

**SEA-GOING HYDROFOIL
PLEASURE BOAT
"VOLGA-70"**

**Certificate,
Operating
and Maintenance Instructions**

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"VOLGA-70"

No. 177 Built in 09, 1975

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TECHNICAL DESCRIPTION

I. BOAT APPLICATION

The VOLGA sea-going hydrofoil boat (Fig.I) is designed for use as a pleasure craft, tourist craft and service craft in the daytime. It is meant for service in coastal sea waters at a distance of up to two miles from the shore and up to 20 miles from the port of refuge as well as on rivers, lakes and water reservoirs at wave disturbance up to Scale 2.

2. SPECIFICATIONS

Overall length, m	8.55
Breadth, extreme, m	2.1
Depth amidships, m	0.98
Displacement, kg:	
full-load	1930
light	1350
Draft, m:	
extreme, afloat	0.92
foil-borne	0.52
Capacity	6 persons, coxswain in- cluded
Engine, type	AQD32A/270D
Engine power according to 1816, SAE Standard, h.p.	
maximum, at 4000 r.p.m.	106
service, at 3800 r.p.m.	102
Speed in smooth water, knots:	
at service power	28
at maximum power	30
Fuel tank capacity, lit	120
Cruising range without refueling, miles	150
Minimum diameter of gyration, m	30
Transverse metacentric height, m	0.44

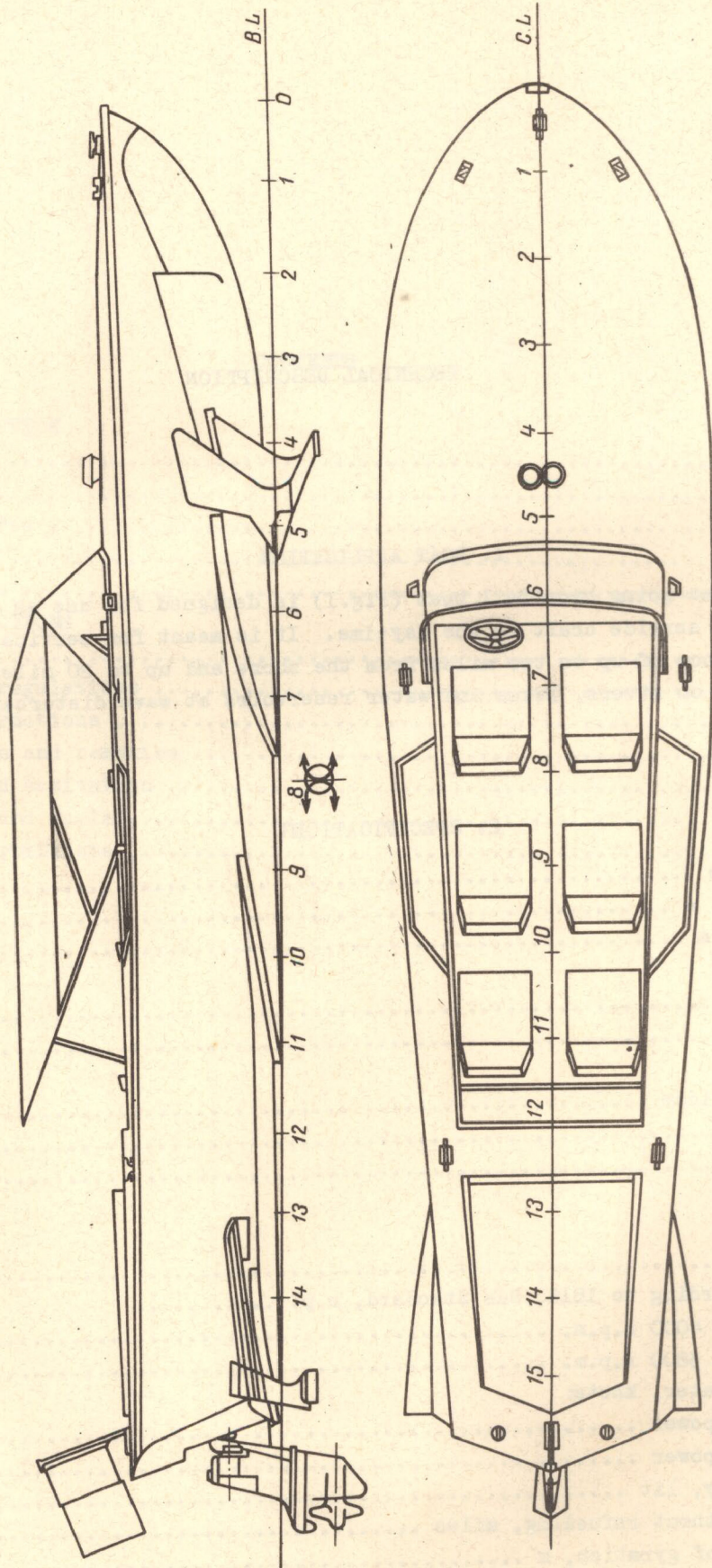


Fig. 1. General View

3. LIST OF SPARE PARTS

Designation	Description	Qty
<u>Mechanical Equipment</u>		
825941	Sea water pump impeller	1
950847	Drive belt for sea water pump, fresh water pump and generator	1
6612598	Oil filter.	1
870680	Ignition plug	1
236628	Fuel filter	1
<u>Electrical Equipment</u>		
B-45M	D.C. single-pole switch, 28 V, 35 A	1
III-45M-2	Neutral-position single-pole switch rated for 35 A, 28 V, D.C. (meant for boats navigating on rivers)	1
PC-503	Relay for cutting in electric sound signal	1
III-35/2	Time-lag fuse rated for 35 A	1
E3-20	Protection unit rated for up to 20 A	1
IIIB-10	D.C. fuse rated for 10 A, 30 V	2
IIIB-20	D.C. fuse rated for 20 A, 30 V	2
IIIK-45-5	Tube fuse rated for 5 A	2
IIIK-1-2	Holder for fuse IIIK-45	2
47K	Plug connector rated for 12 V, 10 A	1
CM-13-15	Filament lamp rated for 13 V, 15 W, with base 2III-15	2
A12-21	Filament lamp rated for 12 V, 21 cd with base 2III-15	10
A12-3	Filament lamp rated for 12 V, 3 cd with base III-15	2
<u>Foil Arrangement</u>		
IMI2x1.25x40	Screw	10
IMI2-1.25	Nut	10
343ME-11-53	Special nut No.4	10
IM10x12	Screw	10
343ME-11-80	Bush No. 2	10
<u>Hull</u>		
MJI-4	Protectors	Set of 4 pc

To place orders for the parts of the boat, you are requested to indicate the designation of the part or unit which incorporates this part, and its type and name according to the diagrams given in Figs 1 to 7 and lists of spare parts and supplies given in Sections 3 and 4.

Form for Placing an Order for Parts

Designation or type	Description	Qty
III-35/2	Time-lag fuse rated for 35 A	1
10, Fig. 2	Oar	2

4. LIST OF SUPPLIES

Designation	Description	Qty
	<u>Navigational Aids</u>	
BIB	Binoculars 7x 50 with light filter and case	1
	<u>Life-Saving Equipment</u>	
	Life jacket	6
	<u>Fire-Fighting Equipment</u>	
OY-2	CO ₂ fire extinguisher	2
	<u>Abandon-Ship Signalling Equipment</u>	
123-33c6	Red false fire	4
811-98.602	Tin for false fires	1
TT-14	Fog horn	1
	<u>Boatswain's Equipment</u>	
343ME-21-4	Caprone mooring rope, dia. 12.3 mm, 5 m long	2
343ME-21-3	Caprone grapnel rope, dia. 12.3 mm, 50 m long	1
343ME-21-6	Caprone relieving rope, dia. 6 mm, 30 m long	1
343ME-21-2	Grapnel	2
343ME-81-6	Oar	1
	Funnel for oil and fuel	1
343YK-214-005	Flag staff	1
812-E80	Canvas pail	1
343ME-81-7	Boat hook	1
8325 ⁷ 86	Corrosion-preventive paint, 1/8 lit	1 can
832594	Paint, 0.75 lit	1 can
281404	Moisture-proof compound	1 can
	<u>Electrical Equipment</u>	
-	Portable filament lamp	1
815008	Electrically-operated bilge pump	1
	<u>Utility Supplies</u>	
343ME-81-2	Protective cover for boat	1
343ME-81-3	Protective cover for cockpit	1
	<u>Lifting Gear and Transportation</u>	
	<u>Facilities</u>	
343YK-190-002	Hoisting ropes	1 set
343YK-912-002	Slipway	1 set

5. BOAT CONSTRUCTION

5.1. General Arrangement

The hull of the boat is subdivided into three compartments with two watertight bulkheads.

The first compartment is a forepeak. Access to this compartment is through a watertight hatch provided in the bulkhead at frame No. 5.

The second compartment is the passenger space (cockpit).

The third compartment is the engine room with a bulkhead at frame No. 12 and with an access hatch in the deck.

5.2. Outfitting and Finishing (Fig. 2)

The boat cockpit is outfitted with six easy armchairs. The cockpit and armchairs are lined with artificial leather.

OTK ④-2 - bench

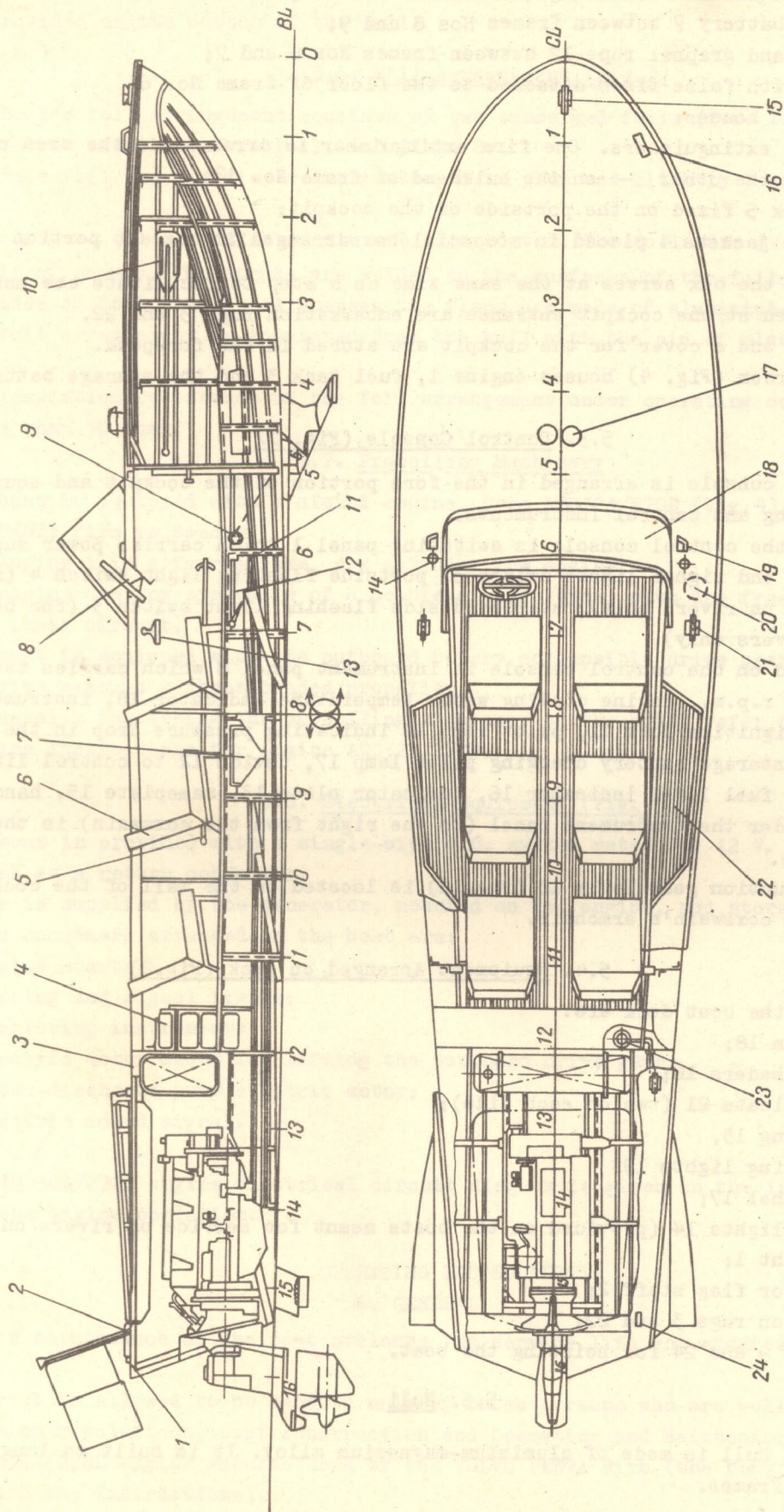


Fig.2. Outfitting and Finishing:

- 1 - stern light; 2 - casting for flag staff; 3 - embarkation rug; 4 - life jackets;
- 5 - boat hook; 6 - armchairs; 7 - storage battery; 8 - boat control console; 9 - eye-bolt for hoisting boat (fore); 10 - oars; 11 - tin for false fires; 12 - grapnel and grapnel rope; 13 - reverse reduction gear lever; 14 - flashing lights; 15 - towing ring; 16 - fairleaders; 17 - electric sound signal; 18 - windscreen; 19 - side lights; 20 - fire extinguisher positioned in area of frame No.6; 21 - mooring cleats; 22 - embarkation rug; 23 - fire extinguisher positioned on the bulkhead of frame No.12; 24 - eye-bolts for hoisting boat (aft)

Arranged in the fore part of the cockpit is the boat's control console 8 which carries monitoring instruments. Arranged under the flooring of the cockpit are:

- storage battery 7 between frames Nos 8 and 9;
- grapnel and grapnel rope 12 between frames Nos 6 and 7;
- tin 11 with false fires attached to the floor of frame No. 6.

The cockpit houses:

- two fire extinguishers. One fire extinguisher is arranged in the area of frame No. 6, starboard, and the other - on the bulkhead of frame No. 12;
- boat hook 5 fixed on the portside of the cockpit;
- six life jackets 4 placed in a special box arranged in the aft portion of the cockpit. The cover of the box serves at the same time as a step to facilitate the entrance into the cockpit. Placed at the cockpit entrance are embarkation rugs 3 and 22.

Two cars 10 and a cover for the cockpit are stored in the forepeak.

The engine room (Fig. 4) houses engine 1, fuel tank 3 and the storage battery plug connector 4.

5.3. Control Console (Fig. 5)

The control console is arranged in the fore portion of the cockpit and equipped with the boat monitoring and control instruments.

Mounted on the control console is switching panel 1 which carries power supply mains switch 2, running and signal lights switch 3, portside flashing light switch 4 (for boats meant for service on rivers only), starboard side flashing light switch 5 (for boats meant for service in rivers only).

Also mounted on the control console is instrument panel 8 which carries tachometer 20 to monitor engine r.p.m., engine cooling water temperature indicator 18, instruments illumination switch 9, ignition lock 11, pilot lamp 19 indicating pressure drop in the engine lubrication system, storage battery charging pilot lamp 17, device 12 to control lifting of out-board drive gear, fuel level indicator 16, indicator plate 13, nameplate 15, handrail 14.

Arranged under the instrument panel (to the right from the coxswain) is the engine shutdown lever 10.

Reverse reduction gear lever 13 (Fig. 2) is located on the wall of the cockpit, to the left from the coxswain's armchair.

5.4. Equipment Arranged on Deck (Fig. 2)

Located on the boat deck are:

- windscreen 18;
- two fairleaders 16;
- mooring cleats 21 (two on each side);
- towing ring 15,
- side running lights 19;
- sound signal 17;
- flashing lights 14 (provided on the boats meant for service on rivers only);
- stern light 1;
- casting for flag staff 2;
- embarkation rugs 3 and 22;
- eye-bolts 9 and 24 for hoisting the boat.

5.5. Hull

The riveted hull is made of aluminium-magnesium alloy. It is built on longitudinal lines with split frames.

The hull is corrosion-resistant which is obtained by oxidizing the hull material and by coating its interior and exterior with anticorrosive paints. Four magnesium alloy protectors are provided on the bottom of the hull.

5.6. Foil Arrangement (Fig.3)

The boat's foil arrangement consists of two submerged foils (fore foil 4 and aft foil 1), fin 3 fitted after the fore foil, and flaps 2.

The fore foil and the fin are arrow-shaped in plan and slightly V-shaped in transverse plane.

The surfaces of the foils and fin are planoconvex. The foils are secured to the hull with the aid of struts. The struts are welded to the surfaces of the foils and fin. The foils are made of stainless steel whereas the flaps are made of aluminium-magnesium alloy.

The foil arrangement is insulated from the hull with the aid of plastic gaskets and bushes.

The insulation resistance of the foil arrangement under operating conditions should not be less than 50 Ohms.

5.7. Propelling Machinery

The boat is equipped with a diesel engine, type AQD32A/270D (Fig.4), manufactured by the VOLVO PENTA firm in Sweden.

The engine 1 is a four-stroke, six cylinder row engine.

The engine cooling system is of a double-circuit type, with the fresh water circulating in the inner circuit.

The boat is equipped with the outboard rotary collapsible drive gear 2. Mounted on the outboard drive gear is a three-bladed propeller.

For details concerning the propelling machinery of the boat, refer to the maintenance and operating instructions for engine AQD32A/270D.

5.8. Electrical Equipment (Fig. 6)

The boat is provided with a single-wire D.C. system rated for 12 V. The hull of the boat is used as a return conductor.

Power is supplied by the generator, mounted on the engine, and storage battery.

Power consumers arranged on the boat are:

- engine starter;
- running and signal lights;
- monitoring instruments;
- electric motor meant for lifting the outboard drive gear;
- water-discharge pump electric motor;
- electric sound signal.

The AQD32A/270D engine electrical circuit diagram is given in the instructions dealing with the engine operation.

OPERATING INSTRUCTIONS

6. GENERAL

Proper maintenance of the boat prolongs its service life and ensures reliable operation.

The boat is allowed to be handled only by those persons who are well familiar with the navigation regulations, boat construction and Operating and Maintenance Instructions for the AQD32A/270D engine manufactured by the VOLVO PENTA Firm (the boat is delivered complete with the Instructions).

$40 = 51\frac{1}{2}$ in
 $90 = 23\frac{1}{32}$ in
 $00 = 7\frac{7}{8}$ in

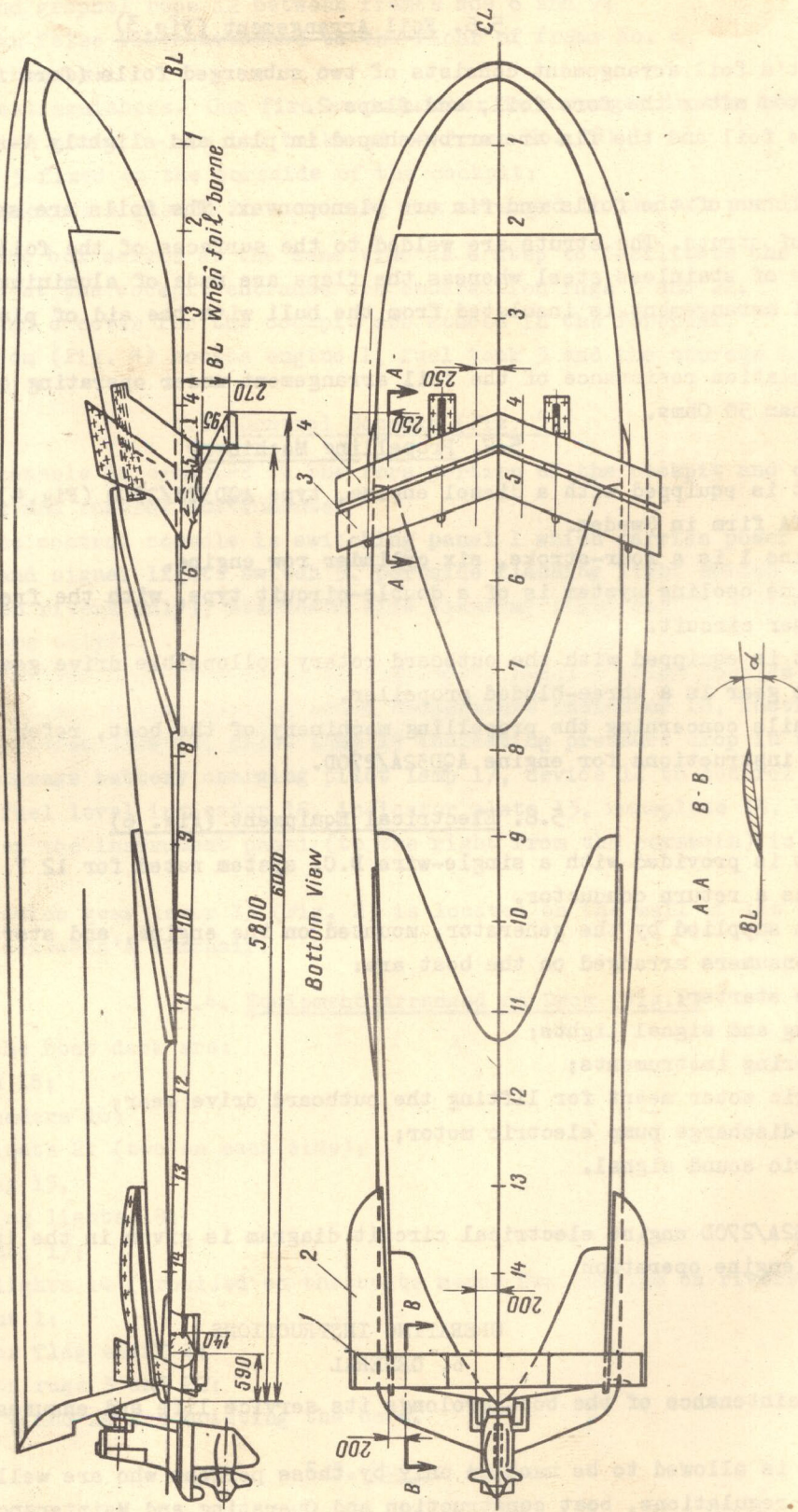


FIG. 3. Foil Arrangement;
 1 - aft foil; 2 - flaps; 3 - fin; 4 - fore foil

Foil	Incidence α relative to BL	Specified deflection
Fore	$-0^{\circ}25'$	$\pm 0^{\circ}6'$
Fin	$+2^{\circ}30'$	$\pm 0^{\circ}10'$
Aft	$-0^{\circ}20'$	$\pm 0^{\circ}6'$

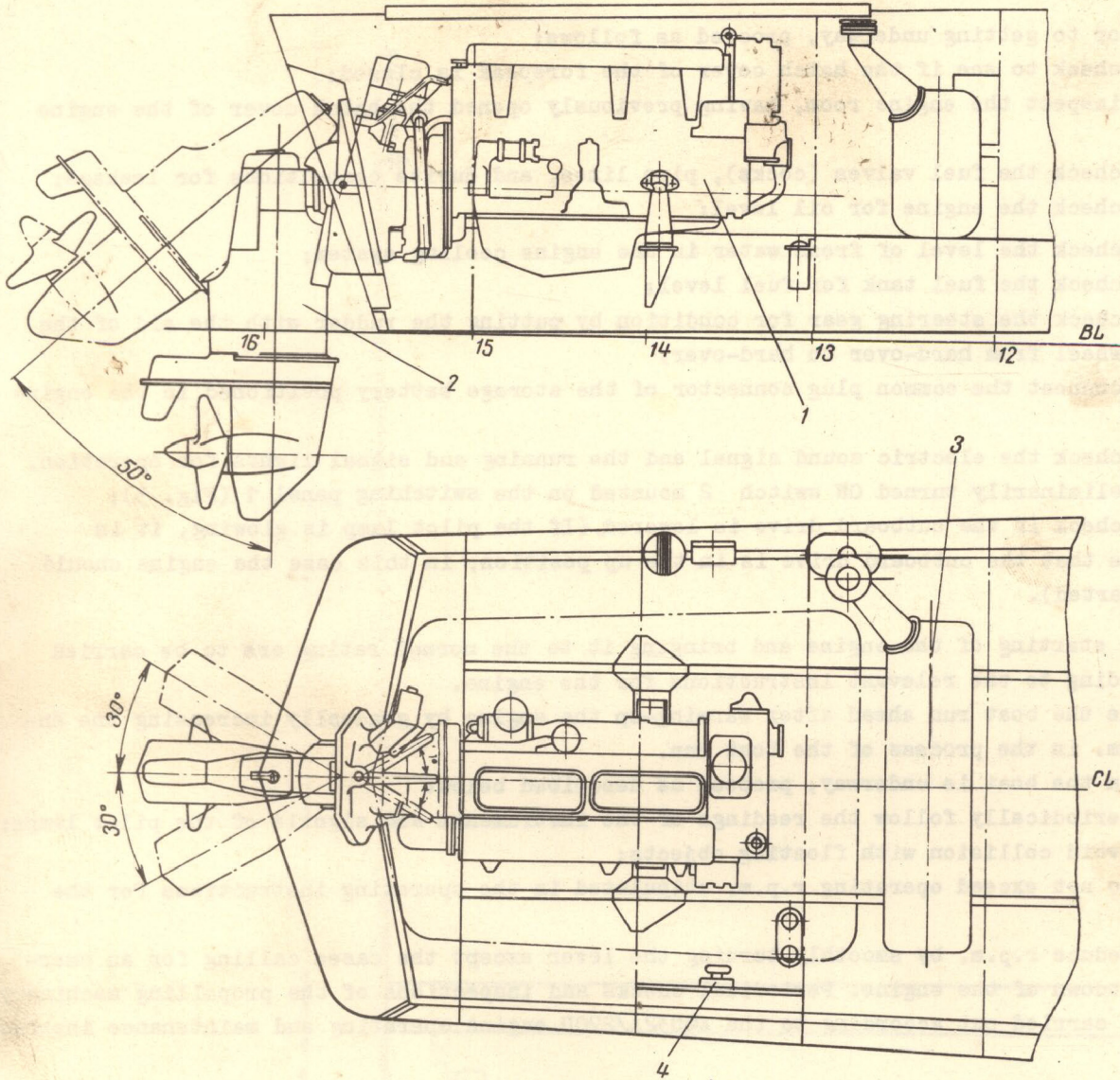


Fig.4. Engine Room:

1 - engine; 2 - outboard drive; 3 - fuel tank; 4 - storage battery plug connector

Prior to operating the boat, the latter should be activated according to Para. 10.2 of the present Instructions and the Operating and Maintenance Instructions for the AQD32A/270D Engine.

CAUTION! Before putting the boat in service, be sure to run in the engine in accordance with the relevant operating instructions.

Prior to getting underway, proceed as follows:

- a) check to see if the hatch cover of the forepeak is closed;
- b) inspect the engine room, having previously opened the hatch cover of the engine room;
- c) check the fuel valves (cocks), pipe lines, and durite connections for leakage;
- d) check the engine for oil level;
- e) check the level of fresh water in the engine cooling system;
- f) check the fuel tank for fuel level;
- g) check the steering gear for condition by putting the rudder with the aid of the steering wheel from hard-over to hard-over;
- h) connect the common plug connector of the storage battery positioned in the engine room;
- i) check the electric sound signal and the running and signal lights for operation, having preliminarily turned ON switch 2 mounted on the switching panel 1 (Fig. 5);
- j) check if the outboard drive is lowered. (If the pilot lamp is glowing, it is indicative that the outboard drive is in the up position; in this case the engine should not be started).

The starting of the engine and bringing it to the normal rating are to be carried out according to the relevant instructions for the engine.

Make the boat run ahead after warming-up the engine by gradually increasing the engine r.p.m. in the process of the boat run.

When the boat is underway, proceed as described below:

- periodically follow the readings of the instruments and signals of the pilot lamps;
- avoid collision with floating objects;
- do not exceed operating r.p.m. stipulated in the operating instructions for the engine;
- reduce r.p.m. by smoothly turning the lever except the cases calling for an emergency shutdown of the engine. Periodical checks and inspections of the propelling machinery are to be carried out according to the AQD32A/270D engine operating and maintenance instructions.

7. FIRE PREVENTION REGULATIONS

To prevent fire on the boat, proceed as follows:

- maintain fire extinguishers in charged state and keep them at the specified places;
- periodically check the fuel system; no leakage of fuel is allowed;
- periodically check the electrical equipment for condition; special attention should be paid to the connections of the electric starter and generator.

In case of fire in the engine room, use fire extinguishers only. Never use water for putting out fire.

Fire extinguishers are arranged on frame No. 6, starboard, and on the bulkhead of frame No. 12.

8. MAINTENANCE INSTRUCTIONS

Operation	Technical requirements	Tools and appliances to be used
Hoisting the boat for inspection of the hull, foil arrangement and protectors (to be carried out depending upon the operating conditions but not less than once a month)	The paint coating on the hull should be intact. The foil arrangement should be free from nicks. If the protectors are worn out by 75 per cent, they should be replaced	1. Special hoisting gear (delivered complete with boat) 2. Slipways for placing the boat ashore (delivered complete with the boat)
Measuring the insulation between the foils and hull (to be done once a year before navigation)	Insulation resistance of the boats in service should be 50 Ohms at least. In case of damage to insulation, it should be restored by placing insulating sleeves and washers	Megger or tester
Tightening the nut 1 of clamping arrangement of the steering gear drive (Fig. 7) (in case of loosening)	The tightening of the nut should prevent the play of the outboard drive with the steering wheel easily rotating under a slight force applied by the coxswain	Wrench

Note. Maintenance and operation of the engine should be carried out in accordance with the instructions for the AQD32A/270D engine of the VOLVO PENTA Firm, Sweden.

9. PROBABLE TROUBLES AND REMEDIES

Troubles and their symptom	Probable cause	Remedy
1. Foreign objects on foils. Visual indication: a) too much time taken by the boat to become foil-borne; b) reduction of running speed; c) list when foil-borne	Dirty water in sailing area	Clean the foils with the aid of the boat hook or run astern. If necessary, lift the boat and clean it of foreign objects
2. Foil surfaces strained. Foil incidence disturbed. Visual indication: a) too much time taken by the boat to become foil-borne; b) reduction of running speed; c) the boat fails to become foil-borne	Impact against underwater object	Lift the boat and check the foils for rectilinearity and dents. Correct bends with the aid of a lead hammer. Dress and polish repaired places. Measure incidence relative to the BL running along the

Troubles and their symptom	Probable cause	Remedy
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CL through the lower edges of the second and third steps of the hull. Measure incidence in the section shown in Fig. 4.³ Incidence should correspond to the values given in the table

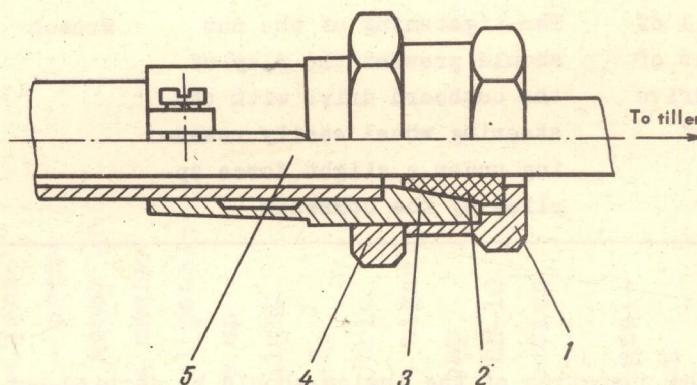


Fig.7. Steering Gear Drive Clamping Arrangement:

- 1 - union nut; 2 - insert; 3 - body; 4 - nut;
5 - control wire rope

10. INACTIVATION AND ACTIVATION

10.1. Inactivation

In case of protracted storage, the boat should be placed on boat chocks in an enclosed dry space.

To let the air into the boat's compartments, the covers of the hatches in the 5th bulkhead and of the engine room should be left open. In this case the boat should not be covered with the protective cover. But if the boat is stored in the open, it should be covered with the protective cover.

10.1.1. Hull and Equipment

For inactivation of the hull, wash it with fresh water both inside and outside and wipe it dry. All the equipment which is not fixed should be removed, wiped, dried and stored in a dry space. Wipe the instrument panel and coat its unpainted and nickel-plated surfaces with anticorrosive compound supplied with the boat.

10.1.2. Propelling Machinery

In case of protracted storage of the boat, subject the whole propelling machinery and its systems to inactivation.

10.1.3. Engine

Carry out inactivation of the AQD32A/270D engine in compliance with the "Description and Operating Instructions for the Propelling Machinery" supplied by the VOLVO PENTA Firm.

10.1.4. Fuel Pipe Line

Drain fuel from the fuel tank. Blow the pipe line with compressed air. Close the cocks of the fuel system.

10.1.5. Cooling Pipe Line

Drain water from the engine and sea water systems and blow them with compressed air.

10.1.6. Electrical Equipment

In case of protracted storage of the boat, apply a thin layer of inactivation compound to all non-coated metal parts of the electrical equipment and instruments.

10.2. Activation

When preparing the boat for service, activate the foil arrangement by washing it in gasoline. Wipe all the mechanisms and wash the hull with fresh water.

10.2.1. Steering Gear

Wipe the external surfaces. Smear the rubbing surfaces of the steering stand in accordance with the respective instructions for the propelling machinery of the VOLVO PENTA Firm.

10.2.2. Engine

Carry out the activation procedure according to the respective instructions for the propelling machinery of the VOLVO PENTA Firm.

10.2.3. Electrical Equipment

Clean all the preservatively treated metal parts of the electrical equipment and instruments. Check the entire wiring and instruments under current.

11. GRADES OF OILS AND FUELS

Follow the respective instructions for the AQD32A/270D engine of the VOLVO PENTA Firm in using oils and fuels for the machinery of the boat.

12. INACTIVATION CERTIFICATE

The boat has been inactivated in accordance with requirements stipulated by p.10.1 of this publication.

Date of inactivation 25.07 1976

Inactivation term 25.07 1977

Inactivated by _____

Upon inactivation the boat has been accepted by _____ (signature)

