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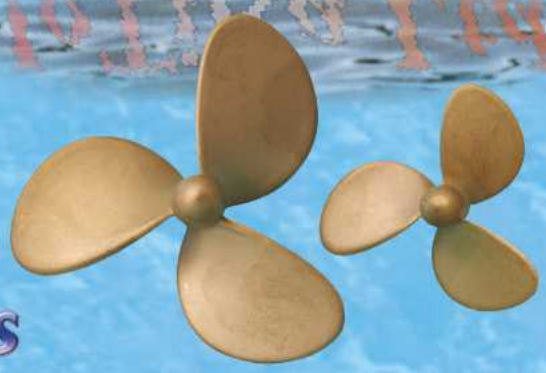

SCALE PROPELLERS

Raboesch Fabricated Props are available in multiple sizes, blade configurations & styles including typical blades authentically shaped for pre 1940's ships; typical blades authentically shaped for post 1940's ships; large surface area props for high propulsion at low revs; 'skewed' blades designed for faster ships where low vibration is a requirement; capped blades specifically for use in kort nozzles and thrusters.

Such a wide range of designs ensures that Raboesch have a prop to suit virtually all applications including, small steam boats, auxiliary engine sail boats, cargo ships, port tugboats, pleasure yachts, motor sailors, fishing boats, steam ships, work ships, tender boats, frigates, patrol boats, cruise ships, container ships, luxury yachts, police boats, pilot boats, torpedo boats, ferries, aircraft carriers and submarines.

Caldercraft Brass Props were designed using the latest CAD surface modelling software. After exhaustive computer modelling of a wide range of designs three test designs were decided upon. These designs were then produced and 'real world' tested on a range of model boats to precisely determine which gave the best performance, for both forward and reverse propulsion. Metal dies were then cut to produce the wax models used in the investment casting process. Investment casting faithfully reproduces the cavity in the metal mould resulting in a final product so accurate that balancing of the propeller is not required for most scale boat applications. The alloy used has also been carefully considered resulting in a rich brass colour with the strength of mild steel. Caldercraft brass propellers are currently available in left and right hand, 3 blade from 30mm to 75mm, 5mm increments, M4 threaded.

PROPELLER SHAFTS

Raboesch Prop Shafts are all made from stainless steel. These high quality shafts have a large range of applications, from simple ABS electric boats through to fast electric and glow engines.

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Model shown photographed complete with the optional Sea Commander fitting set.

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Vol.64 Issue 765: August 2014

contents

Published by **MyTimeMedia Ltd**
Enterprise House, Enterprise Way,
Edenbridge, Kent, TN8 6HF
Phone: 0844 412 2262
From outside UK: +44 (0) 1689 869 840
www.modelboats.co.uk

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Model Boats, ISSN 0140-2910, is published monthly with an additional issue in January by MYTIMEMEDIA Ltd, Enterprise House, Enterprise Way, Edenbridge, Kent, TN8 6HF, UK. The US annual subscription price is approximately 53.40GBP (equivalent to approximately 89USD). Airfreight and mailing in the USA by agent named Air Business Ltd, c/o Worldnet Shipping Inc., 156-15, 146th Avenue, 2nd Floor, Jamaica, NY 11434, USA. Periodicals postage paid at Jamaica NY 11431. US Postmaster: Send address changes to Model Boats, Worldnet Shipping Inc., 156-15, 146th Avenue, 2nd Floor, Jamaica, NY 11434, USA. Subscription records are maintained at CDS GLOBAL Ltd, Tower House, Sovereign Park, Market Harborough, Leicester, LE16 9EF. Air Business Ltd is acting as our mailing agent.

Regular Features

Special Features

Bow piece

This issue includes a Full-Size Complimentary Free Plan worth £12.50 for Ixplorer, a research and survey vessel. The plan has been drawn by James Pottinger and it is an unusual and interesting model project. In addition, Brian Roberts builds the Models by Design 1:24 scale semi-kit of Wildcat 53, a windfarm support vessel. Semi-kits are a popular form of model boat building nowadays, as usually all the basic parts to build the model are included, but the modeller is left to fit it out as desired and add extra detail. This 1:24 scale model is an ideal size, easily portable and Brian has installed brushless motors that are ideal for this catamaran hull and give a scintillating performance.

We also welcome back to these pages Dave Milbourn with this article 'To BEC or not to BEC', in which he describes the options for powering radio control equipment and exactly what the terminology means and how best to maximise its benefits.

Model Boats, in the form of Robin Buckland, was fortunate to be invited to the opening day of a new display of the model tugs that were first seen in children's programmes on television, 25 years ago. At that time Model Boats was the only magazine to run a feature on them and how they worked, so this is a nice follow-up.

In Readers' Models, Barry Martin and Alex Smart describe their unique models. Alex is 83, living in Australia, and building model boats is a great relaxation for him. We do of course also have all the usual regular articles as well, so I hope there is something here for everyone in these pages.

Paul Freshney - *Editor*

Compass 360

Model Boats *notice board for your news*

Editorial Contact - **Paul Freshney**

You can reach the Editor, Paul Freshney, on 01277 849927. The editorial postal address is: Model Boats, PO Box 9890, Brentwood, CM14 9EF.

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Editor's Note

Readers may not be aware that magazines like this are not put together the week before they appear on the newsagent's shelves or arrive through your post box. Design and final layout of the magazine commences six weeks before the On Sale date and the magazine goes to the printers four weeks after the start of this process. This issue commenced design on Friday 30th May and went to the printers on Friday 27th June for its On Sale date of 11th July. The feature articles have of course been prepared for the magazine before then, but there is much checking and rechecking throughout the design period and even then mistakes still occur, but one can only do one's best! For this August issue, Colin Bishop has progressed it through the checking stage whilst I was on holiday for two weeks in June and I therefore gratefully extend my thanks to him for all his input together with Richard Dyer, our dedicated magazine designer. Colin has also dealt with all the incoming emails to myself (132 of them!) as far as practically possible, so a big 'Thank You' to him for that as well.

Kirklees Model Boat Club

On **7th September 2014** this club is holding a Navy/Warship Day at Wilton Park, Bradford Road, Birstall, Batley WF17 8JH, 0900hrs to 1530hrs. The day's theme is warships and military, but you are more than welcome to attend with other types of models. No i.c. or high performance fast electric boats please. Free parking, refreshments, raffle, lots of models on display, both static and sailing. Free sail all day. Please contact Stan Reffin, tel: 01132 675790 for further information.

Model Boat Convention 2014

A reminder that this is being held on **23rd/24th August** in the Haydock Park Race Course Exhibition Centre. This is a major event in the North West of the UK, organised by modellers for modellers, with substantial trade support and numerous club and individual displays. There are also outdoor pools, free parking and economically priced refreshments and the theme is Naval Vessels & Submersibles. Haydock Park is located just one mile from Junction 23 of the M6 and is well signposted. Cars and coach parties should enter the course from the A49. Please check the website for more information: www.modelboatconvention.co.uk

Paddleducks Day 2014

This has new home and is being held on **31st August** at Knightswood MBC, Glasgow, G13 3LS. For further details, please contact David Hume, email: 2014davidh@tesco.net.

Toys for Boys!

This is being held at Old Christ Church, Waterloo, Merseyside, on **Saturday 30th & Sunday 31st August 2014**. Lots of Model Boats and all sorts of displays of Toys for Boys Meccano, model trains, cars, trucks planes etc., etc. The Hoylake, Crosby, OWL's & Liverpool model boat clubs are attending. For more info, please contact John West on 01519 246143.

Waders?

These are something that many of us need when our sailing waters have sloping banks or when we are putting out buoys on the shallower ponds. Sport Fish of Haywards Farm, Theale, Reading, RG7 4AS have a product range that readers might like to consider either for themselves or as a single club purchase. Website: www.sportfish.co.uk

Peter Rippin

At the National Model Boat Show in Coalville earlier this year, Peter, who is a member of the Hull Model Boat Group, became ill on the Sunday and was taken to hospital. His daughter Sue is very grateful for the kindness and assistance given to him by the model boating fraternity at the event and all the additional offers of support when he was in hospital and then being discharged one week later. Pleasingly, Peter is now so very much better and this note is Sue's appreciation to all who helped him on the day.

(A report on this show will be in September MB - Editor)

The entire fleet of 19 Marblehead r/c yachts sailed together for all the races. The huge range of 27 and 40MHz frequencies plus the virtually unlimited 2.4GHz band, enable fleet racing that was unthinkable just a couple of decades ago.

MYA News

Marblehead Ranking event for the Acorn Trophy and GAMES 5 Series

mya-uk.org.uk

Held on the 27th April in the Metropolitan and Southern District of the MYA, an excellent entry of 22 competitors for this Marblehead event from 15 clubs sailed 13 races in light and variable winds on the Guildford MYC Abbey Meads facility. Three guys did not show up, so racing was in a single fleet of 19 boats. The Club Commodore, Hugh McAdoo, welcomed competitors from all over the country and before the initial briefing, announced that the 'Best Improver' at GAMES 4 was Alf Reynolds,

It was good to see several new faces on the r/c Marblehead scene and Jess Collier did well first time out with the SKALPEL that he had recently purchased from John Cleave. John Tushingham is another good skipper who had not been to Abbey Meads before and was sailing the DREADNOUGHT that Tony Guerrier raced last season. Pete Ferguson, who travelled up from Dorset was unable to sail more than three races as his sail winch packed up in his PARADOX. Dave Potter made a welcome appearance with a most unusual boat, which had a 'canard' rudder at the bow. His CREAM CRACKER is a Creed design, resurrected by Dave, and it will be interesting to watch this idea through the whole range of wind strengths.

The racing

Hugh, as PRO, set a simple windward/leeward course with a leeward gate and windward mark spreader. However to keep the course beyond the changing wind shadow line and make the starting line and gate as fair as possible, he re-laid it three times as the easterly wind, initially parallel to the southern control area, became more 'over the right shoulder'. The long starting line gave boats plenty of room to avoid collisions, but such was the eagerness of the starters that there were many general recalls, which only added to the excitement of the racing! There were a few collisions, but all were resolved on the water and there were no formal protests.

Peter Stollery who was trying a new Creed keel on his CRAZY TUBE FREE for the first time, set down the challenge to the fleet by winning the first 3 races. Race 4 was won by John Tushingham ahead of Graham Bartholomew sailing a ROK and Roger Stollery sailing CRAZY TUBE FREE. Tony Guerrier, who had a technical problem with his QUARK in the previous race, came back to win Race 5. There was then a battle of world champions in Race 6, which Rob Walsh sailing CRAZY TUBE TOO led for most of the race until overtaken by Peter at the end.

In the next race there was another tight battle in which Roger Stollery beat his son into second place. Peter came back to win Race 8 and then alternate races until winning the last two. John Tushingham won Race 9 from Roger and Peter and Tony Guerrier, who had sailed very consistently throughout the event, won Race 11 from last year's Acorn winner, Roy Stevens.

International One Metre World Champion Rob Walsh borrowed a 2002 CRAZY TUBE TOO, but was only able to sail two races in which he was second and fourth, so the results did not reflect his performance or true capability.

*Information supplied by **Roger Stollery** and all photos are by **Peter Dunne***

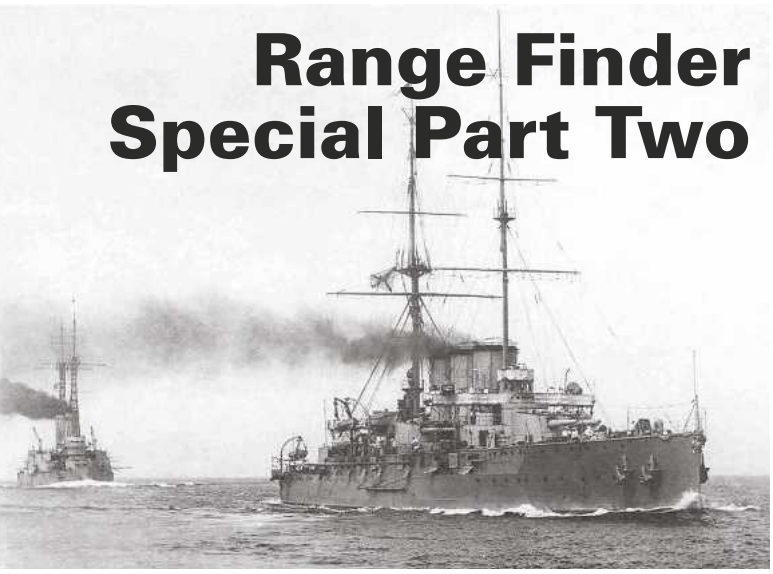
Results (first 10 only)

1st Peter Stollery (Guildford)
2nd Roger Stollery(Guildford)
3rd Tony Guerrier (Three Rivers)
4th Jess Collier (Eastbourne)
5th John Tushingham (Keighley)
6th Roy Stevens (Tri-Services)
7th Alf Reynolds (Chelmsford)
8th John Shorrock (Guildford)
9th Graham Bartholomew (Chelmsford)
10th Peter Crisp (Swanley)

ABOVE: Hugh McAdoo (left) presenting the Acorn Trophy to Peter Stollery. ABOVE RIGHT: Last (and 19th) was Peter Ferguson of the Woodspring MYC. Guildford MYC always give a 'Last Place' prize, because without these guys, there would never be any winners!

Model Boats Next issue

The Model Boats September 2014 issue is on sale on the 8th August 2014



Range Finder Special Part Two

This issue is 100 pages and includes Part Two of a Range Finder Special on the Warships of World War One, a Flotsam and Jetsam Special on early Australian Submarines and Part One of a major Plan Feature for a FAB-U-LOUS model of the Botnia Marin Targa 37 as used by the Metropolitan Police!

See more about what's in ***Model Boats*** magazine month-to-month in forthcoming issues and see some of the articles you may have missed from past issues and subscription offers on our website: **www.modelboats.co.uk**

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Don't forget! The September 2014 issue will be published on **8th August 2014** price £4.50 – don't miss it! Order your copy now! Or better still why not make it your first copy in a year's subscription to ***Model Boats*** magazine? See our subscription offer on **Page 55** in this issue…

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Brian Roberts *builds the Models by Design semi-kit of a Windfarm Support Vessel*

Wildcat 53

"...I've built a variety of model boats from kits, including yachts, lifeboats, tugs and speedboats, so I thought it was about time to try something a little different."

Over the past few years I've built a variety of model boats from kits, including yachts, lifeboats, tugs and speedboats, so I thought it was about time to try something a little different. After a lot of searching on the Internet I came across an offering by Models By Design which is a powered catamaran type of vessel for transporting technicians to and from Windfarms. Not surprisingly, the boat in question is called a Windfarm Support Vessel and there is a choice of kit in either 1:24 or 1:12 scale.

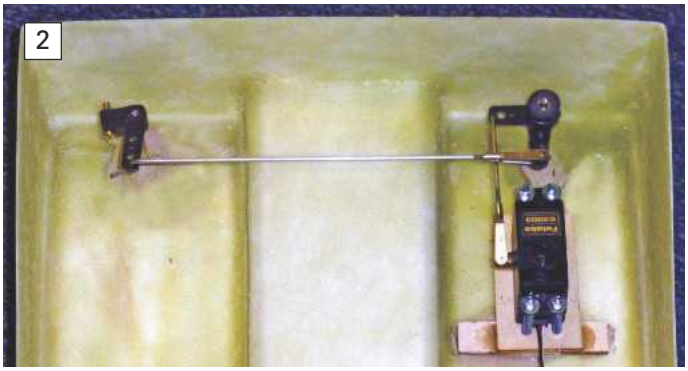
I opted for the 1:24 scale version for two reasons; firstly, my garage/boatyard is getting a little overcrowded with its building space rapidly diminishing, and secondly, I get a lot of ribbing at the Gresford Sailing Club because I tend to build large boats which could be hernia inducing!

I duly ordered the kit from Andy Griggs at Models by Design (MBD) and was a little surprised when I was told that it would be about a month before I'd get it. The explanation being that the fibreglass hulls and decks were only made to order. Fair enough, MBD have a lot of different hulls and kits in their catalogue, and so it would be impracticable for them to stock all of them at any one time. I suspect they're a fairly small company so it's sensible to adopt this line of thinking.

True to their word though, it all arrived a month later securely packed in a stout cardboard box, but on opening it I discovered to my dismay that there were no instructions or plans. I rang MBD and queried this with Andy who assured me that if I experienced any difficulties with construction, a 'phone call or email to him would quickly resolve any queries. With hindsight I realised that for the modest price of £205, it's really good value for money and for a similar type of full kit with plans and instructions, the price would be considerably more. So, this is best described as a semi-kit, but in practice someone who knows their way around a model boat should not have too much difficulty.

What's in the box?

Photo 1 is of what you get for your £205. There are five items which are made of GRP (glass reinforced plastic), namely the hull, deck, a section which fits on top of the hull to support the deck otherwise


2


3

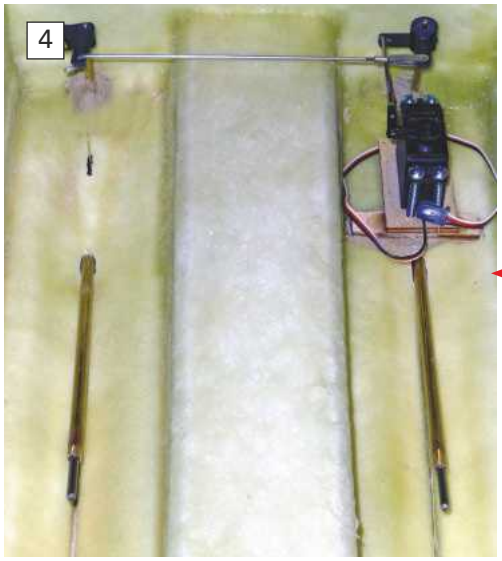
known as the ring deck, the wheelhouse and a small rectangular box like section which I couldn't find a home for at the time, but more about that later. Also: Window frames in grey plastic; a sheet of clear plastic to glaze them and two door frames; brass wire for the stanchions, rails, ladders and mast supports, and numerous resin fittings. The full-size craft has a thick rubber section fixed to its flat bow to avoid damage when docking on a wind turbine, so a thick piece of foam plastic is included in the kit for this purpose that will have to be shaped later. It occurred to me that this arrangement of having a flat bow would be useful to push any models in distress back to the shore, so I can sense the model and its owner becoming popular at any pond! Two propshafts with brass skegs, rubber fendering, decals, plastic items to support the mast and a CD showing a number of photographs of equipment and detail on the full size boat complete the contents. There are no pictures showing the model and full-size craft overall, but there are ample pictures on the Safehaven Marine (builders of the vessel) website showing it from nearly all angles.

Making a start

All the GRP mouldings are of a high standard with practically no blemishes or raised sections to remove, so they were all lightly rubbed down with fine grade emery paper and washed in warm soapy water ready for the first coat of primer. Before any paint was applied and the deck installed, I decided to fit the rudders, propshafts, motors, esc's and radio while I had access to all areas of the hull interior. I should mention that MBD provided me with two motor mounts cast in resin, free of charge, for which I was very grateful.

Rudders

The rudders supplied in the kit are made from cast resin moulded around the rudder posts and since they are custom made they are exactly the right length. The brass tubes that house the rudder posts were about 5mm too long for my requirements so they were shortened. Two holes to take these tubes were drilled in the hull bottom about 12mm from the transom of each sponson and after checking that they were both perfectly upright, epoxied into position. The rudder servo is a Futaba S3003 screwed to a base of 3mm plywood, firmly embedded into a generous amount of Isopon P37 filler. A somewhat 'Heath Robinson' arrangement was then fabricated to link the two rudder posts together after modifying three rudder arms. The important thing to remember, is to make sure that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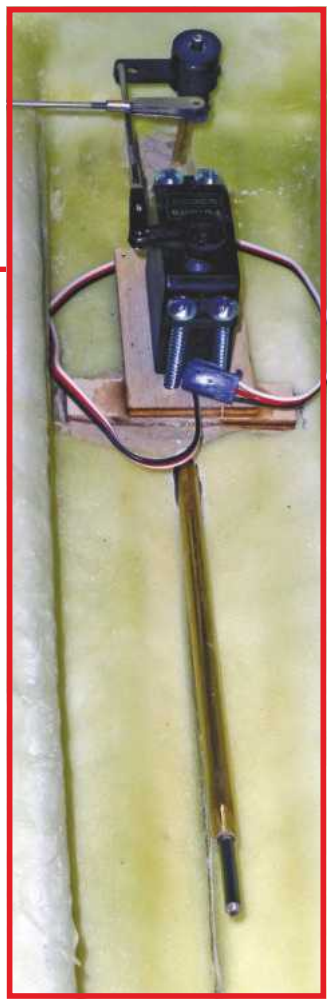

the main coupling arm just clears the top of the hull's central tunnel, **Photo 2**. The reason being that the deck sits just a few millimetres over the top of that tunnel and obviously a reasonable clearance is needed for free movement.

Propshaft fitting

With the aid of a drill and a rat tail file, suitable openings were made in the hull to accommodate the stuffing tubes, which were loosely fitted into position and secured with masking tape, followed by the propshafts themselves and the propellers, **Photo 3**. Each propeller was positioned 12mm from the leading edge of its matching rudder; the propshafts complete were then double-checked for alignment and firmly epoxied into position, **Photo 4**, so now everything was all set for the twin motor installation. This probably seems like a 'back to front' way of doing things, but it was important to get the propellers at the right angle and the correct distance from the rudders, and had the motors been installed first, then there would have been a lot more trial and error to get it all just right.

Brushless motor installation

I should mention that I intended to use my trusty Futaba T6EX transmitter with its appropriate receiver. The brushless motors recommended by MBD are two KV1400 rated types, supported by two Hawk BL 40 amp electronic speed controllers (esc's). I got the motors from Giant Shark, but you can use alternative speed controllers or motors - the choice is yours.


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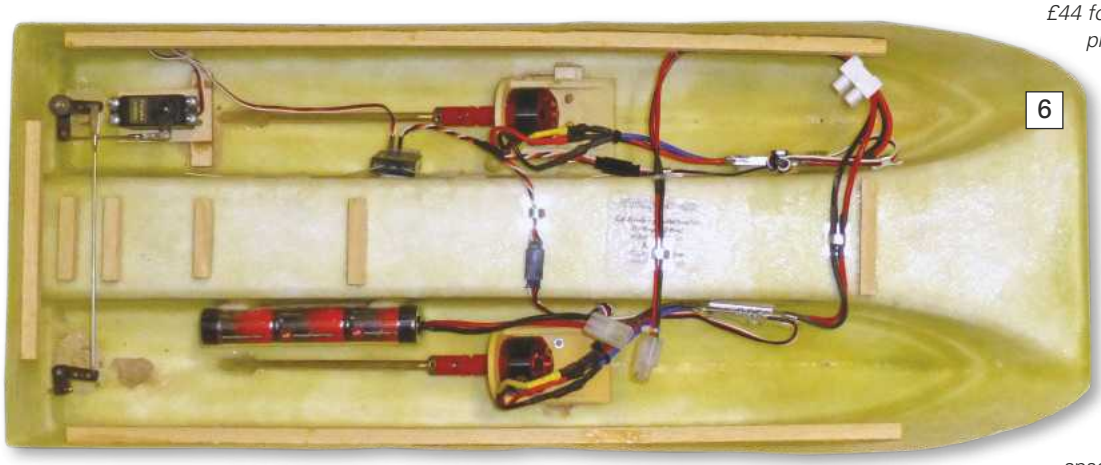
P38 once again, **Photo 5**. The esc's followed next, each one secured by Velcro tape to the inside of a hull sponson and then connected with a Y-lead to the receiver, **Photo 6** giving you a good idea of the internal layout. The brushless motors are of course very powerful for their size and weight. It was decided to power the two motors and receiver with a single 7.2v NiMH battery which you can see in this last picture and the esc's were programmed with the assistance of a Hawk Programmer which makes the task so much easier. The motors ran very smoothly and there was no sign of any heat in the esc's, even though they aren't watercooled *(I only use the Hawk controllers which are around £44 for the 40 Amp version and have proved 100% reliable - Editor).*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The next task was to test the boat in the indoor test facility (aka the bath) and good news! There were no leaks and there appeared to be adequate torque with the recommended brass three bladed 25mm (1 inch) prop's, which at first sight appeared to be very much undersized for the job. More about these later!

Deck fitting


7

Already fitted were 10mm spacers of hardwood over the hull tunnel and similar sized strips along each outer side of the sponsons to support the deck and it's essential to have these in place, particularly at the stern, to give at least 10mm clearance along the whole length of the hull (please see Photo 6 again).

The deck, which was a snug fit, was glued in position using thick gap-filling superglue, **Photo 7**. As you can see, access is limited, but the motors can be extracted and the running gear and radio all accessed for maintenance. Where the deck meets the hull, there were a few small gaps, but these were soon remedied using some filler, applied with a finger to provide a neat finish, al completed with a light sanding, **Photo 8**. So far, so good!

The motors proved easy to install; first they were supported in their correct position with the aid of some scrap plywood and the mounts were then finally bedded-in with, yes, a generous amount of


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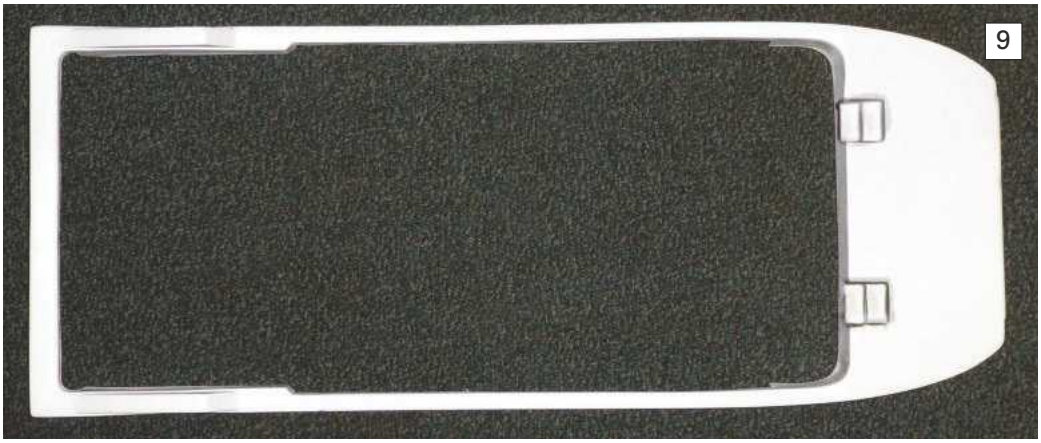


Next up was fitting the ring deck, which is moulded in GRP and is very solid, **Photo 9**. It is a little tricky getting this part into place, as when one side was pressed down, the other side popped up, but with a little perseverance and the help of masking tape it was finally secured in place and sealed with thick superglue, **Photo 10**. There are two panels which will fit onto the rear part of the deck giving access to the rudder linkages and servo if necessary and these were later secured in place with silicone (of the type used to seal the edges of baths). This will ensure a watertight seal and if the panels need to be removed for service purposes, this can be done fairly easily with no damage.

The hull was then turned over and it was noted that there were a few small gaps, **Photo 11**, between the ring deck and the hull's sides, but these were eliminated with P38 filler, followed by smoothing, **Photo 12**. The hull was now ready for painting, the plan being to use Halford's aerosol spray cans, but as the weather was cold and damp (early 2014) and things were no better in the garage and workshop, it was decided to delay this until things warmed up. So, back to model making!

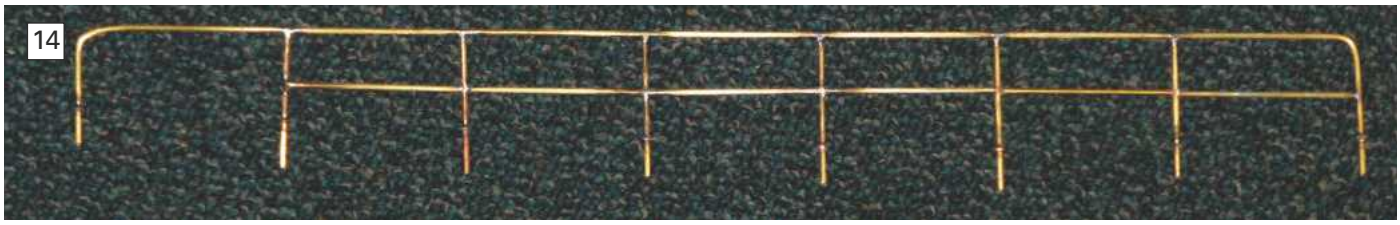
Handrails

This was going to be something of a nightmare to work out in the absence of any instructions or plans. I searched the Safehaven website for pictures of the rails and I found some decent images of the side ones and those on the transom which it was possible to work from. However it was a different story with the bow rails because they are in two sections and from whatever angle the photos are viewed, they are quite difficult to separate individually. Further searching revealed some reasonable images which I decided to try and copy after building the side and transom rails. To my further consternation I realised that all the rails were 'stanchion free' and so the bars had to be butt-jointed to the uprights and fixed with soft solder.

I was extremely careful with cutting the brass wire and there was enough to complete the rails and stanchions, but had to 'guesstimate' their height in the absence of any specific guidance. They are quite varied in size and shape and I'll endeavour to describe the method used by illustrating just one section, i.e. the long rail which runs along each side of the boat.

Work commenced by marking the position of each upright on the hull in pencil, drilling the necessary holes to take the uprights (no stanchions remember!) and then measuring the length of the top rail, cutting it to length, bending at each end, passing a small brass washer over each, inserting in the deck to the required height and then soldering the washer flush with the deck. A fairly hot iron was used so that the solder melted quickly, preventing

> *...a nightmare to work out in the absence of any instructions or plans.*

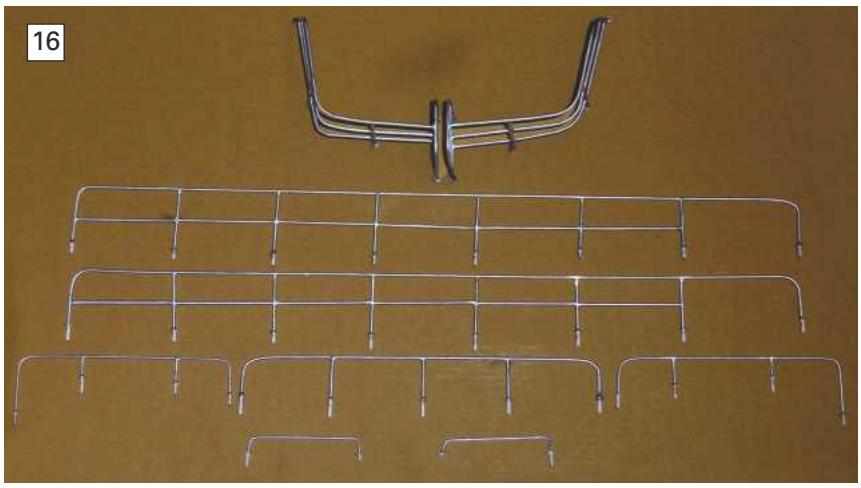


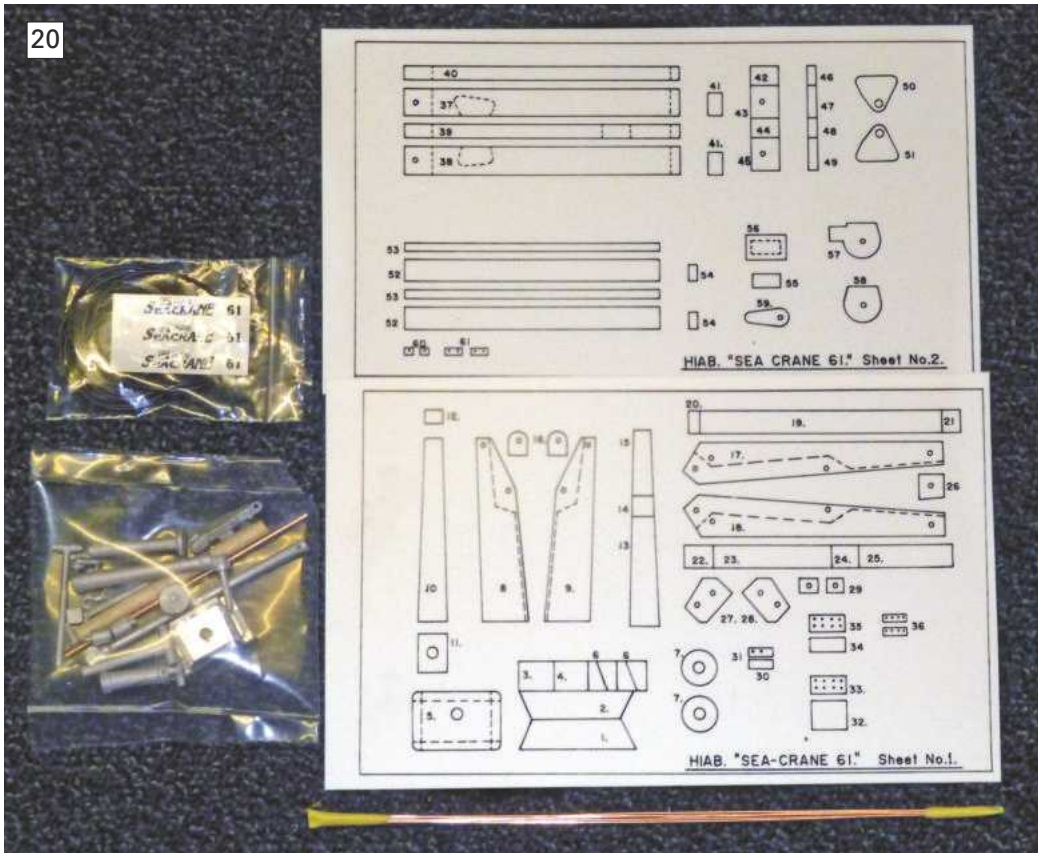
any burning of the deck. Each upright was then cut to size and soldered to the top rail after soldering a brass washer to the base of each one, **Photo 13**. The rail was then removed from the hull, cleaned and set aside ready for painting, **Photo 14**. The rails were all constructed in-situ as this method pretty well guarantees that they are a perfect fit when re-introduced to the deck after painting. The rest of the 'easy' rails were completed in this same manner, and after a little trial and error, the bow rails were made and I think they look reasonable, **Photo 15**. They were all then thoroughly cleaned, primed and finished with two coats of Humbrol metallic paint, **Photo 16**.

Wheelhouse

The wheelhouse is a GRP moulding and just like the hull was blemish free and only required a light sanding with emery paper to create a key for the primer. The position of most of the windows is already marked on the moulding, and the remainder were identified by studying the pictures on the Safehaven website. The openings were chain drilled, **Photo 17**, the unwanted areas being removed and the apertures finished-off neatly with a small file, **Photo 18**.

I'd now reached the point where a home needed to be found for the small rectangular piece of GRP that was mentioned earlier. Another call to MBD revealed that this item, after trimming, formed a canopy at the rear of the wheelhouse, which after a bit of work, was resolved and it was epoxied in position, **Photo 19**.





I was tempted to build the crane in its extended position...

HIAB Crane

The HIAB crane you see here is not included in the kit, but is fixed to the aft deck on the full size boat, so where to obtain one? After trawling the web, I found that Model Slipway had a 1:24 version priced at £15, so one was duly ordered and it arrived the following day. Excellent service, a quality kit, very comprehensive, well detailed and good value for money, **Photo 20**. What more can you say? I was tempted to build the crane in its extended position which would have looked very impressive, but on the stern of a fast moving vessel it would have looked decidedly odd! So I opted for the closed version which looked much more suitable and fit for purpose, **Photo 21**. It was decided to fix it in position at a later date because the hull would have to be inverted for painting.

Wheelhouse painting and windows

It was still cold and damp outside, which is where I do the paint spraying, so I decided to brush paint the model with enamel paints, rather than wait for the weather to warm up sufficiently to use the Halford's aerosol spray paints.

The wheelhouse was lightly sanded with wet and dry emery paper, washed, dried and three coats of Humbrol gloss white applied. Between each coat of paint, the surface was cleaned with preparation wipes to remove any dust or small particles of debris. When the paint had hardened after a couple of days, the window frames, **Photo 22**, were fitted and I decided not to paint them as they look perfectly good to me as they are in a gloss light grey colour anyway. The glazing consisted of cutting to the correct size the sections from the sheet of clear plastic supplied, and then fixing them to the interior of the wheelhouse with Formula 560 canopy glue, which dries clear and doesn't create a fogging effect as can occur with superglue. There were a host of items to be secured to the roof of the


23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wheelhouse consisting of a working radar scanner, mast, vents and navigation lights etc. These items would require a careful study of the full-size boats on the Safehaven website, so I decided to leave them until the latter part of this project.

Painting the hull

The wheelhouse (and deck) had been painted with white enamel gloss which proved to be pretty straightforward. However it wasn't quite so easy with the hull, mainly because four different colours were involved; dark blue, red, white and tan. Good masking tape was essential at this stage and Tamiya is the best in my humble opinion. As before, three coats each of the relevant Humbrol gloss paint were applied by brush and the final result was not too bad at all and the pictures give you a good idea of how it all turned out.

Ladders and mast

There are two short ladders which were made using brass wire and soft solder. All the brass wire supplied had already been used on the handrails, but the 'bits box' as always, turned up trumps with some more rod. One ladder is attached to the side of the wheelhouse, **Photo 23**, which provides access to the roof and the other is aft on the hull on the starboard side, **Photo 24**.

Photos of the mast on the full-size boat showed lots of detail, far too much to try to build into a 1:24 scale model, so I decided to keep it fairly simple, but show all the key features. It was made up from a brass tube for the main vertical section and brass wire of varying thicknesses for the arms and aerials. Various painted resin moulded parts were also attached including the navigation lights etc., **Photo 25**. I didn't use the plastic parts supplied by MBD as I prefer to solder masts from brass for added strength.

Decals and fendering

Application of the supplied decals was quite straightforward and certainly brought the model to life, **Photo 26**. Applying the black self-adhesive fendering was a little more complex than usual as the upper, lower and sides of the hull on the model are all protected by it. After comparisons were made with the full-size boat, the rubber was measured, cut as necessary, the backing strip peeled off and then it was positioned on the hull. Being self-adhesive has a huge advantage which precludes the use of messy glues and does make the job so much easier.

Radar scanner

For the sake of realism it was decided to install a working radar scanner, so a suitably geared motor (and scanner) was purchased from Marks Model Bits (MMB) for a modest £6.99, **Photo 27**. The motor is powered by single AA battery which sits neatly with the drive unit inside the wheelhouse. It was easy to install and it all works very well with the rotation speed looking to be just about right.


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Remainder of fittings

On the full-size craft there is a cradle type device on top of the wheelhouse supporting a liferaft and in an emergency this cradle is tilted to release it into the sea. Photographs showed it was quite a complicated affair to replicate, so a much simplified version was made from brass wire, **Photo 28**. The remainder of the fittings were pretty much straightforward including the bollards, hatches, lifebelts, cowl vents and navigation lights. The last three of these are not included, so they were also purchased from the ever helpful Mark at MMB. I was fortunate to find two small working searchlights in the 'bits box' which were mounted on the wheelhouse roof, **Photo 29**. The boat was now finished, **Photo 30**, and some decent warmer weather was awaited for on the water trials. It all looks quite simple here and there is scope to add more detail if desired.

On the water

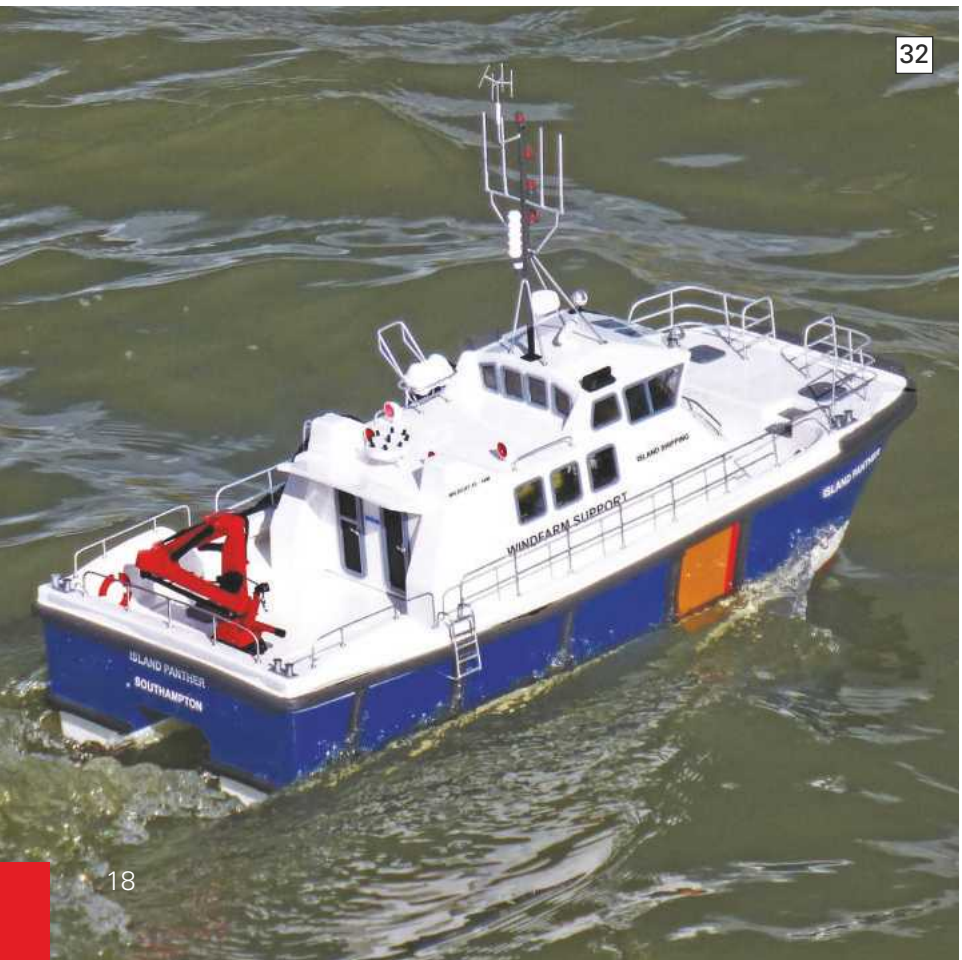
A calm day was chosen for the first launch because I had no idea how the model would react to anything other than a flat calm. Having a catamaran style hull under power was something entirely new

31

to me, and so I thought it wise to take one step at a time. Well, I needn't have worried about the model getting out of control during its first outing as it was a huge anti-climax! At full power it tootled along at no more than a slowish walking pace, much to the amusement of the onlookers! Sitting at the lakeside just before the launch, the model had created quite a bit of interest with its unusual shape, so the lack of speed was a great disappointment.

After some thought I realised where the fault lay, namely those pesky 25mm propellers were just too small, as I had originally suspected. Fortunately, a pair of handed 30mm brass propellers were to hand (just in case!), so they were installed and off it went again. The difference in performance was truly amazing as now it was going so fast it had to be throttled-back to achieve some sort of scale-like speed, **Photo 31**. She handled well on the turns, even sharp ones at full speed, the twin hulls keeping the model really stable at all times. There was no sudden power surge as the throttle was gently applied and full speed was attained very smoothly, with reverse being achieved almost instantaneously. The combination of the Hawk BL 40 amp esc's and the KV1400 brushless motors proving to be a winner.

By this time a sharp breeze was evident which caused some ripples on the water, but the model ploughed through them all effortlessly and looked really good, **Photo 32**. Since there is no water-cooling for motors or esc's, I thought it prudent to fetch the model in after about ten minutes and have a look inside the hull and a pleasant surprise once again! The motors were barely warm, the esc's were cold to the touch and not a drop of water in the hull (either side), which must be a first, for me anyway!



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Conclusion

I'm well pleased with the result and the model performs particularly well. Construction was a little bit frustrating at times and occasionally challenging, but well worth the effort. It is good value for money @ £205, but I would say it is definitely not for the total beginner and is perhaps for someone who has built a model boat previously. Brushless motors save weight and in performance terms their power output is streets ahead of larger brushed motors when installed in this type of hull. This model goes well on 7.2v and the 30mm propellers, and if you were to use either a 8.4v sub-C pack or even a 3S (11.1v) LiPo battery, I should imagine at speed that the hull might be well past its safe operating limit, but good fun whilst it lasts!

So, in summary; good value for money and it builds into a nice practical model with lots of scope for super-detailing, but is perhaps not for the total beginner in our hobby.

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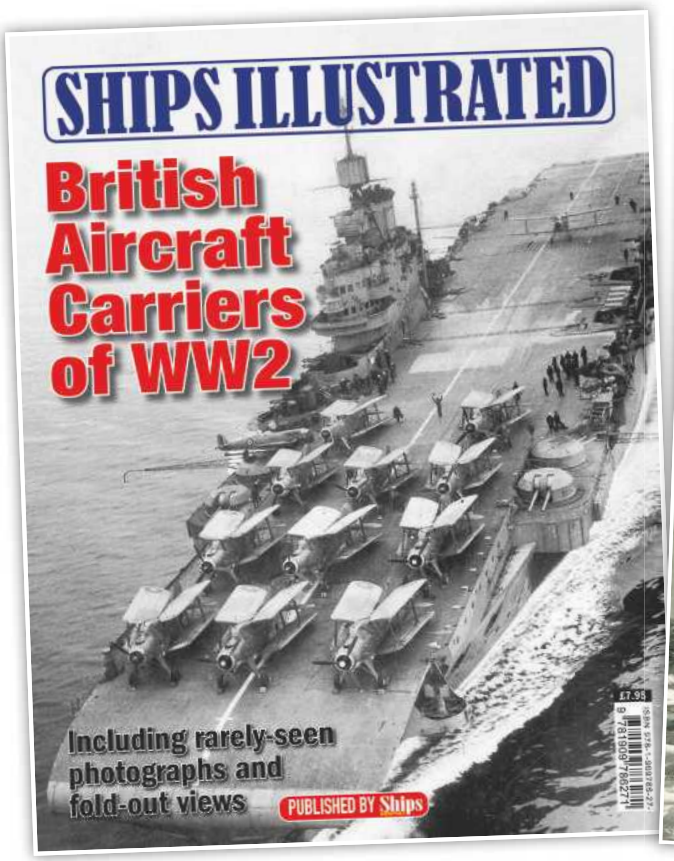

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Range Finder

***Dave Wooley** with his Worldwide Review of Warships and Warship Modelling*

Welcome once again to our regular sortie into the world of fighting ships and this month we are having a look at T35, a German large torpedo boat c1946, when it was under US Navy colours as DD935 and here we are using pictures from the US National Archives, plus are winding up the last stages of the HMS Daring project and have the usual Mystery Picture puzzle.

PHOTO 1. The bow and deck edge anchor arrangement.

Kriegsmarine T35 (DD935) torpedo boat

In March 1921 the German Government passed the necessary laws establishing their post-WW1 Navy and amongst the first new warships to be laid down were the Mowe class of large torpedo boats.

The construction of the T series of torpedo boat from 1936 onwards set the pattern for all future German torpedo boat development. Design work commenced in 1939 for the Elbing class torpedo boats (or Flottentorpedoboot) and T35, the subject of this Photo File, was built at F. Schichau Shipyard. T35 was laid down in late 1942, launched on 11th December 1943 and commissioned on 7th October 1944.

The hull was 102.5m long and 10m beam, built of steel, but having a light alloy superstructure. Although designated as torpedo boats, the displacement of 1294 tons and a range of 2400nm at 19 knots, meant these ships were more of a small destroyer than a torpedo boat as we would know it. T35 had a substantial armament of four 105mm 45 calibre guns, four 37mm and nine 20mm anti-aircraft guns, plus six 533mm torpedo tubes in two triple mountings.

The 32560shp twin shaft Wagner geared steam turbines gave a maximum speed of 34 knots and during the latter part of the war these proved to be capable warships. According to Eric Groner in his book, German Warships 1815-1945 Volume One, the Elbing's were excellent sea boats with a tight turning circle and very manoeuverable, even in severe conditions.

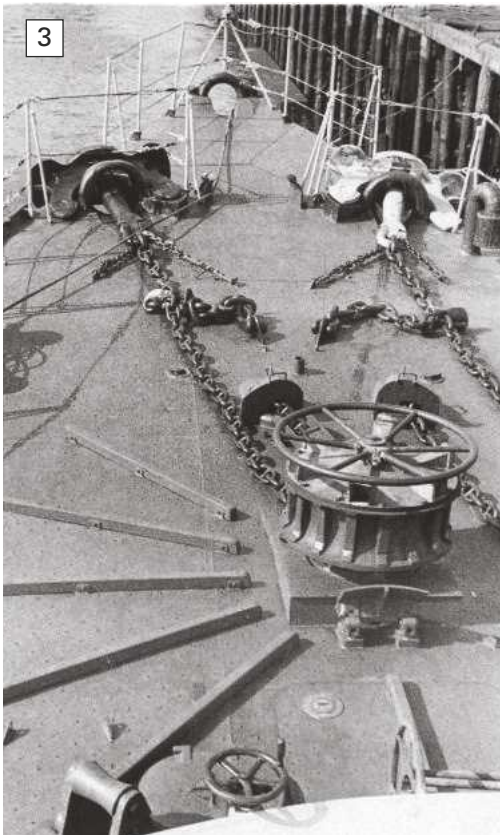
Photo tour - Part One

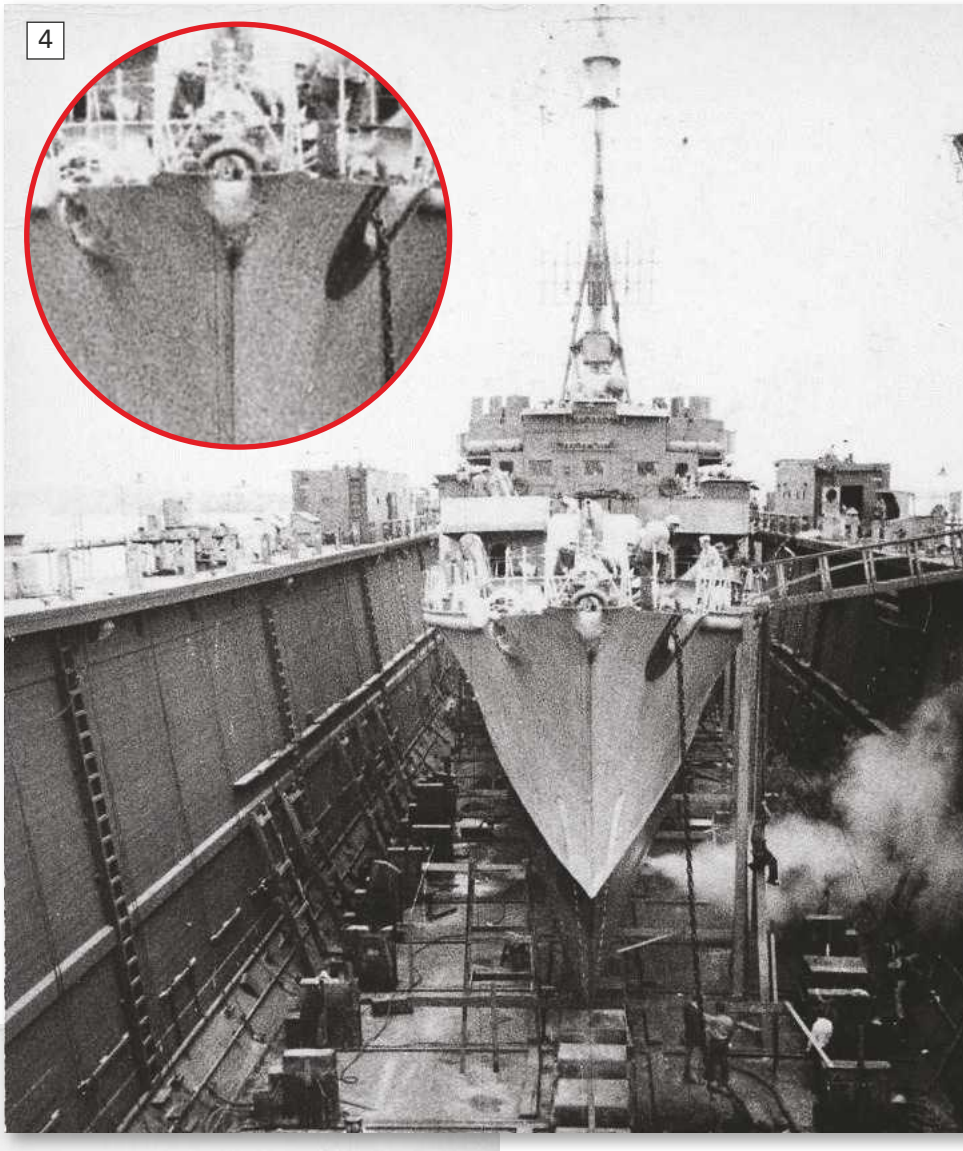
Thanks to Bill Clarke, these pictures have been made available from the US National Archive, some of which may been seen before, but others from this fascinating archive have not. I hasten to add that this collection of pictures were taken after WW2 when T35 was transferred to the US Navy and designated DD935. This collection of pictures are a significant piece of naval history and are useful to the potential modelmaker. I have to say as well, that the ease of obtaining such historical information in the USA is at a distinct variance to the UK where one seems to be charged for everything nowadays. As is now customary, our tour will commence at the bows with **Photo 1** showing the degree of rake and undercut on the forefoot of the stem.

RIGHT: The Kriegsmarine torpedo boat T35 flying the flag of the USA as DD935.

Moving along the hull to starboard we can gain a better view of the gentle flair of the hull towards the bow in **Photo 2** and going aboard, we have a view of the forecastle with the capstan in the foreground. The anchor handling arrangement follows that fitted to many Kriegsmarine warships where the anchors are mounted on the deck with a steel ring surrounding the shank and unusually here, the inboard flukes are resting on blocks, **Photo 3**.

T35 in dry dock, **Photo 4**, highlights the fineness of the hull and is a useful picture for the model maker. Going aboard now, but looking aft towards the bridge front in **Photo 5**, visible to port and starboard, are twin 20mm anti-aircraft guns and in the foreground is the top of the forward 105mm gun turret.





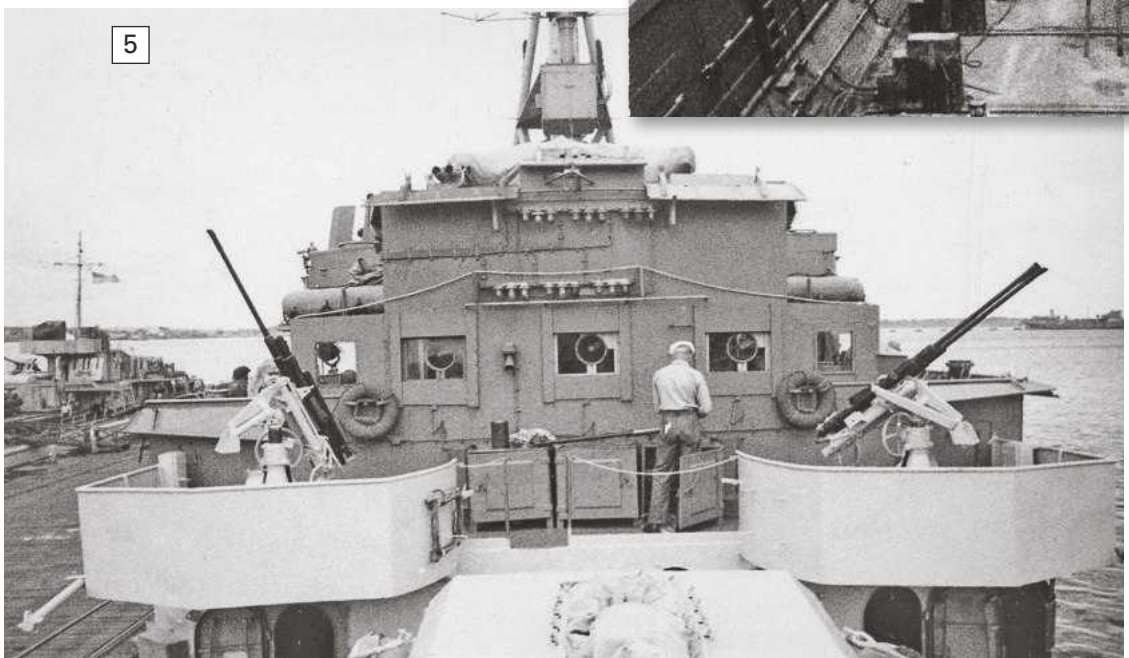
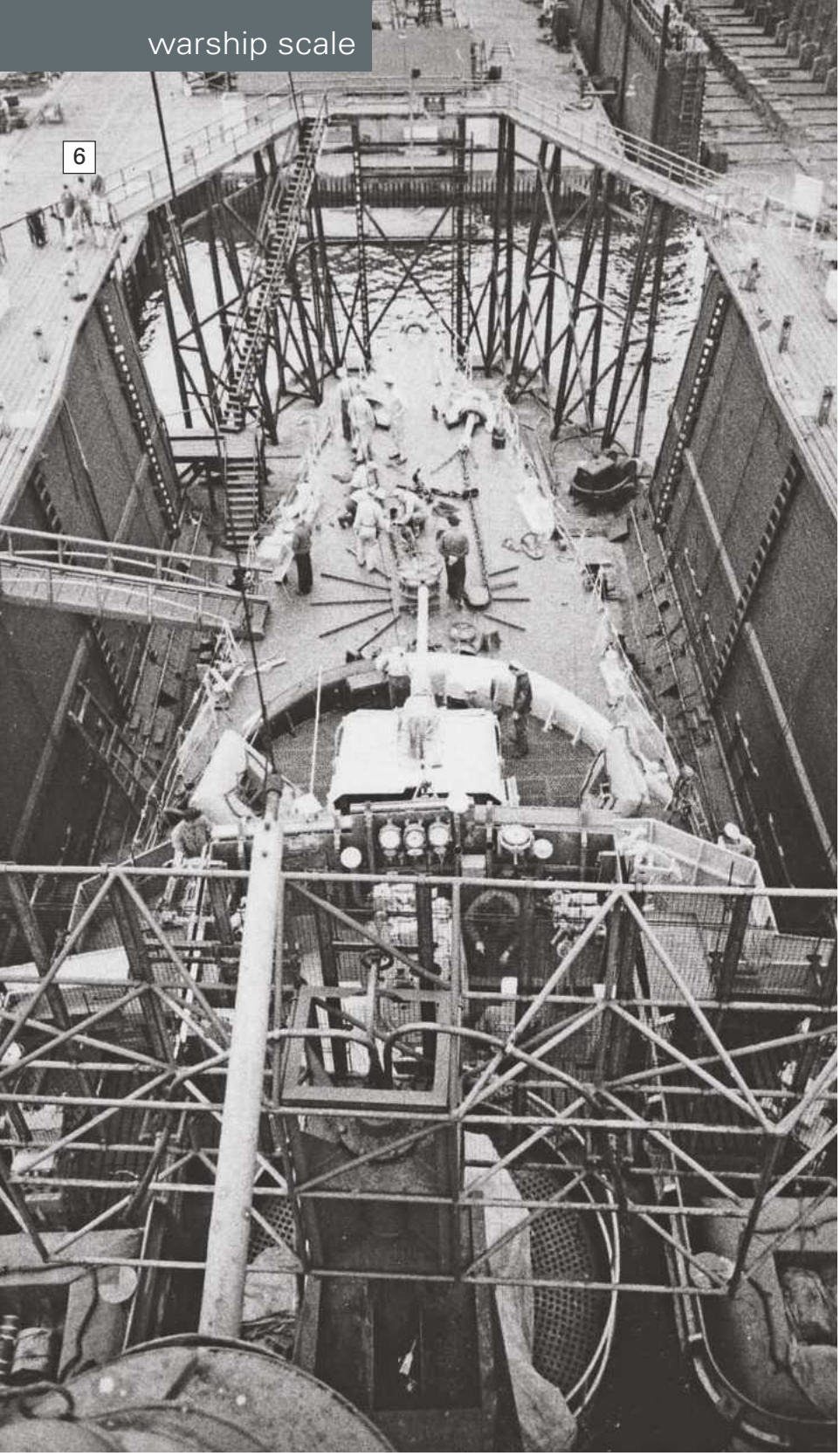


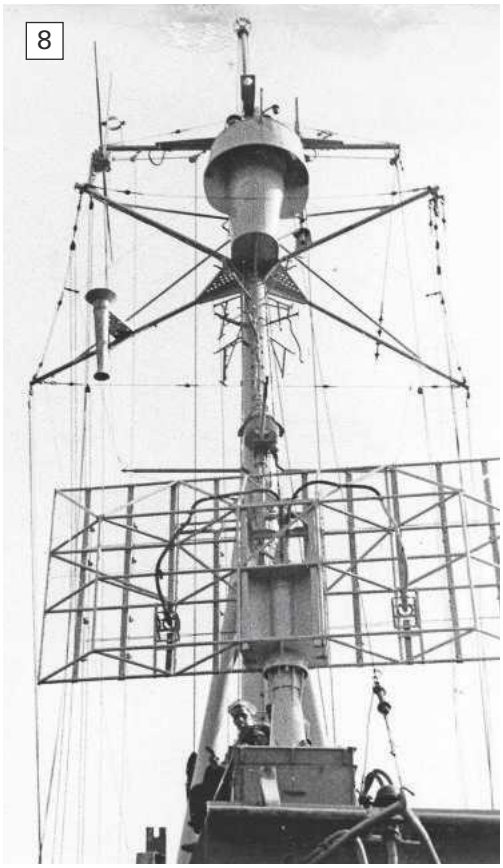
PHOTO 2. Unlike the earlier torpedo boats (T1 to T21), T35 does not have a knuckle forward towards the bow and was fitted with two exhaust uptakes.

PHOTO 3. A good picture of the forecastle detail.

PHOTO 4. T35 in dry dock. From a model making perspective it's worth noting the difference between the port and starboard anchor recesses at deck edge level.

PHOTO 5. A superb picture of the bridge frontage with the two twin 20mm anti-aircraft guns on either beam.





Fire Control

Photo 6 is another of those superb modeller pictures which offer much about the hidden detail, in particular on the top of the open bridge and around the bandstand of the 105mm gun open backed turret. The bridge detail includes voice pipes, dials and a Pelorus. **Photo 7** is a further general view of the starboard side showing the bridge area and the upper shielded 20mm anti-aircraft gun by the foot of the mast.

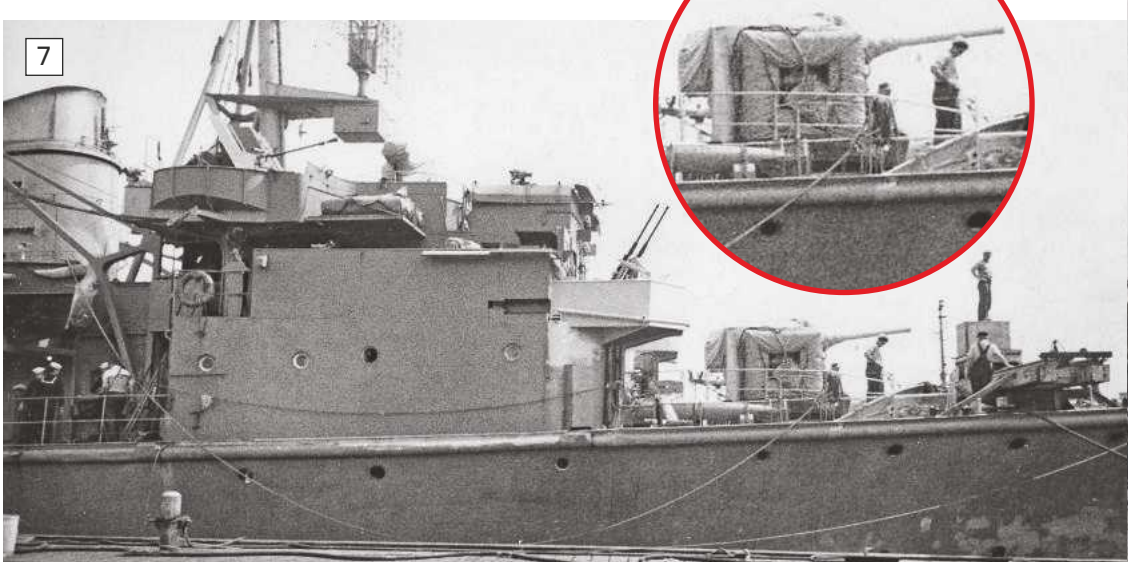
Radar and passive sensors

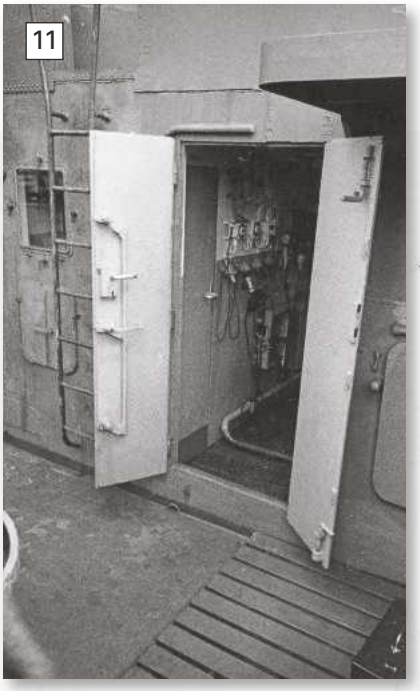
German radar was first installed on the KM Admiral Graf Spee in 1936 and as radar developed it was given a series designation of FuMO 'xx'. T35 received an FuMO 21, a 4m x 2m mattress style radar scanner with a limited arc of movement and a 10nm range and **Photo 8** provides an excellent view of this array. Moving up the mast and immediately below the crows nest are the four dipoles of the Sumatra passive search receivers and at the

PHOTO 6. Looking down on to the radar scanner 'mattress', the open bridge and the forecastle.

PHOTO 7. A starboard side view of the shielded 105mm 45 calibre gun and the bridge section.

PHOTO 8. The 4m x 2m radar mattress with the passive sensor arrays above it.





masthead there is a FuMB3 Bali search antenna. The lower part of the tripod foremast arrangement is often one of those areas the camera film seldom captures, but nevertheless here it is, **Photo 9**. We also now have a different perspective of the foremast and radars in **Photo 10**.

Bridge area and boat stowage

Access into the bridge area is via double doors at each side of it. Given the type of ship, these doors appear to be at best unusual, and at worst, inadequate for the job, **Photo 11**. The next picture, **Photo 12**, is a starboard 'full-on' picture showing plenty of detail. For example look to the extreme right of the picture and you can just make out the door leading into the bridge and a better idea of how the radar mattress is supported. Also, either side of the fore funnel are the two motor boats, one being a motor yawl and the other a motor cutter.

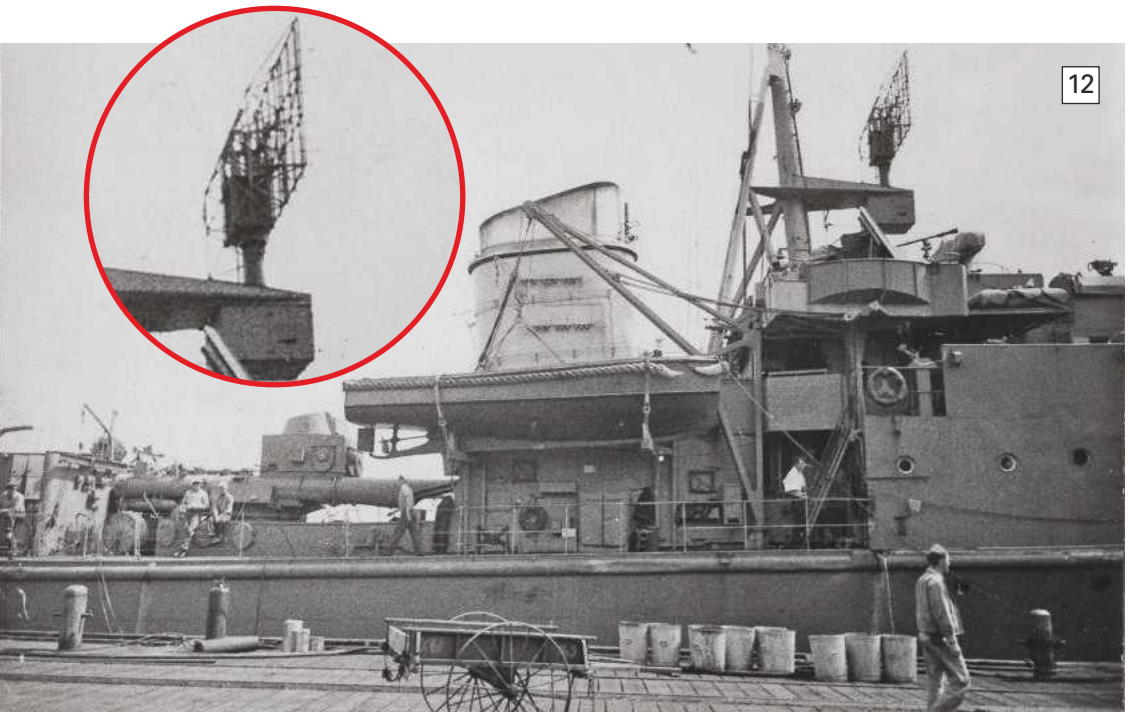


PHOTO 9. The lower part of the tripod foremast, immediately aft of the forward deck housing.

PHOTO 10. Viewing the upper part of the foremast including the Sumatra four dipole array.

PHOTO 11. The double opening doors leading into the bridge from the starboard bridge wing.

PHOTO 12. Starboard profile showing the motor boat stowage and its davit.

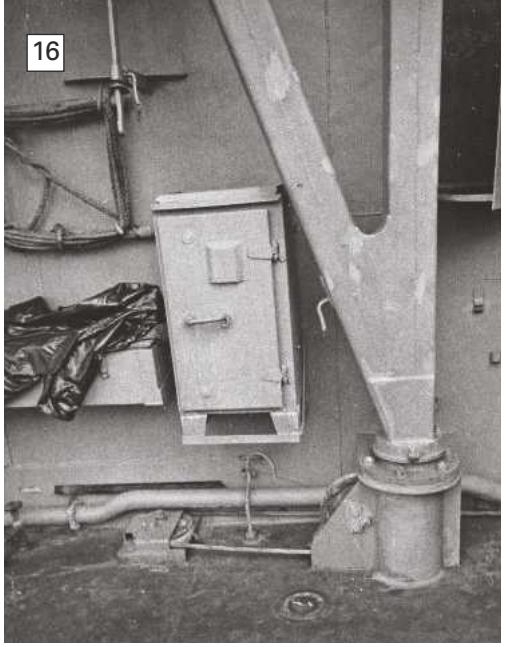


PHOTO 13. Another view of the starboard side boat stowage. T35 carried three boats in all, including a dinghy.

PHOTO 14. A close-up of the starboard boat mounting and its chocks.

PHOTO 15. The single pulley and cable at the top of the port boat davit. All rather basic compared to modern ships.

PHOTO 16.The foot of the boat crane which can traverse outwards.

PHOTO 17. One of the GRP box section stanchions around the forecastle deck edge on HMS Daring.

Viewing the motor boat at a slightly different angle exposes more of the detail and the method of boat stowage and handling, **Photo 13**. Back onboard now and here is one of those useful pictures showing the detail on the boat support frames and chocks, **Photo 14**. Looking closely at the boat handling davit it appears that the boat is lifted clear of the chocks using power whilst slewing out is achieved by block and tackle attached to the arm of the crane, then to the side of the bridge and down to the main deck for manual handling.

Photo 15 shows the single cable davit inner end and the hoist wire which is attached to a three or four legged wire rope span (bridle), to lift the boat. The davit base on the deck is as in **Photo 16**. In Part Two, this Photo File tour will continue further aft with the torpedo tubes and also go underneath the hull of T35.

1:72 scale HMS Daring Type 45 destroyer - Part 37

Final touches!

The project is basically complete now, but still with some detail parts prepared earlier to be added and enhanced. Two examples of these mini-projects are:

1) The method used for making and fixing the stanchions and railings to the forecastle.

2) Applying the warning chevrons to the arms of the RIB hoists.

Stanchions and railings around the forecastle

Previously, I discussed the method adopted for replicating stanchions as part of the netted barriers around the flight deck. The reason photo etchings were not used was down to the type of stanchion used on HMS Daring, it being predominately of a box-section and is made from GRP, **Photo 17**. The same model making method described here was used for the rails around the 30mm gun platform and either side of the forward exhaust uptake.

Forecastle stanchions and rails

For these, the material and method remains the same with Evergreen styrene box section being used to create each stanchion. Whilst 90% of the rails on the forecastle are of a flexible sheathed wire, using

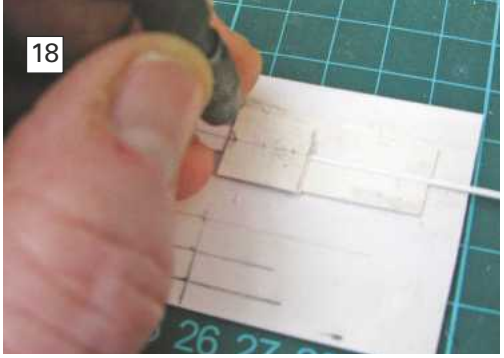


PHOTO 18. A simple jig for drilling out the Evergreen styrene square section that is the basis for each stanchion.

unsupported styrene for the stanchions, would be inherently very weak, so faced with these problems some lateral thinking was required. The first decision was to continue using the styrene box section stanchions, but substitute the flexible rail with 0.31mm fine brass wire. Thankfully the rails on the forecastle are divided into sections allowing for ease of dismantling, either by dropping the stanchion flat to the deck or by removing it totally from its base.

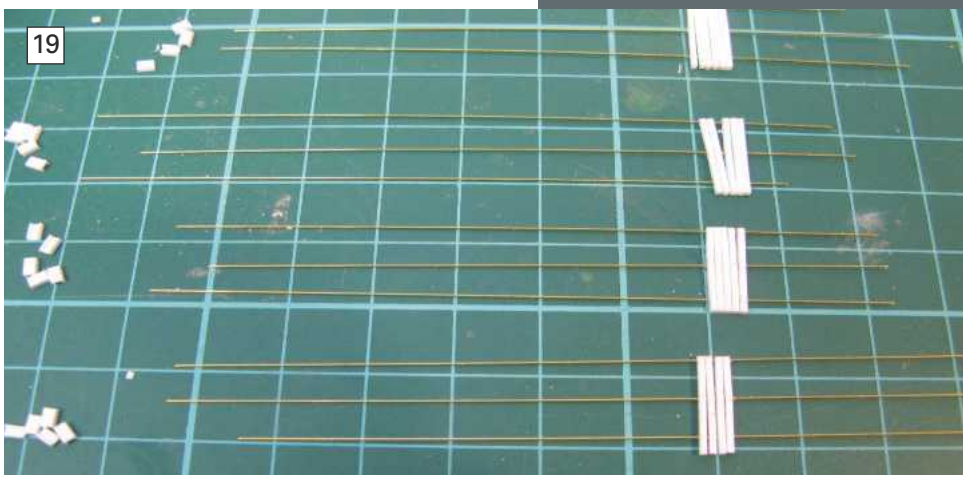
The first task was to drill and cut to length each stanchion. For this a simple jig was used whereby a length of Evergreen square section strip could be fed into the jig at one end, the three holes drilled, and then the piece pushed further along and cut to the desired length, **Photo 18**.

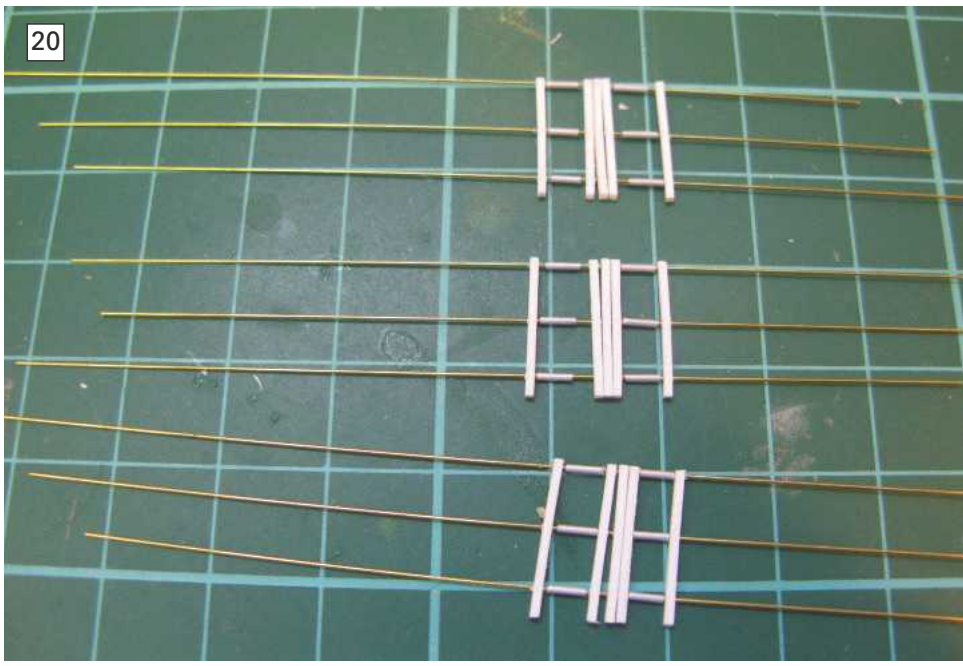
Each section of railing has five stanchions and three lengths of 0.31mm brass wire. The wire and stanchions were prepared as in **Photo 19,** ready to be adjusted to the length required. At the first and last stanchion of each strip, there is an adjustable clamp, simulated here by 1mm o.d. aluminium tube and **Photo 20** is a close-up of the stanchions and railings.

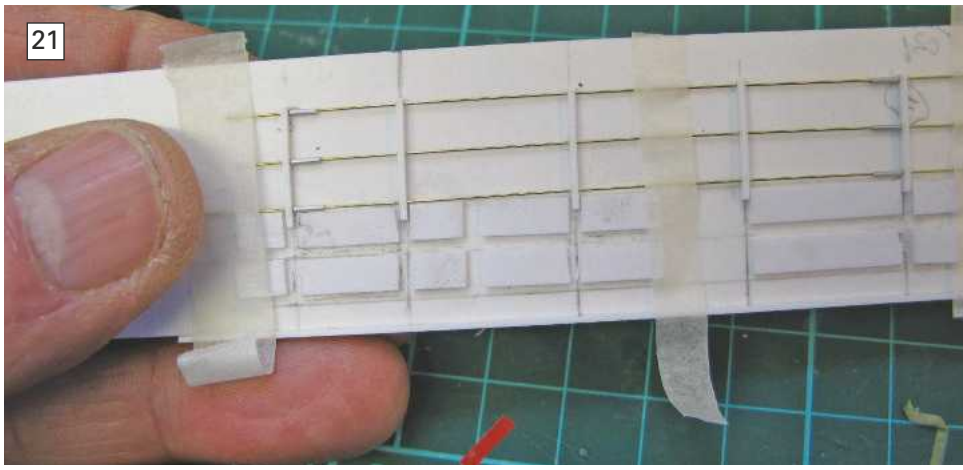
A jig was used to ensure the symmetry and position of each of the stanchions. Interestingly, on the first set near the bows, the distance between the first and second stanchions is different to the remainder. Why this is so is not clear, but it may be just to enable the stanchions to terminate at a given point along the deck edge. The jig was made from styrene strip and is very simple, but effective, **Photo 21**.

Using cyanoacrylate adhesive to bond the rails into the stanchions is straightforward enough, but care needs to be taken to ensure the glue does not come into contact with any part of the jig. For this reason, I targeted the adhesive using a small length of wire, dipping the tip of it into a teardrop amount of adhesive and then applying it direct to the joint. Once set, the completed set of rails could be lifted clear of the jig and excess wire removed from either end, **Photo 22**.

With the six lengths of railing completed, all that remained was to fit the foot which attaches to the bottom end of each stanchion. The same method of manufacture was explained in September 2013 MB when referring to the flight deck barriers. This involves using an Evergreen U-strip section to create the foot into which the stanchion fits and this in turn then rests on a flat seat which is fitted to the deck. As there is a slight incline inwards, the feet and seats are fitted to the stanchions using a jig (yet again!),







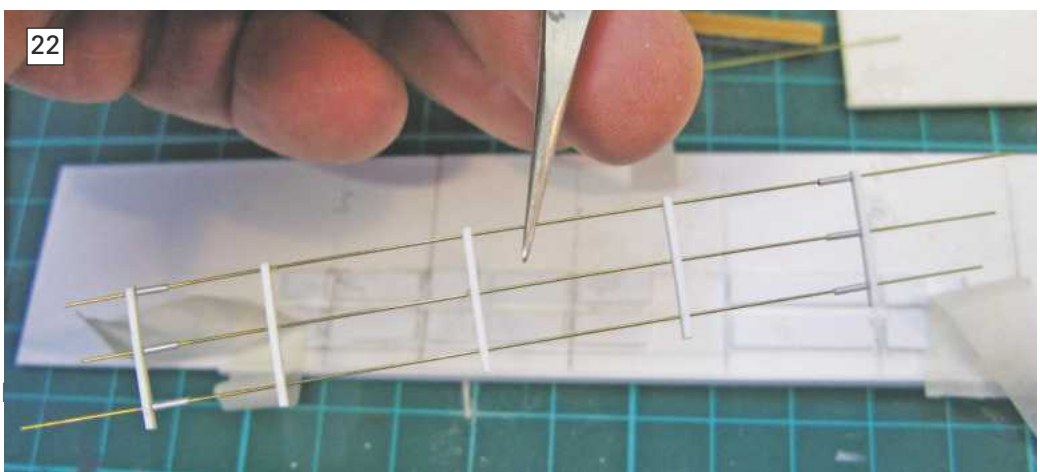


PHOTO 19. Each section of railing consists of five stanchions and three lengths of 0.31mm brass wire.

PHOTO 20. Aluminium tube was added to simulate the clips that retain each wire at the end stanchion of each section.

PHOTO 21. A jig was used to ensure the correct positioning of each stanchion along the wire.

PHOTO 22. Once set in place, the railing section was removed from the jig ready for the wires to be trimmed.

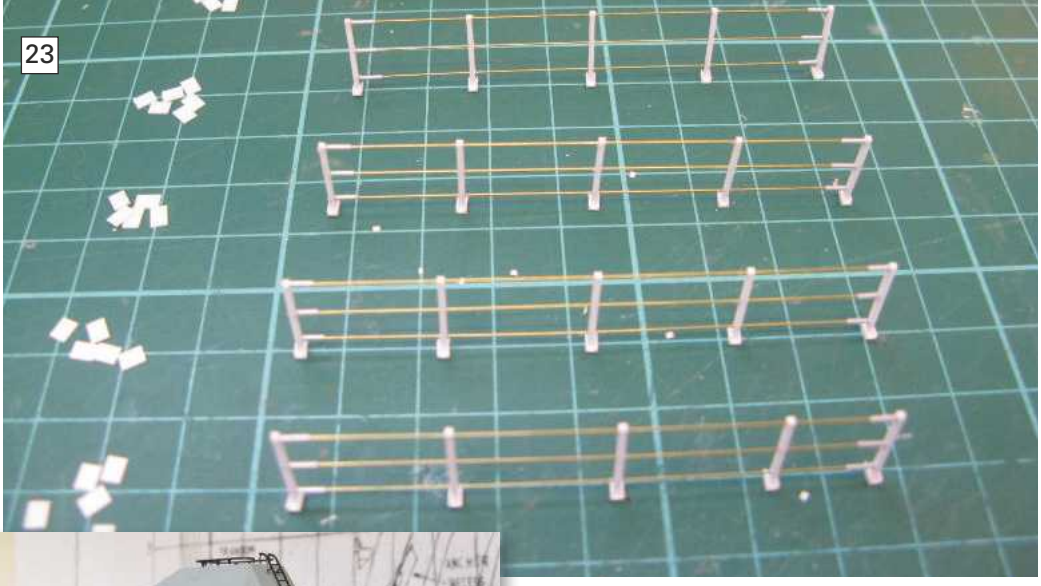
PHOTO 23. Each set of railings was prepared ready to receive the base plates and feet.

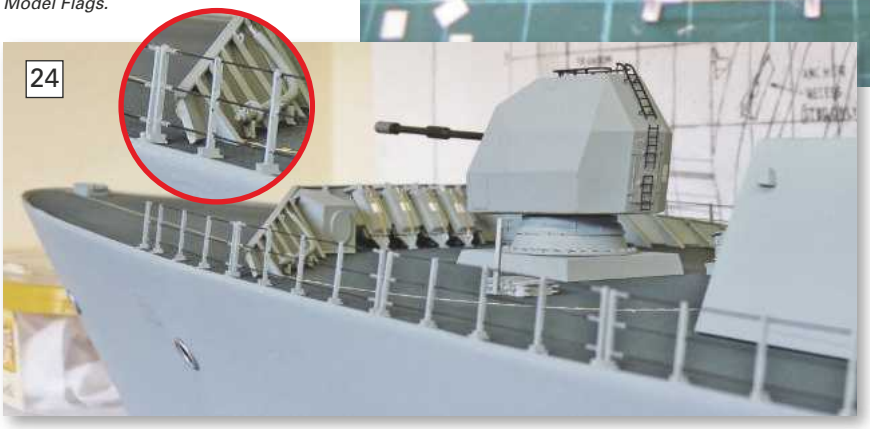
PHOTO 24. All painted and set into place on the model. Note the slight inward sloping angle of the railings.

PHOTO 25. The warning chevrons on the caliper arm of a full-size RIB hoist.

PHOTO 26. The starboard (left of picture) and port (to the right) caliper hoists ready to be airbrushed, and note that they are 'handed'.

PHOTO 27. The bespoke BECC red and white warning chevrons in various scales, that were supplied to me by Model Flags.





ensuring symmetry for all of them, **Photo 23**. Finally, all of the individual lengths of railing were airbrushed in the same grey as the hull (White Ensign Models RN Modern Light Grey). The rails were carefully hand painted matt black with the simulated clamps in a Humbrol 'Metal Finish', **Photo 24**.

Warning stripes to the RIB hoist

Scratch building the caliper type of extending hoist used to lift and lower the Halmatic 24 RIB's clear of HMS Daring's boat bays was discussed previously. With both port and starboard hoists prepared, it was time to review the safety warning chevrons fixed to the caliper arms as shown in this picture, **Photo 25**. As a reminder, the hoists are fitted with a pair of movable arms that act a bit like expanding calipers. These hold a RIB firmly as it is swung clear of the boat bay and yes, the arms on these model hoists also move outward and through 360 degrees, which actually makes installing the RIB onto the boat chocks a relatively straightforward task, **Photo 26**.

Warning chevrons

Initially I attempted to reproduce the chevron warning detail using white and red trim line. It can be done this way, but the process takes some considerable time just for one single arm, so it was decided to somehow or other speed up the process. A call to Brian at Model Flags outlined the problem and what was needed. Just over two weeks later a pack arrived via Model Flags from BECC with various sizes of chevron to suit differing scales, with a number of options as you can see in **Photo 27**.

When cutting the chevrons to size it is worth remembering that they need to be both left and right hand. For these, I cut from the downward

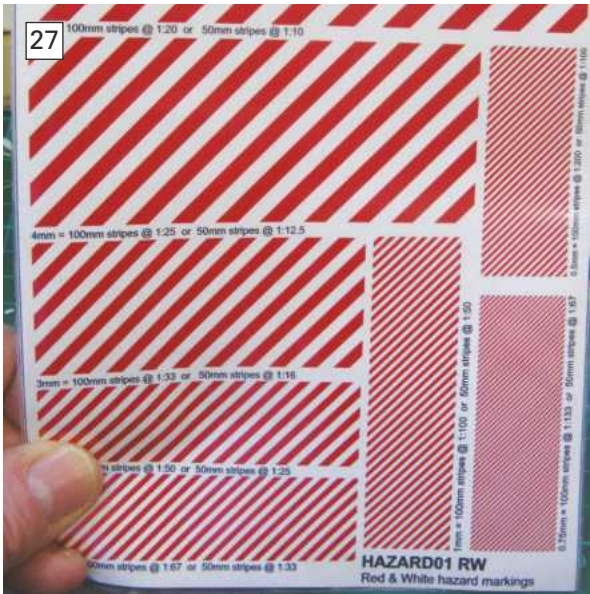


PHOTO 31. This month's Mystery Picture. The clue is: A warship that definitely punches above its weight!

length for one set and across for the opposite side and **Photos 28 and 29** are of the chevrons being applied. The end result does not look too bad at all and reflects the originals really well, **Photo 30**. On the full-size units, warning chevrons are also fixed to the rear faces of the hoist arms, but as these are not visible on the model, there is no practical need for them.

Next month will have us fixing the model to its display base and the final check before the handover to the Royal Navy.

(Readers may not be aware, but Dave builds these large models for his personal pleasure and on their completion he usually gives them to museums, such as happened with his Russian Kiev aircraft carrier which went to the Fleet Air arm Museum three year's ago, or in the case of HMS Daring just now, it will be going to the Royal Navy for display purposes - Editor)

Answer to the July 2014 Mystery Picture

This warship has a familiar profile and it is no coincidence that it resembles in some respects the RN Type 45 destroyer. For those still scratching their heads, it was the French Horizon class destroyer, Paul Chevalier D621. This is one of the joint Horizon Project that originally included the UK, France and Italy, before we decided to go our own way with the RN Type 45's. The general appearance and PAAMS (Principal Anti Air Missile System) are common to the Type 45's, but after that much is different. In the event, only two ships have each been built for the French and Italian Navies, whereas six Type 45's have been constructed for the Royal Navy.

Paul Chevalier was laid down at the DCN Lorient Shipyard in 2005 and launched on the 12th July 2006, entering service with the Marine Nationale (French Navy) in June 2009. Her sister ship is the Forbin D620, and both displace 6635 tons, slightly less than the Type 45's. The main gun armament differs from that of the RN warships in that the Horizon class have two 76mm 62 calibre OTO Breda guns mounted forward of the bridge, one either side, plus two single 20mm 90 calibre guns just aft of the bridge. The Sylver Vertical Missile Launcher (a key component of the PAAMS) is mounted forward in a similar arrangement to that on the Type 45's, but a SSM (Surface to Surface Missile) system of eight MM40 Mod 2 Exocets is located amidships between the early warning radar and communications mast. This location is important, as the launch tubes are partially concealed behind raised surfaces, thus keeping the ship's radar cross section low. Similar launch tubes on the RN Type 45's for their Harpoon SSM missiles have yet to be fitted at the time of writing!

On top of the foremast of Paul Chevalier is the EMPAR (European Multifunctional Phased Array Radar) target designation scanner whilst on the RN Type 45 it is a Sampson 3D system. The EMPAR is paired with the S1850M long range search radar, whereas on the Type 45's it is the Sampson system.

Located towards the ship's stern on either side are concealed openings for anti-submarine torpedo launchers. The interception and decoy systems are all of French origin, but perhaps one of the major differences is not externally obvious. The French and Italian Horizon destroyers have adopted a CODAG (Combination of Diesel and Gas turbine) propulsion, whereas the Type 45's have recuperative gas turbines with integrated full electric power, driving two 15 phase induction motors for the two propshafts. The Horizon class also have a bow thruster and are fitted with two sets of fin stabilisers, the Type 45's just having one set of these. Also, Paul Chevalier and her sister look more austere than the Type 45's, by having fewer external fittings. Having said all of that, the family resemblance is obvious.

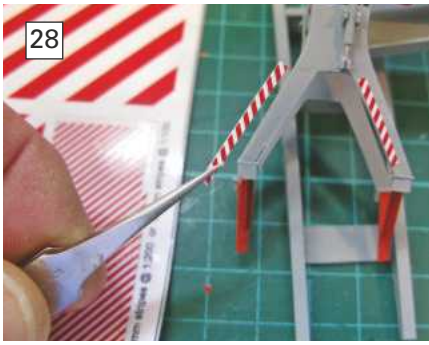
This month's Mystery Picture, Photo 31

The clue is: A warship that definitely punches above its weight.

References and acknowledgements

Kriegsmarine T35 torpedo boat ref: Warship Volume Eleven, German Naval Radar to 1945 Part Two. by Erwin Sieche, pages 146 to 157.
German Warships 1815 to 1945, Volume One by Eric Groner, pages 193 to197.
Jane's Fighting Ships 1947 to 1948, page 178 (French Navy section).
Naval Radar by Norman Friedman, pages 205 to 206.
Paul Chevalier Horizon class ref: Combat Fleets of the World 15th edition pages 206 to 207.

My thanks to **Bill Clarke** from the USA for the series of pictures of T35 from the US National Archive. My ongoing appreciation to the **Captain and Ship's Company** of HMS Daring for their help and support during my visits. My thanks also to the staff at **Model Flags** and **BECC** for all their help and support. ●



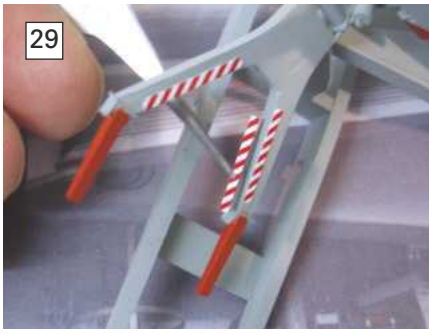


PHOTO 28. Each chevron was cut to size and fixed to the hoist arms.

PHOTO 29. Chevrons are also fixed to the inside of each arm.

PHOTO 30. Both RIB hoists are now ready to be installed into the boat bays of HMS Daring.

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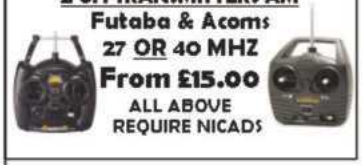

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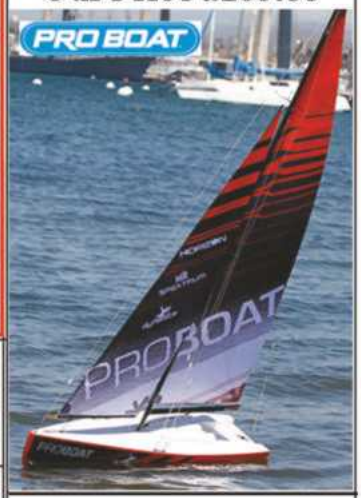

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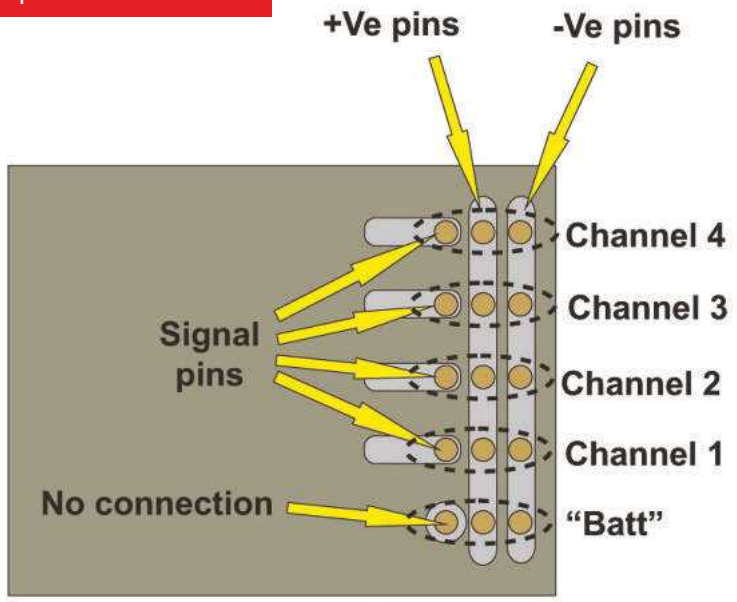


Fig #1 - Typical receiver

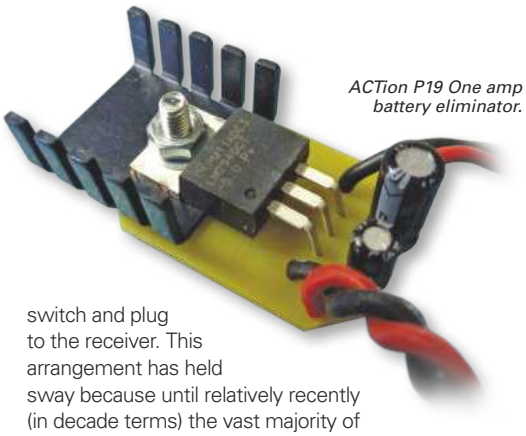
To BEC or not to BEC?

***Dave Milbourn** enlightens us*

I have noticed when reading the various postings on model boat Internet forums that one of the most asked-about and least-understood aspects of radio control is Battery Eliminator Circuitry, or BEC as it is otherwise known. It occurred to me that an article which explains this aspect of the 'Dark Art' of electrics might be a good idea and I've tried to keep the technical side of it to a minimum for the benefit of the majority of readers as opposed to those who have already forgotten more about electronics than I'll ever know!

It's an inescapable fact that our radio receivers need a power supply in order to detect the signals from the transmitter and power the servos, speed controllers and other gizmos that we fit into our models. Historically this power supply has taken the form of a small rechargeable battery pack, typically of four 1.2v cells, which is connected via a flexible lead, switch and plug to the receiver. This arrangement has held sway because until relatively recently (in decade terms) the vast majority of radio-controlled models had been powered by either petrol, diesel or glow plug (nitro) internal combustion engines rather than electric motors, and so a separate dedicated receiver battery was mandatory.

> *"Historically this power supply has taken the form of a small rechargeable battery pack..."*



ACTion P19 One amp battery eliminator.

The technical bit

Take a look at **Figure 1**, which is a diagram representing a typical receiver circuit board. The receiver has a number of sets of gold-plated pins to which devices like servos and speed controllers are connected. These devices have three wires terminated in a polarised plug, the idea being that you can't put the plug into the receiver the wrong way around, at least in theory! If you look inside the receiver you'll see the pins are arranged in sets of three to correspond with the plugs from the servos. If you were to remove the receiver from its case and look at the printed circuit board you'd find that all of these sets of three pins have two connections in common, i.e. all of one row of pins are soldered into the same 'rail' of copper track. These common rails are for the negative and positive poles of the power supply, while the third pin goes to its own little part of the decoder circuit to supply the signals to each servo, electronic speed controller (ESC) etc. All okay so far?

You can see that all that's needed to power up the receiver and the units which are plugged into it is to apply a positive connection of around 5 volts to the positive rail and a negative (ground) connection to the negative rail. It doesn't matter whereabouts along the rails you apply the power, because all of the corresponding pins are connected to each other. It's usual to have a separate set of three pins where a separate battery pack is plugged and this is marked 'Batt' or similar. The third pin of this set will be left unconnected to anything inside the receiver.

Now take a look at **Figure 2**. This represents a typical electronic speed controller. In broad terms this is split into two different sets of circuitry; the bit which receives and decodes the signal from the receiver (the logic circuit), and the high-power part which switches and directs the power from the big battery to the motor (the power circuit). Each of these requires a different voltage to operate properly and each will draw very different levels of power.

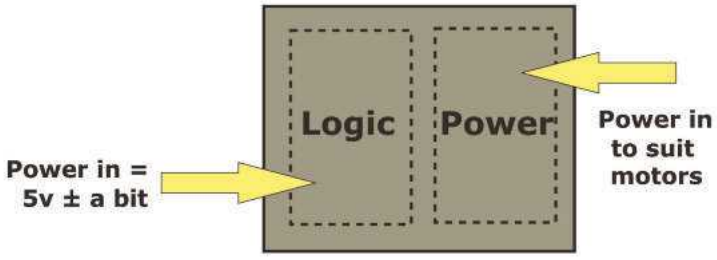


Fig #2 - Typical Electronic Speed Controller

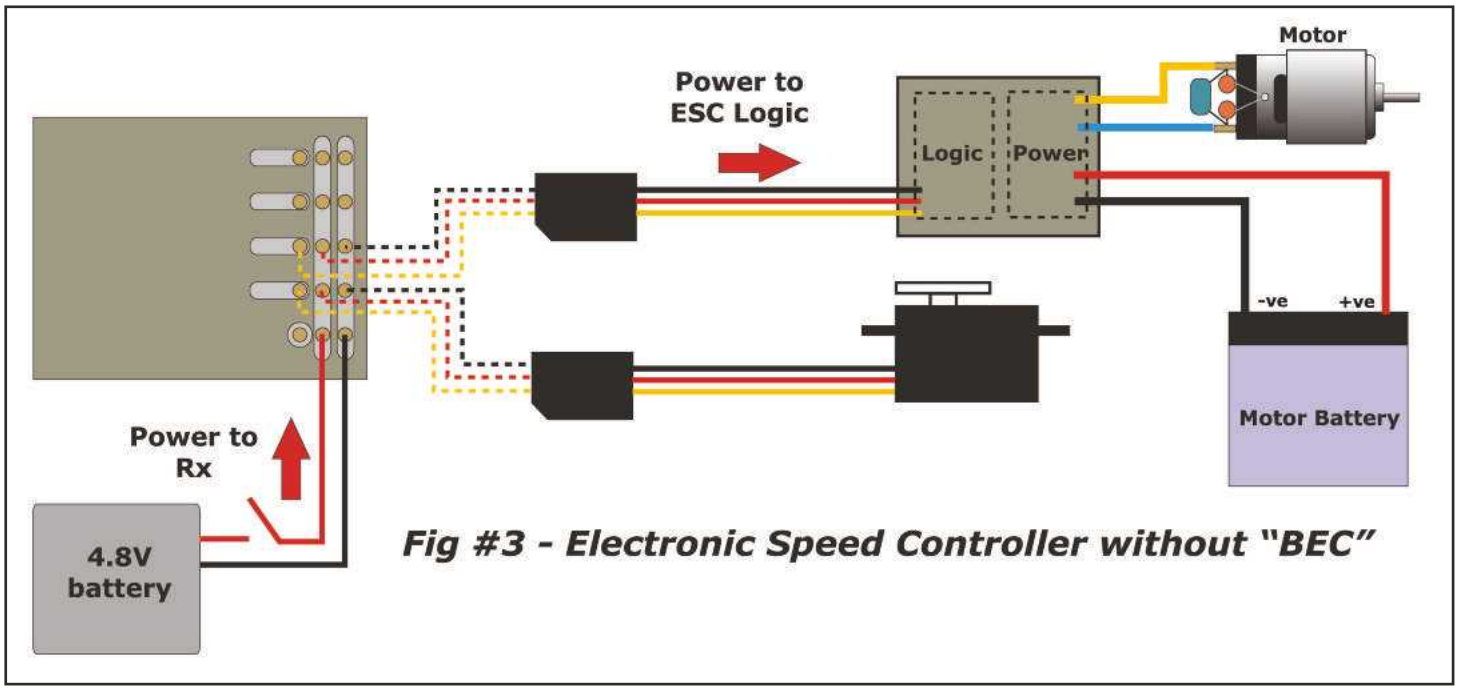


Fig #3 - Electronic Speed Controller without "BEC"

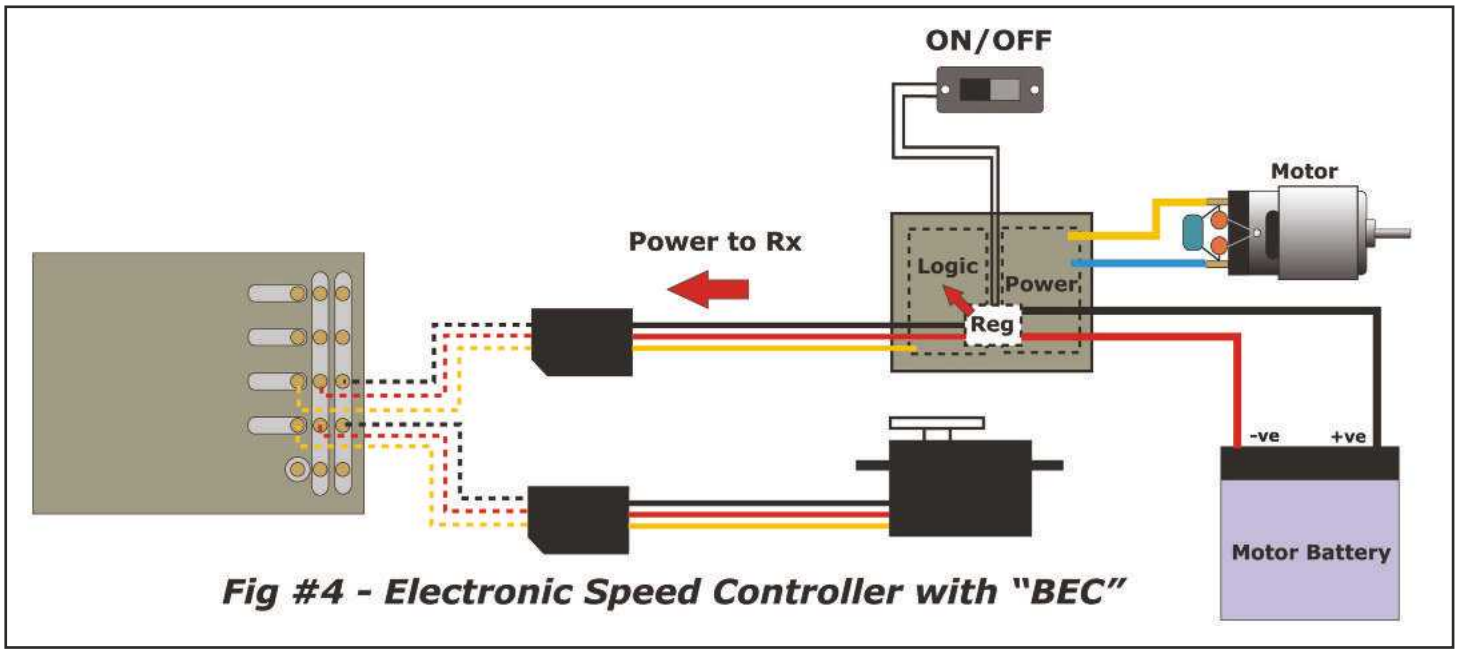
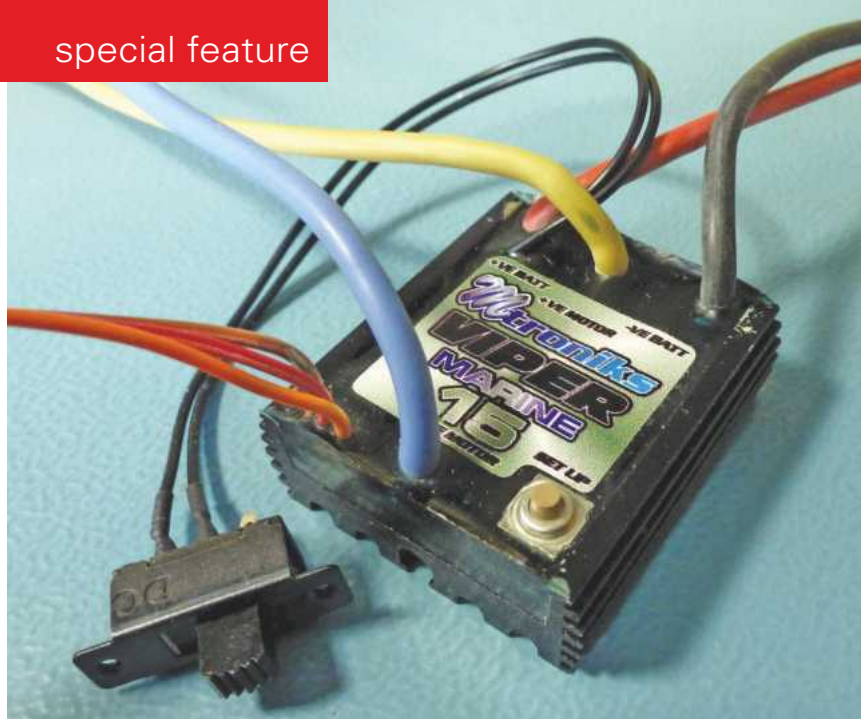


Fig #4 - Electronic Speed Controller with "BEC"

Figure 3 shows a typical system where the receiver voltage rails are powered from the 4.8v battery and the servo and speed controller are fed this power to their logic circuits via their connection to the receiver pins. The main power for the motor goes directly into and out of the power circuit inside the speed controller. With the coming of small, powerful electric motors like the Mabuchi 540 types and the parallel development of high-capacity rechargeable batteries, Nickel Cadmium or NiCd's (sometimes written as NiCad's) it became possible to fit electric power into performance r/c boats and most significantly, 1:8 scale off-road r/c cars such as Tamiya VW buggies. Electric-powered model aircraft soon also took up these new power sources. It was quickly realised that to get the best performance from any of these models it was critical to keep them light and that one of the heaviest components aboard was the receiver power pack. Manufacturers therefore decided to arrange for the main motor battery to supply the receiver's power as well as that for the drive motor. The one problem with this is that receivers and servos are made with electronic components which come mainly from the computer industry and which run at a maximum of 5.5 volts, whereas the batteries used to power 540 motors are normally at least 7.2v. A direct connection between this size of battery and the receiver would have only one outcome, namely the dreaded Magic Grey Smoke!

Now take a look at **Figure 4**. You will see that there is a little box marked 'Reg' inside the speed controller, spanning both the logic and power circuits. This component is a linear voltage regulator which takes the high voltage from the main motor battery and reduces it to a safe 5v to feed to the Logic Circuit. There is also a small switch which allows this reduced voltage to travel down the red and black wires to the receiver and thus supply power for that and the servos etc. Because this arrangement eliminates the need for a separate receiver power supply it's often referred to as Battery Eliminator Circuitry, or BEC for short.

> *"It was quickly realised that to get the best performance from any of these models it was critical to keep them light..."*



TOP: An Mtroniks Viper 15 Marine ESC, a popular BEC-equipped electronic speed controller.

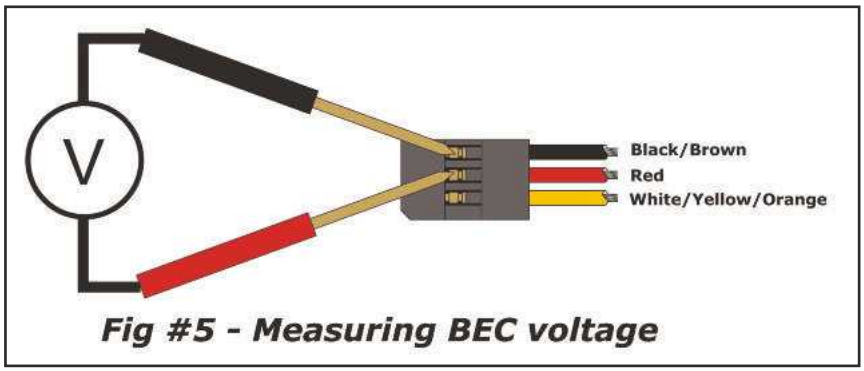


Fig #5 - Measuring BEC voltage

The practical element

It's important to note that there is a drop in voltage across the regulator and therefore the main power battery has to be at least 0.5v higher than the required output (5v). This is why all BEC-equipped speed controllers will quote a minimum voltage for the motor battery, whereas speed controllers without BEC can handle much lower motor voltages. It is also why if you are using a poorly charged (or internally damaged) 6v sealed lead acid battery to power your system with BEC for the receiver (rather than a 7.2v sub-C battery for example), the r/c side may not work properly because the regulator has insufficient incoming volts.

You can determine whether or not your electronic speed controller has BEC in several different ways.

Look at the label and/or the case. Often you will see the letters BEC appear on the unit, so it's a fair bet that it has the necessary circuitry.

BELOW: A Turnigy UBEC device fitted to the speed controller in the author's Vic Smeed designed Moonsong.

Look in the instructions! There should be a wiring diagram or photograph of a system wired up. If there is no reference to a separate receiver battery, then again your ESC probably has BEC.

If the unit doesn't give any clues and you don't have the instructions, then connect a 7.2v battery to the thick Red and Black wires of the ESC and connect a digital voltmeter across the positive and negative terminals in its plug lead, please see **Figure 5**. If the voltage reads zero then move the switch (if present in the wiring). If you obtain a reading of around 5v then you know your ESC has a BEC output.

If you don't have a multimeter (shame on you!), then connect the ESC to the receiver and also connect a spare servo into any other receiver channel. Switch on the transmitter and move all of the sticks in turn. Try the ESC switch too. If the servo eventually moves, then you have BEC.

One warning! There are some receivers on the market which are also marked 'BEC'. I've examined several and I can't find any difference between them and those which don't have this legend, so don't connect any power supply of more than four cells directly to these receivers unless the manufacturer's instructions specifically say you can, or you take the risk that they will blow up with the dreaded Magic Grey Smoke again!

The linear voltage regulators fitted inside speed controllers are good for supplying currents of up to around 1 Amp. This is because they dump the excess voltage in the form of heat and the higher the supply voltage and current drawn, then the hotter they will get. If they aren't fitted with a suitable heatsink then there is a chance that they will overheat other components inside the ESC and catch fire, especially if the speed controller has been 'potted' in a (resin) compound to make it waterproof. One solution to this is to fit an external voltage regulator e.g. the ACTion P19 unit. This is a standard, low drop-out regulator with a metal tab mounted on a circuit board with an aluminium heatsink. The heat from the regulator will be conducted away into the surrounding air, but this again is only good up to about 1 Amp.

Digital servos?

Now that many model-flying folk use digital servos, they are finding that the current drawn from the receiver frequently exceeds that available from the speed controller's regulator. Most ESC's with BEC will seriously overheat if the current drawn gets up around 2 Amps, which is not enough to power two or three digital servos (or winch servos etc.). One solution is to go back to a separate receiver battery pack, but this is frequently too bulky and heavy for the models they fly. The alternative is a separate BEC as per the P19 unit, but one which will deliver 3 Amps upwards. These are called **UBEC's** and work on a similar principle to speed controllers in that they switch the main voltage on and off at a very high speed, thus reducing the average voltage supplied to the receiver down to a safe level and this is usually selectable between 5v and 6v. Because these devices generate a high-frequency

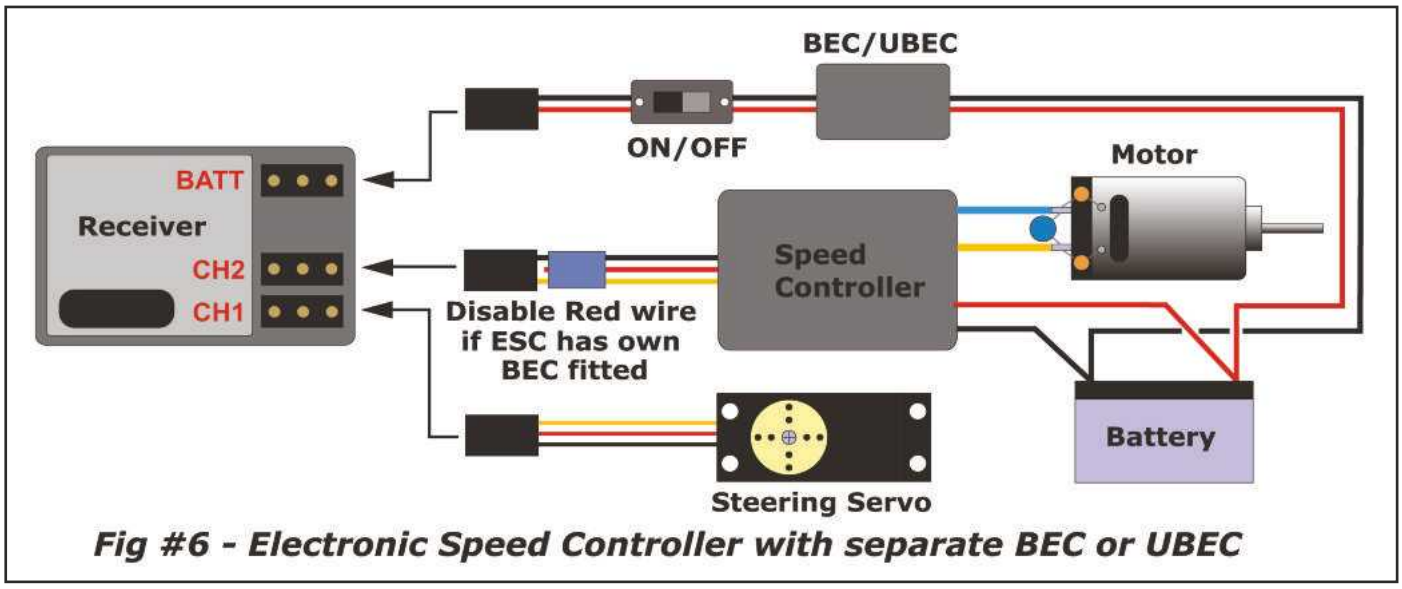


Fig #6 - Electronic Speed Controller with separate BEC or UBEC

radio signal when they operate, it's not sensible to fit the electronics inside the speed controller, so they are connected separately to the main battery and plug into the receiver exactly like a separate battery pack, please see **Figure 6**.

A frequently asked question

Question: 'I've read that you should disconnect the red wire from a BEC plug in some circumstances. What's that all about'?

Answer: 'Yes, there are circumstances when you should do this':

If you are using a BEC speed controller in conjunction with either a separate receiver battery or a separate BEC or a UBEC; If you are using more than one BEC-equipped speed controller in the same receiver, e.g. you have twin motors with an electronic speed controller on each motor.

The reason is that each BEC device will produce a voltage at the receiver pins. If these voltages differ by even a fraction, then eddy currents will appear which can, and usually do, interfere with the proper operation of the receiver. This can produce weird effects such as one motor running only at full speed in either direction while the other stops dead, so avoid! By disconnecting the red wire you will disable the onward connection from the (unwanted) voltage regulator to the receiver. There is no need to cut the wire; simply withdraw it from the plug moulding and hold it back with PVC tape, so the ESC can be used again if required in a different installation, **Figure 7**.

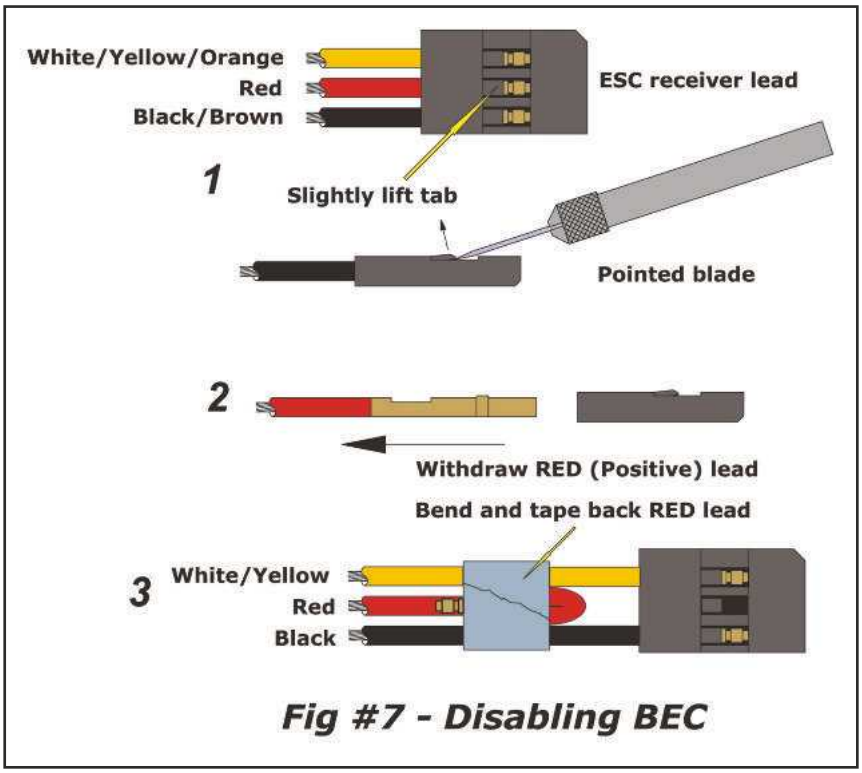
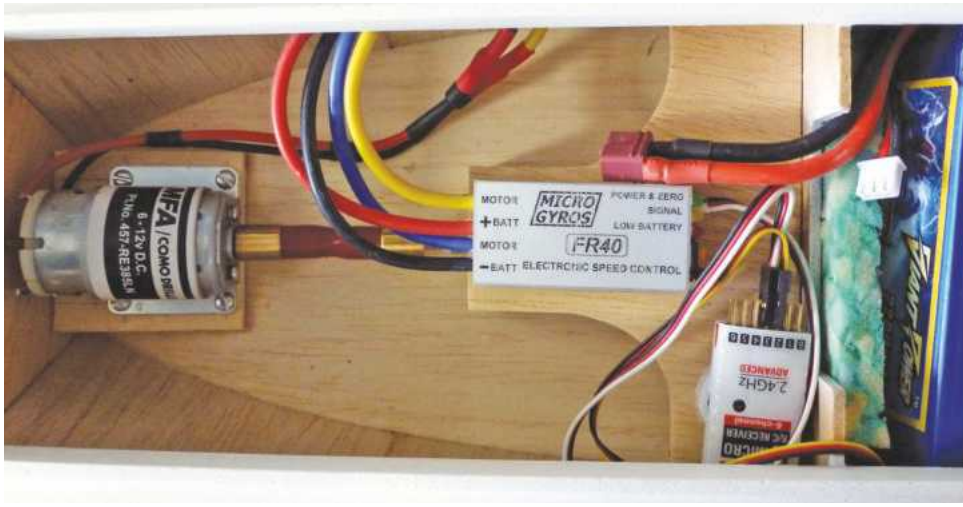


Fig #7 - Disabling BEC

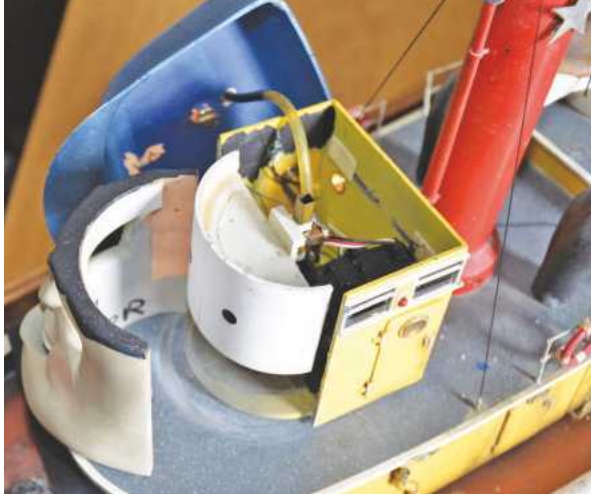
Conclusion

I hope this has all made the subject of Battery Elimination Circuits a bit easier to understand and why it is also common now for the power rating of the BEC output to be marked on electronic speed controllers (or in the instructions) since servo power demand might exceed what the internal regulator is designed to cope with in some sophisticated r/c installations. In practical terms though for the average scale model boat, a 1 or 2 amp BEC output is probably more than adequate, but do bear this in mind if using sail winches and/or high power servos powered directly from the receiver.

(All photos and diagrams by the author)



Microgyros' FR40 BEC-equipped ESC in another Moonsong model.



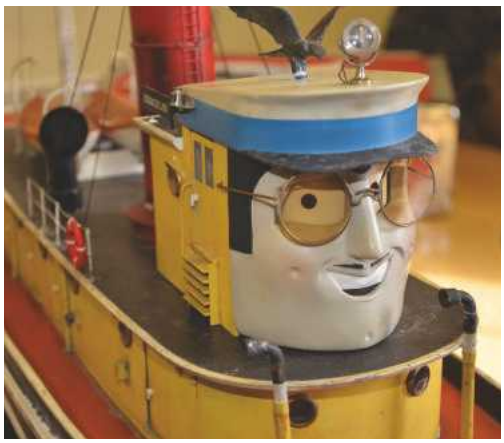
ABOVE: Ten Cents, Stack No. 1 in the Star Tug Fleet. You can see the weathered finish that is applied to all the models to create well used, working vessels. The models are not that large and quite easily transportable. ABOVE RIGHT: Inside the head of Warrior with its changeable face, moving eyes and a head that can turn, along with a pipe to feed water to a fire hose on his cap!

Tugs – 25 years on!

Robin Buckland *visits a new display*

An article in Model Boats in July 1990 covered the production of a children's TV programme called 'Tugs'. That feature closed with the words, 'Now shooting is long over, and before perhaps a second series, each of Clearwater's precious tugboats have been carefully packed away in boxes and locked in a storage vault at Shepperton Studios, but then at £8000 apiece, wouldn't you look after them!

'Tugs' was an idea that grew during Season Two of Thomas the Tank Engine, when Robert D. Cardona and David Mitton were working for Britt Allcroft around 1985, producing those five minute stories in live action animation at Shepperton Studios, all so different from the latest computer generated stories. When a new studio at Shepperton became available, pre-production began in 1987 and actual production started in October



ABOVE: The face for Hercules, one of the largest of the models, bears a striking resemblance to the film star Clark Gable, so clearly something of a hero!

ABOVE: The Star Tugs team at the opening event, Ryan Hagan, Sean O'Connor, Sam Wilkinson, Charlotte Stokes, Chris Eden-Green and Doug Roberts.

RIGHT: Hercules the ocean going tug, is one of the largest of models.

ABOVE: Warrior, with the head parts all in place. The searchlight and fire monitor look very much like some currently available fittings from Graupner, Robbe and the like!

ABOVE: The inside of Hercules. The grey pipe allows another pipe to be inserted through it to feed 'smoke' up through the stack (funnel) for filming.

1987. It ended in December 1988 with a complete series of 13 episodes, each half an hour long, and all safely in the can. That series was aired in the UK in 1989 through their link with TVS and sold to other TV networks around the world, but sadly a second series never materialised. With an expensive process to create another series of 13 half-hour stories, both Clearwater Productions and their partner fell victim to the change in the TV licensing at that time which meant that TVS had to re-bid for the franchise and they lost. So as TVS went out of business, the vital support for another series was pulled away from the Tugs series, and Clearwater Productions folded as well. So in large part, the models stayed locked away in their custom made boxes, stored and awaiting their fate, although one or two did see a new life with some modifications, in the Thomas the Tank Engine stories.

Of the two partners, David Mitton went back to work on Thomas the Tank Engine, which he did until around 2003 while Robert D. Cardona went to work in Canada, where he directed about 60 episodes of a Canadian series called 'Theodore Tug Boats'. It wasn't quite the end of the Tugs footage either, as that was reworked in the USA in 1997 to make a series called 'Salty's Lighthouse'. This created new stories using the footage, with US voices in place of the British ones. One of the original tugs, the paddle wheeler O.J., was adapted, but losing his face, to become 'Lakesider' in Thomas the Tank Engine, a format which it is still in use to this day.

The stories were set in an international harbour in the 1920's, and the work being done was factually based around the documented history of the Crawley Marine Tugboat Company of San Francisco and what they did in the harbour and the local rivers through the different seasons of the year. That was then interweaved with a story centred on the rivalry

ABOVE: Zug, one of the smaller 'baddies'!

ABOVE: Zorran, leader of the rival Z-Stacks!

BELOW: Billie Shoepack is an 'Alligator' tug. His face is missing, but this gives an opportunity to see the working elements of the head and eyes and the front port corner of the deck is in need of some restoration.

ABOVE: O.J. was one of the largest of all the models and is a paddle tug. It was later altered with the removal of the official 'Tugs' head and replaced with a normal bridge for use as Lakesider III in the filming of Thomas the Tank Engine, as you can see here.

RIGHT: Big Mac! Another of the 'goodies', and still in excellent condition.

between two rival tugboat companies so as to create a children's entertainment programme. The tugs each had a bridge that could turn as a head and faces with moving eyes. Each one had a set of different faces for all the different expressions that were required in the stories, helping give them their own personality.

The 'Star Fleet' was made up of seven tugs belonging to Captain Star and these were:

Two Switchers
Ten Cents (Stack No.1) and Sunshine (Stack No.7)

Two harbour tugs
Big Mac (Stack No.2) and Warrior (Stack No. 5)

A railway tug
Top Hat (Stack No. 4)

The older Paddle-Wheel harbour tug
O.J. (Stack No. 3)

The Ocean-Going tug
Hercules (Stack No. 6), the largest of them all.

The opposition were five tugs who made up the 'Z Stacks' belonging to Captain Zero and these were:

Three harbour tugs
Zorran (Stack No, 1) the leader, and Zebedee (Stack No. 2) and Zak (Stack No. 3)

Two Switchers
Zug (Stack No.4) and Zip (Stack No. 5).

Other characters included Lilie the lightship; Grampus the miniature submarine; and Billie Shoepack which was an Alligator tug.

"The group have been able to purchase all but two of the models used in the series, but sadly don't know what has happened to Grampus the submarine and Top Hat the railway tug..."

And now?

25 years later, a group of partners have got together to buy the models and form a new company around them, namely 'The Star Tugs Co'. The group have been able to purchase all but two of the models used in the series, but sadly don't know what has happened to Grampus the submarine and Top Hat the railway tug, though they do have the box with all the different faces for them! If anyone knows of their fate or whereabouts, then Star Tugs would like to hear from you. They currently hope they will at least be able to locate the plans and build replicas in future. So with 18 models in the collection, work is now beginning so as to show them to the public once more.

Having run that feature 24 years ago in this magazine, Model Boats was invited to see them again as their new home which has been opened

The face of Big Mac!

ABOVE: The transport boxes (on top of the display bases) are not dissimilar to what you see at model boating events nowadays.

LEFT: Lillie the lightship makes for a bright display, even without the light working, and that is also Ten Cents visible in the background.

in an old railway carriage, sited in the collection at the Midland Railway Centre at Butterley Station in Ripley, Derbyshire. The group have been working on the exterior of the carriage and have repainted it and begun work on the inside to create two separate compartments, one with displays set to hold six of the tugs at any one time, and the other with a large Thomas the Tank Engine together with a TV and DVD player so children can see the videos of the newer episodes. When we were there we had the chance to watch as the first visitors were let in and the models were unveiled one at a time. The overwhelming comment from all of them was how good it was to be able to see the tugs in the flesh as part of a programme they remembered from their childhoods.

The ones on display for the day included Boomer, Big Mac, Ten Cents, Lilly, O.J., Zorran and Billie Shoepack. We were very fortunate in also being allowed behind the scenes, and got to see some of the others that are still being kept in storage, though not all of them are on site as yet. As I have already written, there will be six on display, but not always the same models, depending on when you visit.

The models

The tugs vary in size, but all were finished with equipment and weathered to give them a more accurate appearance as well-worked tugs in this time of transition, when steam was taking over from sail and just before diesel took over from steam. They did not actually 'sail' as they were mounted on trollies under the water's surface in the tank so as not to get unrealistic movement once on film. With their movement around the harbour to be controlled, along with the head movements, it took two human controllers for each boat during filming. Smoke from the stacks (funnels) was fed through the hull during filming rather than needing a specific unit inside each tug and their interiors still contain the electronic gear. After all these years they are generally in a remarkably good condition, although most of them do require a bit of restoration work which is one of the tasks still ahead for the Star Tugs Company. They managed to successfully complete a Kickstart Campaign to raise the money to acquire the railway carriage as a home for their new exhibition and have put a huge amount of personal effort into the carriage and building the displays.

As for the future, well they know that some of the larger models used in the sets and programmes remain in storage with the Thomas the Tank engine materials, so just maybe they will be able to get hold of more of these marvellous models so we can all see them again. Reminding us of childhood memories may even bring more people round to the thought of getting into model boating, now they are older and perhaps have the disposable income to get their own?

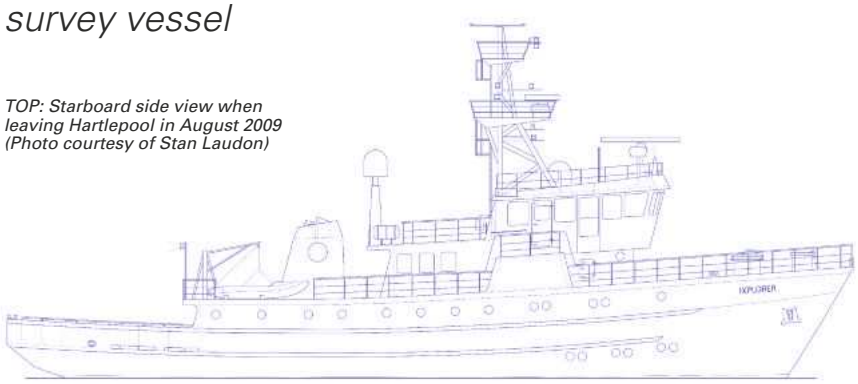
My thanks to the Star Tug Company team who were so helpful when I visited, these being **Ryan Hagan**, **Sean O'Connor**, **Sam Wilkinson**, **Charlotte Stokes**, **Chris Eden-Green** and **Doug Roberts**. Anything else you need or want to know is on their website: www.thestartugs.co.uk.

> *"After all these years they are generally in a remarkably good condition, although most of them do require a bit of restoration work..."*

IXPLORER

James Pottinger *presents a new FREE PLAN for a research and survey vessel*

TOP: Starboard side view when leaving Hartlepool in August 2009 (Photo courtesy of Stan Laudon)



"The shape of the deckhouse on the upper deck allows its easy removal to gain access to the interior of a model..."

This vessel was originally built by Stord Verft, Yard No. 51, in Norway in 1958 as a rescue vessel. She has been extensively rebuilt and converted over a period of time to a hydrographic survey vessel, the final conversion being done at the La Ciotat shipyard and also at Boulogne-sur-Mer in France. Readers might be interested to know that the La Ciotat shipyard is located midway between Marseille and Toulon, in the middle of the Bandol and Cassis wine regions, producing some of the best wines in Provence! This shipyard maintains, services and rebuilds luxury yachts as part of its business.

Ixplorer was also lengthened by some 10 metres which includes the current transom which has been built on to the previous cruiser stern. Perhaps this stern area was extended to take the various gantries and other surveying equipment associated with her new role? The answer to that is that I simply do not know.

She was originally built as Ambassador Bay, but has previously also borne the names Geofjord, Sjomaleren and Geosund before taking her current name of Ixplorer. At the time of writing this in late 2013, Ixplorer was being offered for sale at 900,000 Euros.

Main particulars

LOA:	37.25m
Beam:	7.01m
Gross tonnage:	329
Class:	+1A1 ICE-C EO
Main engine:	Grenaa, 542bhp @ 750rpm
Propeller:	Variable pitch
Rudder:	Becker type

The plan

This to a scale of 1:50. I have omitted some of the fittings and equipment around the deck which is used for survey work. This is for simplicity on

RIGHT: Ixplorer under way at speed.

TOP: Port side view under way showing the hydraulic crane with jib extended. (Photo courtesy of Christophe Dideiu)

ABOVE LEFT: A view when in dry dock. Note the hawse hole and recesses for the anchor flukes in the hull plating.

ABOVE RIGHT: Stern quarter view.

a working model, but notable are the numerous lights and navigation beacons on the mast, the hinged stern gantry and its base sub-frame which is a prominent feature and can be easily made as a working/removable fitting. The various pictures show the details of many of these fittings.

They also show the arrangement of the inside of the wheelhouse and it can be as elaborately outfitted as desired on a model, but I am afraid any search for a steering wheel will be in vain! This is a pity, but it is now is something of an anachronism on some modern vessels.

A model

At 1:50 scale, the hull is 74.5cm overall, or just a fraction over 29 inches long, and a displacement of around 2.7kg (6lbs). At 1:40 scale, model length becomes 93cm (36.6ins) and displacement becomes around 5kg (11.5lbs). Building the round bilge hull should be straightforward enough, either in bread and butter form, or by planking over frames. A conventional single-leaf rudder can be substituted for the Becker type. These Becker rudders have a hinged flap extension on their rear edge to enhance manoeuvrability.

The shape of the deckhouse on the upper deck allows its easy removal to gain access to the interior of a model and the hatch on the aft deck can be made large enough to be above the rudder linkages on an r/c model. Please note the added square section ballast bar added to the original keel. The wheelhouse front is distinctly 'trawler-like', perhaps betraying her origins and original design as a rescue craft.

The current paint scheme is quite basic, the hull showing as being actually a very dark green, indeed almost black, and it has white bands on the hull and guardrails as shown in the photos, with a red underwater section. The decks are a light grey with black bollards and fairleads etc.

Arrangement of foredeck with two hatches. Note angled braces are added to every second rail stanchion on this deck. A floodlight is mounted on each side of the bow with protective guards over.

ABOVE: Forward end of the wheelhouse looking to port, with twin helmsman seats and the central console and instrumentation displays. ABOVE RIGHT: Central console in the wheelhouse and no traditional steering wheel can be seen anywhere! BELOW: Bridge front: This view shows the windlass and the large hatch to port incorporating a smaller escape hatch with central unlocking hand wheel.

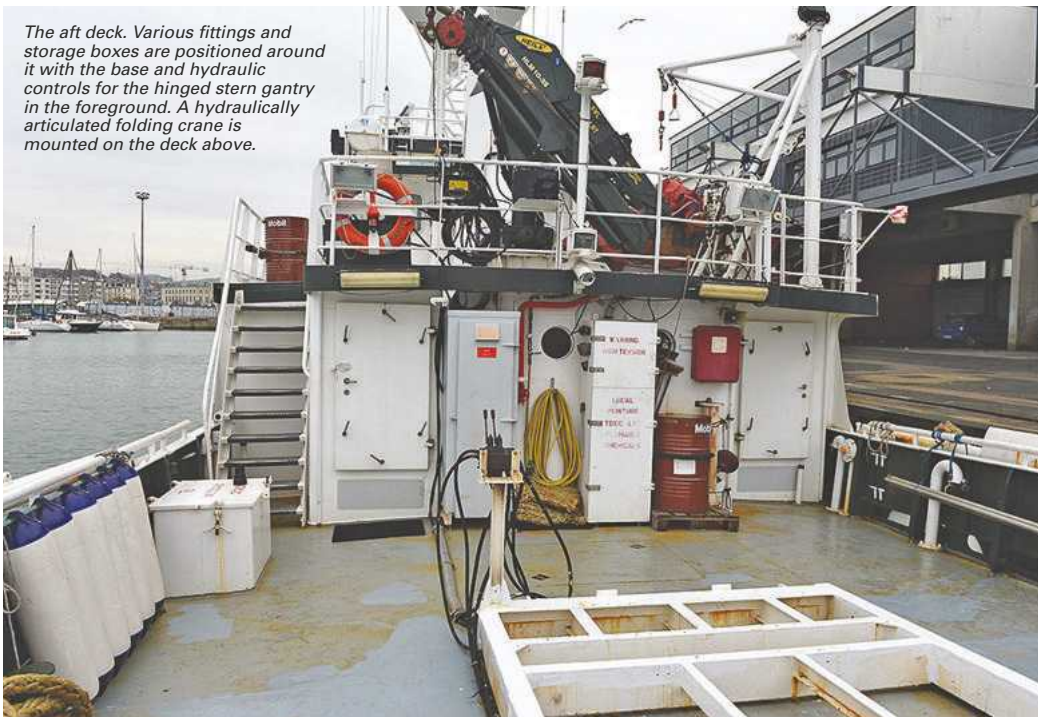
ABOVE: View of mast from forward.

ABOVE: Refitting the rudder and note its Becker hinged trailing flap.

Conclusion

This Free Plan is drawn to 1:50 scale and can be scaled-up as the reader wishes, should a larger working model be required. Ixplorer is an unusual vessel, so makes for a different sort of model boat building project. The plans include the hull lines, so someone with experience of working from plans should have no difficulty in building a model which can be radio controlled. Having a single propeller, but with a Becker rudder, means that it will manoeuvre well when proceeding both ahead and astern, although a conventional rudder can be easily substituted.

(Acknowledgement: Please note that all unaccredited pictures are courtesy of Ships for Sale, Sweden)



The aft deck. Various fittings and storage boxes are positioned around it with the base and hydraulic controls for the hinged stern gantry in the foreground. A hydraulically articulated folding crane is mounted on the deck above.

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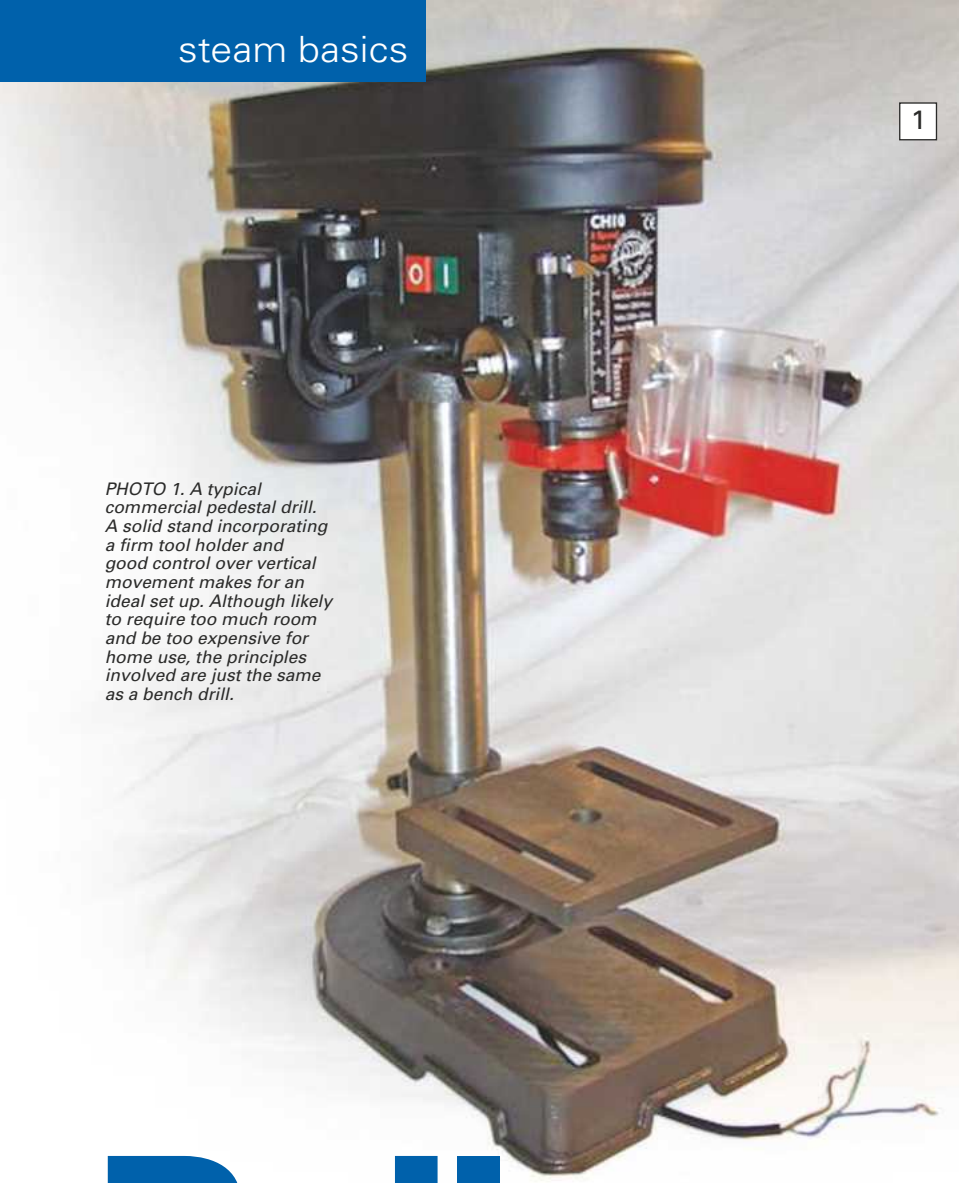

PHOTO 1. A typical commercial pedestal drill. A solid stand incorporating a firm tool holder and good control over vertical movement makes for an ideal set up. Although likely to require too much room and be too expensive for home use, the principles involved are just the same as a bench drill.

Boiler Room

Part Forty Four: Workshop Practice - Drilling: Part One

Richard Simpson's *series on model steam plants*

I generally like to try to select topics for **Boiler Room** based on some sort of comment or feedback I have received in an attempt to try to provide an article that most may find interesting and relevant. In this case I was quite surprised by a few comments at the pondside after club members had read the article on Metals in the MB Winter Special Edition of late-2013, where I touched on some basic workshop skills. Consequently I thought there would be some value in having a look at very basic workshop practices.
I thought I would start off with 'drilling', because I actually think there is much to be gained from a sound understanding of this. Moving away from drilling with a 'close enough' sized drill bit held in our trusty old hand held battery powered pistol drill(!) and then generating nice neat vertical holes of exactly the correct size, has huge benefits to our model making. This is whether we are drilling through a piece of metal, wood, GRP or plastic, as the benefits are really worthwhile.

PHOTO 2. Although limited in many ways, a simple drill stand such as this accessory for a hand-held pistol drill is a huge improvement over not having anything! The job is clamped, the drill is clamped and vertical movement controlled. The whole operation is safer and infinitely more accurate.

The drill

For us, a drill can be anything from a hand-held battery powered pistol drill through to a home pedestal drill, **Photo 1**, but whatever is being used to drive your drill bits, the most basic requirements are that the job is held securely and the drill bit is secured and controlled vertically by a handle. Even a pistol drill clamp accessory device is a huge improvement over a hand-held drill and is inexpensive and easy to include in your workshop, **Photo 2**.

Drill bit types

The good old-fashioned standard High Speed Steel(HSS) drill bit is good for a wide variety of uses. However, if we wanted to be really picky and do every job perfectly, then there is a range of different drill bit types with differing cutting angles and rake angles, making them individually suitable for different materials. As we are not likely to be involved with large scale production, for most common model making metals the HSS drill bit with the 118 degree cutting edge angle is fine and is the one you will find in most tool outlets. As an example, mild steel should be cut with a bit with cutting faces at between 118 and 135 degrees, but for brass and cast iron you should have a tool bit with a cutting angle of between 90 and 118 degrees. So you can now see why most standard tool bits on sale are ground to 118 degrees! The complexity of

drill bit nomenclature is easy to see in **Photo 3,** and this shows just how tricky it can be to sharpen a drill bit yourself and get the angles correct.

As with many varying angles around the business end of the drill, there are also as many different materials from which the bit can be manufactured. Usually these are of varying alloys of steel, including such materials as cobalt and tungsten. Some give you a better quality of bit with a longer lasting life, whereas some are more suitable for drilling certain materials. Sometimes however, a property suitable for one application may work against you in another. For example, a high carbon steel drill bit tends to be harder, giving a longer tool life, but it is also more brittle, being more prone to break if not perfectly centred.

'You get what you pay for' is very relevant here as always, and being tempted by a really cheap set of drills is a false economy as they will blunt quickly, leading to picking up on the cutting edge and subsequent wandering off-centre, as well as overheating and leaving you with a poor quality hole. High quality and expensive drill bits are definitely cheaper in the long run as they will last for a long time if well looked after and give you good quality, accurate holes. To help identify them, invariably good quality drill bits actually look much better with nicely finished flute surfaces and polished cutting faces. Cheap drills often have a dull finish and can even have a rough feel to the cutting edge as a result of them being simply ground and not polished afterwards.

As well as the different tool tip nomenclature and the different materials, there are also specially designed tool bits for specific purposes, such as conical cutters for opening out hole diameters, centre-drills for generating holes perfectly on-centre for lathe operations and stepped drills for use in thin plate operations.

Finally we should mention that all drill bit types are generally split into two categories as a result of the way they fit into the drill, which is either by a straight shank or a tapered shank. Most model making applications will use a straight shank drill, as chucks in hand-held drills tend to be parallel, but larger drills mounted on pedestals for commercial use will often be a taper shank fitting, **Photo 4**.

3

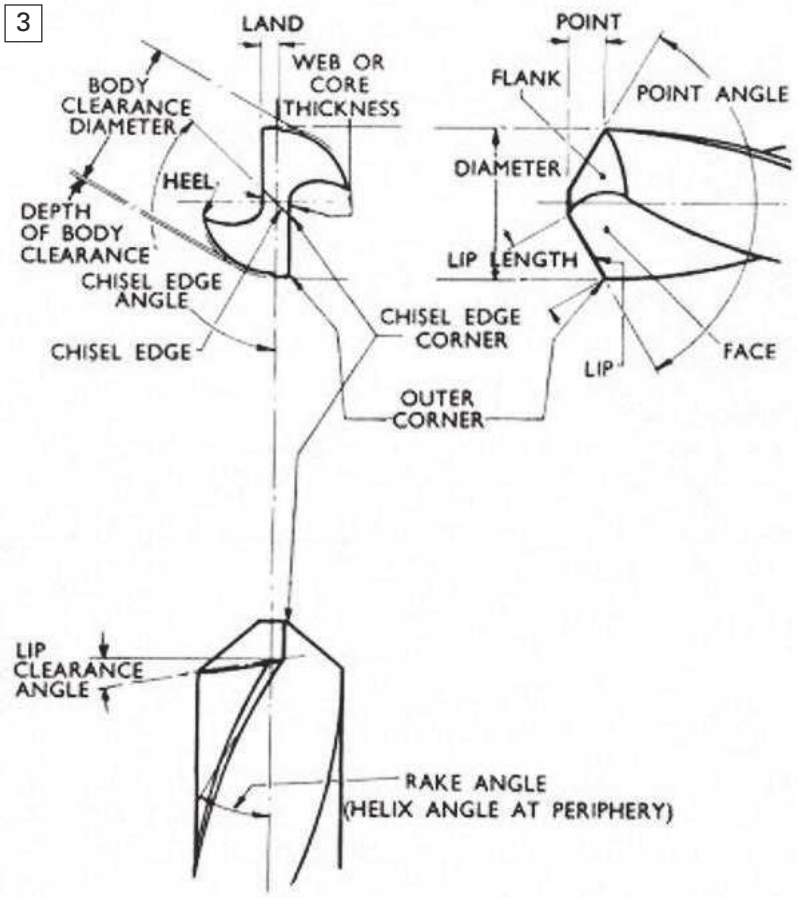

FIG. 11—DRILL NOMENCLATURE
Courtesy of Firth Brown Tools Ltd.

For most modelling purposes we can get away with a standard HSS drill bit, but I would still recommend that you check the cutting speed for the metal you are drilling and the diameter of the drill you are using. Drill Speed Tables are available from many free sources on the internet. The drill bit should of course be sharp and probably the single most common problem in metal drilling is poor sharpening. Also, either the two cutting faces not being level, or the point where they meet in the centre of the drill not being central(!) are probably the other two most common problem areas, **Photo 5**.

PHOTO 3: Just an idea of the complexity of drill bit nomenclature can be seen from this old Sheffield based tool supplier catalogue. There are very few people who can sharpen a drill bit and get all the angles correct.

PHOTO 4: Most small drill bits use a parallel shank and larger ones use a morse taper fitting. Almost certainly we will not come across morse tapers in a domestic drill stand, but some of us may use them in a lathe tailstock.

PHOTO 5. A classic example of a badly sharpened drill bit. The leading edge of the cutting face is actually lower than the following face so effectively there is no clearance. This drill will simply not cut and overheat very quickly.

4

5

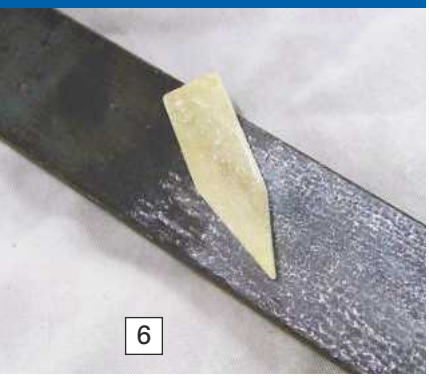

PHOTO 6. Engineer's chalk is quick and easy for marking-out purposes and is readily available. It is actually quite handy for writing on bits of metal as well.

Marking-out

Oh boy, now we are scraping the bottom of the grey-matter barrel! How many times though have you drilled a hole only to find it is not quite where you wanted it and you now have to open it out with a file to give you a rattling good fit, for which you hope, by over-tightening the poor defenseless little bolt, that will adequately compensate this error? We have all done it and for no other reason than we haven't bothered to mark out the job properly. In the good old days of school metalwork, we all used to paint the surface of the metal with a blue marking paint that would show up the scratches of the scribing tools, but I can't remember the last time I saw any of that, although I do remember the smell though!

Nowadays you can either rub some chalk into the surface, **Photo 6**, paint it with a thinned down primer or even put masking tape over the metal, and all these will help you to see your markings and ultimately the point where you are going to drill. This also gives you the option to recheck the position and be completely sure that you are going to drill in the right spot before committing to a centre-punched hole. Marking out properly is still worth doing and the most basic tools such as an engineer's square, a scriber and a steel rule are all you need, **Photo 7**. The steel rule should not have any chamfer or raised edge but should be flat both sides with a square edge and the scriber should be angled into the corner with the job when you are drawing your lines.

When you are finally happy with the position of your hole, reach for the centre punch! Needless to say, the centre punch tool should be sharp and the point placed accurately in the centre of the marked lines, **Photo 8**. One firm tap with a small hammer should be more than enough to mark the centre point for the drill. There are automatic centre punches but they can be tricky to use and you do need to apply quite a pressure on them to get them to operate. Mind you, I have used such a tool now for many years now, so I suppose I have become familiar with it.

So, now having marked out the job and decided the centre punch mark is in the right place, next month we can think about drilling the hole!

"How many times though have you drilled a hole only to find it is not quite where you wanted it..."

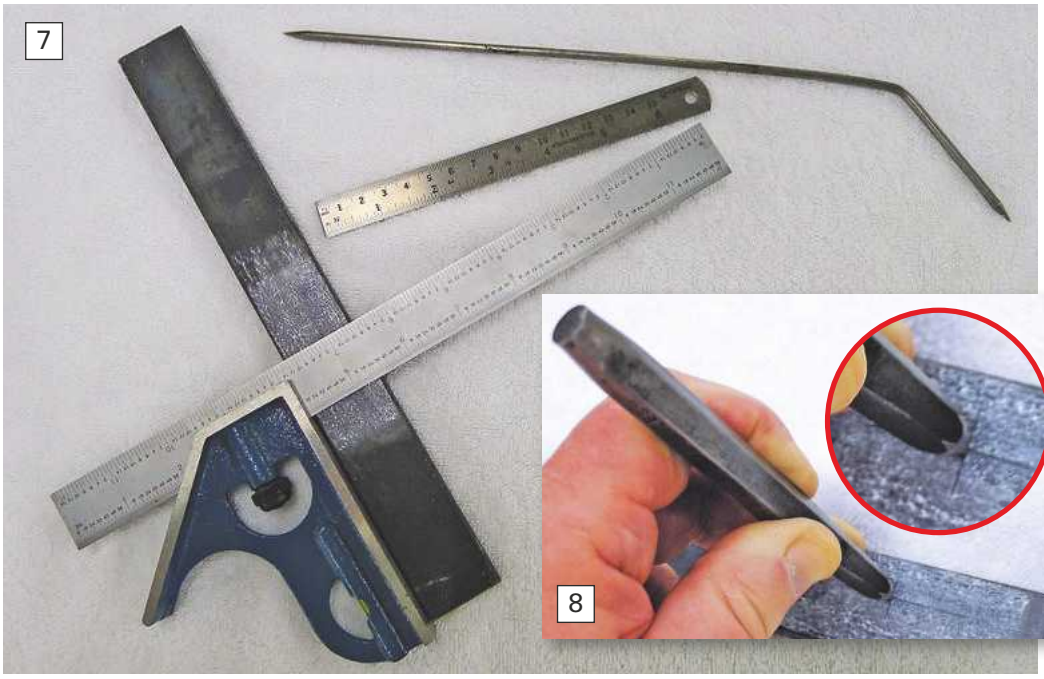

PHOTO 7. Marking out tools are simple, cheap and readily available from machine tool suppliers. It is well worth having the basics to hand and even such things as a scriber can be homemade, or as in this case, borrowed from a scribing block.

PHOTO 8. One good sharp tap with a small hammer should produce a neat centre point to guide the drill and should be bang-on where you marked-out the job.

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Mooring Post

Glynn Guest
with his column of advice and tips for modellers

Geometry to the Rescue!

It is sometimes amazing what you can still remember from school lessons, even though they were some decades ago. I was puzzling out how to draw a nice curve to form the bow shape of a new model. This is normally done freehand and after a few light pencil strokes smoothing and blending them together, a smooth curve can usually be produced. In this case I could not get the bow to flow into the rest of the hull shape. Then out of the proverbial nowhere, I recalled the Intersecting Chord Theorem, something learnt in school geometry lessons but never very useful, until now that is!

This theorem states that if two chords of a circle intersect then the products of the chord lengths either side of the intersection will be equal, **Figure 1**. If we make one chord pass through the centre of the circle, its length will be the diameter or twice the radius of the circle. If the second chord is then placed perpendicular to the first, then we can produce something that could form the bow shape we want.

I leave the algebra to those keen on the subject, but making one simplification gives the handy equation:

R = L squared divided by B

L is the length of the bow section
B is the model's beam
R is the radius required to produce a smooth bow curve

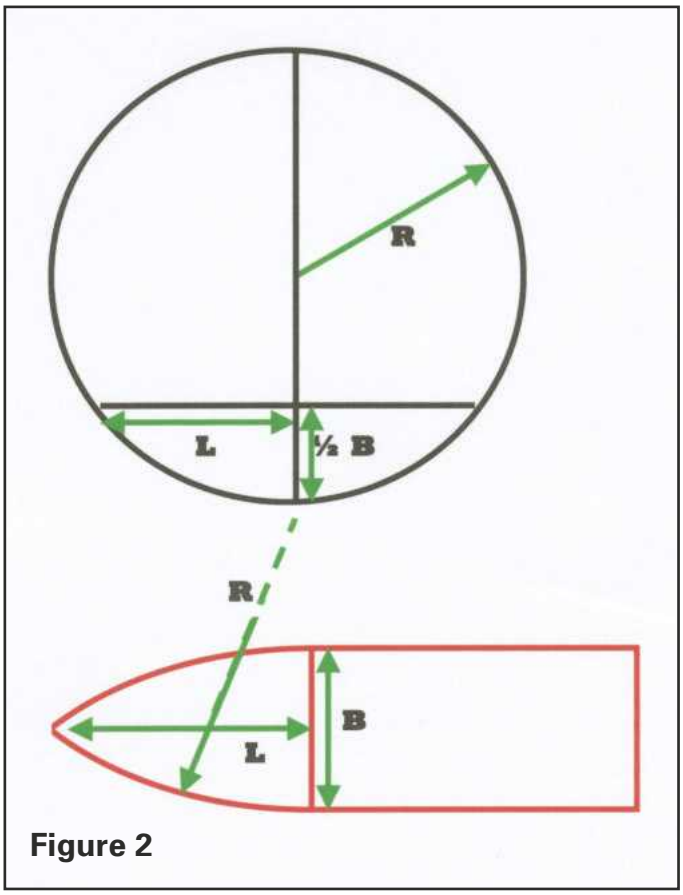


Figure 2

This is shown in **Figure 2** (please note that 1/2B is half the model's beam).

Putting in values such as a bow length of 12 inches (30cm) and a beam of 4 inches (10cm) produces a radius of 36 inches (90cm). The simplification incorporated, that the beam is much less than the length of the bows, does mean that this equation becomes less accurate with the more portly hull shapes, but to use that delightful Americanism, it gets you in the right ballpark. The circumference of the 36 inch radius circle (72 inch diameter) is therefore the curve of the side of the hull.

If dealing with a transom stern which is narrower than the maximum beam of the model, then a modified equation can be used:

R = L squared divided by 2X

R is the radius you require
L is the length over which you want the hull to taper
X is the amount by which the hull sides must be reduced

This is shown in **Figure 3**. Exactly how you draw the curve is up to you as of course the radius will usually be very large. I've used lengths of wood or even string with one end pinned at the centre of the circle and a pen or pencil fixed at the desired radial length to draw the line, but this does give you a method for overcoming the problem.

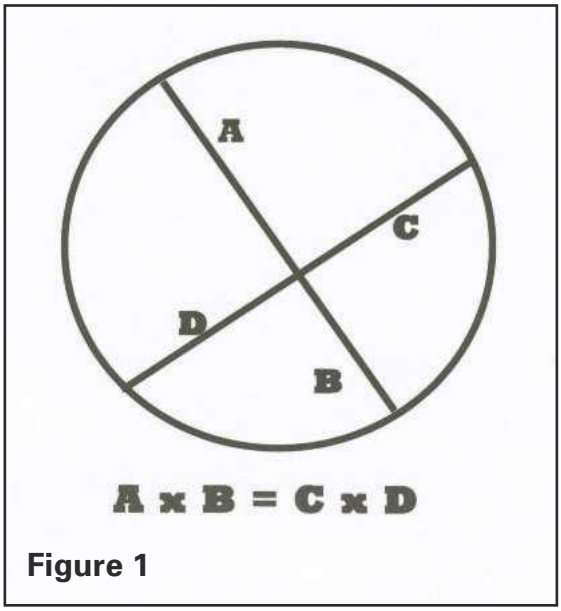


Figure 1

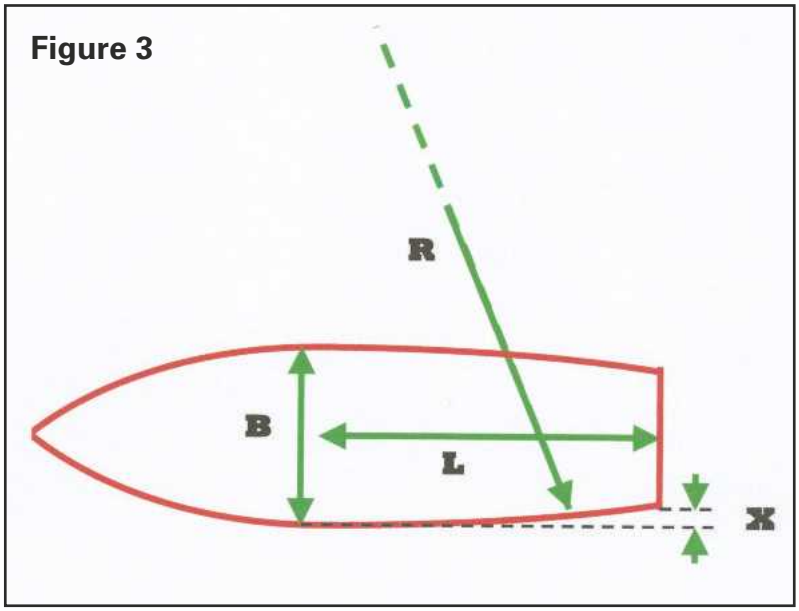
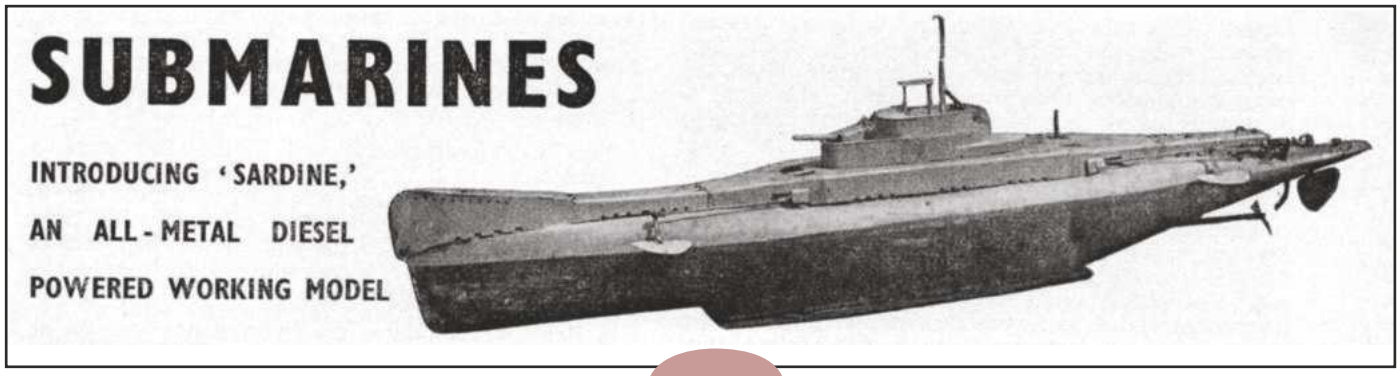
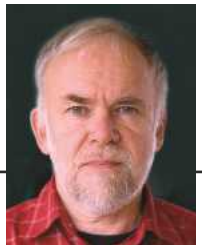


Figure 3



Flotsam & Jetsam

TOP: The Diesel powered submarine, December 1957 Model Maker.



***John Parker** delves into the archives*

17: Early Model Submarines

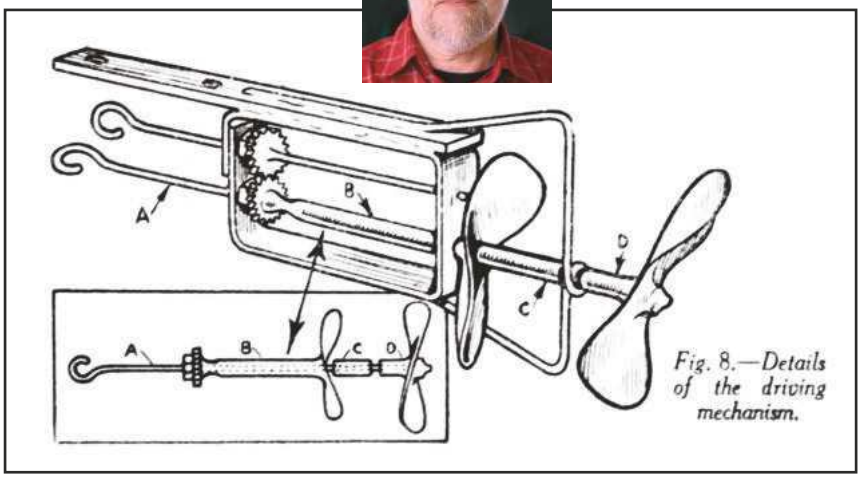


Fig. 8.—Details of the driving mechanism.

ABOVE: Contra-rotating rubber driven props, 1920's.

To many modellers, the thought of spending time, money and effort on a model that is intended to dive below the surface of the water and out of sight in a hostile environment, is a form of madness. To others, the fascination of achieving this feat though the understanding of the science and creation of the model engineering needed to make it happen, makes it all worthwhile. The challenge has attracted fertile minds that have responded with many ingenious schemes over the years, practical or otherwise, and I thought it might be interesting to take a look at some of the pioneering efforts.

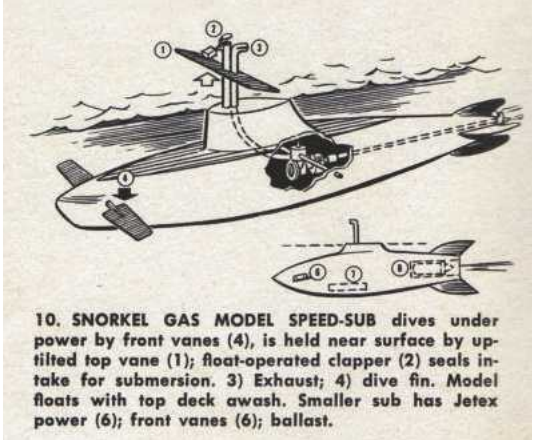
One early form of model submarine took the form of a toy that, although it usually had no form of forward propulsion, would dive and resurface automatically. It did this by means of a chemical reaction that produced a gas when the active substance (calcium carbide or baking powder) reacted with the water. Typically, the model had a 'slow leak' that initially caused it to take on water and dive. This water also started the chemical reaction, the gas from which would expel the water and cause the model to surface once more, whereupon a valve would vent the gas and the cycle would repeat itself. A patent was granted in 1955 for a toy submarine using this principle, but the idea had been around a lot earlier. As a lad I made a diving bell that worked on this principle and sent it down into our large water tank to collect the methane gas from rotting leaves on the bottom. It never failed to return!

If a means of forward propulsion were available, then the model could be made to dive by means of hydrovanes, control surfaces set at an angle to convert some of the forward thrust into a downward thrust and cause a model with minimal buoyancy (typically decks almost awash) to dive. This is known as dynamic diving, because it requires the model to be moving at some speed to generate the necessary down force. In the early days, the motive power was rubber bands, which were very suitable for the task as in effect they had a built-in timer; when the energy from the rubber bands ran out, the model would lose speed and re-surface. A design is shown that addresses the torque reaction problem of a powerful rubber motor by having co-axial counter-rotating propellers. Commercial rubber powered model submarines such as the Glenbur and Electrafleet were available in the 1950's.

Stored energy in the form of a clockwork mechanism could similarly be used, and tinplate manufacturers such as Sutcliffe Pressings made toy submarines that worked this way. The problem here was ensuring the water was kept out of the steel hull, as given half a chance it and its mechanism would quickly succumb to rusting. One simple model submarine was responsible for a notorious hoax, a 1933 photo of the 'Loch Ness Monster' that many experts declared must be genuine, but which its perpetrator revealed on his deathbed to have been a model submarine on which had been attached the sculpted likeness of a plesiosaur neck and head!

Although electric power was the obvious next step, the limitations of battery technology caused some to persist with the application of air-breathing internal combustion engines or even steam engines to model submarines. 'Sardine' was a design for an all-metal diesel powered model submarine that appeared in the December 1957 Model Maker magazine. Its water-cooled Mills diesel engine drew

BELOW: Loch Ness Monster or toy submarine from 1933?



10. SNORKEL GAS MODEL SPEED-SUB dives under power by front vanes (4), is held near surface by up-tilted top vane (1); float-operated clapper (2) seals intake for submersion. 3) Exhaust; 4) dive fin. Model floats with top deck awash. Smaller sub has Jetex power (6); front vanes (6); ballast.

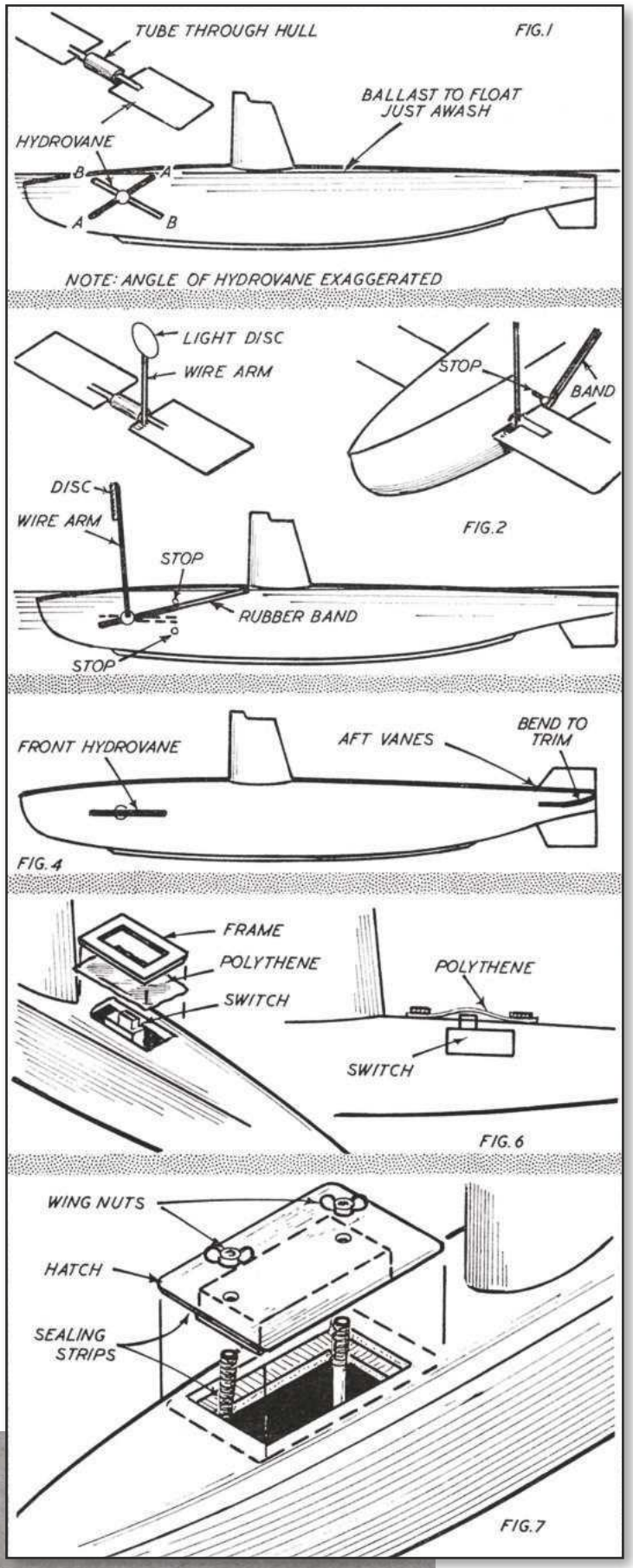
its air from the snorkel, with the dynamics of the model being carefully balanced and adjusted to provide (hopefully) running at periscope depth. It was however necessary to snag the lever on the deck of the free-running model somehow to bring the model to the surface.

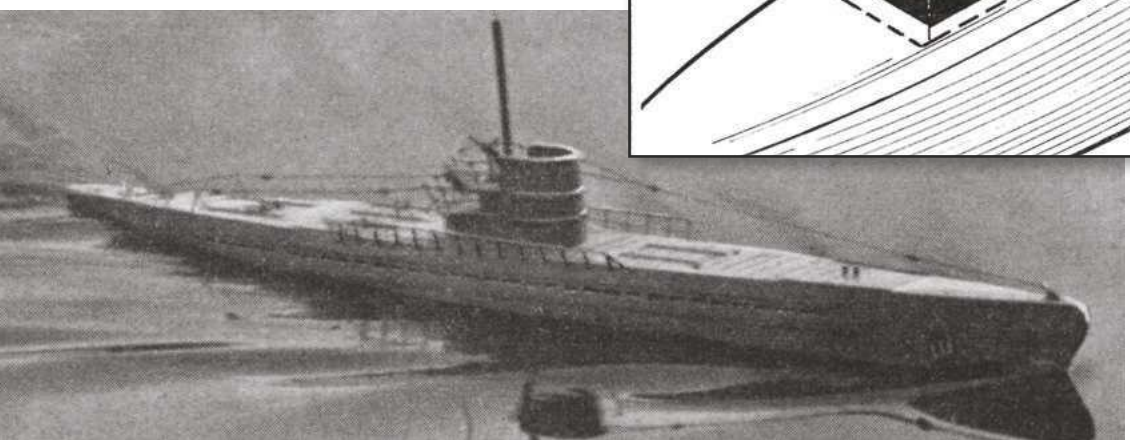
A sketch proposal from an American magazine of around the same time incorporates glow-plug engine power and a float valve to close the air intake should the model submerge, otherwise it is held at periscope depth by the top vane. The smaller sketch below it shows, of all things, a Jetex powered model submarine. I'm afraid that for the tiny short-lived thrust of a Jetex motor to overcome the weight and drag of a model submarine, whilst its wick and exhaust are immersed in water, requires a planet with different physics to our own!

A very popular design from the archives of Model Maker was Peter Russell's Type IX U-boat, which appeared in the May and June 1957 issues. Electrically-driven (appropriately, by two Taycol Torpedo motors) and radio controlled (single channel valve receiver), this we now know doesn't really look much like a Type IX, being far too short and fat, but it did look good and incorporated all the features most people associate with a WW2 U-boat. Being short on control functions with just one channel, diving was effected by means of the front hydrovanes being spring-loaded in the 'down' position, but brought back to neutral when a disk, fixed to the hydrovanes by a length of stiff wire, was pushed back by the drag as it submerged. This was an idea more commonly found on free-running models.

To achieve static diving, without dependence on forward motion, requires water ballast to be taken on or expelled as necessary and causes the model's complexity to escalate considerably. One means of doing this, described by A H Caistor in the April 1959 Model Maker, went back to the principle of the carbide toy submarine already described, but with a more controlled means of dispensing the carbide and the mechanism is reminiscent of a chicken feeder. It incorporates a clockwork model aircraft timer to shut off the air bleed valve that had caused the model to dive by allowing the ballast tank to take on water, and eject a carbide tablet into the tank to generate gas and bring the model to the surface again. The sequence is shown in the diagrams. Mr. Caistor's model was powered by a

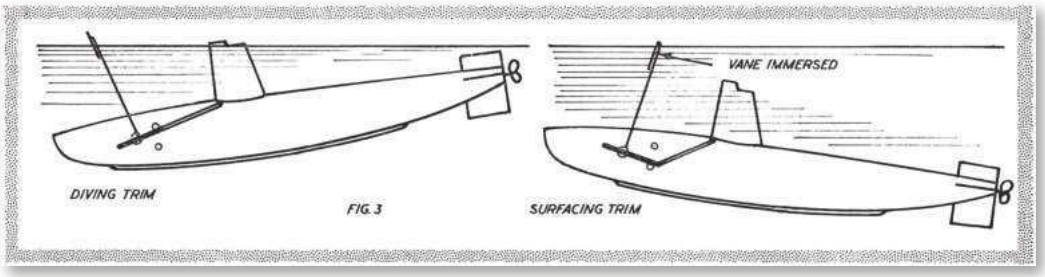
LEFT: Sketch proposals from a 1957 American magazine.





ABOVE: Simple submarine details, July 1965 Boy's Own Paper.

LEFT: Type IX U-boat, June 1957 Model Maker.



RIGHT: Depth regulation by means of drag plate.

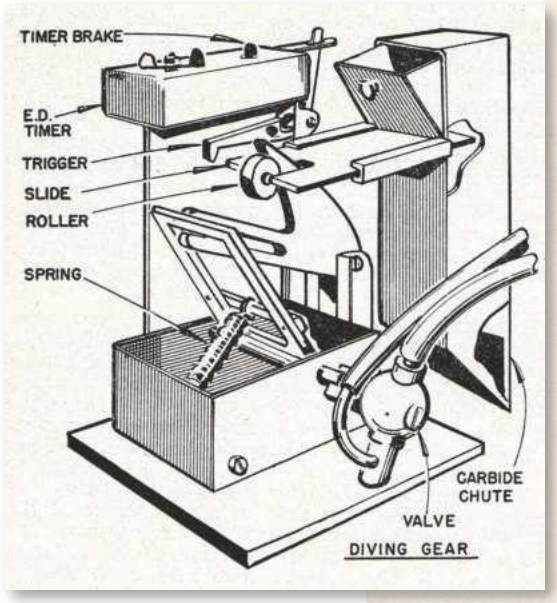
Taycol Comet motor and could dive to 12 metres; what's more, it could kill fish whilst down there as the acetylene gas it produced dissolved in the pond water and poisoned them!

When would you guess a radio-controlled model submarine was first described as a construction project? 1955 or 1948 perhaps, or even a little earlier? How about 1919? I have in front of me the book 'Model Making' edited by Raymond Yates and published in America in 1919. After disposing of such simpler projects as a model aircraft steam engine and gyroscopic railway(!), Chapter XXIII presents to the reader 'A Model Submarine with Radio Control'.

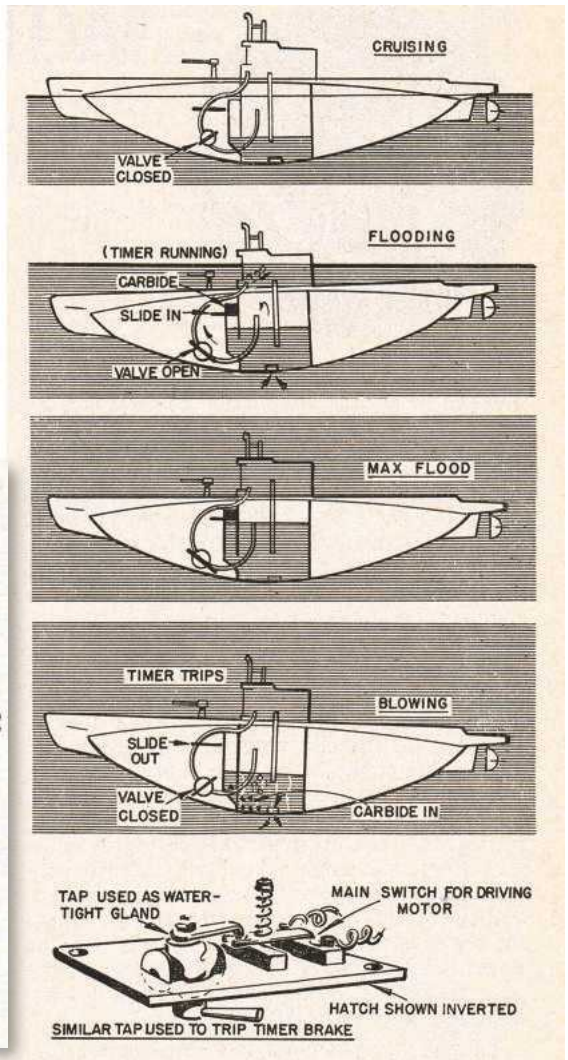
This leviathan of the lake was eight feet (2.4 metres) long and weighed 175 pounds (80 kilograms) on the surface. Full instructions were provided for building the hull, with its geared twin propeller drive, the ballast system and radio control apparatus, making use of a spark-gap transmitter and coherer detector as Nikola Tesla had first done just twenty years earlier. A motorised sequential switch on the model energised different control circuits in turn, which were brought into action if the operator keyed his transmitter when the appropriate coloured light for that function was being displayed by the model. The rudder was activated by solenoids which alone drew 15 amps on pull-in and 5 amps to hold.

An amazing achievement for the time and even more so when you consider that forty years later, some 'experts' in the modelling press were still claiming that a radio controlled model submarine was impossible, as the signals wouldn't penetrate water! This is in fact true now of 2.4GHz equipment, and the reason model submariners need to stick with the 27 to 40MHz bands which brings us back nicely into the 21st Century and the quite large range of working submarine kits now available worldwide.

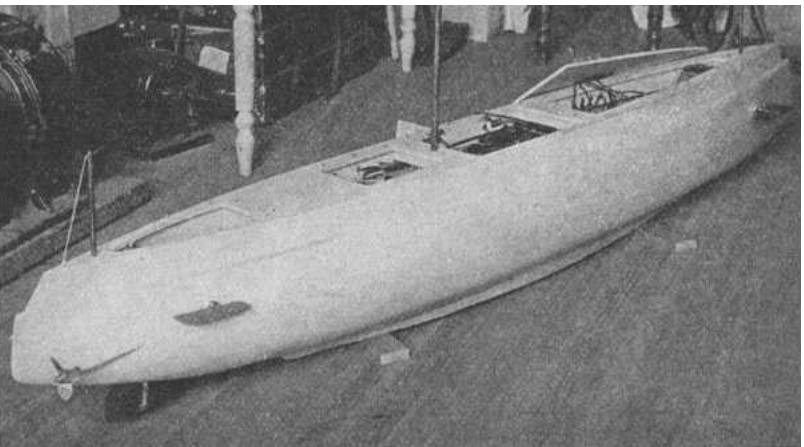
"When would you guess a radio-controlled model submarine was first described as a construction project?"



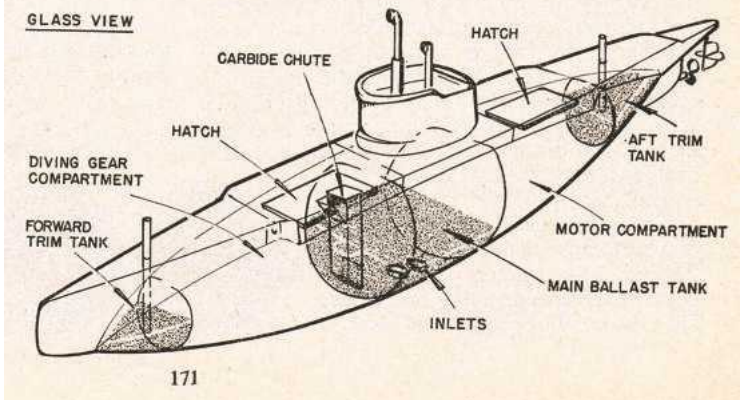
INSET: Carbide pellet feeder unit, April 1959 Model Maker.



FAR RIGHT: Sequence of operations for carbide pellet feeder unit submarine from 1959.



BELOW: A radio-controlled model submarine from 1919!



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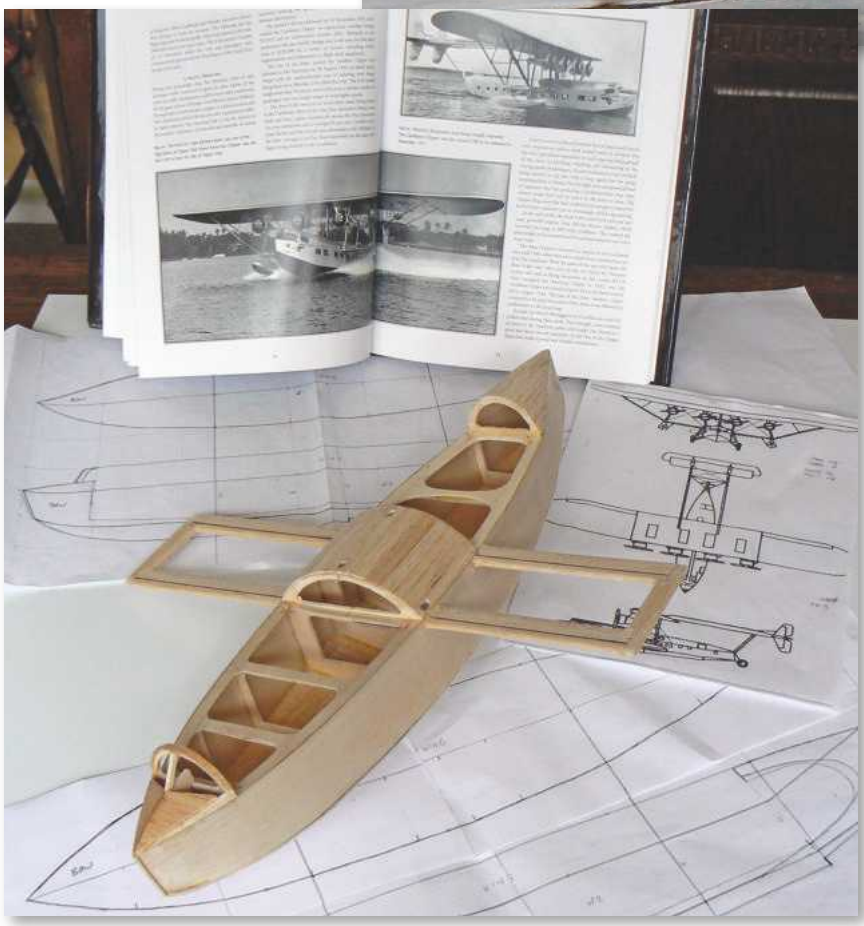
A Non-Flying Boat?

ABOVE: The author's completed S-40 model on the water.

RIGHT: The Catalina styled model flying boat only flew once before going into the bin-bag!

> *...the electrical side of electric flight teaches one about the benefits and pitfalls of brushless motors...*

BELOW: The start of the non-flying S-40 model.



Barry Martin's *models with a difference*

Chatting to other model boaters, I know I am not the only one who has gravitated to boats from model aircraft. Boats offer a less stressful experience, especially as age advances and reactions slow! I still fly occasionally and the electrical side of electric flight teaches one about the benefits and pitfalls of brushless motors, LiPo batteries and high currents, all of which can all be useful in boats, particularly the high performance ones. However, aircraft still exert a fascination for me and all my models have been of my own-design.

Our pond at Horwich, used by the North West Scale Model Boat Club, looked inviting enough to try a seaplane and although I had never before attempted flying off water, I knew that to succeed would need some research and experimentation. It is fortunate that I enjoy building as much as operating boats and aircraft, because thus far my attempt to design a machine which performed on water and in the air, has only achieved one of its design aims!

The first attempt

This was a Catalina type of flying boat of around 33 inches wing span, stabilised on the water by small sponsons rather than wingtip floats. This

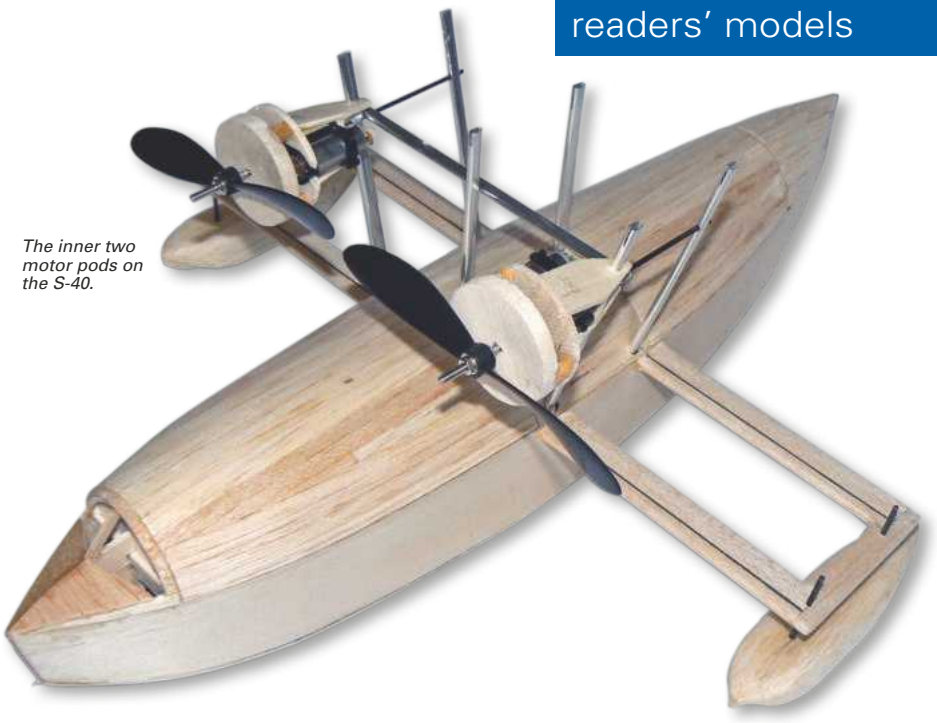
floated satisfactorily on the garden test-pond and to my great satisfaction, it trundled round the field satisfactorily. So far, so good!

At the club pond, the arrival of an aeroplane at the jetty caused some interest, but when powering up the twin, high set brushed motors, the nose sank low under the water! My fellow club-mate's interest changed to amusement and inevitably lots of advice, the submarine enthusiasts being particularly helpful! At this point the genius of those designers of the Sunderland flying boat and Supermarine seaplane became obvious. For flight, an aircraft must balance precisely at the vital Centre of Gravity, but to float it needs buoyancy in the correct places and the hull shape must still be aerodynamic. This Catalina was obviously lacking the necessary volume at the front of the fuselage. After three fuselage rebuilds, I successfully managed to get the model to taxi and get up on the 'step', until trials were terminated due to the prevailing wind. Then, I made the mistake of seeing if it would still fly. The only actual flight of this Mk. 3 Catalina lasted for just two circuits, before the loss of aerodynamic poise due to the weight of the 'floating bits' took over and it ended-up in the usual aeromodelling bin-bag!

However, I do not give up that easily and while still dreaming of a spectacular take-off and landing on the club pond, decided to concentrate on a totally non-flying model, but which looked the part on the water. It would at least be an alternative to my usual paddle steamers and of course Ashley Needham has in these pages designed and successfully operated similar models.

S-40 Pan-Am Clipper

Igor Sikorsky, of helicopter fame, designed a series of float planes for Pan-American Airlines in the 1920's and 1930's, which became known as the Pan-Am Clippers. Sikorsky seemed to solve the design problem I experienced by shaping his fuselages symmetrically, so that they floated as level as any boat hull, upon which he mounted the wings, engines and tail on a multitude of struts to give the vital aerodynamic balance. The centre of buoyancy was obviously very close to the Centre of Gravity, at least that's what it looked like to me. His four engined S-40 first flew in April 1931 and worked Pan-Am's Pacific routes for many years. They were very successful and popular with their well-heeled passengers who travelled slowly, but in considerable luxury.



The inner two motor pods on the S-40.

ABOVE: The S-40 well on its way to completion.

So, the only small three-view image I could find was scaled-up, to make a balsa model of 31 inches wingspan, powered by four small direct drive brushed motors. No effort was made to save weight and in fact the built-up wing is of 2mm thick balsawood and 1mm plywood. The fuselage is balsawood planked, with the underside of 1mm plywood and the struts are alloy streamlined extrusions which also house the wiring for the motors. There are no flying controls and steering is by an ACTion R/C Electronics mixer motor

BELOW: The finished S-40.

ABOVE: Taxiing! The model does not really fly, but is a step in the development programme.

controller, linked to the rudder channel, and it alters the propeller speed of the two inner motors. Three Mtroniks Viper speed controllers are in use; two are necessary for steering (the inner motors), whilst the third controls the two outer motors.

I chose this arrangement because the ACTion unit is so sensitive to transmitter signal that I feared that if my creation did get up to speed, a rapid change of thrust by two motors on the same side could be too severe, so both outers are controlled separately, as the mixer unit allows. Even with this precaution, steering is more controllable by using just the rudder trim, but by using the boat type of electronic speed controller this means the seaplane can also reverse!

The hull is waterproofed with polymer resin over tissue and sprayed with silver car aerosol paint and further sealed with varnish. The outer wing panels detach for carriage and this non-flying boat is something different on the pond. I consider it to be a success, although the detail was limited in case it was ultimately a waste of effort. It is sensitive to wind direction, but on full power generates an impressive triple wake behind, looks good from a distance and even seems as if it might take off. Although it might be considered a failure because it doesn't fly, I am regarding it as a step on the way to one which might – one day!

(North West Scale MBC operates in Horwich, roughly 20 miles North West of the City of Manchester and close to the M61 motorway. The club had a descriptive article in February 2013 MB)

Alex Smart's models

ABOVE: Recognise it? One of Glynn Guest's designs for a semi-scale frigate.

Alex is an 83 year old (ex-pat) retiree living in Australia and as a hobby he has built quite a few model boats from plans in this magazine. He has always had woodwork as a hobby, but was employed in office work and part-time teaching management for more than 20 years. He currently builds model boats to be sailed rather than as exhibition models, his view being that once on the water, all model boats become stand-off scale no matter how much detail has been put into them. As long as they look and perform according to their type, then he is happy! There are no local model boat clubs as such near to him, so he takes them to a local recreation pond to sail, usually in front of an appreciative crowd of parents and young children. All his models are radio controlled and are scratch built using plywood, pine and card. He now has twelve in his collection,

Alex's model of the WW2 HMS Ark Royal.

including a St. Columba cross channel ferry, a Tyne lifeboat, a harbour defence boat, an RAF Thornycroft air-sea rescue boat, HMS Ark Royal, an RN WW2 frigate and a submarine. They give him much pleasure in his later years, keeping him active and helping pass the time.

A few thoughts from Alex

1: In place of balsawood which requires a lot of sealing, light pine is cheap and plentiful in Australia. It is easily worked and the difference in weight is negligible. It is not as absorbent as balsawood and also sands to a fine finish. Access to a small planer-thicknesser machine will easily create sheets 2 to 3mm thick. Domestic wall panelling which comes in half inch thick sheets is easily reduced to the desired thickness.

2: A fine bead of hot glue is run around all the hull joints and helps to stop potential leaks.

3: For all hulls, coats of Shellac are applied inside and out, fine sanded between applications. This takes paint or lacquer really well and is also cheaper then epoxy resin, drying quickly and is waterproof.

4: Alex does not follow all plans religiously as once on the water all models become stand-off scale, so the fine detail is not seen and for some, he may not have the tools or skills to reproduce the fine detail depicted on an original plan, so why 'overdo' it?

5: A crew always looks good and model railway shops have various scale figures that suit many model ship scales. Unpainted figures are available cheaply and with a little care can be painted to suit the type of craft being depicted.

6: It is not essential to purchase expensive motors. Small and very cheap 6 to 12v motors are readily available from electronic shops and if you add a couple of small capacitors, they do not interfere with r/c equipment. Also do not be afraid to use gear reduction to make the drivetrains more efficient.

Alex Stewart - 2014

ABOVE: Some of the detail on HMS Ark Royal.

BELOW: U51 - okay it doesn't dive, but looks menacing on the surface!

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Footballing Tugs?

Phil Scales
of the Ribble MBC describes their fun activity

ABOVE: The match is underway! As you can see Graupner Pollux tugs are small, but capable.

BELOW: The inside of a converted Graupner Pollux tug.

Many people have now seen and enjoyed the furious spectacle of the football playing tugs of Ribble MBC with the associated drama of broachings, collisions and the odd sinking, so the following gives an idea how they came about and what is involved. Some years ago, Ribble MBC built a towing tanker about 8 feet in length and it was agreed by some members that they would build several models of the Graupner Pollux tug to tow it, the kit being of around 1:100 scale. Several Pollux tugs were built and painted in the club colours of red, green and yellow, and all were named with a 'Ribble' prefix. The result was a small fleet with names such as Ribble Rhino, Ribble Rouser, Ribble Bruiser and so on. These little tugs proved to be great fun and it was soon discovered that it was possible to play various games with them including 'Tug Football'. Initially we tried to use a proper ball, but as it was very difficult to push, eventually we began playing with a taped up polystyrene cross, which proved more effective and dramatic.

The tugs

The Graupner Pollux tug is surprisingly powerful and seaworthy for its size, being only about 14 inches long and a single one can tow our 200lb tanker quite easily. The basic kit is of vac-formed plastic and is 'an easy build' project. It will easily accommodate full-size r/c gear and my version contains a full-size servo, a full-size receiver, an Mtroniks esc and a five cell battery pack. The all up weight is about 2lbs which means that the tug has little inertia when used in this contact sport, as even a top-speed T-Bone collision will result in no damage.

The standard motor is the geared Graupner 400 type and it has been found that performance is much improved if a brass propeller, obtained from Prop Shop, is substituted for the plastic kit version. Endurance is amazing and on a full charge most will run for a couple of hours or so. The tugs are very nippy and handy and will turn in their own length.

A little reinforcement of joints is always done and rubber fenders front and rear help with grip when pushing. Obviously the tugs are built to be as waterproof as possible, but do inevitably leak a little over the superstructure coaming and various remedies are being developed to reduce this further, especially as the tugs can spend some time on their beam ends or even being pushed underwater. They are however surprisingly resilient and regularly continue sailing when almost full of water and the Graupner motor seems happy to keep running, even if submerged! Sinkings do occur, but little permanent damage has ever been done. At the last Blackpool model boat show in October 2013, a particularly bruising Saturday match resulted in one sinking, but an evening with the hair drier and it was fully operational again on the Sunday.

The football rules

The rules are simple, as there are none! Two teams are chosen and as a club we have enough tugs to usually play five or six a side, or against external competition. The teams take up position at opposite ends of the pond and the object is to fling the cross into the middle of the (usually indoor) pond and then each team has to try and get it to touch the opponent's side of the pond to score a goal. Anything goes; ramming, ganging-up, playing 'off-the-ball', and the action is fast and furious with no quarter given. We play for 20 to 30 minutes, or until everyone has either retired, been sunk or otherwise disabled. Sometimes one lone survivor plays against the remaining three or four opponents.

Conclusion

Many spectators have said it is the most entertaining thing they have ever seen on show ponds and it is great fun for us and I would say that our members get more enjoyment from their Pollux tugs than anything else they build.

The photographs give a flavour of the football scene, but a much better impression can be seen on You Tube where a search for 'Footballing Tugs' or similar will turn up some action, but for a good viewing of the full-blooded return match against Manx MBC at the Haydock Model Boat Convention in 2012, please see 'Manx vs. Ribble Tug Football' on You Tube. You can also view 'Pollux Football Match 2011' on You Tube and the practicalities of it all?

Unfortunately the Graupner Pollux tug kit is currently showing as discontinued, but may well be reinstated soon as Graupner rebuild their range after their takeover. They do keep popping-up in the marketplace from time to time, so are out there to be had. We have built up our Ribble MBC inventory to 12 tugs, but if any other club would like to start a team and take us on at any of the shows, we would be delighted to mix it with them and have fun. We have been asked to affix coloured pennants to the tugs, so the spectators can clearly identify opposing teams and these are being done with magnetic fittings.

Ribble MBC have a website: www.ribblemodelboatclub.co.uk, and are based in Leyland Lancashire. Phil Scales is the Chairman, and he may be contacted on tel: 01772 629363 for more club information and sailing water address etc.

Looking across the FGSC Model Boating Section site. The smaller model boating operating area is to the left.

MODEL BOAT SECTION

This club has its first Open Day on Saturday 19th April. Why a Saturday? Well, the whole club was open to the public to show what they do and perhaps attract new members for dinghy sailing, as well as the model boating.

Four local clubs supported the event, these being: Brentwood MBC, Moorhen MBC, Stevenage MBC and Chantry MBC, as well as some individual modellers from other clubs. The format was free-sailing on as much of the entire water facility as visitors desired and many took advantage of this with their fast electric models, scale boats, submarines and yachts. A BBQ ran from 10am to the end of the day, organised by Colin Graham ably assisted by Gillian Warne and Ron Rees provided teas and coffees from his camper van. Virtually the entire FGSC model boating membership was on hand throughout the day and there were 25 to 30 visiting model boaters and their partners who could also use the facilities of the licensed clubhouse and its galley.

Was it a success? Well the answer is a resounding 'yes', and it goes to show one can have such an event on a Saturday and visitors will come and enjoy themselves and that free-sailing and talking about model boats in a convivial atmosphere has much to commend it.

The club is based in the Lea Valley just North of Waltham Abbey, Essex. Taking the B194 South from Nazeing or North from Waltham Abbey, turn in to Stubbins Hall Lane and follow signs for Fishers Green and then the sailing club (FGSC). Waltham Abbey is just by the M25 Junction 26, and the club is approx. 8 to 10 minutes drive from that motorway. Website: http://www.fishersgreensc.org.uk/fgsc/

Prospective members should contact one of those listed before coming, as access to the sailing club site is by a card operated electronic security gate.

Colin Graham: colinrgraham@yahoo.com, tel: 07943 436288

Ivor Warne: ivorwarne@aol.com, tel: 07535 990538

*Information supplied by **Paul Freshney***

ABOVE: Gladys Deamer (left) and Heather Lee (right), no doubt discussing how model boating dominates their husband's lives!

A very nice American stern wheeler by Peter Lilley.

Test Bench

***Model Boats** looks at new products*

Attention - Manufacturers & Distributors

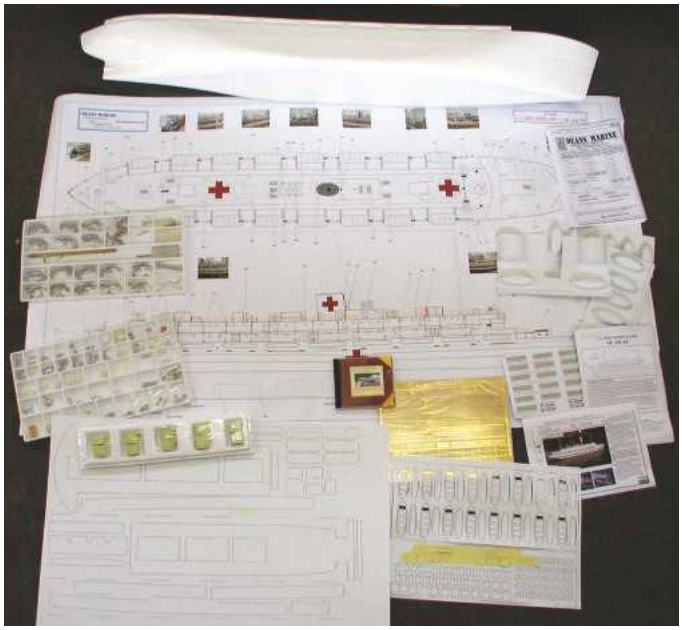
● These pages are open to you - your shop window to bring to the attention of our thousands of readers, new products - kits, books, videos, engines, R/C gear, motors, anything that could be of interest to model boat builders. Send your information initially to Model Boats Test Bench, PO Box 9890, Brentwood, CM14 9EF - or ring the Editor on 01277 849927 for more details.
You cannot afford to miss this opportunity!

St. Olaf is 1:96 scale.

News from Deans Marine

Now released is St. Olaf, a kit of a 1942 US Navy hospital ship, modelled to a scale of 1:96 and being 1400mm x 385mm in size.

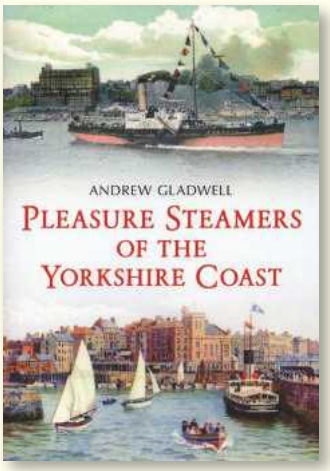
First release price will be £399 and this is a limited edition kit. It is a full kit including a GRP hull, laser-cut styrene and wood parts, 1000 etched brass parts, resin and white metal fittings as appropriate, running gear, sundry building materials, instructions, decals and a full-size plan.



Further information from: Deans Marine, Conquest Drove, Farcet Fen, Peterborough, PE7 3DH, England. Tel: (+44) 01733 244166, website: www.deansmarine.co.uk.

Expo Tools Catalogue 2014

A copy of this recently arrived in the Editorial Office and of course the company are well known from their presence at model shows of all types around the UK. The comprehensive catalogue can be ordered at no charge via their website. As a trader, they ask that you support your local model shop whenever possible when buying goods, and there is a list of the principal stockists on their website. However, in the event of difficulty obtaining the product you require, then orders may also be placed direct via that website: www.expotools.com



Pleasure Steamers of the Yorkshire Coast

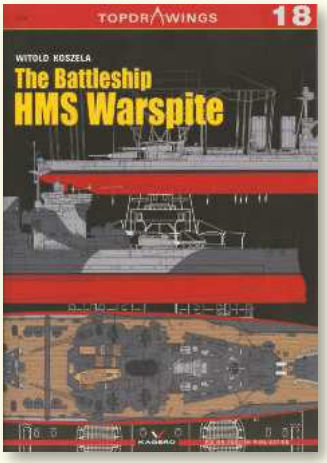
Written by Andrew Gladwell, softback, 128 pages, 235 x 165mm, over 200 photographs in black & white and colour. ISBN: 978-1-4456-1454-0. Price £14.99. Published by Amberley Publishing Ltd. The Hill, Stroud, Gloucestershire, GL5 4EP. Tel: 01453 847800, website: www.amberley-books.com. Available direct from the publisher or through the usual retail outlets.

For over 150 years, pleasure steamers and paddle steamers operated on day trips from the Yorkshire coast resorts, sailing from Scarborough, Whitby and Bridlington up and down the coast, giving the day tripper a taste of life aboard in exchange for a few shillings. From the Cambria, Bilsdale and Coronia sailing from Scarborough to the Frenchman and Yorkshireman from Bridlington, Andrew Gladwell presents a unique glimpse of these and other tourist steamers at the peak of their careers in the period from the 1900's to the 1960's. He tells the story of the pleasure steamers that once plied these waters and the decline in the visitor trade that the majority of traditional UK seaside resorts faced in the 1970's as British tourists sort new and warmer destinations for their holidays, which in turn brought about dwindling passenger numbers and ships being sold off or scraped, and then of its revival in the 1980's when the preserved vessels, PS Waverley and MV Balmoral, re-established the tradition of pleasure trips to and from the Yorkshire Coast resorts that continue to the present day.

Using rare, previously unpublished, photographs of the ships that plied this dramatic coastline and postcards of the resorts they served, we also learn of the musicians that once entertained the passengers and the ship's captains and crews that worked the Yorkshire Coast.

This well presented and highly illustrated book is the latest work by Andrew Gladwell who is Curator of the Paddle Steamer Preservation Society Collection. It is a must-read for both enthusiasts and model boat builders with an interest in paddle and pleasure steamers of this type.

Book Review by ***John Deamer***



The battleship HMS Warspite
Top Drawings No.18

Written by Witold Koszela, 92 pages, ISBN: 978-8-362878-39-0, published by Kagero Books. Price (RRP) £15.99; distributed by Casemate Books in the UK. Available through the usual retail outlets.

HMS Warspite was of course the famous RN battleship, launched in 1913 and finally scrapped in 1950. With a brief historical background and table of general facts and figures about the ship (presented in both English and Polish languages) the rest are pages of excellent scale drawings. In addition there are two separate larger folded sheets of 1:450 scale drawings included, which are tucked into the book as well. These show the ship at the different stages of her service life, together with colour profiles. In the pages of the book itself are drawings that show the ship with detail views of the superstructure elements, masts, ship's boats, main and secondary armament etc., as well as the aircraft carried.

For anyone wanting to model HMS Warspite, I am sure you will find all the extra detail information you could want - recommended.

Book review by ***Robin Buckland***

HMS Barham

1:700 scale plastic kit

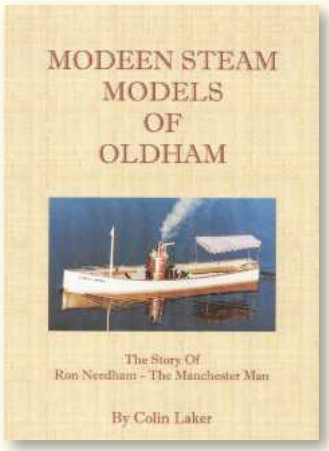
This is manufactured by Trumpeter and the UK Importers are Pocketbond. The kit is available in the retail market, price (RRP), £30, but is often offered at a discount.

This Queen Elizabeth class battleship was launched in 1914, joined the Grand Fleet in 1915 and took part in the Battle of Jutland. She went through a number of changes between the wars, including new AA armament and most visibly, her two funnels being combined into one. In WW2 she served mainly with the Mediterranean Fleet, and was sunk by torpedoes from U331 on 25th November, 1941.

Trumpeter's model features HMS Barham in her 1941 configuration, in terms of armament and camouflage, and is carrying the Walrus as her aircraft. It is nice to see the catapult, which is on top of a rear gun turret, is finely done in etched brass. A number of other items, such as the radar, are also included in etched brass so will look very neat. This also includes some side panels for parts of the superstructure, rather than the detail being moulded into the plastic. You have the option of fitting a flat plate for a waterline model, or if you want to mount it on the display stand, then a full hull option is also included. The Walrus is moulded in clear plastic, which allows you to have a clear cockpit, while the bulk of the aircraft is camouflage painted.

A clear set of assembly instructions take you through the build, stage by stage, and a full colour painting guide, with the dazzle camouflage scheme is included. It is very nicely moulded and is the first plastic kit of HMS Barham as far as I am aware, so a very welcome addition to the range of Royal Navy ships now available.

Review by ***Robin Buckland***



Modeen Steam Models of Oldham - The Story of Ron Needham

Written by Colin Laker, 223 pages, hardback, A4 size, 390 photographs and illustrations, ISBN: 978-0-900443-25-1. Price £28 plus postage & packing from the printers: Headley Brothers Digital Ltd, Invicta Press, Queens Road, Ashford, Kent, TN24 8HH. Order line tel: 01233 648874.

This book is very much about a young man who grew up in the cosy terraced streets of the Bradford district of Manchester. Here from a young age, he was immersed in the sight, sound and smells of heavy industry, but his childhood was interrupted by WW2 and pictures of the devastation caused by the bombing are included in this book. Very much part of Ron's formative years was spent in Belle Vue, Manchester. Although becoming a highly trained pattern maker while working for Crossley Brothers, Ron developed a skill and passion for photography and film making. After leaving them, he worked for a time at Francis Shaw of Manchester as a photographer & film maker then the National Film Agency of Manchester as chief cameraman and editor, and finally B&S Massey Ltd. of Openshaw as their reprographics manager.

Photography was and still is Ron's passion, but he is probably best known for the wonderful model steam boats and engines he manufactured whilst trading as Modeen Marine Steam Models.

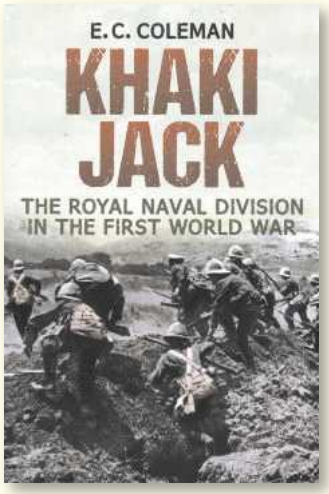
There is much to interest the toy steam and model boat enthusiast in this book with its references to Mamod, Stuart Models, Chart Steam Models, Mersey Model Co. Ltd and others. Now in his 80's, Ron is still active in Manchester and can sometimes be heard presenting jazz music on the local radio or be seen giving talks on photography.

Book Review by ***Paul Freshney***

Khaki Jack – The Royal Naval Division in the First World War

Written by E. C. Coleman. Softback, 256 pages, 248 x 172mm, over 100 black & white photographs, illustrations and maps ISBN: 978-1-4456-0469-5. Price (RRP) £17.99. Published by Amberley Publishing Ltd. The Hill, Stroud, Gloucestershire, GL5 4EP. Tel: 01453 847800, website: www.amberley-books.com. Available direct from the publisher or through the usual retail outlets.

Many thousands of Royal Navy seamen and Royal Marines fought in the trenches of the Great War alongside soldiers from across the Empire. Their graves may be found around Antwerp, on the Gallipoli peninsular, and all along the Western Front. There have been many occasions throughout the long history of the Royal Navy when its seamen have been called upon to fight against an enemy on land. Nelson lost the sight of his eye fighting ashore at Calvi in Corsica and lost his arm leading a force of eighty marines, eighty pike-men and a hundred seamen along the mole at Tenerife. During Victoria's reign, the Naval Brigades made their mark in the Sudan, India, China and Southern Africa.



It would come, therefore, as no surprise to find British seamen, and their officers dressed in khaki uniforms with naval insignia, tramping down sun-baked gullies in Turkey, or wading through flooded trenches on the Western Front to reach the enemy during the First World War. What is surprising however, is the degree to which they, fighting side-by-side with men of the Royal Marines and alongside old established army regiments as an infantry division, made a considerable contribution to the Allied victory of arms over the enemies of the British Empire.

At the armistice, the Royal Naval Division had suffered 46,794 casualties, of whom 10,797 lost their lives and at the same time, the division earned many decorations for gallantry, including eight Victoria Crosses. This book tells the story of those seamen, marines and soldiers who combined together to make up that unique body of men – the Royal Naval Division. This is a must-read for anyone with an interest in the Royal Navy during World War One.

Book Review by ***John Deamer***

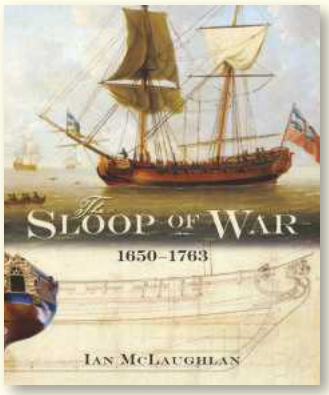
The Sloop of War 1650 - 1763

Written by Ian McLaughlan, hardback, 288 pages, 297 x 256mm, over 320 black & white illustrations including photographs, ship plans, line drawings, watercolour sketches, diagrams and maps, ISBN: 978-1-84832-199-1, price (RRP) £40.00. Published by Seaforth Publishing, an imprint of Pen & Sword Books Limited, 47 Church Street, Barnsley, South Yorkshire, S70 2AS. Tel: 01226 734222, website: www.seaforthpublishing.com. Available direct from the publisher or through the usual retail outlets.

This is the first in-depth study of the Royal Navy's vital, but largely ignored small craft. In the age of sail they were built in huge numbers, mainly in Royal Dockyards, and in far greater variety than the more regulated warships, so they present a particular challenge to any historian attempting a coherent design history. For the first time, this book charts the development of the ancillary types, variously described in the 17th Century as sloops, ketches, brigantines, advice boats, pinks, yachts and bomb ketches, as they coalesce into the single 18th Century category of Sloop of War. The author, naval historian Ian McLaughlan, traces their origins to open boats like those carried by Basque whalers. He also shows how developments in Europe influenced English craft, and focuses on the relationship between rigs, hull-form and the duties they were designed to undertake.

Visual documentation is somewhat scarce, but this beautifully illustrated and presented book, draws together a unique collection of rare and previously unseen images, together with the author's own reconstructions in line drawings and watercolour sketches to provide the most convincing depictions of the appearance of these vessels. By tackling some of the most obscure questions about the early history of small-boat rigs, this book, which may very well become the definitive work on the subject, adds a dimension that will appeal to historians of coastal shipping and practical yachtsman, as well as warship enthusiasts and ship modellers with a particular interest in small ships from this period in the history of the Royal Navy.

Book Review by ***John Deamer***



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BROADSWORD BATCH 3 frigate. One piece 1:72 scale hull, drawings, turret, funnel, deck fittings and running gear. Barely started, but no deck as yet. £200 ovno. John May, tel: 01790 754293 (Spilsby, Lincs.).

LIFEBOATS: Calshot (23.5 inches) £250; Small lifeboat (14.5 inches) £175; Two small (10 inch) police boats £125 each; King George V (22.5 inch) £125; Cobble (35 inch) £300. All with full radio (except King George V). Dot Wilson, tel: 01024 523080 (W. Yorks).

GRAUPNER TITO NERI built to a high standard, never sailed. 12v & 6v batteries, 2.4ghz Rx (but no Tx), £500 ono. Also; scratch built Thames barge, very high standard, can sail, includes weighted keel, no r/c, £450 ono. Buyer collects. Terry Richards, tel: 01865 375726 (Oxfordshire).

LARGE TUG c1950's, scratch built, very sound, metal fittings, would suit steam, good condition, £265. Also; Mountfleet Active tug, immaculate, full electrics, £260. A. Coupe, tel: 01614 273712 (Cheshire).

VOSPER MTB525, with rotating 6pdr gun, 40mm Oerlikon cannon, radar & 2.4GHz Rx (no Tx), £300 ono. Brian Nowill, tel: 01777 704577 (Retford, Notts.).

AIRFIX E-Boat 1:72 scale unopened kit, £15 plus postage. Also 1:72 Walrus flying boat, £6. Richard Bartholomew, tel: 01842 819969 (Weeting, Norfolk).

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Wants

FAIREY SWORDSMAN plans please. 34 inches long? All costs covered. Ted Bunton, tel: 01255 556065 (Dovercourt).

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BMPRS News

Website: www.bmprs.co.uk

Craig Dickson *reports from the second race of 2014 at Nottingham*

ABOVE RIGHT: Kian Searle (2013 runner up Class Champion) with his A class Crusader 3

RIGHT: AA60: Sha Simon's Cavalier on route for second place in the class. (photo by Judith Beesley)

BELOW: Mark Wild keeping his eye on things as OOD.

Hello readers! Following the first exciting event at Branston earlier in April, it was time to meet up again for our next race and Colwick Country Park on the outskirts of Nottingham was the venue. This is always popular as the park has spectacular features including some stunning lakes and excellent facilities making it ideal for model power boat racing. Car parking and toilet facilities are close to the lake, something that is always important. Heavy showers were predicted for the afternoon and that gave everyone the impetus to stick to the racing timetable and get it underway as soon as possible. One concern, was that unlike Branston, we did not have a dedicated team to man the rescue boat, or do the vital lap counting. However thanks to the dedication of the BMPRS members, everyone helped with both duties, so on the day there were no problems whatsoever.

Mark Wild took the role of Officer of the Day (OOD) and did a sterling job of organising the day's schedule. The all important Drivers' Meeting was held at 0945hrs to hear all the key information, including the requirement for each driver to drive safely, especially when in the vicinity of the rescue boat and the penalties for not doing so! Duration for each heat was 15 minutes for all monohull classes except the catamarans whose heats were to be 10 minutes each. The usual format applied, with two heats raced in each class and the laps totalled to decide the final positions. One feature of this fantastic lake is that two sides are surrounded by solid vertical concrete banks. The impact(!) of these, is that any waves heading towards them bounce straight back into the lake instead of being absorbed via the usual sloping grass bank or sandy shoreline. So, with the blustery conditions, this made for some extremely choppy water, making driving challenging and the boats very unpredictable at times. This was especially noticeable in the afternoon when the wind speed rose substantially.

AA class

This is the smallest engine size of boat and there were six competitors. These small boats were, in the afternoon's more adverse conditions, bouncing all over the waves and airborne at times. Most

ABOVE: Little and Large? The smaller yellow D9 cat' of Malcolm Pratt actually won the Cat 2 class. (photo by Judith Beesley)

needed rescuing at least once and on occasion there were only two left on the water. First place went to David Clay with an impressive total of 47 laps, his CMB 21 powered Challenger proving to be the most consistent in both heats. Second place with 24 laps went to Sha Simon running her MDS 28 powered Cavalier. She would have done better if the boat had managed more than four laps in the afternoon because of the poor conditions. Sha is one of the few female competitors in the BMPRS and we would welcome more ladies. Mark Beesley's superb Cavalier powered by an OS 21 outboard engine scored 23 laps in total gaining him third place. Close behind with 22 laps for fourth place was Mike Barnes with his MDS 28 powered Sea Spirit. He won the AA Class Championship in 2013, winning seven of the ten races he entered, so this was a rare non-podium position for him. David Hough and Ian Searle ended up with fifth and sixth respectively, both scoring zero laps in the second heat. Ian had to retire after Heat One anyway, a cog on the engine's gearbox having stripped.

A class

This class features nitro (glow fuel) engines of up to 7.5cc capacity had seven competitors lined up ready to race. It is worth noting that of the five top placed boats, four were using SC and ASP engines that are virtually identical in design. These motors are classed as 'sports engines' and cost a fraction of the price of the highly tuned racing engines, so this does demonstrate that you don't have to spend a fortune to race and get good results.

My own SC 46 powered Crusader 3 was first with a total of 53 laps. I aimed, in both heats, to stay on the water and although not needing rescue, the second heat proved particularly challenging as it was half-throttle for most of the time because of the adverse conditions. Kian Searle running his trusty ASP powered Crusader 3 was second with 21 laps. His first heat was scuppered somewhat, with a failed rudder servo, but it was replaced in time for the second. Third place went to Kurt Cave with his TT 46 powered Cougar and 20 laps. This Cougar is very fast, but the choppy conditions on the day negated its outright speed advantage. Luke Bramwell was fourth with his SC 40 powered Seaspirit and just 12 laps, having had an unwanted meeting with the concrete bank in Heat One!

ABOVE: C176: Mark Beesley's boat powering its way to first place.

However, that didn't stop him from entering the second heat for the all important championship points. Mike Proudman and David Clay both scored zero laps, David colliding with the rescue boat and thus was automatically disqualified. Thankfully the incident was not physically serious, and no damage was caused, but rules are rules!

B class

Only three competitors, but they did well. The splendid CMB 67 powered Apache 50 of Malcolm Pratt clocked up 57 laps to win first place. His actual total was 62 laps, but he received a five lap penalty for driving to-close and fast in the vicinity of the rescue boat. Garry Dickson's Webra 61 powered Challenger also scored 57 laps, but was a fraction of a lap behind Malcolm, and was therefore second. Garry's boat, when throttling back in turns, experienced noticeable problems in turning right because the bow seemed to keep digging-in making it want to go straight ahead, despite full rudder being applied. Garry subsequently realised that the centre of gravity (balance point) of this boat was too far forward and this will be rectified to improve the handling.

Mark Beesley with his 'unknown hull' powered by an ASP 61 was third. The boat flipped over at one point and the time lost in having it recovered and restarted, cost valuable laps.

> *"...you don't have to spend a fortune to race and get good results."*

C class

This is the largest class of the nitro (glow fuel) powered hulls and had four entries. Most of the laps were scored in the morning before the conditions worsened and on more than one occasion in the afternoon the boats needed

BELOW: B176: Malcolm Beesley's third place boat. (photo by Judith Beesley)

ABOVE: Dive, dive! Kurt Cave's F1 Catamaran taking a glug of water in choppy conditions! (photo by Judith Beesley)

ABOVE: Harry Stuart is steering the rescue boat and Ian Searle looking after the recovered D75.

> *...despite the excellent driving skills of everyone, the occasional collision was inevitable.*

BELOW: Carol and Sally Dickson enjoying their lap counting duties!

rescuing. CMB engines powered three of the four boats, this engine being very popular in the large glow engine sizes.

Mark Beesley's CMB 91 powered Aeromarine was especially fast and with 52 laps in total he was first, despite having a stop needing rescue and a re-start. With 43 laps in total, Mike Gelson's CMB 91RS powered Stratos was second. Mike, in earlier testing, had altered the trim of the Stratos making it ride higher out of the water and that possibly presented a new challenge due to the rough water. He was certainly throttling-back in the second heat to reduce the risk of flipping the boat, and even then it needed recovering once for a re-start. Third place with 32 laps went to Harry Stuart with his OPS 80 powered Warhawk. At one point this boat hit a huge wave, leapt into the air and then submarined, before stopping and needing rescuing. In Heat Two the steering function seemed to fail and Harry just managed to cut the throttle to not hit the concrete bank. After recovery it was evident that the boat must have hit something, because the rudder had bent markedly backwards rendering it useless. Ian Searle's CMB 91 Makara boat only managed four laps – not a great day for him! He retired after Heat One as the r/c gear was wet and the propeller damaged after several 'flips' - a wise decision!

D class

This features the largest Spark Ignition (S.I.) petrol engines and had ten competitors. The racing was spectacular, but the rescue boat crew were kept very busy, constantly having to recover boats that fell victim to the rough waters.

Mike Barnes and his Gizmo powered Patriot scored a total of 79 laps to win first place. Mike was the 2013 BMPRS Champion in this class and as this was his first event of the season, so he has started as he left-off! The two Patriot hulls in this event (the other being raced by Kevin Alcock) appeared to cope extremely well with the tough conditions. Second place with an equally impressive 72 laps went to Garry Dickson running his MPM Zenoah powered Miami boat. Garry took it steady in the second heat (after spectacularly barrel rolling the boat), aiming to keep out of trouble and it paid-off with consistent lap scores. Mike Durant with his superb looking Gizmo powered Phantom scored 49 laps to be third. Interestingly, he achieved the highest lap count of all ten competitors in the second heat, but his dismal first heat score reduced somewhat the potential overall total.

Racing in this class saw some fierce competition and despite the excellent driving skills of everyone, the occasional collision was inevitable. Malcolm Pratt's Sigma suffered some hatch damage and a dented tuned pipe after a collision with Kevin Alcock's Patriot, but two following boats managed to avoid a further collision thanks to the reflexes of their drivers.

As an aside, these large petrol engines are commonly started by hand using a manual pull start and if the engine gets swamped with water after a mishap, that can make them difficult to start. Some BMPRS members use an electric starter motor which combined with a belt and flywheel pulley on the engine makes things easier. However, in the afternoon heat this resulted in a problem for Malcolm Pratt as his electric starter could not be found and it was nowhere to be seen! The OOD paused the start of the race to allow him to find it, with people frantically looking everywhere for it. Had it fallen into the water? Was it hidden in his tool box? In the end, much to everyone's amusement, it was discovered that Malcolm had put it back in his car, and so racing started again. This episode greatly added to the fun of the day and was what some would call 'a senior moment'!

Cat T1 class

This comprises small engined catamarans and had three entrants. Catamarans can be a handful in rough water and especially so in the afternoon heat, leading to some spectacular flips and dives. Harry Stuart's OPS 45 powered R2 Silver Fox achieved 25 laps, giving him first place. Throttling down in the rough conditions and driving carefully, paid real dividends with consistent scores in both heats. Second place with nine laps in total went to Kurt

ABOVE: The happy Nottingham winners.

Cave with his neatly built and nicely presented OPS 21 Outboard powered F1 catamaran. He had some spectacular dunkings of this boat after it became airborne on several occasions, but he was always quick to get the engine re-started and away again following recovery. Junior member Kian, with his OPS 21 powered Sprint catamaran came third with four laps. The boat lost its hatch in Heat One and then in Heat Two the first big wave swamped it, which upon recovery revealed that water had now entered the radio box, meaning retirement.

Cat T2 class

This larger class of catamaran had six entries, one more than at Branston. All except one were powered by large spark ignition petrol engines and all of these boats were ballistic when powering over the waves! The only glow fuel powered boat was Malcolm Pratt's Aeromarine cat' powered by a CMB 91RS. Malcolm scored the highest number of laps in both the morning and afternoon heats giving a total of 42 and a well deserved first place. Kurt Cave's exceptionally fast KRC 29 petrol engine powered Conquest achieved 24 laps giving him second place. In the morning heat, Kurt's cat' hit a large wave at speed and did a spectacular back flip somersault before stopping, but he was soon back on the water after recovery. Third place with 23 laps went to Garry Dickson with his new Mercury cat' powered by an MPM Zenoah 31 petrol engine. Garry was taking it steady on the throttle to try and avoid having to have it rescued, although at times even that wasn't sufficient to avoid succumbing to the conditions.

Conclusion

The unpredictable choppy water conditions made for some spectacular action that can only be fully appreciated by those present. These conditions meant that a key requirement to do well was to keep the boat going. The old saying, 'To finish first, then first you have to finish', made good sense on this occasion!

A special thank you goes to Ian, Martin and Steve of the Nottingham MBC who kindly provided the rescue boat, refreshments and a splendid raffle. These guys did a great job and as always made us all feel so welcome. Also a big THANK YOU goes to Mark Wild who did a splendid job of organising the racing.

This concludes my report from Nottingham. Please check our website for the latest updates and remember that potential new members and spectators are always welcome at our venues to enjoy the action and see what we do.

***Craig Dickson** - PR Officer BMPRS*

BMPRS Results: Nottingham 27th April 2014

	Name	No.	Hull	Engine	Heat 1	Heat 2	Total
AA class							
1st	David Clay	42	Challenger 43	CMB 21	27	20	47
2nd	Sha Simon	60	Cavalier	MDS 28	20	4	24
3rd	Mark Beesley	176	Cavalier	OS 21OB	17	6	23
4th	Mike Barnes	4	Sea Spirit 2	MDS 28	14	8	22
5th	David Hough	87	Pursuit	Go 28	11	0	11
6th	Ian Searle	127	Challenger 43	Picco 21	1	0	1
A class *(* rescue boat rule infringement - Disqualified)*							
1st	Craig Dickson	55	Crusader 3	SC 46	30	23	53
2nd	Kian Searle	128	Crusader 3	ASP 46	1	20	21
3rd	Kurt Cave	7	Cougar	TT46	19	1	20
4th	Luke Bramwell	6	Seaspirit 2	SC40	6	6	12
5th	Andy Rennie	11	Challenger 43	ASP 46	5	1	6
6th	David Clay	42	Orion	CMB45 VAC	*	*	DISQ
7th	Mike Proudman	85	Shockwave 36	Dynamite 32	0	0	0
B class *(B9 had five lap penalty due to rescue boat rule infringement)*							
1st	Malcolm Pratt	9	Apache 50	CMB 67	31	26	57
2nd	Garry Dickson	44	Challenger 48	Webra 61	30	27	57
3rd	Mark Beesley	176	Unknown	ASP 61	25	11	36
C class							
1st	Mark Beesley	176	Aeromarine XXX	CMB 91	32	20	52
2nd	Mike Gelson	36	Stratos	CMB 91RS	33	10	43
3rd	Harry Stuart	133	Warhawk	OPS 80	25	7	32
4th	Ian Searle	127	Makara	CMB 91	4	0	4
D class							
1st	Mike Barnes	4	Patriot	Gizmo 28	49	30	79
2nd	Garry Dickson	44	Miami 55	MPM 31 Zen	39	33	72
3rd	Mike Durant	8	Phantom	Gizmo GZ4	13	36	49
4th	Harry Stuart	133	Woody	GWS 26i	20	21	41
5th	Kevin Alcock	75	Patriot	RCMK/Gizmo	4	31	35
6th	Malcolm Pratt	9	Sigma	Zen 29	12	21	33
7th	Ian Searle	127	Apache	RCMK	8	20	28
8th	Kurt Cave	7	Sigma	Tiger King 27	11	11	22
9th	Mick Jones	59	Cyclone	Tiger King 27	8	0	8
10th	Tony Gilder	46	PPB Skater	Zen 26	0	0	0
Cat T1 class							
1st	Harry Stuart	133	R2 Silver Fox	OPS 45	12	13	25
2nd	Kurt Cave	7	F1	OS 21OB	3	6	9
3rd	Kian Searle	128	Sprint Cat	OPS 21	4	0	4
Cat 2 class							
1st	Malcolm Pratt	9	Aeromarine Cat	CMB 91RS	22	20	42
2nd	Kurt Cave	7	Conquest	KRC 29	12	12	24
3rd	Garry Dickson	44	Mercury	MPM 31	7	16	23
4th	Kevin Alcock	75	Conquest	RCMK 27	12	5	17
5th	Mick Jones	59	Cyclone	Tiger King 27	13	0	13
6th	Tony Gilder	46	PPB Skater	Zen 26	11	0	11

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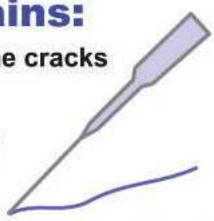

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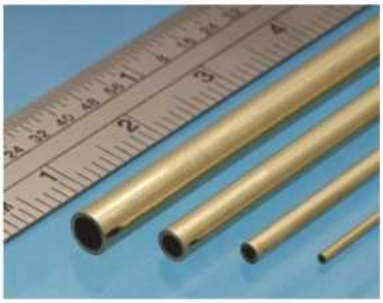

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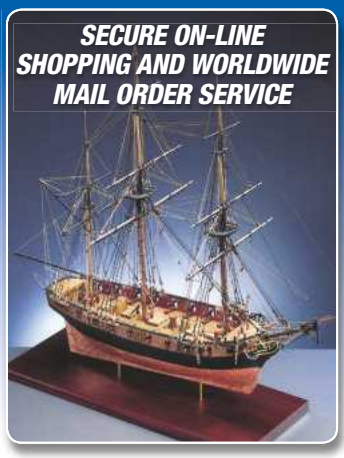

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