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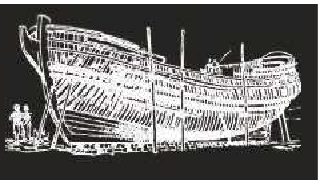

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Hedgehog Anti-Sub. Weapon 1:72 scale	£8.91
Chemical Smoke Apparatus & Smoke Float Set	£8.91
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Small cowl vents	£3.50
Boat hooks	£2.50
Ready Ammunition Lockers type 2	£4.50
Chemical smoke apparatus	£2.50
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Twin manual 20mm Oerlikon on Bandstand	£12.00

Scalelink Etched Brass

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1:96 R.N 3 rail stanchions and railing 11mm	£10.80
1:128 scale vertical laddering	£10.80
1:72 R.N pattern 3 rail stanchions and railing	£10.80
1:192 R.N pattern 3 rail stanchions	£10.80
Clarendon serif Letters 2.5, 3 and 5mm high	£10.80
1:200 Angled step ladders with handrail	£10.80
Vertical rung ladders 4.5mm & 5.5mm wide	£10.50
1:128 Angled step companionway ladders	£10.80
1:128 scale vertical laddering	£10.80
5mm and 6mm wide Angled step ladders	£10.80
6mm & 8mm vertical rung laddering	£10.80

This is just a selection from the huge range available

Crew Figures

1:24 Standing civilian crew member	£8.12
1:24 Seated crew figure wearing woollen hat	£8.12
1:24 Standing R.N/Civilian officer with binoculars	£8.12
1:24 Civilian crew member standing wearing beret	£8.12
1:24 Civilian/R.N Officer wearing cap and pullover	£8.12
1:24 R.N/Civilian wearing waterproof jacket	£8.12
1:24 Standing civilian captain in sheepskin jacket	£8.12
1:24 Seated ships captain with cap and pullover	£8.12
1:24 Standing officer in wet weather jacket	£8.12
1:24 R.N/Civilian wearing waterproof jacket	£8.12
1:24 R.N crew in dress uniform leaning on rail	£8.12
1:24 Seated civilian crew member 1:24 scale	£8.12
1:96 scale crew figure set	£7.37
Ships cat, sitting 1:48 Scale	£2.10
Bearded Officer, 1:32 Scale	£8.75
Crew member,1:32 Scale	£10.50
Officer, clean shaven, 1 32 Scale	£8.93
Bearded Officer1:48 Scale	£7.34
Crew member, leaning on rail 1:48 Scale	£7.56
Young boy,1:48 Scale	£4.55
Small standing dog 1:48 Scale	£2.03
Modern crew wearing dungarees 1:30 60mm	£11.72
Modern crew in smock 1:30 scale 60mm	£11.72
GM72/004 RN 1:72 Officers (Working Dress) (3)	£7.40
GM72/005 RN 1:72 Ratings – pullovers (3)	£7.40
GM72/006 RN 1:72 Officers – overalls (3)	£7.40
GM72/007 RN 1:72 Crew – duffle coats (3)	£7.40

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Rigging Thread, 0.25mm Black	£1.70
Rigging Thread, 0.25mm Natural	£1.70
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Rigging Thread, 0.5mm Natural	£1.81
Rigging Thread, 0.75mm Black	£1.98
Rigging Thread, 0.75mm Natural	£1.98
Rigging Thread, 1mm Black	£2.10
Rigging Thread, 1.0mm Natural	£2.10
Rigging Thread, 1.3mm Black (10mtr)	£2.84
Rigging Thread, 1.3mm Natural (10 mtr)	£2.54
Rigging Thread, 1.7mm Natural 5 mtr	£3.18
Rigging Thread, 1.8mm Black	£4.31
Rigging Thread, 2.5mm Natural (2.5mtr)	£4.42

This is just a selection of the range available.

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Lime Strip 0.6 x 10mm x approx 1 metre long	£0.31
Lime Strip 0.6 x 3mm x approx 1 metre long	£0.35
Lime Strip 0.6 x 4mm x approx 1 metre long	£0.38
Lime Strip 0.6 x 5mm x approx 1 metre long	£0.41
Lime Strip 0.6 x 6mm x approx 1 metre long	£0.44
Lime Strip 0.5 x 7x approx 1 metre long	£0.47
Lime Strip 0.6 x 8mm x approx 1 metre long	£0.25
Lime Strip 1.5 x 1.5mm x approx 1 metre long	£0.36
Lime Strip 1.5 x 10mm x approx 1 metre long	£0.73
Lime Strip 1.5 x 2.0mm x approx 1 metre long	£0.40
Lime Strip 1.5 x 3.0mm x approx 1 metre long	£0.45
Lime Strip 1.5 x 4.0mm x approx 1 metre long	£0.50
Lime Strip 1.5 x 5mm x approx 1 metre long	£0.55
Lime Strip 1.5 x 6mm x approx 1 metre long	£0.58
Lime Strip 1.5 x 7mm x approx 1 metre long	£0.61
Lime Strip 1.5 x 8mm x approx 1 metre long	£0.65
Lime Strip 1 x 1mm x approx 1 metre long	£0.36
Lime Strip 1 x 1.5mm x approx 1 metre long	£0.36
Lime Strip 1 x 10mm x approx 1 metre long	£0.55
Lime Strip 1 x 2mm x approx 1 metre long	£0.37
Lime Strip 1 x 3mm x approx 1 metre long	£0.38
Lime Strip 1 x 4mm x approx 1 metre long	£0.39
Lime Strip 1 x 5mm x approx 1 metre long	£0.45
Lime Strip 1 x 6mm x approx 1 metre long	£0.50
Lime Strip 1 x 7mm x approx 1 metre long	£0.51
Lime Strip 1 x 8mm x approx 1 metre long	£0.53
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Lime Sheet 1mm thick x 100mm x 1 mtr	£5.40
Lime Sheet 1.5mm thick x 100mm x 1 mtr	£6.70
Lime Sheet 10mm thick x 100mm x 1 mtr	£15.59
Lime Sheet 2mm thick x 100mm x 1 mtr	£8.09
Lime Sheet 20mm thick x 100mm x 1 mtr	£31.76
Lime Sheet 3mm thick x 100mm x 1 mtr	£9.53
Lime Sheet 4mm thick x 100mm x 1 mtr	£12.71
Lime Sheet 5mm thick x 100mm x 1 mtr	£12.71
Lime Sheet 6mm thick x 100mm x 1 mtr	£12.13
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Model Ships Fittings	£12.95
Model Submarine Technology	£12.95
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Scale Model Steamboats	£12.95
Making Model Boats with Styrene	£12.95
Simply Model Submarines	£12.95
The Model Tug Boat Book:	£12.95
Scale Model Warships	£12.95
Scale Model Boats. Building & Operation	£9.95
Radio Control In Model Boats	£9.95
Introduction to Marine Modelling	£9.99
Ship Modelling Solutions	£9.95
Scratch Building Marine Models	£9.95
Super-detailing the Cutter Sherbourne	£19.00

This is just a selection from our huge range of books.

Modelling Tools

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Strip Clamp.	£32.95
Swann-Morton 3 knife ACM Tool Set	£22.61
20 piece twist drill set .3 to 1.6mm	£13.23
Amati Pin Pusher De-Luxe	£11.45
Pin Pusher	£9.07
Waterline marking tool	£10.48
A3 cutting mat	£11.18
Pounce Tool with 4 wheels	£11.16

model Boats

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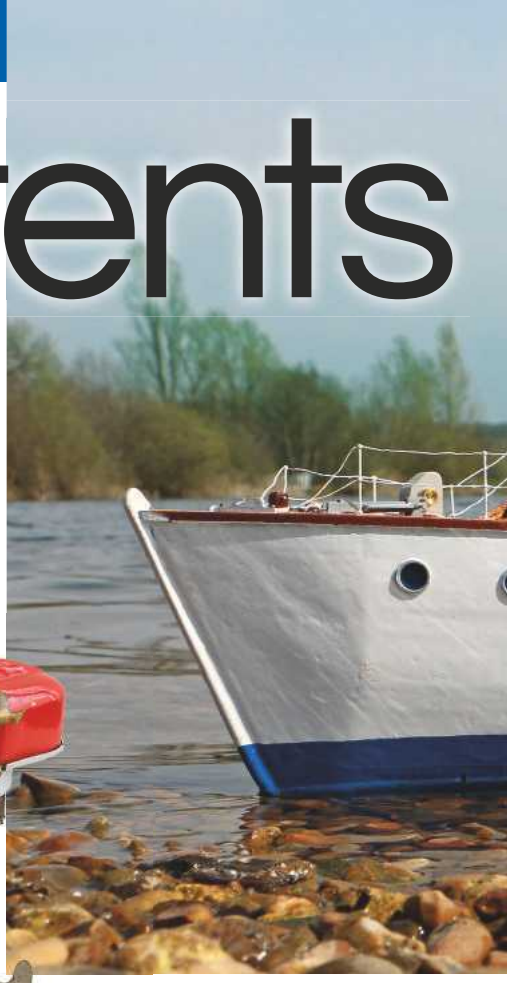

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SUBSCRIPTIONS
My Time Media Ltd., 3 Queensbridge, The Lakes, Northampton, NN4 7BF.
UK – New, Renewals & Enquiries
Tel: 0344 243 9023
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CURRENT AND BACK ISSUES
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EDITORIAL
Editor: Graham Ashby
Suite 25, Eden House, Enterprise Way,
Edenbridge, Kent, TN8 6HF.
Email: editor@modelboats.co.uk

PRODUCTION
Designer: Steve Stoner
Illustrator: Grahame Chambers
Retouching Manager: Brian Vickers
Ad Production: Steve Stoner

BUSINESS DEVELOPMENT MANAGER
David Holden: 07718 648689
Email: davidholden@mytimemedia.com

SUBSCRIPTIONS MANAGER
Kate Hall

MANAGEMENT
Commercial Sales Manager: Rhona Bolger
Email: rhona.bolger@mytimemedia.com
Tel: 01689 869891
Chief Executive: Owen Davies

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Special Features

editorial

In a moment of quiet reflection, whilst snapping photos for Ray Wood's Silver Mist article this month, I couldn't help thinking how lucky we are to be involved in such a satisfaction-rich pastime. There we were, out in the spring sunshine, in the middle of the Kent countryside, beside crystal-clear water, playing with model boats. Life-affirming is the best way I can describe it. Mind you, what we actually experienced during our three-hour session was just the icing on the cake, the finale of a journey that, for Ray, will have begun months ago with the seed of an idea or a flash of inspiration. We've all been there and from that moment the process of creating a working model boat can take us in many directions to tasks that require any number of different skills from research and technical drawing to woodwork, metalwork, mechanics, electronics, fault-finding, problem solving and more.

Enjoyable and sociable as it is, I think it's fair to say that for most of us the singular act of arriving at the lakeside to sail a boat is not, in itself, what keeps us coming back for more, though clearly if you're involved in any form of competition, it plays a significant part. Kim White touches on the broader appeal of the hobby in his article (on page 46) describing the construction of his 1/72-scale battlecruiser, HMS Invincible. "Careful research is one of the great pleasures of building a model, any model, and then knowing just what everything on the real ship actually does, or did." He's absolutely right, of course. Indeed Steve Whitelock alludes to the same while describing the build of his Port of Wells service vessel, Frank T (page 24). Steve, you can tell, got immense pleasure from the contact he had with Wells harbour office, his chat with the skipper, tour of the boat and, finally, the chance to show the finished model to the office staff and crew. Money can't buy this sort of experience, you get it only through following the well-trodden path to building a model boat. This rich diversity of interest and required skill is what makes the hobby a lifetime pursuit rather than a five-minute wonder and it's exactly why that trip to the lake on a Sunday morning is often just a simple and satisfying finale to the main event.

CLOCKING OFF

And that folks is just about it from me. 21st Century publishing is a volatile old business that's constantly reorganising itself. Accordingly, recent developments require that I vacate this position to take the reins of my previous title, RCM&E. I'm going to miss you. I've had a ball editing these last six issues and leave with very mixed emotions. On the one hand a genuine love for the magazine I'm going back to, but on the other a true feeling of regret that I'd didn't manage to get my feet properly under the table here at Model Boats. MB's team of regular contributors is fantastic. Each and every one has gone out of their way to make me welcome during my stay and I thank them all. Fortunately, my replacement is a fella who's as keen as mustard to come aboard, has a wealth of modelling and publishing experience and a desire to keep pushing this fabulous magazine forward. From the next issue, then, do please welcome Martyn Chorlton.

Graham Ashby

Compass 360

Our news round-up from the model boating world

Editorial Contact: You can reach the Editor, Graham Ashby, via email to editor@modelboats.co.uk. The editorial postal address is: Graham Ashby, Model Boats, MyTimeMedia Ltd., Suite 25, Eden House, Enterprise Way, Edenbridge, Kent. TN8 6HF. Tel. 01689 869840.

FOOTY OPEN

Frensham Pond SC Model Yacht Group ran another successful Footy Open Videlo Globe Trophy on Wednesday 11th April which attracted entries from three MYA districts. Despite the foggy conditions, with a steady and cold 8 mph wind, all the competitors enjoyed the day's sailing and 18 races were completed.

Footys are fun

Racing these little boats is always fun and the wind direction allowed the Race Officer, Roger Stollery, to set an unusual course with the leeward mark in a narrowing space between two dinghy jetties, which just added to the fun. On the beat the jetty obstructions allowed port tack boats to hail the starboard boats to tack, adding another interest to the strategy at the start and beating back from the leeward mark. Being so close to the racing is a big advantage and caused Charles Smith to comment after the event: "Quite apart from the jetty work it was so nice to race on a course we could all see so easily."

The racing

As soon as racing started it was clear that the two Peters from Abington Park were going to dominate the event. Peter Jackson sailing his IBEX design won Races 1 and 3 with Peter Shepherd, sailing his Fat Boy Slim, coming second and then going on to win Race 2 and another 10! The remaining races – except Race 9, which was won by Keith Parrott sailing an ICE – were won by Peter Jackson. Some of the finishes were very close indeed and in Race 16 it almost needed a photo finish between Keith and Peter Jackson where Peter ended up clinching victory.

The boats

Footys are popular with model maker sailors because there are a huge number of free plans on the Footy website, including simple competitive chine boats made from balsa that are easy and quick to make. Peter Shepherd designed his own very beautiful little circular section Fat Boy Slim and built it in balsa five years ago.

Weighing less than a jar of marmalade at 410 grams, including 275g of ballast, its lightweight construction and bluff bow has helped to win many events, including this one. It's interesting to note that the recent IOM European Champion Kantun 2 also has this bluff bow feature at the waterline. Fat Boy Slim is narrow and fits in the Footy measuring box diagonally, whereas the wider and more powerful axially measured boats are usually heavier because of their bigger hulls. The jury is still out on which type is best because both provide really good close racing.

National champs

On Sunday 16th September Footys from all over the country will again be gathering at Frensham Pond for the Nationals. In order to encourage young people to race there will be a Junior Championship in the morning run in conjunction with the main event, with the results and trophies awarded at lunchtime. The under 18s may then continue to sail in the main Championship. For more information visit the Footy website at www.sailfootyuk.com – **Roger Stollery**

RESULTS (TOP SIX)

1.	Peter Shepherd	Fat Boy Slim	19
2.	Peter Jackson	IBEX	26
3.	Keith Parrott	ICE	41
4.	Charles Smith	ICE	56
5.	Colin Robinson	ICE	70
6.	John Haine	ICE	77

TRICK SHOT

It has to be said that, as a rule, we're not overly fond of composite images; we much prefer the real thing. However, in an idle hour before starting another build project Brian Knight (who scribbled our Grand Banks motor yacht piece on page 54) created this rather lovely Canadian sunset montage by merging a shot of his model with a stock scenic background. We reckon he did a grand job so we thought you'd like to see it. Nice work Brian.

EXHIBITORS NEEDED

Trevor Goacher, CEO of the charity Care Ashore (which aims to provide housing and support for seafarers in need) has been in touch with the following:

"Care Ashore is a registered charity, which is holding a Charity Model Show from 10:30am to 4:30pm daily on 2nd & 3rd June 2018. We are looking for exhibitors to show their models at the show, which is in its 22nd year. Attractions will include boats, kites, R/C cars, military, trains, stationary engines, plus various children's activities. The show is held at Care Ashore, Springbok Estate, Alfold, Surrey, GU6 8EX. If you're unable to exhibit but fancy visiting the show, entrance is £5.00 for adults, £3.00 for children and OAPs, or £14.00 for a family ticket (2+2). For more Information visit www.alfoldmodelshow.co.uk/ or tel. 07414797331."

A3 MTB

Following week after week of bad weather and postponed photo shoots we finally got to photograph Ray Wood's A3 MTB on the water. Measuring 15" and designed in the style of the hugely popular Keil Kraft EeZeBILT boats, Ferret, as Ray has named it, will be a FREE plan in the July Issue. It's a little gem and we just know you're going to love it. Keep an eye out for more A3 boats in the months to come, there's a whole series waiting in the wings. Next up? Hmm... Maybe we'll do a tug.

PASSENGER POOL

When you're next building a ferry, day boat, cruise ship or, indeed, anything that requires passengers or a civilian crew, remember that model railway suppliers have literally hundreds of figures in all shapes, sizes and poses that are eminently suitable for our use. Everything from N-gauge at 1/160th scale through HO at 1/87th to the larger 1:32nd (and beyond) garden rail sizes is there for the taking. Well worth a look.

DIARY DATES 2018

Saturday 12th May
Model Lifeboat Rally 2018. Knightcote Model Boat Club. Free car parking, club house, plus hot food and drinks. Large sailing water, model railway displays, local RNLI Guild stand and two excellent guest speakers, booked through the Lifeboat Enthusiast's Society, in the on-site conference centre. Gazebos and tables can be provided, however if these are required visitors must contact Adrian or Chris before the event. New House Farm, Knightcote, Southam, Warwickshire, CV47 2EQ. Further details from Adrian Clutterbuck – tel. 01604 846461, Chris Moir – tel. 01926 612827 or visit: kmbcmodelboatclub.com.

Sunday 13th May
Bournville Model Boat Club Submarine Day – the whole day dedicated to all that submerge. 10:00am until 6:00pm. All are welcome to attend and, as all always, tea coffee and refreshments will be available. Disabled access is a given. Visit www.bournvillersmbc.org/ for further information.

Sunday 13th May
Scale / semi-scale navigation event – a joint venture by the Balne Moor Model Boat Club and the Model Power Boat Association. All who are interested in scale, semi scale and novelty boats are welcome to take part or simply bring your boat along for the static display. There will be two classes for navigation: up to 36" and over 36". £1.50 per boat.

Novelty boats can be anything you like! Any boat will be accepted for the static judging. Entry to the competition is by completion of a form which can be obtained by emailing Mike Butler at mikebutler1949@gmail.com. The event will begin at 09:00 and finish about 16:00. More information can be found at: http://balne-moor-model-boat-club.myfreesites.net/.

Saturday 26th May
North West Scale Model Boat Club's Model Show will be held at the Bag Lane Methodist Church, 58 Bag Lane, Atherton, Manchester, MJ46 0JX. 10am – 4pm. Boats, trucks, fairground models and a few aircraft. Free parking, refreshments and just £2 to get in! Accompanied children free. For further details visit www.northwestscalemodelboatclub.co.uk or tel. 01257 270349.

Sat / Sun 26th & 27th May
Model Boat Mayhem at Wicksteed Park, NN15 6NJ. Our usual weekend of model boating fun. We invite all clubs and traders to display and sail. As usual different events will be organised including a Vic Smeed / Glynn Guest model boat competition, straight running demonstrations and warship displays. Entrance to Model Boat Mayhem at Wicksteed is free, however there is an entrance fee to enter the park (max price £6 per vehicle). Camping and on-site facilities are available via Wicksteed Park. For further information contact Nick Brown at raflaunches@outlook.com or visit www.modelboatmayhem.co.uk and click forum.

Sunday 27th May
Edinburgh MBC Start of Season Regatta, Inverleith Park, Stockbridge, Edinburgh, EH3 5NZ. All welcome, catering and comfort facilities will be on hand. www.edinburghmodelboatclub.org.uk.

Sunday 27th May
Balne Moor Model Boat Club – Tugs & Navy Day. It's never a grey day when there are warships! Navigate our scale course, everyone welcome, non naval boats also welcome. £1 per boat, all types. 10:30 start. Bacon / sausage butties are available as well as hot and cold drinks and home-made cakes… until they're gone! SatNav: DN14 0ER. More information can be found at: http://balne-moor-model-boat-club.myfreesites.net/ or by contacting: mikebutler1949@gmail.com.

Sunday 3rd June
Bournville Model Boat Club Workboat Day – the whole day dedicated to all craft that have to earn a living – tugs, coasters, lifeboats, cruise ships etc.. 10:00am until 6:00pm. All are welcome to attend and, as all always, tea coffee and refreshments will be available. Disabled access is a given. Visit www.bournvillersmbc.org/ for further information.

Sunday 10th June
Balne Moor Model Boat Club – Tug Tow Have-A-Go. Here is your opportunity to come along and have a go at tug towing and learn how to tow vessels through harbours. Don't worry if you haven't got a tug, someone will lend you one. £1.50 per boat. 10:30 start. Bacon / sausage butties are available as well as hot and cold drinks and home-made cakes… until they're gone! SatNav: DN14 0ER. More information can be found at: http://balne-moor-model-boat-club.myfreesites.net/ or by contacting: mikebutler1949@gmail.com.

Sunday 17th June
Stevenage Model Boat Club Open Day / Fun Day 10am till 4pm at Fairlands Valley Park, Six Hills Way, Stevenage, SG2 0BL. There will be have-a-go boats for the young and not so young. Come along, bring the family and have a great time on the water. For further information contact Jeff on 07806281236 or email stevenagembc@gmail.com.

Saturday 23rd June
Millbrook Model Mariners will be holding their 2018 Open Day on the freshwater, (brackish), lake at Millbrook on the beautiful Rame Peninsula in South East Cornwall to coincide with the Millbrook Open Gardens Day. There will be free sailing on the 13 acre lake, (sorry no i.c. or fast electric), static displays, local clubs, a rubber duck race (following the outstanding success of last year), and refreshments. The club's sailing platform is at the north east corner of the lake near Millbrook Football Club, PL10 1EN and all will be welcomed by this small and friendly club. For further information contact Richie Richmond on 01752 812898.

Test Bench

A round-up of all the latest kits, books and blingy bits

FREE LUNCH!

Test Bench is a service that we provide free of charge to manufacturers, distributors and retailers of model boat-related product. Covering all disciplines, anything from books to balsa is accepted for these pages. To submit material, email the editor via editor@modelboats.co.uk and make sure to include all relevant text and pricing information along with high resolution images. That's all there is to it. Don't let anyone tell you there's no such thing as a free lunch.

Gorilla Glue Clear

Adhesive brand Gorilla Glue has just launched a new extremely tough and virtually invisible adhesive called Gorilla Glue Clear. Easy to use and perfect for a variety of materials, including glass, it's a glue that could prove very useful for us boat modellers as it's reported to have high strength properties whilst also being waterproof. Quite how it works on traditional building materials we've yet to establish but if you'd like to beat us to it you can find it at Hobbycraft, Morrisons, B&Q and Amazon. Priced at £7.29 for a 50ml bottle and £10.49 for 110ml it's cheap enough to take a chance.

New Narrowboat

Narrowboats make a lovely subject for modelling, not least for the wealth of cabin detail that can be included, a fact that hasn't been ignored by Dean's Marine with the introduction of its latest kit. At 1/12-scale, with a length of 1080mm and a 190mm beam this new narrowboat cries out for fixtures, fittings, furnishings and lights. If you've an eye for internal detail then this is the one for you.

Priced at £270 the basic kit features a glass fibre hull with moulded rubbing strip, laser-cut 3mm marine plywood deck and cabin, a full set of external fittings in cast alloy and resin, prop shaft, propeller, rudder assembly and cast chrome and wood vinyl panels for added bling. Add a full-size plan plus comprehensive instructions and you have a package that'll offer the perfect canvas for all that internal creativity. Visit www.deansmarine.co.uk or telephone 01733 244166.

VMBC Arrow

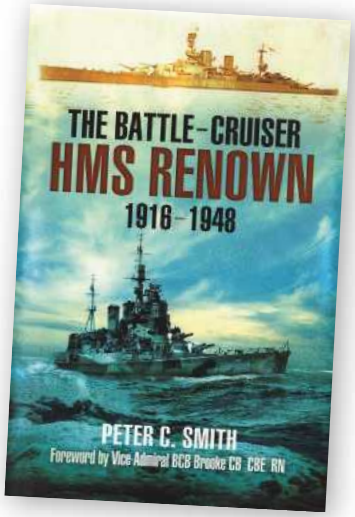
We thought you'd like to know that Ian Hull of SLEC Manufacturing (supplier of the Vintage Model Boat Company range) has just finished upgrading the Arrow powerboat kit, which means he'll have checked all the existing parts for accuracy and performed upgrades to the plan and instructions. Our Sea Breeze has been proof that these old kits still build well however over the years manufacturing discrepancies can creep in and Ian's upgrade aims to iron out any minor problems that may have arisen. In short, there's never been a better time to buy an Arrow. Check it out at www.slecuk.com.

Digital Angle Gauge

If you haven't yet got yourself a digital angle gauge then you've been missing out. Not only are they great gadgets (who doesn't love a gadget?) they're also very useful for an number of jobs in the workshop from levelling stands, decks and waterlines to checking verticals and even hanging pictures! Some we've see use lithium button cells for operation (which can be a pain to source), however this little chap takes a single, common AAA battery. Measuring 2.4 x 2.4 x 0.98", it's constructed from an aluminium extrusion,

has strong magnets in the base and an ABS front panel with LCD display. Best of all it costs a gnat's whisker under £20 from various tool outlets and, of course, Amazon. You need one.

The Battle-Cruiser HMS Renown 1916 – 1948

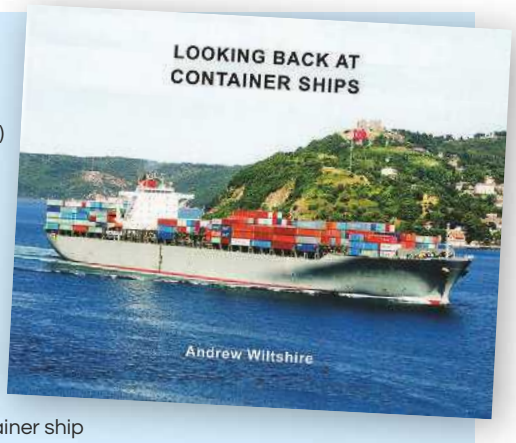


This is the story of the Royal Navy Battle-Cruiser HMS Renown, a famous ship with a long and distinguished operational career. Originally built for the First World War, she subsequently served in the post-war fleet and took royalty around the world. Modernised just in time for World War Two, she re-joined the fleet in September 1939 and, for the first two years of the war, her speed and heavy gun armament made her one of the most important ships. She escorted the famous carrier Ark Royal for most of her illustrious career as flagship of Force 'H' in the Mediterranean and took part in many stirring battles and convoy actions. Later she covered Russian convoys in the Arctic before going out to the Indian Ocean where she took part in attacks on Japanese targets. Her final duties included the meeting of King George VI and President Truman in 1945.

In this book, which was first published in 2008, the well-known aviation and maritime author and historian, Peter C. Smith, tells the story of this famous battle-cruiser in peace and in war, with a host of detail coupled with eyewitness memoirs from former crew members. Ten years on with two reprints (2011 and 2018), this is still an outstanding warship biography.

Written by Peter C. Smith. Softback, 246 pages, 236 x 156mm, over 50 mono photographs, drawings and ship's plans. ISBN: 978-1-8488-4520-6, price (RRP) £12.99. Published by Seaforth Publishing, an imprint of Pen & Sword Books Limited, 47 Church Street, Barnsley, South Yorkshire, S70 2AS. Tel. 01226 734222 / 734555, website: www.seaforthpublishing.com. Available direct from the publisher or through the usual retail outlets – **John Deamer**

Looking Back at Container Ships



Containerisation has rapidly changed the face of global trade. Today it's estimated that at least 90% of the world's non-bulk cargos are transported in container ships and there are around 5000 container ships of varying sizes currently in service worldwide. In this new book by Andrew Wiltshire, the latest addition to his 'Looking Back' series, he takes us on a fifty-year journey exploring container ships from around the world. From the early conversions that gave a new lease of life to cargo ships – many of which started life in the 1940s as wartime standard ships built in US ships yards and laid-up in reserve after World War II – to the giants that have entered service in the last few years.

Lavishly illustrated and beautifully presented, with photographs in full colour, each of the container ships featured has a detailed caption which denotes where and when the photograph was taken, the name and location of the ship's builder, the date completed and the company or organisation it was originally built for. Andrew also gives us a brief insight into the specification and career history, including, tonnage, length, container capacity in Twenty-foot Equivalent Units (TEUs), propulsion type, power output of the engine(s) in bhp, together with any changes in appearance, ownership and name(s), concluding with its current area of operation or, in the case of older ships, final disposition.

Whether you're a ship modeller or container ship enthusiast, this book definitely ticks all the boxes.

Written by Andrew Wiltshire. Hardback, 96 pages, 197 x 245mm, 112 colour photographs. ISBN: 978-1-902953-87-8. Published by Bernard McCall, Coastal Shipping Publications, 400 Nore Road, Portishead, Bristol, BS20 8EZ. Tel. +44(0)1275 84617, email: Bernard@coastalshipping.co.uk. Website: www.coastalshipping.co.uk. Price (RRP) £16.00. Available direct from the publisher or through the usual retail outlets – **John Deamer**

British Warship Recognition

The Perkins Identification Albums – Volume VI: Submarines, Gunboats, Gun Vessels and Sloops 1860 – 1939

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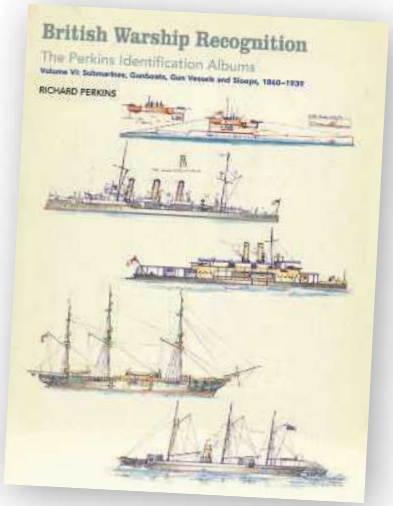
A full review of Volumes I and II was featured in the December 2016 issue of this very magazine (see Crows Nest, page 64). This new Volume VI is now available and details: Submarines, Gunboats, Gun Vessels and Sloops of the documented period 1860 – 1939.



Written and illustrated by Richard Perkins. Hardback, 264 pages, 403 x 311mm (a large coffee table book). ISBN: 978-1-5267-1116-8. Price (RRP) £70.00. Published by Seaforth Publishing, an imprint of Pen & Sword Books Limited, 47 Church Street, Barnsley, South Yorkshire, S70 2AS. Tel. 01226 734222 / 734555. Website: www.seaforthpublishing.com. Available direct from the publisher or through the usual retail outlets – **John Deamer**

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ABOVE: Electric motors available through RipMax in 1958.

Flotsam & Jetsam

John Parker charts the post-war development and the rise of a brand leader

Modellers in western countries first became aware of Japanese miniature electric motors when they started to appear on the shelves of model shops some sixty years ago in 1958. Hitherto known primarily for its cheap tinplate toys, Japan had completed the first stage of its reconstruction after the devastation of World War Two and was seeking new markets. One early driver of this was the realisation that if a small electric motor could be made cheaply enough it could replace the wind-up mechanisms of those tinplate toys and create new demand, not just for the motors but for the batteries that were essential to their operation. Moreover, the motors could also be made available as stand-alone products in their own right.

Mabuchi & Kako

Two quite distinct ranges of motor were offered, each in a wide selection of sizes, under the branding of Kako and Mabuchi. The Kako range was somewhat clumsy in appearance and built from tinplate pressings held together with bent tabs. These pressings held in place two cast Alnico 5 magnets that formed the field and a three-pole armature running in brass bushings. Seven motors from the '01' to the '5' model made up the range in a progression of size and power ratings. The 4 and 5 were of more robust construction and held together with screws; only the 5 had carbon brushes, and they were easily replaceable.

In contrast, Mabuchi motors had a neat deep-drawn blue-enamelled case with a grey plastic end cap. Of a flattened circular section, the casing enclosed two curved field magnets of barium ferrite (held in place by a spring clip) and carried the moulded nylon brush carrier on its top. Six models made up the series, the 15, 25, 35, 45, 55 and 65, covering a similar range of power ratings as the Kakos. Only the 65 was of substantially upgraded construction, with oversize bearings and easily replaceable brushes. On the other models, the brushes could be replaced once or twice (provided your model shop carried spares) by carefully bending the tabs that held the brush housing to the case. An additional two models, the 15-R and 35-R had longer cases and were classified as 'high voltage' motors intended for slot cars.

The most notable thing about these motors was the price, as little as 4s/3d (4 shillings and 3 pence) for a Kako 01 or 4s/11d for a Mabuchi 15. This was substantially less than an English-made motor; the Mighty Midget, for example, sold at the time for 10s/5d in ungeared form.

RIGHT: A line-up of early Mabuchi motors, complete except for the 65.

RIGHT: Six Kako motors of increasing size plus an indeterminate type lower left.

ABOVE: Early long case Mabuchi 12-volt motors for slot cars.

LEFT: Two pages from an early Mabuchi catalogue.

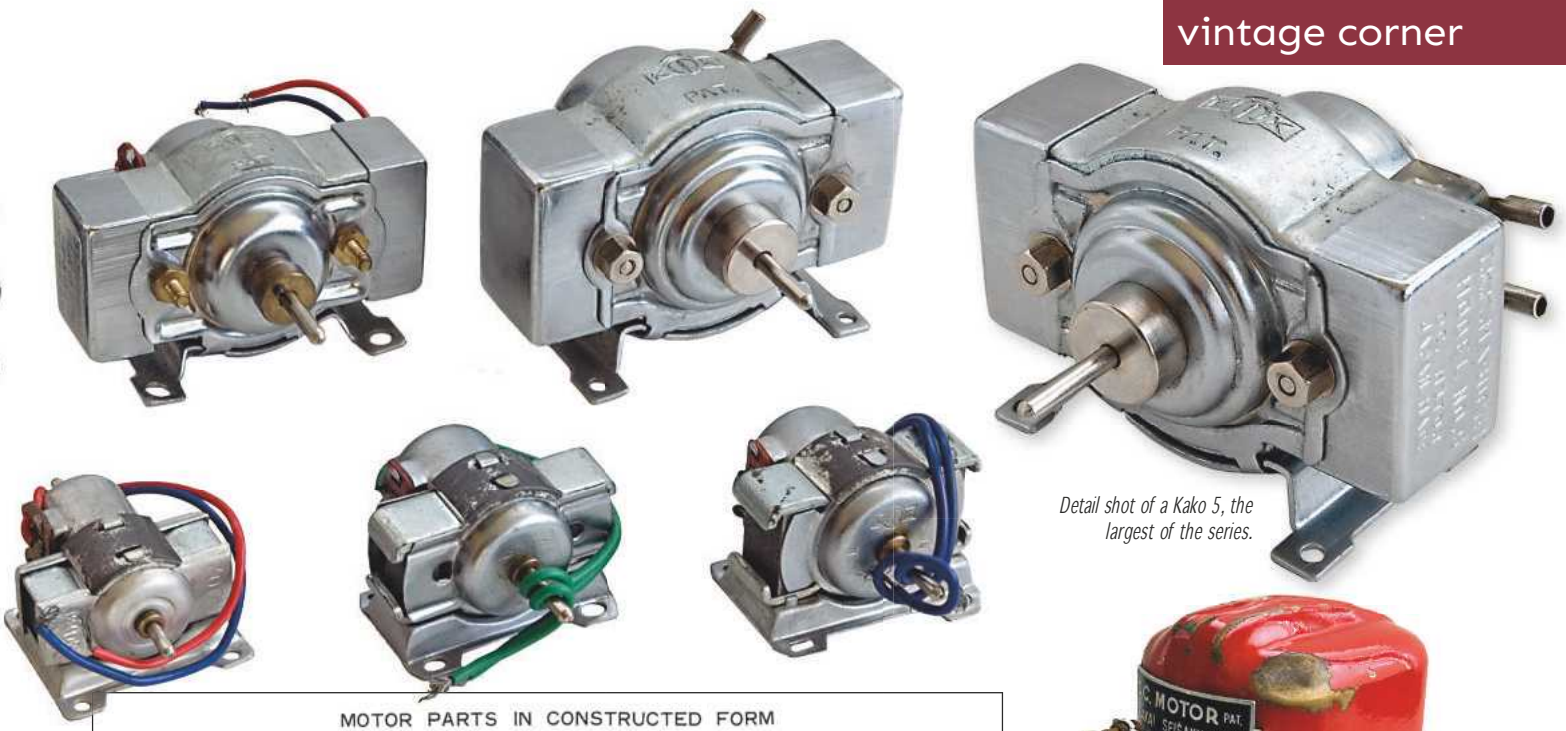
BELOW: Mabuchi motors were sold in the USA under the Aristo-Craft brand and included a unique intermediate 4.5 size Kako.

It meant that you could motorize all manner of projects that wouldn't otherwise justify a 'proper' motor, and made possible the era of low-cost kits such as the Ee-Ze-Bilt model boat range, this because manufacturers knew that they could now specify a motor compatible in both power and price. Both ranges were available to the UK model trade from the large distributors, RipMax and Keil Kraft. RipMax called them the Super-Q Kako and Super-Q Orbit ranges, renumbering the latter as the 105, 205, 305, 405, 505 and 605, whilst Keil Kraft kept the original names and model designations.

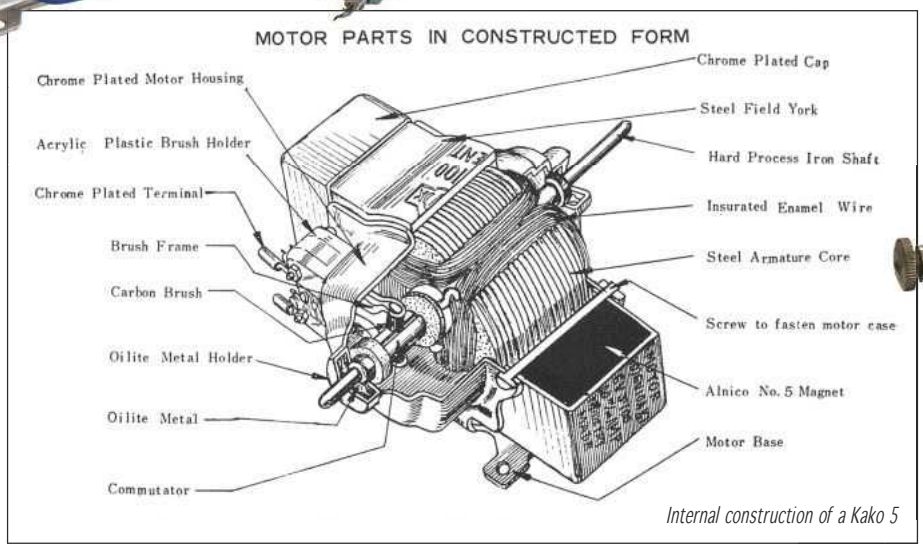
Both the Kako and Mabuchi ranges found eager acceptance and proved to have a long life and performance out of keeping with their price; only on efficiency were they let down by their cheaper construction, but that wasn't a factor understood or valued by most buyers.

So, which was the better? Both had their adherents but for model boat propulsion the lower rpm but better torque provided by a Kako seemed to win out, particularly in the larger 4 and 5 sizes. The 5 excelled at this; its upgraded construction made it about twice the price of the 4, though it was still affordable.

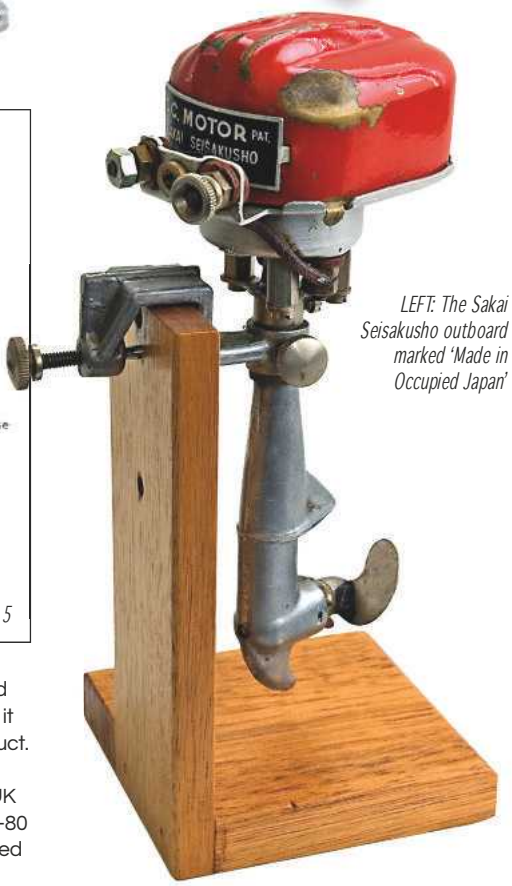
It was the Mabuchi range, however, that won this evolutionary battle, I suspect because of a better appearance, lighter construction (due to the ferrite magnets – a Mabuchi innovation) and cheaper cost of manufacture. As a result the Kako range slowly died out.



Detail shot of a Kako 5, the largest of the series.



Internal construction of a Kako 5



LEFT: The Sakai Seisakusho outboard marked 'Made in Occupied Japan'

In reality, there were no losers, for the two motor ranges that I always thought were from rival manufacturers in fact originated from the same factory. This is indicated by the TKK imprint stamped on the Kakos of my collection, stylised as a sort of motor cross section with the T central. TKK stood for Tokyo Kagaku Kabushiki kaisha, or Tokyo Scientific Company Limited, a name Mabuchi was using at that time and which appears on some early boxes with a TKK Mabuchi logo. So, Kako was a model designation, not the manufacturer, and this is proven by a recent addition to my collection of Kako motors that is actually stamped TKK Mabuchi.

Other manufacturers

There were other Japanese manufacturers, of course. Quite a few American model companies had motors made for them by unspecified companies in Japan – Sterling Models and K&O Models spring to mind, whilst unbranded motors were used in thousands of models and toys with well-known brand names. The firm of Sakai Seisakusho made the electric outboard pictured. It is stamped 'Made in Occupied Japan' which dates it to 1951 or earlier. In some ways it is nicely made but the permanent magnet motor is feeble and has very poorly designed brush gear. I have seen other examples online with wound-field motors, presumably of earlier manufacture; it was later sold into the 1950s as a K&O product.

TMY was another Japanese make that had three smaller models available on the UK market from around 1958, the TMY-50, TMY-80 and TMY-100. The latter two had neatly tooled fully-enclosed square cases and all were inexpensive. Other models were produced for the American market such as the horseshoe magnet type pictured. Several sizes in this style were produced, some were sold as K&O products and a rather neat but rare geared version was available. The brand of NSK was competing with a motor in an enclosed upright case, but I have yet to acquire one for my collection or even see one. Igarashi tended to specialise in higher quality model train and industrial motors.

Mabuchi, meanwhile, went from strength to strength. Although its motors were cheap, this did not mean there was any lack of ingenuity in their design, indeed a search reveals that the company holds hundreds of patents related to electric motor design and manufacturing. I have already mentioned the example of early application of ferrite as a magnet material, enabling lighter motors that dominated slot-car racing from about 1963 on. Through a tie-up with Polk's, the American hobby distributor, their motors became available in the USA badged as Polk's own AristoCraft brand (Flotsam & Jetsam No.43, October 2016 issue). Thanks to their own patented design using an automatic armature winding machine, production was able to ramp up to 250,000 a day by the middle of the 1960s, for motors that were now powering a huge range of household appliances and industrial applications as well as models. Their impact was huge and next month will continue the story of Mabuchi.

RIGHT: A midsize TMY horseshoe motor.

Silver Mist

When a teenage **Ray Wood** constructed his first Vic Smeed motor yacht, little did he know that, 50 years on, this enthusiastic act of creativity would take him full circle...

Vic Smeed designed many iconic model boats over the years whilst editor of Model Maker magazine, none more so than his version of a James Silver motor yacht which he named Silver Mist. The original craft, which Vic had seen and photographed, was called Silver Vanity and was owned by Lister Blackstone, a famous manufacturer of diesel engines of the period. Incidentally, for those who aren't aware of it, Model Maker magazine was published by Percival Marshall and pre-dated Model Boats. As was the way back then it covered a wide spectrum of model disciplines and, back in 1958 when Silver Mist was featured, cost a whole 2/- two shillings.

Vic's Silver Mist plan produced a delightful 21" long balsa model which this '60s teenager enthusiastically built before installing a small motor and dry-cell battery. In truth, I think most of its voyages were across my parents' fish pond but I've never forgotten its classic lines. 50 years on, then, the opportunity to build another one – but this time slightly larger at 30" long and 1/24-scale – seemed a good idea.

Hull & superstructure

The basic balsa construction of my enlarged version mirrors that shown on the original drawing (still available from www.sarikhobbies.com) with the exception that I've simply upsized the thickness of the bulkheads and deck inwhales from 1/8" to 3/16", and used a 1/4" plywood keel with 1/16" sheet doublers where the stern and rudder tubes are 1/4" diameter. In line with standard practice the parts were traced and transferred onto the sheet balsa, cut out and the centres removed for access. The simple ply keel has a straight base line with bow and stern profiles cut to shape using a coping saw or similar. With this, the hull is built upright on a board that has purpose-made wooden support blocks screwed down

Originally featured in Model Maker Magazine back in 1958, Silver Mist has proved popular ever since. It's not hard to see why.

on both sides of the keel, keeping it secure and aligned ready to receive bulkheads 2, 3 ,4 and 5, which are tacked into position and checked for level. With this, the inwhales can be pinned in place, the whole lot stuck together using Gorilla woodworking glue which, of course, is water resistant.

Once set the structure is strong enough to start planking with 3/16 x 3/8" strip, applied to alternate sides to keep her straight. Personally, I think planking the topsides whilst still on the board is the best way to go, working down from the deck line before releasing the hull from the support blocks, turning it upside-down then alternately planking from the keel down and the deck up, whilst gradually reducing the gap between the two, which will then require the planks to be tapered to a good fit. With the planking complete the hull can be extended up to the raised centre deck wheelhouse level.

The cruiser's stern and bow shapes are achieved either by using soft balsa block, cut to fit, or laminations of 1/2" balsa sheet carved and sanded to shape. The raised central section of the deck is constructed on the sub bulkheads with upper inwhales and stringers that demark the removable hatch which gives access to the motor and battery area. Further access is provided on the rear deck using a sub frame comprising deck beams at the same camber as the main deck, the whole covered with 1/32" plywood that has planks drawn on with a fine line black pen. It's worth noting here that many yachts of this vintage had the decks covered in canvas and painted, so you may fancy that as an alternative.

Now is a very good time to make a stand using the hull sections from the drawing as a guide. When doing this I always find it useful to ensure that the boat sits with its waterline parallel to the building board as this greatly assists the construction of the upper works and deck fittings when it comes to making the

ABOVE: Silver Mist carries herself well in the water and with a high freeboard is a very seaworthy little vessel.

RIGHT: The figures are escaped Mosquito aircrew from the 1:24-scale Airfix kit.

LEFT: An old 600-size brushed motor is all that Silver Mist needs. Two battery packs are secured in the bilges for ballast, although only one is connected at any one time.

vertical items actually vertical. For Silver Mist I also made the stand into a storage facility with a drawer that holds the transmitter, thus keeping the whole package in one place for ease of transport.

Wheelhouse & fittings

The wheelhouse is built from 1mm mahogany sheet, cut carefully with a sharp Stanley knife, the corners of the windows sanded to profile with a round file. The photos hereabouts show the varnished and glazed wheelhouse in position with the small mast and navigation lights in place. Note, also, the carved balsa dinghy in place on the rear hatch and the companionway that sits above the access hatch to the rudder. Small fittings for the foredeck are bought or fabricated, whilst the portholes are fibre washers attached with superglue. The stanchions around the deck edge, meanwhile, are commercially available items from Cornwall Model Boats with thin copper wire rails threaded through. If I were doing this again I'd use stainless steel plastic-coated fishing trace wire, which wouldn't be so prone to kinks. Still, we all live and learn! I was quite pleased with the rear deck handrail which is a major feature of this design, formed with two laminations of mahogany one with holes to locate the top of the three-rail stanchions, the other glued above, gently shaped to section, and varnished. Finally, a prominent feature of James Silver yacht designs are the cabin windows, those on the model being cut from 1/32" ply, sealed, painted silver and, once glued into position, filled in with black gloss paint.

Made up

Silver Mist has been a terrific project from start to finish the 9" increase in length resulting in a significant bulking-up of volume and a truly eye-catching model. What's more, since the original drawing has numerous sketches and annotated guidance notes on construction, it makes an excellent choice for a first plan build. But there's more. The icing on the cake is the number of complimentary comments she receives whenever she's on the water. Testament, surely, to Vic's interpretation of the full-size yacht.

The commercially available stanchions are good but I'm not sure I'd use copper wire for the rails again.

The rear companionway sits directly above the rudder tube and makes the perfect hatch handle.

A simple carved balsa dinghy adds sufficient detail and interest to the rear deck.

ABOVE: Awaiting the tide and looking every bit the James Silver gentleman's motor yacht.

LEFT: All the mahogany on the boat was sourced from Mantua Models and is always lovely quality - www.mantuamodel.co.uk.

BELOW: The paints and varnish used are all oil based Humbrol Enamels with yacht varnish for the exposed woodwork.

For more Sliver Mist photos visit www.modelboats.co.uk

1. A clear detailed image of a pelorus as fitted to the OSA 2 205U.

OSA 2 Fast Missile Boat

Dave Wooley is back on bridge with a view to adding more detail

Just to refresh your memory, in the last issue we tackled the deckhouse rails, which means we're in a good position to turn our attention to how we might go about designing and assembling the pelorus and the more technically challenging Target Designation Sight (TDS). The function of the pelorus is to ascertain a true bearing and is fitted to all modern warships and mounted in a convenient location, usually close to the bridge. An example of the type fitted to the OSA boat can be seen in **Photo 1.** The pelorus is like a compass mounted on gimbals with a sight and a bearing readout around the circumference for measuring pairs of relative bearings to ascertain distance off and distance abeam of a navigational aid.

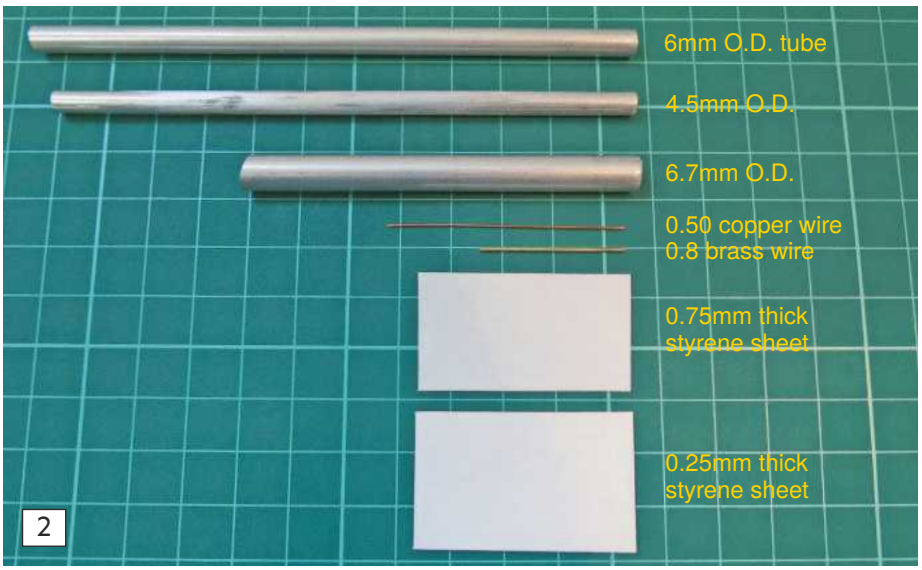
Forming a pelorus

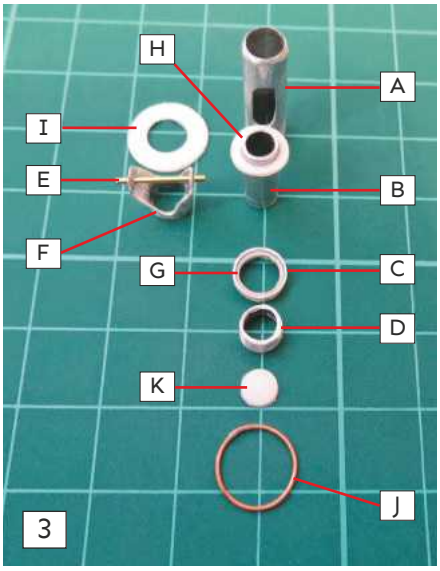
The first job is to determine the number of basic parts followed by the materials required **(Photo 2).** With the fitting divided into its component parts it is then so much easier to arrive at a method for constructing each individual part. For example, the plinth can be formed from 6mm aluminium tube with an opening to the electrical switch box within. For ease of identification I've noted each part but not in any order of assembly **(Photo 3).**

2. The basic materials used to form the pelorus.

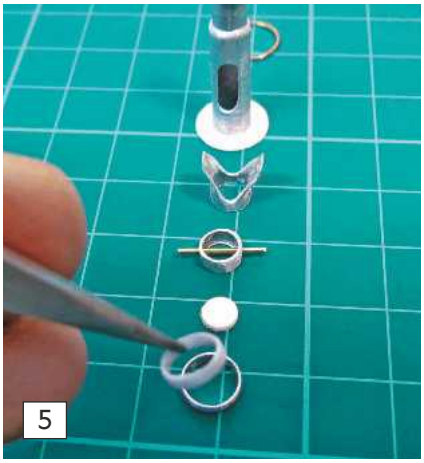
3. Each of the parts that will eventually form the pelorus.

4. Here the assembly sequence is important. First the upper plinth body is inserted into the main plinth body and adjusted for height.





A	Main plinth body	6.0mm OD aluminium tube
B	Upper plinth body	5.5mm of aluminium tube
C	Compass outer support ring	6.0mm aluminium tube
D	Compass bowl	4.5mm styrene tube
E	Gimbal pivot pin	0.8mm brass rod
F	Compass bowl / gimbal support	6.7mm of Aluminium tube
G	Compass inner support ring	5.5mm styrene tube Evergreen 217
H	Upper plinth body ring	0.75 styrene sheet
I	Plinth (base)	0.25 styrene sheet
J	Compass gimble ring	0.50 copper wire
K	Azimuth circle	0.75 styrene sheet



5. To ensure that the compass bowl and compass card base sits within the compass outer ring, a styrene inner support ring is placed into the compass outer ring.

6. The compass support, with gimble pin inserted, is mounted onto the upper plinth body ring.

7. Here the gimble pin is shown temporarily inserted into the compass bowl.

8. Assembly almost complete.

9. The compass gimble ring added to the exposed ends of the gimble pin.

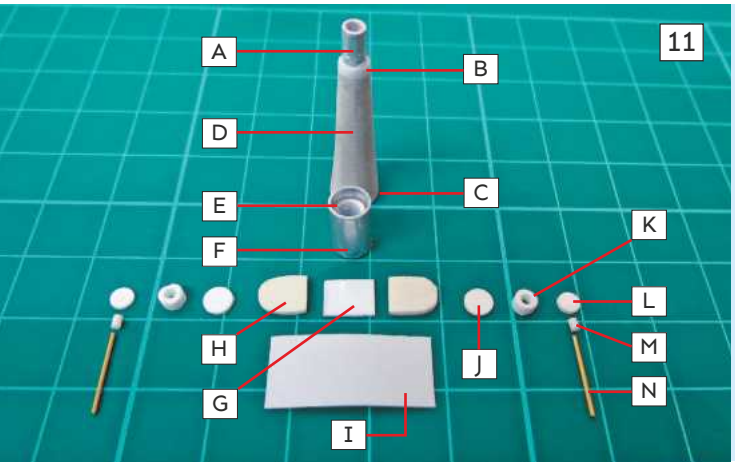
10. The basic TDS plinth formed from aluminium tube, styrene tube and sheet.

11. Each part of the TDS, cut to size and made ready for assembly.

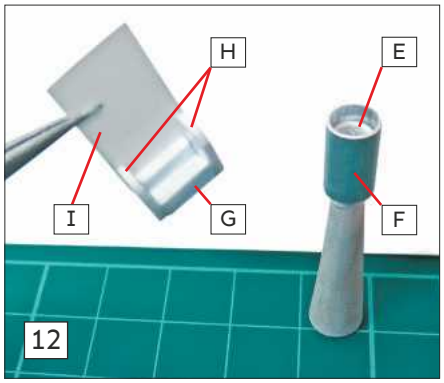
The next stage was to mark the side of the upper plinth body, which will determine the overall height of the plinth at 35mm. With this, the upper body was slid into the main plinth body and bonded into place as in **Photo 4.** The compass and gimbal support were then formed from a section of 6.7mm tube that was duly split, opened out, and filed to shape **(Photo 5).** This was followed by drilling a 0.8 hole through the outside of the compass bowl and inserting the compass bowl gimbal pin. Also visible in Photo 5 is the compass inner support ring being fixed into the compass outer support ring. The purpose of this was to allow the compass azimuth circle (styrene) to be slotted into the compass bowl at a later stage and fixed onto the inner ring. The compass card decal, meanwhile, is to be fitted onto the azimuth circle once the air brushing is complete. 0.8mm holes can now be drilled through the sides of the gimbal support to allow the gimbal pin to be fitted directly through the compass bowl, the rationale being that the compass bowl will move on the gimbal pin as per the original **(Photo 6 & 7).** The result of this can be seen in **Photo 8** where the now combined compass bowl and gimbal support are added to the plinth. The gimbal pin is cut to give a slight overhang either side of the gimbal support onto which will rest the copper gimbal ring **(Photo 9).**

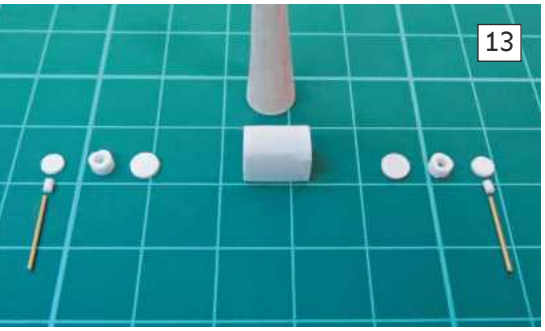
Target Designation Sight

The TDS as fitted to the OSA 2 missile boats is an electro optical device that's sited forward of the foremast to provide target acquisition and fire control for the fore and after AK230 twin 30mm guns. This TDS is a similar device to the Kolonka, an optical director used as a secondary control channel for the 30mm guns on many Soviet era warships during the Cold War. Here, as with the pelorus, the method adopted is the same, reducing all or most of the fittings to individual parts to enable ease of construction.



A	Plinth core	3.0mm O.D. aluminium tube
B	Upper depth ring	4.8mm O.D. styrene tube (Evergreen 226)
C	8mm circular base	1.0mm thickness styrene or litho plate cut to size
D	Filler shaped to suit	P.38
E	Inside core for upper section	4.8mm styrene tube (Evergreen 226)
F	TDS upper section	0.75mm aluminium tube
G	TDS sighting base section	0.75mm styrene
H	TDS sighting support sides	0.75mm styrene
I	TDS sighting upper cover	0.25mm styrene
J	Handgrip inner disc	0.75mm styrene, punched to size
K	Handgrip outer rotating disc	3.2mm O.D. styrene tube (Evergreen 224)
L	Outer rotating disc cover	3.2mm dia. styrene, punched disc
M	Handgrip connector	1.2mm dia. styrene rod (Evergreen 221)
N	Handgrips	0.4mm brass wire





12. Adding the cover to the target sighting support.

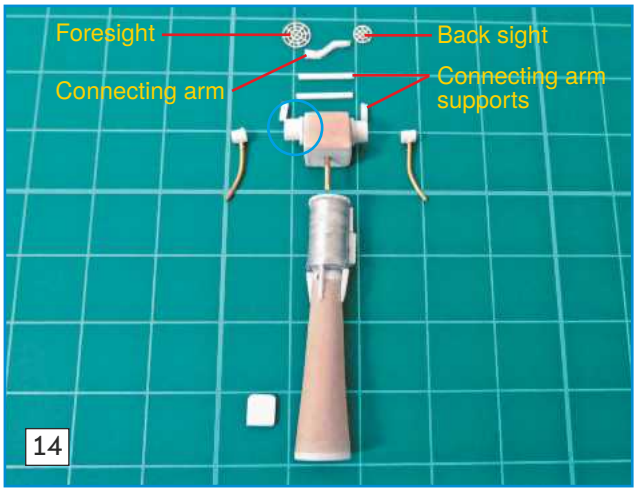
13. Preparing to add the fittings to each end of the target sighting support.

14. The remaining fittings for the sighting support, ready to be added.

15. The completed TDS alongside the pelorus.

16. The raised platform and handrail into which the TDS has been added.

17. Pelorus and TDS temporarily positioned in their respective locations within the upper bridge.



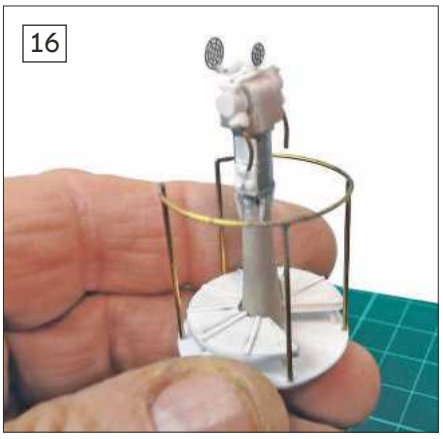
The structural integrity of the TDS relies on the plinth core and this is the first part of the fitting to be made, comprising a 3mm O.D. section of aluminium tube cut to 32mm in height with an 8mm diameter base in 0.25mm thick styrene. A section of Evergreen tube (upper depth ring) of 4.8mm O.D. is placed around the top of the tube giving support for the TDS upper section **(Photo 10).** Using P.38 filler the tapered shape of the plinth is easily formed and can be seen in **Photo 11.** By preparing a sketch from the images available the relative scale could be judged and the basic parts fashioned to suit and made ready for assembly **(Photo 11)**.

The next step was to fix the upper section onto the plinth and assemble the target sighting support by adding each side of the support to the base and fold the upper cover over the curved sides to complete the semi-rounded shape **(Photos 12 & 13).** Added to each side of the semi-rounded support are the handgrip inner discs which can be identified along with the azimuth circle, which sits atop of the TDS upper section, in **Photo 14.** Also seen here are the additional fittings that complete the TDS, these consisting of the fore and aft sight rings plus connecting arm and supports. Circled in blue the handgrip outer rotating disc along with the disc cover have been added to the TDS sighting support. On the original TDS, and to allow movement up and down of sighting rings whilst the handgrips are moved back and forth, the connecting arm supports are fixed to the handgrip rotating disc. To complete the TDS the handgrip connector and handgrips are fixed to the rotating disc **(Photo 15).** Incidentally, this photo also provides a size comparison of both the pelorus and TDS.

The final task was to provide the circular platform into which the TDS will be fitted. Here the vertical rails were formed from 0.8mm brass wire whilst the upper horizontal rail (of extruded soft brass wire) was easily rounded using a former, then soldered into place. The lower base is 1mm styrene with the upper raised platform from 1mm styrene and Evergreen strip.

Just as a matter of interest, it's not totally clear as the reason for the V section, however we do know that it points towards the front of the foremast and that the aimer has only a limited arc of training to port and starboard **(Photo 16).**

Lastly, and prior to airbrushing, both the pelorus and TDS were temporarily placed in position within the upper bridge. Although there are many smaller fittings, plus pipework electrical switches and search lights yet to be fitted, the area is now beginning to look populated and busy **(Photo 17).**



References and acknowledgements

Fast Attack Boats (Brassey's). Combat Systems: pages 11 – 45. General: pages 96 – 98.

Naval Fast Strike & Patrol Boats by Roy McLeavy: pages 130 – 132

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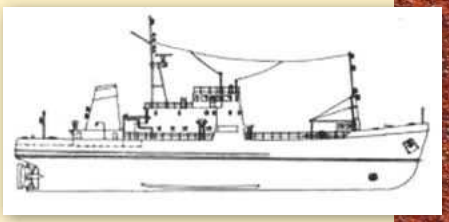
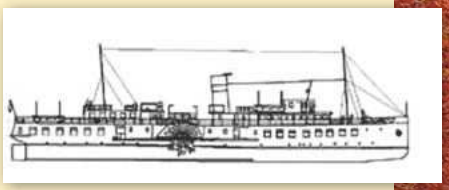
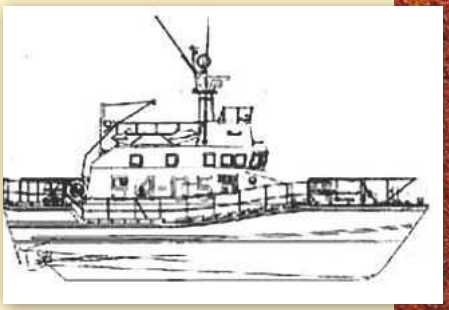
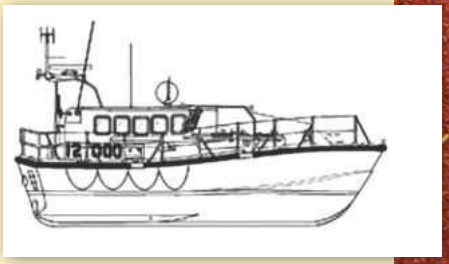
RNLI Solent Lifeboat, Hull & Cabin	1220mm 1:12	**£140.00**
RNLI Tyne Lifeboat, hull, deck & 2 cabins	1094mm 1:12	**£190.00**
RNLI Watson Lifeboat, hull, deck & cabin	1094mm 1:12	**£170.00**
RNLI Waveney Lifeboat (hull only)	914mm 1:15	**£80.50**









** Plans not included*

Frank T

Small workboats can make superb subjects for modelling, not least because their size lends them to larger scales and fine detailing. **Steve Whitelock's** Port of Wells service vessel is a case in point

This construction project started after visiting Wells-next-the-Sea during a holiday in North Norfolk where I'd seen this vessel numerous times. I was looking for a new project and when it came to my attention again in the March 2017 issue of Model Boats (where there was an estuary vessels photo feature) I thought further investigation would be worthwhile. Decision made and during a visit to the harbour office I found the staff very interested in my proposed project and was introduced to the skipper who explained how the vessel transported supplies to the outer harbour where the wind farm support vessels operated, these being too large to use the inner harbour. Frank T is also used for buoy maintenance work and other such tasks. Anyway, my next job was to establish if there were there any drawings available and as luck would have it the skipper found a set of 1/100-scale drawings in the manual (which is kept in the wheelhouse) and kindly copied them for me, also saying that if I would like to make a return visit he would allow me on board to take photographs. We parted company saying that I would be back in a few

weeks, indeed I returned a month later armed with camera and notebook and took around 120 snaps. Multiplying the dimensions of the drawing by 5 would produce a 1/20-scale model of around 750mm, which was just about right to handle so it was game on.

Boot sale bargain

I have a very large car boot sale where I live at which I can usually find whatever I'm looking for. This time I found some 4mm ply of about 400mm x 1500mm for £1 – a bargain! This one sheet quickly made all the pieces for the hull, the only awkward part being the rounded corners. Here the hull was first made with square corners, then a square block of wood fitted vertically into cut outs and sanded round on a vertical belt sander. The running

gear was all fitted and tested before the deck was fitted although access is via a large central hatch hidden under the removable deck boarding. The wheelhouse also lifts off as a unit leaving further access, whilst a removable plate allows access to the running gear. As for the hardware, the prop shafts are from Mobile Marine Models, the props are Graupner, motors speed controllers and servo are from a popular auction site, couplings rudders and motor mounts are home-made and the batteries are 6V 4.5Ah cells.

The wooden hull was covered in fine glass cloth and coated in water-based polyurethane resin, then painted with spray paint from the local DIY shop. Most fittings are home-made and you will see that the wheelhouse is fully fitted out with navigation equipment, microwave, coffee cups and even the kitchen sink. Bought items include the figure and the lifebelts from Deans Marine. Brass tube in assorted sizes is used for the railings mast and ladder. Tyres, meanwhile, are from the scrap box and Tony Green Steam Models.

The model performed well on Boston Model Boat Club pond (my local). Never having had a twin-screw vessel before I was quite surprised at the manoeuvrability, just like the actual vessel I'm told, and it looks realistic on the water.

The boat was taken to the Well harbour office on my next visit and shown to the staff who were very impressed with the outcome and took numerous photographs. It was genuinely lovely to have been able to see the full-size, chat to the people who operate it and then shown them the model, especially as they'd been so helpful. Altogether Frank T has been a great project.

Made by Meercat

The full-size vessel was built by Meercat Workboats (Southampton) and delivered by road in 2011. She was named Frank T after previous harbour master Frank Taylor. (Photo: Anthony Addams)

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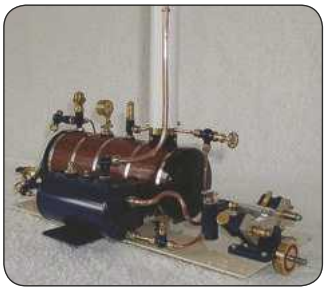

The illustration shows the "Ribbersdale" boiler mounted on a common bedplate with the "Richmond" twin cylinder steam engine and a steam oil separator. The "Ribbersdale" boiler is constructed from copper components and silver soldered. The boiler is stoved with high temperature paint at 175 degrees C. The boiler is lagged with individual hardwood planks and held by stainless steel bands. To improve the boiler performance it is fitted with a ceramic burner. The finished boiler is pressure tested to 150 psi for continuous working pressure of up to 80 psi. A test certificate is supplied with the boiler confirming the test and guarantee of quality. The boiler is fitted with a water filler bush, pressure gauge, water gauge glass and blowdown valve, safety valve, vacuum valve, steam on/off valve, ceramic gas burner, gas pipe and gas on/off valve. The white/cream stove painted chimney is pre-drilled for the exhaust pipe bracket should you wish to extend the exhaust pipe alongside the chimney.
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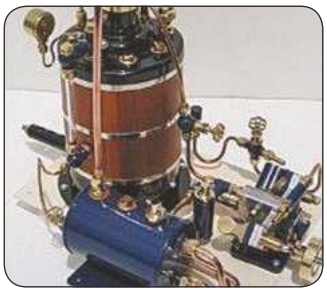
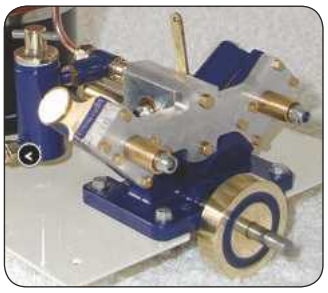


The illustration shows the "Wharfedale" boiler mounted on a common bedplate with the "Richmond" twin cylinder steam engine and a steam oil separator. The boiler can be fitted with either the "Richmond" engine or "York" engine and a steam oil separator. These can be purchased as single items. The "Wharfedale" boiler is constructed from copper components and silver soldered. The boiler is stoved with high temperature paint at 175 degrees C. The boiler is lagged with individual hardwood planks and held by stainless steel bands. To improve the boiler performance it is fitted with a ceramic burner. The finished boiler is pressure tested to 150 psi for continuous working pressure of up to 80 psi. A test certificate is supplied with the boiler confirming the test and guarantee of quality. The boiler is fitted with a water filler bush, pressure gauge, water gauge glass and blowdown valve, safety valve, vacuum valve, steam on/off valve, ceramic gas burner, gas pipe and gas on/off valve. The white/cream stove painted chimney is pre-drilled for the exhaust pipe bracket should you wish to extend the exhaust pipe alongside the chimney and also includes a polished brass flared top. This plant is suitable for installation in all my boat products with ample power to drive your boat satisfactory.
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Alpha

If you were tempted by last month's free plan of **John Goodyear's** quick-build, RG65-legal racer, then you'll be keen to soak up this second part of his build trilogy

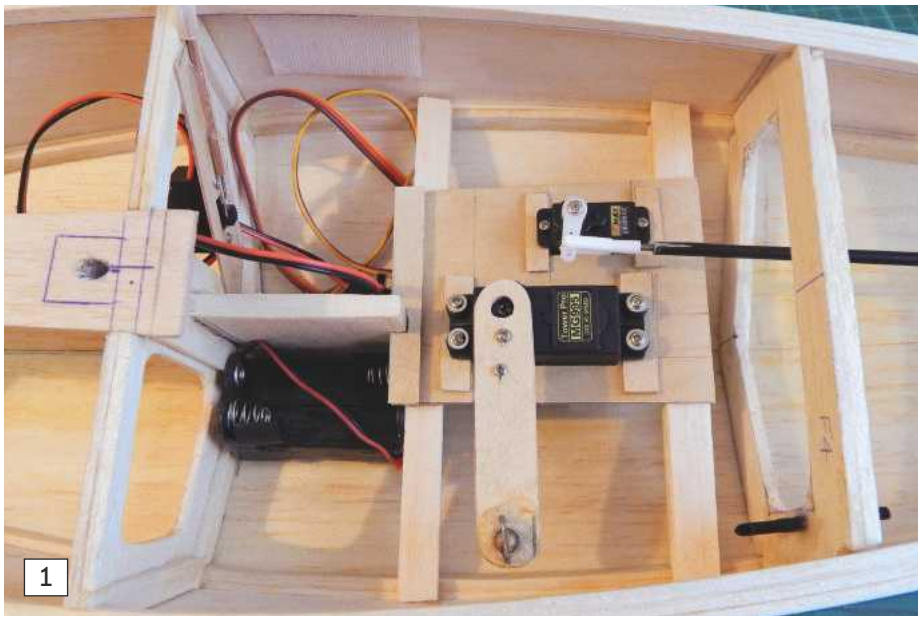
As a result of the feedback already received from last month's article I know that a number of you have already started your Alpha build, which is great news. I'm hoping you haven't caught up with me and been twiddling your thumbs, but if you have, let's crack on.

Fitting out

Now that we have all the underwater bits and pieces (keel and bulb) sorted it's time to return to the top-sides. Before fitting the deck it's a very good idea to install all the internal controls as it's so much easier to juggle where things fit without having to do everything through the two holes in the finished deck. A study of **Photo 1** will enable you to see where everything should go. Note that I try to balance the weight of all the components across the beam. This means that the (heavy) battery pack lies to one side and the (small) rudder servo, on / off switch and receiver fit on the other with the main (sail) servo right in the middle. Note also at this stage that it's a good idea to mount the receiver well clear of the hull bottom to avoid water damage should any get inside. Just one little word of warning, whilst you will not need an expensive sail winch you will need a high power servo. In our club we almost invariably use the Tower Pro MG995 or MG996. These are a standard size servo but will pull 10kg on a 6V supply and will be more than adequate for the job in hand. Given that they're also ridiculously cheap they're a 'must have' for your Alpha. For the rudder, any small servo will suffice and here I chose an Emax ES08MA2 which is a metal-geared unit that I have used successfully in numerous small yachts. Need it be said that they're also very inexpensive?

A quick word now about switches. As we all know, these items are the Achilles Heel of any radio system and activating or de-activating them usually means lifting a hatch cover to prod a finger inside. I now use my own system which allows the switch to be positively mounted yet operated externally via a piece of wire in a close-fitting tube. The bit of wire that projects above the hull is fitted with a piece of silicon fuel tubing and a bead. If you set things up so that pressing the wire 'down' equates to 'on' then the bead sits in the silicone tube and effectively seals everything very nicely. I've been using this method of turning the radio on and off over several models now with 100% success and have never experienced water ingress. Highly recommended **(Fig.1).**

With all the internals fitted and checked thoroughly you can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remove the Rx and battery and glue on the deck. Leave the servos where they are as fitting them after gluing down the deck is a fiddle. Once the glue has dried you can trim everything and then 'glass' the deck. Leave for 24 hours then trim off the excess cloth and lightly sand the edge to acquire a smooth finish. Now, the observant at this stage will be keen to point out that the edge of the deck is effectively 'raw' balsa which is not a good thing. Well, they'd be right and action is thus needed. I combat this little problem by anointing the raw edge with superglue which takes little time but results in the previously soft balsa becoming extremely hard and ding-proof.

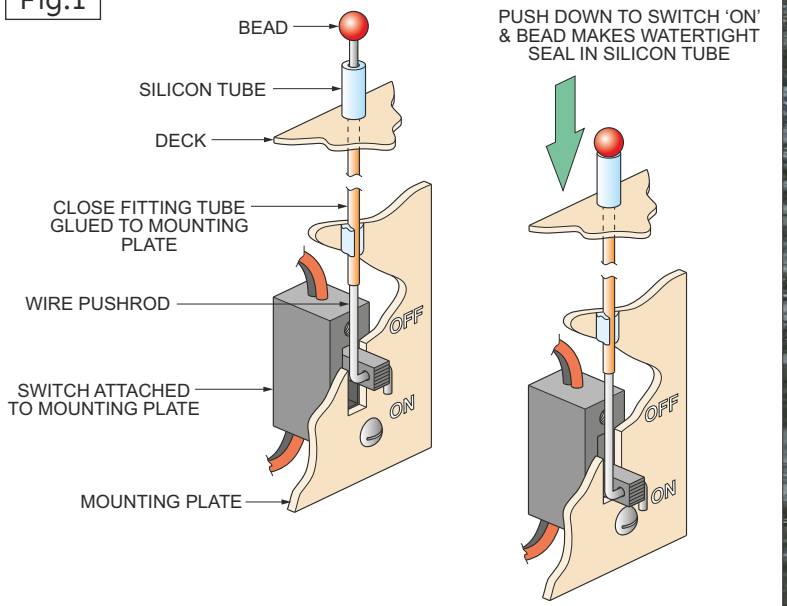
Deck furniture

The final thing to do before painting is fit all the deck furniture. This includes the points where rigging will be attached and where the control sheets will exit the hull. Considering the latter first, bend a small piece of annealed (soft) small bore copper tube around a circular former to make the fitting that must be glued into the transom to guide the main control sheet running from the servo arm. If you only have hard copper tube just heat it to cherry red and quench in water. Result? Annealed, soft tube that can be bent round a former without collapsing. Note that the plan only details a straight piece of copper tube and that the bend will need to be 180° to bring it up onto the deck.

Whilst on this topic I know only too well that different radio systems offer different throws which could be a problem if not addressed during the build of the hull. To accommodate this I suggest you extend the sail servo arm such that the distance from the centre of the servo output shaft to the 'pulley' on the output arm is 50mm. With some systems this throw will be adequate to allow you to set the sails so that there is enough movement from fully sheeted in to fully out for running downwind. Regrettably, other systems won't offer sufficient movement and you will need to run a loop from a fixed point at the rear of the hull, around the pulley on the servo arm and then out through the copper tube. This effectively doubles the amount of throw. In my model I built in the fixed point just in case and suggest you do the same.

As for the remainder of the fittings you can use plastic, aluminium or whatever takes your fancy. I've used printed circuit board (shaped as necessary) for all my deck furniture with great success over the years so you might want to try this if you have some handy.

Fig.1



Be bold

The hull is now almost finished so it's time to rub everything down very gently and then spray with primer or filler. Glue the keel in place first as this will give you something to

get hold of whilst painting. It's at this stage that the beautiful finish you thought you had achieved begins to look very dubious. There's nothing like a lick of paint to reveal all the bumps, lumps and depressions that you could have sworn never existed. All you can do is sand or fill as required until a good surface finish is achieved, then paint some more, rubbing back between coats. You should aim for a good finish with almost all the primer or filler rubbed back to nothing followed by a final coat. Once done, leave to dry for several days and you will have an excellent surface on which to apply a top coat in colours of your choice. Do be bold and make sure that you finish up with a hull that looks as different as possible from the skippers you sail with. This will, hopefully, prevent you from sailing someone else's model whilst yours is merrily attempting to knock holes in the bank.

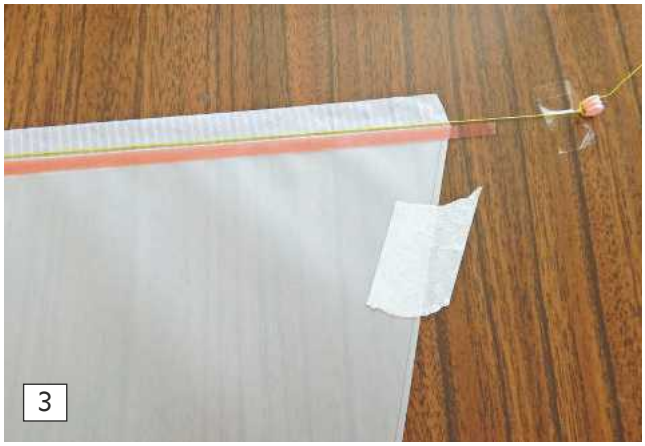
Talking of hitting things, you'll need to make a rubber bumper to fit to the bow. Electrical items frequently come packed surrounded by something that will work but if all else fails pop to Poundland and buy a pair of flip-flops. Now, shaping this stuff to the correct profile can be a pain; manual sanding simply does not work so here's how to go about achieving the desired article. First, make a former to the shape of the bow and stick your (oversize) piece of rubber to it with double-sided tape. Now use a high-speed bench sander and holding the former, get to work. You will discover that the rubber shapes very easily using this technique. Once complete, remove from the former, re-apply new tape and stick to the bow. Job done!

There's one more thing to be done after painting and that's to make clear plastic surrounds to the hatches. Why? Well, in my experience, no matter how well the deck has been painted, with repeated removal of the deck patches you will eventually degrade the paintwork and bits will become detached, leaving the deck looking tatty. Sticking the deck patches to the plastic surrounds will prevent this which has to be a good thing after all the effort expended in achieving a decent finish.

The power units

We can now turn our attention to the things that make the yacht go – the sails. Of course, fully cambered sails will certainly make your yacht go faster but they are significantly harder to construct and do require a bit of extra kit that most beginners will not have in their toolbox. As this is very much a beginner's model I elected to deploy one-piece sails which can be easily cut from a variety of materials, ripstop nylon and Mylar being but two.

On the original Alpha I elected to use 75 micron Mylar only because I had some in stock and knew that it would make good, reliable and strong sails that are capable of a fair bit of abuse and thus ideal for a beginner's yacht.



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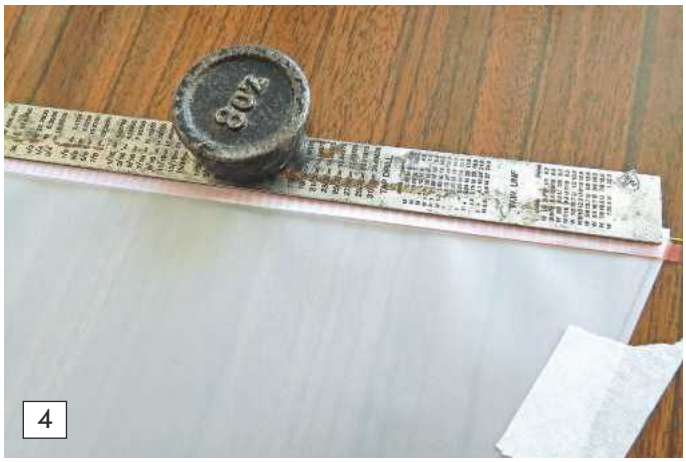
An extensive article on making sails appeared in MB quite recently (February & March '18) so I don't intend to cover previously well-trodden ground completely. All I will say is that cutting the main and jib to shape and size should present no problems. The only tricky bit comes when making the luff pocket of the jib. I use rip-stop nylon for this, applied with 6mm wide double-sided tape. A word of warning, however: Do



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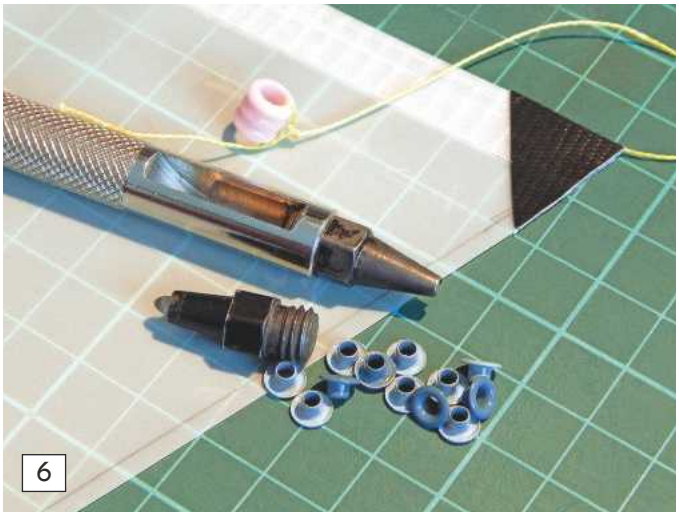
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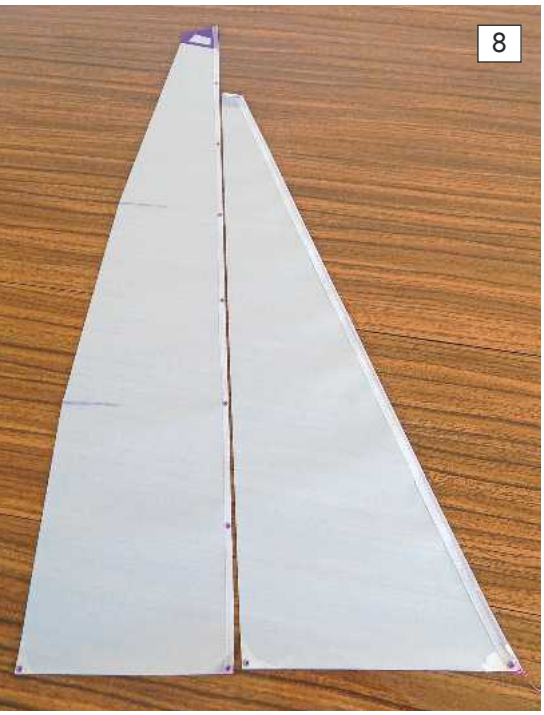
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LUFF TIP

A tip to prevent much gnashing of teeth and plentiful curses. You will remember that when making the luff pocket we tied loops onto each end of the Dyneema. Despite doing this you may find that with moving the sails around whilst attending to other tasks the Dyneema creeps its way up the luff pocket at one end and becomes unreachable resulting in much cursing. There's a simple way to recover the situation, once you know how! Simply remove the existing length of cord completely, then attach a new piece to a large darning needle and insert same into one end of the luff. You can now draw it through the entire length of the luff with a very strong magnet running on the outside of the pocket. Magic!

make sure you buy the waterproof tape and not the cheaper stuff. The tape I buy appears bright pink, the backing film separating the sticky sides on the reel being thus coloured as a visual aid to help peel it off.

To make the luff, lay the sail panel down on the building board and fasten in place with masking tape. Apply the double-sided tape to the luff, peel off the backing and stick down a length of 15mm wide rip-stop nylon. Easy so far but now for the difficult bit. Remove the panel from the board, turn over and stick down again with masking tape. Now take a length of Dyneema significantly longer than the luff and put loops at each end. Apply WD40 to the Dyneema to stop it sticking to anything **(Photo 2)** and lay it in place along the edge of the luff but not touching. Next, lay a length of double-sided tape along the luff but leave the backing in place **(Photo 3).** Now carefully fold the excess bit of rip-stop nylon over the double-sided tape and weigh it down with a long ruler or piece of wood **(Photo 4).** The tricky bit is peeling off the backing strip sideways whilst holding and then pressing down the ripstop as you work your way along the luff **(Photo 5).** A pair of helping hands is useful but once you've made a sail you will be able to manage it alone.

You can use the same double-sided tape to attach reinforcing pieces at each corner of both sails before turning your attention to the luff of the main sail. Having mastered the jib this bit is easy. Just attach the main to the building board with masking tape, apply a length of double-sided tape, peel off the backing and stick a length of ripstop down over it. Trim to size and there you are; job (almost) complete. All that's needed now is to attach eyelets to both sails to allow them to be mounted to the mast and booms. These can be sourced from the same craft shop as the double-sided tape if you are lucky, or via a certain internet auction site if you're not. Go for the 3mm eyelets as they're very easy to work with. The last lot I bought cost under £2.00 for 100 (including postage) so it's not going to break the bank. You will also need a closing tool to form the eyelets over once they have been passed through the sails **(Photo 6 & 7).**

The total sail area using the MYA's measuring methods works out at 2150sq.cm. which is slightly under the maximum allowed in RG65 class rules so you can fit marginally larger sails down the line for ultra-light conditions if you wish. **Photo 8** shows the complete rig.

And that dear reader is it for this month. Join me next time when we'll tackle the masts and booms, fit the sails and pop her on the water to see how she performs.

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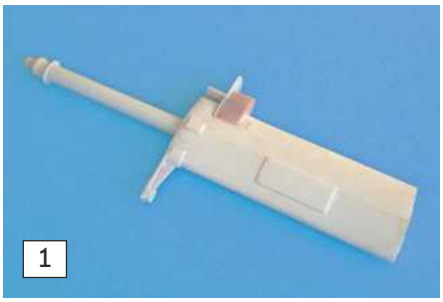
NR-1

In an ideal world build projects run uninterrupted from start to finish, stopping only stop for food and refreshments. Life, of course, has its own agenda and with the adage 'Rome wasn't built in a day' ringing in his ears, **Roger Suitters** takes an enforced three-year sabbatical before returning, refreshed and energised, to tackle the mechanics of his scratch-build nuclear research sub

After months of mould-making we've progressed the build of this static dive submarine to the detailing stage, whereupon, in the last issue, I spent some time making the top casing, adding rivets, grilles and a host of other fittings before fabricating and surface-detailing the conning tower. Time to see what we can make of the periscope...

Up 'scope!

The main body shape for the periscope was developed by gluing together styrene strip with much filling and sanding to create its oval profile. As with all things, if you're patient and take a job in small bites over a few days the item can be easily created **(Photo 1).** From here a two-part mould was made (**Photo 2)** and the final tower cast in Alumilite resin, all much the same as for the hydroplanes and rudders. **Photo 3** is the finished item.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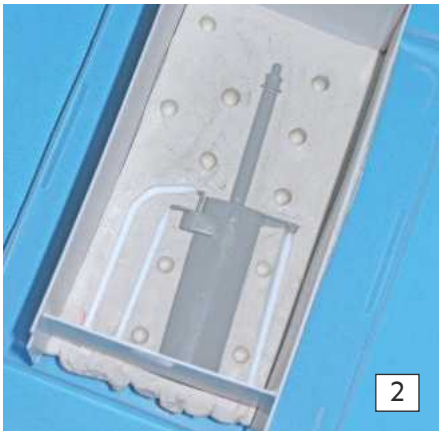
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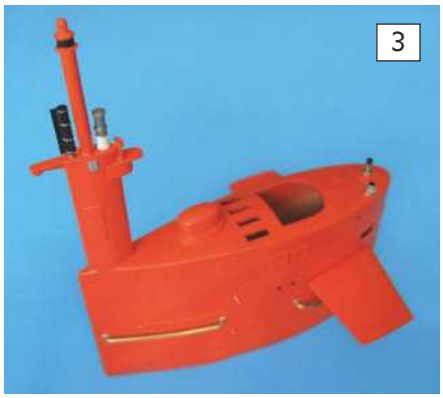
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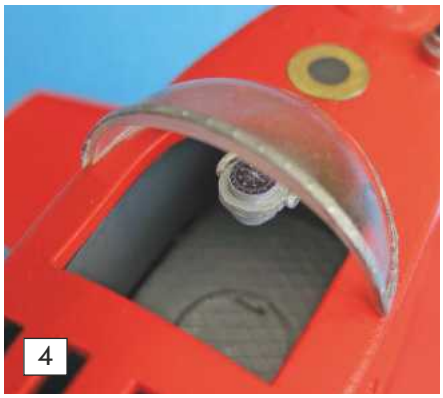
When shopping, I'm always on the lookout for items that might be useful in this hobby indeed the windscreen on top of the conning tower is a prime example that came from a clear plastic floating eyeball. By cutting the plastic globe, a section was created that did very nicely for the windscreen, whilst a thin piece of styrene with dummy rivets was used for the frame around its edge.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The compass card was taken from the internet, transferred into the Photoshop Elements application, fiddled around with, printed onto decal paper, cut to size and glued in place before being varnished to protect it all **(Photo 4).** My thanks go to Michael Appleyard in particular for doing this for me.

To secure the conning tower, which is a push fit over a male plug on the casing


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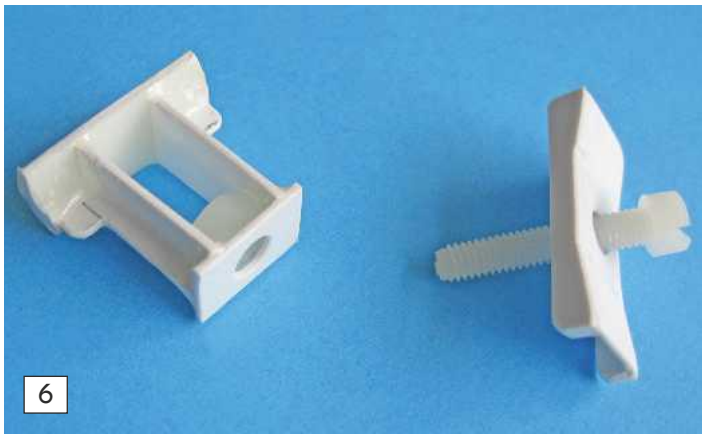
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(Photo 5), a nylon bolt and bracket have been used within the conning tower **(Photo 6).** Adopting similar thinking to that applied with model aeroplane wing retention, the idea behind using a nylon bolt is that if the model should ever be rammed when underwater, the bolt will shear, thus limiting overall damage. At least that's the theory, **Figure 1** giving a good idea of how it all works.

Painting & lettering

With the entire conning tower primed an opportunity arose to remove any previously unnoticed blemishes and faults, before the whole was sprayed bright red from an aerosol can, with the handrails picked out in Humbrol steel colour **(Photo 7).** The style of lettering is not available in standard off-the-shelf rub-on or self-adhesive lettering, so was extracted from a photograph on the internet, pasted into Photoshop Elements, fiddled about with once again and printed onto decal paper. Not quite that easy but you get the idea and if you have a domestic computer, printer and the internet, then it is all within the capabilities of the equipment and yourself.

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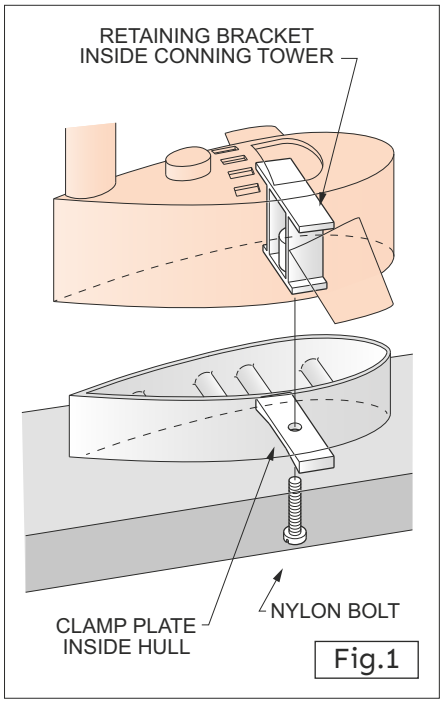

Fig.1

When it came to painting, the entire hull and its fittings were sprayed with Halfords red primer then over sprayed with Halfords Ford Levanter Grey which is almost black, but not quite, if you see what I mean. Meanwhile, Halfords Ford Carnival Red was used on the underside and treated to a spot of weathering with a 'wash' of Humbrol No.53. Various markings can be seen on the hull and all are applied using rub-on lettering obtained via Amazon. To finish, everything was treated to a coat or two of clear polyurethane varnish, the completed model, thus far, shown in **Photo 8.**

Three-year sabbatical

Having got this far by the spring of 2013, a house-move then delayed things somewhat which, coupled with a bout of temporary illness, delayed things yet further. It wasn't until 2016, then, that work could properly start again. Until 2013, there had been four years or so on this model and much had been learnt along the way, especially about the need for proper research, making moulds, 'laying up', casting, fabricating, and all the rest of it. Mind you, it's an unusual submarine and since it's one that has not previously been seen in our radio control world, the project was well-worth continuing. And so, having dusted NR-1 down, **Photo 9** shows her afloat and ballasted, albeit temporarily to see how it would look on the water, but also to gain an idea of the necessary weight distribution internally. Interestingly, at the time of this photograph there were no functioning mechanical parts within the hull whatsoever.

So, the time had come to get NR-1 functioning properly as an R/C static diving submarine. In summary, the model's main outer hull, when assembled, holds the dive (watertight modules) which includes a central 1.5 litre ballast tank, servo pinch valve, water pump, plus its other associated mechanical and electronic components. Fitted in the forward section of the hull is the battery and receiver module and in the rear part is the motor section to drive the two propellers, plus the rudder servo.

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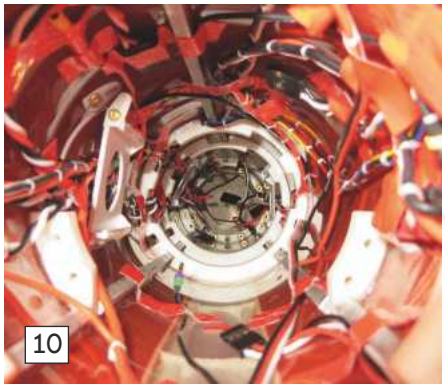
Dive module housing

To support the various 'diving' components within the main outer hull, five rings were initially cast in Alumilite White resin (also known as EasyFlo 60) for this, I thought, would provide an extremely user-friendly, rigid, polyurethane casting that has good physical and cosmetic properties. Three of the rings had cut-outs to take the wiring and were to be glued within the hull to support the smaller diameter dive module / ballast tank, which would slide into them. **Photo 10** is a shot looking into the outer hull tube. Alas, the Alumilite White cast rings were not considered fit for purpose and although Alumilite Black casting resin is more robust, I eventually decided to turn some acrylic rings on the lathe, then drill and tap them as appropriate, before gluing in place. In this last picture, running down the length of the hull between the acrylic rings, you can see some square aluminium rods. These are glued to the inside of main outer hull wall, their purpose being to support it (and the acrylic rings) from being squeezed by water pressure. The remaining two machined rings were fitted to the battery and motor compartments with one ring for each section.

Ballast tank

This is from 75mm (3 inch) diameter clear acrylic tube with its end caps turned on a lathe, these also containing O-rings to make the unit watertight. To secure each end cap, threaded 2BA studs were silver soldered into a single brass tube, the latter peppered with cut-outs which allow water to fill it, slightly increasing the maximum water volume of the unit **(Photo 11).** In this last picture, baffle plates can be seen inside the acrylic tube which are there to stop water sloshing about and upsetting the submarine's trim when it is partly, or fully, submerged. Brass nuts secure the end caps and behind their respective washers the end caps are machined slightly concave to take an O-ring, as can be seen in **Photo 12.** Referring to this last picture, the rear end cap has a hole drilled in its lower section to take a silicone tube that eventually slides into a tougher more rigid nylon tube. Fitted externally to this end cap is the servo which controls the flow of water when the pump is in action. When this servo is in its neutral position, the tube is pinched to stop the water flow, the operating arm being clearly seen. Once the silicone tube enters the ballast tank, the water flow is directed into a longitudinal brass tube which has cut-outs of various sizes on its underside. In effect, this makes the entire unit balanced because as water is forced in or out via one end of the tank, the liquid fills the cavity from end to end, remaining level for the full length of it, thus maintaining the submarine's trim. Getting this problem resolved was, it has to be said, a lot of trial and error, but without this feature, water would tend to rush in and rise at one end of the tank before finding its natural level, quite possibly making the submarine dive stern first, which is not something we want.

Due to the inevitable build-up of air pressure there are advantages and disadvantages with pumping water into a sealed vessel within a submarine. One advantage is that eventually that retained air pressure can force the water out again and hopefully the submarine will then surface following the R/C command. One particular disadvantage, however, is that the pump is made to work harder, increasing its power drain and so drawing more current. Another is that the ballast tank is now restricted to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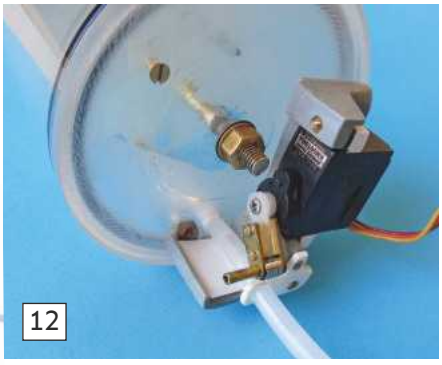
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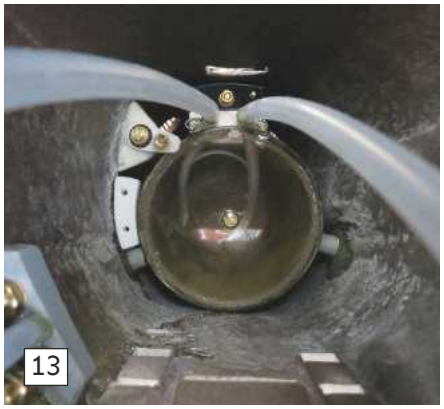
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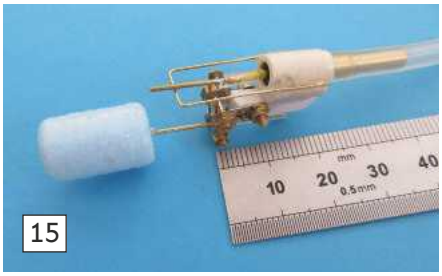
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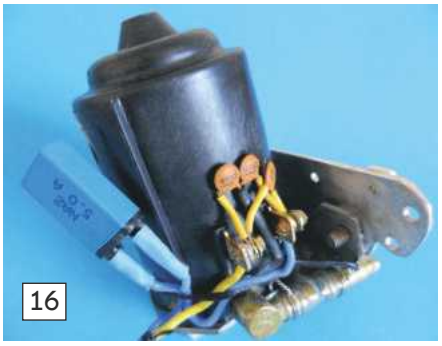
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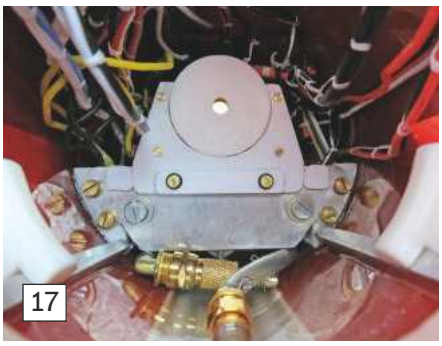
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the amount of water it can actually hold. To overcome this problem a separate air tank was fitted in the front of the hull **(Photo 13),** this comprising a purchased aluminium container, reinforced with glass fibre resin and mat. Getting the glass fibre to take the tight curves of the tube's inside face proved difficult, so a balloon was temporarily put inside it all whilst the resin was still wet. The balloon was then part-inflated forcing the resin into the metal tube's surface **(Photo 14).** A safety device of some sort is needed to ensure that water does not enter the main ballast tank unexpectedly, so a float valve was made **(Photo 15)** which can also just be seen in Photo 11. With the ballast tank now complete, it was placed inside the hull.

Near to the servo operated water valve is a Kavan geared pump which has been modified by having its plastic inlet and outlet tubes removed and replaced with brass. Attached to these are nylon tubes with modified gold-plated F electrical connectors (like those on TV and DVD machine cabling) on the free end. The F connectors have also had a brass tube inserted and glued into them for the purpose of supporting O-rings to ensure a watertight seal. The pump is secured to a heavy-duty aluminium bracket using silicone washers to help reduce any transmitted vibration **(Photo 16),** the bracket itself being secured to a set of Alumilite resin-cast supports glued to the inside of the hull. Note, in Photo 17 that you can see the modified 'F' connectors. An auto set circuit-breaker is attached to the pump motor, should it fail for any reason, whilst secured to the pump's aluminium bracket is a water sensor sound unit, its electronic circuit board being in the bow section and the wires running the length of the model.

Should any water enter the outer main hull tube (and end up where it shouldn't) a 130db alarm sounds. **Photo 17** is of this unit and, believe me, you can hear it from within the submarine when you're standing at the pond-side, even when it is submerged and some metres away.

Either side of the water pump are the two electronic speed controllers. Held in place by styrene (plastic) brackets glued either side of the hull, a turn of a screw allows them to be readily withdrawn. One ESC controls the speed of the water pump plus the water flow direction, whilst the other controls the twin propulsion motors, running in parallel, for both forward and reverse motion.

In answer to the question: Can a shallow-draught model boat really be a practical proposition? **Glynn Guest** presents a '60s-era quick-build cruise ship

Caerleon Castle

AT A GLANCE

Caerleon Castle is based on a small cruise ship. Construction is from balsa, liteply and card, although alternatives could be used provided excessive weight is not added. The model is 800mm (31.5 inches) long and designed to have a shallow draught of just 12mm (½ inch). This gives an approximate operating weight of 1.16kg (41 ounces). As a result a single electric motor of the RE360 or 385 type, powered by a 6-cell NiMH battery pack will provide a more than adequate top speed. Two R/C functions are used to control speed and steering.

Many years ago I drew up plans for a model based upon a photograph of a small cruise ship. This was an attractive vessel with a distinctive clipper bow and a streamlined funnel. Being designed as a ship from the 1950s / '60s period the vessel had pleasing proportions, at least in my eyes, unlike the floating hotel blocks that prevail today which, if upended, could sit inconspicuously in places such as the Las Vegas Strip. Alas, the model never got built and the plans lay dormant in my filing cabinet. That is until I read about a modeller in Phoenix, Arizona who was creating models of ocean liners which had next to no draught and yet despite their high sided hulls and large superstructures, sailed in a stable and realistic fashion. My curiosity was aroused and I eventually deduced that with a shallow draught any heel or sideways listing of the hull would move the Centre of Buoyancy much more than in a deeper draught hull. This can produce a much stronger restoring force to return the model upright. Like most things in life, it was obvious, but only obvious when you have seen it! (See 'Shallow but Stable'; May issue; page 32 – Ed.)

Just working this out was not satisfying enough and a model had to be built to test the idea. At this point my memory threw up the old cruise ship design, which is quite an impressive feat for someone who can sometimes having difficulty remembering what day of the week it is. The original plan had a draught of some 50mm and this was redrawn to be much shallower and the length


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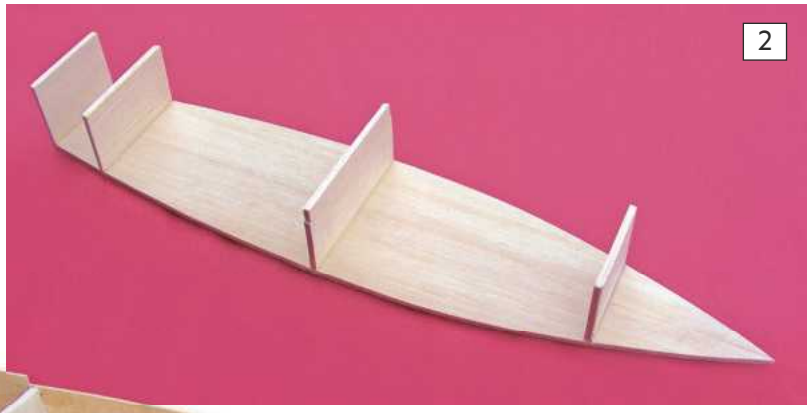
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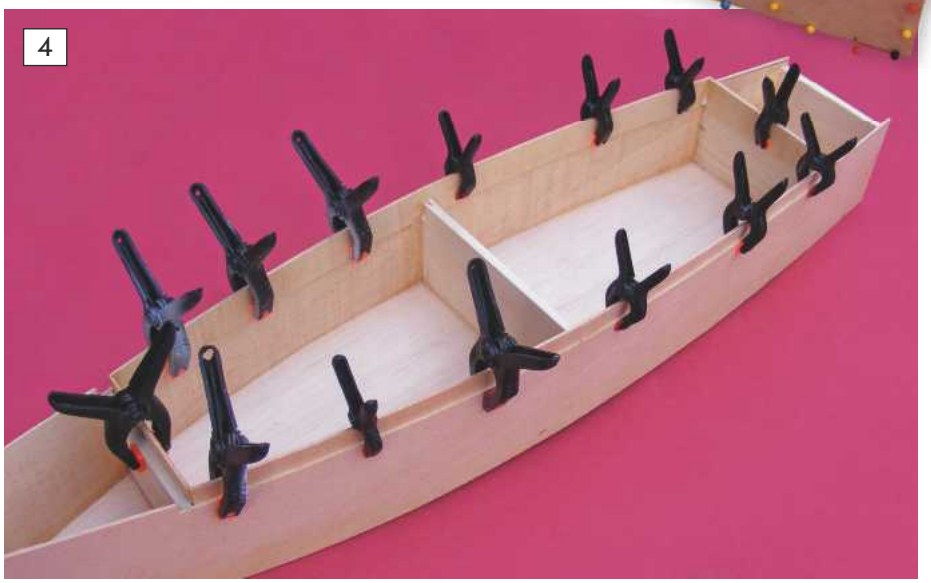
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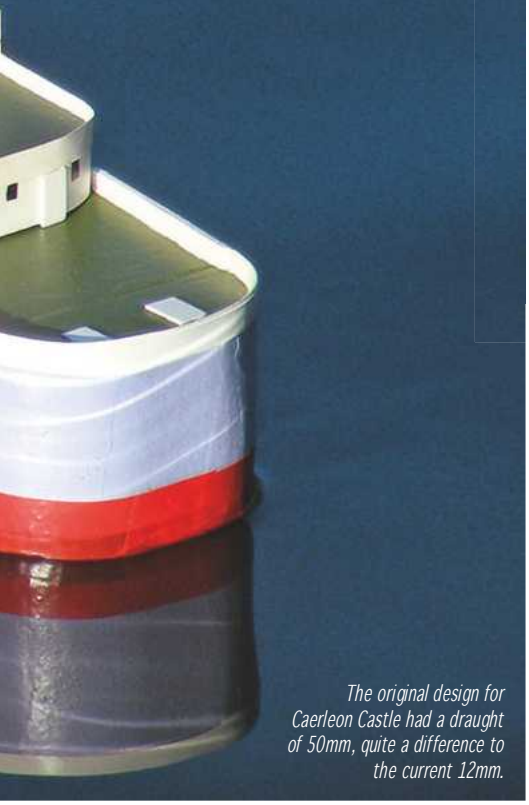

The original design for Caerleon Castle had a draught of 50mm, quite a difference to the current 12mm.

was also reduced. The resulting design was still pleasing but gave me the uncomfortable feeling that I was going to be building what was, in effect, an overgrown waterline model. Luckily, the urge to try out this idea was strong so the model was built and proved a success.

Material matters

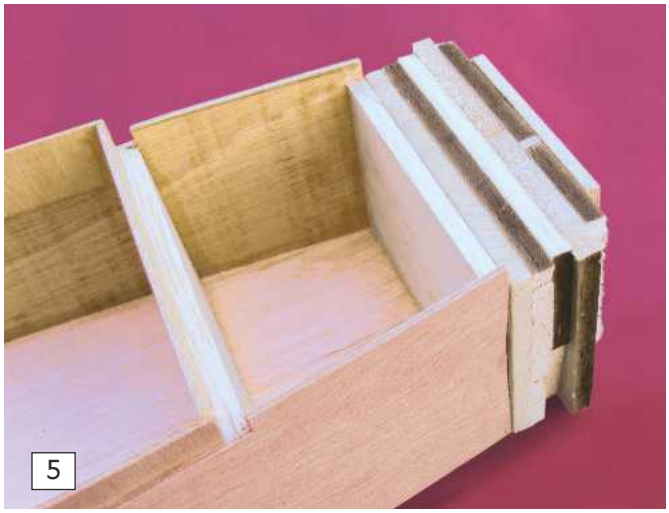
The hull sides and coaming strips were made from liteply for which a thickness of 1.5 to 2mm (1/16 inch) is adequate. Three sheets of 6 x 75mm (1/4 x 3 inch) balsa were needed for the remaining parts of the hull. Now, those who know me well won't be surprised to find that the superstructure of the prototype was made from humble card of about 1.5mm (1/16 inch) thick. A couple of large sheets had been previously bought quite cheaply from an art store, however alternative sources, such as packaging, could supply suitable card although you might have to make more joints. With experience other materials could be used successfully provided excessive weight is not added to the final model.

The bulk of the glued joints were made with some 'weatherproof' wood adhesive which I've found to produce more than strong enough joints whilst being economical and easy to use. True, it admits to only being 'water-resistant' but who fails to waterproof the outside surfaces of wooden hulls? Worst still, who leaves the inside of their models waterlogged between sailing sessions? Some epoxy was also used to secure the propeller and rudder tubes into the hull.

For propulsion, the prototype was driven by a single RE360 motor (the similar RE385 would also be suitable but not the 380 or Speed 400 types). This was connected to a Radio Active 8 inch shaft / tube which had a 40mm diameter three-blade propeller (Part No RMA 3045). A commercial rudder assembly was installed but, of course, a similar item could easily be scratch-built.

Hasty hull

After carefully drawing the shape of the hull side onto the liteply sheet it could be cut out with a modelling knife (equipped with a sharp blade) using a steel rule and flat cutting surface – a good cutting mat is highly recommended. To produce the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second identical hull side piece, the first one was pinned to the liteply sheet and used as a cutting template **(Photo 1).** Again, a little care ensured a good result. With this, the two hull base parts were joined by gluing their centreline edges together and held flat with suitable weights. A few pins made sure that the glued surfaces remained together and nothing could move whilst the glue set. Thin plastic sheets are handy to prevent any glue sticking to the flat surface and weights.

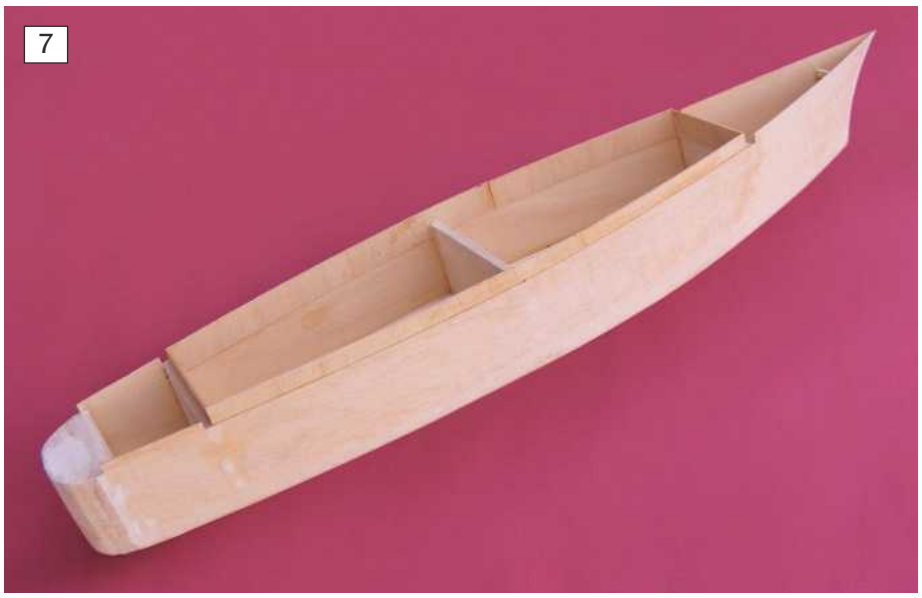
Before gluing the hull parts together, a dry run (using pins to secure them) is a good idea. This should ensure that you do not encounter items that are either out of shape or out of place after applying the glue. With the bulkheads pined in place, the sides can be dry pinned the aim being to get the two sides to join neatly when pulled together at the bow. If the sides extend a little beyond bulkhead 4, this is no problem and can be sanded away later.

All the parts should have good mating surfaces that will produce good strong glued joints. If any gaps appear then now is the time to make adjustments. For example if a bulkhead is wider than the hull base, it can be sanded back until the correct fit is produced. If something is undersize then a strip of wood can be glued in place and the part reshaped.

When happy with the fit of these parts the first job was to glue the bulkheads square to the base **(Photo 2).** The sides were then glued to the edges of the base and the bulkheads and secured with pins **(Photo 3),** whilst the hull sides were held together at the bow with some small crocodile clips. Try not to let these clips bend the sides inwards since this would produce a rather weird concave shape. If this does happen then a spacer can be fitted to push the sides outwards, but go gently. A liberal application of glue was made to the inside of this joint along with a glue-soaked strip of fabric. This is my old aeromodelling origins surfacing again; the joints in solid balsa wings were often reinforced with a cement bandage and where boats are concerned, despite a few sailing accidents I've never suffered the bow splitting open when using this method. If you follow suit, make sure the fabric stops about 12mm from the top or it will foul the fixed deck section when added later.

Coaming strips, from liteply, were installed along the inside edges of the hull sides, between bulkheads 1 and 3, and also between the sides across the top edges of these two bulkheads. Note the notches in the top corners of bulkhead 3 to accept these strips and aim to use clamps, or even clothes pegs, to hold them in place whilst the glue sets **(Photo 4).**

A shapely rounded stern was required and this was produced with balsa laminations taken from the scrap box and glued to bulkhead 4 **(Photo 5).** After the glue had dried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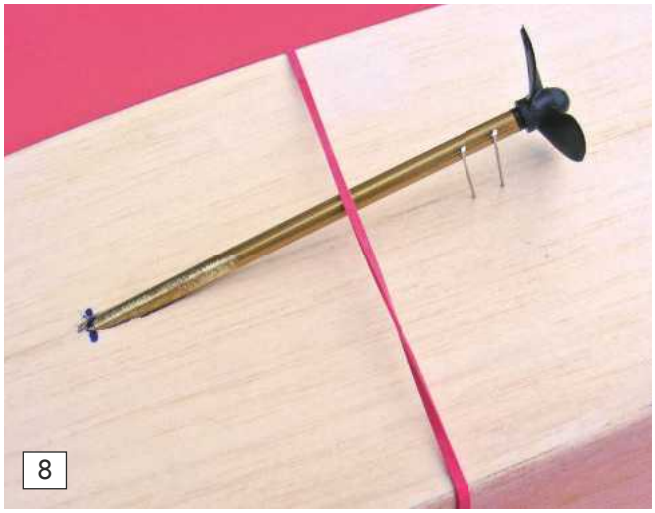

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the balsa was carved and sanded to produce the desired shape and blended into the hull **(Photo 6).** The bow was finished off by gluing some hardwood strips to bridge the joint where the two sides meet (see plan). Again, when dry, the strips were carved and sanded to blend in with the hull. These strips will likely not prevent any damage should the bow hit something hard and unforgiving but they will absorb and localise damage which makes repairs much easier – something I've proven too many times.

The next job was to round off the corners where the hull sides join the base. There's not a lot of material at this joint so only a small radius is needed, as can be seen in the cross section on the plan. With this done the hull's external surfaces were examined and any defects rectified. The final task was something I'll confess to being an obsession with me. A bead of glue was applied along all the corners of the internal glued joints before being digitally (which means I used my finger tip) formed into a smooth fillet. It's almost certainly not needed but I've always done it and it makes me feel better so there's no chance I'm going to stop any time soon.

Caerleon Castle offers scope for a few additional details should you wish to add a deckchair here and there.

Seal the deal

At this stage the external surfaces of the hull were sealed and waterproofed with cellulose dope and tissue. It seemed easier than having to work around the propeller and rudder tubes at a later stage. Here's how it was done: First, a couple of thinned coats of dope were applied, lightly sanding after each coat. This is to enable the dope to penetrate into the wood and create a firm bond. Also, since the dope will have stiffened any 'fuzz' on the wood surface, sanding will easily remove it. The rapidly evaporating solvent in cellulose dope makes this a quick process but not one for enclosed spaces! Panels of model aircraft tissue were then laid over the hull and secured by brushing neat dope onto them. It has always been best to start at the centre of a panel and work outwards with a dope laden brush to avoid creating wrinkles. To ensure full coverage a slight overlap was made between adjacent panels. The relatively flat surfaces made this an easy task but some slitting of the panel edges was needed to make a neat job where the tissue went around the base-side joints.

Next, three or four thin coats of neat dope, lightly sanding between each coat, soon created a nice smooth and watertight hull. The layer of tissue helps to both hide the wood grain and toughen the surface.

An alternative to the dope / tissue method would be to use Sanding Sealer. This can, of course, be bought ready to use but I make my own by adding a suitable filler powder (such as Talcum Powder) to cellulose dope. The powder will thicken the dope somewhat so to restore fluidity cellulose thinners must also be added.

Pond trials

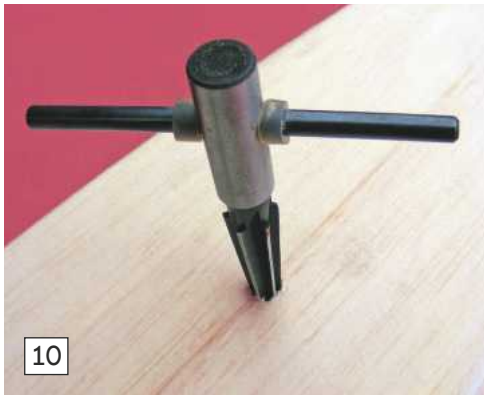
Despite its slab-sided construction the hull was now beginning to look quite shapely **(Photo 7).** After a moment's admiration of my handiwork, I had to figure out where to place the R/C gear, a process which called for a trial float on the garden pond. The idea was to use a more or less conventional

layout with the tube entering the hull in the compartment between bulkheads 3 and 4. The rudder servo and motor would go in the next compartment forward, along with the battery pack. With these items so positioned inside the hull, a test float on the pond was made. This revealed a reassuringly stable model but the trim was not quite level. However, rather than correct this with internal ballast, things were repositioned until the model floated level, a condition that saw the battery placed transversely up against the forward face of bulkhead 2. The motor would have to fit between the battery and bulkhead 1 and the rudder assembly and servo in the compartment bounded by bulkheads 2 and 3, i.e. much further forward than my normal practice. I consoled myself by thinking that if the model's handling proved to be a problem, things could be altered without too much trouble.

The centreline joint between the two hull base pieces provided a perfect guide for making the holes required for these tubes, wherein a slot was cut through the hull base and then opened up for the propeller tube. The RE360 motor had been secured to a plastic commercial mount which was to sit on a balsa wedge in order to be at the correct angle for the propeller shaft. This called for a session of adjustment to the balsa wedge and tube position, always taking care that the propeller would not foul the bottom of the hull. For this task, a stiff plastic tube that was a close sliding fit over both motor and propeller shafts was used. When happy with the alignment, the propeller tube was glued into the hull with some slow setting epoxy adhesive. Where the tube passed through, the hull had been first cleaned and lightly abraded to ensure a good bond with the epoxy. An elastic band and a couple of pins made sure that the tube did not move **(Photo 8).**

Only after the epoxy had fully hardened was the motor and mount replaced into the hull and the shaft alignment rechecked before gluing the balsa wedge to the hull base. When dry the motor mount could be screwed onto the wedge and a final alignment check made. If I seem to be obsessed with shaft alignment it is because early in this hobby it was learnt that making the best use of any electric motor, in terms of model speed and sailing duration, requires the minimum of misalignment.

The shafts were going to be connected with a flexible length of tubing as previous models have proven that this is a safe, efficient and, to be honest, cheap way to do it. Alas, my stock of tubes could not produce anything that would grip both shafts without slipping when tested. A test, incidentally, that involves jamming the propeller whilst applying full power to the motor. A brutal test maybe but not an unrealistic situation when you sail on weed and debris-strewn waters. Good commercial couplings are available, however I discovered an old but still sound item amongst my boxes of spare bits **(Photo 9).**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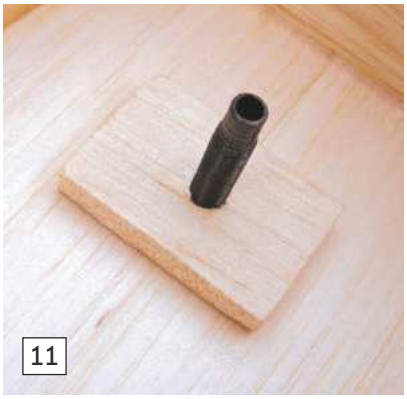
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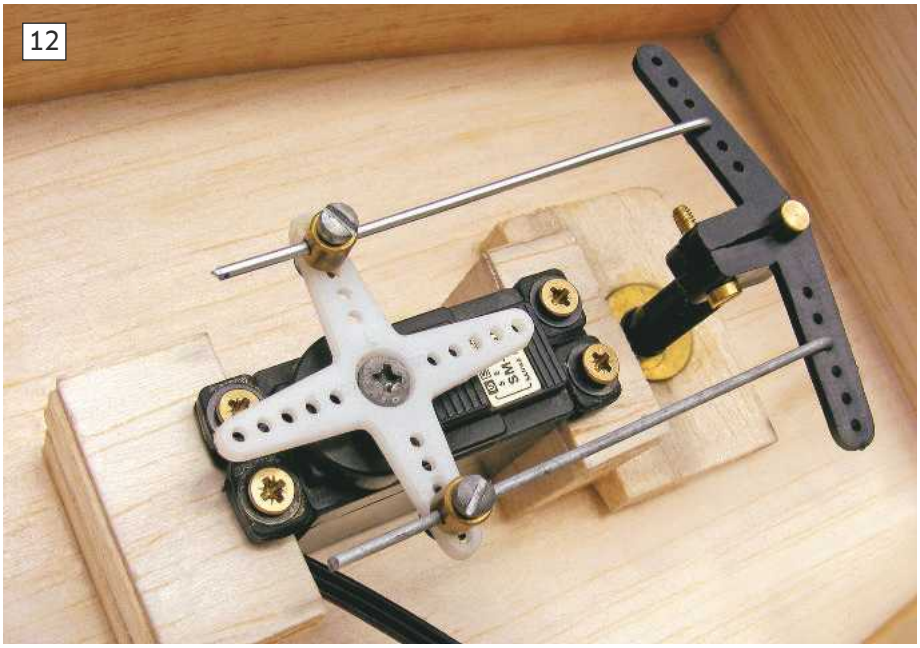
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"The vessel has pleasing proportions, unlike the floating hotel blocks that prevail today"

The rudder tube was a moulded plastic item and required a larger hole in the hull base than any drill bit in my possession. Rather than enlarge the pilot hole with a file, and probably end up with an oversize and oval hole, I used a reamer. This might make some readers wince since such tools are usually reserved for working with harder materials than balsa! However, gentle use of the reamer soon opened up the hole to match the rudder tube **(Photo 10).** Rudders can often be subjected to hard knocks, i.e. with the model running aground or accidents on the work bench, so some internal reinforcement seemed prudent. This was no more than a balsa doubler, with the wood grain running transversely and a hole to match the rudder tube **(Photo 11).** After checking that the rudder would be square to the hull base, the tube was secured with epoxy. The rudder servo was secured in the hull by two blocks of balsa glued to the hull base **(Photo 12)** with a cut-out made to one block so that the servo lead would not be fouled. A double-sided linkage between the servo and tiller arms made for a secure yet easy moving action. I could not resist another quick test on the garden pond, this time with the R/C operational. Still very stable and, as far as I could tell on this restricted water, there were no obvious problems with the propeller and rudder positions. So, on to completion, which we'll do next month when we build the superstructure, add some paint and get her back on the water in finished fettle. Until then...

DATAFILE

Length:	31.5" (800mm)
Beam:	6" (150mm)
Weight:	2.56 lb (1.16kg)
Motors:	Brushed RE360 / 385
ESC:	10A brushed
Battery:	6-cell 7.2V 2500mAh NiMH

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Kim White adopts 1:72-scale to model the world's first battlecruiser as she appeared shortly before her fateful engagement at Jutland

ABOVE: W.W.I warships can be interesting subjects however not too many modellers seem to build ships from the period.

This is the story about the construction of a 1:72 scale model of the British W.W.I battlecruiser HMS Invincible. Readers may remember my earlier model of HMS Glamorgan that was featured in the April 2013 issue, indeed this is my latest. Warships of the First World War, and especially battlecruisers, have always been an obsession of mine and in 2013 with the 100th Anniversary of that war approaching, along with that of the Battle of Jutland, I had a bad case of 'battlecruiser fever'. As it so happened, synchronicity took a hand when I learnt that Tim Amos of Southern Cross Models in New South Wales, Australia, was intending to offer an Invincible Class battlecruiser as a GRP hull in 1:72 scale. It was duly ordered.

By good fortune, in 2013 I had arranged for Tim to start framing the hull master 107 years to the day that the original HMS Invincible was laid down, namely the 2nd April 1906. This was, at least to us, an important connection to the ship that would be modelled. The estimated delivery of the GRP hull from its master and mould was to be Christmas 2013, but this proved to be very optimistic, it not arriving until early 2015, more than a year later than anticipated. Mind you, quality is always worth waiting for.

GRP gold

Tim's hull is a work of art with superb and accurate detailing of the plating, all taken from the original plan for the Invincible class. There are no photos of the bare GRP hull (sorry), however **Photo 1** is of the plated hull master before the making of the mould and the subsequent GRP moulding from it. The fibreglass is of generous uniform thickness with no thin spots or pinholes and measurements of the key hull dimensions confirm the accuracy of Tim's work, the hull measuring spot-on at a 1:72 scale and 2.4 metres in length.

Timeline

In deciding the period in her life that the model should represent I chose to build her as she would have appeared during her last few minutes, before destruction at the Battle of Jutland. Everything thereafter stemmed from that and apart from some small items like the ship's boats, bollards etc., and, of course, the GRP hull, everything else would be scratch-built as far as possible.

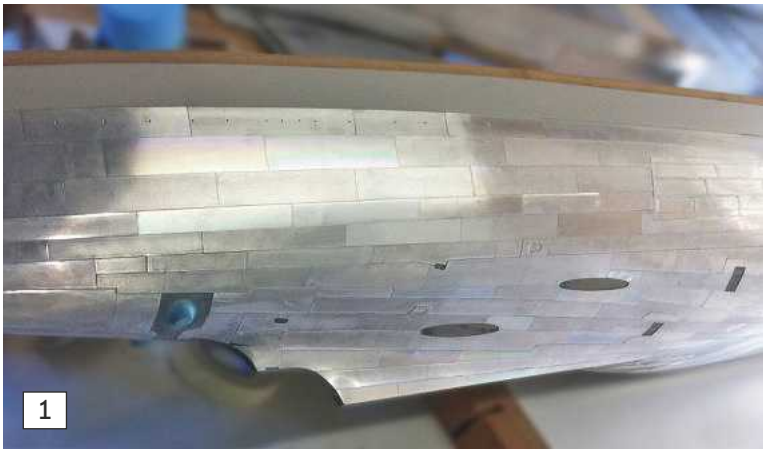
What follows here is a series of notes that, hopefully, highlight some of the more complicated areas of construction and show the ways and means used to overcome some problems that are common to many model projects. One feature which dominates this model is its vast expanse of planked decks and

The Invincible Class

When the Royal Navy was finalising the design for HMS Dreadnought in early 1905, Admiral 'Jacky' Fisher strongly believed there was a need for a new type of cruiser to hunt down the large and fast armed passenger liners that the German Navy was planning to deploy in the event of an expected future Pan European War.

It was widely believed by the naval strategists of the day that all the fast and large German trans-Atlantic passenger liners had strengthened decks to allow the fitting of heavy guns, and that they also carried a secret stash of 6 inch guns as cargo just in case a war caught them outside of German waters. These guns could quickly be mounted and turn the passenger liners into fast merchant cruisers able to play havoc with Britain's trade routes. The warship that Fisher created (the Invincible Class) was an armoured cruiser in design but bigger and faster than any armoured cruiser then afloat, and armed with battleship size 12 inch guns. The three Invincible Class battlecruisers had only cruiser-standard armour and would later prove to be very vulnerable to enemy battleship guns. Also, the concept was good only so long as the Germans did not possess similar ships which, of course, they did. This new class of fast, big-gunned, albeit lightly-armoured, warship grew in size, speed, and armament, eventually resulting in the last of the breed, HMS Hood. Anyway, the new class were eventually officially designated as 'battlecruisers' in November 1911. The later and newer warships were vast improvements on the Invincible Class, it not being forgotten that these first three warships were only 'over-gunned' armoured cruisers.

Research and marine archaeology findings have revealed that HMS Invincible was most likely lost at the Battle of Jutland due to poor ammunition handling and lack of anti-flash safety procedures, but her thin armour did not help matters either.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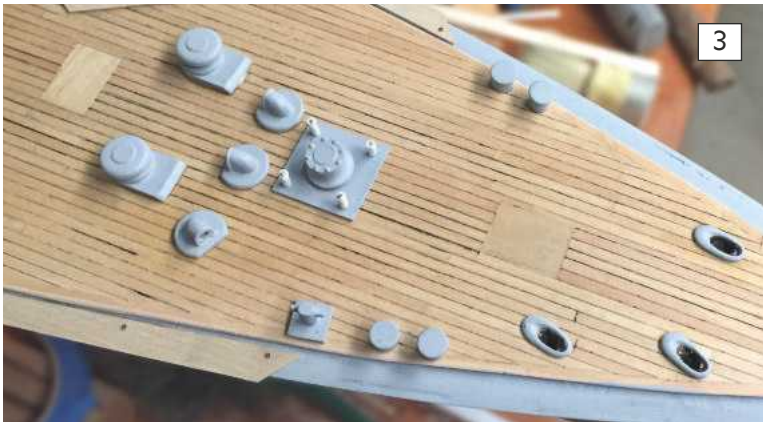
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these must always be done well or they look wrong. After considerable thought individual limewood planks (4mm wide and 1mm thick) were laid over sub-decks of 3mm marine plywood, the sub-decks themselves being cut to size and over-planked before being glued to the top of the hull **(Photo 2 & 3).** The planks are readily available precut in one metre lengths via the model trade and before laying them down, each plank needs to be caulked, which is the black line (tar) one sees separating them on full-size ships. Some modellers use black paper between the planks but I think the result is then over-scale for a 1:72 model, so I ran a black indelible marker along one edge of the plank to be laid. When laying them, care was taken to ensure that a black-edged plank was butted to a non-black edge, thus avoiding too thick a line. Once the now laid deck was sanded and any over-spill of black marker had been turned to dust, what was left was a subtle caulking line that is not overstated. The glue used was a water-soluble white glue of outdoor strength grade and the decks only took about two weeks to lay, doing an hour or so every day. Far from being tedious, the process of planking can be quite therapeutic, in fact it's a joy to see a planked area enlarge from day to day. A mechanical sander was used to do the first light smoothing to remove excess glue and caulking over-spill, and then three coats of clear water-soluble varnish were applied and very lightly hand-sanded with 400 grade wet and dry between coats. No attempt was made to achieve absolutely perfect decks as the real ones suffer dents, splintering, spills and coal dust or oil imparted blemishes. I am a firm believer that, 'realism is improved by avoiding perfection' and strongly believe that models can sometimes look just too perfect. **Photo 4** shows the completed quarterdeck, albeit with marines temporarily in place.

Superstructure

The superstructure units and most other large items were fabricated by laminating two layers of 1.5mm plastic sheet. The method was to build the basic shapes with a single layer of 1.5mm sheet cut to the outline of the structure being represented. This was then 'plated' with a second layer of small plates, usually about 5 x 3cm or whatever was needed to fit into the corners.

HMS Invincible was, as with all ships of her time, built with riveted steel plates. Some modellers apply these rivets by hand, one at a time, with glue on a needle or perhaps not at all, but for 1:72 scale this would involve a huge amount of labour and as it is impossible to represent every rivet, a method was tried which would give an overall impression of riveted construction, indeed **Photo 5** gives an idea of the finished result. In the event the plastic plates were riveted by rolling a pounce wheel very hard along their underside edges, indenting the thin plastic. When a treated plate is turned over and glued to the superstructure with these little dents facing outwards, the effect is quite convincing without being overstated. Please note that the minor gaps between the plates were left, because once paint is applied, the gaps mostly get filled anyway, but still reveal the plate lines, further enhancing the riveted plating effect.

Funnels

The three funnels were easily made by wrapping 0.5mm plastic sheet around a former, after first softening the plastic with boiling water and then gluing the sheet end


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sections together. As with the flat panels on the superstructure, a second layer of riveted plates gives strength and stiffness. Note that the finished funnels are almost completely hollow and unobstructed but are still light in weight and strong. The wire funnel top cages were soldered from 0.5mm wire and scrap brass strip from a used photo etching sheet – never throw anything away! **Photo 6** shows the nearly finished results.

Old relic

For the remaining superstructure parts the materials used, apart from plastic, were brass rod and sheet, plus anything else to hand and suitable. The large tripod masts have been fabricated from brass tubing, silver-soldered at their tops for maximum strength, then screwed and bolted to the underside of the decks, **Photo 7** being the (aft) mainmast in its early stages. In fact, almost all of each tripod mast and its yards are of brass, as are all the deck railings. Plastic may be easier to work with, but too many models come to grief through carelessness when fitted with a fragile plastic mast. These brass versions are bullet-proof and are so robust they can even be used as lifting handles.

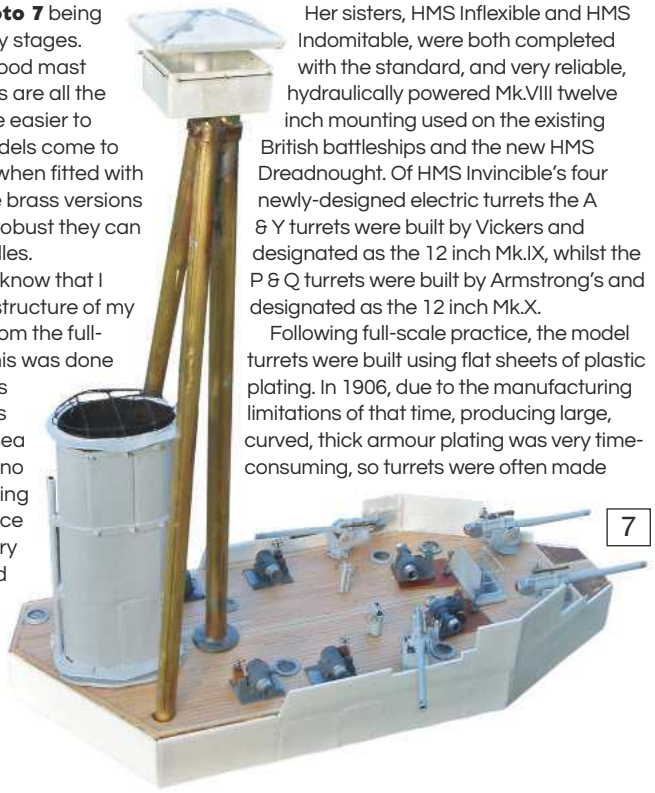
You may be interested to know that I always try to include in the structure of my models some relic or item from the full-size ship being modelled. This was done with HMS Glamorgan, but as the full-size HMS Invincible is at the bottom of the North Sea and a war grave, there was no chance of including something from it. However, a small piece of oak salvaged from the very first HMS Invincible, wrecked in 1758, was eventually located and duly purchased. That small square of almost black oak was used to make the base beneath the compass on the upper open navigating platform, and so, perhaps, the spirit of that original 18th Century sailing warship is preserved in this model.

Gun turrets

While waiting for the GRP hull to be built in 2014, work had already commenced on the superstructure and turrets. The most obvious feature of this battle cruiser is the four 12 inch twin barrel turrets which are 100% scratch-built. An added complication is that HMS Invincible was built with two pairs of distinctly different main gun turrets supplied by two different companies. And why is that you may ask? Well, the Admiralty wanted to test electrically powered main battery turrets and HMS Invincible was chosen as the trial ship.

Her sisters, HMS Inflexible and HMS Indomitable, were both completed with the standard, and very reliable, hydraulically powered Mk.VIII twelve inch mounting used on the existing British battleships and the new HMS Dreadnought. Of HMS Invincible's four newly-designed electric turrets the A & Y turrets were built by Vickers and designated as the 12 inch Mk.IX, whilst the P & Q turrets were built by Armstrong's and designated as the 12 inch Mk.X.

Following full-scale practice, the model turrets were built using flat sheets of plastic plating. In 1906, due to the manufacturing limitations of that time, producing large, curved, thick armour plating was very time-consuming, so turrets were often made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from a series of flat steel armour plates. A pattern for both styles of turret was made with the help of a friend who does 3D computer modelling and all the bits cut from plastic sheet and glued together. **Photo 8** is of a completed Vickers turret. The barrels were easy though, being plastic tubes nested one inside the other to get the stepped-down contours and the thickness at the muzzles. Realistic blast bags were made, these being of facial tissue wipes stiffened with white glue and then painted. The sighting hoods and rangefinder hoods are, I have to admit, commissioned resin-cast fittings from APS Models in Australia.

Of interest is the fact that the electric turrets were actually an operational disaster, being slow to traverse, impossible to insulate properly from salt water and regularly shorting-out with big blue sparks. The training and elevation systems were later converted to hydraulic power just in time for W.W.I but, of course, the different-looking Mk.IX and Mk.X gun houses remained.

Working features

Rotating turrets look nice, but quite often no-one notices them traversing when a model is on the water, so these are not power rotated. They can however, be hand-rotated for posed photos, but otherwise just sit within their barbettes. Also, they can be removed easily, leaving the barbettes as nice big access holes to the hull's interior.

There are the usual working features of individually-controlled port and starboard motors occupying two channels of a Robbe F14 Navy R/C set, using left and right vertical axes of the twin sticks; the rudder is on the third channel and the fourth operates a bilge pump (for emergencies!) and the ship's steam siren in the form of a sound module, via a servo activating two micro-switches.

The 12V drive motors are labelled R4468 **(Photo 9)** and sourced from a Chinese company called DGJL Motor Technology Co. Ltd., who can be easily Googled. Tank testing showed that when driving Raboesch three blade 45mm diameter propellers, these powerful motors turned at 5700rpm on no load and 4200rpm when immersed. Current per motor under load is 3.5 amps and efficiency is better than 73%. At full power, the four propellers really churn the water and drive HMS Invincible at much more than true-scale speed, but the excess power is necessary to develop a realistic wave pattern for taking photos.

The speed controllers are by Electronize and all other electronics (power board, battery balancer and Aldis flasher) are from ACTion (Component Shop). Power is supplied by two 26Ah deep discharge SLA batteries, which are enough to drive the model for an entire weekend without re-charging. Yes, they are heavy, but serve a useful dual purpose as easily-removable ballast.

Navigation lights are controlled by accessing a switch under Q turret and the Aldis lamps on the signal deck continually flash out real Morse code messages provided by a pre-programmed ACTion Morse Code Board when the main power is on. The navigation lights and Aldis lamps will also work on their own battery independently of the main motive power, so if the model is on static display, one can leave all the lights on without also having the R/C and drive motor circuits active. Weight is not a problem.

The portholes in the hull are illuminated too, a job that was very easy to do. All the portholes were drilled out through the hull in their correct locations. A strip of thin clear plastic was then over-fibreglassed on to the inside of the portholes, being careful to later mask the holes and not overpaint the glazing when finishing the hull's exterior. This left the portholes glazed with a semi-opaque appearance not unlike the heavy glass on a full-size ship. Placing four high-intensity LED's the length of the inside of the hull lets enough light out through the portholes to make them visible for evening and night sailing, but the effect is still muted and quite realistic.

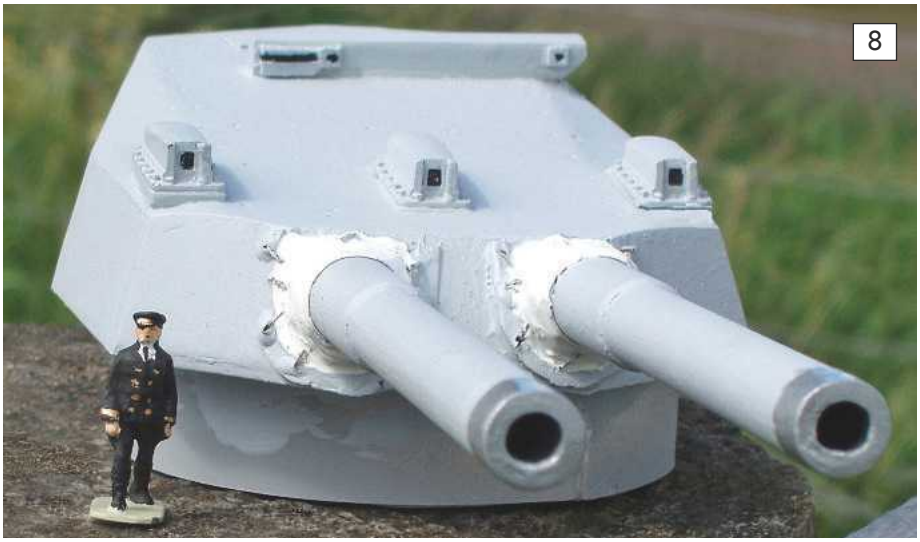
Research issues?

The basics of building the model progressed with no major issues, leaving time to concentrate on the smaller details. Careful research is one of the great pleasures of building a model, any model, and then knowing just what everything on the real ship actually does, or did. When modelling a ship designed back in 1906, some items shown on the original plans did require research. For example: Who knows what a Carpenter's Stopper is? I certainly didn't. There were two of them labelled on the plans, near the stern capstan and the blacksmith's forge on the quarterdeck. I didn't have a clue and several very experienced modellers didn't either. Eventually it was discovered that they are basically large fittings (a bit like an old-fashioned nutcracker) through which a wire hawser from the capstan could be routed, that were used to 'nip' a steel cable and stop it slipping while it was being fitted to the capstan. Knowing their purpose allowed me to fabricate a convincing fitting.

Another mysterious item on the plans was a pair of 'sounding machines' way up on the wheelhouse deck near the signalling semaphores. Nearly six feet tall, lots of exposed gears, but what exactly were they for? The plans gave no details and I knew that echo sounders had not been invented in 1906. 'Mr. Google' finally provided the answer and even a picture. It turned out the 1906 sounding machine was a mechanical automated replacement for the old-time sailing ship leadsman, with lots of gears and shiny brass parts. Once this was known, it was easy enough to fabricate them from odd bits of metal, wood, linen thread and some tiny brass geared wheels salvaged from an old wristwatch.

Even the issue of which flags to fly was a major research job. Amazingly, neither the Royal Navy nor any of the Naval Museums in the UK had any records of what flags HMS Invincible was flying just prior to her destruction. I finally found a note in the signal log for HMS Inflexible, which was following astern of HMS Invincible at Jutland, saying that she was flying the Number 2 numeral flag, a square red and white check flag, which at the time could mean 'Enemy in Sight', or 'Open Fire'. As for how many ensigns HMS Invincible was displaying was problematical too, but British capital ships at that time would customarily fly anything up to five ensigns when going into a Fleet Action. On this model, a comprise was made with three, a Battle Ensign at the gaff and a White Ensign and the Union Flag on the foremast. Note that during W.W.I a Union Flag or Red Ensign was always flown with the White Ensign, because from a long way off the White Ensign could be mistaken for the then German Naval Ensign. Adding a Union Flag or a Red Ensign made the nationality of the ship much more certain.

The last tricky items to fabricate were the two spider-like and very fragile Flat Top radio aerials. These were a distinctive feature of early 20th Century British warships. The long-wave radios of the time needed, not unsurprisingly, a very long aerial with plenty of gain, so they consisted of a long cage of eight strands of wire held apart by eight-armed spacers and I tried various ways of building a convincing example but without success. I finally succeeded by commissioning a fret of specially-made photo-etched spacers from the very obliging people at Scale Warship UK, which is now available in their stock list. The spacers were then strung with hard 0.5mm brass rod to keep the whole thing stiff, as using soft wire or thread simply did not work and looked horrible. The result is realistic and strong, yet still 'spidery enough' and not over-scale **(Photo 10).**

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Models within models

One thing that really lifts a model is when you create vignettes, that is to say, little models or scenes within the big model. People looking closely first see the whole but when they start looking more closely, they have interesting things to catch their eye and study. Examples on HMS Invincible are the chicken coop on the rear superstructure complete with tiny 1:72 scale poultry, the original providing fresh eggs for the officers, or the sailor halfway out of an open door carrying some equipment on his shoulder. Another is a brave sailor climbing the external ladder on the forward tripod mast, and the bicycle stowed almost out of sight behind a ventilator on the boat deck. As always on a model at this scale, a lot of crew make it more realistic as in my opinion, a model with no humans is a sterile object and ships are meant to be alive. A set of Royal Marine Bandsmen with instruments was also found online and a set of Royal Marines in the correct sea-service uniforms for W.W.I. Both the band and the guard live on the quarterdeck when the model is on display, whilst a hidden on-board speaker plays an appropriate selection of Royal Marines musical numbers. When the band plays 'Sunset', that well-loved bugle finish to the day, one can get quite a tingling feeling down one's spine **(Photo 11).**

Painting

Many modellers may disagree with me, but I strongly believe that many otherwise excellent models are spoilt because they are finished just too well. Real ships always have imperfections and the subconscious eye expects to see them on a model and if they are not there the model lacks that indefinable 'rightness', or so I believe. I always paint with a fine brush and never use an airbrush. If the planked decks have small imperfections, then they are left as they are.

On the water

So, how does it sail? Very well, I'm happy to report. I have a three metre test tank in the workshop, so all the ballasting, watertight testing and electronics testing were resolved in a controlled environment. Also, being able to leave the model in the water, inside the garage, for several days, certainly helps you find the source of any slow leaks!

With the two big 26Ah batteries in place, the hull still needed plastic bags of lead shot until the waterline corresponded to the nearly deep-load condition. The lead shot was then melted and cast into two lead bricks of equal dimensions and weight, with convenient carry handles cast into them. With the blocks put back into the hull, they were slid back and forth along the battery tray until HMS invincible floated level, fore and aft. Wooden battens were glued in pace to secure them, but the batteries and lead ballast blocks can be easily removed for transport, yet quickly re-installed without losing their correct ballasting positions. The final ready-to-sail weight is 44kg, which corresponds to nearly 20,000 tons at 1:72 scale, pretty much spot-on for the real HMS Invincible's deep-load wartime displacement.

The model performs like a thoroughbred and with the four propshafts churning the water most convincingly she is fast (as is only right for a battlecruiser) and the wave form generated seems to match exactly that seen on the full-size HMS Inflexible (a sister ship to HMS Invincible) in a photo of her taken on her full-power trials. The model's generous beam and overall size (and weight) means she has excellent stability, sitting in the water with a quintessential capital ship presence. The two electronic speed controllers allow independent speed control for the port and starboard propshafts and she can be manoeuvred delicately at very slow speed. She will even remain in one place whilst rotating around her mid-point, something that's handy for docking in a crowded anchorage at a model ship regatta.

Conclusion

HMS Invincible has been a pleasure to build and in making this model new skills have been learnt that can be applied to future projects. W.W.I warships can be interesting subjects however not too many modellers seem to build ships from that period. Hopefully I have convinced some of you to look more closely at these older ladies with a view to bringing them back to life.

Acknowledgements

Additional photos by Mick Elst, Haig Jansz, Scott Rice and Bruce Stevens, all from Task Force 72 in Australia, with their kind permission


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Sertao

Having secured prime position for the perfect shot, **Fraser Gray** witnesses the arrival of a deep-water leviathan

The future seems somewhat uncertain for the 748ft 60,316 ton self-propelled deep-water drilling vessel Sertao. Previously owned by the bankrupt Schahin Group and under long-term charter with the oil giant Petrobras, the new owner, US-based Dleif Drilling, repossessed the ship on 30th September 2015 with a view to finding a buyer or indeed future employment for it. Having sailed from Brazil to Teeside and been escorted down the east coast to the Thames Estuary, by a flotilla of tugs (deep sea tug Union Lynx and Svitzer tugs Bootle, Brunel, Monarch and London) it now resides in warm lay-up moored alongside the deep-water jetty of the partially-demolished Tilbury Power Station. Given that an offer of a cool $75 million has already been rejected for the ship, you'll need to think long and hard before making an impulse purchase, especially given the perilous state of the offshore oil drilling industry. It might be as well to just enjoy the photos and ponder for a moment on the specification of the tallest ship ever to have docked at Tilbury.

Staggering stats

Sertao has the ability to drill to a staggering depth of 11,400m (37,400ft) in 3,000m of water. She has a complement of four knuckle cranes located port and starboard, each with a maximum lifting capacity of 85 tonnes (18m short boom) or 17 tonnes (42m long boom), and six thrusters handle stability and manoeuvrability. There's also a large hexagonal helipad atop the bridge, to handle movement of supplies, and a 10 x 15m all-weather moon pool offers shelter and protection to facilitate work in all conditions.

DATAFILE

Type:	Self-propelled drilling vessel
Builder:	Daewoo Shipbuilding & Marine Engineering, South Korea
Completed:	2012
Length:	748ft (228m)
Beam:	138ft (42m)
Draught:	40ft (12m)
Height:	200ft (61m)
Gross tonnage:	60,316
Engine power:	40,800kW
Speed:	5.5 knots
Complement:	140 (crew and engineers)
Flag:	Marshall Islands


SERTÃO

SERTÃO


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Grand banks

In search of a subject for super-detailing **Brian Knight** falls for Amati's mahogany-trimmed model of the classic motor yacht

Too many of us that have been building model boats for most of our lives the models we build will naturally change, both in size and certainly in weight. For my part, I've been building model boats for over 50 years of either my own design or from plans and kits. Power boats, warships, tugs and a variety of scale models have all been produced. Anyway, some years ago I downsized from a large house with a large workshop to a small flat and a very small work area, the result being that smaller kit models, with less mess, are now imperative, not least for keeping 'you know who' happy. With this in mind I was attracted to the Amati Grand Banks 46' Schooner in 1:20 scale, indeed the lines were good, it appeared perfect for super-detailing and, most importantly, it was a good size to transport.

After many hints I received a very nice Christmas present voucher from my family for Cornwall Model Boats, a company I have happily dealt with for many years. So, the kit was promptly ordered, it arrived no less than two days later and I couldn't wait to get stuck in **(Photo 1).**

Now, every modeller has his or her own way of approaching construction and all have their merits, indeed I've learnt a lot in the past from my fellow modeller and from my own stupid mistakes and flashes of 'genius'. What I'll describe here, then, is my particular way of tackling the build, which I hope may help others. To this end I normally set myself one main rule, and that is to complete all mechanical, electrical and electronic installation before fitting the deck or any detail work. For this build, however, I had to bend the rules slightly.

DATAFILE
Name: Grand Banks 46'
Type: Luxury Motor Yacht
Length: 795mm
Scale: 1:20
Manufactured by: Amati
Website: www.amatimodel.com

Making a start

To begin I always clean the hull and any glass fibre parts with dilute dishwasher liquid, not only to assist paint adhesion but for a better grip for the prop and rudder shafts, for which I prefer to use a longer set epoxy after first tacking with the good old super glue. I know some of my colleagues and fellow model boaters like to get stuck in with the build immediately, but I prefer to read all of the literature supplied, peruse the plans and locate the parts. Being an engineer I have always believed in the maxim 'measure twice, cut once'. Besides, this kit comes with a multitude of literature: The manual booklet in colour, three large drawings of all the sheet parts in the kit, a scale drawing of the complete boat, many small notes and even one drawing for just the mast set-up. There's also a detailed list of parts (unfortunately in Italian).

At this point I must stress how important it is to read every piece of text on all the plans as I soon found some items pertaining to various build sequences that are not covered in the instruction booklet. Apart from the hull,

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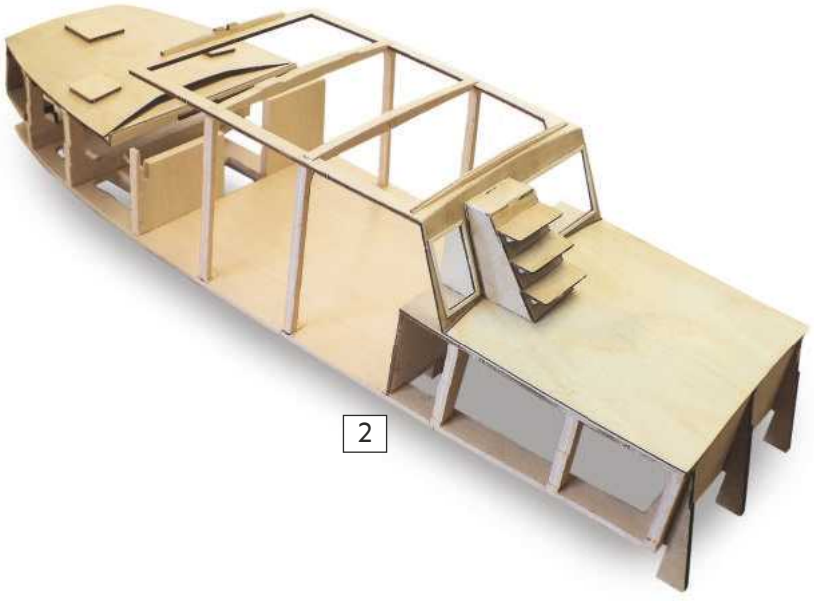

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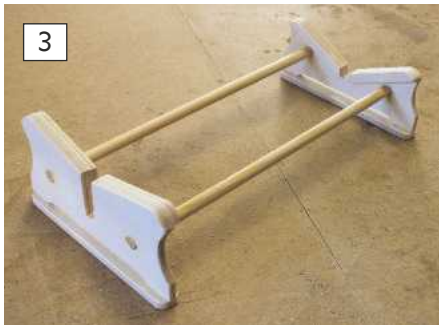
ABOVE: With good looks and enough fussy detail to make you look twice, this is a very convincing model indeed.



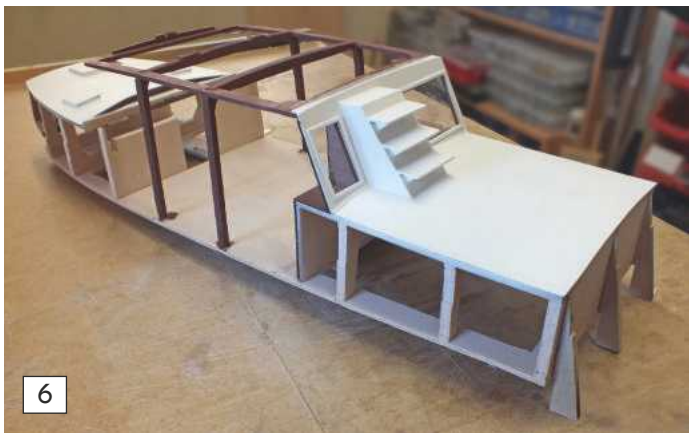
the model is constructed almost exclusively in various exotic and standard woods, for which the sheets were perfectly laser cut with the most accurate and fine cuts I have ever seen. This brings me to an important point, for I would hazard to suggest that this kit, although eminently suitable for radio control, was originally designed as a static model. The reason I say this is because the weight of the wood sheets is, in some cases, excessive, not least some 6mm MDF, plus perfectly moulded seating and a lifeboat of solid resin. At this stage I found myself looking for ways to save weight and given that the hull and deck was perfectly moulded as one it could not be tampered with. So, this left the superstructure and detailing for which every part was marked, removed from its parent sheet and packed into relevant plastic bags.

Many of the wood parts were simply designed to support the mahogany veneer internal detail, so I remade these parts from liteply (for the frames and stress parts) and balsa (for the internal detail) using the originals as templates. This is a good time to remark how well all the parts fit together, to the point that I was sorry I had to do this. Mind you, after a few days work I saved nearly half a kilo simply by changing the wood. But now for the fun part.

I decided to start construction with the cabin as this would be the most challenging. In **Photo 2** you can see the parts I replaced with liteply as the original items have laser burns on the edges of the wood. Also, although perfectly formed parts were supplied for a stand, this was mainly for display purposes and would require a more substantial one for both transport and for use at the lakeside. Accordingly, I decided to make a new one as in **Photo 3.**

The flying bridge was next and since this needed to be removable (to view the internal cabin detail) yet remain secure in operation, I used my preferred method of retention using small magnets with sections of tinplate fixed to the cabin as in **Photo 4 & 5.** Halfords white primer was used on all the white surfaces, this finished with Tamiya flat white. Inside, meanwhile, the cabin frames were treated with mahogany-tinted water-based paint which I found on Amazon some time ago **(Photo 6).** With this my attention turned to some of the internal furnishings which were constructed using the alternative (lighter) wood under the kit-supplied veneer, as described previously and installed in the cabin, not forgetting the pre-printed carpets **Photo 7 & 8.**

The next operation was to glaze the main cabin windows on the outside of the mahogany internal side panels and to glaze the front window frames and fit the mahogany trim **(Photo 9).** Following the

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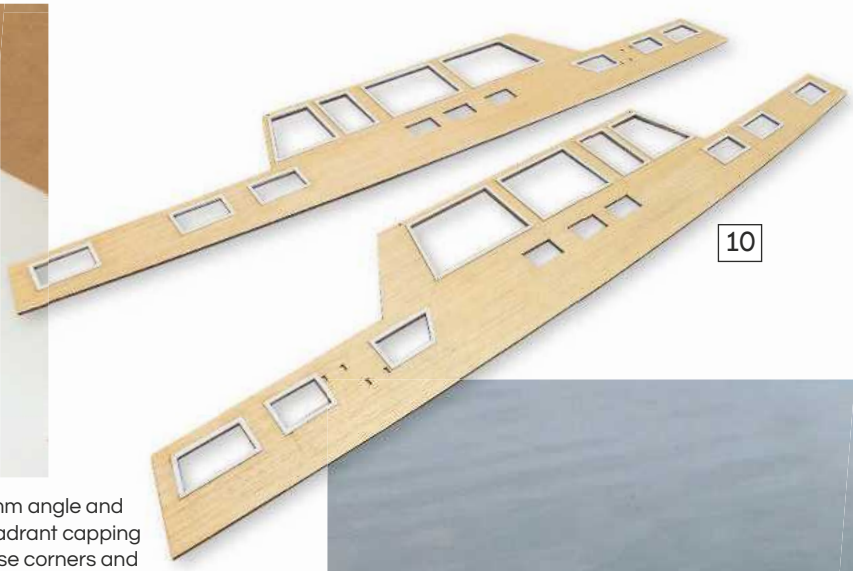
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recommended assembly sequence the build then moved to the outer side panels, a challenging process that involved fitting the window frames of 1 x 2mm plastic strip with mitre joints of different angles. I used thin super glue for this operation **(Photo 10),** the panels duly painted and curtains fitted to the front and rear cabin windows. At this point I also fitted the louvred ventilation panels made from the etched brass sheet before finally attaching the side panels **(Photo 11).**

Soft furnishings

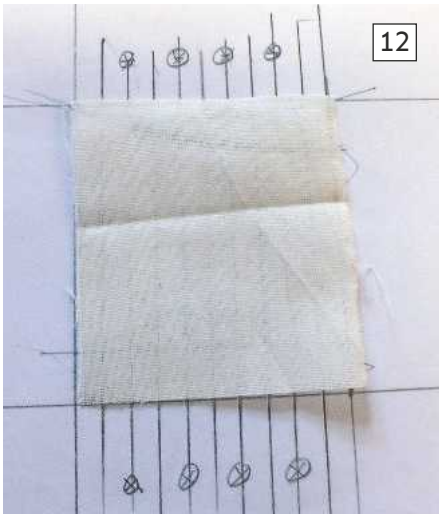
With my previously assembled front windscreen added, along with the pre-assembled glazed and curtain hung rear panel, it was time to turn my attention to the saloon curtains and undertake a process that was new to me, although I'm sure many out there will have done it before. Here, then, the curtain material supplied is cut to the recommended size (15 in all) then coated both sides with diluted PVA white glue and left to dry. To make the required folds in the curtains I decided to make a template **(Photo 12**) and use a small embossing tool (made for scrap-booking and other paper crafts) to emboss alternately, front and back 5mm apart. The cloth, stiffened by the glue, can now be folded and tied as in **(Photo 13)** and glued in pairs to a piece of 1 x 5mm mahogany offcut, which was duly secured in position.

The supplied 3mm angle and 3mm plastic quadrant capping for the deckhouse corners and external joints was then fitted with medium super glue. Great care had to be taken here to ensure that the glue was applied very sparingly to the plastic so that nothing marked the finished paintwork **(Photo 14 & 15).** Note that the stair railing has also been fitted at this point.

Running gear

With most of the superstructure complete I turned my attention to the hull, the first priority being to fit the shafts, rudders and motors. Many modellers have their own way of doing this and as a past i.c. model powerboat racer I know how important the lining up of motor to shaft is in reducing friction and noise. In electric models, of course, this is equally important in reducing current flow.

With twin screws the shafts need to be kept absolutely parallel with each other so after deciding the location of the shafts and rudders I first drilled 3mm pilot holes, then re-drilled to the diameter of the external tube. With the two holes made, bevelled, and the tubes a snug fit, I used dividers to measure between the two shaft holes and, with this dimension, fashioned two templates from 1.5mm plastic, each perfectly matched and sporting snug holes to suit the shaft spacing.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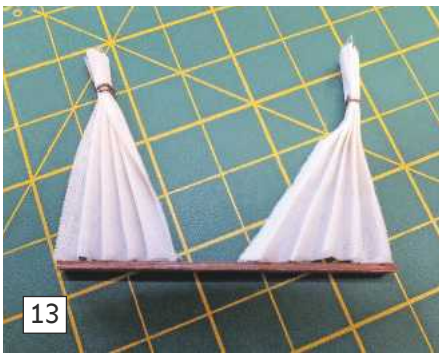
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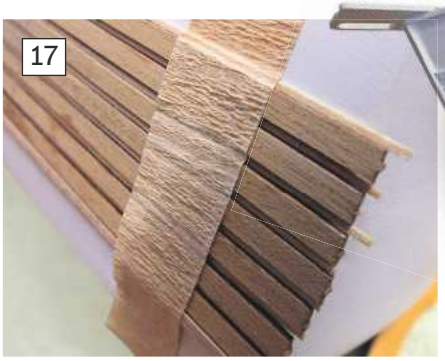
With the shafts inserted I then placed one template on each end guaranteeing a parallel alignment. As you might expect this same measurement was used to mount the motors. Here, my normal preference is to use double-sided copper printed circuit board for the base and face mounting plate, but as I was preserving weight and the motors were low power units I decided to use 1.5mm plastic sheet. The motors can be seen mounted in **Photo 16,** the small bulkhead in front of the motor mount being fitted to prevent any leakage up the shafts from getting to the electronics which would be mounted forward.

Now for lining up. After deciding which coupling to use, I cut two lengths of brass

BELOW: Not for the beginner, perhaps, but definitely one for those with previous building experience and an eye for detail.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tubing (with an internal diameter of 4mm – the size of the shafts) the same length as the coupling. Into one end of the shaft I fitted a smaller tubing to reduce the internal diameter to the size of the motor shaft. I normally solder these tubes together but super glue works equally well. By fitting this between shaft and motor, in place of the coupling, the motor can be perfectly aligned, whereupon the assembly can be tacked in place with super glue, checking everything is true and free before final fixing with epoxy. The rudder posts were also fitted at this time with the addition of a brass washer soldered to the top to provide a flat surface for a precautionary felt washer between the shaft and tiller arm, this because the top of the shaft is very close to the waterline. Having completed the mechanical parts in the hull it was time to consider planking the outside using the perfectly cut (laser) planks that are supplied on two identical sheets of 1.5mm mahogany. As the instructions suggest, I numbered them 1 to 10 before removing, as each is shaped differently, then fitted them in the correct sequence with super glue using a 1 x 1mm basswood strip between each as **Photo 17.** Note that some adjustment was needed along with a little filling **(Photo 18),** the sanded and sprayed finished result shown in **Photo 19.**

On deck

Now, in my humble opinion the removable hatch over the rudders is too small as it does not allow adjustment or repair at a later stage. As a result I decided to enlarge the assembly before planking the decks. For this latter task Amati supplies a bundle of nicely cut 1 x 2.5mm mahogany strips and whilst many of you will have your own way of

ABOVE: The Grand Banks has some attractive features and would lend itself to even more detailing if you so wished.

tackling this, I discovered an easy method many years ago. At that time I was told that it wouldn't produce a lasting result, however I have 12-year-old models done this way and the planking is still as good as the day it was laid. Incidentally, I would normally use 0.5mm black cord to simulate the pitch between the planks, however on this model the strips are butted close so no cord was used. Anyway here's my method, the results shown in **Photo 20 & 21:**

1 Cover the sub deck with thin good quality double-sided tape.
2 Starting at the outside edge lay the planks as required and push firmly onto the tape.
3 Repeat until the deck is covered.
4 Trim extending pieces with a sharp blade and lightly sand the surface.
5 Coat the finished deck with superglue, spread with an old store bank card. A mask is a good idea here and it's best to do this outdoors to avoid the odour.

ABOVE: If you build a Grand Banks you're going to have to get used to admiring comments at the lake.

6 Lightly sand the deck once more and apply two coats of satin varnish.

I also fitted the pre-formed swim deck at this time, along with the bulwark tops, handrails and a 1mm square mahogany strip around the deck edge. For the handrails the bulwark tops were drilled to 5mm deep with a 2mm bit, through the wood and into the glass fibre below. Using the plan as a guide, each supplied stanchion was cut to the correct length and the handrail drilled halfway through using a stopper on the drill bit. Oddly there's a discrepancy on the plan which shows one stanchion less on the side view compared to the top view, although I opted for the later.

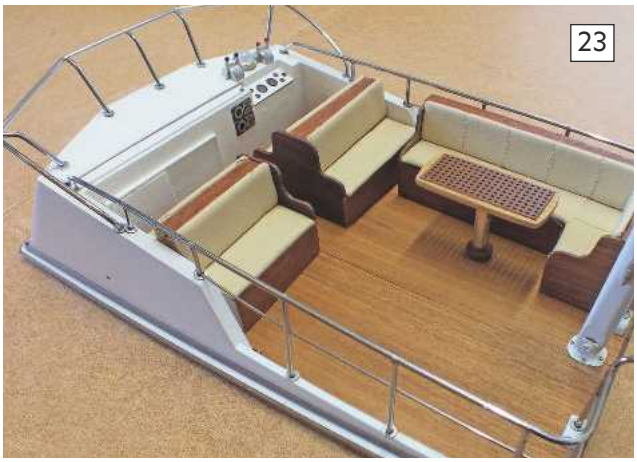
Photo 22 shows the finished and painted hull and with this all that was left to do was finish the flying bridge. Here the deck was laid as before, railings and seating fitted, and the mast modified to fold so that I could build a smaller storage and transport box (**Photo 23).**

Home straight

With the model nearly finished the electrics were completed with two Mtroniks 10amp ESCs offering independent control of the high torque 385 motors, the whole powered by a 5-cell 6V 4300mAh NiMH battery **(Photo 24),** although this was later changed to an 8.4V pack.

Turning my attention to the final cabin details, anchor platform and winch I was presented with a reoccurring problem in that I never launch a boat without a helmsman at the wheel. It's a foible of mine that can sometimes cause a real headache trying to find a crewman of the correct scale. Fortunately I found a 'G' model train driver that was close and after a bit of hip, leg and arm surgery, plus a home-made felt hat, he was persuaded to fit and seemed quite suited to his new job.

The first sail was on a perfect sunny day with no wind and, thankfully, all went to plan and my 'higher than the plans' marked waterline was, by sheer luck, correct. The Amati Grand Banks 46 has been one of the most challenging and satisfying models I have built but, I would suggest, not recommended for a complete beginner.



Range Finder

Back aboard HMS Iron Duke, **Dave Wooley** concludes his tour with a stroll around the flight deck

Welcome back dear reader. In this final part of our visit to HMS Iron Duke we'll be taking a close look at the area surrounding the hangar and seeing what lies within. We'll also view the detail on the main mast, the helicopter landing aids (lighting) and, lastly, the new Wildcat ASW helicopter. Without further ado, then, moving along the starboard side of the hangar in **Photo 1** we can gain a clear view of the essential details, indeed although many re-fits have taken place, little has changed in this area. What is becoming noticeable, however, is the number of fittings seen here that will not be visible on the 23 replacement, the Type 26.

Moving up onto the rear of the hangar roof is the Type 911(1) an X band pulse-doppler tracker / fire control director for tracking both target and missile, the latter being Sea Wolf and, shortly, its replacement the smaller but more agile Sea Ceptor. Fittings such as the 911 are quite a challenge to make from scratch so for those who prefer to forgo that challenge and opt for a good quality fitting, then 3D representations are readily available at reasonable a cost from Mark Hawkins / Shapeways **(Photo 2).** Moving further along the starboard side of the hangar reveals yet more detail **(Photo 3).**

The after mast is sited at the forward end of the hangar and is fitted with various communication and ESM (Electronic Support Measure) systems, commonly known as a candlestick array. Of these the item ringed in red **(Photo 4)** is a UHF radio antenna

(in this case either RX or TX) as also fitted at the head of the mast. It's been an essential fitting on many an RN warship for some considerable time.

Remaining in the area along the starboard side, ringed in red in **Photo 5** are the hangar outline lights designed to provide the approaching pilot with a clear reference as to the limits of the superstructure. Above the hangar doors is a series of landing aids referred to as horizon bars but known in the trade as a Stabilised Horizon Reference System (SHRS). Illuminated (usually by a series of green lights) and mounted atop the hangar entrance the centre bar remains horizontal irrespective of the ship's roll motion and provides the pilot with a real-time reference of the ship's motion relative to the horizon. Those lights fitted to the ship's superstructure greatly assist by clearly displaying the vessel's actual angle of roll **(photo 6).** Ringed in yellow is the fault warning and wave-off light. On the port side of the hangar door are additional landing aids, principle amongst these and ringed in yellow **(Photo 7)** are the wind speed and wind direction indicators.

Moving inside the hangar we gain a perspective of how surprisingly spacious it is, in fact, when I visited HMS Portland the area was taken up with the large Merlin HC1 and there was still space to move around. On the sides of the enclosure, about half way up is a mezzanine walkway whilst traversing the hanger roof are three mobile hoists **(Photo 8).**

Wildcat helicopter

Whilst aboard the Iron Duke and for the first time, I was able to get up close to a Wildcat, the Lynx Mk.8 replacement. Although based on the Super Lynx 300 it is a new aircraft that was given the project name Future Lynx, or AW159. Classed as a multi-role helicopter it has been designed for operations with both the Royal Navy and the Army.

Although similar in appearance to the Mk.8 the Wildcat **(Photo 9)** is fitted with a distinctive tail boom, redesigned cockpit with new avionics, and new engines. But that's not all. It also has BERP rotor blades (which are slightly swept to improve the operational flight envelope), a longer range and a better overall performance. Maximum speed is given at 184mph with an operational range of 420 nautical miles and a flight time of 4.5 hours, loaded. The maximum take-off weight is 13,200 lbs.

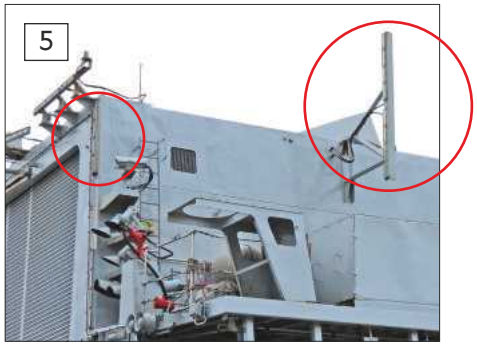
The Wildcat underwent a ten-day trail period aboard the Iron Duke making 390

1. Starboard side of the hangar deck housing.

2. A model maker's shot of the 911(1) illuminating radar for the Sea Ceptor SAM missile.

3. Moving along the starboard side of the hangar.

BELOW LEFT: The ship's nameplate on the deck housing.



4. It's worth noting that on the after mast, below the yard, is an array of aerial wires with glass insulators.

5. Extending from the side and on the front of the hangar are a series of lights (see text).

6. The horizon bars above the hangar doors.

7. Essential instrumentation for the flight deck crew who must be aware of both wind direction and speed.

8. The hangar interior is quite spacious in comparison to other warships of Frigate size.

flight deck touch downs and 148-night landings under variable weather conditions. Interestingly the Lynx made its first flight in March of 1971 and a specially prepared variant held the world speed record at over 240mph, indeed the Mk.8 is currently in service with many navies. Under the terms of the procurement contract with the MOD, Agusta / Westland are to supply 62 Wildcats to the UK armed forces.

Armament & avionics

In terms of weaponry the Wildcat is certainly capable of supporting an impressive array which, of course, will be based on operational requirements. Fitted to a pair of wing stubs are machine gun and rocket pods, air-to-surface guided missiles for both anti-tank and anti-ship duties and a 0.50 calibre MG fixed to the door pintle. For ASW there's also depth charges and torpedoes and to enhance survivability modular armour has been fitted.

There are many methods employed on warships to ensure the safety of both crew and helicopter during take-off and landing, one such going under the acronym of ASIST, whilst the other, Harpoon, is also known as deck lock. It is the latter that's used on the Type 23. Here, then, fixed into the flight deck, is a grid plate arrangement, whilst on the helicopter a hooking device, known as the harpoon, is located below the fuselage. Using landing aids visual and electronic the pilot will bring the helicopter over the grid and when close the harpoon will engage with the grid and pull itself to the deck. In challenging sea conditions, the system enables the helicopter to remain stable and fixed to the flight deck **(Photo 10).**

In **Photo 11** the Wildcat is seen fitted into a deck dolly which is used to move the helicopter into the hangar. There are similarities to the Lynx but there are also many differences, not to mention the two new RR CTS800-4n turboshaft engines developing 1362hp each **(Photo 12).** The differences in profile between the Lynx and Wildcat become more apparent in the tail boom (which on the Wildcat is angular) the tail rotor and, significantly, the twin-fin tailplane **(Photo 13).**

My tour of the Wildcat included a close look at the new cockpit arrangement and the visual digital displays, including a full colour digital map, engine management displays, navigation, and weapons display, which includes a heads-up display. To this little lot we can add the forward looking infra-red, electronic support measure, electronic countermeasures, infrared suppression and dipping sonar **(Photo 14).**

Unsurprisingly, the flight deck on warship models is a major feature which wouldn't be complete without the surrounding crash barriers and netting. **Photo 15** shows the type of barrier fitted to Iron Duke. Release the bolt and they pivot to the horizontal.

Next time...

Range Finder will be shifting tack from full-size back to model with a detailed tour of what will be the world's largest model warship.

9. The all-new Wildcat helicopter Naval variant.

10. The harpoon grid for secure deck landings (see text).

11. A close view of the Wildcat ASW helicopter. Mounted on the nose and seen here covered is the FLIR or Forward Looking Infra-Red imaging pod.

12. The four-blade rotor head and distinctive housing for the two CTS800-4N series turboshaft engines.

13. Tail boom and twin-fin tailplane.

14. Glass cockpit: the various displays for flying, navigation, engine management, electronic surveillance and weapons.

15. Around the flight deck are fitted drop down barriers.

References and acknowledgements

Type 23 Combat Fleets of the World: 15th edition, pages 847 – 848

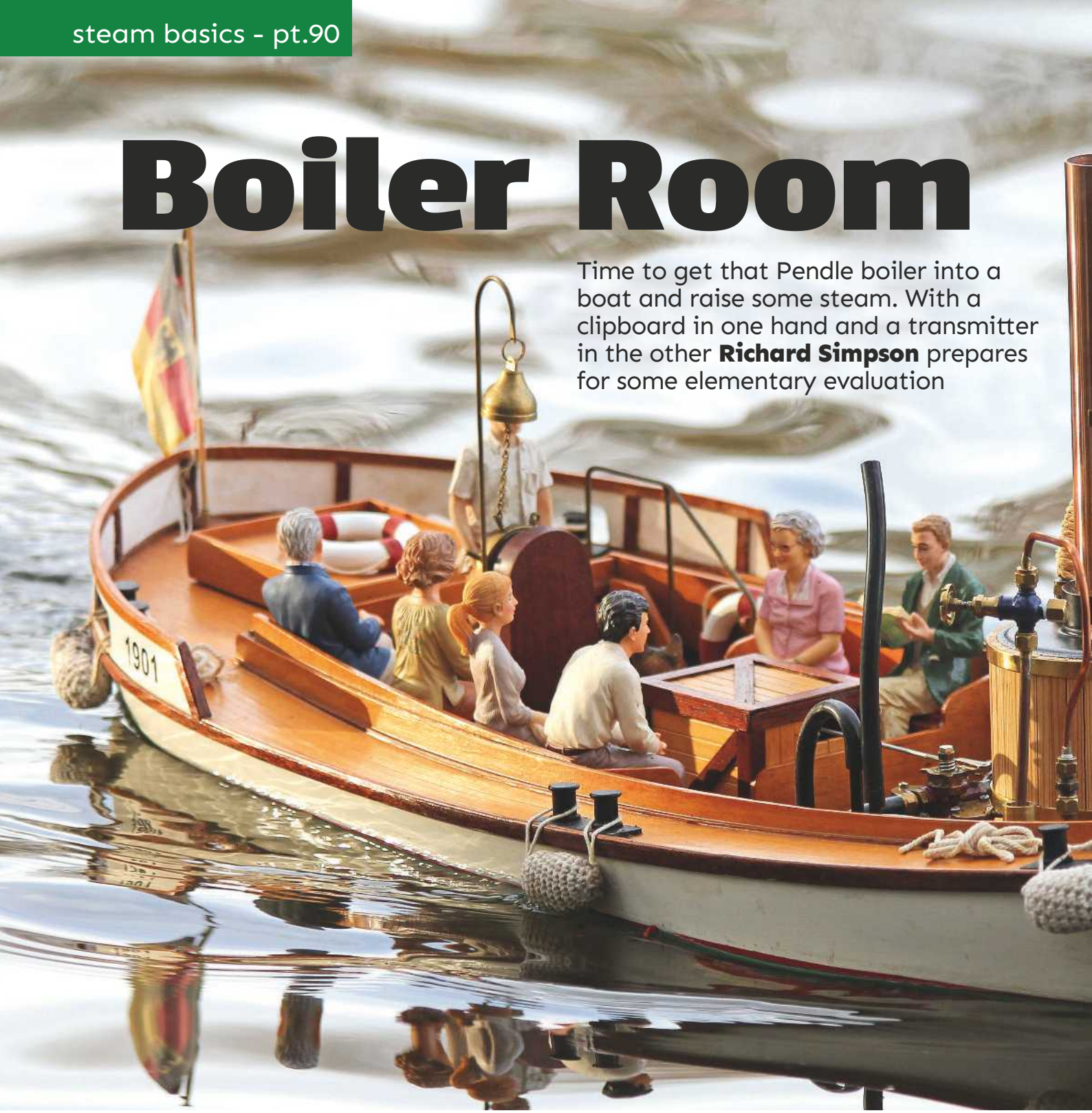
Naval landing aids: naval www.agiltd.co.uk

Agusta / Westland Wildcat helicopter: www.royalnavy.mod.uk

With thanks to: The Captain and ship's company of HMS Iron Duke for their help and assistance during my visit. Also the Naval Regional Office (North of England) for all their help and assistance.

Boiler Room

Time to get that Pendle boiler into a boat and raise some steam. With a clipboard in one hand and a transmitter in the other **Richard Simpson** prepares for some elementary evaluation



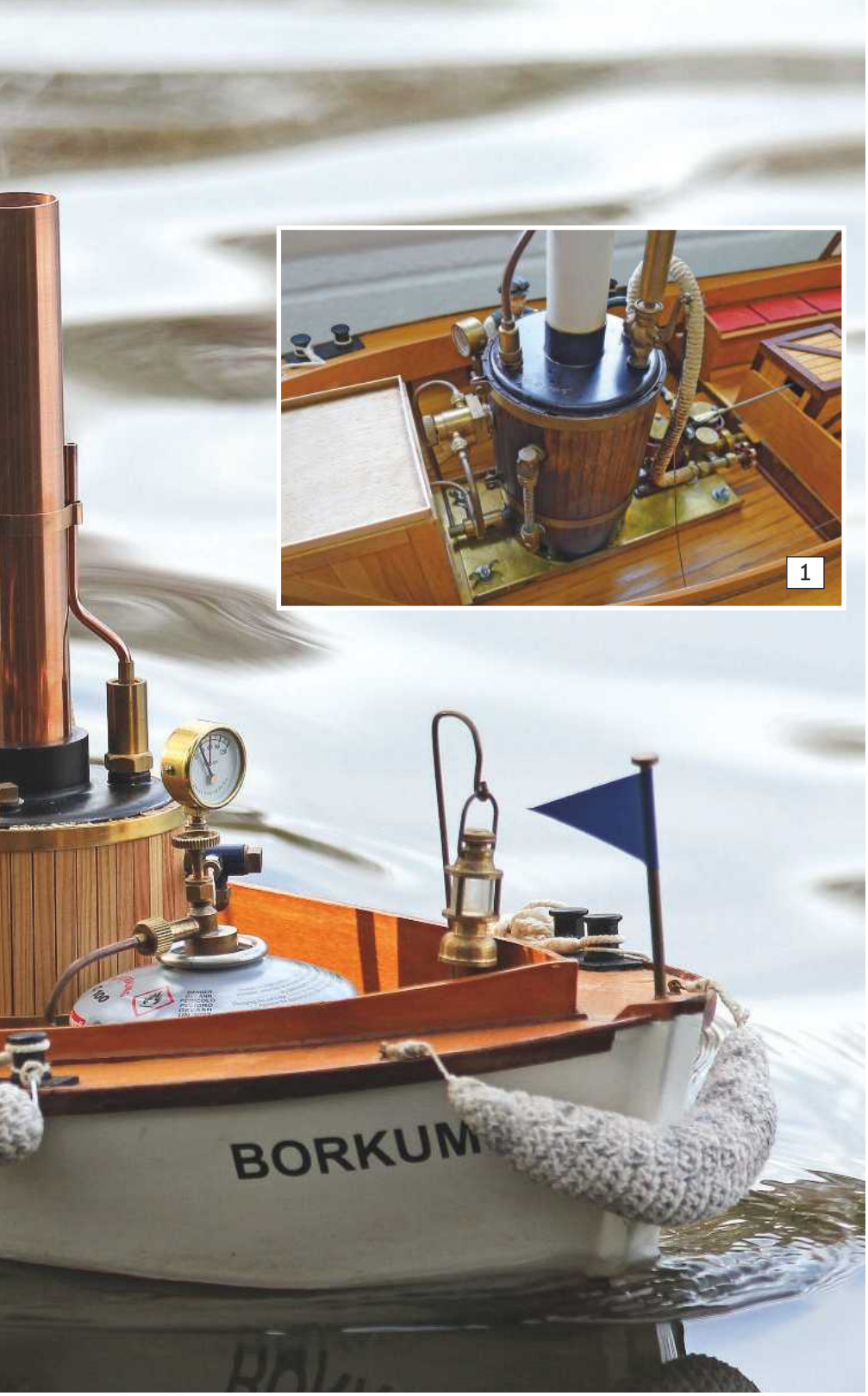
Last month, if you remember, we completed the assembly of the Pendle with its fittings and lagging and ended up with a very smart and professional looking boiler ready to fire up and see what it can do. The intention of this final instalment in our Pendle mini-series is to deal with the installation of the 3.1/2 inch vertical boiler by putting it into a model boat and seeing just how it performs on the water. For this I decided to use my trusty Borkum launch as the recipient as it is normally equipped with an old, but similar, Cheddar 3.1/2 inch vertical boiler so the comparison would prove interesting and give us an opportunity to see how the Pendle behaves in a currently available kit **(Photo 1).**

Initial comparison

The first task was to remove the Cheddar plant from the Borkum, which is a nice straightforward job as it all sits on a common brass base. This involved simply disconnecting the engine servo rod, the gas tank, its pipe, and the four thumb screws holding it all in the base of the boat. The drive is a very simple pin in the flywheel running against an arm on the shaft so there wasn't even a drive to disconnect **(Photo 2).**

Once out the Cheddar plant had its boiler removed, by extraction of the two screws in the brass base, whereupon the plant was given a suitable clean up ready to receive the Pendle Boiler. Before doing that, however, I thought it might be interesting to have a good look over the pair to see how they compare. The first interesting point was not only the fact that they are the same diameter and the same height but also that they proved to be very similar in weight, with the Pendle weighing just over 1800g **(Photo 3)** and the Cheddar tipping the scales at 1777g, i.e. a little under 1.8kg. This would make the Pendle an ideal candidate for any existing model which may require a Cheddar replacement that's proving difficult to source. This is becoming increasingly more likely nowadays as the last Cheddar boilers were made many years ago so a suitable replacement may well be of interest.

Another interesting point is the internal construction of the two boilers. The Cheddar



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LEFT: The recipient model, a Krick Borkum, is still readily available in the UK and is a perfect match for the old Cheddar engine and 3½ inch vertical boiler. As such it also makes a perfect test vessel for the Pendle boiler.

1. A great lesson in how to put together a model with an easy to operate and maintain steam plant.

2. The complete plant, with base, can be removed in no more than a couple of minutes making it easier than most electrical installations to remove for servicing.

is what would be referred to as a 'Fire or Smoke Tube Boiler' with the hot gasses and flame going up through the water space through tubes mounted between a top and bottom plate **(Photo 4).** This is very much in line with normal full-size marine auxiliary boiler practice. Construction of the Pendle, on the other hand, is in the style of a 'Water Tube Boiler' with the hot gasses passing through the water space via a large flue which is fitted with cross tubes to expose the water to as much hot gas as possible **(Photo 5).** Since both boilers were available I also thought it might be interesting to compare the capacities. Accordingly, I poured water into the Pendle until it flowed out of the top valve and then poured the contents into a measuring jug.

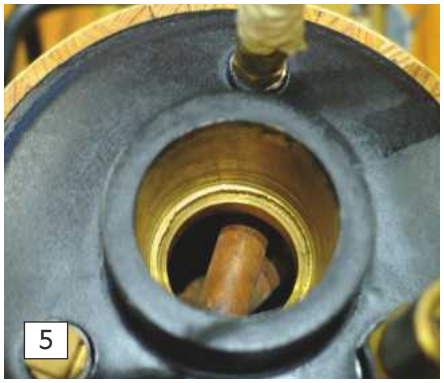
After that I performed exactly the same test on the Cheddar and came up with 525 ml for the Pendle and 375 ml for the Cheddar. Truth is, I was surprised how much of a difference there was. Obviously this larger capacity gives a longer duration but will require a bit more heat to get up to pressure so it was going to be interesting to see how it may affect the performance on the water.

Another interesting comparison is the bar-litre figure so, using the capacities above with the working pressures for both boilers, which is 60 psi, we get a bar-litre number of 0.525 x 4 = 2.1 for the Pendle and 0.375 x 4 = 1.5 for the Cheddar. This puts both boilers well below the 3 bar-litre figure required for steam testing purposes.

Both construction methods are designed to maximize the exposed heating surface area and both can be found in full-size marine boilers. As can be seen from the scales the two methods produce a boiler of very similar dimensions and weights but with differing capacities and I tend to think that any difference in overall heat exchange surface area may be too small to be noticeable, although it may show on the water.

Fitting the Pendle

The large copper base of the Pendle boiler enabled it to sit across the raised edge of the Cheddar base so it was simply sat on top of it. As this was to be simply a performance test I did not want to start cutting anything to make a permanent fit but I was happy that the pipework would hold things in place long enough for the test. Similarly the disposable gas tank was temporarily mounted on an aluminium block to save pipework modifications being required, which in itself I realised would have a significant effect on the boiler performance. The original set up has the gas tank sat on a brass base, which then transmits residual heat from the boiler to the gas tank to minimise the loss of pressure normally experienced when the gas tank cools. With the temporary Pendle set up, gas cooling would not be offset by any



3. The Pendle 3½ inch vertical boiler complete with lagging and fittings comes in at just over 1.8kg.

4. Internal construction of the Cheddar smoke tube boiler. When lit it is possible to very clearly see the flame from the burner at the bottom of the tubes.

5. The Pendle boiler's water-filled cross tubes can also clearly be seen from the top.

6. To avoid cutting and modifying pipework the gas tank ended up sat on a block of aluminium. This would prevent the warmth from the brass base being transmitted into the gas tank, as is the case when the Cheddar boiler is installed.

7. Not the tidiest of installations and certainly not the most secure but good enough for the purposes of a steaming test close to the bank. A perfect opportunity to compare the Pendle boiler with the similar size Cheddar unit of a good few years vintage.

added heat so I fully expected the burner performance to fall off with time.

Once the pipework had been completed the plant with the new boiler was dropped into the Borkum and a quick test firing of the boiler proved that everything was still working okay **(Photo 6).** As with the bench test the boiler fired up instantly, ignited with a flame at the top of the flue, wherein a strong and steady noise was heard from the burner as the boiler raised pressure. I decided to do a quick test again of the safety valve, which lifted at around 40 psi, before opening the outlet valve to the engine. The engine was given a quick test run with no noticeable drop in boiler pressure so the gas was turned off again and the boiler made ready for its first sea trial **(Photo 7).**

Demo time

The Borkum was taken down to a lake in Lincolnshire to give it a run. On arrival the Pendle was filled with water, the lubricator topped up and the separator emptied. An old gas tank was used to raise pressure, which was then swapped for a fresh tank when working pressure was achieved.

Putting the model on the water the first noticeable aspect was the fact that she sat at just the same level as when fitted with the Cheddar boiler, so stability was clearly the same **(Photo 8).** As soon as the model was operated it was immediately apparent that handling had not altered in any way and after a few gentle runs followed by a number of faster passes and turns the model demonstrated exactly the normal stability characteristics that I was used to. After around 20 minutes the level in the glass was getting low so the model was brought in again and taken out of the water. The tone of the burner had noticeably reduced by this time and the pressure in the boiler was falling, obviously as a direct result of the gas tank cooling down and the gas evaporation rate falling away. If the boiler was to be mounted permanently the gas tank would be assisted with some form of waste heat warming and the burner controlled with an attenuator valve to give a more consistent flame. I suspect that the Pendle burner is significantly more effective than the Cheddar ceramic type but possibly uses a little more gas in the process. This will maintain

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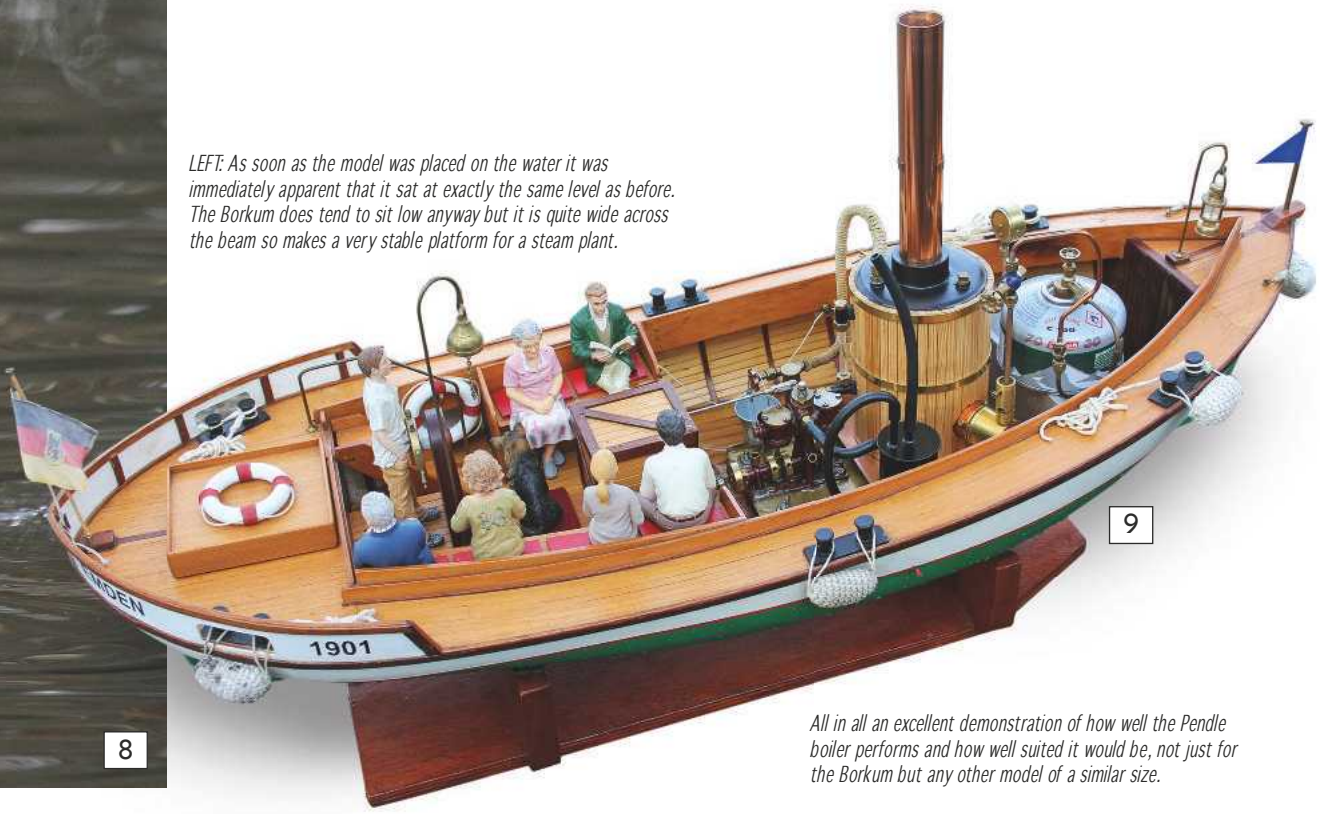
LEFT: As soon as the model was placed on the water it was immediately apparent that it sat at exactly the same level as before. The Borkum does tend to sit low anyway but it is quite wide across the beam so makes a very stable platform for a steam plant.



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All in all an excellent demonstration of how well the Pendle boiler performs and how well suited it would be, not just for the Borkum but any other model of a similar size.

performance but can lead to a quicker fall off as a result of faster gas cooling so all the more reason to use some residual waste heat to maintain the evaporation rate of the gas and an attenuator valve to control it. The test, however, did very clearly show that the Pendle 3.1/2 inch vertical boiler is a perfect match for the Cheddar boiler so can be considered as a future replacement or as an original fitting for a model such as the Borkum or any other similar size vessel **(Photo 9).** Where the Pendle really scores, however, is with the flexibility in manufacture and design that it boasts. Bushes can be fitted in any chosen location and in any size or thread to suit any plant requirement and Pendle is more than happy to produce a bespoke boiler to your exact requirements with no additional cost for the design process. That's a pretty good deal.

It's also worth noting that the boiler produced steam quickly and maintained pressure throughout the duration of the run. This, despite the engine being a twin cylinder oscillator, which are well known for using steam quickly. If this boiler was coupled to a well put together valve engine, such as a Stuart Turner, I'm certain that the lower steam pressure and quantity requirements of the engine would pair perfectly with this boiler.

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ARTESANIA LATINA plank on frame kit, 1:20 scale, Eileen R/C fishing boat, hull part built and needs a good home – £75 ono. Buyer to collect. Tel. 01476 550697 (Grantham).

3.46cc E.D. HUNTER MARINE diesel with R/C throttle, flywheel coupling and double ball race. Bench run only, boxed – offers? Tel. 01616 339884 (Oldham).

BOAT COLLECTION, 20 boats in all to include six 1/12 scale lifeboats. Mersey Rother, Solent, Waveney and more. Ill health forces sale. Please ring for details. Tel. 07546 188258 (Notts).

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MOUNTFLEET LOWGARTH TUG complete kit, untouched apart from a small amount of work to hull. Also includes Torpedo 800 motor and action electronics PII0 sound unit – £295. Buyer to collect. Tel. John on 01159 334047 (Notts).

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WORKING GEAR for a 1920 twin paddle river boat tug. Kit or private sale. Please telephone Terry on 01661 853677 (Northumberland).

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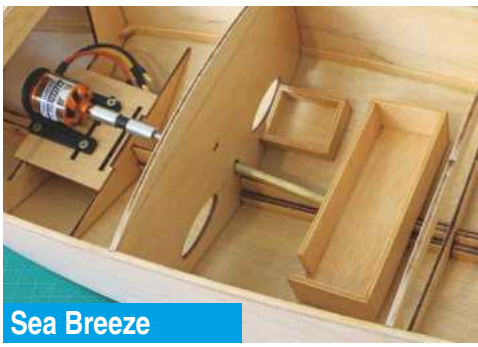
Model Boats July 2018 on sale 8th June

Square sailing

Midhurst Show

Next month in model Boats

Can you really be looking forward to yet another FREE plan? Well, yes you can! Our fourth in the space of three months, this one's a real cutie. Measuring 15" and designed in the style of the hugely popular Keil Kraft EeZeBILT boats, Ferret is Ray Wood's take on the classic Terrier and it's every bit as desirable. Build it in a weekend from the center page pull-out plan… Since square rig sailing ships have such massive appeal we've asked Neville Wade to return and explain how best to handle one on the water and, for those who can't get enough of nostalgia, we've a piece on a resurrected George Turner Models vintage speedboat. Our traditional wooden model boat interest is catered for by part 3 of the editor's VMBC Sea Breeze build, the final installment of John Goodyear's RG65 racer (Alpha) and Glynn Guest's Caerleon Castle. There's also subs, steam, warships, a photo report from the Midhurst Model Exhibition, some outstanding readers' models, your letters, and heaps more. It's shaping up to be a cracker.



Sea Breeze

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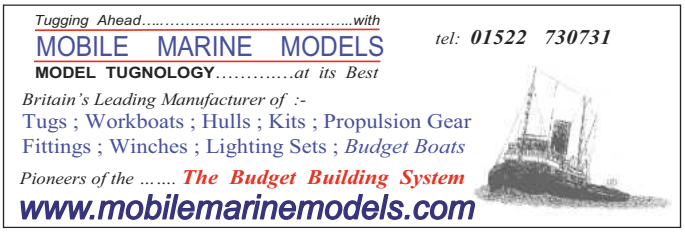
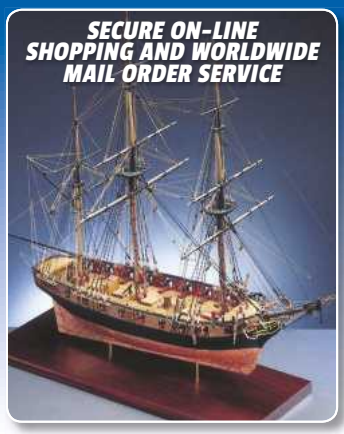


PARTING SHOT

Sweeping the sea. Says Doug Neilson of his Sir Geraint – a modified Caldercraft Sir Kay – "It's been a long winter in the North Sea and all the paint has gone to the 'big ships', hence the rather war-weary look. The model has basic two-channel control, recently converted to a spiffy new 2.4GHz set that replaced my old, and still perfectly functional, Futaba M-Series 4-channel outfit from 1976. She's a very capable little ship, regularly sailed here at Charlottetown Harbour, Prince Edward Island, in the Canadian Maritimes… When it's not frozen over!"

Camera: Canon PowerShot G11
Exposure program: 2
Aperture: f4.0
Shutter speed: 1/800th second
Photographer: Doug Neilson



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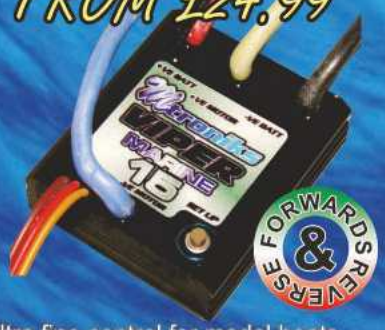

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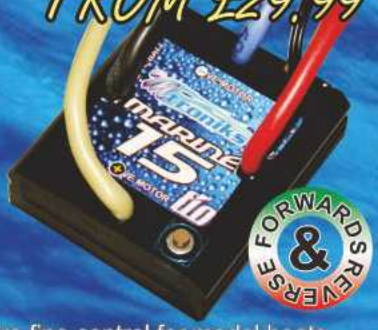

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