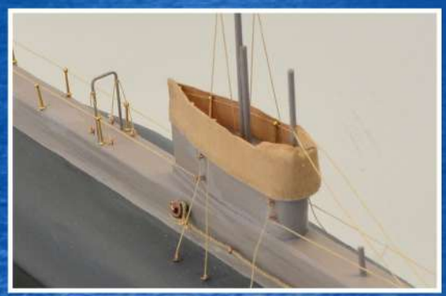
AUSTRALIAN WOODEN MODEL KIT

HMA SUBMARINE AE2 1914

SCALE 1:90



LENGTH: 630mm HEIGHT: 260mm WIDTH: 80mm

ITEM CODE: KTMS1018

Modellers Shipyard

www.modelshipyard.com.au

BUILDING INSTRUCTIONS

Version 1.0

1.0 Introduction

Modeller's Shipyard is proud to present another wooden model ship in our series that have significance to Australian maritime history. We are the only manufacturer of wooden model ships in Australia.

2.0 Historical Notes

HMAS *AE1 & AE2* (originally known as *AE1 & AE2*) were an *E*-class submarine of the Royal Australian Navy (RAN). The two submarines were ordered for the fledgling navy and were built by Vickers Armstrong in England and commissioned into the RAN in 1913. Both submarines then sailed to Australia in what was, at the time, the longest voyage ever undertaken by a submarine.

The *E*-class submarine was a version of the preceding *D*-class submarine enlarged to accommodate an additional pair of broadside torpedo tubes. *AE1 & AE2* were 181 feet (55.2 m) long overall, had a beam of 22 feet 6 inches (6.9 m) and a draught of 12 feet 6 inches (3.8 m). Each boat displaced 750 long tons (760 t) on the surface and 810 long tons (820 t) submerged. The *E*-class boats had a designed diving depth of 100 feet (30.5 m), but the addition of watertight bulkheads, strengthened the hull and increased the actual diving depth to 200 feet (61.0 m). The crew consisted of 34 officers and ratings.The boats had two propellers, each of which was driven by an eight-cylinder, 800-brake-horsepower (600 kW) diesel engine as well as a 420-brake-horsepower (313 kW) electric motor. This arrangement gave the *E*-class submarines a maximum speed of 15 knots (28 km/h; 17 mph) while surfaced and 10 knots (19 km/h; 12 mph) submerged. They carried approximately 40 long tons (41 t) of fuel oil that gave them a range of 3,000 nautical miles (5,600 km; 3,500 mi) at 10 knots (19 km/h; 12 mph) while on the surface and 65 nmi (120 km; 75 mi) at 5 knots (9.3 km/h; 5.8 mph) while submerged. AE1 & AE2 had four 18-inch torpedo tubes, one each in the bow and stern, plus two on the broadside, one firing to port and the other to starboard. The boat carried one spare torpedo for each tube. No guns were fitted.

HMAS *AE1* (originally known as just *AE1*) was an *E*-class submarine of the Royal Australian Navy (RAN). She was the first submarine to serve in the RAN, and was lost at sea with all hands near East New Britain, Papua New Guinea, on 14 September 1914, after less than seven months in service. The wreck of the submarine has never been found, despite several searches.

AE1 was laid down by Vickers Armstrong at Barron-in-Furness, England on 14 November 1911, launched on 22 May 1913. She was commissioned into the RAN at Portsmouth, England, on 28 February 1914 under the command of Lieutenant Thomas Besant, RN. After commissioning, *AE1*, accompanied by her sister ship *AE2,* reached Sydney from England on 24 May 1914. Both submarines were crewed by Royal Navy (RN) officers with a mixed crew of sailors drawn from the RN and RAN.

After the start of World War I, *AE1 & AE2* were sent to German New Guinea with the Australian Naval and Military Expeditionary Force. Both boats took part in the operations leading to the occupation of the German territory, including the surrender of Rabaul on 13 September 1914. *AE1*'s involvement was recognised following an overhaul of the RAN battle honours system in 2010: *AE1* Retroactively received the honour "Rabaul 1914".

At 07:00 on 14 September, *AE1* departed Blanche Bay, Rabaul, to patrol off Cape Gazelle with HMAS *Parramatta.* When she had not returned by 20:00, several ships were dispatched to search for her. No trace of the submarine was ever found, and she was listed as lost with all hands.

It is probable that she was wrecked on a reef or other submerged object. As well as Lieutenant Commander Thomas Besant, 2 other officers and 32 sailors were lost in this disaster. The disappearance was Australia's first major loss of the World War.

The Maritime Museum of Western Australia, sponsored by the Australian Broadcasting Corporation, launched an unsuccessful attempt to locate the submarine in November 2003. The search area was concentrated to the south-east of the Duke of York Islands. In February 2007, a new effort to locate the submarine was mounted by the RAN, when the survey ships Benalla and Shepparton attempted to locate the submarine off East New Britain, based on data compiled over the previous 30 years. Benalla located an object of the appropriate dimensions using sonar on 1 March. Later identification conducted by HMAS *Yarra* found the object to be a rock formation with similar shape and dimensions to a submarine. Between 6 & 9 September 2014, *Yarra* undertook another search around the Duke of York Islands, prior to a memorial service for the centenary of the submarines disappearance. Although numerous sonar "contacts of interest" were made during the search, most were identified as natural terrain. One sonar contact has been marked for future investigation.

HMAS *AE2*

After the start of World War I, *AE2* was sent to German New Guinea with the Australian Naval and Military Expeditionary Force, then spent time patrolling around Fiji. With no need for submarines in the Pacific or Indian theatres, *AE2* was towed to the Mediterranean, and arrived off Egypt in early 1915.

The boat was assigned to the Dardanelles Campaign, and was the first submarine to successfully penetrate the waterway and enter the Sea of Marmara. With orders to "run amok" inside Turkish territory, *AE2* operated for five days before mechanical faults forced her to the surface, where she was damaged by the torpedo boat *Sultanhisar*. The submarine was scuttled by her crew, all of whom were captured.

AE2 was the only RAN vessel lost to enemy action during World War I. The Rahmi M. Koç Museum began searching for the wreck in 1995, and found it in 1998. After another expedition in 2008, the Australian and Turkish Governments decided to leave the boat in place.

AE2 was laid down on 10 February 1912 by Vickers Armstrong at Barrow-in-Furness, England, and launched on 18 June 1913. She was commissioned into the RAN at Portsmouth, England, on 28 February 1914 under the command of Lieutenant Henry H.G.D. Stoker, RN.

Accompanied by her sister boat, *AE1*, the other of the RAN's first two submarines, *AE2* reached Sydney from England on 24 May 1914, manned by Royal Navy (RN) officers with a mixed crew of sailors drawn from the RN and RAN. The 13,000-nautical-mile (24,000 km; 15,000 mi) was, at the time, "the longest submarine transit in history", and 60 of the 83 days of the voyage were spent at sea.

On the outbreak of World War I in September 1914, the two submarines were assigned to the Australian Naval and Military Expeditionary Force as it captured German New Guinea. During the capture of New Guinea, *AE1* disappeared without a trace. After the German surrender, *AE2* spent three weeks patrolling around Fiji with the battle cruiser *Australia*, then returned to Sydney on 16 November for maintenance and repairs. As *AE2* was the only submarine in the region and the German threat to Australia had disappeared, Stoker suggested that the boat be transferred to Europe. Both the RAN and the British Admiralty agreed, and on 31 December, she left Albany with AIF Convoy 2 (under the tow of SS *Berrima*). The submarine was the only warship assigned to the sixteen-ship convoy, as after the Battle of Cocos resulted in the destruction of the last active German ship in the Indian or Pacific Oceans, the Admiralty felt no need to protect shipping in the Indian Ocean. *AE2* arrived in Port Said, Egypt, on 28 January 1915, and was ordered to join the British 2nd Submarine Flotilla, and proceeded to take part in patrols in support of the Dardanelles Campaign.

On 10 March, the submarine ran aground off Mudros when returning from a patrol, as the harbour lights used to aid navigation had been switched off in *AE2*'s absence, which Stoker was not prepared for. The submarine was towed to Malta for repairs and returned to operation in April.

The aim of the Dardanelles Campaign was to knock Germany's ally, the Ottoman Empire, out of the war and open up supply lines to the Russian Empire via the Black Sea. Attempts to open the Dardanelles through naval power were unsuccessful, three Allied battleships were sunk, and another three crippled, during a surface attack; although the British submarine HMS *B11* was able to enter the strait and sink the modernised ironclad *Mesudiye*, two failed attempts to traverse the waterway and enter the Sea of Marmara resulted in the loss of HMS *E15* and the French submarine *Saphir* to mines and strong currents. Plans were made to capture the Turkish defences by a land attack, with landings at Cape Helles and Anzac Cove. Despite the failures of *E15* and *Saphir*, Stoker planned his own attempt, which was approved by the Allied fleet's commander, Vice Admiral John de Robeck.

AE2's first attempt was made early on 24 April, but the boat only made it 6 nautical miles (11 km; 6.9 mi) into the strait before the forward hydroplane coupling failed, making the submarine impossible to control underwater and forced Stoker to retreat. At 02:30 on the following day, Stoker made a second attempt. The submarine was spotted by shore artillery and fired on from about 04:30; Stoker ordered the boat to dive to avoid the shells and to traverse the first minefield.

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AE2 spent the next hour picking her way through the mines' mooring cables: defensive wires that had been welded to the submarine in Malta prevented the mooring cables from catching. By 06:00, *AE2* reached Chanak, and proceeded to torpedo a Turkish gunboat believed to be a *Peyk-i Şevket*-class cruiser while simultaneously taking evasive actions to avoid an enemy destroyer. The submarine ran aground beneath a Turkish fort, but the fort's guns could not be lowered enough to fire, and *AE2* was able to free herself within four minutes. Shortly after, the submarine's periscope was sighted by a Turkish battleship firing over the peninsula at the Allied landing sites; this prompted the ship to stop firing and withdraw. *AE2* advanced toward the Sea of Marmara, and at 08:30, Stoker decided to rest the boat on the ocean bottom and wait until nightfall before continuing.

At around 21:00, *AE2* surfaced to recharge her batteries, and Stoker radioed his success back to the fleet; the first Allied vessel to transit the Dardanelles. Stoker had orders to "generally run amok", and with no enemies in sight, he ordered the boat to enter the Sea of Marmara. Although the landing at Cape Helles was going well at the time Stoker reported in, the landing at Anzac Cove was not as successful, and the commander of the Australian and New Zealand Army Corps, Lieutenant-General Sir William Birdwood was pushing for reembarkation of his troops. Some sources identify *AE2* as one of the factors leading to Birdwood's decision to commit to the attack, although the Australian War Memorial claims there "is no real evidence" to support this.

The submarine made appearances across the Sea of Marmara over the following five days to give the impression of multiple boats, and several attacks against Turkish ships were made, although all failed because of increasing mechanical problems. News of the submarine's successes was spread to the soldiers ashore to improve morale. On 29 April, *AE2* met *E14*, one of several submarines that had entered the Dardanelles following the Australian boat's successful attempt. The submarines arranged a rendezvous for the next morning. When *AE2* reached the rendezvous point on 30 April, smoke from the torpedo boat *Sultanhisar* was sighted, so the submarine inexplicably rose and broke the surface. While diving to evade, the boat passed below her safe diving depth; frantic attempts to correct this caused the submarine's stern to break the surface. *Sultanhisar* immediately fired on the submarine, puncturing the pressure hull in three places near the engine spaces. Stoker ordered the boat's company to evacuate, and scuttled *AE2* at 10:45'. All personnel survived the attack and were captured by *Sultanhisar*, although four died from illness while in captivity.

AE2's achievements showed others that the task was possible, and within months Turkish shipping and lines of communication were badly disrupted, with supplies and reinforcements for the Turkish defence of Gallipoli forced to take underdeveloped overland routes. *AE2* was the only RAN vessel to be lost as a result of enemy action during World War I, and along with sister boat *AE1*, the total of the RAN's operational losses in the war.

The exact final resting place of the *AE2* was unknown. However, after three-years of exhaustive research and searching relevant areas of the Sea of Marmara, Selcuk Kolay OAM, Marine Archaeologist discovered the *AE2's* resting place on 11 June 1998. On 2 July 1998 he dived to the site and reached out and touched the starboard side exhaust pipe of the *AE2* - he was 72-metres down on the floor of the Sea of Marmara, the first person to see or touch the *AE2* in 83 years.

By 2007 an *AE2* Commemorative Foundation had been established whose primary function was to tell the story of the *AE2's* exploits in the 1915 Gallipoli campaign. A further goal was to target the Centenary of Anzac and Gallipoli on 25 April 2015, to ensure the *AE2* would take her rightful and prominent place in the Gallipoli legend. The *AE2* is the last tangible relic of that conflict.

For further information on the *AE1* and *AE2* the reader is referred to:

1. Brenchley, Elizabeth & Fred “Stoker’s Submarine” Australian Teachers of Media Fourth Edition 2013
2. Spurling, Kathryn “The Mystery of *AE1*: Australia’s Lost Submarine and Crew” CanPrint Communication 2014.
3. Australian National Maritime Museum - Signal Quarterly September - November 2014: “Saying prayers at the bottom of the sea” & “Project Silent Service”
4. Submarine Institute of Australia: www.submarineinstitute.com
5. AE2 Commemorative Foundation: www.ae2.org.au
6. Australian National Maritime Museum - Signal Quarterly December - February 2015-2016: “the ocean bed their tomb”, “What happened to AE1” & “Dardanelles Defender”

3.0 General Instructions

These instructions and kit are designed to make the construction of the model as trouble free as possible. Everyone who completes their model in accordance with these instructions and using the materials supplied will have good cause for pride and satisfaction in their achievement.

1. It is **essential** that the modeller study these instructions and associated photographs thoroughly before commencing construction. While reading these instructions, familiarise yourself with the contents of the kit.

2. Parts are numbered in the approximate order of assembly—note there are some minor variations in this numerical order. Parts are identified as, for example P25 — means Part No 25.

3. Few, if any, parts can be simply glued in place without some preparation. Always dry fit parts and if necessary reshape the parts before final gluing.

4. Don’t hurry. Take your time. If you are uncertain of anything take the time to study the instructions, the photos and your kit parts. Most problems will be overcome with a little time spent pondering the issue at hand.

5. Check the contents of the kit against the Parts List. Note that some parts need to be made by the modeller from the stock of timber supplied in the kit.

6. The construction of this wooden model kit can be divided into the following steps.
   - Frame Assembly
   - Hull Planking
   - Hull Finishing & Painting
   - Fittings & Rigging

These written building instructions are to be followed to build your model.

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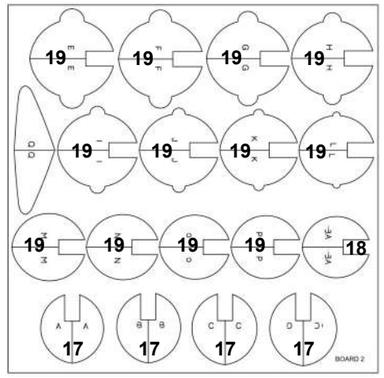
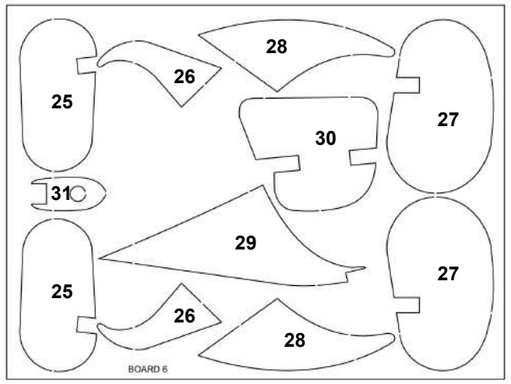
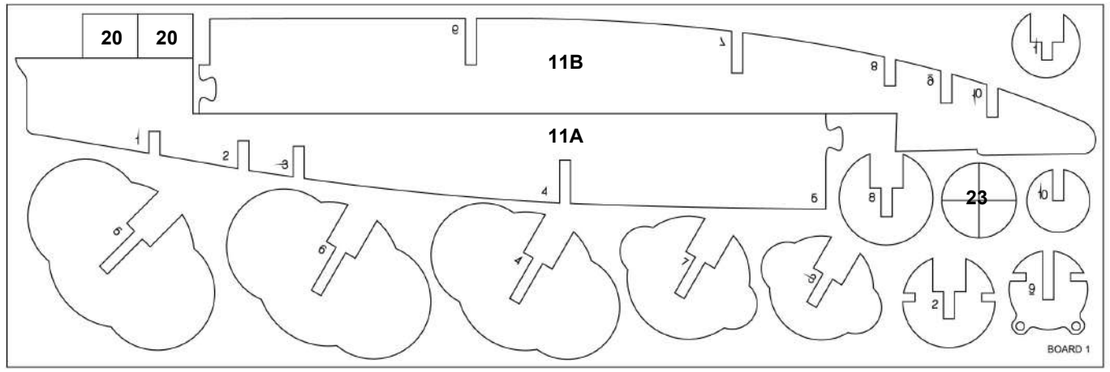
4.0 Parts List (Modeller's Shipyard reserves the right to make changes to the instructions, components &/or kit contents at any time without notice)

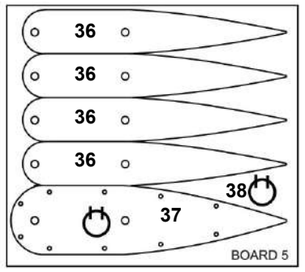
Part No	Description	Quantity	Material
1-10	Bulkheads	10	Board 1
11A/B	Keel	2	Board 1
12A/B	Stiffener Box	4	Board 3
13A/B	Deck	2	Board 3
14	Conning Tower Base	1	Board 3
15	Stiffener box crosses	5	Board 3
16	Stiffener box separators	2	Board 3
17A-D	Filler blocks - fore	8	Board 2
18	Bulkhead 3A	2	Board 2
19E-P	Filler blocks - aft	24	Board 2
20	Bow Blocks	2	Board 1
21	Stern Blocks Q	2	Board 2
22A	Limewood 1x4x400mm	50	Timber Stock
22B	Limewood 1x4x200mm	25	Timber Stock
23	Bulkhead 9 Blocks	4	Board 1
24	Limewood 2x5x50mm	1	Timber Stock
25	Fore hydroplanes	2	Board 6
26	Fore hydroplane fins	2	Board 6
27	Aft hydroplanes	2	Board 6
28	Aft hydroplane fins	2	Board 6
29	Rudder fin	1	Board 6
30	Rudder	1	Board 6
31	Rudder pivot base	1	Board 6
32	Dowel 3mm x 250mm	1	Timber Stock
33A/B	False Keel	2	Board 4
34	Dowel 2mm x400mm	1	Timber Stock
35	Dowel 4mm x 50mm	1	Timber Stock
36	Conning Tower Body	4	Board 5
37	Conning Tower Top	1	Board 5
38	Conning Tower Hatch	1	Board 5
39	Display Base	1	Board 4
40	Base Ends	2	Board 4
41	Base Supports	2	Board 4
42	Base Side - rear	1	Board 4
43	Base Side - front	1	Board 4
44	Name Plate Supports	2	Board 4
45	Wire - brass 1mm x 100mm	1	Parts Card
46	Limewood 1x1x 60mm	1	Timber Stock
47	Propellers	2	Parts Card
48	Hawse Pipes	2	Parts Card

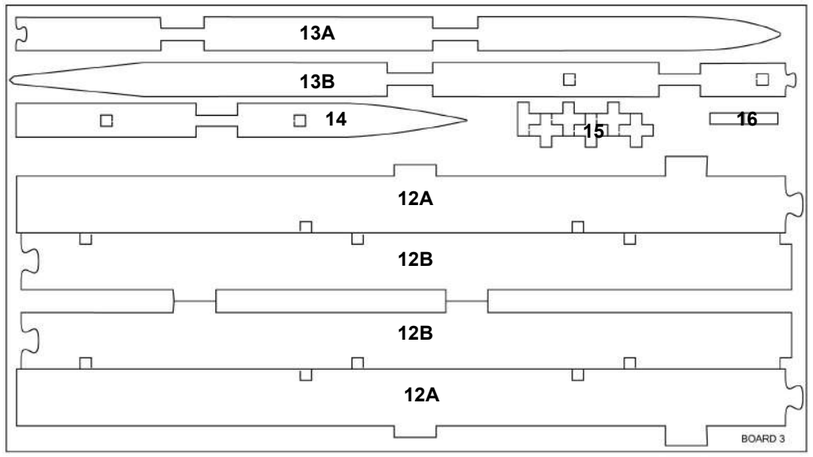
Part No	Description	Quantity	Material
49	Chain - 100mm	1	Parts Card
50	Shackle	4	Parts Card
51	Anchor Rope x 700mm	1	Parts Card
52	Cord - 0.25mm x 3m	1	Parts Card
53	Eye Pins - Copper	Pkt	Parts Card
54	Dowel 1mm x 100mm	1	Timber Stock
55	Stanchions - brass	29	Parts Card
56	Name Plates	2	Parts Card
57	Conning Tower Canvas	1	Parts Card
58	Canvas Template	1	Parts Card
59	Flag Set	1	Parts Card
60	Bow lettering AE1 - AE2	1	Parts Card

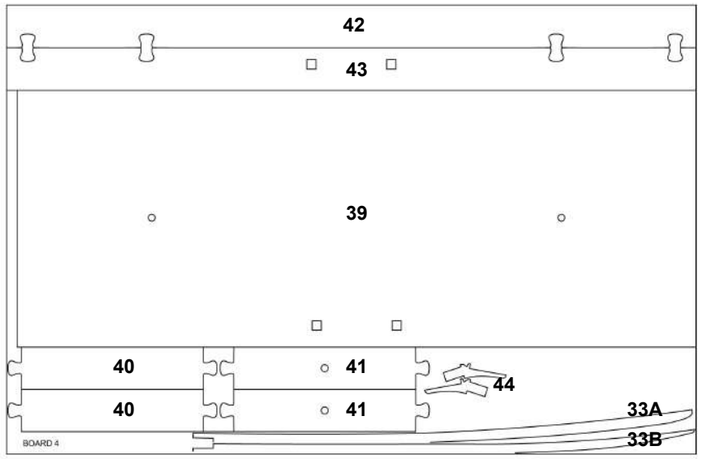












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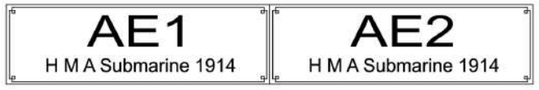

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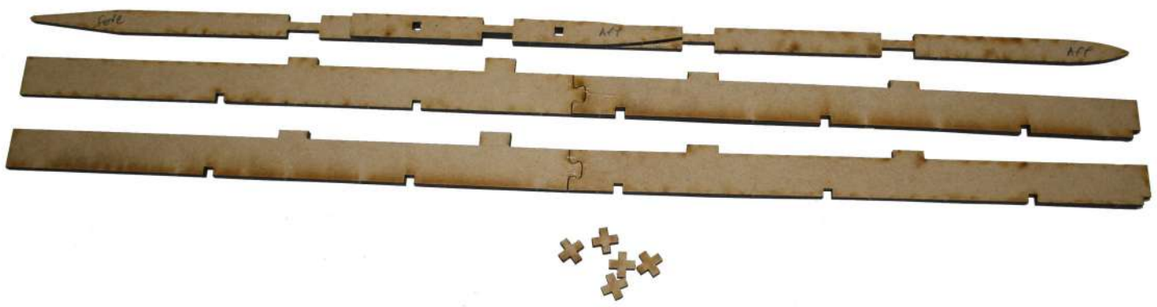
5.0 Hull Construction

5.1 Assemble the Keel, Stiffener Box, Deck & Conning Tower Base

Step 1 On the laser cut sheets in your kit use a pencil to mark the relevant numbers on each piece before removing them from the sheet. Remove the keel P11A/B, stiffener box P12A/B, deck P13A/B and conning tower base P14 from the relevant board. Use a snap blade knife to carefully cut the tabs on both sides of the board. Dry fit each of the parts together - when satisfied glue and clamp as shown. Note the fore and aft ends of the deck.

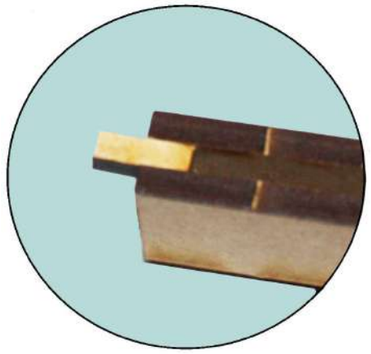
Step 2 Glue the conning tower base P14 in place aligning the two square holes as shown - not the fore & aft ends - clamp until glue has set.

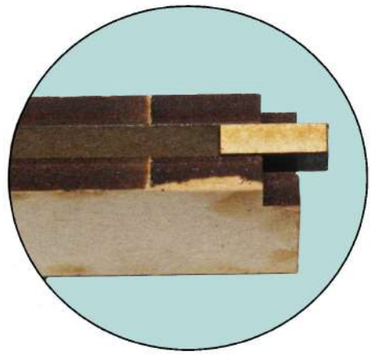
Step 3 Identify the stiffener box separator crosses P15. The crosses will be used to hold the two assembled stiffeners apart to create a strong box structure.



Step 4 Note the alignment of the stiffeners—fore & aft. Glue one stiffener in position. Glue the crosses in position as shown. Glue the second stiffener in position and clamp assembled structure in place as shown - set aside for glue to set.

Use two lengths of 4mm MDF off cuts to fit into the underside of the stiffener box fore & aft as spacers to hold the stiffener box apart at these points while the glue sets. Remove when glue has set.





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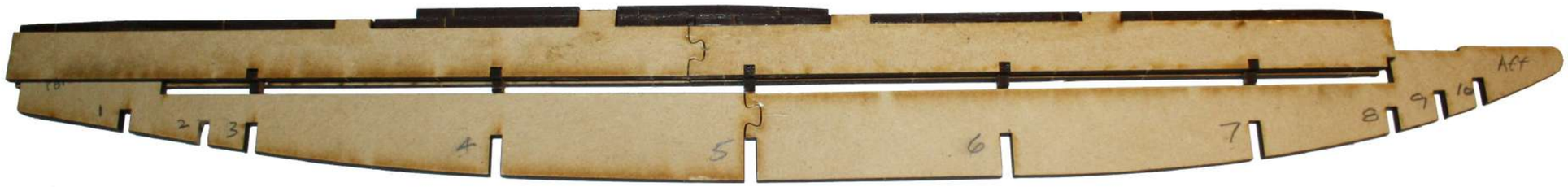
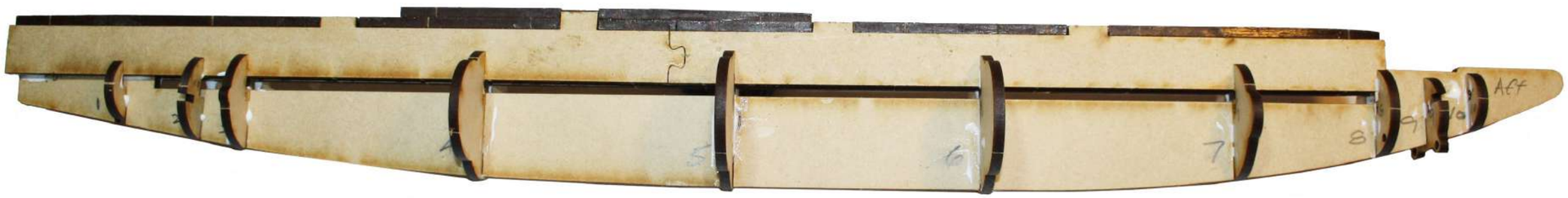
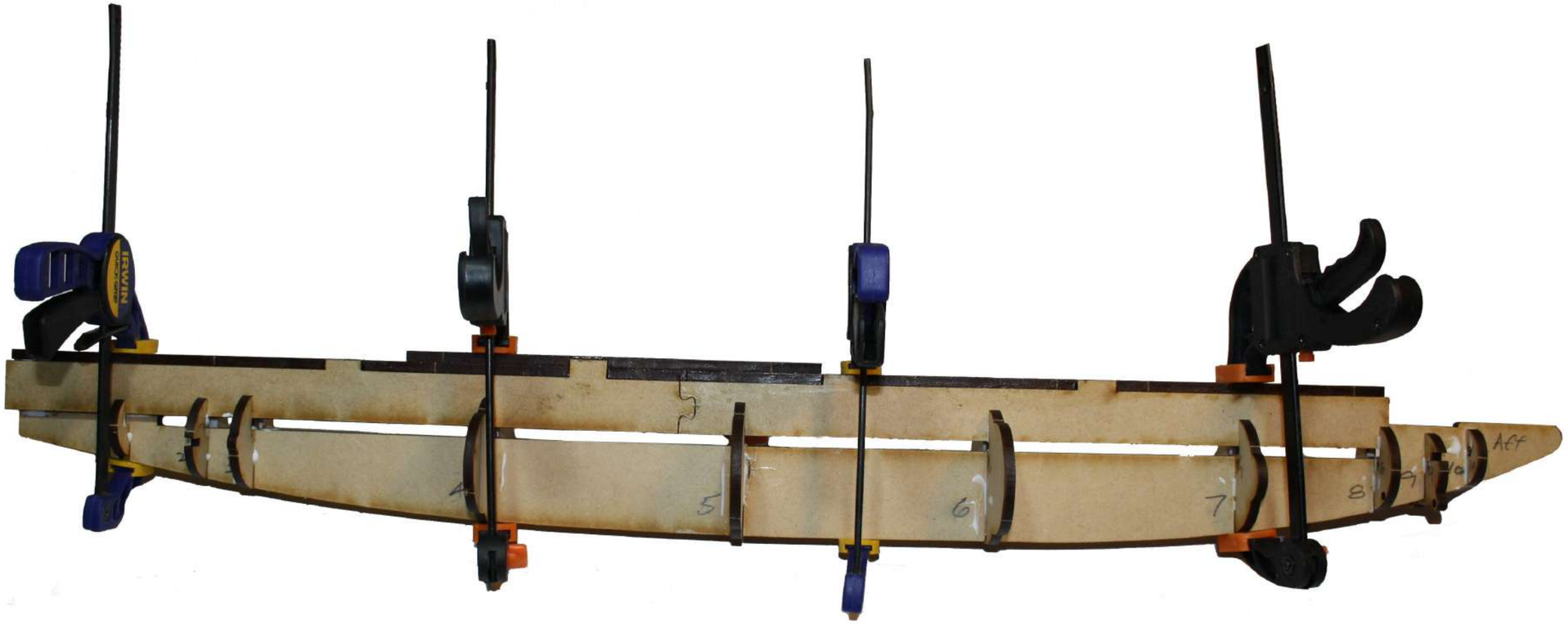
Step 5 Number the bulkhead slots as shown. Trial fit the stiffener box to the keel by aligning the fitted stiffener crosses as shown. Trial fit the bulkheads as shown. Once satisfied glue the stiffener box in place immediately followed by the bulkheads - clamp in position until glue has set.







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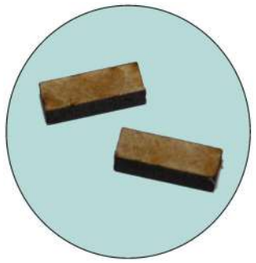
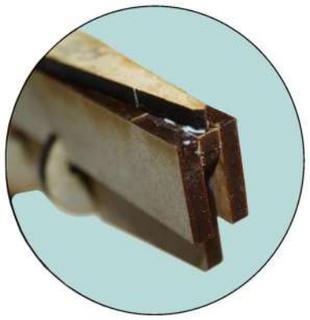
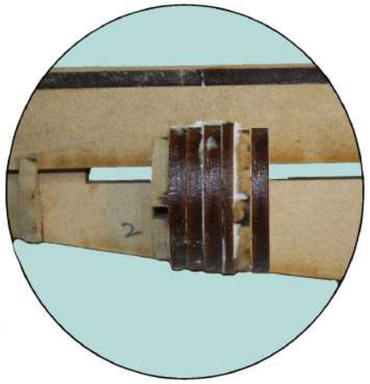
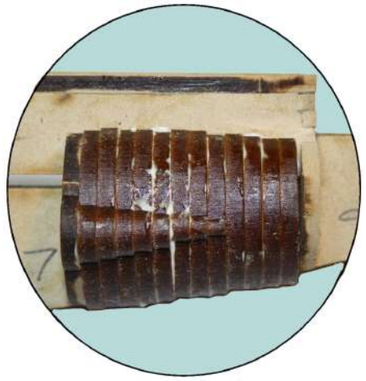
Step 6 Identify the stiffener box separators P16 - glue into the top of the stiffener box fore & aft as shown. Identify the fore filler blocks P17 A-D - glue these blocks in place between bulkheads 2 & 3 a shown. Filler block D will need to be filed thinner to fit into remaining gap. Identify bulkhead 3A P18 and glue in place behind bulkhead 3 as shown. Identify the filler blocks P19 E-P - glue these blocks in place between bulkheads 7 & 8 as shown. Set aside for glue to set. Identify the bow blocks P20 - glue in place at bow as shown. Identify the stern blocks Q P21 - glue in place as shown.



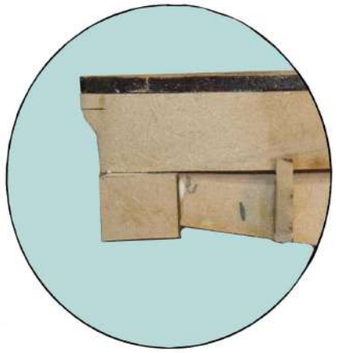




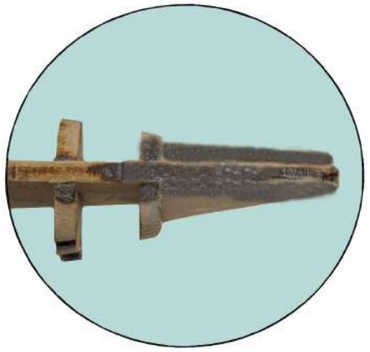
Filler Blocks BH 2-3 & Block 3A



Filler Blocks BH 7-8



Bow Blocks

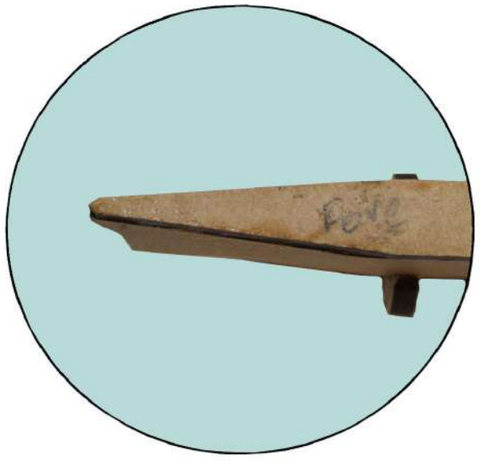


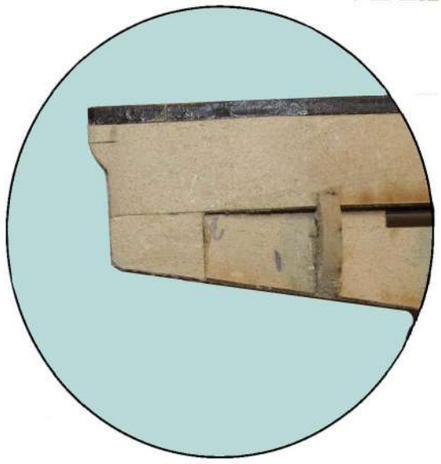
Stern Blocks

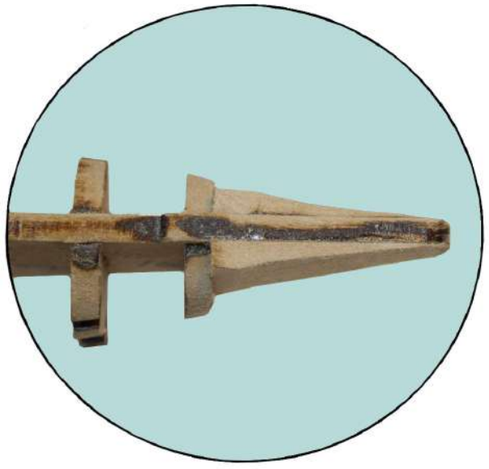
5.2 Fairing

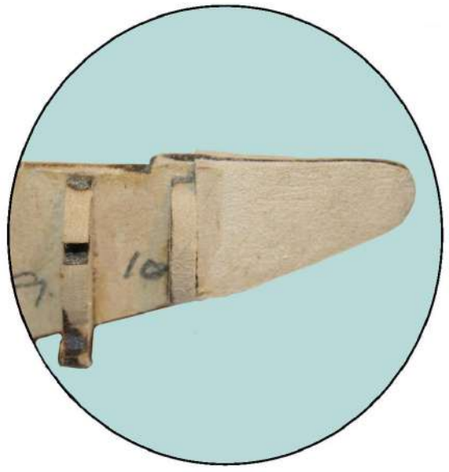
"Fairing" the frames, bow & stern blocks is a very important part of the preparation for planking the hull. The principle of "fairing" the frames is to ensure the planks lay flat on the edge of each frame or block to ensure a good glue bond is established between each part. This will ensure that when planked the hull is smooth and free of bumps or hollows. Take your time. Completing this process properly will ensure a good finish to the hull. Use a plank or brass strap to lay across the parts to be faired - where the plank/strap does not lay flat on the part then this is an area that needs to be faired.

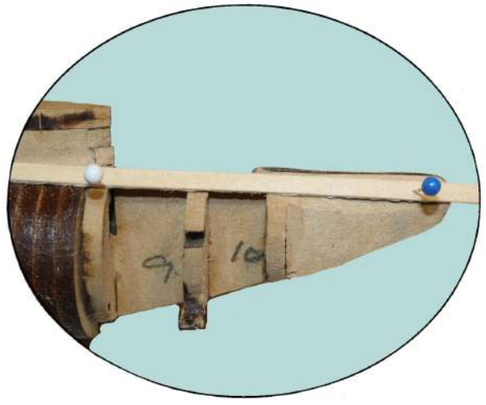
Using sanding blocks shape the bow and bow blocks as shown. Shape the stern blocks as shown. Lastly shape the aft end of the deck and stiffener as shown. Continually trial test with a plank/strap to make sure there is a smooth run over the parts being faired - adjust as necessary until satisfied.











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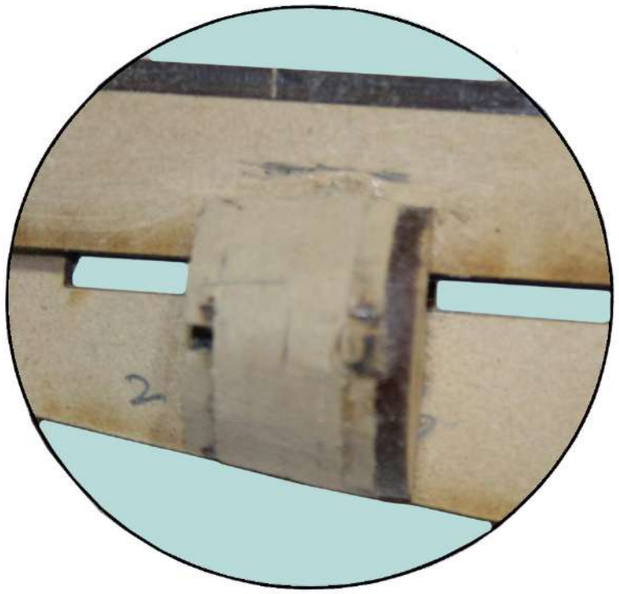
5.2 Fairing Continued

Next fair the bulkheads and filler blocks between bulkhead 2 & 3 and between 7 & 8 as shown - move a plank/strap over the bulkheads at various points along them continually checking to ensure the plank rests on the full face edge of the bulkheads/blocks. Continue the process until you are completely satisfied



6.0 Planking the Hull

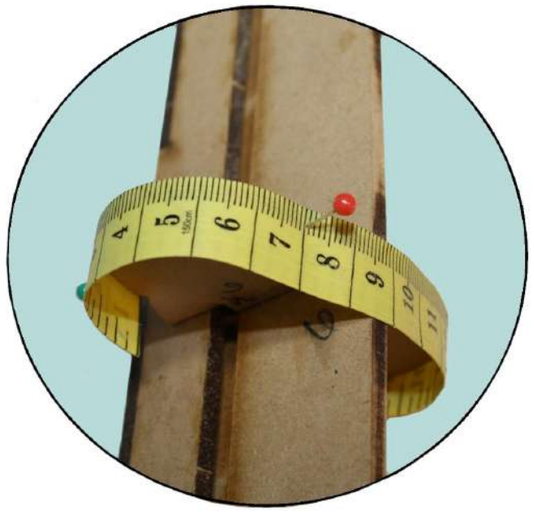
6.1 Overview

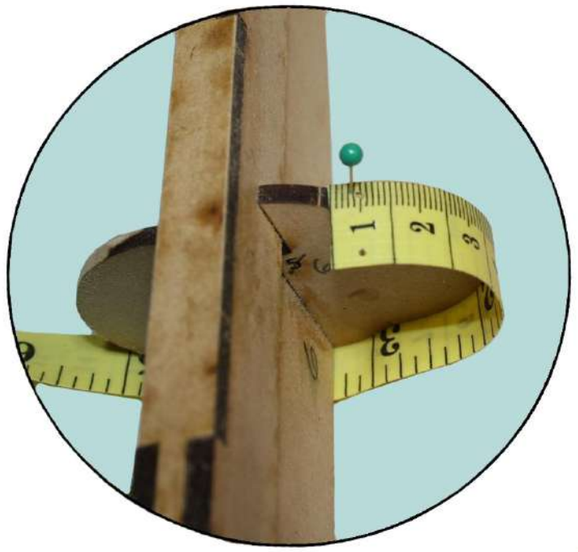
The shape of the hull comprises a number of converging and complex curves. To plank the hull we will be creating a cage between bulkheads 3A and 7. Once this cage is established we will then be cutting and fitting wedges to fill-in gaps between the planks in the area between BH3A & BH7. Once this step is complete we will be then plank the area fore of BH3A and aft of BH7.

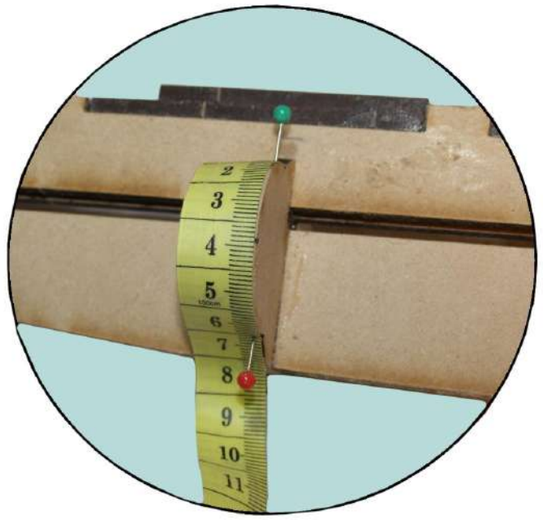
6.2 Preparation

You will notice on bulkheads 4, 5 & 6 there is an outer bulge - this bulge represents the ballast tanks. We will be creating a number of bands over the hull and then completing the planking within each of these bands. The placement of the first plank is determined by using a dressmaker's tape measure and measuring the distance over the ballast tank part of bulkheads 4, 5 & 6.

The measurements will be approximately BH4 - 66mm, BH5 - 70mm and BH6 - 70mm. As you make these measurements mark the mid-point on each bulkhead. Repeat for the other side of the hull. Also mark the mid-points of BH3A and BH7.







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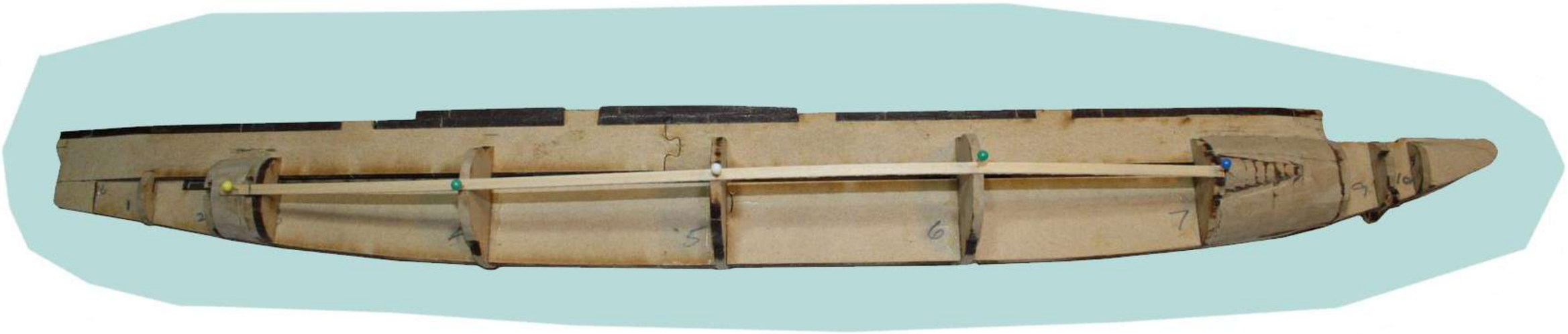
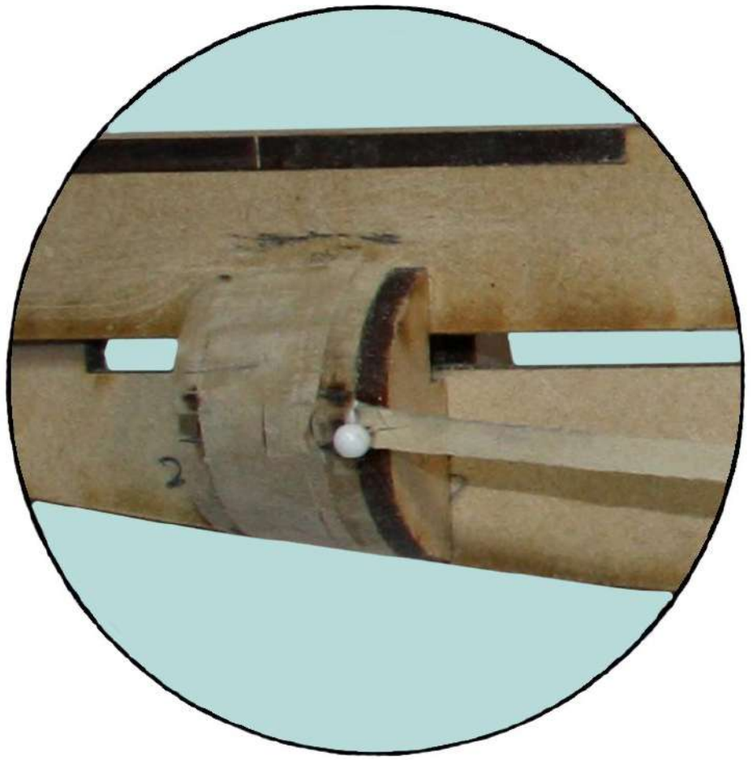
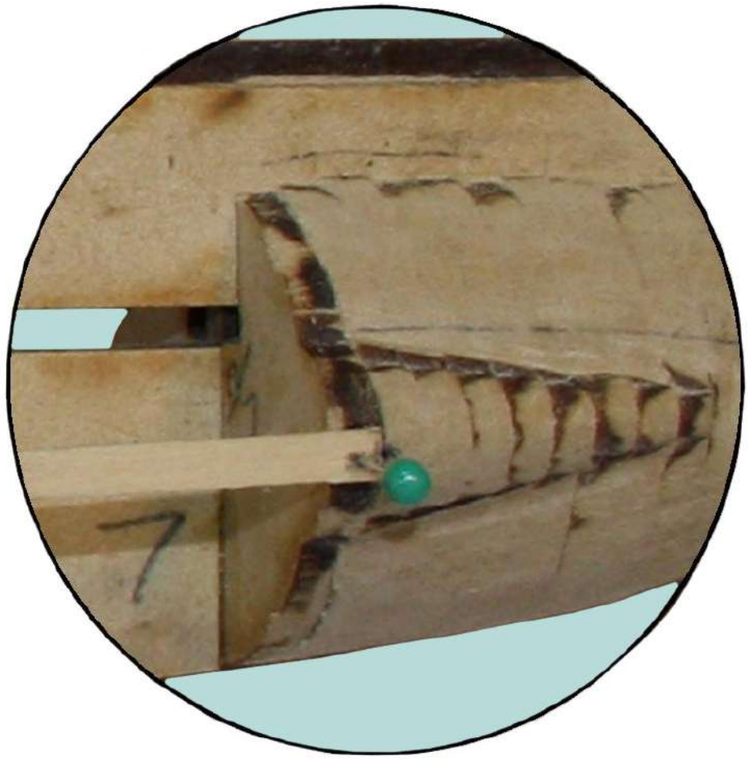
6.3 First Plank

Do not discard any plank off-cuts as these will be used to fill gaps as you progress with the planking. The planking for the hull is 1x4mm limewood P22A/B. Identify this timber and using a length, temporarily pin it in position across the marked mid-points starting at BH7 and moving to BH3A. Trim-off any excess plank length. Once you are satisfied with the fit glue and pin the plank in position - repeat for the other side of the hull. Make sure to remove any excess glue from the edges of the planks on the bulkheads.







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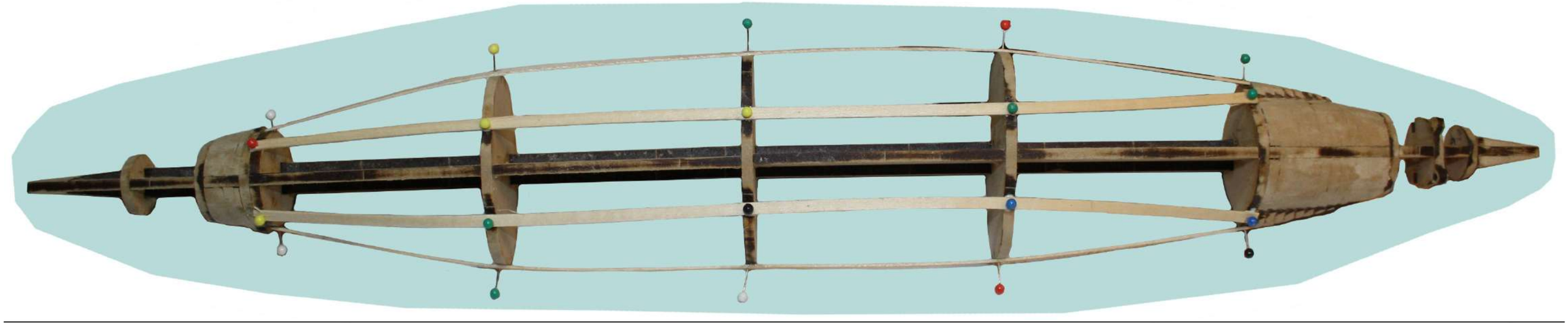
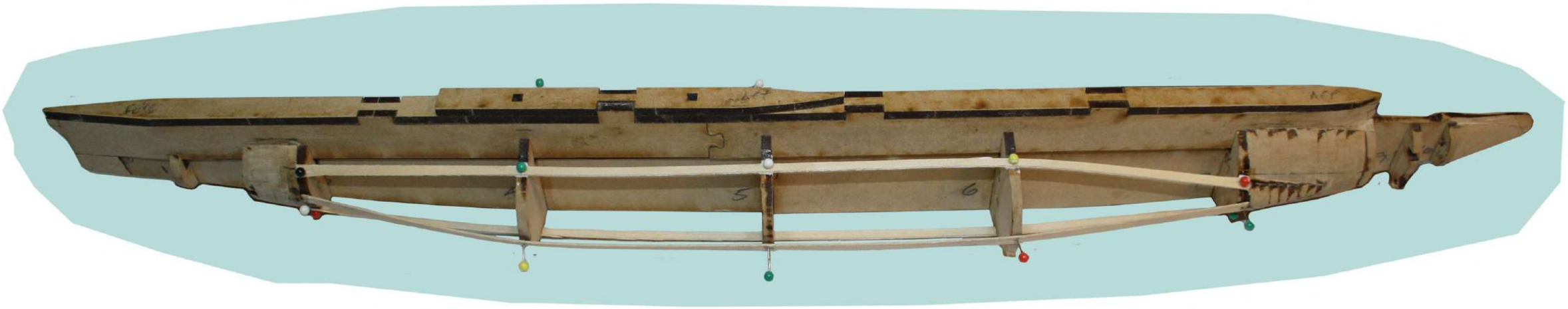
6.4 Second Plank

Turn the hull structure over as shown. Lay the second plank along the hull between BH3A & BH7. On BHs 4, 5, 6 & 7 pin the plank to the ballast tank at the hull body junction. Allow the plank to run its natural course to BH3A and pin in position - this will be approximately 10mm from the keel edge. Once satisfied with the fit glue and pin the plank in position. Repeat for the other side of the hull.



6.5 Third Plank

Turn the hull structure over as shown. Lay the third plank along the hull between BH3A & BH7. On BHs 4, 5, 6 & 7 pin the plank to the ballast tank at the hull body junction. Allow the plank to run its natural course to BH3A and pin in position - this will be approximately 8mm from the top of BH3A as shown. Once satisfied with the fit glue and pin the plank in position. Repeat for the other side of the hull.



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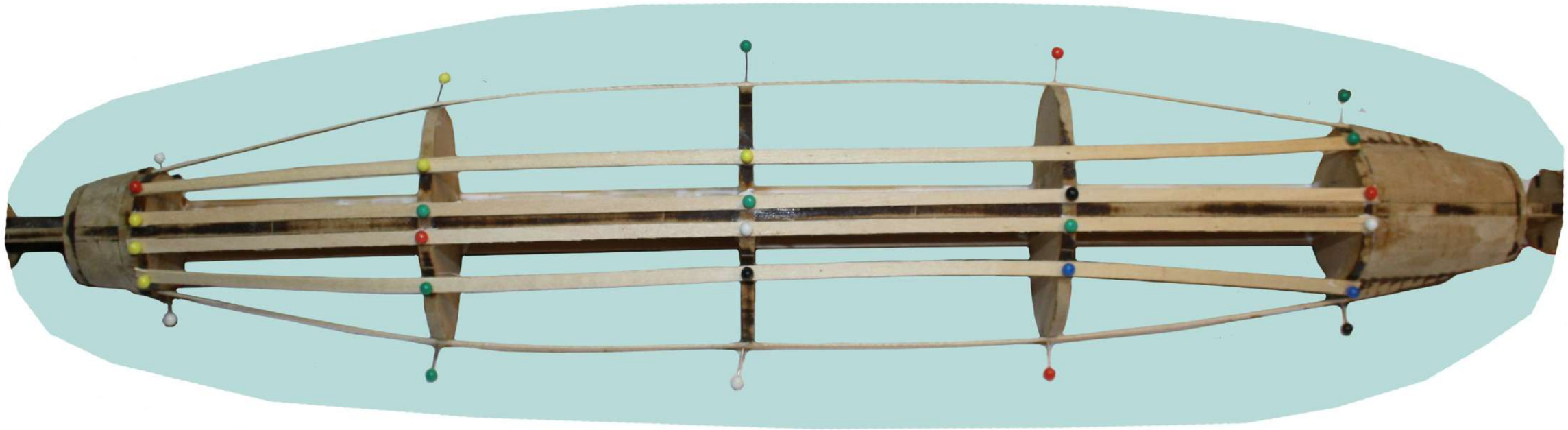
6.6 Fourth Plank

Lay the fourth plank along the hull between BH3A & BH7 as shown - fit the plank across the top of the bulkheads at the hull body/keel junction. Once satisfied with the fit glue and pin the plank in position. Run a bead of glue along the plank/keel junction as shown to give added strength to the joint. Repeat for the other side of the hull.

6.7 Fifth Plank

Lay the fifth plank along the hull between BH3A & BH7 as shown - fit the plank across the top of the bulkheads at the base of the bulkheads along the keel as shown. Keep the plank clear of the keel as the false keel will be fitted later. Once satisfied with the fit glue and pin the plank in position. Run a bead of glue along the plank/keel junction as shown to give added strength to the joint. Repeat for the other side of the hull.



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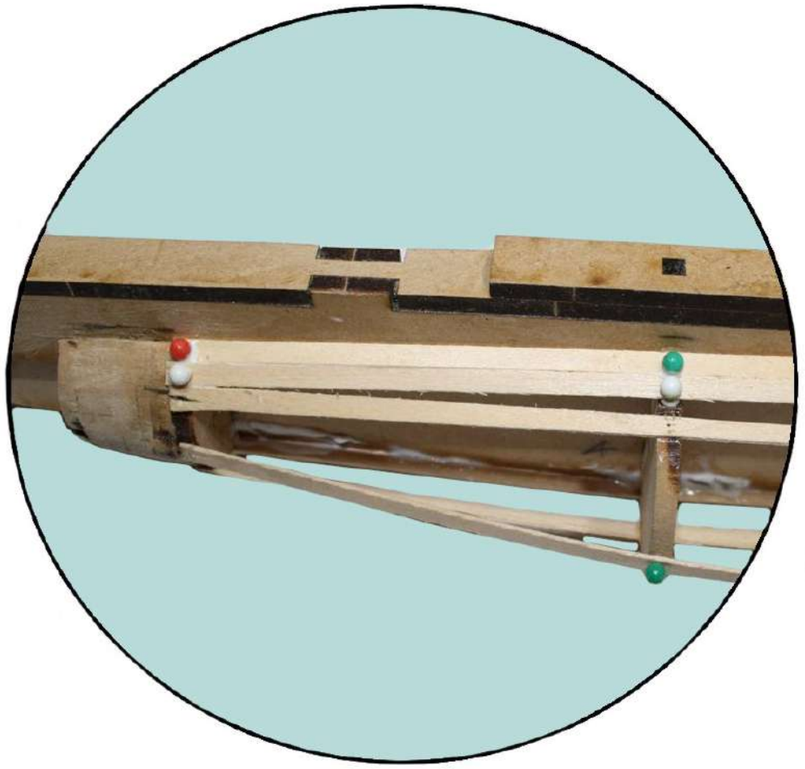
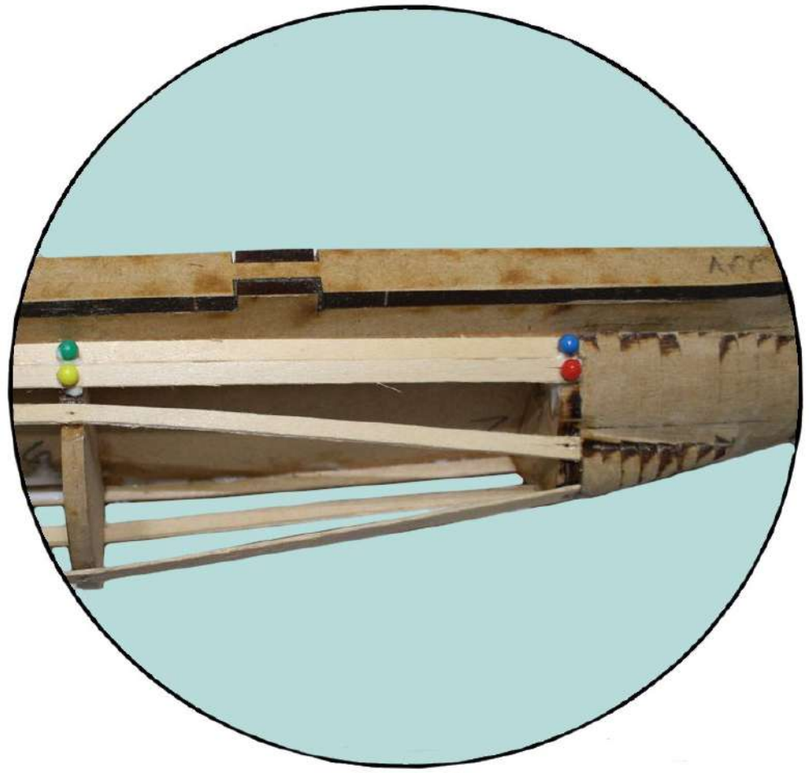
6.8 Sixth Plank

Lay the sixth plank along the hull between BH3A & BH7 as shown - once satisfied with the fit glue and pin the plank in position. Also apply glue to the side edge of the fifth plank - this will add strength to the finished hull structure. Repeat for the other side of the hull.





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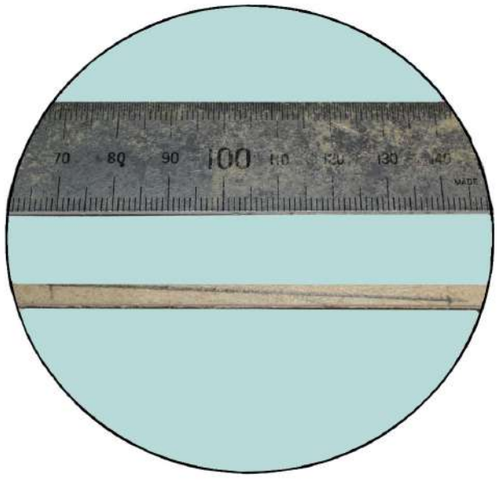
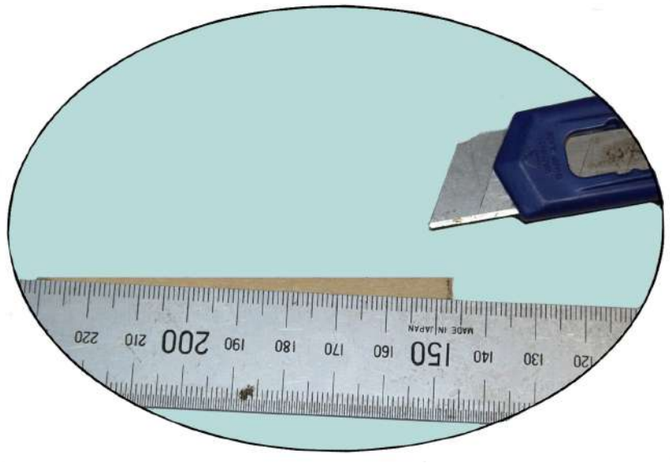
6.9 Closing Gaps

The next plank needs to be fractionally fitted into the remaining gap at the bow end. Trial fit a plank and pin in place as shown. From BH4 to BH3A mark where the plank overlaps with the sixth plank - Point 1 and Point 2 as shown. Remove the plank and use a rule and pencil to draw a line between these two points - then use a snap blade knife to remove the unwanted segment - make a number of light cuts until you cut fully through the plank. Trial fit - fractionally adjust the width with a file as necessary - then glue and pin plank in place. Any minor remaining gap will be filled later with wood filler. Remember to also apply glue to the side edges of the planks to give added hull strength. Place a clamp on the plank to hold it against the previously placed plank so they will bond together. Repeat for the other side of the hull.





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6.10 Closing Gaps - continued

Close the gap between the planks at the stern by cutting and shaping a wedge to fit into the gap - trial fit and once satisfied glue and pin in place as shown.

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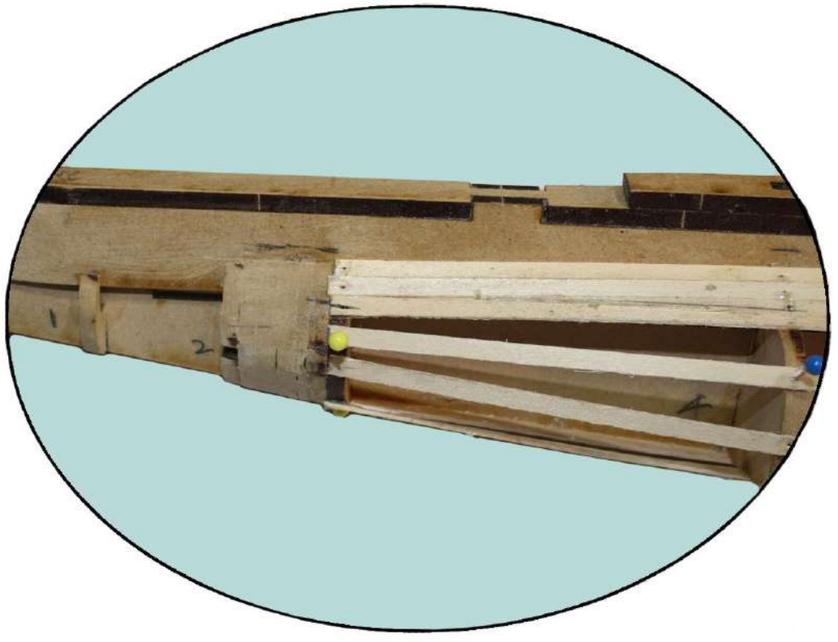
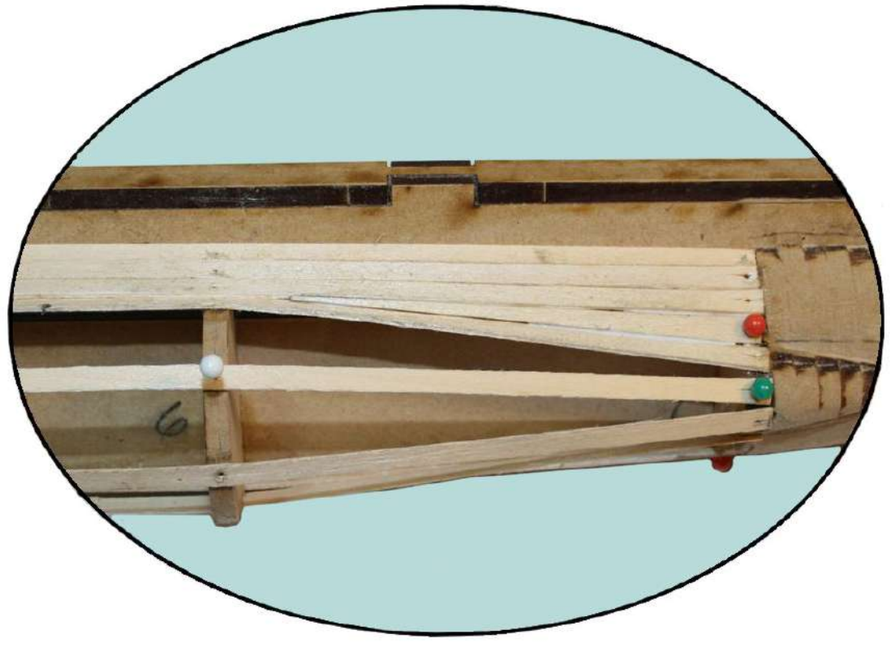
6.10 Closing Gaps - continued

Measure and mark the mid-points on BH4 to BH6 as shown. Temporarily pin a plank in place along these mid-points as shown. Once satisfied glue and pin the plank in place. Repeat for the other side of the hull. You may wish to take the opportunity while the internal sides of the planks are exposed to apply a coating of glue to strengthen the hull planking.





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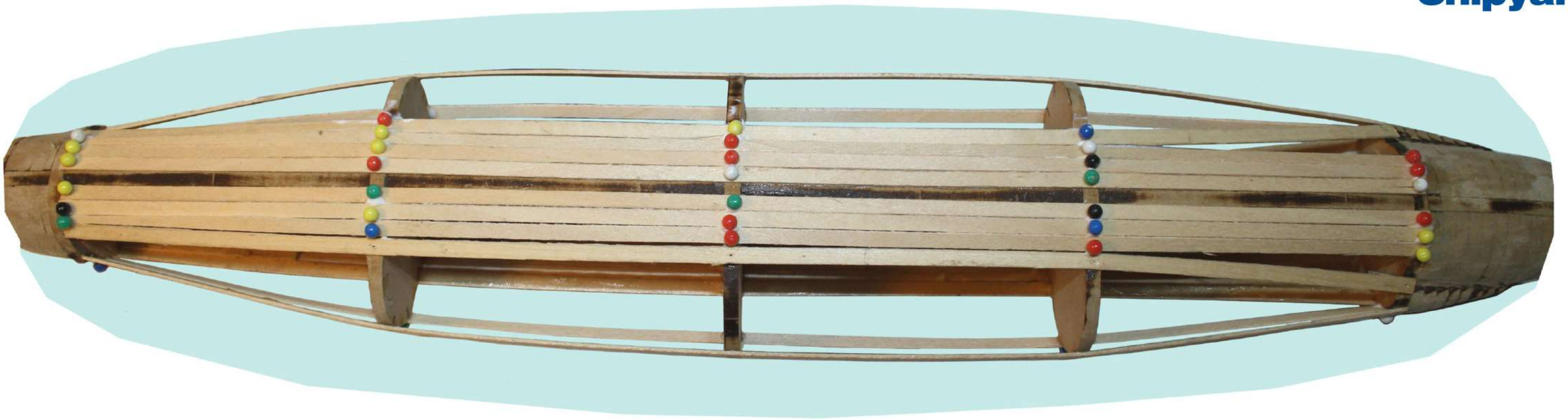
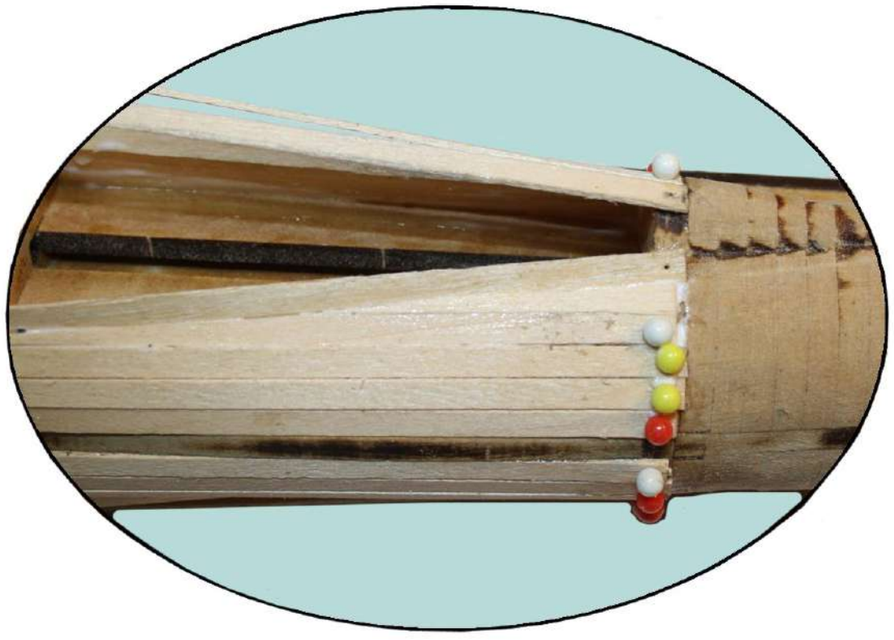
6.10 Closing Gaps - Stern Underside

Turn the boat over and fit two planks on either side of the hull as shown - once satisfied with fit glue and pin in place.



At the stern continue fitting and gluing wedges in place until the gaps are closed as shown. Repeat for the other side of the hull.



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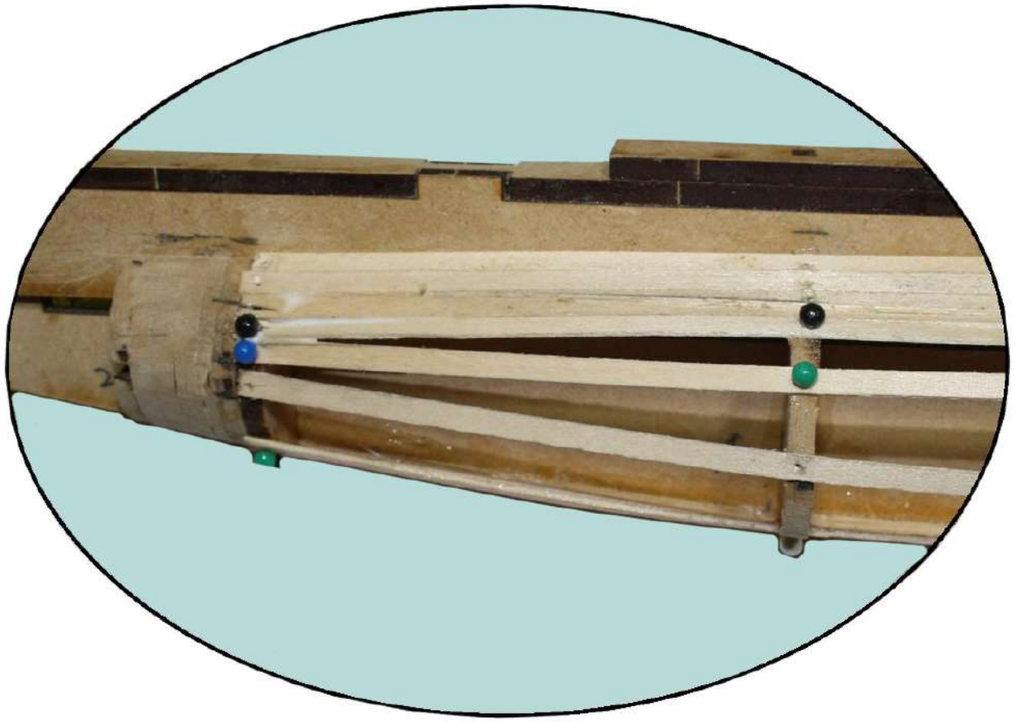
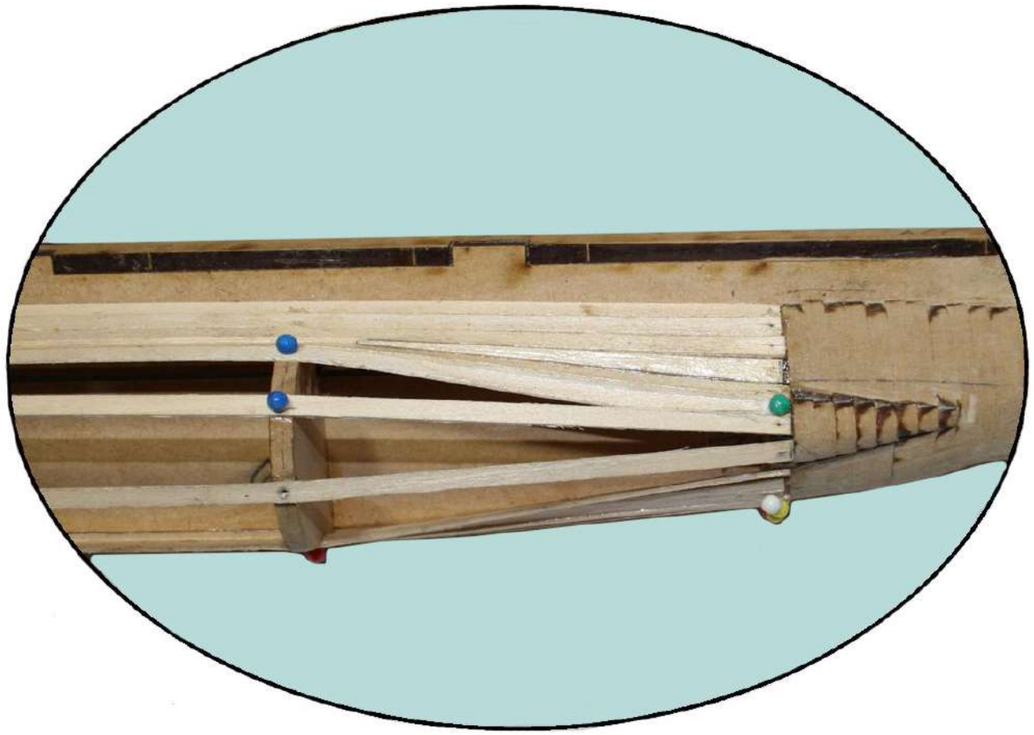
6.10 Closing Gaps - continued

Continue the process of filling the gaps between planks by marking, cutting and shaping wedges.





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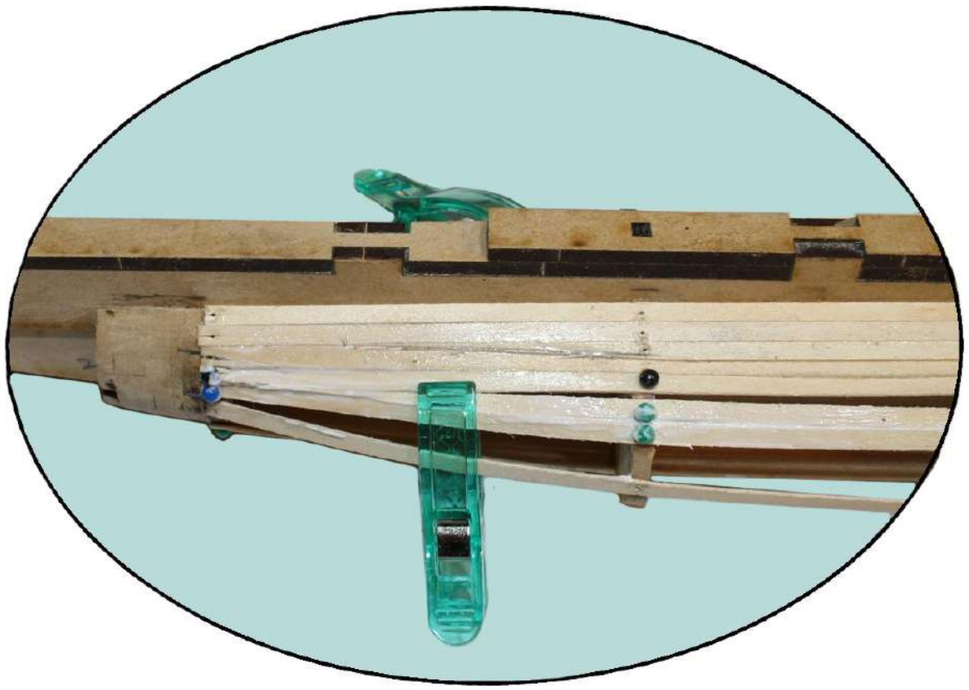
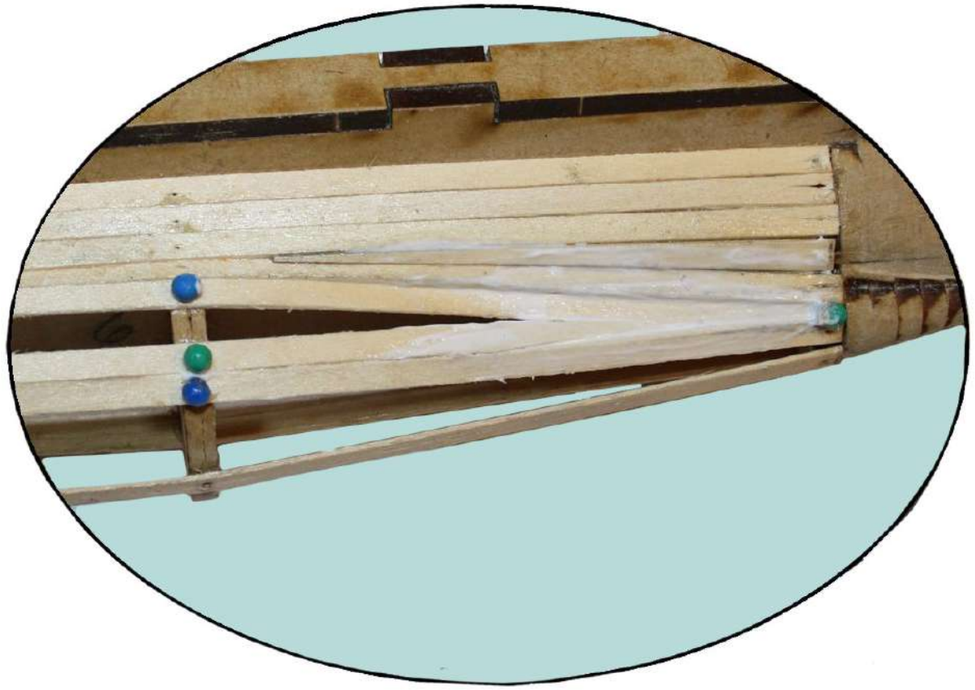
6.10 Closing Gaps - continued

Continue the process of filling the gaps between planks by marking, cutting and shaping wedges.





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6.10 Closing Gaps - continued

Continue the process of filling the gaps between planks by marking, cutting and shaping wedges. To fill-in a large gap you can apply the technique shown below. Measure and cut a length of planking required to fill the gap. Shape the ends of the plank as shown. Lay the plank over the area to be filled and make the plank outline - see next sheet. Cut out excess of existing planks and fit this filler plank in place. Once satisfied with fit glue and clamp in place.

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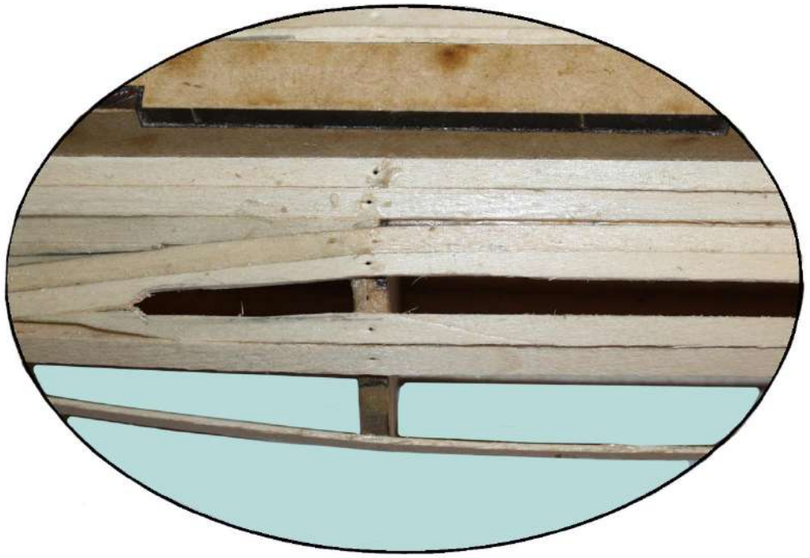

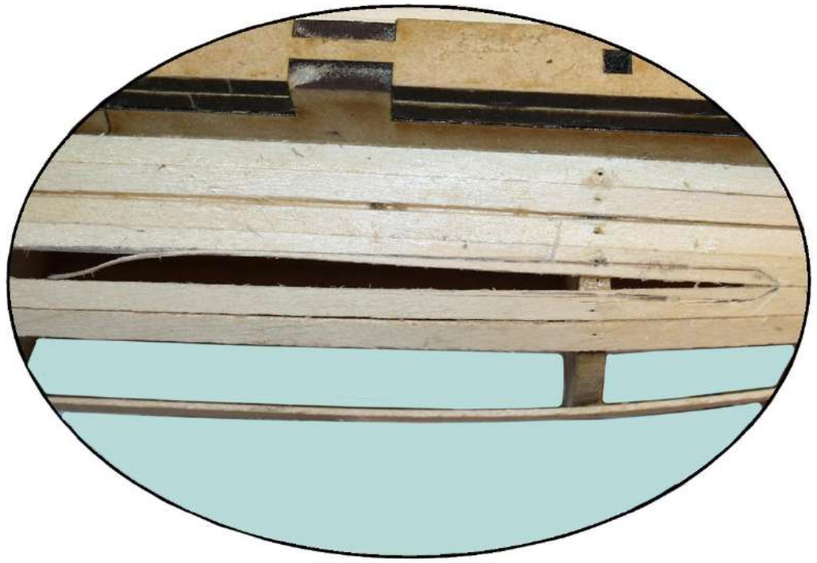

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6.10 Closing Gaps - continued

Continue the process of filling the gaps between planks by marking, cutting and shaping wedges.

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6.10 Closing Gaps - continued

Continue the process of filling the gaps between planks by marking, cutting and shaping wedges.

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6.10 Closing Gaps - continued

Continue the process of filling the gaps between planks by marking, cutting and shaping wedges.

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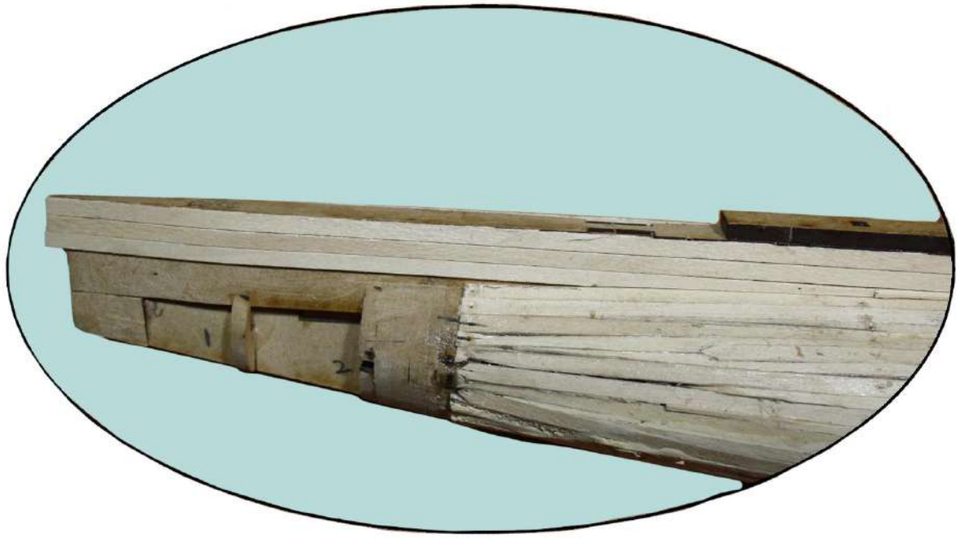
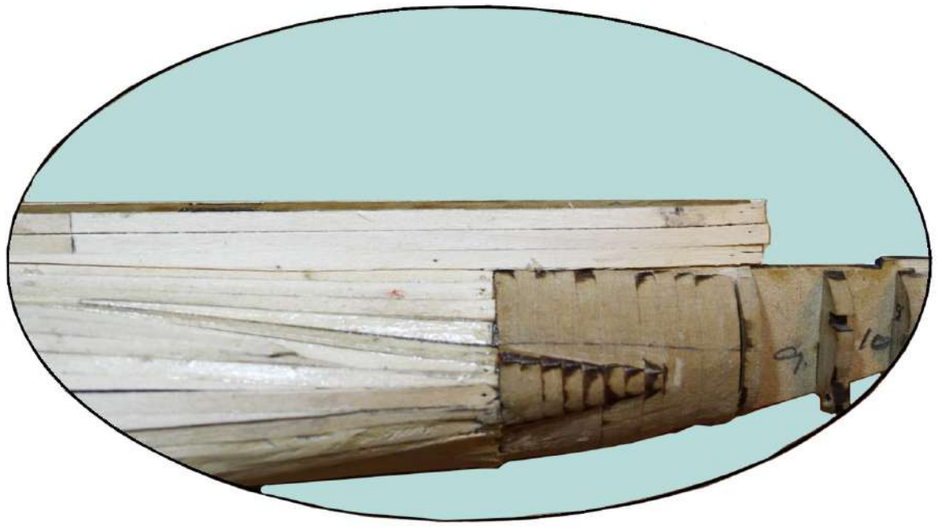
6.11 Planking Rest of Hull

Take a length of P22A & P22B and fit, glue and clamp in place along the top edge of the deck. Pin the plank at the bow and stern to hold the plank in place while glue sets. Repeat for the other side of the hull. Run a second line of planking immediately below the first set as shown - repeat for the other side of the hull. At the bow cut, shape and fit in position a third plank in place as shown. At the stern cut, shape and fit in position a third plank as shown.





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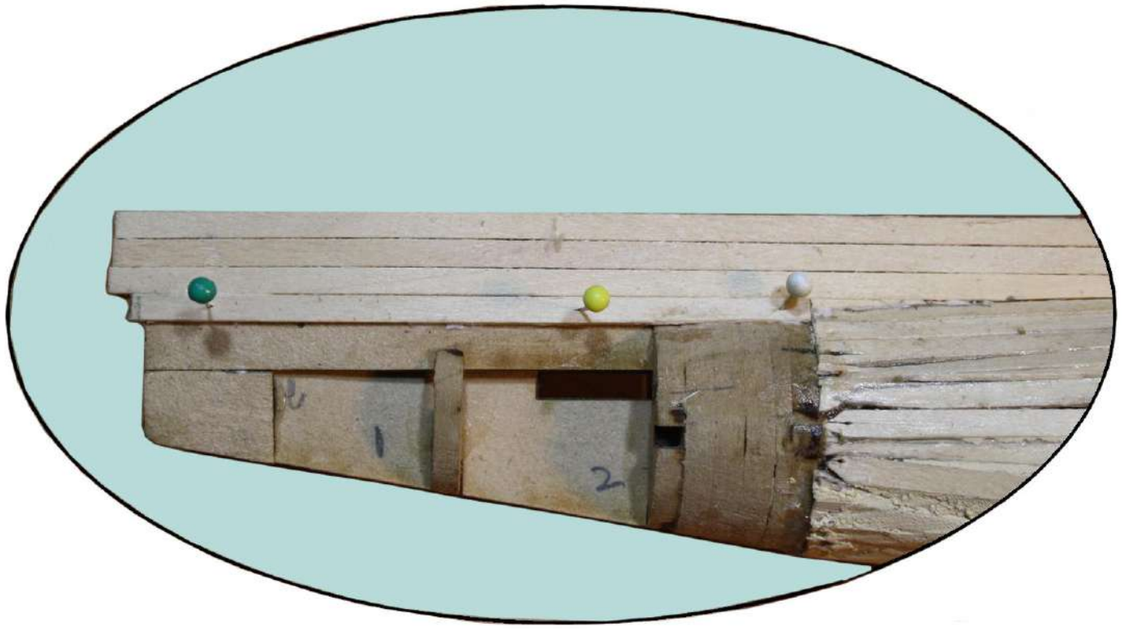
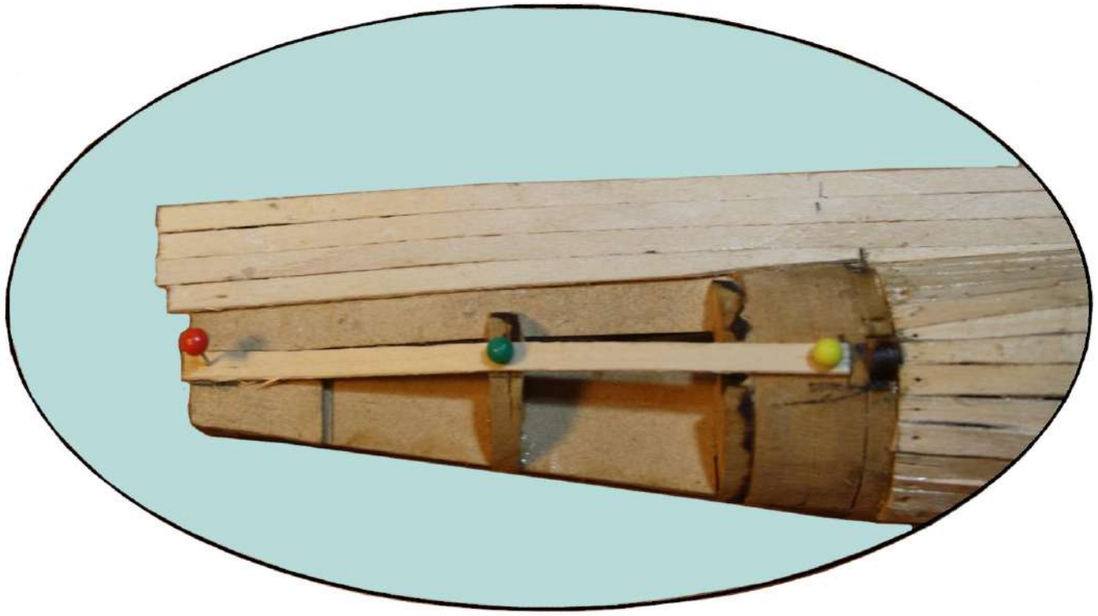
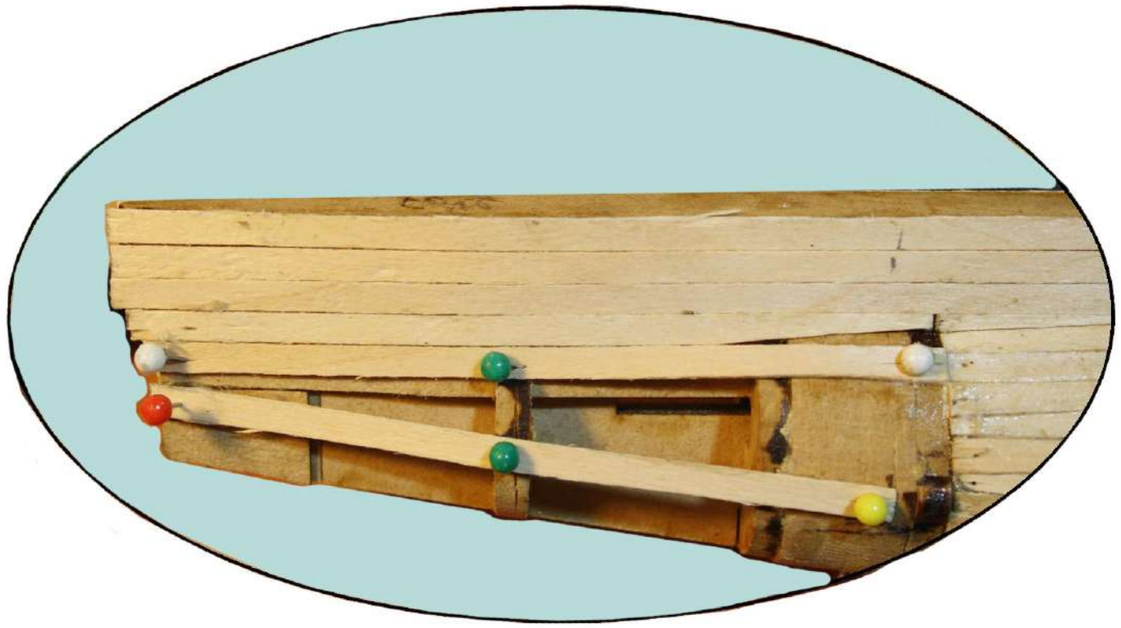
6.11 Planking Rest of Hull

Continue the process as shown to cover the hull area between BH3 and the bow. Fit a plank from the fore end of the ballast tank BH3 to the centre of the gap at the bow. Continue to shape and fit planks and wedges to cover the area as shown. Take care to mark where the location for the front hydroplanes on BH2 as shown.







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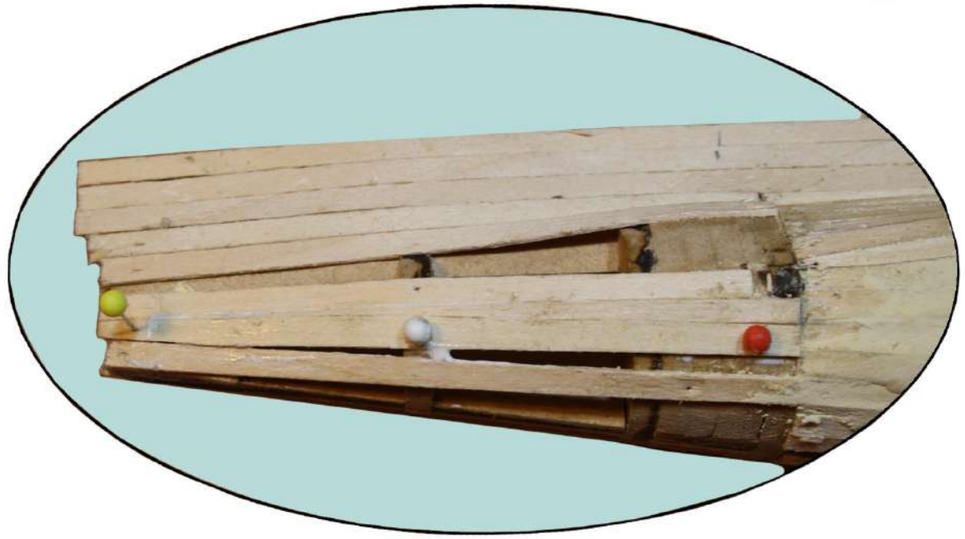
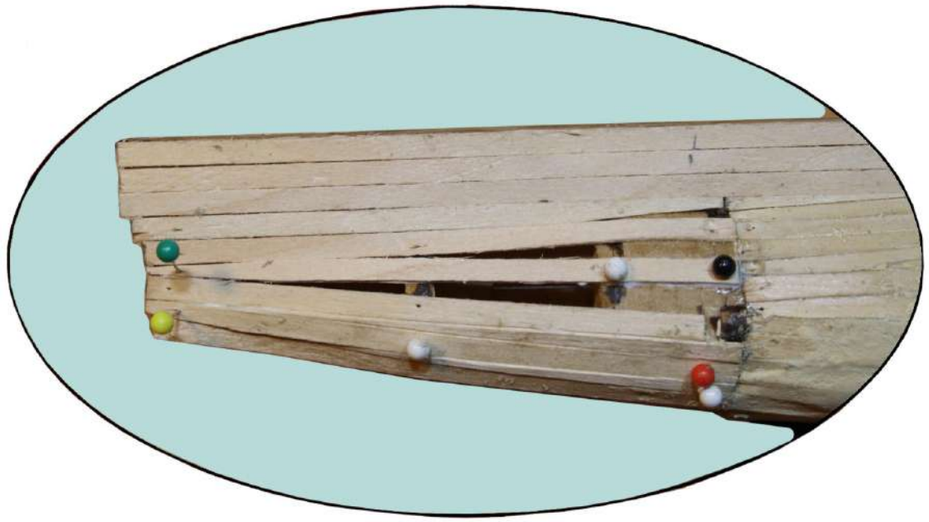
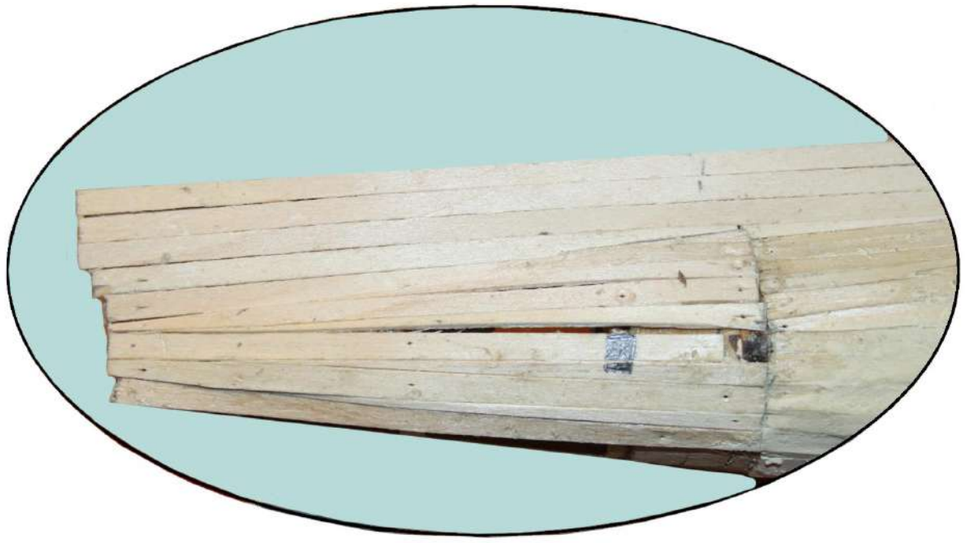
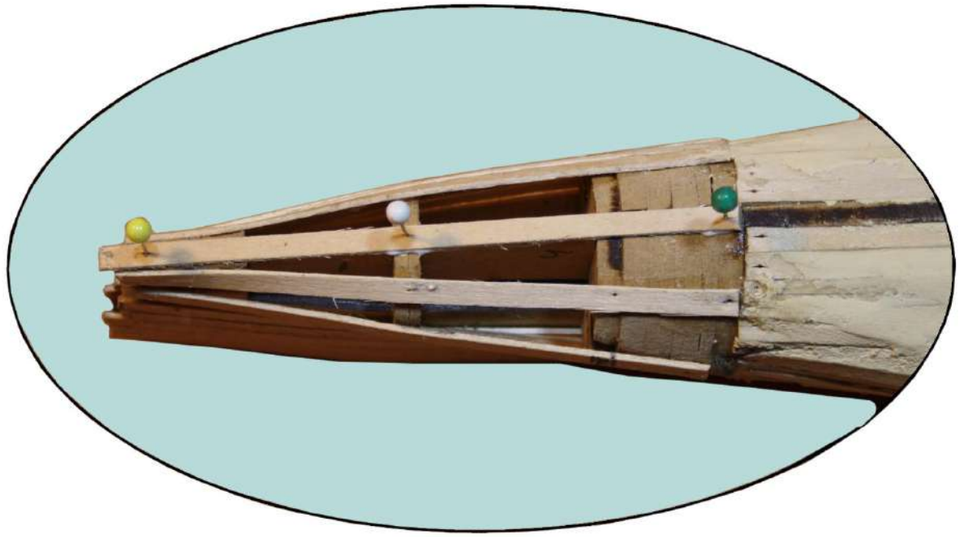
6.11 Planking Rest of Hull

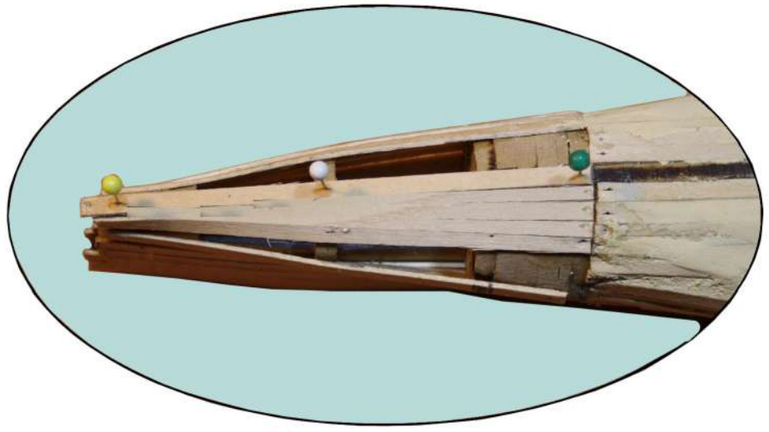
Continue the process of filling the gaps between planks by marking, cutting and shaping wedges. Once the area is covered with planks shape the bow as shown and then use a plank bender to shape and fit a plank to cover the keel end as shown.

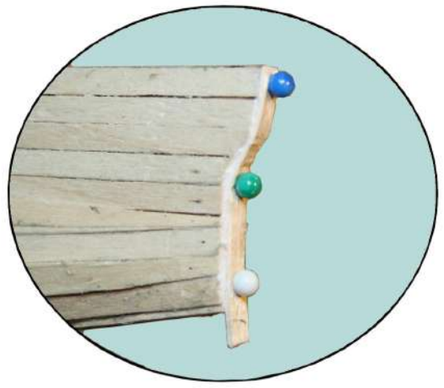












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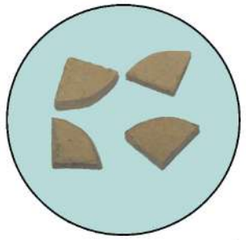
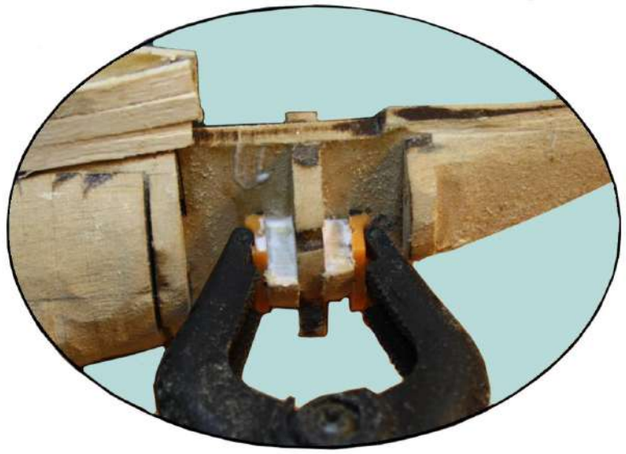
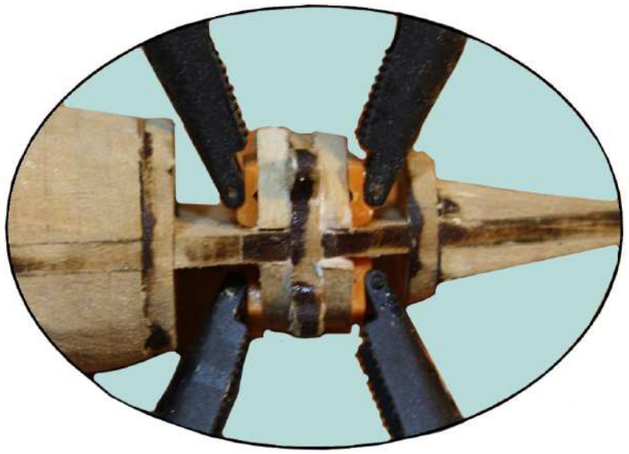
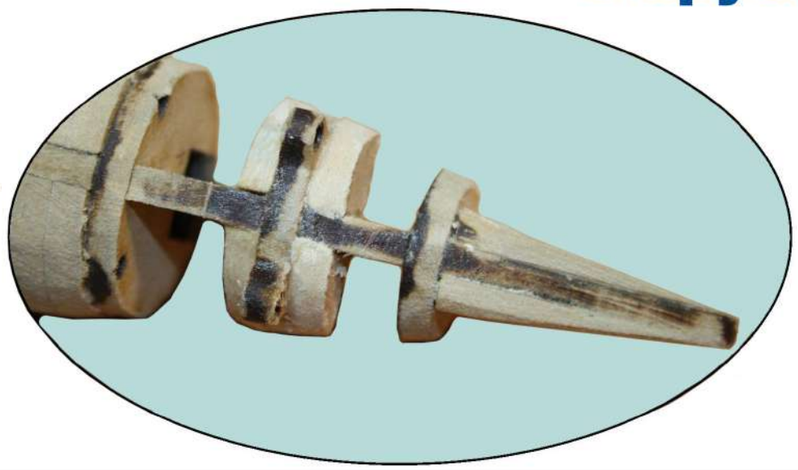
6.11 Planking Rest of Hull

Identify bulkhead 9 blocks P23 - fit, glue and clamp in place either side of BH9 as shown. Once glue has set remove clamps and fair the blocks with the bulkheads either side.



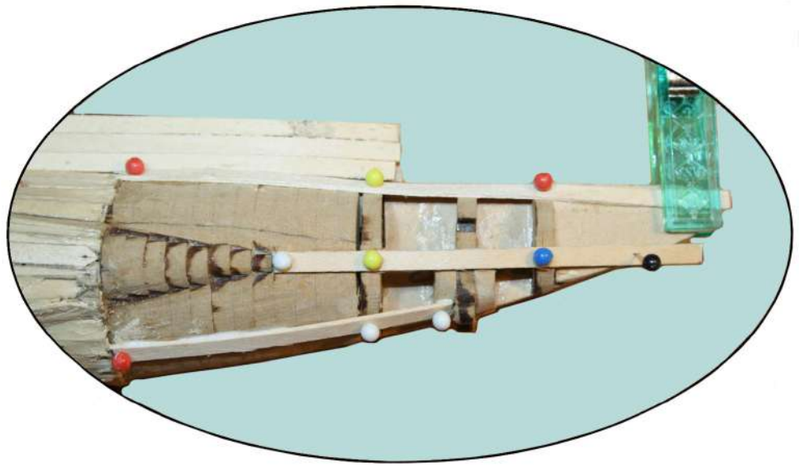


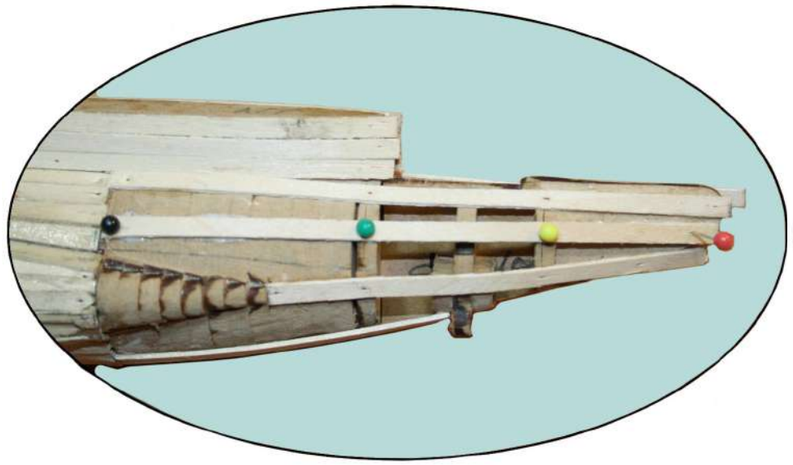


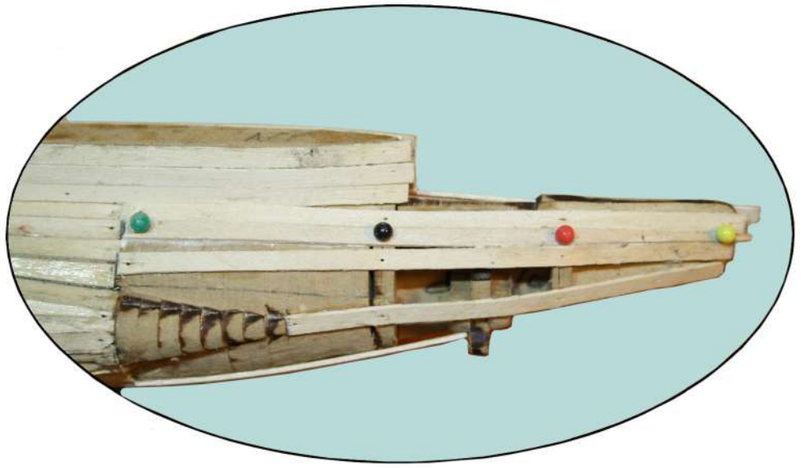


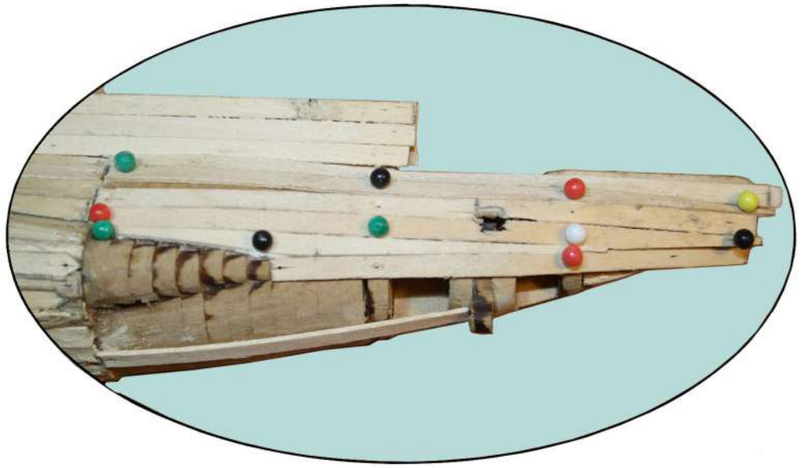
6.11 Planking Rest of Hull

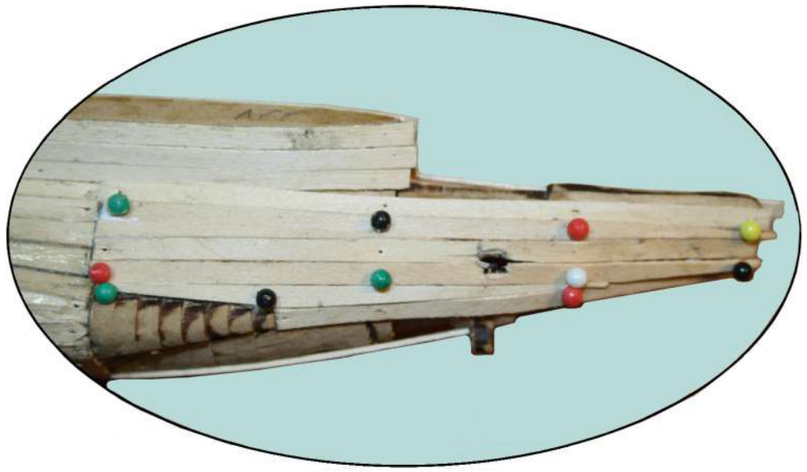
Continue the process of filling the gaps between planks by marking, cutting and shaping wedges. Take care to mark where the location for the stern hydroplanes on BH9 as shown.











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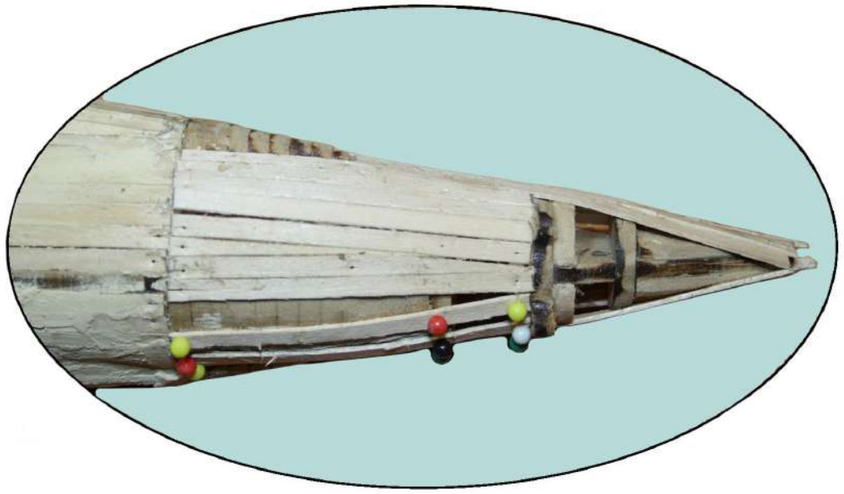
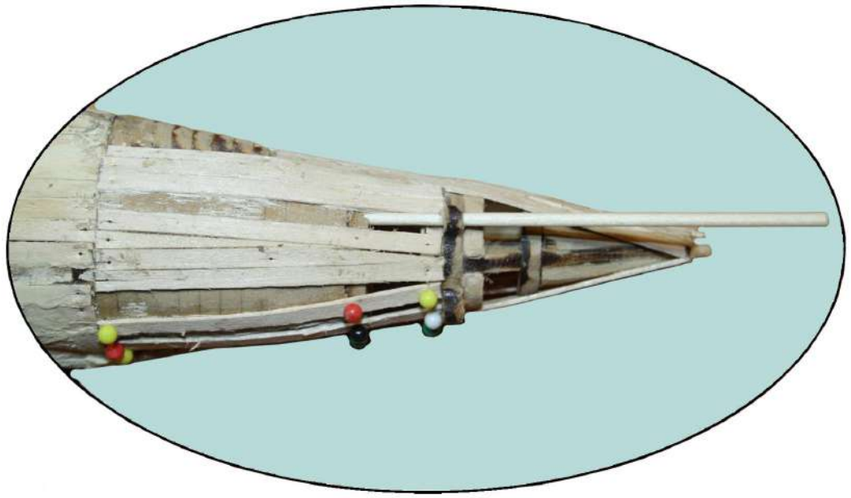
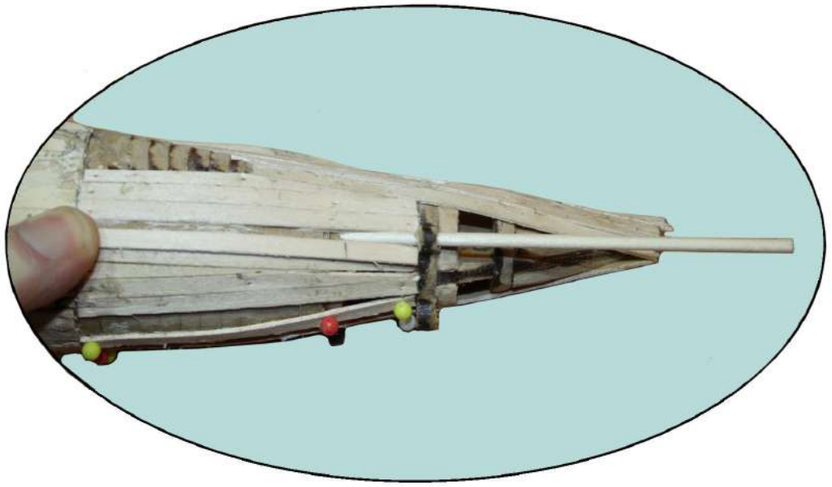
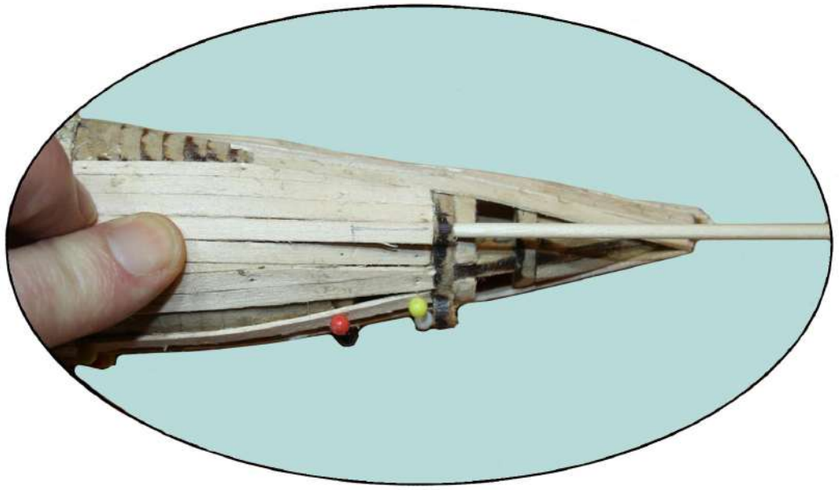
6.11 Planking Rest of Hull

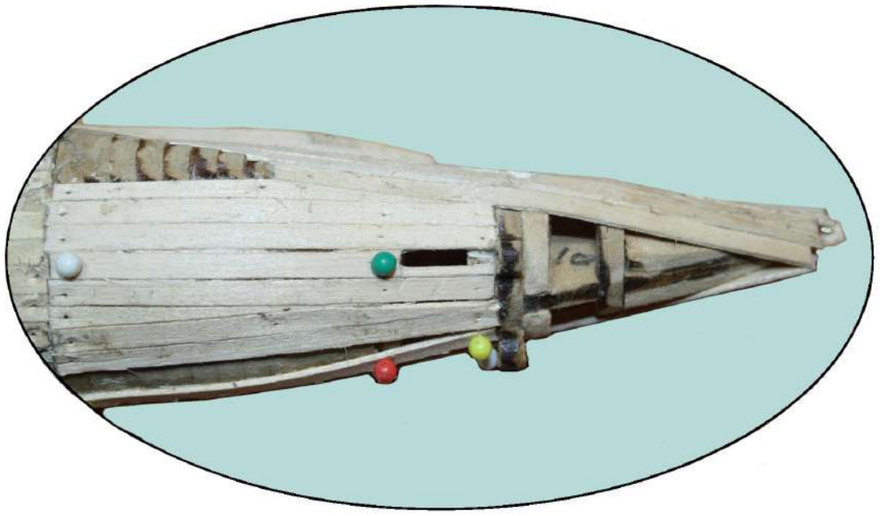
Continue the process of filling the gaps between planks by marking, cutting and shaping wedges. Make sure to leave a gap for the propeller shaft - temporarily insert a length of 3mm dowel P32 as shown. Fit and shape a length of planking to accommodate the shaft.











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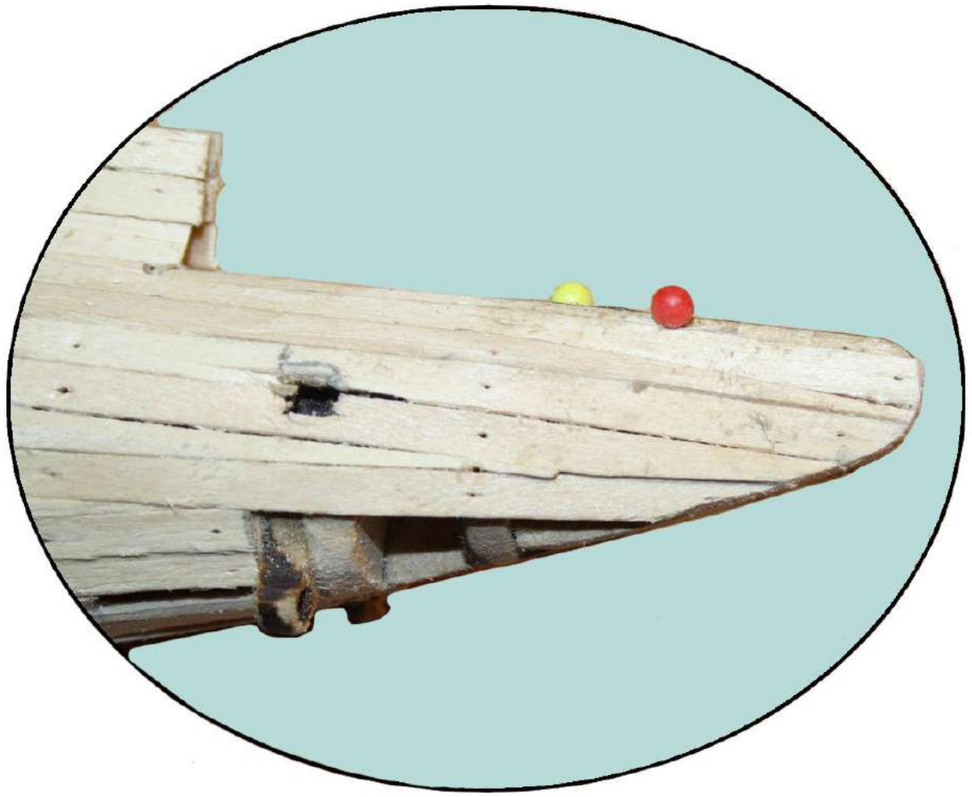
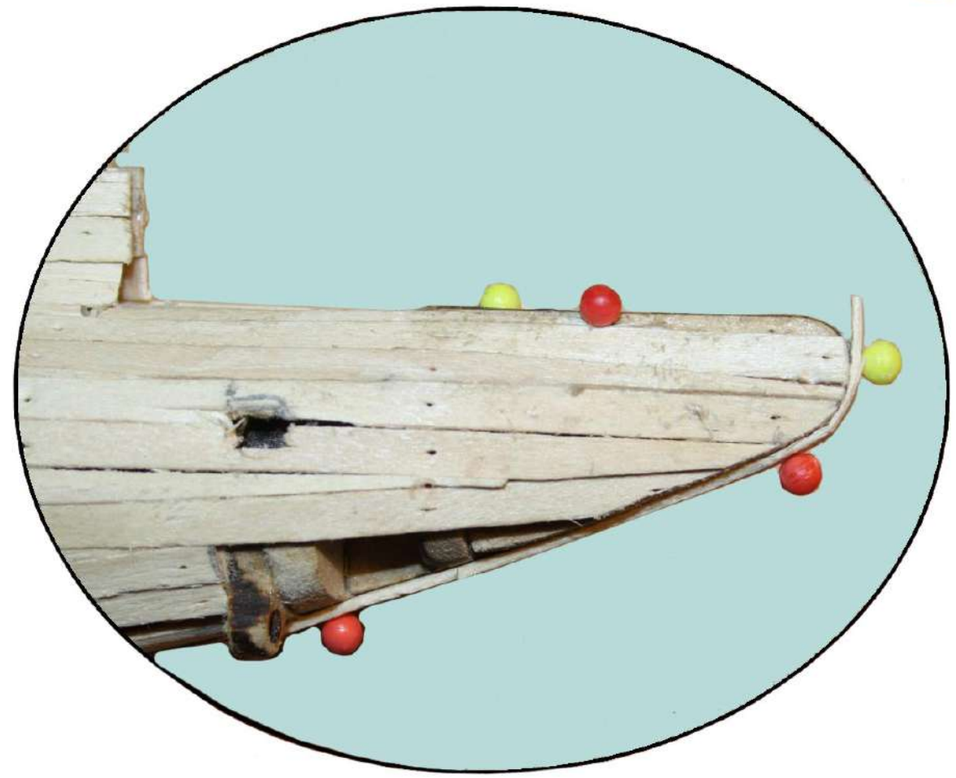
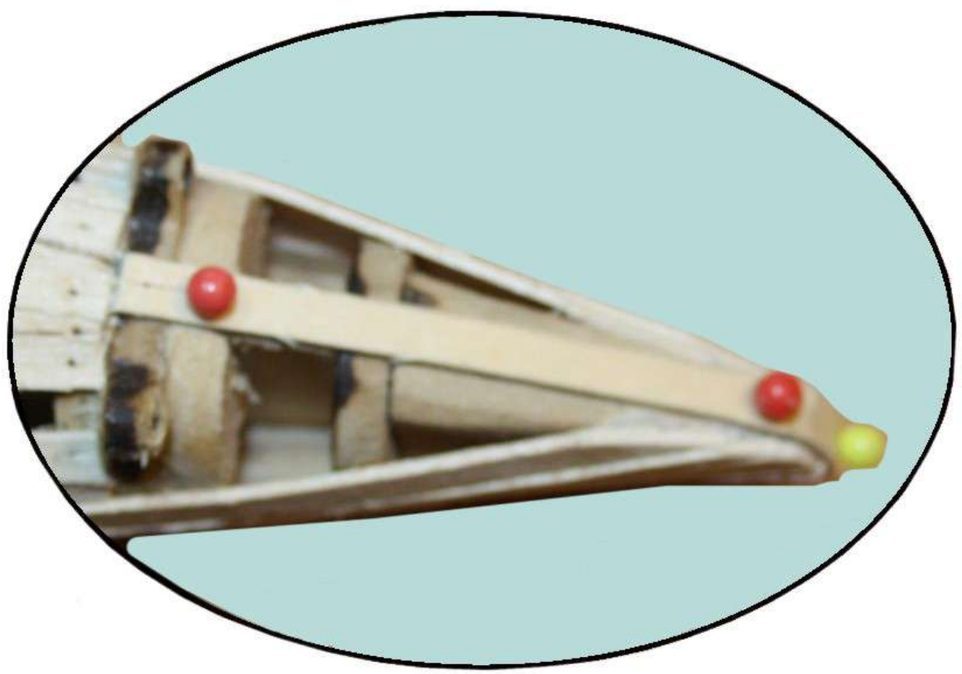
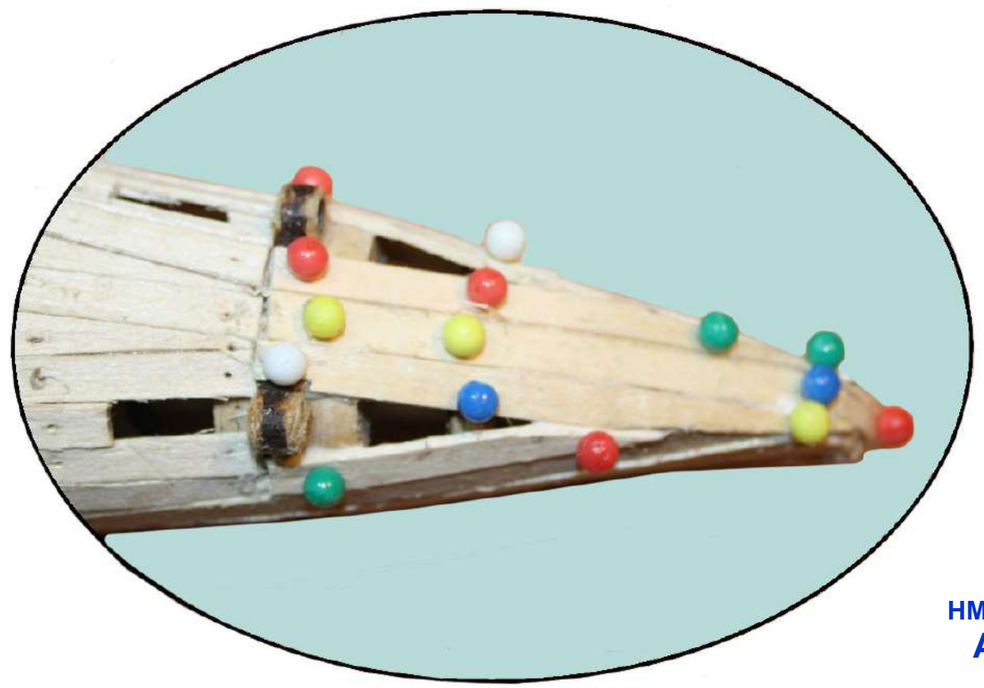
6.11 Planking Rest of Hull

Continue the process of filling the gaps between planks by marking, cutting and shaping wedges.









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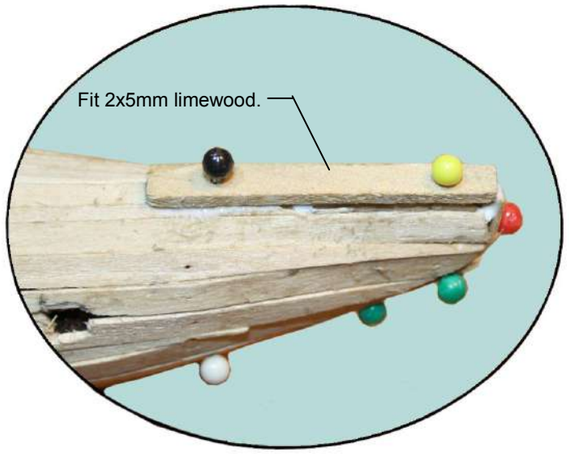
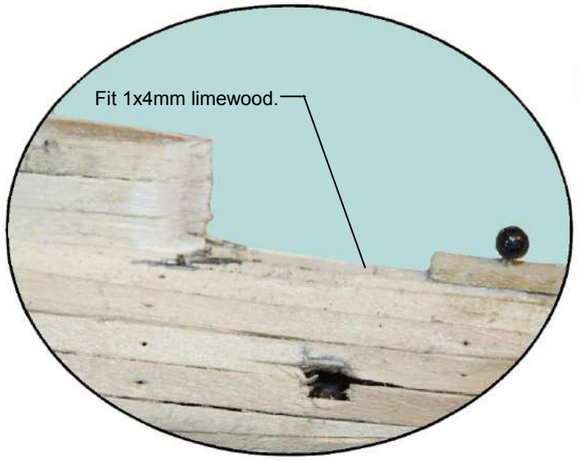
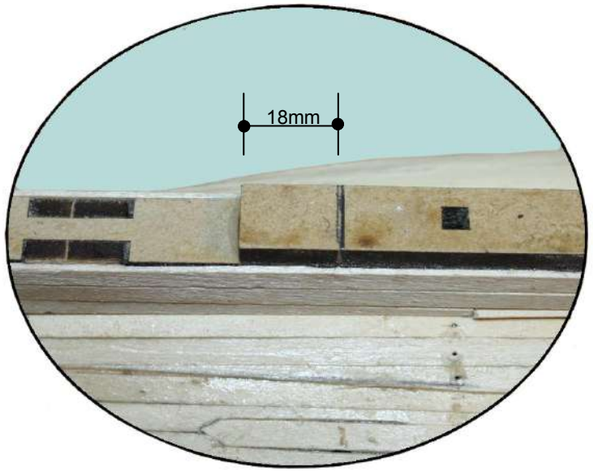
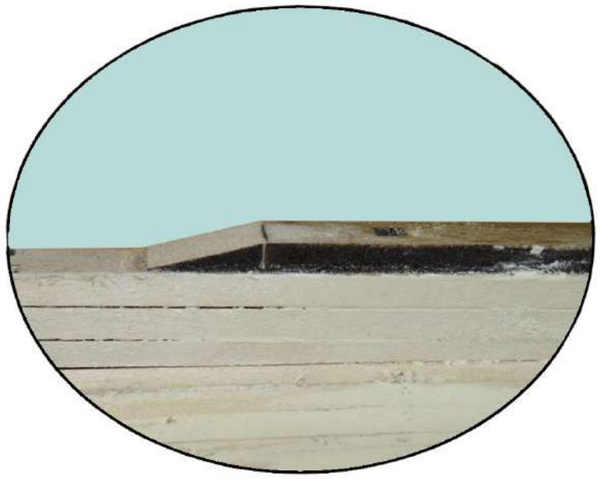
6.11 Planking Rest of Hull

Identify the 2x5mm limewood P24 - cut to 45mm and glue in place at the top of the stern as shown. Fit a length of P22 planking in the area at the top of the hull as shown. On the fore conning tower base measure back from the front edge 18mm as shown and shape down to be flush with the deck.









6.11 Planking Rest of Hull

Fit and glue in place planks to cover the fore deck area as shown.

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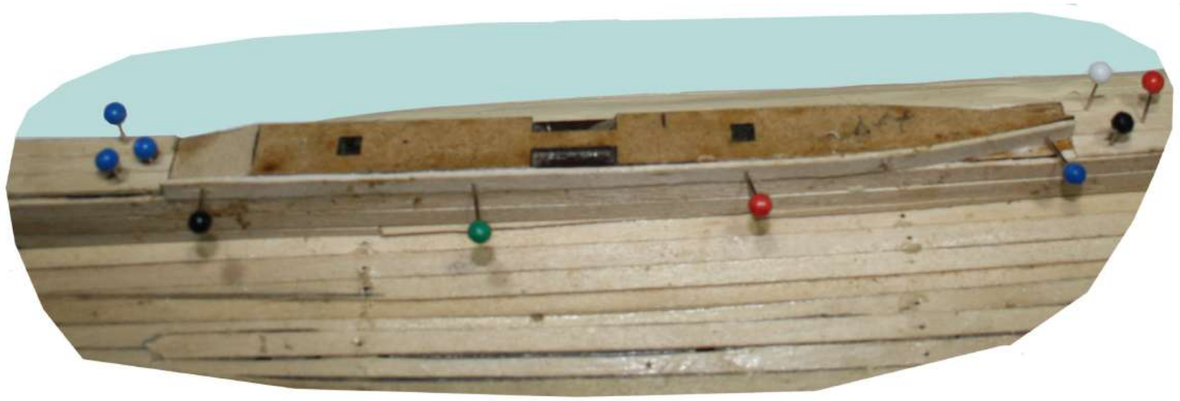
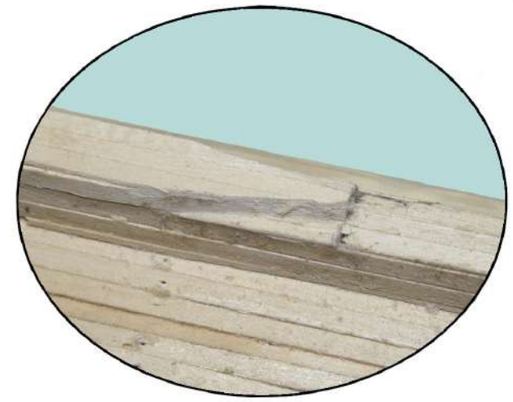
6.11 Planking Rest of Hull

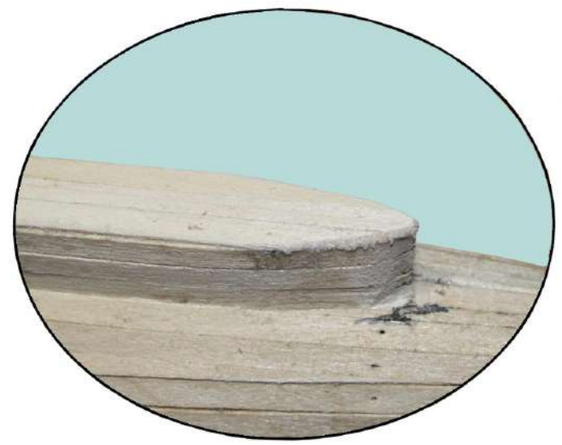
Fit and glue in place planks to cover the aft deck area as shown. Fit and glue in place planks to cover the sides of the conning tower base and the slope at the front of the base as shown.



6.11 Planking Rest of Hull

Remove any planking over hang and shape as shown.





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7.0 Sealing the Hull

Use wood filler to fill in any gaps and hollows in the hull body. Allow the wood filler to completely harden. Use a medium grade sandpaper to smooth the hull. Repeat with a fine grade sandpaper. Continue to use wood filler and sanding until a smooth hull shape is achieved - repeat these steps until you are satisfied.

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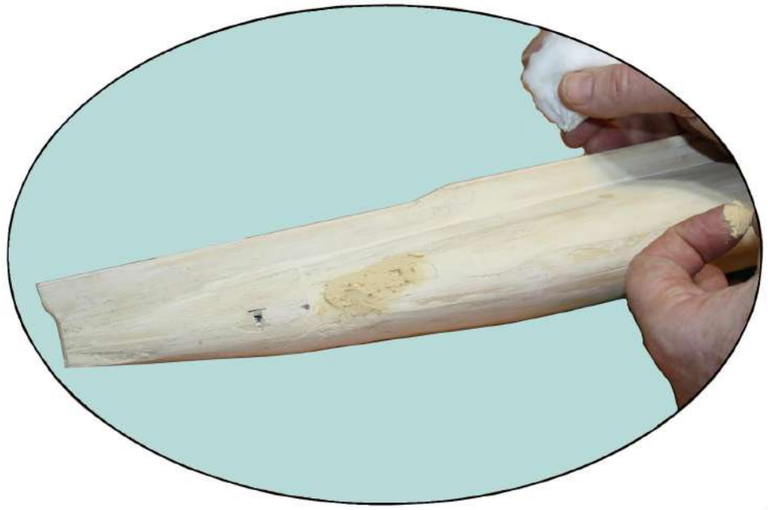
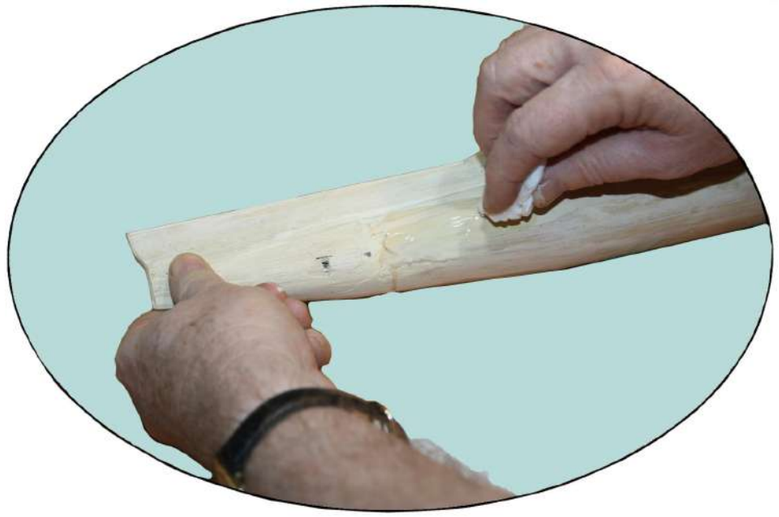
7.0 Sealing the Hull - continued

To fill any minor remaining hollows in the hull apply some wood filler to the area concerned and use a dampened cotton wad to spread the wood filler into and over the area. Carefully check over the hull in different light angles to help reveal any remaining minor low patches. Use wood filler to smear over these, allow to dry and sand smooth with a fine grade sandpaper. Continue these steps until you are completely satisfied with the finish. Set the model aside for 24 hours and then look carefully over the hull again. Fill and sand any blemishes identified. The end result will be worth the effort.





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7.0 Sealing the Hull - continued

Once you are completely satisfied with the shape and smoothness of the hull use a primer sealer undercoat as shown. Once the sealer is dry you may notice other low patches or blemishes - again use wood filler to fill, allow to dry and sand and paint with sealer again.

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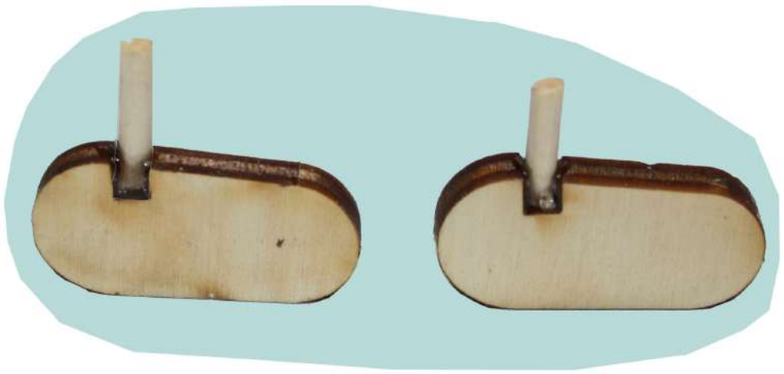
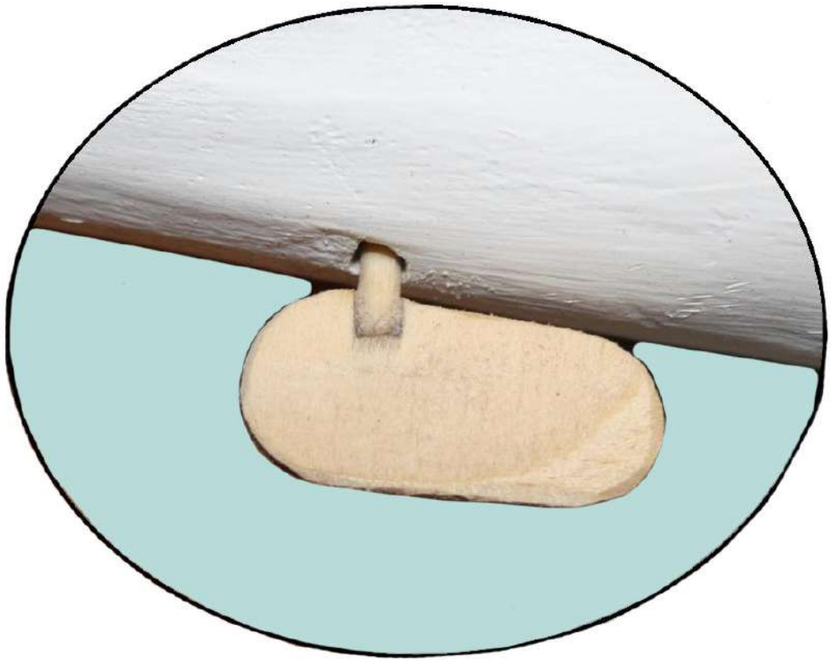
8.0 Hull Fittings

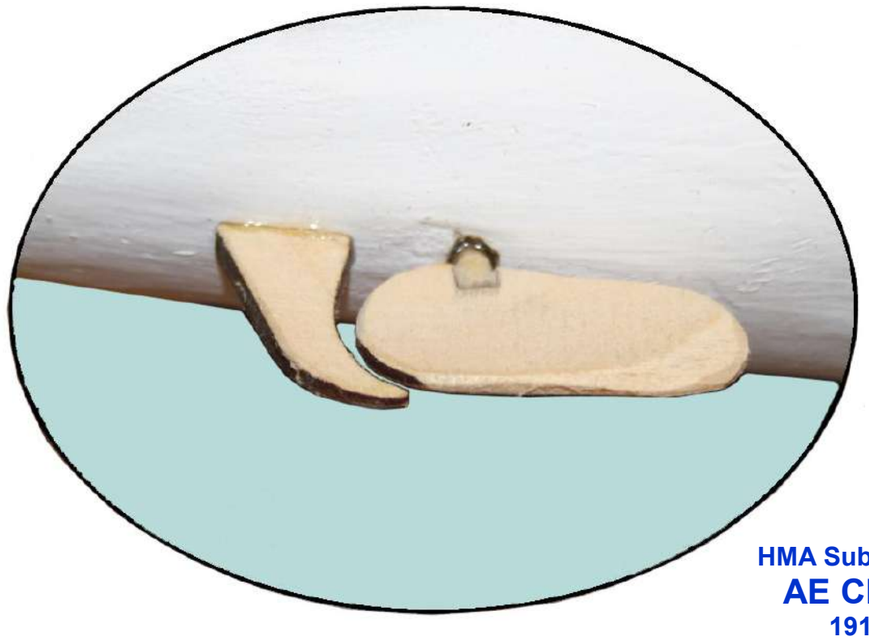
8.1 Fore Hydroplanes & Fins

Identify the fore hydroplanes P25 and fins P26. Identify the 3mm dowel P32 - cut two lengths of dowel at 15mm. Use epoxy glue to fix the dowel in the socket as shown. Once the glue has set use a sanding board to taper the plane towards the outer edges to approximately 2mm as shown - do not reduce the thickness of the pivot area. Slightly round the outer edges of the plane. Trial fit the hydroplane in place - adjust the length of the dowel so the plane sits approximately 1mm clear of the hull - do not glue in place yet. Identify the fore hydroplane fins P26.

Taper the fins to approximately 2mm at the outer edges as shown - leaving the edge that fits to the hull untouched. Taper both faces as shown. Drill two 0.7mm holes into the base of each fin and super glue a map pin in place as shown - snip off the head of the pin. With the hydroplane temporarily in place carefully align the fin in front of the plane and mark the pin locations onto the hull. Drill two 0.7mm holes into the hull at these points and use epoxy glue to fix the fin in place. Epoxy glue the hydroplane in place now as well. Repeat for the other side of the hull.







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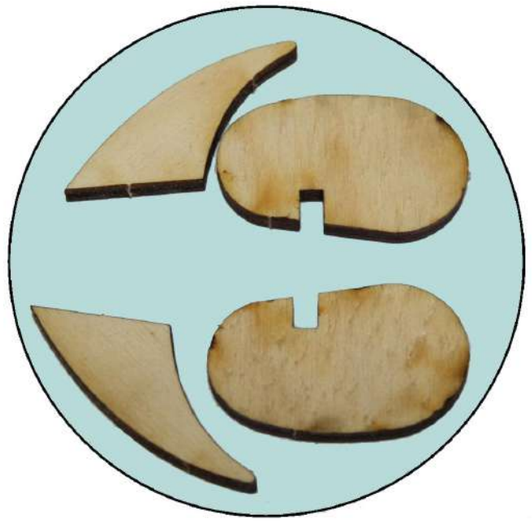
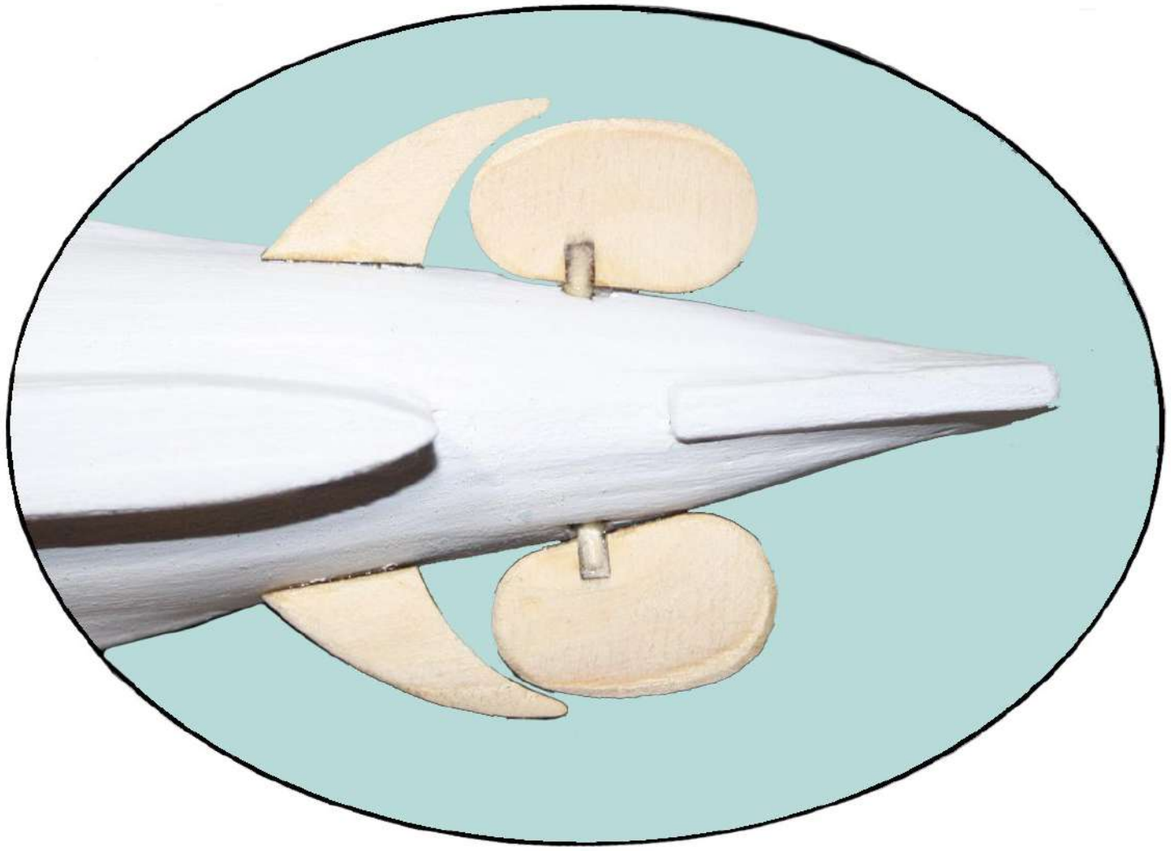
8.2 Aft Hydroplanes & Fins

Identify the aft hydroplanes P27 and fins P28. Identify the 3mm dowel P32 - cut two lengths of dowel at 15mm. Repeat the process for shaping and fitting these planes as previously presented for the fore hydroplanes and

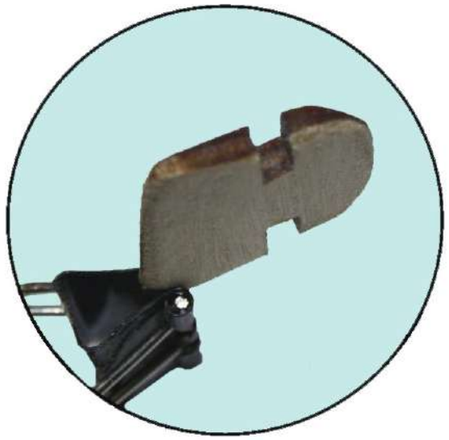


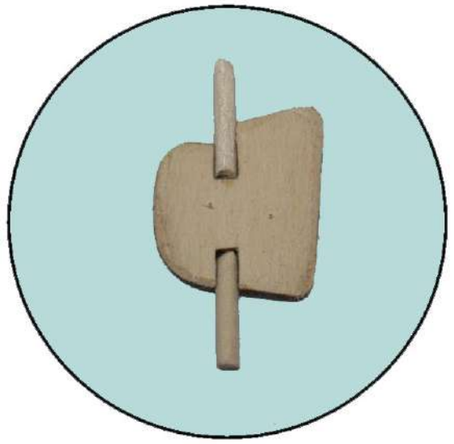


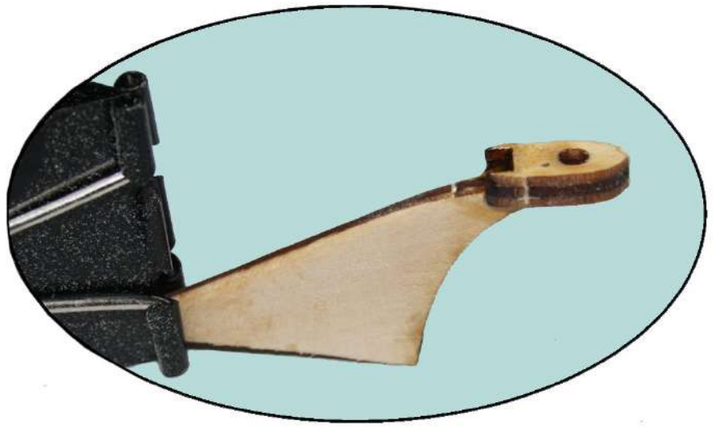
8.3 Rudder and Rudder Fin

Identify the rudder P30. Taper the fore and aft edges as shown. Cut two 15mm lengths of 3mm dowel P32 and epoxy glue in place as shown. Set aside for glue to set.

Identify the rudder fin P29 and rudder pivot base P31. Taper and round the leading edge of the fin as shown. Epoxy glue the rudder pivot base in place as shown. Set aside for glue to set.







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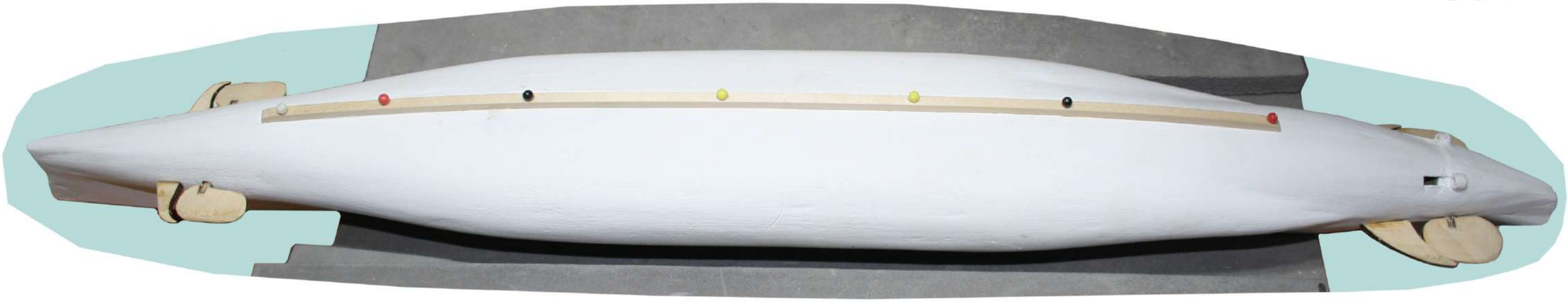
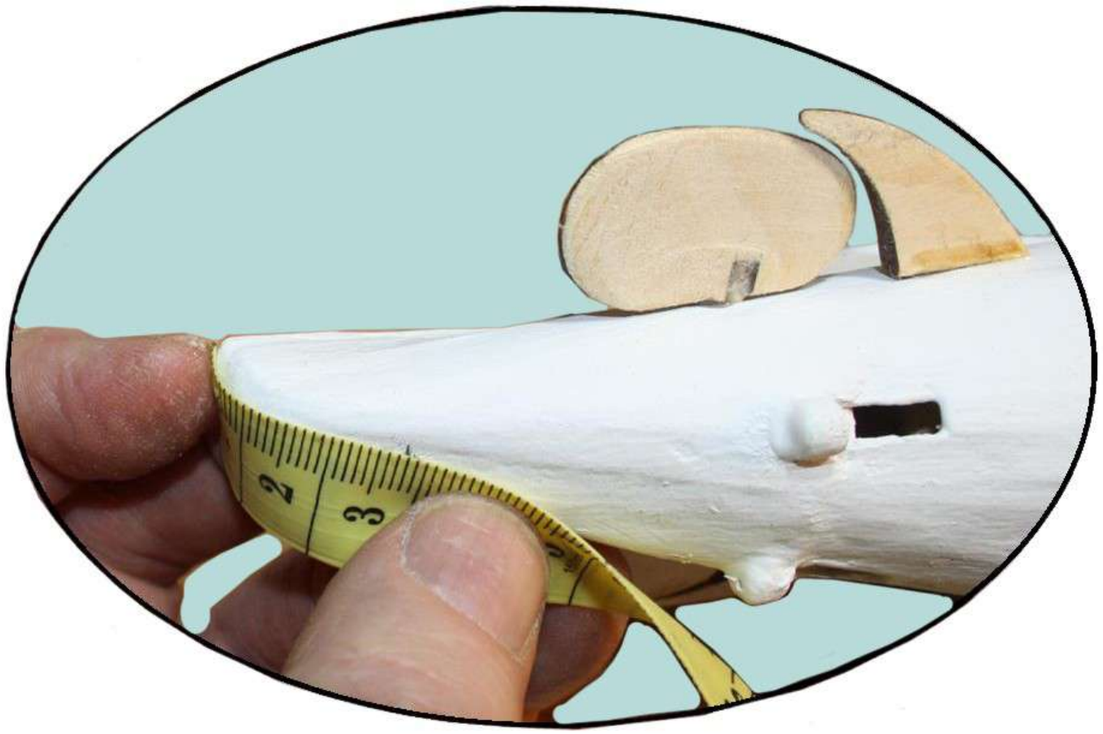
8.4 False Keel

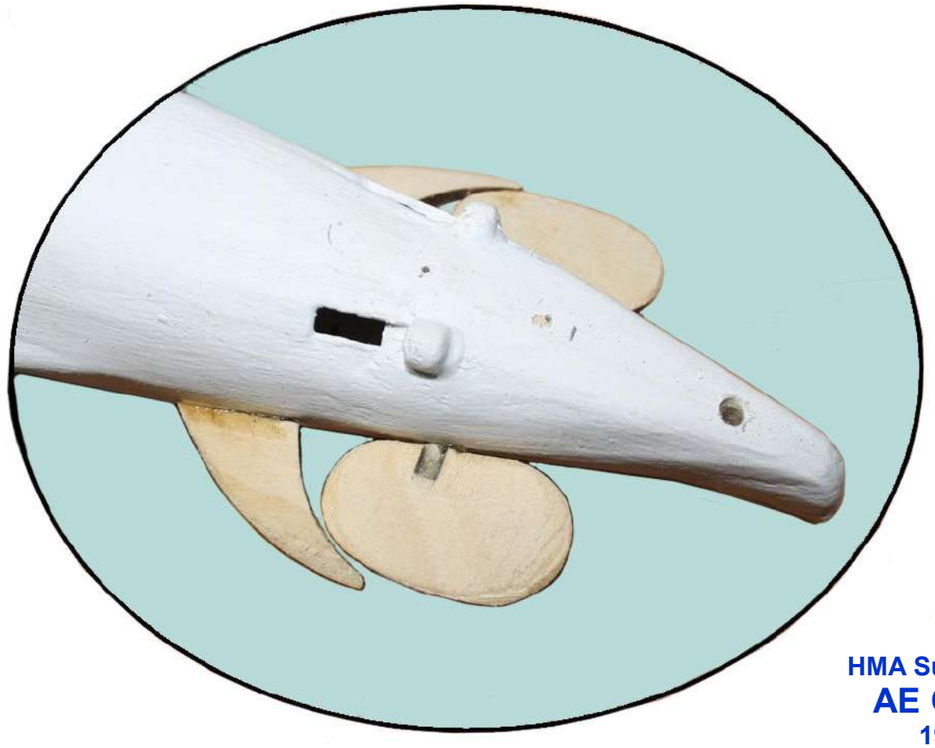
Identify the false keel P33A/B. Trial fit the keel pieces in place—once satisfied epoxy glue and pin in place as shown.



8.5 Rudder Placement

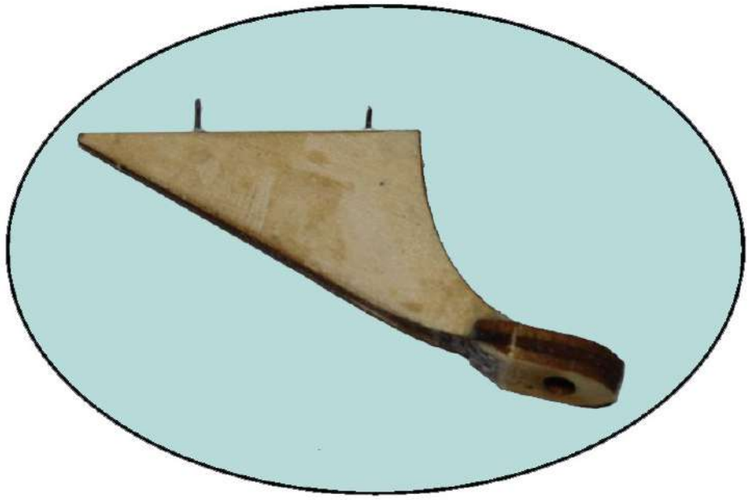
From the top edge of the hull measure down and around the keel a distance of 28mm - mark this point with a pencil. Drill a 1mm pilot hole at this point followed by a 3mm hole drilling to a depth of 4mm - making sure you are drill vertically to the keel.

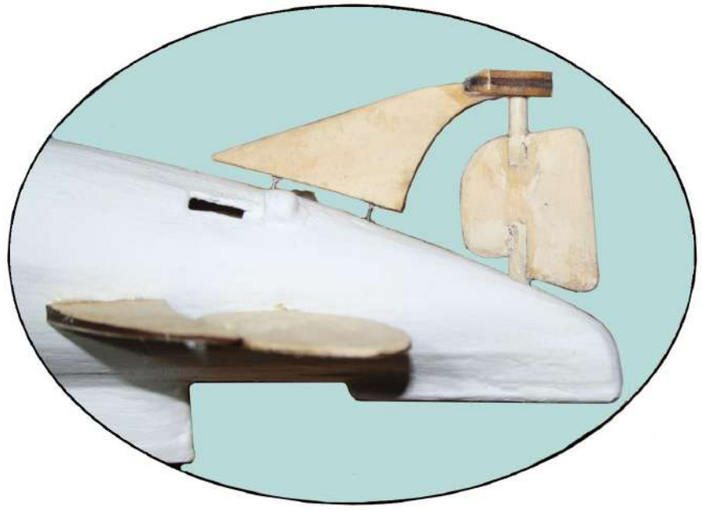


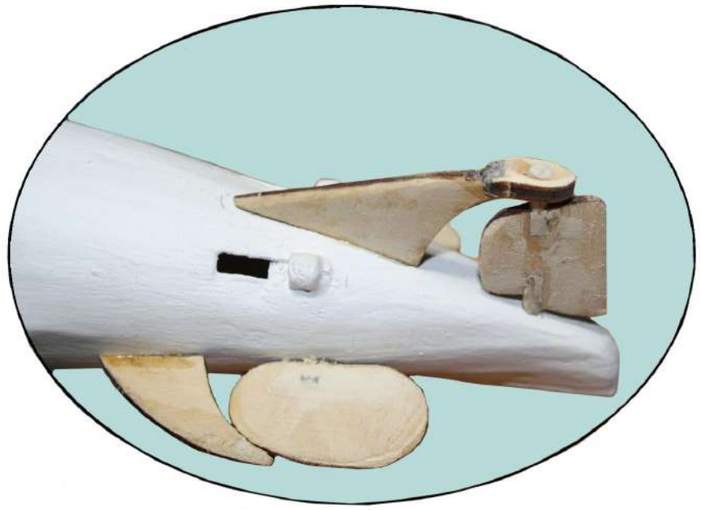


8.6 Rudder Fin

Fit and fix in place two pins to the base of the fin as shown. Shape the rudder pivot base as shown. Fit the rudder in place and locate the fin as shown - make sure the fin is centrally located - pins the pins into the hull to mark their location. Drill 0.7mm holes into these points - trial fit the fin with rudder in place. Once satisfied with the location and fit epoxy glue the fin in place. Once glue has set shape the protruding end of the rudder shaft to be flush with the pivot base. Paint the hydroplanes, fins and rudder parts with wood sealer and set aside to dry.

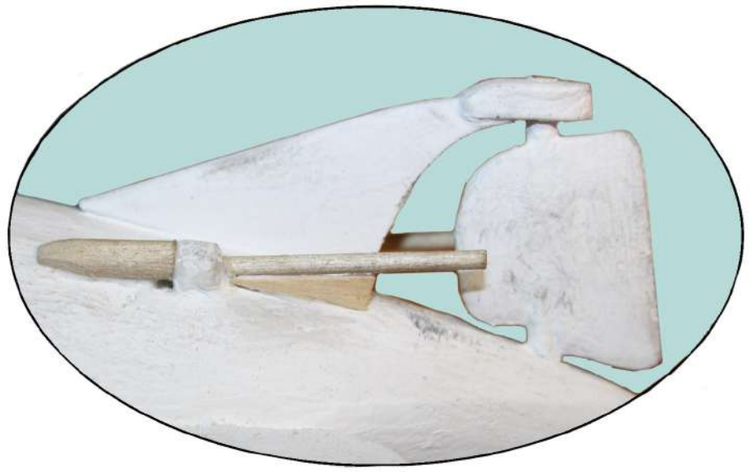


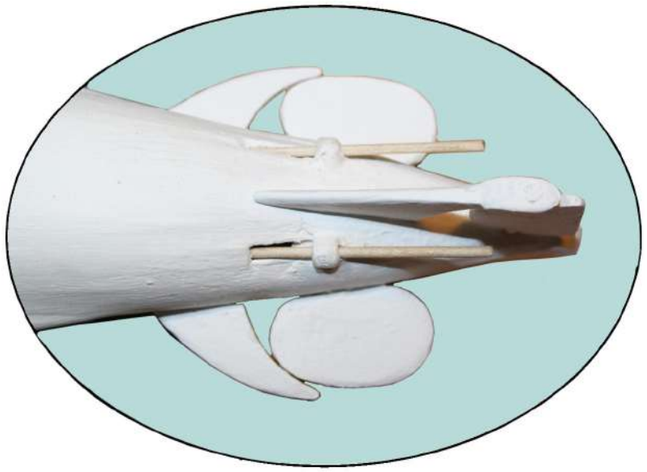


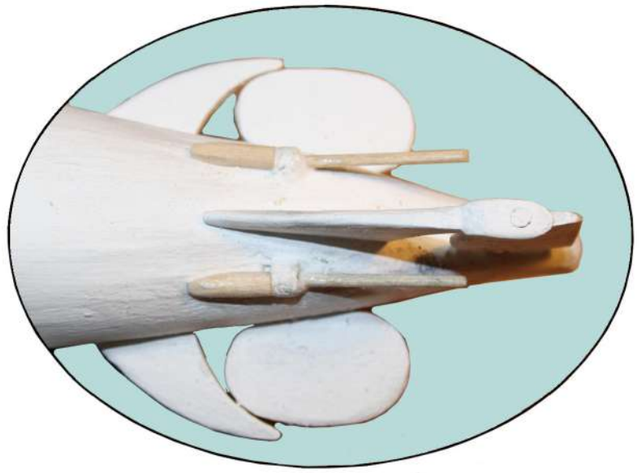


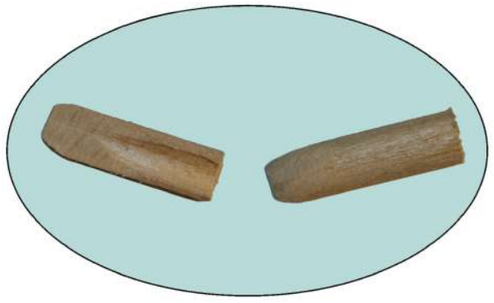
8.7 Propeller Shaft, Cover & Flange

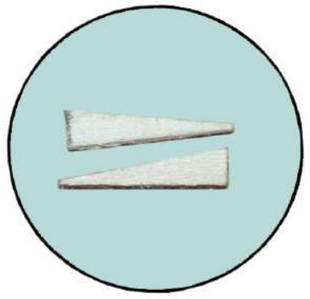
Identify the 2mm dowel P34 - cut two x 55mm lengths as the propeller shafts. Trial fit each as shown and once satisfied glue in place. Identify the 4mm dowel P35 - cut two x 15mm lengths as the shaft covers. Shape as shown. Trial fit and fractionally adjust as necessary. Once satisfied glue in position and set aside to dry. Cut two x 15mm lengths of 1x4mm limewood P19. Cut diagonally as shown to give two halves - glue two halves together. Trial fit and fractionally adjust. Once satisfied glue in position. Use wood filler to close any gaps. Once filler is dry paint with sealer as shown.

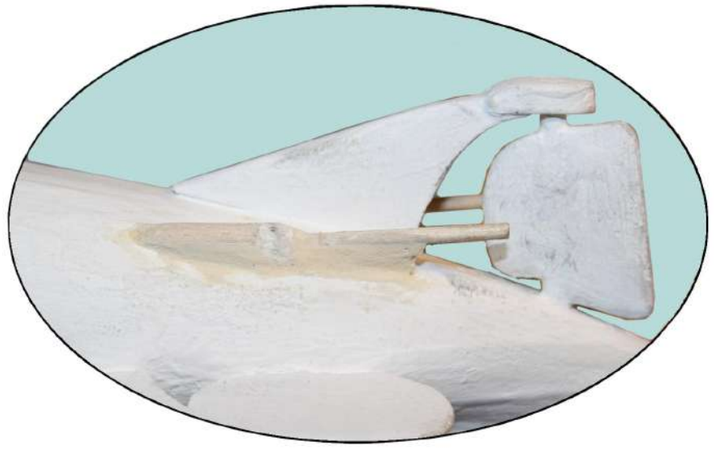












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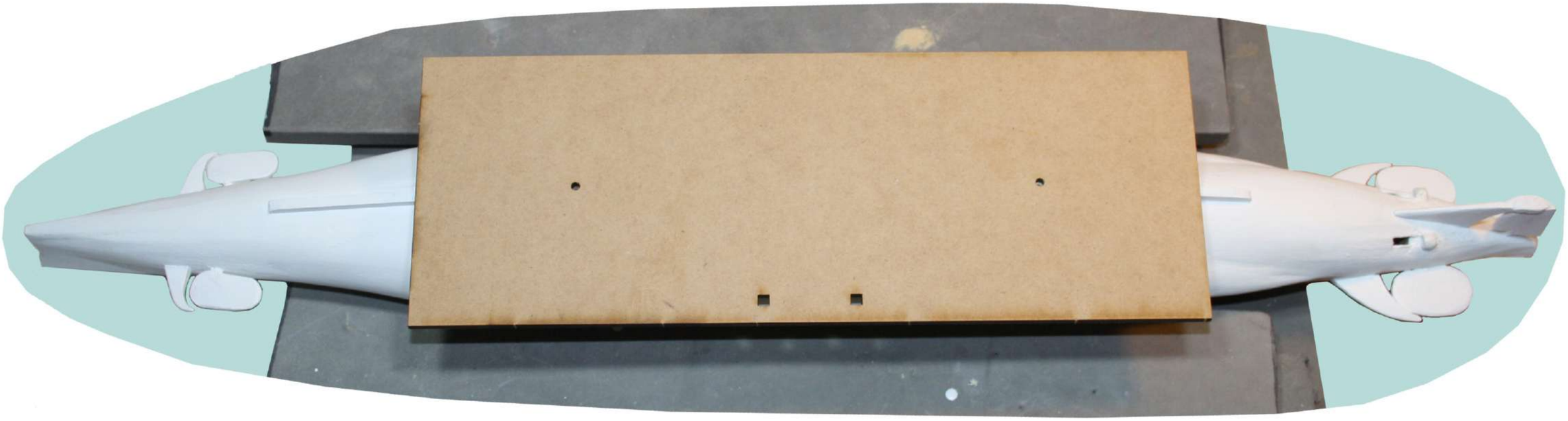
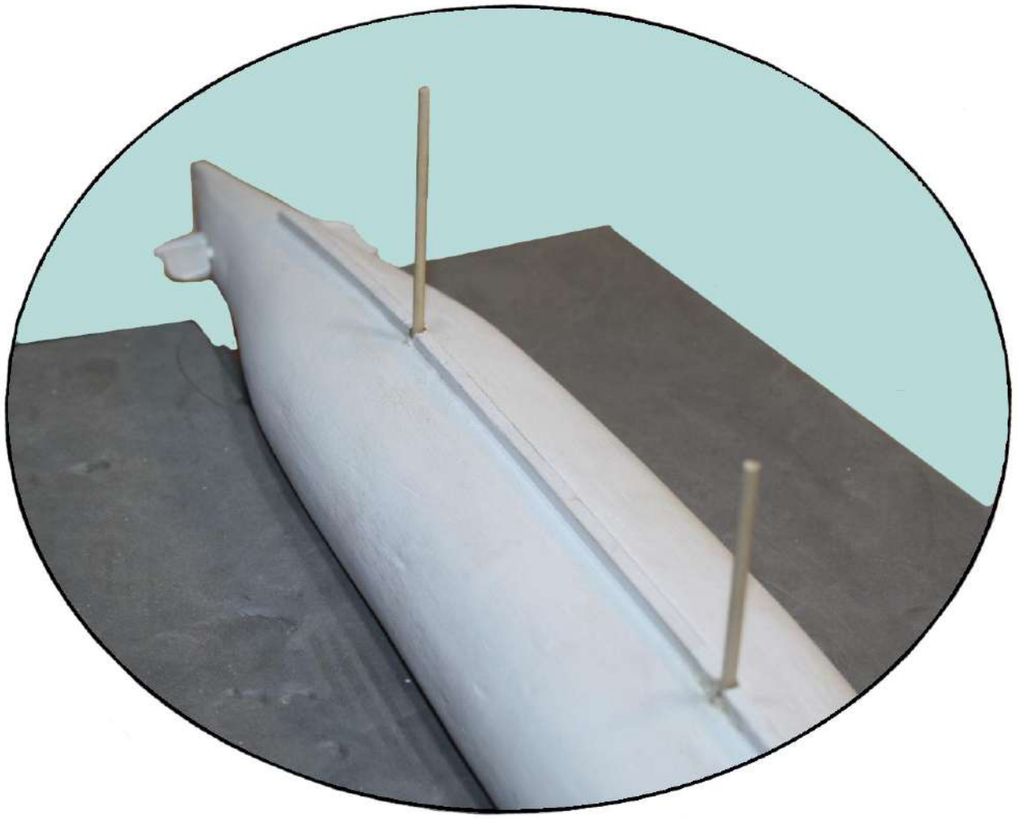
8.8 Mounting Posts

Identify the top base board P39. Turn the model over and place securely and safely on modelling mats. Place the display base centrally as shown aligning the mounting posts holes with the false keel. Once satisfied mark the location of these holes onto the keel. Remove the base and drill a 1mm pilot hole at the marked locations. Followed by a 2mm hole and then a 3mm hole at all times making sure you are drilling vertically. Cut two x 70mm lengths of 3mm dowel P32 as the mounting posts. Epoxy glue these dowels in place as shown. Once glue has set use wood filler to fill any gaps and sand when hardened. Paint mounting posts with wood sealer. Use a block of wood to temporarily mount the model as shown.





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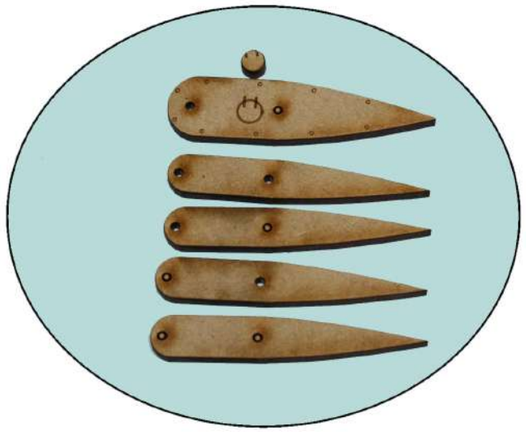
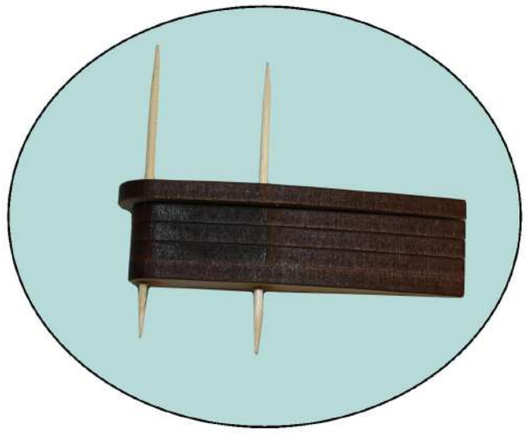
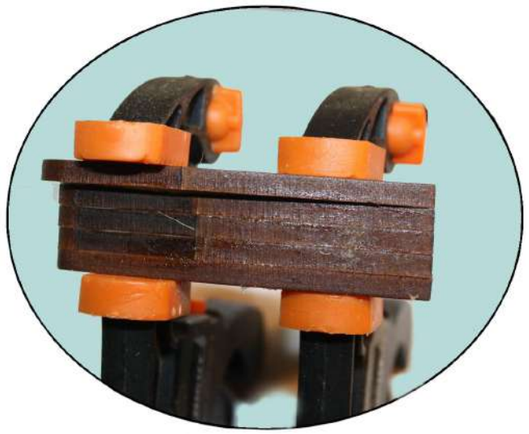
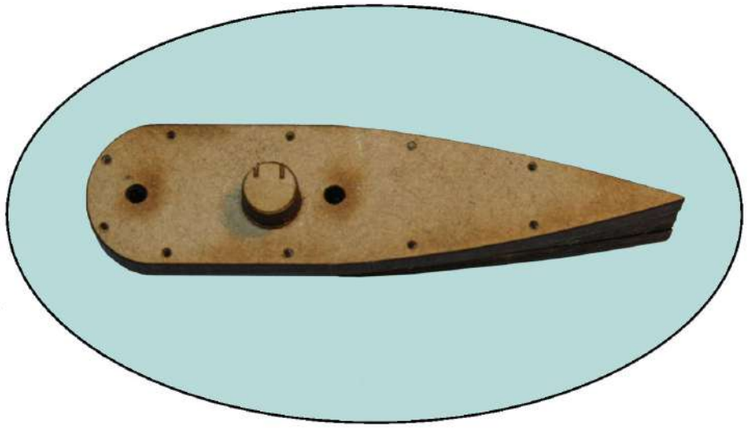
8.9 Conning Tower

Identify the conning tower parts P36 - P38. Glue, assemble and clamp as shown - remove locating dowel before glue sets.



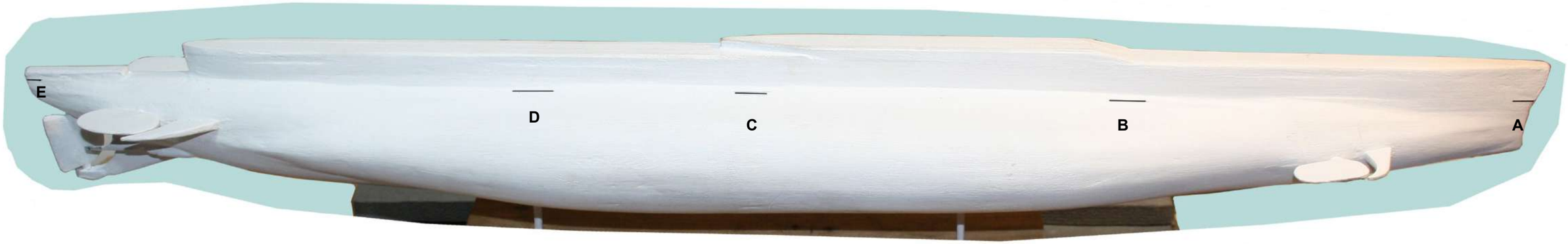


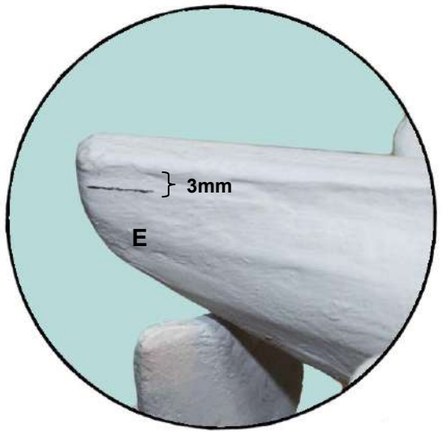


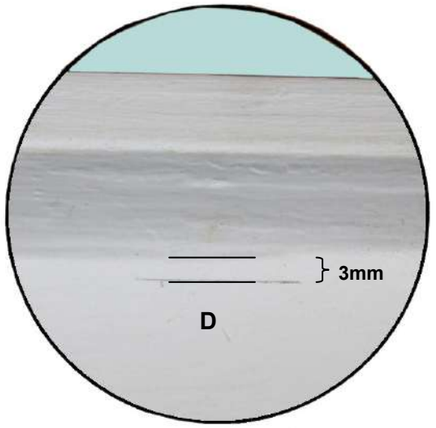


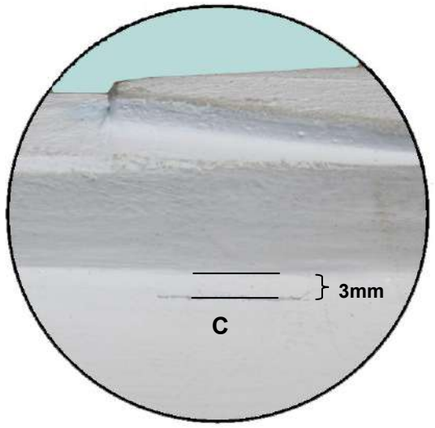
8.10 Painting Preparation

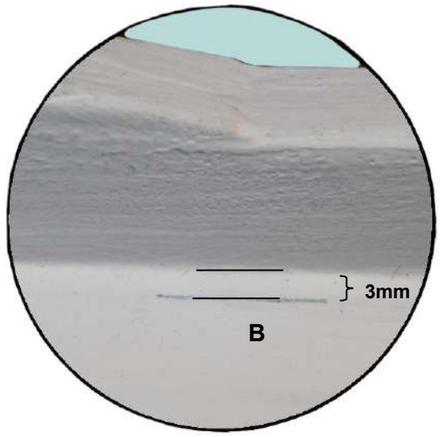
At Point A measure down from the top of the fore deck a distance of 14mm - draw a line. At the mid-boat Points of B, C & D measure 3mm from the main body over the ballast area of the hull - draw a line at each of these points. At Point E measure 3mm down from the top of the deck - mark this point. Make the same measurements of the other side of the hull.

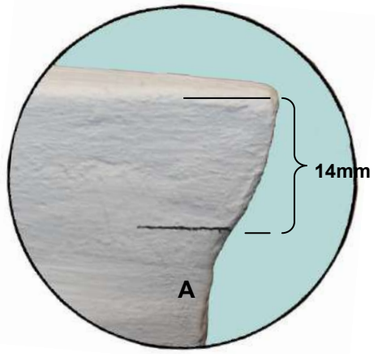












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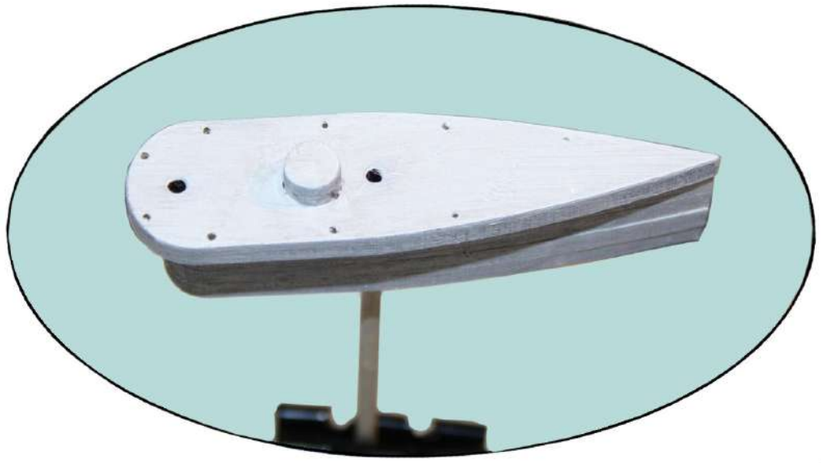
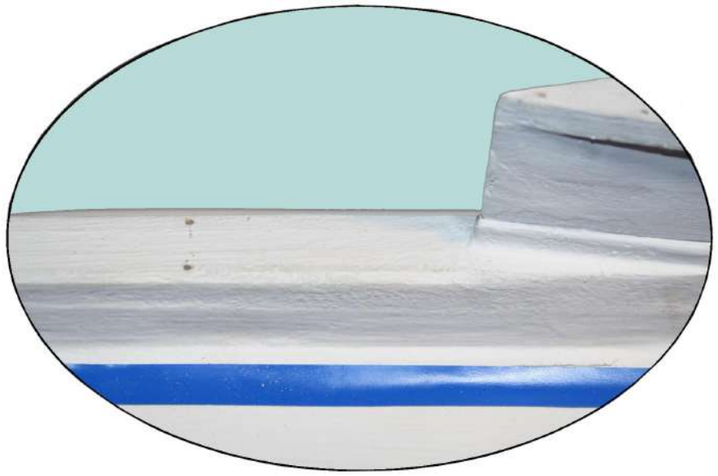
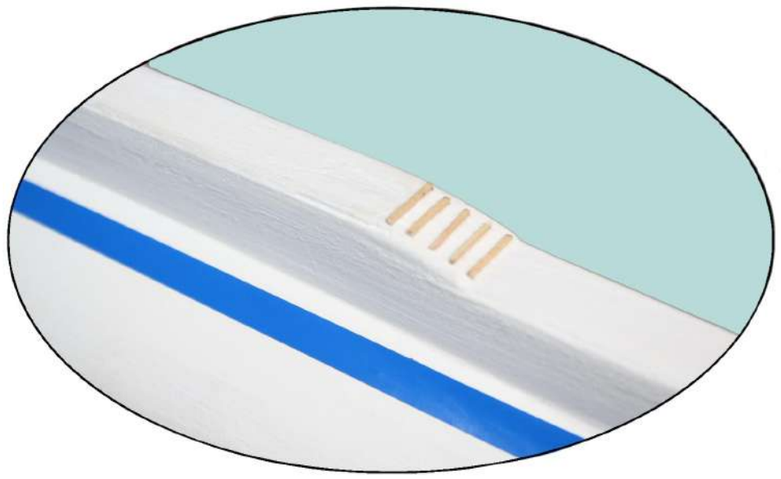
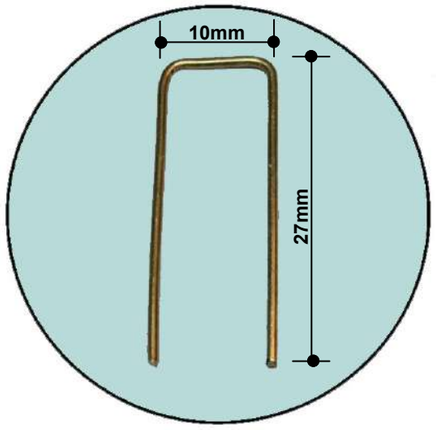
8.10 Painting Preparation - continued

Run lengths of pin strip tape aligned with these points on both sides of the hull - make sure there is symmetry at the bow and stern points with the tape. Paint the assembled conning tower with white sealing paint. Identify the 1mm brass wire P45 - cut a length 65mm as the aerial mast stand. Shape as shown. Drill 2 x1mm holes into the deck 40mm from the aft end of the conning tower as shown. Adjust depth of holes and/or length of uprights so the height of the top is 24mm above the deck. Once satisfied glue in position. Identify the 1x1mm limewood P46. Cut 5 x 10mm lengths as the foot grips on the main deck - glue in position as shown.









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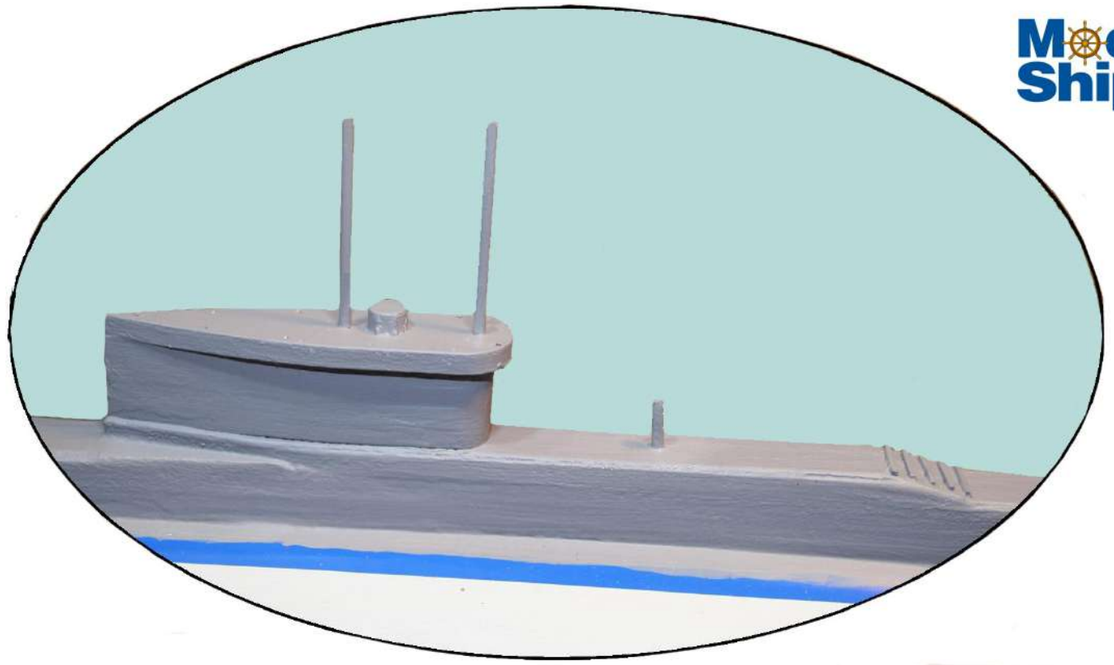
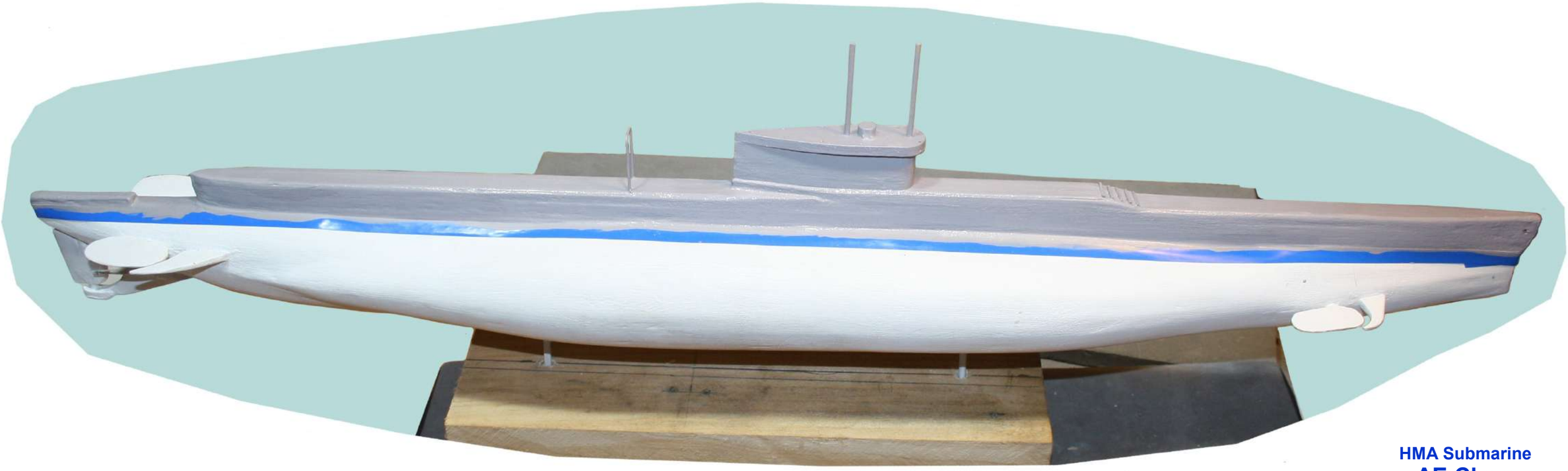
8.11 Periscopes & Snorkel

For the two periscopes cut two x 45mm lengths of 2mm dowel P34. Drill 2mm holes at marked points on the conning tower top. Shape, fit and glue the dowels in position so that each periscope projects 40mm above the top of the conning tower. For the fore deck snorkel cut a 14mm length of 2mm dowel. Measure 32mm in front of the conning tower and drill a 2mm hole in the centre of the deck. Fit and fix the dowel in place so that is projects 10mm above the deck.



8.12 Painting the Hull

Paint the upper hull a light grey—a few coats will be needed. Allow each coat to completely dry before applying the next coat of paint.



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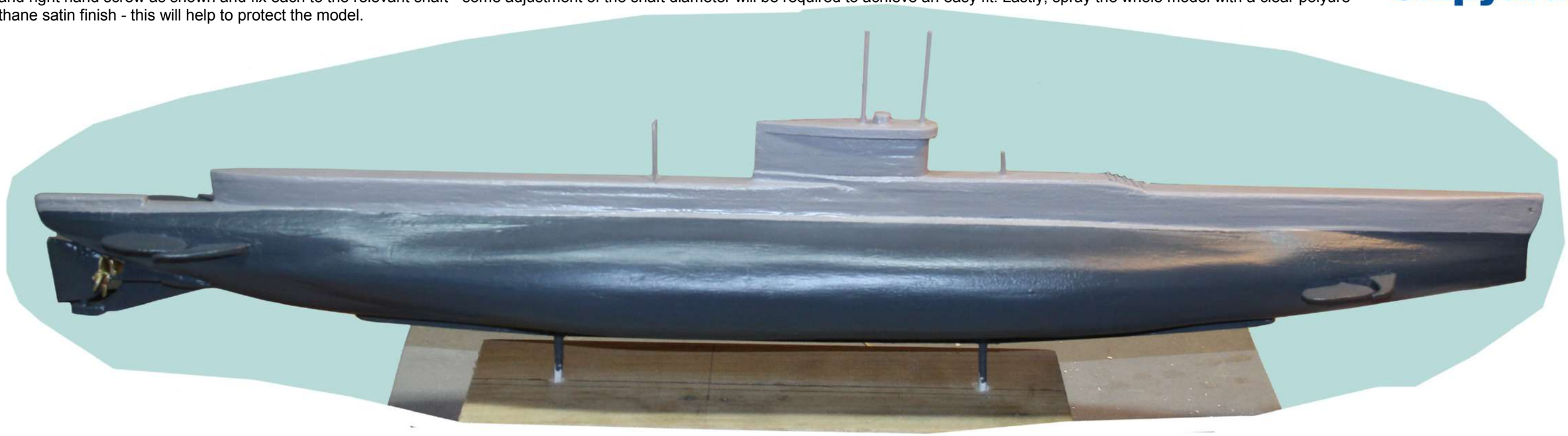
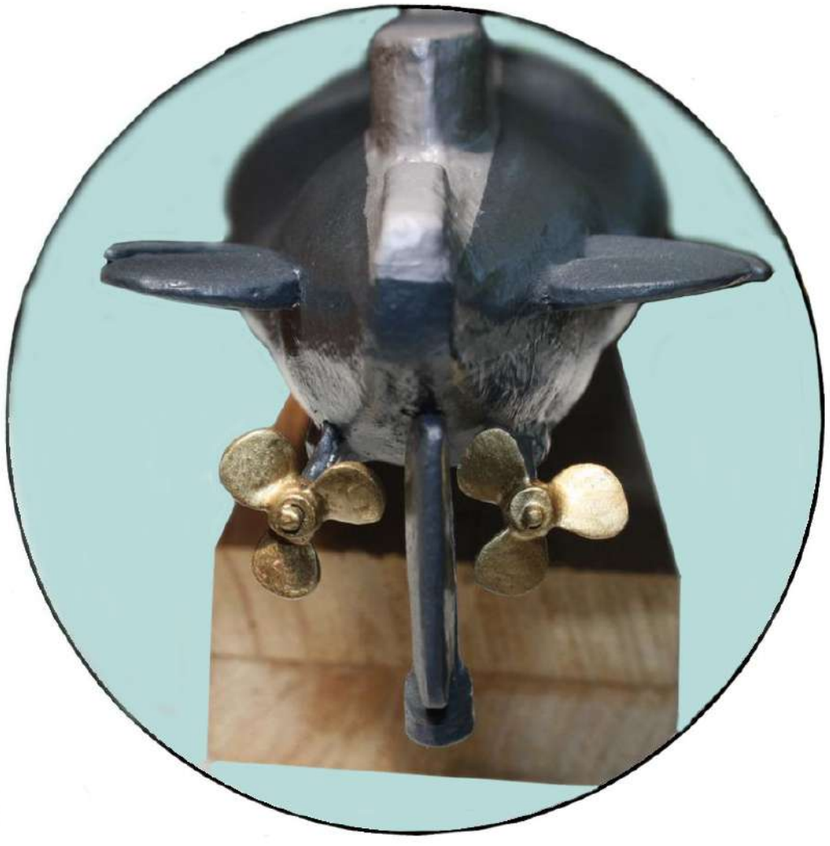
8.12 Painting the Hull

Paint the lower hull dark grey—a few coats will be needed. Allow each coat to completely dry before applying the next coat of paint. Carefully examine the line between the two colours—you may need to correct any minor paint bleed between the two colours - use a small flat brush to do this if needed. Identify the propellers P47. Paint a gold colour and allow to dry. Once dry identify the left and right hand screw as shown and fix each to the relevant shaft - some adjustment of the shaft diameter will be required to achieve an easy fit. Lastly, spray the whole model with a clear polyurethane satin finish - this will help to protect the model.





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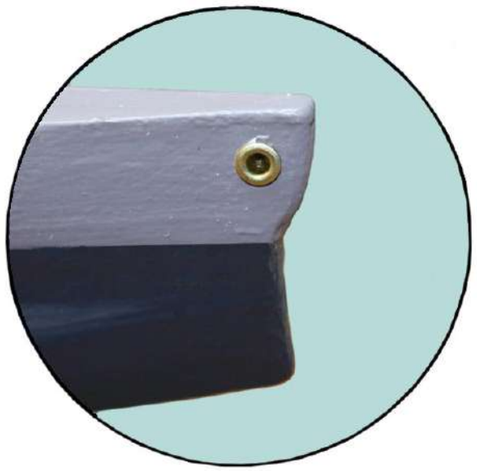
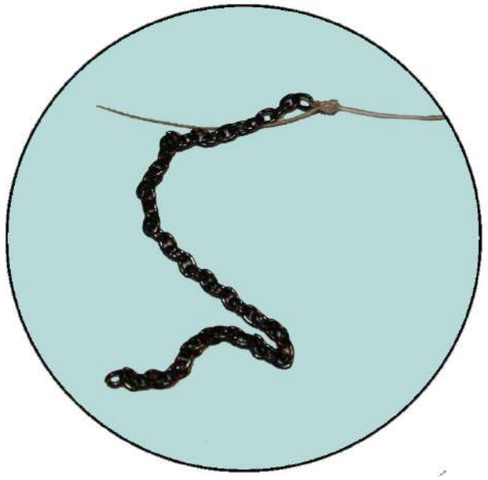
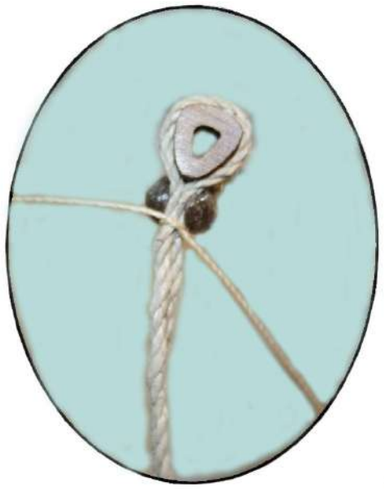
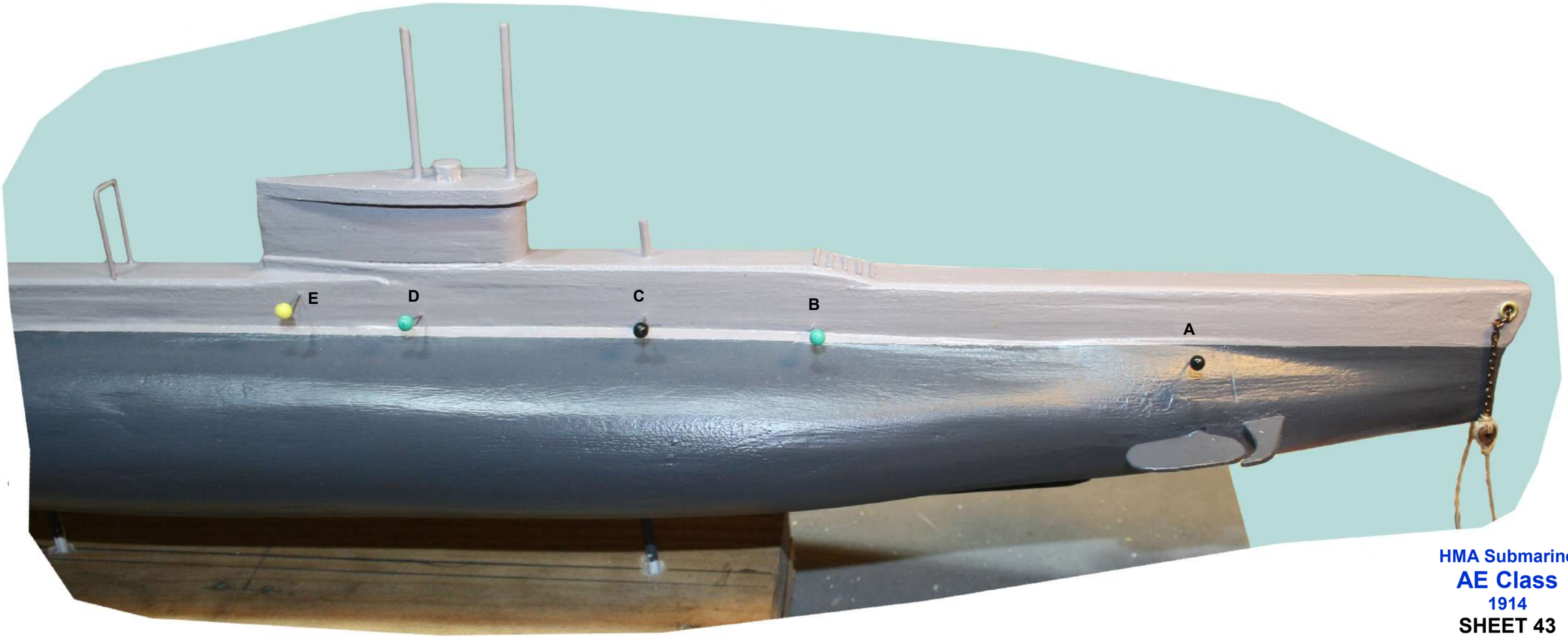
8.13 Hull Fittings

Drill a 3mm hole through the bow as shown - identify the hawse pipes P48 - fix in place as shown. Identify the anchor chain P49. Tie a length of 0.25mm cord P52 to one end of the chain and use to draw chain through the hawse pipes - allow chain to hang equidistance on each side of hull. Identify the shackles P50. Identify the anchor rope P51. Wrap a 20mm length of anchor rope around the shackle and use the 0.25mm cord to tie-off - wrap a few turns of this cord around the anchor rope. Tie the shackle to the end of the chain as shown. Place map pins along the hull at Points A to E as shown - once satisfied with the run remove each pin and drill a 0.7mm hole at each point.









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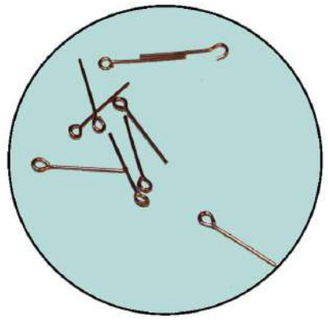
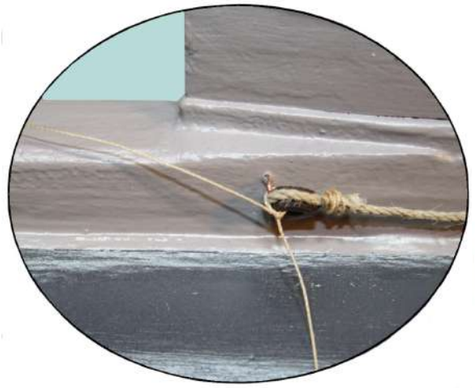
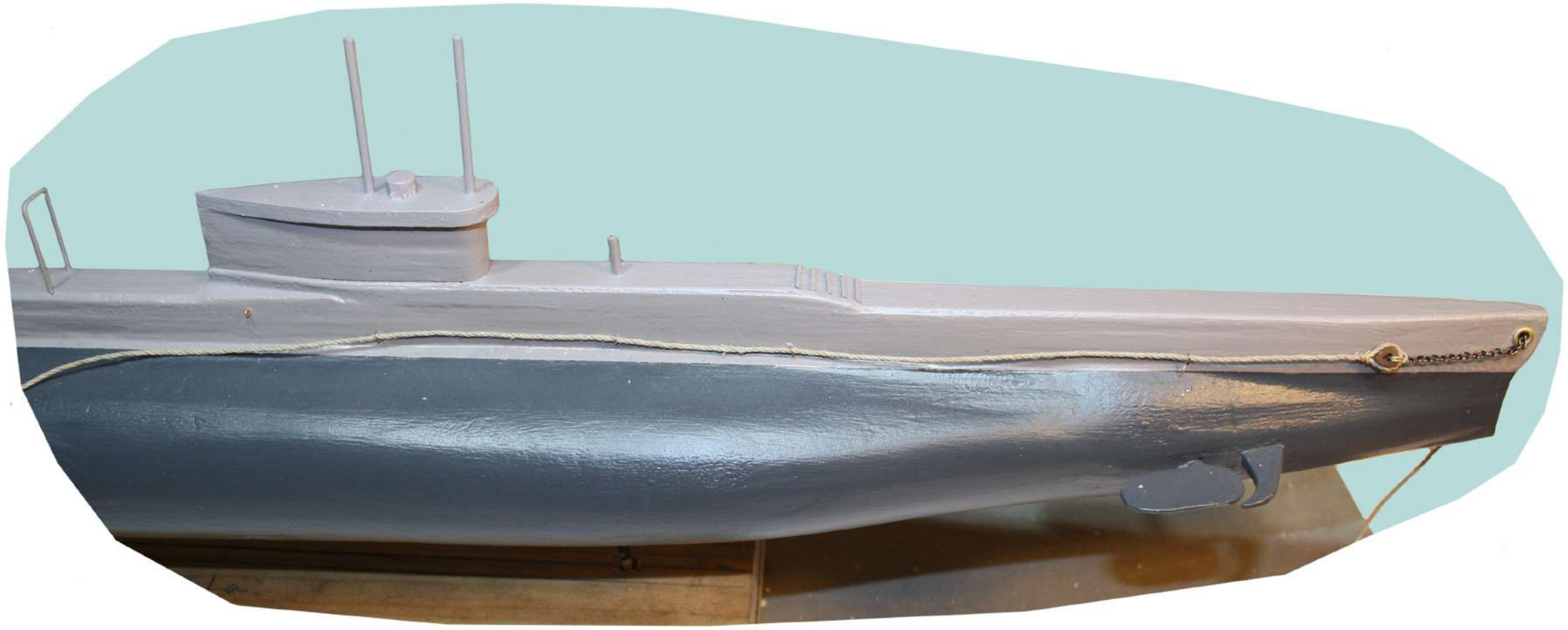
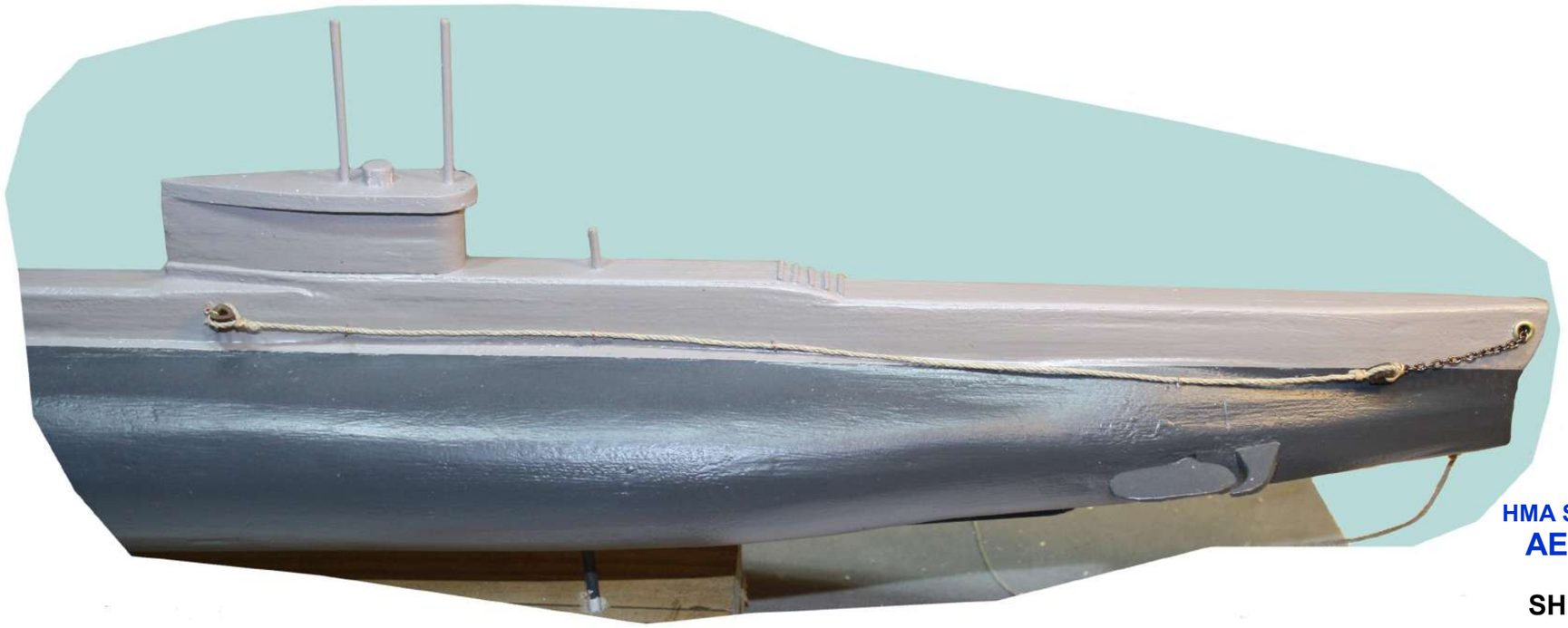
8.13 Hull Fittings - continued

Identify the eye pins P53 - slightly open 4 of the eye pins to make it easier to fit the rope in place along the hull. Fix these eye pins in place at Points A to D. Run the anchor rope along the hull fitting into the partly opened eye pins. Trim the length of the rope to accommodate a second shackle terminated at the last eye pin as shown. Tie off the shackle to this last eye pin Point E. Repeat for the other side of the hull.









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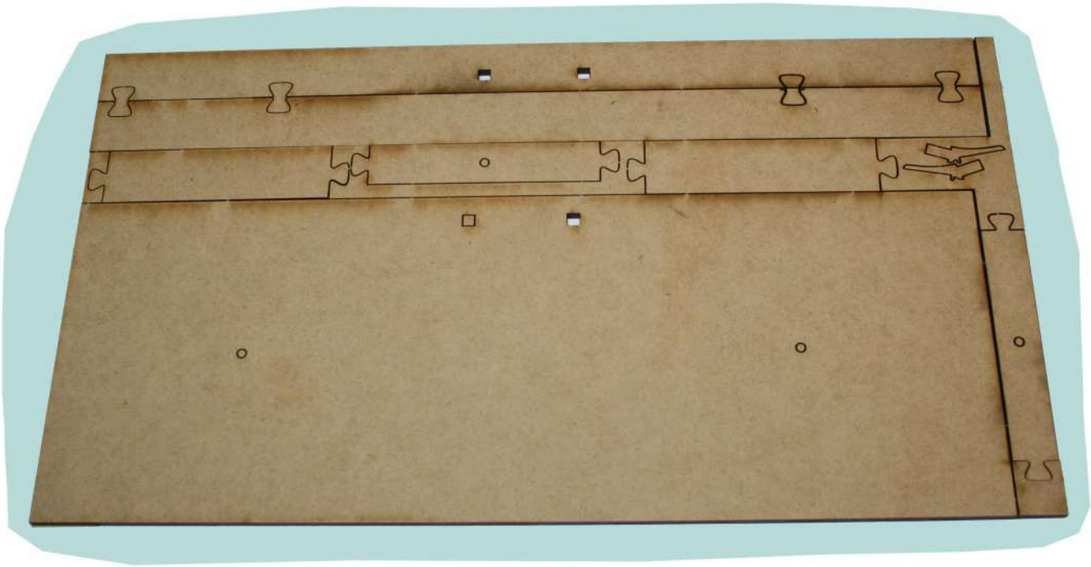
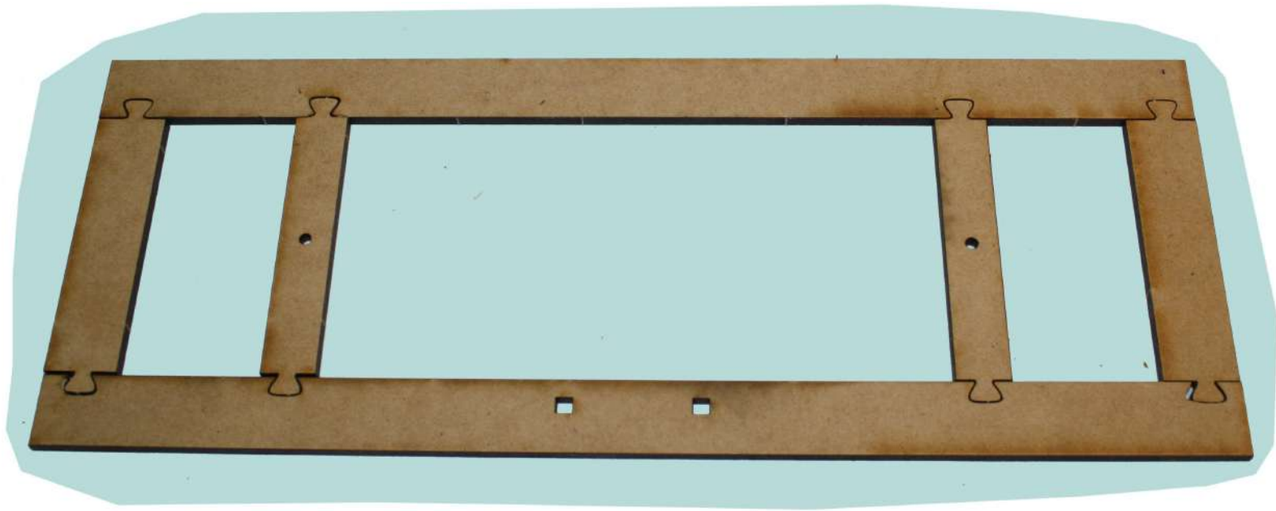
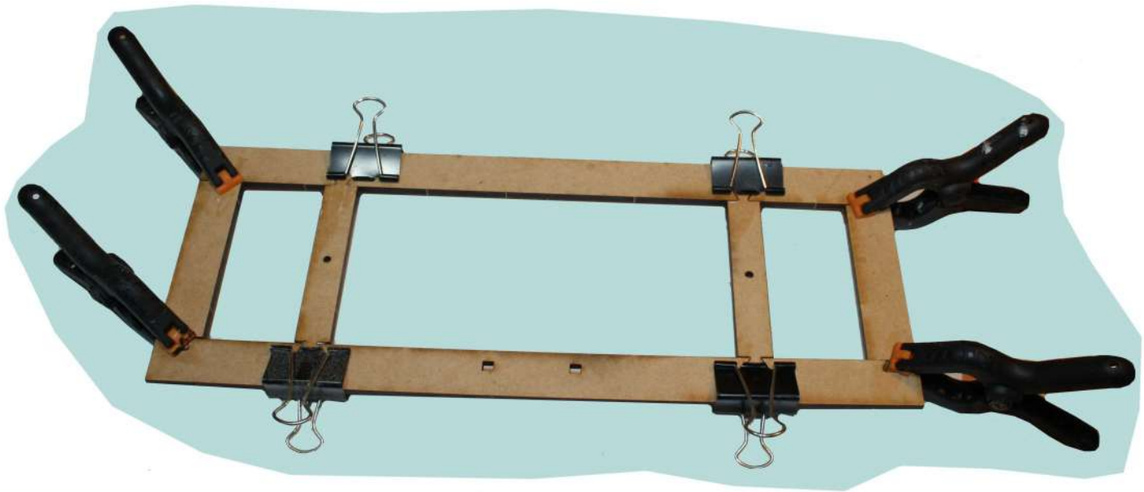
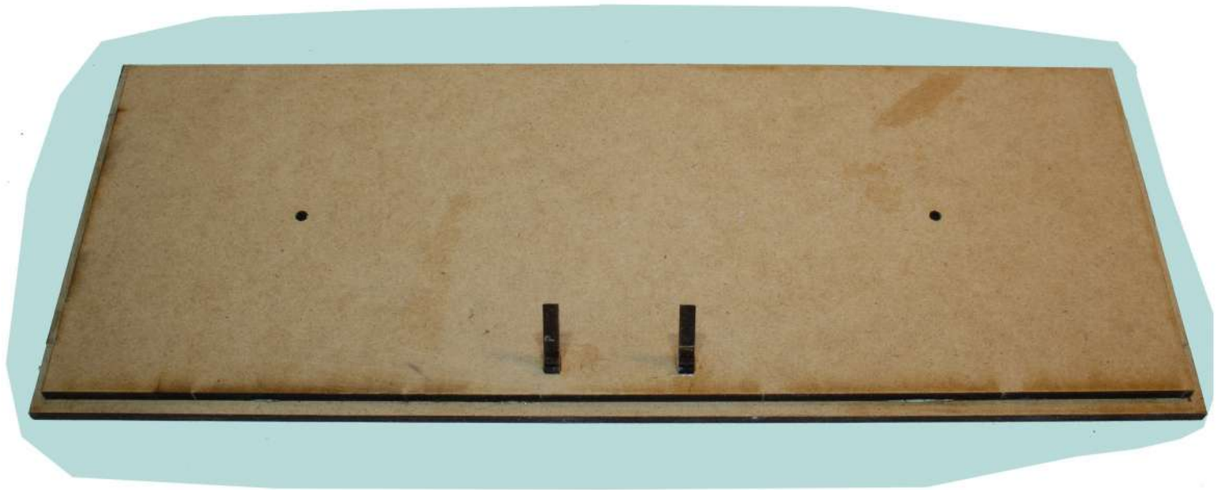
8.14 Display Stand

Identify the display stand parts P39 - P44. Assemble and glue as shown. Once glue has dried spray paint the assembled display board satin black - set aside to dry.









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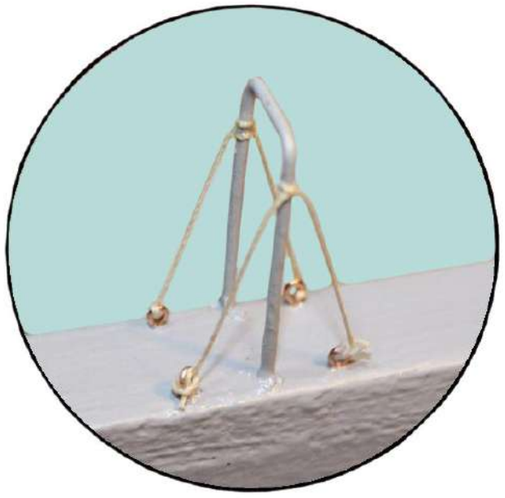
8.15 Mount Model on Display Board

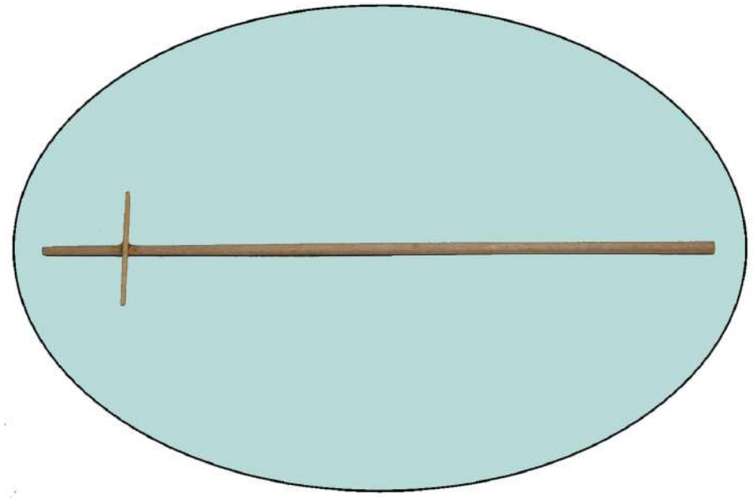
Paint the mounting posts gold. Trim each to a length of 38mm from the keel - once each post is pushed fully into place on the main board this will give a clearance of 30mm from the board to the keel.

8.16 Aerial Stand & Mast

Fit eye pins P53 in place on the deck either side of the aerial mast stand as shown. Using 0.25mm cord tie-off as shown. For the aerial mast cut a 120mm length of 2mm dowel P34 - taper to 1.5mm at the top end. Identify the 1mm dowel P54 - use as the aerial crossbar - cut a 24mm length. Measure down 15mm from the top of the aerial mast and file a small “v” into the dowel - Use super glue to centrally fix the cross bar in position. Paint the aerial mast light grey.

At this point you can choose to display your model as if it were operating submerged. If you choose submerged operation lay the aerial mast down onto the aerial mast stand as shown and fit your chosen name plate and bow lettering to the model - you model is now complete - go to Section 9.0.





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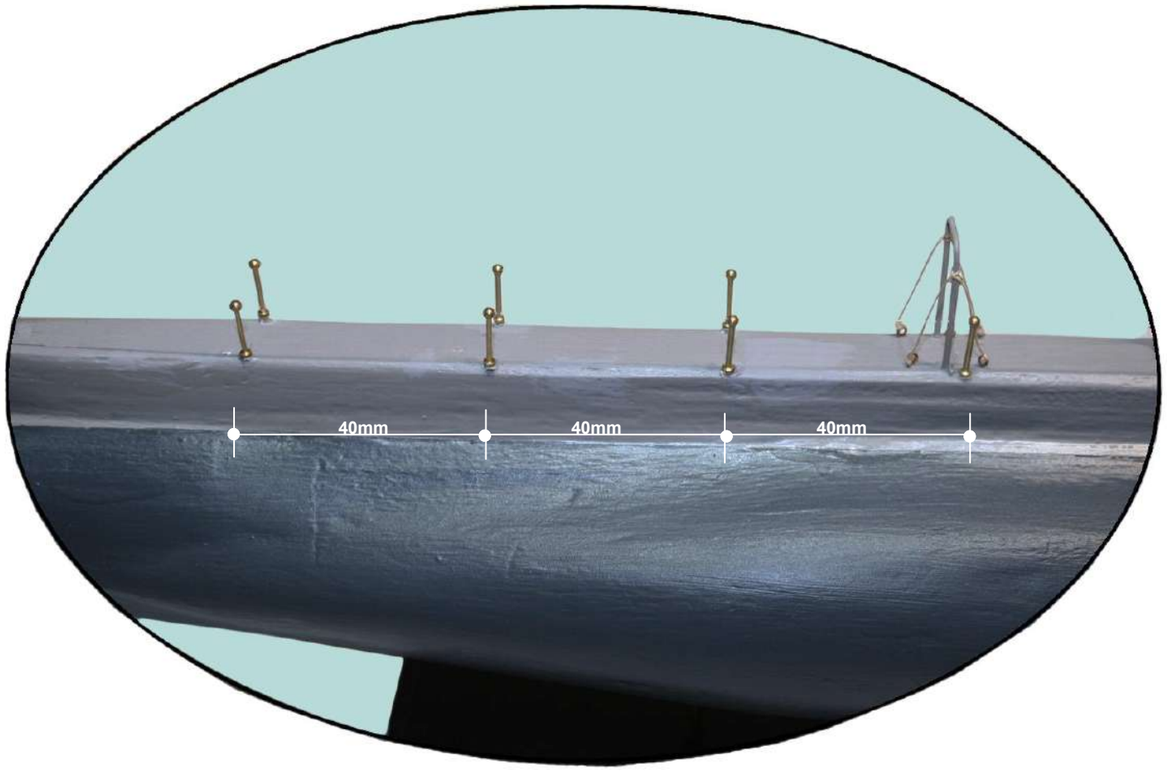
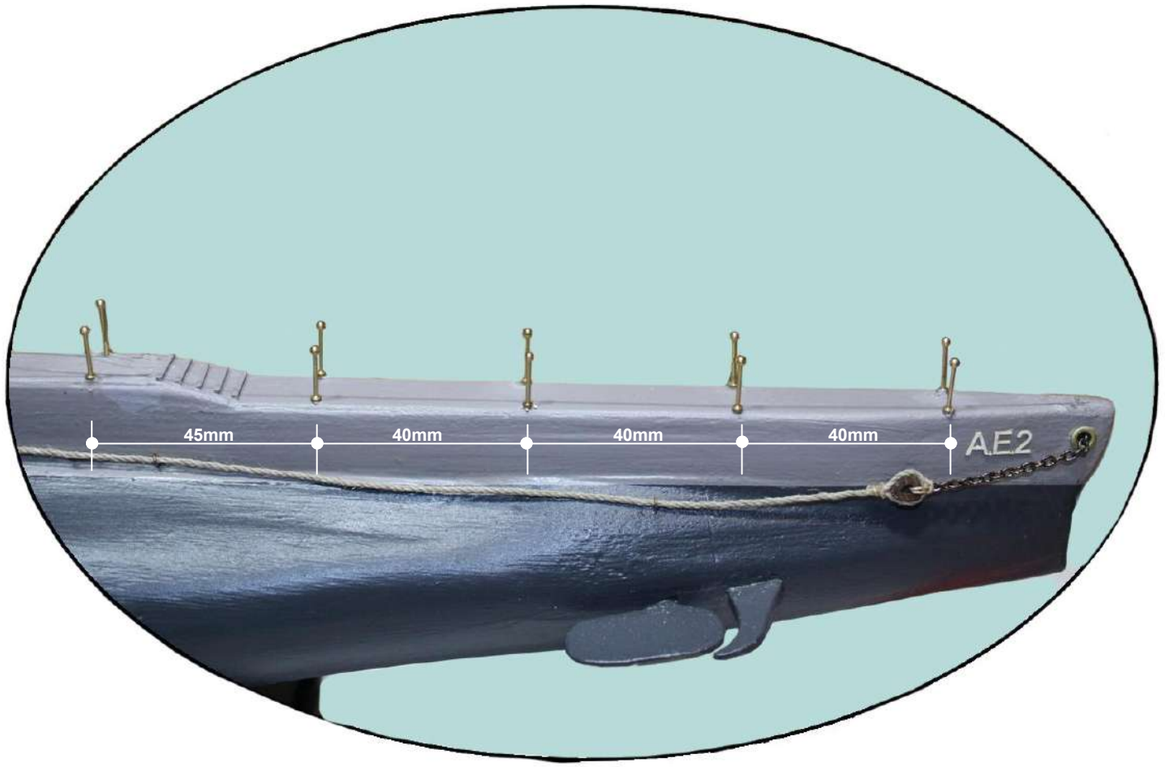
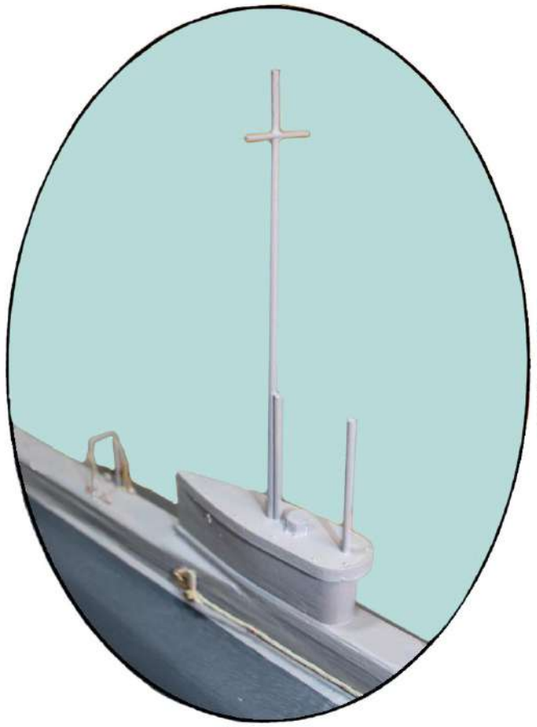
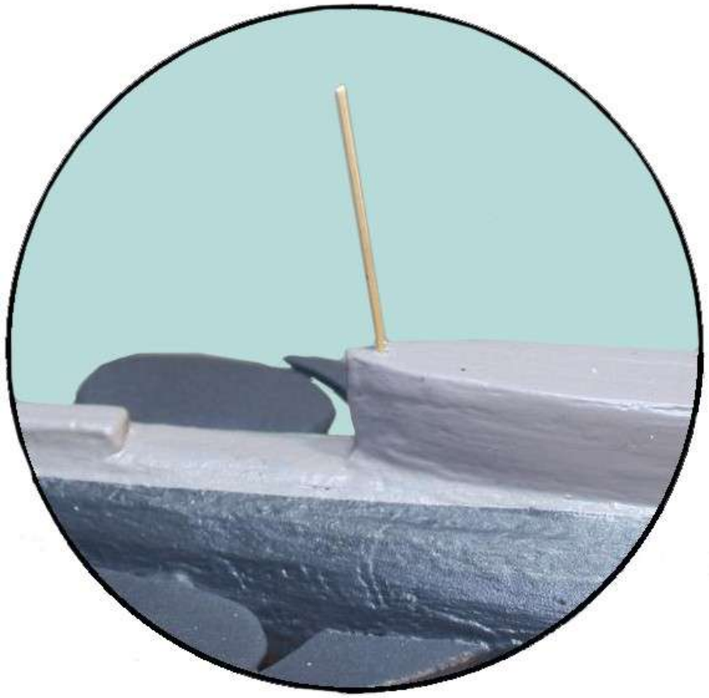
8.17 Deck Stanchions, Flag Poles and Aerial Mast

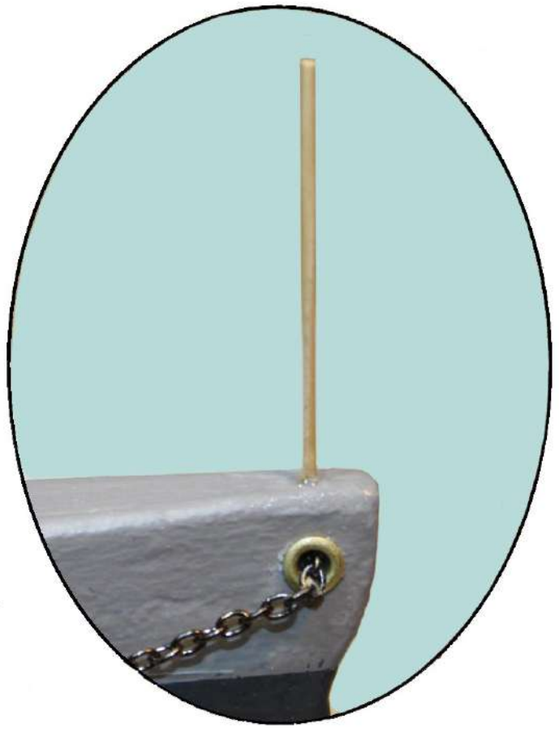
Identify the stanchions P55 - fix to the fore and aft deck at the locations as shown. Fix the aerial mast to the rear periscope as shown. Identify the 1mm dowel P53 - cut two x 38mm lengths for the bow and stern flag poles. Fit and fix each pole as shown and paint light grey.











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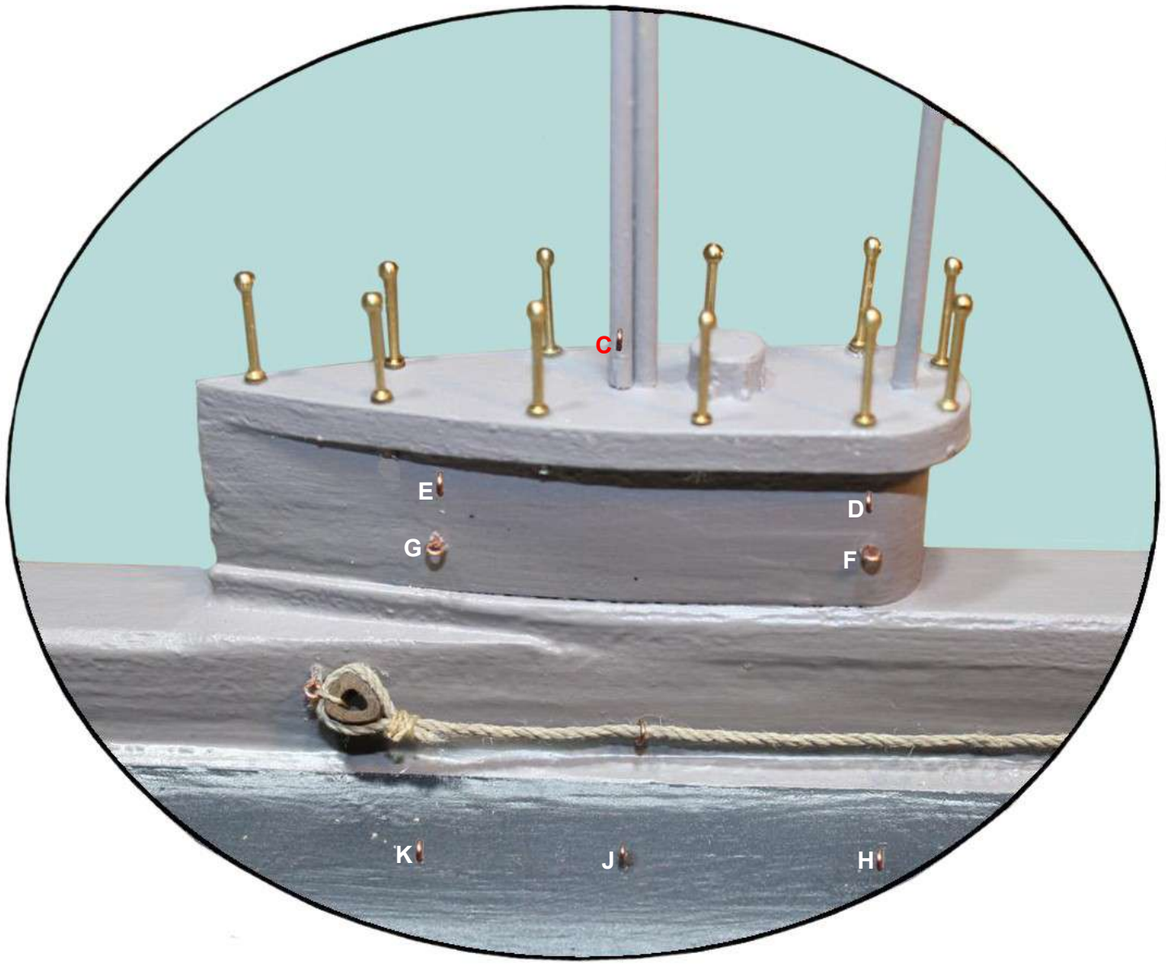
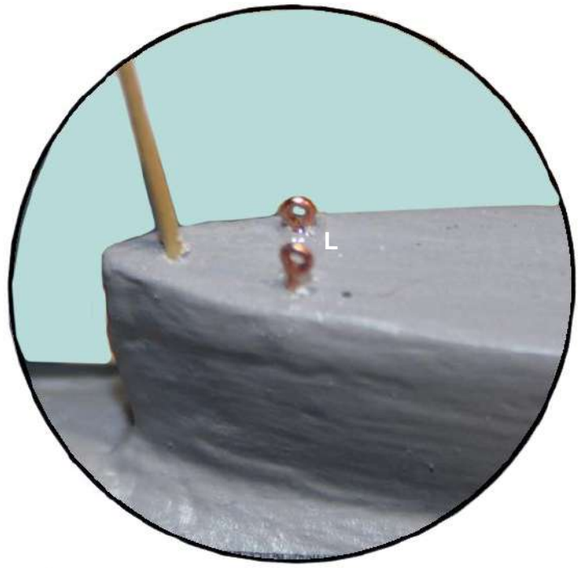
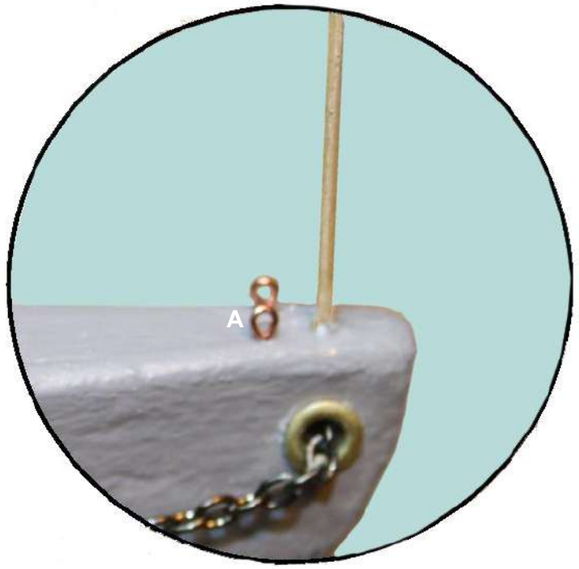
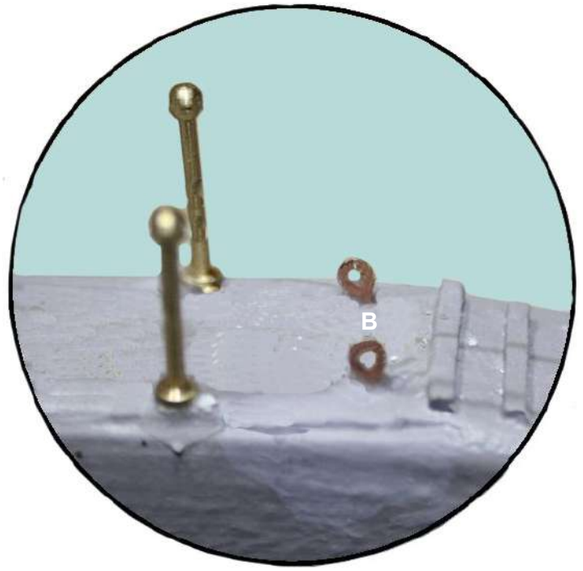
8.18 Conning Tower Stanchions and Rigging Tie Points

Fix the conning tower stanchions P55 to the pre-marked locations on the tower top. Fix eye pins P53 at Points A, B & L as shown. Fix eye pins to Point C on both sides of the aerial mast base. Fix eye pins to Points D to K on both sides of the model.









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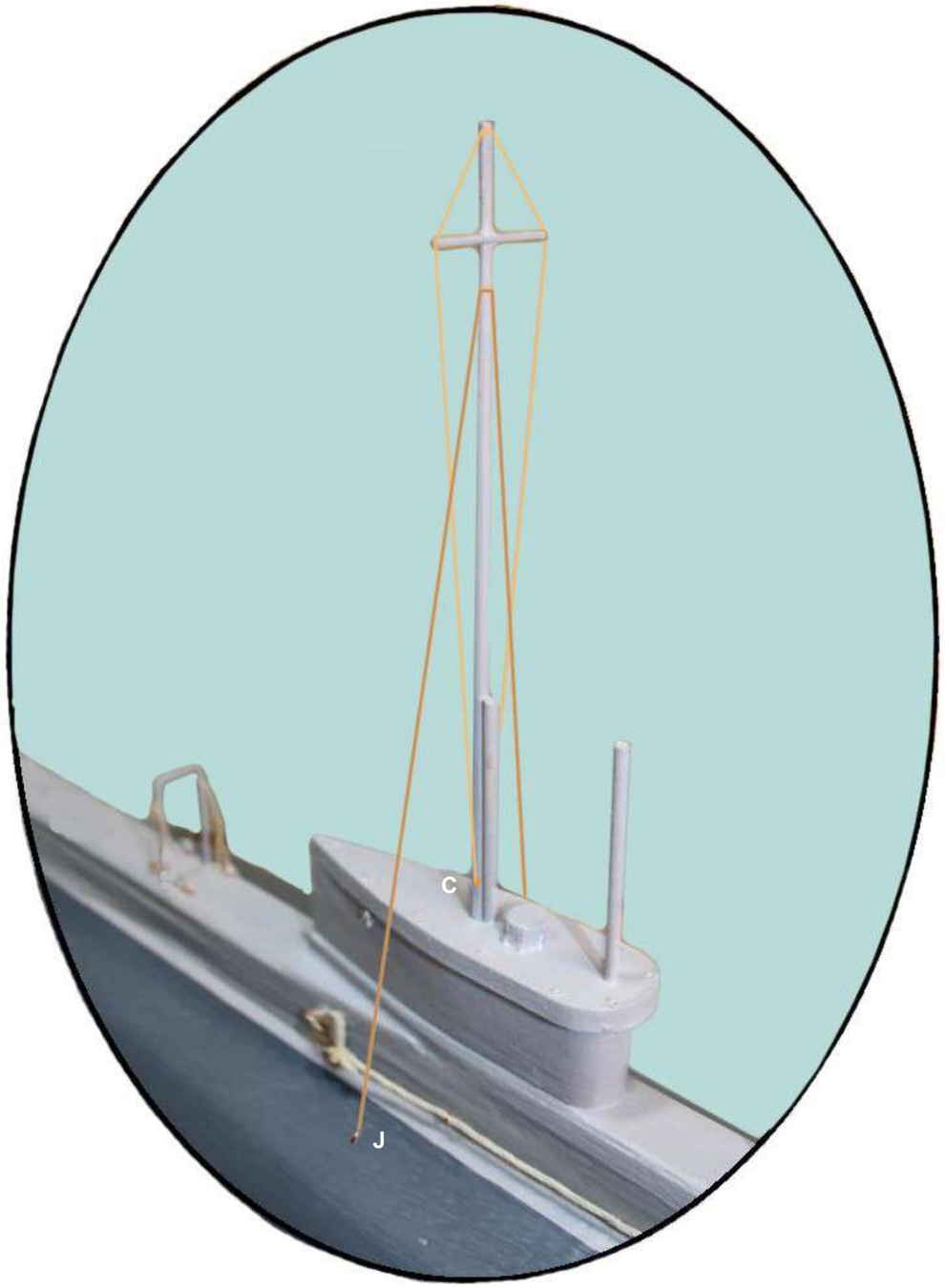
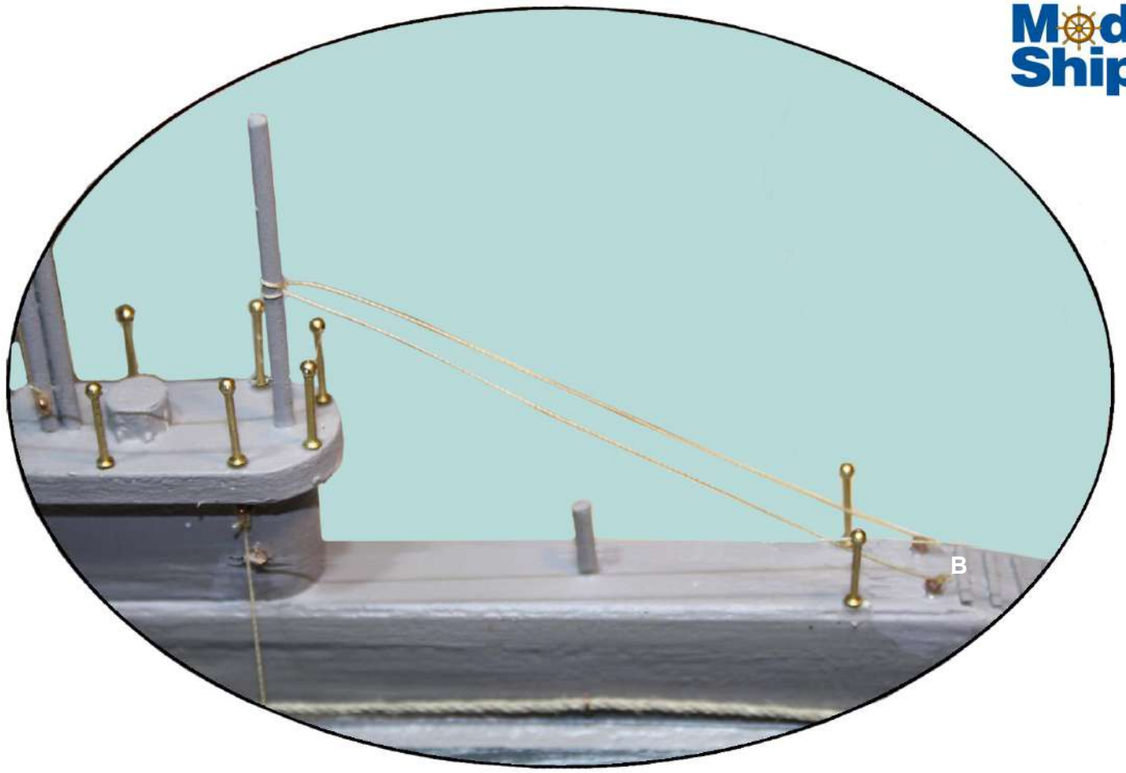
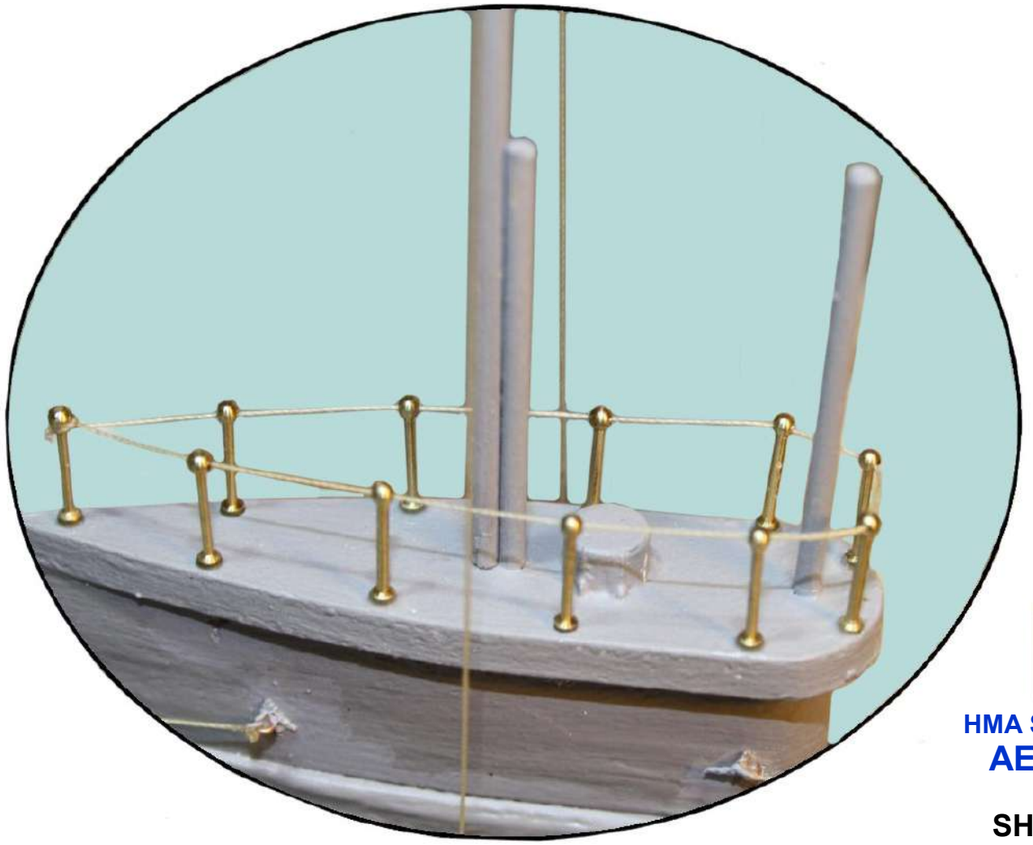
8.19 Rigging

Use 0.25mm cord. Rig the aerial mast as shown - tie-off at Points C & J. Rig from the fore periscope to Points B. Run cord through the stanchion hole for the conning tower rope rail.







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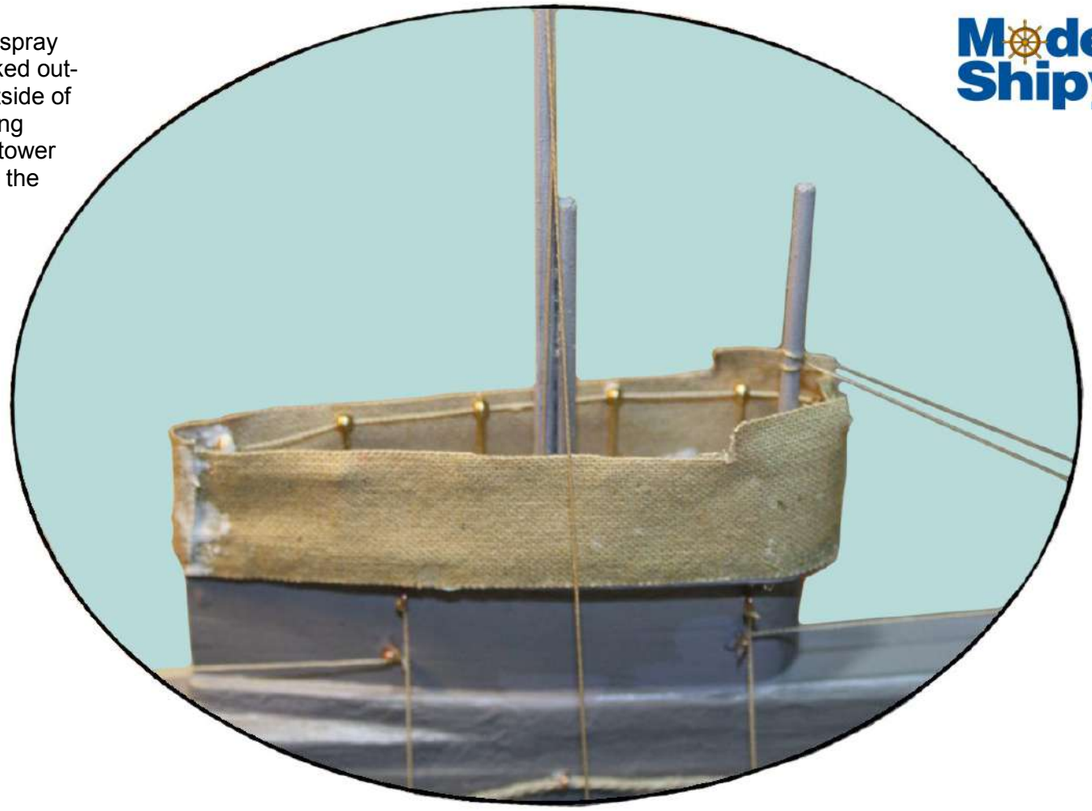
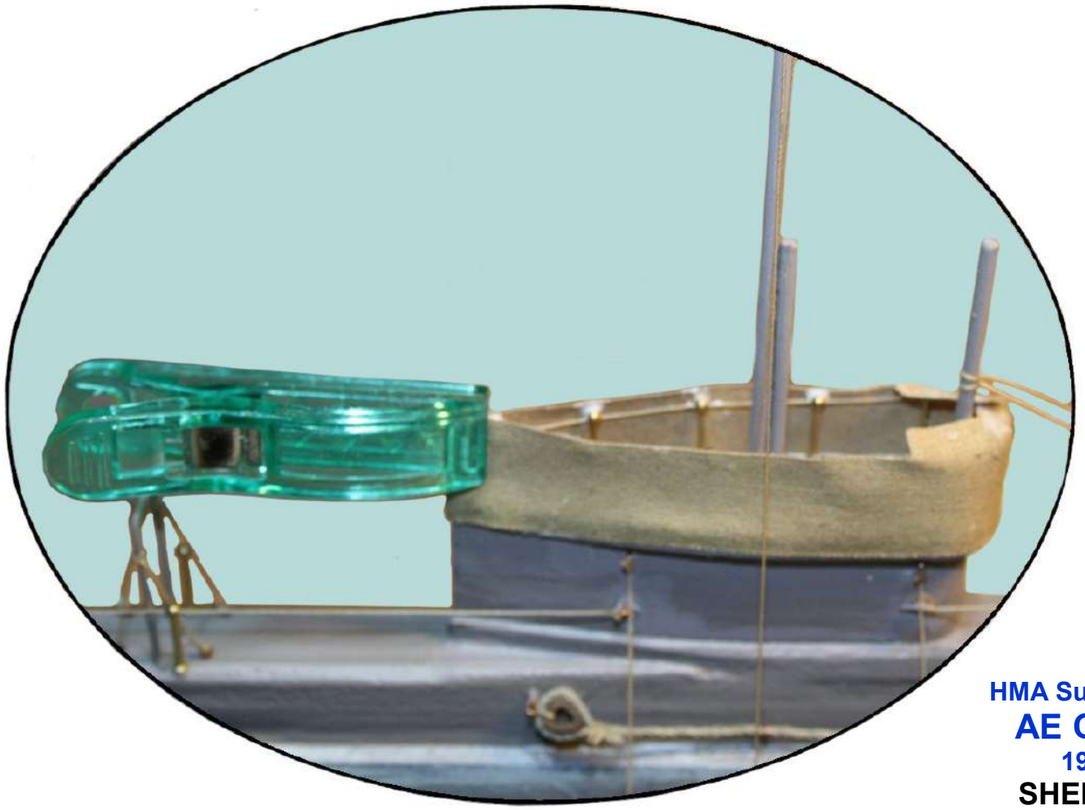
8.20 Conning Tower Canvas

Identify the conning tower canvas P57 and template P58. Stain the canvas with cold tea - allow to dry. Apply spray starch and iron. Use the template to draw the outline onto the canvas. Brush diluted PVA glue along the marked outline as shown - allow to dry. Once dry use scissors to cut along the outline. Trial fit the canvas around the outside of the stanchions as shown. Once satisfied apply PVA glue to the stanchion heads and to the edge of the conning tower top - allow the glue to start to become tacky - then fold the canvas around the stanchions and conning tower top - apply some PVA glue to the overlap and clamp together - allow glue to dry. Smear a tad of PVA glue on the front top edge of the canvas so as to hold in it place when folded over.





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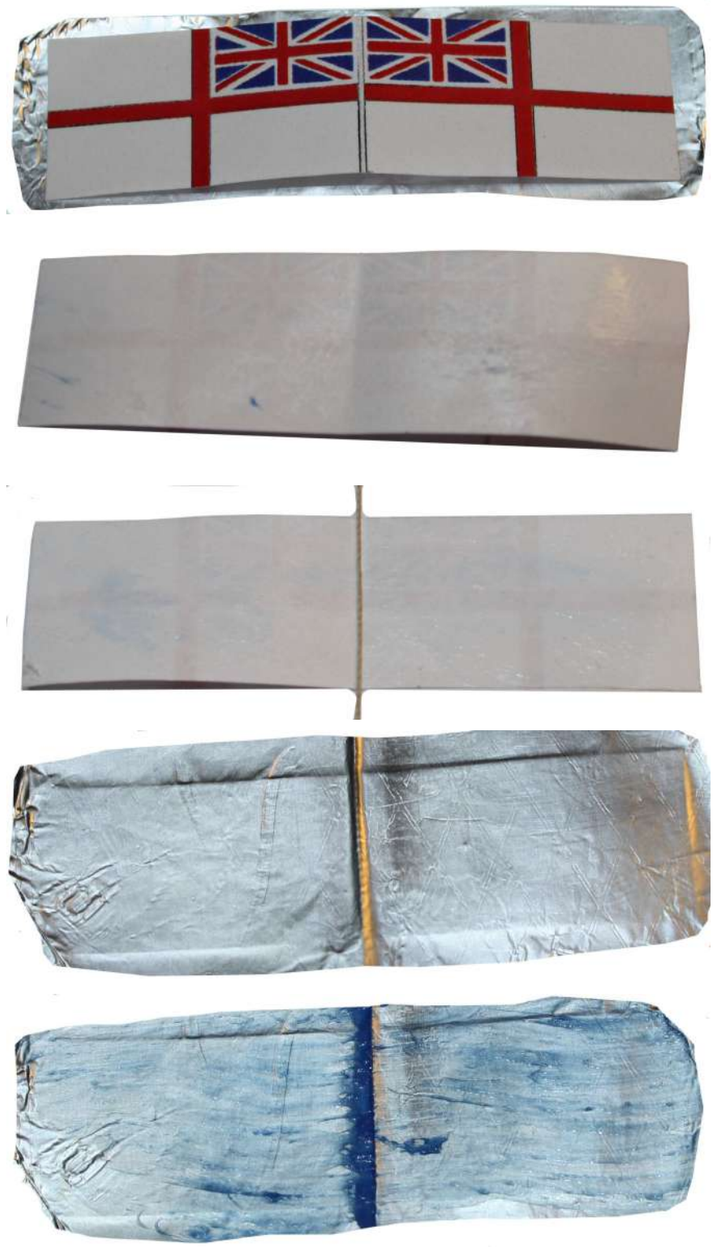
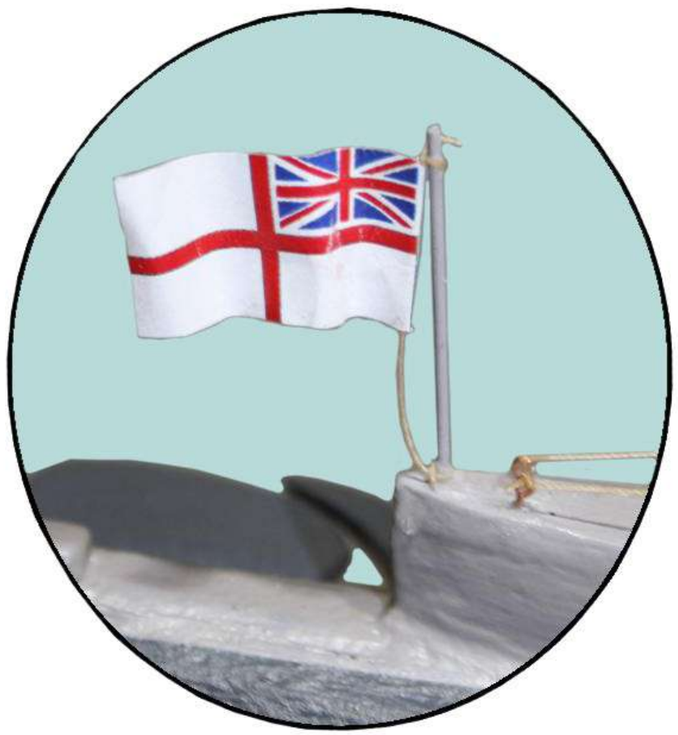
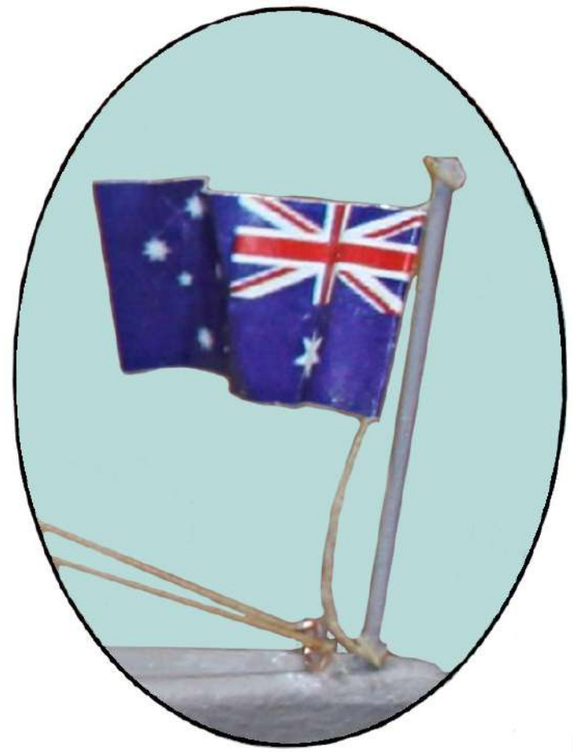
8.21 Flags

Identify the Flag Set P59 - the flag set consists of the White Ensign (1911-1967) and the Australian National flag (1908) as the jack. To create the effect of wind blowing the flags follow the steps below.

1. **Select a paper based glue and aluminium foil**
2. **Cut a flag from the set and a piece of foil slightly larger than the shape and size of the flag.**
3. **Apply glue to the reverse side of the flag and place a length of 0.25mm cord along the flag centre as shown.**
4. **Lay the foil onto the reverse side of the flag as shown. Press firmly down on the foil to remove any air bubbles.**
5. **Apply glue to this foil surface and then fold the flag over upon its self along the centre line. Trim off excess foil.**
6. **Once glue has dried tie the flag to the relevant pole as shown - then shape the flag to give the effect of blowing in the wind as shown.**







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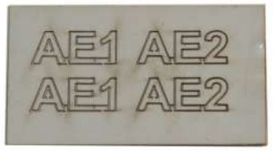
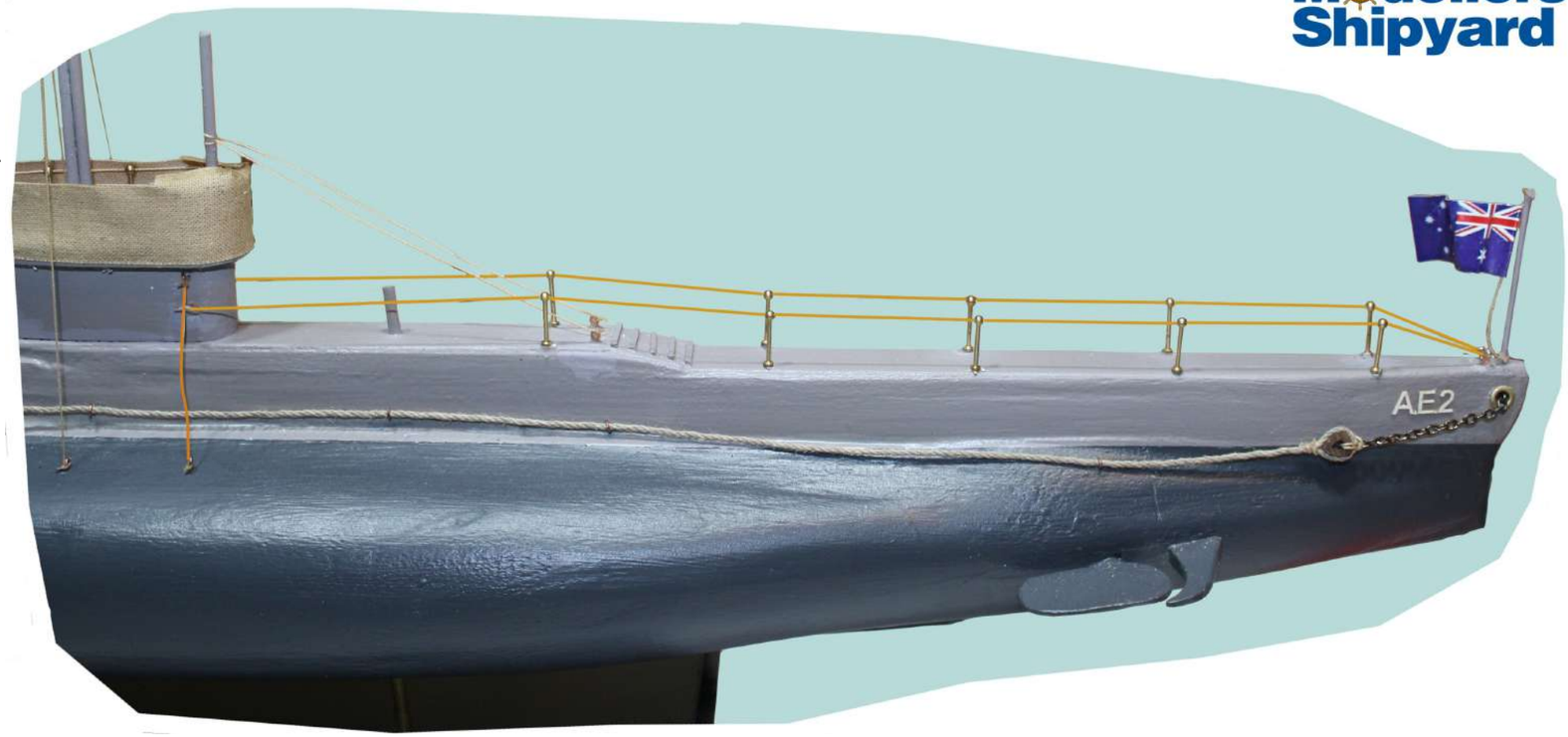
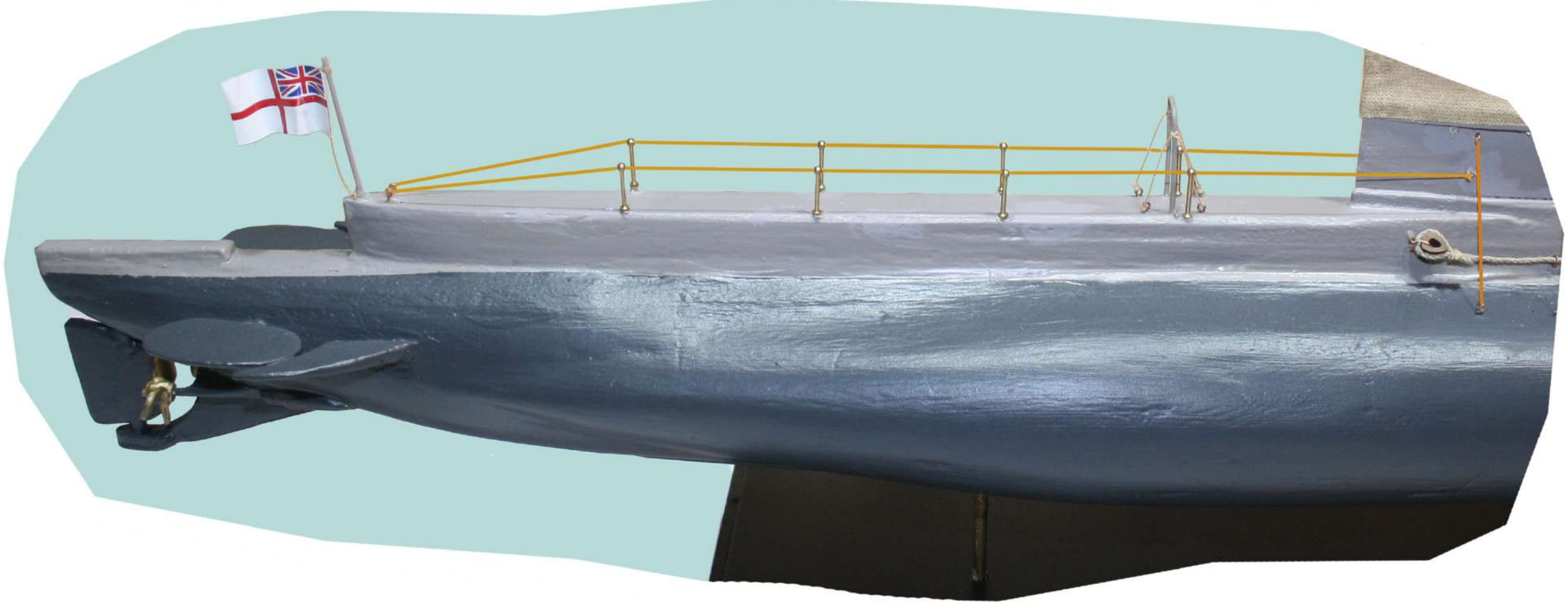
8.22 Deck Rope Rails
Use 0.25mm cord. Run the deck rope rails as shown. Terminate at Points A & F for the fore deck. Terminate at Points E & L for the aft deck. Also run cord between Points F & H and between G & K as shown.

8.23 Name Plate and Bow Lettering
Choose the boat name you wish to use and fix to the display board and bow. Use a sharp blade knife to carefully remove the bow lettering - smear a film of PVA glue to the placement location - allow to go tacky and carefully place lettering in position.







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9.0 Completed Model

Look carefully over the instructions & photos and check to ensure that you have not forgotten anything.
Take great pride in your achievement of building a work of art to be handed-on to future generations and contributing to the perseveration of Australia's rich naval & military history.

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