FREE! WALL PLANNER INSIDE THIS ISSUE

model Boats

Winter 2014
UK £4.95

SPECIAL EDITION

Get on board www.modelboats.co.uk

100 PACKED PAGES

US Coast Guard Picket Boat

John Parker presents a new Feature Plan

LOTS OF GREAT TIPS AND ADVICE

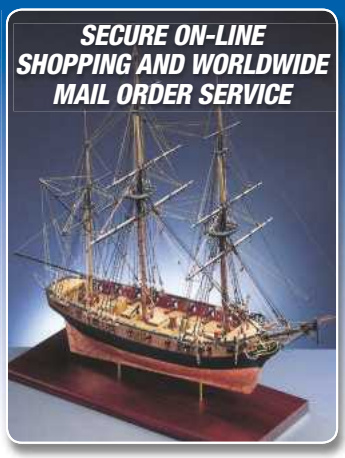
Improve your modelling skills!

mytimemedia MODELLING GROUP
9 770140 291958 30 £4.95

Airbrush Painting for the Model Boat Builder

A Guide to Steam in Model Boats

Radio control all that you need to know!



CORNWALL MODEL BOATS

www.cornwallmodelboats.co.uk

Unit 4D, Highfield Road Industrial Estate, Camelford, Cornwall PL32 9RA

Telephone: **01840 211009**

MAIL ORDER ONLY

FREE UK SHIPPING ON ORDERS OVER £150

WE STOCK A WIDE RANGE OF RADIO CONTROL AND STATIC DISPLAY KITS, FITTINGS, TOOLS & PLANS.

SECURE ONLINE SHOPPING AND MAIL ORDER SERVICE

AEROKITS, AERONAUT, AMATI, BILLING BOATS, CALDERCRAFT, DUMAS, COREL, GRAUPNER, PANART, KRICK, MAMOLI, MANTUA, OCCRE, ROBBE, SERGAL

Amati Kits

Arno XI Ferrari 800kg Hydroplane	£329.00
Arno XI Ferrari Pre Built Hull	£384.00
Bluenose - Fishing Schooner 1921	£87.95
Endeavour 1:35 Wood Hull	£259.00
Endeavour (Wood Hull) 1:80	£76.95
Endeavour Pre Formed Wood Hull 1:50	£239.95
Enterprise Pre-formed 1:80	£77.00
Golden Yacht Ship in a Bottle	£44.95
Grand Banks Motor Yacht	£397.00
Greek Bireme 480BC 1:35 Scale	£74.95
HMAV Bounty 1787 1:60	£222.00
Mayflower, English Galleon 1620	£159.95
Oseberg Viking Ship 1:50	£99.95
Rainbow (pre-formed) 1:80	£76.90
RMS Titanic	£379.00
Robert E Lee	£243.99
Viking Ship	£99.95

Artesania Latina

Hermione La Fayette 1:89 Scale	£152.00
HMS Surprise 1:48 Scale	£595.00
HMS Victory 1:84	£679.99
King of the Mississippi	£143.00
Titanic Lifeboat	£58.99
Santa Maria	£121.50
US Constellation, American Frigate 1:85	£277.00

Billing Boats

Absalon	£450.00
Bluenose	£125.95
Boulogne Etaples 1:50	£149.99
Building Slip	£44.98
Calypso Research Vessel 1:45	£365.99
Colin Archer 1:40	£85.00
Cutty Sark 1:75	£266.95
Fairmount Alpine	£324.95
HMS Reknown	£75.95
HMS Warrior	£449.99
Nordkap 1:50	£269.94
RMS Titanic 1:144	£799.99
Smit Nederland 1:33	£319.99
Smit Rotterdam 1:75	£266.95
St Canute Tug	£136.99
Viking Ship Oseberg 1:25	£111.98
Waveney Lifeboat	£39.95
USS Constitution	£188.99
Will Everard 1:67	£71.94

Caldercraft RC Kits

Alta Liebe	£264.95
Branneran	£299.95
Cumbrae	£266.95
Imara – Single or Twin Screw	£458.95
Joffre	£251.95
Marie Felling – Single or Twin	£395.95
Milford Star	£228.95
Northlight	£251.95
Resolve	£508.95
Sir Kay	£294.95
Schaarhorn - Steam Yacht 1:35 Scale	£335.95
Talacre	£251.95

Caldercraft Static Kits

HM Bark Endeavour	£224.95
HM Bomb Vessel Granado	£204.95
HM Brig Badger	£165.00
HM Brig Supply	£134.95
HM Cutter Sherborne	£71.95
HM Gunboat William	£167.95
HM Mortar Vessel Convulsion	£89.95
HM Schooner Ballahoo	£59.95
HM Schooner Pickle	£124.95
HM Yacht Chatham	£83.95
HMAV Bounty	£184.95
HMS Agamemnon	£588.95
HMS Cruiser	£193.96
HMS Diana	£440.95
HMS Jalouse	£204.95
HMS Mars	£183.00
HMS Snake	£193.96
HMS Victory	£709.50
Mary Rose	£242.00

Constructo Kits

Altair 1840 1:67 Scale	£85.45
America Schooner	£99.73
Cutty Sark	£179.54
Gjoa - Amundsen Expedition Ship	£79.99
HMS Bounty	£176.11
HMS Victory	£331.73
Le Pourquoi-Pas	£189.98
Louise	£82.07
Robert E Lee	£167.57
USS Constitution 1:82	£297.53

Corel Kits

Berlin	£330.00
HM Endeavour	£196.00
HMS Bellona	£299.00
HMS Neptune	£264.00
HMS Resolution	£169.00
HMS Unicorn	£205.00
HMS Victory	£317.00
HMS Victory Cross Section	£99.00
Prince William	£334.00
Ranger	£66.00
Reale de France	£540.00
Scotland	£66.00
Wasa	£405.00

Dumas RC

American Beauty Mississippi River	£185.99
Big Swamp Buggy	£119.99
Carol Moran Tug	£79.99
Creole Queen Mississippi Riverboat	£319.99
U.S.S. Whitehall	£77.99

Euromodel Como Kits

Ajax 18th Century European Frigate 1:72 Scale	£518.95
Derfflinger 17th Century Felucca 1:66 Scale	£260.95
Falmouth 18th Century "East India"	£594.94
La Renommee 18th Cen Frigate 1:70 Scale	£602.95
Lyde 18th Century Schooner 1:70 Scale	£296.95

Joysway - *Ready to run models*

Joysway Blue Mania	£139.99
Joysway Bullet	£145.12
Sea Drifter EP Brushless	£360.00
Caribbean Yacht 1:46	£52.00
Dragon Force Yacht	£148.99
Explorer Yacht	£148.99
Focus 1 meter yacht	£218.99

Krick Kits

Alexandra Steam Launch inc Fittings	£300.00
Anna Steam Launch	£100.00
Borkum Steam Launch inc Fittings	£339.00
Felix	£88.93
Lisa M	£104.95
Gulnara	£271.99
U-Boat	£326.95
Victoria Steam Launch inc Fittings	£355.00

Mamoli Kits

Blackbeard Pirate Ship	£110.00
CSS Alabama	£202.00
Golden Hind	£180.00
HMS Beagle 1:64	£173.00
HMS Bounty 1:64 Scale	£211.00
HMS Endeavour 1:100 Scale	£115.00
HMS Portsmouth 1:64	£156.00
HMS Prince	£256.00
HMS Surprise	£305.00
HMS Swift	£126.00
HMS Victory 1:150 Scale	£260.00
L'Orenoque	£300.00
Roter Lowe	£283.00
Valiant	£173.00

Modellers Shipyard

Colonial Ketch Mary Burne	£214.99
HMS Supply - First Fleet 1788	£ 274.99

Mantua Kits

Amerigo Vespucci	£296.00
Armed Swedish Gunboat	£140.00
Astrolabe. French Sloop 1812	£197.00
Bruma Open Cruiser Yacht 1:43	£165.00
Golden Star	£77.00
HM Endeavour Bark 1768 1:60	£156.00
HMS Victory 1:200 Scale	£103.00
HMS Victory 1:98	£283.00
Mercator	£145.00
Mincio	£94.00
Le Superbe	£322.00

Occre Kits

Albatros	£79.00
Apostol Felipe (Galleon)	£216.00
Bounty with Cutaway Hull Section 1:45 Scale	£257.00
Cazador Xebec	£180.00
Diana (Frigate)	£216.00
Dos Amigos Brigantine Schooner 1:53 Scale	£106.00
Gorch Foch	£320.00
Nuestra Senora del Pilar 1:46 Scale	£450.00
Mississippi Paddle Steamer	£180.00
San Marcos (Galleon)	£215.00
Santisima Trinidad	£358.00
Santissima Section	£115.00
Ulises	£195.00
London Tram	£105.00
Dennis Bus Type B	£95.00
Stephensons Rocket	£72.00

Panart Kits

Amerigo Vespucci 1:84	£670.00
Anteo Harbour Tug	£329.00
Armed Naval Pinnace	£132.00
HMS Victory 1:78 Scale	£389.00
HMS Victory Bow Section	£173.00
Section Deck	£130.00
San Felipe	£583.00
The Royal Caroline	£265.00

Pro Boat - *Ready to Run*

Impulse 17 RTR	£80.00
Westward 18 Sailboat	£139.50

Robbe Kits

Dolly Harbour Launch 1:20 - New Version	£129.95
Dusseldorf 1:25 Almost Ready to Run	£374.95
Magin One Black Race edition	£189.98
Magin Two	£190.00
Paula IV	£165.00
Sylt Police Boat	£549.95
Rapido 600	£139.99

Sergal Kits

Cutty Sark	£358.00
HMS Bounty	£174.00
HMS Peregrine	£182.00
HMS President Light Frigate	£77.00
HMS Racehorse	£77.00
Mississippi 1870	£356.00
Soleil Royale 1669	£710.00
Sovereign of the Seas	£710.00
Thermopylae	£77.00
Wasa	£710.00

Thunder Tiger

ETNZ 1M Racing Yacht	£219.95
Naulantia 1M Yacht	£149.99
Team china 1M yacht	£219.95
Desperado Jr. ARTR Catamaran	£119.99
Outlaw JR OBL Power boat Combo	£165.95

Victory Models

HM Granado	£261.95
HMS Fly	£289.00
HMS Pegasus	£344.00
HMS Vanguard	£684.00
Lady Nelson	£117.95
Mercury Russian Brig	£354.00

Plastic models also available in:

Airfix, Revell, Trumpeter and many more!!

All prices correct at time of going to press

ALSO: ALL THE HARDWARE, BUILDING MATERIALS AND RC EQUIPMENT REQUIRED TO COMPLETE YOUR MODEL

Visit the website for our full range of kits:

www.cornwallmodelboats.co.uk

email: sales@cornwallmodelboats.co.uk

Find us on Facebook

Follow us on Twitter

MOUNT FLEET MODELS

MFM

Steam • Tug Cruiser

Kit Contains:

- G.R.P. Hull, Superstructure Funnel & Boats
- Full size drawings
- Comprehensive Instruction Booklet
- Printed wood
- Colour Photographs
- Nearly 1000 White Metal Fittings
- All necessary wood, cordage, wire tube, etc

£515 including U.K. Carriage

Scale: 1:32
L.O.A. 45½" (1156mm)
Beam: 12" (305mm)
Displacement: 40 lbs (18.18 kgs)

This superb model kit is of one of the last coal fired tugs to be built in Britain. Built by Alexander Hall of Aberdeen and launched in 1953, the tug went into service with the firm of Steel & Bennie, Glasgow. Converted to Diesel in 1963 she later changed owners and was renamed the Ardneil under which name she was seen to be working around North Wales & Liverpool until her recent sale abroad.

Scale: 1:32
L.O.A. 34½" (901mm)
Beam: 9" (228mm)
Displacement: as required

£148 including U.K. Carriage

The ideal companion for the Cruiser!

Lighter No 7

The Lighter is based on Dunstons yard drawings. It is an ideal tow for most models and can be loaded as required. Some model makers will see this kit as ideal for modifying and motorising etc. A very complete kit with full size plans, photographs, crew figures and over 350 white metal fittings. Superb value, and an ideal introduction to scale marine modeling.

Maestro

Mount Fleet Models • Adam Slater • Rock House • Bankwood Road • Womersley • Doncaster • DN6 9AX
Tel: 01977 620386 • E-mail: sales@mountfleetmodels.co.uk • www.mountfleetmodels.co.uk

VISA

contents

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

SUBSCRIPTIONS
UK – New, Renewals & Enquiries
Tel: 0844 543 8200
Email: mytimemedia@subscription.co.uk
USA & CANADA – New, Renewals & Enquiries
Tel: (001)-866-647-9191
REST OF WORLD – New, Renewals & Enquiries
Tel: +44 (0) 1689 869896

BACK ISSUES & BINDERS
Tel: 0844 848 8822
From outside UK: +44 2476 322234
Email: customer.services@myhobbystore.com
Online: www.myhobbystore.co.uk

EDITORIAL
Editor: Paul Freshney
PO BOX 9890, Brentwood, CM14 9EF
Email: editor@modelboats.co.uk

PRODUCTION
Design Manager: Siobhan Nolan
Designer: Steve Stoner
Illustrator: Grahame Chambers
Retouching Manager: Brian Vickers
Ad Production: Robin Gray

ADVERTISING
Group Advertising Sales Manager: Duncan Armstrong
E-Mail: duncan.armstrong@mytimemedia.com
Tel: +44 1689 869 855

MARKETING & SUBSCRIPTIONS MANAGEMENT
Sarah Pradhan & Kate Hall
Head of Design & Production: Julie Miller
Group Advertising Manager: Duncan Armstrong
Chief Executive: Owen Davies
Chairman: Peter Harkness

mytimemedia
print & digital media publishers

Follow us on Facebook and Twitter

www.facebook.com/modelboatsmag
twitter.com/modelboatsmag

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

6
PLAN FEATURE!
38 FOOT US COAST GUARD PICKET BOAT
John Parker presents this new plan, together with full constructional advice in his in-depth article

Features

24
RADIO GA GA!
A guide to the technical bits by Dave Milbourn

50
ATTENTION TO DETAIL!
Colin Bishop presents some of the outstanding work from the Society of Model Shipwrights Exhibition, August 2014

47
MODEL BOAT CONVENTION - 2014
Dave Wooley and Dave Abbott report from this popular UK event.

54
MODELLING MATHEMATICS
Glynn Guest discusses a more analytical approach to your next model

Bow piece

This Special Edition of Model Boats includes a comprehensive Plan Feature for a US Coast Guard Picket Boat by John Parker and two other major articles, one about radio control by Dave Milbourn and one for everything you need to know about getting started in steam written by Richard Simpson. Both of these contributors are passionate about their hobby and experts in their respective fields. In addition, Glynn Guest has a thoughtful piece about using basic mathematics when designing models and determining 'will it ' or will it not'! Dave Wooley is an acknowledged expert model maker as well as being enthusiastic about warships, their models and everything to do with them, and he has supplied a short article on airbrushing and what you need to know to get started. This form of painting is widely used in all model making disciplines and it is a skill well worth having.

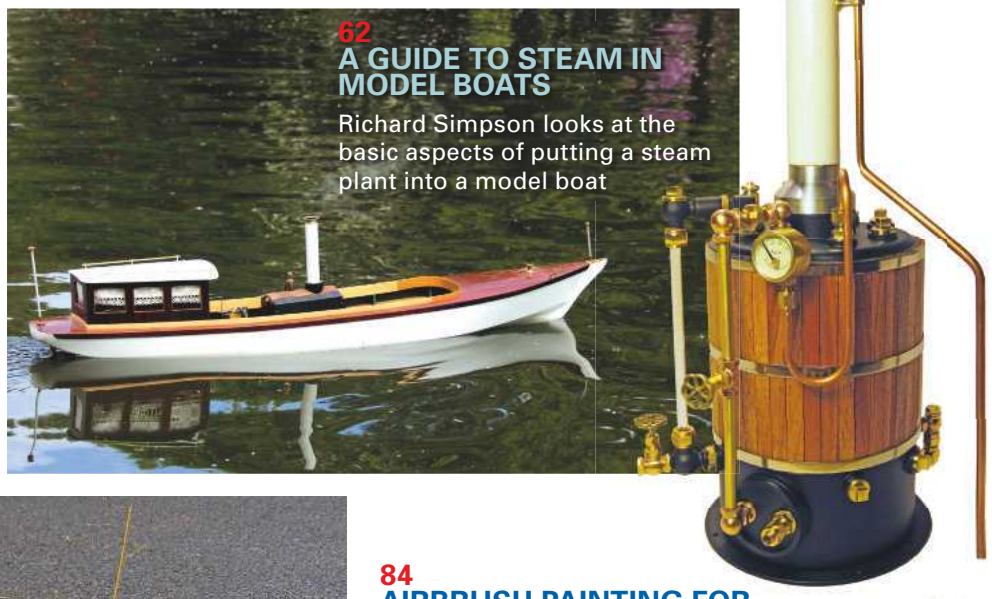
The 1:12 scale Feature Plan, obtainable from MyHobbyStore for the 38 foot US Coast Guard Picket Boat is as always, CAD prepared by John Parker and it is to the same high standard as his previous models and plans in this magazine. His supporting article describing its construction sequence makes this a really attractive project for model boat builders of all skill levels.

The Model Boat Convention 2014 at Haydock Park welcomed back the Russian modellers who did so well at the recent Naviga World Championships. They brought along their models and not unsurprisingly, did rather well in the competition!

Colin Bishop went to the bi-annual Model Shipwright Society Exhibition in Kent and photographed some of the remarkable models on display. So these two reports show the top class models being built world-wide.

I hope in this Special 100 Page Special issue that there is something for everyone who has a passion for radio control scale model boating and please don't forget to visit our website and participate in its active forum that is managed by Colin Bishop.

Paul Freshney *- Editor*

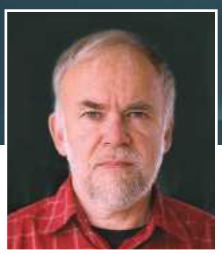


62
A GUIDE TO STEAM IN MODEL BOATS
Richard Simpson looks at the basic aspects of putting a steam plant into a model boat

84
AIRBRUSH PAINTING FOR THE MODEL BOAT BUILDER
Dave Wooley discusses the basics of this handy model making skill

Cutting a dash brings the water plumes up above deck level.

US Coast Guard 38 Foot Picket Boat

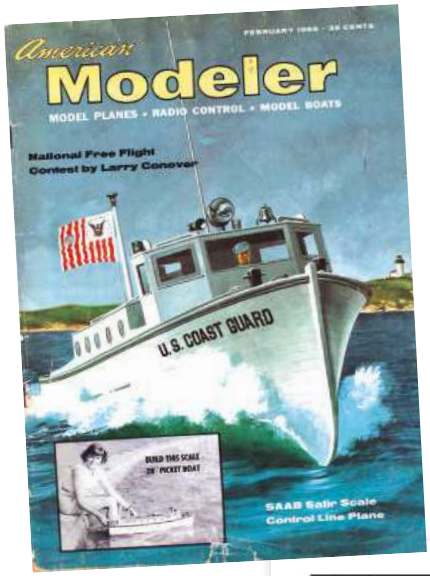


***John Parker** presents a new Feature Plan*

When America found herself at war with Japan on 7th December 1941, an urgent need arose for large numbers of Coast Guard boats to patrol her vast coastline. Fortunately a suitable type already existed in the form of the 38ft Picket Boat, which had been designed by the Eldredge-McInnis company in 1931. The lead builders had been the Gibbs Gas Engine Company of Florida, but with the outbreak of war the design was circulated to small boatyards right around the country who produced 470 boats, adding to the 68 built pre-war for an impressive production total of 538 boats. A tough and well-liked design, the 38ft Picket Boat, sometimes called the Cabin Picket Boat to distinguish it from an earlier open-cockpit design, served well into the post-war period.

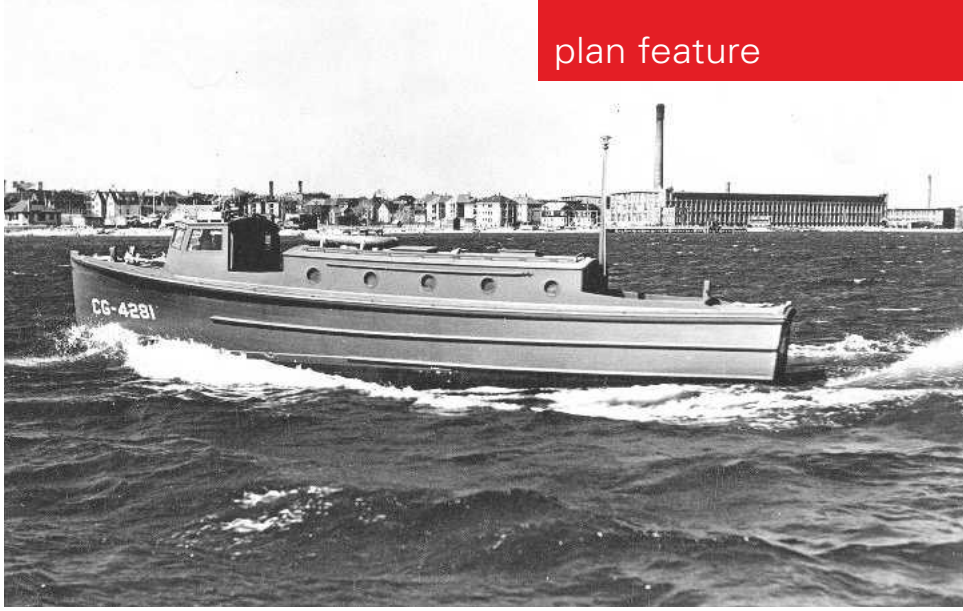
Of wooden construction, early versions of the boat had a maximum displacement of 16500 pounds (7486 kilograms) and were powered by a single six-cylinder Hall Scott Invader petrol engine of 270 horsepower which provided a maximum speed of 25 knots and a range of some 175 nautical miles on 235 US gallons (890 litres) of fuel. Several other types of engine were also fitted, with most of the war-build ones having a 225 horsepower Kermath. With less power and loaded with extra equipment, these versions only managed 20 knots at best. Picket boats were unarmed and normally carried a crew of two or three persons with bunks and provision for several passengers. Their main task was harbour patrol and policing work, but they were also employed for customs enforcement and emergency rescue work, the latter in conjunction with dedicated air-sea rescue boats at lifesaving stations around the Pacific coast. Boats intended for service in far northern latitudes were fitted with ice-sheathed hulls.

Long before I had a particular interest in this craft, I came across plans for a model of it in an old copy of American Modeler magazine dated February 1958, at which time the boat was still in service with the US Coast Guard. With the demise of American Modeler, the plans came into the public domain and can now easily be found on the Internet. To my regret, I pointed this out to two colleagues who subsequently built models to the



ABOVE: On the cover of the February 1958 issue of American Modeler.

RIGHT: Supplier advertisements featuring the full-size 38ft Picket Boat.



plans. I say to my regret, for when I later came to take a close look at the plans, I found they showed a hard-chine hull with straight-sided cross sections and no compound curvature at all. The picket boat actually had a carvel-built round bilge hull, as shown clearly in the cover illustration.

The text accompanying the magazine plans stated that: 'With only those modifications necessary for easing building and operating tasks, our model sticks closely to the full-size boat'! Hmm, well, I suggest that changing the hull from a round bilge to a straight-section hard chine type is quite a modification and one that changes both the character and performance of the model, but I agree with the author when he wrote: 'Overlooked model-wise until now, the Coast Guard 38ft Picket Boat makes an ideal model power boat project'. So, to make amends for my earlier recommendation, I am presenting here accurate plans for the 38ft Picket Boat, worked up from the original Eldredge-McInnis drawings.

Research

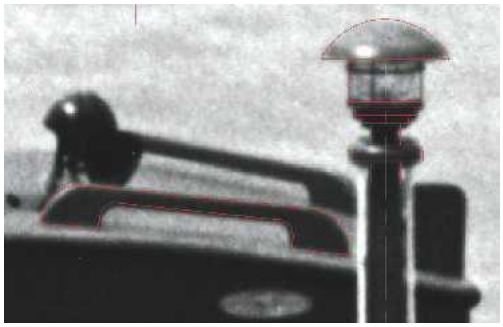
Following the death of designer Walter J. McInnis in 1985, most of the drawings of the Eldredge-McInnis company were acquired by the Mystic Seaport Museum in Mystic, Connecticut, and may be found listed on their website (please see end of article).

This might seem to make the researcher's task simple, since copies of the plans may be ordered through the post, but there are traps for the unwary. The plans are listed by brief written description only, with not even a small thumbnail to identify the vessel, and you can never be absolutely certain you are ordering the correct ones. Yet you do need to be specific, for there are typically six drawings in the set describing a particular vessel, and if you order a copy of each, the cost of the set approaches US $300 with postage. I settled for just the 'Lines and Offsets' and 'Inboard Profile and Constructions' sheets for both the original 1931 Picket Boat (listing number 94.106) and an interesting 1937 variant designed for the Boston Police Department (listing number 94.135). Other drawings of the cabin picket boat listed in the Mystic Seaport collection are specific to the boats built by several different shipyards.

Further information came from magazine advertisements of the 1932 to 1942 period and the occasional reference found in books. A dramatic picture of CG-38721 appears on the cover of the book 'Patrol and Rescue Boats on Puget Sound' by Chuck Fowler, Dan Withers and Combatant Craft of America, the original of which may have been the inspiration for American Modeler cover illustration. There are several good photos in the book of 38ft picket boats under construction and the Internet also provided additional photos and references.

ABOVE AND BELOW: A picket boat undergoing evaluation (Official US Coast Guard photo).

BELOW: Fitting details being traced from an enlarged photographic image.

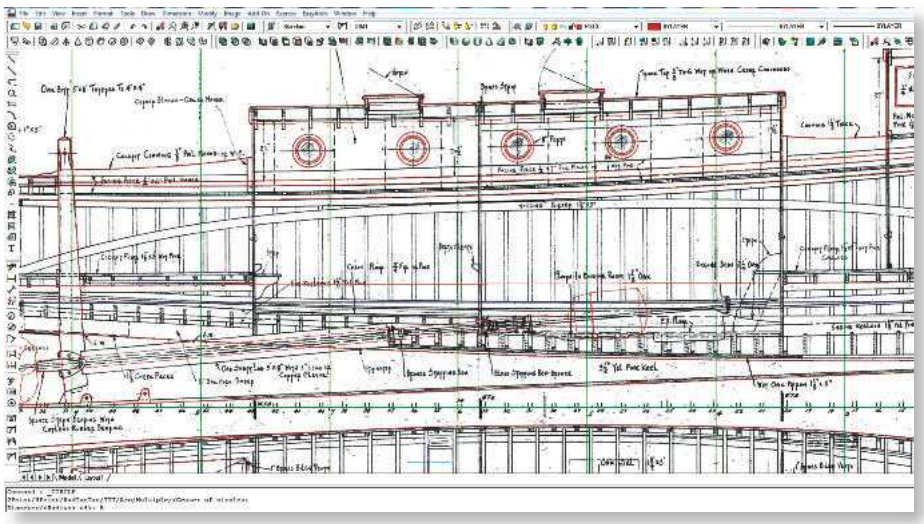


Model design

Traced into a CAD drawing package, the prints gave me all the information I needed to produce an accurate drawing of the hull and superstructure, but were lacking when it came to fixtures and fittings. For these I have had to rely quite a bit on supplementary sources such as photographs and books. The process of tracing an original drawing is an interpretative one requiring much thought. The original may look a work of art, but under the stern eye of a CAD program the unavoidable inaccuracies and approximations of hand-drawn line work become clear, along with the further distortions introduced when the drawing was reproduced as a print. So each line, after tracing, may need to be corrected to its most probable correct location based on whole imperial dimensions and other deduced information.

When designing the model's structure, I chose to retain the original's ten main hull stations rather than bring them in line with the cabin bulkheads, which would have resulted in very uneven frame spacing. As it is, the frame spacing is a constant 94mm centre to centre, except for the final frame where it is 86mm. The positioning of this frame allows for both the picket boat's straight transom and the police boat version's curved transom. The 6mm wide keel has a 3mm doubler each side to

BELOW: Tracing the original drawing into ProgeCAD.



ABOVE: A picket boat undergoing evaluation (Official US Coast Guard photo).

> *"Construction of the model is quite straightforward as the cabin sides have no curvature or inward slant"*

provide continuity over the pre-cut stern tube slot and a shoulder for the 3mm balsa planking to lean on. I used 3mm Lite-ply for the framework and 6mm Lite-ply for the keel because of the lightness and ease of working it provides.

The original stern tube angle puts its inner end well below the waterline and doesn't leave much room for the motor, so I have steepened the angle from a little over five, to nine degrees. An area where I am not at all confident of scale accuracy is the treatment of the side panels of the forward well deck as nobody found them interesting enough to photograph. Presumably there must be steps here, so this is what I have shown. I only had the most basic information to go on for the interior detail of the wheelhouse, but due to the small windows this should pass muster.

Construction of the model is quite straightforward as the cabin sides have no curvature or inward slant, there is no rigging and the few fittings that need to be made are large and chunky. The most difficult part is probably getting the angled panels of the wheelhouse windows to fit and look right and achieving the extreme flare of the hull where it curves away under the foredeck.

Operationally the model commends itself too, for its large main cabin is easily accessible with room for any conceivable motor, battery, sound system or other installation; the round-bilge hull should be able to cope with a little extra weight and the guard below the propeller with luck will protect it from grounding or foreign object damage. If the mast is made removable, the model may be transported easily with little risk of damage and the well-belted hull will fend off any collisions on the water or in the boot of the car!

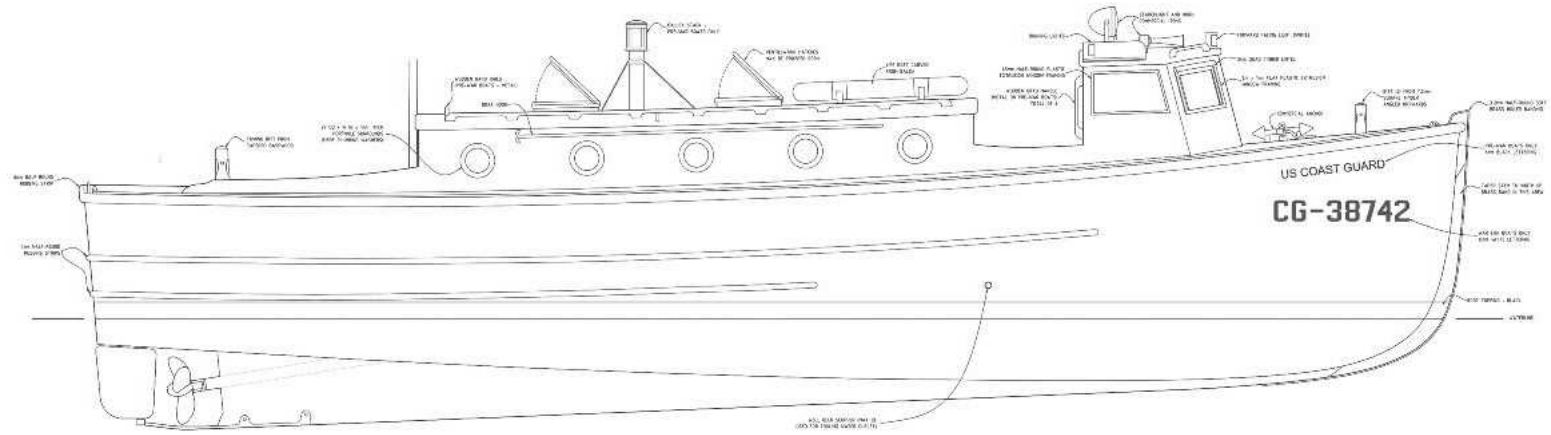
The plans

The plans are on two A0 sheets and include full-size templates for the frames, keel and other major components. To 1:12 scale, they result in a model that is 965mm (38 inches) long by 262mm (10.3 inches) beam. I have chosen to depict one of the war production boats, but scrap views are included for the original pre-war picket boat with its shorter-sided wheelhouse and other minor differences. There is a corresponding choice of colour schemes, the war-era boat being grey all over apart from the orange liferaft, whilst the pre-war and post-war boats have a colour scheme based on a white hull. If you prefer a smaller model, reproducing the plans at 75% of their original size will produce a 1:16 scale model, 724mm long by 197mm beam. The same construction may be used except perhaps for the use of proportionally thinner timber where the thickness is visible, such as the sides of the well decks.

Service notes

Picket boats carried their number on each side of the hull and on the transom, the latter often without its CG- prefix. Originally the designation was in the form CG-XXXX where XXXX was a four-digit number in the ranges 2385 to 2399 and 4300 to 4372 inclusive. From some time in 1942 the numbering scheme changed to CG-38XXX where 38 designated the hull length in feet and XXX was a three-digit number that started at 301. Boats with the early number scheme were re-numbered with the new scheme with no correlation between the numbers. For example, the first batch of 15 boats built by the Gibbs Gas Engine Company, numbered CG-2385 to CG-2399, became CG-38301 to CG-38314. The final boat was built by the Palatka Shipbuilding Corporation in 1943 with the number CG-38836. All numbers in the range CG-38301 to CG-38836 were allocated, a total of 536 numbers, so it seems to me that if the quoted production total of 538 is correct there must have been two hulls that were not allocated numbers.

Use of lower-powered engines in most of the war-build boats has already been mentioned, and was probably the result of the more powerful



engines being needed more urgently elsewhere, but there were also other more visible differences. With steel being a strategic war material, the metal handrails of the pre-war boats were replaced by wooden rails and the 'galley stack', a flue for the small oven fitted in the main cabin, disappeared along with the half-round mouldings around the sides of the wheelhouse. Variations in the position of the single portholes and the design of the mast probably result from production by the different shipyards. Although the deck is planked, on photos of war-built boats it appears uniformly smooth and grey with no sign of the planking, perhaps as a result of a canvas covering, so I didn't feel the need to reproduce the planking lines on my model. If you are modelling a pre-war or post-war version with natural (varnished) planking, you will need to devote more effort here.

Running gear

A single stern tube of 14 or 15 inches (350 to 380mm) is required, but make sure it is a quality one as a rattling loose fit will quite spoil the model. I have had a lot of trouble in this respect; how hard can it be to make a stern tube with close-fitting bearings? We put a man on the moon 45 years ago but we can't stop our stern tubes rattling! I settled for a Raboesch RAB301-09 with ball-raced top end that is not cheap, but the shaft displayed no slop and wouldn't dribble water into the hull, due to its seal, yet I still had problems. Early testing revealed a period of nasty vibration that coincided, naturally, with cruising speed. I put this down to the long 4mm shaft suffering 'whip', and had to make and fit a central bearing to the stern tube to cure it.

The motor is a simple choice, a brushless outrunner of 35mm diameter and modest KV (rpm per volt) rating. Please don't bother with less efficient brushed motors that may even require a gearbox. My own rule of thumb for outrunner motors is that they can drive a propeller 1.5 times their diameter; or to put it the other way, they need to have a diameter that is 2/3rd of the propeller size. With a propeller scaling to 50mm diameter, that means a 35mm diameter outrunner. I settled for a Prop Shop STM/2030/3/LH/BR propeller, which has a diameter of 50mm and pitch of about 75mm, with three blades. These are actually designed for use with steam engines, but I find they work well with low KV brushless outrunner motors. Alternatives would be the STD/2022/3/LH/BR or other 3-blade scale prop of 50mm (2 inch) diameter. The actual motor used was a HiMark C3526-830, running on 7.2 volts and fitted with a water-cooling collar for our hot Australian summers. The torque of these motors is amazing as it is all but impossible to stop the shaft with your fingers, even with the motor throttled right back, and the propeller will rapidly turn floating twigs into fine mulch.

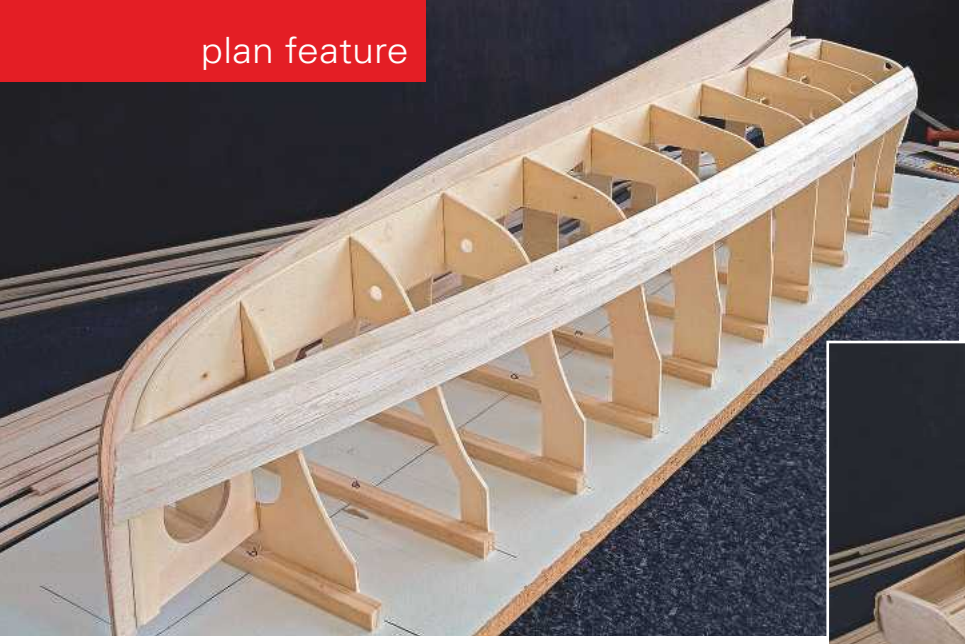
With a fairly light build, the model may require some extra weight to settle properly in the water. Rather than tote around lead sinkers, this weight could be invested in speakers for a sound effects module and/or extra battery capacity. I use two 4300mAh NiMH twin-stick batteries that provide a total fast run time of some 2.25 hours at an all-up weight of 3.9kg. Unless you are aware of the precautions needed when connecting NiMH batteries in parallel, discharge them one at a time (by swapping the plug) rather than connect them in parallel. Adding a third battery or its equivalent weight would bring the displacement up to around 4.3kg, the correct maximum figure for a 16500 pound boat at 1:12 scale. Working lights are easily provided, along with a horn or bell warning sound and you could even make the searchlight rotational, using a small servo with step-up gearing to provide a 270 degree sweep.

Hull framework

I have a friend who commences construction with minute trivial details, such as the bookshelf in the captain's cabin, and uses these as an incentive to then build the model that will provide a home for them, but that's a rather round-about way of doing things and I suggest we start with the framework.

BELOW LEFT: Trial assembly of the framework.

BELOW: On the building board, showing balsa transom filler piece.



ABOVE: Bow planks meeting the keel at the bow doublers.

RIGHT: Planking progresses quite rapidly.

> *"I am thinking of contacting the National Archives to see if they want it for their collection of historically significant artefacts"*

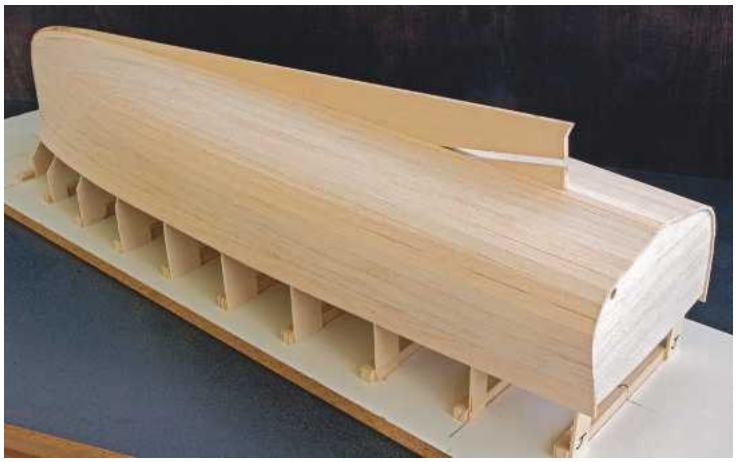
I like to use a piece of melamine-faced shelving 1200 x 300mm as a building board. It has been used for so many models now that I am thinking of contacting the National Archives to see if they want it for their collection of historically significant artefacts; until then though, please excuse any signs of previous construction!

Pasting the template shapes on to the Lite-ply with spray adhesive should enable you to cut these out in quick time. Copy the plan first if you want to keep yours intact. If it's a dark copy, you might prefer to transfer the toner to the wood sheet by running over the back of the copy with a hot iron. I used Lite-ply (balsa core with birch face veneers) because it's such a joy to work with, able to be cut with a modelling knife, but standard plywood could be used at the cost of a little extra weight. Internal frame corners should be drilled first with a 10mm gimlet pointed drill at the centres indicated; the extra holes are service access for wiring and so on. Easy to drill now, all but impossible later! The rear face of the final Frame J is backed up with balsa sheet tapering from 13mm at the top to 3mm at the bottom, ready to receive the 1.5mm ply transom after planking has been completed.

The keel is 6mm thick, which may be made up of two 3mm laminations, with all other frame components in 3mm. The keel doublers need to be given a chamfer on their outer lower edges to approximate the angle of the hull planking prior to gluing to the keel pieces. Aligning the slots carefully will ensure that the keel doublers leave a slot for the stern tube between the two main keel pieces. This will require gentle rounding-out with a rat-tail file to allow the 8mm diameter stern tube to be fitted later. Around the forefoot and stem section, the keel itself should be tapered to about 3.5 to 4mm wide and at the trailing edge, ahead of where the prop' will go, gradually tapered back to a 1 to 2mm wide edge.

Check that all the frames engage the keel at the correct depth and spacing (94mm except for the final frame). Assembled without glue, the framework can then be inverted and the frame extensions glued to the board using PVA glue and lengths of square timber, using a centreline drawn on the board as a guide. Once everything is square and symmetrical about the centreline, epoxy the keel to the frames checking that it remains dead straight. With the glue firmly set, carefully fair all the frame and doubler edges using shaped sanding blocks to provide a good foundation for the planking.

You may prefer at this stage to complete the motor mounting as alignment will be easier without the planking in place. A 6mm ply motor bed is epoxied to the angled section of the keel. It is fitted with M3 barbed T-nuts (captive nuts) on the underside, to anchor the screws for the motor mounting bracket.



BELOW: Just a few planks to go now, but they will be more difficult.

BELOW RIGHT: Narrow planks, rather than cross-grain ones, are recommended to achieve the quite severe outward flare around the bow area.

Planking

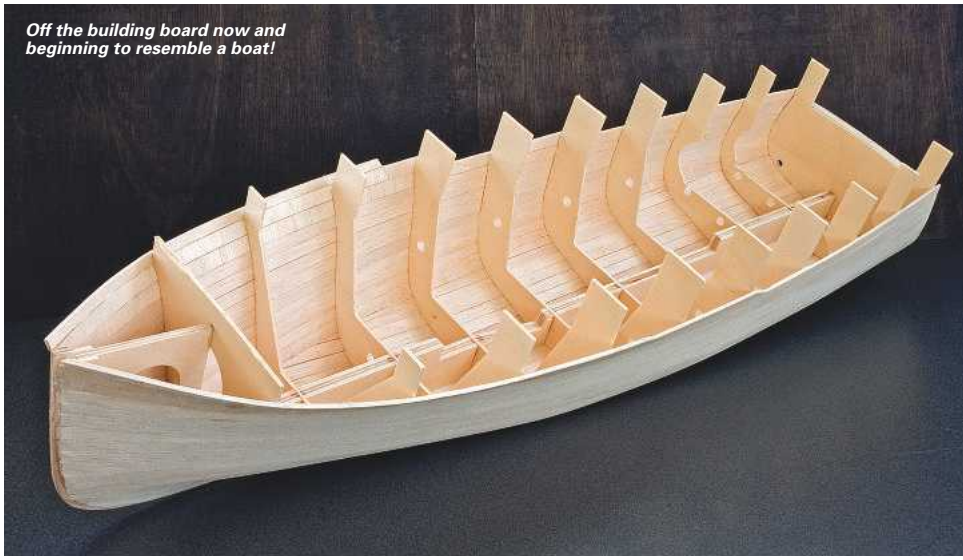
The very word `planking´ strikes fear into the heart of the uninitiated, but planking with balsawood to provide a form for fibreglass sheathing is an altogether different prospect to doing a 'proper' planking job where each plank will remain visible and must fit perfectly. Using medium viscosity cyanoacrylate glue (superglue), progress is rapid as there is no clamping involved and any gaps that may develop may be filled right away with slivers of balsa. Just make sure you work in a well-ventilated area so the fumes don't get to you; I've tried the low-odour type of superglue, but found its slower grab time made it frustrating to use.

Medium grade 3mm balsa is required, about four sheets 1200 x 100mm to avoid the need for joints. Set up a simple jig and use a long straight edge to slice planks 12mm wide from the sheet, or use a balsa stripper if you prefer. I find cutting with a straight edge provides better results, without cumulative error creeping in. If you can only get 900mm long sheets, strip the planks and extend them before starting to plank. This may easily be done by overlapping the ends of two planks by about 50mm, making an oblique cut through both and then gluing the cut edges together. Butting the plank edges against a steel rule will ensure straightness. Done this way, the plank will adopt a natural curve when bent. Fit these planks opposite ways to the frame so that the joints don't coincide.

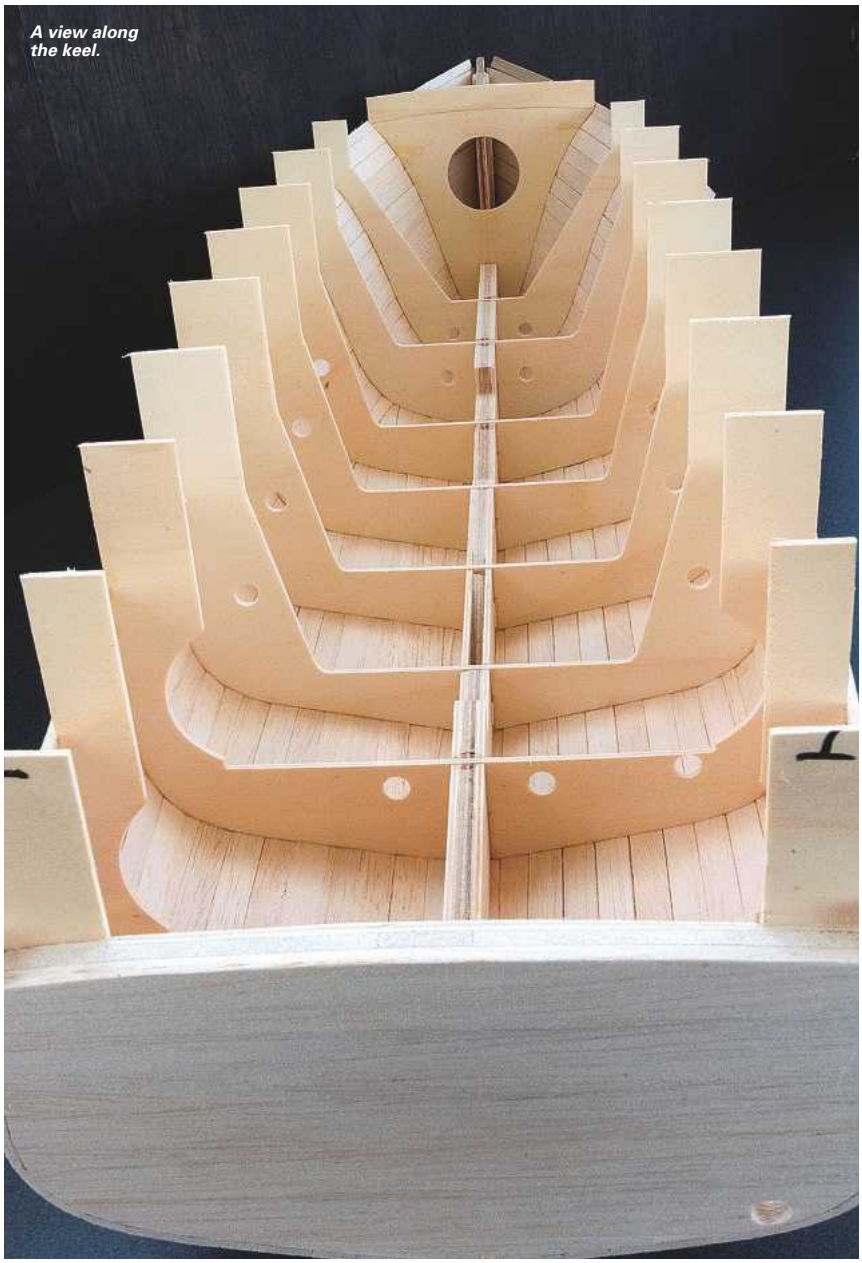
I started with a plank running straight fore-and-aft across the corners of the frames, where the hull begins to curve inwards, to establish the general run of the planking. At its front end, it needed a slight angled cut and under-chamfer to fit neatly against the keel doubler at the bow. Excess length on all planks may be allowed to overlap the transom for trimming with a razor saw once planking is complete. It is good practice to alternate a few planks each side to avoid uneven stresses pulling the frame out of alignment, though I think this would be very unlikely to happen.

Each side of the first plank, the subsequent planks need to have their edges slightly bevelled to fit snugly against it, and be glued both to the frame and adjacent plank so that they don't 'fret' later when the hull is sanded. Towards the keel, I found it best to let the planks follow a natural curve and taper off before they reached the stem, which left a more or less parallel gap for the final garboard plank to fill. This piece will need careful tapering in width to a curved shape and acute undercutting to fit properly, so take your time here.

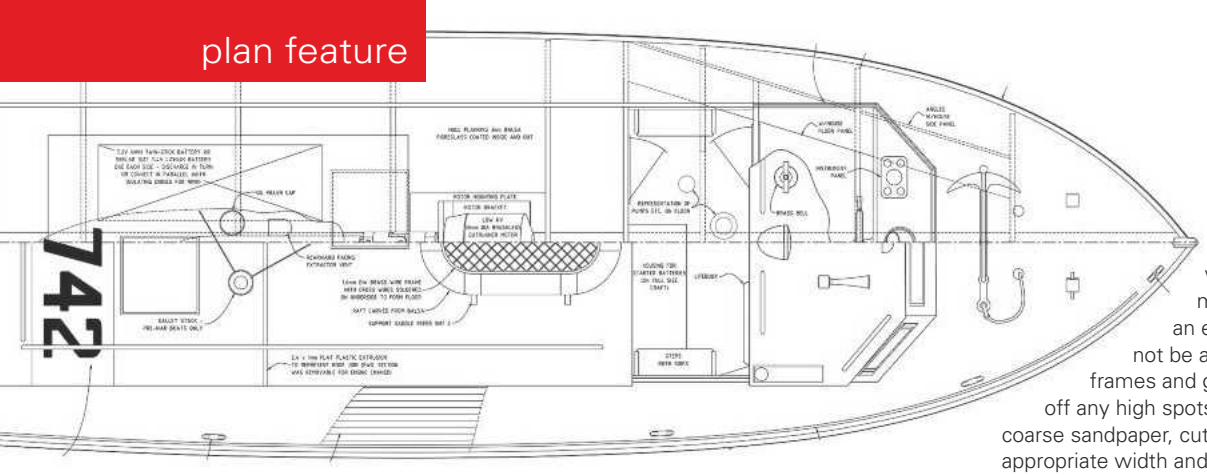
Moving towards the deck, the planking should be very straightforward until you come to final few planks, where there is quite an extreme flare to the bow that requires the planks to bend both length-wise and width-wise. I experimented with cross-grain planks here to ease the task, but this was not very successful and I suggest you instead cut very narrow planks to cover this area, going right down to 3mm wide if need be. When all is done, with a final flourish, you can wield your razor saw and cut through the frame extensions to free your hull from the building board. The square section blocks can be knocked off the board by tapping lightly with a hammer, leaving your melamine shelf ready for the next model.



Off the building board now and beginning to resemble a boat!



A view along the keel.



742

Shaping-up?

The already referred to pronounced flare of the bow sections will leave a only a knife edge at the junction with the deck edge, making the fitting of the deck-edge bump rails a very difficult task later on. We need to be able to sand a flat here, and provide a foundation for the bump rails by gluing on a strip of balsa 6 x 3mm, with its outer face vertical. To enable this, it will be necessary to back up the planking on the inside in this area by at least 3mm with an extra layer of balsa. Fit this and then trim back the tops of the frames and the planking to the correct level for the deck. To ensure I get the deck camber correct, I use a sanding block with a flexible face, set to the radius of the camber by means of wedges driven in from the ends. Trim the planks at the stern back to the balsa infill and fit the 1.5mm ply transom with pre-cut exhaust and scupper holes.

Since we don't have to chase every last gram of weight saving with a round-bilge hull like this, I strongly recommend applying a thin layer of glass fibre (say 80gsm – grams per square metre) cloth and resin, polyester or epoxy, to the inside. This will stiffen-up the hull and make sanding of the outside an easier task, for the planks will not be able to flex in between the frames and give you a rippled hull. Knock off any high spots on the interior planking with coarse sandpaper, cut strips of glass cloth to the appropriate width and resin into place.

Once the interior resin is set, sanding of the exterior can take place, initially with coarse paper of 120 grit, always with a sanding block to avoid creating local depressions. I find it best to make up a number of special sanding blocks for this task by gluing coarse sandpaper to variously shaped blocks of foam or lengths of PVC pipe that enable me to work the concave contours around the bow. Work in different directions where you can, to avoid sanding a groove and sight along the complete length of the hull to ensure its contours are natural and continuous. A smooth surface is not needed, but the correct shape is! If there are any low spots, cutting out a section of planking and fitting a replacement is probably a better solution than building them up with thin sheet, as the glue is harder than the balsawood and feathering the edge will be difficult.

If you haven't already done so, sand a flat area around the foredeck edges and then restore the correct plan outline by attaching 6 x 3mm balsa strips to provide a foundation for the bump strips to be fitted later. These strips are only required around the foredeck curvature, and should be sanded back to blend with the hull at around Frames C

BELOW: Interior of hull fibreglassed, frame extensions trimmed off, flare planks backed-up and frames cut back for the wheelhouse sides.

BELOW RIGHT: The wheelhouse floor is installed as two halves.

BOTTOM LEFT: Wheelhouse lower internal sides being tested for fit.

BOTTOM RIGHT: Trial fit of the stern floor piece and the dummy ex-drink can fuel tanks.

LEFT: Overall view of hull with its planking sanded and the plywood transom fitted.

BELOW: The wheelhouse side panels and deck fitted.

to D. Next, take a sharp pair of clippers and trim your fingernails, bringing them down to a smooth rounded contour with a suitable file! The hull is very vulnerable to dents in its soft, un-armoured state, and must be handled with care! Don't just plonk it down on the bench either, or it will end up embedded with all the tiny screws, washers and other items that went missing on previous projects. Delaying the fibreglassing of the hull until after the deck is fitted means that the fibreglass can seal the deck edge.

The deck can't be fitted until the wheelhouse floor and sides are in place, so this is the next task. The wheelhouse floor may be cut as two halves, facing opposite ways, to save on material, and has slots to enable it to engage Frames B and C whilst sitting on the top edge of the keel. Seal its underside before gluing in place. Frames B and C then need to have their inner edges cut back at an angle so that the 1.5mm ply wheelhouse sides may be fitted. Carefully sand the top edges of the sides back to the correct height for the deck to fit properly. The stern floor piece can at least be trial fitted at this stage, and the fit of the two sports drink cans that will represent the fuel tanks, checked for fit.

The 1.5 to 1.6mm ply deck should be cut with the correct size aperture for the superstructure and a notch for the stem, but with the outer contour left oversize. Cut the apertures for the anchor rope and bitts, fitting 3mm doublers to the underside around these. When all looks well, epoxy the deck in place, using clamps, weights and masking tape to ensure it is pulled down to the correct camber and sheer of the framework. Sand the edge back to the hull once the glue has set.

Armouring the hull

Armouring the hull here refers to providing it with a tough, impervious layer of fibreglass to withstand all the rigours of transport to the lake and operation of the model. It needs to be done either outside or in a well-ventilated workshop as attempting to do it in the house will likely see you banished outdoors for all subsequent model making activity! Have the model supported, inverted, at a comfortable working height, with clearance between it and the work surface, which should be protected by a plastic sheet. This may require you to make a simple wooden stand with slotted supports to engage the keel on the inside of the inverted hull.

Either epoxy or polyester resin may be used. On this occasion I used epoxy, but generally I prefer polyester as it cheaper, more readily available and enables you to work faster. Cut oversize panels of glass cloth for each side of the hull as well as for the transom. Generally I use a thicker cloth first for strength, followed by a finer cloth to fill the weave and reduce the amount of subsequent sanding. Follow the resin manufacturer's instructions carefully and mix only small batches (50 to 100ml) of resin at a time.

The first glass cloth panel may be clamped to the keel with clothes pegs and allowed to drape naturally down one side of the hull. It will run over the side of the stern tube, which should have its end protected by masking tape to prevent resin entering. The cloth will need to be cut to lie flat against the bottom of the hull where the keel ends, roughly along the centreline and may require further cuts or 'darts' to enable it to conform to the hull curvature without folds. The resin can then be applied through the cloth and spread with an old credit card or plastic spreader, being careful to work out any air bubbles, especially in the sharp angle

ABOVE: Epoxy fibreglass sheathing of the hull.

ABOVE: A closer view of the sheathing showing where a cut was required in the glass cloth.

Available ONLY from Sea Watch Books

17th CENTURY DUTCH MERCHANT SHIPS

Text, Photos and Plans for the Ship Modeler

NEW

Text by Ab Hoving, plans by Cor Emke, models by Herbert Tomesen, photos by Emiel Hoving

This book profiling ten different merchant ships from large to small and the accompanying "Plans Portfolio" of 24 sheets, in both ¼ and 1/8 scale, has something for every modeler. Pick your favorite building method, the size and complexity of the ship you want to build, and you are ready to cut wood. Besides being a treasure trove for ship modelers, this work helps document the merchant ships of one of the world's greatest sailing nations.

The color photography in this book is spectacular, and all lovers of ships will find something intriguing for them.

FEATURES

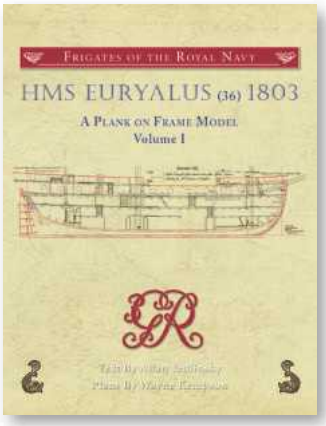
- 152 pages
- Full color
- Case bound
- Dust jacket
- Large 8.5x11 format
- 24 sheets of plans in portfolio

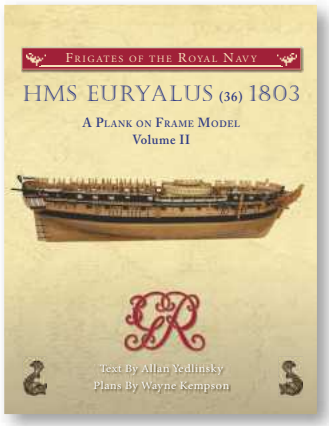
$75 Shipping $9 US / $20 Canada / $30 all other locations
Order by phone or online.

Frigates of the Royal Navy

HMS EURYALUS (36) 1803

Text and Model by Allan Yedlensky • Plans by Wayne Kempson





EURYALUS was part of Nelson's fleet and served at Trafalgar. Volume I begins the plank on frame model using David Antscherl's upright method and covers building the model through the lower deck. Volume II finishes this beautiful model, completing the framing, starboard side planking, upper decks, head and stern details, ships boats, cannon and more. 8-page color section features a painting of EURYALUS by famed artist Geoff Hunt. Plans are included for the masts and spars.

Volume I

Extra large 9x12 hardcover with jacket. 164 pages with photos and drawings. 14 sheets of 1:48 scale plans in rear pocket. CD of printable frames.

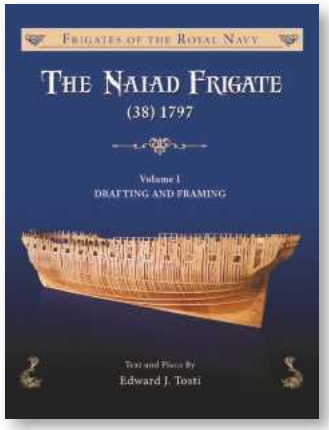
Volume II

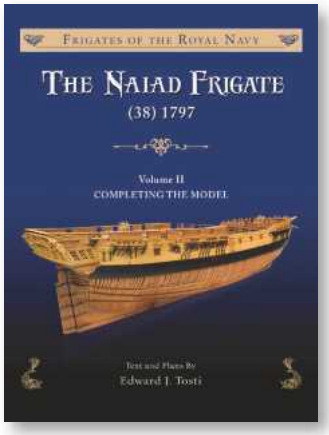
Extra large 9x12 hardcover with jacket. 128 pages with photos and drawings. 13 sheets of 1:48 scale plans in rear pocket.

$80 each Shipping $9 US/$20 Canada/$30 all other locations

THE NAIAD FRIGATE (38) 1797

By Edward Tosti





THE NIAD FRIGATE was a Royal Navy fifth-rate frigate that served in the Napoleonic Wars. Features include descriptions and photos of jigs and building tools for this "keel up" style of building. Volume II deals with interior construction, berth and gun decks, weather decks and all other details of construction. Nine sheets of detailed plans, 16 pages of color photos and a CD containing many details are included.

Volume I — $75

Oversized 9x12 hardcover w/jacket. 248 pages with over 400 photos and drawings. 14 sheets of 1:60 scale plans in rear pocket. CD of printable frames.

Volume II — $80

Oversized 9x12 hardcover with jacket. 328 pages with photos and drawings. 9 sheets of 1:60 scale plans in rear pocket. CD included.

Shipping $9 US/$20 Canada/$30 all other locations

VISA MasterCard DISCOVER

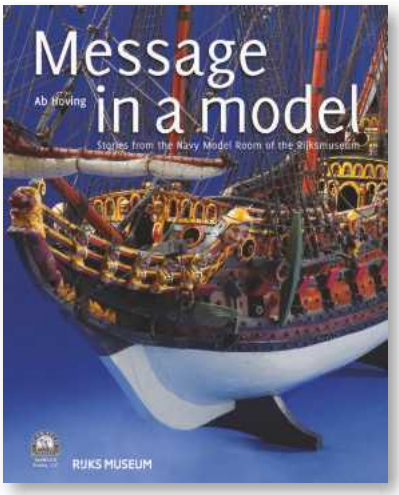
PHONE: 541-997-4439
FAX: 541-997-1282

SeaWatchBooks.com

SEAWATCH BOOKS

MESSAGE in a MODEL

From the newly restored Navy Model Room of The Netherlands national treasure, the Rijksmuseum.



Text by Ab Hoving

Newly translated from the Dutch version, Ab Hoving takes you through the modeling exhibits in the newly restored Navy Model Room of The Netherlands national treasure, the Rijksmuseum. Ab spent 29 years as head model maker and restorer of this collection and he has picked some of his favorites to show in text and over 350 color photos. Come and see the treasures selected for you from one of the world's great maritime historians and model maker.

8" x 10". 246 pages. Cloth bound. Dust jacket. 350+ color photos.

$68

Shipping $9 US/$20 Canada
$30 all other locations

SCANTLINGS OF THE ROYAL NAVY 1719-1805

Comparisons of 1719, 1745 Establishments, Ship Builders Repository and Steel's Elements and Practices of Naval Architecture

Text by Allan Yedlinsky

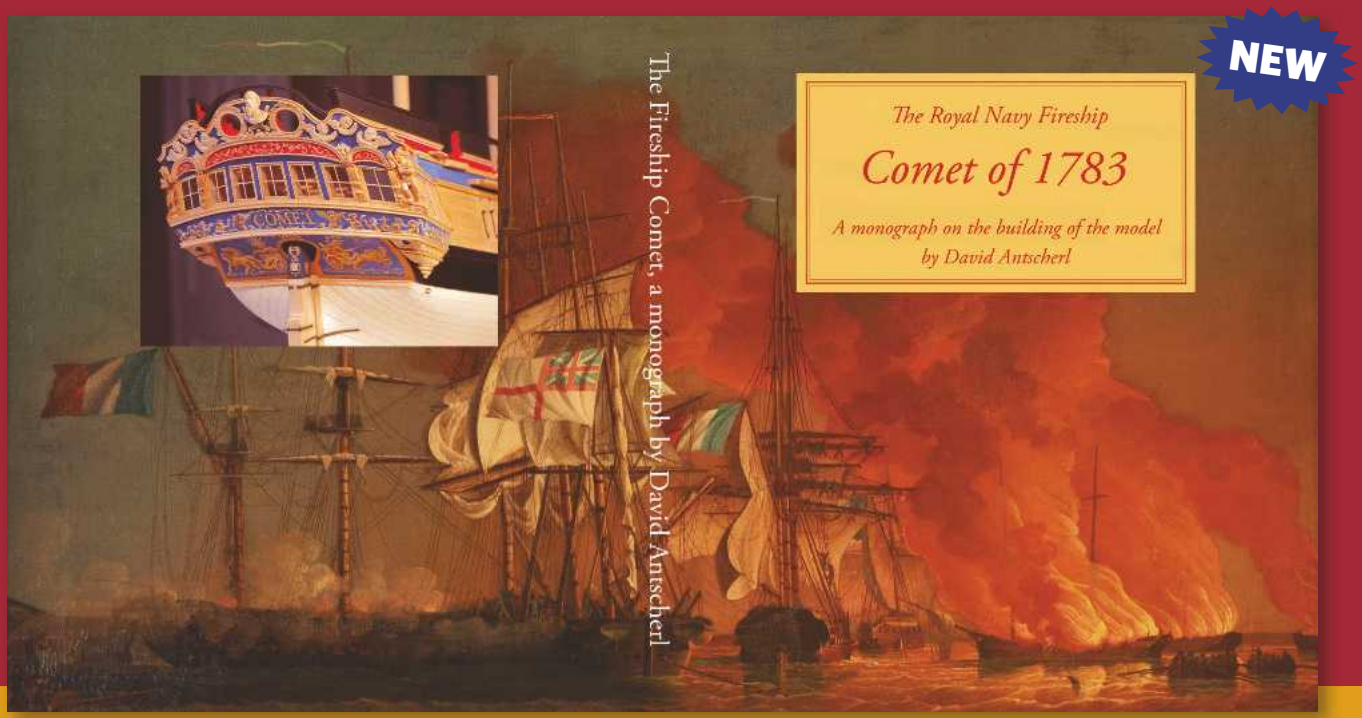
This specially formatted book (14"x8 ½") is divided into 2 sections. The first shows all of the scantlings from the 1719, 1745 and 1750 amended figures in an easy to use spread sheet format. The second section compares Steel and Ship Builders Repository in the same format. Additionally, the author provides notes and comments for each section.

The work is presented in a lay flat binding so that when opened, 28" of information is in front of the reader.

This book is a basic research tool for anyone building or studying 18th and early 19th century Royal Navy warships.

14" x 8.5". 271 pages.

$45 Shipping $9 US/$20 Canada
$30 all other locations



New from David Antscherl

This book describes a late 18th century fireship built by a private yard for the Royal Navy. Although built for the express purpose of setting on fire, *Comet* was lavishly decorated in high Georgian style. She was also one of the first naval ships to be fully armed with carronades.

David's new book describes *Comet's* brief history, then details her construction as a fireship as it varied from standard sixth rates of the period. Readers will find this a useful adjunct to the author's popular series *The Fully Framed Model, The HMN Swan Class Sloops of 1767-1780.*

FEATURES

- 160 pages
- 8.5x11 format
- Color section
- 6 sheets of plans with frames

$65

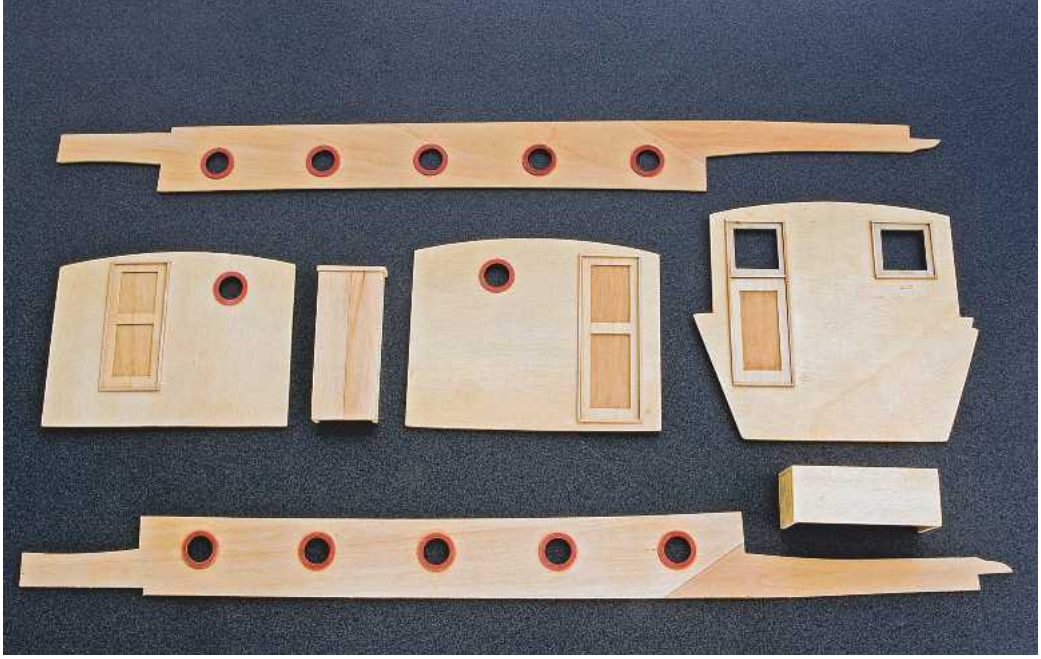
Shipping
$9 US / $20 Canada
$30 all other locations

VISA MasterCard DISCOVER

PHONE: 541-997-4439
FAX: 541-997-1282

SEAWATCHBOOKS.COM

SEAWATCH BOOKS



ABOVE: Sorting and fitting fibre plumbing washers for the porthole surrounds.

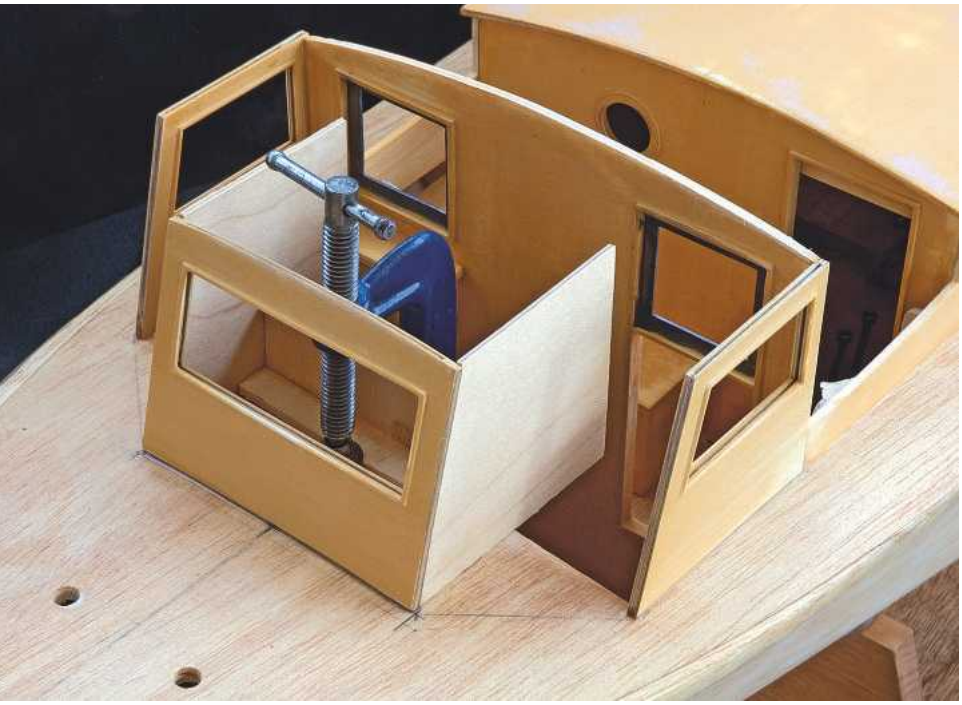
ABOVE RIGHT: The main cabin components complete with door and window detail.

where the keel meets the hull. When it has reached the tacky or green stage, apply the second layer of cloth, followed similarly by a third application of resin only as a sanding/filler coat. Repeat for the other half of the hull, the transom, and, for best results, the narrow exposed edge of the keel. Where edge trimming is required, this is best done when the resin is at the 'green' stage, still soft but easily trimmed with a knife blade.

Sanding of the hull is required to achieve an even smooth finish, and this will take a fair amount of elbow grease. Wet sanding is best, starting with 180 grit wet and dry paper, to avoid putting potentially harmful dust into the air. Again, always use a sanding block and work from different directions, generally in a circular motion. Gradually the matt surface produced will extend over the whole hull, any shiny spots indicating remaining low areas. Once these are only very few and far between, they may be filled with a resin/filler mix and sanding continued until the whole hull is looking dull, but even all over, with no bumps or high spots. Finishing off with 320 grit paper should leave a good finish for the primer. Now would also be a good time to make a stand, so the model can sit safely upright.

BELOW: Wheelhouse assembly, with a jig being used to set the angle of the windscreen.

BELOW RIGHT: Fuel tank and access ladders detail.

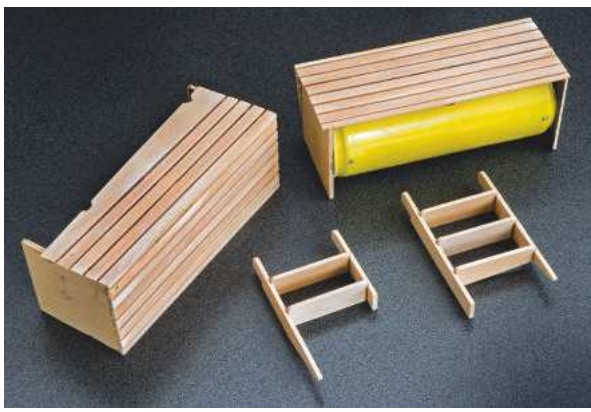


Basic superstructure

Construction continues with the cutting of the panels that will form the cabin ends and sides. Each of the end panels will need to have the appropriate door and window detail built into it prior to fitting. The drawing shows a simple but effective means of achieving a suitable framing effect. In the case of the wheelhouse rear windows, four frames will need to be cut, but only two, the outermost ones, glued in place for now. I used 3mm Lite-ply for the end panels, but 2.3mm (scale thickness) basswood for the sides so that I wouldn't have end grain to fill on the exposed edges. I prefer to do any needed grain filling and priming whilst the panels are still unassembled.

These boats appear to have had simple wooden surrounds to the portholes, at least on the war-build ones, and I was lucky here to find some fibre plumbing washers that were just the right size of 24mm outside diameter and 17mm inside diameter. A total of 12 are required and my luck continued to hold, for there were twenty in the assorted washer kit I bought instead of the ten listed on the contents label. Brilliant, as I didn't have to buy a second kit and can now also fix any leaking tap that comes my way! Plan B had been to cut them from thin ply using a circle cutter. Pre-war boats may have had bronze porthole frames, but it's hard to say. The drawings just state '8 inch ports', which refers to the glazed area. You're unlikely to find commercial model portholes in this size and would probably need to make your own if you want metal ones. I chose not to glaze my portholes as I have in mind a possible sounds effects unit and would need to let the noise out.

The rear wall of the wheelhouse with its under-deck side extensions will need to have its lower



RIGHT: Stern well deck with slatted fuel tank covers.

BELOW: Overhead wheelhouse and forward well deck view. This picture shows how the clear glazing slots into the window frames with no glue required. Additional internal detail was added later.

ABOVE: Overall view thus far showing main cabin roof and model stand.

edges angled to suit the wheelhouse sides and be carefully sized so that it ends up in just the correct position; it can then be glued into place, perpendicular to the floor. The front of the main cabin sits at the rear of the wheelhouse floor and will also need under-deck extensions or tapered infill panels each side to fill the gaps between it and the angled wheelhouse sides. The rear of the main cabin sits on the front of the rear well deck floor. Do check that the end walls align properly with the side panels, having trimmed the top inner edges of the frames to be vertical and flush with the deck cut-out. Then glue it all together, fitting also the curved coaming piece that finishes off the rear well deck.

Main cabin roof

The main cabin roof follows the sheer curve of the deck as well as having camber. In other words, it has compound curvature and you won't be able to get by with just a piece of ply curved to match the top of the end walls. I mocked up a simplified roof with a side profile that was a straight line and it looked terrible! The designers clearly had an eye for appearance and insisted on a dipped roof line despite the extra work involved, so we must follow their lead. This means a simple roof frame with side and three cross members, all with their upper edges curved appropriately, to which wide 3mm balsa strips are glued and covered with fibreglass cloth in a similar manner to how the hull has been made. To avoid the fibreglass cloth feathering out where the roof edge is rounded over, I trimmed the roof edges square and fitted 3.2mm D-section extruded plastic strips all round.

Two basswood frames need to be made and recessed into the roof to form the roof vents. Note that these are tangential to the roof curvature and do not sit vertical. In photos, the covers of these vents are usually propped open at their rear edges so I chose to do the same.

Wheelhouse and forward well deck

Each of the five panels needed to complete the wheelhouse consists of a three-layer sandwich, namely two outer layers of 0.8mm ply with a 1.2mm core. This enables the 1mm glazing panels to be simply slipped in from the top after all the painting is completed, avoiding the need for masking and allowing the glazing to be removed at any time for cleaning or replacement. The drawing provides templates for these pieces, but check they will fit your model before cutting. The window apertures are generally framed with 1.5mm D-section extruded plastic, but the angled corner panels, which were fitted with opening sash windows, require a more elaborate framing to look realistic.

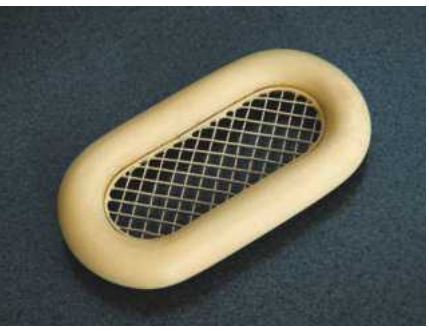
Fit the side panels in place first, overlapping the edges of the rear wall and abutting the main cabin forward extensions. Then, using a simple jig to set the centre panel at the correct angle, fit this panel, followed by the angled corner panels which will require careful trimming to fit properly. The wheelhouse roof should really have a slight degree of compound curvature, but I felt I could get away with single curvature and laminated two pieces of 0.8mm ply together to match the roof camber, with a single 3mm piece of Lite-ply, some 5mm

BELOW: Looking forward into the wheelhouse area, but not yet fitted out. This also shows the motor and propshaft installation.

ABOVE: Carving the balsawood liferaft to shape, first stage

ABOVE: Carving the balsawood liferaft, second stage, rounding the separated sections with a sharp-holed washer.

ABOVE: Carving the liferaft from balsawood, third stage, shaped halves re-joined and final smoothing.



ABOVE: Insert from soldered brass wire to represent floor of liferaft.

smaller all round, on the underside for location. The edges of this roof, which needs to be removable for access to the glazing panels, were finished off with 3.2mm D-section plastic trips as per the main cabin roof.

On top of the roof are mounted a horn, bell and the various lights, which may require a conduit for their wiring if made functional. My wiring runs down the starboard rear wheelhouse corner then under the deck edge on the starboard side to end up in the main cabin. Six grab handles are also required, wooden for war-built boats and metal for pre-war ones, with four mounted on the roof and two on the rear wall.

Basic interior detailing is provided by a full-width dashboard and 12-spoke ship's wheel in natural timber finish, a compass, instrument panel and throttle on the top of the dashboard, and a gear lever rising from the floor toward the starboard side. Also on the starboard side, against the rear wall, is a representation of the shallow cabinet used for small arms stowage. The rear window glazing is inserted from the inside after the interior has been painted, and is held in place by the second pair of window frames which are made a tight fit. Finally, a 1:12 pilot figure completes the fit-out.

In the restricted space of the forward well deck is a rectangular box representing the starter battery housing on the full-size boat, and an entry ladder each side that needs to have its risers and treads cut to suit the various angles of the side panels. I stationed a second crew member, equipped with binoculars, here on the port side, but he's in grave danger if either of the doors is flung open! A lifebuoy made from turned medium density fibreboard pieces and fitted to the rear of the wheelhouse on the starboard side adds some interest and colour, with another placed in the stern well deck.

Liferaft

The other main feature of the roof is the small liferaft, and I puzzled over how this could be made. Rout a semi-circular track in a piece of wood and use it as a half mould? Fill some plastic tube with sand or a spring and curve it around a former? In the end, these ideas gave way to a simple balsa carving exercise, which worked out quite well with the added satisfaction of knowing that the raft is made from the same material as the full-size one.

First three layers of 6mm balsa sheet were glued together with the grain runs perpendicular, to form a balsa block. Through this were drilled two 38mm holes with a hole-saw and then trimmed inside and out to form a basic square-section raft that was deliberately over-length. This then had its shoulders roughly rounded off using a sanding drum in a rotary tool and the blank was cut into two pieces. By using a steel washer with a sharp half-inch (12.7mm) bore, I was then able to thread this over each piece in turn and work it around to shave and compress the balsa into shape. Here and there I had to remove more material first with the sanding drum, but soon ended up with two raft ends of consistent, circular cross section that could be trimmed to length and re-joined. Once filled and smoothed, I fitted this with an oval frame insert made from 1mm diameter brass wire, to which had been

ABOVE: Stern area with rudder servo, also showing mast fitted later with internal wiring for light.

soldered a matrix of copper wire on the underside to form the net floor. The liferaft sits on two basswood saddles shaped to the roof curvature.

The strip running across the width of the roof represents the point at which the forward portion could be removed to facilitate an engine change and is made from 2.4mm x 1mm plastic strip. A small extraction vent fashioned from aluminium rod, an oil-filler cap made from a trouser button and the three grab rails, wooden or metal as appropriate, complete the roof detail.

Aft well deck and rudder servo mounting

The cylindrical fuel tanks on the full-size vessel were housed beneath slatted covers each side of the rear well deck, presumably to prevent petrol vapour from building up and creating an explosive hazard. A couple of 250ml over-priced sports drinks will provide the aluminium cans needed for perfect representations of these. Each end is fitted with a square cheek of plywood to enable the slats to be attached and form a sub-assembly that can then be fitted to the well deck, angled inward toward the stern and held by screws passing through the rear wall of the main cabin into the end cheeks. It's true that the tanks are not very noticeable behind the slats, even with their yellow paint, but I still think they're worth the little extra effort involved.

On each side, a 19 x 1.5mm plywood trim piece fills the gap between the top of the slatted boxes and the cabin side extensions. The towing bitt is shaped from basswood and pegged into the floor. A small woodscrew passing through the rear coaming piece, allows it be removed for access to the rudder servo. The slats only run a short distance under the rear deck, leaving a void as per the full-size boat. The rudder servo, linkage and mounting are hardly noticeable, especially if painted matt black and a coil of rope or other distraction hung over the towing bitt.

The rudder servo is fitted to an angle bracket (or brackets) screwed to a vertical mounting plate of 3mm plywood toward the rear of the rear well deck floor. This should be done is such a way that

ABOVE: Propeller, skeg, rudder and cooling intake detail.

ABOVE: Commencing fitting of the bump rails and the completed wheelhouse panels.

LEFT: Forward hull detail showing D-section brass stem, bump rails and cooling outlet.

the servo can be fitted or removed from the front, either by use of captive barbed nuts on the rear of the mounting plate, or as done here, by fixing forward-facing bolts to the mounting plate that are prevented from turning or push-out by having a length of piano wire epoxied through their head slots. All of this will be more easily done with the floor still off the model. A vertical hole needs to be drilled on the centreline of the keel for the 5/32 inch or 4mm inside diameter brass rudder tube (along with one to the side, behind the up-going propeller blade, if a pick-up for water-cooling is planned).

Rudder and skeg

I made the rudder by filing a flat on each side of the 5/32 inch/4mm rudder stock where the rudder blade is required, and then wrapping a piece of thin brass sheet shaped to a streamlined section around the stock, soldering the lot together and filling the voids with car body filler. The propeller guard was made from a thicker (1mm) piece of brass with a joggle and countersunk holes to enable it to fit flush into a recess in the rear of the keel. I filed a flat section on to a 5/32 inch/4mm wheel collar and soldered this to the end of the propeller guard to provide a lower pivot for the rudder stock. A length of thin plastic tube with some of its rear top section cut off is fitted through Frames H and I providing a conduit to lead the servo wires into the main cabin. Check that everything works freely before gluing into place the rear well deck floor.

Rubbing rails

For the main deck-level rubbing rails 6mm D-section wooden dowel was used. Unfortunately I couldn't buy this, so had to place some 6mm circular dowel on a flat board with some 3mm thick plastic sheet each side, fix one end and plane down to the plastic, keeping the dowel in tension, to leave a D section. Having shaped the forward ends of the rails to nestle against the side of the stem, I found it best to epoxy just the first 20 to 25mm of them into place first (there is virtually no curvature here) leaving the rest of the rails running away from the hull at an angle, but supported so that their weight did not allow them to droop. Once the glue had fully hardened, the rails could then be pulled back to the hull and epoxied in place, using clamps and tape to ensure they followed the line of the deck edge, both in plan and elevation. A short curved piece fitted to the top of the transom completed the wrap-around and three small countersunk screws were used to pull this into line for gluing.

The secondary rubbing rails are from 5mm D-section wooden dowel, which could be purchased online. Postal size restrictions meant that these had to be cut into shorter lengths, which were re-joined using scarf joints. The trick with these rails is getting their run to look right and a

The model nearing completion, forward view.

This rear view reveals bump rail treatment at transom.

ABOVE: A total of six LED's were used for the lighting system; cabin light, forward light, searchlight, two running lights and mast light.

good way to do this, as well as limit the spread of unwanted glue, is to define the position of each rail with two lengths of masking tape spaced 5 to 6mm apart. Start at the transom and move the other end of the tape up or down until it looks right and due to the hull curvature, it won't be a fixed distance down from the deck rail. These rails have short wrap-around sections on the transom.

The final railing to fit is the 1.6mm square section basswood grab rail that runs parallel with the deck edge, but 3mm in from it. It too continues around the transom, but with a small break at each corner to allow water to run off the deck.

Remaining fittings and lighting

Having gained expertise in planing dowel down to a semi-circular section for the bump rails, it was easy to do the same with some 8mm diameter dowel for the mast. This produced two half-masts and into the flat faces of each was filed a groove to carry two enamelled copper wires up to the top to supply power for the masthead light. Two small brass bolts were epoxied into one of the mast halves with their threads protruding and the lower ends of the wires soldered to their heads, thus providing both a means of mounting it on to the rear wall of the cabin, and the terminals for the connection of power. Of course the two mast halves needed to be glued together and tapered, once the internal wiring was completed.

On the foredeck there are a couple of bitts to make and fit. Most photos show these at an outward angle, suggesting their lower ends were bolted back to the keel. Three lengths of brass tube were used to support the stowed anchor, which is a commercial item. Short lengths of brass tube were also fitted to the transom to represent the exhaust outlet and the two scuppers (drain ports) for the well deck.

Other commercial items used were the bell (Robbe No. 1353, 14mm diameter); horn (31 x 8mm); compass binnacle (Krick no. 60111); ship's wheel 12-spoke 54mm; 16mm anvil cleats; swivelling searchlight and a USCG flag (BECC 125mm) and various light fittings from the spares box. The two crew members are from Adrian's Model Figures. The driver had his arm broken(!) and re-set to grip the wheel, whist the modern helmet of 'Binocular Man' was replaced with a peaked cap sculpted from epoxy and filler. The shields for the running lights were folded-up from thin aluminium sheet, incorporating an angled base to compensate for the slope of the roof.

LED's (Light Emitting Diodes) were used throughout, switched on or off by a Turnigy RC switch and taking their power from the 5 volt BEC supply to the receiver. An inexpensive switch such as this, which plugs directly into the receiver and works with a latching action, is only the size of a slim Lego brick and very convenient for switching auxiliary functions on a model. Wide-angle 'top hat' style LED's were used for the running lights (filed slightly to fit) and 3mm bullet types elsewhere, all with their appropriate dropping resistors, for a total current drain of around 120mA. The mast light fires upwards in a clear lamp housing with a curved reflector made from an upholstery washer with its centre flattened providing some measure of downward lighting.

Painting

The overall grey scheme of the war-era picket boats was a welcome contrast to the bright colour schemes of my other models previously featured in these pages. For Australian readers, the colour chosen matches Colorbond 'Ironstone' Pre-Painted Steel, for which aerosol cans are available. For others, Revell 78 (I think the full number is 32178)

LEFT: In the paint shop, with aerosol primer/filler being applied.

Tank Grey is a close match. A deep red aerosol colour, Colonial Red, was used for the lower hull, with a black boot topping. The interior was brush-painted Humbrol No. 120 Light Green and Humbrol No. 7 Light Buff to give a faded look to the liferaft and lifebuoys. Overall, a slightly weathered look was chosen by rubbing through the grey in places that would have been subject to wear, revealing the mustard yellow coloured primer. The build-up of grime was also simulated in corners, but realistic weathering is a true art, so I did not push my luck any further than this.

Pre-war boats had an altogether brighter colour scheme based on a white hull with black lettering, buff coloured roofs and a natural deck finish that revealed its planking. Virtually the same colour scheme also applied to the 200 or so boats that were refurbished and brought to a common standard for post-war service, though there were still variations, with both call-signs and hull numbers appearing on the roof for identification by aircraft. Some boats were individually modified to have, for example, the forward well deck closed in.

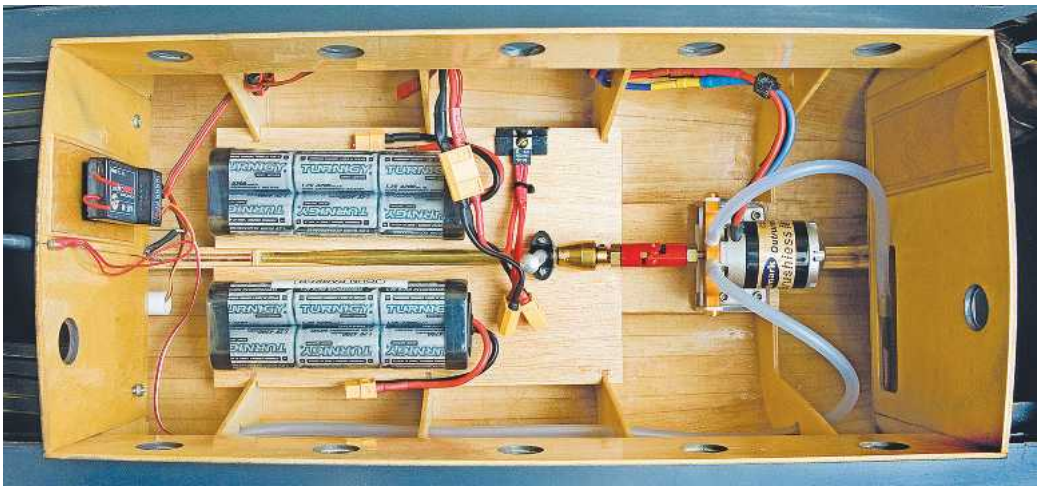
The numbering on this model is 35-year old dry transfer lettering (Letraset) from my student days. It's not quite the right typeface, being too extended, but a lot closer to it than the Arial font commonly found with self-adhesive vinyl lettering. Dry transfer lettering is all but impossible to find now, so accurate characters might only be had by hand cutting them from self-adhesive vinyl sheet, having traced the outlines from one of the military style fonts that may be found on the Internet. A satin clear varnish coat was sprayed all over to bring all the finishes to the same gloss level and provide waterproofing for the hull lettering.

Running gear and completion

This has largely been covered already. A shelf was fixed each side of the stern tube, across the tops of the frames, to carry the two twin-stick batteries.

Cooling water from the pick-up in the stern was fed to the motor by means of silicone tubing running through the holes in the starboard side of the frames, exiting the hull on the starboard side via a small brass tube representing the scupper for the forward well deck. Self-adhesive Velcro tape fastening was used to secure the batteries, brushless speed controller (port side of main cabin, tucked under the deck) and receiver (2.4GHz type) on the rear wall of main cabin. So, this just about completes the model, apart from the all important sea trials.

ABOVE: The completed model on its stand.



LEFT: Power and radio control installation inside the main cabin.

There's cooling water flow at cruising speed, but it gets lost in the wake from the hull.

ABOVE: Moving off at tick-over revs

On the water

At 3.9kg all-up with two 4300mAh NiMH batteries on board, the model is representative of the full size boat at its typical operating weight and no ballast or trim adjustments were necessary. The large outrunner brushless motor is turbine smooth and quiet once past the 'wake up call' it receives from the speed controller upon throttle opening. It makes light work of turning the large propeller and the relatively low rpm can cause you to underestimate the speed of the model.

As speed increases, a prominent bow wake forms at the forefoot sending an outwardly-curving sheet of water down past each side of the hull. This can look untidy and even a bit worrying as it rises to a greater height than the deck, but is absolutely typical of the spray pattern of the full-size boat as revealed in action photos. In practice, keeping to about 85% of full power still gave a good scale maximum speed whilst ensuring that no spray would be shipped into the stern well deck. Despite the amount of water being moved around, the picket boat's displacement hull is surprisingly efficient, the two batteries providing a run time of over two hours at a typical mix of running speeds.

The actual figures recorded by the on-board power meter after a 130 minute run were a peak current drain of 14.4 amps, peak power consumption of 95 watts and a total energy consumption of 7.6 amp-hours or 50.8 watt-hours. This was with the two batteries connected in parallel via two Schottky diodes to prevent cross-charging, involving a voltage loss of about 0.4 volts compared to a single direct battery connection, and with the cut-off voltage set at 6 volts.

The turning radius is quite tight at lower speeds, but I found that rapid application of full rudder at higher speeds sometimes resulted in the model not turning at all, accompanied by a strange whooshing noise from the stern. I suspect the cause is the rudder experiencing hydrodynamic stall and losing its effect in a similar way to an aircraft wing stalling. It is easily avoided by more gentle application of rudder at speed, but as an added measure it is intended to reduce the rudder travel by adjustment of the linkage once this unusual characteristic has been further explored.

Conclusion

Overall I think the model does a fair job of capturing the look of a tough no-nonsense Coast Guard picket boat going about its business in all weathers. Compared (in particular) to the ST206 Seaplane Tender (Plan MAGM2041) and RAAF Halvorsen Seaplane Tender (Plan MM2077) it is slower, but not all that much slower, and has almost 50 per cent longer run time on the same energy source. I like this US Coast Guard Picket Boat, and if it's your sort of model, I think you will too.

Website research plans reference

Mystic Seaport Museum, Mystic, Connecticut: http://library.mysticseaport.org/manuscripts/coll/spcoll094.cfm

Three 38 footers: the USCG Picket Boat leads the RAAF Halvorsen Seaplane Tender (Plan MM2077, left of picture) and the 200 Series RAF Seaplane Tender (Plan MAGM2041, rear of picture).

We've got Christmas sorted! Have you?

Why not avoid those long shopping queues this year and treat your loved one to their favourite magazine? You get to save time & money, and they get their magazine delivered direct to their door!

You could even treat yourself…

Don't miss out, subscribe today!

£19.99* for any of these titles…

*UK ONLY OFFER

- ✶ CHOOSE FROM A RANGE OF HOBBY MAGAZINES
- ✶ GREAT SAVINGS
- ✶ FREE GREETINGS CARD

SAVE 37%

8 ISSUES FOR £19.99
~~FULL PRICE £31.60~~

SAVE 27%

7 ISSUES FOR £19.99
~~FULL PRICE £27.30~~

SAVE 37%

7 ISSUES FOR £19.99
~~FULL PRICE £31.50~~

SAVE 24%

7 ISSUES FOR £19.99
~~FULL PRICE £26.25~~

SAVE 35%

9 ISSUES FOR £19.99
~~FULL PRICE £30.60~~

SAVE 21%

6 ISSUES FOR £19.99
~~FULL PRICE £25.20~~

SAVE 28%

6 ISSUES FOR £19.99
~~FULL PRICE £27.60~~

SAVE 37%

7 ISSUES FOR £19.99
~~FULL PRICE £31.50~~

SAVE 34%

7 ISSUES FOR £19.99
~~FULL PRICE £30.45~~

SAVE 28%

7 ISSUES FOR £19.99
~~FULL PRICE £27.65~~

SAVE 37%

8 ISSUES FOR £19.99
~~FULL PRICE £31.60~~

SUBSCRIBE SECURELY ONLINE: www.mymagazineoffers.co.uk/X300

CALL: 0844 543 8200 and Quote X300

BY POST: Please complete the form below and post it to the address provided. Quote Ref: X300

YOUR DETAILS: (This section must be completed)

Mr/Mrs/Miss/Ms..... Name.....

Surname.....

Address .....

.....

Postcode.....Country .....

Tel/Mob.....

Email .....

D.O.B.....

(Complete if the subscription is for yourself)

Magazine..... Price .....

GIFT RECIPIENT (Complete 'Your details' first)

Mr/Mrs/Miss/Ms..... Name.....

Surname.....

Address .....

.....

Postcode.....Country .....

Tel/Mob.....

Email .....

D.O.B.....

(Complete if gift recipient is under 18)

Magazine..... Price .....

A free greetings card will be supplied with all gift subscriptions;

Please note that this will be sent to the payer's address, separate to the order confirmation. Although we will strive to supply this card prior to December 25th 2014 we cannot guarantee this for any orders placed after December 5th 2014.

PAYMENT DETAILS

Please make cheques payable to MyTimeMedia Ltd and write code **X300** and magazine title on the back.

☐ Postal Order/Cheque ☐ Visa/Mastercard ☐ Maestro

Card no: (Maestro)

Cardholder's name: .....

Valid from ..... Expiry date..... Maestro issue no.....

Signature ..... Date .....

SEND TO: MYTIMEMEDIA SUBSCRIPTIONS, Tower House, Sovereign Park, Market Harborough, Leics LE16 9EF

TERMS & CONDITIONS: Offer ends 31st December 2014. UK offer only. Gift subscriptions will begin with the first available issue of 2015 and personal subscriptions with the next available issue when order is placed. For full terms & conditions visit www.mytimemedia.co.uk/terms. From time to time, your chosen magazine & MyTimeMedia Ltd may contact you regarding your subscription, or with details of its products and services. Your details will be processed in full accordance with all relevant UK and EU data protection legislation. If you DO NOT wish to be contacted by MyTimeMedia Ltd & your magazine please tick here: ☐ Email ☐ Post ☐ Phone. If you DO NOT wish to be contacted by carefully chosen 3rd parties, please tick here: ☐ Post ☐ Phone. If you DO wish to be contacted by carefully chosen 3rd parties, please tick here: ☐ Email.

Radio Ga Ga!

A Guide to the Techie Bits, by
Dave Milbourn

As a follow-up to my last article in the MB 2013 Winter Special Edition, the Editor thought it would be a good idea if I went a bit deeper into what a model radio control set is, what it does and how it does it. I'll explain the difference between AM and FM and why 2.4GHz radios are so much better at rejecting interference. We'll then take a tour around the workings of a typical transmitter, receiver and servo and look at several different types of radio which might be used in model boats. Please note that the following is not intended to be a technical treatise. If you feel moved, as one reader of a previous article did, to take issue with me on such detail as the finer points of cold-flow in solder then I'm afraid you have rather missed the point of the article. I have tried to simplify descriptions etc. as much as possible, more for the benefit of the curious young novice or the old bloke with the pipe and the scale Clyde Puffer, than for any highly-qualified electronics engineer who might be reading it (OE & M are excepted, as usual). There's no math's involved – honest!

Oh, go on – it won't hurt and there's no test at the end!

First up, and I am not going to explain just how a radio signal is generated. It's rather boring and there are any number of excellent websites which will do the job better than I can here, but let's just say that there's a lot of very clever stuff inside the transmitter that rubs a few electronic sticks together and makes magic invisible sparks. You may, however, have heard some folk muttering darkly about VHF, AM, FM and the latest fancy kid-on-the-block 'Two-Point-Four Gig', so let's see if we can de-mystify that little lot first.

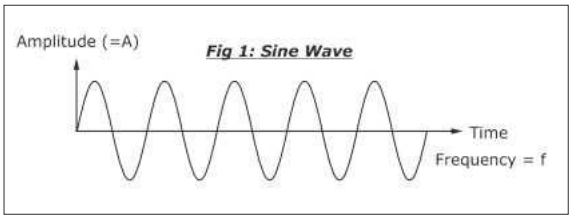


Fig 1: Sine Wave

Let's make waves

Modern radios use what we call a continuous sine wave to transmit information, **Figure 1.** If you were to plot a graph to represent the radio signal strength against time then you would see such a wave-form. It has two obvious properties; its signal strength and the number of times the signal 'peaks'. The strength is called its amplitude while the number of times it 'peaks' in a second is called its frequency.

Naturally with just about everything in the modern world now being wireless, there are gazillions of different radio signals flowing though the same space at any one moment, so in order for one receiver to be able to isolate and use the signal from one specific transmitter to operate a model, requires some very precise electronic devices and circuitry. As the amplitude, or 'loudness', of a radio signal isn't an easy (or even meaningful) thing to be able to try to control or detect with any accuracy, then we use its unique frequency to identify it.

Some geeky stuff which is kind-of interesting and useful, without being essential

Frequency is measured in 'cycles per second'. The measurement is from one peak of the sine wave to the next, so that each 'cycle' includes both a positive 'peak' and a negative 'trough'. The German scientist Heinrich Hertz did much to prove the existence of electromagnetic waves so the unit of frequency was named after him. As one cycle per second (one Hertz, or Hz) is a very small unit indeed, we quote radio frequency in terms of Mega Hertz (1 MHz =1 million cycles per second) and latterly Giga Hertz (1 GHz = 1 thousand million cycles per second). Just as a matter of interest, frequencies between 30 and 300MHz are often referred to as Very High Frequency signals (or VHF). Those between 300MHz and 0.3GHz are Ultra High Frequency (UHF) while anything beyond that are Microwaves (up to 300GHz), but the limits of each term tend to be a bit flexible, depending on where you look for them. The cherry on the top of this mélange of information is that the linear distance between two adjacent peaks of a wave is called – believe it or not – the wavelength! It's usually quoted in metres, so now you know.

Controlling the waves (or Canute, eat your heart out!)

The basic component for accurate frequency control is a device called a crystal. As its name suggests, this is a chunk of ceramic crystal material and it will vibrate at a very precise frequency (resonate) when a voltage is applied across it. Cutting the crystals, like diamonds, at slightly different angles and in different planes will produce smaller crystals

with different resonant frequencies. Fitting such a crystal into the circuitry of a transmitter will control very precisely the frequency of the transmitted signal. For example, a 27MHz crystal is calibrated to a value of three decimal points e.g. 27.045MHz and will generate a signal to within a fraction of a percent of that value. If we now fit a corresponding crystal to the receiver, then it will 'hear' signals from a transmitter on that frequency far better than any other radio signals. In practice the two crystals are a tiny bit different in frequency and this creates an intermediate (or 'beat') frequency inside the receiver, due to an effect called heterodyning. This much lower-frequency signal is easier for the decoding circuitry in the receiver to handle.

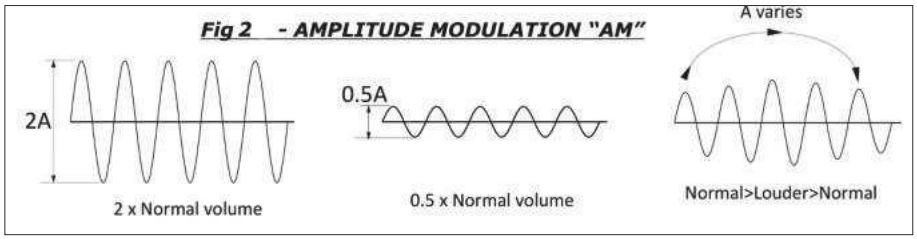
Where model radio control frequencies can be controlled to within very narrow limits like this, it's possible for several models to be operated at the same time, provided that they are all crystal-controlled to their own specific frequency. With plug-in crystals the modeller can change frequency very easily to avoid any clashes. There are some VHF radio sets on the market which use very advanced and precise electronics to do away with the crystals altogether; you simply 'dial' the frequency you wish to use and switch the radio transmitter on, followed by the receiver. These 'synthesised-frequency' sets are of course more expensive and much less common than the crystal-controlled types.

Jeux sans frontières

Until quite recently all standard model radio sets used a VHF (Very High Frequency) radio signal. There are only a few permissible ranges (bands) of radio frequency which can be used for models. Unfortunately these aren't the same throughout the world, although the 27MHz band seems to be pretty much universal. Regrettably that frequency band was hijacked in the UK by illegal 'Citizen's Band' radio in the 1970's and for a time was virtually unusable for model control. CB seems since to have taken a huge drop in popularity with the advent of mobile cellphones, so 27MHz is enjoying a small renaissance, although obtaining equipment on those frequencies is difficult as there are few current manufacturers of these sets, except for the basic two channel types.

In practical terms, the model frequencies are allocated in chunks, or bands, by the various radio communications authorities in each country. Within those bands there are a number of specific frequencies, each of which will have a frequency value, a channel number and sometimes a coloured flag. In the UK there are separate bands for surface models (40MHz), flying models (35MHz) and a universal band (27MHz). There is also an obscure UHF band at 459MHz for all models, but the equipment which was available for this was bulky, expensive and unreliable and its use in models faded in the late 1970's. I seem to remember 'Reftec' and 'Cotswold Controls' as manufacturers. These days, part of this band is also authorised for industrial use.

I am bound to say at this point that it's not only illegal to use a forbidden frequency e.g. 35MHz in a model car or boat, but also very stupid and irresponsible. Many models these days are quite capable of inflicting serious personal injuries or even death were they to lose control through radio interference, so don't even think about doing it.



One man and his modulator

All this technical wizardry has only taken us to the point in this description where there is a contact between the transmitter and the receiver. At this stage the receiver will detect only a continuous signal at a specific frequency.

Now let's image a man standing in a field, whistling to his dog. He wants the dog to move where and when he orders it, perhaps to herd a few sheep into a pen so that he can go home with a nice shiny trophy. So does he just whistle a long continuous note? Nope(!), as the poor dog has no idea what his master wants because there's nothing in that monotone whistle which tells him. The single note contains no information. Similarly a continuous signal from a radio transmitter tells the receiver nothing (except that the transmitter is switched on). In order to transmit any other information we have to change the signal somehow.

Remember the **sine-wave?** As we've seen, it has only three properties:
1) Whether or not it is on
2) Its amplitude
3) Its frequency

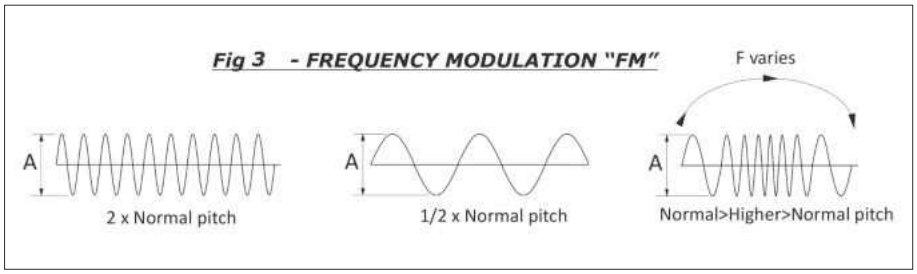
We can vary the wave by changing one of these properties and thereby superimpose some information which can be used at the receiving end to prompt an action. This changing of the wave pattern is called 'modulating' by the technical geeks.

Back in the field, the man could simply stop and restart the whistled note. While the dog might eventually learn how to distinguish between various different lengths of whistled note, in model radio terms it is not a good idea to interrupt the transmission altogether as it leaves the receiver open to all manner of other signals while the transmitter is off, and is therefore not used in practice! Back in the field it would also leave the dog susceptible to 'rogue' whistles from another competitor offstage perhaps!

Alternatively he could change the loudness (or amplitude) of the single note by blowing harder or softer. In radio-speak this is called Amplitude Modulation (AM), **Figure 2.** He could vary the pitch of the note between high and low; this changes its frequency and yes, you've guessed it – is called Frequency Modulation (FM), **Figure 3.**

Finally, if he and his dog are as clever and as fast

> *"I am bound to say at this point that it's not only illegal to use a forbidden frequency e.g. 35MHz in a model car or boat, but also very stupid and irresponsible."*



as a computer, then he could embed a series of pulsed, coded whistles within the overall 'shape' of the continuous note. This pulsed signal is called Pulse Code Modulation (PCM), **Figure 4.**

Differences?

You would not be able to tell whether a radio was using AM, FM or PCM in practice unless someone had told you or you were to encounter some radio interference.

AM radios are susceptible to just about any type of interference going, be it metallic mechanical parts rubbing together, electric lighting, an unsuppressed washing machine motor next door - you name it. With model radio transmitters limited to a tenth of a Watt in output power (which is very low-powered) then it wouldn't take much to make your model 'glitch' and twitch if swamped by a stronger signal. This is why AM radio stations are hissy and crackly as the sound you hear includes all sorts of unwanted background interference and 'noise'.

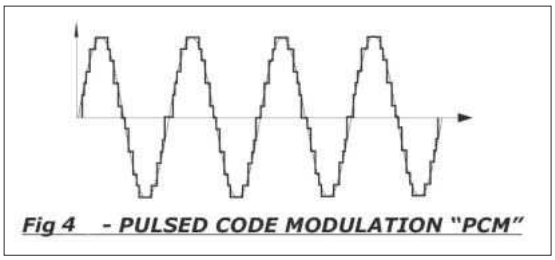


Fig 4 - PULSED CODE MODULATION "PCM"

FM sets are much better at handling radio interference although they are still prone to metal-to-metal noise. If you think your model is suffering from this then you should do all you can to remove the source by either replacing the parts with non-metallic equivalents or by electrically connecting (bonding) them together. Typical sources of problems in a model boat might be a wire pushrod rattling in a cast-metal tiller arm or un-lubricated metal bearings. Compare the quality of reception between an FM domestic radio signal and an AM one and is obvious that the FM is much clearer and precise.

PCM radios are practically immune from interference because they are listening for a unique digital code within the signal and they won't even recognise anything else as a valid signal and in audio terms this would be comparable to a DAB radio.

There's absolutely no reason to dump all of your non-PCM radio sets into the waste bin now. There are thousands of boat modellers around the world who regularly enjoy a day's sailing with the more basic AM and FM sets without any trace of interference. Don't forget also that you might not even notice a glitch in a slow-moving model boat whereas the equivalent glitch in a model helicopter could produce instant garbage.

`Two-point-four gig´ and all that

The use of 2.4GHz radio signals is now so thoroughly familiar that it's difficult to remember when it wasn't common. In fact its origins go back to 1947 when it was allocated to the new International Industrial Scientific and Medical Radio bands for experimentation into microwave heating. Prior to being adopted for low-power remote-control applications such as our models, its most familiar application was in domestic microwave ovens, which operate at 2.45GHz. These days it is also used in cordless phones, baby alarms, wireless LAN's, Bluetooth, car alarms and WiFi networks, as well as just about every radio controlled model helicopter and aeroplane coming out of China and the Far East.

From the modeller's point of view it has one huge advantage over VHF sets in that it has a transmitter and receiver which are 'bound' together. This means that the receiver is incapable of detecting or responding to any radio signal which doesn't come directly from its 'buddy' transmitter. The consequence of this is that the user no longer needs to pay any attention to the frequency of any radios operating in the vicinity because he knows that they will not interfere with his radio, nor will his with theirs. In fact there is a finite number of frequencies available within this band, but the radio manufacturers have developed two different ways of spreading the transmission over the available spectrum in a unique way for each radio set.

The first of these is called **Frequency Hopping Spectrum Spread (FHSS).** The transmission hops from one available frequency to another hundreds

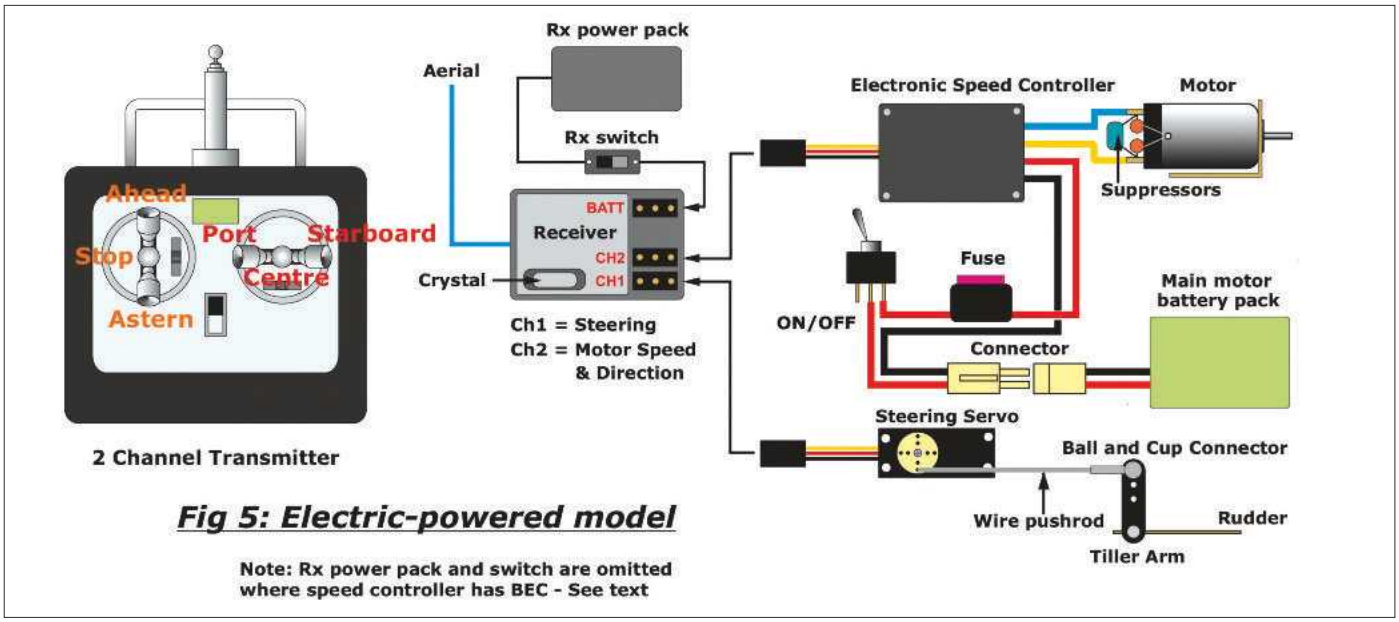


Fig 5: Electric-powered model

Note: Rx power pack and switch are omitted where speed controller has BEC - See text

of times a second, and the binding process will prompt the transmitter to teach a compatible receiver the frequency-changing pattern and time-frames. Futaba is probably the best-known manufacturer of FHSS radios. The other method is **Direct Sequence Spread Spectrum (DSSS)** and involves a unique code which spreads the signal data over a wide bandwidth on a single selected frequency. Spektrum/JR call their version of this DSM (later DSM2) which apparently stands for Digital Spectrum Modulation. DSM2 actually uses two different frequencies to eliminate any corrupted signals. I've owned and used both types and found there's no discernable difference. Combined with the PCM method of superimposing the control information on to the basic waveform, it's difficult to imagine how any interference might affect them. The only obvious disadvantage of a 2.4GHz set is that the frequency used has a very short wavelength. This makes it prone to being reflected off metallic surfaces and water, so it's not suitable for use in submarines or models made substantially from metal plate or carbon-fibre.

So what is the best radio system?

Frankly the details of quite how and why these very sophisticated systems do what they do is academic to 99.9% of modellers, myself included, so I shall end the technical lecture there. As to which 2.4GHz spectrum spreading system is best depends on who you talk to. The market is so obviously inclined towards flying models that some feature which Manufacturer A sees as a vast technical improvement and/or huge advantage over Manufacturer B's product, is probably meaningless in the context of a Clyde Puffer or even a D Class i.c powerboat. That said, while no radio system is totally immune to interference, I believe that a properly-designed and well-assembled 2.4GHz radio is as close as you are going to get to it these days, but you aren't going to get that for peanuts. I'll have more to say later about price and quality. There's also the very real point that few radios are now being made which aren't in the 2.4GHz band, so you may not have any choice in the future anyway!

Today we have the naming of the parts!

Now that we are completely au-fait with the different types of model radio control transmission, let's have a look at the basic parts of a radio system and how they work. No matter which transmission system it uses, every model radio set has four main parts so let's look at the transmitter first.

Transmitter

This is the bit which contains the electronics which generate and send out the radio signals. It is held in both hands (or hung from a neck-strap) and the operator moves a combination of sprung levers, switches, rotary knobs and buttons on the front of the case to cause the changes in the radio signal which tell the model what to do. It has its own internal power supply in the form of batteries which are either alkaline 'dry' cells or rechargeable NiMH ones. Some sets even use LiPo cells now.

1

ABOVE: Hitec Ranger 2N 40MHz AM 2-channel transmitter

VHF sets have a telescopic antenna to maximise signal strength, whereas 2.4GHz sets have either a short external antenna, or one which is completely internal. VHF sets will also have access to the socket where the crystal is plugged. In addition to the main controls there may also be trim levers, servo-reverse switches, battery state-indicator meters and buttons to select and program the various functions of more complex sets, so let's look at them in detail.

The transmitter (please don't refer to it as a 'handset' – they are toys for playing computer games with) is at the heart of the radio system. Its basic classification is by the number of different functions it will operate, and these are called channels. A simple one with two single-axis levers on the front and no other control input is called a two channel set, **Photo 1.** This represents the basic requirements of controlling a model boat, i.e. its steering and speed of travel (usually forwards and reverse). It will have a corresponding receiver into which you may plug two servos for an i.c. engine powered model (or yacht), or one servo and usually a speed controller for an electric motor powered model. The left-hand lever, which is usually referred to as a 'stick' by the way, moves up and down in its housing and will be used to operate the engine throttle or electric speed controller, while the right-hand stick moves from side to side and controls the steering. Where the model has an electric motor for its main power it is usual for its speed controller to dictate not just the speed of the motor but also in which direction it rotates. Changing the rotation of the propeller will change the direction of the boat from ahead to astern (note those cool nautical terms!). In this case the throttle/left-hand stick will be in its central position when the motor is stopped. Pushing the stick towards the top of the transmitter case will increase the speed ahead while pulling it back down towards the bottom of the case will reverse the motor, **Figure 5.**

If the model has a speed controller which only works in a forward direction e.g. for a fast electric

> *"The transmitter (please don't refer to it as a 'handset' – they are toys for playing computer games with) is at the heart of the radio system."*

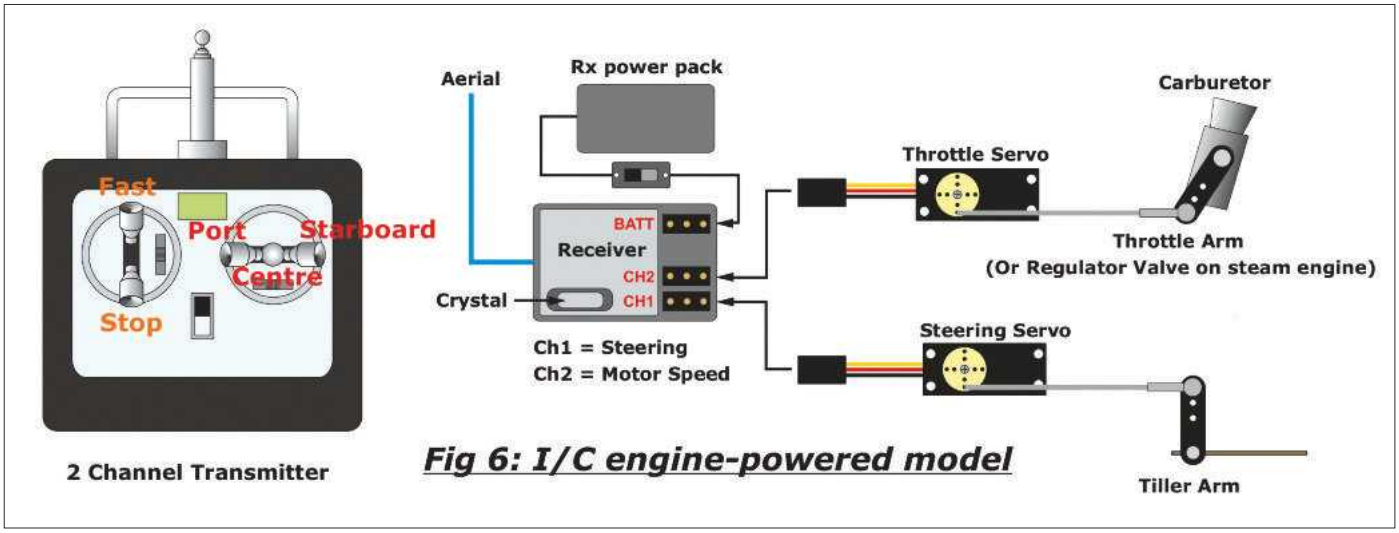


Fig 6: I/C engine-powered model

> *The trims on some radios will cause the transmitter to emit a beep when they are being moved; the more often it beeps, then the further the neutral has moved.*

racing model, or if it has an i.c or non-reversing steam engine then the throttle stick will need to be pulled all the way down/back to stop the engine, **Figure 6.** Similarly, the sail winch of a yacht will be connected to this channel and the sails are hauled all the way in when the stick is pulled right back, **Figure 7.** When you first pick up the transmitter, you will immediately notice that the right-hand stick, which is used for steering, is biased to the centre position with an internal spring so that if you let it go it will spring immediately to the centre (which gives dead-ahead steering). The left-hand stick may instead have either no spring or a ratchet which allows the stick to be left 'clicked' in one of around eleven fixed positions. This arrangement better suits those applications where you need to be able to leave the stick in one position e.g. to set the sails or the cruising speed of a steam engine.

Alongside the two sticks you will see two much shorter levers with serrated tops which move in the same direction as their sticks and these are the trims. Their purpose is to move the neutral position of the servo in the model by a small amount to correct, for example, a slight turn to one side when the steering stick is centred or perhaps to adjust the idling speed of an i.c. engine. The further you move the trim from its centre then the more you will move the neutral position of the servo disc, **Figure 8.** Some trim levers are mechanical and actually move the main stick position relative to its operating yolk, while others are purely electronic and don't affect the stick physically at all. The trims on some radios will cause the transmitter to emit a beep when they are being moved; the more often it beeps, then the further the neutral has moved. If you use the trim to correct a constant unwanted deviation e.g. a right turn then, it's best to adjust the mechanical link between the rudder and servo to effect that correction and then return the trim lever to centre, **Photo 2.**

For models equipped with ahead-and-astern speed controllers, it is usually preferable to replace the ratchet inside the transmitter with a similar spring-centring mechanism to that of the rudder stick, so that if you let go of the throttle stick then the motor will stop, **Photo 3** is of no ratchet and **Photo 4** is with the ratchet fitted. Most radio manufacturers provide the parts to fit either spring-centring or a ratchet either with the radio set when purchased, or as a separate accessory. Some transmitters have both fitted already and you simply tighten or remove a screw to change over from one to the other. As I sail only scale or semi-scale model boats with forward-and-reverse electric motors, I have fitted return springs to the throttle sticks on all of my transmitters. The choice is entirely yours

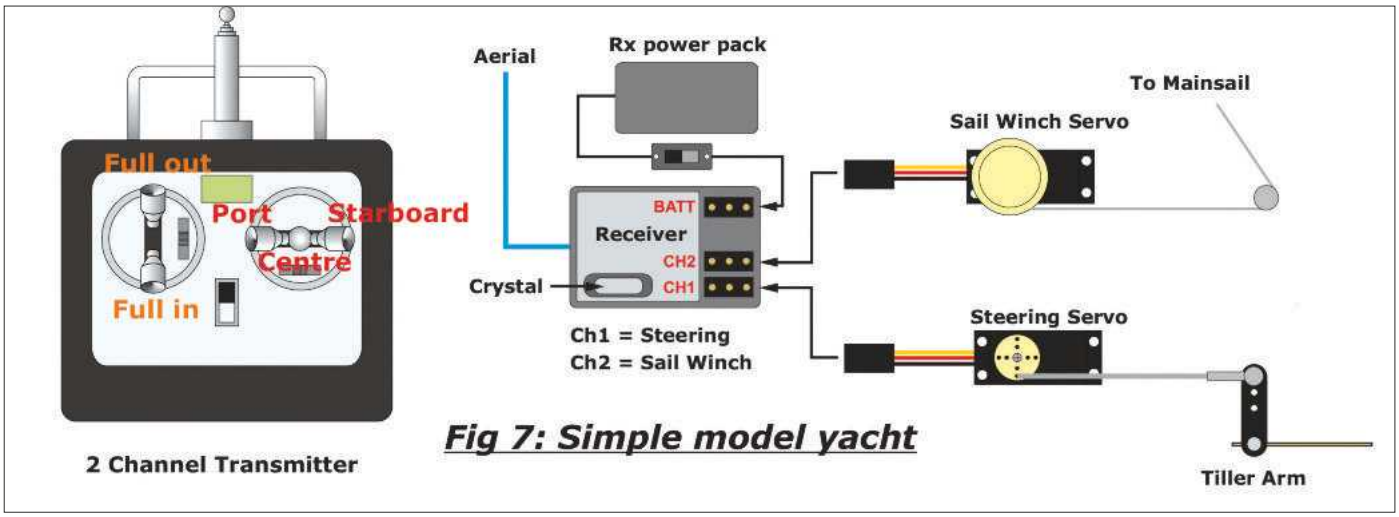
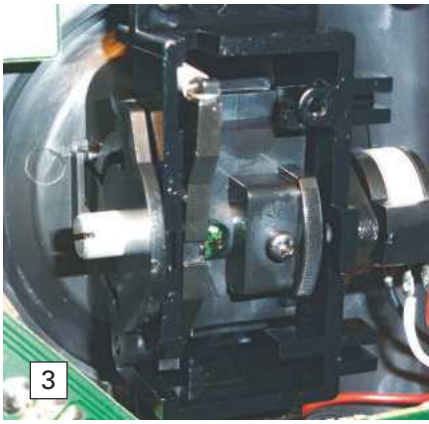
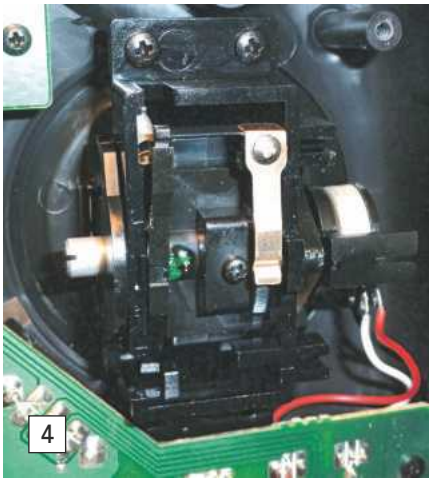


Fig 7: Simple model yacht

LEFT: Close-up of two channel Tx showing sticks, trim levers, servo reverse switches and throttle neutral adjustment lever. Battery indication via two LED's.



ABOVE: Inside of transmitter shows centring spring fitted to arm on stick unit.



ABOVE: Centring spring disconnected and ratchet arm fitted instead.

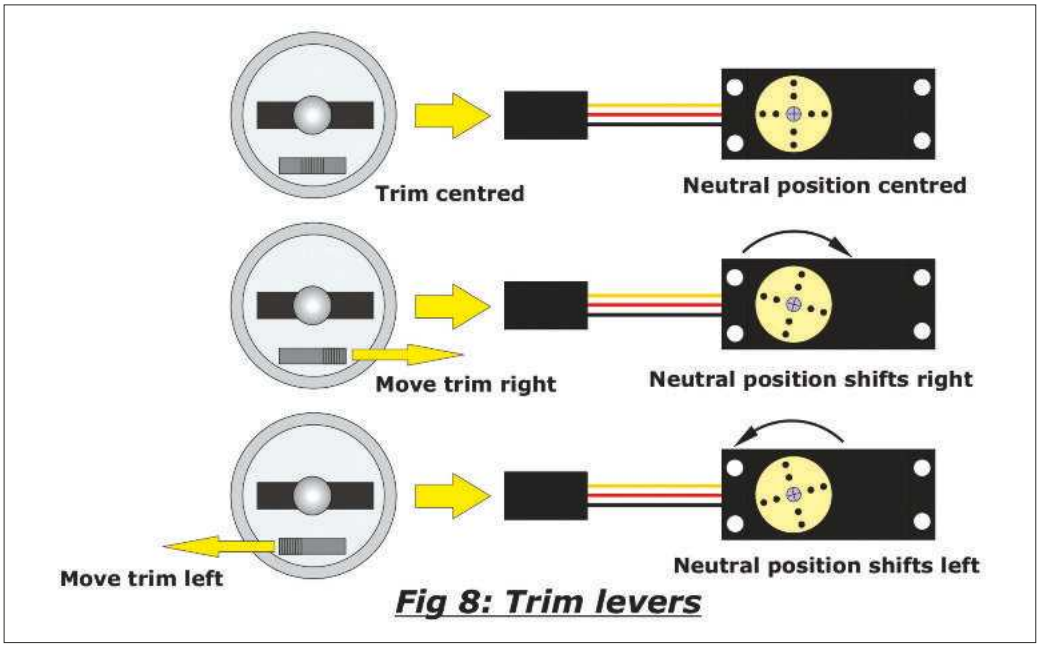


Fig 8: Trim levers

as to which set-up you prefer; I have just described what are the conventional ways of setting things up.

Most two channel transmitters also have a lever to adjust the neutral position of the throttle stick from the centre – which gives 50/50 movement up and down – to a position which gives 70/30 up and down. This gives more forward throttle movement and less reverse, which can be useful for model boats, but is most often used with model cars.

The only other controls which are pretty much universal on two channel sets these days are the servo-reversing switches. They are clearly visible on the front of the transmitter if you refer back to Photo 2, but can also appear in other forms. These are slide switches and can be hidden away behind an access panel or on the bottom of the transmitter case. Their purpose is to change the direction of rotation of a servo with respect to the stick. For example, if the rudder servo rotates clockwise when you push the steering stick to the left, but because of the physical installation in the model you need it to rotate anticlockwise, then the servo-reverse switch will allow you to do just that, **Figure 9**. On most sets, moving the reversing switches takes effect while the radio is switched on, but on some you will need to switch off the equipment and then move the switch before turning the radio back on again. Naturally if you use the same transmitter for several models then you will need to check that the servo-reverse switches are set in the right positions

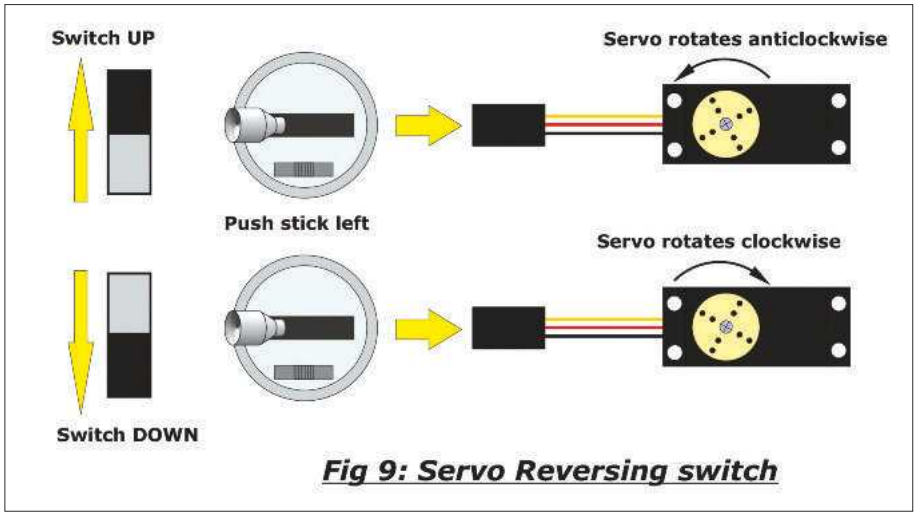


Fig 9: Servo Reversing switch

ABOVE: Futaba Magnum 2-channel 27MHz AM steerwheel style transmitter.

ABOVE: Servo reversing switches and battery indicator LED's.

ABOVE: Trim knobs and removable crystal.

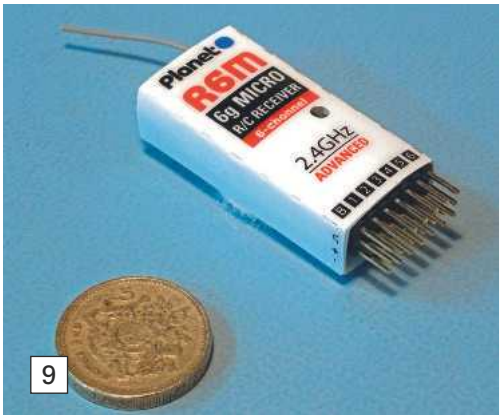
> *The first and foremost thing to bear in mind here is that 99.99% of the radios in this bracket are made and sold for use in model aeroplanes and helicopters*

for the particular model you are sailing before you let the thing go charging off across the lake! I have seen more than one model aeroplane bite the runway on take-off because this simple check was forgotten.

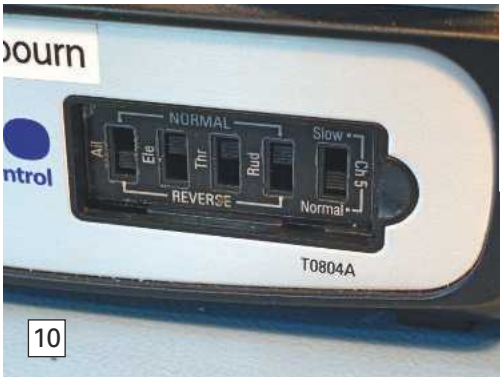
There is another type of two channel transmitter and that's the 'steerwheel' type, **Photo 5.** It was designed especially for r/c cars, but many are used in boats and so I've included a description here. The receiver and servos are identical to the twin-stick set but the transmitter is radically different. It is shaped rather like a large automatic pistol and is held in the left hand. There is a large rotary wheel in the centre at the top and this is used to control the steering with the right hand, just like a car's steering wheel. The throttle or speed controller is operated with the forefinger of the left hand, which is hooked through the 'trigger'. Squeezing the trigger will increase the model's speed forward while pushing the trigger away from the handle will reverse the model. The batteries are held in a pod at the bottom of the grip/handle for balance. There are usually servo-reversing switches, **Photo 6,** and many of these steerwheel radios have a third channel and some exotic computerised functions for the really committed model car racers, **Photo 7.**

Once we start to increase the number of channels beyond two, then we are into 'multi-channel' territory. The first and foremost thing to bear in mind here is that 99.99% of the radios in this bracket are made and sold for use in model aeroplanes and helicopters, so that the controls and computer functions are dedicated to flying those and not to sailing model boats. There is just one dedicated mainstream 'truck and boat' radio, but we'll leave that until later. While is it possible to obtain three channel radios with control sticks as an alternative to the three channel steerwheel sets just mentioned, they are uncommon these days, especially as the four and five channel sets are relatively inexpensive. I wouldn't entertain buying a three channel set for a model boat unless it was proved to me that it was superior to a multi-channel set for that same application. So we're left with a bewildering array of four (and more) channel radio sets. I should point out now that some continental manufacturers tend to regard one function e.g. rudder as two channels, presumably because there is a left rudder and a right rudder command available. Consequently what we would refer to as a six channel radio they may call twelve channels. If you're not sure, then just check the specifications for the number of actual functions it will operate as that's a better guide than the quoted number of channels. Also bear very much in mind that there are more than just the 'proportional' functions which are referred to as channels. I'll explain this with reference to our first simple multi-channel set, this being the very popular Planet T5 2.4GHz set, **Photo 8,** and **Photo 9** is of a six channel matching receiver that works perfectly well with the five channels of this transmitter.

You'll see that it has two sticks, but there the comparison with the two channel set ends. Each stick is able to move both up and down and side-to-side, so you can move the stick to any position within the limits dictated by the edge of the stick's shroud. With both of these sticks being so-called 'dual axis' you can control four functions fully proportionally i.e. the servos will move in proportion



9



10

8

ABOVE: Planet T5 5-channel 2.4GHz transmitter.

TOP LEFT: Planet T5 6 channel micro-receiver; note very short aerial.

LEFT: Servo reversing and Planet Tx fifth channel fast/slow switches.

11

RIGHT: Channel 5 switch on top RHS of Planet Tx and central digital voltage display.

to the amount of movement you input to the sticks, **Figure 10.** In the bad old days (pre-1970ish) control was restricted to a full movement of the servo to one or the other extreme of its travel, or neutral. That's either full left, neutral or full right rudder. Imagine that! We are spoiled these days in that we can apply as much or as little control input as we need at the sticks and the servos will respond accurately. In practice we use the same RH and LH stick movements as the two channel set to operate the rudder and throttle/speed control. The two spare proportional channels might for example, be used for a bow-thruster and to switch on and off lighting and a horn.

The Planet T5 has its complement of trims and servo-reversers, **Photo 10,** just like a two channel set, but you will also see a switch at the top RH corner of the case, **Photo 11** and this is Channel 5. It is NOT a proportional channel in that it is controlled by a two position switch, which is either fully one way or the other. It stands to reason then that a servo connected to Channel 5 can only be positioned at either end of its travel. If you want to use this fifth channel for a proportional function such as rotating a gun turret to any position within its arc of fire then I'm afraid you won't be able to. This type of channel is useful only for on/off or up and down situations like open or shut doors; cranes, boat davits etc. Planet has a little trick here in that you can select how fast you want the connected servo to move, using a slide switch behind the smoked plastic front panel. I imagine that the slow movement would more suit the flaps or retracting undercarriage servo in a model aeroplane. For a model boat, this channel is useful to operate an r/c

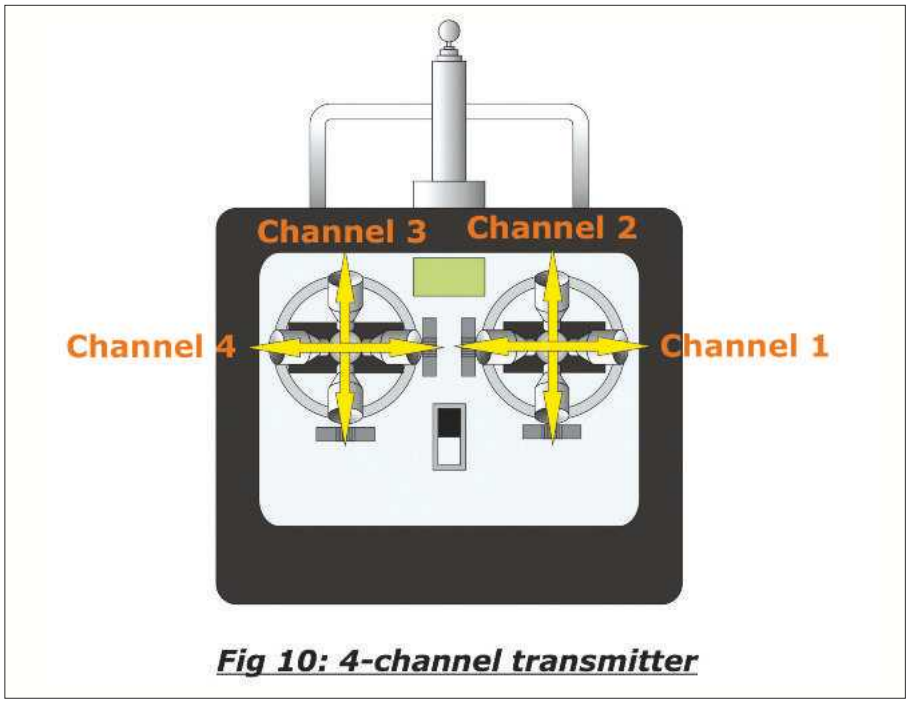


Fig 10: 4-channel transmitter

Model Boats SUBSCRIPTION ORDER FORM

DIRECT DEBIT SUBSCRIPTIONS (UK ONLY)

Yes, I would like to subscribe to *Model Boats Magazine*

☐ Print + Digital: £50.00 per year
(**SAVE 28%** on shop price + **SAVE 70%** on Digital Download + **FREE GIFT**)

☐ Print Subscription: £41.00 per year (**SAVE 28%** on shop price + **FREE GIFT**)

YOUR DETAILS MUST BE COMPLETED

Mr/Mrs/Miss/Ms.....Initial .....Surname .....

Address .....

.....

Postcode ..... Country .....

Tel ..... Mobile.....

Email ..... D.O.B .....

I WOULD LIKE TO SEND A GIFT TO:

Mr/Mrs/Miss/Ms.....Initial .....Surname .....

Address .....

.....

Postcode ..... Country .....

INSTRUCTIONS TO YOUR BANK/BUILDING SOCIETY

Originator's reference 422562

Name of bank.....

Address of bank .....

.....

.....Postcode .....

Account holder .....

Signature..... Date .....

Sort code ☐☐☐☐☐☐ Account number ☐☐☐☐☐☐☐☐

Instructions to your bank or building society: Please pay MyTimeMedia Ltd. Direct Debits from the account detailed in this instruction subject to the safeguards assured by the Direct Debit Guarantee. I understand that this instruction may remain with MyTimeMedia Ltd and if so, details will be passed electronically to my bank/building society.

Reference Number (official use only) ☐☐☐☐☐☐☐☐☐☐

Please note that banks and building societies may not accept Direct Debit instructions from some types of account.

CARD PAYMENTS & OVERSEAS

Yes, I would like to subscribe to *Model Boats, for 1 year* (13 issues) with a one-off payment

UK ONLY:

☐ Print + Digital: £54.00 (SAVE 21% on shop price + SAVE 70% on Digital Download + FREE GIFT)

☐ Print: £45.00 (SAVE 21% on shop price + FREE GIFT)

EUROPE & ROW:

☐ EU Print + Digital: £67.00

☐ EU Print: £58.00

☐ ROW Print + Digital: £67.00

☐ ROW Print: £58.00

PAYMENT DETAILS

☐ Postal Order/Cheque ☐ Visa/MasterCard ☐ Maestro

Please make cheques payable to MyTimeMedia Ltd and write code X261 on the back

Cardholder's name.....

Card no: (Maestro)

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐ ☐☐☐

Valid from..... Expiry date..... Maestro issue no.....

Signature..... Date.....

TERMS & CONDITIONS: Offer ends 5th December 2014. MyTimeMedia Ltd & Model Boats may contact you with information about our other products and services. If you DO NOT wish to be contacted by MyTimeMedia Ltd & Model Boats please tick here: ❑ Email ❑ Post ❑ Phone. If you DO NOT wish to be contacted by carefully chosen 3rd parties, please tick here: ❑ Post ❑ Phone. If you wish to be contacted by email by carefully chosen 3rd parties, please tick here: ❑ Email

POST THIS FORM TO: MODEL BOATS SUBSCRIPTIONS, TOWER HOUSE, SOVEREIGN PARK, MARKET HARBOROUGH, LEICS LE16 9EF.

Please visit **www.modelboats.co.uk/terms** for full terms & conditions

CODE X261

PRINT + DIGITAL SUBSCRIPTION

Free Spraycraft Airbrush SP20 Plus 12 piece Toolkit*

13 Issues ***delivered to your door***

Save up to ***28% off the shop price***

Download each new issue to your device

A ***70% discount*** on your Digital Subscription

Access your subscription on ***multiple devices***

Access to the ***Online Archive*** dating back to January 2007

Exclusive discount on all orders at myhobbystore.co.uk

PRINT SUBSCRIPTION

Free Spraycraft Airbrush SP20 Plus 12 piece Toolkit*

13 Issues ***delivered to your door***

Save up to ***28% off the shop price***

Exclusive discount on all orders at myhobbystore.co.uk

SUBSCRIBE TODAY

CHRISTMAS OFFER

DIGITAL SUBSCRIPTIONS AVAILABLE ONLINE!

Receive a Free

Spraycraft Airbrush SP20 Plus 12 piece Toolkit*

when you subscribe today!

WORTH £54.94

SAVE **28%**** ON THE SHOP PRICE & **70%** ON DIGITAL

The Spraycraft SP20 All Purpose Airbrush is simple to use and easy to maintain, with 3 quick-change spraying tips for fine, medium or broad strokes. Great for use with most paints, acrylics, enamels, inks and lacquers.

The SP20 Airbrush has a ergonomic lightweight resin handle. Adjustable for varying line widths from fine to broad strokes. Easy to clean removable spray tips, quick-change nozzle system for easy spray effect changes. Fixed hose connects to airbrush propellant. Can be used with compressor (adaptor included). External mix (Air/Paint mixed outside the airbrush).

The 12 Piece Boat Building toolkit is a selective set of precision tools for model boat building and general craft. The set includes mini pliers, craft knife and 5 x #11 blades, sanding block, flat diamond file, hammer, bent nose tweezers and swivel top pin vice. Supplied with attractive aluminum carry & storage case.

‘A great addition to your tool collection!’

TERMS & CONDITIONS: Offer ends 5th December 2014.
*Gift for UK ‘Print and ‘Print + Digital’ Subscribers only. While stocks last.
When you subscribe by Direct Debit. Please see **www.modelboats.co.uk/terms for full terms & conditions.

SUBSCRIBE SECURELY ONLINE
www.subscription.co.uk/mdbl/X261

CALL OUR ORDER LINE Quote ref: X261
0844 543 8200
Lines open weekdays 8am – 9.30pm & Saturday 8am – 4pm

BT landline calls to 0844 numbers will cost no more than 5p per minute. Calls from mobiles usually cost more.

RIGHT: Hitec Optic 6 six-channel 2.4GHz computer radio transmitter.

ABOVE: Back of Planet T5 transmitter showing rechargeable NiMH cells fitted and trainer socket.

electronic switch which would for example turn a lighting circuit on and off. In an i.c boat it might be used to cut the ignition circuit or turn off the fuel supply in an emergency. The final goody on the transmitter is a battery state indicator. On most VHF transmitters this doesn't actually display any specific units and so has no marked increments; the 'needle' will simply move gradually from right to left as the batteries discharge. Planet T5 has a digital display which actually shows the current voltage of its batteries, which is very useful. You'll soon get to know when it's time to recharge or change the batteries, which can be either dry batteries of the AA size or rechargeable as in **Photo 12.** Many radio transmitters have the facility of using either type, with a charging socket also built into its case negating the need to remove the rechargeable NiMH batteries for 'top-up'.

We come now to a subject that causes much hair-tearing and teeth-gnashing in Internet forums, and that is 'stick mode'.

Stick mode?

Again we can blame model flying for this complication. Remember that ratchet throttle from the 2-channel set? Well, multi-channel sets have two sticks which can move up and down, and so there are (of course) two schools of model flyers that use either the RH or the LH stick to control the throttle. These are referred to respectively as Mode 1 (RH throttle) and Mode 2. We saw earlier that it's possible to change over a stick from ratchet to spring-centring, so if you inherit or buy a set which has the throttle on the opposite side to that which you prefer, then just take the back off the case and swap over the ratchet and spring mechanisms. That means that you will now need to connect the speed controller into a different channel output to the previous position, i.e. into the channel which is operated by the newly selected throttle stick. Here the Planet T5 has another trick up its sleeve, because there is a Mode Select switch inside the back of the transmitter which will transfer the

LEFT: Switches on left hand side of Optic 6 transmitter.

RIGHT: Switches on right hand side of Optic 6 transmitter.

ABOVE: LCD display and programming buttons.

throttle control electrically over to the new stick – so there's no need to move the servo/speed controller connection to the receiver. You will need to switch the set off before changing the mode switch and the changeover will take effect only when the transmitter is switched back on again. Of course if you've followed my earlier advice and fitted return-springs to both sticks then all of this is irrelevant, as you can just plug the speed controller into the channel which is operated by the stick you prefer.

There is however a potential problem if your radio is equipped with a failsafe facility. This is something which will return every servo to a known position if the receiver suddenly loses contact with the transmitter. Some radios, like Planet T5, will actually centre all of the servos before turning off the signals to them from the receiver, thus freezing them in the centre of their travel. In other sets an exception to this might be the servo (or speed controller) which is connected into the channel which is marked 'throttle'; this is moved to, and then frozen at, one extreme end of its travel. That would be of no use where you need a centre stick position to stop the motors. In my experience, no two sets do things exactly the same way when the failsafe kicks in, so you need to read the instructions very carefully. You should experiment with the failsafe settings in order to ensure that the throttle servo returns to the 'engine stop' end of its travel or that the electronic speed controller returns to the centre of its travel to stop the motor, but in practice just about every electronic speed controller will stop the motors if it doesn't receive a valid signal anyway. In this case it's often best to disable the failsafe altogether, if you can. In all cases however, you need to be aware of what will happen if your radio suddenly goes into failsafe mode and be ready to deal with any consequences. To test it, just switch the transmitter off while the receiver is still on and see what the servo(s) and speed controller(s) do. Sorry, but that's what happens when you have to use aeroplane/helicopter radios for boats and it's a real pain in the neck.

Six channel systems

We now notch up several gears to a six channel, computerised 2.4GHz radio, and here we are using the Hitec Optic 6 system, **Photo 13.** At first sight this is very similar to the Planet T5. It too has two dual-axis sticks with electronic trims and these work in just the same way as with Planet system. There is a Channel 5 which isn't proportional and that's up on the LH face of the transmitter, but also note the clearly labelled 'Elev Rudd D/R SW1' and 'Gear Aux SW2', **Photo 14.** Like the Planet system, the 'Gear Aux SW2 will only move a servo connected to this channel to one or the other end of its travel, but the 'Elev Rudd D/R SW1' and its companion 'Ail D/R SW3' on the RH face, **Photo 15,** in combination with some parameters which you input via the selector buttons and the LCD screen (more later), give the user the option to control the limits of the servo movements on the usual aeroplane flying control surfaces. The idea is that a model aeroplane responds more rapidly to control inputs when it's flying at high speed, so it's possible to be very gentle with the controls and yet still over-control the model. Thus, the Dual-Rate (D/R) switches allow you to reduce the control throws at full deflection at the flip of a switch which is useful they say for novice pilots and very slow aileron-rolls. The amount of reduction or increase is set via the computer input buttons and can be varied between zero and 125%, and I suppose that this might have its uses for restricting rudder throw when allowing a young 'un to have control of your model boat. Otherwise my advice is set the reduced throw to the same limits as full throw, that's 100%, and ignore the switches from then on. That way if you accidentally hit one of them, it won't affect the amount of servo travel at all.

Like many multi-channel aeroplane radios, Optic 6 has a trainer facility. Two similar transmitters are connected via a long lead which plugs into a jack-socket on the back of the case. The Master transmitter has control of the model until the Trainer switch (please see Photo 14 again) is pulled and held, when control of the model is transferred to the Pupil transmitter. If the teacher wants to regain control at any time he just releases the trainer switch. You should note that the two transmitters must be the same; you can't plug a Hitec Optic 6 into a Futaba 4Y and expect it to work! If you have the luxury of two similar sets and you see some scope for training other would-be skippers, then this could be useful. Opposite the trainer switch on the top face of the transmitter is 'FLT MODE SW4' and I can find no use for it in a model boat as none of which I've ever seen are fitted with wing flaps! The two levers on the sides of the transmitter together make up Channel 6. They are again dedicated to control of model aircraft flaps but they are proportional so could be used for moving a servo. The last gadget on the top outside right of the case is a button marked 'ENG.CUT'. When pressed, this moves the servo connected to the throttle channel to one end of its travel, the idea being to cut the throttle and thus stop the engine in an i.c. powered model.

The feature which sets these computer radios apart from the simpler type is the ability to pre-set and adjust many different control parameters. These affect how the controls on the transmitter operate the model, independent of real-time input from the operator. Computer sets vary as to the method of data input but all have some kind of Select, Edit and Confirm buttons in combination with an LED or LCD screen on the front of the transmitter, **Photo 16.**

> *"In all cases you need to be aware of what will happen if your radio suddenly goes into failsafe mode and be ready to deal with any consequences."*

17

ABOVE: Hitec Optima 7 receiver as supplied with Optic Tx.

As I said earlier, all but one of these sets are made for flying models so many of the computerised functions are of little or no use to boat modellers (that's even if you can understand them!), but there are a few which are distinctly interesting and potentially very handy. Different manufacturers give them different names, but when you've read my descriptions you should be able to go to the manual for your radio and find the one you need without too much trouble. By the way, the instruction manuals for all of the computerised radios I have handled are excellent and all are available on the Internet, too. Of interest is the receiver, **Photo 17,** which is mall and compact, a common feature of most current 2.4GHz systems. This receiver, you will note, has a single aerial.

> *"I've never investigated the possibilities of using a computer radio to do it for me! I have it on good authority that it can be a bit of a head-scratcher"*

Timer: You can set a timer function to count down a preset amount of time before sounding a buzzer etc. There may also be another timer which records the amount of time since the set was switched on and this can be useful for monitoring fuel or battery use.

Reverse: This is good old servo-reverse from the two channel set, brought kicking and screaming into the 21st century. You first need to select the channel number which you wish to reverse, then select either NORmal or REVerse.

EPA (End Point Adjustment): This is probably the most useful computer feature available. It allows you to set, for each channel and for each direction of rotation, the maximum amount of servo travel at full stick deflection. For example, if you find that the rudder servo is too fierce then you can reduce the end point so that the servo only moves to say 70% of full throw in each direction when the stick is pushed to the limit. You can set different limits in each direction too, so you could restrict the speed of your electric motor when going in reverse while leaving it to go to full speed ahead.

Subtrim: This adjusts the servo output disc neutral position very finely and independently of the trim levers on the transmitter case.

EXP (Exponential): A little difficult to explain, but this allows you to set the sensitivity of the controls e.g. you can make the throttle very smooth around neutral, so that the stick can be moved a long way and only alter the speed a little, while having coarser control at full speed. It's a bit like the Dual-Rates I described earlier, but without having to move the DR switches.

VTAL and PMX: These are both mixing functions and enable you to combine the movements of two different channels in a preset way. I understand that it is possible to program a radio so that it emulates a twin motor/steering mixer for controlling twin electronic speed controllers. The idea is that increasing the amount of rudder command will automatically slow down the motor speed-controller running the motor on the inside of the turn. I have to confess here and now that I used to run a business which makes electronic motor mixers and dual mixing speed controllers (ACTion P94) and so I've never investigated the possibilities of using a computer radio to do it for me! I have it on good authority that it can be a bit of a head-scratcher so I shall avoid it if I possibly can. That's not to say that it is impossible and indeed I understand that several modellers have done it and are happily running and mixing their twin-engined models. Good luck!

Finally these sets allow you to retain the various programmed settings for many models (up to their model memory capacity). This means that if you use the same transmitter for several different models, then you simply punch in the name of the model you wish to sail and all of the preset computerised parameters for that model are magically recalled and loaded into memory, ready to sail. Now we come to the dedicated truck-and-boat radio which I mentioned earlier.

Robbe-Futaba F16

This is a VHF crystal-controlled FM radio and it's not available in 2.4GHz form. It can, however, be operated in a 'PCM 1024 interference-resistant' format simply by selecting that format in one of the computer menus. The most obvious thing about it, is its size and layout - it's a big beast, **Photo 18!** This is the 'continental' style of transmitter, which is designed to be suspended horizontally on a neck strap or fitted into a moulded plastic tray which

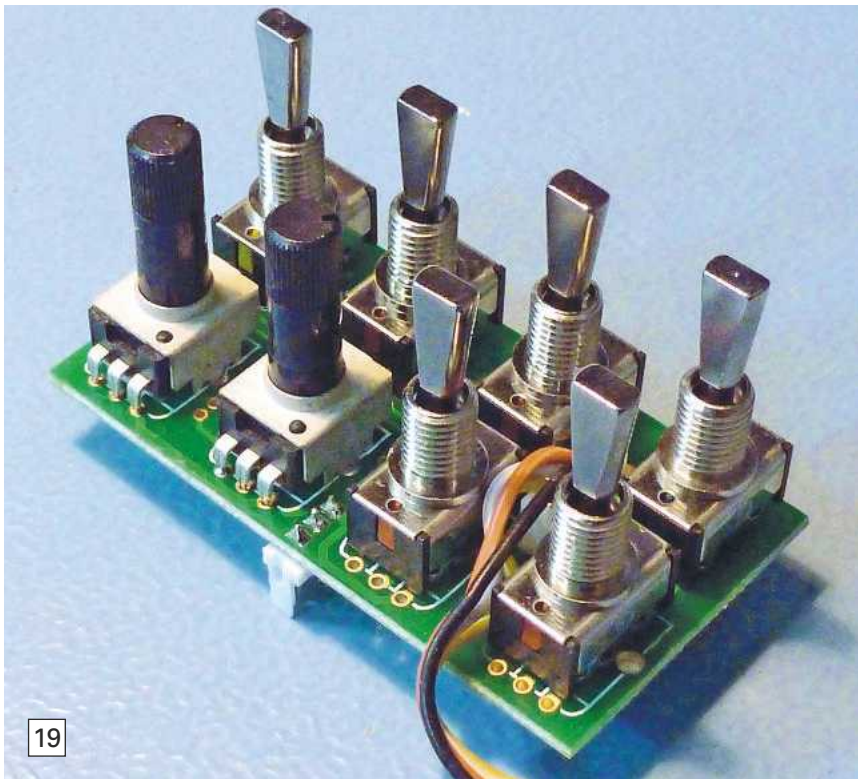
18

ABOVE: The Robbe-Futaba F16 Boat 'n Truck 40MHz FM/PCM modular computer radio transmitter.

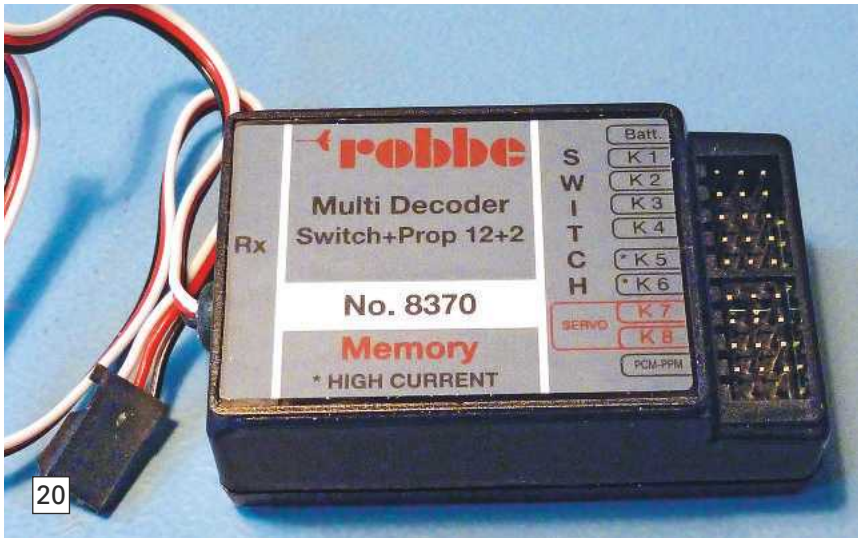
is hung close to the operator's waist. You then operate the main sticks by holding them between thumb and forefinger, as opposed to holding the transmitter with one hand on each side and using your thumbs on top of the sticks to move them. However the F16's sticks are close enough to the edge of the case to allow you to use this 'normal' way of holding a transmitter if desired. There are the two familiar dual-axis sticks with their trim levers, and also two vertical 'sliders' between the two sticks which control proportionally Channels 5 and 6, but there are no trims for these two channels. There is a large LCD screen with input buttons for the computerised functions and a battery state indicator meter. You'll also see that the top part of the transmitter face is sloped upwards and has a number of holes half-punched through the plastic on each side of the meter and this is the F16's secret weapon.

Using a system called multiplexing, this radio splits one of its transmitter/receiver channels into the equivalent of eight additional channels by fitting an extra encoder circuit into the transmitter. This comprises of a number of switches and/or rotary knobs to operate additional proportional or switched functions. These switches and knobs hold the encoder module into the transmitter case by punching through the marked holes in the case and screwing them in place, **Photo 19.** There is an electrical connector inside which plugs on to a set of marked pins on the transmitter's circuit board. Inside the model a corresponding decoder

BELOW: Robbe Switch/Prop transmitter encoder module.



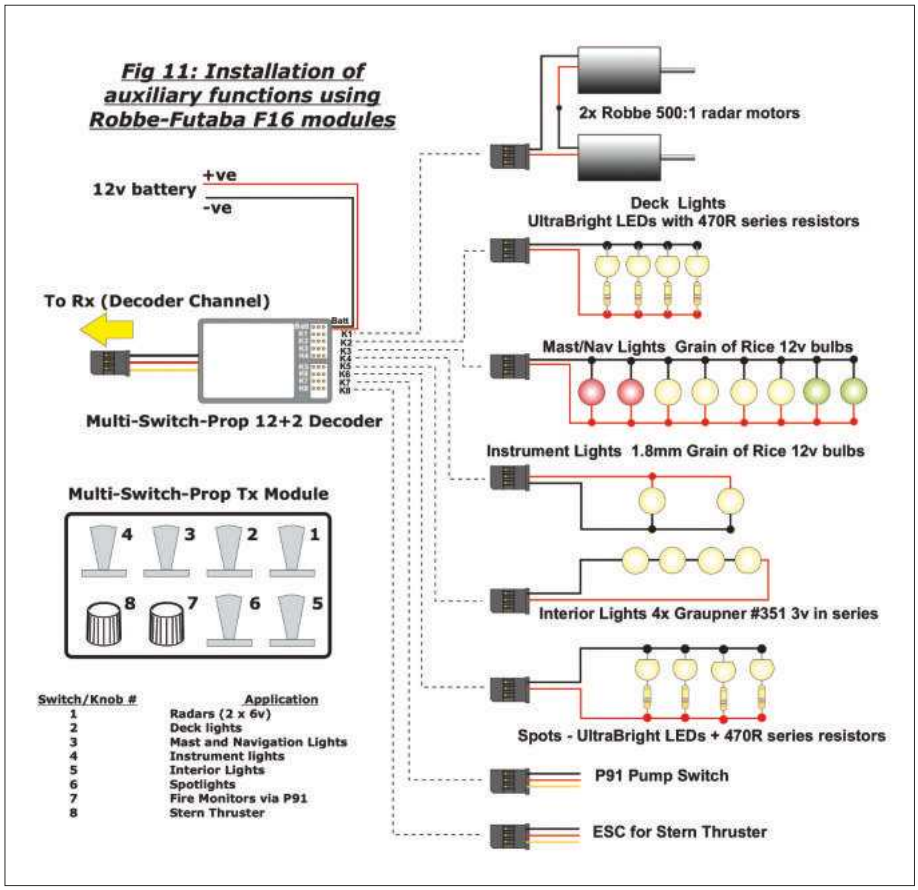
19



ABOVE: Robbe Multi Decoder Switch+Prop 12+2 module fits in model and connects to receiver.

module, which resembles a multi-channel receiver, is plugged into one of the receiver's output channels, **Photo 20.** From this decoder you can operate lights, winches, horns etc. as well as additional servos, depending on which one of the several types of encoder/decoder modules you have fitted. **Figure 11.**

F16 actually has two pre-punched module bays in its case, so you can fit two banks of switches and knobs and operate two decoders in the model, but naturally all this comes at a price, and it's not a small one! It is however, the very best way of operating a complex model boat which has many working functions such as cranes, winches, anchors, doors, deck lifts, lights etc. Robbe say that the maximum expansion allows for six proportional channels and 32 switched channels, although in practice the boat modeller may need more of the former and less of the latter.



F16 and its non-computerised little brother F14 can have the LH dual-axis stick replaced with what Robbe call the Navy Twinstick. This has two sticks mounted closely side-by-side in the vertical axis (there is then no side-to-side axis) and is intended to be used for twin electronic speed controllers running twin electric motors. This allows the operator to 'split' the throttle control on a twin-engined model, just like the full-size vessel would do, for increased low-speed manoeuvrability. This option however costs an extra hundred pounds and I have reservations about how easy it is to operate in practice, particularly in cold weather with gloved fingers. There is also the consideration that the side-to-side movement of the normal LH dual-axis stick is the usual way to operate a bow-thruster, so with the Twinstick you would have to use either the spare vertical axis on the RH stick (which isn't very intuitive) or fit a rotary proportional control knob elsewhere.

One other option available for this radio is a helically-wound transmitter aerial. The usual telescopic aerial is particularly long on this set and you could easily poke someone in the eye when turning round with the transmitter in your hand. These long aerials are also more susceptible to being accidentally snapped-off. The optional stub aerial is only about 270mm long, screws into the socket on the top of the case, and is well worth the extra in my opinion. Oh! I forgot to mention that the F16's computer software has had all of the confusing and basically useless aeroplane and helicopter programs removed – hooray!

For those of you who are seeking a 2.4GHz multiplex set like the FC16, Spektrum make two continental 'tray' type radio systems called respectively DX10T and DX18T. These both have add-on encoder switch and decoder modules similar to FC16 and operate with the Spektrum DSM2 frequency spread technology. They also have full telemetry facilities. However our requests to Horizon Hobbies for some detailed information and permission to publish their photographs have gone unanswered. Naturally these sets are also very expensive as the basic DX10T is well over £500 at the time of writing and it appears likely that the customer is not given a choice of which modules are fitted as standard when the set is purchased, i.e. if you want the marine modules then you have to buy them as extras to replace the (aeroplane) ones supplied. Nevertheless if you are interested then I suggest you visit the Spektrum website.

The receiver

This is the partner of the transmitter and is the part which fits inside the model. It is usually contained in a purpose-moulded plastic case although some receivers have only a paper sleeve to save weight. VHF receivers have a length of thin stranded wire to act as an antenna and a socket for the crystal (where fitted); 2.4GHz receivers have a much shorter antenna (one or two externally) and no crystal. The receiver will have a number of sets of three conductive pins. Each set of three pins corresponds to a radio channel (e.g. steering or motor speed control) and will accept the connecting plug from a servo, a speed controller or a remote-controlled switch. **Photo 21** is of a typical 40Mhz

receiver.

Some 2.4GHz radio sets have very tiny and lightweight receivers with a limited range. These are intended for small model aircraft which are flown close to the operator and are so-called 'park flyers'. The range is typically only 100 to 150 metres and the Planet T5 falls into this category. If you are buying a 2.4GHz radio then you should bear this in mind, particularly if you sail on a large lake. Full range receivers are held out for sale as suitable for flying model aircraft to almost out-of-sight distances, which is of course more than adequate for a model boat.

Receivers, like their associated transmitters, come in the aforementioned types (AM, FM, 2.4GHz etc.). They are also classified by the number of separate channels with which they can deal at any time. For example, a radio set with just two single-axis sticks on the transmitter and no other control switch etc. will have two channels of information to transmit to the receiver and of course this makes the receiver a two channel type. It will operate two servos or similar devices in the model, and no more. For manufacturing reasons though, you might find that your two channel transmitter comes with a three or even four channel receiver. This isn't necessarily a mistake, but you will only be able to operate two of the receiver's outputs with a two channel transmitter. Conversely you can often operate a two channel receiver from a matching four, or even six, channel transmitter, with the same caveat about only being able to use two of the channels. Naturally the transmitter and receiver must be of the same type and on the same frequency (for VHF), so a 40MHz AM transmitter will not operate a 40MHz FM receiver. Neither can you change the frequency range of a set, e.g. by using 40MHz AM crystals in a 27MHz AM radio set. It is often possible to mix-and-match different manufacturers' transmitters and receivers e.g. a Hitec receiver will generally work with an equivalent Futaba transmitter, but this isn't always the case and is seldom the case with 2.4GHz. The rule is that, unless you have definite knowledge to the contrary, always use the same manufacturer's transmitter and receiver and for VHF, the same make of crystals. Make sure that you fit the crystals the right way around; they are generally marked which one is for the transmitter and which is for the receiver. The only other problem you may encounter is the difference between single and dual conversion FM receivers. The latter have additional circuitry to reduce interference and require special dual-conversion crystals for the transmitter and receiver.

2.4GHz radios have to be 'bound' by following the instructions which come with the set and failure to do this results in a 'dead' radio system. You can bind one transmitter to as many receivers as you like, but you can't bind a receiver to more than one transmitter at a time. The receiver may often have a very tiny button somewhere which is involved in the binding process. Other types have a special 'binding plug' which you fit over two of the output pins while binding the receiver. There is a small LED which indicates the progress of the binding process and subsequently indicates when the receiver is switched on and ready to be operated. Unlike VHF sets, which are instantly usable as soon as they are powered up, 2.4GHz sets take a few seconds for the transmitter and receiver to establish contact with each other (the handshake) before they are ready to go.

Receivers are small and can usually be installed pretty much anywhere in a scale model boat and I prefer to use self-adhesive Velcro strips to fix it to a suitable bulkhead, which makes any subsequent removal very easy. Try to avoid having to use long extension leads to reach the battery and servos and make sure that all connecting leads are clear of any moving parts like the propshaft couplings. The receiver aerial wire in a VHF set (27/40MHz) is typically somewhere between 40cm to 100cm long, depending on the frequency. Don't just coil it up neatly and stow it in a corner as it must be fully extended, or the range will suffer. Many modellers run it round the inside of the hull just below the deck. Others prefer to fit an external aerial or run the wire up the mast or a crane jib etc. This is a better set-up in that the more of it which is vertical and outside the model then the better the range will be. If you have to cut the wire to connect it to an external aerial, e.g. with a small plug-and-socket, then the combined length of that external aerial and the remaining wire in the receiver should be equal to the length of the original receiver aerial. Aerial wires are there to pick up radio signals and there is an obvious source of spurious radio signals inside every electrically-powered model, namely the motor(s). Brushed motors MUST have suppressor capacitors fitted and the aerial wire should be routed as far away as possible from them and the power cabling. However, brushless motors don't generate RF interference, so they don't need suppressors.

The aerials on 2.4GHz receivers are very much shorter than on VHF receivers and this is to do with the short wavelength of the radio signals. Some of these receivers have two aerial wires and others even have a smaller (satellite) receiver connected to the main one. Whatever you do, don't try to shorten or extend the aerial(s). The receiver(s) should be installed according to the instructions

"Receivers are small and can usually be installed pretty much anywhere in a scale model boat and I prefer to use self-adhesive Velcro strips to fix it to a suitable bulkhead"

BELOW: Hitec receiver and dry batteries in holder, with power switch.

21

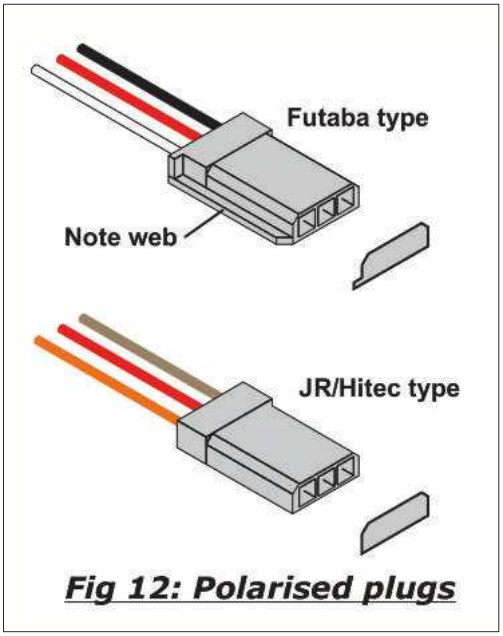


Fig 12: Polarised plugs

for the radio set, ideally above the level of the waterline, and that is because microwaves (which is what they are) don't travel through water. Also, because 2.4GHz systems are working on such a high frequency, interference from brushed motors that are not suppressed is less of a problem. You should not however, omit suppressor capacitors completely as they are also there to smooth out any transient spikes of back-EMF from brushed motors. These voltage spikes can break through to the receiver circuit and cause unwanted glitches etc., especially if the speed controller is fitted with BEC (Please see my earlier article in the 2013 MB Winter Special Edition for more information on this subject).

As far as connecting the servos, speed controllers, remote-controlled switches etc. to the receiver, all plugs have three wires and are polarised and they will fit easily only one way round. Most have a chamfer on two of the shoulders of the plug moulding while others, like Futaba, also have a small web which fits into a slot in the receiver case moulding, **Figure 12.** Make sure you know which way round they are intended to fit by examining them first. If they don't fit comfortably, then it's a safe bet that you have them the wrong way around! This shouldn't do any damage to the electronics, but the thing just won't work! If it isn't clear from the plugs and case which way the plugs should fit then the general rule is that the negative wire (usually black or brown) fits onto the pin which is nearest the outside edge of the receiver case. These days all manufacturers comply with the convention that the battery positive wire (usually red) is connected to the centre of the three pins. Beware of older sets like Fleet or early Sanwa because they have battery negative centre-pin connection, but if in doubt, check with someone who knows.

BELOW: Inside top of servo case showing ball-bearing for output shaft.

22

The battery pack

The receiver will always need a power supply. In the past this has come from a four cell battery pack and a battery holder and switch harness is often still included in the display box with the transmitter and receiver. I always advise modellers to fit rechargeable batteries to the receiver end of the radio system. This is because there are electromechanical devices like servo motors and relays in there which take a significant amount of current to operate and will flatten a set of alkaline dry cells fairly quickly. For these receiver packs, the norm' is Nickel Metal Hydride (NiMH) cells, usually four cells to a pack. These have a capacity far in excess of dry batteries and are not expensive these days, e.g. four of 2900mAh NiMH cells cost about £5 (UK) and this is comparable with Duracell's own price for their 'Ultra' alkaline type. A suitable plug-top charger can also be bought for a similar amount. When installing battery packs in a model boat try to keep them as far down in the hull as possible to assist stability, but keep them away from any damp or wet areas because water conducts electricity and terminals can become corroded.

For transmitters I also recommend using rechargeable batteries, although some of the latest types of 2.4GHz transmitters use only four batteries whereas the older types have eight. They are also very economical as regards current draw and I've heard of one set of standard Duracell's lasting a full season of pretty regular use in a 2.4GHz set. It's a fact that most transmitters are fitted with battery-state indicators, so you can see at a glance when the batteries are becoming borderline-flat.

These days, especially now that many models are powered by electric motors, the separate power source is often dispensed with and the receiver takes its power from the main motor battery pack via the speed controller. Where a speed controller has an internal voltage regulator which supplies power to the receiver it is said to have 'BEC' (Battery Eliminator Circuitry). This should ALWAYS be mentioned in the instructions and you may even see it appear on the case or label of the speed controller. If you have such a speed controller then you must NOT also connect a separate battery to the receiver. One will fight against the other and the result will usually be what we affectionately call 'The Magic Grey Smoke'! These days electronic speed controllers which don't have BEC are in the minority, although I personally don't like BEC for a number of technical reasons, but hey – it works, it's popular with modellers and it's very well supported by the manufacturers, so what do I know!

Some receivers have 'BEC' marked either on their cases or labels. Despite this I have not been able to find any difference internally from others which don't, so please DON'T connect anything but a four cell battery pack or a BEC-equipped speed controller to them.

Servos

A servo is a device which converts an electronic signal from the receiver into a physical movement to operate moving parts of the model, usually via a rotating disc connected to an internal electric motor and gearbox and each channel will have its own servo. It's also possible to operate two or more servos simultaneously on the same channel by connecting them together electrically and then to the receiver outlet via a split connecting lead called a Y-lead (or splitter lead). The main use for a servo in a model boat is to operate the rudder. This is done by connecting a rod or cable to the output disc of the servo and the other end to the rudder tiller arm. Servos are also routinely used for other functions

such as the throttle control arm on i.c. engines; the regulator valve on a steam engine and raising/lowering doors, ramps and boat davits etc.

Servos are classified according to their speed and the torque (mechanical power) available at the output disc. There are some very fast servos which have pretty low torque. These would be used for example in steering small, fast electric-powered racing boats or to control the tail rotor of a model helicopter. The other type of servo is often bigger and more rugged and has large amounts of torque to power for example, larger model aircraft flying surfaces or steering an i.c. engine powered car. Other variations come in the material used to make the gears (nylon, 'Karbonite' or metal) and whether or not the output shaft runs in a plain or ball-raced bearing, the latter being in **Photo 22.**

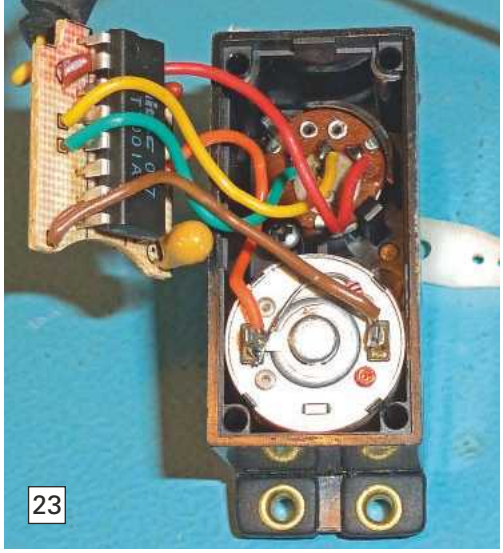
Finally of course there's the size. We used to joke about servos becoming so small that they were actually larger than their connectors and well, it's happened! Some servos weigh just two or three grams and have especially made tiny connectors. These are intended for ultra-light indoor-flying model aircraft. At the other end of the scale there are some truly massive servos which require their own power supplies and cost hundreds of pounds (UK) each.

For the average model boat rudder or engine throttle arm then it's quite reasonable to use what we call a standard servo. This definition would be of a nylon-geared servo about 20mm x 40mm x 40mm; 35 to 45gms in weight with no special bearings; a torque of about 3kg/cm and an end-to-end speed of about 0.2 seconds. Typical cost would be about £6 to £9 in the UK and the Hitec HS311 and Futaba S3003 fall into this category. If you have a model with a large or unbalanced rudder then you might opt for a higher output torque. In contrast, if your model is so small that fitting a standard servo becomes a problem, then go for a mini-servo of around 13mm x 30mm x 30mm and 20gms in weight such as the Hitec HS85.

Special servos

There are certain applications which call for special servos and I'm thinking in particular of model yacht sail winches. There's not much to say here except that these split into two types; those which operate long arms to pull the sail sheets and those which wind the cord on to a rotating drum. The more powerful types are best run at a higher voltage than standard servos (6v to 7.2v is common) and often from a separate power pack to the one used for the receiver. Few, except the very expensive ones, have an adjustment for the amount of turns which they can apply end-to-end, but some types are available with different amounts of end-to-end turns (e.g. those from Component Shop) or you can connect up a gizmo like the ACTion P96 ServoMorph to introduce end-point adjustment. If you are into model yachts, then you will soon pick up better advice about what type to buy for your particular model than I can offer here.

Model aircraft undercarriage retract servos may have some boating applications in that they rotate 180 degrees from end-to-end and are very slow and powerful. If you have a heavy ferry door or a landing-craft ramp to lift, then one of these might be just what you're looking for.


23

LEFT: The servo motor, amplifier circuit board and feedback pot to one side of the motor.

Servos - how do they work?

In a servo the position of the output disc is governed by the motor and gearbox, which drive it via the electronics and a device called a feedback potentiometer (or 'pot'). **Photo 23** is of the inside of a typical servo, the potentiometer being within the circular brown board to one side of the motor in this picture. The receiver sends out a signal pulse of current to each servo once every 1/50th of a second. The exact length of this pulse is dictated by the position of the relevant control function on the transmitter. It is measured by the servo's electronics and converted into a reference voltage. This voltage is compared to the voltage which appears at that instant across the 'pot'. If they are different, then the electronics will power up the motor and move the gears, **Photo 24,** thus rotating the pot until the two voltages are the same. In this last picture, the gears are standard nylon, good enough for most scale model boat control applications.

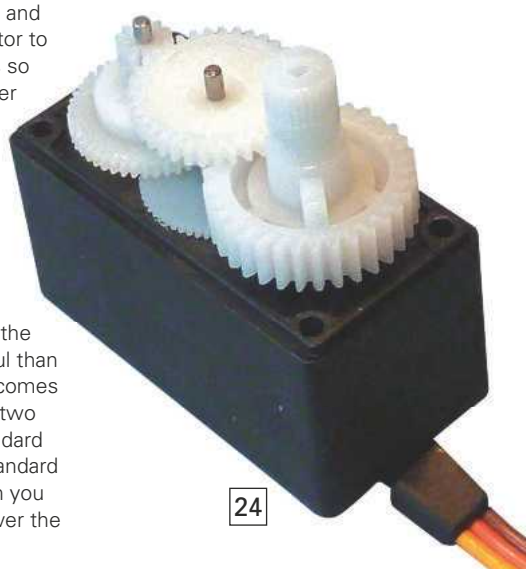
We now have a mechanical output whose rotation angle varies with the signal being received. I should mention that the motor speed is proportional to the angle through which the pot is moved, so if the disc is only needed to rotate a little then the motor won't run at full speed or full power. This means that small movements of the controls will only result in relatively slow and weak movement of the servo output disc. Some manufacturers have sought to minimise this by using coreless electric motors but the essential limitations are still there. There is, however, another type of servo which solves this problem almost completely and is called a digital servo.

"We used to joke about servos becoming so small that they were actually larger than their connectors and well, it's happened!"

Digital servos

Externally, these are identical in appearance to the standard type, i.e. they have similar cases and output discs and the same three-wire connector to the receiver. They accept the standard signals so you don't need to buy a special type of receiver to operate a digital servo. The difference is that they have a small microcomputer inside them which monitors the reference voltage more often than the standard type (typically every 1/300th of a second). This sends out a pulse of current to the motor six times as often as the standard type, so the motor is always running at a higher voltage and thus a faster speed when it does move. This makes the digital servo not only faster, but more powerful than the equivalent-sized standard servo, but it all comes at a price. They are more expensive, typically two or three times the price of the equivalent standard servo and they use a lot more current than standard types. If you choose to use digital servos then you will need to fit a larger-capacity battery to power the

BELOW: Typical standard servo internals showing gearbox and output


24

receiver, or a bigger pack for the main motor if your system uses BEC.

Are they worth the extra money? For the vast majority of normal model boat applications my answer would be no, although if your thing is racing fast-electric or i.c. powerboats then the extra expense can probably be justified. As I usually say in these circumstances, 'suit yourself'.

Waterproof servos

Much the same goes for these as they are available at a price, and I'm sure that they are as waterproof as is claimed by the manufacturers. However, if you are going to worry about a servo running when immersed in the equivalent of 1m of water, then you will already have a much more immediate problem on your hands, i.e. your model has sunk! Standard servos are just about 'splash-proof' as they come, so if you have built a decent coaming around the deck-opening in your model and you install them sensibly away from any bilge water sloshing around the inside of the hull, then the servos will come to no real harm unless as I have said, the model sinks! Servos which are fitted in models which habitually operate in rough water are invariably fitted inside purpose-made waterproof radio boxes, complete with rubber bellows to prevent the slightest drop of water entering via the wiring or control rods and the same applies to model submarines. At the end of the day you must weigh the price of a waterproof servo (maybe £25 to £30) and the likelihood of it being totally immersed, against the cost of replacing a standard servo in the same scenario (£6 to £9). I'm not a rich man, so the latter looks to me to be a good bet.

> *"Servos which are fitted in models which habitually operate in rough water are invariably fitted inside purpose-made waterproof radio boxes"*

And after an unwanted emersion?

Incidentally, if you are unlucky enough to have a model sink then don't just scrap the radio gear inside it when it is recovered, but equally don't try to operate it until you've carried out the following cleanup routine.

Unplug the battery, unscrew the cases and rinse all of the electronics under the normal domestic tap to remove any weed, gravel, sludge etc. Shake off excess water and pat the units dry with paper towel, then put them in a warm place like an airing cupboard and allow them to dry for at least a week. The chances are that they will work again once you connect some fresh batteries. You will almost certainly need to change the batteries, especially if they are of the alkaline (dry) type. Units which have been underwater for a matter of months, however, are often so corroded that they can't be repaired. We were once sent back an Action R/C Electronics P91 r/c switch from Australia for repair which had been in salt water for over a year and had practically none of the copper tracking left on the back of the circuit board. It was duly buried with full honours.

'When I'm calling you…hoo-hoo-hoo…hoo-hoo-hoo…'

Many moons ago we were far more restricted than at present in the maximum size of model aeroplane which could be flown without a CAA Exemption Certificate, which was notoriously difficult to obtain. The limit was an engine capacity in total of 10cc (for multi-engined models that's two x 5cc or four x 2.5cc) and a maximum weight without fuel of 11lbs (5kgs). This very much limited the scope for models with lots of working functions, simply because of the small size of the models and consequently the limited space and power available to carry all the associated radio equipment. If a model had wing-flaps and retracting undercarriage as well as the usual four main controls (elevator, aileron, rudder and throttle) then it was considered complex by the standards of the day. As time has passed, these rules have been relaxed to the point where 1/3rd scale models of WW2 fighters and even bombers are quite the norm, along with jet models powered by real gas-turbine engines.

You can imagine then that with very complicated, expensive and potentially lethal models like these blasting around the skies it has become desirable from a safety standpoint to be able to monitor various aspects of the model's performance while it is flying. For an i.c. powered model this might be engine speed and temperature, along with values such as altitude and airspeed. With a glider you might want some form of variometer to tell you when your model hits a thermal and with a model gas-turbine then temperatures, pressures and fuel levels become critical.

So, with the advent of microwave radios (2.4GHz) has come telemetry. Wikipedia defines this as the 'highly automated communications process by which measurements are made and other data collected at remote or inaccessible points and transmitted to receiving equipment for monitoring'! In practical terms it involves fitting your model with an array of sensors to measure each of the parameters which you wish to monitor. These measurements are sent to a central on-board module which turns them into digital code and sends them back to the transmitter via the link with the receiver. The transmitter will have a corresponding decoder and an enhanced LCD or LED display (or even a voice synthesizer) to show the operator each of these measurements in real time.

The 'mainstream' radio manufacturers are beginning to add telemetry sensors and modules to their top-of-the-range models, e.g. Spektrum Dx7s and Dx8, Futaba 14SG, JR XG14, Graupner HoTT, Multiplex etc. There are also a few very specialised manufacturers like Jeti, whose sets have telemetry fully integrated within their designs. If you enjoy slobbering over a really beautiful example of design and manufacture then have a look on the Jeti website and their DC16 transmitter. I have also recently noted a totally stand-alone Quanum telemetry system currently marketed by Hobby King which has a small module which you clamp to the aerial of your transmitter. This has a screen which displays data received from an on-board transmitter module and sensors in the model. It operates independently of the main radio (in this case using 2.4GHz DSSS technology) so can be used with any radio irrespective of its frequency and the price seems to be attractive. The application to scale model boats is not so obvious though, but Paul Freshney tells me that the fast electric boys in his Fishers Green Club use telemetry to see what is happening to their LiPo batteries in their boats and also check the motor rpm with different propellers and battery voltages. I'll leave you to make up your own mind in the light of the type of models you operate and the size of your bank balance, but I've noted that Graupner have in 2014 introduced some

basic budget sets with built-in telemetry capability (MZ10 and MZ12) and reduced the prices generally of their computerised HoTT sets quite considerably.

So, in summary, for specialist model boats with high-performance motors and batteries I imagine that a case can readily be made for telemetric monitoring, but for most of us in the r/c scale model boating world, should we be bothered with such space-age stuff?

And now the end is near……

As we've seen, the Robbe-Futaba F16 doesn't represent the pinnacle of technology as far as radios go, but it is in my honest opinion the most practical and adaptable multi-function model boat radio available, so don't dismiss it simply because it isn't 2.4GHz. As regards those 14 and 18 channel all-singing-and-dancing 2.4GHz sets, do be sure that you can actually make use in your model boat of all of the additional whizz-bang features that they pile on for helicopter and aeroplane pilots, or you may end up paying a lot of money for a white elephant.

On the other hand there are a number of very inexpensive 2.4GHz radio sets on the market, nearly all of which come from the Republic of China. These are made very much down-to-a-price for fitting into ready-to-fly/float aeroplanes, helicopters and boats. I'm sorry to have to say it but these are inescapably toys and everyone knows that toys never last very long, so they aren't built to do so. I have handled radio sets which on the surface look quite smart and presentable, with smart plastic mouldings and even instructions which are at least understandable, if not totally comprehensive or comprehensible! However when you remove the back of the transmitter it's a different story with cheap and flimsy circuit boards holding poorly-soldered second-grade components with unsupported wiring of too thin a section for the job; connectors and switches which are loose or intermittent; poor mouldings with excess flash which sometimes interferes with proper operation and a radio signal whose nominal neutral value of 1.5mS (the industry standard) is seldom achieved. This last feature (!) has a direct bearing on whether or not you can use third-party add-ons such as speed controllers and electronic switches. Independent research carried out and reported on the Internet indicates that some of these cheaper sets are also poor at rejecting interference from a stronger 2.4GHz signal. Nevertheless, some of the big name manufacturers seem to have opened factories to produce these (frankly sub-standard) sets, while making their upmarket radios elsewhere. It's down to the dictates of the market, I guess.

I do it my way!

I am not going to name those radio sets which I wouldn't touch with a barge pole. Apart from the fact that it would be purely negative, unfair and possibly libelous, I'm aware that this is a commercial publication and its publishers have interests other than my personal opinions to consider. That said, I wouldn't personally pay any less than about £80 for a new multi-channel transmitter and receiver combo, certainly if I'd not had a chance to have a really good look at one first. I'm well aware that I've just offended umpteen users of Brand X, which they bought for forty quid, have had for years and has never gone wrong and conversely Brand Y, which cost the earth and hasn't worked properly from new - it happens.

In my experience of buying and operating model radio control sets (45 years-ish) I've discovered that the best is not necessarily the most expensive, but the cheapest is never the best value, because it's only cheap because corners have been cut to make it that way. In other words if you pay a lot you might not get everything you expected, but if you pay peanuts then you'll usually get everything you deserve.

Here are my personal preferences:

1) If you are on a budget and only need 2 channels then I would suggest the Futaba 2ER, Hitec 2N2 or Acoms/Techniplus sets. They are all AM, but available on 27 or 40MHz. If you are sailing at a club pond then it would be as well to take advice on which would be the best frequency to buy, as there can be a preponderance of one or two frequencies at some sites. Think carefully before buying a steerwheel set, as for whatever the reason might be, they generally aren't popular for boats.

2) For a simple multi-channel set, the Planet T5 is very popular and relatively well made, even though it falls outside my £80 criteria, but do beware of its limited range.

3) Full-range budget sets include the Spektrum DX5e, Futaba 4YF and Hitec Optic 5. These are all 2.4GHz non-computer radios.

4) For good-value computer radios I would take a look at the Futaba 6EX and 6J, Spektrum DX6i (there's a new version out now, mid-2014) or the Hitec Optic 6/7.
For an unlimited budget you can take your pick from dozens, but bear in mind what I said about aeroplane-oriented bells-and-whistles.

5) Naturally a complex model with many working functions will need something like the Robbe-Futaba F14 or F16 with the suitable expansion modules. The mysterious Spektrum DX10T remains a tantalising if expensive 2.4GHz alternative.

Finally, a very **BIG** caveat. If you are inclined towards buying radio equipment and accessories direct from the Far East then you'll find it is unquestionably cheaper, even after the cost of shipping and import taxes have been added, but there is a downside in that quality control is a luxury that some Chinese manufacturers either can't afford or just ignore. In consequence your bargain gizmo might arrive in a state where it doesn't work and you quickly find that there's no redress to the seller by way of repair, replacement, refund or sometimes even a response. If you pay the extra and buy a 'name' radio set from a reputable, established UK-based supplier then your chances of any problems being sorted out are much better. You'll also be doing your bit to ensure that a viable, retail model trade continues to exist to supply your everyday bits and pieces. (Soapbox put away now!).

I guess we're back to what I said about paying peanuts, which is probably a suitable place to sign off and say 'cheerio' until next time!

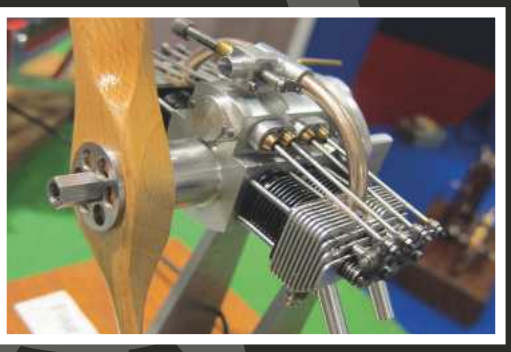
(All legended and captioned diagrams, as well as the pictures, are by the author)

> *"I wouldn't personally pay any less than about £80 for a new multi-channel transmitter and receiver combo, certainly if I'd not had a chance to have a really good look at one first."*

MODEL ENGINEER EXHIBITION

1907-2014

www.modelengineershow.co.uk



12th – 14th December 2014 • Sandown Park Racecourse

VISIT THE WORLDS LONGEST RUNNING MODEL ENGINEERING SHOW

- **World class competition**
- **SMEE lectures and workshops**
  (Free to all visitors. Tips, tricks, advice for beginners and experts, problems solved!)
- **Over 70 Clubs, Societies and Trade Stands**
- **Railway, traction engines, stationary steam models, boats and planes**

SPECIAL FEATURE FOR 2014

An extended display of loan and competition model ships and boats. Phoenix Marine Model Club: Many models previously unseen at MEX

Patronised by the UK's BEST model engineers.

EARLY BIRD TICKETS

	PRICE PER DAY	
Adult	£8.00	Save 20%
Senior (65yrs+)	£7.00	Save 22%
Student and child discounts apply		
Family (based on 2 adults & 2 children)	£21.00	Save 12%

**Children under 12 years FOC*

01332 912894

www.modelengineershow.co.uk

Deadline for early bird tickets is 28th November 2014, tickets will be dispatched 1 week prior to the event

THE MODEL ENGINEER EXHIBITION

12-14 December 2014

ENTRY NO.	OFFICE USE ONLY	
	CLASS	ENTRY NO.

Please return completed form to:
Mr Mike Law, 12 Maple Drive, Elkesley,
Retford, Notts DN22 8AX
Email: post@michaellaw.co.uk

ENTRY FORM - COMPETITION & LOAN MODELS

PERSONAL DETAILS (Please print)

Surname _____ Forename(s) _____ Age _____

Address _____

_____

_____ Post Code _____ Email _____

Home Tel No _____ Daytime Tel No _____

Model Club or Association _____

How many years have you been a modeller? _____

MODEL DETAILS – PLEASE TICK BOX IF MODEL IS FOR LOAN ❑

Entry Class (competition entries only) _____

Model Title (to be used for catalogue and display card) _____

Model Description (to be used for catalogue and display card) _____

_____

_____

Model Scale _____ Length _____ Width _____ Height _____ Weight _____

Type of construction _____

_____

Parts not made by you and commercial items _____

_____

_____

Please supply a photograph of the finished model for insurance purposes.

Are you supplying Judges Notes? Yes ❑ No ❑

Value of Model (MyTimeMedia Ltd will not insure the model unless a realistic value is entered) £ _____

I have read the rules and conditions of entry and confirm the information is correct to my knowledge and I accept the conditions of entry.

Signature _____

Information about entries included on or with this form may appear in MyTimeMedia Ltd publications and on our websites.
Other than entrants name, no personal information will be published.

Mail Order Protection - By supplying your email/ address/ telephone/ mobile number you agree to receive communications via email/ telephone/ post from MyTimeMedia Ltd and other relevant 3rd parties. Please tick here if you DO NOT wish to receive communications from MyTimeMedia Ltd: Email ❑ Phone ❑ Post ❑ or other relevant 3rd parties: Email ❑ Phone ❑ Post ❑

PHOTOCOPIES OF THIS FORM ARE ACCEPTABLE

N.B. Please make a copy of this form and any photographs enclosed for your own reference.
Please note that MyTimeMedia Ltd will not accept liability for any loss of documents or photographs submitted with this form.

To help you get the best from The Model Engineer Exhibition

These notes are written purely for guidance. Full information is contained in the Competitors' Information booklet which is sent to every entrant as part of the information package. If you have an item and are unsure as to the Class into which it should be entered, leave that section blank and we will take care of it. The Judges have the right to move any competition exhibit into another class if they feel that by doing so its chances of gaining higher marks or a more appropriate award are improved.

If the item is offered as a Loan exhibit please indicate this by writing Loan on the form in the box identifying the Class. Loan models are not judged but carry all other privileges associated with competition entries.

Part built models are particularly welcome in the Loan Section; visitors like to see work in progress, and entry does not preclude the item being entered in competition when completed.

The classes listed below are those associated with mainstream model engineering.

Club exhibits

Where a club is exhibiting, each model should be entered on a separate entry form and clearly identified as a club exhibit by entering Loan/Club in the class section box. This ensures that we have a full record of all models on display during the show and facilitates matters of administration and insurance.

Additional forms

If you do not wish to deface your copy of the magazine we are happy to receive photocopies of the entry form, one for each model. We will be pleased to send out extra forms if required, so if you know of a modeller who is not a reader of one of our magazines but who you think may wish to participate, please advise them to contact our Exhibitions Office, or simply photocopy the entry form for them. The success of the show depends largely on the number of models on display. Your work could well be the stimulus which inspires someone else to start in the hobby. There can be no doubt that this event is our showcase on the world of modelling in all its aspects. Every modelling discipline needs more and more participants, and it is by displaying not only the crème-de-la-crème, but also examples of work of a more achieveable standard, that people are encouraged to join into the wonderful world of modelling, in whatever aspect. We look forward to seeing a sample of your work at the show!

Engineering Section

A1 Hot air engines.
A2 General engineering models (including stationary and marine engines).
A3 Internal combustion engines.
A4 Mechanical propelled road vehicles (including tractors).
A5 Tools and workshop appliances.
A6 Horological, scientific and optical apparatus.
A7 General engineering exhibits – not covered by the above

Railway Section

B1 Working steam locomotives 1" scale and over.
B2 Working steam locomotives under 1" scale.
B3 Locomotives of any scale, experimental, freelance or based on any published design and not necessarily replicas of full size prototypes, intended for track duties.
B4 Scratchbuilt model locomotives of any scale, not covered by classes B1, B2, B3, including working models of non-steam, electrically or clockwork powered steam prototypes.
B5 Scratchbuilt model locomotives gauge 1 (10mm scale) and under.
B6 Kitbuilt model locomotives gauge 1 (10mm scale)and under.
B7 Scratchbuilt rolling stock, gauge 1 (10mm scale) and under.
B8 Kitbuilt rolling stock, gauge 1 (10mm scale) and under.
B9 Passenger or goods rolling stock, above 1" scale.
B10 Passenger or goods rolling stock, under 1" scale.
B11 Railway buildings and lineside accessories to any recognised model railway scale.
B12 Tramway vehicles.
B-K1 Working steam locomotives built from a kit.
B-K2 Working locomotives other than steam powered. (Any model locomotive in class B-K1 and 2, built from a commercial kit, entered into these classes will not be judged in the medal classes but can receive commended certificates and an award from a trade supplier).

Marine Models

C1 Working scale models of powered vessels (from any period). Scale 1:1 to 1:48
C2 Working scale models of powered vessels (from any period). Scale 1:49 to 1:384
C3 Non-working scale models (from any period). Scale 1:1 to 1:48
C4 Non-working scale models (from any period). Scale 1:49 to 1:384
C5 Sailing ships and oared vessels of any period – working.
C6 Sailing ships and oared vessels of any period – nonworking.
C7 Non-scale powered functional models including hydroplanes.
C8 Miniatures. Length of hull not to exceed 15in for 1:32 scale, 12in for 1:25 scale, 10in for 1:16 scale; 9in for 1:8 scale. No limit for smaller scales.
C9 For any model boat built from a commercial kit. Before acceptance in this class the kit must have been readily available for at least 3 months prior to the opening date of the exhibition and at least 20 kits must have been sold either by mail order or through the retail trade.

Scale Aircraft Section

D1 Scale radio control flying models
D2 Scale flying control-line and free flight
D3 Scale non-flying models, including kit and scratch-built
D4 Scale flying radio controlled helicopters

Model Horse Drawn Vehicle Section

G1 Carriages & other sprung vehicles. (Omnibuses, trade vans etc.) Wagons, carts and farm implements. Caravans.

Junior Section

J1 For any type of model, mechanical or engineering work, by an under 14 year old.
J2 For any type of model, mechanical or engineering work, by an under 16 year old.
J3 For any type of model, mechanical or engineering work, by an under 18 year old.

All entries will be judged for standard of craftsmanship, regardless of the modelling discipline, i.e. a boat will not be competing against a military figure. Providing a model attains sufficient marks it will be awarded a gold, silver or bronze medal.

Model Vehicle Section

K1 Non-working cars, including small commercial vehicles (e.g. Ford Transit) all scales down to 1/42.
K2 Non-working trucks, articulated tractor and trailer units, plus other large commercial vehicles based on truck-type chassis, all scales down to 1/42.
K3 Non-working motor bikes, including push bikes, all scales down to 1/42.
K4 Non-working emergency vehicles, fire, police and ambulance, all scales down to 1/42.
K5 Non-working vehicles including small commercial vehicles (e.g. Ford Transit,) scale from 1/43 or smaller.
K6 Any available body shells including Concours, in any scale or material, to be judged on appearance only.
K7 Functional model cars/vehicles which must be able to move under their own power of any type. Can be either free-running, tethered, radio controlled or slot car, but must represent a reasonable full size replica.

DUKE OF EDINBURGH CHALLENGE TROPHY Rules and Particulars

1. The Duke of Edinburgh Challenge Trophy is awarded to the winner of the Championship Award at the Model Engineer Exhibition.
2. The trophy remains at all times the property of MyTimeMedia Ltd.
3. The name of the winner and the date of the year in which the award is made will be engraved on the trophy, which may remain, at the discretion of MyTimeMedia Ltd., in his/her possession until required for renovation and display at the following Model Engineer Exhibition.
4. Any piece of model engineering work will be eligible for this Championship Award after it has been awarded, at The Model Engineer Exhibition, a Gold or Silver medal by MyTimeMedia Ltd
5. A model may be entered more than one year but if the model wins it will be permanently retired.
6. Entry shall be free. Competitors must state on the entry form:
   (a) That exhibits are their own bona-fide work.
   (b) Any parts or kits which were purchased or were not the outcome of their own work.
   (c) That the model has not been structurally altered since winning the qualifying award.
7. MyTimeMedia Ltd. may at their sole discretion vary the conditions of entry without notice.

COMPETITION RULES

1. Each entry shall be made separately on the official form and every question must be answered.
2. Competition Application Forms must be received by the stated closing date. LATE ENTRIES WILL ONLY BE ACCEPTED AT THE DISCRETION OF THE ORGANISERS.
3. Competitors must state on their form the following:
   (a) Insured value of their model.
   (b) The exhibit is their own work and property.
   (c) Parts or kits purchased.
   (d) Parts not the outcome of their own work.
   (e) The origin of the design, in the case of a model that has been made by more than one person.

NOTE: Entry in the competition can only be made by one of the parties and only their work will be eligible for judging.

4. Models will be insured for the period during which they are in the custody of MyTimeMedia Ltd.
5. A junior shall mean a person under 18 years of age on December 31st in the year of entry.
6. Past Gold and Silver medal award winners at any of the exhibitions promoted by MyTimeMedia Ltd. are eligible to re-enter their model for the 'Duke of Edinburgh Challenge Trophy'. Past winners at any of the exhibitions promoted by MyTimeMedia Ltd. will not be eligible for re-entry into the competition unless it has been substantially altered in any way.
7. MyTimeMedia Ltd reserve the right to:
   (a) Transfer an entry to a more appropriate class.
   (b) Describe and photograph any models entered for competition or display and to make use of any such photographs and descriptions in any way they may think fit.
   (c) Refuse any entry or model on arrival at the exhibition and shall not be required to furnish a reason for doing so.
8. Entry into the competition sections is not permitted by:
   (a) Professional model makers.
   (b) Anyone who has a financial interest in the direct supply of materials and designs to the public.

NOTE: If unsure, please contact the Competition organisers prior to the show.

9. The judges' decision is final. All awards are at the discretion of the judges and no correspondence regarding the awards will be entered into.
10. Exhibitors must present their model receipt for all models collected at the end of the exhibition and sign as retrieved.
11. The signed release for each model must be presented to security staff when leaving the exhibition complex with display model(s) after the close of the exhibition.

IMPORTANT NOTE: PLEASE MAKE COPIES, INCLUDING PHOTOGRAPHS, OF ALL INFORMATION RELATING TO YOUR MODEL, AS MYTIMEMEDIA LTD WILL NOT ACCEPT LIABILITY FOR ANY LOSS.

CLOSING DATE 21 NOVEMBER 2014

ABOVE: Working model submarines from the Victorian age. The Turkish submarine Abdul Hamid, a Nordenfelt II of 1886, and a Barrow built Nordenfelt IV of 1887.

RIGHT: The Association of Model Submariners had a large and varied display.

The Model Boat Convention - 2014

Dave Wooley *and* ***Dave Abbott*** *report from Haydock Park*

Celebrating its 25th Anniversary Year, this iconic event was run over the 2014 August Bank Holiday weekend as usual and now for the fourth time in the prestigious surroundings of the Haydock Park Racecourse Exhibition Centre. The Guest of Honour was Dr. Nicholas Jedynakiewicz, a Deputy Lieutenant of Merseyside and an enthusiastic model engineer. The event also was pleased to welcome back again The Federation of Ship Modelling Sport of Russia with some of their 2014 World Championship winning models. There were 27 clubs from around the UK, plus some individual model boat builder displays and more than 20 dedicated marine traders. The event is run by modellers for modellers on a voluntary basis, with Jean Barlow being the secretary and our Editor as the Honorary President.

Club displays

We had the opportunity to get around every stand and to say we were impressed is an understatement. The standard improves year on year and with the theme for 2014 being Naval Vessels and Submersibles, this added an extra dimension to it all.

Runcorn and District Scale MBC really did rise to the occasion by showing not just one themed display but three! One was a WW2 dockside repair facility that had a really authentic backdrop which included welders in the basin working their torches and a functioning dockside railway; the second a 1:96 scale model of HMS Invincible returning from the Falklands and the last was of warships through the ages with a press button device that highlighted a particular model with its relevant information, all ingeniously created.

Submarines were well represented by the Association of Model Submariners and there where two really unusual submersibles that are rarely seen as large scale working models, these being based on the Nordenfelt and Garrett designs of the 1880's, both built by David French.

The Scottish Model Warship Association display

BELOW: Part of a diorama on the Runcorn stand that featured a naval repair facility.

LEFT: The superbly build Russian ocean going tug Lifeguard has been built by Alexsei Ukhanov of the Federation of Ship Modelling Sport of Russia.

BELOW: Super detail on this German floating artillery platform built by David Jack.

LEFT: The well-known Model Boats Website forum duo of Paul Thompson (left) and Bob Abell with some of their unique designs.

RIGHT: North West Model Shipwrights showed a diverse range of their ship models.

ABOVE: David Jack from the Edinburgh MBC displayed his new LST laden with Sherman tanks.

This highly detailed model of the Japanese float plane carrier IJN Nissin is actually largely made of cardboard and all built by Chekushev Mikhail.

ABOVE: White Swan, built totally from wood by Vladimir Churlin.

BELOW: An interesting model built by Alan Summerfield of Ibex BM27, a Brixham 78ft trawler. This vessel was unfortunately sunk by a U-boat off Berry Head in January 1918.

RIGHT: Reg' Preece, right, explaining the Intricacies of modelling warships.

was all about warships (no surprise there!) with their top quality workmanship for all to see. They are of course major players at the international model warship meeting being held annually in Glasgow.

An example of the diversity of skills present at the Convention was to be seen on the North West Model Shipwrights stand which had not just full-hull models from the age of steam and sail, but dioramas, parts of ships, and Navy Board style models.

Competition

There were over 70 models entered for the specific individual competition classes, and that does not including the Best Boat on each Club Stand awards. Well, once again the Russian modellers came and pretty much cleared the decks award-wise, and very deserved they were too!

The classes are: Scratch Built Static; Scratch Built Working; Semi-Scratch; Kit; Best Mountfleet Model; Best Themed Stand; President's Award; Diorama; Junior Boat Building; Best Tug in Show; Best in Show and the Best on Stand Model for each club display.

The judges at the Convention are all well known and respected model boat builders who have been award winners themselves with models across the UK. Paul Bannon gained the best Scratch Built Working Model award with his magnificent 1:144 aircraft carrier USS Truman and Gareth Jones was second with his fine model of Shemarah II, a model that was the subject of a long running thread on the Model Boats Website Forum.

In the category of Best Scratch Built Static Model was the amazing all wood model of the American river boat White Swan, built by Vladimir Churlin which also gained the President's award. As always, many of the other models entered would have done as well if the competition were not so high.

Dioramas are making a return to the competition scene and this was shown in the really impressive entries from David Booth of Runcorn and District Scale MBC with his naval repair facility and Gordon Longworth of the Etherow MBC with his HMS Victory Gun Deck. The Kit Class was a clean sweep for the Russians, but Semi-Scratch was an all British affair with first place going to Brian Cowell of the Scottish Model Warship Association with his cleanly finished Chant tanker followed closely by

ABOVE: The Marks Model Bits team had a new range of RIB's in different scales.

ABOVE: At 1:350 scale, this model of the Imperial Russian battleship Poltava was entered into Scratch Static Class gaining third place for Alexey Lezhnev.

RIGHT: The Scottish Model Warship Association was awarded the Best Themed Stand award.

BELOW: The Russians came and conquered! From left to right: Alexsei Ukhanov, Veniamin Litvin and Vladimir Churlin are all from the Federation of Ship Modelling Sport.

BELOW: The volunteer Convention Committee with the 2014 Guest of Honour Dr. Nicholas Jedynakiewicz (centre) and the Convention President Paul Freshney.

RIGHT: This model of Donald Campbell's famous Bluebird has a fully-functioning jet engine.

LEFT: This Soviet Kotlin class destroyer Soznatelny of the late 1950's has been built by Nicolai Rmiantsev.

Reg' Preece of Burton MBC and his highly detailed, but not yet finally complete, Type 22 frigate HMS Campbeltown.

On the water

As in previous years, two ponds were available with a full programme of activity which included the, now famous, furious tug football game where the aim is to capture a cruciform float and steer this across the pond to score goals. This could almost be considered a genuine contact sport where no quarter is given or asked, which is entertaining and great fun to watch.

Trade

This 2014 Model Boat Convention had 22 trade stands, many being well established names and this event is one of the major opportunities to stock up on your modelling needs. The manufacturers play their part here, not by just bringing their 'shops' to the customer, but using the opportunity to launch new products. For example DK Figures had a new range of figures (no surprise there!) to suit various types of larger scale model and Chylds Hall Model Shipyard now has pre-corked planking in various widths and types of wood.

Conclusion

Haydock Park is ideally suited for hosting the Model Boat Convention, being close to the M6 and other motorways. Since generally the major racecourse guest facilities are used for the event, light is not a problem and oh, the bliss of carpeted floors! This year, an extra new room was used upstairs, but you needed to check your complimentary programme to make sure you didn't miss that part of the exhibition. Free parking, reasonably priced refreshments and top class personal facilities (as you would expect at a racecourse) make this an excellent venue and having run for 25 years, this event is well established in the model boating calendar. It is run totally by volunteers, makes substantial donations to charities and the sharp-eyed amongst you might have spotted the Editor's wife helping to take the money on the door on the Saturday!

ABOVE: Frequently seen around the UK coast line are wind farm support vessels and this model of the Island Panther from Models by Design is a nice example.

Attention to detail!

Colin Bishop *with some of the outstanding work from the Society of Model Shipwrights Exhibition, August 2014*

ABOVE: Not all models in the show were scratch built. Here is an excellent example of the Caldercraft tug kit Imara built by G. Le Riche demonstrating just how good results can be obtained from a commercial kit.

RIGHT: Colin Vass' superb HMS Warspite model at 1:72 scale is often photographed in its entirety, but here we can see just how much deck and superstructure space is taken up with aircraft arrangements on battleships prior to WW2.

This society are well known for the high quality of their work and this gallery takes the opportunity to showcase some of the exquisite detail to be seen on their models at this year's bi-annual exhibition which featured a high proportion of miniatures.

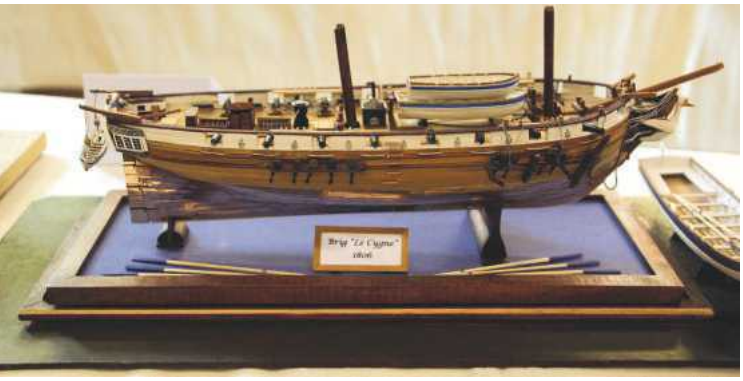
Society of Model Shipwrights information

This society is dedicated to the art and skills of making model ships and other maritime subjects to museum quality standards and currently has a membership of about 80 active model shipwrights whose workmanship covers static & working scale model ships of all types including sail & steam, Navy Board style, miniatures, open boats & dioramas. It is based in Bromley, Kent, England and holds meetings with guest speakers or a general discussion on the last Friday of each month at:

The Club Hall St Peter's & St Paul's Church, Church Road, Bromley, Kent.
They also have the use of a local pond in Orpington every Tuesday afternoon during the summer months from April to October.

For further details please contact:
Mr. Adrian Roberts, Hon. Secretary SMS,
21 Wickham Court Road, West Wickham,
Kent, BR4 9LW.

LEFT: John Prothero Thomas' battleship HMS Queen Elizabeth is impressive even at the small scale of 1:384. The ship is depicted c1935 before her major rebuild.



BELOW: French naval brig La Cygne of 1806 built by Anthony Newell to 1:96 scale based on plans from a model in the Musée national de la Marine, Paris.

ABOVE: An unusual presentation of an action in the US War of Independence depicting the crew of the US gunboat Philadelphia (smaller vessel) being rescued by the galley Washington after being holed by British Gunfire on Lake Champlain. The Philadelphia was raised in 1935 and is presently exhibited in Washington D.C. Modelled at 1:144 scale by John Garnish.

BELOW: Sliced bread and butter! An interesting twist on a traditional building method from David Andrews with his 1:200 scale model of the German WW1 battlecruiser SMS Hindenburg. The unusual building method was adopted to facilitate the notable hull sheerline of the original ship.

LEFT: Traditional model shipbuilding was well represented by the armed schooner HMS Halifax of 1768 built by Colin Skeggs to 1:48 scale from Swiss Pearwood and Boxwood.

ABOVE: Anthony Newell's 1:32 scale New Bedford Whaler built of lime represents the ubiquitous New England whaling boat of the 19th Century.

BELOW: SMS Exhibition showing L to R: John Longstaff President SMS, Councillor Julian Bennington Mayor of Bromley and Adrian Roberts Hon Sec SMS.

ABOVE: Keith Smith exhibited a diorama showing the Trinity House flagship Patricia to 1:250 scale. This attractive ship has frequently been modelled at larger scales as a working model.

LEFT: The SMS have a variety of competition trophies including this one commemorating Len Tucker, National Maritime Museum Curator and founder of the Society of Model Shipwrights.

RIGHT: Beautifully executed window, lifeboat and superstructure detail on Bernard Baldwin's 1:600 scale liner Canberra.

The Model Dockyard

17 Tremorvah Barton
Tregolls Road, Truro
Cornwall, TR1 1NN
Mail order Only. Sorry no callers
Phone line open Mon-Fri 9am- 1pm

Tel UK: 01872 261755
Tel Int: +44 1872 261755
www.model-dockyard.com

U.K Delivery

Kits and Boat Hulls Add £9.00
Timber orders Add £9.00
Other Order value up to £50 Add £5.00
Other Order value Over £50 Add £9.00
Over £190 Free Delivery
Free delivery does not apply to shipments weighing over 2 kilos, being sent to the Channel Islands or Northern Ireland, Scottish Islands, Scillies, or IOM. Delivery here will be charged at cost.

Orders are sent by 1st class post or UPS carrier. Large parcel deliveries to Scottish Highland and Islands, the Isle of Man, Isles of Scilly and Northern Ireland will be shipped by 3 day UPS carrier . Deliveries to Channel Islands will be shipped by Euro 48 service

We ship Worldwide too

All prices correct at time of going to press but we reserve the right to supply at the prices ruling at the time of order despatch. E&OE

Amati Kits

Egyptian Ship Sahure Dynasty 350mm	£77.57
Greek Bireme 480 BC 560mm	£77.57
Viking Ship Oseberg 1:50 440mm	£105.14
Mayflower 1620 1:60 scale 650mm	£174.59
Chinese Junk Scale 1:100 400mm	£87.78
Xebec.1753 720mm 1:60	£155.95
New Bedford Whaleboat 1:16 550mm	£122.50
Riva Aquarama. With Transmission kit	£509.57
Endeavour J Class. Wood Hull 1:80 480mm	£83.69
Endeavour J Class 1:35 scale 1130mm	£259.95

Victory Models Kits

Lady Nelson Cutter. 1:64 scale 530mm	£117.95
Granado. Bomb Ketch 1756 1:64 800mm	£261.95
HMS Fly. Swan Class Sloop. 1:64 800mm	£289.95
HMS Vanguard. 74 gun 3rd rate 1:72 1171mm	£684.95
HMS Pegasus Swan class sloop 1:64 800mm	£344.95
Mercury: 20 gun Brig 1820. 1:64 scale 860mm	£354.95

Mamoli Kits

Friesland 80 gun 2 Decker 1:75 775mm	£492.14
Mary Royal Yacht 1:54 scale 483mm	£179.18
Golden Hind 1:53 scale 496mm	£184.58
La Gloire 34 gun Frigate 1:90 840mm	£287.18
Hunter 12 gun Cutter 1797 1:72 440mm	£134.76
Rattlesnake Privateer 1779 1:64 697mm	£222.62
H.M.A.V Bounty 1787 1:64 610mm	£215.76
CSS Alabama. 1:120 694mm	£206.92

Caldercraft Display Kits

Diana 38 Heavy Frigate 1794 1:64 1180mm	£472.45
Cruiser.1797. 18 Gun Brig 1:67 scale 850mm	£206.98
Snake 1797 18 Gun Sloop 1:67 scale 910mm	£206.98
Mary Rose. Tudor warship 1510. 735mm 1:80	£260.98
Agamemnon 1781. 64 gun ship 1300mm	£661.45
Endeavour. Bark 1768. 1:64 scale 725mm	£245.65
Bounty. 1789. 1:64 scale 660mm	£202.45
Sherbourne. 8 Gun R.N Cutter 1763. 500mm	£75.55
HM Yacht Chatham 1741 1:64 scale 530mm	£89.96
HM Mortar Vessel Convulsion. 1804 1:64 530mm	£96.71
Victory 1781. Nelson's flagship 1:72 1385mm	£746.98
Granado. Bomb Ketch 1756 1:64 scale 785mm	£220.48
HM Brig Badger 1778 1:64 scale 600mm	£177.12
HM Schooner Pickle 1778 1:64 scale 565mm	£130.46

Caldercraft R/C Kits

Joffre. 1916 Tyne Tug.	£251.95
Imara. Twin Screw Berthing Tug	£458.95
Resolve. Twin Screw Admiralty Tug	£508.95
Amaranth. Motor Fifie	£120.95
Milford star. Post war East Coast side trawler	£228.95
Marie Felling single screw steam tug	£395.95
North Light. Steam Clyde Puffer	£251.95
SS Talacre. Single hatch Steam Coaster	£251.95
H.M.T Sir Kay Round Table Class Minesweeper	£294.95

Card Models

SD14 general cargo ship 1:70 2133mm.	£295.00
USS Missouri. 1:200 scale	£61.24
GPM SMS Seydlitz 1:200 scale 1010mm	£56.95
Queen Mary 2, 863mm 1:400 scale	£53.06
Prince of Wales Battleship 1:200 scale	£51.95
Tirpitz 1:200 scale Full hull 1260mm	£49.99
Bismarck 1:200 scale Full hull 1250mm	£48.98
Revenge 1588 600mm 1:96 scale	£47.95
HMS Mercury 6th rate frigate 1779 1:96 scaler	£44.95
Admiral Hipper, cruiser 1935 1:200 scale	£40.81
HMS Enterprise 28 gun Frigate 1:96 scale	£40.80
Graf Spee. Full hulled model at 1:200 scale	£30.60
Lexington. American Brig 1:96 scale	£30.59
HMS Endeavour. Captains Cook's Bark 1:96	£30.59
Santa Maria & Nina	£30.59
H.M.S. Invincible. Battlecruiser 1907 1:250	£28.54
HMS Sheffield 1:200 full hull	£28.54
HMS Repulse. Battleship 1:300 scale 806mm	£27.53
Iowa 1:400 US Battleship 1942 680mm	£26.52
HMS Dreadnought 1:200	£26.50
HMS Cambeltown 1;200 scale 470mm	£25.95
Normandie French Liner 1:400 scale	£25.95
Yamato. Japanese Battleship 1:400 685mm	£23.95

Hull and Plan Sets

Grand Banks Schooner 1193mm	£87.50
Victoria Steam Launch 1:12 scale 762mm	£40.45
Pilot 40 . Pilot boat 698mm	£50.45
Bluebird Of Chelsea . 1:24 scale 654mm	£46.95
Forceful Paddle Tug . 1:48 1003mm	£51.49
Guardsman Customs launch 1:32 scale 571mm	£37.45
Burutu & Bajima Tug 1:50scale 768mm	£47.45
Tyne Life Boat 1:19 scale 740mm	£46.49
Smit Nederland Hull 558mm	£42.45
St Louis Belle Mississippi Steamer 838mm	£72.45
Liverpool Lifeboat 1905mm 1:12 scale	£91.50
RMAS Moorhen Hull 1:43 scale 740mm	£51.45
Cervia, Thames Tug 1:48 scale 711mm	£71.50
Brave Borderer 1:32 scale 914mm	£86.50
HMS Warspite. Queen Elizabeth class	£154.00
H.M.S. Devonshire. Cruiser 1504mm	£134.00
H.M.S. Liverpool. Town class1409mm	£120.00

Plan & Material Packs

Vosper MTB Hull Pack 670mm	£39.99
Higgins Hellcat CNC Pack 610mm	£44.99
HMS Temerity CNC Pack 890mm	£42.45

Deans Marine Kits

LCM 1653 1:24 scale 710mm	£213.75
25ft Motor Boat 1:12 scale 690mm	£175.95
Compass Rose. Corvette1:96 673mm	£177.65
H.M.S. Solebay.Destroyer 1945 1210mm	£306.33
MGB77. 71.6ft BPB 1:24 920mm	£243.01
73ft Vosper Type 1 1:24 scale 965mm	£252.20
Bronnington. minesweeper 1:100 465mm	£107.18
MTB 488. B.P.C. 71.6 MTB 1:24 920mm	£272.63
Steam Yacht Medea 1904. 1:48 870mm	£139.86
Tradition. Seine net trawler 870mm 1:24	£360.92
H.M.S. Cossack Destroyer 1938 1200mm	£272.63
SS City of Truro 1:96 960mm	£356.95
Yarra Twin Screw berthing tug 1:48 580mm	£223.95
Snow Goose Broads Cruiser 1:24 scale 740mm	£137.95

Plastic Kits

Tamiya IJN Yamato 1:350 717mm	£270.95
Trumpeter USS Missouri 1:200 scale 1352mm	£249.16
Trumpeter Bismarck 1941 1:200 scale 1265mm	£203.95
Italeri Schnellboot S-100 1:35	£175.00
Trumpeter USS Arizona BB-39 1941 1:200	£160.16
Lindberg PT 109 MTB 1:32 scale 749mm	£149.95
Heller HMS Victory 1:100 scale	£149.95
Heller Le Soleil Royal 1:100 scale	£149.95
Lindberg Sea Witch. Clipper 1:96 scale 838mm	£149.95
Dragon Scharnhorst 1943 1:350 scale	£139.00
Revell Flower Class Corvette 1:72 850mm	£119.00
Italeri MTB77 1:35 scale 632mm	£99.99
Italeri PT109 Torpedo Boat 1:35 scale	£99.95
Lindberg Blue Devil Destroyer 1:125 910mm	£99.95
Trumpeter HMS Repulse 1941 1:350	£87.21
Trumpeter HMS Hood (1941) 1:350	£80.09
Trumpeter USS Alabama BB-60 1:350	£71.19
Trumpeter Prinz Eugen 1945 1:350	£64.96
Trumpeter HMS Queen Elizabeth 1943 1:350	£62.29
Trumpeter HMS Belfast 1942 563mm 1:350	£62.29
Trumpeter Graf Spee. 1:350 531mm	£47.16
Trumpeter Admiral Hipper 1941 1:350	£62.26
Tamiya Bismarck 1:350 717mm	£61.99
Revell Type VIIC U-Boat 1:72	£59.99
Tamiya Tirptz 1:350 717mm	£58.50
Tamiya HMS King George V 1:350	£49.99
Tamiya HMS Prince of Wales 1:350	£49.99

Plastic Kit Upgrades

German AA Weapons WWII 1:350	£8.40
Naval figures 1:350 scale	£7.20
Passenger ship crew figures 1:350 scale	£8.40
Naval Crew Figures German WWII 1:350	£8.40
Etched lifebelts set 1:350 scale.	£8.40
R.N Naval figures Far East 1:350 scale	£8.40
Bismarck etched detail Tamiya Bismarck 1:350	£22.30
Tirpitz (designed to be used with Tamiya kits)	£30.60
HMS Hood detail sheet pack 1:350 scale	£30.60
Admiral Graf Spee etched sheet set 1:350 scale	£24.99
HMS Repulse etch detail sheets 1:350 scale	£19.50
Prinz Eugen etched set. 1:350 scale	£22.30
HMS Repulse railings set 1:350 scale	£19.50
Prinz Eugen etched railings set 1:350 scale	£22.30
Prince of WaleS etch sheet pack 1:350	£20.60
HMS Dreadnought 1907 Etched detail 1/350	£19.50
HMS Dreadnought 1907 Railing Set 1/350	£14.99
Wooden deck for HMS Hood 1:350 scale	£36.50
Wooden deck for Graf Spee1:350 scale	£32.30
Wooden deck for HMS Repulse 1:350 scale	£34.80
Wooden deck for Prinz Eugen 1:350 scale	£34.80
Wooden deck for Tirpitz 1:350 scale	£34.80
Wooden deck for Admiral Hipper 1:350 scale	£34.80
DX Wooden deck & Railing for Bismarck 1:350	£37.99
Wooden deck for Bismarck 1:350 scale	£31.50
Wooden deck for Tirpitz 1:350 scale	£31.50
Wooden deck for KG5 1:350 scale	£33.20
Wooden deck for Price of Wales 1:350 scale	£33.20
DX Wooden deck & Railing for Warspite 1:350	£53.80
DX Wooden deck & Railing for Bismarck 1:200	£149.40
DX Wooden deck & Etech for Missouri 1:200	£217.30
GLS Flower Class Deck & Fittings Set. 1:72	£99.99
GLS Flower Class Type `C' Bridge Set 1:72	£38.40
GLS Flower Class Corvette Depth Charge Set	£39.38

This is just a selection from Gold Medal, MK1 Design, Master, Great Little Ships and Eduard.

R/C Boat Plans

Miranda Edwardian steam launch 42in	£12.50
Will Everard Thames Barge: 1:48 scale	£17.50
Brave Borderer: 36in Vosper patrol boat,	£12.50
Enterprise:Northumbrian Coble. 27in.	£12.50
"Pilot 40 police/pilot launch 27½	£12.50
Inchcolm: Clyde puffer 24¾in.	£12.50
Liverpool Lifeboat: 1:12 scale	£12.50
200 Series RAF Seaplane Tender: 950mm l	£12.50
H.M.S Ark Royal : A 1:192 scale model, 50in.	£12.50
Vosper MTB : 26 1/4 inches	£12.50
Steam Yacht Greta: 44in	£17.50
Launch Out: 27½in., side and pair trawler,	£17.50
P.S Totnes Castle paddle steamer 42½in.	£12.50
Joffre:Tyne Tug30½in.	£12.50
St Louis Belle 1:64 Mississippi stern-wheeler	£12.50
T.B.D Cruiser Leader: 1:144 32in. Scout class	£12.50
200 Series RAF Seaplane Tender: 1:12 950mm	£12.50
H.M.S Kent : 1:96 scale early cruiser 58"	£17.50
Fairey Huntsman:1:8 scale 1066mm	£12.50
Celia Jane:Thames Barge 1:24 scale. 50in.	£22.50
Joffre:Tyne Tug 1:48 scale 30½in	£12.50
Britannia 1893 . Royal racing yacht, 1:32nd	£29.50
Pibroch A 1:50th scale Clyde Puffer, 400mm	£17.50
Osprey Scottish wooden fishing boat,500mm	£31.50
Altair gaff rigged schooner 1:32nd 1200mm	£33.50
Princess High speed luxury motor yacht.1:24th	£17.50
Constance Bowater paper freighter,1030mm	£17.50
Boston Fury 1960 East Coast Trawler 1125mm	£17.50
Waverley paddle steamer 1365mm,	£17.50
Hoop Op Zegen Beamer trawler725mm	£17.50
Louis Heloise 1:10th French Bautier.1025mm	£23.50

Harold Underhill Plans

Cutty Sark Clipper Ship 698mm	£29.54
Marie Sophie of Falmouth 1033mm	£44.41
Lady of Avenel. Wood. 850mm	£33.30
74-Gun Two-Decker (Circa 1813 1422mm	£77.71
Lady Daphne Thames Sailing Barge812mm	£29.54
12-Gun Brig-of-War. Lines, 1187mm	£55.51
Cunard Liner Servia, 1:192 scale 850mm	£33.30
40-Gun Frigate (Circa 1790 831mm	£66.61
Valerian. Brixham Trawler 1069mm.	£49.23
Diesel Ring Net Fishing Boat 615mm	£29.53
Three Brothers. Rye Fishing Smack. 797mm	£29.54
Muirneag. Scottish Zulu- 1612mm	£66.61
Clyde Puffer Sealight, 588mm	£19.68
Leon. Wood Brigantine 514mm	£59.07
Iron Paddle Tug 1:48 scale 863mm	£44.40

Static Display Kit Plans

Chinese Junk, construction plans.	£7.02
Sovereign of the Seas, plans 1:78 1100mm	£16.18
HMS Fly Plan set	£26.50
Lady Nelson Cutter Plan Set	£8.86
HMS Bounty, construction plans	£13.43
French Xebec construction plans	£10.99
Vikingship, Osjberg, construction plans.	£7.12
Titanic Plans set	£48.84
Endeavour J Class Plans set	£22.38
Cutty Sark, construction plans, Scale 1:78.	£31.00
La Couronne, construction plans, Scale 1:98.	£28.50
Santa Maria, construction plans, Scale 1:50.	£14.95
French Xebec, construction plans, Scale 1:49.	£14.85
Thermopylae, construction plans, Scale 1:124.	£14.85
Mississippi Stern Wheeler plan 1:50 1050mm	£34.95
Pinta. construction plans 1:50 570mm	£14.85
Friesland (1:75) Drawings & Instructions	£47.73
H.M.S. Victory (1:90) Drawings & Instructions	£64.09
Yacht Mary (1:54) Drawings & Instructions	£32.73
Golden Hind (1:53) Drawings & Instructions	£32.73
Rattlesnake (1:64) Drawings & Instructions	£46.36
Royal Louis (1:90) Drawings & Instructions	£62.73

This is just a selection of over 1000 plans available

R/C Equipment

Hitec Optic 6 (2.4 GHz) combo	£124.99
Hitec Optic 5 channel (2.4 GHz) combo	£89.95
Viper Marine 40 amp speed controller	£53.22
Planet 5 Transmitter and Receiver Set	£54.99
Hi Tech Ranger 2 Channel	£49.95
FR30HX 30amp speed controller	£47.14
15HVR 15amp speed controller	£37.69
Viper Marine 25 amp speed controller	£34.99
FR12VR 12amp speed controller BEC	£33.86
Hi Tech Mega Arm Sail Winch 19.8kg/cm	£30.99
Proportional Drum Sail Winch	£30.63
Viper Marine 20amp speed controller	£28.99
Viper Marine 15amp speed controller	£22.99
Viper Micro Marine 10amp speed controller	£22.99
Viper Marine 15 Plug Play speed controller	£22.99
Programmable mixing module	£20.34
Waterproof mixing module (w-tail)	£17.80
Waterproof mixing module	£15.70

Full range of R/C installation equipment available

Sound Modules

Petrol/Diesel Engine with Horn	£43.40
Machine Gun	£35.73
Steam Engine Sound	£43.40
Whooper	£35.73
Fog Horn	£35.73
Ship Klaxon	£35.73
Sub Sonar Ping	£35.73
Sub Dive Alarm	£35.73
Air Horns	£35.73
Large Ship Horn	£35.73
Large Ship Steam Whistle	£35.73
Old Steam Whistle	£35.73
Tug Boat Air Horn	£35.73
Mtroniks Diesel Canal Boat	£59.99
Mtroniks Multicylinder Diesel	£59.99

Motors

Schottel drive unit 70mm dia prop	£95.94
Schottel drive unit 50mm dia prop	£76.48
Rudder-propeller drive:	£74.42
Schottel drive unit 40mm dia prop	£62.71
543/12 low drain motor for large props	£18.85
Speed 480 Motor 7.2v	£18.75
Mabuchi Low Drain 545	£9.96
Mabuchi 540	£7.43
Mabuchi 480 motor 4.8 to 8.4v	£7.00
Mabuchi 400	£7.00
Electronize 365/14 low drain	£5.56
Motor mount for MFA 800/850 Motors	£4.50
385 Motor 6 to 15.0 Volt with mount	£6.56
540 Motor 6 to 12.0 Volt with mount	£10.36
RX15 540 Motor 6 to 8.4v Volt	£35.95
RE800 Motor 12.0 Volt with mount	£27.49
RE850 Motor 12.0 Volt with mount	£27.49
Motor mount for 540/500.550 and 600 Motors	£2.75
MFA 540 Motor and 2.5:1 Gearbox 4.5 -15v	£19.33
Bevel 90 degree Gearbox 1:1	£20.38
MFA 540 Motor and 6:1 Gearbox 4.5 -15v	£19.36
MFA 385 Motor and 2.5:1 Gearbox 4.5 -15v	£17.56
950 series 385 Motor and 6:1 Gearbox 4.5 -15v	£17.56
951 series 951 Motor and Gearbox 298:1 6volt,	£9.00
800/850 Belt Drive Reduction Unit 2.1:1	£40.80

Raboesch Propshafts

Waterproof Prop Shaft M4 290mm	£25.29
Waterproof Propeller Shaft M4 290mm	£34.22
Waterproof Propeller Shaft M5 290mm	£34.32
Waterproof Propeller Shaft M4 450mm	£39.74
Waterproof Propeller Shaft M5 450mm	£39.74
Prop Shaft &support bracket M2 230mm	£23.49
Prop Shaft &support bracket M3 270mm	£25.29
Prop Shaft &support bracket M4 330mm	£30.71

Rudder Assemblies

Rudder assembly 33 long x 22mm wide	£3.90
Rudder assembly 60 long x 41mm wide	£5.36
Rudder assembly with tiller arm 45 x 35mm	£4.54
Rudder assembly with tiller arm 55 x 45mm	£4.54
Steerable Kort nozzle for props up to 35 mm Ø	£18.33
Becker Rudder 43 x 38mm	£20.42
Skeg and Rudder Assembly 68mm deep, 56mm	£19.75
Rudder assembly with tiller arm 35 x 26mm	£4.54
Boat rudder set: 45 mm Height: 40	£6.69
Boat rudder set: 32 mm Height: 25 mm	£6.47
Boat rudder set: 36 mm Height: 50 mm	£6.19
Boat rudder set: 36 mm Height: 70 mm	£7.42
Rudder assembly 45 long x 30mm wide	£4.80
Rudder assembly 53 long x 36mm wide	£4.92
Rudder assembly 67 long x 44mm wide	£5.36
Double Tiller Arm. Fits 3/16 or 5mm shaft	£0.97

Raboesch Brass Propellers

Brass Propeller (A Type) 20 -3 Blade-M4	£9.94
Brass Propeller (A Type) 25 -3 Blade-M4	£9.94
Brass Propeller (A Type) 30 -3 Blade-M4	£10.84
Brass Propeller (A Type) 35 -3 Blade-M4	£10.84
Brass Propeller (A Type) 40 -3 Blade-M4	£10.84
Brass Propeller (A Type) 45 -3 Blade-M4	£12.65
Brass Propeller (A Type) 50 -3 Blade-M4	£12.65
Brass Propeller (A Type) 55 -3 Blade-M4	£12.65
Brass Propeller (A Type) 60 -3 Blade-M5	£15.36
Brass Propeller (A Type) 65 -3 Blade-M5	£15.36
Brass Propeller (A Type) 65 -3 Blade-M4	£15.36
Brass Propeller (A Type) 70 -3 Blade-M5	£17.61
Brass Propeller (A Type) 75 -3 Blade-M5	£17.61

This is just a selection of a huge range of 3, 4 and 5 blades props in stock

Raboesch Bow Thrusters

Bow thruster unit with motor 14mm I/D	£33.87
Bow thruster unit with motor 16mm I/D	£33.87
Bow thruster unit with motor 19mm I/D	£33.87
Bow thruster unit with motor 22mm I/D	£38.39
Bow thruster unit with motor 25mm I/D	£38.39
Mini Bow thruster unit with motor 10mm I/D	£27.10
Bow thruster unit with motor 30mm I/D	£81.29

BECC Letters&Number sets

2A Arial Lettering 2 mm,	£4.07
3A Arial Lettering 3 mm,	£4.59
4A Arial Lettering 4 mm,	£4.59
6A Arial Lettering 6 mm,	£4.59
8A Arial Lettering 8 mm,	£5.10
10A Arial Lettering 10 mm,	£5.10
12A Arial Lettering 12 mm,	£6.12
15A Arial Lettering 15 mm,	£7.14
20A Arial Lettering 20 mm,	£8.16
25A Arial Lettering 25 mm,	£10.20
5A Arial Lettering 5 mm,	£4.59

Available in most colours

Quaycraft Ship's Boats

QS77 1:72 scale 27 ft Clinker whaler 115mm	£19.44
QR27 1:96 Scale 27ft Whaler 85mm	£9.36
QL43 1:48 18ft Lifeboat Double End 114mm	£14.88
QL37 1:32 16ft Clinker Double End 150mm	£19.08
QR25 1:96 Scale 25ft Motor cutter 79mm	£9.84
QD24 1:24 14ft Clinker Dinghy 178mm	£20.28
QP16 1:48 16ft Royal Navy 16' dinghy 100mm	£11.04
QL53 1:48 20ft double end lifeboat 125mm	£15.84
QS75 1:72 Motor cutter 109mm	£20.88
QP27 1:48 27ft Royal Navy Whaler 172mm	£22.32
QD34 1:32 14ft Clinker Dinghy Stern 123mm	£17.76
QL59 1:48 . 22ft Lifeboat. double ended 140mm	£16.56
QS70 1:72 16ft Clinker dinghy, 66mm	£10.32
QN32 1:128 32ft Cutter clinker 75mm	£7.08
QL36 1:32 16ft Clinker Transom Stern 150mm	£19.08
QP12 1:48 12.5ft Clinker Dinghy.Stern 80mm	£11.16
QD20 1:24 10ft Clinker Dinghy 123mm	£17.88
QMB15 1:96 26ft Lifeboat double end 83mm	£12.96
QB14 1:72 20ft clinker lifeboat 83mm	£12.72

This is just a selection of over 100 boats available

Scalelink Etched Brass

11mm 3 rail stanchions & railing 840mm	£10.20
1:96 R.N 3 rail stanchions and railing 11mm	£10.20
1:128 scale vertical laddering	£10.20
1:72 R.N pattern 3 rail stanchions and railing	£10.20
1:192 R.N pattern 3 rail stanchions	£10.20
Clarendon serif Letters 2.5, 3 and 5mm high	£10.20
1:200 Angled step ladders with handrail	£10.20
Vertical rung ladders 4.5mm & 5.5mm wide	£12.00
1:128 Angled step companionway ladders	£10.20
1:128 scale vertical laddering	£10.20
5mm and 6mm wide Angled step ladders	£10.20
6mm & 8mm vertical rung laddering	£10.20

This is just a selection from the huge range available

1:24 scale Crew Figures

Standing civilian crew member	£8.12
Seated civilian crew figure wearing woollen hat	£8.12
Standing R.N/Civilian officer with binoculars	£8.12
Civilian crew member standing wearing beret	£8.12
Civilian/R.N Officer wearing cap and pullover	£8.12
R.N/Civilian wearing waterproof jacket	£8.12
Standing civilian captain in sheepskin jacket	£8.12
Seated ships captain wearing cap and pullover	£8.12
Standing R.N/civilian officer in wet weather jacket	£8.12
R.N/Civilian wearing waterproof jacket	£8.12
R.N crew in dress uniform leaning on rail	£8.12
Seated civilian crew member 1:24 scale	£8.12

This is just a selection of the range available.

BECC Flags

GB02 White Ensign, Size: AAA 10mm	£3.05
GB02 White Ensign, Size: AA 15mm	£3.05
GB02 White Ensign, Size: A 20mm	£3.05
GB02 White Ensign, Size: B 25mm	£3.05
GB02 White Ensign, Size: C 38mm	£3.96
GB02 White Ensign, Size: D 50mm	£3.96
GB02 White Ensign, Size: E 75mm	£4.95
GB02 White Ensign, Size: F 100mm	£5.97
GB02 White Ensign, Size: G 125mm	£7.91
GB02 White Ensign, Size: H 150mm	£9.91

Also available, Naval ensigns in red, Blue as well and National flags from most maritime nations

Timber

Lime Strip 0.5mm x 2mm x 1000mm	£0.34
Lime Strip 0.6 x 10mm x approx 1 metre long	£0.31
Lime Strip 0.6 x 3mm x approx 1 metre long	£0.35
Lime Strip 0.6 x 4mm x approx 1 metre long	£0.38
Lime Strip 0.6 x 5mm x approx 1 metre long	£0.41
Lime Strip 0.6 x 6mm x approx 1 metre long	£0.44
Lime Strip 0.5 x 7x approx 1 metre long	£0.47
Lime Strip 0.6 x 8mm x approx 1 metre long	£0.25
Lime Strip 1.5 x 1.5mm x approx 1 metre long	£0.36
Lime Strip 1.5 x 10mm x approx 1 metre long	£0.73
Lime Strip 1.5 x 2.0mm x approx 1 metre long	£0.40
Lime Strip 1.5 x 3.0mm x approx 1 metre long	£0.45
Lime Strip 1.5 x 4.0mm x approx 1 metre long	£0.50
Lime Strip 1.5 x 5mm x approx 1 metre long	£0.55
Lime Strip 1.5 x 6mm x approx 1 metre long	£0.58
Lime Strip 1.5 x 7mm x approx 1 metre long	£0.61
Lime Strip 1.5 x 8mm x approx 1 metre long	£0.65
Lime Strip 1 x 1mm x approx 1 metre long	£0.36
Lime Strip 1 x 1.5mm x approx 1 metre long	£0.36
Lime Strip 1 x 10mm x approx 1 metre long	£0.55
Lime Strip 1 x 2mm x approx 1 metre long	£0.37
Lime Strip 1 x 3mm x approx 1 metre long	£0.38
Lime Strip 1 x 4mm x approx 1 metre long	£0.39
Lime Strip 1 x 5mm x approx 1 metre long	£0.45
Lime Strip 1 x 6mm x approx 1 metre long	£0.50
Lime Strip 1 x 7mm x approx 1 metre long	£0.51
Lime Strip 1 x 8mm x approx 1 metre long	£0.53

This is just a selection of sizes. Other woods stocks include Walnut, Maple, Tanganykia, Beech, Pear, Balsa, Obechi

Admiralty Paints

Available in 14ml flip top capped bottles in the following colours. Light Ivory, Red Ensign , Maroon Admiralty, Polished Bronze, Antique Bronze, Olive Green, Walnut Brown, Matt Flesh, Gold/Brass, Copper, Dull Black, Matt Black, Dull White, Matt White, Yellow Ochre, Red Ochre, French Blue, Flat Matt Varnish, Matt Varnish Satin Matt Varnish £2.25 per colour

Admiralty Woodstain

Available in 14ml eye dropper bottles in the following colours. Mahogany, Oak, Ebony, Walnut or Cherry £3.32 each

Tensocrom Weathering Pigments

Tensocrom Base Medium 22ml	£2.85
Tensocrom Sand (22ml)	£2.85
Tensocrom Earth (22ml)	£2.85
Tensocrom Grass (22ml)	£2.85
Tensocrom Rust -1 (22ml)	£2.85
Tensocrom Rust -2 (22ml)	£2.85
Tensocrom Oil (22ml)	£2.85
Tensocrom Smoke (22ml)	£2.85
Tensocrom Kerosene (22ml)	£2.85
Tensocrom Fuel (22ml)	£2.85
Tensocrom Burnt Brown (22ml)	£2.85
Tensocrom White Oxide(22ml)	£2.85

Books

Plank on Frame Models. Volume Two	£25.00
Plank on Frame Models. Volume One	£20.00
Ship Modeling Simplified	£14.95
Rigging Period Fore & Aft Craft	£22.50
Ship Modeling from Stem to Stern	£16.95
Card Modelling	£22.95
Ship Modelling from Scratch	£19.95
The 100 Gun Ship Victory	£14.99
The Battleship Dreadnought	£16.99
The Battleship Bismarck	£16.99
The Battlecruiser Hood	£14.99
Advanced Ship Modelling by Brian King:	£16.95
Model Marine Steam	£14.95
Scale Model Tugs	£14.95
Historical Sailing Ships: Remote Controlled	£14.95
Period Ship Kit Builders Manual	£16.95
Model Ships Fittings	£12.95
Model Submarine Technology	£12.95
Painting Model Boats	£12.95
Ship Modelling in Plastic	£12.95
Scale Model Steamboats	£12.95
Making Model Boats with Styrene	£12.95
Simply Model Submarines	£12.95
The Model Tug Boat Book:	£12.95
Scale Model Warships	£12.95
Submarines. Models and their Originals	£12.95
Scale Model Boats. Building & Operation	£9.95
Radio Control In Model Boats	£9.95
Introduction to Marine Modelling	£9.95
Ship Modelling Solutions	£9.95
Scratch Building Marine Models	£9.95
Photoetching For The Plastic Ship Modeler	£12.95
Super-detailing the Cutter Sherbourne	£19.00

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

Modelling Tools

Mantua 12v Electric Fret saw 12v	£110.00
Mini Compressor	£99.00
Mantua Spar Lathe. 12V	£99.00
Mantua 12v Electric Planer	£79.00
Amati heavy duty Building cradle	£52.60
Building Slip	£54.95
Mantua 4 speed mains transformer	£48.40
Deluxe Modellers Tool Chest	£38.95
Amati Electric Plank Bender	£31.54
Rope Walk kit	£37.13
Strip Clamp.	£32.95
Bench Vice.	£17.50
Swann-Morton ACM Tool Set	£22.61
Planet, special work bench	£10.58
20 piece twist drill set .3 to 1.6mm	£13.23
Amati Pin Pusher De-Luxe	£11.45
Pin Pusher	£9.07
Waterline marking tool	£10.48
A3 cutting mat	£11.18
Pounce Tool with 4 wheels	£11.16
Assorted grade Sanding Sticks (5)	£10.94
Shroud Making Jig	£12.72
Zona Fine Kerf Universal Razor Saw 32tpi	£9.39
Zona Fine Kerf Universal Razor Saw 42tpi	£9.39
Zona Fine Kerf Universal Razor Saw 24tpi	£9.39
Zona Ultra Thin Kerf Razor Saw 52tpi	£8.34
Zona Ultra Thin Kerf Razor Saw 32tpi	£8.34
8 piece twist drill set .5 to 2.0mm	£7.38
Rigging Tool	£8.14
Archimedean Hand Drill	£6.74
Pin Vice with collets for .01 to 3.0mm drill bits	£6.64
K&S Tube cutter	£6.50
Wooden Clamping Pegs (3)	£5.75
Miniature hand plane	£5.06

THE MODEL DOCKYARD CATALOGUE

Our non illustrated catalogue contains a brief description and principal dimensions of over 12,000 product items that are available from our extensive range aimed and the the scale modeller. these include both static and R/C Kits, Plastic kits and upgrade parets; the largest range of boats fittings to be found anywhere, building materials, boat plans, boat hulls, props, couplings, motors, propshafts etc etc. Whether you interest lies in working radio control, display period ships or static kits, our catalogue has everything you will need, £3.00 plus £3.00 for UK Delivery

Westbourne Model centre

Http://www.westbourne-model.co.uk

Email: saleswestbourne@btconnect.com Tel 01202 763480

Model Slipway R/c

Assurance: WWII Tug 1/43rd 1108mm	£315.00
Tamar Class Lifeboat: 1/16th 1000mm	£367.00
Shamrock: M160 Fast Patrol Boat 1/24th 685mm	£119.00
Sentinel: 34m Island Class cutter 1/40th 940mm	£213.00
Drumbeat of Devon: Fisheries Protection 1/24th 915mm	£219.00
Maggie M: Shelter Deck Trawler, 1/32nd 850mm	£239.00
Tsekoa II: Buoy Maintenance vessel 1/32nd 845mm	£199.00
10 Hatch Coaster: Europa-type coaster 1:50th 1005mm.	£254.00
4 Hatch Coaster: Europa-type coaster 1:50th 1005mm..	£254.00
Wyeforce: Harbour Tug1/24th scale 840mm	£219.00
Dutch Courage: General Tug 1/32, 870mm	£249 00
Vielstroom: Buoy-Layer :1:40th 960mm	£233.00
Post War Envoy: Envoy Class Tug 1:48th 1108 mm	£315.00
Admiralty: Envoy: Class Tug 1:48th 1108 mm...	£366.00
Aziz: Anchor Handling Tug 1:50th 1105mm	£284.00
Our Lass II 21.5m twin-rig trawler	£274.73

Calda Craft R/c

Joffre: Tyne Tug 1:48th 775mm	£232.23
North Light: Weston isle coaster 1:32nd 660mm	£232.39
Marie Felling: Crown Colony Tug 1:32nd 1105mm	£368.34
S.S Talacre: Single Hatch Coaster 1:48th 863mm	£232.36
Cumbrae :Clyde Pilot 1:32nd 864mm	£247.96
Sir Kay: Table Class minesweeper 1:48th 933mm	£266.36
Imara :Tug Crown Colony Tug 1:32nd 1105mm	£431.91
Brannaren: Coastal tanker 1:48th : 1067mm	£277.36
Milford Star: Steam Trawler 1:48th 933mm	£212.57
Alte Liebe: Harbour tug 1:25: 984mm	£260.81
Schaarhorn: Steam yacht 1:35 Length: 1140mm	£311.55
Resolve: Salvage Tug 1:48th 1165mm	£472.00
Amaranth: Herring Drifter : 1:40th 600mm	£101.79
Thunder Tiger Sea Dragon Racing Yacht 993mm	£179.00
Laser :1/4 Scale Laser Yacht Inc with bag & radio	£413.00
Graupner True Blue: Bermudian Rig	£144.99

R/C Yachts

Robbe Atlantis, Wishbone Schooner, 1:20, 1730mm	£439.00
Robbe Windstar, 1Mt class inc Std Rig (Sail)	£338.99
Aquacraft Vela One Meter sailboat	£410.39
Thunder Tiger Vouger II 1Mt	£149.99
ProBoat Westward RTS Return to base motor 69Cm	£139.60
ProBoat Serenity 1Mt Ep RTR 914 mm	£245.99

We are one of the largest stockiest of model boat Shops in England and currently have on display some 300 to 400 model boats.
Split between static 'Plank on Frame and Radio Control kits From Companies like Robbe , Graupner , Aero Naut , Deans Marine , Marten Howes & Baylis ,Billing Model Slipway. Along with the static manufactures Calder Craft ,Victory Models , Amati , Mantua , Corel .
In addition to this we stock a wide range of model Boat fittings, Radios Control Systems , Electric motors, and Steam plants, plus many other accessories for model boats.

WP Rhode Island Formula 1 Catamaran Artr

Information :
ARTR (Almost Ready To Run)
Controlled via 2 functions
With 1 brushless outboard motor
After installation of the receiver and drive battery, the model is ready to go:
Description: ARTR (Almost Ready To Run) model ,GRP hull ,Built-in brushless outboard motor ,Built-in controller ,Built-in servo
Simple installation of the RC components Price:£255.60

Westbourne Model Centre
41 Seamoor Rd Westbourne Dorset
BH4 9AE
Tell/Fax 01202 763480
Opening Hrs 9:15..5:00Pm Mon-Sat Half Day Wed

Amati Static

Tipo Riva Aquarama 1970 1:10th . 850mm	£352.50
HMS TitanicScale 1:250 .1070mm	£375.00
Ferrari Arno X1 RacerScale 1:8 . 790mm	£332.00
Dorade modern yacht. Scale 1:20 . 856mm	£276.98
The Schooner Endeavour POF 1:80 .480mm	£9.99
The Schooner Endeavour Pre Made Hull 1:80 . 480mm..	£89.99
Rainbow Pre Built Hull Version 1:80 . 480mm	£89.99
Rainbow Plank on Frame Kit 1:80 . 480mm	£89.99
Enterprise America's Cup 1930 1:80 . 460 mm	£89.99
Shamrock V 1:80 . 440mm	£89.99
Ranger America's Cup Defender 1:80 . 470mm	£89.99
Columbia 1958 Us Cup 12 Mt Class 1:35 . 68mm	£130.99
Constellation 1946 Us Cup 12 Mt Class1:35 . 600mm	£130.99
Schooner Endeavour America's Cup1:35 . 1150mm	£270.00
Robert E. Lee 1:50 . 600mm	£266.99
H.M.S. Bounty 1:60th . 720mm	£225.99
New Bedford whaleboat 1:16th .550mm	£128.99
Bluenose 1:100 .540mm	£96.00
Pirate Ship 1:60 .780mm	£88.04
Mayflower 1:60 .650mm	£165.36

VICTORY MODELS Static

Sciabecco 1:60 .720mm	£133.06
Chinese Pirate Junk 1:100 400mm	£81.19
Viking Long Boat Oseberg 1:50 440mm	£106.99
H.M.S Pegasus 1776 Sixth Rate Swan Class 1:64th	£349.00
HMS Vanguard Ship Of The Line 1/64th 1171mm	£694.00
HM Cutter Lady Nelson 1:64, 530mm, 1/19c 10 gun	£124.95
HM Bomb Vessel Granada, 1:64, 800mm	£268.90
HMS Fly, 6th rate Swan Class Sloop, 1:64th 810mm	£291.00

CALDERCRAFT (Nelson's Navy) Static

H.M.S Victory: Ship Of The Line 1:72 1385mm	£709.00
HM Brig Badger: Brig 1:64 600mm	£161.00
H.M.A.V. Bounty : 1:64 660mm	£157.99
HM Revenue Cutter Sherbourne, 1:64, 500mm	£72.61
HMS Mars: 1781 Armed Brig, 1:64, 790mm	£183.68
HM Mortar Vessel Convulsion: 1:64, 600mm	£91.00
HMS Agamemnon, 1781 3rd Rate, 64 gun, 1:64 52"	£615.00
HM Brig Supply, 1759, 675mm, 1:64 sc	£135.50
HMS Cruiser, 1797, 18 gun brig. 1:64, 850mm	£193.57
HMS Snake, 1797, 18 gun Sloop, 1:64, 910mm	£194.57
HMS Diana, 38 gun heavy frigate, 1180mm	£442.19
Mary Rose, 1545, 1:80, 730mm	£241.17
HM Bark Endeavour, (Cooks) 1:64, 725 x 275mm	£208.06
HMS Jalouse, 1794 ex French 18 gun brig 1:64 815mm	£204.99

ABOVE: SS Balboa and the Empress liner model. These models can be easily enlarged or reduced in size, but a half-size liner model will be a lot less than 50% of the displacement of the original, as pictured here.

Glynn Guest *discusses a more analytical approach to your next model*

Modelling Mathematics

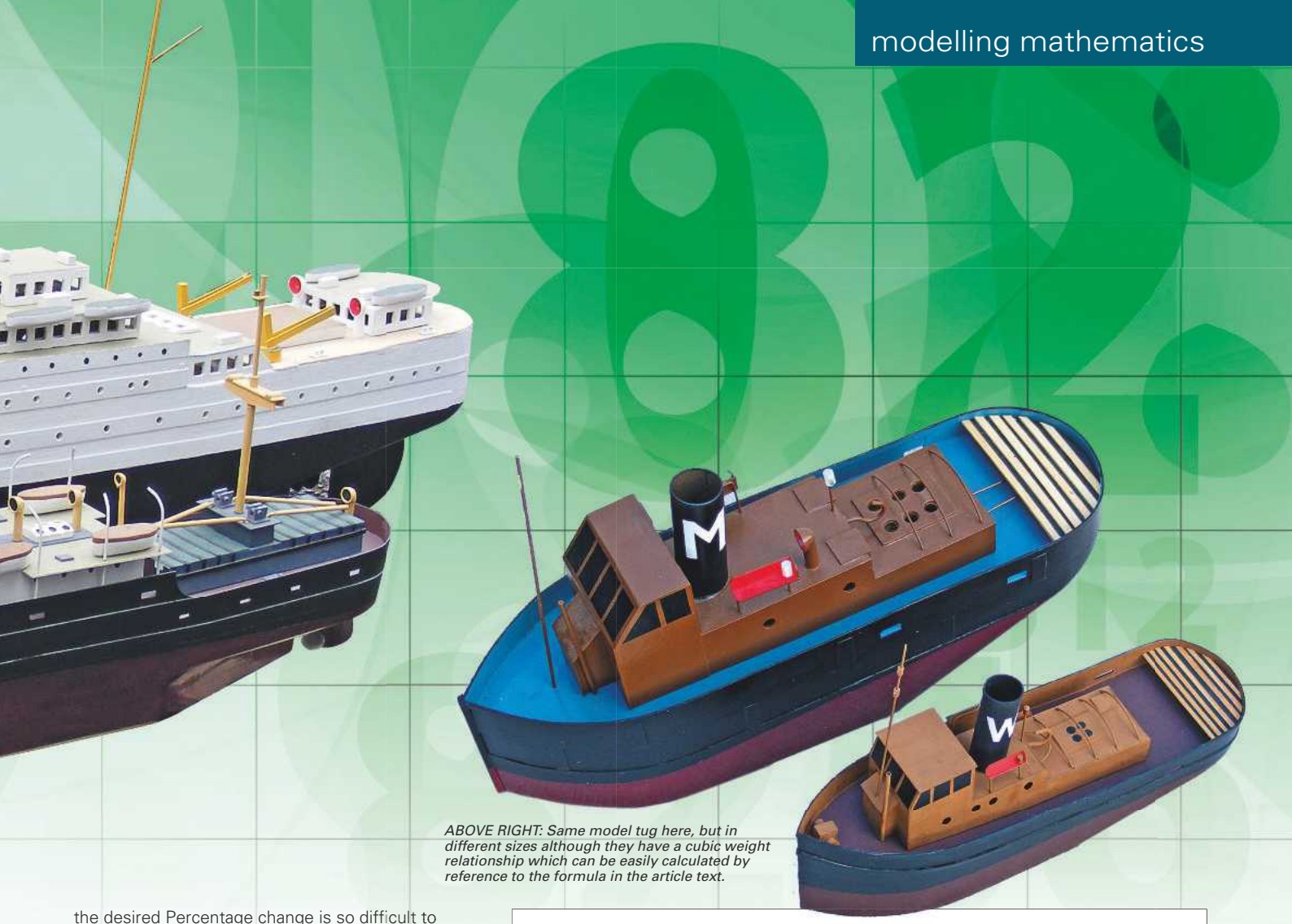
In the course of my working life I've met some very intelligent people, often with a string of letters after their names to prove it. One thing that could occasionally amaze and to be honest also amuse me, was that some of these people would literally run away from any problems that required a calculation to produce a quantitative answer. There were also a few who could not cope with the idea of 'estimating' to obtain an approximate answer, which is handy to gauge the 'size' of something, or even determine if an idea is possible or not.

Looking at the questions that often get asked on Internet forums, sometimes over and over again, it struck me that many modellers seem unsure of how to calculate their way out of a problem. So what follows now, assumes that our struggling modellers know the basic mechanics of arithmetic, but may well have probably never learnt how to apply it to real world situations. Most of the time you just need to use addition, subtraction, multiplication and division in order to obtain a result. Well, squares, cubes and their roots will also come into it, but as these now only require you to press the right button on a calculator, quite a change from when I first learnt about them, so they ought not to be a challenge.

The aim here is to use simple and straightforward sums so that you can get your next modelling project in, to use the phraseology of our American cousins, 'the right ballpark'. This could avoid disasters such as a model becoming too heavy to safely launch, or the opposite with a model too small to float when loaded with all its internal equipment. It is surely worth the effort of a few sums to avoid starting out on a difficult if not impossible new project?

Scale

Working out the scale of a model or how to change a plan to suit the size of model you want to build is a common source of confusion. To those skilled in such matters, it can seem puzzling that a simple Fraction that gives the Ratio that will produce



ABOVE RIGHT: Same model tug here, but in different sizes although they have a cubic weight relationship which can be easily calculated by reference to the formula in the article text.

the desired Percentage change is so difficult to understand, but therein may lie the nub of the problem as we have used three different terms for what is basically the same process.

It may cause no problems for the mathematically fluent to use such terms in this interchangeable fashion, but it does I know for a fact, cause some people a lot of confusion. **Figure 1** is used to show that fractions, decimals and percentages can all mean the same thing. Taking '0' to mean nothing and '1' to mean everything on this scale it ought to be easy to see that the mid-point can be represented by the fraction '1/2' or if you prefer 'half'. Further subdivisions' into it can be made such as the common fractions of a quarter (1/4) and three quarters (3/4).

Looking at these fractions and it is clear that the number on the bottom is how many equal parts the whole thing has been divided into. The number on the top is the number of these parts we are concerned with. There is no need to remember the terms numerator and denominator that math's teachers bandy about!

So, if we encounter the fraction of 7/16, all it means is that we have divided something into 16 equal parts of which we are going to need 7 of them. Hopefully this shows how we are going to use it when we try to make a model that is scaled down in size from the original object.

I have to confess to a preference for using a fraction of 1/144 when building radio control model warships. It might seem to be an odd fraction in this decimal age, but is related to the British Imperial measurements and equates to one inch equals 12 feet.

So, if I'm planning a new model then the original vessel's dimensions would have to be reduced

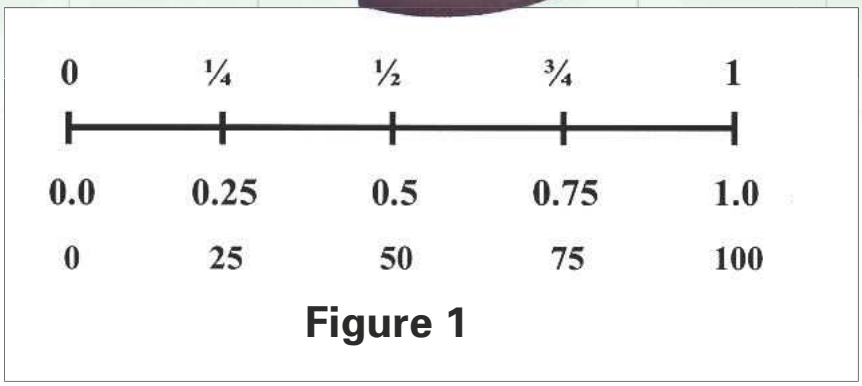


Figure 1

to 1/144 of their value to make the model. This is easily done with the aid of a calculator by simply dividing by 144.

Sometimes the fraction is not so simple and your model might need to be built to a scale of say, 14/78 to make a practical size. This would entail dividing all the original sizes by 78 and then multiplying them by 14. This is two operations and being lazy, I prefer to do just one. This can be achieved by dividing 14 by 78 to produce 0.179 (yes, I have rounded it off, figuring that a few ten thousandth's can be missed!) then placing it the calculator's memory to allow it to be used over and over again. Now all you have to do is multiply the original's dimensions by this number to get any size you need for a model at this scale.

This leads neatly onto the idea that any fraction can be represented by a decimal figure. Thus referring back to **Figure 1** again, we can add a decimal scale so that the fraction 1/2 is equivalent to the decimal 0.5; a 1/4 becomes 0.25; and so on.

Percentages are often quoted when trying to

ABOVE: HMS Matador is an EXCITING Model weighing 3.25lbs and consuming 18W (MB February 2003)

scale things up or down. Now the scale reads from 0%, which equates to our 'nothing' and 100 % which is 'everything'. Half on the percentage scale become 50% and three quarters (3/4) becomes 75%, and so on, from which it should be clear that the percentage value is just the decimal value of any fraction multiplied by 100.

Now whenever someone talks about terms such as 3/8 or 0.375 or 37.5%, they all mean the same thing. You can use whichever term you find most acceptable. I like decimals as they require one multiplication when using a calculator, but for mental arithmetic, fractions always seem easier to work with.

Changing scales?

Quite often a modeller sees a plan or drawing of a vessel that they would dearly love to build, but it's the wrong size. A common example might be a plan in a magazine or book and unless you like massive page sizes, it is going to be way too small for a practical working model.

The simplest case is where you just decide how big you want the model to be, perhaps 750mm long, and then measure the length on the plan, so let's say 90mm in this example. So now we know 90mm on the plan equals 750mm on the model. Thus, dividing 750 by 90 gives us the conversion ratio for scaling-up any dimension on the plan to match a model of this proposed size. Just put the ratio of 8.333 in this example, into a calculator's memory and off you go, as each 1mm on the plan equals 8.333mm on the model.

It is a little harder if you want to change a plan or drawing made to a certain scale into a model built at a different scale. Here is where it can become confusing with fractions, ratios and percentages all getting entangled, but the actual process is straightforward. You could print the original scale drawings, enlarge them to full-size, then reduce them to the desired scale size! Luckily we do not have to actually do this, as imagine trying to get a piece of paper to match the dimensions of the full-size vessel!

By using a little mathematics, this process can be simplified to the following equation:

Model Dimension = Plan Dimension x desired Model Scale/original Plan Scale

The last two terms, Model Scale and Plan Scale, are going to be constant for all the dimensions we are converting, and so might as well be turned into the decimal ratio and put it into a calculator's memory for easy repeated usage. Plan and model scales are usually quoted as fractions, so an example could be to convert a 1/50 plan into a 1/32 scale model:

1/50 = 0.0200 and 1/32 = 0.0313
So the desired conversion ration is 0.0313 divided by 0.0200 = 1.5625

Yes, there are other ways to do this calculation, but until you are fluent in the process and have a feel for what the numbers ought to be, this is probably the safest way.

Scale changes

Altering the linear dimensions of a model, such as the length and beam etc. can have more far-reaching consequences than some modellers might expect. This is often shown by the person who reduces the size of a plan to make a more convenient model and finds that it is now unable to carry the weight of batteries and radio gear. The converse can also occur in that a modest increase in size of a plan may produce a monster of a model that is a pain to handle.

This is the infamous 'Square-Cube' relationship that can perhaps be best understood by considering what happens when you double the size of a simple cube as in **Figure 2.** Starting with the original cube, let it have edges of one unit length (this unit can be a centimetre, inch or whatever takes your fancy). The volume of such a shape is found by length x breadth x depth. So, our unit cube has a volume of one cubic unit of whatever you used for the length of the sides.

The cube has six sides each made of a square shape. The area of each side is the product of the length and breadth of the sides. Thus, the unit cube has a side area of one square unit giving it a total

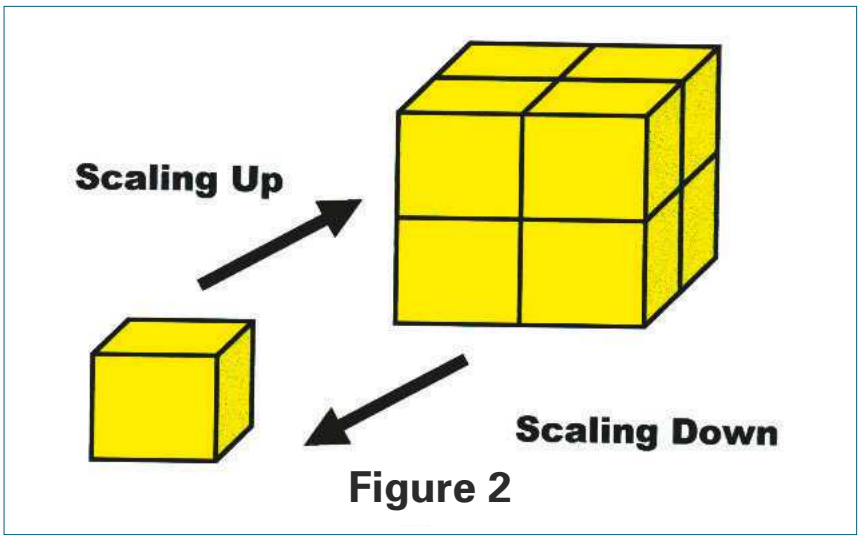


Figure 2

area of six square units.

Let's now see what happens when we double the size of our cube so that it has edges two units long. The area of each side is now four square units and with six sides it gives a total of 24 square units. This is a fourfold increase compared with the original cube size. If you thought that was a big jump, then consider the double size cube's volume, as it has actually increased by eight times!

By playing with other increases in cube size from the original unit cube, it is not hard to see that areas change by the square of the conversion ratio you use and the volume by the cube of this ratio. In the previous example the square of 2 (i.e. 2 x 2) is 4 and the cube of 2 (i.e. 2 x 2 x 2) is 8.

The same effect is found if instead of enlarging the cube, we reduce its size. Using Figure 2 again, lets start with the big cube and halve its size. The surface area is reduced from 24 to 6 square units, a quarter of the original size and the volume shows an even larger reduction back to one eighth of the double size cube.

The same rules apply as before, but because the conversion ratio is less than one (it's 0.5, or if you prefer 1/2 in this example) then things get smaller. Square this ratio (1/2 x 1/2) and you get the 1/4 of the original area; cube it (1/2 x 1/2 x 1/2) and you have one eighth of the volume.

You might think that all of this does not really matter if you are changing the size of a model plan by a mere 25%, but scaling-up will more than double the volume and hence its weight. Scaling down will perhaps be more of a problem as the model can only support a shade under half its original weight. **Table 1** lists the effect of different conversion ratios on Volumes (i.e. weight) and Areas.

You might be wondering why 'area' is so important in our models? So consider a yacht being scaled down where the sideways force on the sails is being countered by suitable ballast weights? The force on the sails depends upon the sail area and if the new model is to be half the size of the original, we can expect the force to be a quarter of the original. However, the model's displacement will now only be an eighth of the original and thus greatly increasing the chances that it will get blown onto its beam ends when sailing. Yes, this an example full of simplifications, but it shows that reducing a model design in size is not as straightforward as at first you might think. Even scale models can suffer from the effect of side winds!

Weighty matters

It is not a bad idea to work out, if only approximately, the likely weight of your next project. As shown previously, it is a straightforward process to calculate the effects of changing size of your model if you are starting from a design of known weight, but what if it is an original design you plan to build? It may be possible to use other model's designs for guidance, but this requires them to have a similar hull shape and size and this is not going to happen for every new design you plan to build.

If it is to be an exact scale model, then you could use the displacement of the full-size vessel to calculate the model's weight using our knowledge of the effects of scaling model plans. In this case you take the full-size weight and multiply it by the CUBE of the scale you plan to use for your model.

Table One

Conversion Ratio	Area Change	Volume Change
0·5	-0.25	-0.125
0·6	-0.36	-0.216
0·7	-0.49	-0.343
0·8	-0.64	-0.512
0·9	-0.81	-0.729
1·0	0	0
1·1	+1.21	+1.331
1·2	+1.44	+1.728
1·3	+1.69	+2.197
1·4	+1.96	+2.744
1·5	+2.25	+3.375

For example: If the full-size vessel displaces (weighs) 4000 tons (or tonnes as there is not much difference) and you plan to build a model to 1/100 scale then:

The cube of 1/100 is 1/100 x 1/100 x 1/100 = 1/1000000 (i.e. one millionth!)

Multiply 4000 by one millionth (or divide by one million for the same result), this gives you 0.004 tons, which I agree is not a very convenient figure with which to build models. However, since one ton contains 2240 pounds, just multiply this value to your model weight in tons to get 8.96 pounds, or for those of you with a leaning towards the metric, 1 ton(ne) contains 1000kg so our model will be approx. 4 kilograms in weight.

One thing to watch out for when using the weight of a full-size vessel is that the appropriate value is used. A variety of tonnages can be quoted, but what you need is the one that matches the waterline at which you would like to float your model.

> *"One thing to watch out for when using the weight of a full-size vessel is that the appropriate value is used"*

Hull volume

All of the preceding is of little value if you are building a model that is semi-scale or freelance, or in other words, you have no real full-size vessel that matches your proposed model. True, you could try

BELOW: Warships such as this cruiser and destroyer always make for attractive models, but because they are usually long and narrow, building even smaller models than these can be a real challenge because their displacement can be so very low.

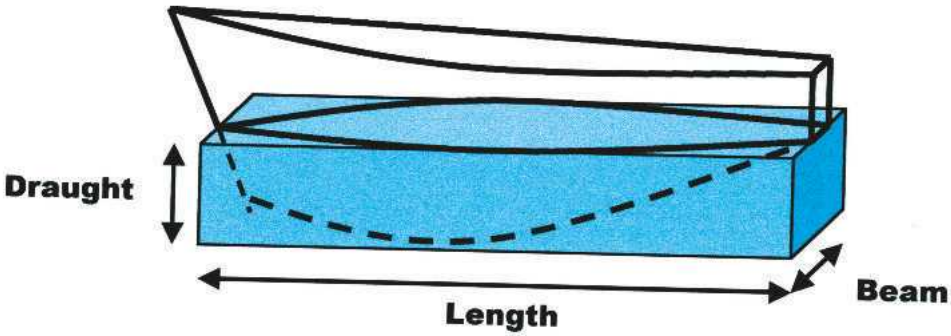


Figure 3

ABOVE: HMS Tanganyika is a HANDY Model weighing 10lbs and consuming 18W (MB April 2004)

to find something that closely resembles your idea, but this will not work if you have simplified the hull shape for easier building, and perhaps increased the draught and beam of the model, perhaps for better sailing qualities.

Luckily, we can still make a good estimate of a model's weight by using the fact that they float as soon as the hull has displaced a volume of water with the same weight as the model (Archimedes' famous principle). This of course simply requires you to measure the underwater volume of a model's hull and then multiply it by the density of the water. This would be easy if we made our model hulls with simple shapes, such as rectangular and then its volume would be length x breadth x depth! Alas, our hulls have to pay some attention to streamlining, or at least they ought to, which results in shapes that are anything but simple. There are ways to calculate the volumes of such a hull, by slicing it into numerous transverse cross-sections and working out the area of each section, multiplying it by the thickness of each section and finally adding them all together. This is quite accurate although tedious, but thankfully we have an easier way that will produce an approximate value that is usually good enough.

Block Coefficient

We can use the idea that a hull, full-size as well as model, only occupies a fraction of the block created by multiplying the length (strictly the waterline length) by its maximum beam and draught, **Figure 3.** Within reason, the shape of a vessel's hull is determined by its function; for example warships tend to have slim hulls whilst others such as tugs can be stouter in shape. Thus, many warships will tend to occupy a similar fraction of this block whilst the fraction for tugs will cluster around a different value.

This fraction is usually termed the Block Coefficient of the hull. I have seen values quoted for full-size vessels, so please see **Table 2**, and you could use these as follows:

Model Length x Beam x Draught x Block Coefficient x Density of Water = Weight

For example, consider a hull having a Block Coefficient of 0.5, a model length of 75cm, beam of 10cm and draught of 5cm, the density of water being a convenient 1g/cc (one gram per cubic centimetre)

75 x 10 x 5 x 0.5 x 1 = 1875g (or 1.875kg)

Or, for the diehard Imperialists amongst you, for the same Block Coefficient the length is 30 inches, beam 4 inches and draught 2 inches, the density of water now being a less convenient 0·58oz per cu. inch.

Table Two

Typical Block Coefficients

Destroyer	0.50
Cruiser	0.55
Battleship	0.63
Liner	0.64
Trawler	0.64
Tug	0.60
Tanker	0.80
Cargo Vessel	0.64 to 0.84
Motor Cruiser	0.55

30 x 4 x 2 x 0.5 x 0.58 = 69.6 ounces or 4.35 pounds

Approximate weight

My usual method of working out the likely weight of a new scale model is based on experience gained with previous models. Working backwards from the known operating weights of these models, it was found that if this weight (in ounces) was divided by the overall length x beam x draught of the model (in inches) the result came out around the fraction of 3/8 (or 0.375). So I tend to use the following:

Overall Length (inches) x Beam (inches) x Draught (inches) x 3/8 = Weight (ounces)

When I discovered this handy method, most of my models had been based on warships which had similar slim hull shapes. So, using it for more portly hulls does tend to underestimate the model's final weight, but this is probably safer than the opposite, which can lead you into trim and stability problems.

You might like to try this method, in which case you need to determine your own fraction. It will depend on the type of models you build and the units you use. It will never give you a precise answer, but at least it will get you in 'the right ballpark'.

Power and more power?

When building a scale model it is possible to take the power of the full-size vessel and attempt to scale it down to suit the model. This method can be full of pitfalls, and such results will always be suspect until tested. For this reason, most modellers use past experience and then err on the generous side. Their very sensible reasoning being that with a little too much power you can always 'throttle down' and save the excess for emergencies.

The actual relationship between a model's speed and the power available is not the simple 'double the power for twice the speed' that some people might imagine. By the way, that which follows, refers to displacement models and not the planing types which achieve their high speeds by using hydrodynamic lift rather than just pushing the water out of the way.

ABOVE: Balboa is a STEADY model weighing 6lbs and consuming 5W (MB November 1990)

It is a sad fact that if you want to double a model's speed then it will need approximately eight times the original power. This is our old friend, the Cube Law that we encountered when discussing the effects of scale, i.e. doubling the speed needs 2 x 2 x 2 = 8 times the power, which is shown in **Figure 3.**

In terms of a formula, the relationship can be written as:

P = kV cubed
Or in words; Power (P) =
Constant (k) x speed (V) x speed(V) x speed(V)

This constant depends upon the shape and size of the hull. Slim low resistance hulls will have a small constant, whereas bluff angular hulls result in larger constants. Likewise, smaller hulls have smaller constants.

> *"When building a scale model it is possible to take the power of the full-size vessel and attempt to scale it down to suit the model"*

LEFT: HMS Sheffield is a LIVELY Model weighing 10lbs and consuming 30W (MB June 1998)

ABOVE: Escondido is a HANDY model weighing 7lbs and consuming 9W (MB April 1997)

From experience with many models I have found that destroyer type hulls built in 1/144 scale with a length of around 30 inches (75cm), a good value for k is 0.10. Thus, if the model is required to sail with a top speed of four feet per second, then the power required is:

P = k V cubed, which equals 0.10 x 4 x 4 x 4 = 6.4 Watts

At this scale, larger warship models such as cruisers will have k values of 0.15 to 0.25 and battleships and aircraft carriers have k values of 0.35 and larger. It is worth pointing out that the value of k is affected by how well the components in the drive-line are set up and matched. Poor alignment, high friction and the wrong motor/propeller combination will all serve to increase the power needed at any model speed. Also, the numerical value of k depends upon the units of power and speed used. I started many years ago with Watts and feet per second, and do not feel like changing!

It is also interesting to see that increasing a model's speed will result in a disproportionate increase in the power demanded, but reducing the speed greatly lowers the power demand. For example, consider a modest speed change of 20%:

A 20% increase requires the power increasing by 1.2 cubed =1.73 or approaching double.

20% decrease requires the power decreasing by 0·8 cubed = 0·51 or almost half.

So, easing-off on the throttle stick can significantly increase the running time of a displacement model, which is something that might seem obvious, but running at 85% of full-power speed can markedly increase sailing times.

Handling

Exactly how a new model will respond to the transmitter controls is always something of an unknown! Luckily I have kept records of my models and after sorting though them it was clear that the power to weight ratio was the best indication of a model's sailing character. The results are shown in **Table 3** for these displacement models.

The STEADY models were exactly that, relaxing to sail and would never get into dangerous situations. The HANDY category had a little more sailing character, being more nimble, but never stressful. Those classed as LIVELY had a good combination of sailing qualities, being responsive but requiring more care for precise manoeuvres. Full attention was needed when sailing the EXCITING models, as coarse operation of the transmitter controls could get me into trouble!

For the few fast scale craft I've built, torpedo boats and the such like, a figure of around 20 Watts/pound (40 Watts/kg) would give the right sort of performance at 1/32 scale, but like most things, you need to establish your own values for comfortable power to weight ratios. What works for me with my models on the waters that I sail on and in the style that suits me, might be quite different for you.

Helpful numbers?

Hopefully, I have shown that performing a few calculations before embarking on your next project can place it very much in the 'doable' region of our hobby. That is to say, the size of the model will neither be too large to make launching and recovery an injury risking process, nor will it be too small to float when outfitted with your intended equipment. Likewise, the performance of the model will be about right. A little tweaking might be needed to get it perfect, but you ought to avoid having to replace the entire driveline to get what you want.

This approach is admittedly full of approximations and assumptions rather than an exact science. The alternative is to go down the route of a frustrated naval architect and try to create a perfect design on paper or a computer screen, but I suspect that few such perfect designs have ever survived unchanged after contact with the harsh real world!

Rather than spend a lot of time, effort and money (all of which are better employed in building models) whilst aiming for perfection, I'm happy to check that the new model is in the doable zone. This approach has not failed me yet, although I will confess that a few projects have caused some head-scratching when they have come a shade too close to the boundary between doable and impossible, but then life would be awfully boring without a few such challenges!

Table Three

Handling Characteristics	Watts/pound	Watts/kg
STEADY	< 1	< 2·2
HANDY	1 to 2	2·2 to 4·4
LIVELY	2 to 3	4·4 to 6·6
EXCITING	3 to 5	6·6 to 11

The Perfect Winter Projects!

billing boats

brought to you by myhobbystore.co.uk

As those dark nights start to creep in why not treat yourself to a **Billing Boats** kit to keep the blues at bay? We have a fantastic range available, from beginner to expert, to suit every budget.

Check out our full range today at www.myhobbystore.co.uk/BBNov14!

SAVE £10

1:35 HMS Renown (BB604)

A 50-foot steam pinnace from around the middle of the19th Century. These boats had a small forecastle, a room for the crew, a boiler room and a cabin. Please note this is a static model.

Size: 14cm (H) x 45cm (L) x 9.5cm (W)
Build Complexity: Beginner

Was £89.99 NOW £79.99

SAVE £10

1:50 Marie Jeanne (BB580)

Built as the19th Century was drawing close. This is a "dundee" of 50-60 tons and equipped with many sails, making necessary a ballast of 20-25 tons and a12-man crew. Please note this is a static model.

Size: 50cm (H) x 57cm (L) x 13cm (W)
Build Complexity: Advanced Beginner

Was £109.99 NOW £99.99

SAVE £20

1:45 Calypso (B560)

The Calypso was built in the USA in 1942 as a minesweeper. Bought in 1950 by Jacques-Yves Cousteau, after being modified become a fully equipped ocean research vessel. Model suitable for R/C.

Size: 33cm (H) x 94 cm(L) x 17cm (W)
Build Complexity: Expert

Was £429.99 NOW £409.99

TRIPLE REWARD POINTS this Christmas

Call: 0844 848 8822 (lines are open Mon – Fri 9am to 4:30pm)
Online: www.myhobbystore.co.uk/BBNov14

Please note prices do not include P&P. All prices are correct at the time of publishing. MyHobbystore reserves the right to change product prices.

1 *Photo 1. A favourite and easy starting point for many is a Krick Borkum like this nice example. A wide range of easy to obtain steam plants can be used to power it and, being a wide open hull, it is easy to operate and maintain as well as being a very satisfying model to build.*

A Guide to Steam in Model Boats

Richard Simpson *looks at the basic aspects of putting a steam plant into a model boat*

Over the years in this magazine we have looked at a number of different aspects of steam plants in model boats and how we can better understand them. However, these have tended to be in isolation, so we thought for this Special Edition that we would pull together a number of these articles and give a broad overview of what you should be considering right from the inception of your idea, them moving on to planning, building and finally where you might be able to get the bits and pieces for your steam powered model boat.

Photo 2. Another easy to build kit is the Krick Victoria, again giving an easy starting point for prospective steam modellers. This particularly well made example shows just what a lovely model can be produced from the kit.

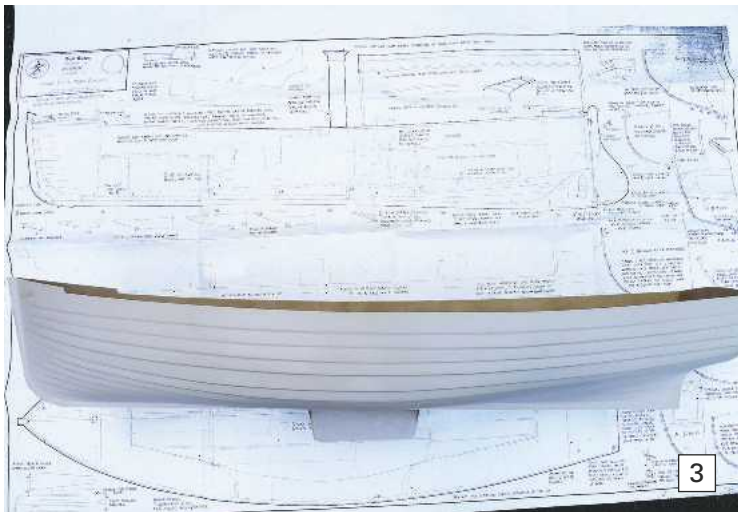
2

Where to start?

I always think it is best to start with the model you like, then look at how you can power it and what you want to include, which will almost certainly be determined by the amount of space in the hull. If I was just starting out in steam I would first of all be asking myself such questions as whether I wanted an open or closed hull and how much work I wanted to put into the model. Consequently, would I be more interested in a scratch build model project or a commercial kit and if the latter, would I want everything included or could I go for a hull and plans set? Once you have determined those few basic preferences you have a better idea of where to start, so let's then consider the possibilities one by one.

Open hull full kit

Probably the easiest way to start in steam is to buy one of these and I would highly recommend this option to anyone who is looking for their first steam powered model boat. These kits are well tried and tested, are relatively easy to assemble and operate, so you are giving yourself the best possible chance of success. If you enjoy your first model you may well go on to another, but if it is difficult to build and operate you may well give up! Good starter models include; Krick's Borkum, **Photo 1**; Victoria, **Photo 2**; or Anna and Alexandria. All are relatively easy to assemble with laser pre-cut parts and an ABS hull. They go together well and make for an easy platform in which to put a steam plant, which will then be relatively easy to access and operate. Accessory packs are available for them all, so a nicely detailed model can be put



together with very little headache and they are readily available in the UK via suppliers such as The Model Dockyard, Westbourne Models and Cornwall Model Boats, to name but a few. Check the retail advertisements in this magazine!

Open hull with plans

If you fancy a little bit more of a challenge in putting together the boat, then perhaps a readymade ABS or GRP (fibreglass) hull with a plan might be a better option. Kingston Mouldings do a large range of models that come supplied with beautifully made GRP hulls and plans enabling you to add that bit more individuality to the model, **Photo 3,** with some such as the Lady Margaret specifically designed for a steam plant. You also have a bit more variation when tailoring the interior and can choose the materials that you want to use to build the model, so this option is also very popular with those new to steam.

Another supplier of GRP hulls is Orion Mouldings who offer a couple of open hulls specifically designed for steam plants. You do not get plans with these, so you are on your own as regards designing and building the internals and finding fittings to suit, but you are starting with a well made and proven hull and the freedom to put what you want in it. An Internet search of GRP model boat hull manufacturers will turn up a few more for you to consider.

Closed hull full kit

There are many tempted by the bright lights of the complex and challenging closed hull model in which to put their steam plant and I class myself amongst them. Closed hull models bring a whole new set of challenges with them that only add complexity and difficulty, which may prove to be too much for the beginner. As a result of this, there are not many closed hull kits specifically designed to take a steam plant, however there are a number out there that do lend themselves to the idea so are best looked at first. The Model Slipway Envoy tug kit for instance does include a sketch layout of a steam plant at the end of the instructions, but it is only included as a suggestion, rather than a working drawing. You definitely need a big wide-beam hull to give you as much room as possible so you should be thinking along the lines of a coaster at around 1:35 scale or a large deep sea tug at around 1:48 scale. A number of the Mountfleet Models kits are suitable such as the Ben Ain; the steam tug Cruiser, **Photo 4,** and the Highlander Puffer. All come complete with all the wood, plans and white metal fittings needed to complete the model. A disadvantage of this option is that the cost is invariably the highest as everything is provided for you, but you should not need to add much more apart from the steam plant and radio gear. You may well find yourself modifying the kit though to get easy access to the steam plant, so it can sometimes feel that you may have been better off not being quite so ambitious.

Other models suitable for steam plants could be any one of the Mobile Marine Models steam tug kits, **Photo 5,** which have the advantage of being available on a budget system whereby you can purchase parts of the kit as you go along and so spread the cost outlay. These models provide a roomy interior suitable for steam and all come with a GRP hull.

Closed hull with plans

This is a cheaper option than a full kit, but you are on your own as regards the design, so it isn't an option for the faint-hearted. Kingston Mouldings produce a couple of suitable hulls such as the HS Class Tug and the Clyde Puffer Inchcolm, so you start with a very nicely made GRP hull and a good set of working plans to build your model, but you then have to work out the best internal layout yourself, so you do need to have a good idea of what you are doing. A number of the Orion

Photo 3. An alternative to the kit is the hull and plans set such as the River Queen hull from Kingston Mouldings, designed to compliment the Vic Smeed plan supplied with it. The plan is comprehensive and even shows the location of the steam plant, so the thinking has been done for you.

Photo 4. A good example of an enclosed model full kit is this Mountfleet Models Cruiser tug. A wide deep hull gives plenty of space to play with, and scope to fit the steam plant of your choice.

Photo 5. Making the most of the flexibility that a budget building plan gives you, this model believe it or not started out as a Mobile Marine Models Lady Wooes tug. This is an electric example, but would be an ideal candidate for steam propulsion.

Photo 6. A 100% scratch build project is not to be undertaken lightly, but it does give you the ultimate control over the model. This stunning example shows what can be achieved, however significant amounts of time and resources will be required to get a steam powered model of this size fully operational.

Photo 7. A comparatively slender hull of a launch will require a bit more speed and so a smaller propeller with a reduced pitch and probably only three blades operating at a faster speed will be more appropriate. This propeller is 60mm diameter.

Photo 8. At the other end of the scale, a similarly sized steam coaster with its high block coefficient, deep draft and bluff bow will need more torque than speed. This coaster performs well with a four-bladed, 80mm diameter propeller. You can see clearly that the pitch is considerably greater and this propeller will be required to turn noticeably slower.

Mouldings hulls could also be used such as the Harbour Steam Tug and the Steam Barge, but as with the open launches there are no plans, so you are on your own as regards design.

Closed hull - scratch build project

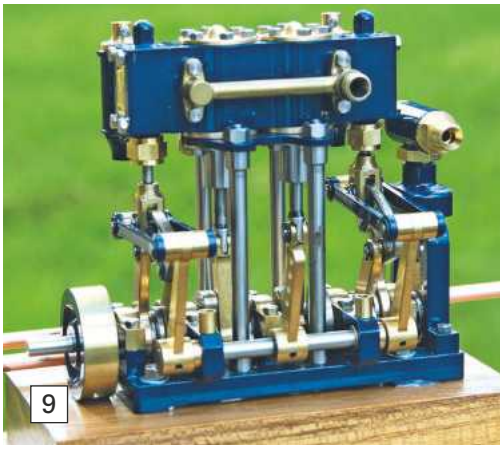
For those of you really brave, there are always the full-on scratch build models. Obviously the world is your oyster, but you are really on your own here and models such as this should really be only taken on by those with good experience of steam plants and the requirements of such a propulsion system. The obvious attraction is that you can build any degree of stunning model such as this amazing trawler, **Photo 6,** but I think for now we should set our sights on something that has been designed for us, so we know it will go together and work.

Matching the boiler and engine to the model

This is one of those areas of putting together a steam plant that seems to generate a significant degree of confusion, mainly because there is no fixed answer. There are so many variables involved and with such a choice, all we can do is look at some basic guidelines to help us make our decision and then, based on input from experience generated by other modellers, come to what we hope is an informed conclusion. We are looking at a significant outlay for the steam plant, so the last thing we want to do is get it wrong and have a very expensive white elephant on our hands, so where do we start?

I have seen modellers buy a boiler and engine, then start to look for a hull to put it in. I'm not saying this is wrong, but to me it is working backwards and it is far more difficult to work this way and you are far more likely to end up with layout and stability problems. I would definitely start with the model that you want to make, be it a kit, a plank-on-frame craft from a plan, enclosed model, open launch or whatever. Make your decision as to what you want to build and then we have a starting point as that choice dictates everything else we need to do.

Once we have a hull identified, in shape and size, the next thing we want to do is identify a propeller(s) for it and here you will be influenced by the proposed model and why? Well the type of propeller will also determine the most suitable steam engine. A Windermere type launch will have fine lines and the propeller could well be turning that bit faster, so a finer pitch and smaller size would probably be more suitable, **Photo 7.** A large coaster that takes a bit of pushing through the water will probably need a slower turning higher torque propeller, so a larger diameter and a bigger pitch would be more suitable, **Photo 8.** Advice from the propeller manufacturers is invaluable as well as experience from other modellers to help you choose your propeller, as well as possibly the plans



or kit manufacturer you are dealing with. At one end of the range you could be looking at a four bladed propeller of sixty millimetres in diameter, with a coarse pitch for a blunt ended four foot long deep draft coaster and at the other end of the range, possibly a twenty five millimetre three-bladed propeller with a fine pitch for a three foot long Windermere launch. These are just guidelines, but are based on experience of these types of models.

Now we have a propeller and a hull we can take this to the next stage and look at what type of engine we would want to drive such a model. The big, coarse pitched propeller will need to be driven that bit slower to avoid cavitation, so a higher torque, slower revving engine would be the direction to go. Assuming we want complete control, we would be looking at a twin cylinder, double acting engine possibly of an in-line configuration and probably slide valve or piston valve type, **Photo 9.** This type of engine can run very slowly, is very controllable, has a high torque and is quite economical on steam. A good example of such an engine would be the Anton Crystal, but for the Windermere launch you may prefer an oscillator as these tend to be higher revving and are much more compact for the finer hull of the launch and again, twin cylinder to give us complete control and it could be of either a vee or in-line layout. A good example of such an engine would be a Hemmens Richmond, **Photo 10.**

Now having an idea of the engine we want, we can now look at what boiler we need to power the engine. It is no good having a boiler that is too small and needs continuous filling and very quickly loses steam, as much as it is no good having one with a nice large capacity that won't fit in the hull. **Photo 11** is of a small boiler that will run without refilling for around 30 minutes and **Photo 12** is of a large bulky boiler that will only fit in the largest of models. The boiler manufacturer should be able to give you a good idea of the boiler you need to power the engine you have chosen. This may well be the same manufacturer as the engine, in which case it can almost certainly be purchased as a package, or it may be from a dedicated boiler manufacturer such as Maccsteam or Cheddar Valley Steam who will understand what is needed. You will still have to decide as to whether you want a vertical or a horizontal boiler and how you want to feed and heat it, but you should at least now have a good idea of what you need.

After all this, you might now be faced with the fact that the steam plant you need to run the model you desire, will simply will not fit in it, or will not fit with the auxiliary gear you want to install, so you may well have to start all over again! You might also find that when you start to look at the other considerations such as ergonomics, ventilation and stability, that again you have to go back to the drawing board.

Photo 9. A twin cylinder slide valve engine will operate the larger coarse pitch propeller better as they generally have much better torque characteristics than an oscillator and are more efficient in their use of steam. They usually perform better at lower revolutions as well, making them perfect for heavy full-hull models.

Photo 10. Better suited to the smaller propeller is a twin cylinder oscillator. Typically these engines operate at higher revolutions with a high power to weight ratio, and are small and compact so well suited to a small launch. They don't have the torque of a valve controlled engine though.

Photo 11. A much smaller alternative is this vertical boiler from Maccsteam Ltd. It supplies the requirements of the small home-built oscillator sufficiently to allow it to propel the small launch around the pond for a good 30 minutes.

Photo 12. A heavy steam consuming plant such as this twin oscillating engine, will need a lot of steam and reserve capacity. This large Cheddar boiler is needed to keep these two engines reliably supplied with steam, but it is easy to see that the boiler, engines and all the auxiliaries are going to be very heavy, thus requiring a large hull to accommodate them all.

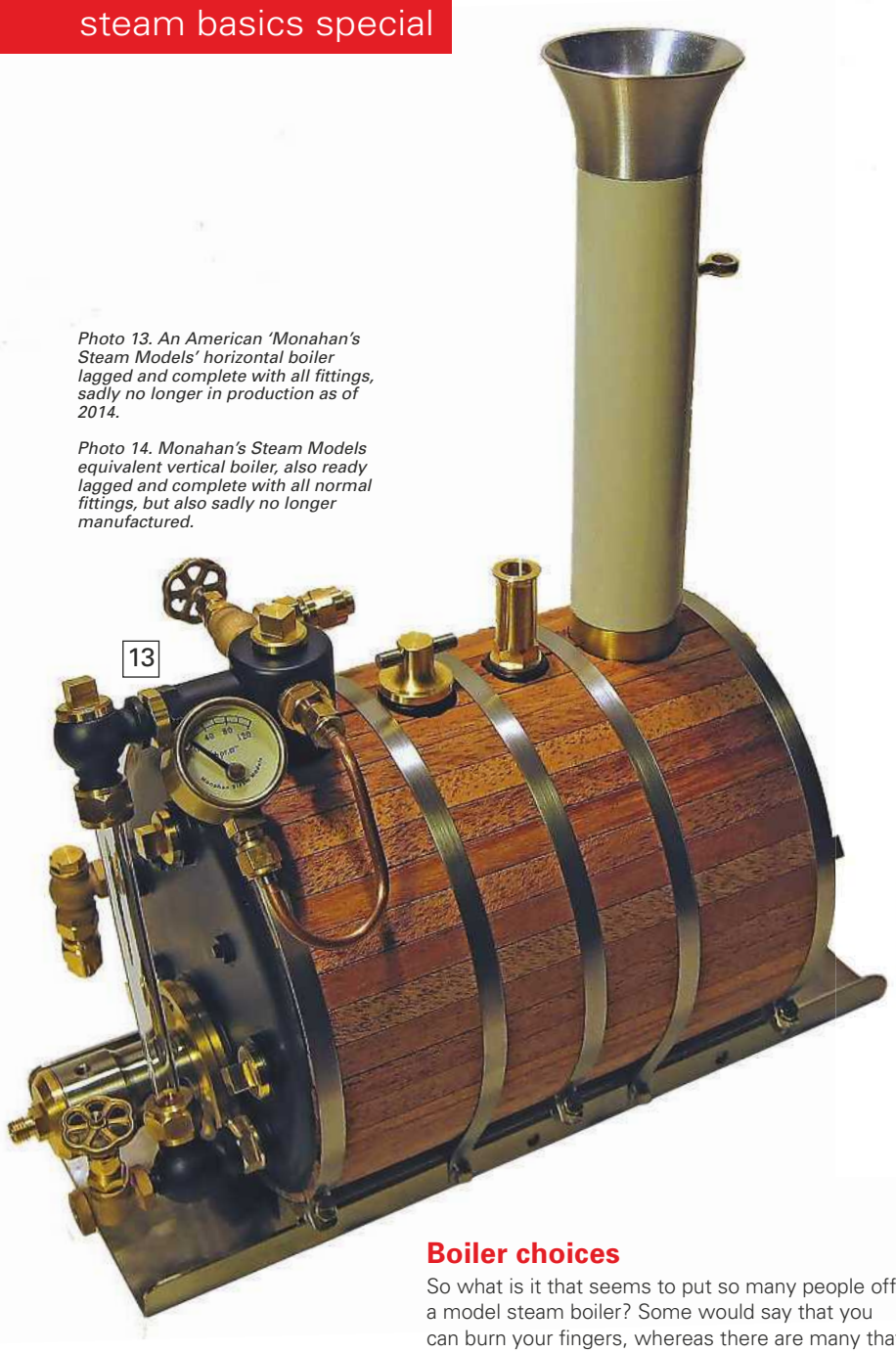


Photo 13. An American 'Monahan's Steam Models' horizontal boiler lagged and complete with all fittings, sadly no longer in production as of 2014.

Photo 14. Monahan's Steam Models equivalent vertical boiler, also ready lagged and complete with all normal fittings, but also sadly no longer manufactured.

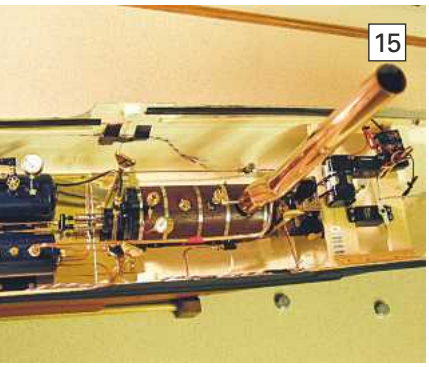
Boiler choices

So what is it that seems to put so many people off a model steam boiler? Some would say that you can burn your fingers, whereas there are many that would attest to a similar experience with batteries(!) and some would even suggest that they could blow up, although the number of burnt-out model boats over the years would indicate that electrical propulsion could be just as hazardous! A well looked after boiler is no more of a risk than a battery and, as with the latter, a bit of knowledge, thought and plain common sense will help to ensure that your steam plant remains safe and reliable for a very long time.

Vertical or horizontal?

Most modellers looking for a boiler to provide power for their model steam engine are going to eventually come back to the one basic question, namely do you want a horizontal, **Photo 13,** or a vertical, **Photo 14,** boiler? Most UK manufacturers make boilers of similar capacities in both configurations, allowing us to choose the best for the model. One of the prime considerations will be which type will fit the available space and with most enclosed models there will almost certainly be one that fits better. I used to assume that the vertical boiler's centre of gravity was considerably higher than the horizontal equivalent, but in actual fact there is not a lot of difference, but it is slightly higher though, so if stability is an issue it may be something to think about. One of the major advantages of the vertical boiler is the fact that it will be fired from a ceramic burner, and the wide efficient flame produced can be directed straight up through the centre of the water space ensuring the best possible heat transfer to the water. Horizontal boilers can have a ceramic burner as well, or could be fired by 'poker' burners, but either way, the furnace is at the base of the water void and is not in as good a contact with it. However, horizontal boilers do tend to fit in most enclosed hulls that bit easier and the slightly lower thermal efficiency may be a price that has to be paid. They also have slightly more flexibility as regards the position of the flue, which could be at either end on top of the boiler, or indeed exiting at the end of it, enabling more possibilities for aligning it with the model's funnel casing, **Photo 15.** Capacities of either boiler will be almost the same for each configuration of similar dimensions, but the greater heat transfer of the vertical boiler may provide that bit more steam for a more demanding engine and consequently will require filling perhaps more frequently. Open launch models generally do not put the same restraints on the boiler and so more of these tend to be fitted with vertical boilers, which also release more space in the hull for auxiliary equipment and model fittings.

Photo 15. A horizontal boiler gives you more options with flue location, but even then you may have to modify the supplied item, as this one has been, to align the flue with the model's funnel casing.




16


18


17


19

Photo 16. A Hemmens vertical boiler supplied with fittings, but without the lagging, so allowing the modeller to add a degree of personalisation and individuality.

Photo 17. The boiler fittings are clearly visible on the same Hemmens boiler (Photo 16), including steam stop valve, safety valve, filling port and gauge glass. This boiler is also fitted with a vacuum release valve.

Photo 18. A twin poker burner unit removed from the boiler. The brass items fitted to the end of the poker are the burner nozzles.

Photo 19. A typical ceramic burner of a type used in a vertical boiler. Generally ceramic burners give out more heat than poker burners, but nozzles and the quantity of air supplied must also be matched.

More considerations?

You can choose how little or how much you want yourself to put into the steam plant. At one end of the scale there are manufacturers who provide plans and a set of materials to enable you to build the boiler from scratch. Obviously a proficiency in Silver Solder techniques would be essential for this as well as a working knowledge of boiler making processes so is probably best avoided for the first time steam modeller. At the other end of the scale is the complete boiler with all the fittings, ready to fill with water and be fired-up. In the middle there are ready built shells that you will need to fit out yourself, such as completed boilers that require lagging, **Photo 16,** and many other degrees of completion to suit tastes and pockets. A first time steam modeller should consider buying the boiler and engine as a package, which will ensure compatibility and adequate steam production for the engine's requirements, but this usually increases the initial cost.

Also, consider the ability of the boiler to 'steam' the model for a reasonable length of time. Most marine steam manufacturers state a hull length and displacement and a propeller size that the engine can comfortably propel, but generally you are looking for the biggest boiler that you can reasonably fit into the model, ballast considerations not withstanding! If the maximum size of boiler you can get into the hull will still struggle to keep up with the steam engine, then perhaps your model would be better propelled by an electric system?

Boiler fittings

The items attached to the boiler are generally known by the manufacturers as fittings, although in the real world they are known as boiler mountings, and not surprisingly they are comparable to the real world items. **Photo 17** is a close-up of the fittings seen on the bare boiler seen in the previous picture. If you buy a complete boiler it will have the fittings included or if you buy a bare manufactured (and tested) boiler, it will be kitted out with threaded bushes to allow its fixed external components to be added. The following fittings must always be included on a completed boiler and you must never use a boiler, even for testing, without them installed and working 100% properly.

Burners

Pretty obvious, but these do come in various types and sizes and care must be taken to ensure that you have the appropriate one for the boiler. The two basic types are poker burners, **Photo 18,** and ceramic burners, **Photo 19,** but you may come across something out of the ordinary, especially on an old boiler. The burner is designed to mix the fuel (gas), with the correct proportion of air to ensure efficient and complete combustion. In the supply arrangement to the burner there will be a nozzle,

> *"You can choose how little or how much you want yourself to put into the steam plant"*

Photo 20. Two typical boiler safety valves. The Cheddar type at the top requires removal for adjustment, but the more modern unit at the bottom can be adjusted externally.

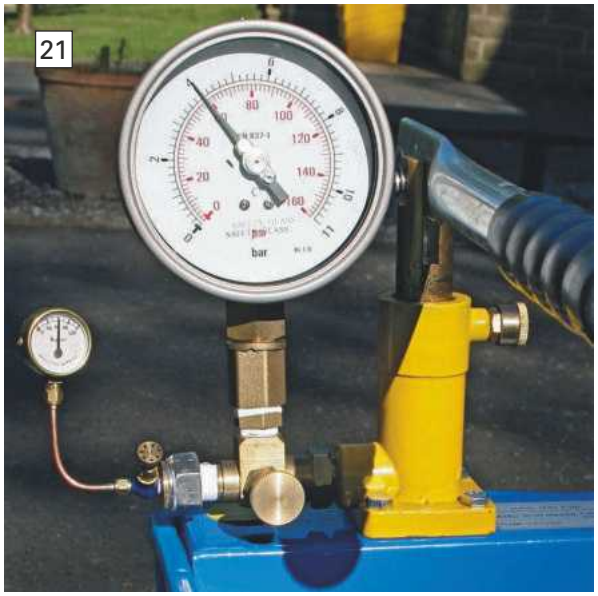
Photo 21. A boiler pressure gauge undergoing a calibration check against a certificated and calibrated standard gauge. The quality of model gauges can vary, so they should be checked annually as part of the steam test.

Photo 22. This main steam stop valve on top of a Caton boiler is mounted on a brass bush on the boiler shell. This valve can be connected to a servo and used to control the steam supply to the engine from zero to full in a ninety degree arc of movement.

which carefully meters the gas supply to the burner and gives the gas sufficient time to mix with the available air coming in through ports. The nozzle size can be changed, but you must be aware that too much gas can cause poor combustion and an unreliable flame, and too little, which may cause too hot a flame and damage to the boiler. The safest path with nozzle selection is to consult the boiler manufacturer and do not change it without checking that your intention is compatible with the boiler configuration.

Safety valve

This must always be in good condition and operational, **Photo 20.** All safety valves should be tested by the manufacturer and supplied with a stated 'lift' pressure. These valves are adjustable to give you the lift pressure that you want, but this must only be done after consultation with the manufacturer or a recognised professional.



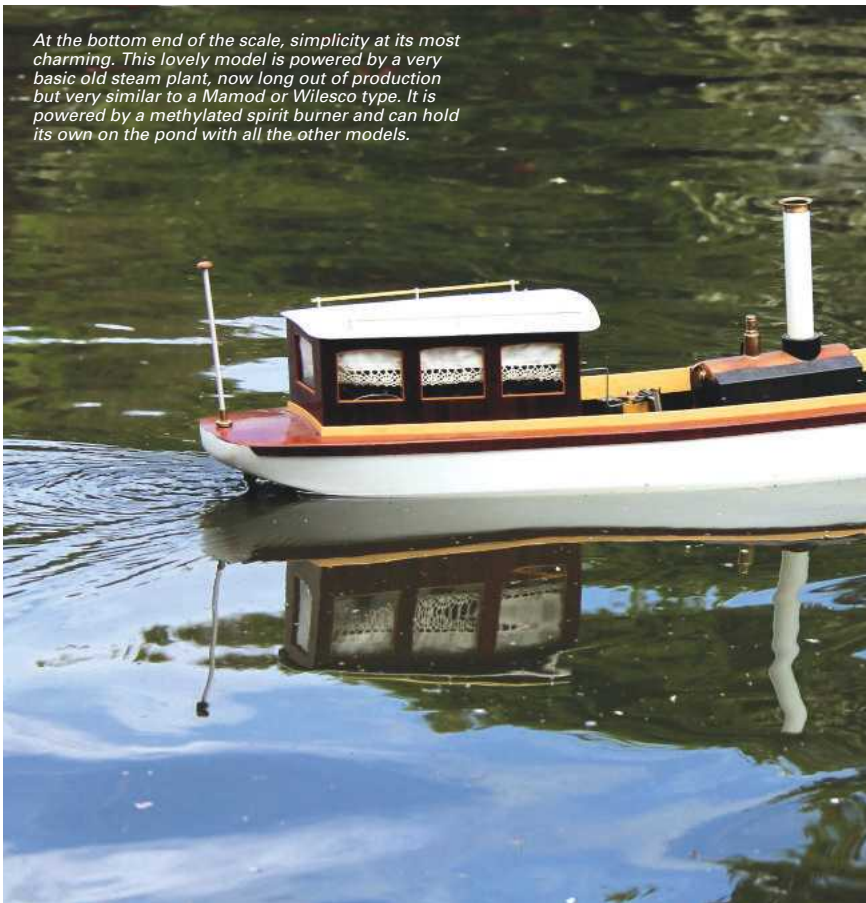
If you adjust the valve fully down, you will do what is known as 'gagging the valve' and it will not lift, thereby exposing you to possible boiler failure. Just a note here that boiling water converts to steam in a volumetric ratio of approximately 1:1600. The water under pressure in the boiler is only water because it is under pressure, so if you suddenly release that, the water instantly flashes-off into steam and takes up 1600 times the volume. This is why when a boiler ruptures, it can be likened to the shorting out of a large battery, as the energy released is of a similar magnitude.

Pressure gauge

This is your best indication of what is going on in the boiler and it is not fitted to make the model look more like a real boiler! It should be clearly visible and you should pay attention to what it is telling you as the steam plant operates, **Photo 21.** If the pressure is slowly dropping, then the boiler is not keeping up with the engine demands and eventually it will stop. If the pressure is slowly rising and it goes above the pressure your safety valve is set, you should be concerned that the valve hasn't lifted and immediately shut down the burner.

Main steam stop valve

Some manufacturers fit this directly to a threaded boss in the boiler shell, **Photo 22,** and some fit it remotely in-line with the supply pipe to the engine. I prefer that it is mounted on the boiler shell and you are not exposing yourself to the possibility of the copper pipe to the valve failing and hence do nothing to prevent the loss of the entire boiler contents. If you ever become aware that this valve is 'passing' do not hesitate to overhaul it or change it for a new one. Leaking steam from any fitting should be avoided, but if this valve leaks then the engine line will always be pressurised even when the stop valve is closed, and removing any part of the engine could result in the escape of some steam.



At the bottom end of the scale, simplicity at its most charming. This lovely model is powered by a very basic old steam plant, now long out of production but very similar to a Mamod or Wilesco type. It is powered by a methylated spirit burner and can hold its own on the pond with all the other models.

Gauge glass

This to me is one of the most sensitive areas of the model steam boiler and when compared to the armoured glass within a reinforced housing that is fitted to low pressure full-size auxiliary boilers, I sometimes wonder if it is adequate. Suffice to say it tells you the level of water in the boiler and, as such, is a vital piece of information to help you run the boiler safely, **Photo 23.** You should always aim to run the boiler with at least a quarter to a third of its full capacity, but also not fill it above two thirds to three quarters either. It is worthwhile experimenting with this to find out exactly where these levels are and mark the gauge glass accordingly with a neat painted line. If you let the water level get too low, the heat is not being removed from the burner effectively enough and the furnace area can overheat, perhaps leading to an eventual rupture. If you let the water level get too high, the steam space is greatly reduced and so the pressure can rise and fall very quickly, causing a significant over-pressure should the safety valve not release the pressure quickly enough. The extreme case where the boiler is completely full of water, is said to be 'hydraulically locked' and it will definitely rupture if the burner is turned on as there is nowhere for the steam to go. The gauge glass is made of glass (no surprise there!) so treat it with the care it deserves as we do not want it to break.

Engine choices

It is the engine of a steam plant that really gives us the degree of fascination and attraction that an electric power plant can never hope to match. It is so difficult to define just what the attraction is, but a major feature has to be the fact that you can see it all moving as well as knowing that you have a perfect miniature reciprocating engine, including pistons, crankshafts and connecting rods all spinning around in your model. Once again, you have to define for yourself what you need the engine to do as regards the involvement at the pond side, such as reliability, ease of maintenance and above all, what hull is being propelled.

Engine configurations

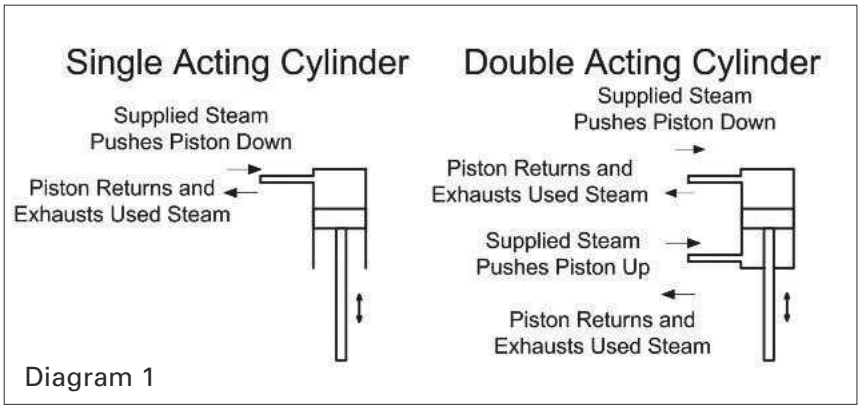
To help you decide what you want to fit to your boat you first of all need to know a bit about the limitations of each type of engine available and hence what they can and cannot do, so have a look at **Diagram One** to help understand the difference between a single acting and a double acting cylinder engine.

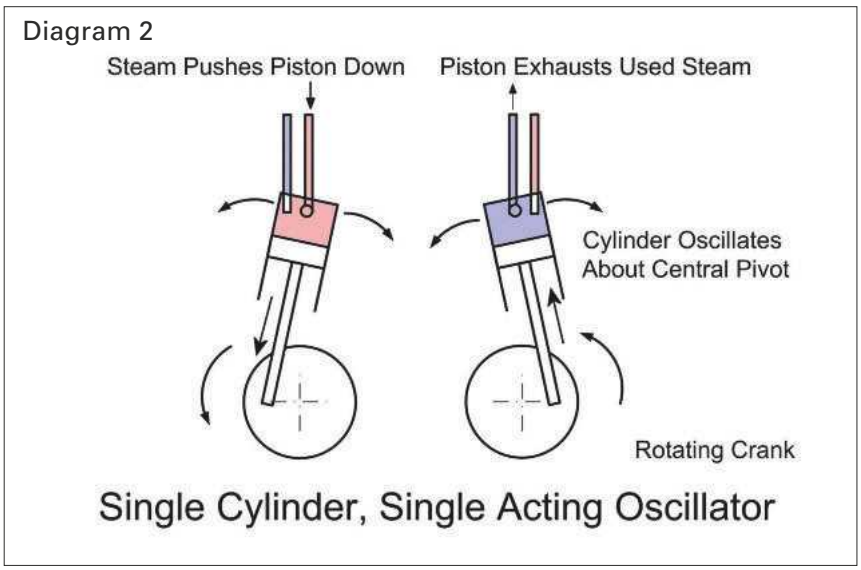
The simplest configuration has to be the single cylinder, single acting oscillator as in **Diagram Two.** This engine has a cylinder that oscillates from side to side, which in turn opens and closes the supply and exhaust ports drilled into the cylinder and matching up with similar ports in the main frame. The piston and rod is solid, hence there is only a bearing at the crank throw, so the rotation of the crank moves the cylinder from side to side and it is this operation that makes the engine an oscillator type. The single acting part of the definition refers to the fact that steam is admitted only to the top of the piston. The bottom of the piston is open to the atmosphere and there is only one power stroke per revolution, relying on the flywheel to rotate the engine through the exhaust stroke. This type of

Photo 23: A common gauge glass on a Hemmens Ribbersdale boiler. Attaching the mountings to the circumference of the shell gives an excellent picture over a wide range of exactly what is in the boiler, but it does make the glass long and susceptible to breakage.

Diagram One. The basic difference between a single acting cylinder and a double acting cylinder. The single acting operates on one side of the piston only, whereas the double acting cylinder uses both sides of the piston.

Diagram Two. Operation of an oscillating engine. The engine is simple, robust and cheap to produce with a high power to weight ratio, but due to its symmetrical operation, is not efficient with steam use.





HOWES MODELS

01865 848000

Unit 2C & 2D Cherwell Business Centre

(Part of Station Field Industrial Estate)

Rowles Way, Kidlington, OX5 1LA

www.howesmodels.co.uk

Fast mail order - Overseas postage at cost

TAMCO

Tamco 2 Channel 2.4GHz Combo
Special Price!
(Includes Transmitter & Receiver)
Digital Trims!
RRP £39.99
Our Price Only £34.99!

Cirrus

3 Channel 40MHz FM Combo
Includes Transmitter, Receiver and Crystals.
Futaba Compatible
Only £19.99!

SPECIAL OFFER
Tornado 50Amp Forward & Reverse Waterproof Electronic Speed Controller. 6-12 volts fitted with tamiya plug bullet connectors and switch
Only £29.99

Receivers

FM - AM - 2.4Ghz

SPEKTRUM RECEIVERS IN STOCK
AR400 4 Ch 2.4GHz £25.00
AR6210 6 Ch 2.4Ghz £54.99
MR200 2Ch 2.4Ghz £35.99
MR3000 3Ch 2.4Ghz £51.50
AR600 6CH 2.4GHZ £38.99
Planet Micro 4CH Receiver £14.99
Planet R7Ms 7CH 2.4GHz £16.99
Planet R7Ms 7CH Hard Case £17.99
Planet 6CH Receiver £14.99
Radio Link 6CH Receiver £15.00
Futaba R200 4CH 2.4Ghz RX £39.99
Futaba 617FS 7Ch 2.4Ghz RX £63.99
Futaba 2 Ch Am 27mhz £21.99
Futaba 2ch Am 40mhz £21.99
Hitec 2 Ch Am 27/40mhz £14.99
Acoms 2ch Am 27mhz £12.99
Acoms GR-24 2 Ch 2.4GHz £27.00
FUTABA 6CH FM 40MHZ £43.99
TAMCO 6CH 2.4Ghz RX £15.99
Saturn 6CH 2.4GHz RX £19.50
QSF 27MHz AM 2 Channel RX £8.50

Special!
400 size
Brushed motor
6v-9.6v
Only £3.99

Transmitters

2 CH TRANSMITTERS AM
Futaba & Acoms
27 OR 40 MHZ
From £15.00
ALL ABOVE REQUIRE NICADS

New In! Tornado 3300mAh 7.2v Racing Pack, High Quality!
Only £13.00

New In!
2 Turn & 4 Turn Winch Drum Servos
Torque: 6KG
Size: 40.5x20.2x38mm
Special Price Only
£10.95 Each!

FULL RANGE
Tamco 2.4Ghz 6 Channel Combo
Superb Quality
Only £45.00
Transmitter & Receiver
Additional RX £15.99

FUTABA 2 CH AM 27 OR 40 MHZ
SET INCLUDES
TRANSMITTER –RECEIVER,
2 SERVOS, CRYSTALS & B/BOX
ALL FOR ONLY £42.99

Futaba 4YF 2.4Ghz Combo
Includes transmitter, receiver & switch harness
Excellent Quality
Only £86.99

Radio Link T4U
4 Channel *2.4Ghz*
Radio Complete With
6Ch 2.4Ghz Receiver.
Additional RX £15.00
Now Only £29.99!

PLANET T5 2.4GHZ COMBO SET
SET INCLUDES
TRANSMITTER & RECEIVER
VERY EASY TO USE
5 CHANNEL RADIO
OUR PRICE £45.50

Special Offer
Radio link T7
2.4ghz 7 channel
Tx/Rx combo, 7 model memory Digital trims
Only £59.99

Saturn **2.4GHz Systems**

Saturns Full Range 2.4GHz Combos

X4 4 Channel £38.99
X5 5 Channel £44.50
X6 6 Channel £53.99

Planet T7
Brand new 7 Channel Planet 2.4Ghz Combo set
Only £69.99

Futaba 6J Combo Set
Ideal step up from a 4 channel system.
15 Model memory, Digital trims.
Futaba Quality at only
£135.00!

Mini/Midi 1250MG Metal Geared Servo
Torque 6V : 3.5KG Speed 6V 0.12
Length 31mm x Width 16mm x Height 35mm
NEW IN! Only £6.50!

NEW STOCK OF POWER PACKS!

7.2 VOLT PACKS
1800MAH *ONLY* £7.99
2000MAH *ONLY* £10.50
3000MAH *ONLY* £13.50
3300MAH *ONLY* £13.00
3800MAH *ONLY* £14.99
4000MAH *ONLY* £19.99
5000MAH *ONLY* £24.99

8.4 VOLT PACKS
3000MAH *ONLY* £15.00
3600MAH *ONLY* £16.99
5100MAH *ONLY* £24.99

Lead Acid Cells

6 VOLT 1.0 AMP - £4.99
6 VOLT 1.3AMP - £4.99
6 VOLT 3.4 AMP - £5.99
6 VOLT 4.5 AMP - £5.50
6 VOLT 7 AMP - £7.45
6 VOLT 10 AMP - £9.99
6 VOLT 12 AMP - £12.50
12 VOLT 2.1 AMP - £6.99
12 VOLT 3.4 AMP - £11.50
12 VOLT 4.5 AMP - £12.99
12 VOLT 7 AMP - £9.99
12 VOLT 8.5AMP - £15.99
6V JELLY CHAGER - £8.99
12V JELLY CHARGER - £8.99
2-6-12V JELLY CHARGER - £14.99

Speed Controllers

MTRONIKS WATERPROOF
10 AMP 4.8-12v ONLY £19.99
15 AMP 6-12 V ONLY £19.99
20 AMP 6-12 V ONLY £24.99
25 AMP 6-12 V ONLY £28.99
40 AMP 6-12 V ONLY £48.99
RV11 4.8-9.6V RRP £57.99
OUR PRICE ONLY £24.99!!
FUSION AQUAPOWER 280AMP Only £39.99
MTRONIKS G2 HYDRA 30AMP BRUSHLESS £54.99

Chargers

Mains Chargers

Vector NX85 – 4-8 Cells ni-cad/ni-mh, Variable charge rate, 0.5-5amps. Mains operated, Peak detection. £24.99

5ive NX82 - 6-8 Cells ni-cad/ni-mh, Dual 5amp output charger. Peak detection on both outputs. £24.99

Ethos LX41B Pro - Charge rate 0.4-4amps 1-12cells ni-cad/ni-mh Li-Ion/Li-Po 1-4, cells lead acid 1-12volts integrated balancing port mains or 12v operation. £49.99

VECTOR **NX85**

Mains & 12v Charger
- 4-8 cell 4.8v-9.6v
- NiMh & NiCad
- Will charge 3000mAh pack in approx 40 minutes at 5 Amps

Our Best Seller
Only **£24.99!**

Howes Super Deal!

Acoms 27MHz 2 Channel Combo

acoms

Combo includes
1 x 2 CH Transmitter
1 x Receiver
2 x Standard Servos
1 x Pair of Crystals
1 x Battery Box and Switch
RRP £49.99
Our Price Only £29.99!

Howes Special Offer Servos.

Micro Servo: Torque 1.7Kg Speed 0.14 Size 29x12x30mm Only £3.50
Mini Servo: Torque 2.7Kg Speed 0.14 Weight 16g Size 29x12x30mm Only £4.00
High Power Ball Raced Servo: Torque 6.5kg Speed 0.16 Weight 43g Size 40x20x40mm £7.99

Joysway

SEA RIDER & WARRIOR RTR with 2.4GHz Radio, Battery pack & Charger
Length 420mm
High Quality Models
Our Price Only £59.99 Each

Joysway

SERVOS

SATURN 3KG STANDARD - £4.99
AAS-700STD WATERPROOF STD - £6.99
FUTABA 3003 STANDARD - £9.50
ACOMS AS17 STANDARD - £5.50
FUTABA 3010 6.5 TORQUE - £23.99
FUT 3014 WATERPROOF - £24.99
HITEC 325 BALLRACE - £11.50
FUTABA 3004 BALLRACE - £11.75
BUY 4 x 3004 FOR ONLY £46.00
SD 200 MINI - £14.30
ZEBRA/HITEC 135 Feather £5.25
ZEBRA/HITEC 135 Mg Feather £9.25
POWER HD 9g Micro £3.50
OR 4 For £13.50
MINI SERVO ONLY £4.00 (4 for £15.00)
STANDARD BALLRACED £6.50
HIGH POWERED BALLRACED £6.99

SAIL ARM, WINCH & SPECIALIST SERVOS

HITEC 785 HB SAIL WINCH WITH FULL ROTATION DRUM
OUR SPECIAL PRICE £25.00
HITEC 765BB SAIL ARM WITH 12 CM LONG ARM
OUR SPECIAL PRICE £25.00
FUTABA S3802 SAIL ARM WITH 12CM LONG ARM £56.25
HITEC HS 805BB SAIL ARM HUGE WITH 20KG TRQ £29.99

Hi Torque Servo
17kg Torque, Metal Gears
Standard Size
Fits All Brands
Was £29.99
Only £12.00!

HOWES MODELS

LARGER STOCK-LOWER PRICES

Open Mon-Fri 09.00-17.00 / Sat 09.00-16.00

New Website Available Now!

www.howesmodels.co.uk

You will benefit from special offers and clearance lines first.
Also Emails of brand new items will be sent to you fast.
You do not need to order on-line to benefit from the offers. Just register!
Registration takes only a couple of minutes!

AQUACRAFT Models

Rescue 17

RC Fireboat with working water pump & 10 Piece LED Lighting system.
Includes 2.4GHz radio
High Quality Model
Length: 965mm
Beam: 261mm
Height: 432mm

Only £329.99

Requires Battery & Charger

AAS-700STD

Waterproof Standard Size Ball Bearing Servo

Only £6.99!

Torque: 3.6KG/CM @ 4.8v
4.7KG/CM @ 6v
Speed: 0.14 sec /60° @ 4.8v
0.12 sec / 60° @ 6v
Dimensions: 41 x 20 x 36mm

Back In Stock!
Westwood 18

Model comes ready to sail and includes Spektrum 2.4GHz radio. Superb quality. Length 460mm Height 775mm

Howes Special Price Only £125.00

PRO BOAT

Joysway Dragon Force RTR RG65 Yacht 2.4GHz

Specification
Hull Material Plastic Moulded
Mast Height 915mm
Sail Area (Overall): 22.26 dm2
Length: 655mm
Height: 1338mm
Includes 2.4GHz Radio

Only £139.99!

Available without TX-RX
Only £119.99

New Range Of Li-Po Batteries!

7.4v 1000mAh £10.99
7.4v 1300mAh £12.99
7.4v 1600mAh £15.99
7.4v 2200mAh £15.99
7.4v 3900mAh £31.99
11.1v 1000mAh £15.99
11.1v 1350mAh £16.99
11.1v 1600mAh £21.00
11.1v 2200mAh £17.99
11.1v 3900mAh £44.00

OVERLANDER BATTERIES

Receiver & Transmitter Battery Packs

4.8 VOLT PACKS
1300MAH FLAT OR SQUARE - £6.99
1200MAH FLAT £5.00
2700MAH Flat or Square £8.99
6 VOLT PACKS
1300MAH FLAT or TRI - £8.99
2700MAH Flat or Tri Only £11.75
TRANSMITTER PACKS.
9.6 VOLTS
1300 MAH FLAT - £15.00
2700MAH Flat or Square £19.99
All packs are made from AA Cells.

PRO BOAT

Volere 22 2.4GHz

Ready to run model with Spektrum radio. Includes battery & charger. Great finish on boat

Our Price £199.99

SPEKTRUM DX5e

Includes 5 Channel AR500 Full Range Receiver Only

£69.99

Includes 6 Channel AR600 Full Range Receiver Only

£119.99

Props, Shafts etc

LARGE RANGE OF THE FOLLOWING
BRASS PROPS M4 3 BLADE
M4 NYLON PROPS 2 BLADE
BRASS SHAFTS M4
BRASS RUDDERS S/M/L
MANY OTHER SMALL PARTS STOCKED

Extension Leads

All For Futaba/Hitec
SERVO LEAD 200mm £1.00
EXTN LEAD 270mm £0.60 each
EXTN LEAD 500mm £0.80 each
EXTN LEAD 1000mm £1.00 each
Y LEAD £1.75 each
BEC RED BOTH ENDS £0.90
SWITCH HARNESS £2.25

Howes Special!

Core-RC 7.2v 1800mAh

Only £7.99

Very Limited Stocks!

AA's & AAA's

GP 1000mAh AAA £1.70 Each
1300mAh AA NiMH £1.45 Each
2700mah NiMh Rechargeable Battery.
Only £2.00 Per Cell.

Special Offer!
MTroniks Viper RV11
4.8v-9.6v. RRP £57.99
Low Price £24.99

YACHT KITS

At Our Prices
T/Tiger Volans £169.99
T/Tiger Naulantia £149.99
T/Tiger Victoria £97.50
T/Tiger Entz £169.99
T/Tiger Voyager £129.99
Joysway Dragon Force £135.00
Joysway Explorer - £144.99
Surmount £99.99
Monsoon £150.00
Phantom £150.00
Pro Boat Westward £124.99
Pro Boat Regazza £239.99

AQUACRAFT Models

Bristol Bay

Length: 850mm
Motor, Servo & ESC Included
Requires 2 Channel Radio, Battery & Charger
Super detailed model with working lights
Our Price Only **£169.99!**

---

robbe Modellsport

Robbe 1198 Paula IV Kit
£169.99 Includes Fittings
Scale 1:20 Length 790mm
Robbe 1195 Dusseldorf
£399.99 ARTR
Scale 1:25 Length 1170mm
Robbe 1196 Bussard
£259.99 ARTR
Scale 1:20 Length 900mm
Robbe 1197 Dolly
£119.99 ARTR
Scale 1:20 Length 550mm

Platinum Edition

Revell Flower Class Corvette (Snowberry)
1/72nd Scale. 850mm Length
Includes Wooden Deck, Metal Tubes & Photo Etched Parts.
RRP £119.99
Clearance only £79.99
Other Revell boat kits available please check website for stock

---

Electric Motors

385 5-POLE £3.10 each
400 3-POLE £3.99
540 3-POLE £2.99
545 5-POLE £2.99
550 3-POLE £6.25
MFA RE 140 (3-6v) £2.75
MFA RE 170 (1.5-3v) £3.75
MFA RE 360 (6-15v) £4.99
MFA 380 (3-7.2v) £5.75
MFA 385 (4.5-15v) £5.75
MFA RE 540 (4.5-15v) 3 POLE £7.50
MFA RE 700 (6-8.4v) £28.99
MFA TORPEDO 800 £22.50
MFA TORPEDO 850 £22.50

Joysway RC hobby world

Orion Yacht RTR

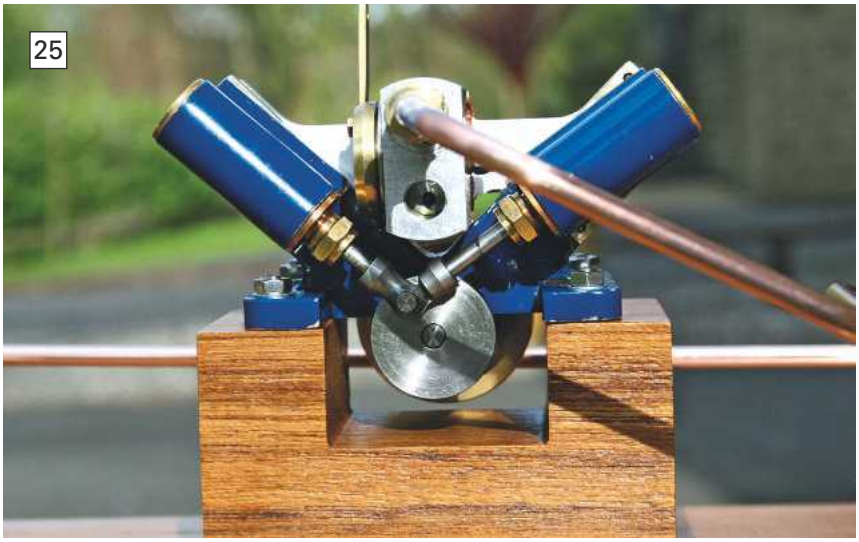
New Ready to Run Yacht from Joysway! (Smaller Dragon Force!)
Includes 2.4GHz Radio.
95% Assembled
Height: 920mm
Length: 465mm
RRP £99.99

Our Price £89.99!

Photo 24. My own home made single cylinder single acting oscillator. This simplest of engine designs was made many years ago from bits of brass and items found in the scrap box.

Photo 25. A Hemmens Vee Twin Richmond double acting oscillator. Complete control can be achieved from a single servo, making it ideal for model use.

Diagram Three. The slide valve engine can be arranged to admit the steam exactly when required and not symmetrically giving far better steam efficiency. The downside is that reversing gear is required to reposition the valve to a new relationship with the piston for reverse operation.



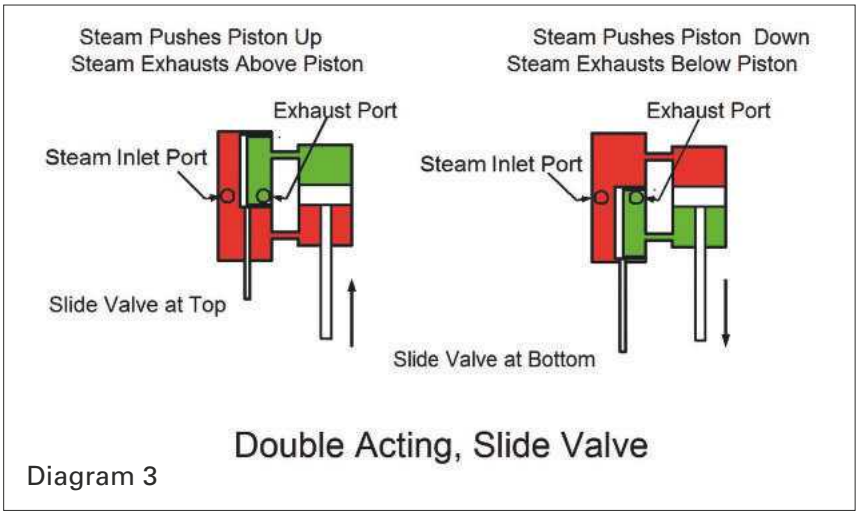


Diagram 3

engine will not self-start, so cannot be reversed. You will find engines such as this in some of the simplest model boats, **Photo 24.**

The next stage up the evolutionary ladder is a twin cylinder, single acting oscillator. Two pistons arranged on a single crankshaft of either an in-line horizontally opposed, or a Vee configuration. Ports are arranged to both cylinders supplying and exhausting the steam which connect to common inlet and outlet pipes. Once again there is a possibility that it will not self-start, but now there are two power strokes per revolution, giving a bit more of a useful output, but it still cannot be relied upon to be reversible.

Now to a considerably more common arrangement for modern model boat use and that is the twin cylinder, double acting oscillating engine as in **Photo 25.** The significant difference here is that the lower part of the piston is sealed with a cover and a shaft seal, so steam is now admitted to the lower part of the piston as well, hence 'double acting'. For such an engine there are four power strokes per revolution, so the cylinders can be arranged to ensure there is always one on a power stroke. This engine is therefore self-starting and hence reversible, so can be used in conjunction with a pressure regulating valve to control speed and direction. Once again you will find these as either horizontally opposed, in-line or Vee engines with the Vee being the most compact in a longitudinal

direction and the in-line being narrower and hence better suited to a finer hull's stern. One of the biggest concerns with an oscillator is the fact that you are transferring steam to the cylinder through ports machined into two sliding faces. There is always going to be a possibility of steam leaking from these if they should become worn or if not sufficiently lubricated. Oscillators are also limited as regards performance adjustments as the ports are not moveable and there has to be a degree of separation between the ports so there is a dead band where steam is neither being supplied nor exhausted. The steam must also be admitted for the entire length of the piston travel and exhausted for the entire travel in the opposite direction which does not give the best performance characteristics. This makes these engines heavier on steam use, but they are nevertheless robust, simple, reliable, compact and relatively high revving.

The next major type of engine is the slide valve. With this type of engine, the cylinder is fixed and the piston is moved up and down with a connecting rod as found in a petrol engine with a bearing at its top and bottom. Steam is admitted to the top or the bottom of the piston by use of a valve that is housed in a chest attached to the cylinder. The steam entering the chest is directed by the valve that slides up and down within the chest and either supplies or exhausts the cylinder space and this valve is connected via another connecting rod to an eccentric on the crankshaft as in **Diagram Three.** The advantages of these engines is that there is no loss of steam at the port faces and the steam inlet and outlet can be timed to give much better performance. To pay for that however, there is the added complexity of two connecting rods per cylinder, with their associated bearings. Once again, a single cylinder double acting slide valve engine would not be considered self-starting because if the engine stopped at top dead centre or bottom dead centre it would have no starting torque. The significant positive characteristic of this engine is the fact that the valve can be infinitely adjusted to admit steam at just the right time in the cycle. This will usually be slightly before top dead centre, so the valve is then set up to operate the engine in one direction only. Reversing a slide valve engine requires a complex linkage that adjusts the position of the slide valve relative to the crankshaft and once again makes the engine very complicated for the modeller, and it will need another channel and servo for the reversing linkage as in **Photo 26.**

Because of the requirement of the slide valve engine to have separate eccentrics on the crankshaft for each valve, creating a Vee configuration would be very complex and is certainly not common. In line twins are common though, and horizontal twin configurations were very regularly used as factory engines throughout the industrial revolution years. There was a Vee

> *"The significant positive characteristic of the slide valve engine is the fact that the valve can be infinitely adjusted to admit steam at just the right time in the cycle"*

LEFT: At one end of the scale, scratch building opens up the whole world of possibilities. The trawler Lydia Eva is powered by a Stuart Turner plant and looks simply superb on the water. Her plant is reliable to operate and she appears regularly at model boat club steam events throughout the year.

Photo 26. A Graham Industries TVR1A reversing engine showing the reversing linkages in the slide valve rod and the reversing control lever in the centre of the engine.

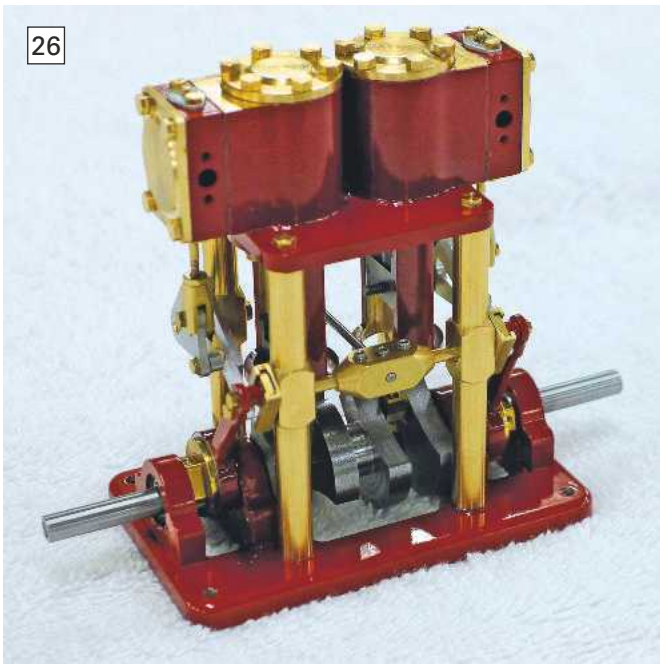


Photo 27. The rare Hemmens Vee Four Caton Engine. Four double acting piston valve operated cylinders complete with built-in water pump and reversing valve.

Photo 28. A German Hansen engine, twin cylinder double acting piston valve, as opposed to slide valve, engine. This engine does not incorporate reversing gear, so is limited to one direction in this state.

Photo 29. A typical face to face oscillating engine control valve giving full control of direction and speed over an arc of operation of around ninety degrees.

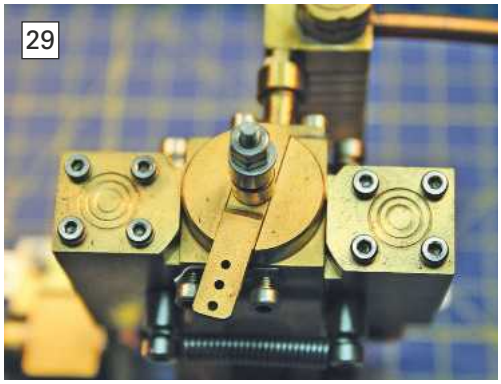


Photo 30. A close-up of the reversing linkage on a TVR1A engine. The slide valve control rod can quite clearly be seen connected to the end of the linkage.

Photo 31. A typical modern displacement lubricator of the type fitted via a Tee connection in the steam line to the engine. This type is not controllable, so the oil is carried over at a pre-determined designed rate. The threaded connection at the bottom is for the drain valve.

Four model engine produced by Maxwell Hemmens in the 1980's that is now a highly regarded and sought after piece of engineering, **Photo 27.**

Other engine configurations include a piston valve arrangement which uses a piston rather than a slide valve to control the steam, **Photo 28,** and any number of one-off designs created by imaginative minds with a desire to produce something unique!

Engine fittings

Compared to a boiler, the fittings on the engine are relatively few, however they are equally significant and need a degree of understanding to ensure reliable operation.

Control valve

A number of oscillating engines will have the main control valve arranged as part of the engine and incorporate a rotating disc valve which slides over a ported distribution face, **Photo 29.** This type of valve allows operation of the engine via a single servo from a mid-stopped position to full ahead one way and full astern the other. These valves must be looked after and carefully lubricated to ensure smooth operation and all are fitted with an adjustable spring to vary the pressure on the rubbing faces. Too little pressure will lead to leaking of steam at the valve face and too much pressure will cause premature erosion of the face and once again, leakage. Another useful thing to remember with these valves is always try to arrange the operating servo so that the servo arm is in the same plane as the valve operating arm. This will ensure that there is no component of the servo arm force trying to lift the valve off its face and this will help to keep the valve sealed. Valves on slide valve engines tend to be nothing more complex that a throttle valve, operated by a servo to control the steam pressure, and hence the engine speed. Reversing will have to be done with another servo connected to the reversing mechanism.

Reversing gear

These are found only on a slide valve engine to enable the engine rotation to be reversed. There are a number of different types of mechanism, but they tend not to be so simple and they usually require another servo to operate, **Photo 30.** There is a possibility that they can be unreliable if not correctly set up to operate smoothly, so could possibly be avoided by some modellers, their tending to go for the less efficient, yet more reliable oscillator engine. A way around this is to use a controllable pitch propeller, if you are able to find one. With this the steam engine itself does not need to reverse, so the benefits of the slide valve engine can be enjoyed without it changing running direction. One other possibility is a reversing gearbox, but that will consume power and require some ingenuity of manufacture.

Lubricator

There are mechanically operated lubricators available but they require engine power to operate and by far the most common found in marine models is the displacement lubricator, **Diagram Four.** The importance of this device cannot be overestimated and the reliability and condition of your engine is entirely dependent on its operation. It consists of just a vertical cylinder, full of lubricating oil, connected via a Tee piece to the engine inlet, **Photo 31.** As steam passes the lubricator, a small amount condenses and collects in the bottom of the cylinder. This displaces the lubricating oil, which then enters the inlet steam flow and passes through the engine with the steam,

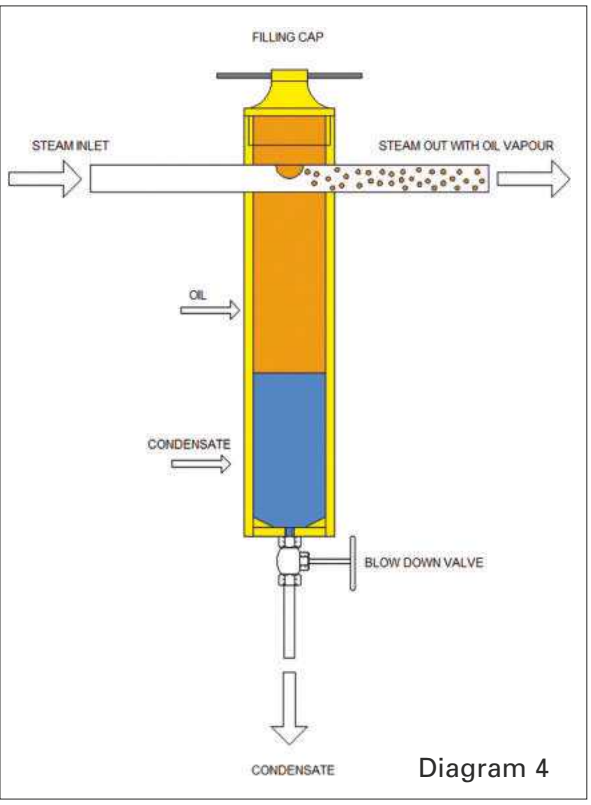


Diagram 4

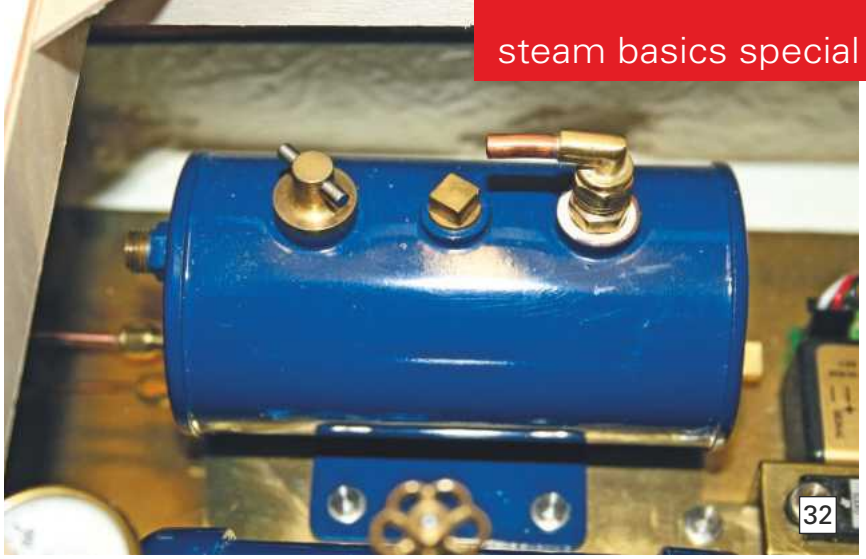
thereby oiling all the internal steam passages. If the lubricator is allowed to run dry, the engine will not be oiled and will very soon start to wear excessively on any running surface. You must also use proprietary steam oil in these lubricators with all the required properties to do the job to ensure reliable oiling of the engine. Each time the model boat is brought into the bank, it is well worth draining off the water from the bottom of the lubricator and topping up with fresh oil. Lubricators are fitted with a drain valve to enable this to be done and the water can be blown out under pressure from the boiler with the engine off. Take great care when opening the top of the lubricator to ensure there is no pressure in the line by checking that the boiler stop valve is closed and the line is vented by having the engine control valve in a full ahead or astern position.

Auxiliaries

Looking at the two main components of the steam plant is one thing, but they are not going to do much individually without the support of all the other bits and pieces. Some of the available components are a personal preference, but some of them are more of a necessity so I would like to first have a look at them and then some of the more commonly found possibilities.

The separator tank

Although it is possible to run a steam plant without a separator tank, this is one of those items that should be considered as essential and planning should incorporate one in the model, **Photo 32.** The idea is that it cleans-up the exhaust steam from the engine to ensure that only steam vapour is eventually expelled. The oil that the displacement lubricator supplies goes through the engine and after doing its job is carried out by the exhaust steam. Also the steam, having had its energy levels and its pressure lowered by pushing the pistons around, is in a state whereby it will readily condense and so tends to be of a poor quality and a very 'wet' steam. The engine exhaust therefore is directed



to a tank that usually contains a baffle, designed to impede the flow of steam and cause the moisture and oil to collect. The relatively drier steam is then vented out of the tank and directed out as exhaust and the oil and water mix collects in the bottom of the tank. This must be removed periodically, usually via a large syringe with a silicone hose attached, at the pondside. If you do not use a separator tank, then the oil and moisture will be ejected with the exhaust and cause an environmental concern on the pond water and also make a mess of your pride and joy.

Diagram Four. Schematic diagram of a displacement lubricator.

Photo 32. The separator tank fitted into the hull. On top is the plug for syringing out the liquid, the discharge line and a spare inlet fitting.

Gas tank

In keeping with the idea of a modern and readily available steam plant I am only going to consider systems powered by gas. There are models out there powered by solid fuels such as tablets and coal, but they are relatively few and far between.

The storage of gas on board the model is usually achieved in one of two ways. The first is to use a small purchased gas canister and have that in the model, connecting it directly into the steam plant system via a valve screwed into the tank as in **Photo 33.** This has the advantage of great convenience and a large stock of gas onboard, but the disadvantage of requiring a large volume of hull space for the gas canister as well as the model having to accommodate a significant change in its draft as the contents of the gas tank are used.

The second method is to have a separate onboard gas tank that is filled from the aforementioned larger canisters (or bottles), **Photo 34.** This has the advantage of being smaller and easier to accommodate in the model and also of being permanently plumbed into the system so such features as a pressure gauge can be added and arrangements to prevent the over-cooling effects of the evaporating gas can be fitted. The

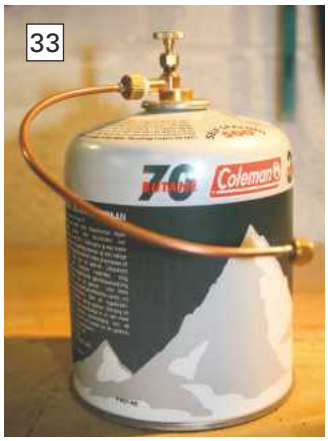


Photo 33. A purchased gas canister with a valve and pipe fitted to enable connection to the onboard gas burner. Smaller canisters can be found, but they are all much larger than a manufactured onboard tank.

Photo 34. The onboard gas tank. On top is a pressure gauge and a manifold to allow the raising of pressure from an external tank on the bank as well as the normal outlet. The final connection is the filling Schrader valve.

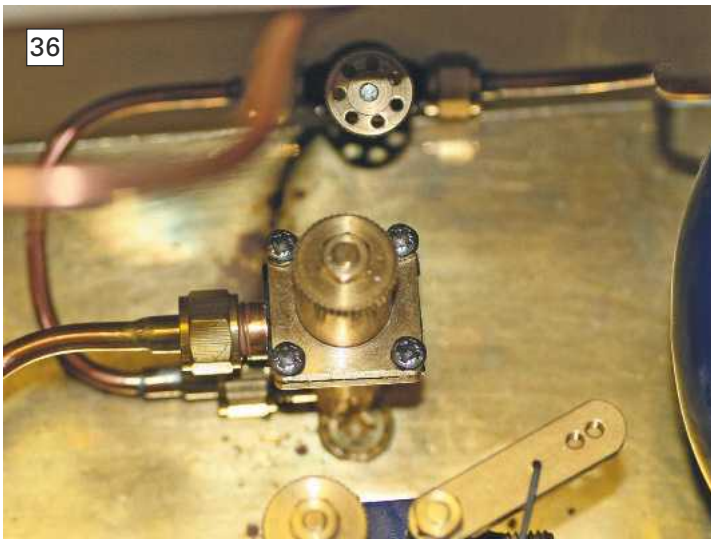


Photo 35. The fitted feed tank with the gauge glass and outlet valve clearly visible. Filling and ventilation is through a false deck vent next to the anchor windlass.

Photo 36. The valve shown here stabilises the pressure fluctuations from the gas tank, which can vary depending on the temperature of the tank. The valve cannot actually generate pressure as it will only limit the pressure in the supply.

Photo 37. A diaphragm operated gas attenuator valve. The boiler pressure connection operates the valve and controls the gas outlet to the burner, thereby maintaining a stable flame at the boiler and more consistent control.

Photo 38. Here you can clearly see the line from the gas tank going first to the pressure regulating valve before going to the pressure control valve. The control valve switches from high flame to pilot flame depending on the pressure in the boiler.

disadvantages of the onboard tank are that it does not hold as much gas as the purchased canister and it requires regular filling which can be inconvenient and is potentially hazardous. No lighted cigarettes in the vicinity please! The deciding factor tends to be the size and configuration of the model, with probably only the largest of hulls giving the option of using the purchased canisters as the gas supply. It is also a requirement for a safe steam plant that it does not enable the gas supply to outlast the water capacity in the boiler system.

Boiler feed water arrangements

These come in a number of different types with the most sophisticated being a complete water level management system, controlled by a sensor on the boiler that operates a three-way valve on the discharge line from a pump fitted to the engine. This draws from the feed tank, **Photo 35,** and then discharges to the boiler, or back to the feed tank depending on the valve position. This system is complex and quite expensive, but it does mean that the boiler is topped up regularly, thereby preventing a big slug of cold water needing time to get back up to pressure, and all the operator has to do is occasionally top up the feed tank. Obviously a power supply for the electronics as well as an additional servo to control the valve is needed; the pump driven by the engine will require power plus the extra feed tank and pipework. All of these make such an arrangement more suitable to larger displacement models.

A slightly simpler arrangement is to use a manual pump from an onboard feed tank that fills up the boiler via a non-return or 'clack' valve. This still allows the boiler to be filled under pressure, but does away with the complexities of the electronic arrangement and it does not need a continuously running pump, taking power away from the engine. The main disadvantage is the fact that you fill the boiler in one go, thus putting a large quantity of cold water into it and therefore significantly cooling it down.

The next arrangement is to rely totally on external filling arrangements, which may be an option if there is not a great deal of room in the hull, such as small fine-lined launches. You can have an external pump and tank that connects to a line into the boiler to enable filling it from outside the model. This has the disadvantage of making the filling operation that bit more inconvenient and will require the boat to be out of the water more often than with the other arrangements.

Finally, the most basic form of filling the boiler, which is used on some model boats, is to cool the boiler down, remove the filling cap and pour water into it! This is also the most inconvenient method and also wastes considerable amounts of gas in getting the cold boiler back up to pressure, but having said that, some are happy for their boat to be on the water for 30 minutes or so and then bring it off for maintenance, refilling, emptying the separator tank and checking, before 'steaming' again.

Regulators

The most common method of trying to deal with the varying pressure from a gas tank is to use

a gas pressure regulating valve in the line from the gas tank, **Photo 36.** This valve consists of either a diaphragm or a piston that acts against a spring. The gas balances the other side of the piston (or diaphragm) and the spring tension rate can be set with a knurled knob to give the desired pressure outlet. This valve is limited in so far as it can only control the gas outlet pressure for as long as the pressure in the tank is greater than the set pressure, so if the cooling effect is allowed to become too great and the pressure in the tank drops too much, this valve will not be able to prevent a reduction in pressure in the line to the burner.

Taking the idea a step further is a gas attenuator valve, **Photo 37.** This valve does not use a spring to set the pressure, but uses another line from the boiler to the diaphragm in the valve. Consequently if the boiler pressure drops, the attenuator valve opens up and allows more gas to the burner. Once again however, this cannot overcome the effects of under-cooling if the pressure in the tank drops to below that required by the burner. The final type is an electronically controlled gas valve that operates a valve in the gas line according to the pressure in the boiler, transmitted to a servo that operates the valve, **Photo 38.** This type of valve is usually set up to operate from a normal full flame to a pilot flame as the boiler pressure varies either side of a pre-set point, but again, this valve cannot compensate for too low pressure in the gas tank should it over-cool.

Pipework

This sounds a bit obvious(!), but the components of the system have to all be joined together one way or another with pipework. Pipework can be put together neatly or can be thrown together, and just like electric cables, the installation will be more reliable and easier to maintain, plus look so much better if a little bit of thought goes into the quality of the pipework. There has been a tendency in the past for some manufacturers to use silicone pipework for the low quality exhaust side of the plant (please see Photo 12 again). This may be perfectly acceptable from a practical and operational point of view, but many modellers much prefer to see copper pipe used throughout the installation for no other reason than it looks so much better, **Photo 39,** whether polished or insulated.

You are going to need a stock of a few lengths of pipe, so the first decision is whether to buy straight lengths or a large coil. Coils are undoubtedly cheaper, but no matter how hard you try, you just never seem to be able to get the lengths straight, which may not bother some people, but it does me! Straight lengths are more expensive, but are so much easier to work with to achieve a neat looking installation. Joints must be made with silver solder because soft lead-based solder may be prone to softening under the temperature of steam, so should be avoided. Bear in mind that copper pipe sizes are usually designed to fit into each other so it is a relatively straightforward job to make a sleeve to increase the pipe diameter for a larger fitting, **Photo 40.**

Finally, insulation is not there to make it look pretty, although it can, but it serves a very practical purpose. Live steam lines are best insulated, **Photo 41,** to prevent any condensation forming in the pipe and so ensure that only good quality steam enters the engine and passes into the separator. It also protects the inside of the model from excessive heat and helps avoid burnt fingers!

"Finally, insulation is not there to make it look pretty, although it can, but it serves a very practical purpose. Live steam lines are best insulated"

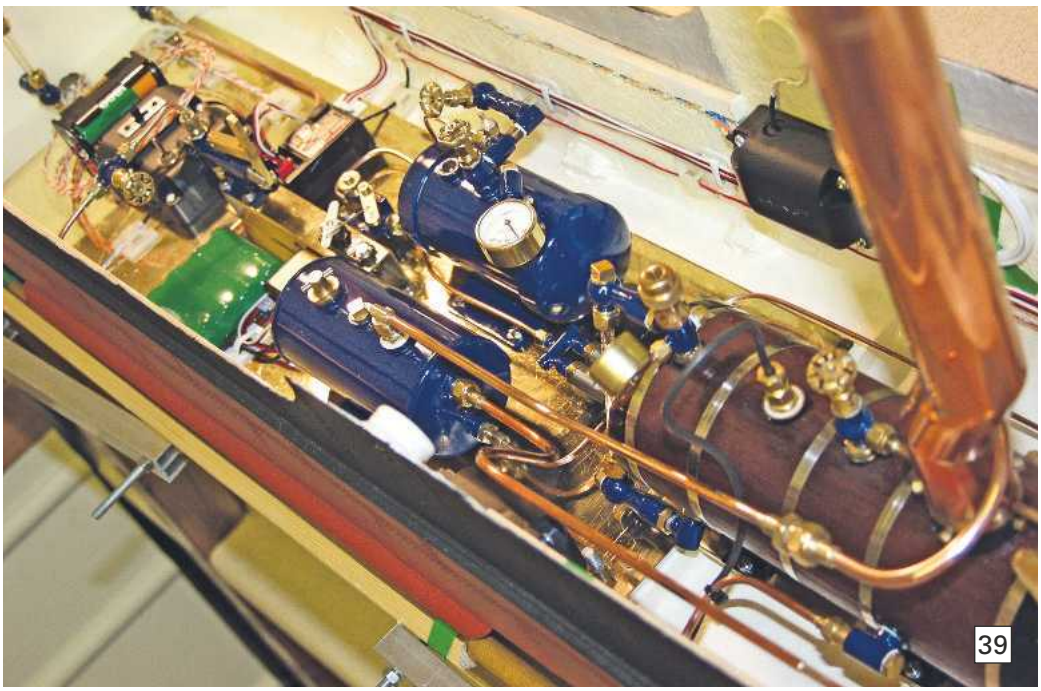
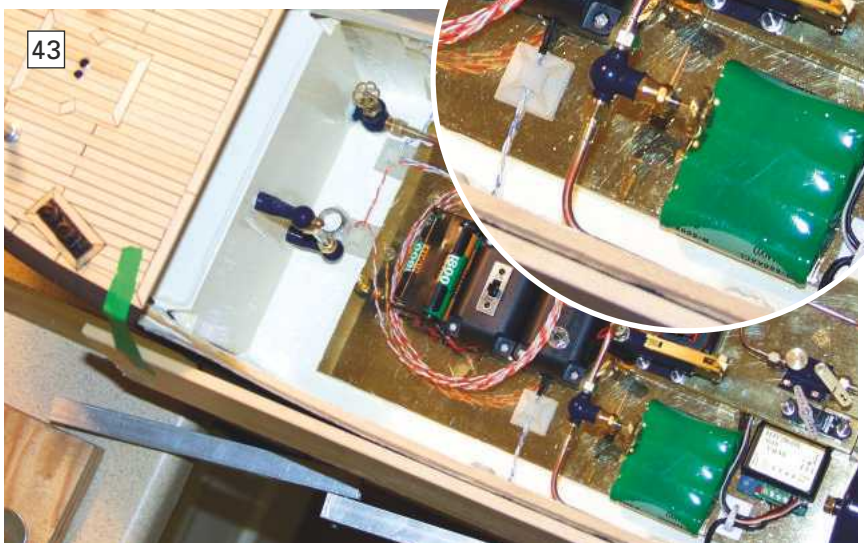


Photo 39. Neat straight pipe runs always look so much tidier than either twisted bent pieces of copper pipe (or silicone tubing), whether they are polished or insulated.

Photo 40. A gas line connection making use of the ability of copper tubes to slide inside each other and so be used to make reducing sleeves.

Photo 41. Two lagged pipes. The lagging is no more than string, closely bound, and then painted with white matt enamel paint.


42


43

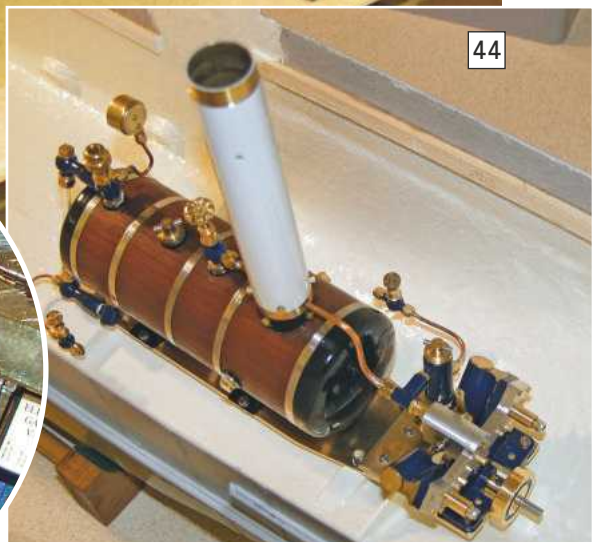

44

Photo 42. Playing around with the location of all the major components to determine the best position as regards accessibility and operational considerations. It was obvious from the beginning that the gas tank and separator tanks should be close together.

Photo 43. The obvious location of the feed tank was to be tucked away in the bow section, allowing easy filling through a vent and connection to a feed pump as well as convenient operation of the pump.

Photo 44. To get the boiler flue lined up with the funnel it was obvious that the engine was going to have to be as far back as possible and therefore a new base was needed to raise the height of the engine.

Designing the plant

Having now had a good look at the various individual parts of the steam plant, and assuming we know into which model it is going to go, it is time to turn out minds towards how we are going to squeeze all the bits into the hull. It would be so easy to get the design wrong and end up with a part-built boat that cannot be completed the way it was originally envisaged, if at all! I cannot emphasis enough the requirement to put as much time and effort as you can into how you want the steam plant to work, how you want the components to sit in the model, how you want to operate the plant and how you intend maintaining it. There is nothing more guaranteed to put you off steam for life that getting this wrong and ending up with something with which you are completely disheartened. Take your time, think about it, play around with the bits, change your mind, move things around and think of all the consequences before committing to a plan. Even then you may get it wrong, but at least you will have given yourself a fighting chance and any changes should be minimised and of a minor nature, **Photo 42.**

Select the components?

Start by deciding just what you want to incorporate into your model, its operation, what you want to do at the side of the pond and how frequently. I have covered the elements of the steam plant earlier, so now finally decide whether you want an automatically filling boiler, a manual feed from an on board tank, a manual feed from an outside tank or a one-shot boiler. Do you want an onboard gas tank or commercial single use containers? What gas control do you want to use, if any, and what electronics do you want to include such as lighting and sound systems? The final choices can be as follows:

1) I want to fill the boiler under pressure but do not want automatic level control. This means the inclusion of a manual feed pump and an onboard feed water tank. **Photo 43.**
2) I want to use a manufactured gas tank because the camping canisters will not go through the opening in the deck.
3) I am going to use a separator tank.
4) I need to get the plant as far back in the hull as possible to try to get the boiler flue as close as possible to be in-line with the model's funnel. This mean a Vee Twin oscillator engine with a horizontal boiler fitted with a flue at the aft end of the boiler, **Photo 44.**
5) Lighting on the model is going to be included.

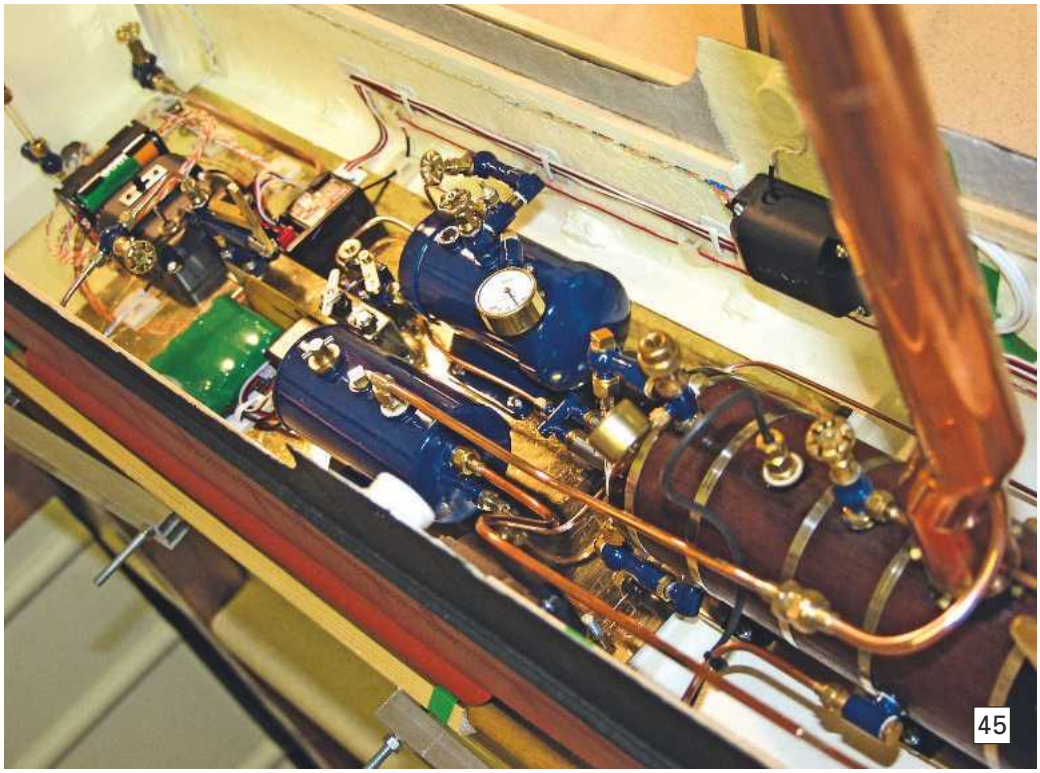


Photo 45. The final arrangement, before the decks were finally fixed in place, thus enabling final adjustments to be made.

Photo 46. A piece of square section brass tube was used to mount the feed pump, bringing it up to an easy height to operate and was also used to route cables through and mount the other electronic items alongside it.

Photo 47. The separator tank and gas tanks and their relationship to each other and the other components. The heat shunt is also fitted, allowing heat to transfer from the hot separator to the cooling gas tank. z

6) Visits to the pondside are expected approximately every 30 minutes to empty the separator tank, fill the boiler, top up the lubricator and refill the gas tank.

So, once these decisions have been made and you are reasonably sure you are not going to change your mind, the next stage of the design phase now follows.

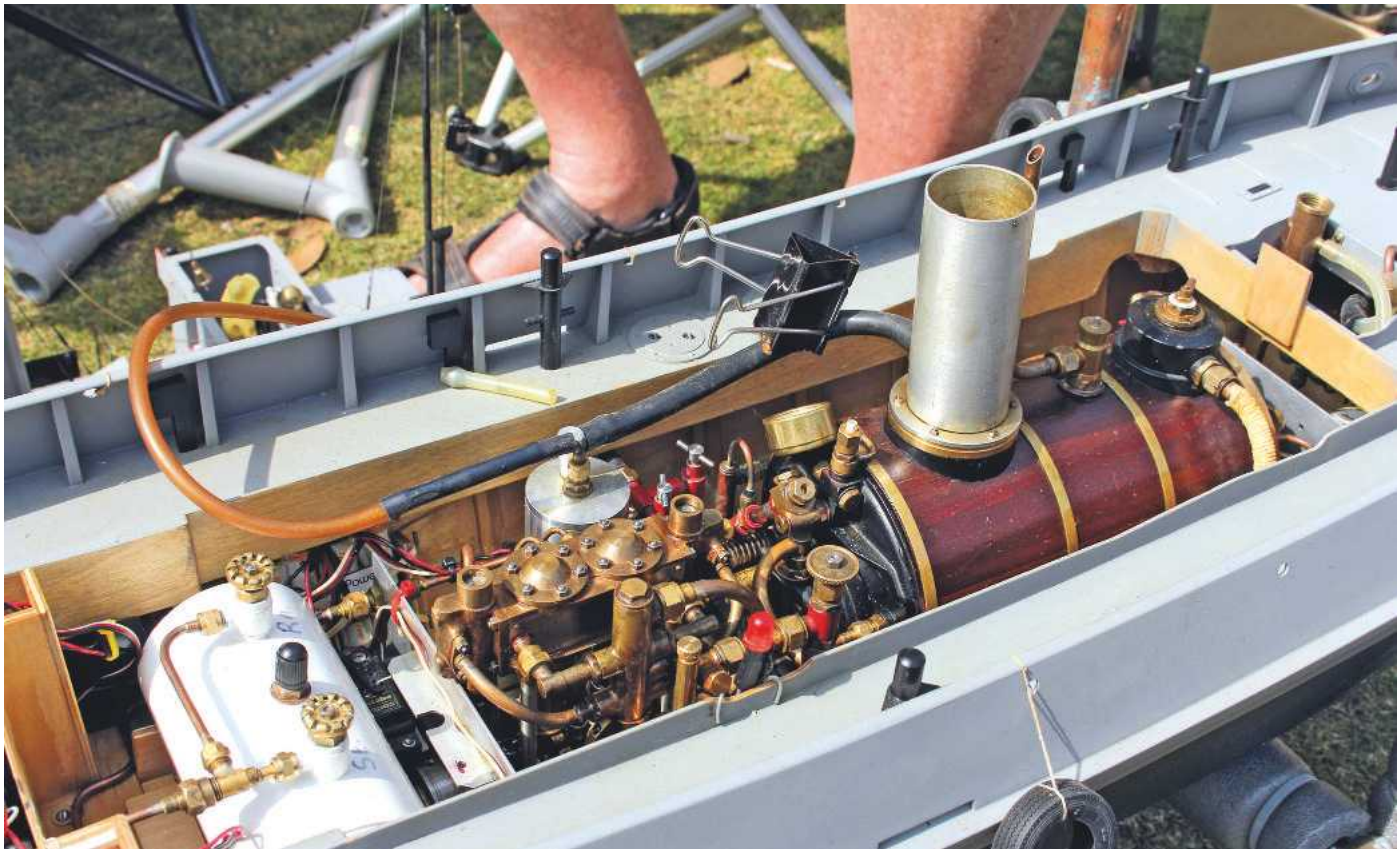
Arranging the components

The hull has to be reasonably complete before you can do much else. If you are building a kit and/or have a ready made hull then you are already virtually there, but if scratch building or are into plank-on-frame, then the hull still has to be basically complete. It is easier if you had the main decks to hand as well (but not attached), to check for height limitations, as well as the access possibilities. You will need an internal base for the steam plant, which can be a brass plate mounted on wooden bearers and covering steel plates for the main bulk of the ballast, as in the case of one of my models.

Then, simply play around with the arrangement of the components, particularly bearing in mind access. Think of how the components relate to each other, how they can be accessed, how they can be removed, how they can be operated and whether there is likely to be any effects on each other from such things as heat or moisture, as once the decks are in place, there is considerably less opportunity to play around with it all, **Photo 45.** In the case of this model, I wanted to put the feed tank into the bow area. It is desirable to have the r/c gear at the opposite end of the model to the steam plant so the receiver, batteries, switches etc. were all placed in the forward hatch area. The water pump had to be accessible so it was mounted on a brass square section tube bearer in the middle of the main hatch (please see Photo 43 again) where it is easily operable with a handle extension. The brass tube bearer was also used to mount the gas control valve and servo, **Photo 46.**

The separator tank and the gas tank needed to be near each other to allow for a heat transfer arrangement to be fitted between them, so they were mounted either side under the main hatch and at its aft end, **Photo 47.**

The boiler and steam engine assembly would fit through the aft deck access, but to get it in place would prove extremely difficult. The best way around this was to modify the model and have the entire bridge assembly removable, the design being finalised once the decks were fitted. The engine servo and the rudder servo would be located under the aft access hatch on a tray incorporating some protection from the heat and moisture of the engine. So, once you are reasonably confident that the design is as you want it, you can then progress to putting all these thoughts into practice!



An impressive lesson in careful design as this TID tug model has a great deal of plant squeezed into a relatively small space. Everything is accessible though and carefully arranged to ensure easy and reliable operation.

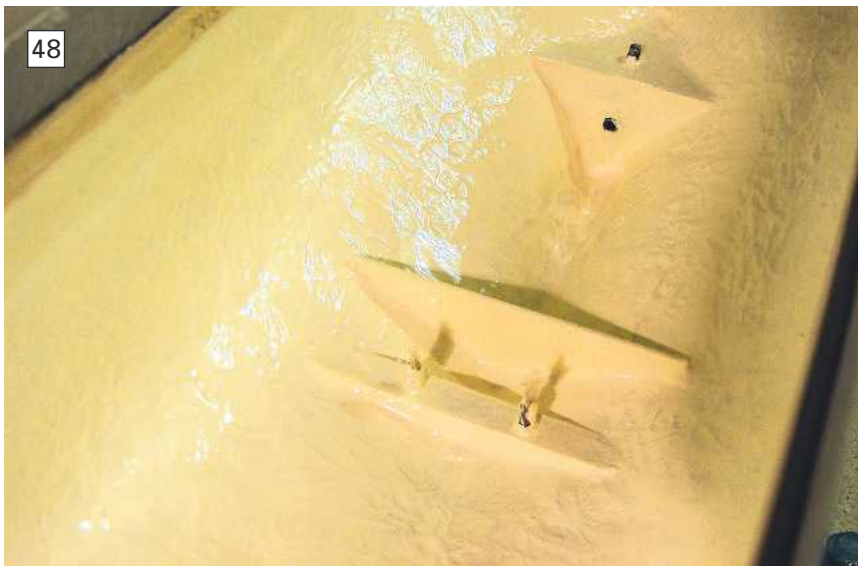
Installing the components!

Starting with the items with very limited flexibility, the boiler and engine assembly are obviously the first to be installed. On the model mainly featured here, these were mounted on an independent brass base to make removal as easy as possible, but a simple method of then fixing the base into the hull so it could be secured and released externally was needed. The solution was to embed machine screws into a GRP resin floor which could have nuts fitted to them when the plate was in place was the solution, **Photo 48.**

The gas tank, separator tank and brass square tube were all fixed to the main forward brass baseplate and the water pump attached to the top of it all with stainless steel machine screws. Then the arrangement of all the smaller items such as the batteries, switches, receivers and servos was finalised, with most of these being held in place with a blob of silicone sealant, making their possible removal relatively simple. The gas tank is next to the gas valve which in turn is very close to the boiler burner so that all goes together well. The separator tank is close enough to the gas tank to enable the fitting of a copper bridge to be relatively easy and most things are easily accessible and easily removable.

Your steam plant will be very different to this, but the chances of a successful and reliable model will be greatly improved if you follow the same steps, as it will be almost impossible to make major changes after the decks are fitted.

Photo 48. The boiler and engine tray are held in place by screws bonded into the hull with resin held in a 'dam' arrangement. The stern tube and its grease connection can also be clearly seen, determining how far back the engine could be located.



Connect them all together?

All the individual components in the hull have to be connected, by cables or copper pipe work. This may seem simple, but the same care and attention must still be put into this, because you still need to think of accessibility and removal. It is no good running a water feed line over the top of the boiler to then discover you cannot remove the boiler! All the pipes must be designed and fitted in such a manner as to allow no interference with any of the other components and allow proper operation and maintenance as originally envisaged. Take your time, plan the pipe runs carefully, and bear in mind those connections that are going to have to be broken to enable the boiler to be removed.

Sea trials

An important part of the model's development, **Photo 49!** It is your first chance to test the design under normal conditions and get a feel for how it all operates, with or without decks! With no decks fitted obviously a calm day is required, but this gave me the opportunity to see how easy it would be to operate.

This steam plant installation revealed a couple of things that could be improved and which were subsequently modified, before adding the main deck and testing the model again on the water. One concern was that when first opened-up, the boiler stop valve to the engine got a slug of water through that had to go through the engine before steam would flow. This invariably leaked out from the control valve and the cylinder port faces, and had the potential to damage the engine. Also, the boiler was fitted with a vacuum breaker valve designed to prevent the boiler going into a vacuum when it cooled down, potentially drawing oily water back into it. Unfortunately the ball in the vacuum breaker seemed to stick and not work, so it was decided to fit a vent line in the discharge pipe to the engine. This allowed the line to be vented outside the hull before putting the engine on-line and now allows the boiler to vent during cooling. Simple modifications such as this were possible as a result of the sea trials and allowed a more reliable and user friendly plant to be completed.

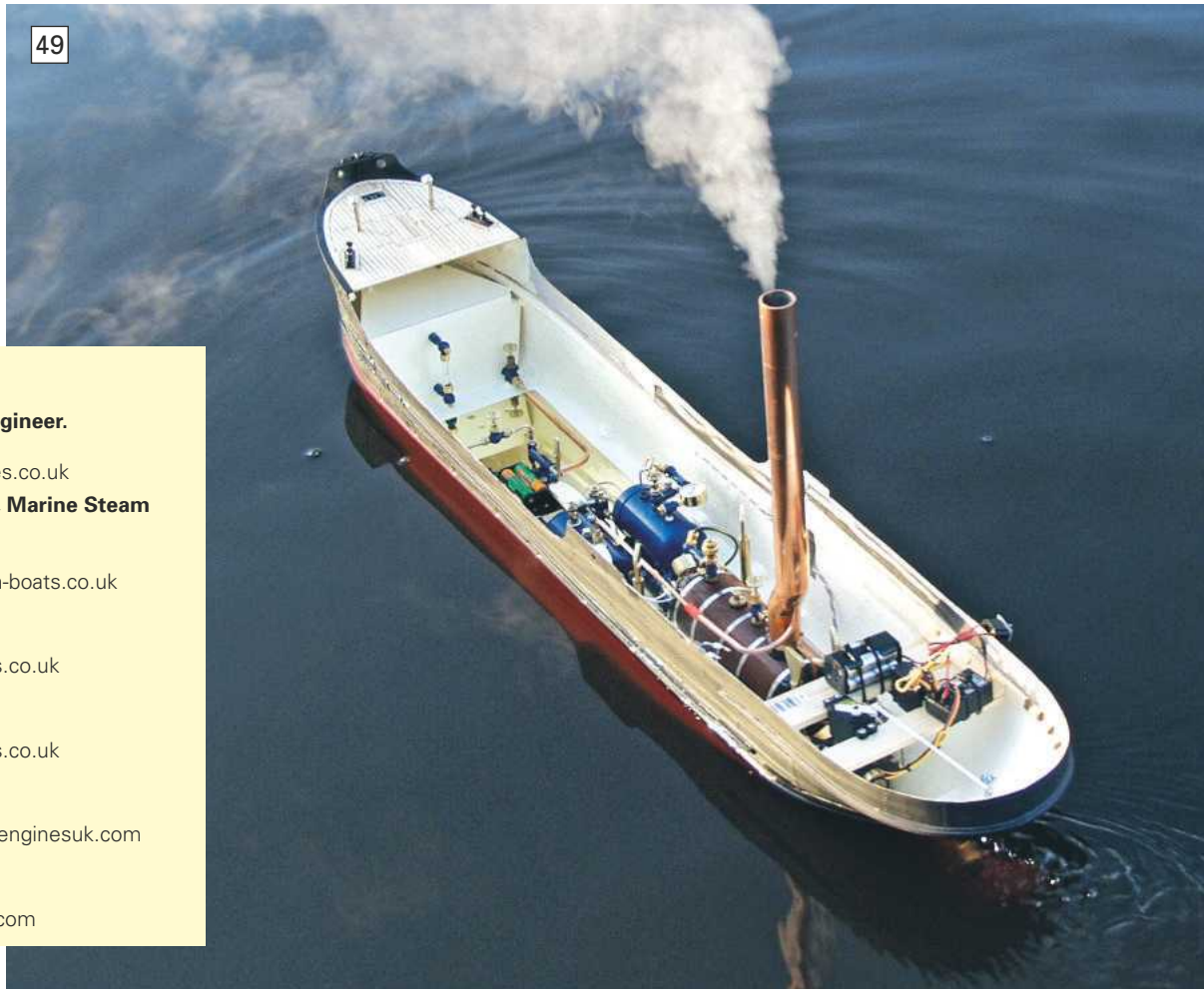
Final thoughts

There is no doubt that putting a steam plant into a model boat is not as straightforward as putting a battery and an electric motor into a hull, but with a bit of careful thought and planning, it can be reliable to operate, easy to maintain and if your design matches your requirements, you should be able to run it as frequently as you wish at the pond. One moment of great satisfaction a couple of years ago was using a steam powered Borkum to recover a 'dead' electric tug from the middle of the pond during a tug-tow event! The rewards of a steam plant are certainly well worth the effort put into its design, construction and installation, and should give you a model to enjoy for many years to come.

Enjoy you hobby - ***Richard Simpson***

ABOVE: There is something about the beauty of polished brass, varnished wood and a lovely steam plant that nothing else can match. This scratch built launch by Raymond Binns of the Kirklees MBC won him the club's Steam Queen Award on the club's first Steam Open Day.

Photo 49. The first time on the water and an opportunity to see how everything works together before the decks are fitted. Adjustments were made after these trials and further live tests were conducted before actually fitting the decks.



Useful contacts

John Hemmens, Steam Engineer.
Tel: 01757 289664
Website: www.steamengines.co.uk

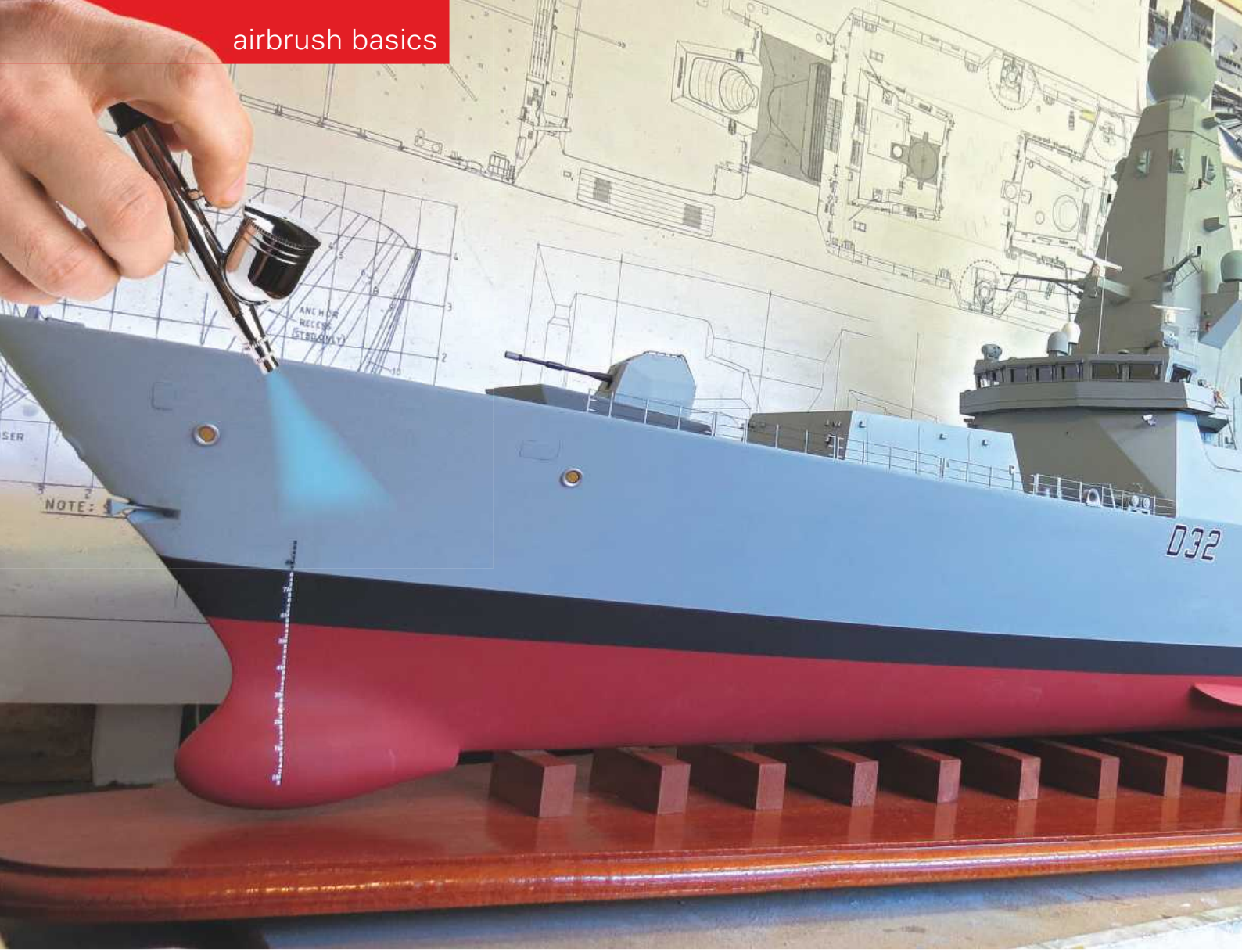
Marten, Howes and Baylis, Marine Steam Model Supplies.
Tel: 01634 233146
Website: www.model-steam-boats.co.uk

Steam Fittings
Tel: 01341 280637
Website: www.steamfittings.co.uk

Stuart Models
Tel: 01481 242041/249515
Website: www.stuartmodels.co.uk

Cotswold Heritage
Tel: 01789 721444
Website: www.modelsteamenginesuk.com

Maccsteam
Tel: 01625 619784
Website: www.maccsteam.com



Airbrush Painting for the

Dave Wooley *discusses the basics*

For this 2014 Special Edition of Model Boats, I was approached to compile a feature on airbrushing and coincidently I was asked by one of my local clubs if I would give a talk on the same subject. The advantage of the latter was I could ask the pertinent question,'How many of you have used an airbrush', then adjusted the talk accordingly. With a piece of written work the subject becomes more circumspect, so this here is a general guide to airbrushes and the associated skills for the model boat modeller .

I'll start by introducing the reader to the various elements, which include aerosol paints, airbrushes, air compressors, types of paint, masking and the need for cleanliness which is hugely important in maintaining a good working airbrush tool, because a precision tool it is, and not always inexpensive either!

The beginning, or the end?

This may appear rather strange, but for many years enamel or more usually acrylic, aerosol paints have been available from automotive suppliers. These paints come as primers or in a variety of colours, but generally not all are suitable for the more specialised shades required by the model boat builder, although bespoke colours are available and more on this later. For someone building a model boat for the first time, or not having access to an airbrush, these aerosol paints are ideal. So, if the right colour is available in this form and it suits the user, then the article stops here, **Photo 1!** The price of around £6 or more can put people off though, because for a decent size of model you may need a fair number of cans.

Basic airbrushes and how they work

As we shall see later, aerosol paints can give excellent results, yet there will always be a need to improve the application either by a variation in the paint thickness or for greater control of the delivery of the paint to the surface of the model. Spray paint generally does not go round corners, and this can be a distinct problem with intricate multi-surfaced models, so the selection of the type of airbrush is important and some brush-painting may still be necessary.

As a basic rule, go for airbrushes that are recommended for use with enamel or acrylic paints as some types are designed for us with just ink and as such can easily clog. A 'brand' name will usually

ABOVE: Nearly all of this 1:72 scale model of HMS Daring was painted using an airbrush.

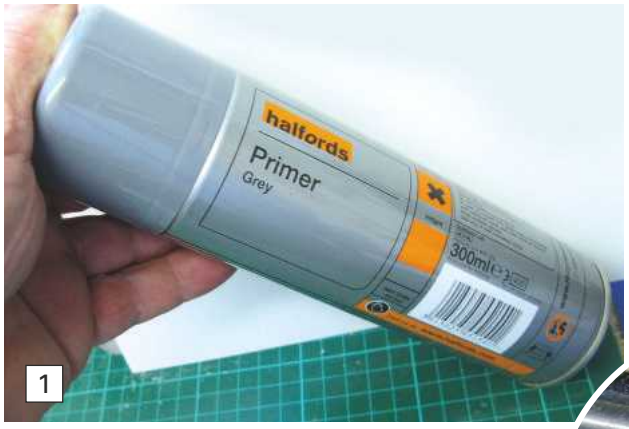


Photo 1. *Halfords grey primer is an example of the aerosol paint readily available from motor factors.*

Photo 2. *An inexpensive basic siphon type airbrush which has operational limitations, but still does the job in many situations.*

Model Boat Builder

be of high quality with a back-up spares service. The question is often asked as to what type of airbrush would be suitable for xxxxxx, but equally how long is a piece of string as there is indeed no precise answer, so for our hobby we will usually settle for something that gives good results in most circumstances.

Airbrushes are divided into two distinct types: Gravity or siphon feed, which can be sub-divided into single-action and double-action and finally, external or internal mix. Good results can be obtained with the most inexpensive basic airbrush tool, so operator skill is another factor.

Gravity feed as the name implies, draws paint from a container downwards into the flow of air.

Siphon feed draws the paint upwards from a container. As a rule of thumb, the siphon type has the potential for greater paint capacity whilst the gravity feed airbrush is generally lighter, but limited by the capacity of the paint container.

External or internal mix?

External mix

My first airbrush was a simple single-action siphon feed external mix tool which for certain applications is still used and **Photo 2** illustrates how this action occurs. The air nozzle directs a flow of air over a tube into the paint container sucking (siphoning) the paint up and into the airflow. On this type, the trigger or lever is depressed and only controls the airflow, the pressure being preset elsewhere.

Photo 3 is of a similar type but with a propellant aerosol fitted directly to the handle, but is still a siphon feed, external mix, with the large paint container enabling more paint to be sprayed without 'refuelling' as it were. The air flow is 'all or nothing' and in some respects this airbrush functions much like an aerosol can.

Internal mix

Here, the paint passes directly into the airbrush and combines with the air and it is generally accepted that the internal mix airbrush gives better results than an external mix device.

Single or double action?

Here, the flow of air and volume of paint are both controlled and with such an airbrush it is quite usual to be able to change the nozzle size and its matching needle to increase or reduce the potential spray area.

Single action airbrush

Single action refers to the operation of a trigger which controls the sole function of airflow, whereas a double action trigger controls both the air and

Photo 3. Another basic siphon type airbrush using a detachable can of pressurised air, is external mix but has a large paint capacity.

Photo 4. Badger produce this single action siphon airbrush with internal mix of the paint and air.

Photo 5. Iwata have introduced the trigger type to give this double action airbrush an improved user experience.

Photo 6. Professional spray guns come in various sizes and this gravity feed type can hold (depending on the container size) up to a litre of paint which could be useful when painting a large area such as a 1:96 scale model battleship hull.

paint flow. In a single action the paint flow is usually controlled by turning a screw at the rear of the airbrush which adjusts the needle position within the nozzle. In use this can be distracting, as you have to cease spraying to regulate the amount of paint leaving the airbrush nozzle, but you can fine-tune how much of the paint you wish to direct to the job from a narrow pencil beam to a wide angle spray pattern, **Photo 4.**

Double action airbrush

Both the airflow and paint volume is controlled by a single button/lever control that can be both depressed and moved back at the same time. Depressing the button enables the airflow whilst being eased back as a lever controls the volume of paint passing through the nozzle, no other adjustment being required.

Pistol trigger side feed airbrush

A relatively new addition to the traditional types is the pistol trigger airbrush from Iwata, which operates much like a spray gun, but has a side-feed container and is a combination of gravity and siphon feed. This pistol type works in much the same way as a double action conventional airbrush, but instead of pressing the button down and pulling back to adjust airflow and paint volume, the pistol trigger arrangement with its more positive grip does the same job, but more comfortably (at least for me), **Photo 5.** Pulling back on the trigger allows the air to start to flow, and then pulling further back and the paint is released into the body of the airbrush as with any other type of internal mix device.

> *"Paint flow is often adjustable on modern spray guns and should be optimized for the specific paint being used"*

Professional spray guns

Like airbrushes, these come in all shapes and sizes adopting the same principles of operation, either gravity or siphon feed. An advantage can be having a larger capacity for paint. For example, the spray gun shown in **Photo 6** is gravity feed with a paint capacity of 500ml, one of the hidden advantages being that as the paint arrives in the airflow by gravity, not so much air pressure is required to turn it into a spray pattern. Paint flow is often adjustable on modern spray guns and should be optimized

Photo 7. A small selection of the paints manufactured specifically for model makers. There are many others in the marketplace.

for the specific paint being used. Usually this adjustment, once set, doesn't need to be changed unless a different air cap and needle is being used on the spray gun. These professional spray guns usually operate between 30 to 50 psi (because of the larger paint volumes being used) whereas our modeller's airbrushes can often operate down to 15psi, although around 30psi is a good starting point. Generally speaking, the greater the air pressure in pounds per square inch (psi) the more the paint will be atomized.

Paints for spraying

There is no hard and fast rule that says only Type xxxxxx of paint will do! However, from my experience, it is best to stick with known brands. Call it 'playing it safe', but I know how these paints perform when used with an airbrush and that can apply across the board. So, this is down to personal preference and what you are comfortable with. I do avoid the cellulose type of paint, as it attacks plastic (styrene) and can on a warm day be virtually dry as it leaves the airbrush nozzle, giving a horrible finish. On the other hand, no doubt some paint sprayers' are 100% comfortable with it. As a builder of working scale models my needs are tempered to using enamel or acrylic paints, and I guess that is more or less what readers of this magazine use.

Enamel or acrylic?

Enamel paints are oil based whilst acrylic are water based. An example of just some of the paints available that are specifically prepared for modellers and generally work well when used with airbrushes are in **Photo 7.** The choice of paints is not of course restricted to any specific brand mentioned. Enamel or acrylic is also available in larger quantities specifically made to suit the modeller's requirements .

A good example are Phoenix Precision paints manufactured to a BS standard with a specific thinner formulated for the grade of paint and you really can't do better as these paints work well with airbrushes and spray guns, **Photo 8.**

Just a mention here of bespoke aerosol paints. These can be filled with the customer's specific requirements by companies that specialise in this type of paint such as C. J. Aerosols. At the time of writing (August 2014), they were free delivery next day for orders over £25.

Thinners

Although many of the recognisable modelling paints such as Revell or Humbrol recommend their own formulated thinners, in practice there are suitable

Photo 8. Phoenix Precision Paints are blended to a BS standard for the model maker and can be supplied with an appropriate grade of thinners.

Photo 9. Whilst alternative thinners can probably be used for any type and brand of paint, it is desirable that the manufacturer's recommended product be used, and this is an example of the thinners for Lifecolor acrylic paints.

alternatives for enamel or acrylic based paints. When using enamels, for me at least, white spirit works well as an alternative mixed 20% by volume, the only drawback being its longer drying time .

When using an acrylic paint, the thinners can be an isopropanol (isopropyl) alcohol which is an ingredient of windscreen washer fluid, but it's better to use those recommended by the manufacturer as these are formulated specifically for their paints, usually with a ratio 25% by volume added to the paint, **Photo 9.** When using acrylics, the drying times tend to be faster than enamels, therefore the method of application needs to take this into account, especially with regard to the number of coats being applied in a single session. Hobby paint manufacturer's thinners are generally quite expensive and only sold in small quantities, so if you can find the same in bulk, then there will be a cost saving. As a rule of thumb, if the dry finish looks like an orange skin, then your diluted paint is usually still too thick and if it runs all over the job, then it's usually too thin!

Mixing

As a matter of interest, the constituents of enamel paint are the solvent, usually an oil, the pigment for colour and polymers as the binder. In acrylic paint the solvent is water, pigment for colour with polymer emulsion as the binding agent. To be honest, mixing with thinners is more trial and error until you reach a happy medium(!) with which you are confortable for the paints you use,

Photo 10. The mechanical pre-mixing and blending of paints is highly recommended before their use, whatever the means of delivery to the object being painted.

Photo 11. This is the on/off valve on a direct aerosol can connection, with some control over the air pressure, but you have to guess the pounds per square inch (psi).

Photo 12. There is a huge range of compressors available for airbrushes. Some are very basic, such as this one, and require additional fittings such as an air pressure control valve and a moisture trap.

Photo 13. This AS186A middle range compressor comes complete with a pressure regulator valve, the moisture trap and a small three litre capacity air reservoir.

the air pressure generally used and type of spray equipment. However, no matter what type of paint is used the single most important factor is to mix the paint well before use. Most paints respond well to machine mixing and usually a simple battery operated mixer does the job well, **Photo 10.** Such dedicated mixers can be purchased, but with a bit of lateral thinking, a similar device for frothing coffee can be had in Ikea for less than £2!

Compressors

There many different types of compressors available, but before I discuss this subject some words on the use of aerosol propellants. There is no doubt the latter can become an expensive alternative to purchasing a good quality compressor when used a lot, with their other drawbacks which include loss of pressure within the container through use and the aerosol can cooling, thus causing a

drop in pressure. However, for infrequent use, they are a useful alternative and should not be dismissed on price alone, **Photo 11.**

Types of compressors

The old adage comes to mind that you get only what you pay for. There are basic types of compressors that just supply unregulated air, with no moisture trap or pressure regulator. To use a compressor without these fixtures is not impossible, but it certainly affects the ability of the airbrush to deliver the paint effectively, **Photo 12.** Pulsing of the air supply is the problem creating instability at the airbrush. At the other end of the market there are much larger and more powerful compressors such as those from Clarkes and Machine Mart or one can even go down the dental route with those from manufacturers such as Bambi and Titan Precision, together with numerous others from a whole range of manufacturers in-between. Mind you, it has to be said that many compressors look suspiciously similar in specification and appearance and I would imagine they are sourced from the Far East.

Here, we are just looking at the 'hobby' types, which will be adequate for our painting needs, rather than perhaps painting a full-size car or operating other air tools.

Air pressure needs to be regulated and most airbrushes work well between 15 and 30 psi depending on the paint used. From experience I would say the minimum requirement is a compressor that will deliver air at up to 40psi and has:

1) A pressure regulator.
2) A moisture trap and a draining facility.
3) An air tank of some sort.

The advantage of the air tank is that it will provide a constant output of air with no pulsing. Without such a reservoir, the compressor will pulse

air which makes controlled spraying very difficult. Once the reservoir (tank) has reached a preset pressure, then the motor (and pump) will cut out and restart only when the pressure falls below a certain level, thus constantly maintaining the pre-set operating pressure. The moisture trap ensures that moisture does not pass through the air line to mix with the flow of air and paint at the airbrush or spray gun.

An example of a reasonably priced combined compressor is the AS186, with a three litre reservoir tank, pressure regulator, moisture trap and air filter, retailing at around £75, from S. M. Designs, **Photo 13** (website and address at the end). Moving slightly up market there is the Iwata Smart Jet Plus (from the Airbrush Company - website details at end of article) which has a piston compressor which is amazingly quiet. This company advertises regularly in this magazine. One of the novel features of this compressor is the air reservoir which is actually the handle, providing 450cc of capacity. This compressor when fitted with a multiple outlet manifold is capable of operating two airbrushes at the same time, **Photo 14.** Like many hobby compressors, there is a time limit on its continuous usage which is referred to as the 'Duty Cycle' and for the Smart Jet Plus this is 40 minutes of continuous use, then it must rest for 20 minutes. Of interest is the outlet pressure regulator, **Photo 15,** something that is essential in my view.

Going up market somewhat is this virtually silent (52 decibels) compressor by Titan Precision, **Photo 16,** which is a much larger type that has a tank capacity of 22 litres, free air delivery of 2.1 cubic feet per minute and pressure of up to 8 bar (115psi), but is in fact not much more expensive that a specialist dedicated airbrush unit, being just £299 at the time of writing from an online supplier.

So, it is a matter of choice: little or large; quiet or noisy; frequency of use and price you want to pay. Perhaps more important, is the question of whether you intend to use the compressor for other purposes such as the pumping-up of car tyres or specialist air-tools. Personally, having a supply of compressed air is invaluable when wanting to keep something one is making clean of dust, and a 'blow-gun' attached to the air-line is great for this, but it needs more air than the average hobby compressor can deliver. Anyway, all of these are considerations, but please look around for what is best for you bearing in mind your current and future needs as well as operating location from a noise point of view.

"So, it is a matter of choice: little or large; quiet or noisy; frequency of use and price you want to pay"

Photo 14. The Smart Jet Plus is one of the top of the range compressors from Iwata an would you have guessed that the handle is the 450cc air reservoir?

Photo 15. By pulling the pressure regulator valve knob upwards, it can be turned to adjust the level of air pressure required, which is then indicated on the gauge. The knob can then be locked down to securely maintain the desired output pressure.

Photo 16. The Titan Precision 22l oil free silent compressor. Not cheap, but capable of a range of 'air' uses and quieter than a refrigerator motor when running.

Photo 17. In the absence of a large spray booth I restrict big jobs for airbrushing to 'out of doors' in the warm months, but still wear a suitable face mask. I know of some modellers who erect a walled gazebo, to enable an external wind-free, dry and warm environment, without causing domestic upheaval! Inexpensive gazebos can be had online quite easily.

Photo 18. Here a single-action airbrush is being used where the needle adjustment at the end of the barrel is adjusted to reduce or increase the amount of paint delivered to the job, in this case one of HMS Daring's funnels.

Photo 19. Many small fittings are arranged here on a circular turntable, as used by cake makers, which is an efficient and convenient method for airbrushing numerous similarly coloured fittings.

Photo 20. Spraying paint requires that for most jobs good masking is very important, especially when using aerosol paints which tend to deliver large volumes of paint, or the basic airbrushes, with no actual paint flow adjustment.

Using an airbrush

Airbrush technique is more of a craft than a science and has a learning curve element that requires practice to gain the best results. There are other more mundane tasks such as the cleaning of the airbrush tool which is very important for its efficiency, as to neglect this at your peril, means you will soon have a non-functioning device on your hands.

The prime purpose of the airbrush is to transfer paint in even proportions over a given area to gain the best possible finish or desired effect and there are endless tutorials on the Internet and books available to the model maker, with even specially arranged real time hands-on tutorials. Yet very few, if any, devote much to the larger scale working model boat or scale ship. This is not an omission as the main focus for airbrushing is directed towards smaller scale static models such as 1:72 aircraft and 1:35 military dioramas etc. To be honest, there is no substitute for having a go and self-tutoring, although some distributors do organise tutorials which can be beneficial.

Preparation

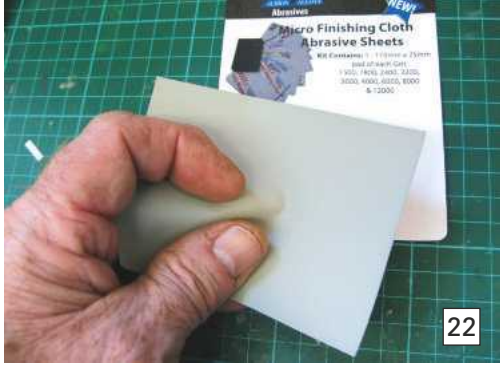
Whatever paint is used, airbrushing and/or spray painting should be undertaken in an environment where the vapour and fumes can be either extracted or dispersed safely away from the operator area. I have a DIY cubical which is small, but ideal for the fittings and smaller superstructure components of the sort of models that I build. When larger surfaces such as a hull or main superstructure block requires spray painting, personally I do it outdoors, obviously selecting a suitable day! This is not the most convenient of environments, but at least any vapour disperses quickly and I can cover the entire model without any obstructions or needing to rearrange its position. Yet even in an open well-ventilated area, a suitable mask is still essential, **Photo 17,** and do the protect the garden furniture!

Masking?

There is no substitute for good masking, as the airbrush tool is quite unlike a conventional brush, as even at the finest spray pattern setting, paint may well go beyond the intended area to be painted. So, careful use of masking tape will be important on multi-coloured objects and is as important as getting the right mix of paint and the air pressure setting correct, **Photo 18.**

On many models there are usually a large number of small fittings which are better airbrushed together (off the model) rather than individually, and this is where the airbrush tool really does come into its own. Hand painting large numbers of fittings can be tedious if not a hugely time-consuming process. The airbrush can do the same task in less time and usually giving better paint coverage and depth of colour. I think it was Brian King who remarked that to brush paint railings would require ten times the thickness of paint if applied by brush compared to the single thickness of a spray application. Not quite as simple as that of course, but basically you need far more brushed coats to get the same depth of colour.

Small fittings can be placed on a revolving tray meaning there is no need to move the airbrush as the tray rotates ensuring an even distribution of paint, **Photo 19.** And the revolving tray? Well it is a rotating cake stand of the type you buy as a cooking accessory.



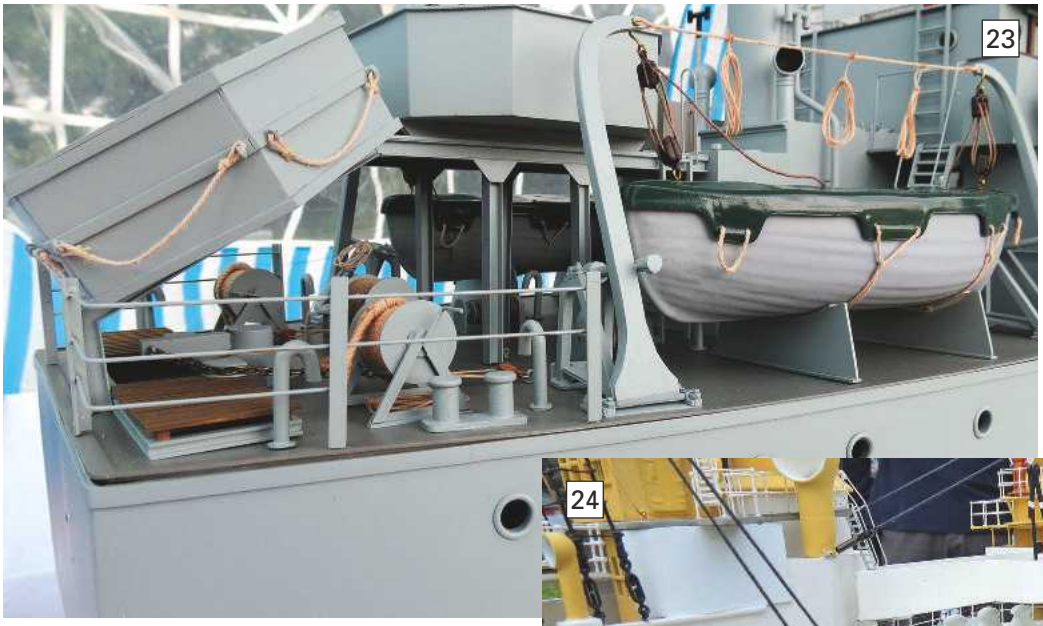


Photo 21. A selection of the ultra-fine micro finishing cloths from Albion Alloys. Note the finest grade!

Photo 22. The micro cloths from Albion Alloys can improve even a very good airbrushed surface, but more usually, they remove or conveniently blend in any slight surface blemish.

Photo 23. This fine model of a Chant coastal tanker built by Brian Cowell has been painted throughout by standard car touch-up aerosol paints.

Photo 24. Airbrushing in skilled hands will produce top-class results as with this model of HMS Inflexible by Brian King.

As mentioned earlier, I still use the single action, siphon feed airbrush and for some jobs it still performs perfectly well as in **Photo 20** where it is being used to paint the boot topping on HMS Daring.

Finishing?

An airbrush combined with a good compressor and suitably well mixed paint can produce excellent finishes whether the surface be uninterrupted, detailed or even a complex camouflage representation. However, even when a surface is well prepared and carefully painted, the result can have minor and irritating blemishes, or there may be a need to further 'even-off' the surface. For this purpose, the Micro Finishing Clothes from Albion Alloys are another useful tool to have in the box. These superfine grades of paper are ideal for improving even the best airbrushed surfaces, **Photos 21 and 22.** Note the 'grit' values of 1500 to 12000, the latter being very, very smooth.

Achieving a good finish is not confined to an airbrush, because aerosol paints used effectively and in accordance with their instructions can deliver some superb results as in **Photo 23** of this 1:32 scale Chant tanker. However, by contrast, complex models such as this excellent top-class model of HMS Inflexible built by Brian King has been painted almost exclusively using an airbrush, **Photo 24.**

Cleaning?

A dirty airbrush, or indeed any spray painting tool, inevitably means the paint finish will not be as good as it could be.

Stage one

'Good maintenance' are the watch words when it comes to keeping an airbrush functioning properly. On completion of the spraying session don't put the airbrush tool to one side, even for a short period, as there will be a good chance that paint residue will lodge within its internal parts, thus actually making it more difficult to clean at a later time. As a basic first step to cleaning, have a small container of cleaning agent, be it white spirit, turpentine, water or cellulose thinners, all being dependent on what the airbrush has recently been spraying.

For me, immersing the nozzle end of the airbrush tool in the cleaning agent and allowing air and the agent to circulate within the nozzle area will remove most of the paint deposits that remain within it, **Photo 25.** For those of us working in enclosed spaces, such as a spare domestic room, there are cleansing bowels into which the nozzle end of the airbrush can he placed to spray out this residue into the closed container, **Photo 26.**

Photo 25. Immediately after use, the first stage of cleaning is to immerse the airbrush in a cleaning agent and allow both air and the cleanser to circulate.

Photo 26. This device allows the user to spray unwanted paint (and cleansing) media through the airbrush into a container for later safe disposal.

Photo 31. This is another proprietary airbrush cleaner solution. Finally fill a clean jar if your using a siphon airbrush, or for a gravity feed fill the header bowel, with a good quality cleaner (you could just use cellulose thinners), and pass air and cleaner through the airbrush internal air channels. Your airbrush will then be clean and ready for next time.

Photo 27. The second more intensive stage of airbrush cleaning is to completely dismantle it when possible, and clean the component parts separately.

Photo 28. Liquid Reamer is formulated to remove even the more stubborn paint deposits from within an airbrush's body.

Photo 29. Foaming Airbrush Cleaner is ideal for cleaning an airbrush after using acrylic paints.

Photo 30. The final stage involves cleaning orifices with specialist brushes as some paint deposits may have dissolved but remain within the airbrush body.

Stage two: Dismantling the airbrush

The second step is usually to dismantle the airbrush down to its component parts. Here care needs to be taken when withdrawing and replacing the needle from the barrel of the airbrush. Sets of cleaning brushes are a good investment and can be really handy. Also, if you are using a siphon feed arrangement from a jar, remove any unused paint to a sealed container for possible later use.

Fill the paint container (normally a small clear jar) with a cleaning agent and clean everything as the plastic tube from the top into the bottle can retain paint and be easily blocked,

Photo 27. For the very basic airbrushes which cannot be dismantled (such as that shown in Photo 2, Page 86) all that is required is to circulate cleaning agent from the bottle as if spraying and use a very fine wire to ensure that there are no deposits of paint remaining in the outlet .

Stage three

Proprietary brands of cleaner are available which help to remove or dissolve any paint that the earlier cleaning sessions failed to remove. For example there is a Liquid Reamer, **Photo 28** which clears hardened deposits and a Foaming Airbrush Cleaner, **Photo 29,** formulated to deal with acrylic paints which can be troublesome if neglected. With the airbrush parts exposed, the mentioned cleaners can be safely injected into all the nozzle and orifice parts of the airbrush, **Photo 30.** I should say though that you do not want to get cleaning agent into the air valve as its rubber seal could be affected. Also, you must make 100% sure there is no cleanser left within the airbrush when you start painting again, otherwise the first blast of air and paint could be air and paint solvent which would inevitably damage the exiting paint finish or prevent the drying of a subsequent paint application. To complete this section, **Photo 31** is of another proprietary cleanser, but it is worth bearing in mind that conventional cellulose 'gun cleaner', normally bought in five litre cans for around £10 from a car paint supplier will pretty much dissolve anything, but the smell can be offensive domestically!

Conclusion

An airbrush, regardless of cost is a very useful tool, but like any tool requires a level of maintenance and there is no substitute for a good cleaning regime. Some of you may consider the maintenance not worth the effort and others will achieve equally good finishes from a range of good quality brushed paints or aerosols. That's fine, as airbrushing and spraying is not to every modeller's taste, yet those that have an airbrush and as soon as they have mastered the basics, tend to never look back.

I hope this short article answers some of your frequently asked question, but don't be discouraged if you don't get it right first time as there is an 'art' in spraying paint, and practice makes perfect. What is also certain though, is that a cheap double action airbrush with three needles and nozzles will inevitably not be as good as an equivalent from a well known brand such as Badger, Iwata and Paasche to name a few, so that is something also to bear in mind. Also, military modelling and plastic modelling magazines frequently have articles on this very subject, so they are another source of useful information apart from books and the internet.

Website references

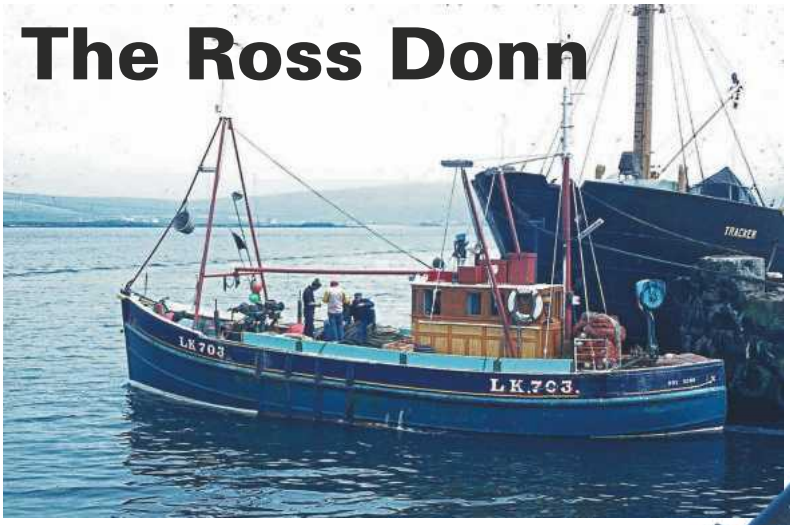
The Airbrush Company:	www.airbrushes.com
Phoenix Precision Paints:	www.phoenix-paints.co.uk
Albion Alloys:	www.albionalloys.co.uk
C. J. Aerosols:	www.customfilledaerosols.co.uk
Everything Airbrush:	www.everythingairbrush.com
Titan Precision:	www.titanprecision.co.uk
Machine Mart (& Clarkes):	www.machinemart.co.uk

Thanks to Lisa Munro at The Airbrush Company of Lancing, West Sussex, who provided some of the sample products illustrated here.

Model Boats Next issue

The Model Boats December 2014 issue is on sale on the 5th December 2014

The Ross Donn



HMS Trafalgar

This Issue includes a Full-Size Complimentary Free Plan for the 50 foot trawler Ros Donn, presented by James Pottinger, and the Plastic Magic radio control conversion of the Airfix HMS Trafalgar by Tony Dalton.

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

We have a great range of subscription packages that you can choose from, including **our new Print + Digital package** which give subscribers 13 issues a year with 6 free plans, 13 digital editions to download and keep PLUS access to an Online Archive dating all the way back to January 2007.

Don't forget! The December 2014 issue will be published on **5th December 2014** price £4.50 – don't miss it! Order your copy now! Or better still why not make it your first copy in a year's subscription to ***Model Boats*** magazine? See our subscription offer on **Page 32** in this issue…

If you can't always find a copy of this magazine, help is at hand! Complete this form and hand in at your local store, they'll arrange for a copy of each issue to be reserved for you. Some stores may even be able to arrange for it to be delivered to your home. Just ask!

Please reserve/deliver my copy of ***Model Boats*** on a regular basis, starting with issue.....

Title..... First name.....

Surname.....

Address.....

.....

.....

Postcode.....

Telephone number.....

If you don't want to miss an issue Just ask!

Contents may be subject to change.

SCALE HOBBIES

UNIT 20 , SANDY LANE, SKELMERSDALE , WN8 8LQ

Opening times – Fri & Sat

9.30am-5pm.

www.scalehobbies.net

We stock a large range of **Robbe** fittings plus 1000's of others available

We also have a large selection of radios in 2.4ghz , including **Planet T5 and Pulse etronix** radios in stock

We have a large range of hulls that we manufacture in fibre glass , this is a small selection , please ring for more details

Moorcock £55.00 1/32 scale with plan

German Harbour Tug with plan £45.00

Searcher - Custom and Excise Launch with plan £45.00

Applegarth 36" with plans £58.00

Hazelgarth 40" 1/32 with plans £64.00

Eldergarth /Rowengarth 1/32nd £64.00

TID tug 1/24th with plan £55.00

We get regular shipments Of Graupner fittings

Building materials and tools are also available

MTRONIKS

Speed controllers

Full range of viper speed controllers

Plus

Many others available

NEW MOULDING

S Class Manchester ship canal tug, 1957 Hull, Superstructure and bridge in fibreglass with plan £ 100.00

Mail order is available for all of our products

Please ring for prices
01695 732800

www.nylet.co.uk

1932 - 2014 The longest established model sailmakers in the world!

IOM yacht kits "THETIS" – also "SPIRIT 3" available in semi-kit or full kit with rig/s; *prices start at under £400.*

Finest IOM sails in racing scrim, film, or white Dacron. Sails made to your sizes. Replacement kit sails (Voyager 2, Victoria, Seawind, Fairwind etc).

Large range of deck & mast fittings, wires & sheeting cordage, brass & st. steel screws, alum tubing, IOM rig carry bags, Nylet 'how to' booklets.

Finest NYLET cotton sails & Vintage yacht restoration service. NEW sail winches, see website: www.nylet.co.uk

Latest 36 pg **CATALOGUE** send 10 x 1st cl. stamps (UK). MINI CAT. 4 x 1st cl stamps (UK).

One of many customer comments:

Sails arrived in Australia safely, they look superb and I must now complete the yacht; thanks. Geoff.

NEW PHONE NUMBER

tel/voice: 07474 939 535 (Int +44 7474 939 535)

Fast world-wide mail order
PayPal® & VISA accepted

1932
82 years
NYLET
www.nylet.co.uk

NYLET
(MB14)
P.O. Box 5416
Bournemouth
BH6 5XT
U.K.

BERKSHIRE

WINDSOR
Mantua Model UK Ltd 179 Dedworth Rd,
Winsor SL4 4JN **www.mantuamodel.co.uk**
Tel: (01753) 856321 Fax: (01753) 857444
Specialist in cars, planes, boats, Tools and Wood centre
Mon - Sat: 9.30am-6.00pm

LANCASHIRE

SKELMERSDALE
Scale Hobbies Unit 20, Sandy Lane, Skelmersdale, Lancashire WN8 8LQ. Tel/Fax: (01695) 732800
Mon-Sat. 9.30am -5.00pm. Closed Tues & Thurs
Mail Order! • Building and Repair Service
ALL MAJOR CREDIT CARDS ACCEPTED!

LEICESTERSHIRE

LEICESTER
Midway Models
157 St. Leonards Rd, Leicester LE2 3BZ
Tel: (0116) 2701609
For boats & fittings. Catalogue: £3.50 UK £5 Overseas.
Tues - Sat: 9.30am-5.30pm

TYNE & WEAR

Gladston's North Shields Model Centre
99, Bedford Street
North Shields
Tyne and Wear
NE29 6QJ
T: 0191 257 0335
F: 0191 257 4546
W: www.modelkit.co.uk
E: sales@modelkit.co.uk
Mon-Sat 9am-5pm
Mail order available
Boats, subs, cars, aircraft, helis, static or RC. Materials, tools, accessories, we just about have the lot !

THE DOLLS HOUSE EMPORIUM

EST 1979

1000s of NEW items added from leading brands!

Order at www.dollshouse.com or call 01332 912989 now!

Many more offers online at **dollshouse.co.uk/modb16**

Now with 1000s of NEW items from your favourite miniature brands!

feefo

98% service rating for the past 6 months

facebook.com/dollshouseemporium

twitter.com/dollshouse

pinterest.com/dollshouses

dollshouseforum.co.uk

dollshouseblog.co.uk

FREE POSTAGE AND PACKING on orders over £40*

Good to know: *We share our customers' enthusiasm for their hobby – regularly posting pictures of their projects online on our company blog. Quite simply, it's something we enjoy!*

100s more items on offer only online! visit www.dollshouse.co.uk/modb16 to order or call 01332 912989 now!

Casting Kit

Everything for resin casting

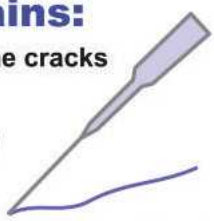
Make **super-detailed** resin casts of carriages, figures, buildings, fittings - just about anything.

Long life silicone rubber moulds & professional resins for detailed casting.

Superglue Bonding Kit

Comprehensive Kit Contains:

Thin: for bonding fine gaps and hairline cracks
Medium: general purpose bonding
Thick: gap-filling and accurate bonding
Activator: for instant curing
Precision Nozzles for pin-point application



Precision Nozzle

Styrene Profiles

Huge range of scale plastic profiles

- Hundreds of shapes and sizes to choose from
- Comes in lengths up to 100cm

Pin Vices & Micro-Drills

Metric Sizes 0.3 to 1.6mm
Number Sizes 61 to 80

Precision Angle Sander

Perfect for sanding angles on plastic profiles & Plastikard

- Sand wood, plastic & metal at precise angles
- 40mm sanding depth
- With 3 spare bands
- Made in Britain

Plastikard

Plain & embossed styrene sheets in a wide choice of patterns including tread plate, bricks stone, paving, roof tiles...

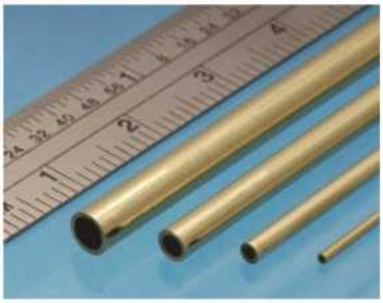
Work Holding

Wide range of Work Holders & Vices for every application

Multi-Angle Guillotine

- Cut wood, plastic, balsa, card, white-metal etc
- With spare blades and cutting anvil
- Made in Britain

Metal Profiles



High precision Micro Tubes, Rods, Angles, Sheets, Strips, U-Channels & C-Channels.

OVER 800 NEW TOOLS ONLINE

Mtroniks

marine rc products for all

24 month warranty

NEW! SOUND MODULE FROM Mtroniks

Why buy a sound module from Mtroniks?

The new digiSOUND5m sound module from Mtroniks is the worlds first 100% waterproof, plug in and go, realistic sound module designed specifically for the RC model boat market.
It is easy to install and even easier to set up.....because there is no set up! You simply plug it in and use your model as normal, only now it will sound real!!
Features:

- 100% waterproof
- Incredible small size and weight
- Built in amplifier
- 6 to 12V operation
- Realistic sound reproduction taken from real boat engines
- Volume control
- Plug and go operation
- No set up or PC interface to confuse
- Auxilliary horn sound
- Splashproof speaker and all connections included

digiSOUND5m
SRP £59.99

Why buy from the Mtroniks marine range of speed controllers?

All Mtroniks marine controllers are 100% waterproof, all have a built in failsafe, all have intelligent current limiters. These three features make the Mtroniks marine controllers the safest and most reliable on the market.
With the addition of the new tio marine controllers, that include LiPo battery support, to the already existing Viper range, there is now a speed controller for every type of model boat and every type of model enthusiast.
Features:

- 100% Waterproof
- Built in failsafe
- Current limit protection
- 6 to 12V operation
- Lipo safe (tio controllers only)
- Forwards/Reverse - Symmetrical
- 5.0V/1.2A BEC
- Ultra fine throttle response and slow control

For more info see www.mtroniks.net

NEW! tio
Marine speed controllers
Li-Po battery support!

SRP £26.99

SRP £39.99

SRP £22.99

SRP £22.99

SRP £27.99

SRP £34.99

SRP £49.99

25 years of know how

Mtroniks marine products are available from all good model shops, we are always available for advice direct

High quality speed controls designed and manufactured since 1987 in the UK

Mtroniks marine speed controllers
41A Ilkley Road, Otley, LS21 3LP, UK
Tel: +44(0)1943 461482 Fax: +44(0)1943 468335
www.mtroniks.net
enquiries@mtroniks.net