DRIVE LINES: A definitive guide to installing motors and running gear

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June 2024
Vol.74 No.883

DIY RIVER FERRY

Centre spread mini plan & full build instructions inside

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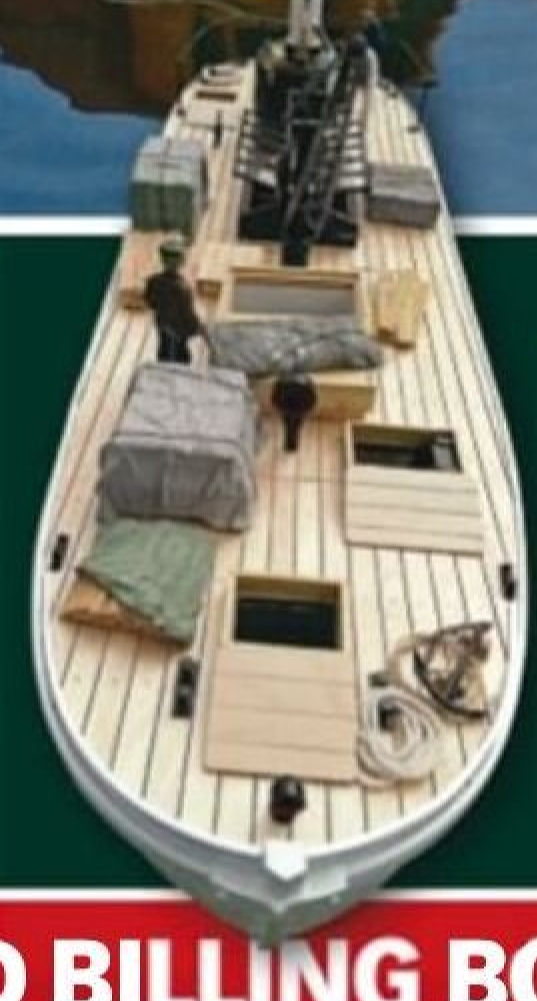

◀ ***SS Raven***

Modelling this historically significant Windermere steam barge from scratch

HMS *WARRIOR* – PART 1 OF A DETAILED BILLING BOATS' KIT REVIEW

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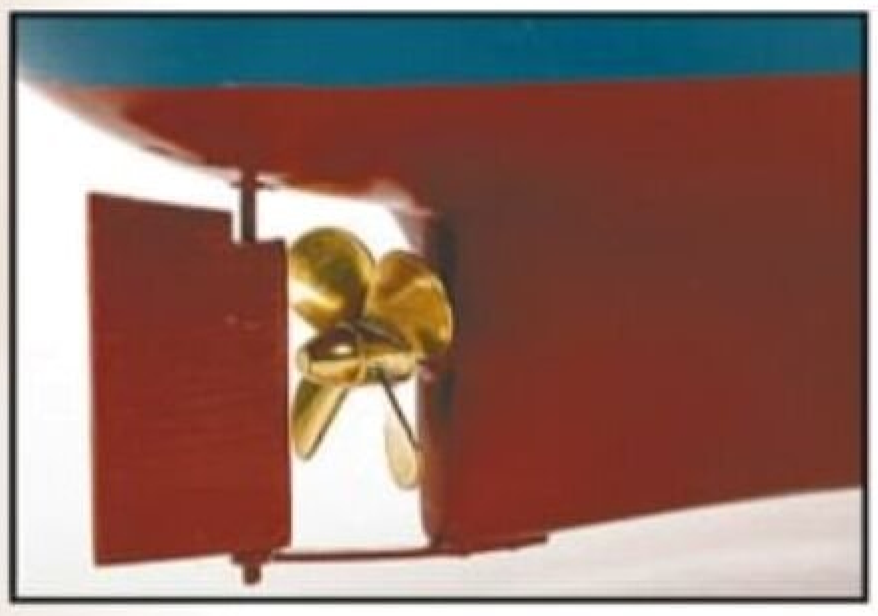

424 MERCANTIC

Wodden Hull 1:50
L. 96 W.18 H. 36cm

Updated lasercut construction

- **Added deck for RC equipment**
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M/S M/S Mercantic (build no.84) was built in 164 by H. C. Christensens Staalskibsværft, Marstal, Denmark, ordered by Per Henriksen and was the Mercandia shipping lines first ship. LOA 48,01m, Beam 9,10 Draft 3,33 m. Brt. 299 Nrt. 200 Tdw 625. Call signal OZHA. Main engine B&W/Alpha 405-24VO. HK: 425 bhk. KW: 313. Speed 10 knots. M/S Mercantic was a traditional freighter and her kind was very common in the 1960's up to the 1990's. M/S Mercantic was sold and renamed several times. In 2004 she was sold to Wade Group, Portsmouth, Dominican republic and renamed to "Love Divine". Run aground on August 22th 2012, West Indies and declared CTL.

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“STAB boat 1/24 scale

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WELCOME TO THE JUNE 2024 ISSUE OF MODEL BOATS…

Although not scheduled as a 'plan issue' (those of you who are regular readers/subscribers will be aware we include a free pull-out plan and build guide in every other issue), we do have a bonus mini plan and full construction instructions for you this month, in the form of Glynn Guest's economic, easy to tackle and super versatile River Ferry model.

Glynn has also revisited and updated his previous (2011) article on drivelines, thereby providing a definitive guide to installing motors and running gear, which, considering the number of queries that arise concerning this topic, will hopefully be of great assistance to many of you.

Elsewhere in the mag, you'll find Part 1 David Bray's full kit review for Billing Boats 1:100 scale HMS *Warrior*, the first instalment of Tony Bird's restoration diary of a vintage Stuart Turner *Henley* steam launch and John Mileson's latest scratch build of a significantly historic Windermere steam barge that's definitely worth crowing about!

Plus, we've got all your favourite regular pages, including the latest instalments in the popular Flotsam & Jetsam, Memory Lane and Boiler Room series, a packed with forthcoming events Compass 360 news section, and some fantastic input from your fellow readers in the Your Models/Your Letters section.

There's lots to look forward to next month as well, not least the free full-size pull-out plan and directives for Ray Wood's exquisite 1:24 scale gentleman's motor yacht *Shandau*.

Enjoy your read!

Lindsey

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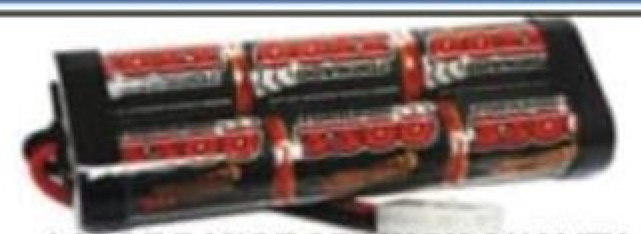

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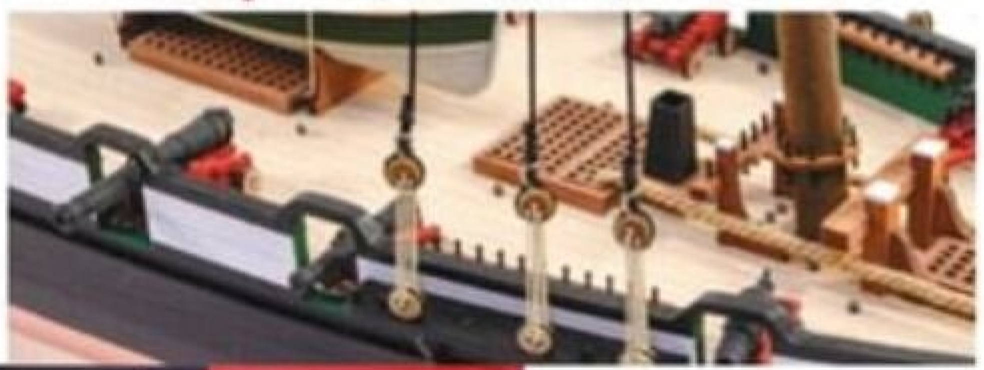

NEW Release - Available Now!

His Britannic Majesty's Cutter
Trial 1790 (1:64th Scale)

Scale - 1:64
Length overall - 570mm
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Height overall - 495mm
Price - £220 plus £9,00 P&P (UK)

Exact scale model of the successful experimental cutter Trial

- *Laser cut materials include pear wood, plywood and MDF*
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- *2 photo-etched brass sheets*
- *Dowel, blocks, deadeyes and rigging thread*
- *Fittings in wood and fine resin*
- *Full colour English instruction manual with photographs plus 11 full size plan sheets*

NEW Release - Available Now!
HM Gun Brig of 14 Guns
ADDER 1797

Scale - 1:64
Length Overall - 615mm
Hull Length -409mm
Height Overall - 493mm
Width Overall - 208mm
Price - £246 plus £9,00 P&P (UK)

Exact scale model of one of the Acute Class Gun Brigs Equipped with two Schank Sliding Keels and Armed with 12 x 18-Pounder Carronades and 2 x 24-Pounder Long Guns

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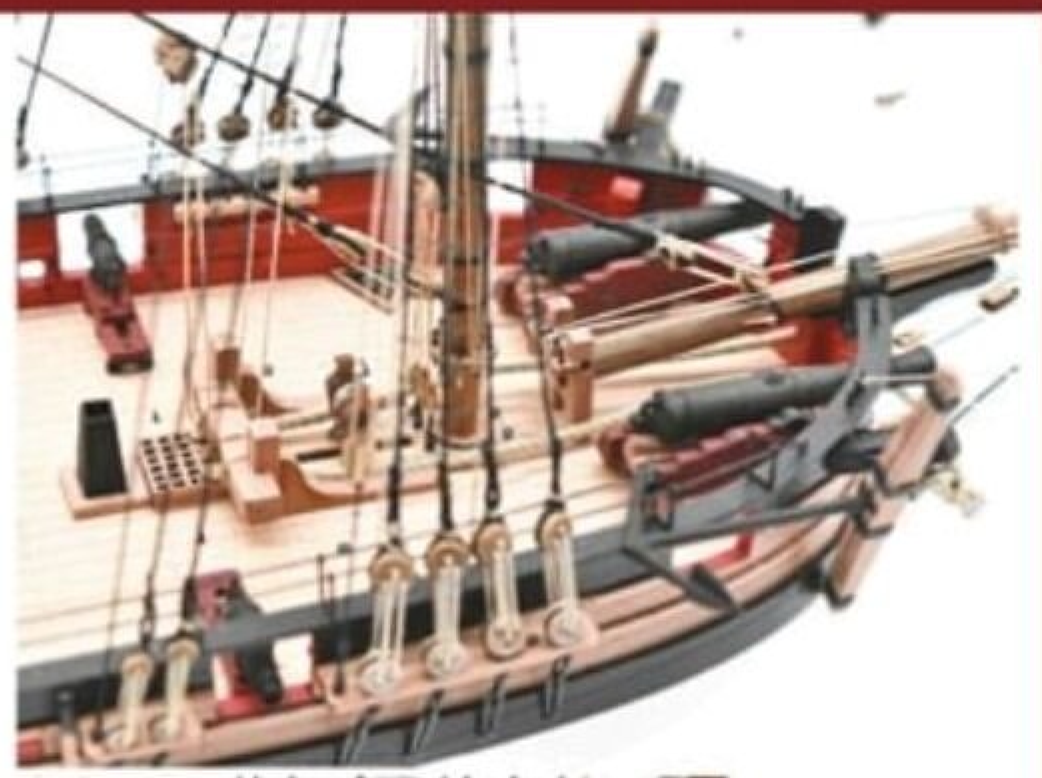

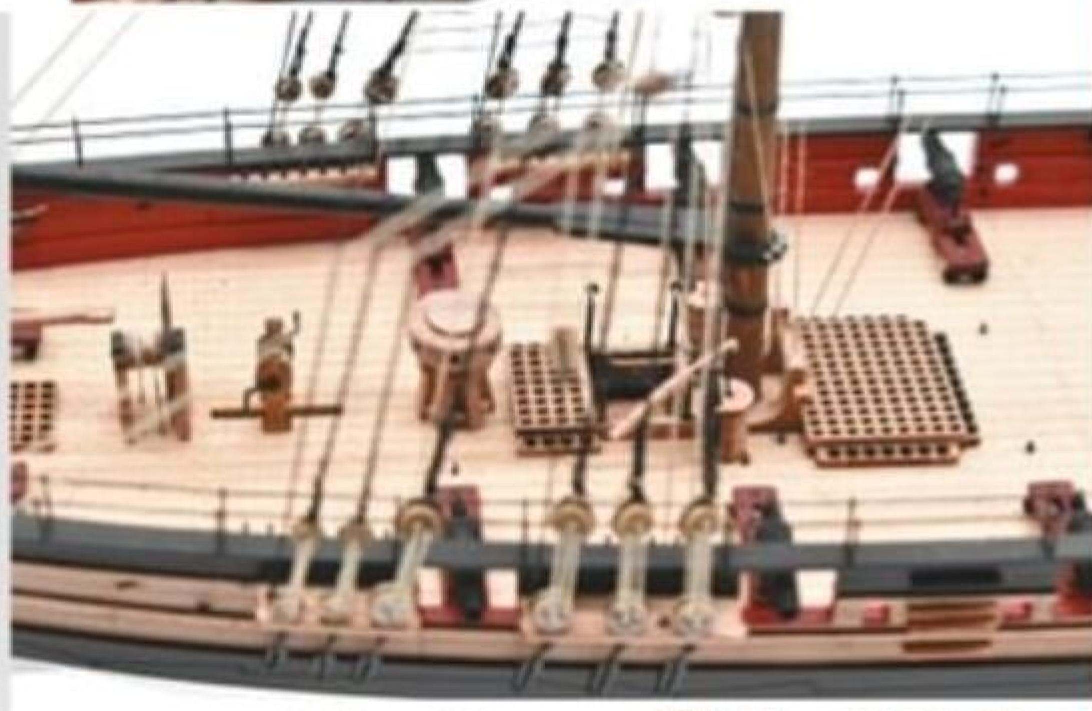

NEW Release - Available Now!
His Britannic Majesty's Cutter
Sherbourne 1763

Scale - 1:64
Length Overall – 512mm
Hull length – 284mm
Height Overall – 484mm
Width Overall – 202mm
Price - £149 plus £9,00 P&P (UK)

Exact scale model of the Armed Cutter Sherbourne

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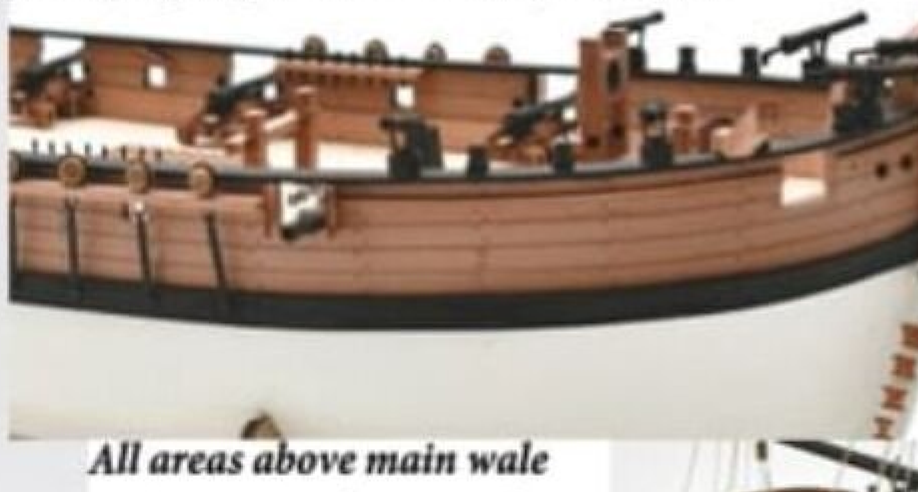
- *Laser cut and laser engraved deck*
- *2 photo-etched brass sheets*
- *Dowel, blocks, deadeyes and rigging thread*
- *Fittings in wood and fine cast resin*
- *Pre laser cut and engraved upper hull detail*
- *Full colour English instruction manual with photographs plus 19 x A3 size plan sheets*



All areas above main wale are pre cut and engraved with both planking lines and treenail detail

VANGUARD MODELS
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Compass 360

If you have a news story for these pages, please contact the Editor, Lindsey Amrani, via e-mail at editor@modelboats.co.uk

EXPLORE FOR FREE
New VR tour of *Cutty Sark*

If you've always fancied visiting the *Cutty Sark* but haven't been able to make the trip to Greenwich, a new immersive VR (Virtual Reality) experience is now allowing members of the public to step back in time and explore the legendary ship on their digital devices.

Working from state-of-the-art 360 degree photos, 3D scanning and drone photography to accurately replicate the ship in 3D, the University of the West of Scotland (UWS) and Smartify (the arts and heritage app) have digitally recreated the iconic 19th century vessel on behalf of Royal Museums Greenwich and created a spectacular VR tour, this including items from the wider *Cutty Sark* collection which are not typically on view to the public. The project was made possible through Innovate UK's flagship Knowledge Transfer Partnership (KTP) scheme – a scheme which brings together universities and businesses to share knowledge and expertise.

Cutty Sark, the fastest sailing ship of her time, was built in Dumbarton in 1869, and was one of the final clippers – designed for seasonal trade such as tea – to be constructed. Now preserved as a museum ship by the Royal Museums Greenwich, visitors are able to venture aboard and beneath this historic three-masted clipper: walk along her decks; explore the hold where cargo was once stored; and even get beneath the 963-tonne ship in dry berth to view the elegant lines of her hull. Time, though, to get the kettle on, as all this can now also be enjoyed in virtual reality simply by keying the following link into your browser: (https://ar.smartify.org/liverpoolhouse/index.html).

A view of the Cutty Sark in Greenwich shot from the northeast by Ethan Doyle White (image courtesy of Wikipedia).

If you can't visit Greenwich in person, the iconic cutter can now also be explored in virtual reality.

OUT AND ABOUT

Model Boat Mayhem

The weekend of May 25-26 will see the Model Boat Mayhem show return to Wicksteed Park in Kettering, Northamptonshire. From 10am on the Saturday, when the show opens, visitors are invited to sail the models they've brought along with them; although, please note that while there will be IC demos be held twice daily by the Stevenage Model Boat Club, no other IC boats will be permitted on the lake.

Following last year's expansion, this year the organisers have gone a step further and secured the use of the park's massive amphitheatre area, where the Mayhem tent and stalls run by the Wicksteed Model Boat Club and the RNLI, amongst others, will be sited, along with the ever popular Bring & Buy and catering stands.

Admission to the Model Boat Mayhem show will be free of charge. Wicksteed Park, however, does run a Pay to Park scheme (the funds raised from this contributing to parkland maintenance costs). Fees are determined by the length of stay, with up to three hours set at £5 and a full day (7am-12pm) at £7.50.

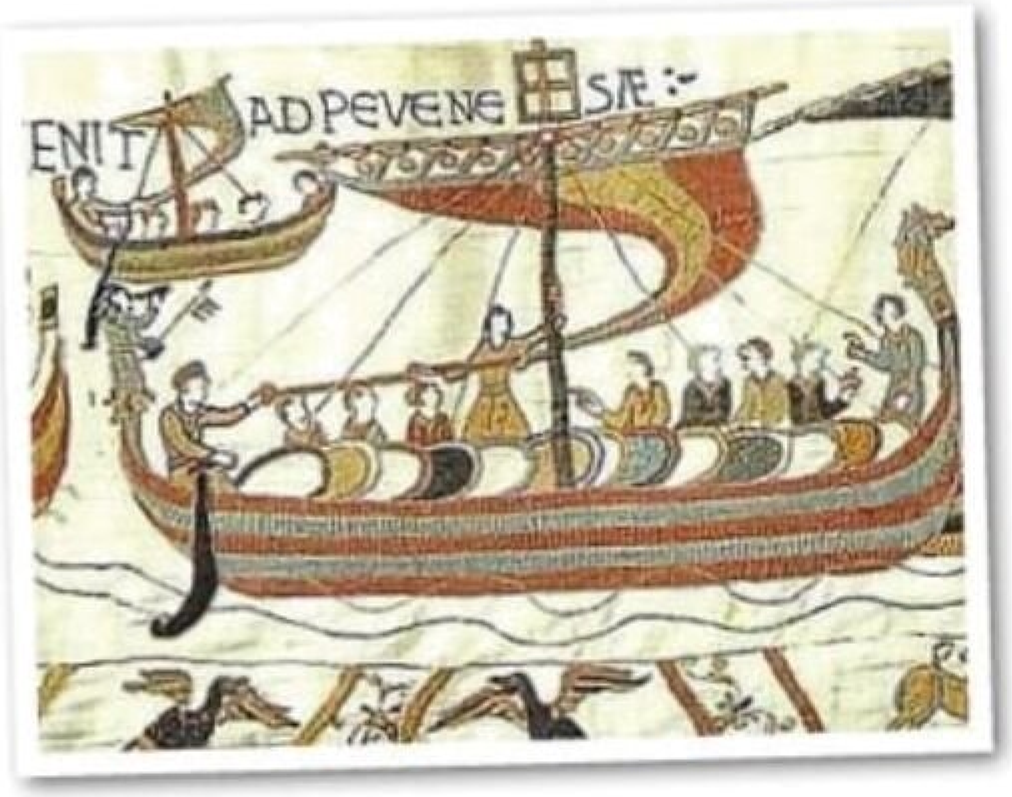
Likewise, for those of you wishing to camp overnight and get the most of your trip, pitches (starting from just £25 and including parking for one vehicle) must be booked at least 24 hours in advance, either online at https://wicksteedpark.org/you-visit/camping-at-wicksteed-park/ (where you can find full details of facilities and camping terms & conditions) or by calling 01536 512475.

Manvers Waterfront Boat Club weekend event

Manvers Waterfront Boat Club will be holding its first open to all model boat trade show over the weekend of Saturday/Sunday, June 8/9, 2024. Admission, which will afford access to the trade stands and allow visitors to sail their own models on the club's large lake (sorry, no fast electrics or I.C. powered models can be accommodated) will be charged at £2 per person.

Traders in attendance will include the Component Shop, Mountfleet Models, Macs Mouldings and the Prop Shop.

The club is also very keen to hear from both individuals and clubs interested in participating (on either, or both, of the aforementioned days) in the waterfront exhibits and on water displays planned. Please contact stephen.perkins@mwbc.org.uk for further details.



La Mora, as depicted in the Bayeux Tapestry

La Mora

Members of the public are now able to visit the build site of a life-size reconstruction of *La Mora*, the flagship of William the Conqueror, at Honfleur in Normandy, France, and inspect the work in progress. Without the original plans (no longer in existence) to refer to, the design will reference the plan for the vessel's sister ship and depictions of *La Mora* in the Bayeux Tapestry and will largely be crafted using 11th century tools and techniques. The 2027 launch of the hull has been planned to coincide with the thousand-year anniversary of the birth of William the Conqueror. Those of you wishing to book site tour tickets can do so online by keying the following link into your browsers: https://www.ot-honfleur.fr/en/site-culturel/la-mora-visite-immersive-et-chantier-naval-du-navire-amiral-de-guillaume-le-conquerant/

Rawdon MBC Open Day

June 8 will see the Rawdon Model Boat Club host the first of two open days planned for this summer at its off Larkfield Road in Rawdon, Leeds, sailing venue (program your Satnav to LS19 6EQ).

From 10am to 4pm, visitors will be able to enjoy free of charge admission to the club's beautiful private lake and clubhouse – with everyone assured of a very warm welcome.

Model boats of all varieties will be sailed throughout the day – and visitors will be offered the chance to participate if they so wish. There will be plenty of seating (both indoors and outdoors), onsite facilities (WCs), reasonably priced refreshments on sale in the clubhouse and possibly also some boats offered for sale.

For more information, email the Rawdon MBC Secretary at rmbcclubsecretary@gmail.com

RNLI artwork exhibition

Now on at the National Maritime Museum Cornwall, and due to run through until November 2024, is an exhibition of paintings celebrating the role of the RNLI locally by the internationally renowned contemporary artist Kurt Jackson.

Jackson's *RNLI Cornwall* paintings vary in scale from postcard sized pieces up to massive canvasses and capture the charity's iconic blue and orange lifeboats both at work, sometimes in mountainous waves, and nestled into Cornish harbours. Also included in the exhibition is a selection of paintings created inside Mousehole's old Penlee Lifeboat Station as it was left following the tragic Penlee Lifeboat disaster, to which to Jackson was given special access.

Admission to the museum, which is located on Discovery Quay at Falmouth (TR11 3QY), includes 15 galleries dedicated to exploring the influence of the sea on history and culture laid out over five floors, and is open daily from 10am to 5pm, is charged at £18 for adults (this ticket will afford unlimited visits over the course of 12 months) and £9 for under 18s (under 5s go free of charge).

Windermere MBC Regatta

The Windermere Model Boat Club regatta at the Windermere Jetty Museum is this year scheduled for the weekend of June 15-16. Commencing at 10am on the Saturday and finishing on at 5pm on the Sunday, this two-day event promises to be filled with racing, model boat displays and a chance for the kids to participate. More details can be found online by keying https://lakelandarts.org.uk/events/windermere-model-boat-club-regatta/ into your browser.

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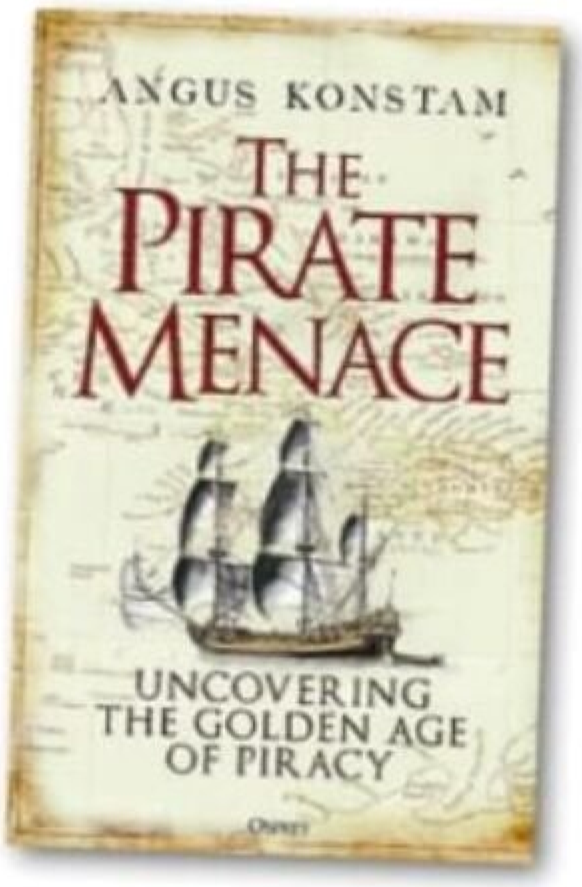

Penned by maritime historian Angus Konstam, this new book from Osprey Publishing covers the era when legendary figures such as Blackbeard, 'Calico Jack' Rackam, Charles Vane and 'Black Bart' Roberts threatened the established world order, played havoc with maritime trade, and instigated a reign of terror on the high seas. Drawing on letters, memoirs, newspapers, crime reports, archaeology and the trials of the pirates themselves, Angus Konstam has weaved together a fascinating and definitive new history of the Golden Age of Piracy.

Although this title (ISBN 9781472857736) carries an RRP of £25, it can currently be purchased for the discounted priced of £22.50 when ordered directly from www.ospreypublishing.com as a hardback, or for £15.75 in downloadable eBook and AudioBook formats.

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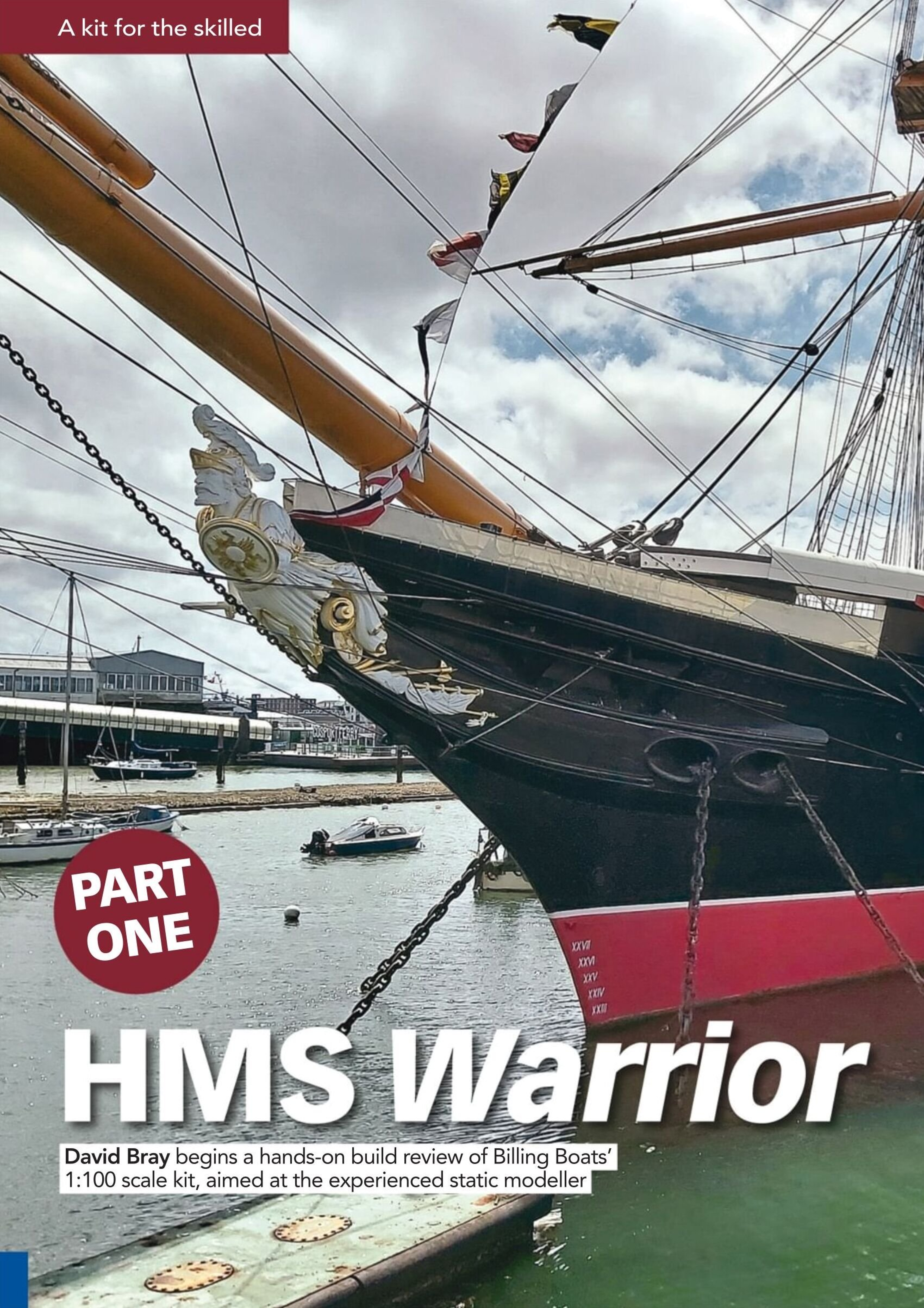


PART ONE

HMS *Warrior*

David Bray begins a hands-on build review of Billing Boats' 1:100 scale kit, aimed at the experienced static modeller

Warrior moored quietly at her berth in Portsmouth.

Before starting this build review, let's first take a look at history of the magnificent British warship on which Billing Boats has based this highly detailed kit…

Although the Napoleonic wars ended in 1815, there remained a significant distrust of the French. At the time, naval vessels were traditional 'wooden walls': wooden-hulled sailing vessels armed with batteries of cannon firing round-shot. But from about 1850 an arms race was triggered by the introduction of new technology. Steam propulsion was beginning to make its presence felt, and experiments were being conducted on the effectiveness of armour-plate against incoming shot. New guns were being developed which fired explosive shells instead of round-shot.

Steam power was well established by this time. The Admiralty, in conjunction with the East India Company had built a series of wooden-hulled paddle steamers from around 1820. Paddle propulsion was something of a technological backwater in ocean -going ships, and eventually the Admiralty required all steam plant to be located below the waterline.

In 1859 the French warship *Gloire* entered service, marking a revolution in maritime warfare technology. *Gloire*, designed by Dupoy de Lôme, was converted from a traditional wooden-hulled warship, cut down by one deck and equipped with extensive armour plating protecting the vessel's wooden hull and machinery. She was steam powered with engines developing around 1,500 HP giving her around 11 knots.

A section of Warrior's armour plating, showing the 18 inches of teak backing the 4½ inches of wrought iron. All of this overlies the ship's inner iron plating.

Although *Gloire* was the first armoured vessel, she was essentially a wooden-hulled warship. In Britain, the Royal Navy was building a much more revolutionary and effective response. HMS *Warrior* would be the first iron-hulled, fully armoured, steam-powered warship, and when introduced she would be the most formidable warship afloat. Designed by Isaac Watts, Chief Constructor to the Navy, *Warrior* represented a move into a new generation of warship development and construction. Three elements were utilised in this vessel: iron hull construction, steam power to a screw propeller, and armour plating. The vessel was built by the Thames Ironwork Company and launched in December 1860. The contract price was £190,225. The steam machinery was contracted separately to John Penn & Sons of Greenwich for the sum of £74,409. Cost overruns resulted in a significantly higher price of the completed vessel to the Admiralty.

Warrior was rigged as a three-masted, fully rigged ship, but her main propulsion was by steam power. Steam was provided from ten tank boilers to a twin-cylinder trunk engine of 5,772 ihp. This gave her a speed of 14 knots under power alone. The engines and boilers were all located below the waterline, as was the lifting propeller. Some earlier wooden-hulled steam warships were propelled by paddles, but these were vulnerable to battle damage.

Armament consisted of ten Armstrong 110 pounders, rifled and breech loading, firing 7″ shells to a range of around 3,800 yards. Additionally, 26 muzzle-loading Armstrong 68-pounders and four 40-pounders were installed. All the guns were able to fire solid shot or explosive shells. Her armour plating consisted of 4½″ hammered tongue-and-groove wrought iron plate backed by 18″ of teak hardwood. The armoured section of the vessel covered the midship 213ft of the ship, extending 16 feet above the waterline and six feet below. This armour was mounted onto the conventional iron structure of the hull.

Warrior was 418 feet overall length, 380 feet on the waterline. Her beam was 58 feet, while her draught was 26 ft 4 inches forward, 26 ft 10 inches aft. She displaced 9,210 tons. She could accommodate 705 crew and she carried the designation 'Armoured Frigate' but was more powerful than any vessel afloat at the time of her introduction.

Warrior entered service with the Channel Squadron on August 1, 1861, under the command of Captain the Honourable Arthur Cochrane. She was based at Portsmouth for the whole of her commissioned service, and, indeed, is located there today, restored to her original condition.

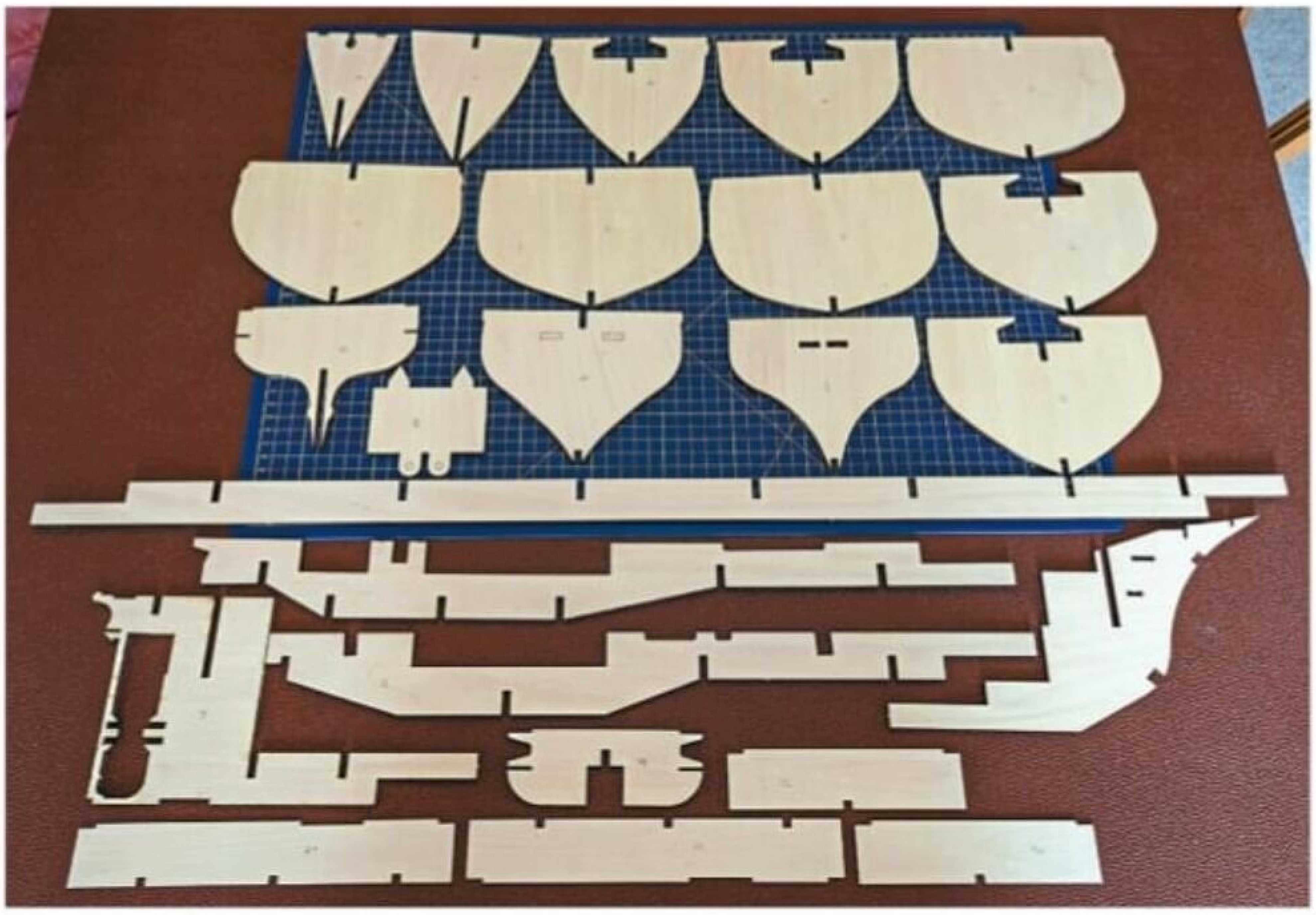
Sea trials lasted over a year, with many modifications made – not surprising, considering she was the first of a new and very different class of vessel to that which the majority of the Royal Navy was familiar with! During her first commission she was visited by royalty, British and foreign diplomats and many senior Royal Navy personages. She visited Cork, Lisbon and Gibraltar, escorting Queen Alexandra to her wedding with the Prince of Wales. One of her officers was John Arbuthnot Fisher, gunnery officer and later to become First Sea Lord. Decommissioned in 1864, she underwent a refit at Portsmouth during which her armaments were strengthened. During her second commission under Captain Henry Boys one of her more unusual tasks was to tow a floating dock to Bermuda. Very few drydocks existed capable of stemming a vessel of *Warrior*'s size.

By 1875, *Warrior* had been overtaken by more modern technology, and was placed on the reserve list. She was paid off for the last time in May 1883. She then became a stores 'hulk' at Portsmouth.

The well-presented and packaged kit from Billing Boats.

Various auxiliary duties ensued, until 1929 when she was taken to Pembroke dock in Milford haven to act as a floating jetty for the Admiralty fuel depot. She was known as Hulk C77 and remained there until 1979 when her ownership was transferred to the Ship Preservation Trust, and she was moved to Hartlepool. Her restoration was a lengthy process, with much research carried out to allow her to be returned to her original condition. This epic undertaking involved many organisations and individuals, too numerous to detail here.

She finally arrived at Portsmouth on June 15, 1987, taking up the berth she now occupies. Open to the public, she is a superb example of this iconic type of vessel, bridging the wooden wall sailing ships with today's modern warships.



The components for the framework of the vessel.

The build begins…

The Billing Boats' kit for *Warrior* comes in a large box, adorned with attractive artwork, inside which the contents are all well packaged. The drawings and instructions are comprehensive and well laid-out, and several languages are catered for. A complete numbered list of all components is provided, each component referenced to the particular ply sheet. The ply sheets are illustrated and themselves numbered. All construction stages are depicted but not described in the form of text. This kit is described as at 'expert' level, and I would concur with that.

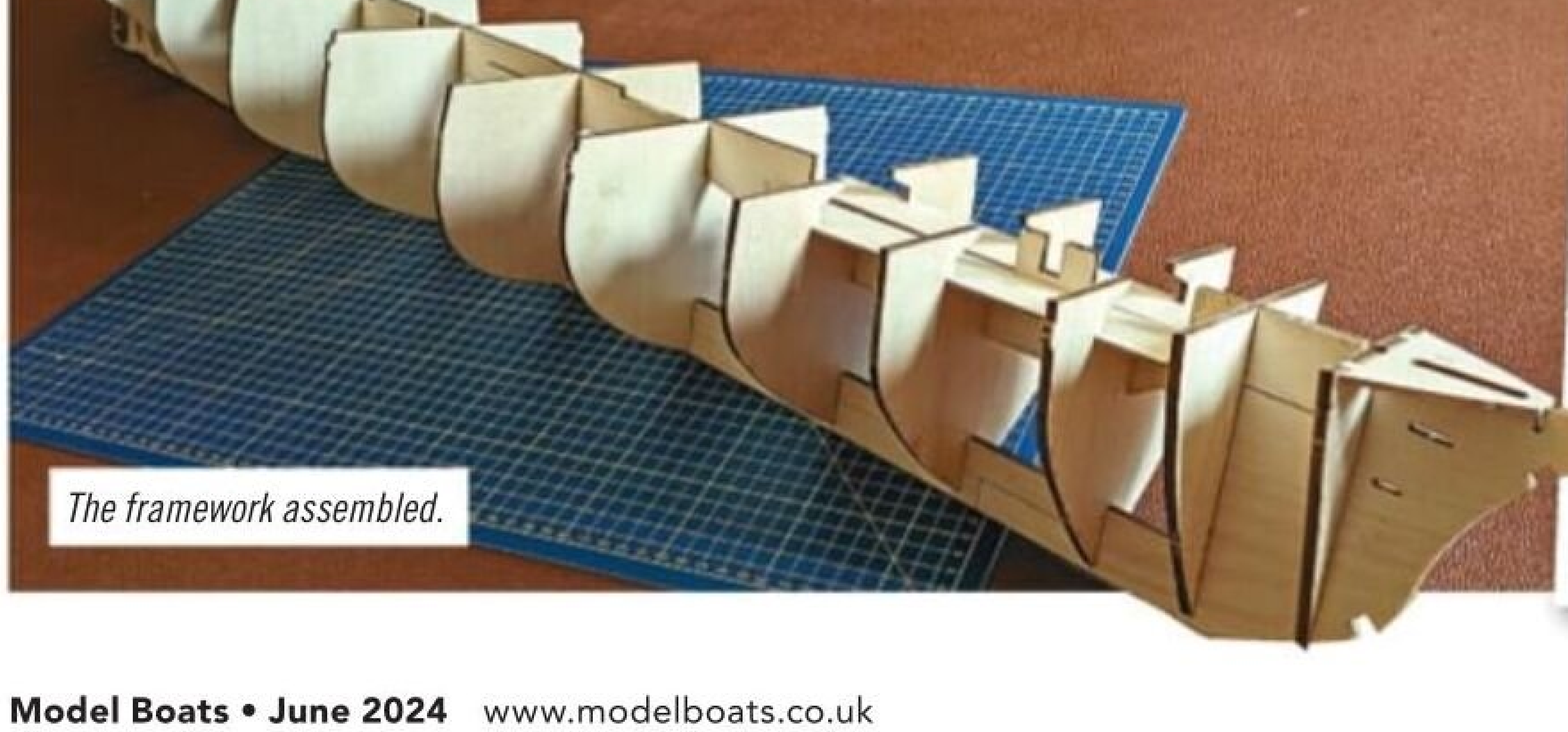
Scaled to 1:100, this gives the resulting model an overall length of around 59 inches or 1.47m. Construction is single-skin plank-on-frame built onto keel, deck and bulkhead elements from high-grade ply. All plywood elements are crisply and accurately laser-cut and it's a simple matter to carefully separate them from the ply sheets, afterwards trimming and cleaning edges with a file or rasp. I find it useful to number the individual elements of the build with pencil, identifying each from the drawings, before separation from the ply sheet; this obviates the possibility of locating a bulkhead, for example, into the wrong keel slot.

Assembly of the framework of the vessel is best done on flat plank some 1-1.25m in length. This is not part of the kit, and it essential that the board you use is flat and straight. Once construction is underway, this board may act as a useful temporary mounting for the model.

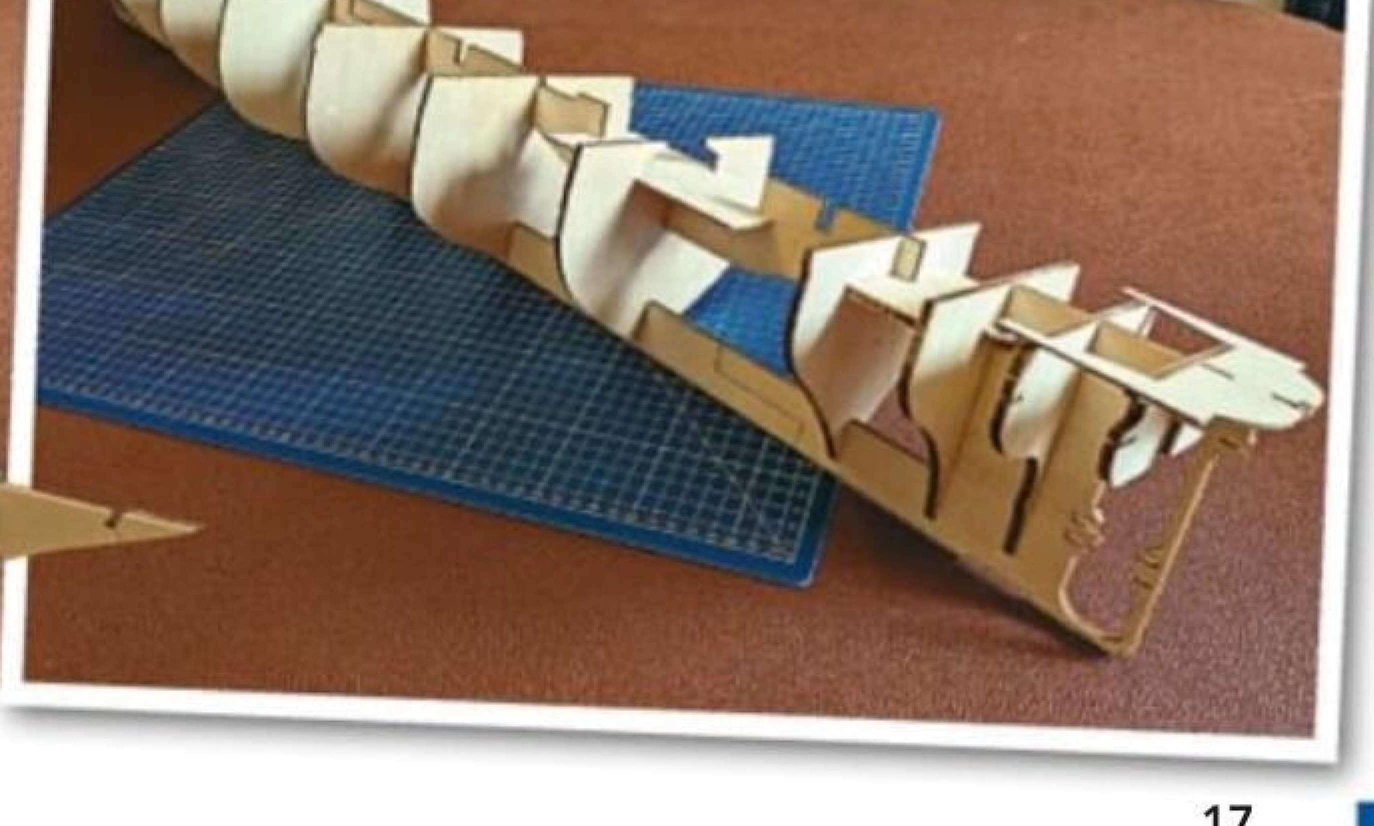
I found assembly of the hull framework elements to be very straightforward. All the bulkheads, keel, deck stringers, stempost, sternpost and other ancillary items were carefully separated from the ply sheets and cleaned up. The bulkheads for the bow and stern sections were roughly bevelled, then the units were assembled. All the laser-cut elements fitted together with great precision, enabling a tight and fair fit. Once assembly was complete, further bevelling was carried out on the bulkheads to ensure a fair landing for planking.

It was now possible to see the size and scale of this build. This is a big project – easily the biggest I've tackled. I was fortunate enough to have taken some pictures during a visit to the ship in May 2019 that I could use, alongside a copy of the Seaforth 'Historic Ships' publication *HMS Warrior, Ironclad Frigate 1860* by Wyn Davies and Geoff Dennison, for visual reference. This excellent book has a comprehensive range of colour photos covering all areas: on deck, below, and rigging. Most useful!

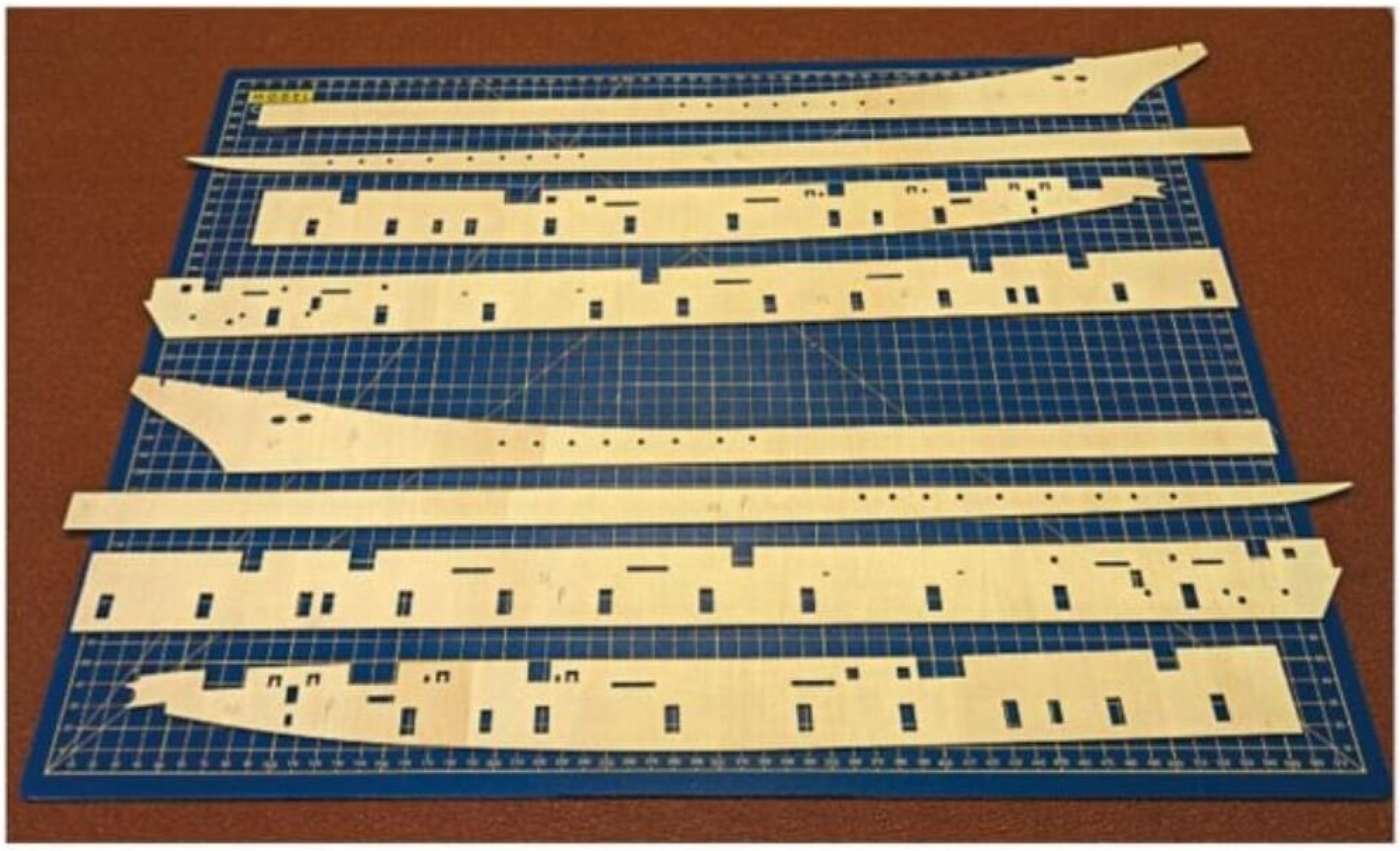
The next step was to fit the deck substrate. This is the 2mm sheet ply base upon which the deck planking is laid. The ply deck is fitted in four sections, again, very accurate laser-cut forms. It must also be said that all the plywood from which the pre-cut components are formed is of very high quality. The deck was glued into position. I was now contemplating the most difficult part of the hull construction: the fitting of the topsides (these are the sides of the hull from the waterline up to the top of the bulwark rails). Laser-cut sections were provided in 2mm ply, eight sections in all. Exquisitely and accurately shaped, these components were carefully separated from the ply sheets and prepared for fitting. Many apertures and cut-outs were pre-formed but needed to



The framework assembled.



be cleaned up prior to fitting. The topside panels need to be steamed in places, so as to fit the curvature of the hull. The tightest curves are on the upper forward panels which form the bulwarks and sheerstrake. The extreme forward ends require a bend of approximately 70 degrees over around 3cm. I assisted the bending by making a number of shallow (about half the 2mm thickness of the ply) saw cuts. It would be very easy to break the panel at this point, so I was quite relieved when the required bend was achieved. The forward topside panels were fitted and glued into place. Where port and starboard bulwarks met, I shaped and glued a scrap piece of wood to connect the two sides more securely in way of the aperture for the bowsprit. The aftermost panels fitted with no problem. The next items to fit were the outer stem and its triangular braces. These had to be bevelled to match the adjacent bulkheads.



The components for the topside.

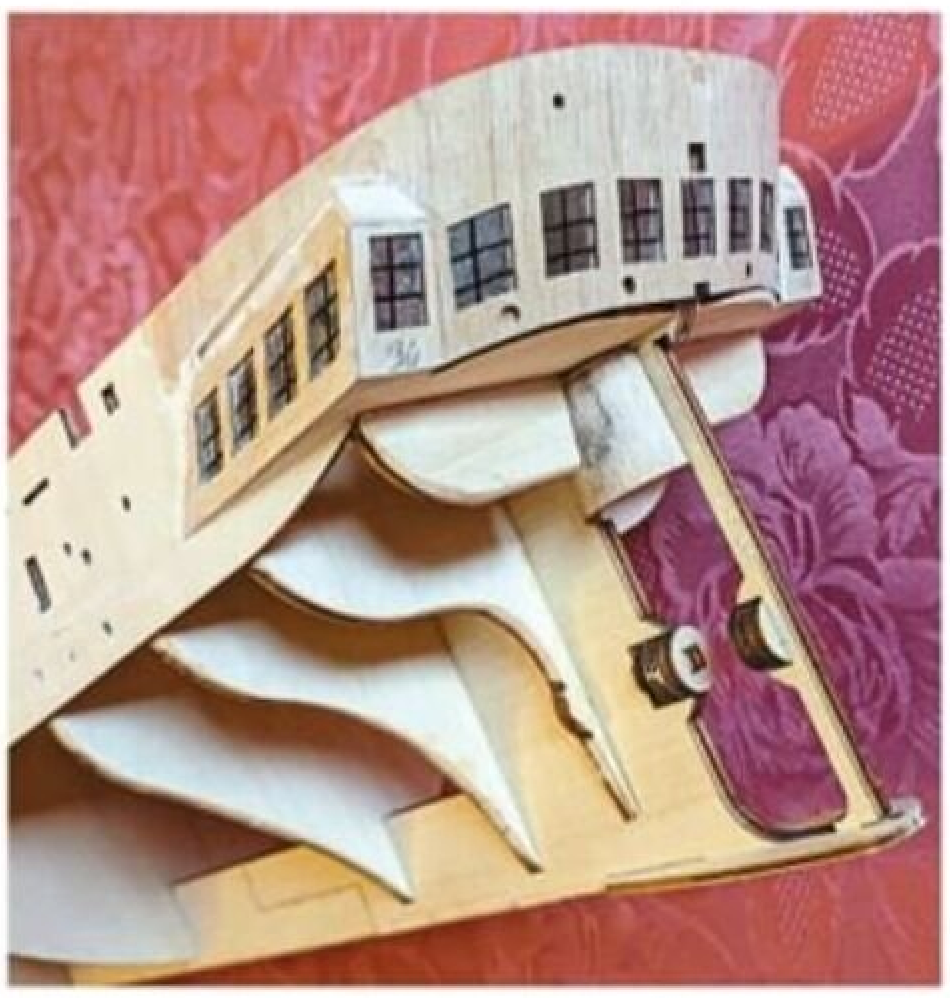
The lower panels of the topside provided the biggest challenge so far. The forward ends needed to be steamed, then given a complex shape comprising a bend and a twist. After some trial and error, a suitable shape was formed. The outer stem was bevelled using a file, to give the topside panels a fair landing surface. Having applied glue, a variety of clamps and clothes-pegs was used to secure the forward ends. Once the forward ends were firmly fixed it was a straightforward matter to progressively work aft until the forward panels were also secure. The aft panels were much easier. The topside panels were very accurately laser-cut and made a quite precise fit onto the hull. A minimum of filling and sanding produced a perfectly faired topside. Now to tackle the stern galleries.

On the real HMS *Warrior* the stern galleries aren't all they seem. In a sailing warship these galleries give onto the spacious Captains' cabin, affording him a panoramic view. On *Warrior*, however, the upper part of the propeller trunk is located behind the windows. *Warrior* was of the 'up funnel, down screw' era. When under sail, the 26 ton, two-bladed propeller could be lifted within a trunkway, reducing drag. The propeller was fitted within a vertically sliding 'banjo' frame, which itself weighed eight tons. It took the whole crew around half-an-hour to raise the propeller. Once lifted there was still a portion of the lower blade in the water but drag was reduced significantly.

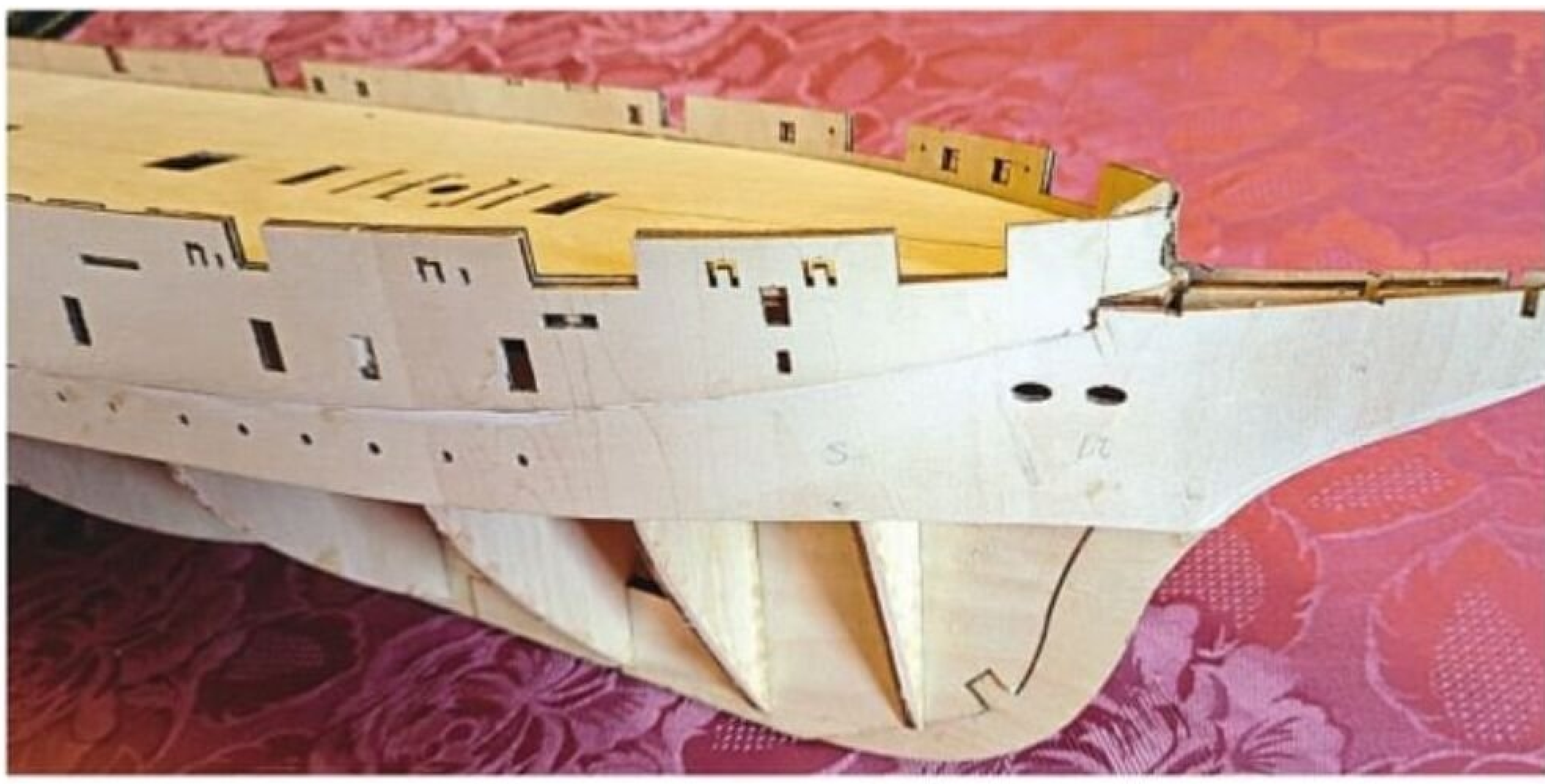
In the model the stern galleries are constructed from a series of precision-cut parts. Work begins with the construction of the counter stern shell. This is formed from two sheets of ply, pre-formed with all window apertures pre-cut. The inner laminate is applied first, after steaming to the required curve. Once secure, the outer laminate is attached. The windows are represented by a sheet of clear acetate, which is carefully marked with the glazing bars. The acetate needs to be cut to shape and carefully glued to the inner face of the outer laminate. This is then glued onto the inner, care being taken to ensure the window apertures coincide. A small amount of fettling and filling is needed to fair this assembly into the existing topside.

The side galleries were then constructed. The parts need to be prepared and cleaned up. Side- and aft- facing windows are fitted as described above, and the parts carefully glued into position. Again, a small amount of fettling is required to obtain a perfect fit, with a minimal amount of filling to make good. At this point it is advisable to paint the internal structure of the hull in the stern area matt black, otherwise it might be visible through the windows. Obviously, once the planking has been completed it will not be possible to do this.

The next task was to attend to a few details around the sternpost. A sole piece needs to be added to the lower part of the stern frame, and a series of small discs fitted to comprise the propeller bossing. It is now necessary to construct the propeller housing. As mentioned before, the propeller on this vessel is intended to retract upwards into the counter. A flat rectangle of ply is steamed and formed into a flattened cylindrical shape.



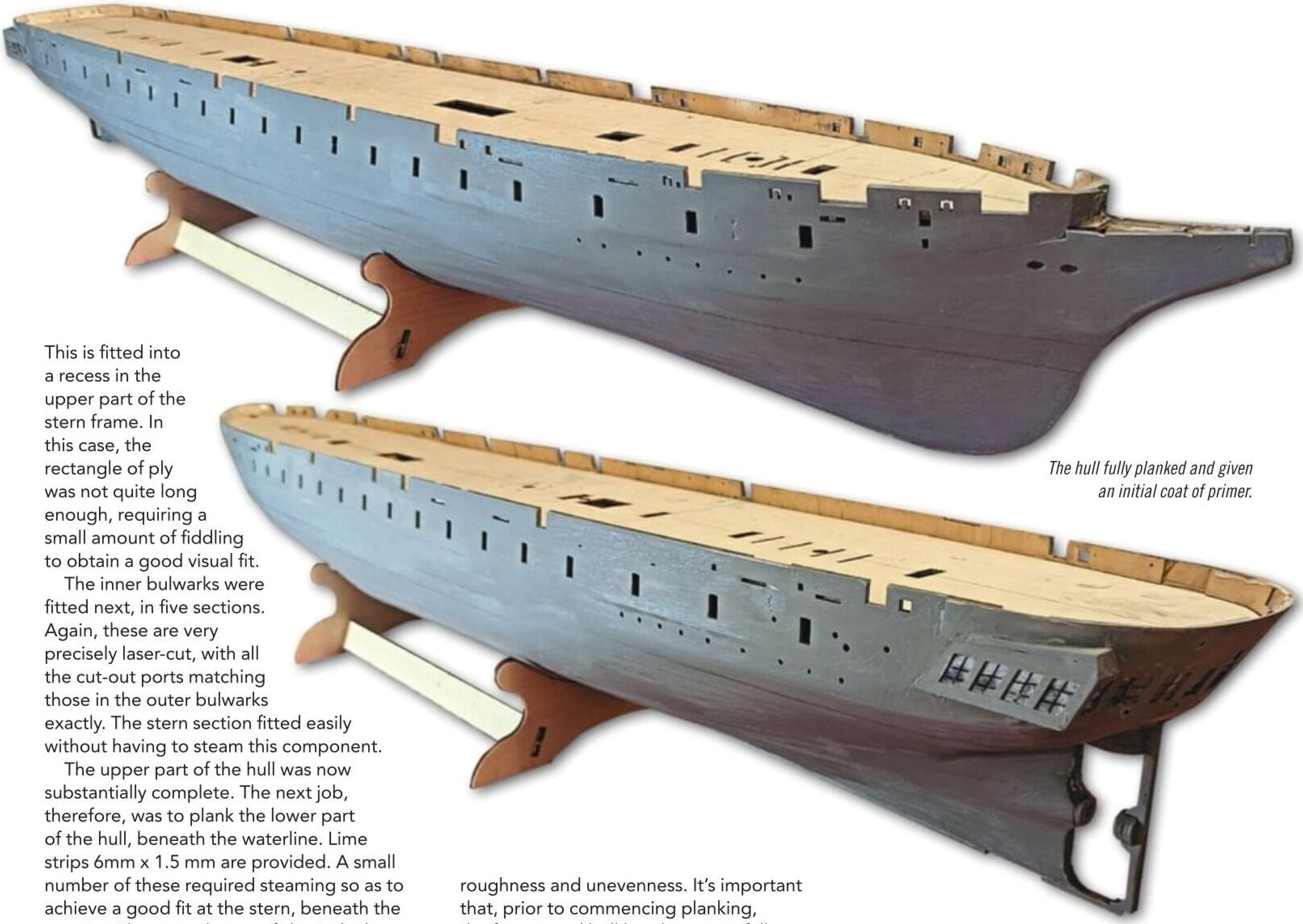
The stern galleries and propeller trunk assembled.



The topside fitting at the bow.

The hull with the topside panels fitted. Now she's beginning to look like a ship!

The deck ply substrate is in position at this point.



The hull fully planked and given an initial coat of primer.

This is fitted into a recess in the upper part of the stern frame. In this case, the rectangle of ply was not quite long enough, requiring a small amount of fiddling to obtain a good visual fit.

The inner bulwarks were fitted next, in five sections. Again, these are very precisely laser-cut, with all the cut-out ports matching those in the outer bulwarks exactly. The stern section fitted easily without having to steam this component.

The upper part of the hull was now substantially complete. The next job, therefore, was to plank the lower part of the hull, beneath the waterline. Lime strips 6mm x 1.5 mm are provided. A small number of these required steaming so as to achieve a good fit at the stern, beneath the counter. The normal array of short planks and stealers need to be fitted to complete the shell. The run of planking is unimportant in this vessel, as we are actually simulating a hull constructed from iron. Once planking is complete the hull will be filled and sanded smooth, with no visible trace of the individual strakes. This process takes time and patience. Once planking is complete, the hull surfaces will show considerable roughness and unevenness. It's important that, prior to commencing planking, the frames and bulkheads are carefully bevelled. Even so, the finished planking will show irregularities which must be filled and sanded. The same applies to full-sized wooden construction hulls. The shipwright would systematically work around the whole surface of the hull with his adze and plane. In Lowestoft shipyards this was known as 'scrubbing down'. Hard, back-breaking work. Fortunately, easier for us model-making types! Once the 'scrubbing down' is complete, the hull can then be given a coat of primer. ●

Part 2

That's the first stage of construction complete. Next month I will continue this review, documenting the fitting out of the hull from my kitchen shipyard!

DRIVE LINES

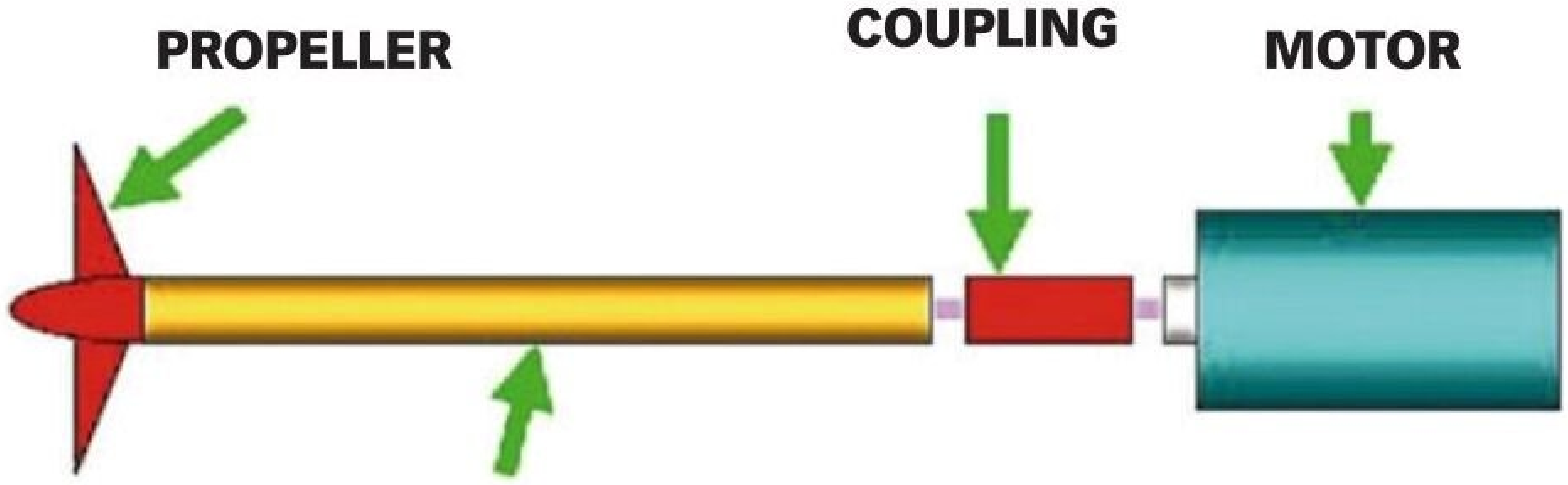
Glynn Guest provides a definitive guide to installing motors and running gear

This article focuses on the problems that many readers have when outfitting and operating their model boats. The subject was originally covered in a Construction Special issue of Model Boats way back in 2011 but, as the same queries still seem to regularly arise, I have now reworked that article, with a few updates included, for those of you who either missed the article first time around or are new to the hobby. I will be concentrating on scale type models, but the general principals can also be applied to other types.

The driveline of a model boat is centred on the propeller shaft and the tube it rotates within. At one end the shaft is connected to the motor, while at the other is the propeller, which turns the motor's efforts into a propulsive force (see **Figure 1**). Failure to correctly install all the parts that make up this driveline can result in disappointing performance and unreliable operation, no matter how well the rest of the model is built.

When building from a plan or kit, this important stage in a model's construction should be fully explained. The only exception might be a model intended for very experienced modellers and clearly described as such. Alas, too many examples of vague, glib or even nonexistent driveline installation instructions can be found. I have even come across some which if followed would have the propeller blades fouling the hull should you do anything as foolish as trying to switch on the motor!

"Failure to correctly install all the parts that make up this driveline can result in disappointing performance and unreliable operation, no matter how well the rest of the model is built"



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The benefits of getting it right are reflected by high performance, as with this Air-Sea Rescue Launch seen at a Model Boat Mayhem event.

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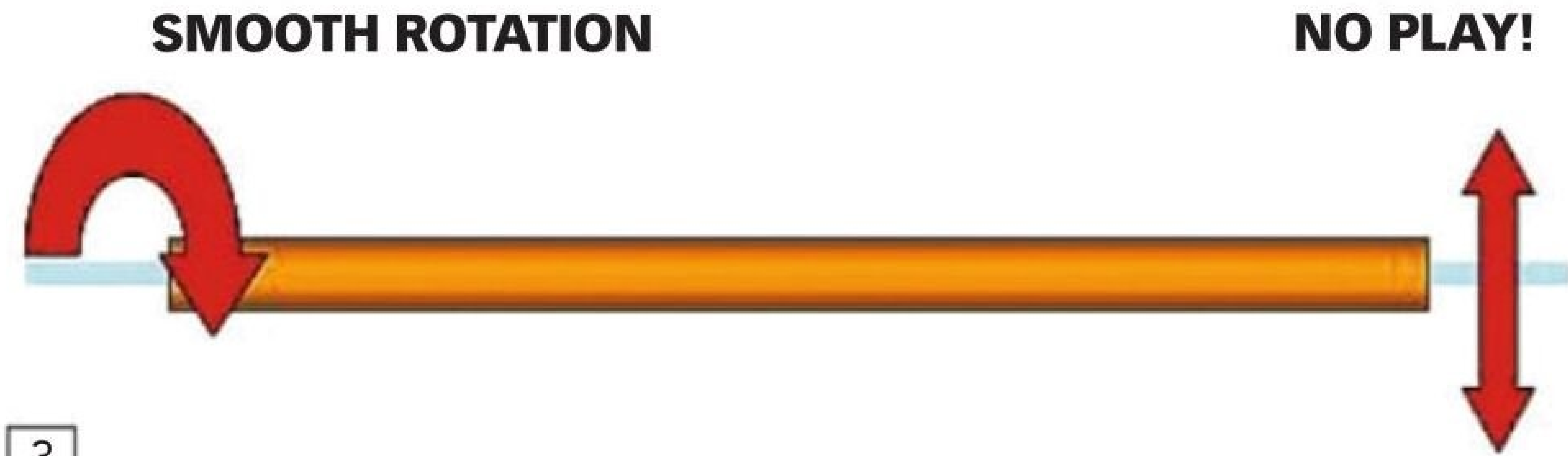

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Propeller shaft and tube

These are usually supplied as a complete set, with a length quoted which describes the length of the tube. A brass tube with a steel shaft that rotates within it is the usual combination of materials. The shaft is supported by two short bearings fitted to each end of the tube (see **Figure 2**). The shaft should slide smoothly through these bearings and rotate freely but with no noticeable 'play' or sideways movement of the shaft within the bearings (see **Figure 3**). If the shaft is reluctant to pass through the bearings and/or rotate easily then you might want to replace it rather than hope that it will 'free up' with use later on. If excessive play is found between the shaft and bearings then you really must replace it, as it will cause no end of subsequent problems.

The more curious amongst you might ask why not use a simple close-fitting tube to support the whole length of the shaft and so save the need for two bearings. This is clearly a more economical approach that has appealed to some. There are two answers to this question. Firstly, it is rare to find a propeller shaft that is exactly straight. Forcing even a slightly bent shaft into a close-fitting tube will result in lots of friction when the motor tries to turn the propeller. This will in turn lead to poor performance (speed and duration), and in extreme cases overloaded speed controllers, wiring and motors, which may reveal their unhappiness by attempting to ignite inside the model.

The second reason is to do with lubrication. If a straight shaft was running in a close-fitting tube some lubricant would be required between the rotating shaft and inner tube surface. The gap between these two would be very small (close-fitting, remember) and lubricant would create significant 'viscous drag' as the surfaces moved past each other. This effect can be very detrimental, as I discovered with a small steam-powered model in which the 'viscous drag' in a close-fitting tube was high enough to stall the engine. With the tube firmly embedded in the model, the only solution was to reduce the diameter of the middle part of the shaft to create a bigger gap between shaft and tube wall. Thankfully, this worked, but it would have been an unnecessary chore had the kit manufacturer done its job properly.

Of course, someone is going to now suggest using a plastic tube, that would result in less friction. However, this would be more flexible. Lack of stiffness in any rotating system can lead to vibration, excessive wear and, quite often, loud unwelcome noises. Suitable plastics can however be used to make the bearings for metal tubes, provided they produce smooth operation without any 'play'.

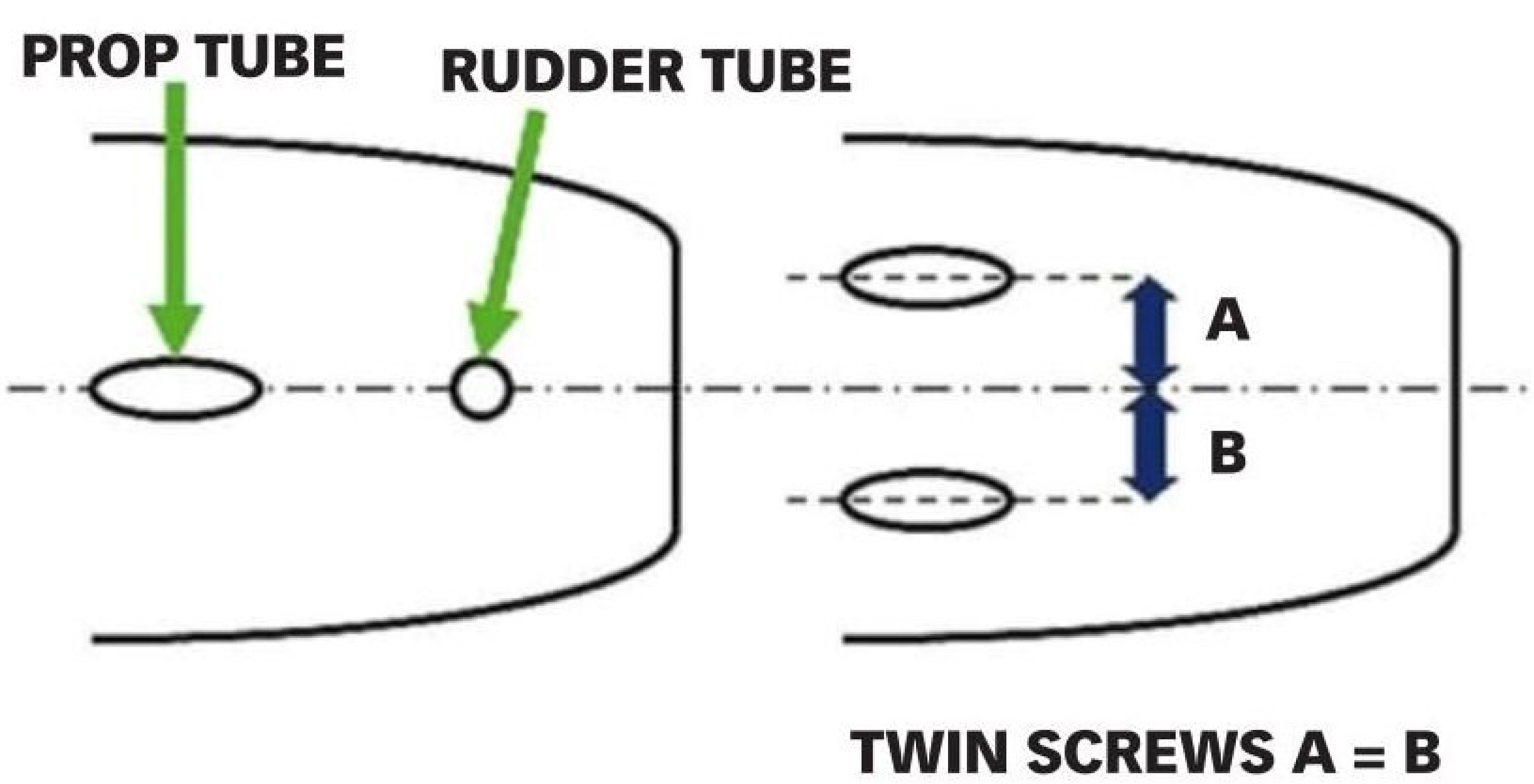
Installing the driveline

It is usual to install the propulsion items into the hull as soon as possible during construction. It is much easier to work with good clear access than have to fiddle through narrow deck openings. Should kit or plan instructions suggest otherwise, then think about it carefully as there may be a good reason for doing things the harder way. Of course, the designer/manufacturer might just be a sadist!

The propeller tube should be the first thing to fit into the model. The instructions and plans ought to clearly show where the propeller tube passes through the hull. Kits which include readymade hulls may already have the location for this hole marked. It is wise not to be too trusting and double check that any such markings are correct and that the whole drive line can function correctly with the tube in this position.

If no markings are given, then you have to locate the correct position. The first thing to do is mark a centre line on the hull. The holes for a single screw and rudder vessel should be along this line, or if twin screws are fitted equally spaced from this line, unless otherwise stated in the instructions (see **Figure 4**). If you fail to do this then the model will still operate but you run the risk of encountering some odd sailing characteristics.

Getting shafts aligned with rigid close-fitting tube.



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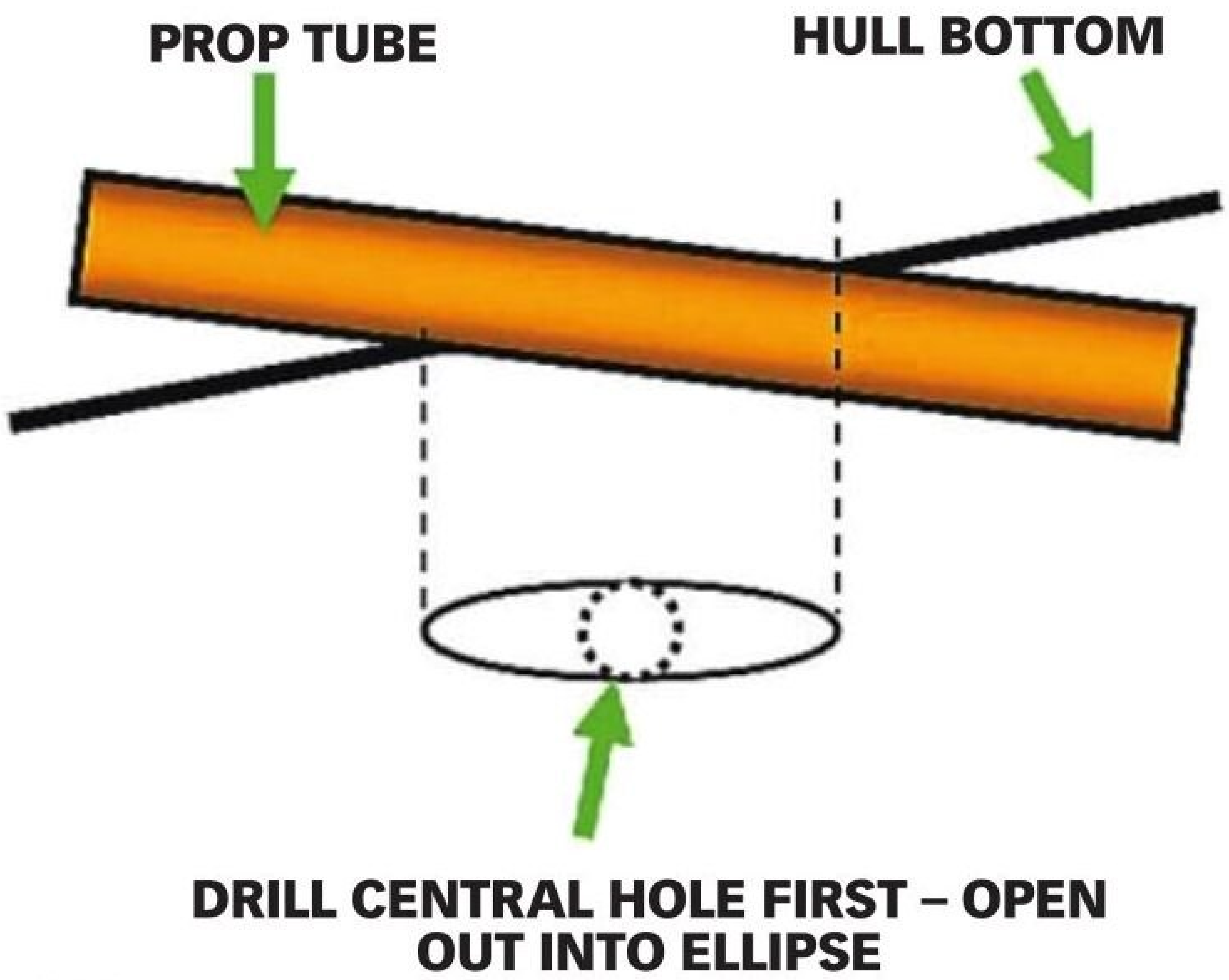

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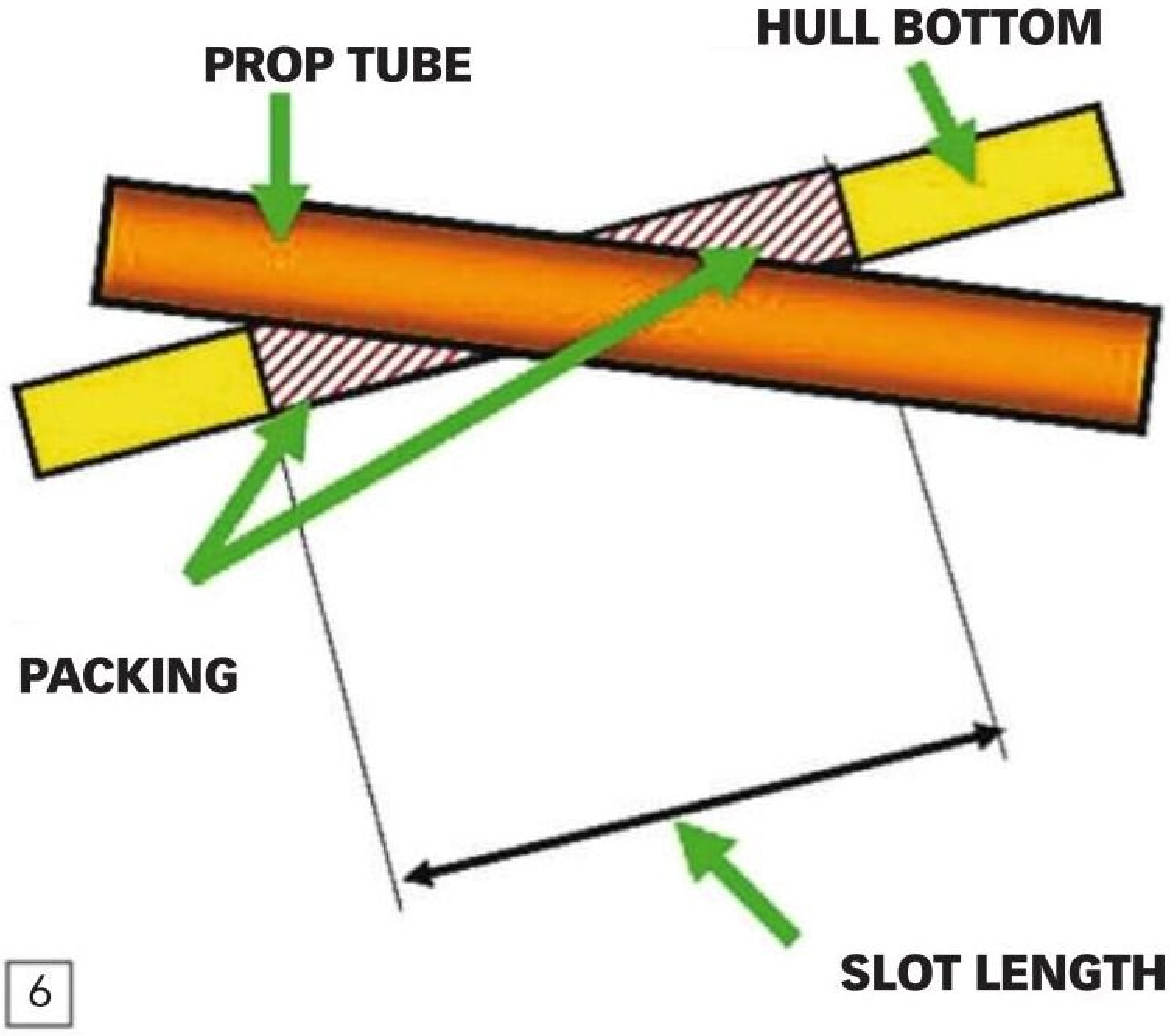

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"If you fail to do this then the model will still operate but you run the risk of encountering some odd sailing characteristics"

When making holes through plastic hulls it is wise to cover the area around the hole with masking tape to prevent any accidental damage to the surface while drilling/cutting. The rudder tube hole can usually be drilled to the exact size, but it is always a good idea to start with a smaller pilot hole first. The propeller tube, usually being at an angle to the hull bottom, will need an elliptical hole. The obvious way to make this is to drill a hole to match the tube in the middle of the desired opening then use a round file to get the desired shape (see **Figure 5**). The aim should be for a snug fit without any suggestion of the hull being deformed when the tube is at the correct angle.

An alternative to the elliptical hole could be a suitable slot cut into the hull bottom. This can be easier to fit the propeller tube through when hulls have thick wooden sections. In this case, some packing before and after the tube will be needed to secure it (see **Figure 6**).

With short propeller tubes, the inner (motor) end can sometimes be left unsupported and will be sufficiently rigid when the tube is glued to the hull. Long unsupported tube lengths can be prone to vibration, which destroys motor/propeller shaft alignment and creates noise, wear and a loss in performance. Some kit/plan designers do not seem to regard this as a problem, but I would be worried once unsupported lengths reach around 6 inches (15 cm) in length, especially if significant power was being transmitted along the shaft. A simple half bulkhead, or even just a block of wood glued between the tube and hull, could prevent such problems.

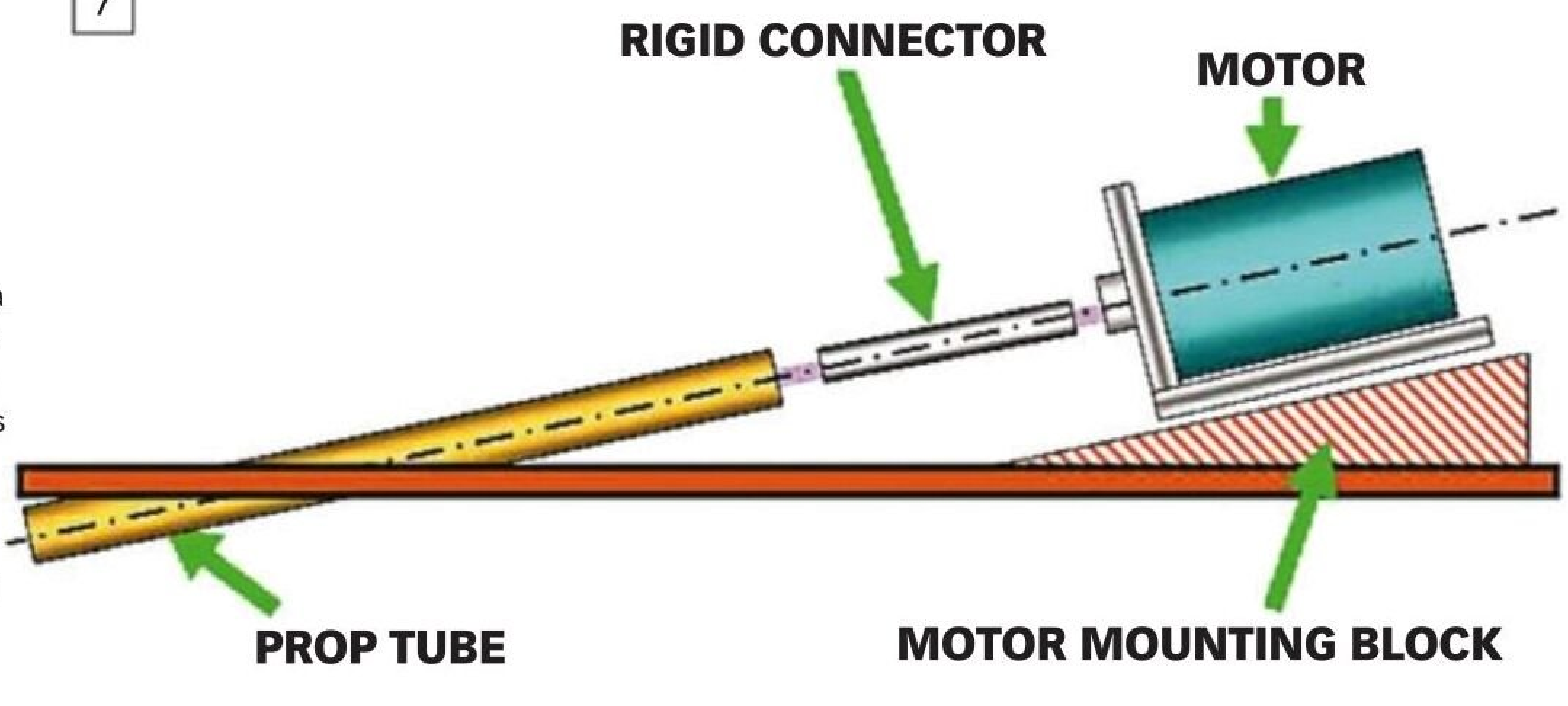
Fixing the propeller tube into the hull can be done at this stage; again, read the instructions and see it makes sense for your model. Suitable adhesives ought to be specified but you may have to make your own choice. Epoxy types will bond well to metal tubes and GRP (Glass Reinforced Plastic) or wooden hulls; the proviso being that all the surfaces must be clean and it's wise to also abrade the metal surfaces with a coarse file for better adhesion. The two-part fillers intended for repair work on GRP and car bodies can make excellent adhesives in this area. One word of warning though: if the hull is moulded from plastic as opposed to GRP, then take care that any adhesive does not soften, if not dissolve, the plastic. Experiment on a scrap piece of plastic first. In addition, epoxy, at best, only forms a mechanical joint when used on plastics; any movement or knock can break the joint. For this reason, clean surfaces, plus abrasion and the application of epoxy to both sides of the joint are strongly advised.

Motor mounting

It is vital that the motor is secured firmly into the model and correctly aligned with the propeller shaft. Alas, this crucial stage can be 'glossed over' or even totally omitted in the instructions that come with many model kits. If details are given, then they should be followed, unless you plan to do things differently; if so, do not blame anyone but yourself if things go pear shaped.

There are many ways to install the motor, but a typical one is shown in **Figure 7**. The motor has a mounting bracket, which is secured by screws to a wooden block fitted to the bottom of the hull. The block is shaped so that the motor and propeller tubes will be aligned. To ensure that this is so, a rigid connector (usually a close-fitting tube of the same length as the intended coupling) is slipped over these two shafts.

7



"Alas, this crucial stage can be 'glossed over' or even totally omitted in the instructions that come with many model kits"

An alternative means of securing the motor is to make a 'cradle' from wood into which the motor snugly fits – the motor being held in place by a strap, with the ends of this strap screwed into the mount blocks (see **Figure 8**). With a low-powered motor, an elastic band stretched between pegs on the sides of the mounting blocks may be adequate to hold the motor in place.

It is possible to 'glue' a motor into the hull. Using something like epoxy, this would be very secure, but possibly a shade too permanent if you ever needed to remove the motor. A better idea is to use something like Silicone Sealant (as used in plumbing and other domestic jobs). On clean surfaces this sealant creates a strong enough bond for the rigours of sailing, but not so strong that a firm and steady force, perhaps aided by a few knife cuts, cannot part the motor from the model.

Couplings

The couplings between motor and propeller shafts come in many forms and sizes. No one type is inherently better than the others and all can be badly installed to cause no end of problems. The couplings' function is to transmit the rotational force from the motor to the propeller shaft with no slippage and minimum friction, and to accommodate any minor misalignments. If you could guarantee the two shafts would never move out of alignment, then a simple rigid coupling could be used; this rarely happens in the real world, let alone in models, though, and these rigid couplings are best left to experts or the very optimistic.

The simplest, and also probably the cheapest, coupling is a length of flexible tubing which is a tight push fit into both shafts. The unsupported tube between the two shafts ought to be kept to a minimum to avoid twisting and deformation of the tube. Rubber tubing has a tendency to perish over time and the silicone tubing, as sold in hobby stores as fuel tubing, is much better. Although, if correctly set up, flexible tube couplings can transmit a surprising amount of power, they are best limited to smaller models. Another option is to use tubing with a larger diameter than the motor and propeller shafts, but which has inserts in each end that match these shafts.

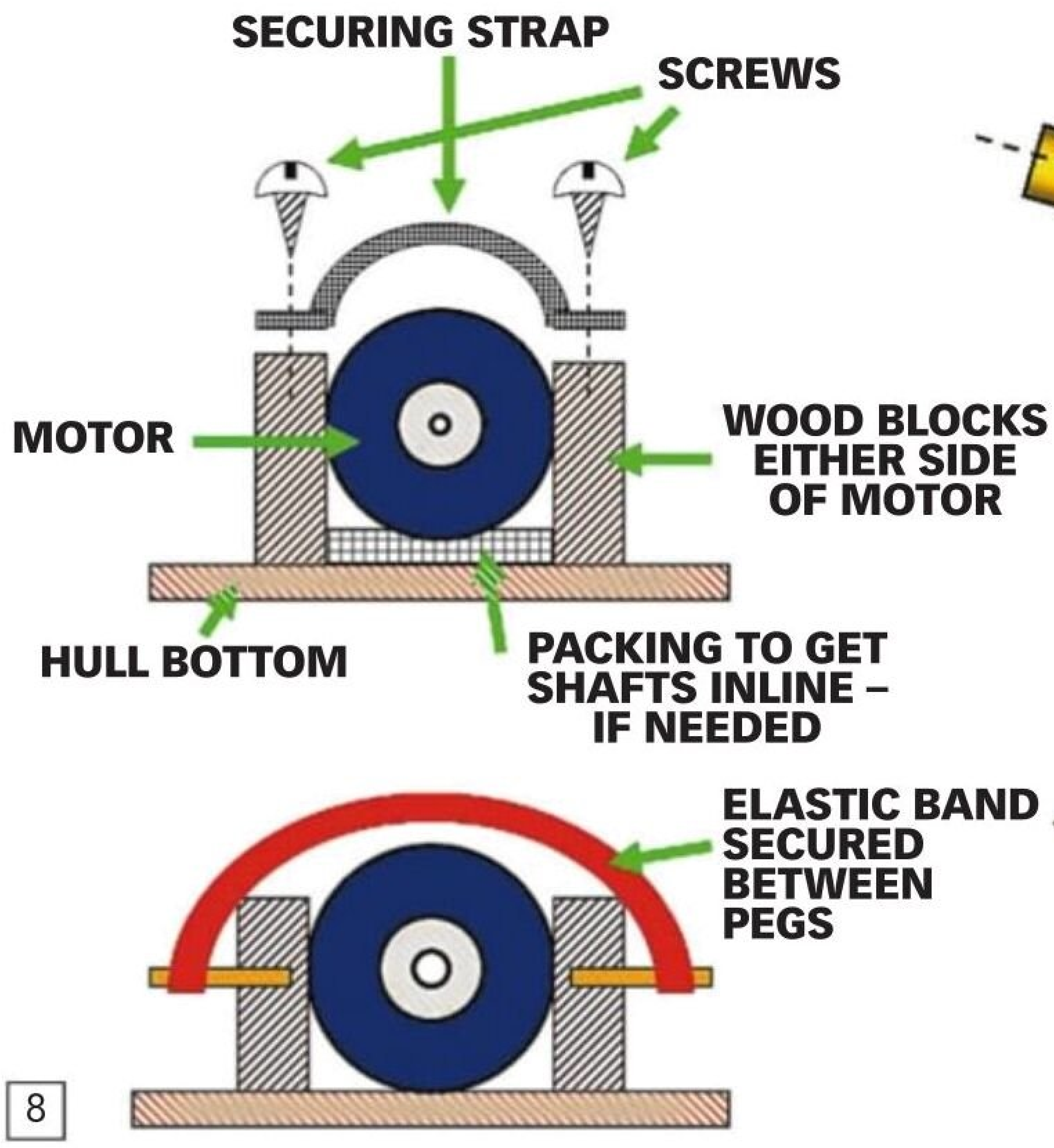
One of the more common types of coupling features a 'Universal' or 'Hooke' type of joint. Metal inserts fitted to the ends make the connection with the shafts. A grub screw usually connects the coupling to the motor shaft, while the propeller shaft can be plain and secured with a grub screw or threaded (in which case, there must be a matching threaded insert). It is vital that these inserts are the correct size and type for the motor and propeller shafts. Incorrect inserts will result in vibration and almost certainly fail at the most inopportune moment.

Now the question I suspect many of you have wanted to raise: if the coupling can accommodate misalignment, why go through all the trouble to get the motor shafts as near perfectly in line in the first place? Well, these couplings can only accept a limited amount of angular displacement before they start to protest, usually no more than 5-10 degrees. Rotation is possible at larger angles, but significant power loss can occur, and couplings have even been known to show their displeasure by disassembling! If there is any lateral displacement of the two shafts (see **Figure 9**) then these simple couplings cannot cope at all. You can purchase double couplings that can accommodate both angular and lateral displacements, but these cost more and take up more space, so why not do the job properly in the first place?

Silicone tube coupling with brass inserts.

Propellers

Most propellers have a threaded hole in their central boss, which will screw onto a matching threaded end of the propeller shaft. This alone would not give a very secure fitting, as the forces applied by the motor,



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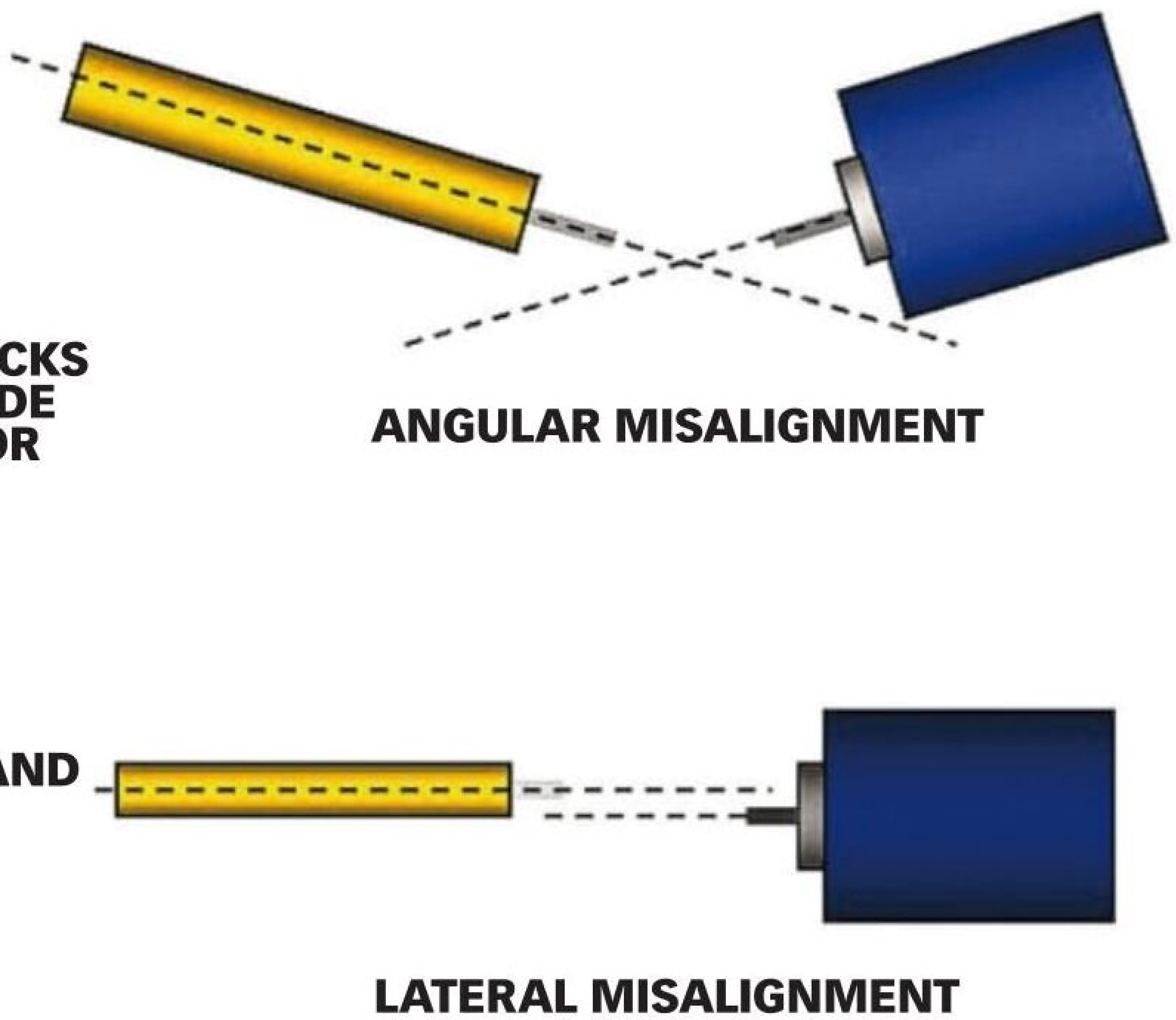

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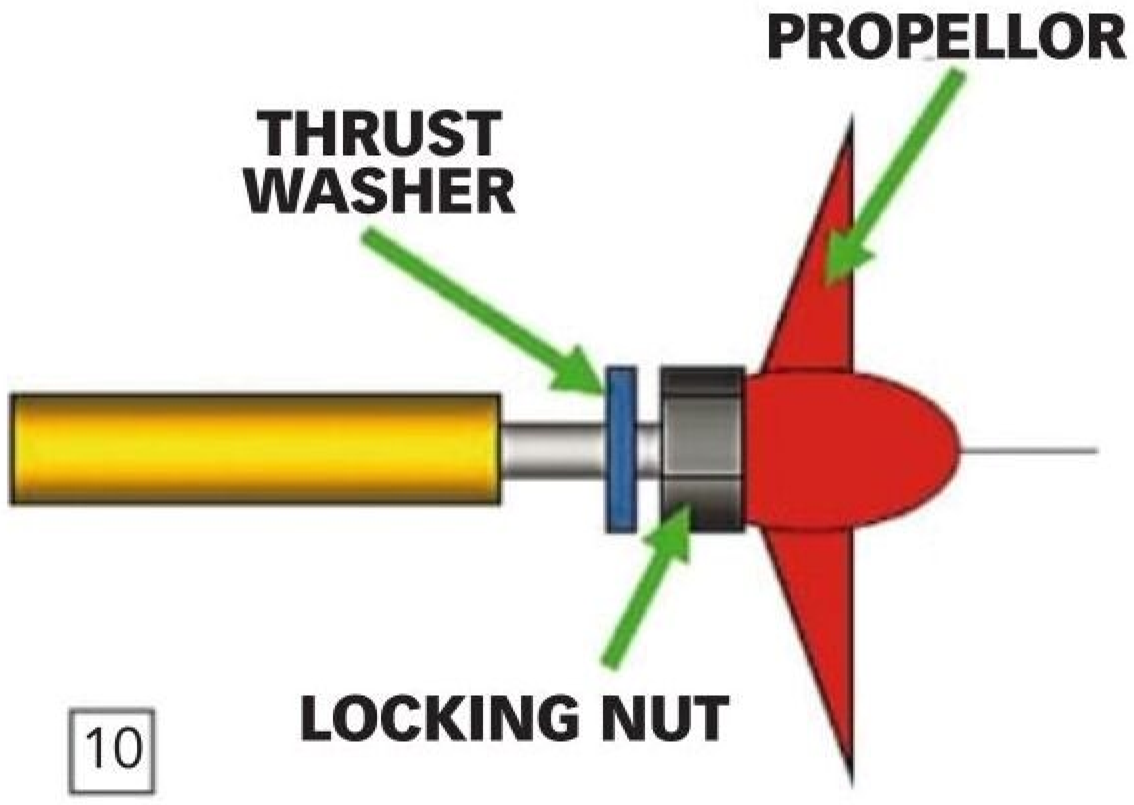

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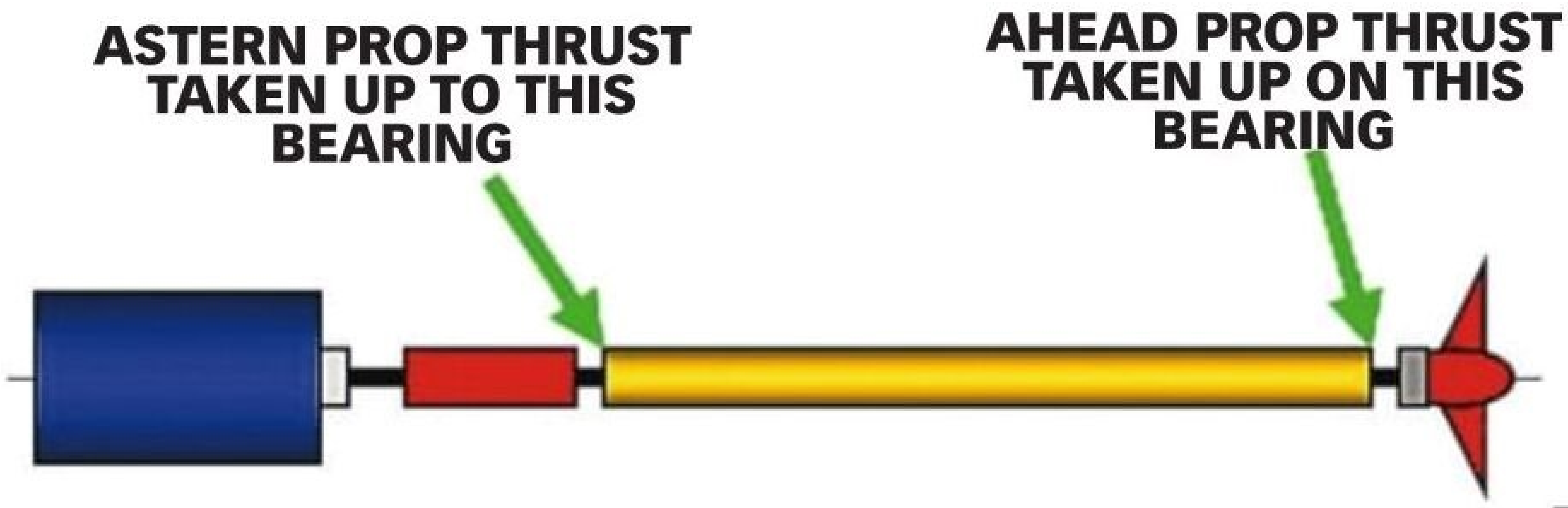

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especially if applied suddenly, would quickly loosen and unscrew the propeller, which would soon be lying at the bottom of the pond with a stationary model above it!

The standard way to secure a threaded propeller top to a threaded shaft is to fit a 'lock nut' (called a 'jam nut' in some parts of the world, for reasons that will soon become clear) ahead of the propeller. By holding this nut stationary with the appropriate spanner, the propeller can be tightened up against the nut. You sometimes see modellers trying to use pliers to hold this nut while fitting the propeller – not very good practice at all. Finger pressure on the propeller blades is usually sufficient force to ensure a firm and reliable fitting. Ideally, little of the threaded part of the shaft should be visible, thereby ensuring that only the plain part of the shaft runs in the close-fitting tube bearing. This ought to make a more watertight seal in the bearing and keep friction down. A washer is often fitted ahead of the lock nut so that when running in the forwards direction this, not the nut, presses on the tube bearing. The washer can be metal or a hardwearing plastic and this helps to minimise friction (see **Figure 10**).

I did not mention this in the section on couplings but, if the coupling insert is threaded to match the propeller shaft, then it too must be secured with a lock nut. The method is just the same as described for fitting a propeller, but this time two spanners must used: one for the nut, the other for the coupling.

Driveline adjustment

It is not enough to just secure the coupling to the motor and propeller shaft then screw the propeller in place. A little careful adjustment will result in a smooth and trouble-free driveline.

Ideally, when the model is going ahead, the propeller's thrust should be taken up by the thrust washer pressing on the lower tube bearing (see **Figure 11**). This places the wear due to friction on the bearing/washer contact surfaces where it can do little harm. In fact, after a little 'bedding in' of these surfaces, they become very smooth and surprisingly watertight.

Likewise, when running astern, the propeller tries to pull the lower thrust washer away from the lower bearing. This time the force ought to be taken up by the thrust washer behind the coupling lock nut pressing against the upper tube bearing. This is achieved by having a small amount of fore and aft 'play' in the propeller shaft. Pushing on the propeller presses the thrust washer at its end onto the lower bearing; pulling on the propeller (i.e., as when moving astern) pulls the couplings' thrust washer onto the upper bearing. I suggest that you aim for the smallest amount of 'play' possible by adjusting the coupling and/or the propeller positions on the shaft; less than a millimetre would be best.

On no account should the propeller's thrust be transmitted along the shaft and reach the motor bearings in most model boat installations. This will cause friction where you least want it and may lead to damage. But, you cry, electric motors are widely used in model aircraft where the propeller is secured to its shaft and hence 'pulls' very strongly on the motors front bearing. True, but we usually install the motors the other way around, and forward propeller thrust would be applied to the motor's rear bearing which is not intended to accept such forces.

"This will cause friction where you least want it and may lead to damage"

'A' frames

Sometimes the lower end of a model propeller shaft is supported by an 'A' frame to emulate full-size practice. If the 'A' frame is attached to the propeller tube then the prop thrust can still be taken up by the lower tube bearing, as previously described.

If, in the interests of scale fidelity, the tube stops short of the 'A' frame and leaves a length of shaft exposed, then things are different (see **Figure 12**). It might be tempting to arrange the propeller thrust to be taken up at the 'A' frame; this would be very foolish. I once experienced a kit to be propelled by two high power motors, which featured flimsy plastic 'A' frames secured to a flexible plastic hull. Such 'A' frames are best regarded as decorative items which, at most, are only asked to support the shaft; any propeller thrust should be taken up by a suitable collet secured to the shaft so that it can press against the lower tube bearing, as described before. My advice is to fit the 'A' frames after the rest of the driveline is installed (and the adhesive has fully set) and aim for minimum friction.

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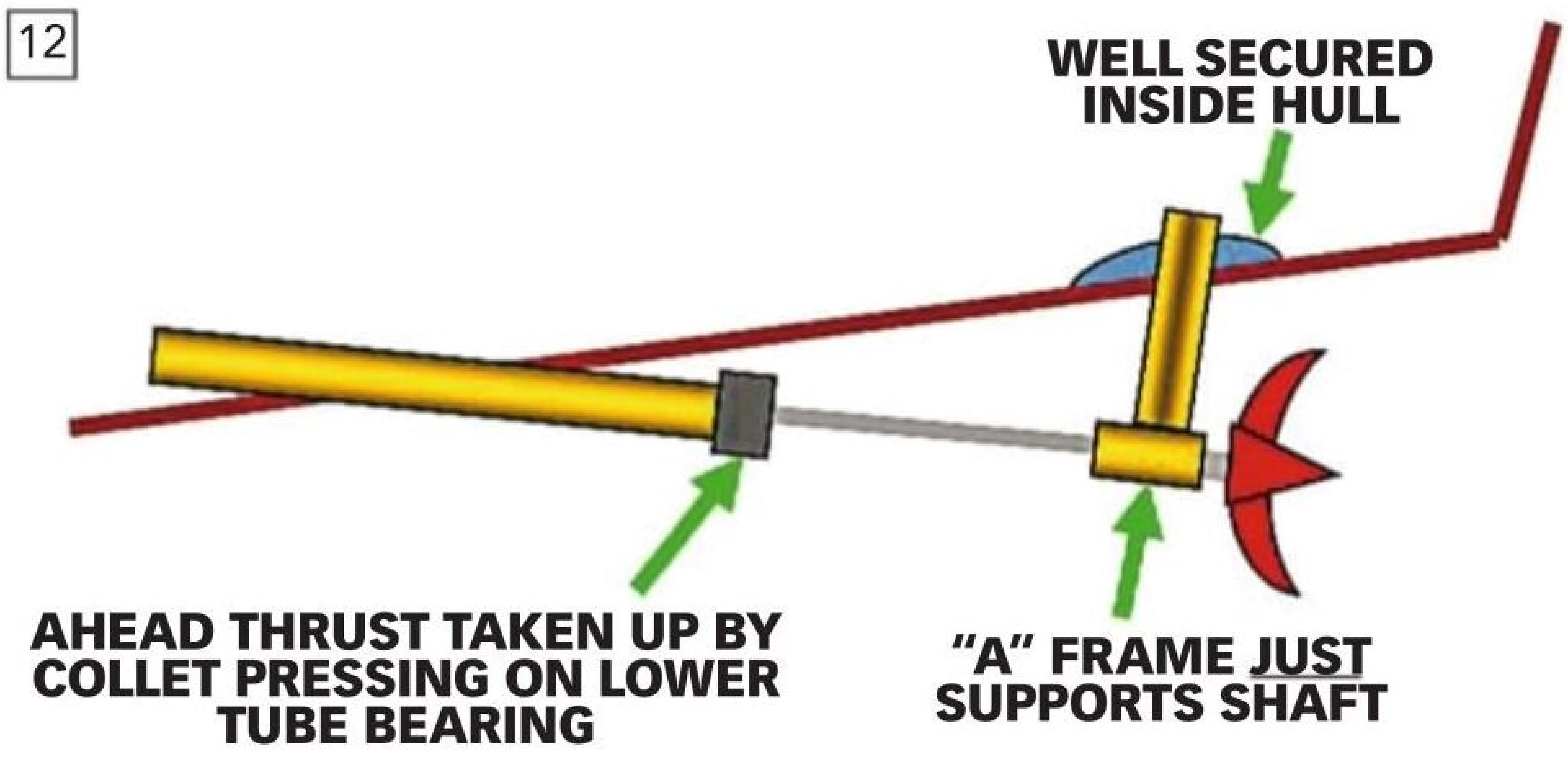
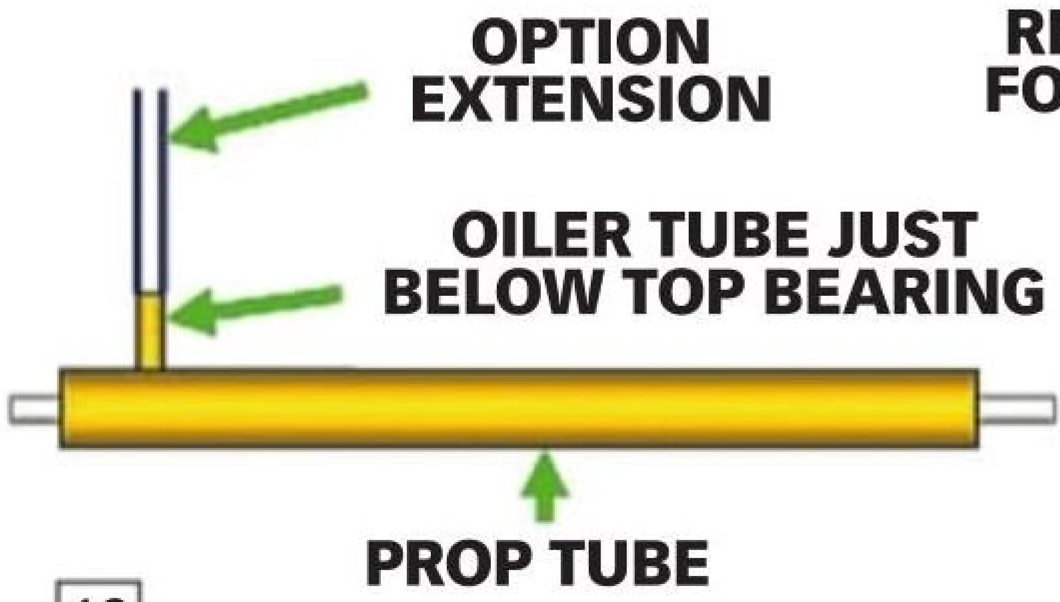


Lubrication

The bearings at both ends of the propeller tube need some lubrication to minimise wear, friction and probably noise. The simplest method can be to add a spot of oil to these bearings prior to each sailing session and before any out of the water 'bench testing'. A light machine oil, from the ubiquitous '3 in 1' can, is fine but, for convenience, I tend to use a slightly heavier automotive engine oil as there is always some handy in my garage.

A prop tube oiler with flexible extension tube.



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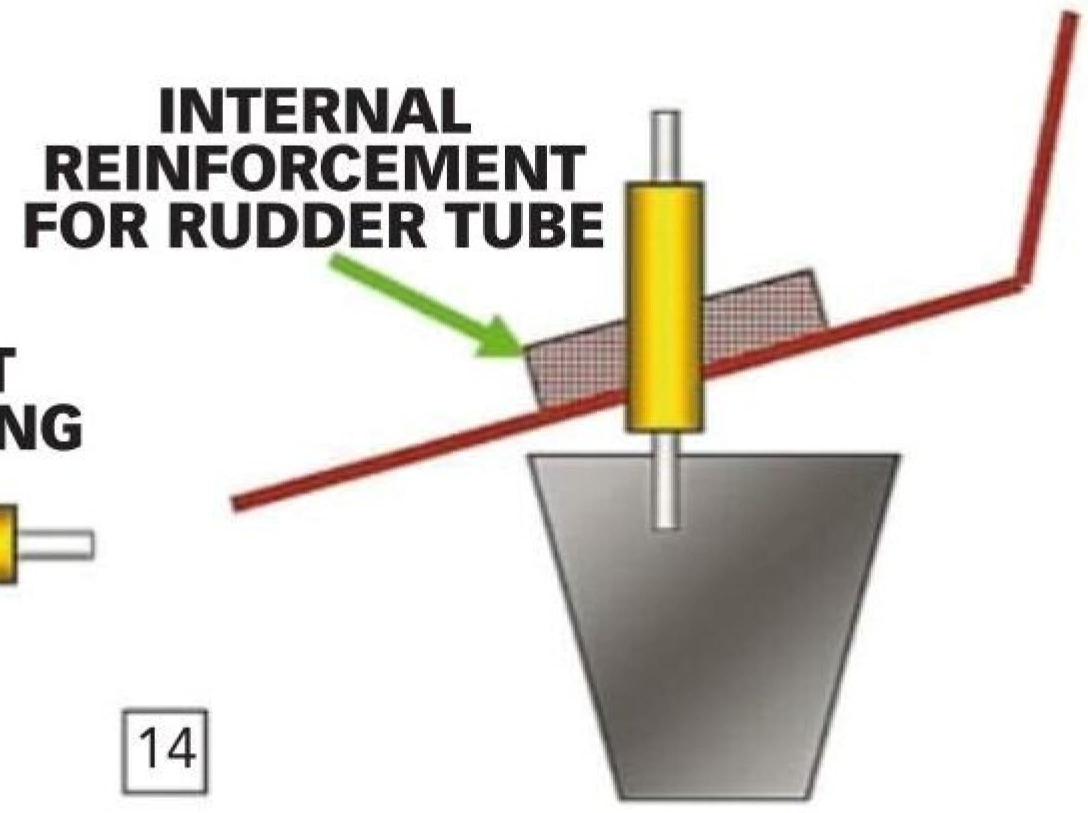

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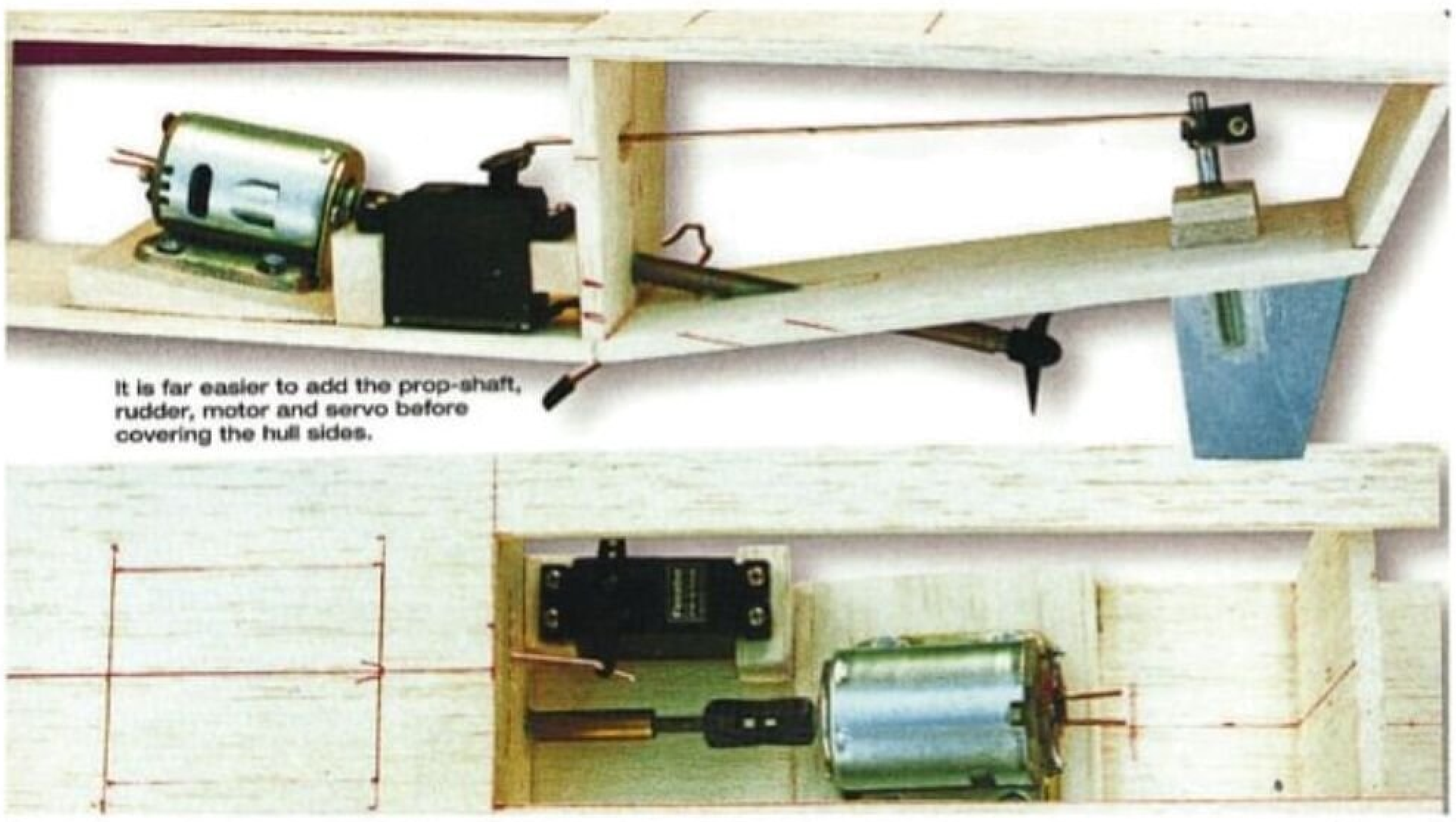
Many modellers advocate filling the space between the propeller tube and shaft with a lubricant. This is excellent for ensuring the bearings are always lubricated but is often used to prevent water seeping up the tube and into the hull. If the propeller shaft is a good fit within the tube bearings and the propeller thrust is taken up by the bearings then little, if any, water should enter the tube.

Filling the tube with oil, then inserting the propeller shaft and remaking all the connections can be a messy job, which is assuming that the rudder allows you to withdraw the shaft in the first place. A much neater idea is to fit an 'oiling tube' to the propeller tube which allows convenient top ups prior to sailing (see **Figure 13**).

Some tubes may come with an oiling tube already fitted, but most don't. However, fitting such a tube is not a great challenge: using a suitable piece of tubing, drill a hole in the propeller tube to match, then secure the oiling tube with solder/epoxy making sure the shaft is not fouled. The location of the oiling tube needs a little thought to avoid problems of access and interfering with other items – somewhere near the upper bearing is usually best. For more convenient topping up, a length of flexible tube can be fitted to the oiling tube.

Some modellers insist on filling the propeller tube with grease. This might be an advantage if you have a leaky propeller tube and the thick grease would hinder the inward flow of water. The problem with grease is its viscosity: in other words, its 'stiffness' and resistance to letting things flow around it. A good illustration of this effect is to take a knife blade and move it edge first through a low viscosity fluid such as water; you will hardly feel any resistance. Then try it through something more viscous like treacle or jam; even with the sharpest of blades you will feel noticeable resistance. The same thing happens inside the propeller tube as the rotating shaft struggles against this viscous drag.

In my less experienced youth, I built a model based on an early torpedo boat. It was outfitted with a motor and battery pack typical of similar sized fast electric racing craft, and similar performance was expected. In fact, it wallowed around the pond in a disappointing fashion and displayed a short battery life and very hot motor. I had, of course, followed the accepted wisdom of filling the propeller tube with grease. Removing the grease and replacing it with oil resulted in the model storming across the water in a much more realistic manner, with a cooler motor and a longer powered run.



One Glynn made earlier! The USS Hibbard design published in the October 2002 issue of Model Boats puts theory into practice.

Since then, it has been a 'no-brainer' for me to avoid grease-filled tubes and only use oil. To be fair, if the shaft has a low rotation speed, perhaps as in a paddlewheel drive, then grease might not be a problem.

Rudders

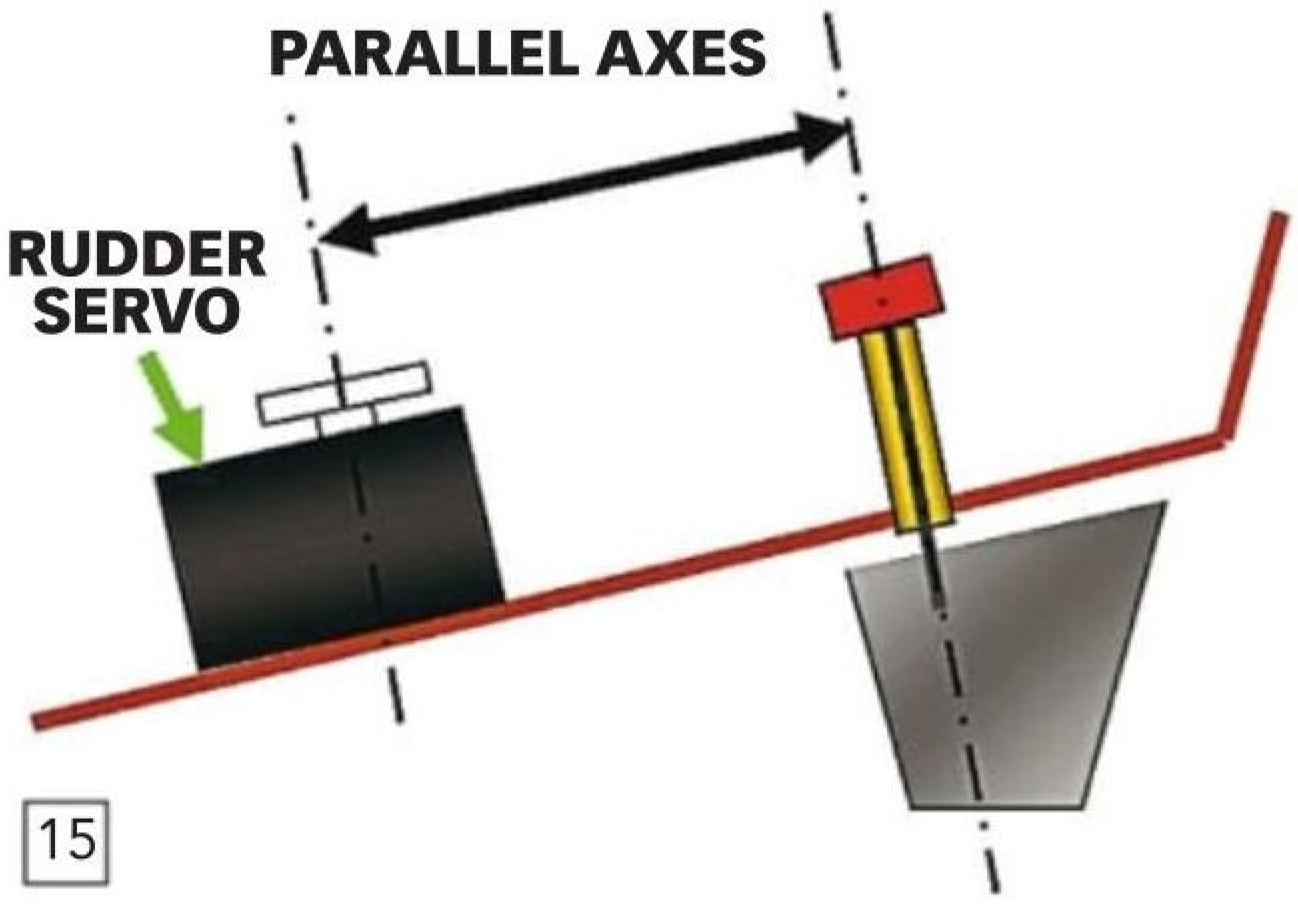
Compared with the accuracy demanded when installing and setting up a driveline, rudders seem almost easy to install. The danger is this may lead you into taking a casual approach to the job, which could result in problems later. The rudder shaft rotates inside a tube which is usually brass, sometimes just plain metal, and at other times just a moulded plastic item. Either way, the tube must be firmly fixed into the hull, this being to ensure reliable operation and minimise damage to this potentially vulnerable item.

Before doing anything too permanent, it is always worth checking that the rudder assembly can move freely in its designed position. Note that this also applies to the tiller arm fitted to the top of the shaft, which can sometimes foul internal items or structures. On most models, a rudder movement of 30-40 degrees either side of the neutral position will be adequate. Some thought should also be given to future access to the tiller arm. If the deck is fixed above this arm, then you might want part of it removable. Tiller arms in inaccessible places have the perverse habit of working loose at the worst possible moment.

Sometimes it is enough to simply fix the tube into the hull with a suitable adhesive. However, if the hull is thin and potentially flexible then some form of internal reinforcement is wise; this is often just a piece of wood shaped to fit the hull and glued into place on the internal surface (see **Figure 14**).

Some rudder tubes are threaded for a securing nut to be used on the inside of the hull. Again, I would advise internal reinforcement with thin hulls and use some adhesive where the tube passes through the hull to ensure a watertight installation.

Lubrication of the shaft inside the rudder tube is a good idea. It will ensure free movement of the rudder and hinder water creeping up the gap between shaft and tube through capillary action. As the movement of the rudder is limited, then grease would be satisfactory.



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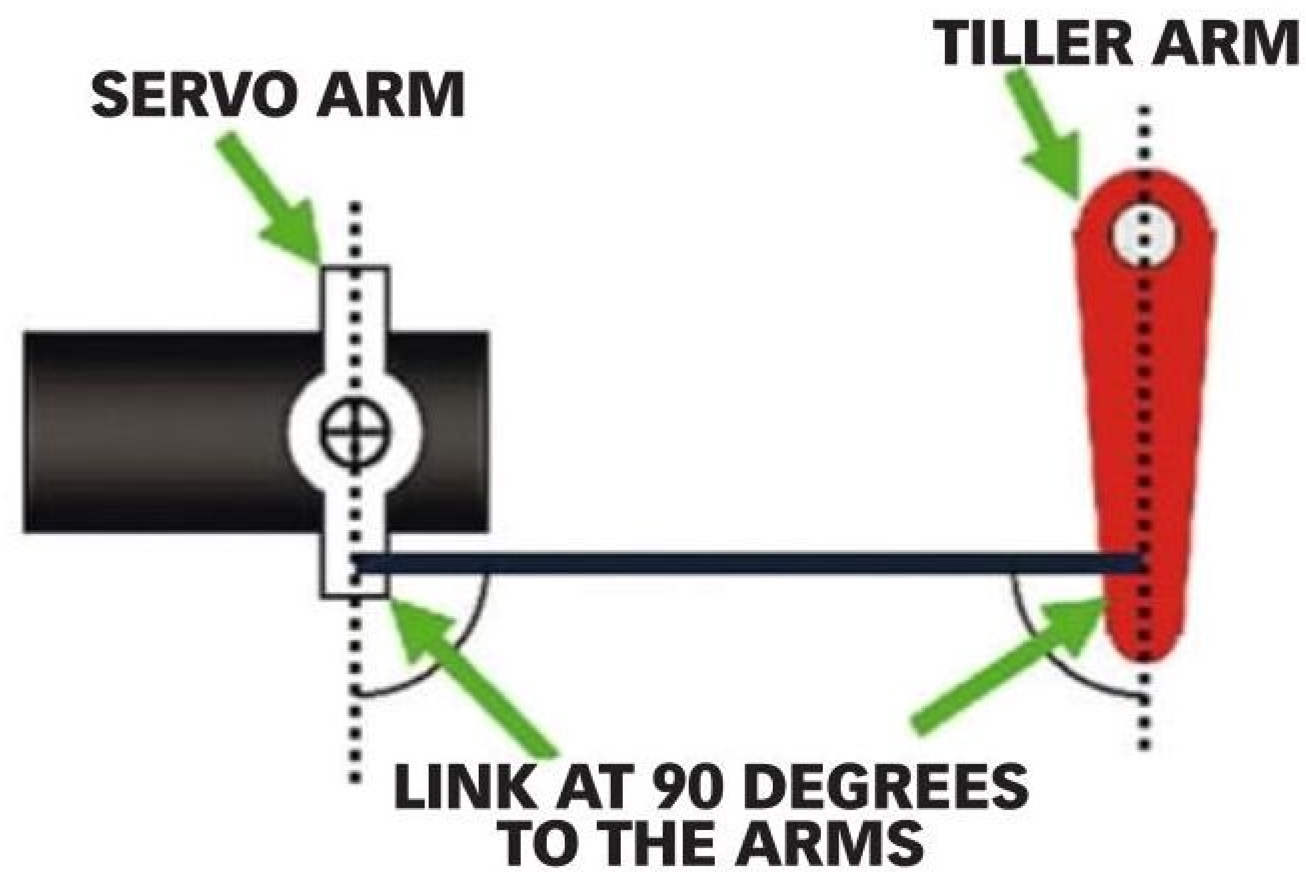

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Finally, some people insist that the top of the rudder tube must be above the model's waterline to prevent water entering. This sounds very sensible, but it's no substitute for a close-fitting rudder shaft and tube, plus some lubrication, which ought to keep water out of the model.

Rudder linkages

The tiller arm on top of the rudder shaft must have a positive link with the servo arm to minimise any free movement or 'sloppiness', which can result in the model having vague steering characteristics. It's therefore tempting to make the linkage as stiff and tight as possible, which then introduces other problems. The rudder servo can end up struggling to overcome the resistive forces in the linkage, which results in slower response to transmitter commands. It may not even take up the commanded position before the servo 'stalls', as indicated by the always bad sign of a stationary but still buzzing servo. Under these conditions excessive wear in the servo's gear train, if not damage, may occur.

What follows are general guidelines, remembering that a kit/plan ought to show a suitable position for the rudder servo and its link to the tiller arm:

*Mount the rudder servo so that it is firm with no significant movement when under load.

*Try to keep the axes of the servo and tiller parallel. Thus, if the rudder shaft is at an angle to the vertical, then mount the servo to match (see **Figure 15**). This assists in achieving a smooth motion.

*Use as short and straight a wire link as possible to minimise the risk of the wire bending under load. Commercial push rods are available, but any steel or hard drawn brass wire about 1/16-inch (1.5 mm) or a shade more will be suitable for most applications.

*Ensure that the link wire is a snug fit in the servo and tiller arm holes.

*Secure the wire in the holes to ensure they cannot become detached when in operation. Simple 'Z' bends are often used along with clevises on commercial push rods.

"Under these conditions excessive wear in the servo's gear train, if not damage, may occur"

*Ensure that the servo and tiller arms are parallel and square to the link when at the neutral position (transmitter stick, trim and rudder centred), as illustrated in **Figure 16**. This will aid producing even rudder movement in both directions. Adjustable linkages and/or connectors greatly aid this job.

*Check and double check that everything is secure, especially if subsequent construction will hinder access to these items!

My ideal rudder linkage is one where, with a fingertip placed on the rear edge of the rudder blade, you can just feel, but not see, a small side-to-side movement.

Internal installation

Most plans/kits will suggest the placement of internal items such as the battery and radio control gear. You may, however, find you cannot follow these suggestions because of changes, use of different items, or (let's be honest here) where the suggested layout is not practical (I have also encountered some that were actually impossible). The best approach to this job is to remember that anything that is hard to reach, or even inaccessible, when the model is completed will fail sooner rather than later. That is the way the Universe works, and there is little point in arguing with it! So, make sure that you install nothing that cannot be removed easily and safely at a later stage.

"That is the way the Universe works, and there is little point in arguing with it!"

An external view of the Perkasa's running gear. In this case the thrust is taken by the substantial skegs built into the hull forward of the rudders.

It ought to be obvious that all internal items must be fitted so that they cannot move while sailing. If they do, at best the model will adopt a comical attitude; at worst, it will founder. Heavy items like sealed lead acid batteries can be held in a simple wood frame glued into the hull. A cut-out in some stiff foam plastic can also secure lighter items while still allowing easy removal.

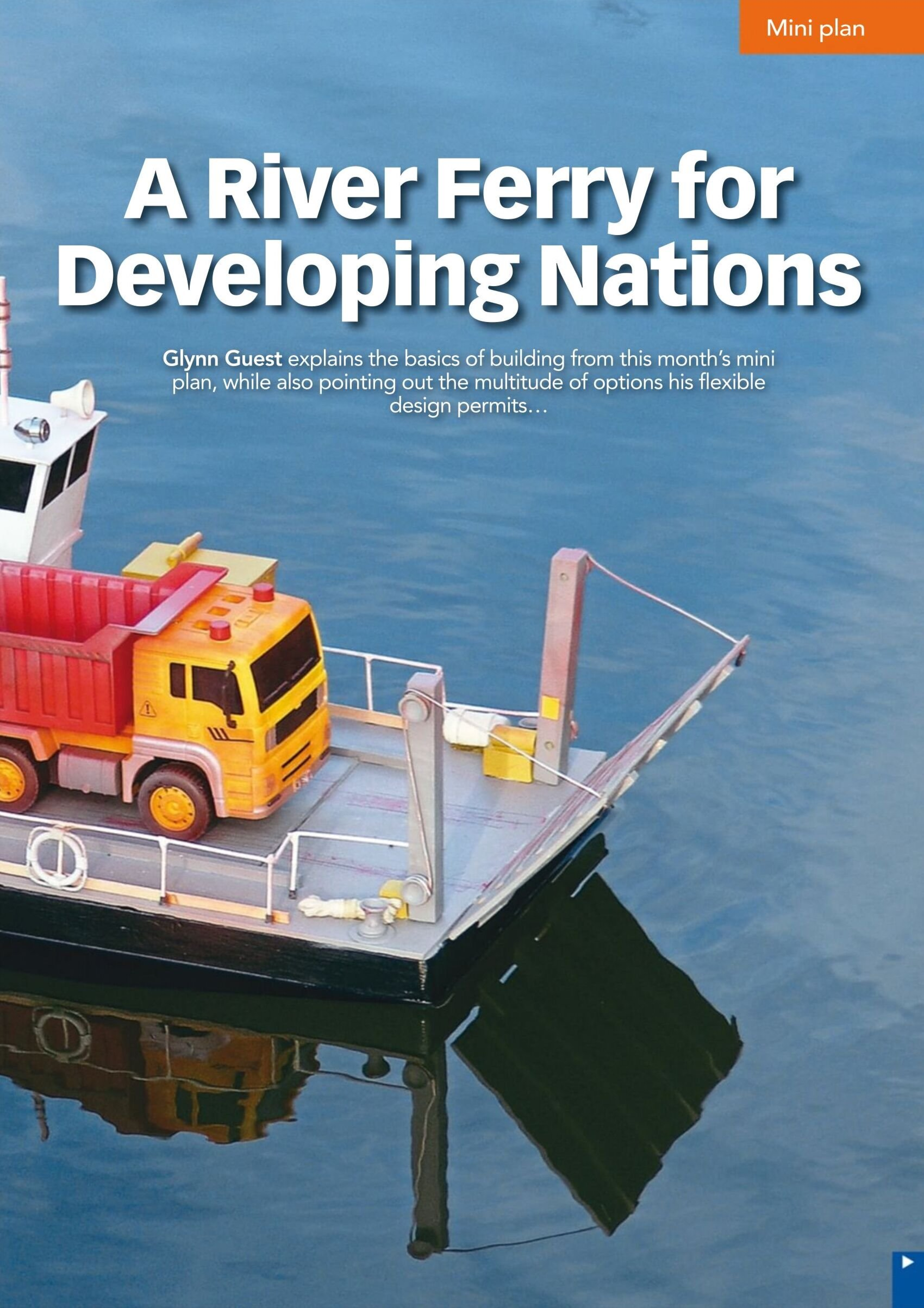
The whole internal installation needs to be tidy. This not only avoids problems but can greatly aid any trouble shooting you will inevitably have to do – remember the perverse Universe we live in? The model's internal wiring is usually worst offender in this respect. Loose wires can easily become entangled with moving things like rudder servos and motor couplings. Try to use as short a length of wiring as possible, bearing in mind the need for access and removal of items. Any loose wires inside the hull ought to be tided away into safe corners and lightly secured there. When opening up a model you should be greeted with a view of a neat and logical layout, not something that appears to be an example of conceptual art!

Following these simple guidelines can make all the difference between a model boat that's a joy to operate and one which is a continual cause of frustration. ●

David Abbott's installation in the Nautical Marine Models' Perkasa kit provides an excellent illustration of Glynn's guidelines. This is a twin rudder setup with the linkages still to be fitted.

A River Ferry for Developing Nations

Glynn Guest explains the basics of building from this month's mini plan, while also pointing out the multitude of options his flexible design permits…



"It was time to get logical about how to power and steer this model…"

This model is based on those small ferries used where there is a need to move people, vehicles, and goods across rivers too wide or too deep to wade and yet a bridge would be too difficult or costly to build. It has a simple construction and can easily be modified to suit individual tastes and ideas. It's been designed to a notional scale between 1:30 and 1:40, with a length of about 60 cm (24 inches), and an intended weighed of approximately 4.5 kg (10lb).

Starting point

The motivation to build a model can often come from unexpected sources. In this case, it was the chance sighting of such a ferry while searching the internet for something completely different. While this immediately struck me as a potentially interesting modelling project, though, other jobs had priority at that time. The idea was to resurface again, however, while rummaging through my stock of timber (mainly consisting of off-cuts left over from work around house but too good to discard), as it occurred to me that the PSE (Planed Square Edge) lengths included looked ideal for construction of a simple hull suitable for one of these ferries.

Although this would be a semi-scale model, to avoid the comical appearance that can occur when items on a model have apparently been built to noticeably different scales there was still the need to keep a sense of proportion about it. The scale I decided upon was determined by my desire to have the model carry some suitable vehicles, and I was confident that toy shelves would offer a whole range of suitable farming, construction and road transport models in scales around 1:30 to 1:40. That just left the vessel's drive and steering to sort out.

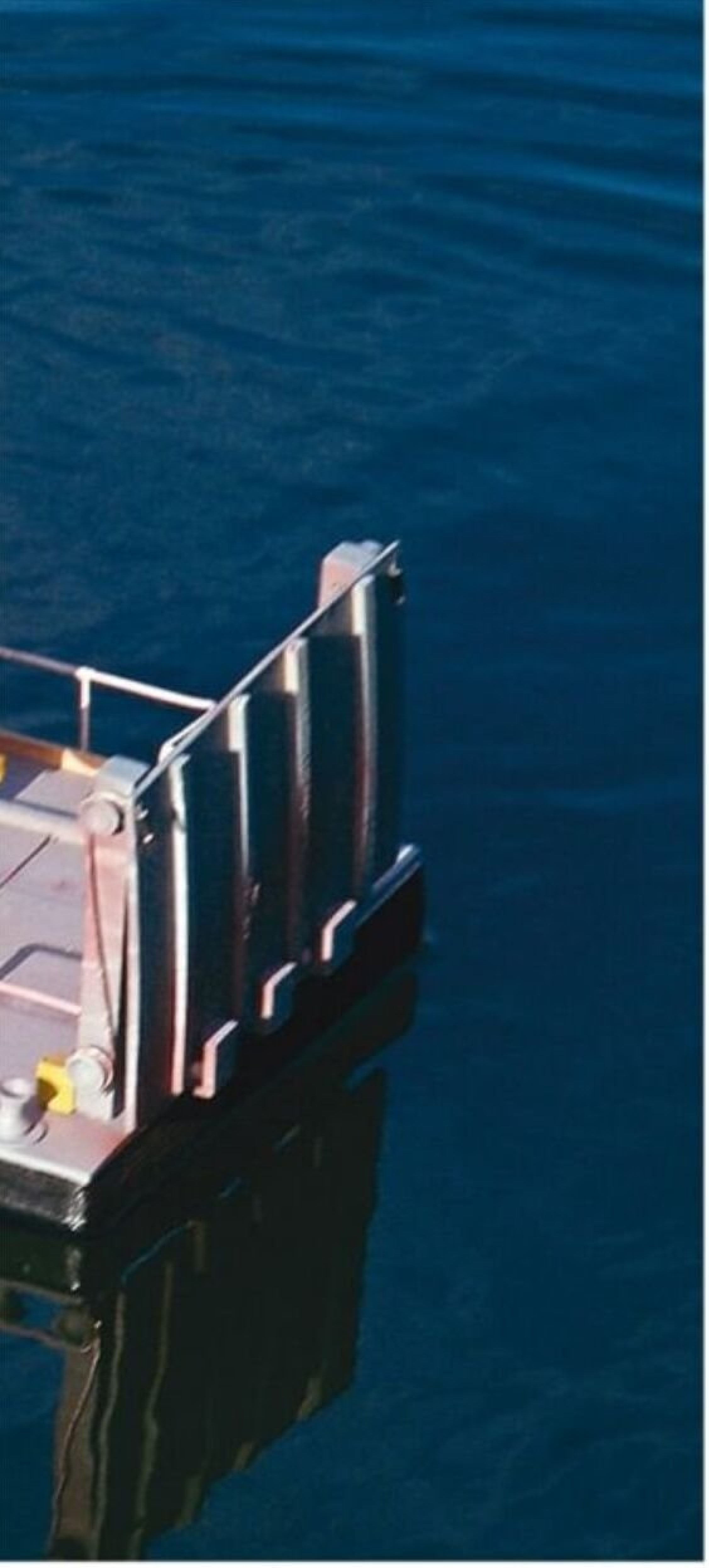
Not so simple

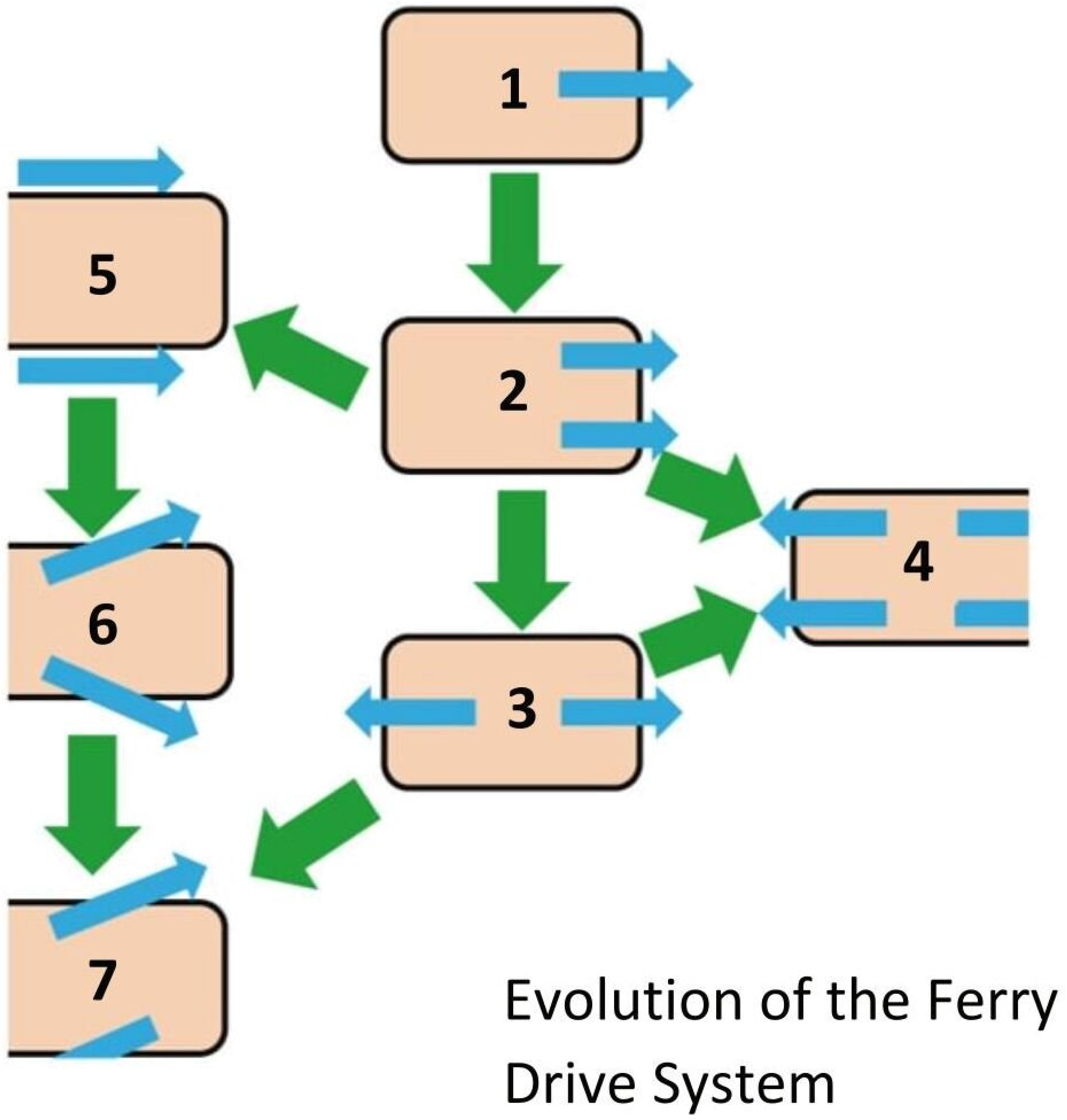
These small ferries were often powered by a 'Z-drive' unit, which allowed the propeller to be lifted clear of the water: a sensible system, as it made any maintenance or repair work much easier. On some vessels the drive system would be mounted on the stern. On others, however, two units would be mounted on either side of the hull, this giving steering with independent throttle control, allowing vehicle access at both ends, and removing the need for the vessel to be turned before returning back across the river.

The use of twin 'Z-drives' appealed to me, but a brief and fruitless online search indicated that they would have to be scratch built. Never having had the desire to become a machinist, with an elaborately (and damn expensively) outfitted workshop, the solution would have to be simple (and cheap). The best option would perhaps be to fit a pulley drive from the motor above the water down to submerged propeller. A quick lash up was made and tested in the kitchen sink, Mrs Guest being absent! This worked, but the band between the pulleys threw up a worrying amount of water up and sprayed it around. A few ideas were tried to minimise or contain the water lifted by the upwards moving band, but none of them proved satisfactory. Rather than be stumped, it was time to get logical about how to power and steer this model.

The logical path

Sitting in front of a blank sheet of paper can be a worrying experience, but I usually find that once I start really thinking about problems, potential ways round them will often start to tumble out. True, many times these are poor, if not impractical, ideas, but by an evolutionary process a good and workable solution will usually present itself. In this case, the path that led me to how best to power and steer my river ferry can be followed in my diagram. I started with a single propeller and rudder set-up (1); simple and reliable but limited in manoeuvrability and I knew I could come up with something better suited to this model. The idea of using twin independently controlled propellers





(2) would, I felt, greatly improve things. The next possible layout considered (3) was tempting; I had used it successfully before (see the Nov 1998 issue of Model Boats), and with independent control of both propellers and rudders it was possible sail the model conventionally, rotate it and make it move both sideways and diagonally! I also used in my *Janus* model, based on a short sea ferry (see the Feb 2018 issue of Model Boats). Idea 4, which combined options 2 and 3 would also have been an interesting experiment.

All of these methods would work and there's no reason why you can't use them if you chose to build a similar model. I, however, had rather set my heart on the use of something like the 'Z-drives' fixed to either side of the hull of the 1:1 vessels. Onwards, then, to layout 5. A more extensive search for model outboard motors called up some small toy ones, but these unfortunately lacked the power required for my river ferry. I came across some larger outboards too, but these were intended for racing craft. A brief flirtation with the idea of using a submerged electric motor to drive the propeller then followed, but quickly dismissed. I know some people do this, but the idea of operating a wet electric motor, brushed or brushless, has never sat comfortably with me.

I did try to figure out a way to 'bend' the propeller shaft such that the motor could be inside the hull while the propeller was in the correct position on the outside. A flexible wire drive might have worked but, I reminded myself, propellers don't have to be aligned exactly fore and aft (see last month's article on thrust lines).

Layout 6 seemed to have no problems; careful use of the throttles would keep the model on a straight course and steer it adequately. However, studying photos of some of the full-size ferries showed they had their 'Z-drives' facing in different directions (7). This looked a little tricky, as playing with the thrust lines and straight running would need careful throttle management, but no insurmountable problems could be seen. After all, if an early test on the bare hull didn't work out, I could always revert to layout 6, or even 2, and some filler and paint could be used to hide my misjudgment!

Materials and plan

The prototype was built using some PSE timber 63 x 16 mm (2.5 x 0.5 inches) in section, although there is no reason why you cannot use this design with other timber sizes. The simple shapes that make up the hull frame could also be altered to make a model of different size. Indeed, these shapes, and the model's construction, are so simple that they have been drawn out at half size on one sheet of my mini plan. The other sheet, however, does feature a full-size cross-section for greater clarity.

The bottom of the hull was covered with pieces of 3 mm (1/8 inch) plywood, again found in my stockpile of wood. The deck could be made from plywood, but I used some card of about the same thickness (this had been found when dismantling some old furniture and added to my stash of potentially useful material). The hull bottom may have to resist the odd scrape and bump, but this card looked as if it would be fine for the less arduous role of ship's decking, with some suitable waterproofing of course.

As the model wouldn't need a massive amount of power, two RE 385 motors were used, directly driving 1-inch (25 mm) diameter three-bladed propellers (RadioActive brand). A single 6-cell Nimh battery pack produced enough thrust with this set-up.

"The prototype was built using some PSE timber 63 x 16 mm (2.5 x 0.5 inches) in section, although there is no reason why you cannot use this design with other timber sizes. The simple shapes that make up the hull frame could also be altered to make a model of different size"

As for the R/C system, my plan was to use 'tank steering', which required motors controlled by the vertical movement of two transmitter sticks. The receiver outputs were connected to the motor via two small ESCs (Electronic Speed Controllers).

Building the hull

The first thing to do was to cut out the three pairs of hull parts, the sides, bulkheads and end pieces. My usual method is to cut the first one out, check for accuracy and then use it as a template for the second one (see **Photo 1**).

The next task was to glue the parts together using a good weatherproof wood glue (see **Photo 2**). You only need a totally waterproof glue if the outer hull surfaces are not properly sealed, or if the model is left with water inside between sailing sessions. This hull frame must be square, and the joints firmly held together while the glue sets. I will confess that when using lumber in my models, it's not unknown for me to supplement the glue with a few nails!

Before gluing the three bottom sheets, the edges of the hull frame ought to be checked to ensure they are smooth and flat. It's also advisable to chamfer the bottom edges of bulkhead and end pieces so that the two end bottom pieces can lay flat and make a good, glued joint (see plans).

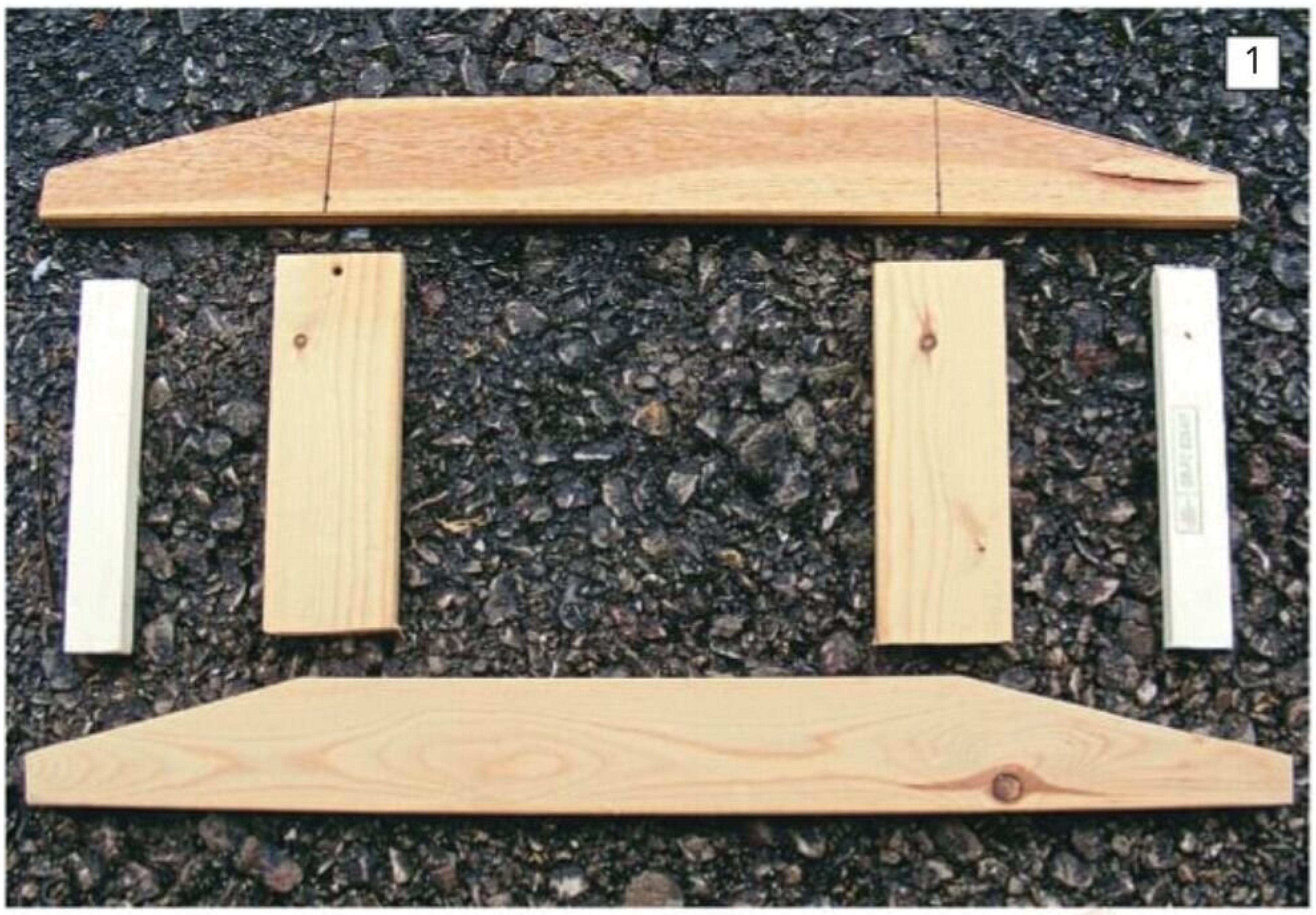
The middle bottom sheet was fixed in place first (see **Photo 3**). This had been cut slightly wider than the hull frame but to just the right length so as only to cover half of the bulkhead width. This created ledges onto which the end bottom pieces could be securely glued. I will again admit to reaching for the hammer, supplementing the glue with a few panel pins (see **Photo 4**).

The hull was then given a once-over, edges trimmed flush, and any defects corrected with glue and/or filler as appropriate. The lower edges and corners were slightly rounded; see the cross-section on the plan. This was not to achieve any degree of streamlining but to give the sealants and paints I would be using better adhesion; sharp corners tend to promote thinner coats.

Installing the drive

Slots were needed in the hull sides for the propeller tube to pass though. The two motors had mounting bases that could sit on the hull bottom and this fixed the position of the height of the slots above the bottom edge of the hull sides. Using a 150mm (6-inch) long propeller tube, coupling and motor against the hull, the positions of these slots were marked up.

"It is inevitable that some degree of adjustment to the slots will be needed before this is achieved"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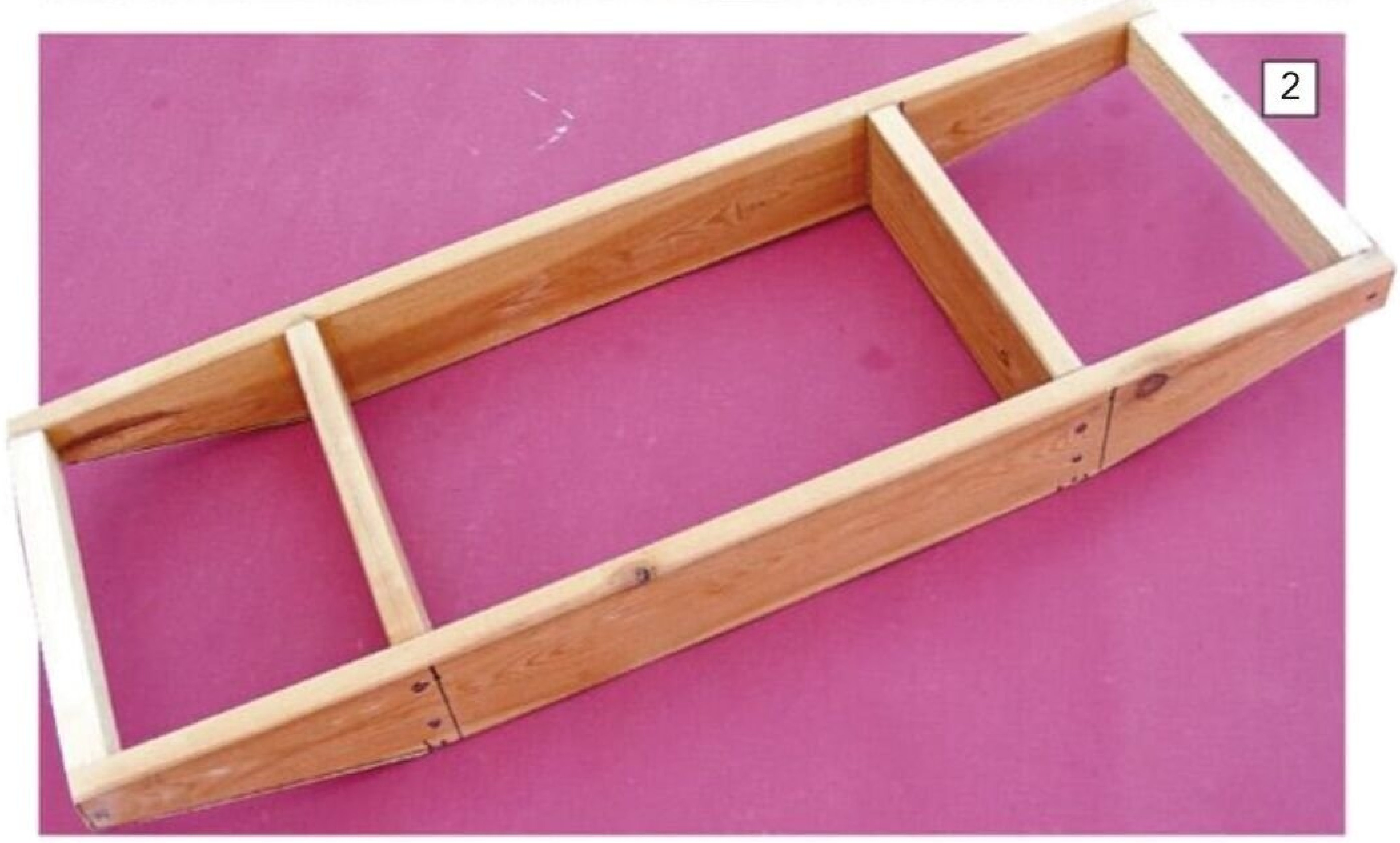
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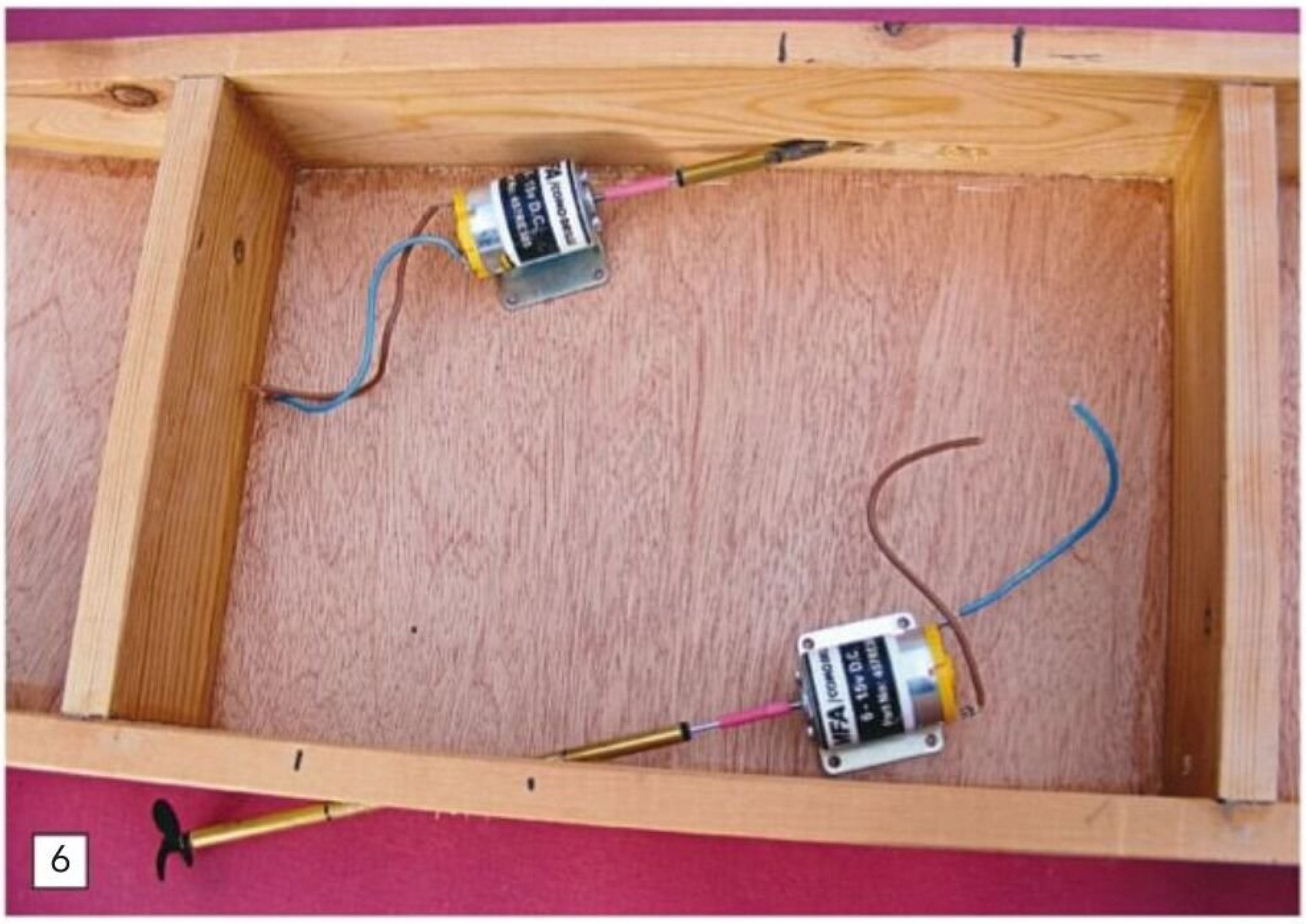

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The slots were created by chain drilling a series of holes through the hull sides and then opening them up with a coarse wood file (see **Photo 5**). It was then a case of fitting the whole driveline into the hull and adjusting things. The propeller should clear the hull sides and be in the right position to match the dummy 'Z drive', with the propeller shaft horizontal and the motor base sat on the floor of the hull (see **Photo 6**). It is inevitable that some degree of adjustment to the slots will be needed before this is achieved. Because you may well be using different items, the position of the slots is not shown on my plans.

When everything was properly aligned, the tubes could be wedged with scraps of wood and tacked into place with some rapid setting epoxy (the tubes having already been cleaned and lightly abraded, of course). Once secure, the slots were filled with scrap wood, glued into place and, when the glue had dried, sanded to give a flush external surface (see **Photo 7**).

Precautionary sailing trials

Due to the somewhat experimental nature of this model, an early on the water test of the drive system seemed prudent. The hull's externals surfaces were sealed with a few coats of quick drying clear acrylic varnish, lightly sanding between each application to give a final smooth surface. This varnish had been left over after refinishing some interior doors some time ago, and it looks like what's still left in the tin may outlast me!

The propeller shafts, couplings and motors were then reinstalled, with motor bases being stuck to the hull bottom with one of those 'sticks everything' adhesives that has yet to fail me. Knowing that the model would need a fair amount of ballast to float on the desired waterline, a lead-acid battery was fitted to power the R/C system, and then it was off to the garden pond (see **Photo 8**).

The hull weighed in at about 3 kg (6.6 lb) and the propellers were too close to the water's surface so aeration could occur at times. Adding extra weight, though, soon cured this problem. It took a little while to develop the coordination needed to maneuver the model around in the pond. Once the usual rudder/throttle transmitter stick movements were replaced by the two up-down throttle sticks, however, the model was easily moved and rotated on demand.

Finishing off

The deck was made by simply laying the hull upside down on the card and drawing around the edge. After adding the platforms for the dummy engine cabinets, the outline was then cut out. The deck access-opening piece was also cut out and saved. When sticking the deck to the hull I employed some old batteries as weights to hold them together (see **Photo 9**). Before adding anything to the deck, some triangular support strips were fitted to the underside of the engine platforms (see **Photo 10**). The extra strengthening they provide is questionable, but they do enhance the model's appearance.


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"Before adding anything to the deck, some triangular support strips were fitted to the underside of the engine platforms. The extra strengthening they provide is questionable, but they do enhance the model's appearance"

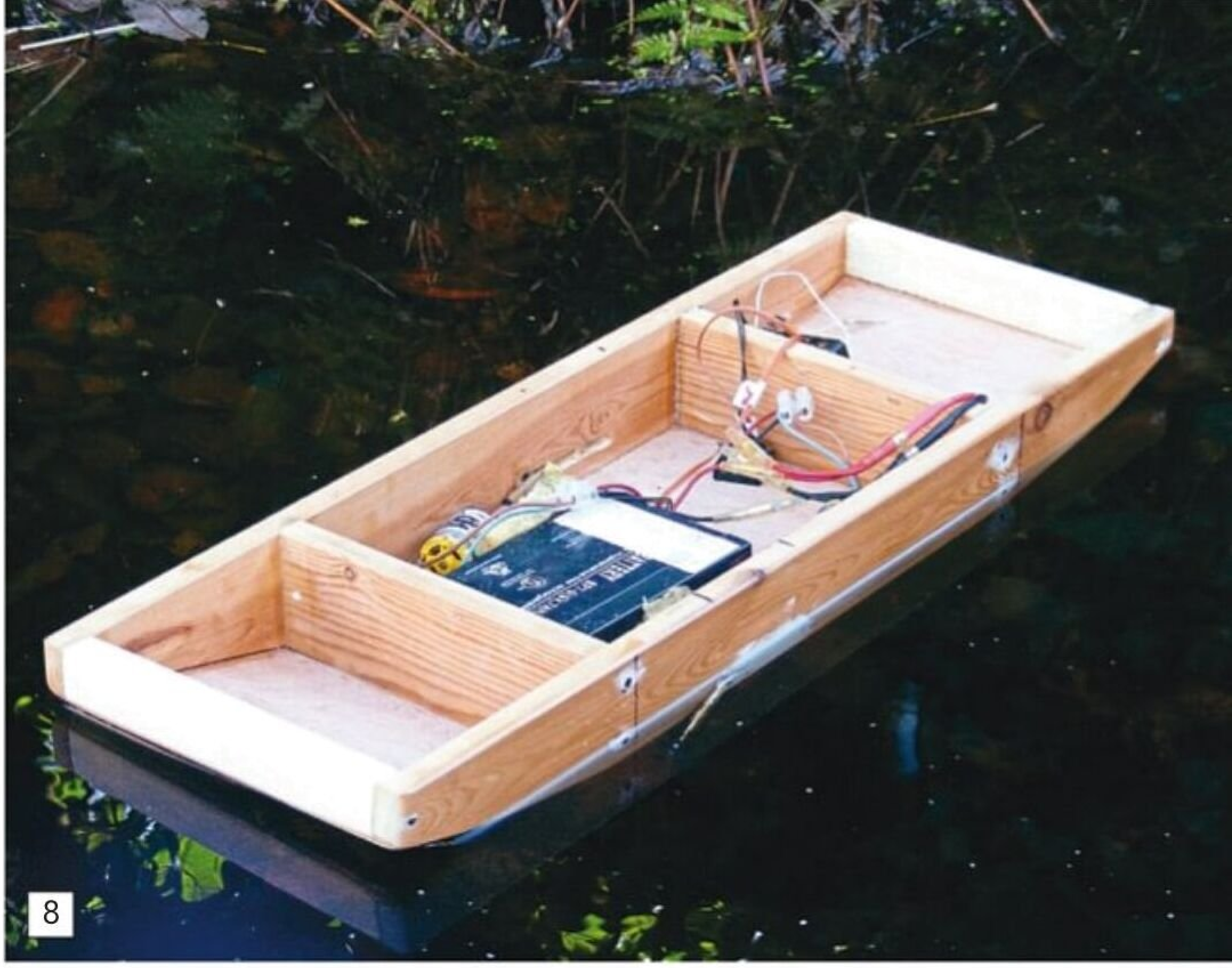
"This does demand a little care to avoid the risk of injury!"

The engine cabinets and bridge were made from card and sealed with the acrylic varnish. Some form of ladder was needed to reach the bridge from deck level. A small plastic one was found in my box of spares but unfortunately just didn't look right for this model. A more realistic one was, therefore, made, with the rungs fashioned from copper wire bent into a 'U' shape and glued into holes. To position the rungs correctly, a strip of wood was placed between the structure and the rungs and left until the glue set (see **Photo 11**). This worked well and the use of copper wire was extended to the handrails on the bridge (see **Photo 12**).

The copper wire came from the type of cable used in domestic electrical circuits. This has three solid wires which can easily be stripped out of the insulation. Only modest forces are needed to bend the wire to shape, and it can be joined by soldering or the use of epoxy adhesives. Straightening copper wire is achieved by pulling it past its 'yield point'; you feel it suddenly 'give' a little. However, this does demand a little care to avoid the risk of injury!

This copper wire was also used to make the rails around the edges of the deck. Copper wire stanchions were epoxied into holes drilled into the decks and, once the epoxy had set, the horizontal rails were bent to match and soldered into place.

The two ramps were cut from card sheet and given a ribbed upper surface using sticks normally used to stir coffee, while strengthening strips made from wood strips out of my scrap box were added to the undersides of the ramps. Raising and lowering the ramps was made possible by fitting cables running up to pulleys at the top of uprights (see **Photo 13**). These uprights were just wood strips, again from the scrap box. A short length of dowel was glued into a hole drilled into the base before then being glued into matching holes in the deck. The pulleys were made from, believe it or not, golf tees!



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A couple of wood strips can be seen running most of the length of the deck at the edge of the access opening. For modelling purposes these were added to provide a little extra stiffening to an unsupported edge, but they also serve to represent guides for getting vehicles on and off the deck.

"For modelling purposes these were added to provide a little extra stiffening to an unsupported edge, but they also serve to represent guides for getting vehicles on and off the deck"

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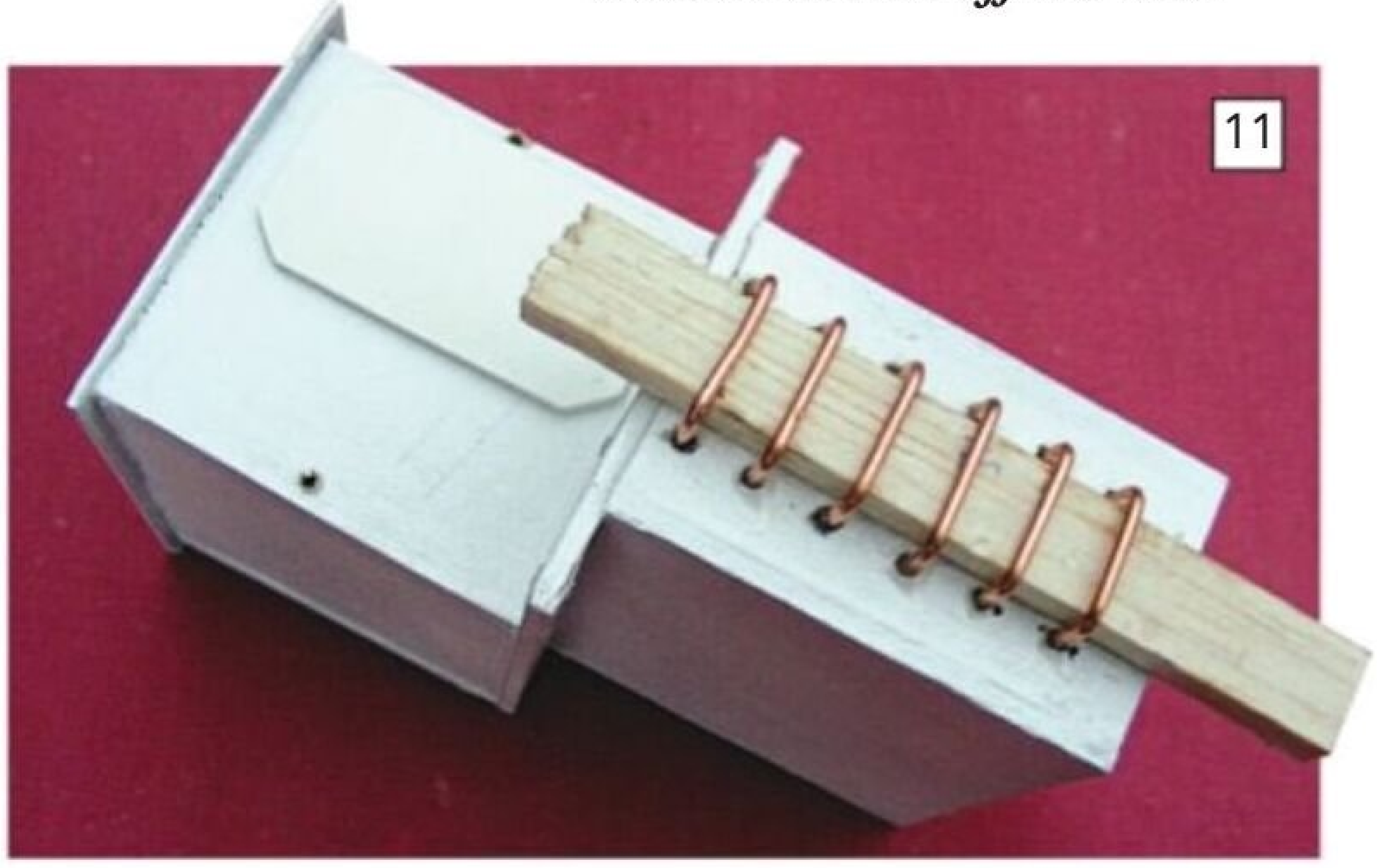

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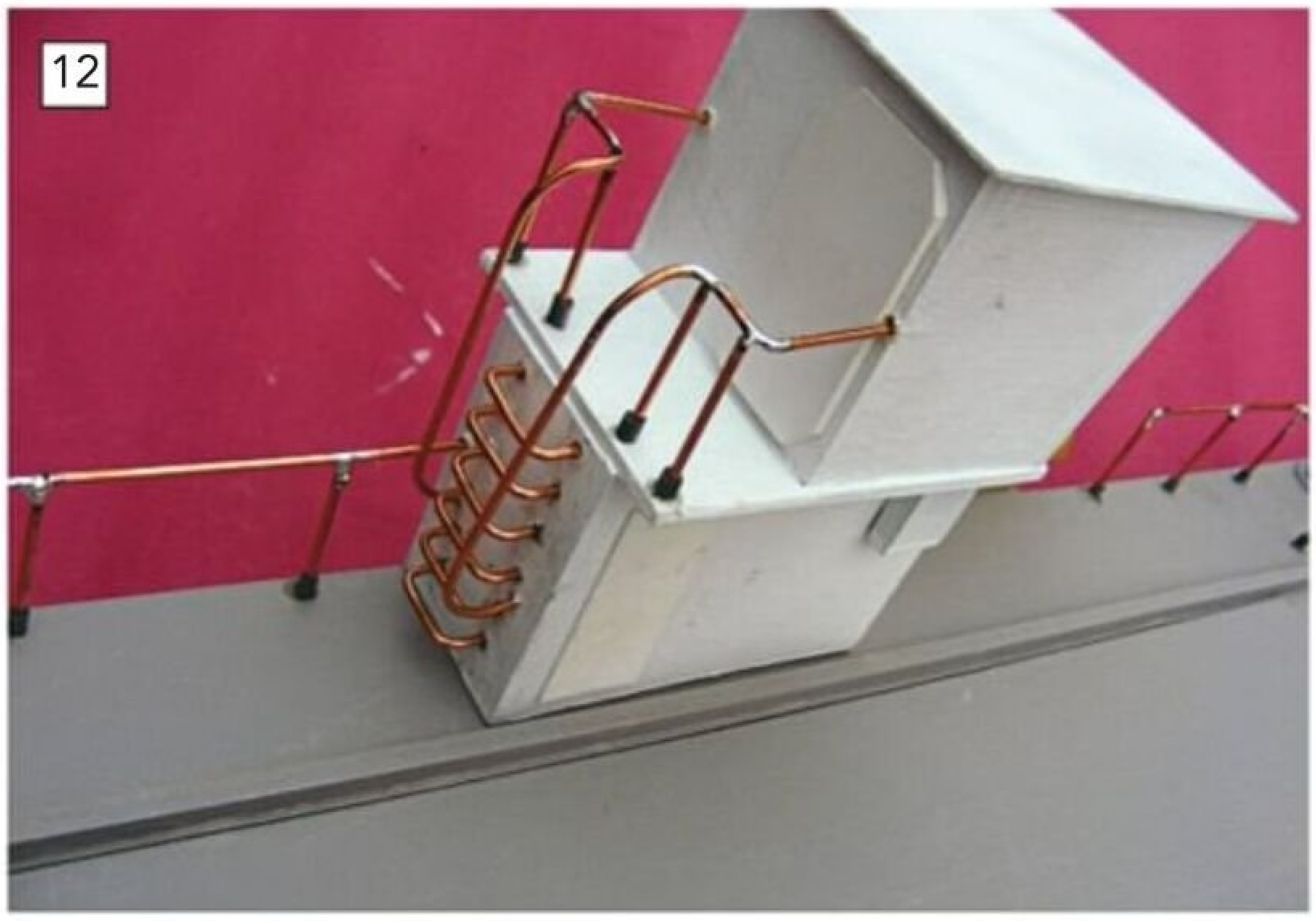
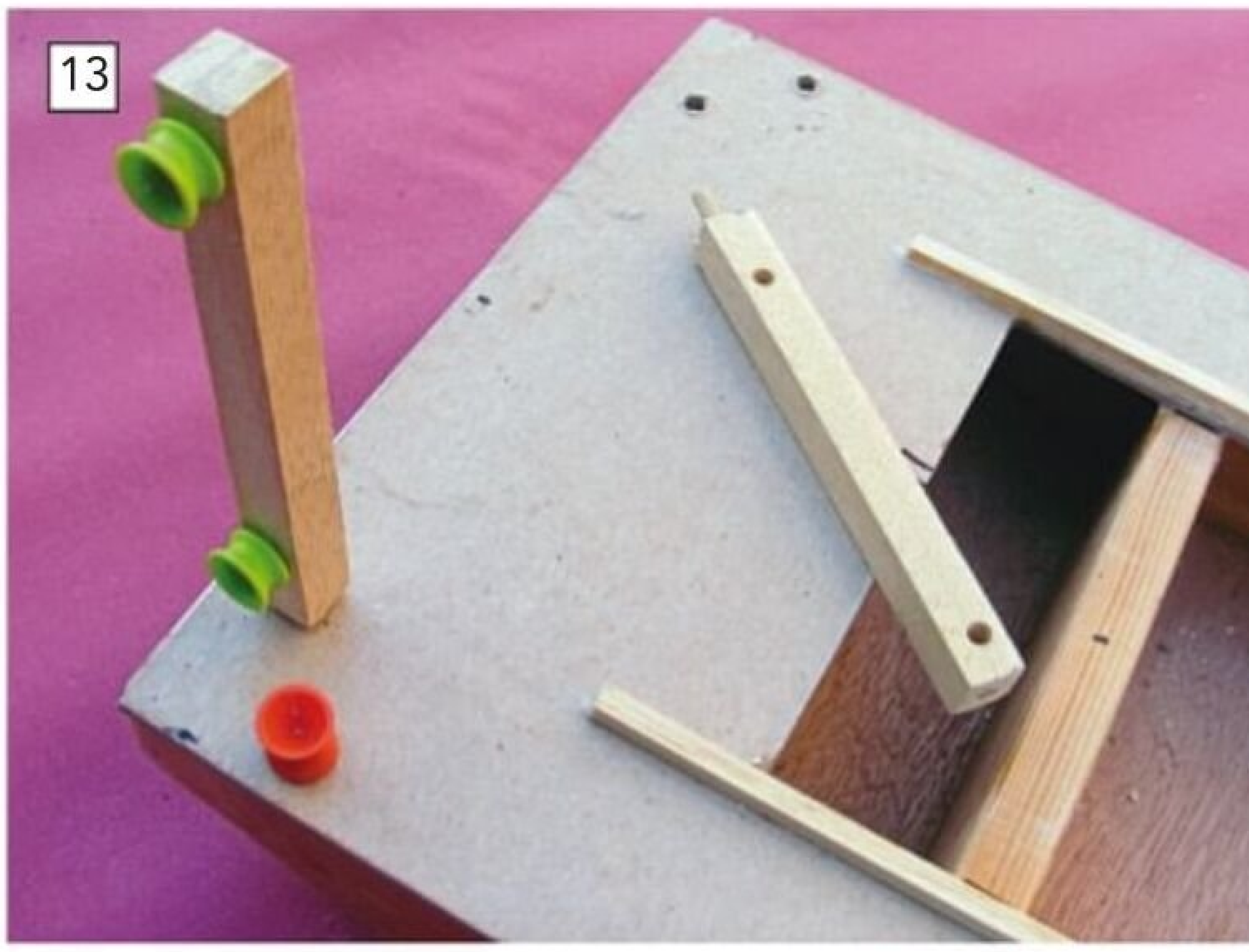
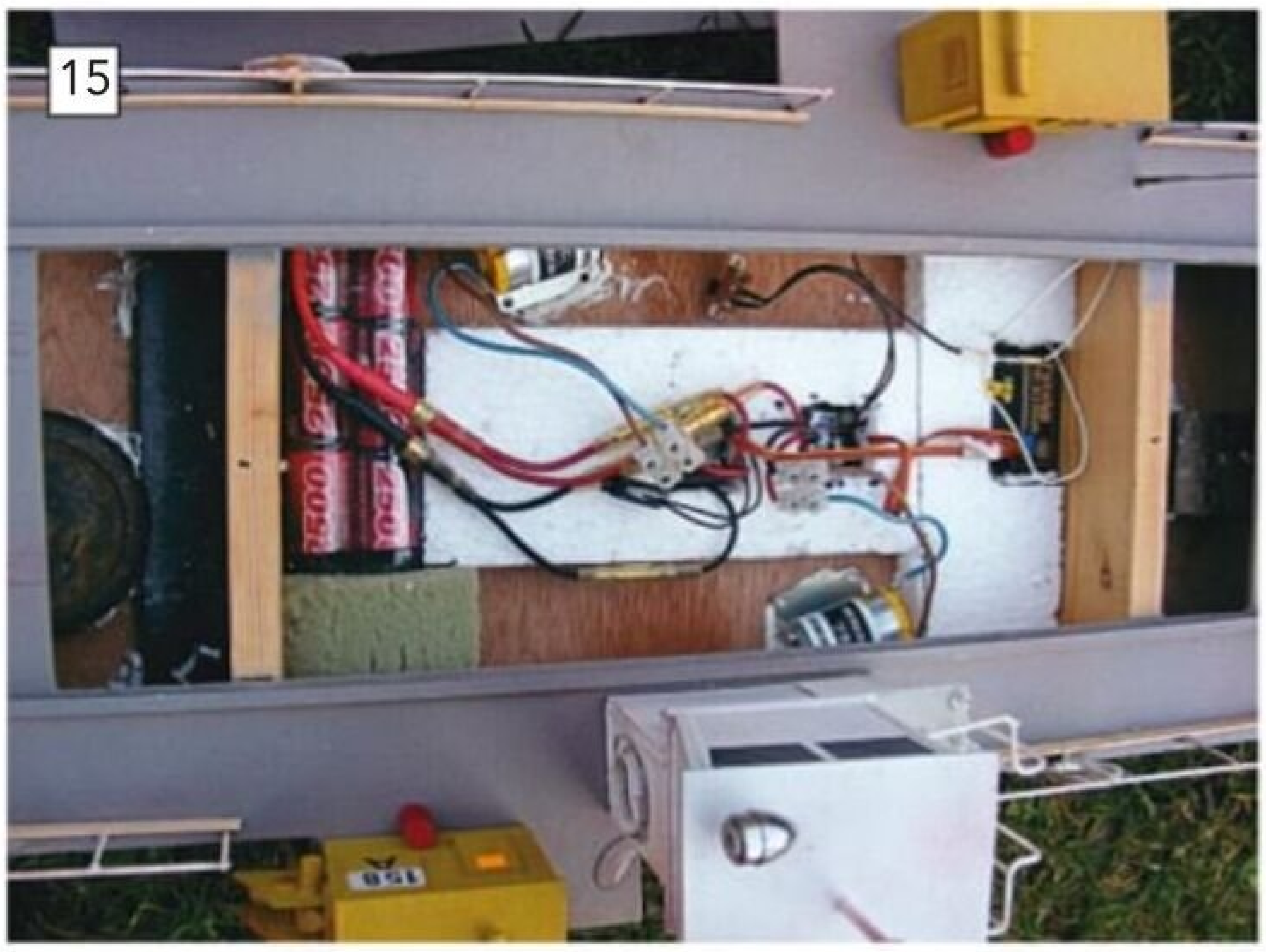






As you can see from the photographs, the model was painted and detailed at the same time. The colours used on this model were based on what most of these functional craft appeared to wear. A black hull and grey decks were livened a little with a white bridge and yellow engine cabinets.

Bogus 'Z' drives

While the idea of having angled propeller shafts though the hull sides had worked, it hadn't created the 'Z' drive appearance. Looking at real drives, there should have been a vertical shaft running up from the propeller to some mechanism that allowed the propeller to be rotated though 90 degrees and clear of the water. Rummaging around in the scrap boxes again, some bits were found to suggest this and stuck to the engine cabinets and propeller shaft tube.

The drive was painted yellow to match the engine cabinet but the propeller tube running into the hull sides remained black. This has had an unexpected benefit when the model is sailing: the tube can disappear from view, with just the 'Z' drive visible. Spectators sometimes think they're looking at the real thing, but honesty always sees me confess to the trick used.

Vehicle search

Outfitting this river ferry with a couple of suitable vehicles didn't appear to be a problem at first. However, plans to use farm vehicles had to be abandoned. All the scale models I looked at were unjustifiably expensive, while those on the toy shelves were just too toy-like. At this point I was beginning to think I might have to build my own. Luckily, however, Mrs Guest took me into one of those stores that seem to sell just about everything, including, it turned out, very reasonably priced and realistic looking construction vehicle toys (see **Photo 14**) of the right size and type. Two were promptly bought and fixed to the removable section of the deck by long screws driven up through the deck and into the lorries' chassis. This method has proven secure enough for sailing yet allows for easy removal.

> *"The trick is to apply the paint in the lightest of coats by passing the spray can quickly over the area to be weathered. The first pass should be barely noticeable, the effect being slowly built up over the next few passes. One thing to avoid is any suggestion of uniformity"*

Too clean?

The model at this stage looked a little too smart for what ought to be a well-cared for but hard-working vessel. Some people turn weathering their models into an art form, but I settled for using red and black primmer spray cans. The final effect was subtle. The trick is to apply the paint in the lightest of coats by passing the spray can quickly over the area to be weathered. The first pass should be barely noticeable, the effect being slowly built up over the next few passes. One thing to avoid is any suggestion of uniformity. Finally, some tyre tracks were added to the deck and ramps, mimicking how vehicle wheels inevitably drag dirt onboard and, over time, cause wear.

Sailing

While the initial tests were carried out with a 6-volt lead-acid battery, this would have been difficult to install between the two bulkheads with the R/C gear also in this space. As the motor would only draw a modest current, a smaller six cell Nimh battery pack was installed. This battery pack, the receiver and two ESCs were held in cut-outs made in a piece of expanded polystyrene (see **Photo 15**). This river ferry will never be a fast model so it's enough to ensure that these items cannot easily slide about and affect its trim or foul anything.

A test float on the garden pond revealed that a fair amount of ballast would be needed to get the model down to the desired waterline. Luckily, the habit of saving anything that may prove useful provided me with enough pieces of metal. Once floating correctly, this ballast could be secured into the hull. Strategically placed drops of silicone sealant were used for this, giving a bond strong enough for safe sailing but allowing for removal if needs be.

Down to a larger water and it took a few moments to relearn the steering technique needed on the transmitter sticks. One problem I had anticipated was that shape of the model might make the ahead and astern direction confusing if distracted at any time. For this reason, what I wanted to regard as the bows of the model had the ramp partially lowered and the lorries facing that way. Believe me, if you stop the model to chat to spectators, this trick will be very handy when you're ready to start sailing again!

I found that to keep the model heading on a reasonably straight course, it was best to keep the propeller that is operating in reverse (*i.e.*, pulling the model) at a constant speed and adjust the other one. Rotation is achieved by operating the propellers in opposite directions, again keeping one at a fixed speed and using the other to prevent creep.

Like learning to do something (riding a bike?), it can take a little while for the coordination with the transmitter controls to become natural and automatic. Even if you give the wrong commands, though, because the model isn't particularly quick to respond you can often correct mistakes without others noticing!

Worthwhile?

This model has taught me a little more about the hobby so, along with the satisfaction I will admit to when seeing it perform, it's definitely been worthwhile. The economy of the materials used to build it also adds to the pleasure; to quote Neville Shute, *"It has been said that an engineer is a man who can do for ten shillings what any fool can do for a pound"*.

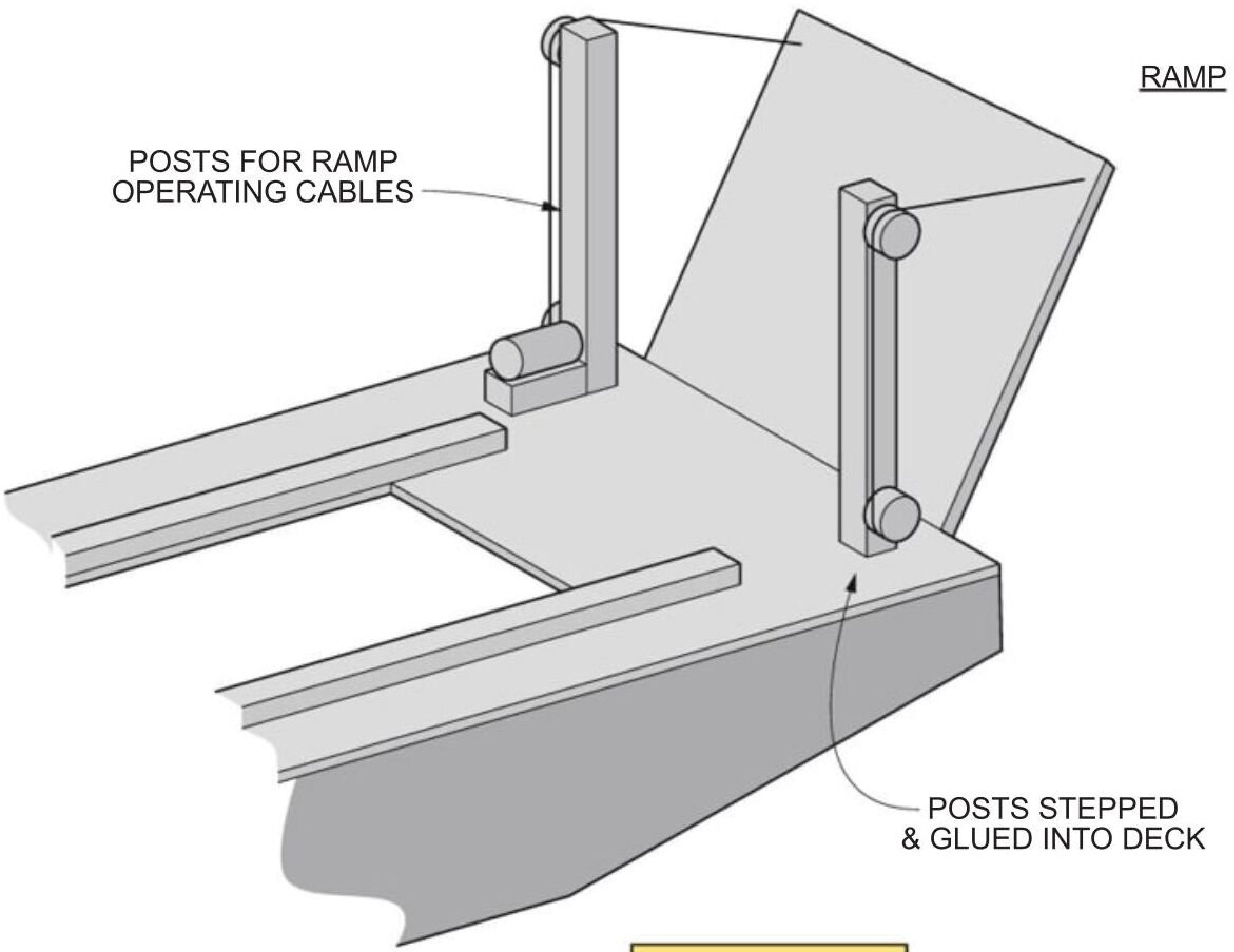
It's a flexible design, in that the materials used, their sizes, and the propulsion methods can be changed, and putting that extra personal element into any model is something many modellers do very successfully.

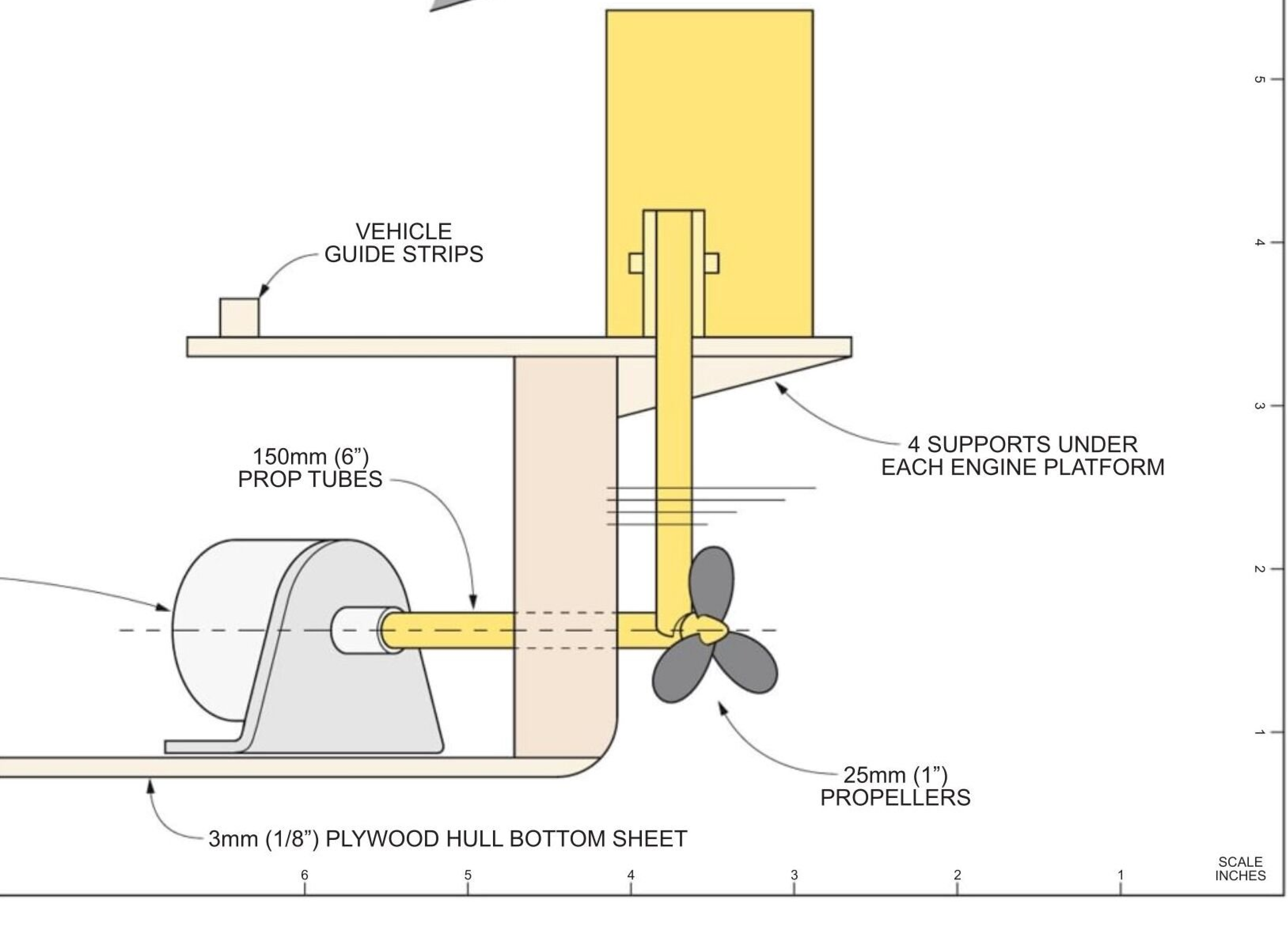
I have also encountered an unexpected bonus with this model. Spectators often have a habit of, just within earshot, talking about your models. At least with this one they have never described it as an "army boat" or the *"Titanic"*!

"Believe me, if you stop the model to chat to any spectators, this trick will be very handy when you're ready to start sailing again!"

DESIGNED BY GLYNN GUEST

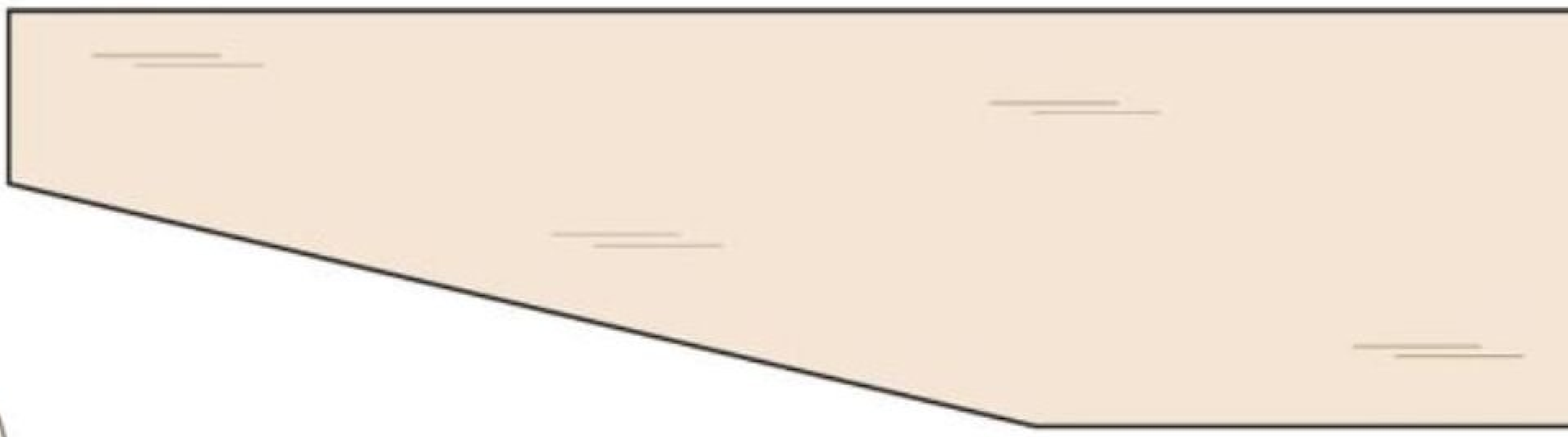
RIVER FERRY

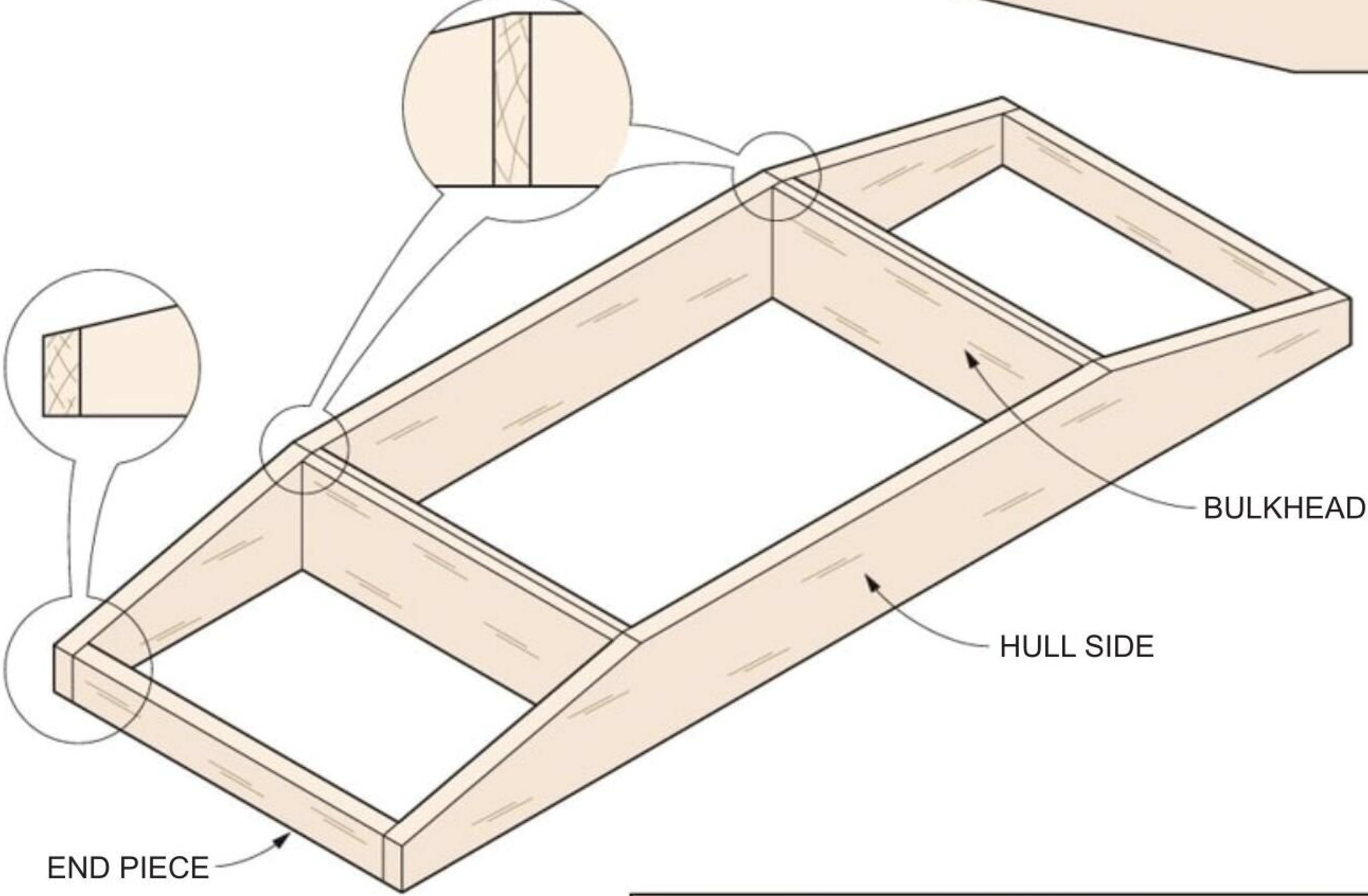


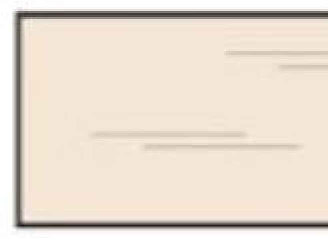


SCALE MM 10 20 30 40 50 60 70 80 90 100

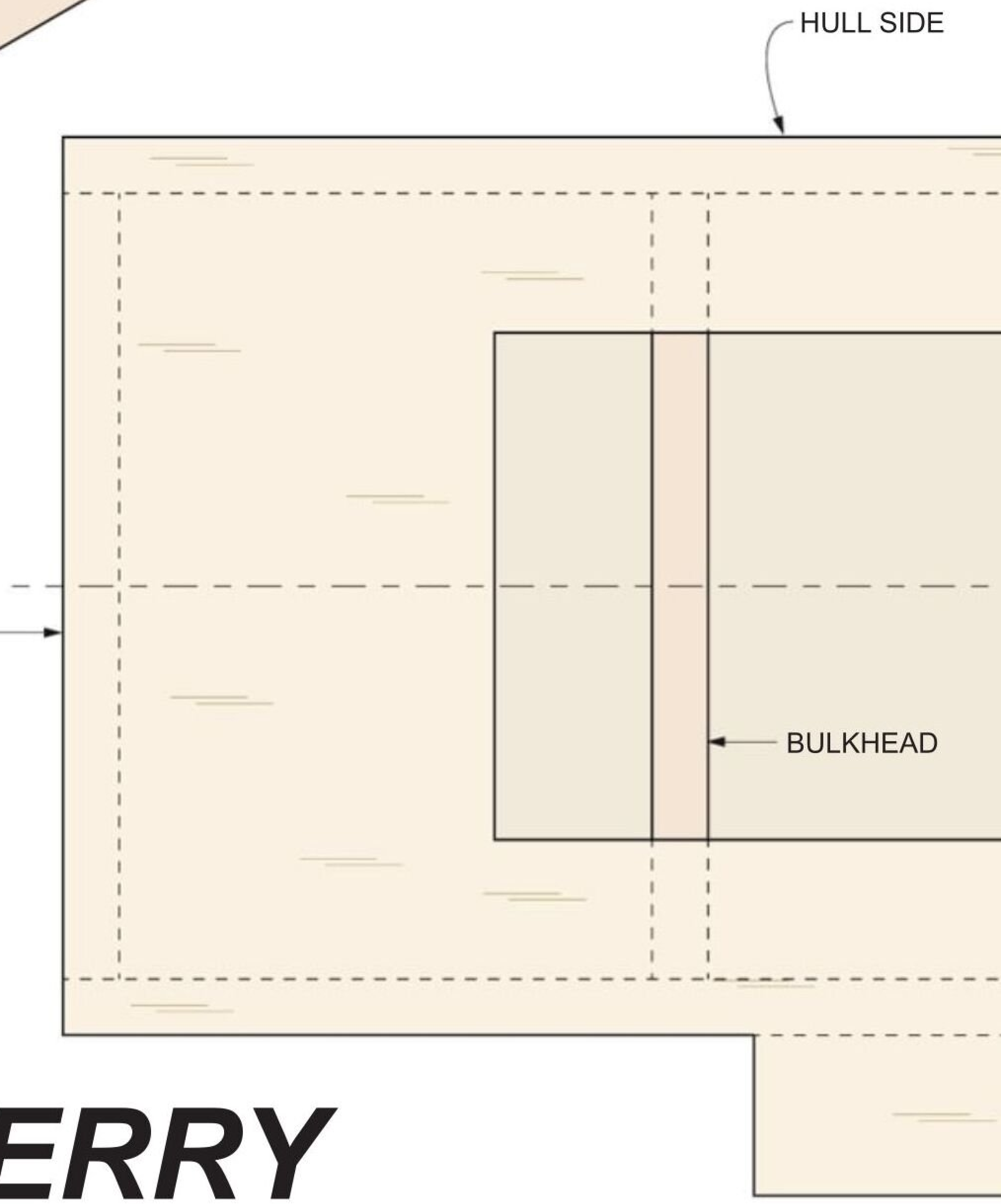
CHAMFER BULKHEADS &
END PIECES FOR BETTER GLUED
JOINTS WITH HULL BOTTOM SHEETS





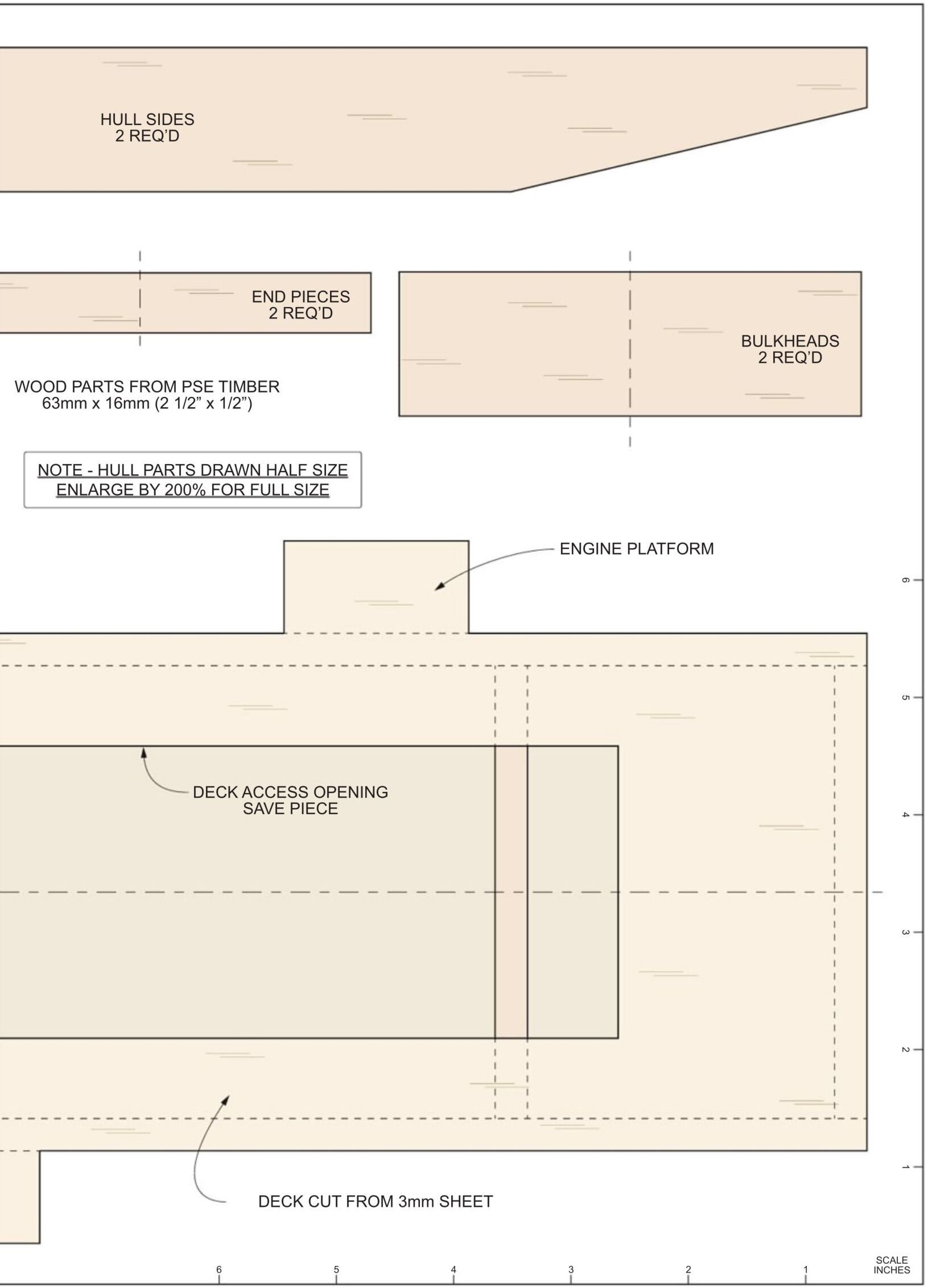


BUILD UPSIDE DOWN
TO ENSURE FLAT
SURFACE FOR DECK



DESIGNED BY
GLYNN GUEST

RIVER FERRY


HULL SIDES
2 REQ'D
END PIECES
2 REQ'D
BULKHEADS
2 REQ'D
WOOD PARTS FROM PSE TIMBER
63mm x 16mm (2 1/2" x 1/2")
NOTE - HULL PARTS DRAWN HALF SIZE
ENLARGE BY 200% FOR FULL SIZE
ENGINE PLATFORM
DECK ACCESS OPENING
SAVE PIECE
DECK CUT FROM 3mm SHEET
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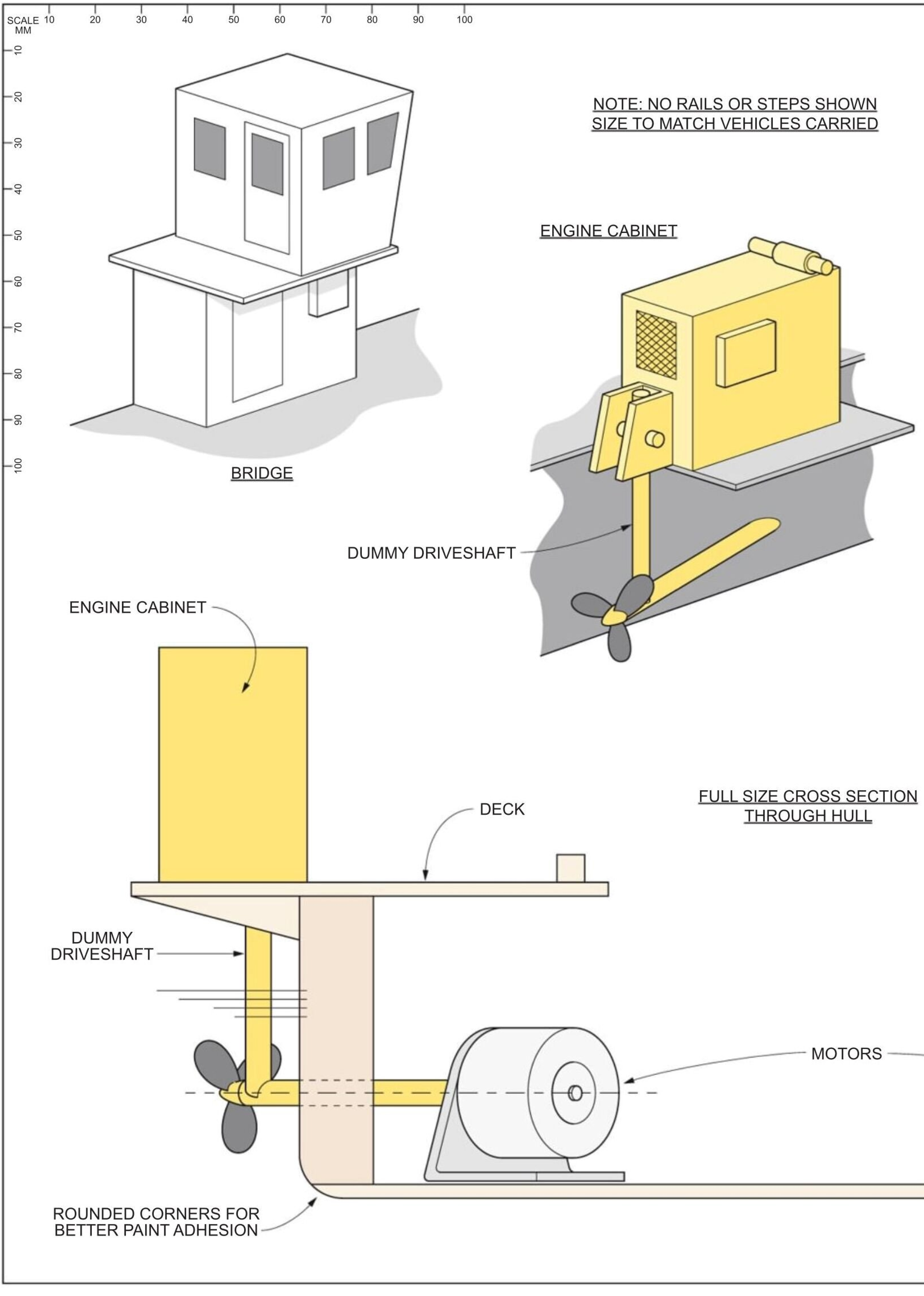

SCALE MM
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20
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80
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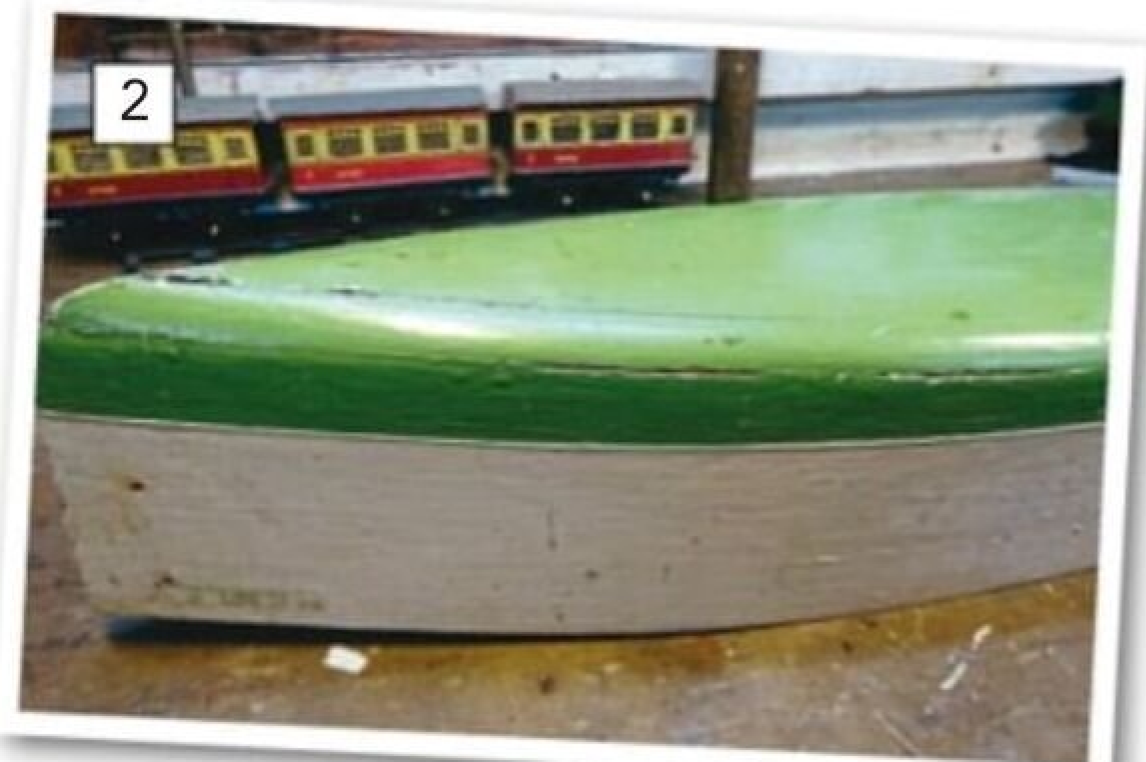
100
NOTE: NO RAILS OR STEPS SHOWN
SIZE TO MATCH VEHICLES CARRIED
BRIDGE
ENGINE CABINET
DUMMY DRIVESHAFT
ENGINE CABINET
DECK
FULL SIZE CROSS SECTION
THROUGH HULL
DUMMY
DRIVESHAFT
MOTORS
ROUNDED CORNERS FOR
BETTER PAINT ADHESION

ST Henley TLC

PART ONE

Tony Bird explains how he turned a vintage Stuart Turner steam launch hull in a rather sorry state back into a magnificent, ready to hit the water again, beauty



Some time ago I acquired an old Stuart Turner Henley hull from a friend who had purchased it on eBay, and this is the story of its restoration/rebuild. But first, a little history…

During the 1920s and 30s there were three fairly large companies manufacturing model steamboats: Bowman, Bassett Lowke and Stuart Turner. Both Bowman and Bassett Lowke made a similar model steam launch to the Henley. The Bowman 'Snipe' which was 23-inches long and cost £1-2s-6d, which equates, if you're too young to remember pre-decimal days, to the princely sum of £1.121/2p. The Bassett Lowke 'Dixie' was 21-inches long, and slightly more costly, at £1-5s-0d – £1.25p in today's money. The Stuart Turner Henley was 24-inches long and a lot more expensive, at 2 guineas/£2-2s-0d, or £2.40p. What did that extra expenditure get you? Well, unlike the Snipe and the Dixie, the Henley's engine was double acting, while the boiler was hard soldered copper rather than soft soldered brass and had two water tubes under it (these being absent on the other two models). Another touch of luxury was that the hull was made from Honduras mahogany rather than pine. All three models were spirit fired and had safety valves, but none of them had a regulator; and only the Snipe had a crude lubricator fitted. It would have been very interesting to compare their performances on the water.

Stuart Turner is, of course, well known in the model engineering world due to the finished model steam engines and casings that it still sells to this day. The Henley steam launch was the first of only a few designs of model boats that ST marketed; both Bowmen and Bassett Lowke had many more designs. The first version of the Henley (this being the one that I acquired) was made between 1925 and 1929. There are records of 250 hulls having been made, while the boiler and engine had been designed, produced, and marketed a few years earlier as stationary rather than marine units (the engine used for the Henley is still available today, in both ready to run and kit form). All the Henley's parts were available as separate units for anyone wanting to build their own version, or indeed use to create a totally different model. Given this, you'd be forgiven for thinking plenty of factory and home built examples would still be around today. Unfortunately, that doesn't appear to be the case, and other than what was in the old Stuart Turner catalogues and advertisements, along with a few photographs on the internet, there isn't a

"The first version of the Henley (this being the one that I acquired) was made between 1925 and 1929"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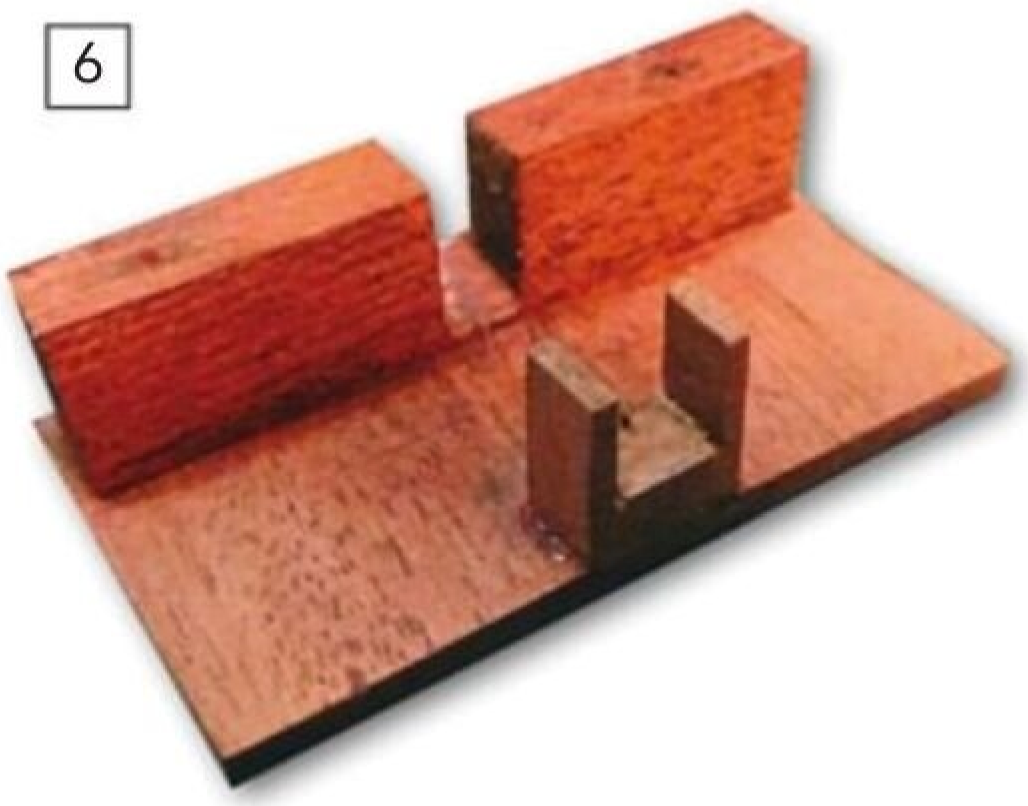
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great deal of further information to be found about either the first version made (the one in this article) or its replacement released during the early 1930s.

Drawing on previous experience

My hobby is predominantly model engineering, and many years ago I found myself repairing the boiler/engine of a friend's Bowman Eagle, the largest of the Bowman steam launch range, which started with the Swallow and the already mentioned Snipe. The hardware of the Eagle I was repairing was well within my engineering capabilities and the hull was of a very simple construction, so I decided to build a copy. This copy was fitted with rudder-only radio control, housed under a replacement stern deck (a rather poor video of this Eagle in action when we were on holiday in the Netherlands can be viewed online at: https://youtu.be/Ew9112XyCHU?si=HnqvXkatukQwSXvQ). It therefore occurred to me that I could perhaps take a similar approach with the Henley…

First things first…

On arrival, my Henley hull came fitted with its original rudder which had no tiller, propeller, propeller shaft and a mahogany stern deck. As the wood work appeared to be a bit on the damp side it was kept in a slightly warm place for three months so I could be sure it had completely dried out before I began any work on it (see **Photo 1**).

Once I was confident this was the case, I gave it another, more thorough, inspection. It had obviously been re-painted at some point and I noticed that several of the seams had split, the bow and stern being particularly bad. Having said that, the hull was very solid and none of the mahogany was spongy (see **Photo 2**).

I began, having removed the fittings, by dismantling the hull; these fittings being the rudder and its tube, along with the rear deck, the propeller and its shaft, as well as the wooden cover which was over the end of the propeller shaft and the asbestos sheets that protected the inside of the hull from the heat of the boiler. (see **Photo 3**).

Repairing & replacing original parts

The first repair undertaken was the rudder, which had a bent shaft (see **Photo 4**). The blade was therefore removed, and the shaft straightened before soldering the blade back on to it (see **Photo 5**). The remaining metal parts were cleaned, and the wooden cover at the end of the propeller shaft was taken apart and put back together again (see **Photo 6**).

To clean the debris from the splits in the hull, a broken piece of a hack saw blade suitably sharpened was used (see **Photos 7** and **8**).

To avoid putting any strain on the hull, rather than trying to pull the stern and bow sides together again I decided I would just to fill the gaps. These were filled using a standard pack of Araldite, which after being applied was heated with a hair dryer, whereby it became very fluid and flowed easily into them; a thin sliver of wood was then wobbled into these splits to remove any air bubbles that may have formed in the adhesive.

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Where necessary, some masking tape was used to stop the adhesive bleeding out (see **Photo 9**). Alas, as the Araldite became more liquid the split needed to be held level for a couple of hours until the adhesive started to set. This meant that almost every split had to be attended to individually, so it took a considerable amount of time to complete this particular part of the restoration.

While waiting for the Araldite to cure, other work was started. Because the sides of the hull were not being pulled in against the transom (these splits having been filled with Araldite), the stern deck was now a loose fit in the hull (see **Photo 10**). A piece of what might be mahogany that once did service as a slat in a door was used to make two fillers for the deck. A tile cutter fitted with a blade that would cut wood was used to cut the two filler pieces needed. PVA glue was used to hold these fillers to the edge of the deck. Once this adhesive had cured, the fillers were filed to size and the deck varnished, along with the wooden propeller shaft cover (see **Photo 11**).

With the cracks in the hull all dealt with, the holes in the hull bottom could then also be filled, using wooden dowels glued in place. This was done as the replacement engine and boiler wouldn't be in the exact positions of the originals (see **Photo 12**).

A start was then made on finishing the hull, first by rubbing it down both inside and out (see **Photo 13**). It wasn't a good time of the year for spray painting, as it was cold and damp, so I decided to hand paint the hull and maybe later rub the paint back for spraying in warmer weather (see **Photo 14**).

The inside of the hull had been varnished, and unfortunately some of this original varnish had been baked on due to the heat from the boiler. This had become very hard, and while attempting to rub it down I realised the mahogany being exposed was also getting worn away. Not wanting to resort to paint stripper, the old varnish was, therefore, varnished over. I then applied a further three hand-painted undercoats to the hull's exterior, rubbing down between each application.

"It took a considerable amount of time to complete this particular part of the restoration'

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This done, the propeller shaft and rudder tubes could be glued back into the hull and the propeller shaft and rudder fitted (see **Photo 15**). As previously mentioned, the rudder's tiller was missing; it would appear, given the various different ways in which replacements have been fitted in the photographs I've studied, the originals weren't fitted very securely, possibly just an interference fit. There was a 3/32-inch (nearly 2.5mm) plain hole in the rudder shaft, so a 2mm brass rod which had been threaded 8BA on one end was fitted as a tiller and held in place with a couple of nuts. There is an interesting friction adjustment on the rudder tube which allows the rudder to stay in a selected position. The end of the rudder tube has a split in it and a tapered thread around it, so that when a knurled nut is screwed down it compresses the tube which grips the rudder shaft (see **Photo 16**). This system works really well.

I had a cunning plan to maybe install radio-control later, so the stern deck was left loose so that another deck fitted with rudder-only radio-control could replace it (I'd already successfully done this on the Bowman Eagle copy I'd made some years previously). So, to this end, wooden supports were glued on either side of the hull to support the stern deck.

All the original parts received had now been repaired.

The engine

With the engine I got lucky, I had one. This had come into my possession, along with various other bits and pieces, as part of a swap years ago, and had been restored, painted red, and then never used. So, I changed its colour from red to Brunswick green, which is sort of a Stuart Turner green (see **Photo 17**). I have no idea whether the engines would originally have been supplied

"I have no idea whether the engines would originally have been supplied painted, as with so many home builds undertaken this would now be difficult to ascertain"

painted, as with so many home builds undertaken this would now be difficult to ascertain.

Making a mount

Thankfully, I was able to find an old photograph (admittedly a very poor one, but helpful nonetheless) showing how the engine was mounted in the hull, with the spray sheet appearing to rest on screws fitted in the inside of the hull (see Photo 18). What I failed to find any evidence of was the engine being connected to the propeller shaft with anything other than a helical spring, which lead me to believe the means of connection from the propeller shaft to the engine on my model is an alteration (more on this later).

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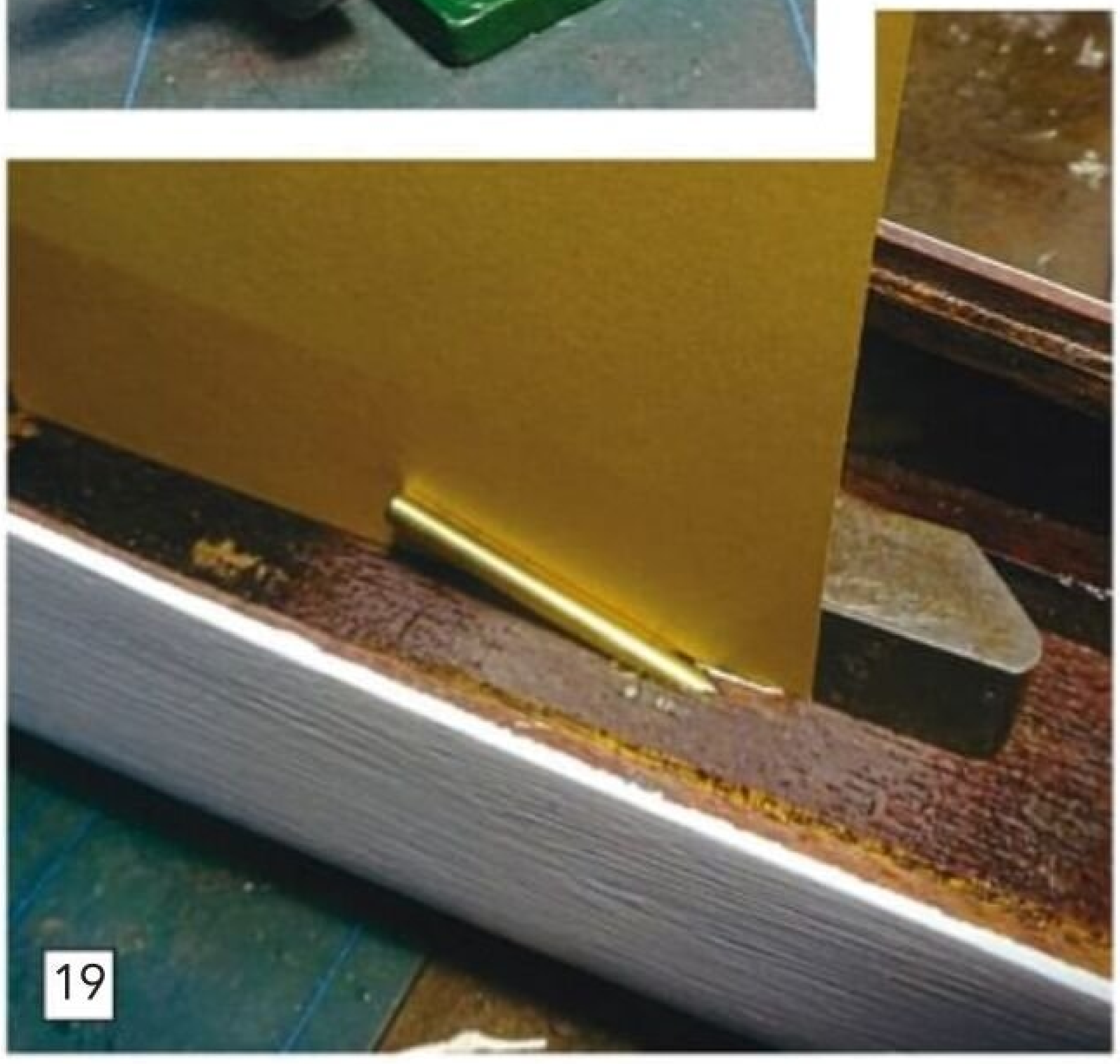
"This rather begs the question of when a Henley actually a Henley?"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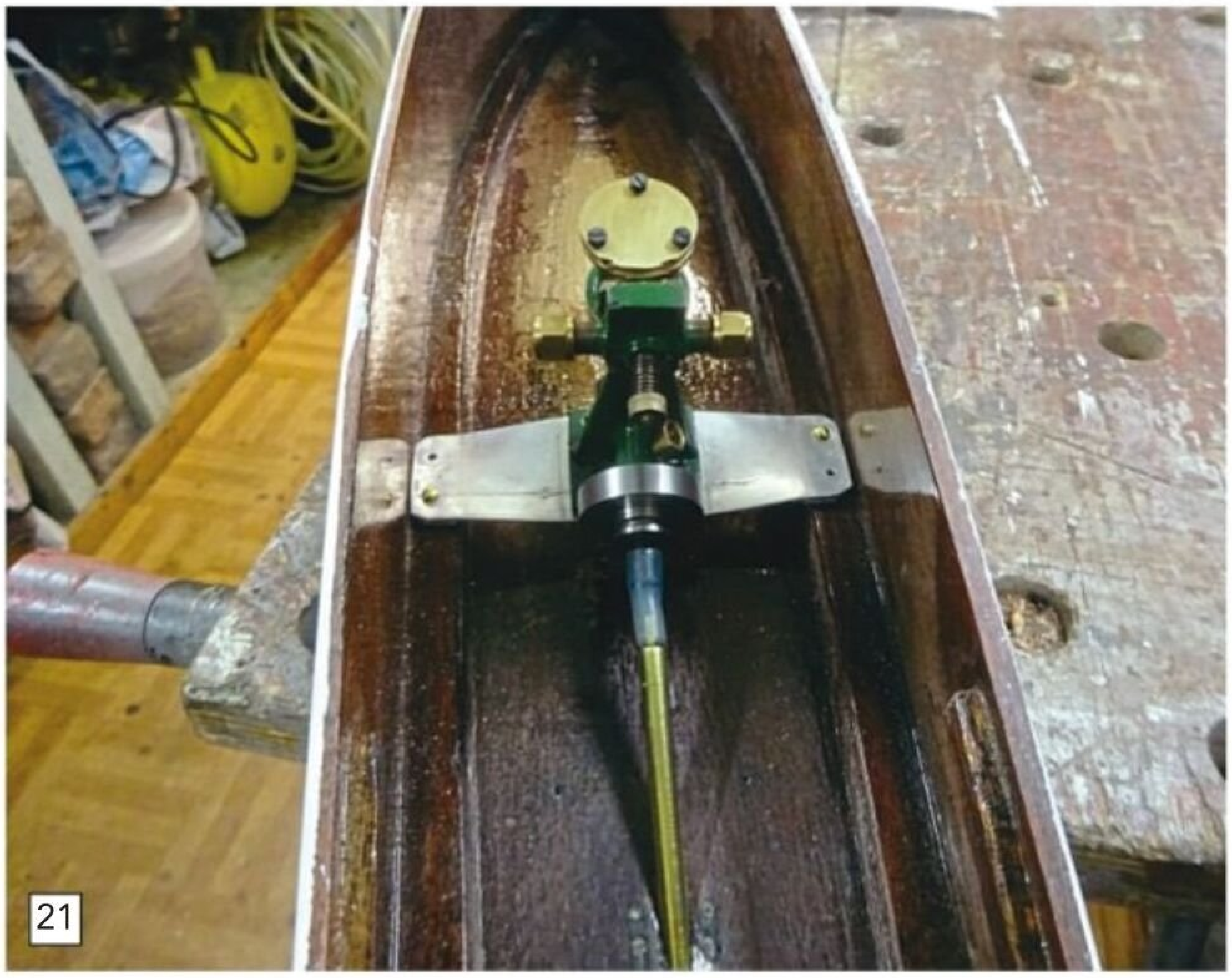
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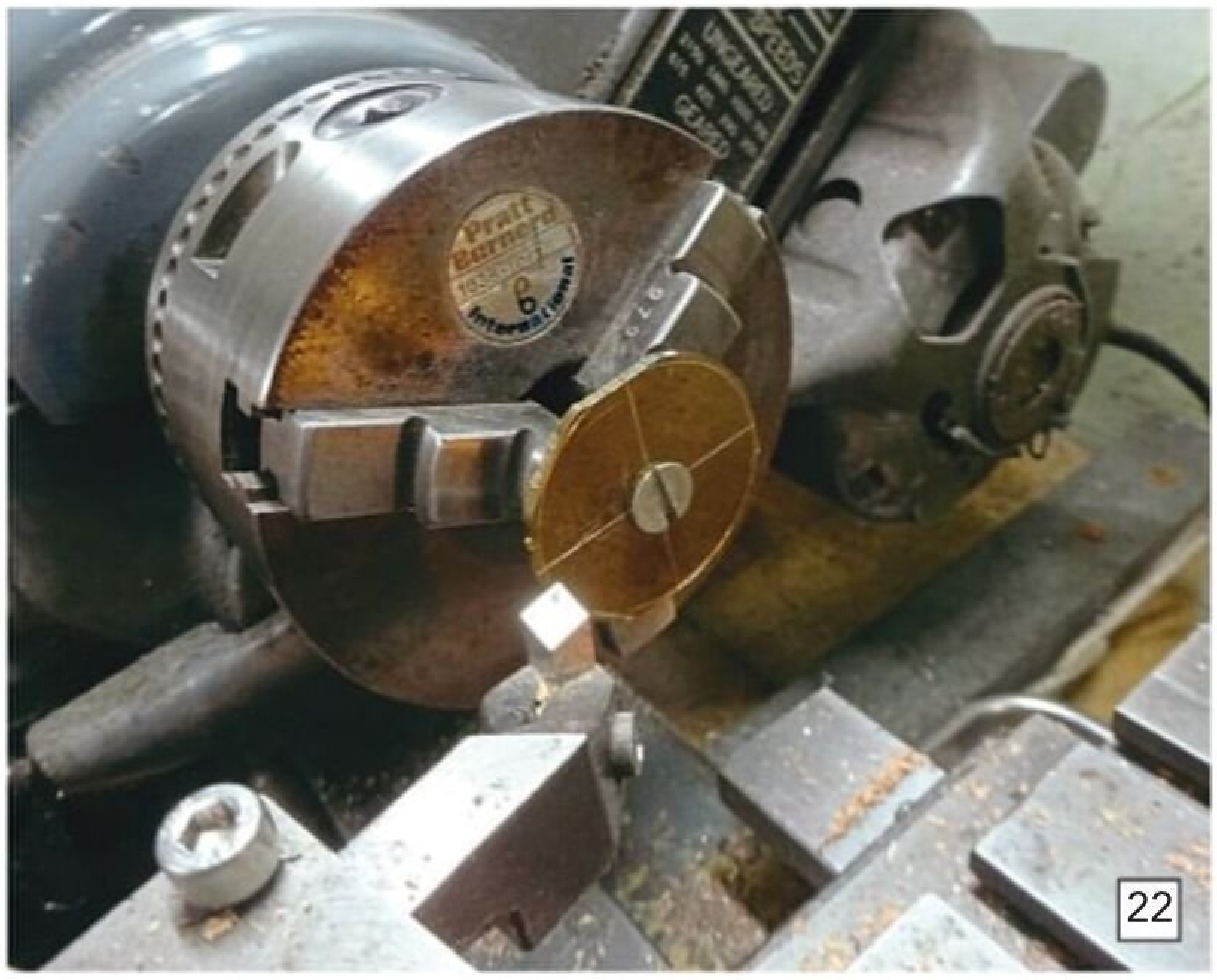
Equally, I didn't find any photos of a wooden cover for the end of the propeller shaft such as is fitted to my hull. I am still inclined to think that this cover is original, though, because of how it's made with matching wood and by the way it attaches to the hull.

While scratch building a copy of the Bowman *Eagle*, knowing what individual parts looked like had made them relatively easy to replicate. Bowman supplied the Eagle as a ready-to-run model, meaning that, despite any minor modifications made post-sale, all examples were built in the same way. Also, there are, relatively speaking, plenty of these models still around to reference and copy. The Henley is totally different. Customers could opt for either a ready-to-run model or purchase the components (i.e., the hull – painted or unpainted, boiler and boiler fittings, propeller shaft and propeller, rudder shaft and rudder, and the engine) individually. As a result, this rather begs the question of *when a Henley actually a Henley*. Factory assembled and finished examples can certainly lay claim to the name; but what about the home-built versions where certain



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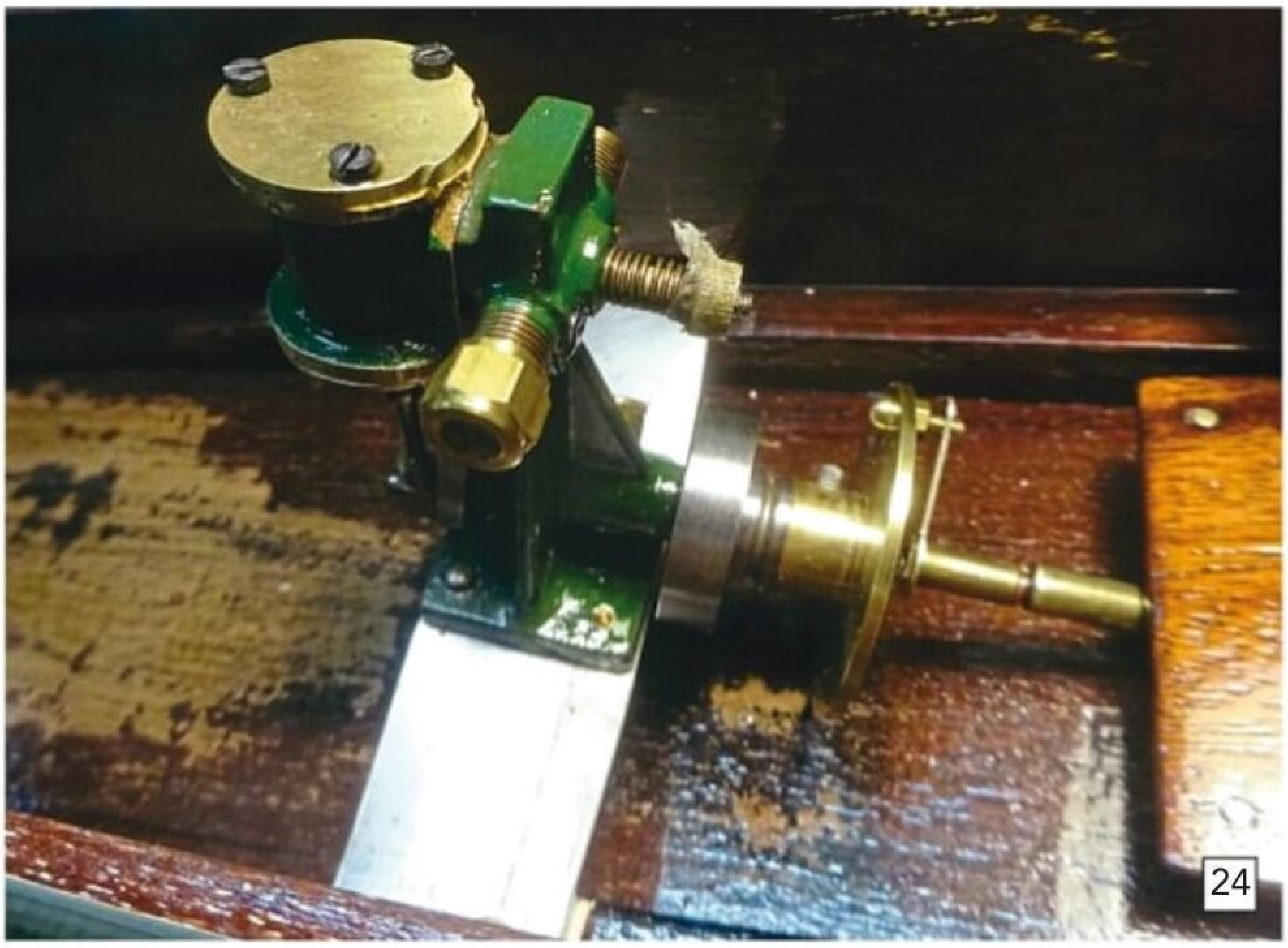

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parts not supplied by Stuart Turner have been used? Another problem is that there doesn't seem to be many Henleys still around to look at.

Photographs indicate that the engine propeller shaft coupling was usually a coiled spring and that the engine sat on what looks like an aluminium plate secured by screws to the hull's longitudinal battens. Some of the photos and drawings in period advertisements show the engine being mounted at an angle, to be in line with the propeller shaft, while in others a curve in the coil spring appears to take out the misalignment.

I set to work by cutting an aluminium strip to the width of the engine's base and to a length slightly in excess of hull's width. The angle of the propeller shaft coming into the hull I measured simply by resting a piece of card on the bottom of the hull, drawing a line along the top of the propeller shaft (see **Photo 19**) and then cutting the card template along that line. The width of the engine base was scribed in the centre of the aluminium, along with the position of the engine supports either side of the hull. The aluminium sheet was then gripped in a vice so that it was firmly held where the engine would sit, while the protruding end was sandwiched between two strips of steel gripped by a 'G' clamp. The extended pieces of steel were used to twist the aluminium to the angle indicated by the card template (see **Photo 20**).

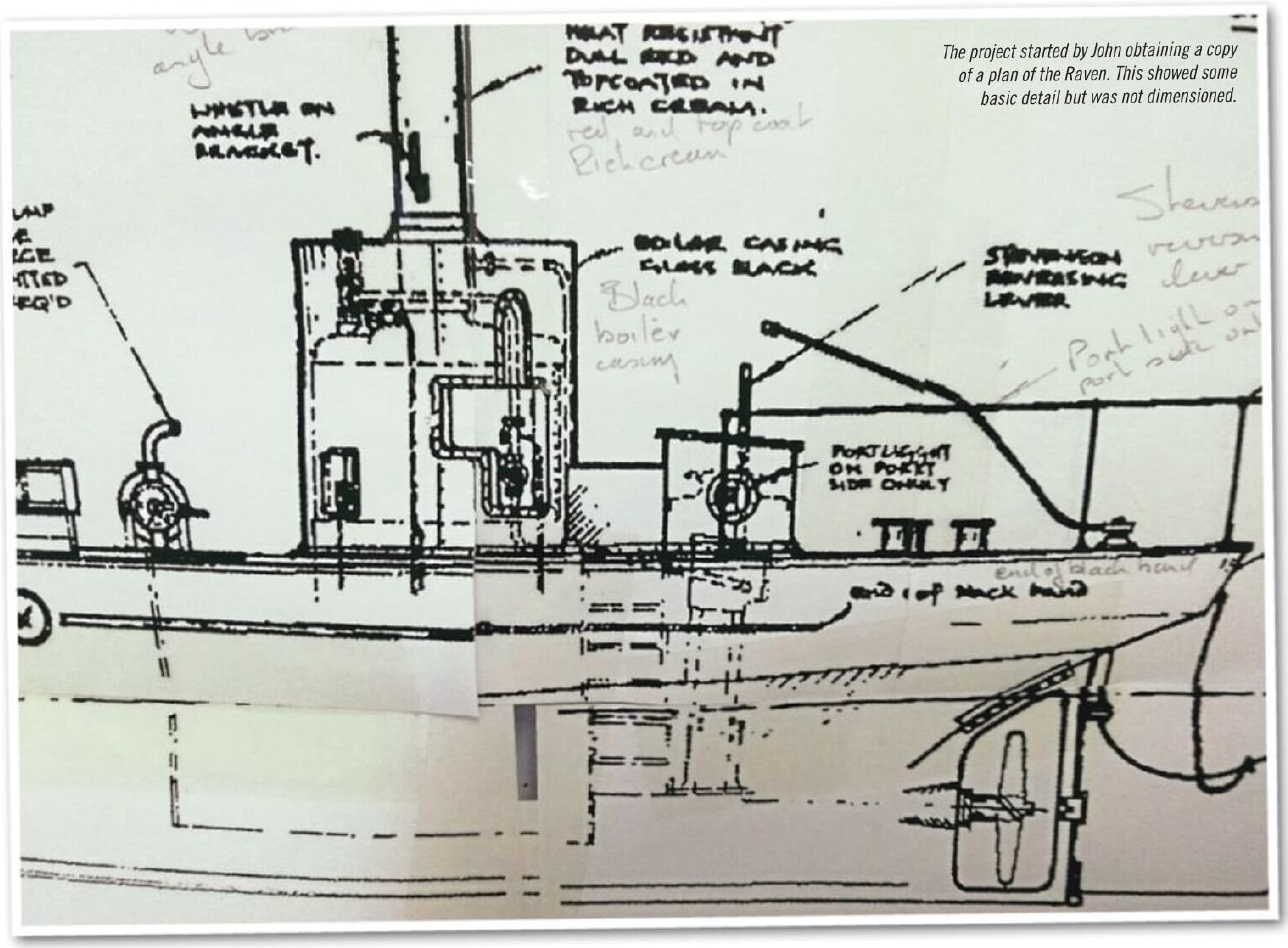
The other end of the aluminium was treated in the same way but twisted in the opposite direction. The aluminium was then drilled for it to hold the engine and for it to be secured in the hull. The engine was positioned in the hull and connected to the propeller shaft with the help of a silicon tube fitted over their shafts (see **Photo 21**).

The propeller shaft had come with half of another type of coupling rather than a helical spring that seemed to have been the norm. Although I did give some thought as to whether I should try and make a spring type coupling of my own, I eventually opted to recreate the other half of the existing coupling.

A brass sheet was marked out for the coupling disc. A hole was then drilled through the coupling blank so that it could be fitted to a screw which I could mount in my lathe (see **Photo 22**). Some hexagonal brass rod was used to make the centre boss of the coupling; first this was drilled to fit the crankshaft, then a shoulder was turned on it for the coupling disc to fit on. The boss was then cross drilled for a set screw, turned to a round section and parted off. The parts of the coupling were then dry fitted to the engine. Next, I hard soldered boss to the disc and trued it in a lathe. When the disc was found to wobble when fitted on the crankshaft, its hole was plugged and tapped to suit the crankshaft thread, which corrected this problem. The hole in the coupling for the drive pin was marked out from the original part of the coupling, using it as a jig (see **Photo 23**). A temporary drive pin was fitted to the coupling and the engine was then installed in the hull so that it lined up with the propeller shaft (see **Photo 24**). ●

Part 2

Except for painting, all the work on the hull was now finished, leaving just the boiler and fore deck still to build. More next month!



The project started by John obtaining a copy of a plan of the Raven. This showed some basic detail but was not dimensioned.

SS Raven

John Mileson builds another interesting model to crow about!

While recently chatting with Jerry Watson from Clevedon Steam about potential next projects, he suggested the Lake Windermere steam 'barge', the SS *Raven*, would be interesting scratch build. To be honest, I wasn't particularly excited by the idea but rather than cause offence I decided to investigate further.

The *Raven* is, as far as I'm aware, currently still on dry land awaiting restoration, something that has been put on hold while her owners seek additional funding (as is so often the case with costly projects such as this), and, as there are only a few photographs of the vessel in her original working condition, I didn't have a lot to go on. However, what I did discover was that the history of this boat, and her almost unique status, is quite fascinating.

SS *Raven* was commissioned by the Furness Railway and was built in 1871. Her sole purpose was to carry cargo from the Furness Railway's terminus at Windermere's lakeside station to the many, often secluded, houses, hotels, farms and businesses scattered around the lake. The railway also used the 'barge' to carry rail borne goods to its warehouses at Ambleside and Bowness on Windermere. Her cargoes included mail, coal, timber, farm produce and general cargo. It was not until 1922 she was finally withdrawn from railway service and sold on to Vickers Armstrong (Barrow in Furness), who used her on Lake Windermere for the testing of mine laying equipment. But by the 1950s, she was redundant and abandoned at lakeside. In 1956, however, George Pattinson, founder of the Windermere Steam Boat Museum, realised the importance of the vessel and purchased her rotting hulk for preservation/restoration. Historically, the *Raven* is of considerable significance; she the second oldest ship on the Lloyd's Register, but the oldest with her original machinery.

> ***"Historically, the Raven is of considerable significance; she the second oldest ship on the Lloyd's Register, but the oldest with her original machinery"***

In terms of dimensions, the vessel had an overall length of 70.95 ft (21.63m), with a beam of 14.59 ft (4.45 m), so assuming a build of ½-inch to the foot, she would, at just over 35-inches long and with a beam of 7-inches, make an ideal steam powered model.

SS *Raven* specifications

Builder: T.B. Seath & Co, Rutherglen
Built: 1871
Hull material: riveted iron
Boiler type: water tube
Fuel: coal
Engine: single cylinder steam
Tiller steering
Current owners: Lakeland Arts Trust

Orion Mouldings' superb Clyde Puffer fibreglass hull was drastically altered by removing the bulwarks at the bow and stern. This was carried out using a hacksaw blade.

The build

My first concern was the hull. I'm not very keen on scratch building wooden hulls, and this one needed to be clad in 'riveted iron'. Whether the project was viable, therefore, relied heavily on my finding a suitable fibreglass hull. Fortunately, I recalled the Clyde Puffers were iron clad, and that their profile from above resembled that of the *Raven*'s. In the past I have purchased fibreglass hulls from Orion Mouldings, which have always been of superb quality, so it was to Orion I turned for a Clyde Puffer hull. This was a bit of a gamble but, provided my wife didn't see it, if it wasn't suitable I could simply hide it under the bench.

As it turned out, the hull was superb and I felt confident that, with a little bit of hacking about, it could be made to work. A good call.

My next task was to gather together all the other bits required. Plywood from SLEC, a steam plant from Clevedon Steam and the propellor and prop shaft from the Propshop.

There did need to be some changes from the prototype. For a start, the engine on the model would have to be located in front of the boiler, whereas that of the original was positioned behind it.

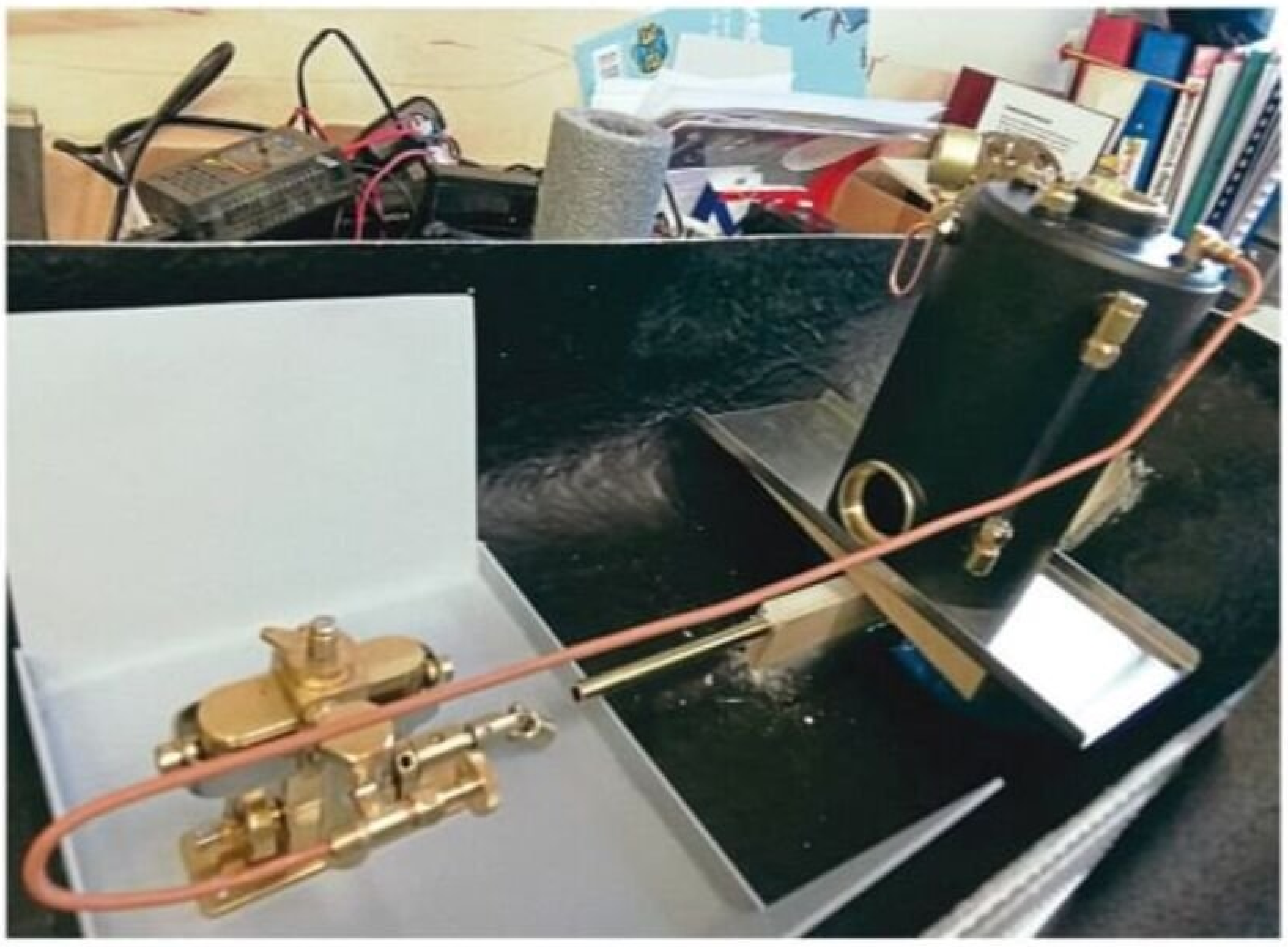
It wasn't long before I hit my first snag. With few photographs to refer to, I was desperately short of info when it came to various details. So, I contacted Jerry Watson to see if he knew of the availability of any plans. He put me in touch with Ted Gregg, who, as it transpires, lives in Windermere and is a steam boat fan. The result was Ted that managed to obtain some basic plans from the Steam Boat Museum for me, and while not dimensioned, scaling these down proved a relatively simple task.

The deck of the *Raven* is virtually flat, with no bulwarks; I presume, considering the type of work the *Raven* carried out on an inland lake, bulwarks would have just got in the way when craning goods on and off. So, using a hacksaw blade, I removed the fibreglass bulwarks from the Orion hull, thereby achieving the flat deck profile required.

I planned to use a Libra vertical steam engine from Clevedon, which when installed would look very similar to the original. The problem was the boiler would sit almost at deck level, raising the centre of gravity considerably. In an effort to try and counteract this effect, an aluminium channel was screwed and glued to the underside of the hull. I made the keel from 8mm thick reconstituted black plastic. If necessary, this could be located in the channel, although whether it or not the idea would work I'd have to wait and see.

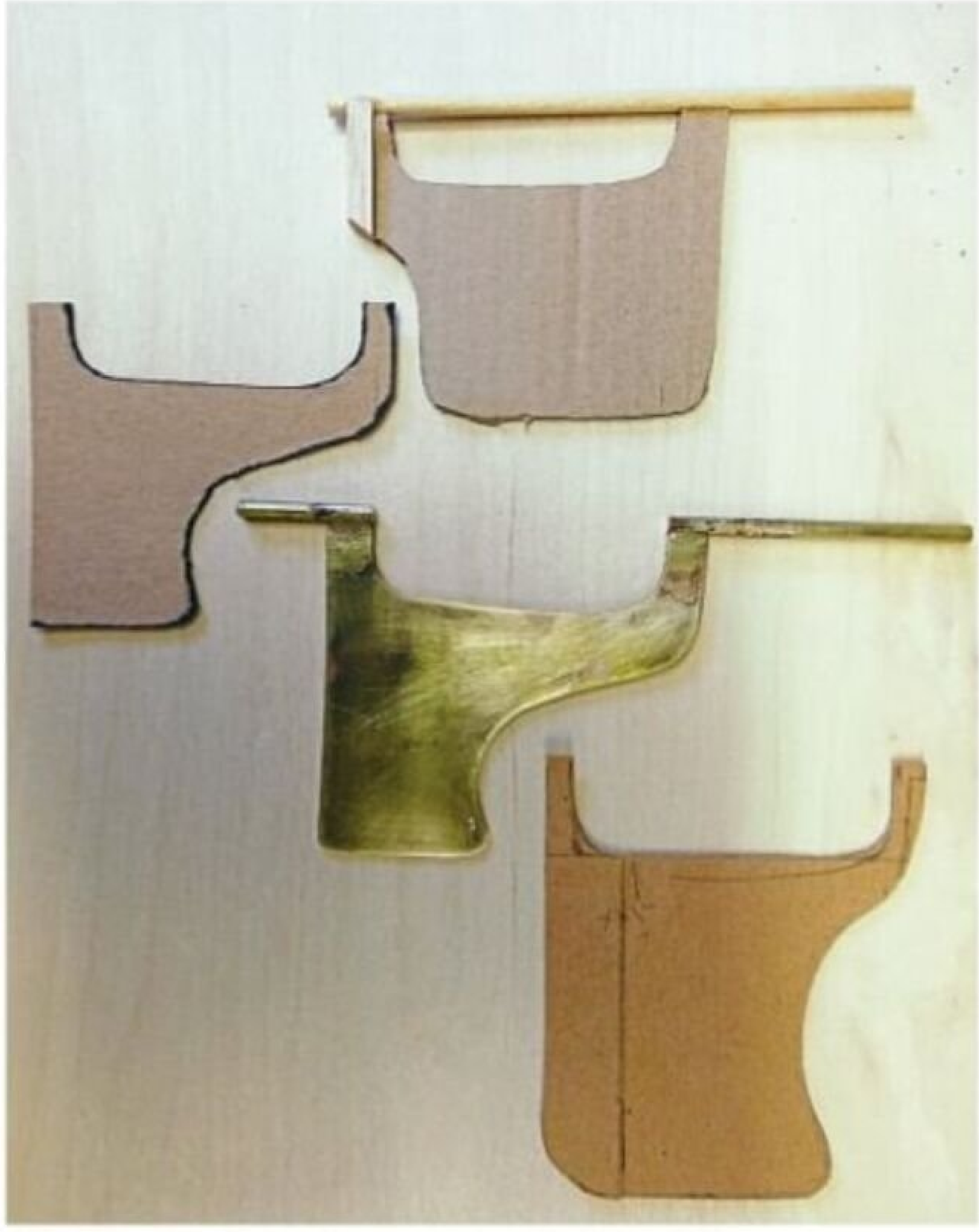
Having removed the bulwarks, the hull required further cutting back to create Raven's almost flat deck. John's 6mm plywood deck was cut but not fitted at this stage.

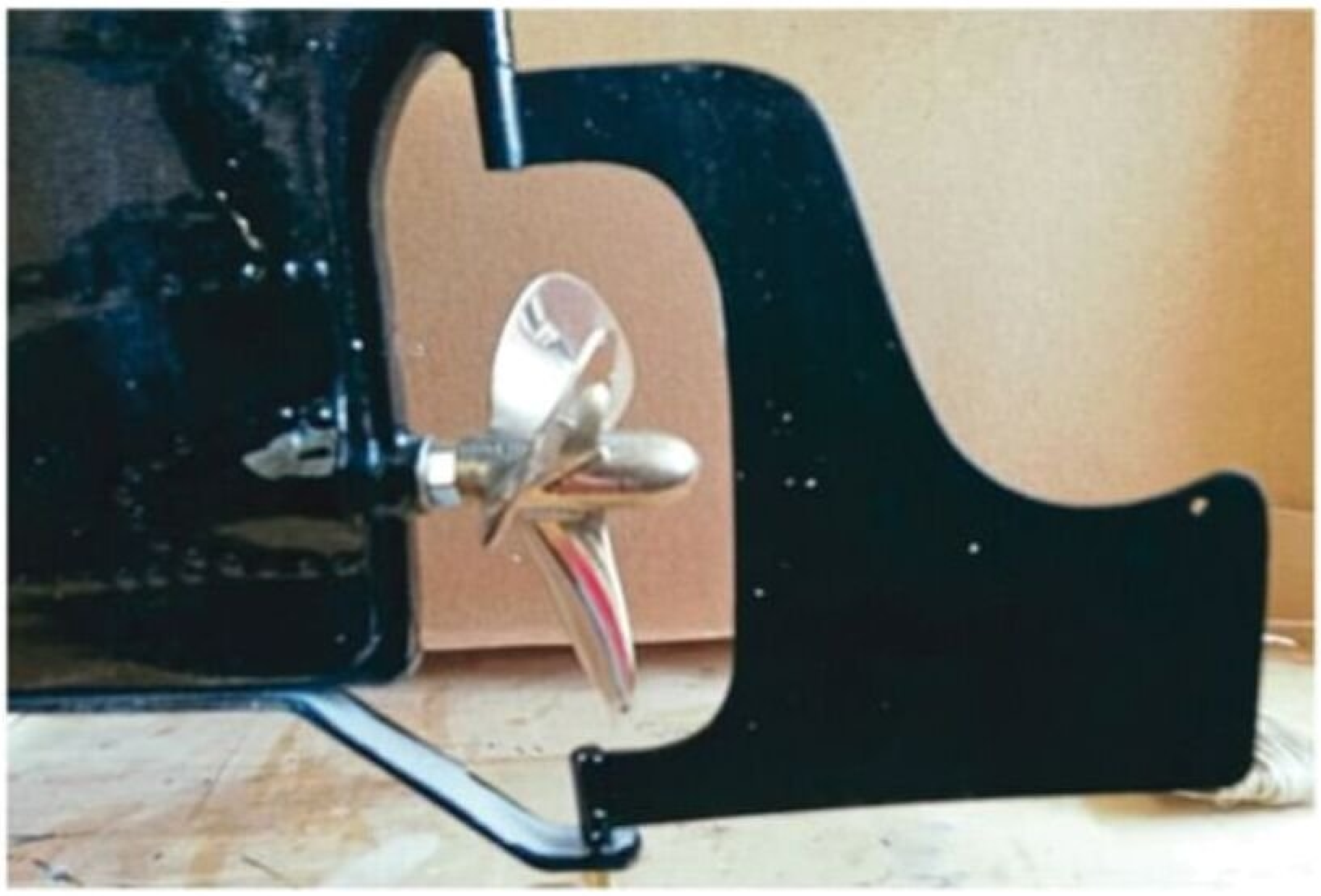
A keel was to be fitted to the hull. To this end, an aluminium channel was screwed to the underside of the hull. Into this a plastic keel could be slotted.



The trial setup to establish the position of the boiler and engine. The 14-inch prop shaft is located beneath the boiler.

The bow section of the hold showing the 'mock' ribs in place. Both these and the decking were cut from plywood.





The rudder installed.

Left: The evolution of the rudder. It took a number of attempts using card to get the profile of the rudder looking something like that of the original. John's rudder was made from brass sheet and was silver soldered to the spindle.

The boiler, which is located very close to the stern, was raised up approximately 50mm above the keel. The engine sits forward of the boiler and at a lower level. This meant a long prop shaft (14 inches) had to be purchased. This shaft runs beneath the boiler. It was recommended that I get this, and the propellor, from the Popshop. Although possibly a little more expensive than a run of the mill propellor, etc, I found the quality to be absolutely superb. I was also advised to get a 70mm diameter 3-blade propellor. Its design, so I am informed, combines the early 20th century narrow chord blade style with a larger pitch ratio than the standard propellors, being approximately 1.5 to 1 (no, I didn't understand it either!).

Installation of the prop shaft and propellor followed the usual course. The engine location pad, and that for the boiler, were made from brass and aluminium sheet.

Details below deck are few. The bulkheads and ribs were made from plywood. The holes for the nine portholes were drilled out, six on one side and three on the other. Access ladders down into the hold would be made once the deck was in situ. All very basic but, due to the location of the steam plant, little detail of the hold would be seen.

The interior of the hull virtually complete. The model's hold is considerably smaller than that of the full-sized vessel due to the fact that the engine will be located forward.

The deck, due to its size, was made in two halves. This involved a fair amount of work with a coping saw as it was too wide to fit onto John's bandsaw.

The deck, made from 6mm plywood, took some holding, down due to the curvature of the hull, while the glue set. It was painted black so it would better represent the caulking once the planking was added.

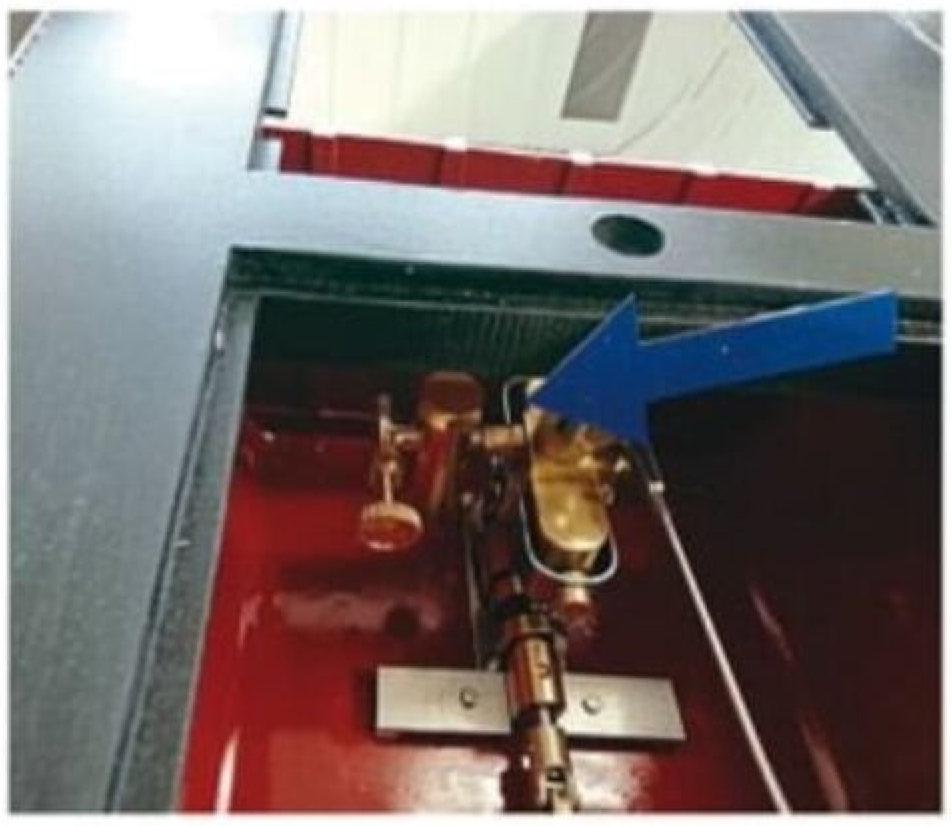
The hold was then painted, and servos for the steering and engine fitted. But I was in a bit of a quandary regarding the *Raven*'s colour scheme. In photos capturing the current state of the vessel, the hold is painted white, and the boiler room in a sort of pinky-red oxide. This presented little problem. When it comes to the vessel's exterior finish, however, she is currently white on the upper hull and black below the waterline. Apparently, she was originally painted in Furness Railway colours, which were, according to some sources, Madder red (being more of an orange-red than the Midland red with which most of us are more familiar) and pale cream. I can find no evidence that substantiates the use of these colours on the *Raven*. One of the earliest photos, does show the hull painted all over in a dark colour, but with no cream.

So far everything had been relatively easy. The fitting of the sub deck, the application of the decking and construction of the very prominent crane would, I knew, be more far taxing.

My next task was to assemble the steam plant on the bench and test run it to ensure there were no leaks, etc. This also, with a couple of hours running, helps to bed the bearing surfaces in, allowing the engine to run freely.

With the steam plant 'passed off', the plywood sub deck was glued on. Installing the steam plant proved a lot more difficult than I'd anticipated. What I hadn't allowed for was getting access to various screws and, more importantly, the oil reservoir for the displacement oiler. So, a bit of hacking about was necessary!

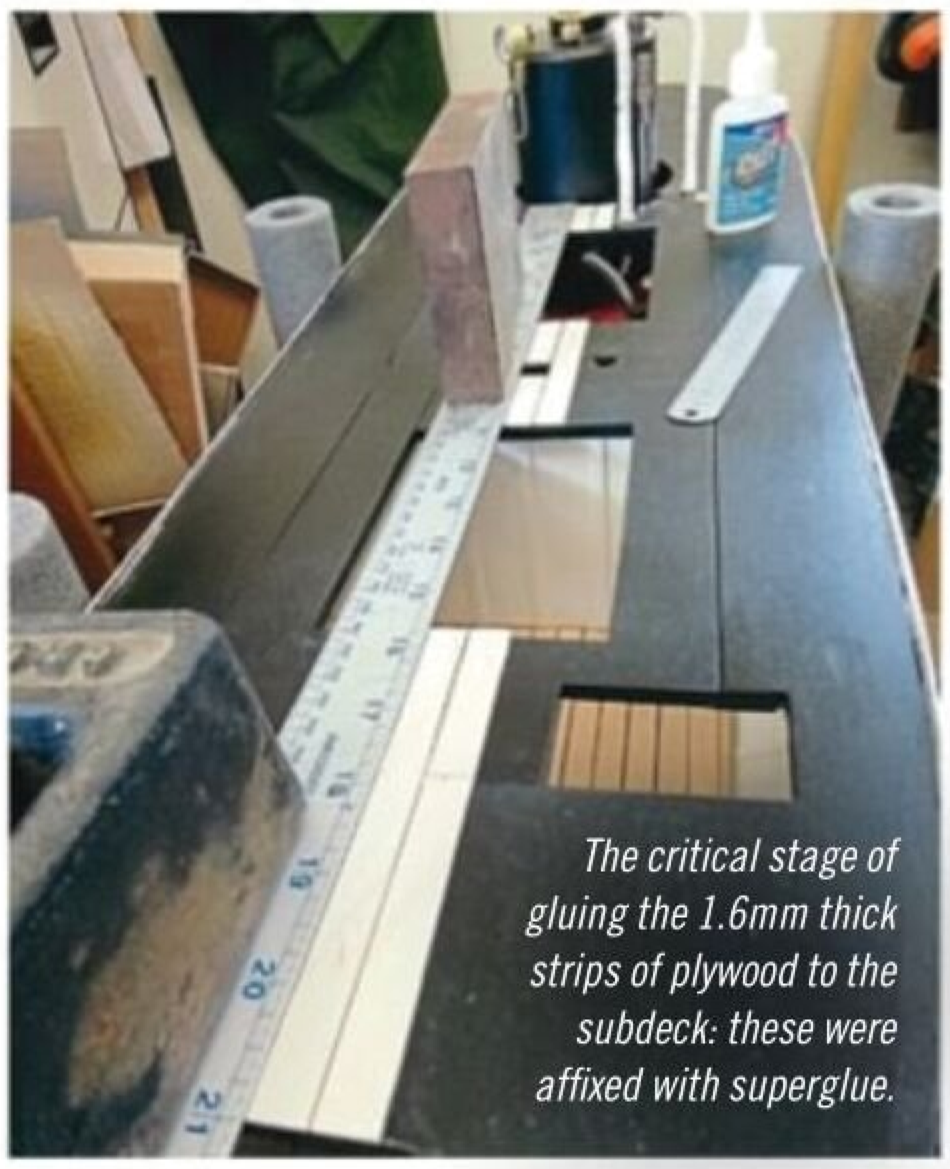
Mechanical and electrical equipment installed, it was time for a test in the tub.



Installation of the engine went smoothly, until John realised that access to the lubricator was blocked by the beam that would carry the onboard crane (the location for which is indicated here by blue arrow).

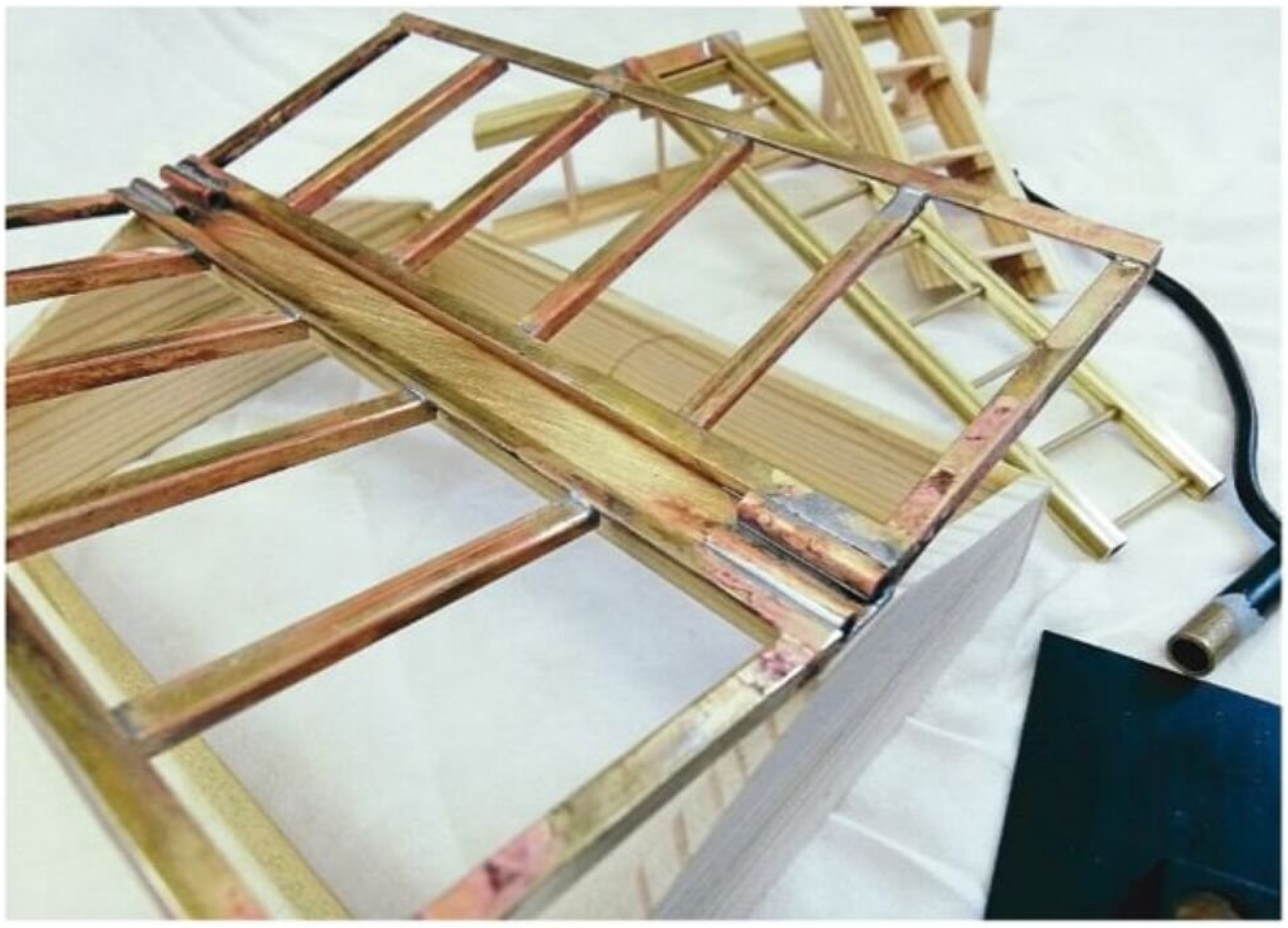
To remedy the problem with access, a hole was bored through the beam. Note the plastic syringe going through the hole and lining up with the oiler.

Fortunately, most of the installation of the steam plant went well, although it was a tight fit in places.



The critical stage of gluing the 1.6mm thick strips of plywood to the subdeck: these were affixed with superglue.

The deck planking complete. A gap of approximately 1mm was left between each plank, which allowed the black paint to show through, representing the caulking.



In the foreground the frame for the skylight, made from various brass sections silver and soft soldered together, can be seen. Behind this are some of the ladders that permitted access to the hold and engine room.

Right: The upper rubbing strake being glued on and held in place with masking tape. The strake was fashioned from miniature cable ducting (sourced from B&Q). The red arrow indicates the ducting as purchased, while the blue shows the 'cover' John created.

Below: The completed stern with chain fitted. John assumes, because the Raven was tiller steered the purpose of this chain was to avoid excessive tiller movement.

So, with boiler and gas tank filled, everything was made ready for the test. First, the bath was filled with about 10 inches of water. What I hadn't bargained for was the sheer weight of the boat. As I struggled from the shed into the house with the model, I realised I wasn't going to be able to bend down and place it on the bathroom floor, nor indeed pick it up again from that position and lower it safely into the water. Stopping for a much-needed rest in the living room, where I laid it on the table in order to catch my breath, a plan came to the fore. A chair could be placed next to the bath and the boat placed on the chair. This idea, however, was quickly discounted, as there was still so much potential for mishap. Time for Plan B… This involved rolling up my trouser legs, removing my shoes, battling my way to the bathroom with the model and, somewhat precariously, stepping into the tub with it in my arms. Darn – I'd forgotten to take my socks off! Never mind, I was on a roll, and after a bit of puffing and blowing, the boat was successfully lowered into the water. She was, understandably, heavy at the stern, but I had already planned for this situation, having earmarked three large lead acid batteries to use as ballast. Unfortunately, these were still in the shed!

Having retrieved the batteries, this process causing me considerable stress, they were placed on a chair beside the bath. Baths can, by their very nature, be slippery, and, as I stepped back in to the water, I slipped. Although this happened in a fraction of a second, to me it all played out in slow motion and when I disappeared beneath the 'waves' I cannot begin to describe to you just how cold cold water is! It's an episode is best forgotten, and, before you ask, no – there are no photographs!

The completed vessel from the bow.

Deck detailing, including the crane and various hatch covers.

Once I'd recovered from hypothermia, what remained to be done was all the detailing and final coats of paint. This would be somewhat tedious to describe, so I will leave it to the photographs to illustrate the final operations.

The prototype obviously saw many changes during her long life –and understandably so considering the humble purpose for which she was originally intended. Few of these changes, however, seem to have been documented, and my model, therefore, reflects only the more obvious/recorded ones. For example, portholes were added to the prototype at some stage; one can only speculate about the reason for this, but it meant the rubbing strake had to be cut into sections, negating its original purpose. Another addition was the 'greenhouse' (skylight) that sits over one of the two loading hatches; I was tempted to omit this from my model, but in the end decided it is very much a part of the boat's chequered history.

In term of deck details, the crane was obviously the major challenge. Constructed mainly brass from brass, this was modelled as accurately as possible from the restricted details on the plan.

Raven round-up

Using an existing fibreglass hull moulded specifically for a Clyde Puffer immediately divorces my model from a scaled down replica of the real thing, but practicality sometimes has to take precedence over accuracy, and my intention never was to build a museum quality piece. On the other hand, I didn't need to use a live steam plant, a mock-up of the boiler would have sufficed. Electric motor power and a steam generator would definitely have been the easy option but, in my humble opinion, such an iconic vessel deserved a steam plant.

The crane and forward hold.

The plans gave a few clues to the vessel's past, so it will be very interesting to see the 1:1 *Raven* on Lake Windermere again once her restoration is complete.

Despite my initial misgivings, this proved to be a most interesting and rewarding build and I really must thank Ted Gregg (from the Windermere Model Boat Club) for his invaluable help and encouragement; the Lakelands Arts Trust and the Windermere Jetty Museum of Boats and Stories for providing the essential plans for the *Raven*; and last, but not least, Jerry Watson from Clevedon Steam for suggesting the project in the first place, regardless of all the angst, sleepless nights, hair loss, and, oh yes, the resulting overdraft! ●

Suppliers

- **Plywood, balsa, etc – SLEC**
www.slecuk.com
- **Fibreglass hull – Orion Mouldings**
www.orionmouldings.com
- **Steam plant – Clevedon Steam**
www.clevedonsteam.co.uk
- **Resin figures – Model Town**
www.modeltown.co.uk

A bird's eye view, with all the hatch covers removed.

The various hatch covers and crane removed. To disguise the joints in the deck, some of John's cargo is bonded to the removable covers.

ROLLING YOUR OWN

John Parker reflects back on the bygone era of DIY radio-control

The 1949 advertisement for Mercury Models Radio Control Equipment reproduced here signals the birth of the commercial radio control industry in the early post-war period. Wartime developments in electronics were being put to new use as ex-servicemen returned to civilian life and applied their technical skills to the growing interest in radio control of models. *"Control by radio now definitely established"* reads the advertisement, but it didn't come cheaply. The quoted price of 12½ guineas (13 pounds, 2 shillings and 6 pence by my reckoning) plus batteries is the equivalent of some £400 today and was out of reach for most. There was only one way out of the problem, as least for the more experimentally minded modeller – build your own equipment!

The 1950s

Building your own equipment in the 1950s inevitably involved a fair degree of 'chassis bashing'. The transistor had been invented in 1947, but it took well over a decade for it to start to appear in consumer products, so this was still very much the era of the electronic valve or vacuum tube. The fragile glass valve needed a rigid chassis for its valve socket to be mounted on, and this usually took the form of folded aluminium or steel sheet construction, mounted in the much larger box needed to house the considerable bulk of the LT (low tension) and HT (high tension) batteries required.

So far this was within the scope of most with a basic workshop and tools but wiring it up was certain to cause an outbreak of head scratching for the uninitiated. For one thing, the builder would need to be able to recognise the various miniature components (huge by modern standards) – resistors, capacitors and chokes for the most part – that were so 'tiny' it was no longer possible to print the manufacturer's name, logo and value on them; they instead had to be identified by means of coloured dots painted on their sides.

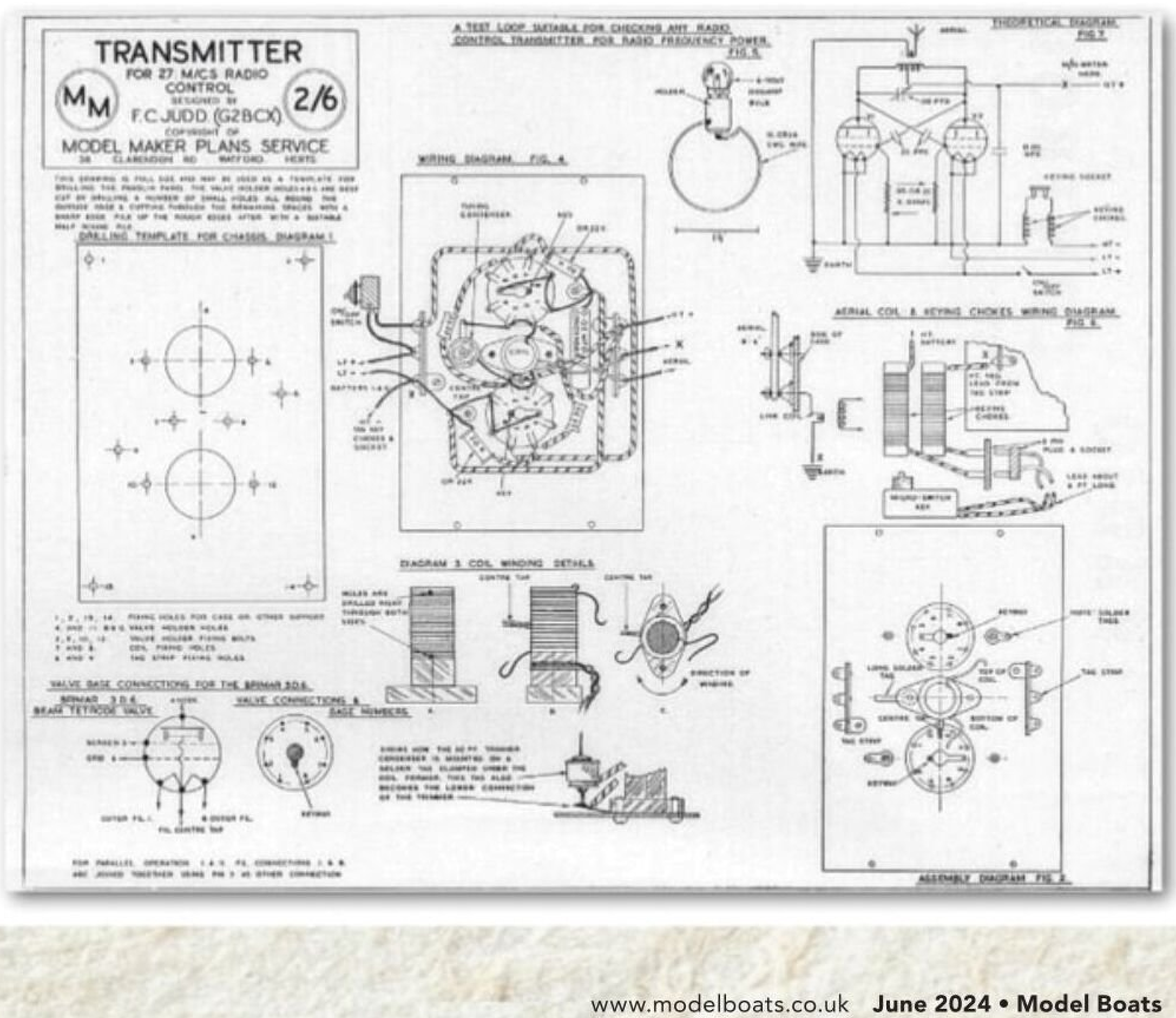
A typical do-it-yourself circuit for an R/C transmitter of the time was provided by F.C. Judd, a well-known contributor on radio matters, in the May 1952 issue of *Model Maker.* It is absurdly simple in principle, the plan showing two valves in a multi-vibrator arrangement to generate the RF signal, and the "rat's nest" of wiring that results from the components being soldered directly to the tags on the valve sockets and other convenient points. The constructor had to become adept at winding the various coils that were required, for the correct functioning of the transmitter was very dependent on these. An HT supply of 120-150 volts was required as well as 1.5 volts LT.

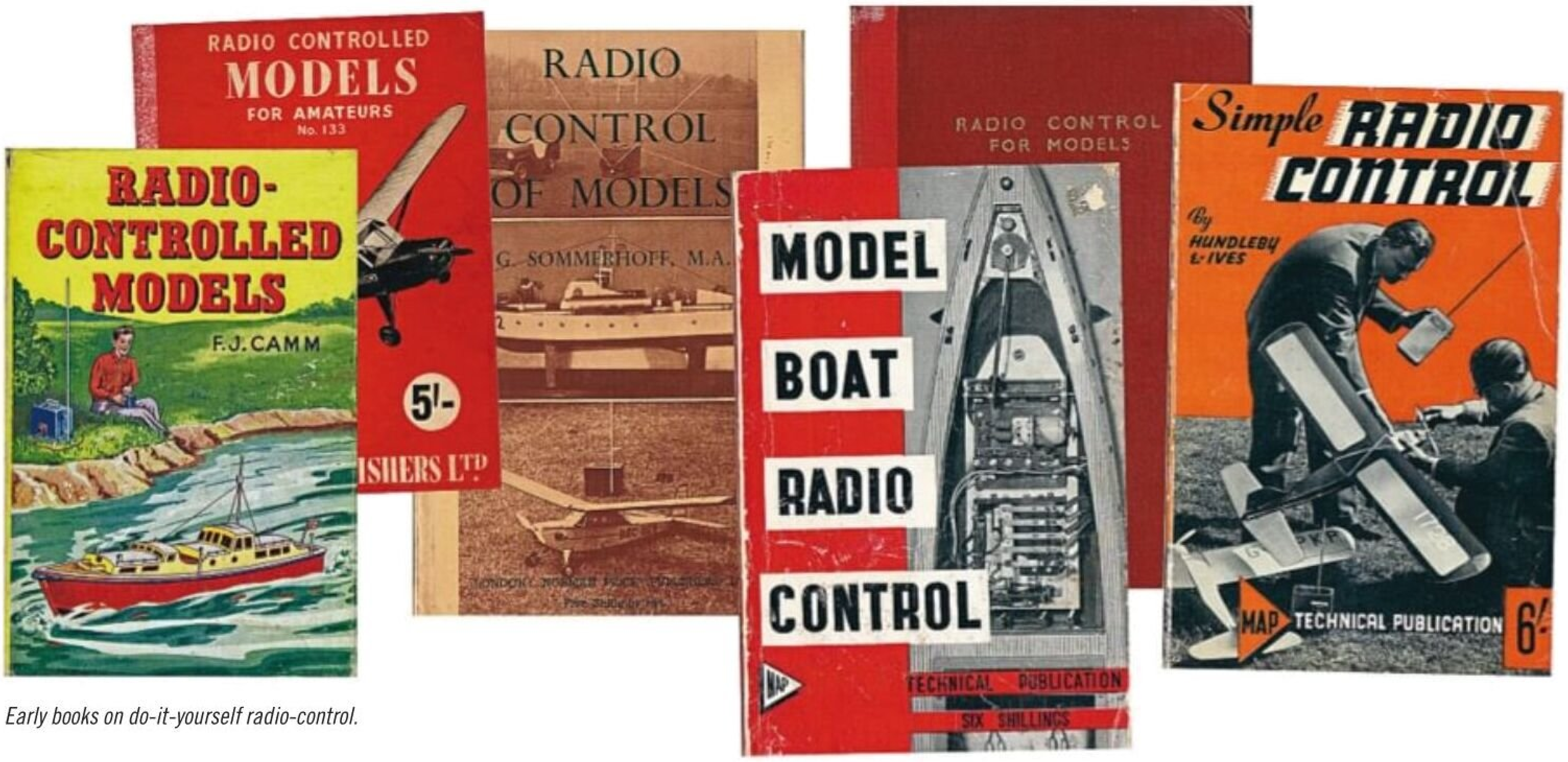
A matching receiver, again very simple and only capable of the most basic single-channel sequential control, was presented in the following issue. The plan shows its use of a "soft" gas filled valve, the XFG1, which was developed especially for R/C applications.

"Building your own equipment in the 1950s inevitably involved a fair degree of 'chassis bashing'.

A 1949 advertisement for Mercury Radio Control Equipment.

Below: A circuit for an R/C transmitter, as published in the May 1952 issue of Model Maker.





Early books on do-it-yourself radio-control.

This could work with only 45 volts of HT, easing the model's battery requirement, but came with the significant disadvantage of a short life, only some 30 hours or so, during which time its performance progressively fell off and the circuit required constant re-tuning. The need for frequent re-tuning was the bane of early R/C experimenters and accounted for greater expenditure of time (and precious battery life) than operation of the model did.

The 1960s

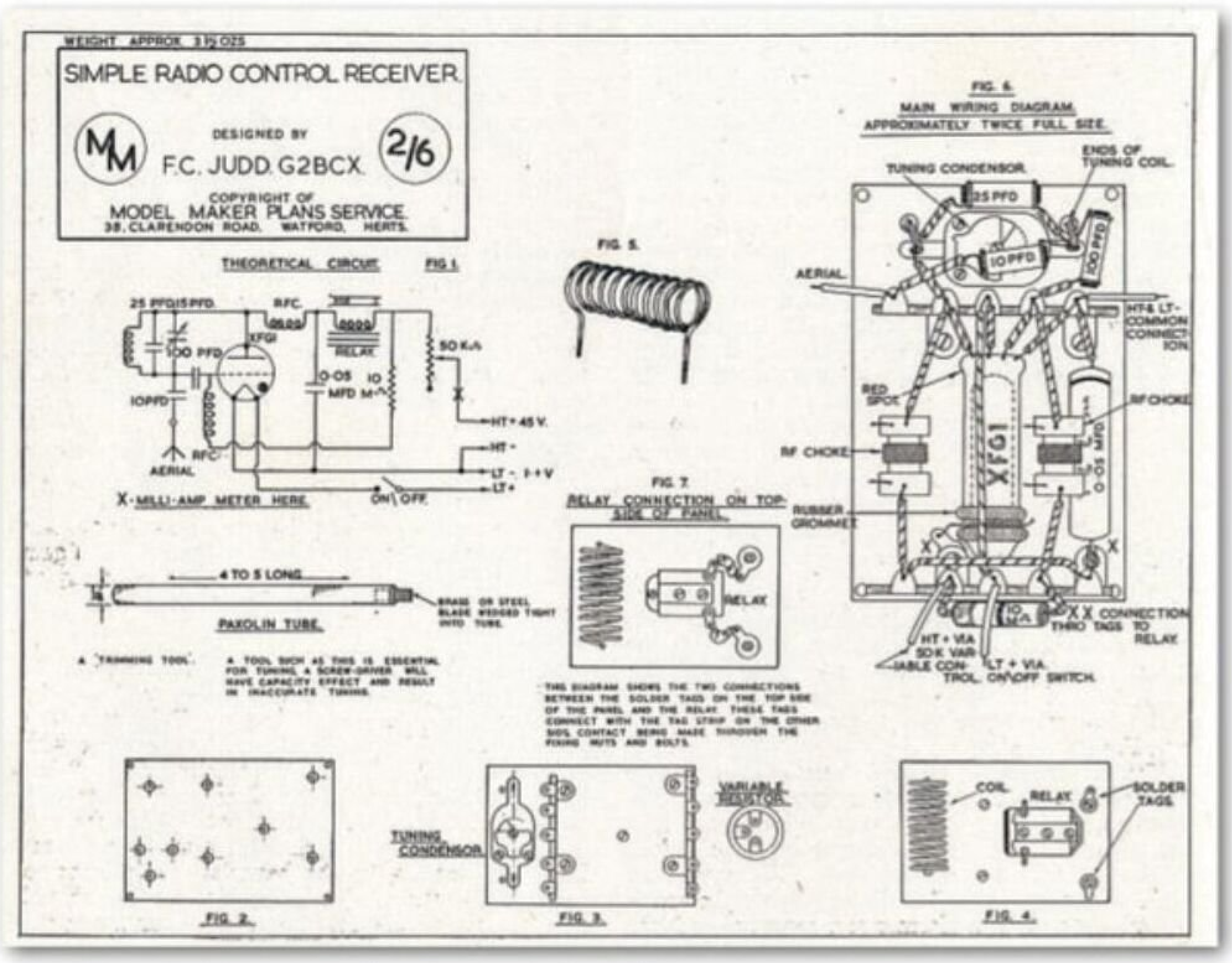
During the 1960s, the situation got better, for a number of reasons. The standard of living had improved and there was more money in people's pockets; the printed circuit board became common, easing construction; the transistor started to make its appearance; and a specialist magazine was launched to further the hobby.

Taking the last of these first, *Model Maker* issued a prospectus for a new magazine devoted to do-it-yourself R/C in November 1959 and, after a favourable response, the first issue of *Radio Control Models and Electronics (RCM&E)* appeared in May 1960. True to its title, the pages were filled with circuits and diagrams for building all manner of R/C and associated equipment, the models they were applied to, and news and reviews of commercial developments. This was warmly welcomed by the R/C experimenter as the only up-to-date treatment of the subject; endless library searches tended to turn up only outdated books on this rapidly developing subject.

The printed circuit made use of copper clad Paxolin sheets that could have the inter-connections of the circuit etched onto them. This was a great boon as it eliminated the rat's nest of point-to-point wiring and reduced the chances of mistakes being made. The pattern for the circuit board would be painted on in a resistant paint using artwork from a magazine and then the board dipped into an etching solution, often ferric chloride, to remove unwanted copper areas. The resist could then be washed off and the copper areas drilled with a fine drill, ready to have the components mounted to one side and soldered on the other.

One of those components would be an unfamiliar one, the transistor. Expensive at first and unable initially to perform the functions of a valve at higher frequencies, its

"During the 1960s, the situation got better, for a number of reasons…"

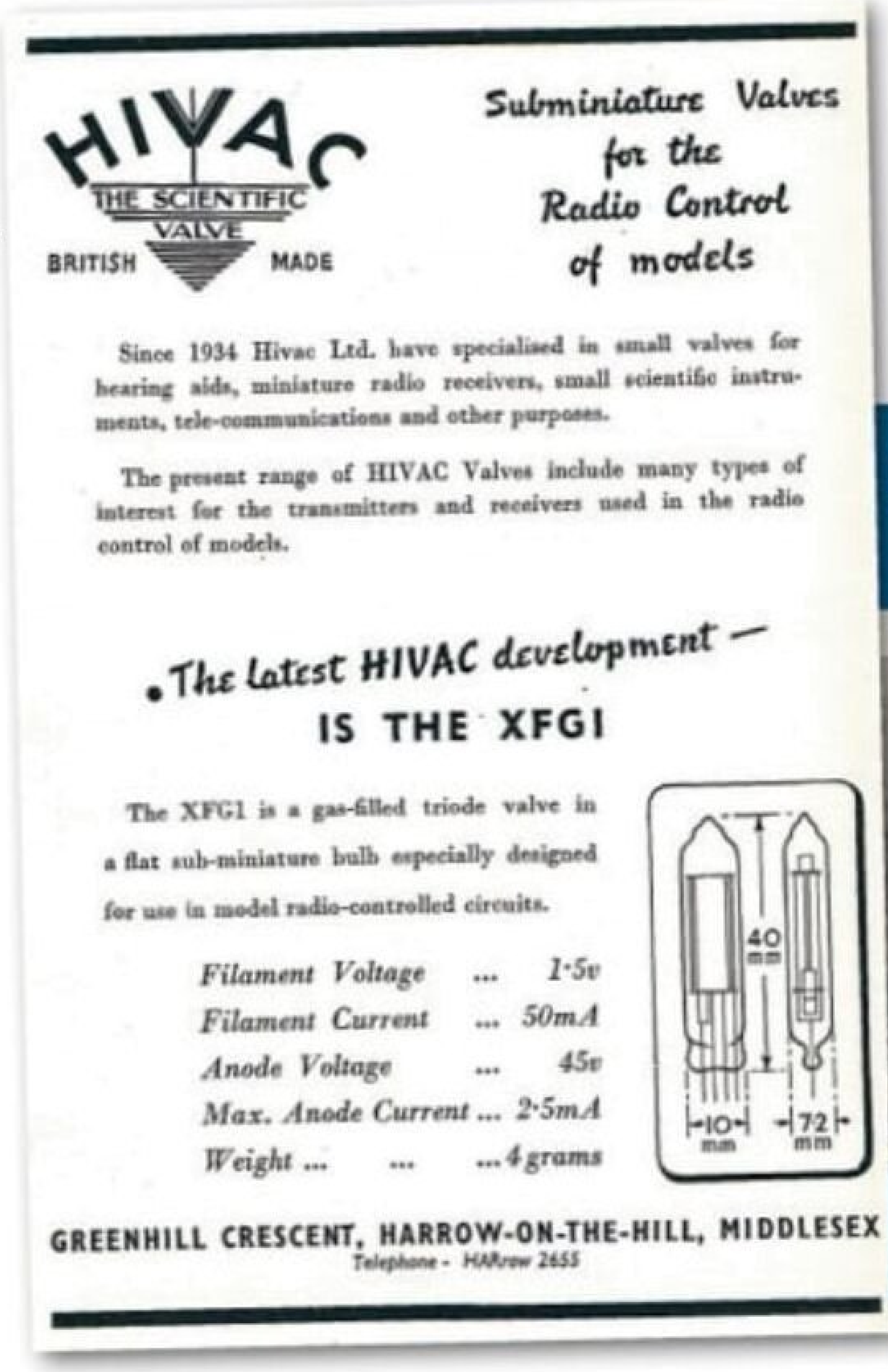


A Model Maker circuit for a simple R/C receiver from the June 1952 issue.

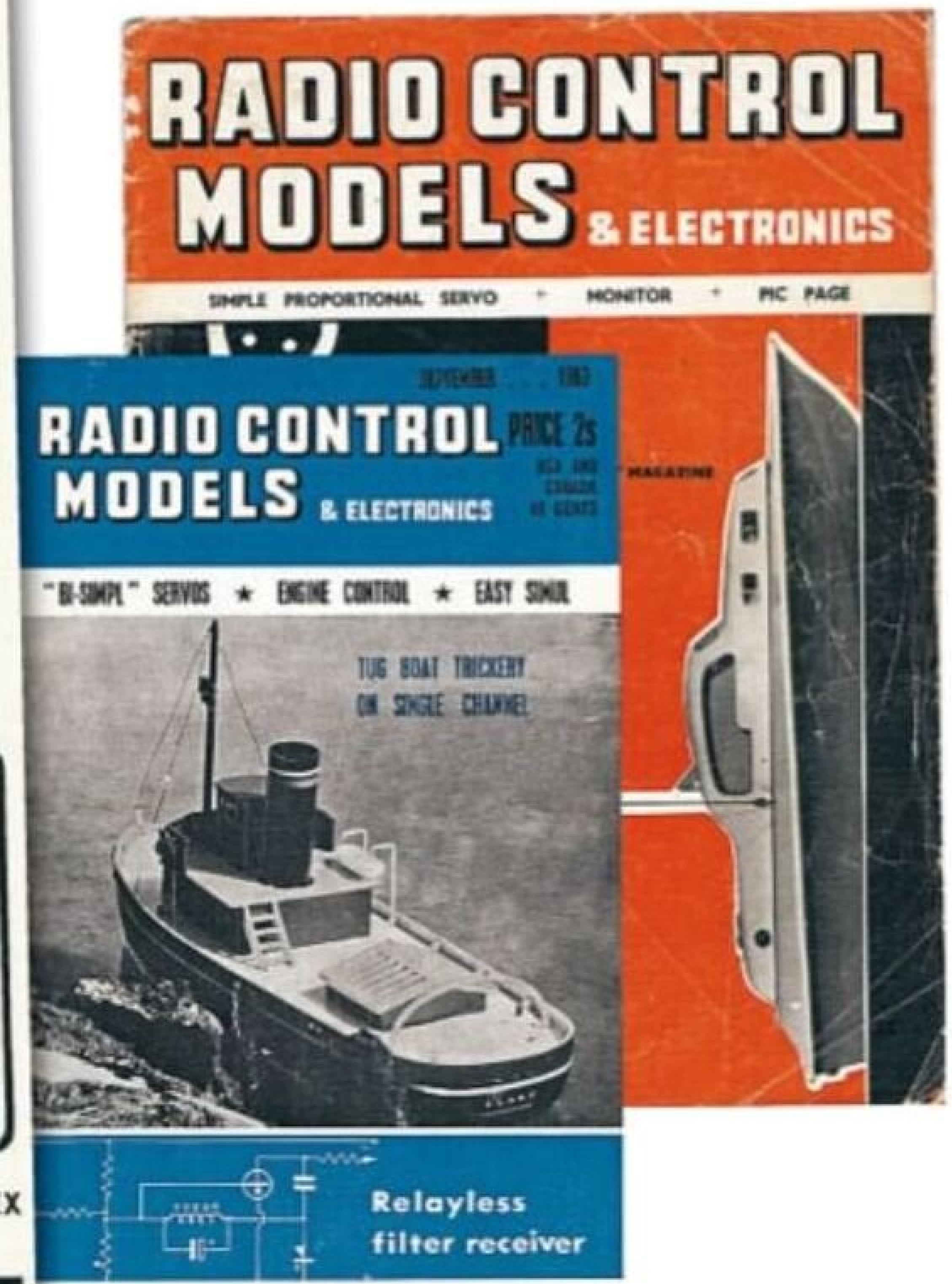
rapid development soon consigned the valve to the scrap bin and along with it the bulky and expensive HT batteries, as it needed only a low voltage, often centre tapped, supply which could be provided by rechargeable DEAC batteries, lowering the running cost significantly. A circuit for a single-channel super-regenerative receiver, the Flexitone, is shown in one of the images from the pages of *RCM&E*'s September 1964 edition. This uses early Mullard transistors of the OC42 to OC170 series.

In many ways this was the golden era, if there ever was one, of home-built R/C. Many, many circuits were published, and the difficulty of sourcing the correct parts was alleviated when complete kits were made available. The success rate of home-built R/C is hard to establish. There must have been many failures when the circuit didn't work first time, perhaps just because of a simple wiring error, and the builder, lacking any fault-finding knowledge or equipment, had to scrap it; but on the other hand, there must have been a reasonable success rate for the circuits and kits to go on being made.

What becomes obvious when reading the text of the Flexitone article today is that clearly as mass production made the price of commercial R/C equipment steadily fall it was no longer necessarily true that the home builder would save a lot of money. The article pointed to other less convincing advantages, such as personal satisfaction and the ability to tailor the circuit to your needs.



A period advertisement for the Hivac XFG1 'soft' valve.



Early issues of RCM&E in the original small and later larger format.

The complexity of R/C was increasing all the time too, with multi-channel proportional becoming the norm, decreasing the chances of an amateur home builder successfully making his own.

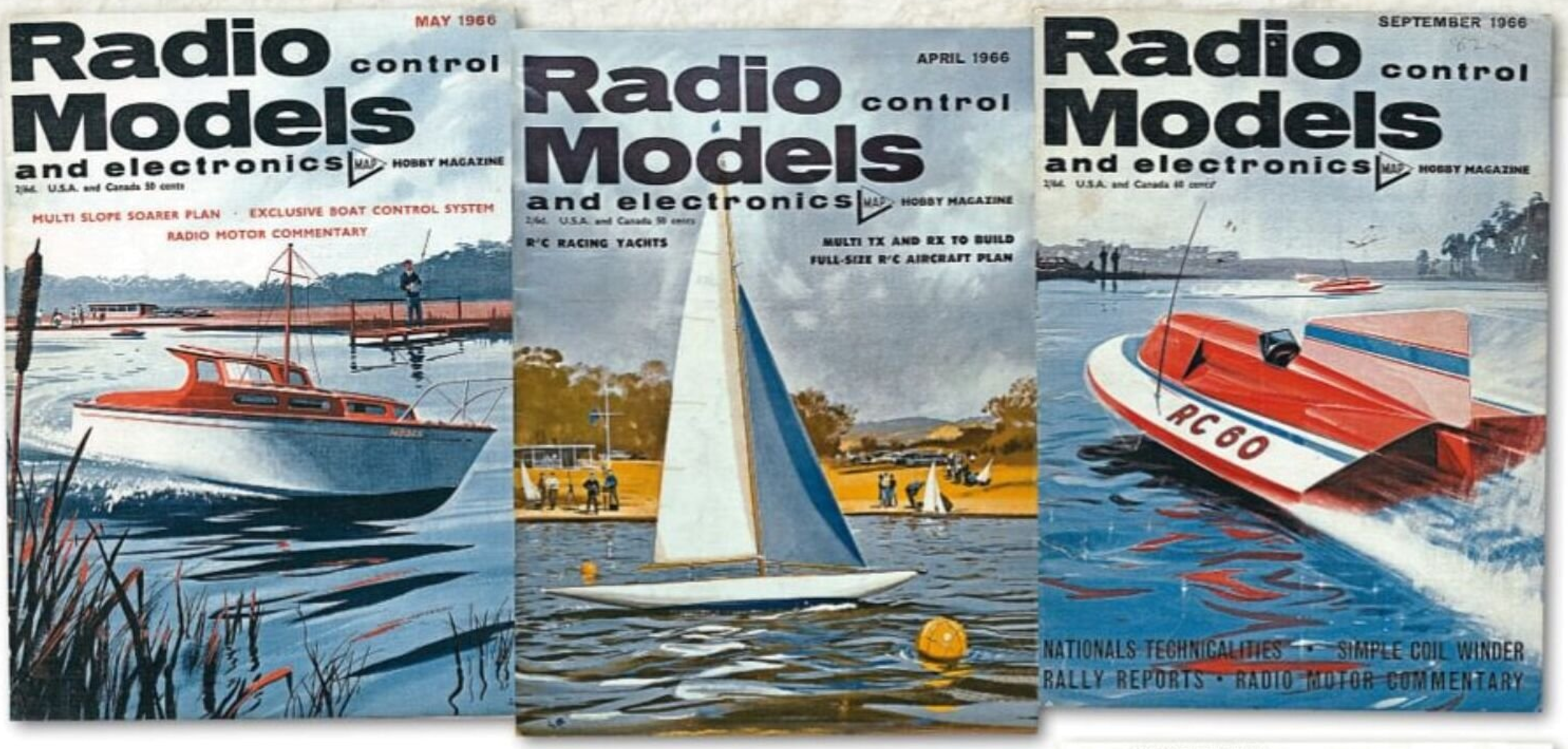
From the 1970s to date

In the 1970s *RCM&E* began to change its emphasis from do-it-yourself circuitry to more of a general modelling magazine, with a strong leaning to model aircraft, a reflection of the larger modelling scene. This decade brought forth the digital era and made

A hybrid valve/transistor home-constructed receiver from Simple Radio Control by Hudleby and Ives (revised edition, 1961).

Prospectus for RCM&E magazine, November 1959.

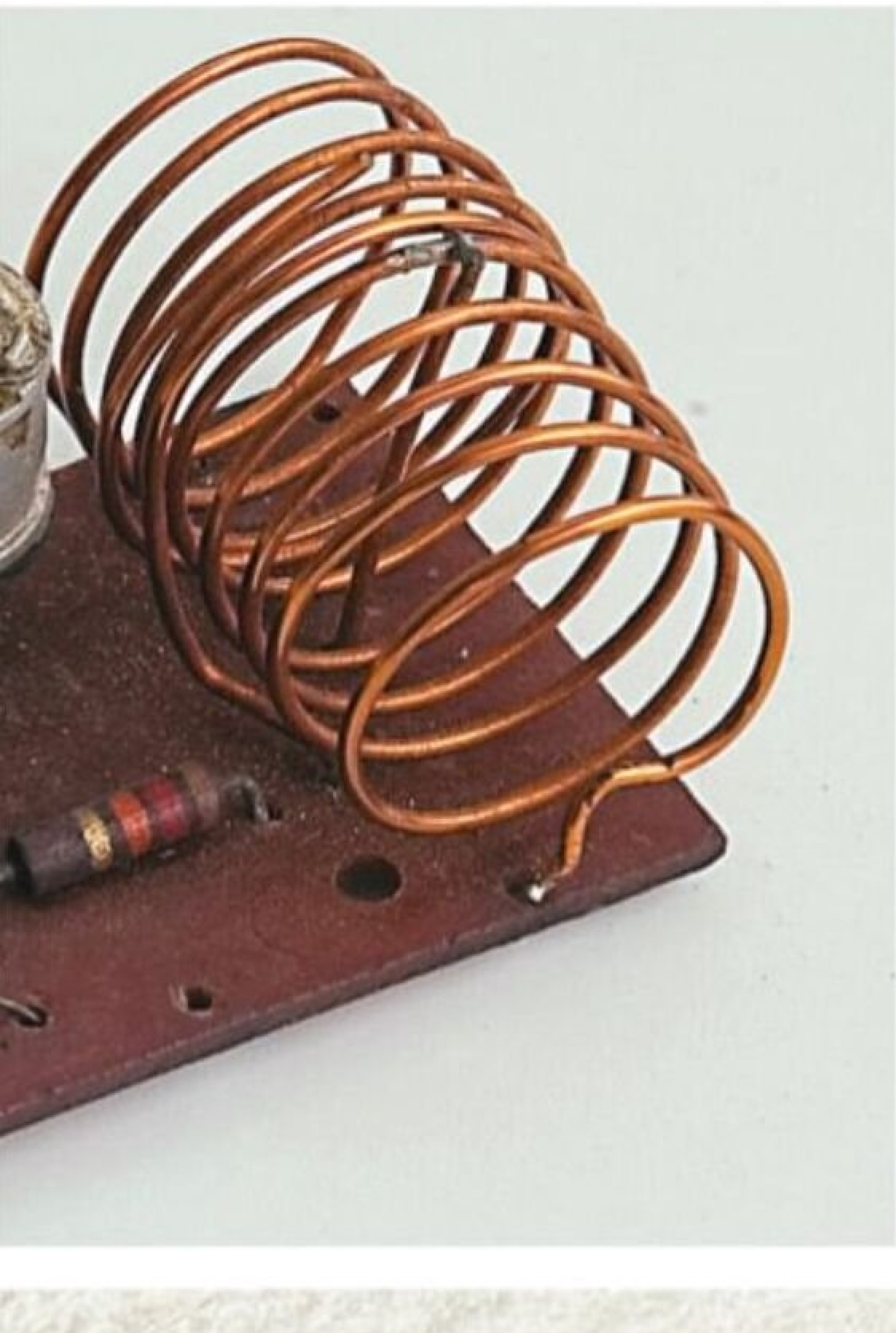
A home-build valve transmitter on a printed circuit board.



Three 1966 issues of RCM&E with nautically themed cover artwork by Laurie Bagley.

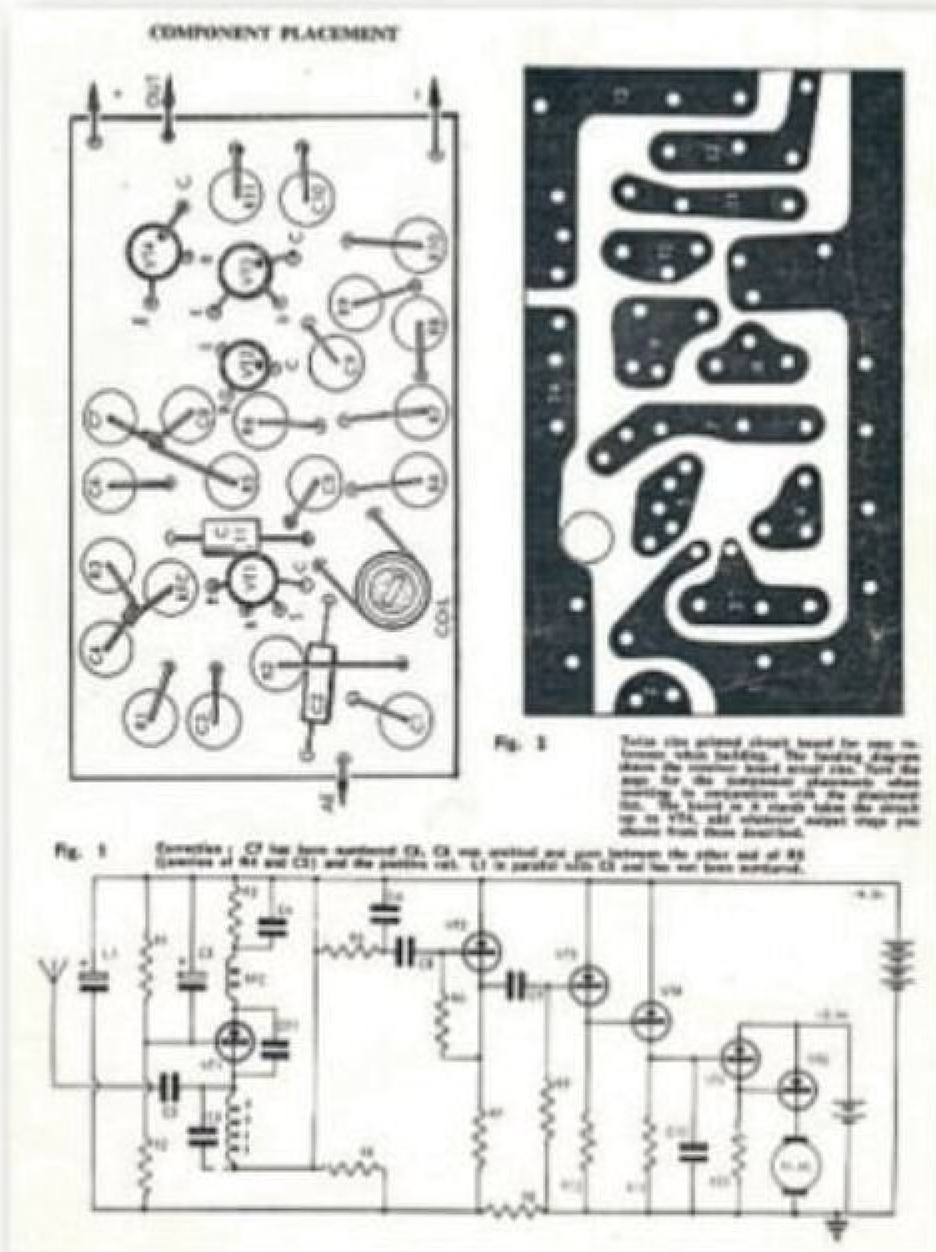
"This decade brought forth the digital era and made commercial R/C equipment financially within reach of many for the first time. The writing was on the wall for those who liked to build their own"

commercial R/C equipment financially within reach of many for the first time. The writing was on the wall for those who liked to build their own. *Radio Control Boat Modeller* magazine, the offshoot of *Model Boats*, continued with DIY electronics projects throughout its publication (1985-1994), but these focused mainly on accessories such as speed controllers and switching units rather than transmitters and receivers.

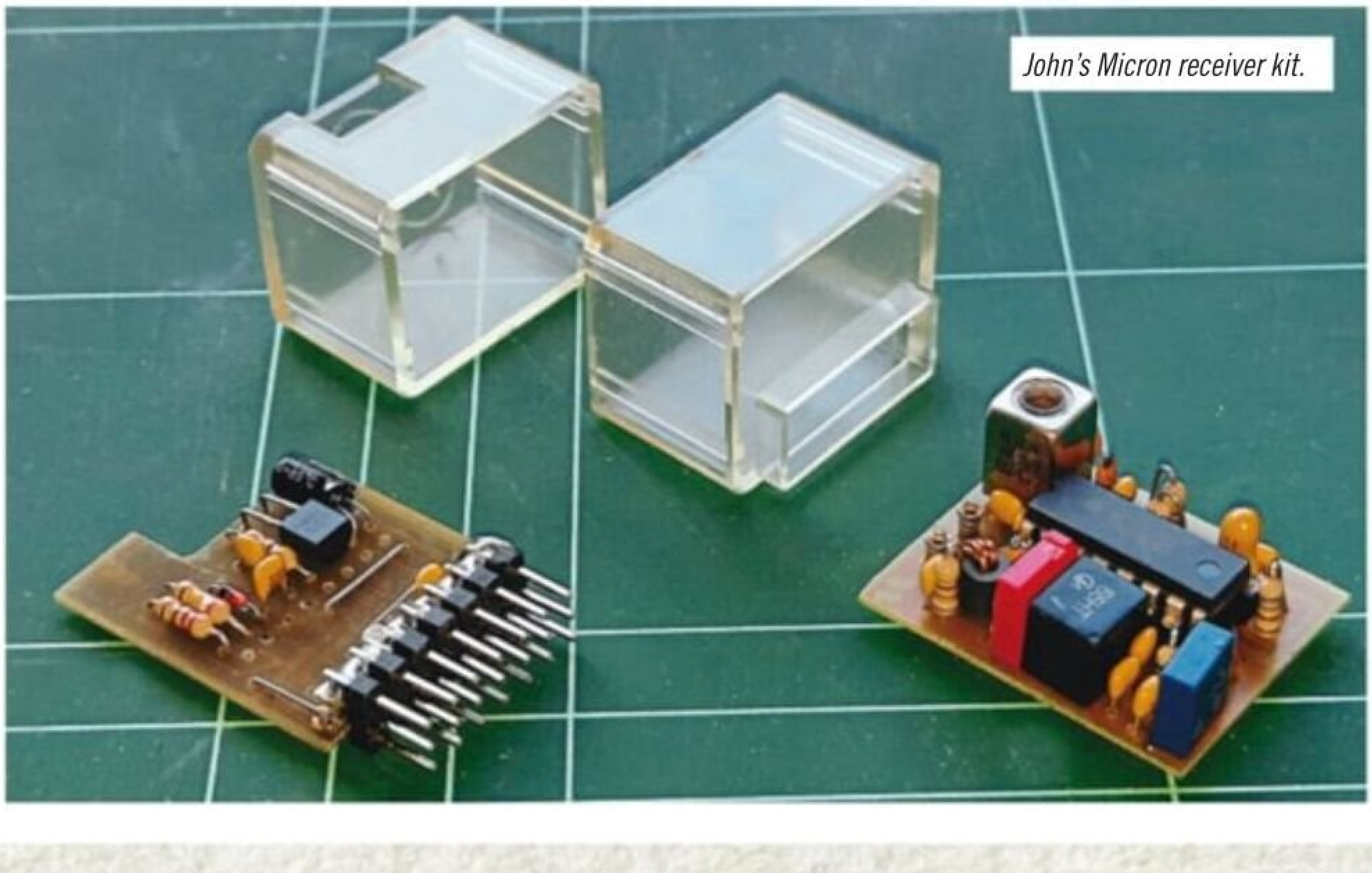


The last company I am aware of that offered kits for building your own R/C equipment was Micron Radio Control, which now specialises in ready-built receivers for miniature rail and car models. I have a Micron Mini FM 7-channel receiver kit from about 25 years ago and, as you can see, its assembly required some delicate soldering work on two small printed circuit boards that then were joined with some wiring; making it practical at all is the fact that most of the complication resides within the integrated circuit.

Nowadays, when even the cheapest toy can come with reliable and sophisticated radio-control, it defies belief that it was all so hard for so long! ●



The circuit, PCB artwork and component layout for the Flexitone receiver, as featured in the September 1964 issue of RCM&E.



John's Micron receiver kit.

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BOILER ROOM

Richard Simpson urges you to consider the use of more 'engineering' in your modelling

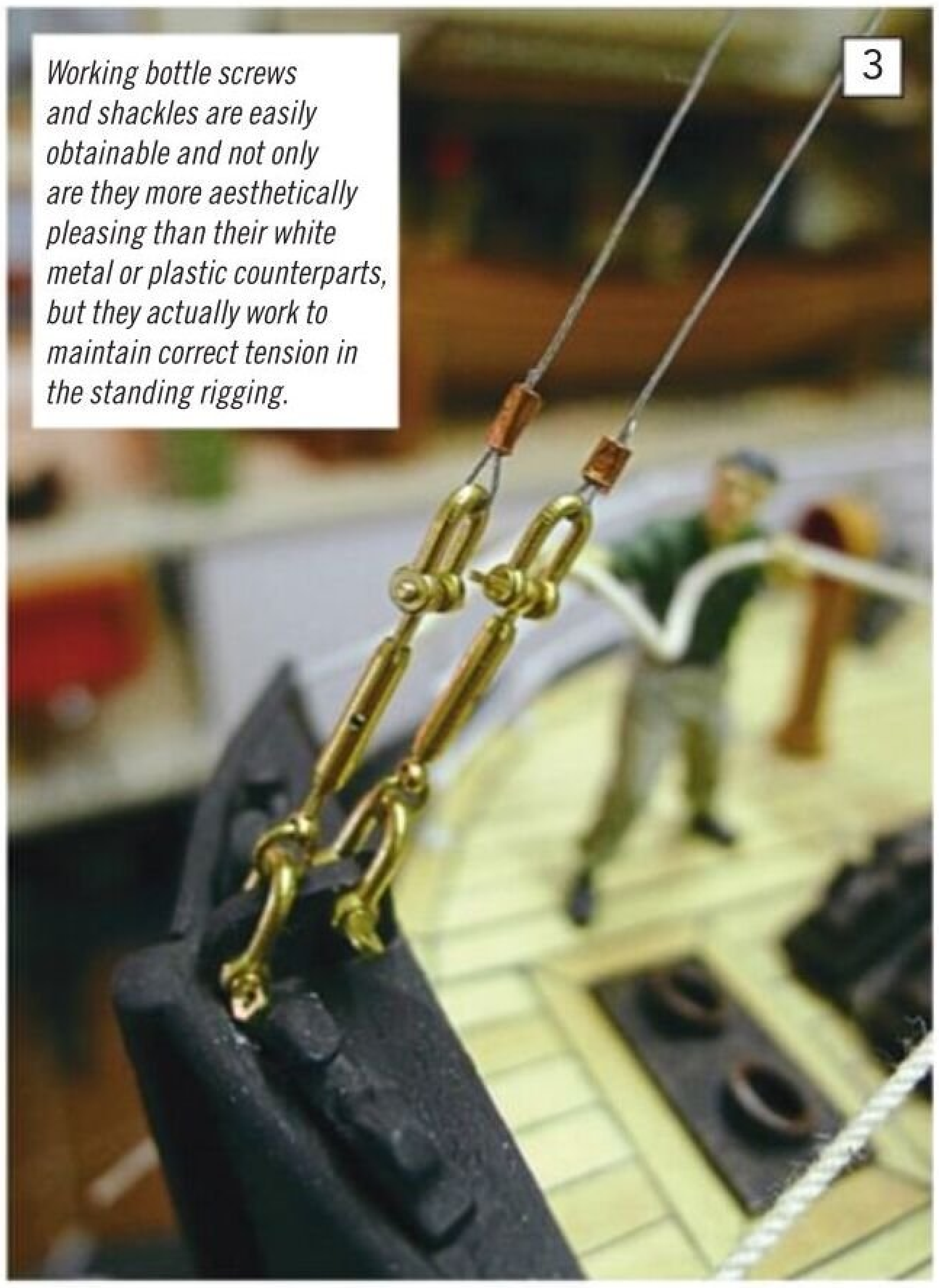
In this month's instalment of Boiler Room I will be wandering off the beaten track at little in order to point out how many of the tools and techniques employed in the building and maintaining of steam plant can be just as useful for 'mixed media modelling' purposes. For those not familiar with the term, 'mixed media modelling' refers simply to the materials we are modelling with. For example, during the 1960s, 99% of model aircraft construction involved gluing pieces of balsa wood together, while in the 1970s the plastic kits that started to really become popular were almost exclusively made from injection-moulded polystyrene plastic: these would be considered 'single media' kits. Nowadays, of course, many kits include a variety of building materials and components, such as a fibreglass hull, a wooden, plastic, or a combination of both, superstructure, and numerous detail parts in cast white metal (making them 'mixed media' kits). Plus, of course, there's a huge number of after-market items available with which to enhance kit builds. When it comes to scratch building parts or making certain modifications to improve the overall look of a model built from a more basic kit though, many modellers tend to stick with the materials and techniques they are familiar with. Beyond our boilers and engines, however, the use of metal and model engineering has a wide, and perhaps somewhat under exploited, range of modelling applications.

As an example, I recently converted a ready built 1:16 scale Willy's Jeep model from a European version to a desert SAS version. These vehicles were frequently fitted with a Bagnold Sun Compass on the dashboard as magnetic compasses were unreliable when located so close to the body of the vehicle. The Bagnold Sun Compass was made almost entirely of brass parts. If I had scratch built this from plastic I would then have had to paint and carefully weather the parts to

> ***"Beyond our boilers and engines, the use of metal and model engineering has a wide, and perhaps somewhat under exploited, range of modelling applications"***

One of Richard's recent projects required the making of a Bagnold Sun Compass from bits of scrap brass. This wouldn't have looked nearly as effective if it had been constructed from plastic and painted up.

Below: All the rigging on this model was built from the plastic parts supplied by the kit manufacturer. Not only does this then require careful painting to make it look realistic, but it will never actually function to maintain tension.



Working bottle screws and shackles are easily obtainable and not only are they more aesthetically pleasing than their white metal or plastic counterparts, but they actually work to maintain correct tension in the standing rigging.

Even when painted to represent galvanised fittings, these remain operational and still look much more to scale.

"Using engineering in this way has a lot of value to us as modellers, broadening the textures and finishes achievable and increasing the level of realism"

try and effect a brass-like appearance, but obviously this wouldn't have looked as good as actual brass. I decided, therefore, to exclusively use bits and pieces of scrap brass from which to fashion a more credible interpretation, with a much closer to reality finish (see **Photo 1**). Using engineering in this way has a lot of value to us as modellers, broadening the textures and finishes achievable and increasing the level of realism. To put this into context, I'll share a couple of examples where I think using engineering techniques has paid off.

Rigging

Many kits come supplied with rigging fittings, usually manufactured in white metal or plastic. Either way, they sometimes lack strength and good looks. The kit-built fishing boat illustrated was assembled straight of the box, using all the plastic parts supplied for the rigging, such as the sheaves and tensioning screws. The only way the rigging could be make to look tensioned, however, was by using rigid wires in much of the fixed rigging (see **Photo 2**). The use of after-market fittings such as brass bottle screws and shackles in conjunction with real wire for shrouds and stays (I frequently use the fine core from old servo cables) not only gives a much better look but actually works, allowing a realistic tension in the rigging to be maintained. In some instances, a better look can created by enhancing the use of brass fittings with a simple wash or clear coat (see **Photo 3**), while in others applying grey paint to resemble galvanised fittings works well (see **Photo 4**); either way, not only will you notice a huge improvement in aesthetics but you will have a standing rigging arrangement that's far stronger and fully operational.

Mast fittings

In many kits mast fittings are also supplied in either white metal or plastic but, again, the strength may not be up to what's required. These are frequently better made from brass, and this is where we can start to look at scratch building exactly what we want (see **Photo 5**). Brass tube can be purchased in stock lengths, and it's worth keeping a reasonable quantity in your own materials drawer. Each is designed to a diameter that will allow it to slide over the next size down, a very useful property, and tubes can be cut either in a lathe, with a suitable blade in a power saw or with a pipe cutter. My preferred method is the power saw as it doesn't leave a burr, just a perfectly square flat end. The brass components can then be soft soldered together to make a whole range of mast furniture, which can either be painted or polished up to the desired finish. The brass mast head lamp illustrated here (see **Photo 6**) was soft soldered to a piece of brass tube to make a neat and effective mast fitting.

Handrails

Many kits are supplied with white metal handrails, which, while they may look OK when fitted, frequently succumb to handling and end up bent and misshapen over time.

A combination of white metal mast rings, brass shackles, real wire, and copper thimbles, all add up to a more credible, practical and effective fixed rigging set up.

Invariably, they also don't have the best standard of surface finish either, so are ripe for replacing with after-market turned brass items. I find assembling the entire handrail and stanchion unit on a ship, without gluing it to the deck, and then soft soldering it together works well. The unit can then be removed for painting, weathering or polishing before being permanently attached to the model (see **Photo 7**).

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Brass tube can be used to make your own mast fittings and soft soldering the parts together makes for a good, strong fitting. The base and the nuts are plastic, just for a scale effect.

General thoughts

Before looking in a little more detail at a specific project, there are a couple of general points to address. First up, of course, is deciding which tools are needed to work the metal. Recently I went through some of the considerations when setting up a home metalwork shop. While the prospect may initially seem a little daunting, as pointed out, I started with the very basics and relied on saws and files until I was able to afford such luxuries as a lathe, power saw and milling machine. I've even seen examples of modellers making their own lathes using a power drill to drive them; however, serious thought must be given to the safety aspects of such cobbled together devices. You will generally find that many small metal components can be fashioned from bits of scrap using nothing more than your saw and files. Holding parts in a power drill and dressing them up with a file is another option but, again, always prioritising safe practice. Not surprisingly, I would encourage any serious modeller to buy a small lathe. If looked after, you will have this for life, making it a sound investment, and you'll be amazed by how handy it can be for making parts from all sorts of materials. Bushes and small turned

"You will generally find that many small metal components can be fashioned from bits of scrap using nothing more than your saw and files"

items can literally be produced in minutes, meaning not only will you get better results but in a fraction of the time taken to carry out the same job with hand tools.

Another consideration is stock metal. I rarely throw much away, even the bits and pieces that many people would dismiss as off-cuts, so I've built up a useful stash that I keep tucked away in a drawer (see **Photo 8**). I keep a good supply of brass and copper tube and extrusions too, mainly for steam jobs but also for other modelling applications (see **Photo 9**). Very small brass BA nuts, bolts and screws are surprisingly useful; not only do I use these as screw fastenings but frequently glue them to items as enhancements. I keep a selection of 14 BA fastenings as well as a 'bit box' full of other sizes. Picking up bits and pieces at shows and online is a great way of building up a cache of brass items that can be used to form new parts.

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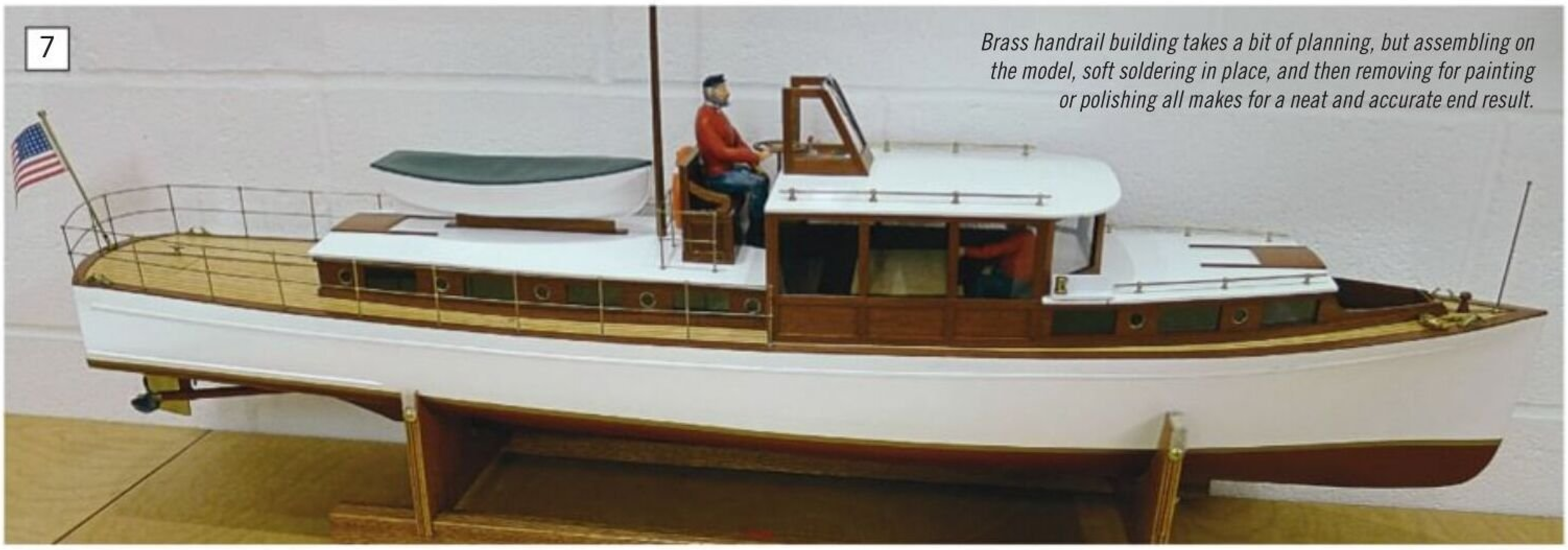

Brass handrail building takes a bit of planning, but assembling on the model, soft soldering in place, and then removing for painting or polishing all makes for a neat and accurate end result.

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Bits and pieces Richard has collected over the years provide an invaluable stash of mainly brass components ready to be turned into parts of models.

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Also built up from years of show visits and leftovers from projects, a stock of frequently used brass and copper stock lengths.

Built mostly from the kit supplied parts, this anchor winch makes into a very nice model. The only real enhancements were the brake levers made from brass rod and dressing up the warping ends in the lathe.

A steam winch project

So, to now put all this together, let's look at something a bit more involved and see what an engineering approach can do for us. As an example, I am going to use a kit supplied steam winch. All the parts provided were white metal castings, and if assembled as per the instructions would make a perfectly acceptable steam winch. If you wanted to improve the overall appearance though, instead of a silver painted con rod you could use a steel rod, and instead of a brass painted valve rod you could use real brass, thus achieving a far more realistic overall effect. Stock parts can be purchased as either tube, plate or extrusions of differing shaped cross sections, opening up a huge range of possibilities, and all can be finished to a far more accurate standard than cast plastic or white metal. For example, I invite you to compare two pieces of deck machinery: the first, an anchor windlass, was built mainly from the kit parts with a couple of little tweaks (see **Photo 10**), while the second, a steam cargo winch, I decided to improve and enhance as much as I could.

The first step in any scratch building project is identify the component parts. This will then help you to select the different materials required and consider how they need to be put together.

What prompted me into making some changes was that after the first application of paint it quickly became apparent that the kit supplied components could be a little crisper and better defined (see **Photo 11** and **Photo 12**). On my steam winch I noticed that the cylinders were not fitted with valve chests, so I need to add these, along with a bolted cover and valve rods driven from an eccentric on the crankshaft. I therefore needed materials to make these parts and decided that the rods and eccentrics would be brass, while the valve chest and bolts could, as they were to be painted, be crafted from wood and plastic. The cast cylinders as supplied included the piston rods, glands and guide rods, which would require a lot of very careful fettling to get them looking anything like realistic. A much better representation could be achieved by using a brass tube for

A coat of paint frequently shows up those areas that could do with improving. Richard decided to remake this part from a solid piece of aluminum plate to give a neater finish and a more regular shape.

The cylinders were certainly the area that would benefit the most from a scratch build in metal. Breaking down the shapes into identifiable components that could then be manufactured was the next step.

Identifying the best metal spare to use can often be identified by the shape of what you're trying to reproduce. Frequently there is little more than a bit of cutting and drilling required. The lathe makes square cutting tube very easy.

The plastic winch drum was replaced with another section of brass tube and the cross members were all created by repurposing various pieces of brass pipe and tube. The warping ends were dressed up but, by the time the finish was good enough, too much metal had been removed.

Consequently, the warping ends were made out of brass bar in the lathe; A fairly easy turning and drilling job that shouldn't take a great deal of time.

With a wooden valve chest, valve rods and cranks made from brass, BA brass nuts and bolts for crank pins, and plastic nuts on the valve chest, the cargo winch is looking much more realistic.

"We now come to one of the biggest challenges when building anything of a mixed media nature, and that is what to use to stick everything together…"

the cylinder, with various bits and pieces fashioned from different metals to create the other components (see **Photo 13**). I also made a new drum from a piece of turned brass tube (see **Photo 14**), and, after turning the warping ends down in the lathe and not being happy with the result, I also made brass warping ends (see **Photo 15**).

We now come to one of the biggest challenges when building anything of a mixed media nature, and that is what to use to stick everything together. In some cases, soldering will be quick and easy; in others glue can be the better option, particularly when joining metals to plastics or wood. Metals can prove tricky to glue successfully as no glue will penetrate the surface. We are, therefore, reliant on glue with a good grab. Some modellers favour cyanoacrylate glues, but I tend to steer clear of using these with metal as their grip tends to loosen with age. I usually opt for a two-part epoxy such as Araldite (either full strength or rapid) or Stabilit Express (which is a base and activating powder mix). Both bond with metal well and firmly secure metal to other materials such as wood or plastic. Also not to be overlooked is the use of real fastenings, such as brass or stainless-steel nuts and bolts; both types are available in small sizes, look realistic and prove reliable. The winch we are dealing with here is held to the deck with small BA brass screws as they are far more effective than any glue at such a size.

Once I had identified the various component parts, made them, glued them all together and built my enhanced steam winch (see **Photo 16**), it was time for a painting and weathering job. Chipped paint effects used in conjunction with real metal effects, such as polishing and polishing with a wash over the top, can produce some very convincing finishes surprisingly easily. The cast metal components of my winch were first given a (sprayed on) metallic base coat. They were then dry brushed with rust enamel paint, and sprayed with good old hairspray, which I use as a chipping fluid. This done, a topcoat of a water-based light grey acrylic was applied. All of this was then distressed using a small brush dipped in water to 'chip' away little spots of the topcoat of paint and reveal the metallic finish underneath. The overall effect was a much more plausible rendition of a steam winch on my 1930s'-1940s' steam coaster (see **Photo 17**.)

Conclusions

Many of us use engineering techniques and practices without even realising it, but many still struggle with using unsuitable materials because they simply haven't considered using metals in general modelling. I think this should be a completely integral part of how we build a model. Familiarising ourselves with different types of metals and how they can be incorporated for the sake of finish, realism and strength certainly adds another string to our bow. Just comparing a kit supplied white metal casting with a scratch built alternative shows what can be achieved (see **Photo 18**), while, of course, using these skills throughout the entire model can make a huge improvement to the overall outcome (see **Photo 19**). ●

Some painting and weathering used alongside real metal finishes, some scale rope wrapped around the drum, and the fabrication of steam pipes from copper tube wrapped in cord insulation, all serve to make things look very life-like.

"I think this should be a completely integral part of how we build a model"

The kit-supplied cast white metal cylinder and Richard's own self-fabricated and much improved version.

Left: Included in this one shot is a photo-etched push bike kit, real BA bolts holding down the water tank, vent cowls sat on brass tube as opposed to wooden dowelling, operational bottle screws on wire shrouds and many more bits and pieces. All add beautifully to the level of realism and attention to detail.

Al Khubar

Al Khubar was a harbour tug.

This colourful harbour tug was built in 1976.

The kit is to the usual high standards and includes building manual, GRP hull, other materials. CNC cut styrene decks and superstructure, full size plan, resin and white metal fittings.

Your Models

Whether you're highly skilled and experienced or completely new to the hobby, you're definitely invited to this launch party! So please keep the contributions coming by emailing your stories and photos to editor@modelboats.co.uk

LCT 7074

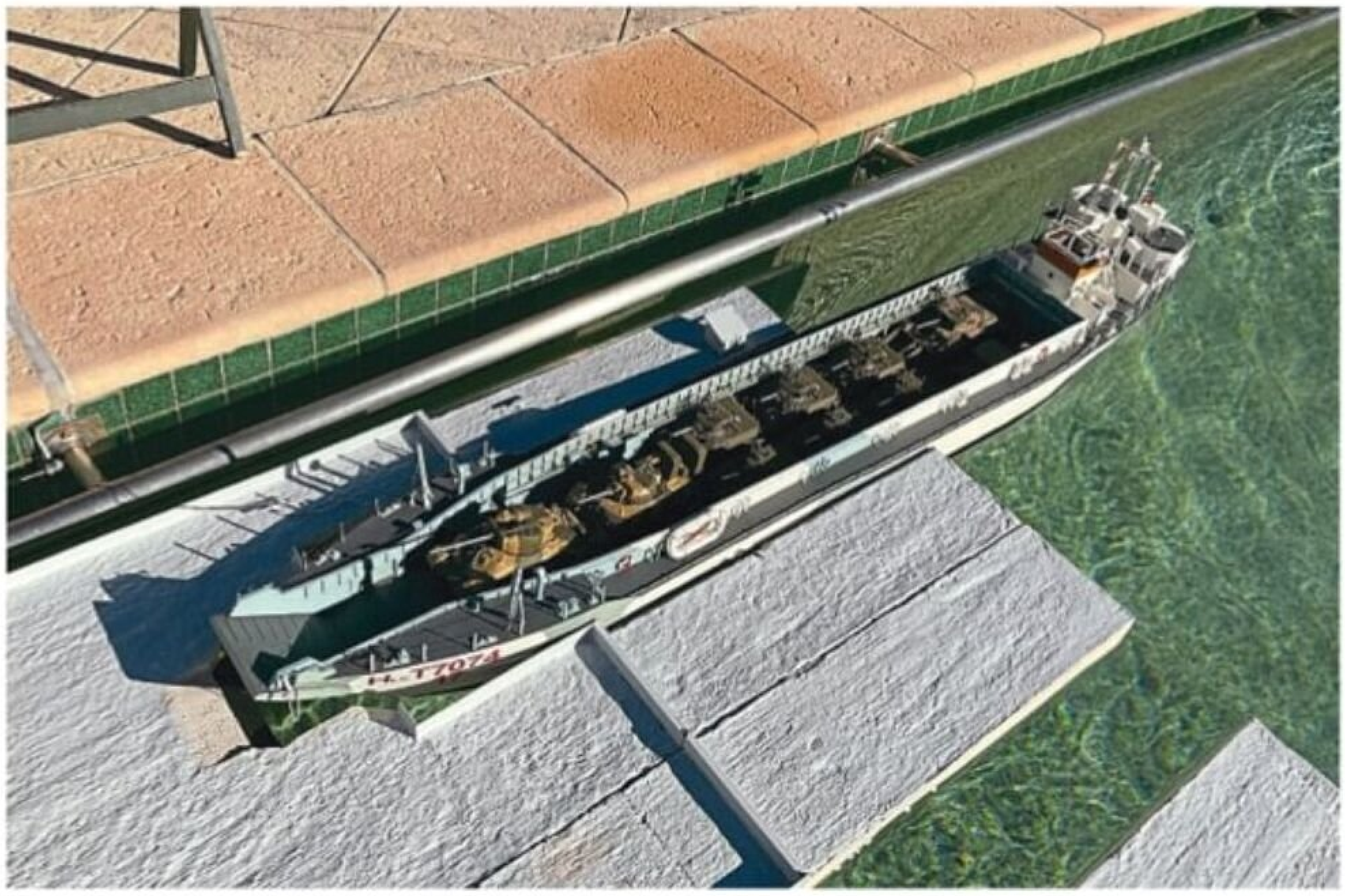
80 years ago, on June 6, 1944, the Allies executed Operation Overload off Normandy, France, that saw the D-Day amphibious landings against German occupied territory in Europe. An armada of ships was necessary to transport all the equipment and personnel necessary, including tank landing ships. One of these, LCT7074, the last surviving landing craft tank Mk III from that invasion, is the subject of this article. Today she is preserved and on display at the National Maritime Museum of the Royal Navy, at Portsmouth in the UK. Built by R&W Hawthorn, Leslie & Company and was launched on March 30, 1944, she measured 59 meters in length and had a beam of 12 meters. Her first load of tanks consisted of seven Stuart V M3A3 scouting tanks from the 5th Royal Tank Regiment, two Sherman M4A4 OP medium tanks from the 5th Royal Horse Artillery Regiment, and one Cromwell medium tank from HQ 22nd Armoured Regiment, along with a total of 45 crew.

The cramped internal workings of a static to R/C tank conversion.

My association with amphibious ships began back in 1982 when I was posted to the Landing Ship Heavy H.M.A.S. *Tobruk* L50, which was my last sea posting during a 20-year career in the Royal Australian Navy. I had obtained modellers plans of *Tobruk* and these later saw me build a radio-controlled working model of her (incorporating 19 working functions) over a period of seven years, this being completed in January 2022. To accompany my *Tobruk*, I also built a model of the Landing Craft Heavy H.M.A.S. *Balikpapan* L126 (featuring six working functions). A six-minute YouTube video 'HMAS *Tobruk* – 1:72 scale radio-control ship' may be viewed online for those interested. These models were sailed three times to produce that video, then both were then sold to the Australian War Memorial in Canberra for future display in its new Peacekeeping gallery, currently being constructed for an opening in late 2025. The model of *Tobruk* has already had its first official viewing when in April 2023 veterans of Operation Solace, who served in her in Somalia, gathered at the AWM to commemorate that activity.

An overhead view showing the model's tank load.

In May/June 2022, a build article for a 1:72 scale model of LCT 7074 by Francis McNaughton was published in Model Boats magazine. That article inspired me to build my own version of LCT7074, but at a scale of 1:35. I referred to the plans that were included with the article to construct my model but unlike Francis, who made use of plastic, I elected to build in ply. 1:35 scale was chosen, in order to allow two Sherman tanks, which I had converted from static to remote control with rotating turrets and had left over from my Tobruk model, to disembark onto my floating jetty. The jetty was made from foam. The six Stuart V light tanks and the one Cromwell tank remained static models. To fill the void at the rear of the tank deck, two jeeps with their trailers were added.

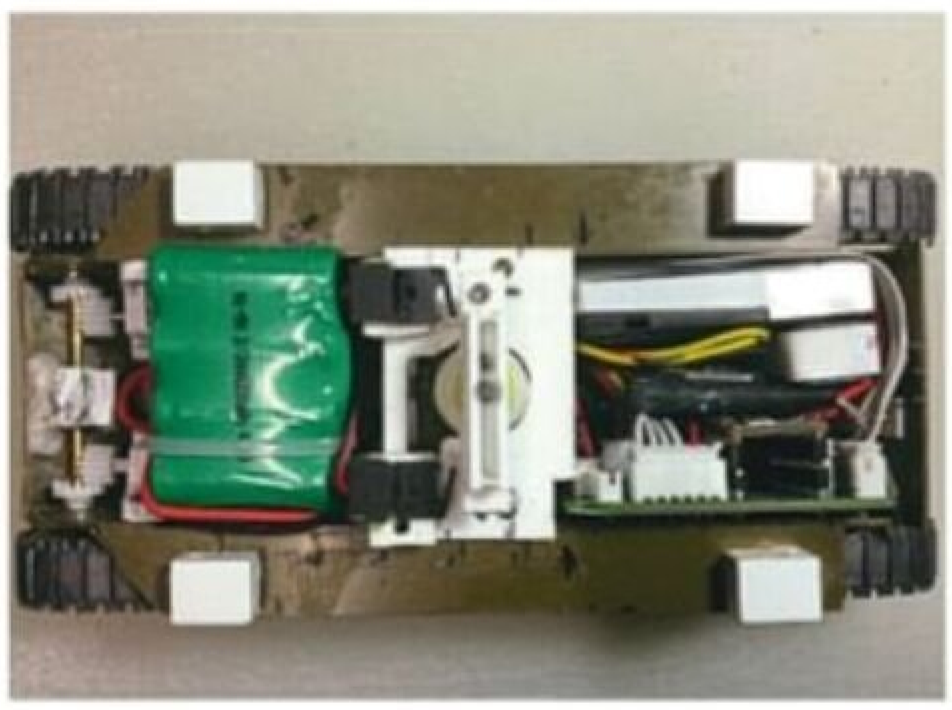


The chart table, complete with a map of Normandy coast and the bridge front.

Working functions include the bow ramp, rotating Oerlikon guns and a (not particularly successful) vapour smoker. The flag hoists flown on the port side reflect the ship's international callsign, GXNC, while the starboard side hoist spells out D-DAY courtesy of flags of the type used in 1944. On the front of the bridge is the ship's pennant and flotilla numbers, and above these numbers is the motto '*Dum Spiro Spero*', which translates to 'While I breathe, I hope'.

Inside the bridge, there are the usual voice pipes and binnacle, and a flag bin containing all the unused flags (starboard side), while on the port side the chart table features a map showing the Normandy Coast, English Channel and England, including routes taken.

The two Sherman tanks are controlled using miniature motors and gearboxes to control the tracks. A further motor is used to rotate the turrets. My fellow club member, Hugh, devised the control board inside the tanks, and the transmitter was modified using the gimbals to allow control of the tanks together or individually. A further switch is used to control individual turret rotation. A control board was also made to control the LCT's working functions – I can say here, there wasn't any room left under the superstructure.

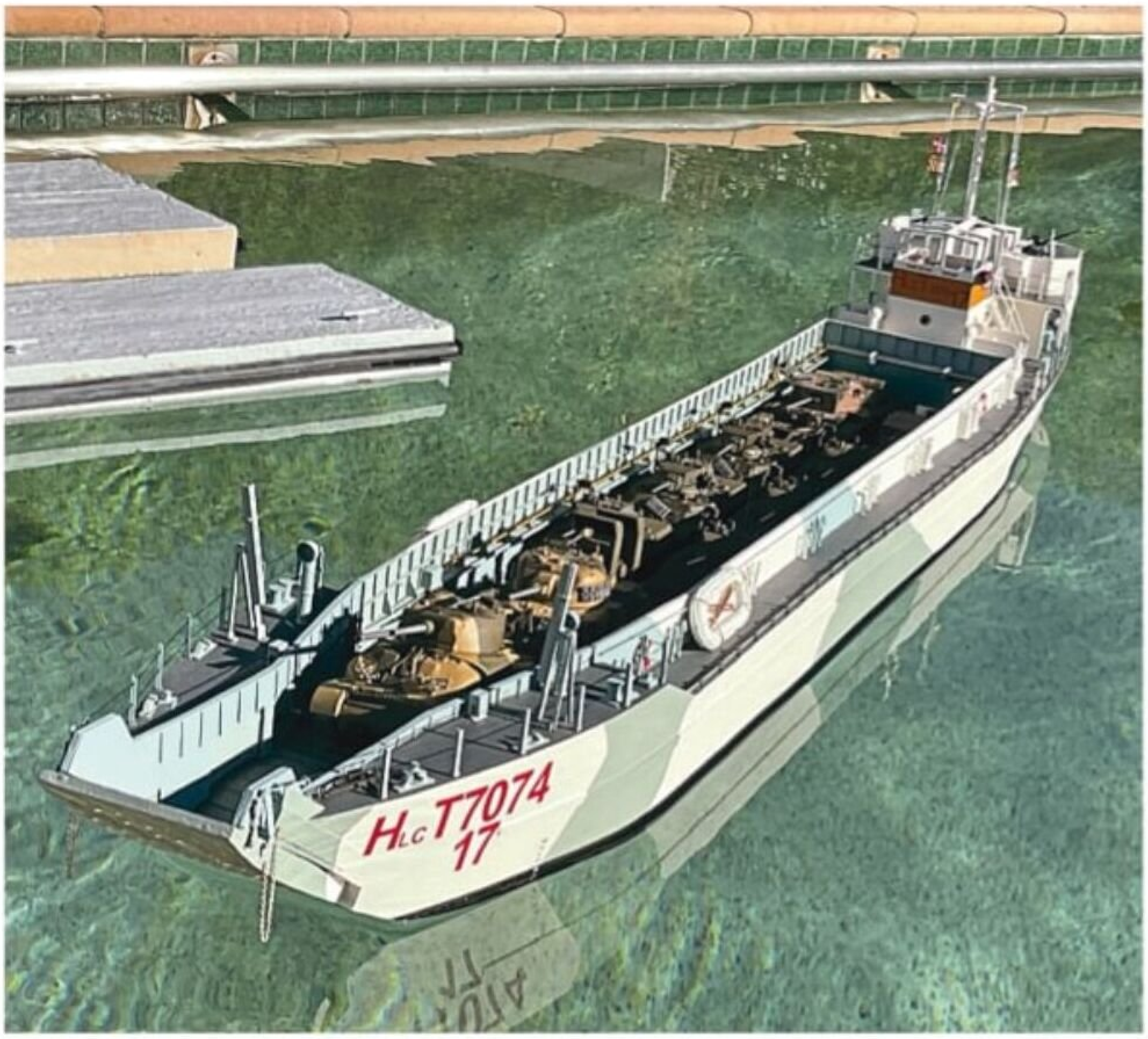


The build was an interesting one, which took 12 months to complete, and my thanks goes to Francis McNaughton for the plans, build instructions and for sharing his knowledge and expertise.

My thoughts are also with all the brave men and women who sacrificed their lives during the Normandy landings for the freedom we enjoy today – Lest We Forget.

RICK MAYES
QUEENSLAND, AUSTRALIA

Thanks so much for this timely addition to Your Models, Rick. Your larger scale version looks superb, and I am sure Francis will be delighted to see what you have achieved. Ed.



The model finally finished and on the water.

Troy, the canal pusher tug

Troy: Dave Mark's 1:12 scale British Waterways' tug.

My father was a maintenance foreman working for British Waterways (BW), which until 2012 was the government body responsible for the upkeep of the majority of the canal system in the UK. Having seen details of a revolutionary new fleet of pusher tugs and ancillary vessels that the company had won the contract to design and build in a BW staff magazine, I decided the pusher tug would make a perfect modelling project, due to its unique design and attractive colour scheme. While at the boating pond, the chance of seeing another model of this vessel would be pretty well non-existent.

So, where to start? Well, I began to look at what further information was available on the internet at that time and was pleased to find a number of detailed images, all in glorious colour, of the tug, plus specification details which included the length and beam dimensions of 6m and 2.07m respectively. The bow of each tug featured a coupling system to engage with one of the module units (*e.g.*, a mud hopper) but also included two winch units to allow the tug to be used with older style dumb vessels not fitted with the coupling system.

The next step was to find an actual tug on the canal system and take numerous photos, including a full-length image of the starboard side, ditto the port side, and full width images of the bow and stern, ensuring that all four of these 'key elements' showed the full height of the superstructure. Fortunately, the tug used for the photo session was moored adjacent to a road bridge, which enabled be to obtain images (taken from above) of the deck profile and ancillary equipment, e.g., the winch units.

Armed with the vital dimensions of the actual vessel, previously defined, together with the collection of images printed off onto A4 paper, from there it was a relatively easy task to produce some working drawings for a scale model.

I chose to build *Troy* in 1:12, which gave a model with an overall length of 500 mm (approx. 20 inches) – so, a fairly small model to both store and to fit into the car for trips to the pond.

I like to add at least one scale figure to my models, as this gives onlookers an idea of the size of the actual vessel. In this case, the steerer at the wheel of *Troy* is one of a range of figures obtainable from Mountfleet Models.

I cheated a bit with the hull design. Although there was enough information available to create a good representation of the actual hull, I opted for a Springer style hull (see NB 2) for ease of manufacture and also to give more space for the batteries (2 off, 6V gel cells) and the necessary electronics. The shape of the hull above the waterline, however, is fully representative of the actual vessel. The hull was constructed from birch ply, with some softwood, and the superstructure from Plasticard. The coupling system and the twin winches (previously mentioned) can be seen on the model just aft of the pusher pads.

The paint used was all from the Halfords rattle can range, including the primer/filler, which provided a very good likeness to the non-slip surface on the deck of the actual vessel. The decals were all home made using the appropriate decal paper and my home computer and printer. Normally these tugs were not named, but I know of one named *Darb*, so I named my model *Troy*. The name comes from a short arm off the Grand Union Canal, close to where I used to live.

Ballasting the model to give it a realistic amount of freeboard was the only problem that I encountered with the build. The twin batteries were a great help, but after adding lead sheet to every suitable space below deck, the freeboard was still not correct. Adding weight above deck was, therefore, the only solution, thus the two covered oil drums astern of the cabin both contain a large slug of rolled up lead sheet; not an ideal solution, but providing the model is kept to scale speed it has not proved to be a problem.

Designing and building a Springer style tug is (in my opinion) is an ideal entry into scratch building. As British Waterway (BW) officially ceased to exist in July 2012 and was replaced by the Canal & River Trust CRT), anyone wishing to find one of these pusher tugs to take some reference pictures of would have to contact their local CRT office. And, obviously, CRT decals, as opposed to the BW ones on my model, would now need to be created.

Also worth considering is once you've scratch built a model compliant with a set of rules controlling hull shape/size, motor type, *etc*, you can then partake in various competitions against other Springer tugs – great fun!

Finally, some great footage of a 1:1 vessel in action can be found on YouTube by running a search for *BW Pusher Tug Breaks Ice at Cow Roast, Grand Union.*

DAVE MARKS
EMAIL

You've done a really neat job here, Dave, not just in terms of your own marvellous model but in promoting these Springer style pusher tugs as fun and highly recommended entry level scratch building projects. Ed.

The Terror

I thought you might be interested to see some photos of my 1:75 scale static model of the Royal Navy ship *The Terror*, which I built from a kit by OcCre. I had intended to write an article of the build, but unfortunately was unable to complete certain aspects of the build, due to poor eyesight, lack of skill, and making the mistake of using Superglue to secure some of the rigging, making it brittle and prone to snapping when it was flexed.

For centuries, European countries had wanted to find a shorter sea route to the Orient by sailing west. The difficulties of finding a Northwest Passage were immense. The short 'summers', unpredictable ice, fog, a mirage effect known as iceblink, the cold, barren landscape, the maze of islands, inlets, false channels, inaccurate and incomplete charts were bad enough, but so too was the difficulty of navigation so close to the magnetic pole. Ships often became trapped in the ice and crews were forced to spend winters in darkness and intense cold, hoping the ice would melt the following summer. It was not until 1906 that Roald Amundsen completed the Passage in a small boat with only six crew. It took him three years.

The Terror was a three masted Royal Navy 'bomb' ship built in 1813 in Devon. She was strongly built to carry heavy mortars on her deck and was further strengthened for exploring the Northwest Passage in 1836. Just as well, as she became trapped in the ice over the winter. Damaged, she limped back as far as Ireland with a chain around her hull to keep it together! She was refitted and then, together with *Erebus*, set out in 1839 on a four-year expedition to the Southern Ocean, during which three attempts were made to reach the South Pole.

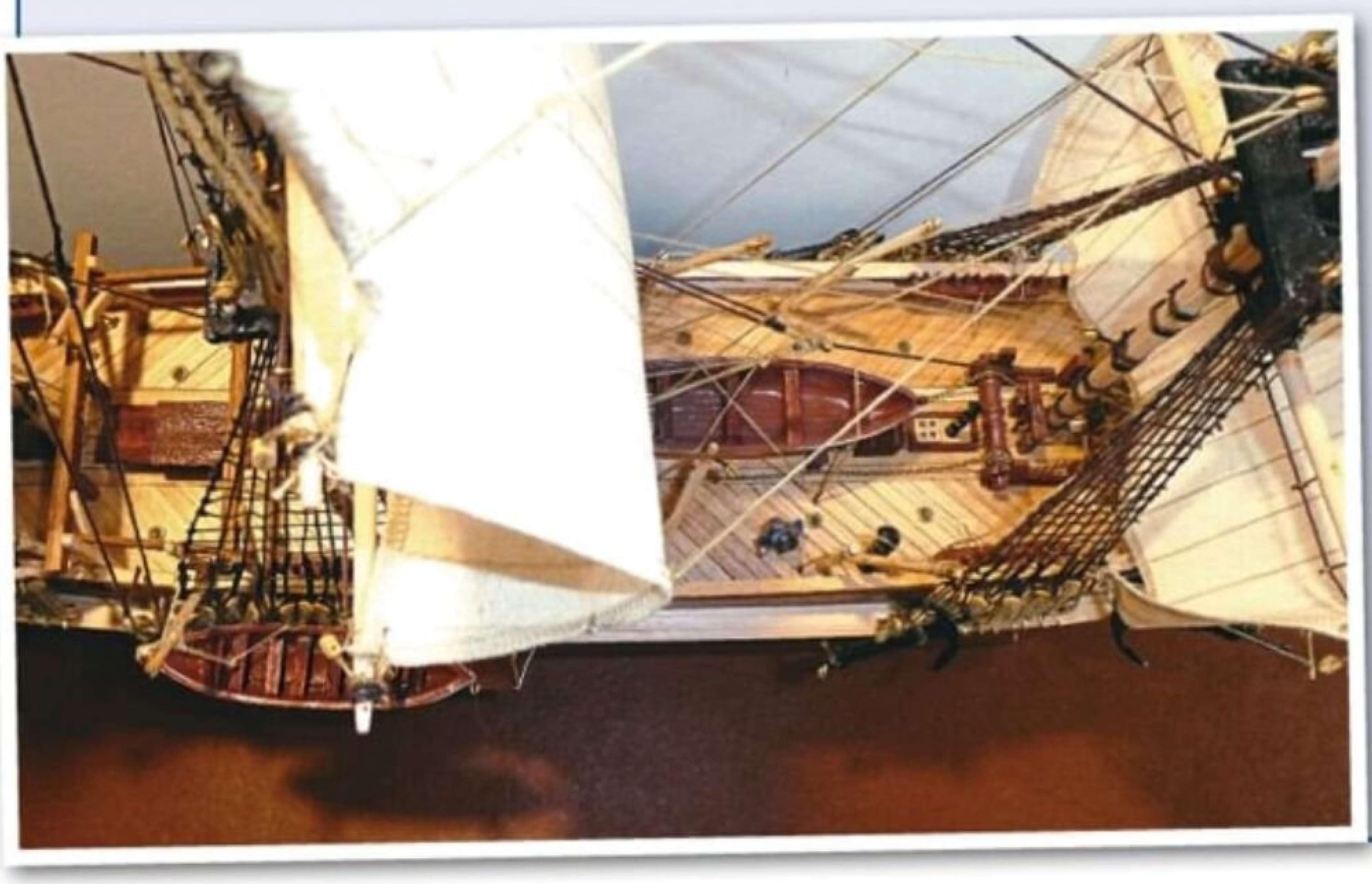

David Neal's build of OcCre's 1:75 static kit for The Terror.

On return to England, both ships were again repaired and refitted. This time they had an addition: a steam engine. The engine was for emergencies, such as breaking through ice, or dodging icebergs. It was early days for marine engines, and the practical solution was to use a 25hp railway locomotive mounted inside the hull, complete with wheels! A two-bladed retractable propellor was fitted to the modified stern. Another innovative feature was the many 'illuminators' set into the deck to bring light into the hull.

In 1845 *The Terror* was sent on another expedition to find the Northwest Passage, together with her sister ship, the Erebus. Neither ship was seen again, nor were any survivors found, despite several rescue missions being sent. In 1948, the crew apparently left the ships frozen in the ice to trek overland. Some bodies and artefacts were found, and the indigenous people had had some contact, but the deaths remained a mystery and have been the subject of much speculation ever since. Possible causes were food or lead poisoning from the tinned supplies the ship carried, tuberculosis and fighting amongst the crew. The wreck of *Erebus* was finally found in 2014, and that of *The Terror* in 2016.

If readers want to know more, Michael Palin has written a non-fiction but very readable book Erebus. There is also a docu-drama book TheTerror by Dan Simmons.

DAVID NEAL
EMAIL



I think you are selling yourself a bit short, David, as despite the difficulties encountered you've done a splendid job.

Thanks, too, for these recommended reads. Probably like many readers, I watched Ridley Scott's BBC 1 drama The Terror, and, while the chain of events portrayed was purely speculative and in parts the plot was very 'out there', I feel it did offer a good, although hard to watch, insight into the dreadful predicament and awful conditions the crew must have found themselves in. Ed.

Huon Pine decked beauty

I am sending you some pics of a model I loosely based on Ray Wood's plan for *Eventide*, which featured as one of free plans included in this mag. She's 110 cm in length and 35cm beam. All the blocks and winches are operational and were built 'in house'. They will not, of course, be used while being sailed but are nice for static display. The deck planking was done using individual planks of Huon Pine, an indigenous wood from Tasmania. On the whole, I am pleased with this model, and I learnt some valuable lessons during the build that I will be able to utilise in my next project. I always enjoy reading Model Boats, even though we receive it at least two months after the published date here in the Antipodes.
MICHAEL EAST
EMAIL

What a smart, clean looking, build, Michael! I love that you used locally sourced wood for planking your deck. I was curious, so did some research about Huon Pine. I was amazed to discover that some of these native to Tasmania trees (which are found nowhere else on Earth) can live to around 2,500 years old, and that because of the high oil content (methyl eugenol), the highly prized timber from them is naturally waterproof, can be bent, shaped, worked and sculpted without splitting, and (as evidenced on your model) ages to a rich honey gold. So, we both learnt something from this project!
Ed.

Right: Michael East's superb build, based on Ray Wood's plan for Eventide, a classic single chine sloop.

Robin Searle's 1:48 scale Sea Shadow stealth boat build on the water.

Large scale *Sea Shadow*

Why do these things happen? I was taken with the article in the June 2023 edition of *Model Boats* by Lionel Broadbent, describing his model of *Sea Shadow* and found I could not resist the challenge. I started the build a little later and just this weekend (March 31, 2024), managed to finally get her on the water. The weather has been so cruel of late.

I noted Lionel's comment that perhaps a larger scale would be useful, so my Sea Shadow is built to 1:48 scale. The bow and stern nose cones are 3D prints and are 'O' ringed into a 50mm o/d PVC downpipe – near enough for my purposes. The stern cones house E-Max CF2812 brushless motors driving 45mm diameter 5-bladed props on sealed 4mm diameter stainless steel shafts. Initially she was to be powered by an 11.7 Vdc 3S Li-Po battery, but I found that was too much so changed to a 7.4-volt 2S version. I painted her as per how the full-size ship was first seen, in plain black dark grey (radar absorption paint).

I found tank type steering to be a challenge on during her first trial, but gradually got the hang of it. She is sensitive to the inclination of the inner hydrofoils, a little more than neutral incidence proved to be OK. The main problem is slowing her down; even with the reduced voltage she just leaps away. Perhaps smaller props are required. At the end of her maiden voyage, a friend who was commissioned to take video evidence stated the only problem of which he was aware was that the radar reflecting panels meant he couldn't see the thing! Where would we be without a comedian on the scene? So, at 41 inches long with a 17-inch beam, she has most onlookers guessing.
ROBIN SEARLE
WEYMOUTH & PORTLAND MBC

Ooh, she's so stealthy and sinister looking in these on the water shots, Robin. Nice work! Ed.

Your Letters

Got views to air or information to share? Then we want to hear from you!

Letters can either be forwarded via email to **editor@modelboats.co.uk** or via post to **Readers' Letters, Mortons Media Group, Media Centre, Morton Way, Horncastle, Lincs LN9 6JR**

Mick Astle is making great progress on his build of the Deans Marine steam collier Hudson Sound but is hoping someone can shed some light on a couple of detail queries he has.

Hudson Sound advice sought

I am building a Deans Marine *Hudson Sound* steam collier. At the moment I am about three quarters of the way through the build but am wondering if anyone reading can help out with some clarification/further info on the 'Tilbury Lights' that are positioned on the starboard side on the top of the bridge (these lights are shown when entering the Thames by Tilbury). Does each collier have its own dedicated set of lights? The four colours shown in the book *The Steam Collier Fleets* are blue and white, aft, and red and white, fore). In a couple of photos of *Hudson Sound* the light box is fixed in vertical position on the top of the bridge next to a water tank.

I have included a few photos of my model showing progress so far. Fingers crossed someone out there will be able to help me.

MICK ASTLE
EMAIL

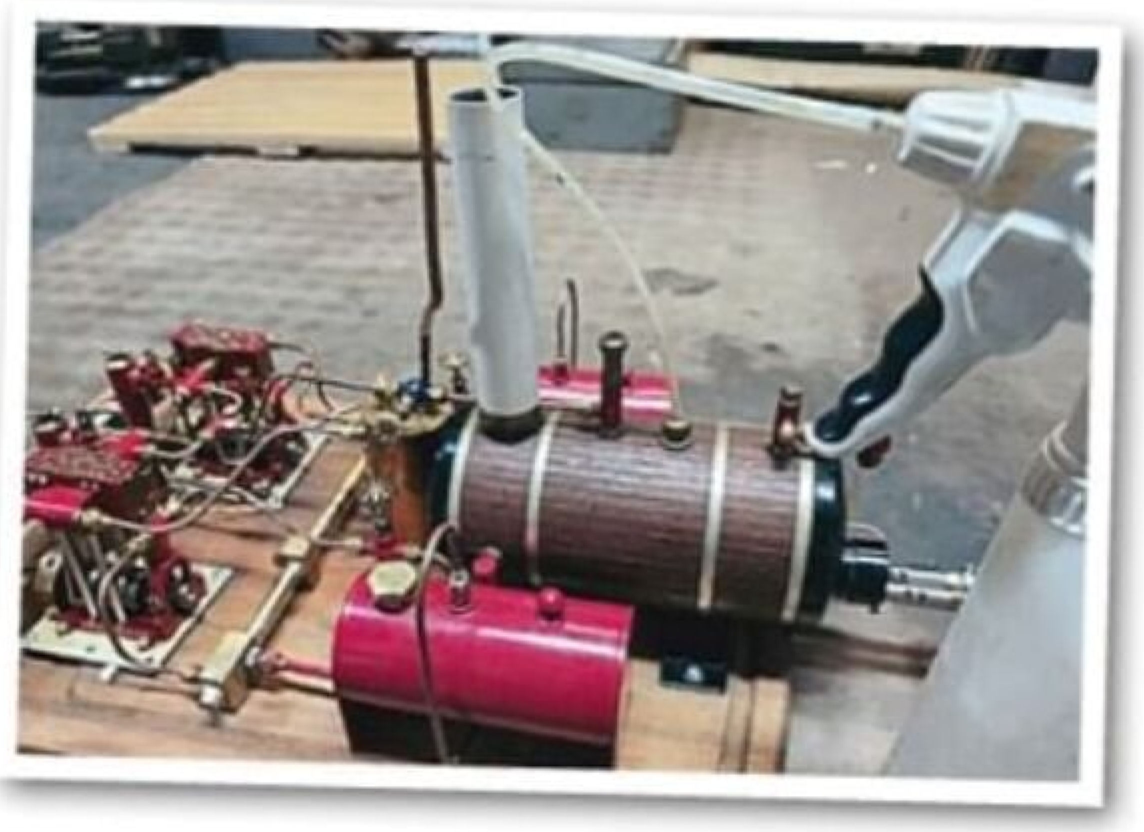
The build looks to be coming together beautifully, Mick, and I look forward to being able to pass on the contact details of anyone reading who is able to advise here. Ed.

Mystery model engines

I have a pair of vintage (1930-1950?) UK 15cc 2 stroke model engines that looks like they were used in a boat (they have a flywheel). I suspect they are home construction made from castings.
I am very keen to identify the make of these and wonder if can you help?

MIKE HAMPTON
EMAIL

Sorry, Mike, but I've run these pics past our resident vintage R/C expert Dave Wiggins and he tells me he's never seen the like. So, bearing in mind all the years he's been involved in this aspect of the hobby, I'm rather inclined to agree that we are looking at home-built items. Who knows, though – perhaps someone reading will recognise them and be able to tell a different story. Ed.



Mike Jackson's Maxwell Hemmens boiler with the Goodall valve and spray bottle.

Boiler Room observations

I have recently returned to model boating after decades away pursuing my love of steam through 7 ¼-inch gauge and 16mm garden railway. The April 2024 issue of addition Model Boats was therefore the first I had bought in a long while. The article by Richard Simpson headed 'Boiler Room' caught my attention in particular. I appreciate that the topic of my observation may have been covered in earlier additions but, if not, then I was surprised to find that an article on feed pumps did not make reference to the 'Boiler Test Code 2018', also called the 'Orange book'. This publication lays out the best practice advice for live steam model makers.

While I appreciate that most model boat steam boilers may fall under Vol. 2 of the code, i.e., below 3 bar litres, especially if supplying steam to an oscillating engine, engines running at higher pressures of between 60-80 psi may have boilers that cross this mark. My scotch boiler driving a Stuart Turner D10 is 4.1 bar litre. The term critical water level is important and Vol. 1 para 11.7 recognises that model boats may not be able to carry feed water.

I apologise if this topic has been covered in earlier editions of the magazine, but I feel it may be useful to make reference to the code when discussing the need or requirement for feed pumps. If your readers are not aware of the existence of the Orange Book then it may be worth an article, especially those think about moving into the steam world.

Can I also draw readers attention to a simpler device to the nitrile ball and syringe option: the 16mm community use Goodall valve and high-volume spray bottles. The long plastic tube makes it easier to not get hit by jets of hot water, and some versions come with a quick lease connection if you don't want to just hold the tube in place on a rocking boat. Each stroke of the sprayer delivers about 3ml of water. The spray bottles more easily fill boilers with WP of 40psi and I happily use one on my boilers at 60psi. These valves and spray bottles can be found on most garden railway supplier websites.

MIKE JACKSON
EMAIL

Thanks so much for your email and welcome back onboard, Mike. Naturally, our Boiler Room contributor Richard Simpson is better placed to respond here than I am, so it's over to him: "Very many thanks for your interest in the April 2024 instalment of Boiler Room and your comments. Over the many years the Boiler Room series has been running the subject of the Boiler Test Code has been covered numerous times as a means of trying to help steam modellers understand its requirements, and the benefits of the code to guide us all towards a safer regime of building and operating our model steam plant. I think I have specifically reviewed The Blue Book version and The Green Book version, and in the issues cover dated December 2018 and January 2019 I did a particularly in-depth review of the Orange Book version. I also support these reviews with other specific topics, such as dedicated explanations of the bar-litre rule, explanations of why we have rules and regulations in place, and even the role of the Boiler Inspector, in an attempt to try to remove some of the uncertainty and confusion as regards testing procedures. While I will also occasionally, when applicable, refer to the code, I don't do so in every article, as this may run the risk of it being seen as an imposition, which can be off putting, particularly to those new to the hobby.

"Many thanks for identifying another method of filling a boiler while under pressure. No matter what subject is discussed in my series of Boiler Room articles, I can almost guarantee there will always be other alternative methods not yet discovered!"

I did, of course, consider simply forwarding Richard comments directly on to you, but your letter, and Richard's reply, are far too interesting not to share. Ed.

To puff or not to puff

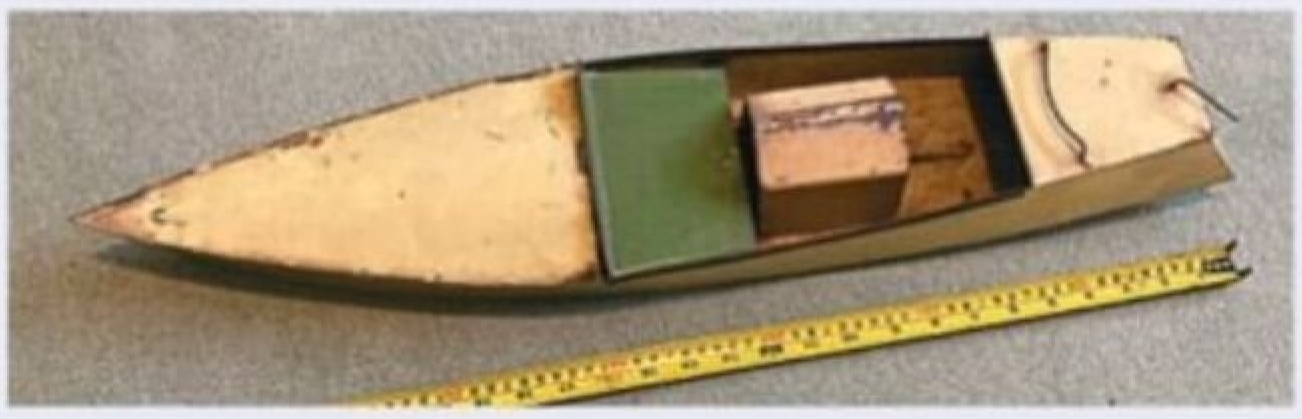
There have been several innovative smoke generators in Model Boats magazine (including my own – see the Feb 2022 issue). Some of these solutions have suggested a requirement to 'puff' the smoke. However, it is my understanding that unlike a steam railway engine which uses the exhaust steam to draw the fire and hence puffs in proportion to the engine speed, waterborne steam craft, in general, condense the exhaust steam which is then returned to the boiler. This not only improves the engine efficiency but minimises the amount of freshwater that needs to be accommodated. Hence, what is emitted from the funnel is purely the flue gases and the quantity is only proportional to the efforts of the stoker to maintain boiler pressure.

Ships/boats tend to run at steady speed so there is not much need to vary what comes out of the funnel and when the stoker does pile on the coals the smoke coming out of the funnel is usually black – any ideas for a black smoke generator anyone?

The only well-known exception of which I am aware was the eponymous Clyde Puffer, which was powered by a simple steam engine without a condenser, drawing fresh water from the canal and emitting a series of puffing sounds as steam exited the funnel as the piston stroked. Although boats built from the 1870s onwards required condensers, as they travelled beyond the canal, the name 'puffer' stuck.

RICHARD NORMAN
EMAIL

Thanks so much for your interesting letter, Richard. I look forward to seeing if anyone has managed to come up with a way of successful generating black smoke. Ed.



Old metal boat origins/info sought

Please can you help me? My club (the Dolphin Model Boat Club) has been given this old metal boat and asked if we can restore it and get it working again. The motor works fine, although requires new brushes, but I am hoping that someone can supply some further information about the model. I think it would have been a straight runner and I believe it hails from sometime around the 1960s.

PAUL ALLEN
DOLPHIN MODEL BOAT CLUB

What a fascinating restoration project this promises to be. Hopefully someone reading can supply some more details, and please do keep us posted on progress. Ed.

MARIE FELLING SINGLE SCREW
Unstarted kit
£400 cash on collection
IMARA TWIN SCREW
Needs finishing internally comes with couplings props 2 MFA 800 motors.
£300 cash on collection
Tel. John 07904 519244
South Yorkshire
Email. jvardy507@gmail.com

U Boat type XX1 Robbe
Finished as U2511, fully functional never sailed straight to storage, radio Futaba F14 battery charger, tools, original box instructions, off cuts. £300
Tel. 01904 593220
York
Email. alandgwen@tiscali.co.uk

WANTED
Plans for WW2 German Armed Trawler please
Tel. 07706 500059
Hampshire

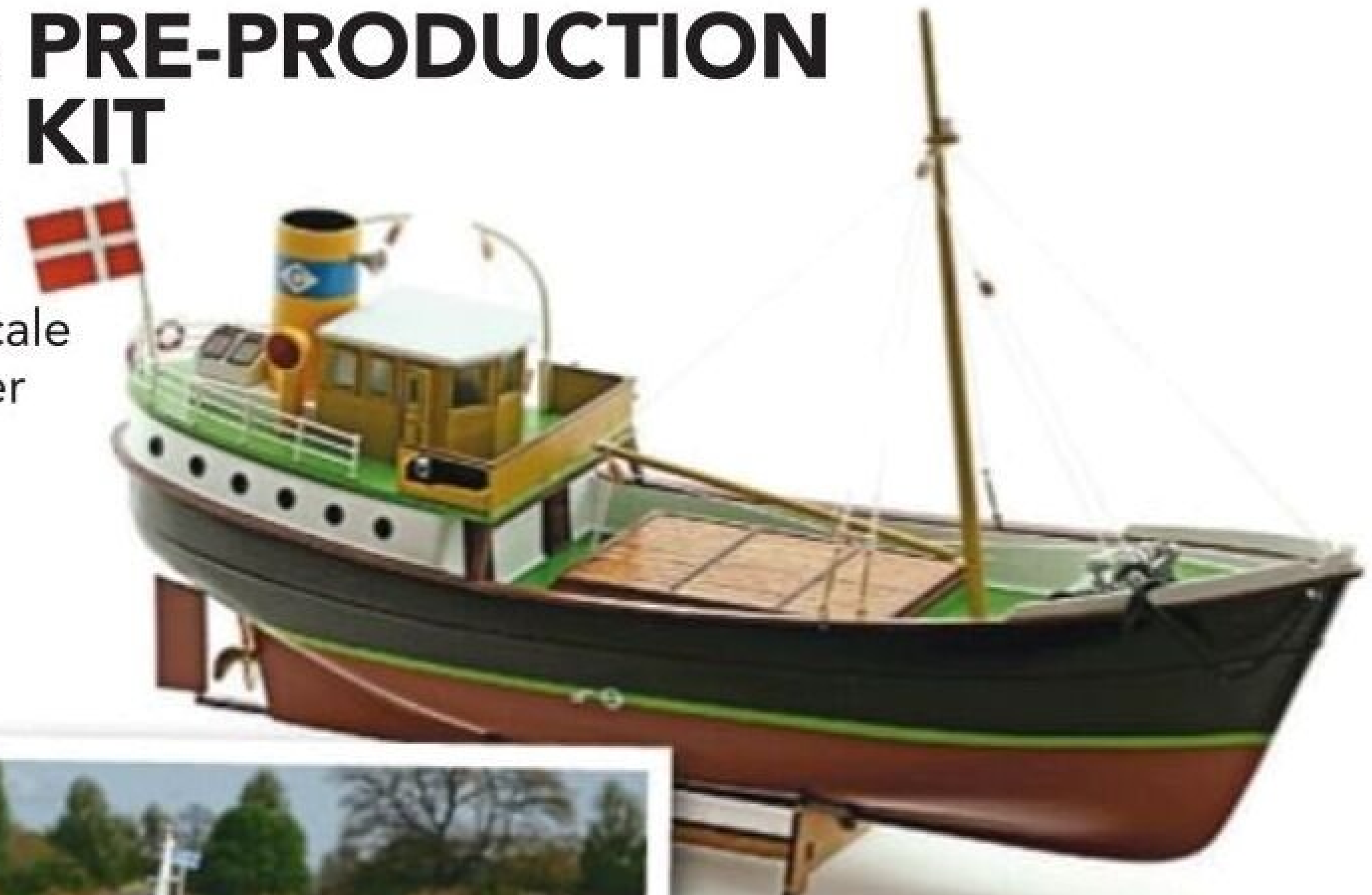
Model Yachting, Vic Smeed, £50
Miniature Boat Building, A.Leitch, £20
Famous Paddle Steamers, Hambleton, £3
Model Boat Building, F. Camm, £5
Fibreglass Tug Hull, £30
Tel. 07957 168019
South Yorkshire
Email. t.drabble@btinternet.com

Next month in Model Boats

In the July 2024 issue, on sale from Friday, June 21, 2024, be sure not to miss...

WIN A PRE-PRODUCTION SAMPLE KIT

For *Carli*, Billing Boats' newly updated 1:60 scale outrigger trawler



FREE PULL-OUT PLAN & BUILD GUIDE

For *Shandau*, an exquisite 1:24 scale gentleman's motor yacht

ATHENE

The Greek fishing boat scratch build perfect for summer sailing sessions

PLUS A thematically varied selection of feature-length articles, all your favourite regular pages – including Your Models, Your *Letters, news, reviews – and lots more* (*Please note: content may be subject to change*)

You will find more about the exciting content coming next, features of particular interest you may have missed in past editions and details of the very latest subscription offers on our website at www.modelboats.co.uk

You can, of course, order you copy of the July 2024 issue, which goes on sale at all good newsagents from Friday, June 21, 2024, now, but why not treat yourself to an annual subscription, as monthly copies will then be delivered directly to your door.

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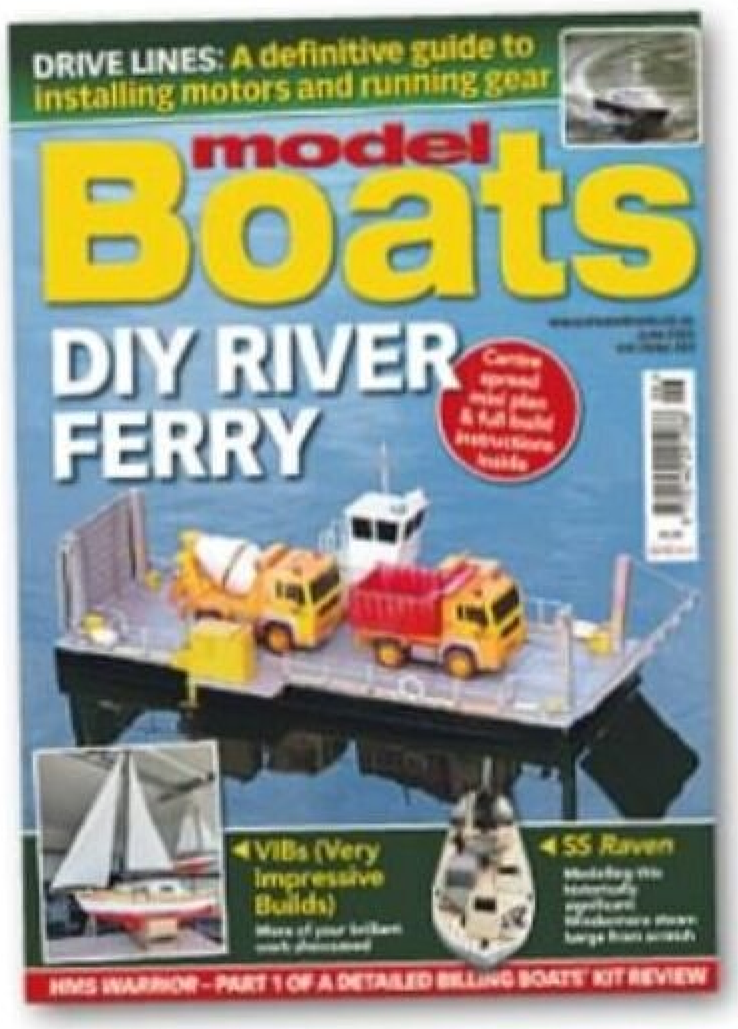

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