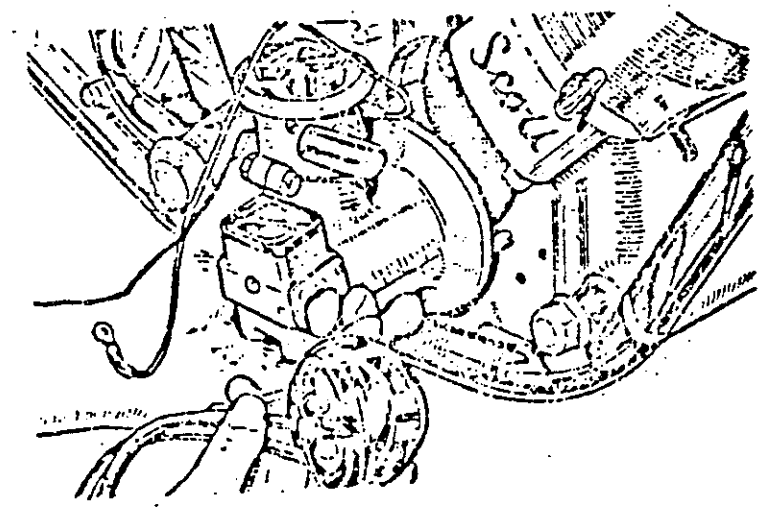


FIG 6.

4 A single bolt secures each of the two transfer covers to the port apertures at the back of the cylinder block. Take away these covers noting that, as illustrated, the gasket will probably tear and should, in any case, be renewed at each overhaul. Clear away carbon and polish the inner face of each cover before assembling. The top-feed carburetter faces up to the inlet port on three studs. (FIG 4)

"YOWL" SUPPLEMENT—Part 2

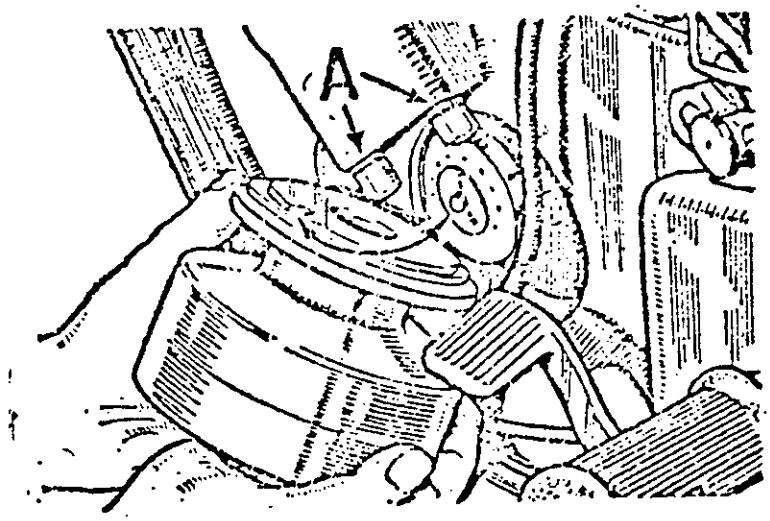


FIG 3.

5 Early post-war models had a tap in the main oil supply pipe. Forgetful owners were apt to leave it in the "off" position so the tap was dropped, and on current models it is necessary to disconnect the union "A" and drain the tank. "B" (part hidden) and "C" are the outlet feeds from the pump to the main bearings. Disconnect these and remove the straps, leaving the studs as at "D". (FIG 5)

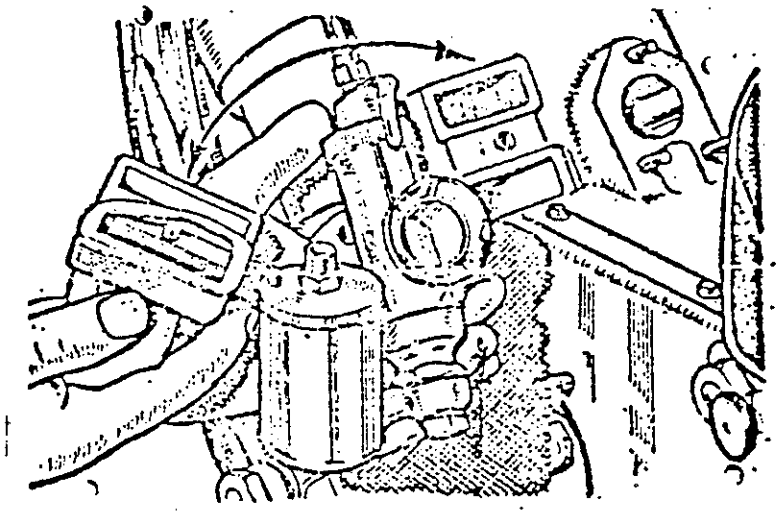


FIG 4

6 Removal of the retaining straps frees the pump-distributor unit. Disconnect the short earth wire and take off the distributor cap, complete with the ht leads. Leave the distributor drive in mesh and, as the housing is pulled free, note the simple peg-drive locating with the crankshaft, which makes it impossible to get the ignition timing wrong when reassembling. The sealing ring can be used a second time. (FIG 6)

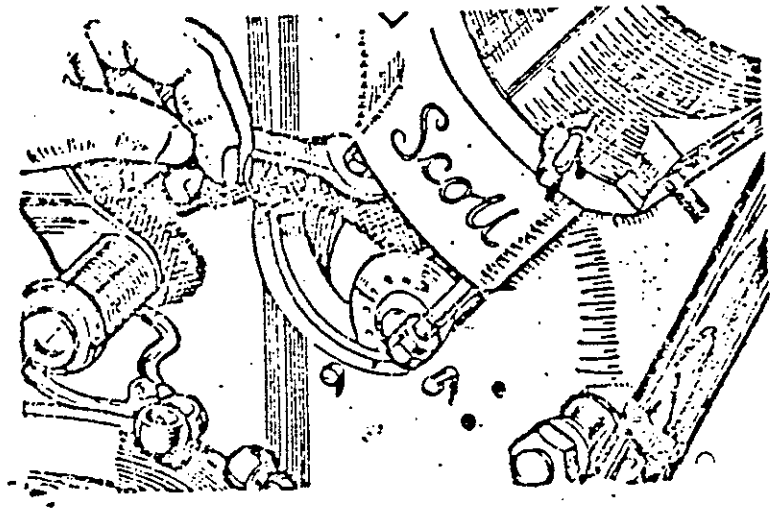


Fig 7

7 Four cylinder retaining studs, two each side of the engine, pass through the crankcase and screw into the cast-iron "pot", clamping it securely to the crankcase mouths. The both hexagons are ½in. x 26 tpi; a standard workshop spanner can be used. The bolts should fall free, but sometimes stick due to the formation of carbon at the face joint.

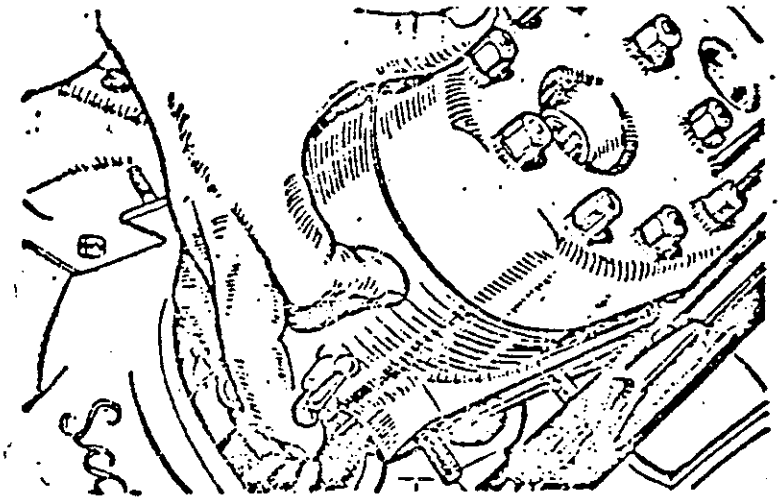


Fig 8

8 On the engine used for demonstration, the block was a very tight fit and the manufacturers emphasised that care must be taken in breaking the joint. Leverage with screwdrivers is taboo and a rawhide hammer, if it is used, must be applied only gently. The final solution in this case was to replace the plugs and spin the engine so that the block lifted on compression.

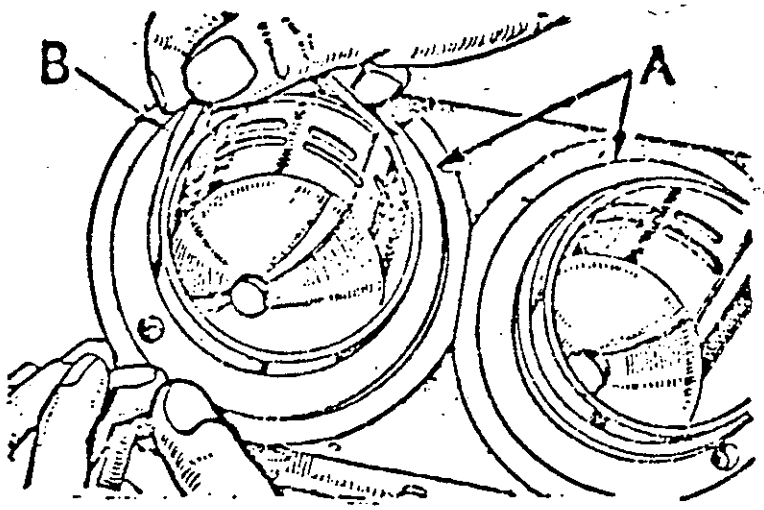


Fig 9

9 As the block lifted, it will probably damage extensively the paper gasket "A" and the Neoprene base rings "B". A new set should be fitted each time the cylinder base joint is broken. Unless tuning with a view to altering the compression rato, it is neither necessary nor desirable (say the manufacturers) to take off the cylinder head. All the scouring necessary can be carried out from below.

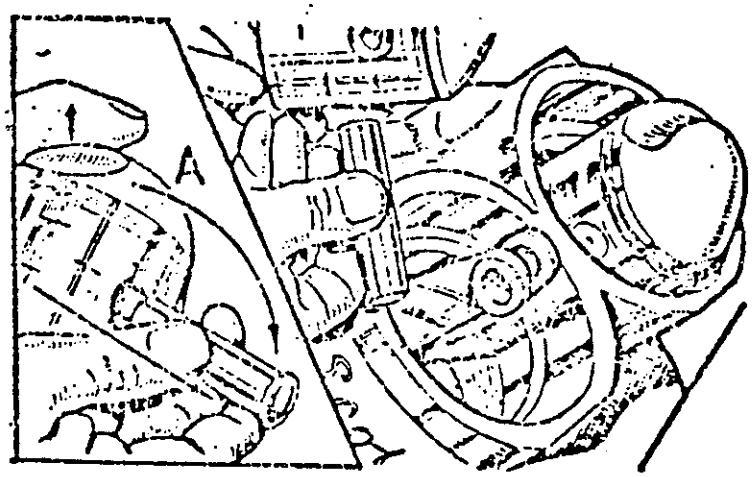


Fig 10

10 Turning to the pistons, note that each gudgeon pin embodies a flanged end-pad which should be on the outer side. The generally good condition of the demonsfration engine made it possible to pull the pins free by hand. This arrangement is seen in the insert, where "A" indicates the outer location of the flange as the pin is withdrawn. The small-end cut-away facilitates lubrication.

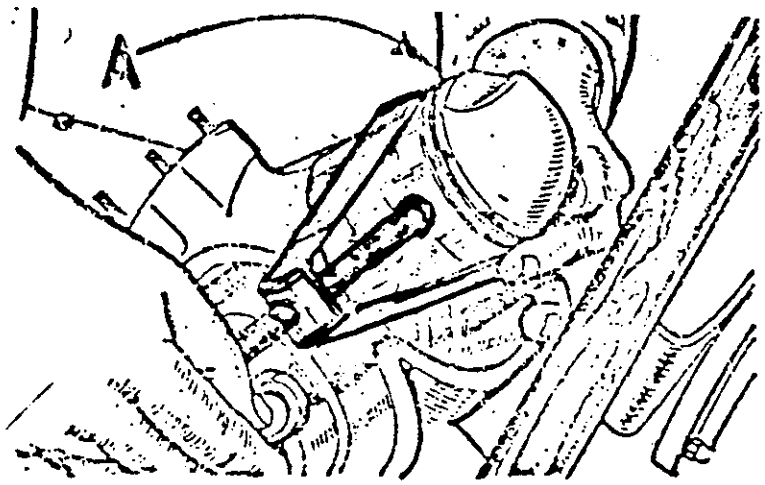


FIG 11

11 An alternative method, if the pin is a tight fit, is to employ a conventional gudgeon-pin extractor. This gadget should be employed in preference to tapping the pin free. Note that the expelling action is still from the centre, where the pin is unflanged, towards the outer boss. Replace each pin from the outer side and note that the steep part of the deflector crown "A" is to the rear.

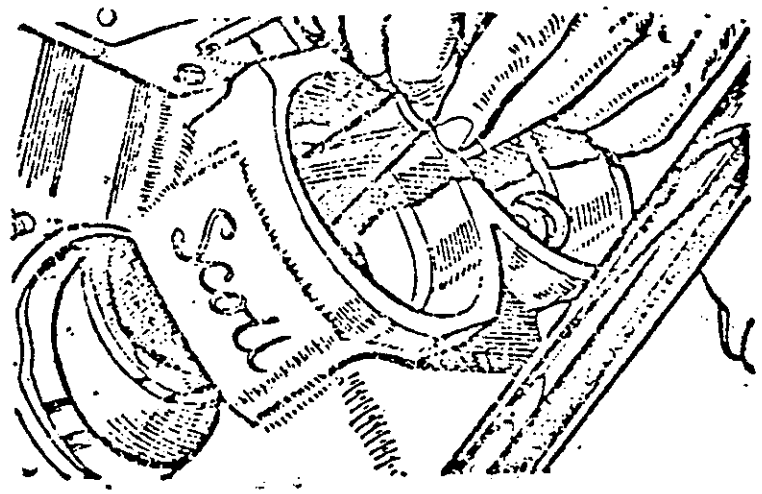


FIG 12

12 This is as far as a top overhaul need usually be taken. It remains only to clear away carbon from the ports, the head hemispheres and the exhaust system and then to reassemble. The demonstration unit had run for more than five years without attention to the bottom end. The routine up-and-down test showed no defect there but, in the interest of next weeks' instalment of this article, the crankshaft assembly was also dismantled.

YOWL SUPPLEMENT — Part 3

(Reprinted from "Motor Cycling" of 7th March 1962)

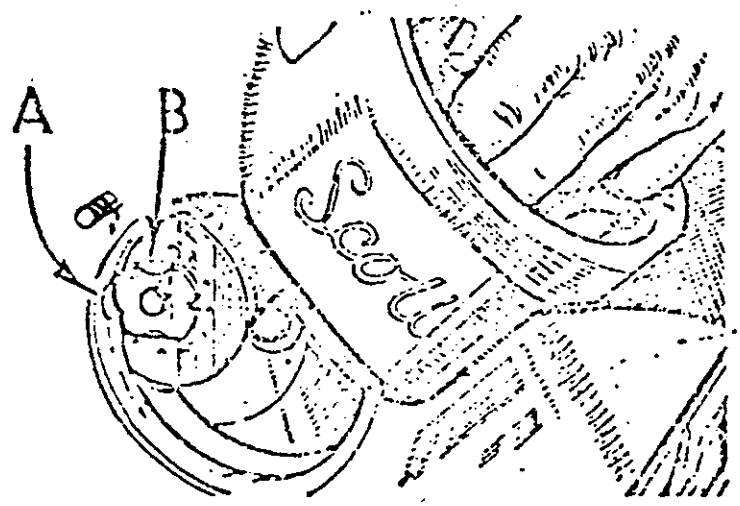
CORRECTION: The latter part of part 1 may have set numbers puzzling, but it is regretted that illustrations No. 3 and 4 became transposed with 5 and 6. So out with pens please and make notes in margins. Captions are correct in sequence but illustration 3 should read 5, 4 read 6. The illustration shown in No. 5 should read 3 and 6 read 4.

Bottom-half operations on the Scott "Flying Squirrel" fall, broadly, into two stages—extracting the connecting-rods for work on the big-ends and dismantling the built-up crankshaft to renew the roller main-bearing assemblies or to fit a new primary drive sprocket.

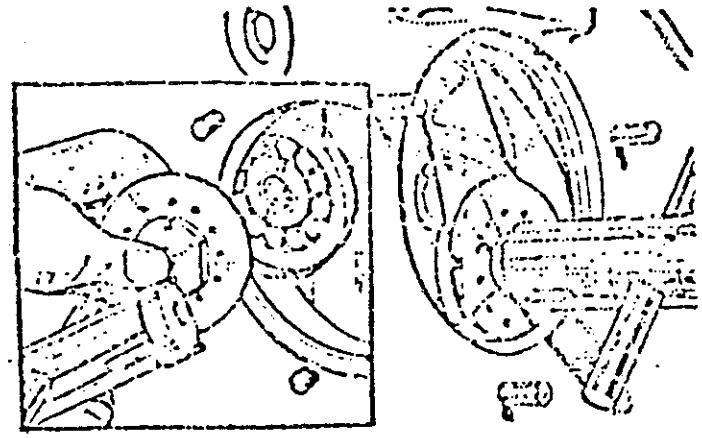
The big-ends take the form of overhung cranks, each integral with a crankshaft disc and forming a journal for a ½ x ½ in. 12-roller Hoffman bearing. The rollers are extracted, inspected for scuffing or other signs of wear, and reassembled via the two crankcase "doors", without touching the flywheel assembly.

This work is done with the engine in the frame but, to get at the centre crankshaft assembly, the crankcase, secured by four through-studs and nuts, must be transferred to the bench. Its removal is facilitated by taking out the gearbox. To complete this 12-stage overhaul, the dismantling of the clutch and gearbox also is dealt with.

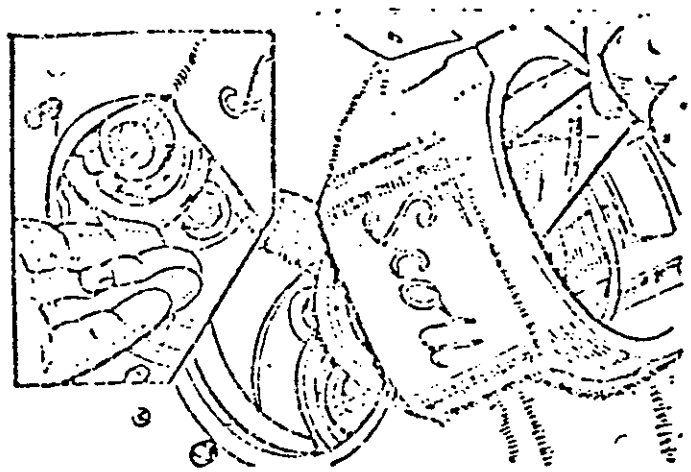
Special tools are limited to a peg-spanner, used for big-end dismantling, and a suitable hammer-and-drift kit to break the taper fit of the crank components and the flywheel, and also to jar the gearbox end-cover away from the mainshaft bearing on that side. This bearing is an SKF 1¼ x 2½ x ⅝ in. ball journal; the self-aligning ball bearing in the outrigger housing is similarly dimensioned. The layshaft is carried in the shell by an SKF ½ x 19/16 x 7/16 in. bearing, and in the cover at the opposite end by a bush.



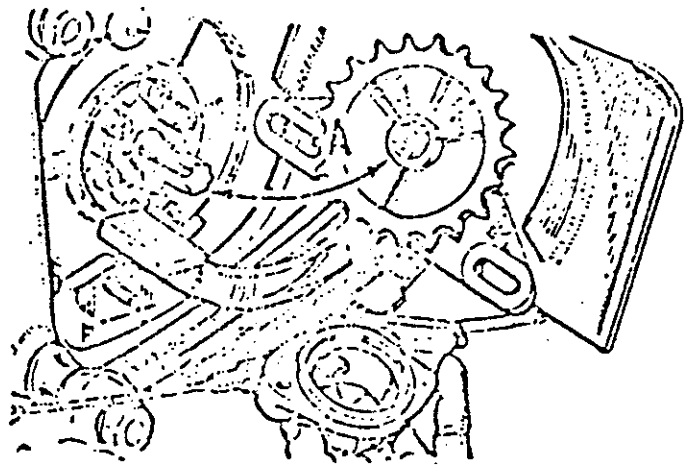
13 Move the connecting-rod assembly so that the crankpin comes round to the half-moon cut-away in the crankcase door, as at "A". The lock-washer "B" can be used twice by turning it through 180°. A special peg-tool (see No. 2) slackens the crankpin screw (left-hand thread on right side of engine and vice versa). Alternatively, start the screw with a hammer and soft drift.



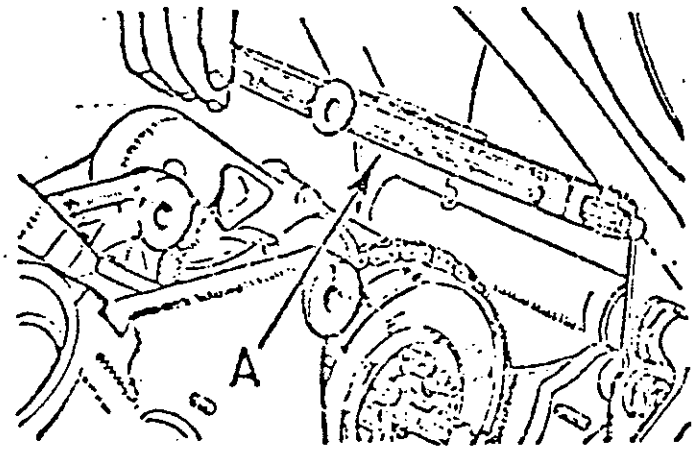
14 On early models no lock-washer was fitted but, as a result, the bearing assembly could slacken in the event of the engine temporarily running in reverse—usually a result of over-advanced ignition. To avoid risk of trouble, the fitting of a lock-washer to the older models is advised. Sketches show the peg-tool and its application.



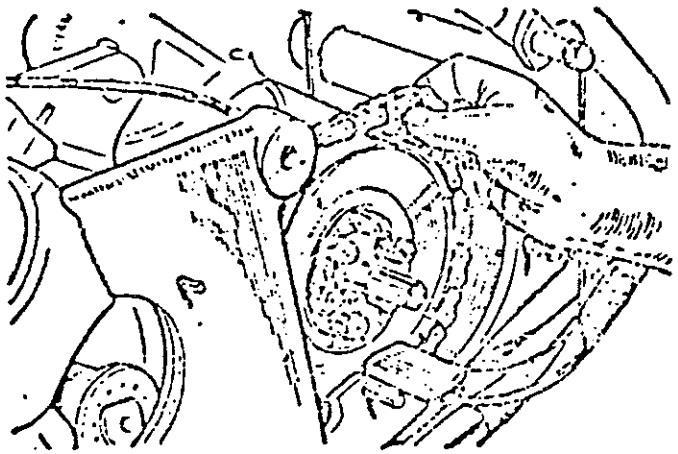
15 Taking away the crankpin screw and plate assembly, releases the connecting-rod so that it can be withdrawn. Two slots in the crankcase mouth provide clearance for the con-rod to be tilted while the big-end bearing (12¼ x ¼ in. Hoffman rollers) comes away (inset). Scoop out the rollers and inspect for wear.



16 Before the crankshaft assembly and central flywheel can be dismantled, the primary and secondary transmission must come away. Take off the rear chain, the speedometer-drive unit and the outrigger housing which carries the final-drive sprocket on a self-aligning ball-journal bearing. Note that the sprocket splines on to the gearbox mainshaft "A".



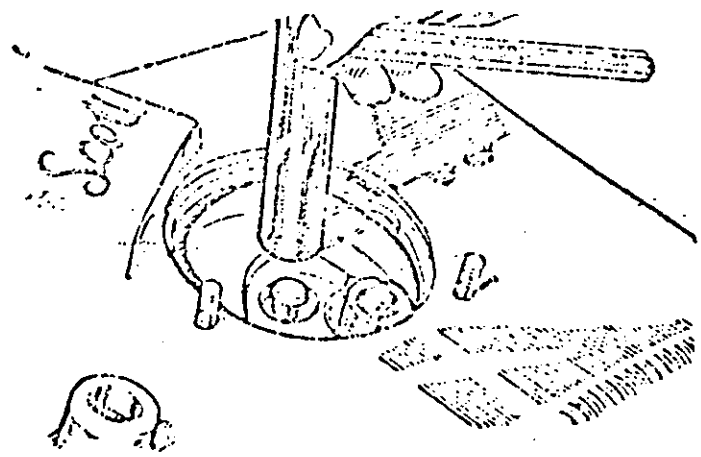
17 Further dismantling involves removal of the oil tank, retained by two ¼ in. bolts and supported below by two rubber buffers. Take off the top cover plate of the flywheel and primary chain compartment; extract the through-stud connection and pull up the tubular cross-member "A" which acts as an oil-tank platform and a support to the duplex main frame.



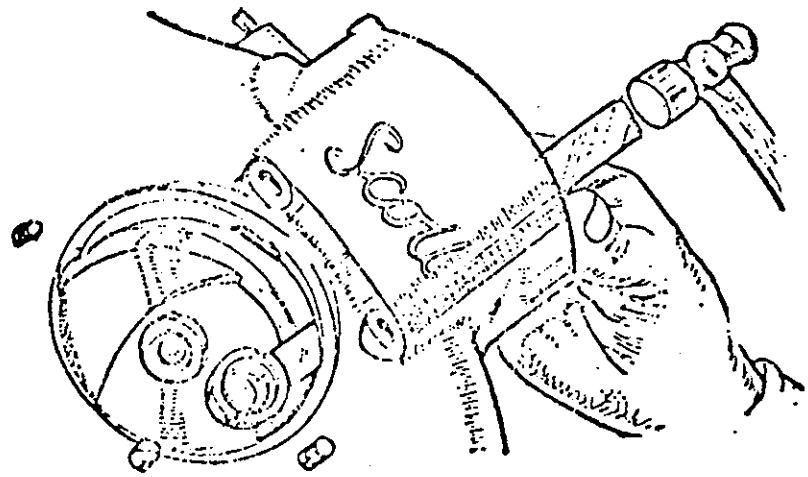
18 Slacken the primary drive by moving the gearbox fully forward. The box is to be removed. therefore slacken the two ¼ in. x 26 tpi anchorage pins. The primary chain can now be lifted off the clutch sprocket; alternatively, the split link can be disconnected. The gearbox is now free to be taken out of the frame.

YOWL SUPPLEMENT—(Part 4)
(Reprinted from Motor Cycling of 7/3/62)

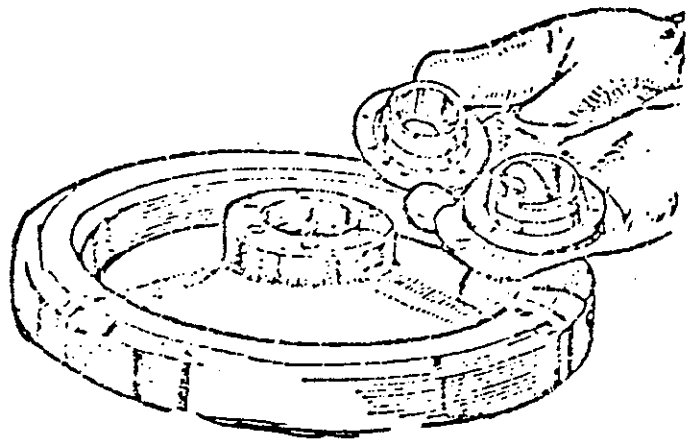
OVERHAULING THE BIRMINGHAM SCOTTS



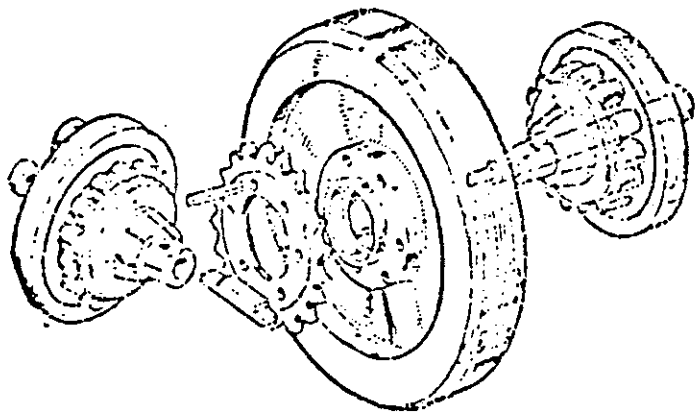
19 Take out the crankcase; remove the main bearing oil pipes. Slacken the left-thread nut on the through-bolt in the right crank. The bolt-head on the opposite side is right-hand threaded. Partially slackening the bolt and striking the hexagon head is one way of dislodging the right-hand crank assembly from its taper fit in the flywheel.



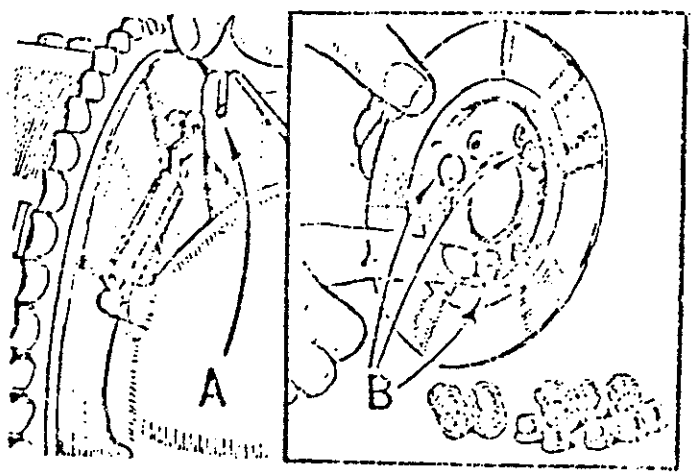
20 An alternative method of breaking the taper fit is illustrated. When the centre bolt is extracted, use a hammer and drift to tap the crankpins and break the taper-fit torsionally. Work carefully to avoid damaging the surrounding crankcase metal. Half-a-dozen taps are normally sufficient to break the taper.



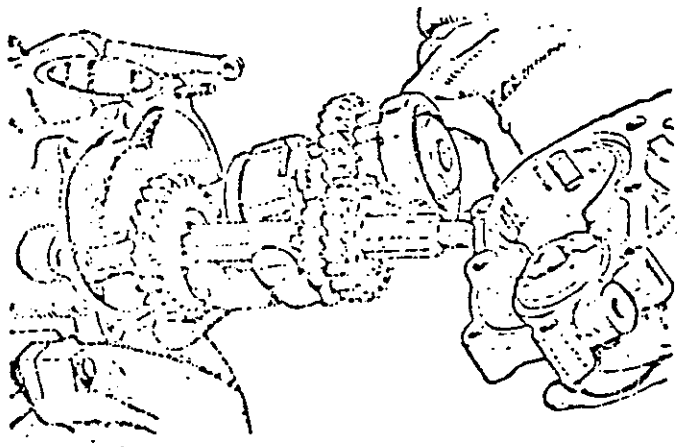
21 With the crankshafts removed. the flywheel and primary drive sprocket (not visible in this sketch) can be withdrawn. Keying into the boss are right- and left-handed packing glands; these should not be reversed when re-assembling because each is precision-drilled to provide correct lubricant inflow at the induction phase.



22 The crankshaft. centre flywheel and primary chain sprocket in extended form. Rigidity is preserved by the narrow dimension of the assembly when nipped up in the flywheel centre taper. where it is secured by a common key and through-bolt and nut. Main bearings are $\frac{1}{8}$ x $\frac{1}{4}$ in. rollers (15 each side) running in races pressed into the crankcase inner walls.



23 Normal clutch maintenance consists of adjusting to establish a minmum $^{3}/_{16}$ in. free movement at "A" when the cable is in position. The clutch is operated by a quick-thread mechanism and the three slot-headed studs and locknuts "B" provide basic adjustment. The clutch runs on $^{3}/_{16}$ in. x $^{3}/_{16}$ in. (30) caged rollers and there are four plain and four friction plates in the assembly.



24 To get at the gearbox interior, take off the end-cover, held by four sleeve nuts and three dowels, complete with k/s and gearchange mechanism. Take out the oil-level plug; this gives access to the main bearing which is now tapped free. Apply a mallet to the splined end of the mainshaft to expel the gearbox "internals" complete with end-cover. Normally the high gear wheel drops down into the shell.

TALE OF WOE

Restoring a Brum (part 1)

Douglas Kephart

Pennsylvania, U.S.A.

Dear Editor,

I had always thought a Scott would be an interesting machine to own, they were so unconventional looking. Just a year ago I finally plunked down on my first Scott, a Birmingham model, not exactly my first choice, which would be a '30ish three-speed, but with Scotts few and far, one can not be too picky. At least the lighting should be up to date enough for transportation to work. Any Scott seems to fetch quite a price, as they are not so common here, but the pre-war models (and it seems true for most all Brit bikes) tend to fetch silly prices.

When I got this machine, it came with some assorted papers and such, as well as some *Yowls* from the mid-sixties to early seventies. As restoration was required, I figured it best to see what was happening in the world of Scotts, and as of this year was put on to the new address to join the S.O.C.

I thought I might write in for two reasons, first, apparently this machine was owned in the past by another S.O.C. member, and second, as restoration progresses (currently at the torn asunder stage) several interesting things have come to light which maybe another member might have a comment on.

As for the history, I have a bill of sale from Commerfords Ltd. Surrey to Doris Chet Flynn, Timonium, Maryland, USA, dated the 29th July 1970. The letterhead states "export sales" yet there is no indication whether the machine was collected in the U.K. or shipped to the States, it just states, "1962 Scott motorcycle: £140.00" and then the registration and engine numbers of BWW 675 and DMS 2103, (Frame S1299). From there it appears it became the property of Chester J. Flynn, Deerfield Beach, Florida (though the machine was still in Maryland), for it was sold from him to Gary Ford, Pipersville, Pennsylvania, USA in October of 1982, from whom I bought it last Spring.

Perhaps someone will recognise 675 BWW, it sports a S.O.C. badge on the right tool box, a York herald badge on the rear mudguard as well as York transfers on the tank. A twistgrip has been added to the left bar to manually control the spark, and a chain oiler concealed in the left tool box, as well as a removable patch to access the insides of the muffler.

It would seem that it has not been run for quite some time, possibly since the mid-seventies, however nothing appeared externally wrong with it and an afternoon attending to the sparks, fuel and water saw it burst into life with a thick cloud of smoke. To be on the safe side I had the pump on nearly full delivery, so that was cut back a bit, and also I was feeding it on petroil, fortunately as it turned out. A few trial runs were made, where everything seemed all right mechanically, the engine ran, the gearbox had all three gears, but things were out of adjustment or on the stiff side. It was also noted that one window on the Pilgrim Pump was full of oil, so that was the end of play.

The bike was broken down to start restoration and to access what needed replacing, and the engine was the first thing to check. The big ends seemed in good shape, in fact it looks like they may have been replaced, but one mainbearing had a little bit of clearance, the crank could be wiggled up and down a sixteenth of an inch! No prizes for guessing which side, out came the crank where an interesting anomaly came to light. The outer main brg. race had spun in the crankcase, cutting off the oilway. It seems though, all the damage was bourne by the rollers and inner race, which show much wear, the outer race hardly showed any wear. It does however have about five hairline cracks on the surface the gland runs against. It is hoped that Loctite will cure both these problems, they do make a hydraulic sealant for cracks.

Another interesting bit was the rear brake reaction arm was broken through one of the bolt holes, (see photo) some brakes!

675 BWW had weathered badly over the years, so I decided to sand blast the frame before refinishing, which revealed several unpleasantries! First the frame tubing looks to be more like water pipe, with a conspicuous seam running it's length, and it seems to be a fairly soft grade of steel. The frame is made of short lengths not exceeding say five foot, as there are splices under the engine, where as the main loop could very well have been made in one piece, perhaps they were using up drips? The welding surprised me, there were holes blown clear through the frame and numerous slag inclusions, under cuts, and welds that just missed the joint. It might be destroying originality, but I knocked off quite a bit of weld "splatter" as well, I can't stand the sight of a weld joint that has not been cleaned! some parts of 675 BWW had been painted with a brush, though I am not sure if the frame had been repainted as well, built it is possible the frame had "gone to rust" as it was pock marked all over. This very well could have been caused by the sandblasting, there was no indication of rust under the paint, though other items done at the same time were not thus affected, just the Scott frame! The piece of angle iron for the oil tank platform is definitely salvaged material as it was rust free, but extensively corroded on one face, there is no way it could have rusted so whilst on the machine. Maybe someone will have something to add to this, there seems to be a lot of strange things about this frame not that it has been modified or anything such as that, but just in it's construction, were the frames made by a vendor for Aerco?

At any rate I hope the bits and pieces will start to come together shortly and 675 BWW will be re-assembled again, I've rambled on far enough as it is! I would like to find out what 675 BWW was up to prior to 1970, just out or curiosity, if anyone out there happens to know.

Sincerely yours — **Doug Kephart**

TALE OF WOE

Restoring a Brum (part 2)

Douglas Kephart

Glen Mills, Pa USA

Dear Brian,

Still working away (slowly!) on my Brum, it is not together yet as I hoped, but the parts look a lot better now. The frame, of which I was so critical, at least has improved in looks after several coats of primer, filler, and gloss black. I have not attended to the front forks yet, but I could actually start reassembling the chassis now if I had space to do so, at the moment the frame is hanging upside down from the rafters in the shed!

I removed the one main bearing race in the engine that had spun, and reground the gland face that had been torn up. The mating gland washer had also worn convex, and I cracked it not realising it was through hardened. I made a new gland from a piece of truck axle and made the flange thicker to compensate for the amount ground off the bearing. I put the main bearing back in with Loctite, I also used some Loctite sealant on the cracks on the gland face, I am told these sometimes came cracked from the factory! I gave Ken Lack a ring (it was a Sunday) to find out how much end float to allow for the crankshaft, I thought three to five thou. would be normal, he said better make it ten to twelve thou! I would not have gotten far on my clearance.

At this point I decided the rod races were not quite as good as I first thought, so out came the cranks again, as I was told the crankpin sizes vary, and must be measured for replacement, but how to get them off? I found if one heats the race up with a Burnsamatic (not so good if one plans to reuse the race) it can be eased off a bit with an aluminium drift applied where it projects past the throw. Once you get a bit of a gap, standard gear-pullers can be used (or two screwdrivers!). I knocked out the wristpin bushes, and the one rod looked as if it were bored with a dull drill! I decided then that Ian Pearce would enjoy working on them more than I, and they went off to be reconditioned.

While the rods were away, I attacked the distributor and drive, the bushings, as expected, were worn out. The skew gears showed surprisingly heavy wear, perhaps from the poor lubricating quality of the icky slime I drained out of there! The plain bronze bushing behind the drive disc had seized right to the shaft, another indication of a lubrication problem, and the bushing was spinning in the housing. Must have made a rather good bearing, as once I coaxed the bushing off the shaft, I was able to remount it in the housing with more Loctite, it had not worn out the bore. The bushing and the shaft needed some polishing but other that no damage done. I replaced the distributor bushings with a Vespel plastic bushing, it remains to be seen if these new high tech. self lubricating plastics are Scott compatible.

The head studs were seized in the head, what a pain they were! After a lot of heat and penetrating oil most of the studs were backed out, three twisted off flush with the head and needed nuts welded to them. A trick for heating up the studs to try and break the bond of corrosion; use a heavy duty arc welder, ground the block, and short a very heavy electrode to the top of the stud, since corrosion is a poor conductor, the current flows through the stud, heating it up like the old electric iron rivet furnaces. I can personally assure that 250 amperes or so can take a 5/16" stud glow! Even with all the studs out the head was still glued firmly to the block and needed a few clouts with the mallet, times like these one has to try hard to resist the temptation of driving a logging wedge into the joint!

The left hand pot must have had a loose sparkplug electrode bouncing around, there being numerous dents in the head, but none in the plus thirty pistons, so it must have been early in it's life prior to a rebore.

Severe electrolytic corrosion around hose spigot, and note how little metal there is between the hole and the vertical face of the cylinder head.

I decided the head surface could use a light skim to clean it up, so I needed to remove the one coolant pipe. Needless to say the threads were corroded so tight, a chunk broke out of the head (see photo) notice how the aluminium has been eaten away from electrolysis, this only occurred in areas of dissimilar metals, the rest of the water passages were fine. So I had to weld this lot up and re-machine it, what a chore!; must be some of the most impure aluminium I have encountered in some time! One had to heat the area with the TIG torch and stir the area with a spare rod of tungsten to break up the impurities and bring them to the surface, only then would filler material adhere to the head.

After much work all the aluminium "sponge" had been replaced with new material, rather than rethread the head I just bored it through and pressed in a new one piece stainless steel tube instead.

I bored the cylinders out and they just cleaned up at plus fifty. I suppose that most people use the head surface as a reference to set up for boring, but I found that the head surface was not true to the base surface by several thou, so I set off the base surface, after all the head surface, the existing bores were a bit crooked to the base, and was part of the reason I had to go plus fifty.

Current status is the engine is together with a set of Ken Lack's pistons but I need to finish a set of stainless headstuds, 5/16"-22t.p.i. threads are none too common here, this time the head is going to be well greased before assembly.

No word yet as to past owners of BMW 675, it had to have belonged to somebody in the U.K....?

Story to be continued....

Doug Kephart.

TALE OF WOE

Restoring a Brum (part 3)

Douglas Kephart

In the first instalment (way back in October 1990) is a typo.; I said the frame is possibly made up of *drops* (offcuts to you), not *drips* as printed — which might be a bit confusing to some. Further, on that subject of the splice in the frame under the engine; there were also welded up holes on either side, apparently to tack in place a doubler inside the tubing to help line things up. The welding which I said was so terrible, was 'stick' arc-welding, just to clarify that. It is not hard to make a mess stick welding. I might add.

So to continue where I left off in *Yowl* Vol. 17: No. 5: Tales of Woe, Chapter Three.

At this stage the engine work has been competed for some time. New headstuds and nuts in stainless steel were turned up and the head reinstalled (with a wipe of grease).

The ancillaries, save for the carburettor and the Pilgrim pump were put in their place. All other openings were taped off. That done, the engine was placed in storage and attention turned to the gearbox.

The gearbox posed few surprises. The throw-out bearing was shot, not much of a surprise. One of the gears was shy a tooth, surprise! (I'm not talking about a close-ratio cluster either). I did not find the lost tooth in the bottom of the transmission, so it would seem the tooth fairy had already drained it off. The inserts for the mounting bolts were loose and leaking oil. Copious amounts of sealant had been smeared around the heads, but in vain. I put them back in with, you guessed it, more Loctite, extra thick and sticky. Other than replacing the one gear, bearings, and output seal, the only serious problem was wear on the mainshaft where the sleeve gear ran. Oh yeah, and the splines were fretted out as well, but really a mint piece of shaft otherwise. A bead of weld was laid down along the worn side of the spline and it was re-milled back to the correct width. The mainshaft was then reground to clean up the worn portion (0.010" off the dia.) and a new bush to suit was made for the sleeve gear. This left one problem, the output sprocket. Besides the splines (which were shot as well) it is bored to be a close fit on the mainshaft. So the new sprocket from Ian Pearce had to be bushed 0.010" under.

One interesting thing about the final-drive sprockets was, besides the normal wear resulting from 'hooked' teeth, that the gearbox sprocket had heavy wear from the chain-plates on the inner side and the rear wheel likewise on the outer side. I must remember to look at the chain alignment when (ever!) it goes back together.

I have not done anything to the clutch yet, but the rest of the gearbox

got the usual treatment; clean this, paint or plate that etc. Then it too was placed in a plastic bag and stored with the engine.

The wheels were rather straightforward. Clean up the castings, new bearings, new linings for the front, the usual. The spokes were starting to rust and the chrome was going on the rims, so it was treated to new stainless items. The rims came from Doug Richardson, and were from the introductory batch of S.S. rims. These were absolutely superb. They not only looked nice but were dead true. I have since had a second set for another bike and I do not think they are quite as good as the first batch, ever so slight a kick at the weld, but still very, very good. These rims are not cheap, but they charge just as much to re-chrome-plate rims over here, so it might as well be S.S. They did screw up and pierced the rear wheel with too small a hole, and I had to drill them out, ugh!

It was also the first time I laced and trued my own wheels, having in the past sent them out. It really was not as horrible as I thought. I did develop a headache and it took all day, rather like a normal day in at work! The trick is to take a good photograph of the wheel prior to dismantling. This photo should show, clearly, the valve stem (or stick a pencil in the vacant hole) and the adjacent spokes. If you have a photographic record of where the spokes next to the tyre-valve go to on the hub, it makes it so much easier to replace the pattern. I also stamped on the hub (inside) and arrow pointing directly at the valve stem hole to aid orientation of the hub when it came time to lace up. I also made a drawing. No sense taking chances.

At this point I had a change of heart about the spun bush I refitted with Loctite in the right-hand crankcase door. The two bushes did not seem to be in line, so the housing was line-bored, and then new bushes made to suit.

At the same time, an external oilcup with a tube leading down to the inner bush was installed, just to make sure it would get some oil. This is rather discreetly tucked away behind the distributor body.

For some reason I had thought I was going to re-use the rear sprocket that was on this machine. After a second look I quickly changed my mind. Ian Pearce supplied one. As he was waiting for resupply, he took a nearly new one off his own bike. Incredible!

New tyres: Speedmaster Mk2 front, and SM Mk2 rear, finished off the wheel assemblies.

The swinging arm got re-bushed and line reamed (everything is worn out on this bike!), but I did not install it on the frame. The frame is still yet hanging from the rafters out in the shed, for lack of space. I do not want to add many pieces to it, lest I am not able to lift it down! Besides painting, the suspension units only needed new rubber bushes, thankfully.

Next we move on to the saga of the front forks, a story in their own right. As you can imagine, the front forks were very worn. Right from the start I had a set of fork bushes from Ian as I knew I would be needing them. But the stanchions had been worn through the chrome, and that would have to be fixed first.

First I sent them to a well-known firm that specialises in telescopic fork repair. After a long while they determined they did not have the right size tubing to do the job. Next was to send them to a place that specialises in hard chrome-plating worn hydraulic piston rods and then take them to another shop that could grind them back to original size.

I was advised to turn the old plate off the forks. First, as the plating

would be a uniform thickness, the stanchion needed to be a uniform size, not worn all funny. Second, when I had it ground back to original size, I did not want to grind through the hard chrome into the base metal. Hard chrome, unlike decorative chrome, can be built up rather thick, something up to 5/16" thick, if required.

While turning down the stanchion in the lathe, some very interesting facts came to light. The plating on the front forks is decorative chrome, over nickel, the same plating as on your handlebars. Not hard chrome at all! This is applied right over the tubing, no precision grinding before or after. In fact the tubing is not very round at all (measured at the top and bottom where there is no wear, nor is it anything special, like seamless tube. How do I know? Well, when I turned it down, I uncovered a cold shut running most of the length of the leg. Just your plain old mild steel tube (with a few defects), dipped in the old plating tank. Oh well, it lasted this long, sort of.

Anyway, I plugged the end, undercut the chrome, and got each leg nice and true. Not having any idea what this hard chrome- plating job would cost, I shipped off the parts with a note of where and how thick I wanted the deposit, and to quote the job before commencing work (I set a limit). After a month went by, I gave them a ring, they had not had a chance to look at it. Another month went by, I ring up, and yes they have started on them. I ask about my quote, "I'll have to check into that and get back to you," was the reply. Several weeks later I get a call from them the job is done, $430, if you please. (I had told them the limit was $200.) Needless to say, I went ballistic. After some screaming about their inability to follow written instructions, I told them they could have the $200 or keep the fork legs.

After some humming and hawing, they decided to strip off their chrome, and return the fork legs no charge, rather than take the $200 I suppose, so I did not cheat them!

This put me back at square one. So I thought I could replace the stanchions with centreless ground, seamless stainless steel tube. Not as good as hard chrome, but better than flaky decorative chrome. That was until the supplier of the same (at $50 a foot) could not deliver, despite cataloguing it. Seems they forgot that they actually had sold off the machine that did the grinding....

That left standard seamless S.S. tube which, though a lot rounder than the original tubing on the Brum fork, was not quite good enough, I thought. As I had to bore the new fork bushes to suit anyway, I thought I might be able to get the tubing centreless ground on my own, but no one who had such a machine wanted to bother with such a small job.

Then I thought I might make a lap, and lap them true (the amount was too small to turn successfully). This caused some interesting problems, as it would heat up from the lap, the leg would buckle between the centres of the lathe. Not only that, but the high spots would heat up and rub the lap harder, when it cooled down they would become low spots. The legs were getting worse than when I started!

The final end-all solution was to hold an orbital sander against the rotating stanchion, with frequent stops to let it cool down. High spots would get a bit of localised attention from Mr. Orbital. After three weeks of spare time I had both legs true to plus/minus 0.0005", which is far better than it ever was. I also got a lovely engine-turned finish from the sander. But never, ever again!

In case you are wondering, the insert that goes in the bottom of the stanchion is virtually impossible to sweat out with heat. The tubing has to be machined away to free it. The insert is only cast iron. I would have thought it would be at least malleable cast iron, but later I inadvertently snapped clean off one of the fender brace mounting lugs, and it is definitely not malleable. The inserts have an annular groove machined in the part that plugs into the bottom of the tube, most likely to wrap a few turns of silver solder to supplement that added externally during sweating. Which is the same use I put them to.

Next was to replace the bushes in the upper fork tube. As these were tacked in place at three spots, they also had to be parted off in the lathe. The new bushes were bored to suit the stanchions. There were no seals in the little tin shrouds. As I had forgotten to send out the small tin cups which hold the (packing?) with the rest of the stuff to be plated, I replaced them with polished S.S. turnings, and installed a modern lip seal at the end of that (still concealed under the tin shroud).

For some reason, probably impatience, I assembled the fork legs while they were still in primer. I must say they worked rather well, which they ought to do, considering the trouble they were. Rather than take them apart, I decided to paint them assembled, by sliding the shrouds down, masking with tape, and covering the lower end with a plastic baggie. The only drawback was it was a bit heavy to hold and paint. I finished spraying the one and leaned it up against the wall (touching only the baggie or the taped portions, of course). No sooner had I started on the second one when I heard a 'thump!'. That's right! It fell over in the dirt.

A few weeks later, when I had sufficiently calmed down, I had another go, but the results are just not there. I will have to strip it all down and start over. It never pays to cut corners, or not very large ones, anyway!

The steering-head races had some deep dents in them from the balls, in fact I have never seen worse. With the help of an engineer in work, I got a few free sales samples of a carbide insert, pre-ground with an 0.125" radius. After making a mandrel to hold the races in the lathe, I was able to slowly skim out the race and clean it up. I was quite pleased at the time, but now I am not so sure. If I could cut them, they cannot have been all that good to start with, can they? I will replace them with new ones, if possible.

The tank had a dent, plus it was starting to split up at the front. Prior to stripping, several photographs of the lining were taken, as well as tracings. It took quite a bit of work to smooth out the tank, not so much the dent as to get the sides to flow smoothly into the top. Using the same epoxy primer as on the frame, and some filler, eventually after some sanding it was done. Painting it black was simple, but I have yet to get the lining on.

First, in trying to lay out the side panels, I could not get them the same on each side, until I realised both sides of the tank are not the same height! To get it to look right, one has to lay down a stripe of chart tape along the apparent apex of the curve between the top and the side. Equally spaced off either side of these are the borders for the top and side panels. By doing this the panels 'look' right, even though they do not measure right.

Next was to try and get lines on the tank. I tried to cheat with chart tape, but it would not take the radius. Then, traditional dagger brushes and signwriter's enamel, but lack of talent and a shaky hand got the better of that. Borrowing one of those Bugeler paint stripers, I practised with that. The only problem was my hand blocked the view of what I was doing. But it made a fine stripe, even if I could not control where it was going!

I was given some fluid to try that is supposed to aid the paint to flow smoothly off the dagger brush, but I feel I require a different sort of fluid to steady my hand! Perhaps it would be simpler to farm out the lining.

The radiator held water, just. Both sides of the header tank were stoved in, and overall it looked pretty rough with its patches. Not surprisingly no one wanted to have anything to do with it. Even though it is not the correct 'fin' type, a new honeycomb core radiator from Darad looks the part, and is much more sensible. This radiator is stunning. The original radiator looks like junk in comparison.

Also of interest are repairs to the carb. The flanges of the carb were bent from using thick gaskets. Repeated sanding of the flange face left each tab tapered giving a poor surface for the nut to seat against. This bent the studs over when the nuts were tightened down. New bits of brass were silver- soldered onto the flange and filed down to the proper shape. The threads in the crankcase had to be Helicoiled, and new studs made.

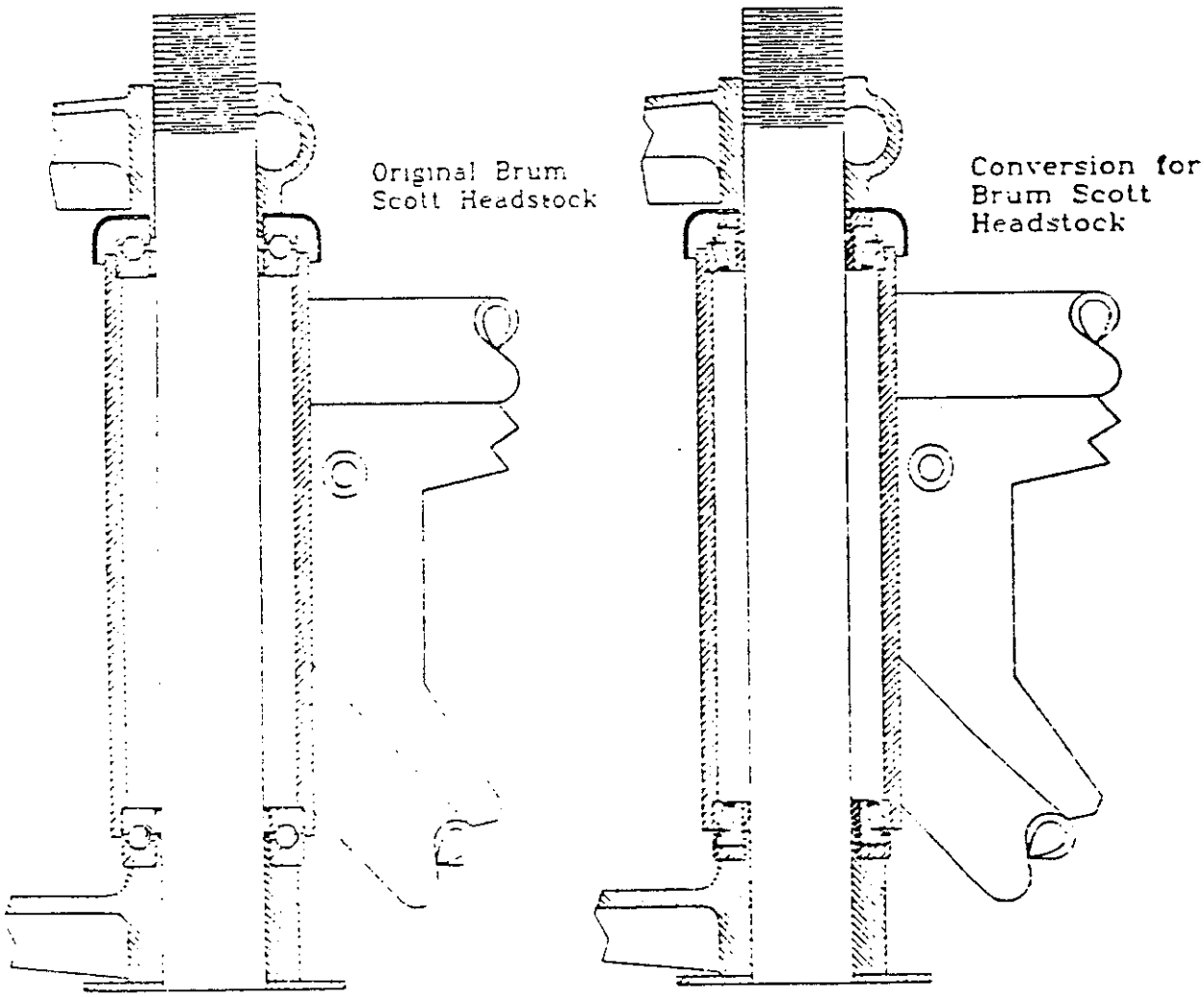
Two things I need to source, and perhaps someone out there can help. Is anyone making a repro of the Miller headlamp rim? This Brum, and my '57 Velocette Venom which uses the same rim, are both dented very badly. Yet neither took a hit to the headlamp shell. A friend in Virginia who has a Brum had the misfortune of it falling over. It also took a direct hit to the rim. Though he also cracked his lens, his shell also escaped damage. What is this phenomenon? Do the bright shiny parts have some unseen attraction to damage? Anyway, new rims?

I was able to try this machine on the road, which was interesting. I only tried mine around the yard briefly, it not being roadworthy. So it was the first time to experience what mine will most likely be when it is done. Not as bad as I had been led to believe, as long as one does not expect too much.

Another item is cloth-covered spark plug wire of a bronze colour, with which the bike was fitted. Unless this is wrong, can it be had in the U.K.? The only cloth-covered wire here is a rather bright orange colour, with red and black tracers. Not quite subdued enough for my taste. One could use modern neoprene or silicon wire, of course, but it is the little details that get one's attention that this was how it was then.

Still, there are things to be done, but they are becoming smaller and smaller. Like refinishing the headlamp shell, some fender stays to fix, nuts and bolts to remake. Plus find some place to assemble the beast, which is the biggest problem of all. I have some other bikes a-building in the cellar, but the access is vertical through a four-by-five hatch, and they do not weigh as much as a Brum (sort of rhymes with 'a ton'). I fear if I built it down there, it would become the proverbial 'ship in the bottle', and there it would stay!

But that will wait for the next instalment, story to be continued, perhaps in a year or two....

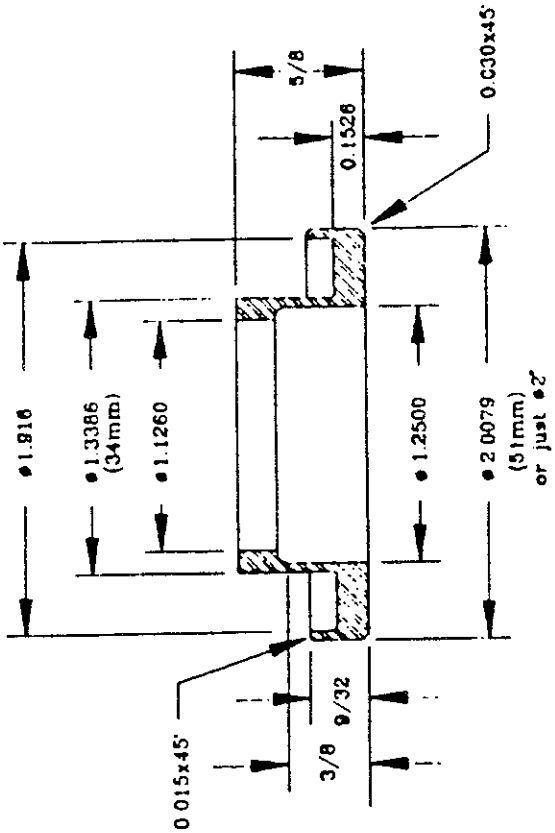


Of This and That and Headrace Bearings

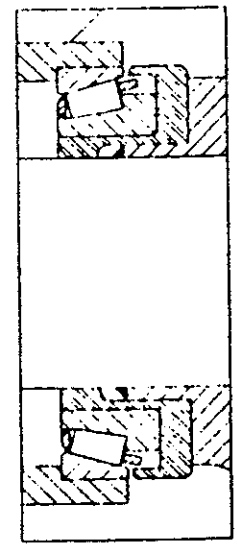
Dear Editor,

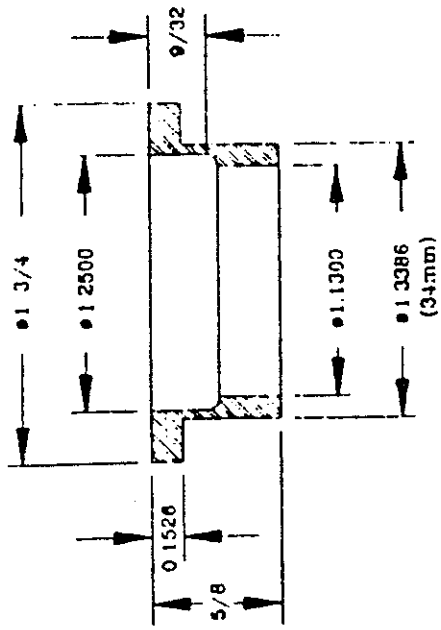
You mean Scotts were not mass-produced vehicles? (*This and That, Vol.18, No.12.*) I had heard that the Brums were made in small fitful batches which took second priority to more profitable work, but did not realise that even pre-war production, oops, er — hand crafting, was in such small quantities. I had assumed (dangerous thing to do) that 'production' went down gradually from their high point, when ever, and what ever there was.

Well I did warn you that I thought there were only two types of Scotts! The delusions we live by. You must realise that we, or perhaps just I, tend to be a bit ignorant on these matters over here, so far from the scene. Nor was I around way back when, so was not even reading the period trade magazines. So I don't mind being corrected, because at the moment the *Yowl* is my best source of information on old Scotts. Thanks

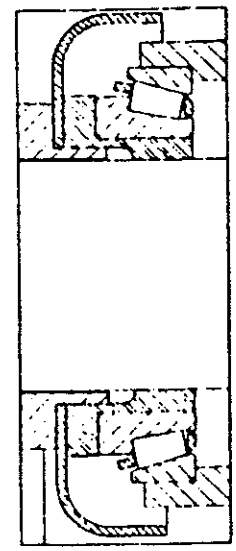


Lower Adapter





Upper Adapter



for setting me straight.

Last instalment on the Brum restoration I mentioned I wanted to replace the steering headrace bearings. According to Ian Pearce, these were not available and I would have to find a substitute. I have come across one, and I thought others might be interested if they have not already found their own replacement. The bearing is a taper roller replacement unit for Earles-forked BMW machines, which originally had a loose ball bearing similar to the Brum. I got mine through a BMW parts dealer. The bearings are special, made in Japan. You will not find these bearings at your bearing stockist! A pair of bearings cost me $50.00. These bearings are very compact in cross section, and may lend themselves to other retrofits.

The O.D. of the taper roller bearing is 51mm, same as the Brum, the I.D. is 34mm, and needs to be bushed to fit the 1.250" dia. Scott fork yokes. The assembled height of the bearing is 12mm, which is less than the 0.625" of the original unit. So the bush needs to pack up the bearing as well, to keep everything in its original position. I suppose there really is no need to pack the bearings up, if having the top and bottom yokes about 1/16" closer to one another does not matter.

Some drawings are provided I have installed a set on my Brum with these adapters. The outer race is very thin in section, use of a shouldered mandrel to install in the headstock is mandatory, or you will never get it started in square. Or use a draw bolt arrangement. Make sure the races are seated tightly, or you will be adjusting your headstock bearings for months!

I did get the front fork stanchions painted satisfactorily, and assembled. But one seems a bit stiff, and the other quite free, so I think I mixed up the upper bushings which go at the top of the stanchions. So I will have to tear that apart again. I suspect it is just waiting for the opportunity to fling itself on the ground again and scratch the paint!

Douglas Kephart, Glen Mills, Pa. 19342, U.S.A.

Notes for drawing on opposite page:

1. Material of adapters is mild steel.
2. Tolerances are: Fractional ±0.005"; Three decimal place ±0.001"; Four decimal place ±0.0001".
3. Depth of Ø1.2500" bore in upper adapter is to clear Ø1.2500" spigot on upper yoke.
4. Ø1.1300" through bore on upper adapter is a bit loose on the fork stem, but is the same size as bored in the upper yoke casting. So 'when in Rome...'. Actually making it a tighter fit than the yoke casting could cause problems when the pinch bolt is tightened.
5. Depth of the Ø1.2500" bore on the lower adapter is to clear the fillet of braze securing the fork stem into the lower fork yoke casting. Some filling may be required to remove surplus (read sloppy!) braze from the fork stem.
6. Note that the lower adapter is turned to look like the bottom race of the original bearing. The conversion is practically undetectable externally.
7. The Ø1.1260" through bore on the lower adapter is to provide a thou clearance on the fork stem for a sliding fit. The Ø1.2500" dia. is a press fit on the lower fork yoke spigot.
8. Remember, Loctite® is your friend...!