

4.1 General Description and Maintenance

EXHAUST NOTES

Titch Allen

If I were not a true blue (big end roller) dyed in the wool (purple) Scott enthusiast, I would be cynical enough to suggest that the thing about Scotts which captivated so many enthusiasts in the vintage days was the exhaust note. Certainly I was won over completely by the dulcet notes rising and falling from the odd Squirrel which was about when I was a lad. So infatuated was I that I would cycle several miles, and did, for the chance of hearing a Squirrel... an exercise I usually reserved only for a very pretty girl.

That being the case I was disappointed when Squirrels, with their thrilling note, were gradually replaced on the roads by the more masculine Flyers with a more deep throated "yowl". This "yowl" came by courtesy of Mr Howarth's patented silencer and I am pleased to be able to provide your Editor with an advertising leaflet for same, wherein it can be seen that whilst much thought has been given to silencing without loss of power, not a word is said about exhaust note.

Since the beginning of motor-cycling, exhaust note has been important and to a certain extent can be regarded as a substitute for performance. Is there a man with so little feeling for music that he has not eased back his throttle and cocked his ear to savour the "yowl" at its best?

Accepting, as I do, that the Scott can be a musical instrument... there are some unkind enough to suggest that it performs better thus... it seems a shame that the musical side was so neglected in later years. Whoever introduced the Burgess silencer can have had no ear for music, for whether or not it is bunged up with gunge, which it usually is, the noise is in my opinion a noise with no musical cadence whatsoever.

I feel therefore that there must be many Scott enthusiasts who have never experienced the erotic... not what you think... look it up in your dictionary... thrill of the real Scott "yowl" or before that the trilling whine of a two speeder with front expansion chamber and small bore tail pipe. This was Scotting as Alfred intended it but now as rare as the Nightingale in Berkeley Square, although the dedicated naturalist may still glimpse and hear a Squirrel at Stratford on Avon or Banbury in the summer months.

Main Features and Advantages of the "Howarth" Silencer

Editorial note:

Whilst it was not practical to reproduce all of the pamphlet kindly loaned by Titch, the following extract may be of interest:

The chief aim in Silencer efficiency is Silence without Loss of Power. Silence alone can be obtained quite easily by the crudest means, but the ideal Silencer must be constructed on thoroughly scientific principles.

In the "Howarth" Silencer, the high velocity gases are allowed to pass straight through a central tube with almost negligible impedence, the tube having an open conical end. Meanwhile, the slower moving gases pass through long slots from the central tube to an outer cone. Escaping through the open end of this, they pass through a ring of large holes in the middle baffle into a second cone, whence they emerge through wide apertures, into the common outlet.

The Silencer is made up entirely from sheet steel, and steel pressings. Its components are ingeniously divided into an inner and outer welded assembly, having no loose parts. These can be separated instantly for cleaning by the removal of the two end-cap nuts.

The Silencer, whilst being primarily designed for use as an auxiliary to standard exhaust systems, can also be used very satisfactorily as a quick-detachable fitment for racing machines with open exhaust pipes.

(Original advertising pamphlet entitled "The Howarth Silencer" was published by The Scott Motorcycle Co. Ltd. in around 1924. The basic Silencer, without clips and fittings, cost a princely fifteen shillings!)

EMISSION OMISSIONS

I wonder how many people properly digested the "Autoweek" article on page 195 of your December *Yowl*. The last paragraph proved that someone knew NOTHING about two-strokes! It is a very strange two-stroke that fires "on each stroke". I would also have thought that a two-stroke eliminates "valve-train complexity" rather than reducing it.

The article implies that the two-stroke emission problems are just caused by petrol lubrication but of course the main problem is that caused by some of the incoming fuel/air mixture escaping, unburnt, straight down the exhaust port. — A problem helped, but not eliminated, by the deflector on the piston crown in the Scott engine. Whether you have "Schnurle Loop" scavenging, charging pistons, — *a la* DKW, stepped pistons like Dunelt, or any other variation, the basic problem remains. The two-stroke motorcycle has been almost killed off in America by emission regulations, and we must be very careful that tighter and tighter new laws do not legislate us off the road completely. A great deal of ignorance makes millions of people think that the smoke from an engine is the pollution, whereas if truth be known, the real dangers are the invisible toxins such as lead compounds, carbon monoxide, nitric oxides, etc. Most two-strokes need no lead in petrol, and their emission of carbon monoxide is no higher than a four-stroke. I recently put a dozen different modern motorcycles (at random) on a Souriau diagnostic analyser. The two-strokes varied from about 1.5 to 2.5% Carbon monoxide. The four-strokes varied from 1.5 up to 5%, with the worst offender being a Suzuki "hyper sports" superbike! They tell me that the lead in petrol, added as tetra ethyl lead, reduces the tendency to "pinking", pre-ignition, detonation, or call it what you will, simply by acting as a flame retardant, in other words it slows down the combustion process. The "cushioning" effect it gives to valve seats was not the original aim, just a side benefit of adding lead. It can be easily replaced by "Stellite" coating of valves and valve seats. Apparently the amazing response of the petrol companies now, to replace the lead, is to add more benzene. Benzene is an awful compound, with well known carcinogenic toxicity. So instead of lead poisoning you will get cancer of the liver instead! I find this to be an incredibly cynical answer to the whole problem. Come back "Pool" petrol, all is forgiven! Seriously though, pressure on motorcar/motorcycle manufacturers, to reduce compression ratios drastically, drop the constant striving for higher and higher power output, and to produce engines designed to run on simple "pure" fuels is the only long term answer if we are not going to be poisoned out of existence. Ethyl alcohol would be ideal I reckon, a simple alcohol, produced by fermenting virtually any old organic waste containing plant sugars, such as fructose, sucrose, glucose, etc. (They use sugar cane in Brazil, where many vehicles run on alcohol). Such a fuel would be from a renewable resource instead of the limited crude oil reserves. The only problem is that we would be tempted to drink it instead of putting it in our fuel tanks! (Another possibility might be compressed methane gas, produced by fermenting virtually anything organic, including sewage).

If only we could find some sort of catalyst that would split water, good old H_2O , into its constituent elements hydrogen and oxygen, without using vast quantities of electricity for electrolysis. The perfect clean fuel, and the only emission is water, as they recombine on combustion! All round us in unlimited quantities, and not "used up" because it is reformed on combustion. Such a process is of course a modern "Alchemist's Dream", and about as easy as the old one, that of turning base metals into gold. One thing we can be sure of, the petrol companies would be queuing up to buy the process, and then quietly reject it, to go the way of everlasting light bulbs, shoelaces that never wear out, and other realities squashed by commercial interests!

B.M.

A REPLACEMENT SILENCER FOR SCOTTS

Roger Wheeler

Ever since owning my present 1972 Birmingham Scott I have not been satisfied with the tone of the exhaust. Cutting and re-loading the silencer reduced the volume of noise but did not alter the rather flat tone.

Having recently obtained a silencer through the Club Spares Scheme, I was disappointed to find that this was no better, in fact slightly noisier than my steelwool-packed old one.

On close examination of these silencers I find that they differ from other Scotts I have owned and that the expansion chamber is much larger and the absorption part much shorter than the old Burgess silencers.

This prompted me to make my own silencer in which I could readily alter this ratio and also experiment with different internals with no difficulty.

The silencer as shown on the drawing is basically as I remember the old Burgess internally, but with a slightly reduced central tube and tail pipe diameter. I have had this silencer on my bike for several months now and find there is a very marked reduction in noise, and the tone is much more in line with my previous Scotts. I hope it may influence the petrol consumption for the better, but I shall not be able to comment on this until the spring, as I don't ride for fun at this time of year (February).

However, it has unfortunately highlighted the level of mechanical noise sufficiently to make me inspect the condition of the engine. I found that one source was the alternator drive and ball bearing, which was imitating my wife's spin dryer. I found, on dismantling, that I could not remove the offending bearing without damaging the oil seal, so had to be content with giving it a thorough clean and re-greasing. The result is a big improvement.

To prove the point, I rode the bike without the alternator, using a plywood crankcase door. There was still more noise than one would expect from such a simple engine, but further checks seemed to show nothing amiss.

I remember when I last renewed the big-ends that I was surprised at the roaring noise made by spinning the flywheel with the conrods removed. The condition of the main bearings appears to be first class and there is no detachable play in them. The big-ends are still the tight fit as when I assembled them. The pistons are bushed and there is negligible play in the little-ends — so why so much noise?

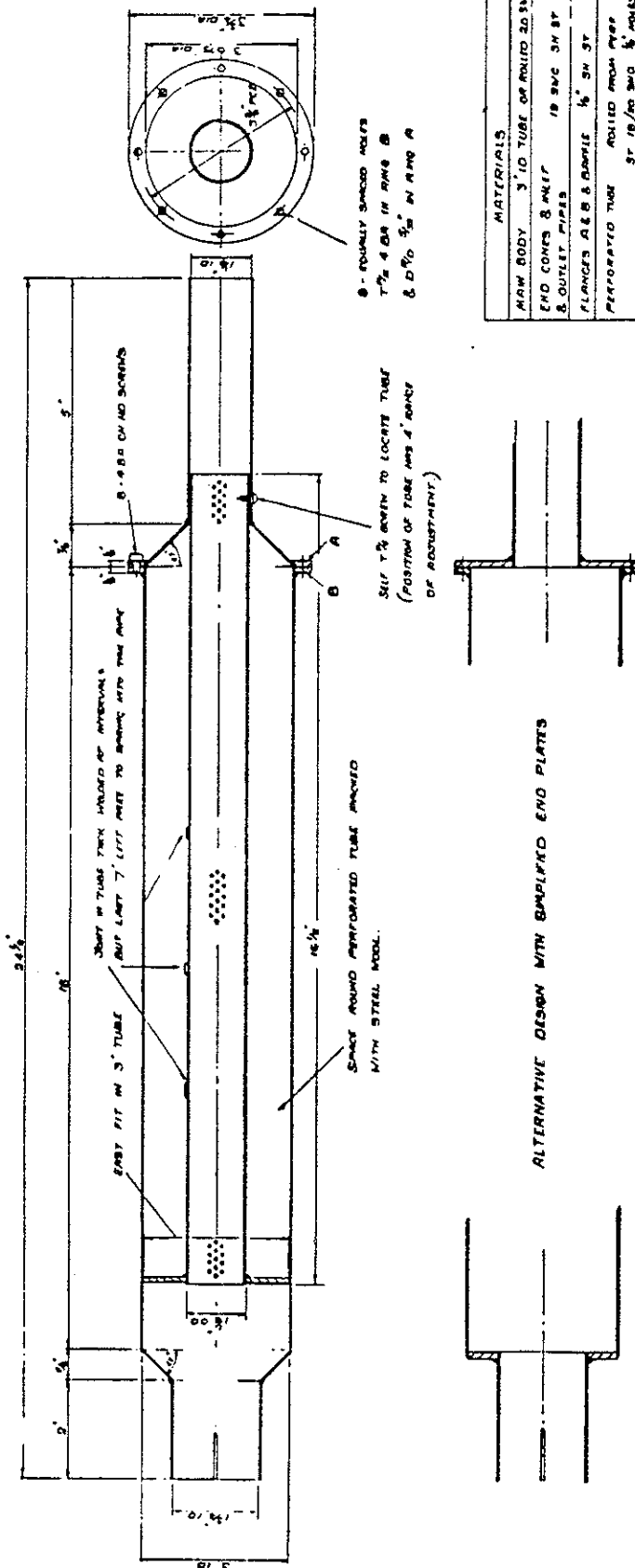
I remember when I was a design draughtsman on large electrical machines, we had a couple of large D.C. motors with ball and roller bearings on test and the noise level was intolerable. All the usual checks were carried out and new bearings fitted. No improvement, and in desperation we tried some Japanese bearings with a lapped finish. The transformation was remarkable and caused a bit of consternation with our British suppliers.

Going back further, in the late 50's when I was riding a 1929 Flyer, I decided to have a good go at the engine and took the lower half complete to Tom Ward for overhaul as necessary. In the meantime I had the cylinders re-sleeved and then cut the ports out and turned down a couple of pistons to suit.

I was rather concerned when I realised what dubious contact there was between the liners and the exhaust port dividing bar. However, all went well, and the engine has remained in my memory as quite the nicest Scott I have ever ridden. The magneto was driven direct from the L/H crank and the dynamo *via* a belt from the clutch drum. I rather think that Tom Ward used to lap the bearing races to fit his oversize rollers and that this might be the secret of mechanical silence. I also think that any roughness in the bearings is much magnified by the large aluminium crankcase. Anyway, I am satisfied that there is nothing amiss in my engine.

REPLACEMENT SILENCER FOR SCOTT MOTORCYCLES
FITTED WITH CURCESS SILENCERS
 INCORPORATING EASY CLEANING & RENEWAL OF
 ADSORBENT MATERIAL

INCHES



MATERIALS	
MAIN BODY	3" I.D. TUBE OF WALL THICKNESS 2.0 ST
END CONES & SPLIT	1/2" DIA IN DIA 20
& OUTLET PIPES	1/2" DIA 3/4 ST
FLANGES A & B & SCREWS	1/2" DIA 3/4 ST
PERFORATED TUBE	ROLLED FROM PIPE
	3/4" DIA 3/4 ST

Drawing by Roger Wheeler.

V4/2 Oct. 1964

SPRING-CLEANING YOUR BURGESS . . .

from a Works Directive

Immerse for about an hour in a strong solution of caustic soda ; about 1½ lbs. to one gallon of hot water. Great care should be taken to wash thoroughly in fresh water after removal from the caustic bath. Drain and dry before re-fitting.

If there is excessive deposit of oil sludge proceed as follows : support silencer at an angle of about 45 degrees and slowly pour commercial paraffin down the perforated tube, rotating the silencer at the same time so that it soaks the acoustic. Set alight from the bottom. When the fire is out, thoroughly cleanse with water, then "dump" silencer to clear carbon sludge and if possible wirebrush the tubes. Replace in exhaust line, dry out by exhaust heat, preferably turning the silencer over two or three times, if installed horizontally, before finally coupling up.

V4/4 Feb. 1965

SILENCE !

A few months ago *Towl* carried some hints on decoking Burgess silencers which I found interesting as I had done similar "experiments"—with no improvement to the efficiency of the silencer. At the time, I thought a previous owner of my 1960 Squirrel has raised the exhaust ports so making it noisier.

I ordered a new silencer from Geoff. Milnes and sought details of exhaust port timing. I got the information but not the silencer which was to be sent on later.

The exhaust ports had not been altered, so I decided to make the silencer work.

A couple of hacksaw cuts and a series of holes removed a piece of the silencer body (underneath where it would not be noticed)—about two inches by nine and half inches. Surprise, surprise—it was quite empty and clear except for an eggcup full of oily hair (!) sticking to the bottom. I don't think it can have been used for more than 1,500 miles.

However, the centre tube was cleaned with a wire brush, the small holes being quite free of carbon, and a curved plate made to cover the long hole ; about 20 holes were drilled round the edge for fixing purposes. Tapping the small holes can be done very quickly if the tapping size hole is made on the large size and the tap, preferably a taper tap is used in a hand drill. By this means, and a little gentleness a tap need never be broken.

Now the silencer was packed with about three quarters of a pound of No. 3 grade steel wool as tightly as possible with the fingers.

The result : a complete success, beautifully silent and nothing can be seen to spoil the appearance. I think glass wool is used for packing originally and my guess is that the steel wool will not blow away as the glass wool does. Scott exhaust is rather oily and a small hole drilled at the lowest point of the packed chamber will allow excess oil to drain away. Anyone want a new Burgess at a reasonable reduction ? Credit : Tim Massey.

A MODIFIED SILENCER

by Neil Smith

V4/5 April 1985

I have seen several references in *Towl* to the difficulties encountered when trying to clean Burgess silencers. As these units can easily be made detachable without the help of special equipment, the following notes may be of use to impetunious members. You will need : one large Jubilee clip, a hacksaw, a light ball pane hammer, and a block of wood.

Method.

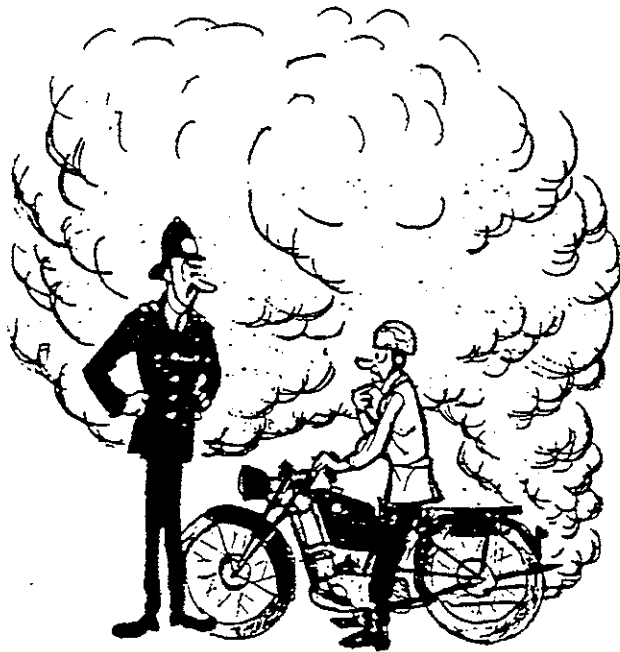
Fit the "Jubilee" Clip about 3 inches from the end and using the side of this as a guide saw the silencer in two. The Old stuffing may then be dug out.

Refasten the "Jubilee" Clip about 3/16 inches in from the cut edge, take off the "rag" with a File or piece of "Blue Back" and then, supporting the clip on the block of wood, knock up a lip all round the edge. Don't try to form the lip all "at one pass." Raise an angle of 10 to 15 degrees all the way round—you will need to reposition the clip—then run round the edge with a file and bring the edge up another 10 degrees. (Filing the edge helps to prevent the metal splitting). Carry on until you have an angle of about 60 degrees (120 degs. inclusive). Now do the same with the other half of the silencer.

Finally, butt the two "Belled" ends squarely together and carefully fit the "Jubilee" Clip with an equal overlap each side. Screw up fairly tight. Now carefully supporting the opposite edge, tap the edge of the clip down over the "Belling" a little each side at a time until a snug fit is obtained all round. The clip will stretch during the process and will need tightening from time to time.

A very neat joint will be achieved and length fo silencer will be reduced by only about quarter of an inch. (Not enough to notice).

A word of warning. Even the most careful hammering will blemish the Chrome plating. If this is to be avoided a split wooden clamp should be made and used when "belling" the two halves.



"Honestly officer, it only does this for the first couple of hundred miles"

SCOTT MUSIC**Titch Allen**

Some time during the war when my first Flyer was on essential work...well, essential to me to take me home 150 miles each way on a weekend pass, the coffee pot front expansion chamber fell apart through rust, and when I took it to a skilled welder friend of mine he said it was in such a state it would be much easier for him to make me a Siamese system from bits of car exhaust pipe than to tack together my remains. I jumped at this offer, for it would make the Deluxe Flyer look like a TT Rep. and with a racy exhaust and a degutted Howarth on the end, it would obviously be much faster. Well, he made me a passable copy of a normal branch and I went on my way rejoicing in a much louder, if deeper, exhaust note. But it didn't go faster nor, I am sure, quite as fast. More important, it has lost something subtle, a joyful willingness to build up speed from a fixed throttle position. A kind of 'I am enjoying this, let's go a bit faster' feel and a resonance in the exhaust not at this mid-range speed.

You chaps who only know the guttural drone of a Burgess on a long pipe don't know what you are missing. If you could borrow a vintage coffee pot system for a day I reckon you would be converted. And my loud noise system cost me about five miles to the gallon. Maybe that was because it had no joyful mid-range cruise and I tended to use more throttle to get more speed that I did not really need. Not with petrol rationed, anyway.

Softer Music

V19/3 April 1995

Dear Tom,

I found the piece 'Scott Music' by Titch Allen in the February edition of *Yowl* most interesting and it goes some way to confirm something which I have thought for some time, that the later fashion for two-stroke exhausts of a long pipe followed by some sort of barrel-type silencer, although perhaps arguably better looking, is far inferior in both silencing and efficient performance than the earlier 'coffee pot' and outlet pipe.

Over 30 years of owning various types of two-stroke motor cycles I have always had ones with the long pipe and following silencer type. I have had silencers which were fairly quiet, but which had to be 'degunged' every thousand miles or so if they were not to block completely, or the raucous type which didn't block, but which didn't silence either and which set your ears ringing after a day in the saddle. I would place the Burgess-equipped Scott in the latter category and I have experimented with various silencers on my Birmingham model over the years. I still remember Brian's reaction to the D14 BSA Bantam silencer fitted to my bike at Founder's Day a few years back. I agree that it looked ugly and I have since removed it, but it did make the bike much more pleasant to ride and it seemed smoother as well (psychological).

Some years ago I owned a couple of two-stroke Wartburg cars over a period of seven years. They were certainly not noisy and neither did they ever block their silencers. They seemed to achieve this by exhausting the hot gases direct into a large expansion box (coffee pot equivalent) which was lagged with insulation to keep the gases hot and therefore preventing burnt oil from being deposited. The expanded gases then passed to a baffle box before being finally exhausted to air. The expansion box not only took most of the force from the gases directly after the combustion point, but also provided the necessary back-pressure waves at the right point.

Nearly all modern two-stroke systems either use a form of expansion chamber exhaust or have the expansion box part of the silencer as a major part and coming as close to the cylinder outlet as possible (i.e. the MZ). However, the resulting exhaust system is not exactly elegant, even if efficient, and I would think that the Scott type of two-stage exhaust with coffee pot and rear silencer gives a good compromise between looks and efficiency. Several times I have looked at Scott coffee pot silencers of the twin-port type and wondered if one could be adapted to fit my Brum (sorry, Brian), but I doubt that there is clearance between the frame and front mudguard. Like Titch I much prefer the sound of coffee pot equipped Scotts, having ridden my bike with both standard Burgess and 'quiet' silencers. To me it is a far better bike when quiet.

Colin Atkinson, Brentwood, Essex.