SAITO

オープン　スチーム　ボート
OPEN STEAM BOAT

NEW STAR

組立説明書
Manual For Assemble

Instructions for SAITO NEWSTAR

We would like to express our sincere thanks for your purchase of the SAITO NEWSTAR assembly kit, which is manufactured by Saito Seisakusho, Ltd. Please read our instructions carefully to assemble the ship correctly and enjoy sailing your ship.
Please refer to the data shown on the right.

Technical data

Overall length	830 mm	Applicable engine	S3R (3-cylinder steam engine)
Overall width	210 mm	Applicable boiler	BT-1 (vertical boiler)
Overall height	350 mm	RC unit	4ch, 3 servo units
Overall vessel weight (including fuel and water)	Approx. 4 kg		

I Assembling the Hull (Bonding in descriptions requires the two-agent mixing epoxy adhesive hardening in 30 min.)

1) Preprocessing the hull

A ϕ4 mm prepared hole is located at the stern of the hull. Enlarge the prepared hole to easily pass through the propeller shaft bearing as shown by Photo 1. Additionally enlarge the setting hole for the rudder bearing to easily pass through the bearing pipe.
Rough the FRP areas to be bonded with parts by using files or sandpaper, to ease bonding.

NOTE: Securely bond rudder and its parts at the stern of the hull before installing the deck.

2) Assembling the rudder

Use instantaneous adhesive to temporarily attach the rudder ⑥ to the ϕ4 mm × 108 mm brass rudder shaft before fixing with adhesive.

Photo 1 Enlarging the stern tube hole

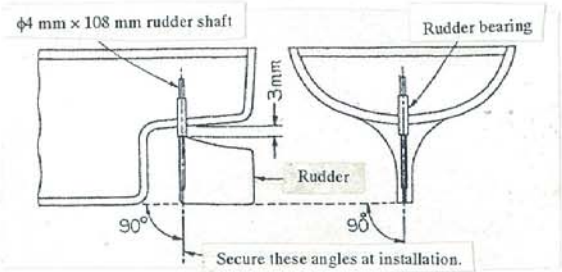
Photo 2 Working the rudder

3) Installing the rudder

Use instantaneous adhesive to temporarily attach the rudder bearing to the hull and bond the rudder bearing stiffening plate ⑦ with adhesive. Position parts in this stage as per dimensions shown in Fig. 1. Make the clearance between the hull and rudder to approx. 3 mm. Fix parts while checking squareness to related parts. (See Photos 3 and 4.)
Insert the rudder into the rudder bearing before setting the rudder horn, adjuster and rod (ϕ2 mm × 60 mm long). (See Photos 7 and 7A.)

NOTE: Rudder installation becomes impossible if the deck is bonded previously. Securely tighten set screws of the rudder horn.

Fig. 1 Correct installation of rudder



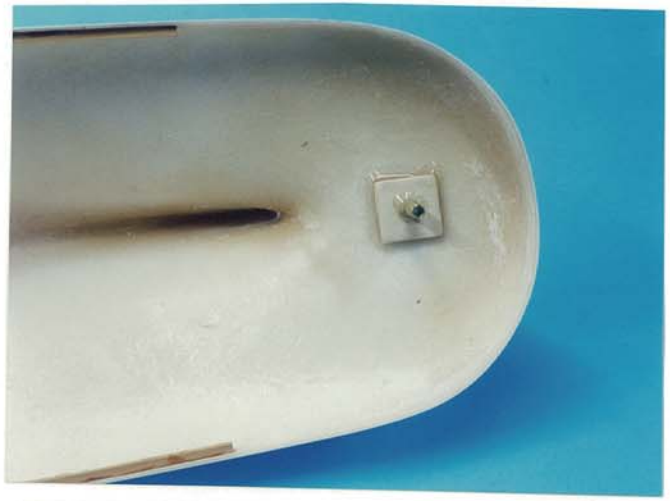


Photo 3 Bonded rudder bearing viewed from the hull inside

Photo 4 Temporarily assembling the stern tube and rudder

Photo 7 Setting the rudder horn, adjuster, rod and other parts

Photo 7A Setting the rudder horn, adjuster, rod and other parts

4) Bonding the deck

The internal surface of FRP hull is irregular. Correct the inner surface with a planer, file or sandpaper in advance to set the deck onto the hull.

Bond deck corbels (4 × 4 × 550 mm wood bar) to the hull inside. Recessing by the amount of deck thickness as shown in Fig. 2 and referring to Photo 5.

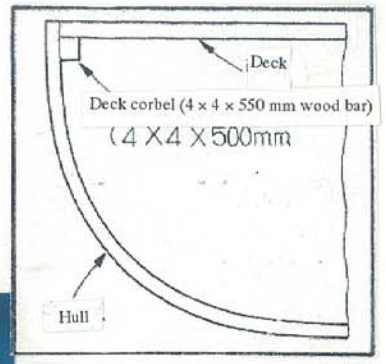


Fig. 2 Bonding the deck corbels

Bond deck corbels to both sides of the hull as shown by Photo 6.

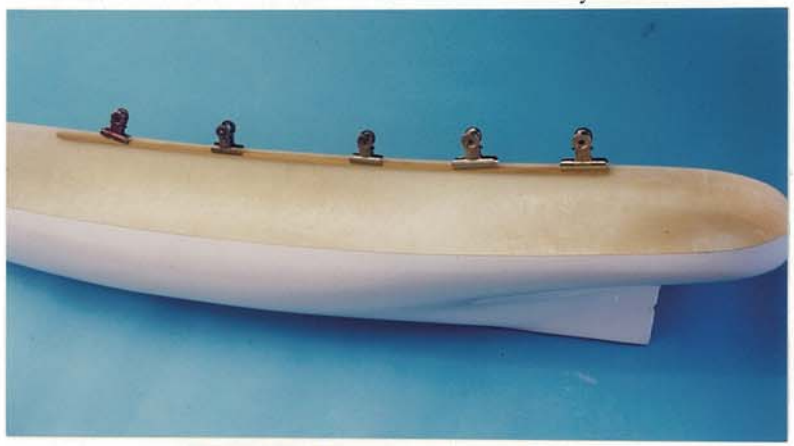


Photo 5 Bonding the deck corbels

Photo 6 Bonding the deck corbels

Apply adhesive to surfaces of deck corbels 4 × 4 mm wood bar and hull subject to mating with the deck to bond the deck.
Using tapes for temporary setting clamps the deck and helps secure bonding as shown by Photos 8 and 8A.

NOTE: Before bonding the deck, be sure to bond the mast holder ⑦ to the hole on the back side of deck.

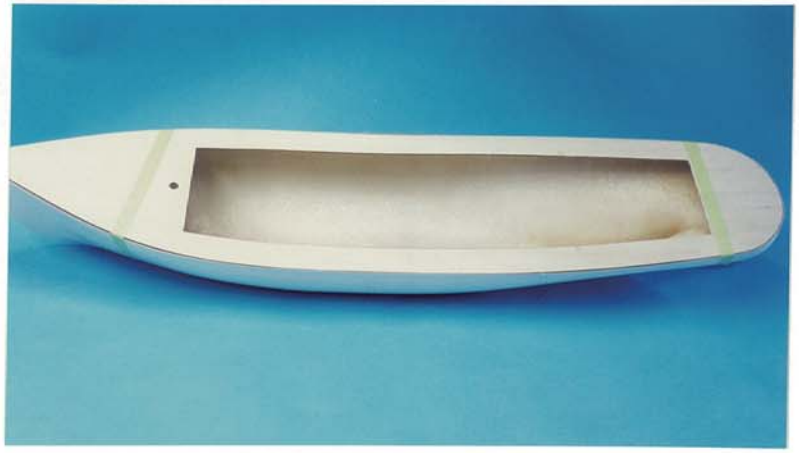


Photo 8 Bonding the deck

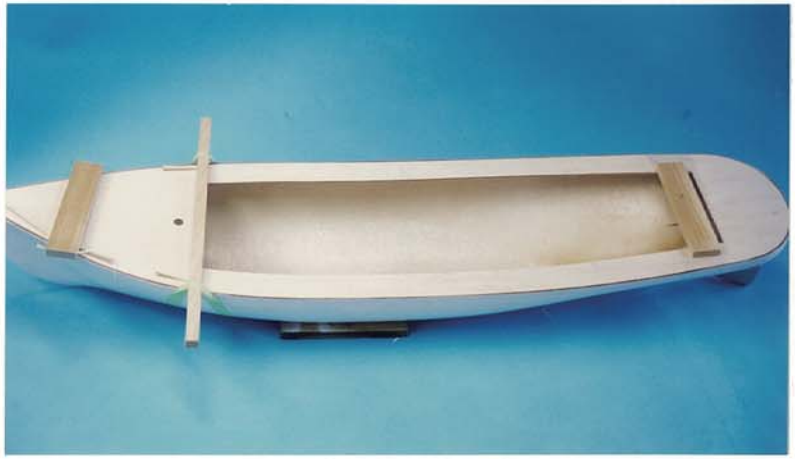


Photo 8A Bonding the deck

5) Installing the bulkhead

Bond 4 × 4 mm wood bar to the back side of hull as shown by Photo 9 and in Fig. 3.
The bulkhead ② is to be bonded at the position of the dimension in Fig. 4. Trim the edge of bulkhead mating the inside of hull to match with the hull shape as shown in Fig. 4.

Photo 9 Installing the 4 × 4 mm wood bar

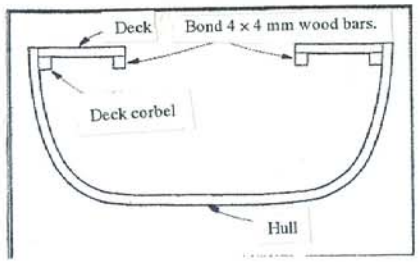


Fig. 3 Bonding the wood bars

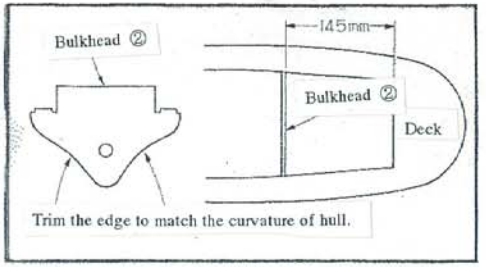


Fig. 4 Installing the bulkhead

Next insert broadside boards ③ into both sides of the bulkhead as shown by Photo 10. Check and correct interference as necessary before bonding. Also bond front and rear frame boards ④ and ⑤ on the front and rear sides of hull.

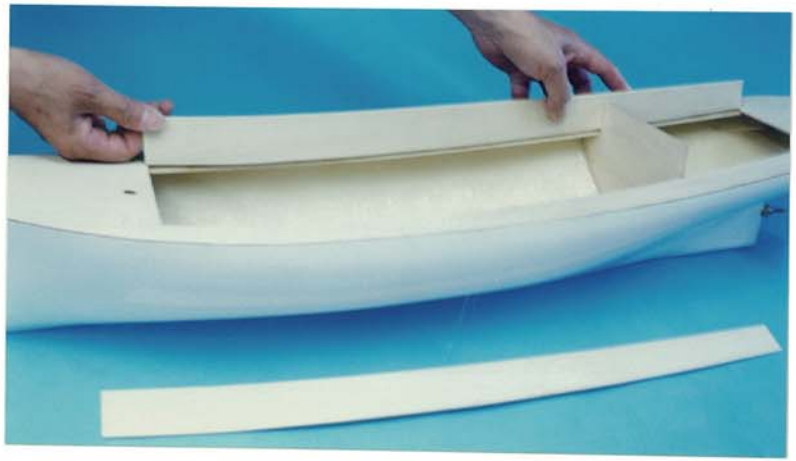


Photo 10 Installing the broadside boards

Photo 11 Installing the front and rear frame boards

6) Positioning and working the mechanical box and hatch

Apply adhesive double-coated tapes at sections (on bulkhead ② and rear frame board ⑤) indicated by arrows of Photos 12 and 13. Temporarily set cleats A and B (5 × 5 mm wood bar) so that they are leveled by 1 ~ 2 mm above bulkhead ② and rear frame board ⑤ as shown in Figs. 5A and 5B. Then bond the hatch ⑩ to cleats. After adhesive is dried, dismount the hatch. (Also remove adhesive double-coated tapes.)
Bond both sides of cleats as shown by Photo 14.

NOTE: Correct protruded area of hatch with a planer, file or sandpaper. (The hatch has been sized larger to provide allowance.)

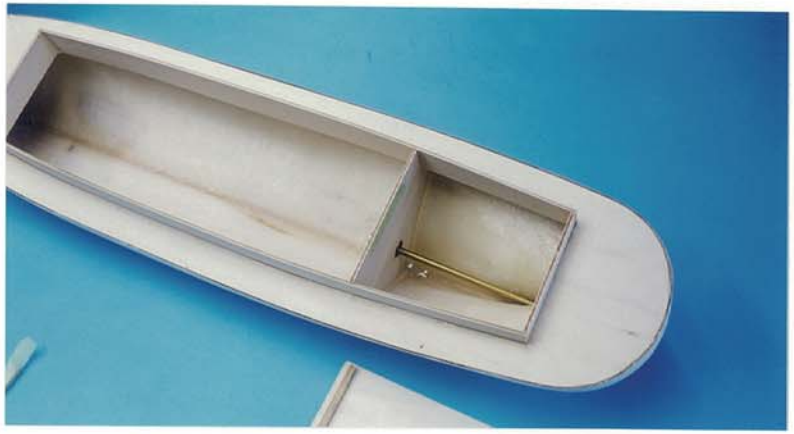


Photo 12 Adhesive double-coated tape locations

Photo 13 Adhesive double-coated tape locations

Photo 14 Hatch construction

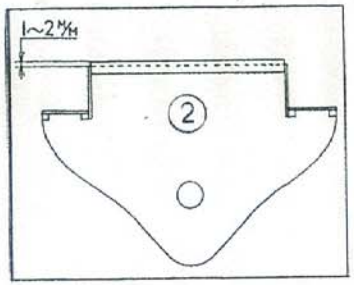


Fig. 5A Cleat locations

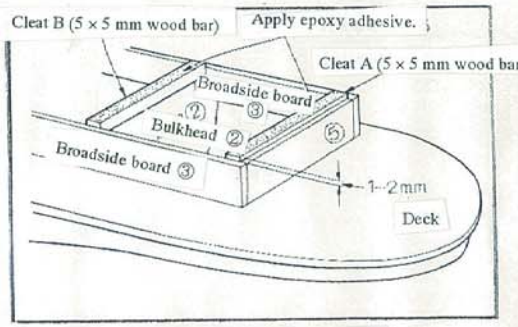


Fig. 5B Cleat locations

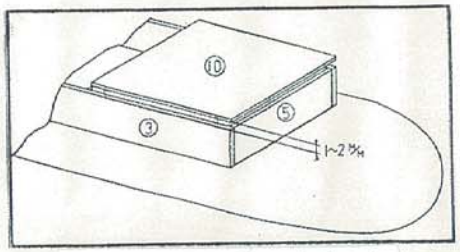


Fig. 6 Working the hatch

7) Installing the engine and bed

Assemble parts shown by Photo 15 to dimensions shown in Fig. 7.
Fix parts A and B to the engine and bed with wood screws. Bond C with D and E.

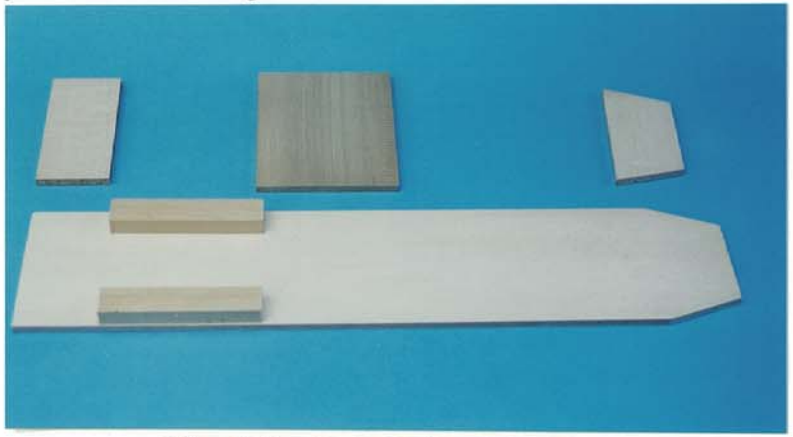


Photo 15 Engine and bed components

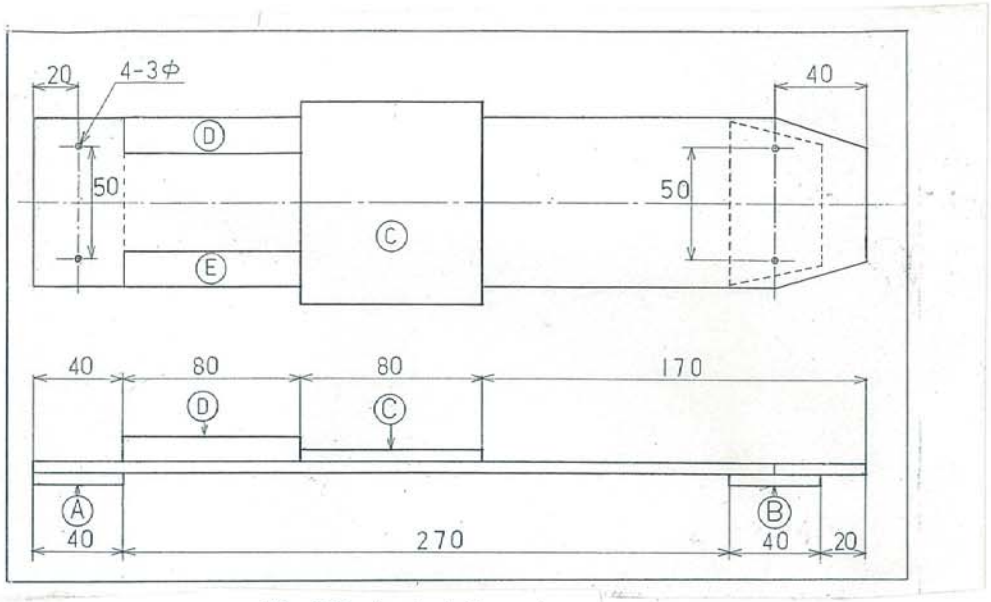


Fig. 7 Engine bed dimensions

8) Working the proper, shaft and stern tube

Temporarily mount the stern tube, screw shaft, shaft bearing, Teflon washer, screw, stern tube height set board ⑧ on the hull. Temporarily attach the stern tube height set board to the bulkhead ② attaining 45 mm of height between the ship bottom to the screw shaft center. Bonding with epoxy adhesive is to be made after alignment between the engine and propeller shaft is secured.

9) Engine and bed base (Photo 15, A, B)

Install the assembly with parts A and B fixed to the engine and bed with wood screws and other parts temporarily set, into the hull. Correct the lower part of bed bases A and B as shown in Fig. 8, to match the heights of engine and screw shafts. At this time, fixing the universal joint with a tape helps centering.
It is necessary to secure a proper clearance not interfering operation between the universal joint and Teflon washer.
Apply adhesive to the area to bond parts A and B as shown by Photo 19 and make adhesion as shown by Photo 20 as described in the previous section.
When the adhesive becomes dried, remove four pieces of wood screws. Photo 21 shows the result. This status allows easy maintenance of the boiler.
Set the burner on a holder spring board to free installing and removing of burner. This allows removing the burner for easy alcohol supply.

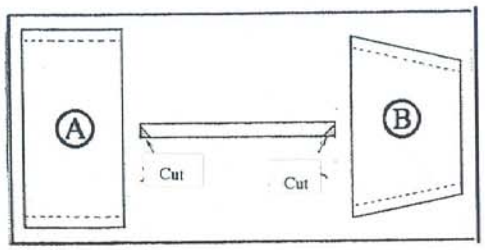


Fig. 8 Correcting bed bases A and B

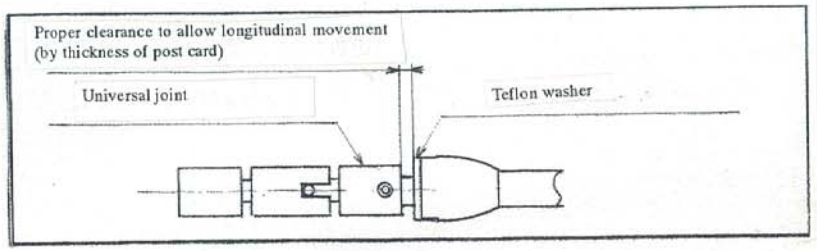


Fig. 9 Joint clearance

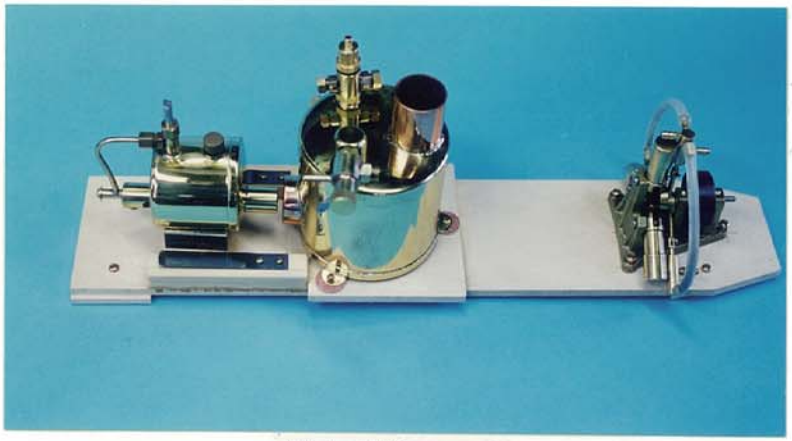


Photo 17 Power unit

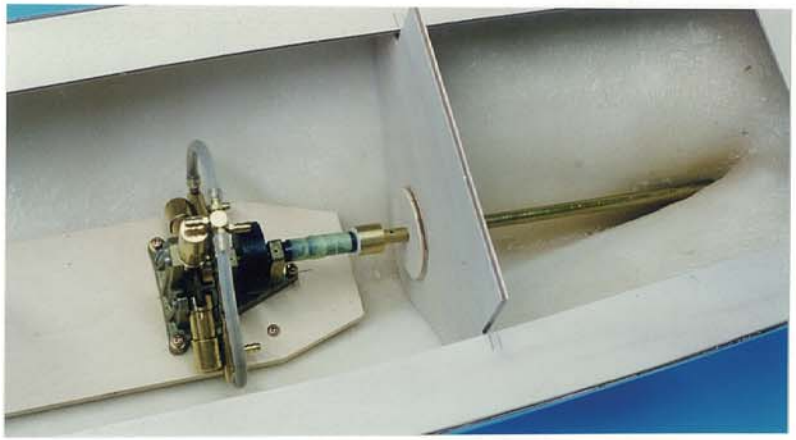


Photo 18 Screw shaft adjusting

Photo 19 Locations to bond parts A and B

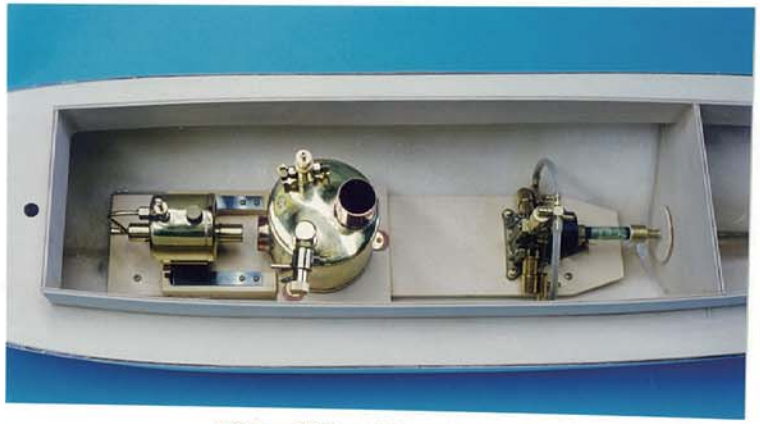


Photo 20 Installing the power unit

Photo 21 Bonding the parts A and B

10) Preprocessing for correction of hull profile

Finally correct hull profile before painting. Fill recessed areas if any with putty.
Photos 22 and 23 show the stern and Photo 24 shows the rear area of propeller shaft bearing.

Photo 22 Bow vied from the bottom

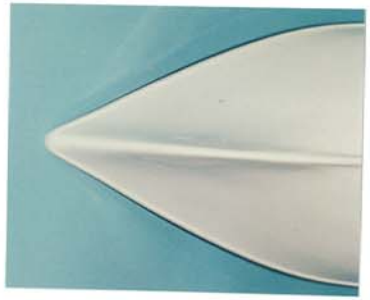


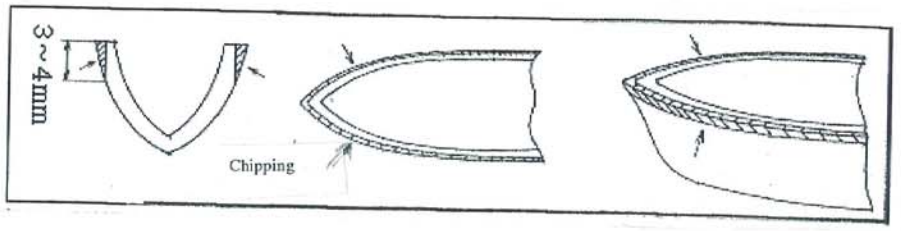
Photo 23 Bow vied from the bottom

Photo 24 Rear area of propeller shaft bearing

Photo 25 Installing the ABS material

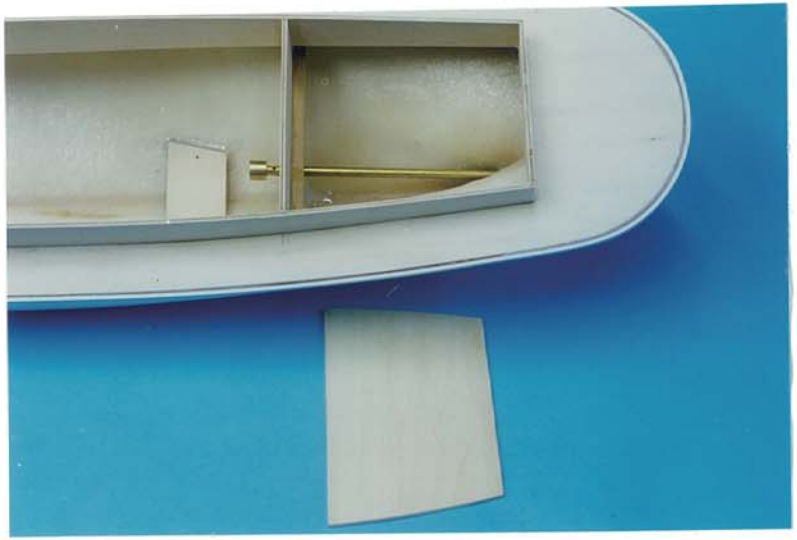
11) Bonding the rim material

Bond the rim material (2 × 5, ABS material) to the outside of the hull as shown by Photo 25. The hull has oblique sides on its bow. Chip the sides to attain 3 ~ 4 mm of vertical width with a file.



12) Making the mechanical box

The servo mount ⑨ is made by bonding cleats (10 × 10 mm wood bar) as shown by Photo 26. Since sizes of servo units differ by manufacturer, make the mount ⑨ to accommodate the servo board to match with the actual units. Once sizes are determined, bond cleats as shown by the arrow mark.



13) Linkage

Before painting, install all equipment once to provide holes to pass through the linkage rod to avoid working after painting, as shown by Photo 28 and 29.
Install the boiler and engine unit in the hull and mount the servo units in the mechanical box before installing the linkage rod.
Make the linkage rod referring to Fig. 11.
Screw the ball joint and adjusters into rods. Connect the ball joint to the servo unit side and the adjuster to the side of regulator, rudder horn and forward/reverse shift valve. Install the ϕ3 mm pipe in the middle and adjust the length before soldering. (Adjust servo unit and regulator strokes by using hole positions of the servo horn.)

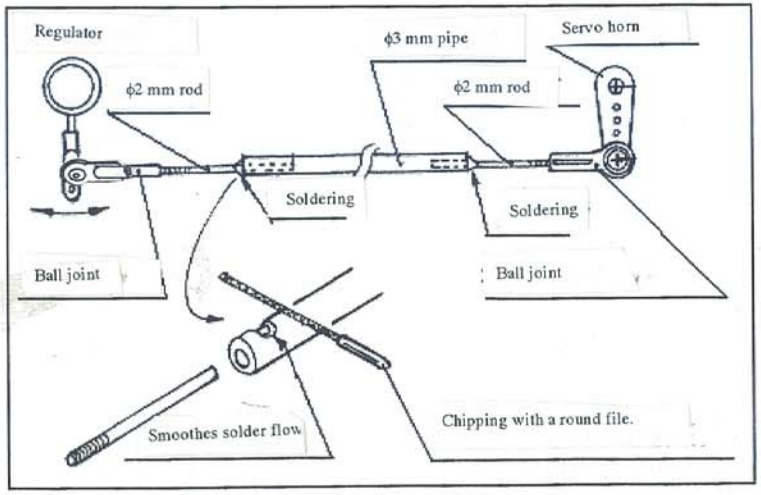


Fig. 11 Example of linkage rod

14) Painting (Refer to Photos 27 and 30.)

Photo 27 Painting

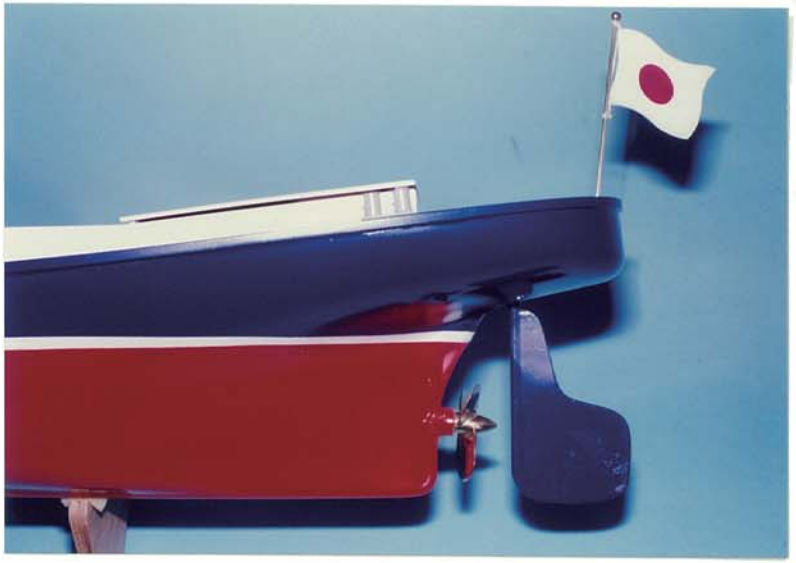


Photo 30 Painting

1. Paint

Coat the outside with lacquer or urethane paint (mixing of two kinds). Coat the inside with urethane paint since solvent resistance is required. For the deck use clear lacquer or the lacquer included with coloring agent (teak or mahogany).

As the primer for the hull, use lacquer surfacer or urethane sanding sealer. For final coating, select colors of white, red and blue and small amount of gray for the bollard.

2. Painting order

a. Deck

Finish the surface with No. 600 water-resistant sandpaper on the deck and hull at the same time. Coat the deck with the lacquer described above.

b. Hull

Provide masking for the area of deck to keep the grain (edge of deck) before applying surfacer. (See Photo 27.) Polish the surface with No. 400 sandpaper before applying another coat of surfacer to attain smooth surface.

Paint white the line in about 6 mm wide of the area to be remained in white, the area to be colored in red, and the frame of engine room.

NOTE: Priming the area to be colored in red with white color will brighten the red. Provide masking for the upper part above the boundary between white line and red area, for red painting. Next provide masking for the red area leaving the width of white line, for blue painting. Then the upper part of the hull is painted in blue separately with the lower part in red. On completion of painting the hull, paint the inside and engine bed.

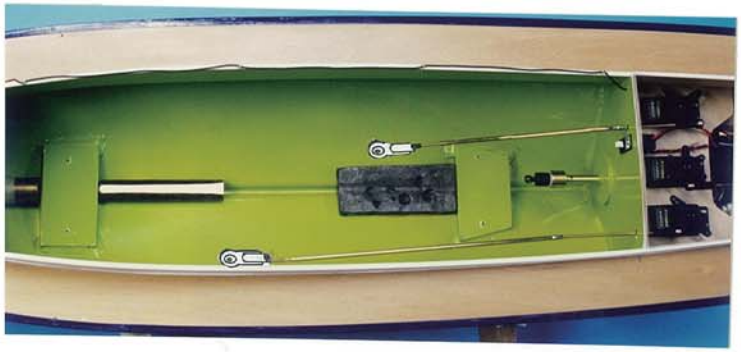


Photo 28

15) Ballast

After painting, install the weight at the bottom of the hull. It is preferable to install the weight at the center of ship as shown by Photo 28. Hence install the weight before installing the boiler and engine. Install the weight on the overall line from the bow to the stern, including the bottom of the mechanical box. Failure to install weight at the bottom will cause floating of the ship's bottom. (Weight is about 1 kg.)

II Outfitting and Finishing

1) Installing the external parts

Install the mast, bollard, flagstaff and flag stand referring to Photos 31 and 32.

Photo 31 Flagstaff area

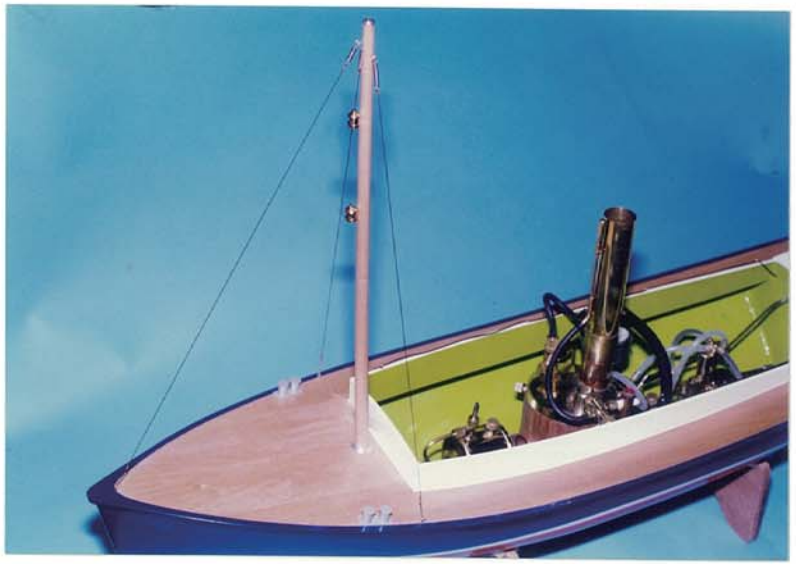


Photo 32 Mast area

2) Installing the engine and parts (Refer to Photos 28 and 29.)

Prepare an assembly of engine, boiler and burner set on the bed as shown by Photo 17. Fix the assembly to the hull with four pieces of wood screw. Install the servo unit for regulator control (normally called as engine control) on the left side viewed from the stern, the servo unit for rudder control at the center, and the servo unit for forward/reverse shift valve control on the right hand.

Photo 28 Installing the engine and boiler

Photo 29 Installing the mechanism

3) Piping

Securely install silicone tubes or equivalent for the following lines, referring to the piping drawing separately provided.

Boiler ~ Oiler → Shift valve
- Engine intake (forwarding) (exhaust when reversing)
- Engine exhaust (forwarding) (intake when reversing)
- Drain tank

Ⅳ Sailing

When checking each section is completed, try to sail the ship in a pond or river. The ship sails by about 10 m of distance using residual pressure in the boiler even after the burner is extinguished. Sail the ship in a close area from the shore for the time being. It is safer not to fully open the burner to regulate its firepower to the middle of capacity at the initial stage of sailing.

At sailing in the pond or river, securely attach a drain tank to prevent oil drainage to the outside.

In the flowing water of river, sail the ship on your upstream side. This secures recalling the ship even if the burner is extinguished, the screw is caught by a fishing line or an alga, or wind blows strongly. Recalling the ship might become difficult if sailing the ship on your downstream side of river.

Close the burner needle by 1/3 to lower firepower before sailing. Fully opening the burner will gradually increase burner body temperature and raise pressure inside the tank, possibly causing fire extinction.

Care must be exercised when sailing the ship equipped with your self-made cabin since the cabin might store hot air resulting in fire extinction due to overheating. Lower the firepower of burner by about 1/3 before sailing as described above.

Ⅴ Adjusting and Maintenance

1) Servicing the boiler relief valve

Move the stem several times to check movement at every water supply. If the stem does not move smooth, remove adhering white scales or rust with a toothbrush.

Replace O-rings if deformed excessively (new O-ring has almost round cross section), flawed or cracked, or having no elasticity.

The relief valve functions at approximately 2.0 kg/cm^2 of pressure for the boiler. Strictly avoid modifying the relief valve. In no case raise the functioning pressure.

2) Servicing the burner

The performance of a boiler depends on the adjusting and servicing of the burner. When burner operation becomes unstable, use an attached cleaning needle to remove oxide collected at the nozzle. For this purpose, insert the cleaning needle straight into the hole without turning. Turning the needle will enlarge the nozzle hole and lower blow performance.

It is also recommended to use a timer for sailing to prevent stopping of ship due to fuel out. Although some wireless machines use timers, kitchen timers can also work well in actual sailing.

Memo

All specifications and models are subject to change without notice.

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Ⅲ Testing Each Section before Sailing

* For details of handling the boiler, burner, engine and RC unit, thoroughly read instructions attached to these units.

1) Articles to be prepared

Prepare water, alcohol, steam oil, engine oil or machine oil, needle adjust handle, measuring cup, syringe, lighter, funnel, and wet towel.

2) Preparation for test operation

1. Boiler ····· Remove the water level detect plug. Remove the relief valve to supply water. Stop water supplying when water starts to come out of the detect plug. (About 180 cc of water supply is necessary.) Set the relief valve and detect plug back to their original positions.

2. Burner ····· Remove the alcohol fill-plug and use the funnel to supply prescribed volume of fuel alcohol exercising care for spilling. (The maximum volume of fuel alcohol is 40 cc. Avoid overfilling.) Set the fill-plug back to the original position. Securely tighten burner needle.

3. Engine ····· Remove the oiler cap to fully supply steam oil. Set the oiler cap back to the original position. Give a small amount (2 ~ 3 drops) of engine oil to external rotary sections.

4. RC unit ····· First turn ON the transmitter switch. Next turn ON the receiver switch to check if respective sections move smooth. After checking no problem, slightly open the regulator and set the forward/reverse shift valve to any of forward or reverse.

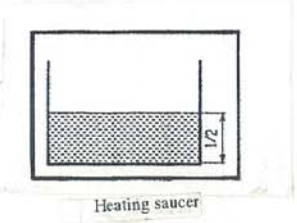
   * This is to allow automatic starting of the engine on receiving steam and to pass through water content produced from the boiler at the initial stage of operation. The 3-cylinder engine starts rotating automatically on opening the regulator when steam reaches the engine.
   When turning OFF the transmitter and receiver, turn OFF the receiver switch first and then the transmitter switch.

3) Precautions for handling

1. Burner ····· The burner has the system to blow gas generated from the internal alcohol when the burner becomes heated by preheating as described in the instructions.
   Avoid using a propane gas burner to preheat the burner outlet and tank since pressure inside the tank rises excessively causing unstable blowing or extinction.
   To preheat the burner, bond the heating saucer under the burner as shown by Photos 12 and 13.

(1) Heating the burner

Preheating the burner outlet and tank front is necessary before lighting. Use the attached syringe to supply alcohol into 1/2 full of the heating saucer. (Refer to Fig. 14.)
Before lighting the heating saucer, give water around the saucer and thoroughly wipe off together with alcohol if spilt around the saucer.
Even if spilt alcohol is lighted, give water with your hand or cover the fire with the wet towel composedly. Burning alcohol is extinguished upon watering.



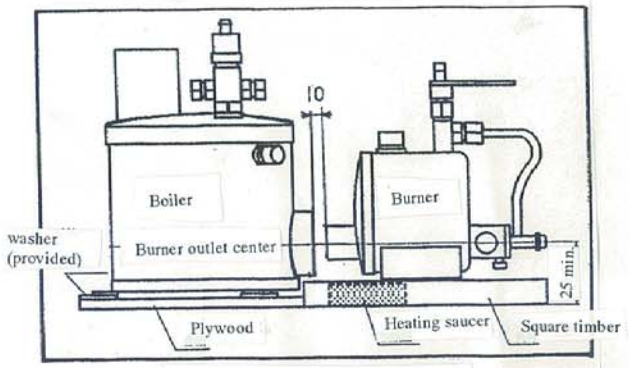


Fig. 12 Layout drawing

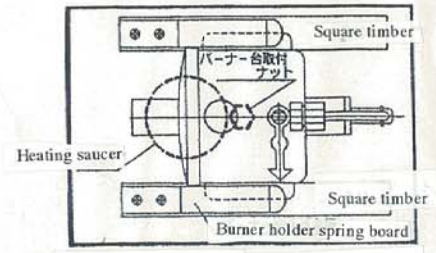


Fig. 13 Heating saucer location

SAITO-NEW・STAR-PARTS LIST

NO	Description	Outline	NO	Description	Outline
1	Deck(3mm Plywood)	Attached Paper	29	Rudder Arm	
2	Frame Panel(3mm Veneer)	Attached Paper	30	Ball Joint	
3	Side Frame Panel(3mm Veneer)	Attached Paper	31	Ball Joint	
4	Front Frame Panel(3mm Veneer)	Attached Paper	32	Pushrod(2φX30mm Side Single Screw)	
5	Rear Frame Panel(3mm Veneer)	Attached Paper	33	Pushrod(2φX60mm Side Single Screw)	
6	Rudder(3mm Veneer)	Attached Paper	34	Joint Pipe(3φX200mm)	
7	Mast Base(9X20X20mm Veneer)	Attached Paper	35	Joint Pipe(3φX100mm)	
8	Stern Tube Hold Board(3mm Veneer)	Attached Paper	36	Joint Pipe(3φX30mm)	
9	Servo Set Up Base(3mm Veneer)	Attached Paper	37	Ball Joint Set Up Screw(M2X8mm)	
10	R・C Hatch Cover(3mm Veneer)	Attached Paper	38	Ball Joint Set Up Nut(M2mm)	
11	Engine Bed(5X75X370mm)	Attached Paper	39	Boiler, Engine Bed Set Up Screw Nail	
12	Boiler Bed(5X80X90mm)	Attached Paper	40	Mast Flange	
13	Bed Set Up Base Ⓑ	Attached Paper	41	Mast Lamp	
14	Bed Set Up Base Ⓐ	Attached Paper	42	Fitlin	
15	Burner Bed(10X15X80mm)	Attached Paper	43	Wire	
16	Mast Bed(20X20X10mm)	Attached Paper	44	Bollard	
17	Display Mount	Attached Paper	45	Bollard Bed(ABS Sheet 1X10X100mm)	
18	Connecting Member(25X25X250mm)	Attached Paper	46	Wire Spring	
19	Mast(10φX350mm)	Attached Paper	47	Mast Top	
20	Propeller shaft(203mm)		48	Flag Pole Bed	
21	Stern Tube(175mm)		49	Funnel	
22	Teflon Washer		50	Hooter	
23	Front Bearing			Japanese Cypress Rod(4X4X900mm)	
24	Rear Bearing			Japanese Cypress Rod(5X5X900mm)	
25	Universal Joint			Japanese Cypress Rod(10X10X150mm)	
26	Propeller(55φmm)			ABS Sheet(2X5X1000mm)	
27	Rudder shaft(4φX108mm)			Brass Wire(1φX300mm)	
28	Rudder Bearing(6φ-4φX25mm)			Brass Wire(2φX100mm)	