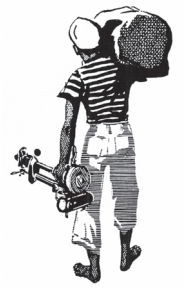
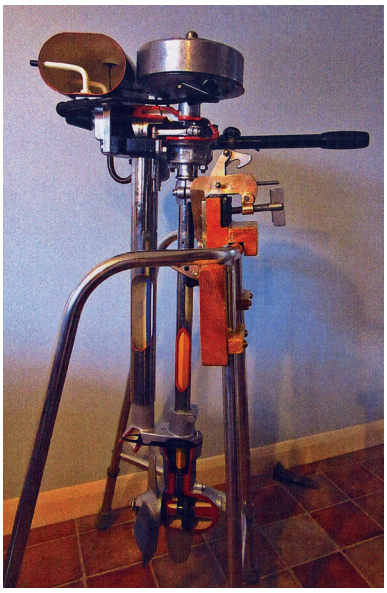
Sectioning a British Seagull Outboard Motor

by Andrew Dawson



This account will also appear in *Model Engineer* magazine



WHY SPOIL A PERFECTLY good engine by cutting it almost down the middle? That is a question I heard frequently during the 10 months or so that this project occupied much of my time. The answer is quite simple. We take some of our outboards to displays of vintage transport and also give talks on the subject of older motors. To try and explain the workings of a two-stroke engine is difficult, particularly to folk without an engineering background. It therefore made sense to sacrifice an outboard to make such explanations easier. The idea is not new. Many makes of motors often gave the works apprentices the task of sectioning an engine and I'm sure that you will all have seen sectioned engines in museums, often turning over slowly, powered by an electric motor.

The Seagull chosen for the work was a 1959 40+ model that I happened to know was used on a tender to a speedboat used by the Marlow Water Ski Club in Buckinghamshire. Oddly enough I found out from the vendor that some work had been completed on the engine by a friend who owned a chandlery and outboard business. He lived about 1½ miles from my house when I lived in Hazlemere (Bucks not Surrey).

The 40+ was probably the most popular engine that British Seagull produced and so it was felt that sacrificing one would be acceptable. This has not stopped a great friend who owns a number of these motors referring to me as a 'Seagull Vandal'! I believe that the ultimate benefit justified the 'vandalism' involved!

British Seagull was a company that prided themselves on customer care. Established in 1931 and called Marston Seagull they were manufactured in 'Sunbeamland', Wolverhampton. Prominently displayed on the fuel tanks of the original engines is 'Makers of the Sunbeam Motorcycle'. The motors were simple two-strokes made from first-class materials and designed for seagoing use. They became 'British Seagull' in the mid-1930s when they separated from Sunbeams. The design remained almost unchanged until the early 1980s. Truly a British maritime institution whose virtues were appreciated by owners throughout the world. The firm finally closed in 1996.

Much more on the company history can be obtained from websites, particularly **saving-old-seagulls**, a small but dynamic firm owned by John Williams in Essex.

I am very fortunate to have a friend and mentor who is an experienced model engineer and has been involved with the project since its inception – many thanks Paul for your help and advice.

As an aside, this particular friend is a retired vicar who has a great love of steam. In our model engineering club there is yet another retired vicar with similar interests. Over the years I have met and heard about a number of clergymen with a similar passion for steam engines. Is there an underlying reason for this dual calling I wonder?

I bet I'm the only person you know who has a certificate informing the world that I have completed my engineering apprenticeship and passed with honours from the University of Sheringham! Presented to me at a model engineers monthly meeting by Paul. My test pieces were to construct from scratch 2 pairs of working buffers for a 5ins gauge locomotive.

British Seagull themselves had a sectioned 40+ on their stand at the London Boat Show in the early 1970s and excellent photographs of this engine can be viewed by looking on the **saving-old-seagulls** website. When I first saw the original sectioned engine at the Show I thought to myself that one day I would like one of those. That day arrived finally in December 2015 when our project was complete.

The motor has had one evening's display at the North Norfolk Model Engineering Club's January meeting and reaction was very favourable. Friends in the NNMEC are extremely good engineers and their praise meant a lot to one who only started precision model engineering about 5 years ago.

The first task was to take the motor apart, but I did not complete this all at the same time. The Seagull service sheets available

Flywheel / magneto, with centre nut

from Sheridan Marine are a must for this work. If you can also obtain a copy of the Clymer Publications *British Seagull Service Repair Handbook* so much the better. Even carefully putting all the stripped parts in a box would no doubt lead to confusion, so I completed the job a piece at time.

Seagulls are, unlike most modern engines, made to be taken apart easily though some of the screws and bolts did require the application of heat to start them on their way. I cleaned the whole motor thoroughly with paraffin prior to any work and then started on the engine itself.

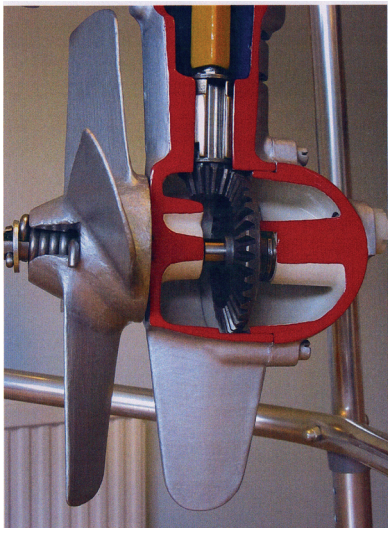
Removal of the power unit from the rest of the outboard is extremely easy. The 2 nuts that attach the powerhead to the drive tube were slackened then refitted loosely. Removal of the screw on at the top of the silencer allowed this unit to be slid downwards and the union connection to the water cooling pipe released. Next the flywheel/magneto was removed from the engine in the correct manner. Never, never use a 'puller' on a Seagull flywheel – it will break the casting. The way to do it is to place the piston at bottom dead centre and after removing the starter pulley and cover plate replace the centre nut. Then, with a friend holding the outer rim of the flywheel, strike the nut a number of smart blows with a 4lb lump hammer. Easing the flywheel on the shaft with WD 40 or similar liquid and leaving it to soak prior to this operation is also a good idea.

Once the flywheel is loose, remove the centre nut and then the flywheel itself. The Woodruff key that stops the flywheel rotating on the centre shaft should remain in place and there is no need to remove it. If it does fall out watch where it goes – it is quite small.

I decided to not cut the flywheel/magneto perimeter itself but to show the magneto workings by taking a section out of the cover plate *(left)*. The main reason for this was to allow me to motorise the engine at some future date utilising a drive to the flywheel itself.

Separating the gear box from the drive tube was not easy. There is a central bolt with a slotted screw head located between the drive tube and the silencer which is difficult to access and often stuck. Again I used moderate amounts of heat to start with and having freed the drive tube from its lower casing managed to remove the offending bolt. I had the motor mounted on its transom bracket securely clamped an outboard motor stand to remove the drive tube from the gearbox casing.

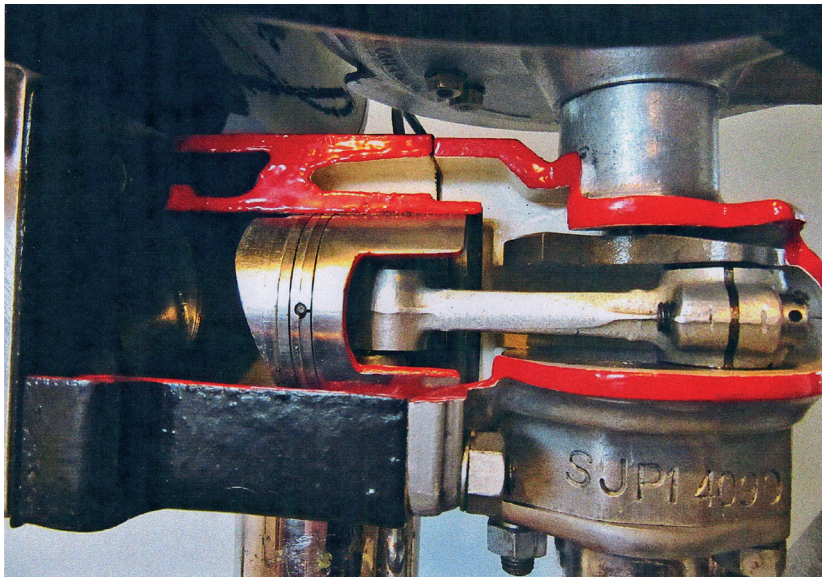
Crankcase sectioning was achieved by chain drilling and careful use of a file. Removing the cylinder head is essential for sectioning and in my case this was secured by 4 large slotted machine screws. Later models

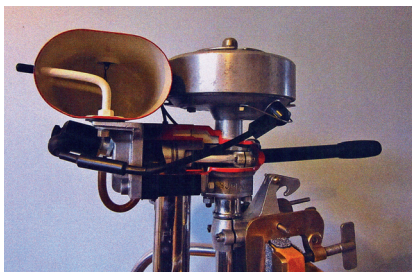

Propeller and gearbox

have hexagonal-headed machine screws. What I thought was going to be difficult was in fact easy largely due to a substantial jig made to hold the cylinder and a turnscrew bit in my brace. Again moderate heat was necessary and penetrating oil applied around the screw heads. It says on the head 'Don't Remove' but you have to ignore this instruction as removal is essential for sectioning the cylinder. The reason that it states this is that the machine screws holding the head pass through the cooling water passageways and often corrode. I guess mine were greased before fitting and that made them relatively easy to remove.

I thought that cutting the cast iron cylinder block was going to be

Flywheel top right, registration number, sectioned cylinder & piston





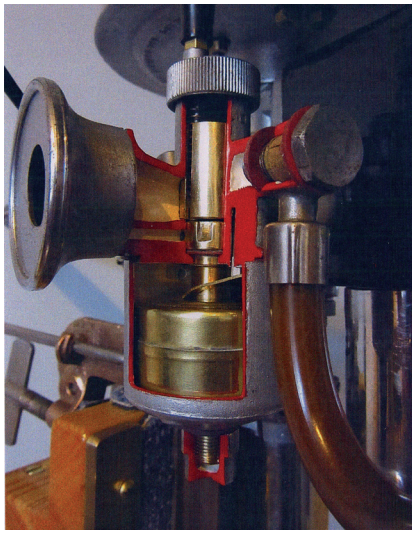
Sectioned tank

difficult – it wasn't. A hacksaw was the only tool necessary to achieve two successful cuts, a fine file being used to tidy up the saw marks.

The gearbox needs special mention, not least because the vertical bush that is within its 'innards' is difficult to remove. The service sheets recommend driving it out with a drift and hammer but my method was to first heat the casing several times, apply penetrating oil then use a large valve spring compressor with various sizes of wooden drifts to gently ease the bush from the surrounding casing. I applied pressure via the compressor screw then tapped the steel bracket of the compressor itself. It went 'ping' at once and I knew I was getting somewhere.

More penetrating oil and successively longer wooden drifts completed the job though it did take two hours start to finish! Cutting the gearbox casing was achieved using a Dremel power tool and numerous cutting discs. The thicker sections of the castings required a hacksaw but the Dremel was a wonderful tool for this work.

The fuel tank caused me much thought. The one that was with the motor was in very good condition with only minor dents. I was reluctant to cut this open so substituted one from another 40+ that had a badly damaged starboard side. I also decided to cut the tank in a different place to that shown on the **saving-old-seagulls** website. It seemed to me that it would be better to have two of the tank supports left on the sectioned tank rather than one. It would make the tank much more rigid and assist carrying the motor in the boot of the car. The tank was again cut using the Dremel with cutting discs.



Carburettor

Taking a large piece of metal from both the silencer and drive tube was very time consuming. I used a modelmakers milling machine but found that in the silencer's case I could only take 1-thousandth of an inch each pass. The silencer tube is only about 1/16th-inch chrome plated brass and if I tried to increase the cut the surrounding metal had a tendency to tear. The drive tube has walls of approximately 1/8 inch and this proved a challenge for the mill. Again progress was made 1 thou at a time. Both tubes were finished at the curved ends of the cut section with a file. A substantial jig was made for both of these tasks and sacrificial tightly-fitting wooden plug was turned on a friend's woodworking lathe to line the inner face whilst milling took place. Each tube took 8 hours to complete.

The carburettor was sectioned by another friend who builds clocks from scratch and is a very skilled engineer. Gordon wanted an interesting precision job to complete and I am very grateful for the splendid result. Thank you.

The propeller was badly nicked at the tip of two of its blades and the type of repair I completed may well be of interest to anyone who is faced with a similar problem. I drilled a 1.5 mm hole in the centre of each broken area from the outside edge of the blade in the direction of the propeller hub. The hole was about 8mm in depth. A steady hand is needed for this part of the job! Into this hole I inserted a very small stainless steel split pin with the loop of the pin in line with the blades. The pin was secured in the hole with Araldite. When this had cured I moulded a small ball of *Quiksteel* onto the split pin head and surrounding damaged blade. This dried quickly and I was able to shape the material to the profile of the sound section of each blade with a fine file and emery cloth. *Quiksteel* is a super product found in car accessory shops and is extremely easy to use. I am certainly not saying that this product would stand the revs of a competition outboard but for a slow running Seagull propeller it is worth a try, providing that the damage is not too extensive. When painted you cannot see the repairs I have made to the propeller.

Paintwork on a sectioned motor is of vital importance to show the different parts of the outboard. Cream is the accepted colour for revealed surfaces and red for surfaces that have been cut. I saw no reason to deviate from this convention. The water cooling system, pipework, channels and impeller (oddly enough this last item is made of alloy on this motor not hard plastic as is usual), are painted blue – predictably! I decided to paint the drive shaft yellow to contrast it to all the other colours used.

Twenty-three separate jigs were made from timber to hold the awkward shaped pieces of metal and I am now left with the dilemma of what to do with them now that the project is finished. I don't think I shall tackle sectioning another Seagull but it does seem a shame to consign them to the fire! For the moment they are in a box in the loft.

I'm sure that most folk will have spotted that the stand used for supporting the outboard is made from a re-cycled Zimmer frame! I saw the idea in a boating magazine some time ago. It seems quite stable. I paid a nominal sum for it which went towards a hospital charity.

I have enjoyed the work and it has given me much to think about during the time it has taken to complete the job. I hope that you find this report of some interest and maybe it will inspire you to have a go at sectioning a motor yourself.

Andrew B Dawson and Ann Hook