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Vega handbook

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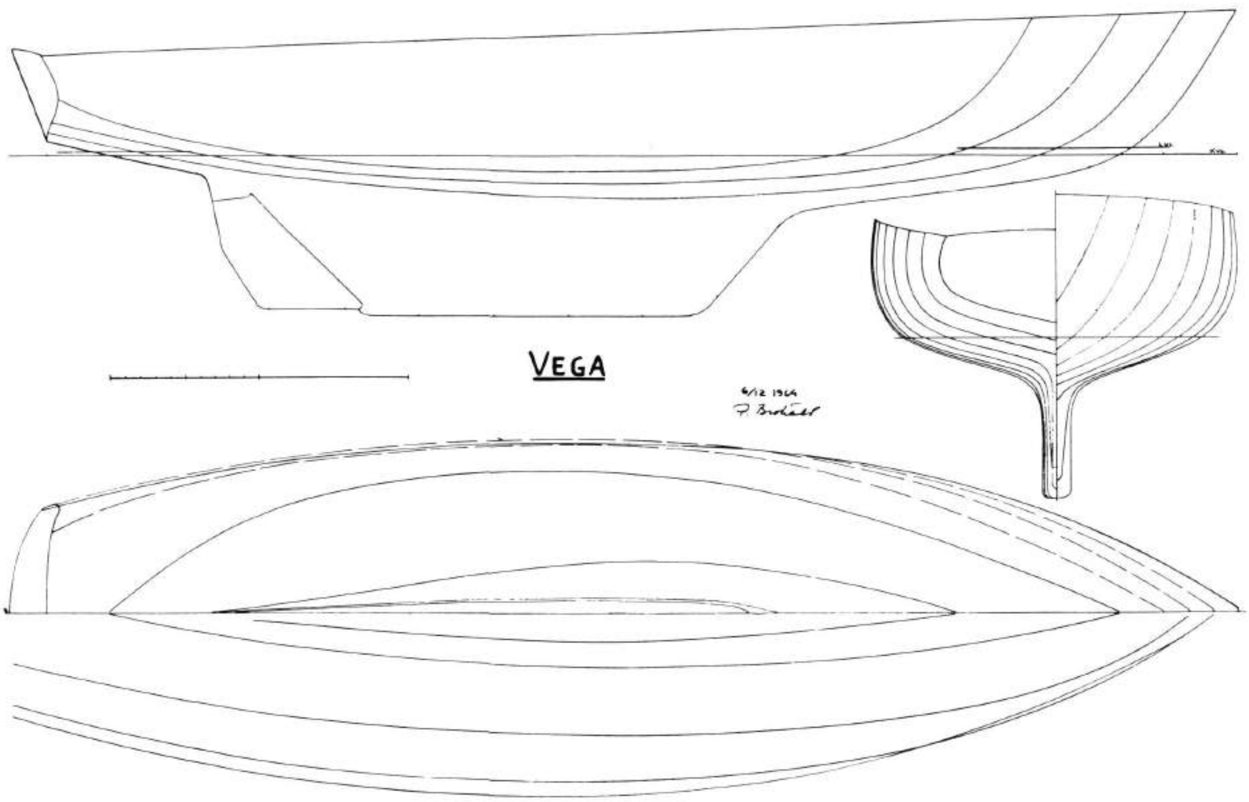

Fig. 1. The lines.

Per Brohäll

THE VEGA HANDBOOK

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Foreword

The object of this handbook is to provide VEGA owners with a concise manual on how the boat should be used and maintained. Generally only features which are peculiar to VEGA are covered. Those who want further theoretical knowledge about sailing, seamanship, boat maintenance, racing and so forth are advised to read other published handbooks on the subject.

Even a boat so well equipped as the VEGA may, after delivery and launching, require some adjustments, e.g. trimming of rig; minor engine adjustments; tightening of screws, nuts and hose clips; and repairs to minor damage sustained during shipment. The manufacturer will naturally stand by his guarantee, but the low price of VEGA is calculated on the basis that a normally handy owner can himself take care of maintenance items such as mentioned above. This means that the manufacturer's resources can be used more effectively for guarantee repairs where skilled personnel are really required.

This handbook covers the installation of the petrol engine Albin O-22 Combi (delivered 1970—1972) as well as the installation of the diesel engine Volvo Penta MD6A Combi (delivered from 1972) — and the different electrical systems.

Should any problem arise which cannot be solved with the help of this handbook, do not hesitate to write or call the manufacturer or his agent for advice. Please do not forget to tell us about minor faults or possible improvements (even things which you may have fixed already yourself) because if the manufacturer does not recieve constructive criticism it is more difficult for him to introduce suitable improvements.

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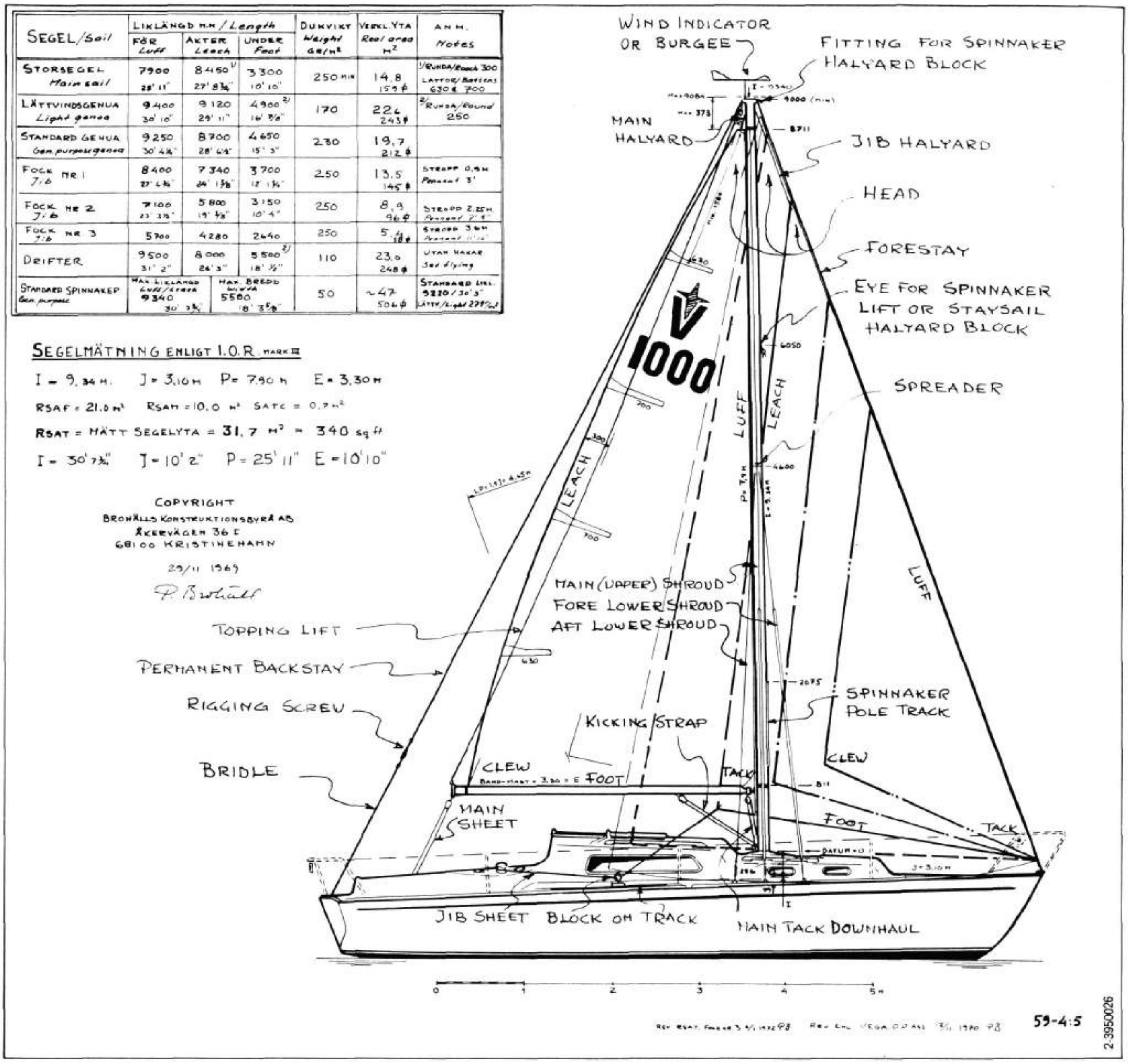


Fig. 2

Technical data

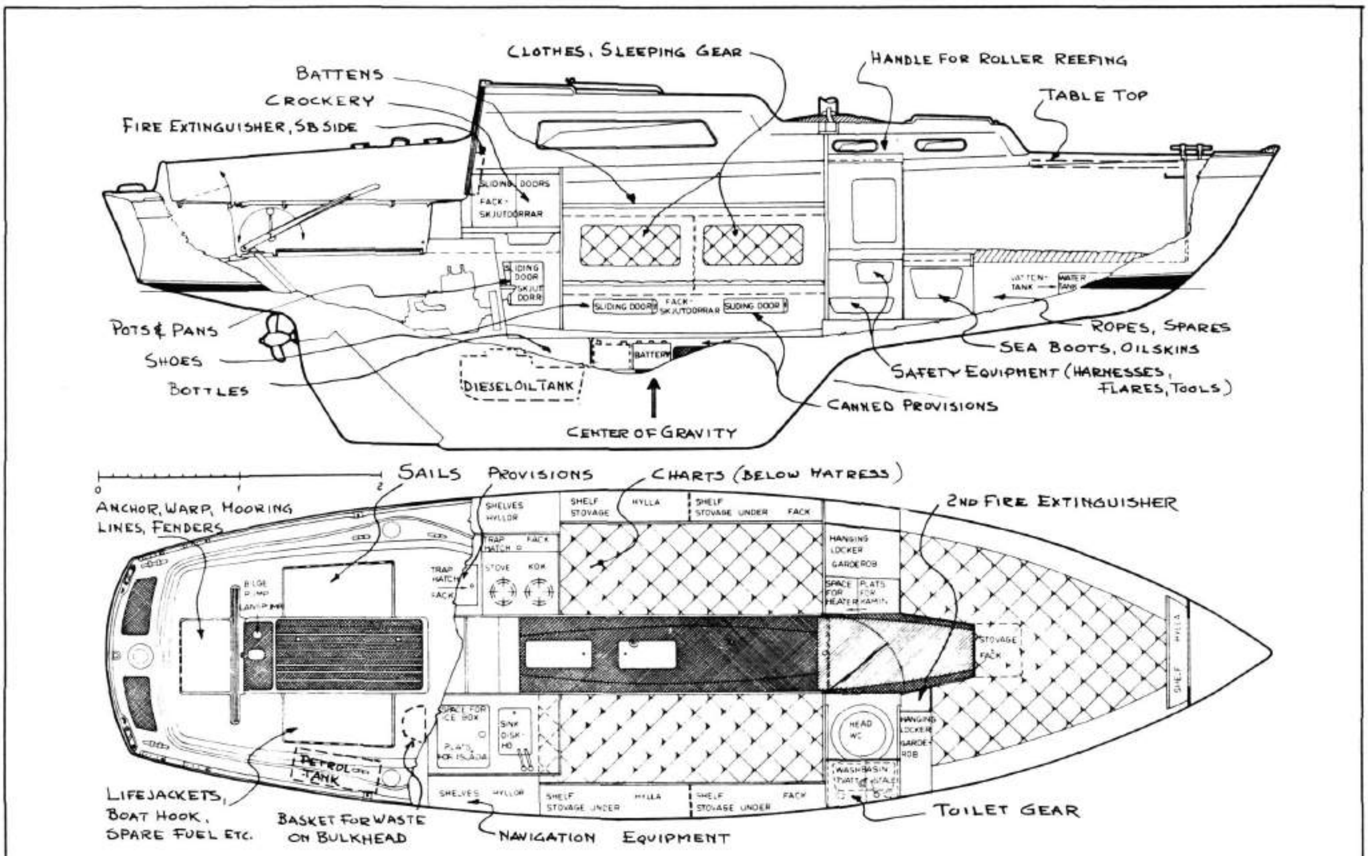
L. o.a.	27′ 1″	8.25 m
L. w.l.	23′	7.00 m
Beam	8′ 1″	2.46 m
Draft	3′ 10″	1.17 m
Displacement (measurement trim)	5070 lbs	2.3 tons
Ballast	2020 lbs	915 kgms
Auxiliary engine	ALBIN O-22 Combi or Volvo Penta MD6A Combi	
Measured Sail Area (I.O.R.)	341 sq ft	31.7 m²
Main sail	159 sq ft	14.8 m²
Light genoa jib	243 sq ft	22.6 m²
Gen. purpose genoa jib	212 sq ft	19.7 m²
Jib No 1	145 sq ft	13.5 m²
Jib No 2	96 sq ft	8.9 m²
Jib No 3	58 sq ft	5.4 m²
Gen. purpose Spinnaker	506 sq ft	47 m²

Hull. The thickness of the grp hull is between 6 and 7 mm (¼ inch) on the topsides, 9 and 10 mm (⅜ inch) below the waterline and 12 and 13 mm (½ inch) in the bottom and keel area. The lamination is made partly by spraying chopped glassfibre mixed with polyester and partly by laying up by hand layers of woven rovings. The glassfibre content is approximately 34%. The hull is stiffened by glassfibre angles — stringers and ribs — and a fixed floor.

The ballast is bonded into the keel and consists of:

Lead (at the bottom)	about 100 kg	(220 lbs)
Iron	about 740 kg	(1630 lbs)
Polyster/sand	min. 75 kg	(165 lbs)

Due to the way in which the ballast is bonded in, the keel is both strong and resilient and has proved able to withstand very hard grounding — full speed against rock — which resulted in so little damage that a simple filling job was the only repair required.



Accommodation with stovage plan (example)

Fig. 3

Deck. The horizontal surfaces of the deck and cabin top are of sandwich construction with Divinycell (PVC foam) as the core. The top laminate is 3.5 mm (5/32″) thick, the Divinycell 15 mm (5/8″) and the inner laminate 2.5 mm (1/8″). Areas without sandwich construction are a minimum of 5.5 mm (1/4″) thick. Toe rail, hatch frames, mast step etc. are filled with a pressure resistant filler of polyster and Vermiculite (a mineral product).

Windows are of hardened glass.

Moulded into the deck are conduits for the electric wiring and wood chocks to take the various through bolts. See Figure 4.

The Hull and deck are joined together with stainless steel bolts through the toerail and a flange at the top of the hull. In between there is an elastic gasket. (In boats completed between 1966 and 1968 epoxy glue was used instead of the gasket).

The rudder is cast in glassfibre with fibre bearings set into bronze fittings that are mounted in the keel and cockpit floor.

Mast and boom are of aluminium alloy. The boom is fitted with roller reefing. Gear for easy lowering of the mast is stocked as an optional extra for the VEGA.

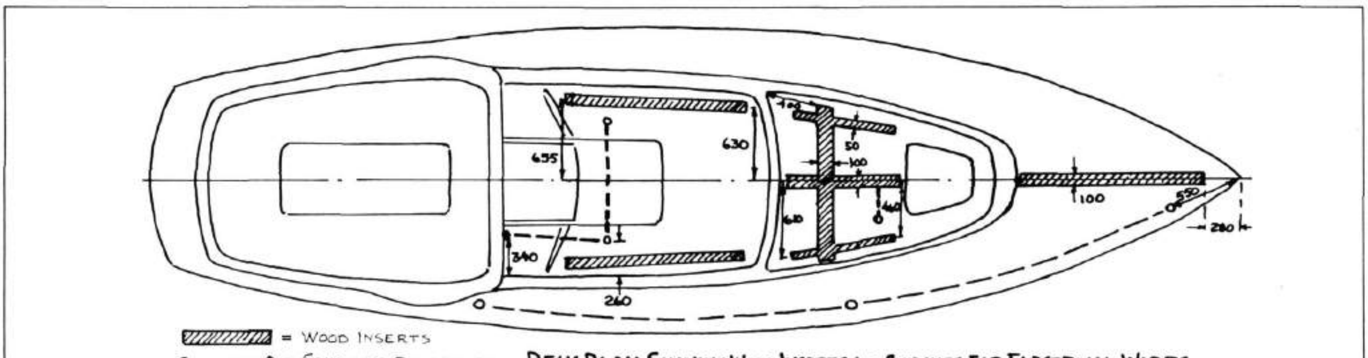
Sails are of high class materials.

Standing rigging. 1×19 stainless wire. Stainless steel rigging screws.

Running rigging. 7×19 stainless steel wire and double braided Terylene rope for the tails and sheets.

Fittings and winches of bronze and stainless steel.

Tanks. Petrol (copper) 23 litres (5 imp. gals.). Fresh water (plastic) 65 litres (14 imp. gals.). In boats with diesel engine installation the fuel tank is made of Polyamid plastic and the volume is 35 litres (8 imp. gals.).



Deck Plan Showing Wood Inserts and Conduits for Electrical Wires

Fig. 4

Thoughts behind VEGA

The problem in designing a cruising yacht which is economical, comfortable and fast is to assess all the factors which influence the desired qualities — and to make a successful compromise.

Economy

A light boat is economical. Not so long ago, light and strong designs were expensive to make. With modern glassfibre construction it is possible to make light and strong mouldings at almost the same price per pound as heavy mouldings. The price per pound of a complete sailing yacht is just a fraction higher for a light boat than a heavy boat. Consequently it is possible today to build a roomy boat which is light in relation to the volume — giving more boat for the money. Naturally, the yacht has to be designed for modern, industrial manufacture. From the designer's point of view, disregarding the manufacturer's industrial and selling efficiency, these are the most important factors to achieve to ensure a low initial price.

However, the annual cost is almost as important for the owner. Upkeep, yard bills and the cost of sails etc are almost directly proportional to the weight of the yacht (displacement).

Comfort

A comfortable boat is one which is easy to handle, a pleasure to own and, above all, roomy. Comfort is more dependet on "elbow room" and standing headroom than on ingenious accommodation and equipment details. Thus a large volume is desirable.

If the boat is light she will be easy to handle because there will be small weights to handle and small sails will be carried in relation to the size.

A very common opinion is that a stiff hull has a quicker motion at sea than a less stiff hull. In small sailing yachts the steadying effect of the sails makes this a purely academic opinion. Long experience of sailing in the open sea has taught me that there is almost no difference in the sea kindliness of a light, stiff boat and that of a heavy, narrow boat. There is so much power in the seas that they can give large sailing vessels a rather quick motion regardless of the hull shape. Furthermore, it is more comfortable to sail at a small angle of heel and in a boat which does not ship a lot of water. More important than the athwartships motion is the longitudinal motion if the boat pounds heavily. Comparing the VEGA in a test with a much heavier offshore cruiser of a well known type, showed that the latter pounded much more and shipped more water at the same speed. The only boat which has been sailed single handed twice round the world, "Islander" sailed by Pidgeon, had a very stiff, hard chine hull. My conclusions are that for normal cruising — often in sheltered waters — a light, stiff boat is as good or better than a heavier boat. Catamarans are the ultimate in this direction; they have been used for long ocean passages but there are other problems — which is another story.

Speed

If we disregard the propulsive force (the sails), the speed of a sailing boat in different strengths of wind depends on many different factors. Most important are: Area and form of wetted surface; effective waterline length; weight (displacement); hull lines; and stability.

The wetted surface is most important at low speeds and also to a lesser extent at high speeds.

The effective **Waterline length** governs the theoretical maximum speed of a boat (disregarding planing hulls). A longer boat has a higher maximum speed than a shorter one. However, a light boat can achieve a higher speed than a slightly longer but heavier boat. Thus **displacement** affects speed. If one wants a fast craft it has to be made light. This holds true for aircraft, cars, bicycles, ships and motor boats, so why not for sailing boats? It is no mere chance that "displacement" is placed below the line in speed equations for motor boats. Only when weight increases the ability to carry sails, thus increasing the propulsive forces, does it — in a limited sense — promote speed.

The **lines** of a boat are always important. It is possible to make the underwater lines of a light weight boat sleeker than those of a heavy displacement boat, thus promoting speed. Even if relatively high freeboard and short overhangs decieve the eye, the lines of VEGA are inherited from the skerry cruisers. This purely Swedish type of boat is considered (like the Scandinavian Viking ships) to be one of the most highly developed and beautiful types of boat ever concieved. The skerry cruisers developed according to a measurement rule which neither restricted nor governed the development of the hull lines. This resulted in a speedy hull. The basic lines of VEGA have been drawn without considering any measurement rule.

Stability can be achieved by different combinations of hull form and weight. A beamy, shallow hull produces a long righting arm at a small angle of heel and even in a light boat, a large righting moment can be obtained — initial stability. A deep, narrow hull with a deep ballast keel has a small righting moment at small angles of heel, but at greater angles the righting moment increases. The desired stability charac-

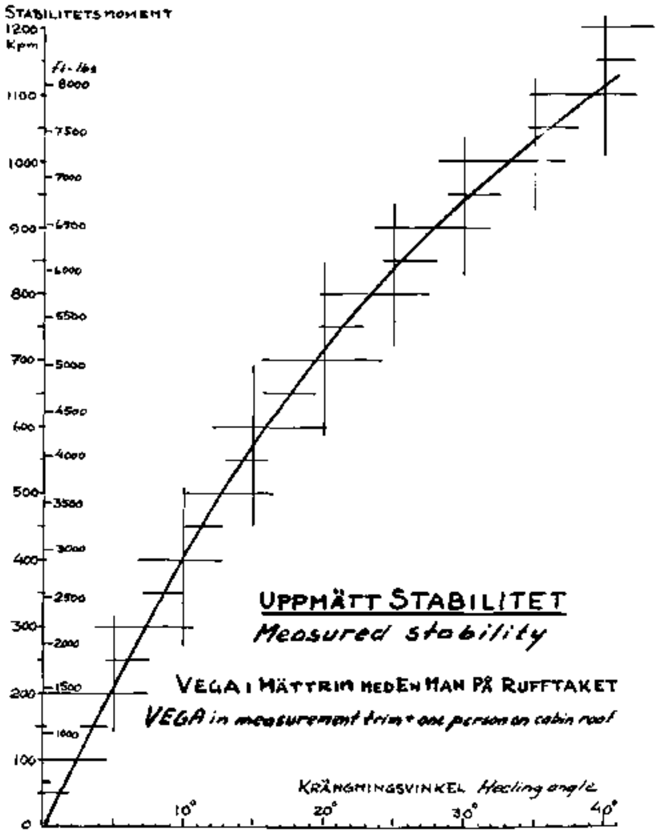


Fig. 5. VEGA's stability curve.

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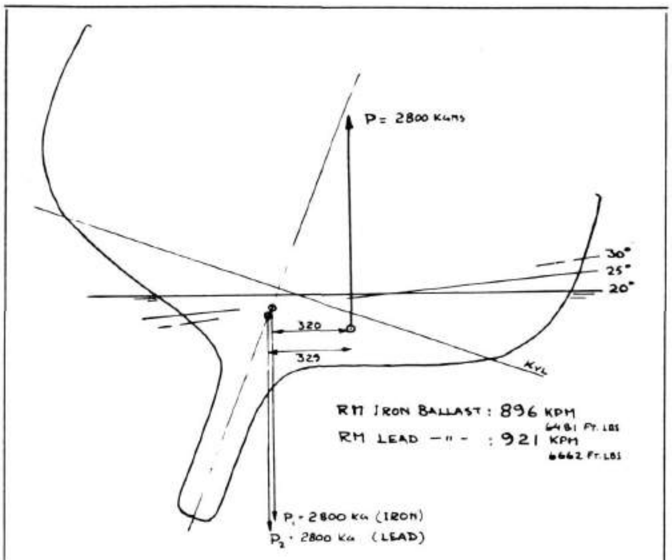


RIGHTING MOMENT (RM) WITH IRON OR LEAD BALLAST

Fig. 6

teristics must be chosen between these two extremes. Here we arrive at the question which many people consider very important — the ballast ratio. VEGA has a ballast ratio of about 40% — less than 30% in cruising trim. An opinion often expressed also by professionals (well known designers) who use ratios in an arbitrary way is "The ballast ratio should be at least 45% to give good stability". However, ratios must always be refered to boats of a certain size and type. The ballast ratio is not sacred. The old English cutters had a ballast ratio of 60 to 70% (lead mines!) and were narrow, heavy and tender, and sailed at a large angle of heel. The other extreme, multihulls, have a ballast ratio of 0 and sail at a very much smaller angle of heel.

VEGA has been designed with a stiff hull form so that the ballast weight can be kept as low as possible to achieve the necessary righting moment required in the case of a complete capsize. More ballast would make VEGA slower in most conditions — and more expensive. The measured stability of the VEGA (almost empty) is shown in fig. 5. With cruising equipment and crew the stability is increased considerably. In light displacement boats payload — crew, provisions, equipment etc — is much greater in relation to the weight of the boat than is the case in heavier boats. Thus a light boat is much more sensitive to the payload. If such a boat were ballasted to obtain the maximum stability (ability to carry full canvas in winds of 10 to 14 knots) when empty, with a full cruising load it would have excessive stability and be slow. This is why the weight of the ballast keel in VEGA has been calculated to provide the correct stability in cruising trim. If, however, for family sailing, more stability is required, VEGA can be loaded with heavy cruising equipment but performance will suffer. Owners who boast of their stiff boats, capable of carrying full canvas in a 20 knot wind are stating either that the boat is under canvassed and is slow in light winds or that they do not understand that a boat sails much more efficiently and faster at a small angle of heel. Heeling more than 35° is always a disadvantage and few boats sail efficiently when heeling more than 30°. Light, shallow boats like VEGA should be sailed on the wind with not more than 20° to 25° of heel. This means comfortable, dry sailing in fresh winds and a heavy sea. The sail area must be reduced in good time thus giving better speed. VEGA can certainly stand up to full canvas in a 20 knot wind but comfort and speed are sacrificed.

Now we can return to stability and ballast. Some owners have requested more ballast or a change from iron to lead. Because VEGA is meant to be a strict one-design class the builders have no intention of making such alterations. Let us look a little closer at the problems to show that the suggested alterations are not really justified.

Let us begin with the suggestion of changing from iron to lead ballast. The centre of gravity of the total ballast can be lowered about 90 mm (3½") and the centre of gravity of the whole boat in cruising trim = 2800 kgms/6175 lbs is lowered about 25 mm (1"). What does this mean in terms of increased stability when sailing on the wind? In figure 6, the midship section of VEGA is shown heeled at 20°. The length of the righting arm is 320 mm (12½") and the righting moment is 896 kilogrammetres (6500 ft. lbs). With the lower centre of gravity (lead) the righting arm would be increased 9 mm (3/8") (heeling at 30° the increase would be 12,5 mm — ½" and the righting moment to 921 kilogrammetres — an increase of 25 kgm (180 ft. lbs) or 2.8%. The same increase in righting moment can be achieved by increasing the weight of the boat by 75 kgms (165 lbs) or by moving one person weighing 80 kgms (176 lbs) a distance of 310 mm (1 ft.) to windward. It is obvious that placing the ballast deep down is of little importance at the modest angle of heel at which VEGA sails most efficiently. The figure also shows that the increased angle of heel puts the lateral plane in the shadow of the hull and so reduces its efficiency.

The other suggestion — increased ballast weight — could be justified in waters where the average wind strength is more than 10 to 12 knots and the direction such that much of the sailing time is spent on the wind. However, what is said above shows that the required increase in stability can be achieved by not being weight conscious when equipping the boat and possibly by using internal ballast. In this way

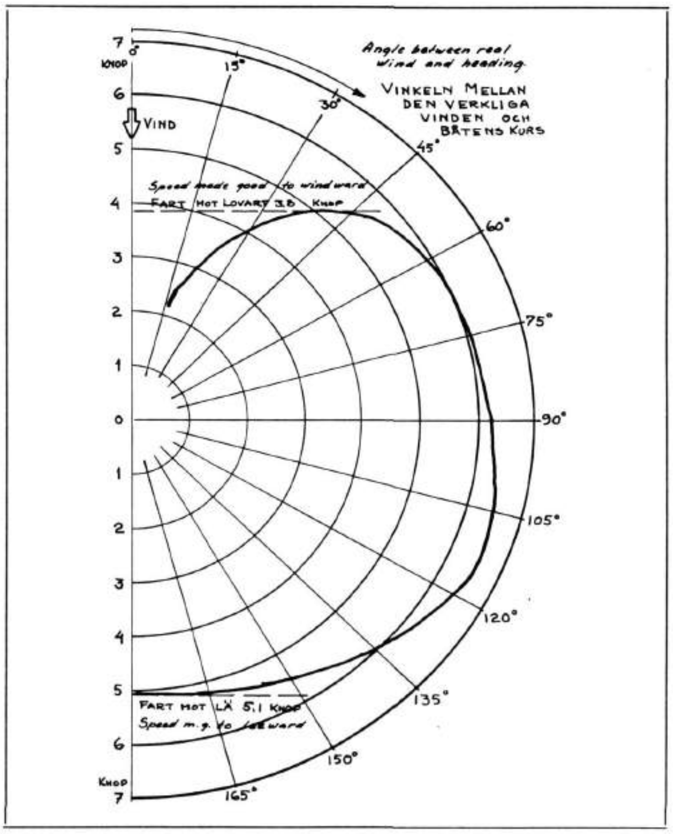


Fig. 7. Speed diagram for VEGA (mainsail + jib no. 1) in a 16 knots wind.

the one-design theme is maintained and it is always possible to lighten the boat to increase the speed for racing — especially in light winds. Fig. 7 shows an example of VEGA's sailing speed.

Summing up, Lightness has been the main consideration behind the design of VEGA. A light boat can be made roomy and fast in relation to size and price.

To make VEGA the best possible family boat a little speed had to be sacrified. A powerful and heavy engine and good equipment with tanks, pulpits and a comfortable interior adds weight. The sail plan had to be drawn with an eye on both family sailing and racing. For pure racing a smaller mainsail and a larger foretriangle would be worth while, but be less handy and more expensive. For one design racing — VEGA against VEGA:s — the rating naturally has no importance. In 1969 22 VEGA:s started as a separate class in Sweden's largest offshore race (Round Gotland). That was One Design Offshore Racing for the first time. The VEGA class has continued to grow and now VEGA is racing as an One Design Class in most of the main sailing events in Scandinavia.

A compromise, and every boat is a compromise — cannot give everything, but happy owners consider the VEGA to be an ideal family boat. Racing results show that a well tuned VEGA with a good crew can win handicap races sailed to the R.O.R.C. and C.C.A. measurement rules and other simpler rules. The compromise seems to be a good one.

First launching and rigging

Launching

VEGA is delivered in a shipping cradle which has been with the boat since she was built. A steel band is fixed through the lower rudder fitting with an ordinary steel bolt to hold the back of the keel to the cradle.

The recommended launching procedure is as follows:

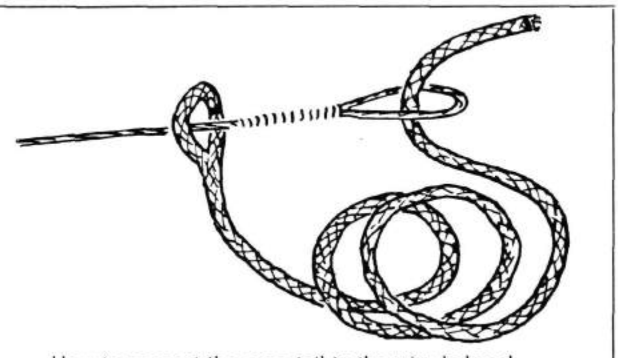
1. Remove the bolt that holds the steel band. Replace it with the stainless steel bolt that is fixed to the aft end of the cradle. The bolt should be tightened with a patent wrench (14 mm).
2. Lifting strops should be put in front of the keel and the other behind. Attach the strops to the hook of the crane. When the strops are tight they should be adjusted so that they do not bear against any sharp angles.
3. Put fenders on the side of the boat which will be alongside the dock and attach long mooring lines fore and aft. These are used to control the boat when it is lifted.
4. Check: that the bottom plug is tight,
   that the cooling water seacock for the engine is open,
   that the valves for cooling water on the cylinder block and on the exhaust pipe are closed.
5. Close the sea cocks for the toilet and sink to prevent any risk of leakage when the boat is launched. When in the water open and check that the hose clamps are tight.
6. Lift the boat until it is well clear of the cradle.
7. The unpainted parts where the boat has been resting on the cradle should be painted with the bottom paint provided for the purpose.
8. Lift and launch the boat.
9. Unhook one part of each strop and recover the strops with the crane.

If the boat cannot be rigged where she is launched it is best to move to a mast crane where you can work in peace and quiet. The mast can be loaded on to the cabin top and pulpit and secured. The engine is test run before delivery and there is fuel in the tank for at least one hour's running. Check the level in the battery and the oil level in the engine — in addition to the checks mentioned in paragraph 4 above. Top up with fuel as soon as possible. Follow the engine instructions when starting the engine.

Rigging

The standing and running rigging are packed in the boat and marked. The rigging procedure is as follows:

1. Place the mast on two boxes or trestles.
2. The soft eye on the jib halyard — the other end carries a snap shackle — is put over the sheaves at the top of the mast on the same side as the jib halyard winch with the soft eye on the aft side. The rope tail is then attached to the wire halyard so that the two form a reef knot (fig. 8).



How to connect the rope tail to the wire halyard.

Fig. 8

3. The eye of the main halyard is fed over the sheaves on the other side of the mast head and the rope tail is attached as on the jib halyard. In this instance the rope tail is on the forward side of the mast.
4. The forward and aft lower shrouds are fixed to their respective tangs.
5. The main shrouds are attached.
6. The forestay is attached to the toggle on the forward side of the mast head fitting. The forward strap is for the spinnaker halyard block.
7. The block for the topping lift is fixed to the inner bolt on the aft side of the mast. The block should be turned so that the rope end leads down the mast.
8. The back stay is fixed in the aft toggle.
9. The locking pins on the rigging screws are removed and the bolts must be taken out. The rigging screws should be opened half way and then attached to their respective stays and shrouds. All rigging screws should be fitted so that they turn the same way when tightened.
10. The straps on the spreader ends are loosened. The main shrouds are put into the grooves and the straps are replaced. Tape or cover the ends with rubber to prevent the sails from chafing on sharp edges.

11. Attach wind indicator or burgee.

12. The back stay bridle is fixed to the lower end of the back stay rigging screw.

13. A large rope strop should be put round the mast under the spreaders. Leave a piece of line hanging from the strop so that both the strop and the crane hook can be pulled down when the mast has been stepped.

14. Tape round the chain plates so that the rigging screws do not topple when the rigging is slackened off and bend when the shrouds tighten again (fig. 9).

With the help of tape around the shroud fittings bent rigging screws can be avoided.

Fig. 9

15. Check that all bolts in the rigging are locked with cotter pins and all shackles are siezed with wire. Tape over the sharp ends of cotter pins.

16. Attach the crane hook to the strop and lift the mast till it hangs with the foot near the the mast step. Feed the mast light cables down through the hole in the mast step.

17. Connect the cables to the connectors behind the hatch on the mast support.

18. Lower the mast and attach the stays and shrouds. The plastic covering tubes for the rigging screws of the shrouds have to be fitted before connecting the shrouds. When the mast can stand by itself the crane hook can be removed. Tighten the rigging and lock the rigging screws. The aft lower shrouds should be tightened lightly but the others should be tightened hard. After sailing for some time, the rigging should be tightened again. Tape the pins and the rigging screws of the stays (not necessary on the shrouds because of the covering tubes).

19. Boom, lifelines and stanchions should then be fixed. Tape should be put round the lifelines at the stanchions to prevent the cover from being damaged.

Advice on sailing and sail handling

Setting sails for the first sail

Pull the mainsail out on the boom and attach it to the roller fitting. Pull the sail out tight but not past the black band. Fit the slides into the mast track, insert the battens in the batten pockets in the mainsail and attach the main halyard. Hoist the mainsail to the black band at the top of the mast. Check from a distance with binoculars that the sail is up to the band and mark the halyard so that the sail can be rehoisted in the same position. The luff can then be tensioned the desired amount by pulling the boom down with the down haul. Both the foot and luff should be stretched just enough to make the small wrinkles in the sail disappear but not so hard that diagonal wrinkles appear.

The stops on the mainsheet track may be placed about 15 cm (6 in) from the ends. A general rule for sheeting the mainsail is that the traveller should be close to the centre in light winds and further out the harder it blows. Hoist the jib and tension the halyard with the jib halyard winch. The blocks for the jib sheet leads should be adjusted on the tracks so that the line of the sheet is just below a line bisecting the sails angle at the tack. When using a genoa, the line of the sheet should lead just over this line. The sheeting points must of course be adjusted so that the leech is neither too slack nor too tight. As a rule, it is better to have the leech too slack if anything. The positions of the sheeting points for different sails should be marked on the track with paint or tape. It is advisable to tape the forward ends of the track so that the sheet block slides cannot come off by mistake and be lost.

Sail your VEGA on the headsails and she will go fast and point high into the wind. Do not let her heel too much but change sails in good time. Begin by reefing the mainsail — but more of this later.

How to sail VEGA

VEGA sails well. She is fast in both light ans strong winds. To get the most out of VEGA she must be tuned correctly. The bottom has to be clean and for racing it is important to put elbow grease into painting and polishing the bottom — it is a pleasure to polish such a smooth plastic surface. When sailing, the propeller should be put in the "sailing" position — feathered and with the blades lying vertically. A guide mark should be placed on the fly wheel or on the propeller shaft.

Tuning the boat means, amongst other things, that the shrouds and stays have to be tightened correctly. The forestay, permanent back stay, main shrouds and forward lower shrouds should be tightened hard. The aft lower shrouds require only light tightening — thus making the mast bend forward a little in the middle to make the mainsail flatter in strong winds. There are several ways of increasing or decreasing the draught in the sails by bending the mast or adjusting the tension on the stays, but before trying these the advice of an experienced sailor should be sought.

Tuning includes ascertaining the correct position on the track for the sheet leads for different sails in different wind strengths. Also different lengths of tack pennant may be

The tension in the backstay can be altered with a lanyard around the bridle.

Fig. 10

needed. Shackles, snap shackles, sheet track and winches have to be adjusted and oiled to function smoothly and fast. Tuning, in a wider sense, means marrying sails to spars and rigging and getting everything, including the crew to function fast and with precision.

VEGA is well balanced and has just the right feel on the helm when sailed with the correct sails. A slight tendency to luff, and thus a pressure on the helm, is desirable in a boat with a conventional keel and rudder in order to get the boat to go well to windward. When the breeze freshens, the pressure on the rudder increases. To keep the pressure low, the first large reduction in sail area is best made by reefing the mainsail. Another reason is that the headsails are more efficient than the mainsail size for size. Just like other boats, VEGA can become very hard on the helm under certain conditions. When broad reaching with the spinnaker pole against the forestay in a 16 to 20 knot wind, considerable effort may be needed to keep the boat on course — but then she travels at over 10 knots for periods, well above her theoretical maximum speed. If the wind increases, the spinnaker has to be changed for a genoa jib and the boat will again be very easy to handle. When running, the spinnaker can possibly be used in up to 30 knots of wind — giving a sensationally fast run.

VEGA can be sailed under either mainsail or jib alone. Under jib she is more easily manoeuvred than under mainsail only. With jib no. 3 (area 5,4 m^2/58 sq ft) she has been sailed to windward in heavy seas and a 38 knot wind. It was possible to tack if the right moment was chosen. Later, under the same conditions, VEGA broad reached for several hours at a mean speed of 4 knots. Certainly very fast for a boat of her size with a sail area of only 58 sq ft. This illustrates how easily she is driven.

The following information regarding a suitable sail change schedule applies to offshore racing with the boat and crew in good trim and no unnecessary weight on board. The schedule can also be a guide for the family cruising man who should shorten sail a little earlier than the racing man to make sailing more comfortable. The information refers to sailing to windward when the angle of heel should be less than 20° to 25°.

Wind			Sails
m/s	knots	Beau-fort	
0—5	0—10	0—3	Mainsail + light genoa jib
5—8	10—16	4	» + standard genoa jib
8—11	16—22	5	Reefed » + standard genoa jib
11—14	22—28	6	More reefed » + small genoa or jib no. 1
14—17	28—34	7	More reefed » + jib no. 2
17—20	34—40	8	Bottom reefed » + jib no. 2
20—24	40—47	9	Bottom reefed » + jib no. 3
24—	47—	10—	Bottom reefed » or jib no. 3

When racing it is important to keep the boat light. The amount of food and stores (water and fuel) has to be considered and maybe part of the cruising equipment can be left ashore.

Sail handling

It is best to practice setting, changing and taking down sails in light conditions. Once the procedure is known and after some practice, sail changes can easily be effected in strong winds, large seas, rain and darkness. There are many ways in which sails can be worked and handled and it is best to determine which way is best suited to oneself and the crew. The following are brief suggestions on different methods:

Changing of headsails

The fore deck hand does everything except sheeting the sail home, which should be done by the crew man in the cockpit or by the helmsman.

1. The tack of the new sail is attached to the stem head — at least two hooks should be fixed on the stem head fitting.
2. The lower sail hanks of the old sail should be taken off the forestay.
3. The new sail is hanked on and pulled out along the lee rail.
4. A new sheet is attached — this means having two sets of sheets and sheet leads.
5. The old sail is taken down and unhanked.
6. The halyard is transfered to the new sail — and also the sheets, if two sets are not available.
7. The new sail is hoisted and sheeted in.
8. The tack of the old sail is unhooked and the sail taken below.

Reefing the mainsail

The sail is best reefed when hoisted, also when the boat is at anchor or moored to a buoy.

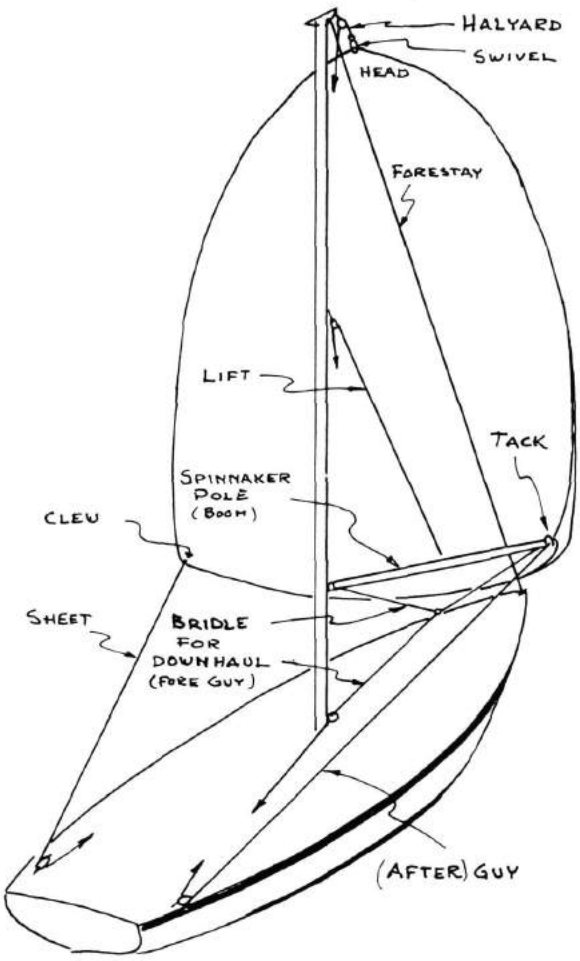
To reef when sailing, the helmsman should steer a course somewhat higher than close hauled and ease the sail a little. All action is carried out by the fore deck hand.

1. Tighten the topping lift.
2. Take out the reefing handle.
3. Release the slide stop on the mast track and ease the downhaul.
4. Ease the main halyard two feet.
5. Roll the sail up, ensuring that the luff rope and slides lie well back along the boom, clear of the handle and gears.
6. If more reduction in sail area is required, ease the main halyard again and continue rolling.
7. The sail should be rolled so that the boom lies above the level of the black band on the mast and does not droop too much. The slides should be removed from the lower part of the mast track as any left in will pull the sail out of shape.
8. Tighten the downhaul, ease the topping lift, and sheet in the sail.

   When rolling it may be necessary to pull the sail out along the boom to ensure that it stows neatly. When taking in a large reef, it may be necessary to remove the bottom batten if it does not lie parallel to the boom. The reef can be improved, the boom prevented from drooping and the sail prevented from wrinkling if some form of padding is wrapped in the sail from the middle to the end of the boom. A sail bag, a pillow or some spare battens are suitable.

Sailing with the spinnaker

The standard VEGA must be equipped with the following extras to take a spinnaker: Spinnaker, spinnaker boom, boom topping lift with an extra block on the mast, foreguy (downhaul) with a block on the fore deck or by the mast, halyard with a block at the top of the mast above the forestay, two sheets, two sheet blocks. Your VEGA already has mast track with a traveller for the spinnaker boom and fittings for blocks at the stern. (See Figure 11).



Spinnaker gear.

Fig. 11

How to set a spinnaker

Only in light winds can the spinnaker be set and taken down with only two men on deck. Normally there should be three. The foreguy, sheet and after guy can be handled from the cockpit. Everything else must be handled by the fore deck hand.

1. Bag the spinnaker but let the clews and the head stick out of the bag.
2. Place the bag on the leeward side of the foredeck and secure it with a length of line.
3. Pull the guy (windward sheet) outside the windward shrouds and round the forestay and hook it to the lifeline for the time being. Pull the leeward sheet outside the shrouds and fix it beside the guy.
4. Pull the fore guy through the block on the foredeck and take it to a cleat in the cockpit.
5. Attach the spinnaker boom to the traveller on the mast track and place the forward end on deck to windward of the forestay.
6. Hook the topping lift and the foreguy on to the pole.
7. Raise the pole until it is horizontal and take up the slack on the foreguy.
8. Attach the guy and the sheet to the clews of the spinnaker and take up the slack in them. Put the guy through the end of the pole.
9. Attach the halyard with the snap shackle or with a bowline.
10. Hoist the spinnaker under and behind the genoa as fast as possible. Do not sheet the sail until the halyard is secured.
11. Take up on the guy until the tack of the sail reaches the pole end and continue hauling until the pole is at right angles to the direction of the apparent wind. (Watch you wind indicator or burgee). The foreguy may have to be eased.
12. Take up on the sheet until the sail fills and no more.
13. Adjust the position of the pole on the mast so that the pole is perpendicular to the mast. The downhaul may need easing and the topping lift tightening.
14. Drop the genoa and secure it on deck.

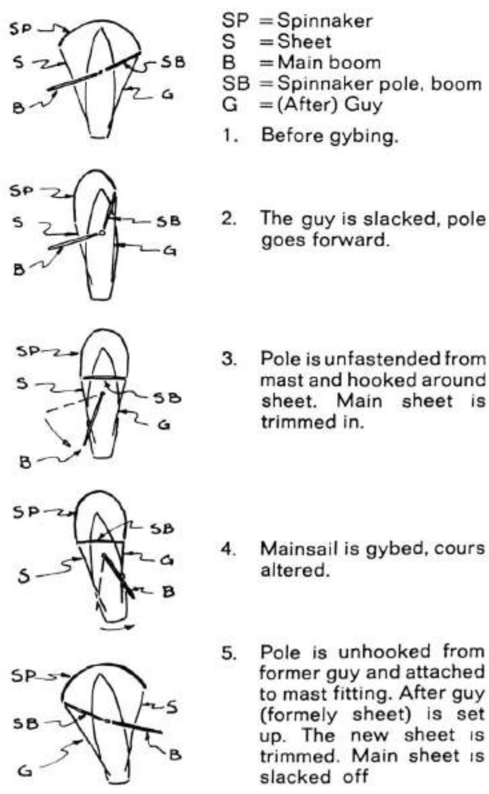
Rules to memorise

1. Keep the pole at right angles to the apparent wind.
2. Keep the pole perpendicular to the mast.
3. The end of the pole should be the same height above the water as the clew of the spinnaker.
4. The sail should be sheeted no more than necessary to keep it full.
5. Jerk the sheet if the luff starts falling in.

Gybing the spinnaker

(Figure 12 shows a slightly different method)

1. Release the pole from the mast and hook the end into the "old" sheet.
2. Pull the boom across the boat, release the "old guy" and put this end into the traveller on the mast.
3. Gybe the mainsail.
4. Trim the sails on the new course.



One method to gybe the spinnaker.

Fig. 12

9

Dropping the spinnaker

The spinnaker should always be dropped in the lee of either the mainsail or a headsail. The simplest way is to drop it on a run. The sail is then fully under control. The spinnaker can be dropped straight on to the foredeck but the easiest and safest method is to haul it into the cockpit.

1. Slack off the guy so that the pole goes forward to the forestay.
2. *Grab the sheet from the cockpit.*
3. On a beam reach when the spinnaker does not fall into the lee of the main, the guy has to be eased further until the sail collapses.
4. Pull the sheet in, ease the halyard slowly and hand the sail in, begining with the foot.
5. Release the guy and let it run through the end of the pole to get the whole spinnaker into the cockpit.
6. Take the spinnaker below and bag it. Put the boom back on deck and prepare the spinnaker for resetting.

Some other advice on sailing

The **kicking strap** from the fitting on the boom to the anchorage point at the foot of the mast should be used for holding the boom down on the reach and run. Its use promotes speed by preventing the boom lifting. When **running in heavy seas** an unintentional gybe can be dangerous. A length of 10 mm (½ in) diameter nylon line can be used as a preventer guy. This should be rigged by tying one end to the fitting at the outboard end of the boom and leading the other end forward outside the shrouds and to a cleat on the fore deck. The guy should then be tightened. Further tension can be applied by hauling in on the mainsheet. When the preventer guy is not in use it can be left attached to the outboard end of the boom with the other end led forward along the boom and secured at the forward end by the mast. The guy will not be in the way when reefing. The preventer guy and mainsheet do the job of the kicking strap when running and can also be used when the mainsail is reefed when the kicking strap is not available.

It is not necessary to have **shackles or snap hooks** on the ends of the spinnaker halyard and sheets. A bowline is better and with practice it can be tied just as quickly as attaching a snap hook. A bowline will never come undone (whereas snap hooks can), it is easy to release, adds no additional weight and costs nothing.

A **tiller extension** makes steering easier when the boat is heeling and makes it possible for the helmsman to sit in the best position.

Sails and maintenance

For cruising and family sailing

The sail that is most useful in addition to the mainsail and jib no. 1 is the genoa. It gives the boat a much better performance in light airs. A number 2 jib should be the second choice as it gives security on the few occasions that one is sailing in really hard weather. If a small jib is not carried on board, either a working jib alone or a reefed mainsail can be used. A spinnaker can, therefore, be given the same priority as a no. 2 jib. Many cruising sailors are a little frightened of this sail — some even say that it is dangerous. It is not, but it calls for more extensive seamanship, judgement and forethought. The spinnaker can make a run just as interesting a point of sailing as a beat. Those who have got used to having a spinnaker on board never want to be without it. If you think that it is an unnecessary expense, bear in mind that it will make sailing much more interesting. If you want to play with figures, you will find that the spinnaker increases the pleasure much more than the cost!

For racing

All the above mentioned sails and some others are needed for racing. The really hot racing sailor usually has very definite ideas on how the sails should look and usually has his favourite sail maker who taylor-makes his sails. The following advice, therefore, is for the beginner and for those who race once in a while and need some initial help.

The most important sail is the light weather genoa and after that an extra lightweight spinnaker, both made to maximum size. The maximum size being that refered to by the IOR rule. These measurements also comply with the **one-design rules** of the VEGA class (see p. 23).

The maximum size of the **genoa** is 4.65 m (15′ 3″) from the clew perpendicular to the mast (LP on the sail plan). The other measurements refer to the desired height of the clew and the length of the forestay.

Standard sail measurements are shown on the sail plan. The maximum dimensions of the spinnaker are: leeches 9.34 m (30′ 7¾″) and windth 5.58 m (18′ 3⅝″). Vega's standard **spinnaker** is a compromise — an all round spinnaker. For light airs you need the lightest spinnaker possible with a weight of about 40 gram/m² (1.2 oz/sq yd) or less. This spinnaker should be full and have a deep skirt. For stronger winds a heavier, flatter spinnaker that can be carried close to the wind is needed.

A **spinnaker staysail** is useful. This is a short and very wide sail that is set flying beneath the spinnaker and is not attached to the forestay. It can be triangular with each side 4.65 m (15′ 3″) and made of heavy spinnaker material. The clew of this sail may not be sheeted aft of the LP distance (4.65 m = 15′ 3″ from the forestay).

Therefor if one wishes to attach the tack aft of the forestay, the foot must be shortened by the same amount. The spinnaker staysail is set under the spinnaker to catch the wind which would otherwise pass under it. It should be set low enough down so as not to disturb the set of the spinnaker. In light winds it is desirable to have a full **mainsail** but in strong winds a flat mainsail is required. Racing mainsails, therefore, are often equipped with a slab reef along the foot so that it is possible to take in the fullness with, for instance, a zip.

Sail material

Nowadays, sail cloth for all sails except spinnakers is made of polyester fibre. Terylene (England), Dacron (USA), Tergal (France), Tetoron (Japan) — they are all basically the same but the qualities can vary quite considerably in weave and finishing treatment. For spinnakers a more elastic material is required and nylon is used. The weight of the cloth is given in grams/m² or oz/yard² or, in the USA, oz/yard 28 inches wide. The standard cloth for VEGA mainsails and jibs is 250 grams/m² (7.3 oz/yard²), for the genoa 230 grams/m² (6.8 oz/yard²) and for spinnakers 50 grams/m² (1.5 oz/yard²).

Maintenance

Provided they are not subjected to abnormal forces, modern sails will keep the form given by the sailmaker, but it is advicable to give the sails a short breaking-in period. Set the sails properly and sail off the wind for about an hour.

Sails do require some maintenance. What spoils the sails is chafing, too much flogging, over stretching, wrinkles, moisture, dirt, salt, mildew and direct exposure to the sun. Some parts of the sail are more vulnerable to chafe than others. The head and clew, batten pockets, the luff and foot where pulled into the mast and boom are particularly exposed. The part of the mainsail that lies against the spreaders when running and the parts of the headsails which come into contact with the spreaders and shrouds are particularly liable to be damaged. Modern synthetic sail cloth is much stronger than cotton and not so soft which means that the stitching does not sink into the cloth as it does on cotton sails.

This means that the stiching is exposed and likely to be chafed. It is necessary to check the seams periodically and to carry out repairs before the damage becomes too extensive. Temporary repairs can be made with tape and there is a tape made specially for the purpose. It is important to ascertain the cause of any damage so that precautions can be taken to avoid a recurrance. These can take the form of altering the position of a sheet lead, covering the spreaders or reinforcing the sails at exposed places. Flogging spoils the sails and should be avoided. Wet sails should be dried by spreading them out in the sun and only in a very light wind should they be hoisted to dry.

Wrinkles make the sails less effective. Sails should, therefore, not be stuffed into bags which are too small. It is best to fold sails parallell to the foot and then to roll them loosely around the luff. A sail must of course be dry before being bagged. It is easiest to detect the presence of moisture by feeling the tack. Dirt and mildew may not damage a sail but they look unsightly. Salt makes sails heavier and it also attracts moisture which will make them heavier still. Salt is best removed by hosing the sail with fresh water.

Polyester fibre and nylon are resistent to sun but age faster if exposed to too much sun. It is important to protect the mainsail with a cover when it is left on the boom. Best of all, remove it from the boom and take it below. Dirty sails can be washed in luke warm water and a mild detergent. If the sail is too big to be rinsed in a bath tub, spread it on a floor, hose it with fresh water and scrub it with a soft brush. Grease can be removed with trichlorethylene. In winter the sails should be clean and dry and folded loosely in their bags. They should be stored in a dry, well ventilated place.

Engine installation in VEGA

Even the best engine needs certain maintenance to do a good job. Therefore it will pay to carefully read this instruction. See also the engine manual.

VEGA has a variable pitch propeller with a feathering position for sailing. It is operated by a single lever remote control which engages the manoeuvring mechanism. This synchronizes the pitch of the propeller blades with the engine speed by the throttle lever.

The construction of the exhaust system eliminates the risk of water entering into the engine when sailing. The exhaust pipe is enclosed in a length of 1.8 m (6 ft) by a water jacket consisting of a rubber hose. The water is entering the jacket in its forward part and is led out in its rear part. The water is further led to the outlet side of the exhaust pipe where it is entering the gas stream. The water has here partly a cooling and partly a silencing function. With other words, the engine has a dry exhaust pipe except for the very rear part. Thanks to the so called "goose neck" at the stern water cannot enter the engine this way.

Manoeuvring

When the operating lever (fig. 13) is in neutral the engine is idling and the propeller blades are in neutral position. When the lever is moved forward the propeller pitch as well as the engine speed is increased in correct proportions. At full engine speed the propeller pitch can be further increased — this will however, cause reduced engine speed. For running astern, move the operating lever aft from the neutral position.

If you move the control lever as far aft as possible when the engine is not running the propeller blades are feathered to achieve least possible drag when sailing. By alining indicator marks on the flywheel or the propeller shaft (engine MD6A) the propeller blades are put in vertical position. The propeller pitch has to be adapted to the sea conditions. When going against rough sea, full pitch cannot be used. When going with the sea, a bigger pitch may give increased speed. For cruising economy the engine revs ought to be about 15% less than maximum obtained.

Running

When running check at regular intervals that the two control lights are not glowing and that the cooling water temperature is normal. It is regulated by a built-in thermostat and needs no manual adjustment. The temperature indicator shall be within the green area of the gauge or 75—85°C.

Check before starting: Remaining fuel, engine oil level and battery electrolyte level. In a calm the cruising speed at 85% engine revs is about 6 knots and at max. revs approx. 6.8 knots. Because of the low propeller revs and the large propeller the speed reduction in headwind and head seas is comparatively small.

Petrol engine ALBIN O-22 (1970 - 1972)

Technical data

Engine model	ALBIN O-22 Combi, 2-cylinder, 4-stroke
Bore	78 mm (3.07")
Stroke	92 mm (3.62")
Cylinder capacity	0.88 litres (54 cu.in.)
Compression ratio	5.6:1
Output SAE	12 hp at 1600 rpm
Idling	about 500 rpm
Carburettor	Solex 26 VBN-2
Spark plug	Bosch M45T1
Spark gap	0.6 mm (0.025")
Tappet clearance with cold engine	
Inlet valve	0.20 mm (0.008")
Outlet valve	0.25 mm (0.010")
Fuel consumption at cruising speed	approx. 2 lit/h (0.45 imp. gal/h)

Starting

1. Turn on the main switch (on the port side in the engine room, under the stop).
2. Start the fan 11, figure 15, for ventilation of the engine room, under the step).
3. Open the fuel cock under the petrol tank.
4. Put the operating lever, figure 13, in neutral.
5. Pull out the switch 5, figure 15.
6. Press the starter button 4, figure 15. At cold and humid weather it may be necessary to use the choke 6, which

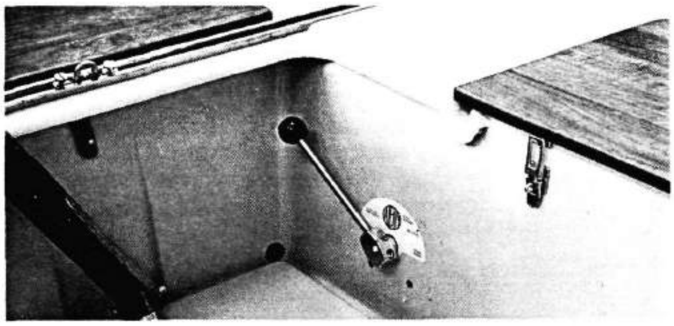


Fig. 13. Singel lever for engine throttle and propeller pitch.

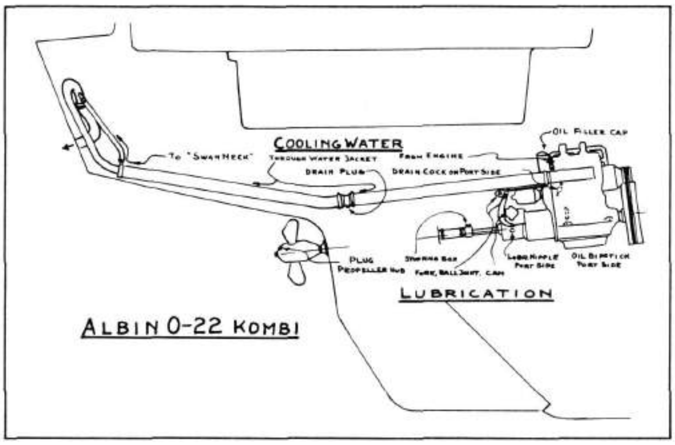


Fig. 14

Fig. 15. Instrument and switches O-22.

1. Cooling water temperature
2. Warning light, battery charging
3. Warning light, oil pressure
4. Starter button
5. Engine switch
6. Choke

Switches for:

8. Compass light
9. Navigation light
10. Steaming light on mast
11. Engine room evacuation fan

is pulled out before starting the engine. It has, however, to be pushed in as soon as the engine is running. During freezing weather move the flywheel by hand first to avoid breaking the breakpin of the cooling water pump. Release the starter button when the engine is running to avoid damage on the starter generator relay.

7. Check that the control lights for oil pressure and charging are not glowing when the engine has reached normal speed. Check for cooling water at the exhaust pipe.

Stopping

1. Set the operating lever to neutral.
2. Press in the switch 5, figure 15.
3. Close the fuel cock.

Lubrication

O-22 Combi is pressure lubricated throughout and the oil quantity in the engine is about 1.4 litres (2.46 Imp. pints/2.95 US pints). Use engine oil with the quality "Service MM SAE 30". In early spring or late autumn it is recommended to use SAE 20 oil. Change the engine oil after the first 25 hours of running. Thereafter it is quite enough to change the oil every 50 hours of running or once every season. The old oil is removed by sucking it out with the special suction pump included in the tool kit. It should be done with warm engine when the oil is thin and easy to suck out.

The manoeuvring mechanism and the propeller hub are lubricated at least once every season, e.g. before launching. When lubricating proceed as follows:

1. Set the remote control lever in neutral position.
2. Pump in grease through the lubricating nipple on the manoeuvring mechanism (port side) — at least 20 pump strokes. Use Shell Alvania EP 2 or Esso Beacon 2 grease.
3. Lubricate with ordinary engine oil the cam curve of the manoeuvring mechanism, the ball joint and the fork end connection for the teleflex device.
4. Unscrew the plug in the propeller hub. Fit the lubricating nipple which is in the tool bag and press in grease. Use the same grease as for the manoeuvring mechanism.
5. The stuffing box (fig. 14 and 16) should be checked every 100 hours of running or at least once every season. Fill up with grease if necessary. Use "Outboard Grease".

Ignition system

The engine has coil ignition, i.e. it is provided with an ignition coil that passes the high-tension surge to the spark plugs and a distributor that distributes the surge and gives the correct preignition at all engine speeds. The engine cannot be started by hand without battery but even an almost flat battery gives as a rule ignition voltage. The gap of the contact breaker in the distributor should be 0.4 mm (0.016").

The spark plugs should be checked in conjunction with the launching. The spark gap should be 0.6 mm (0.025"). Adjustment of the gap is done by bending the side electrode.

The battery is of 12 Volt and has a capacity of 60 Ah. Every second week the electrolyte level should be checked. The correct level is about 10 mm (just under ½") over the battery plates. Use only destilled water for topping-up.

Suitable measures to be taken before winter lay-up

During the winter engines run the risk of being damaged by corrosion and therefore it is recommended to give a thorough anticorrosion treatment before the winter layup. The simplest way of anti-corrosion treatment is the following.

1. Empty the fuel tank.
2. Pour in 2 litres (3.50 Imp. pints/4.2 US pints) anti-corrosive fuel consisting of 94 octan petrol and 5% anti-corrosive oil, such as Esso Preservative Oil EP 1011 or Shell 2049.
3. Run the engine for about one hour on varying loads.
4. Change engine oil.
5. Drain the cooling water system — taps on port side of engine, below the cooling water pump and at the fore end of the exhaust jacket (fig. 14).

The remaining anti-corrosive fuel can be kept in the tank during the winter lay-up and needs not to be drained when launching in the spring. In very salt water it is advisable to run the last 10 minutes before draining the cooling water system with fresh water (cooling water inlet tube to a bucket with fresh water).

Measures to be taken when launching

1. Lubricate the propeller, stuffing box and manoeuvring mechanism.
2. Connect the battery, check the electrolyte level.
3. Fit the drain plug in the exhaust jacket and close the drain tap on the engine.
4. Check the oil level.

Diesel engine VOLVO PENTA MD 6A (from 1972)

Technical data

Engine model	MD 6A Combi
Operation	2-cylinder 4-stroke diesel with direct injection
Continuous output, (DIN)	10 hp at 2400 r.p.m.
Bore	70.0 mm (2.75")
Stroke	82.0 mm (3.23")
Capacity	631 cm³ (38.5 cu.in.)
Idling	550—650 r.p.m.
Tappet clearance, inlet and outlet valves, warm engine	0.30 mm (0.012")
Reduction gear	1.42:1
Sound level (cruising at about 1900 r.p.m.)	
cockpit	77 dBA
cabin	79 dBA
fore cabin	71 dBA
Fuel consumption	
1900 r.p.m., 6 knots	1.35 l/h (0.3 Imp.gal/h) (0.36 U.S.gal/h)
2300 r.p.m., 6.8 knots	2.75 l/h (0.6 Imp.gal/h) (0.72 U.S.gal/h)
Battery voltage	12 volts
Starter-generator,	
starter motor	1 hp
generator max.	135 W
Alternator max. output	490 W

The engine is rubber-mounted in a fiberglass engine bed completely sealed off from the hull and has a very efficient sound isolation. Air for the engine is led through a duct laminated to the hull. An evacuation fan under the aft deck can suck out any fumes or dangerous gas in the bilges through a hose.

The fuel tank is fitted deep down in the bilges. Made of Polyamid its capacity is about 35 litres (7.7 Imp.gal., 9.2 U.S. gal.). The tank has a mechanical fuel indicator (type dipstick). The fuel filler cap is on deck. An extra fuel filter with water separator is fitted in the engine "room". The fuel injection pump is fitted with an automatic cold starting device.

Before starting the first time

Before the engine is started the first time after launching check the following:

1. Check the acid level in the batteries and that the battery cables are connected.
2. Check that the engine oil level is between the maximum and minimum marks on the dipstick. At delivery the engine is filled with lubricating oil.
3. Check that the cooling water inlet seacock is open. Also check that the drain cock on the engine block is closed (port side near the oil dipstick) and that the drain plug on the exhaust system is screwed tight. See fig. 16.

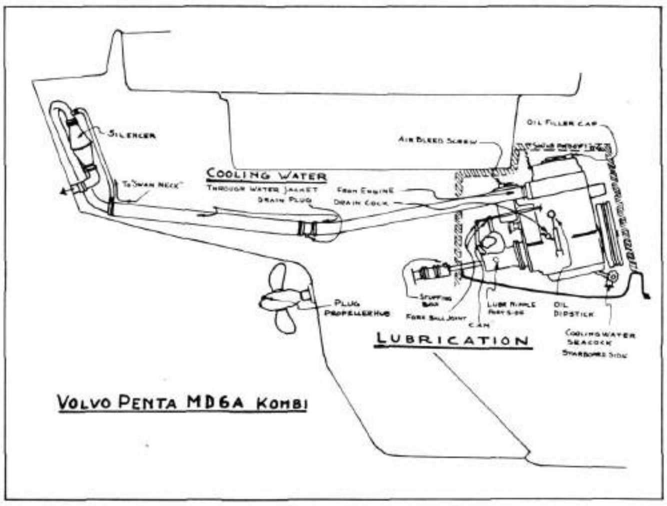


Fig. 16

4. When delivered, around 10 litres of fuel mixed with inhibiting oil is put in the fuel tank. Before starting, the tank ought to be topped up with ordinary diesel oil, such as car diesel oil.
5. When the engine is tested before delivery the fuel system is bled free of air. It would be wise to do this again before the first start. It is important to know how to bleed the fuel system while away cruising. Air can get into the system if the fuel level is too low and the boat is rolling heavily. Try not to allow the fuel level to fall below 10 litres (2—3 gallons).

The bleeding is performed as follows:

1. Remove the cockpit floor to make it possible to reach the engine fuel filter (fine filter) and the feed pump.
2. Rotate the flywheel to a position where the hand primer lever on the feed pump has the longest stroke, i.e. maximum pump capacity.
3. Pump to get a pressure in the fuel system. Open the vent screw on the fine filter. See fig. 16. Continue pumping until fuel free from air bubbles flows out. Close the vent screw.

Starting

1. Check that the cooling water seacock is open. See fig. 16.
2. Check that the stop control is pushed in. See fig. 17.
3. Put the control lever in neutral. See fig. 13.
4. Insert the starting key and turn it to position 1, fig. 19.
5. Check that the yellow warning light for oil pressure and the red warning light for charging are on (fig. 17, 18).
6. Push the starter switch key and turn clockwise to position 2, fig. 19. Hold the key there until the engine starts. The key when released will return to the switched on position (fig. 19:1). If the key is held in position 2 with the engine running the starter generator relay may be damaged.
7. Check that the yellow oil pressure warning light and the red charging warning light are out when the engine runs smothly.
8. Check that cooling water is discharged through the exhaust opening.

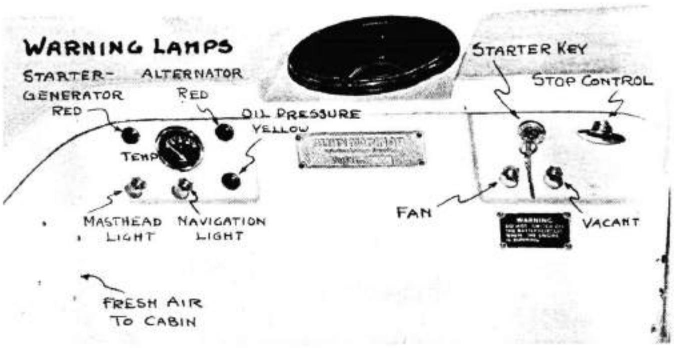


Fig. 17. Present engine controls for MD6A.

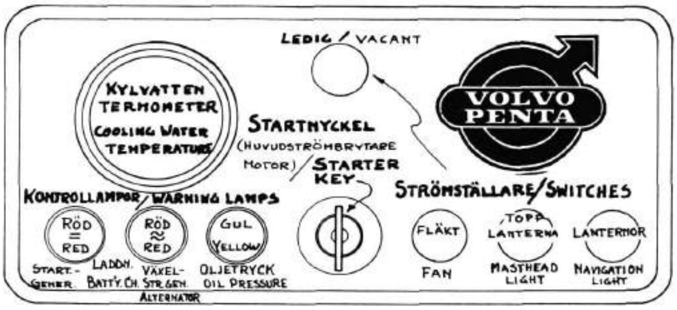
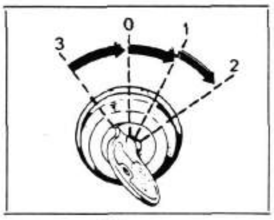


Fig. 18. Future control panel for MD6A.



0. Neutral position
1. Switched-on position
2. Starting position (starter motor switched on)
3. "Radio position"

Fig. 19
Starter switch key.

NOTE: The starter switch is also the main switch for the electrical system of the engine. Because the engine is equipped with an alternator the starter key must not be turned off (position 0 in fig. 19) when the motor is running as the alternator rectifier diodes could be damaged. For the same reason the battery cables should never be disconnected or reconnected to another battery while the engine is running.

Stopping

1. Place the control lever in neutral.
2. Pull out the stop control. As soon as the engine has stopped, push in the stop control again. Make it a habit, then you won't run the risk of using up unnecessary current next time you try to start with the knob out.
3. Turn the starter switch key back from position one to the neutral position (position 0) and remove the key.

Lubricating system

MD 6A is fitted with a pressure lubricating system. The total oil capacity of the engine including filter is 3.2 litres (0.7 Imp. gal., 0.84 U.S.gal.). Use only **diesel lubricating oil, quality "Service DS"**, SAE 30. Early in spring or late in autumn a thinner oil is needed (SAE 20W). Change the oil and oil filter after the first 20 hours of running and after that every 50 hours running or once each season. Change when the engine is warm and the oil is thin and easy to suck out. The manoeuvring mechanism, the propeller shaft stuffing box and the propeller should be lubricated as described for engine O-22 Combi.

14

Prevention of frost damage

In spring and autumn when there is a risk of freezing temperature the following steps should be taken.

1. After stopping the engine close the seacock on the cooling water intake, fig. 16.
2. Open the cooling water drains on the engine block and exhaust system (fig. 16).

Precautions when engine is not used

In the case of an idle period of **less than a month** with the boat afloat, the engine should be started and run warm at least every 14 days to prevent corrosion damage to the internal parts of the engine.

If the engine is to remain idle for a **longer period than one month** the engine should be inhibited, see "Procedure before laying up".

Procedure before laying up

The complete procedure as described in the engine instruction book has to be performed to ensure the dependability and the life time of the engine. This is also a condition for the engine manufacturers guarantee to be valid.

The following simplified procedure is a definite minimum requirement and is recommended to be used at a pinch and on the owner's own responsibility.

1. Add inhibiting oil such as Esso Rust Ban 623 to the fuel tank giving a fuel mix of about 33%. If there is 2—5 litres of diesel fuel left in the tank put in 1—2 litres of inhibiting oil.
2. Run the engine at least half an hour (fast idling). The last 10 minutes the engine should be run with fresh water cooling (the cooling water tube to a bucket of water). While the engine is still warm the lubricating oil should be changed.
3. Clear the cooling system of water as described in the frost prevention paragraph.
4. Start the engine and run it for one minute with a short race to higher r.p.m.
5. The batteries should be removed and stored fully charged in a place protected against frost.

Procedure before the first start next season

1. Replace the batteries, fully charged and checked.
2. Change oil and fuel filters. Check that there is no water in the fuel line water separator. When changing the fuel oil filter it is a good idea to use a plastic bag around the filter from the underside so that the leaking diesel fuel is contained inside the bag. Clean the feed pump pre-filter and the air filter.
3. Top up the fuel tank.
4. Bleed any air from the fuel system.
5. Check that the cooling water seacock is open and that the drains on the engine block and exhaust system are closed.
6. Put grease in the propeller shaft stuffing box, propeller and reversing mechanism.

Interior and equipment

Many suggestions have been made for alterations to the interior. The interior and equipment now provided is better than that on the early VEGA:s. The best possible function has been considered. After that, the accommodation is a compromise between strict economy and desirable extras. Further improvements will be made provided they do not result in an increase in the price. The number of berths can be increased (for children) by placing an extra mattress between the bunks in the fore peak or by providing upper bunks above those in the main cabin. These items can be bought as extras. A special locker for crockery and a book shelf can also be supplied. The saloon berths can be fitted with canvas lee boards to prevent you falling out in a seaway or when the boat is heeling. See the price list for VEGA extra equipment.

Varnish, glue and fastening, cleaning

The interior joinery is mainly of resin glued marine plywood with surface veneers of sapele on gaboon cores. The finish should normally last for several years but its life may be prolonged by polishing with furniture polish. After a period the surface finish will have to be renewed. The varnished parts can be treated with either alkyd or polyurethane based varnish in accordance with the manufacturer's instructions. Other parts can be painted with marine paint. Teak (hatches, handrails, etc) should be oiled several times each season. When necessary, the teak parts should be scraped and sanded. The best and cheapest "teak oil" is a mixture of two parts raw linseed oil and one part turpentine thinners. It can be put on with either a brush or a soft cloth. Excess oil should be wiped off with a cloth moistened with thinners.

If you wish to fix hooks or other fittings to the boat they can either be screwed or glued on. Fittings can be screwed to all wood parts, including the cabin aft bulkhead, which is faced with plywood. Holes should be drilled for screws. Fittings that do not carry a great load can be screwed on to plastic surfaces with short stainless steel self tapping screws. It is very important that the right size holes are drilled first. A dab of epoxy glue on the threads will provide considerable holding power. Epoxy glue is so strong that it can be used to glue metal fittings on to the plastic surfaces. This cannot be done, however, on thermo plastic.

Fittings that have to take a load must be attached with through bolts. The sandwich deck will take the load of such bolts only where the deck is filled with wood or special filler. (See Figure 4). If bolts must be used in other places, the Divinycell filling should be removed round the hole and glassfibre and resin put to form a strengthening "tube" round the bolt. A piece of wood should be fitted under the nuts to spread the load. Bolt holes will leak if the bolts are not packed with a rubber gasket or sealing compound. Glassfibre does not expand when moist, so leaks are not self sealing as is sometimes the case with a wood boat.

The curtains are cotton and can be washed in water. For the carpets a foam detergent can be used. The covers for the matresses are synthetic and may be removed and dry-cleaned, but it is a lot of work to put the covers back again. With a foam detergent it is possible to wash the covers without removing them. Test the detergent on a spot on the back side to ascertain that the colour does not fade.

Fresh water

The water tank holds 65 litres (14¼ gals). The deck filler is situated right forward on the fore deck. The level of the water in the plastic tank can be checked through the vertical opening in the bulkhead aft of the tank. A thin breather pipe which finishes just under the deck is fitted parallel to the filling pipe. If the tank is completely filled the water level will rise up the breather pipe and a small amount of water will find its way into the bilge; it can be removed easily with the bilge pump. If the tank is completely filled, water may also run out into the sink and wash basin if the plastic caps have not been placed over the water outlet pipes. If it is desired to flush through the tank and supply hoses, the plastic cap should be left off at the sink and the drain plug removed. Water can then run freely through the system, into the sink and overboard. A large lid is fitted to the tank to facilitate inspection and cleaning. When sailing, the fresh water outlet in the wash basin should be covered with the plastic cap (or the wash basin locked in the pulled out position) because with a full water tank, large quantities of water may run out into the boat when heeling on the port tack. The forward foot pump in the galley is for fresh water and the aft one for sea water.

Skin fittings and hose clips

All skin fittings below the waterline — inlet and outlet from the toilet, outlet from the sink, sea water intake for the galley, and cooling water for the engine have sea cocks to prevent the water from entering the hull if a hose or pipe should be damaged. Skin fittings for the exhaust and cockpit drains have no sea cocks since they can be reached from deck and bunged up if need be.

All hose attachements should be checked regularly for leaks and the hose clips tightened if necessary. There are drains from the cockpit seats down to the cockpit floor. When the boat is heeling a considerable amount of water can run through the leeward hose if it is raining hard or spray is coming aboard. Should the seat drain hose come adrift, water will run straight into the boat. The hose fittings should, therefore, be checked frequently.

Ventilation and heating

The bilge is provided with a special ventilator with an electric extractor fan. This sucks any fuel fumes or gas from the deepest part of the boat through a hose and so prevent explosions. The fan should be run from 2 to 5 minutes before starting the engine or lighting a naked flame.

The ventilation system has been designed with scientific thoroughness by a former chief of the Swedish defence research, Hugo Larsson. This is probably the only system that provides a well ventilated and dry boat without the use of electric fans. On hot summer days the temperature inside the boat will be cooler than that outside.

The system is based on the principle of all air being let into the accommodation through a ventilator in the cockpit. The hatch must be kept closed. The air is taken through ducts next to the hull of the boat below the waterline which cools the air and causes the moisture to condense against the

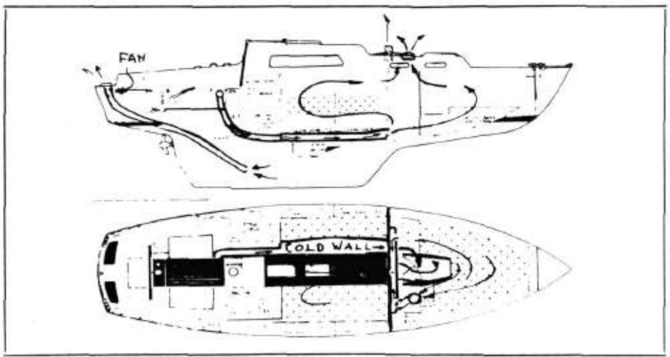


Fig. 20. Ventilation system.

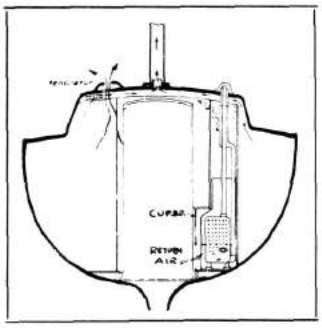


Fig. 21

Section showing installation of gas heater. Evacuation through aerodynamic ventilator in W.C. roof and via hanging space through hollow beam and mast.

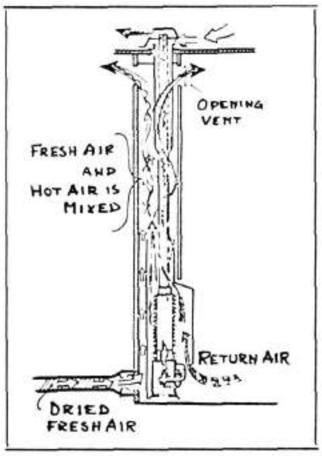


Fig. 22

Air stream around the heater.

cool hull. The water runs into the bilge and the dehydrated air is fed into the cabin and fo'c's'le. It is important always to keep the ventilator in the cockpit open; only in the unlikely event of seas breaking into the cockpit should it be closed. Fresh air is important because a sleeping person uses 4 m^3 (140 cu.ft.) every hour and a two burner stove uses 110 m^3/h (3885 cu.ft./h).

Stale air is evacuated through an Electrolux ventilator which was developed first by Hugo Larsson for his VEGA. It is designed to suck out air as soon as there is any movement of wind outside regardless of direction. The ventilation exhaust system is supplemented by ventilation through the mast. On hot days there is a funnel action which increases the flow of air. The temperature inside a VEGA, lying at her mooring on a hot day with all the hatches closed can be 5°C less than that of the air outside. Without this system the boat would be like an oven.

The use of the Lidén Junior gas heater offered as an extra improves the ventilation system. Provision has been made for installing this heater in the VEGA. The temperature is controlled automatically by a thermostat which can be set to a chosen temperature. Instructions for adjusting the thermostat and lighting the heater are provided with the heater. The quantity of fresh air being supplied to the system can be regulated by adjusting the ventilator in the cockpit. In cold weather it may take up to half an hour for the temperature to reach the maximum. Circulation of the air ensures that the air is warm, even at floor level.

If the heater is difficult to light or is extinguished in strong winds this may be due to bad balance between the exhaust and the inlet of air to the burner. The balance can be adjusted to obtain the correct draught with the metal pieces at the top of the funnel.

Liquefied Petroleum Gas (LPG) system

Fig. 23 is a sketch of a complete liquefied petroleum gas system including a heater. If a stove only is used a small gas container (max. 2 kgms/4½ lbs) can be mounted under the stove. Larger containers must not be installed in the cabin. The gas container for the stove as well as a container for a heater can be installed in a box as shown in fig. 23. The box has a tight lid, fittings for the containers and an evacuation to the aft part of the port tube of the cockpit drain. In case of leakage the gas can escape outboard. The main shutoff valve for the gas container (on outside of box) should always be closed when no gas appliance is used. When turning off it is best to close the main valve so that the gas in the tubing is consumed before the valve on the stove is closed.

The gas is odorized to make it easy to detect gas leaks at an early stage. A mixture of between 1.5 and 9% gas in air is combustible. If LPG is used in a proper manner it is no more dangerous than other fuels.

For safety the following instructions should be noted:

1. The gas system must be used only by persons familiar with its function.
2. All connecting fittings and valves should be tested regularly for leaks by applying a soapy water solution. A leak will of course be shown by soapy bubbles.
3. When changing gas bottles it is essential that no naked lights or lit cigarettes exist on board.
4. The engine should not be running when changing bottles.

A manual and instructions regarding the use of LPG should be on board. If there is a smell of gas, all fires must be extinguished and cigarettes put out. The gas main and all other valves should be shut off and the boat should be well ventilated (use engine room fan).

The system should then be checked for leakage by turning on the gas again after all connections and valves have been "painted" with soapy water solution. **Naked lights must not be used.** Check that the main valve is closed again before the leak is repaired. The gas system must not be used until the fault has been corrected.

In case of a fire on board gas containers must be removed to a safe place. Check that the valve is closed before removing the container.

During winter lay up gas containers must not be stored on board. The system should be checked in the spring, noting that valves and connections may have to be repacked and greased. Copper tubing ought to be changed every second year.

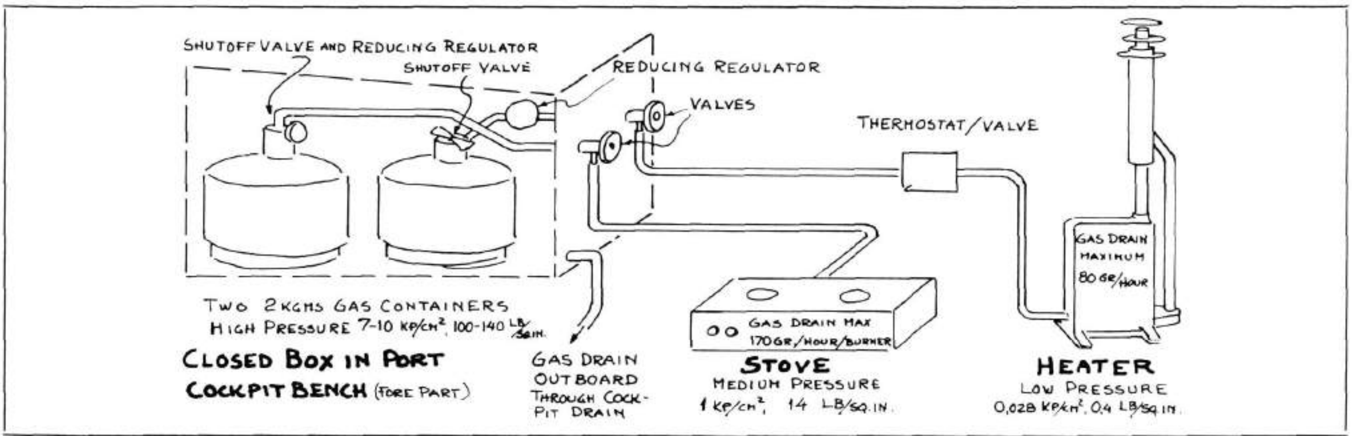


Fig. 23. A complete liquefied petroleum gas system.

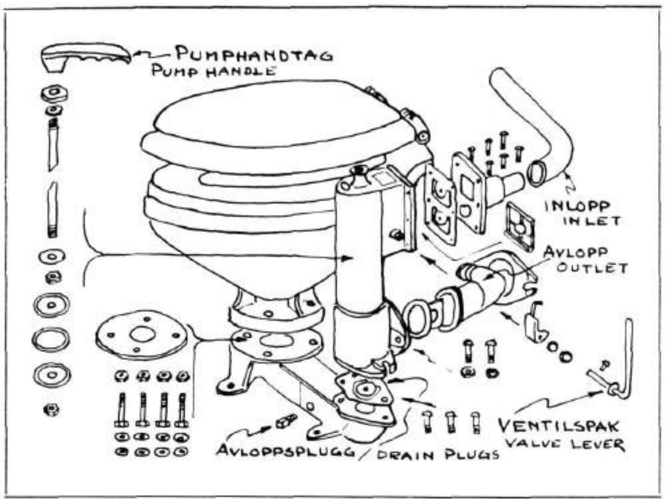


Fig. 24. Toilet, type "Brydon Boy".

Marine toilet

Use only toilet paper and not to much of it!

Fig. 24 shows VEGA's marine toilet type "Brydon Boy". It is flushed in the following manner:

1. Open both sea cocks (inlet and outlet).
2. Move the small valve lever to "flush" and pump until only water is left in bowl.
3. Put the lever on "Dry Bowl" and pump until bowl is dry. The pumping is much harder now. If necessary, wipe off with paper — switch from "dry" to "flush".
4. The lever should be positioned on "Dry bowl" when the toilet is not in use.
5. In heavy seas or when leaving the boat the sea cocks should be closed.

Maintenance: Do not use strong detergents — they can damage hoses, rubber gaskets and valves.

When laying up one or both drain plugs in the lower part should be opened so that no water is left to freeze. Pump a few times.

After use in saltwater the W.C. should be flushed with fresh-water to be ready for use the next season. The W.C. should of course be cleaned.

Normal maintenance during a season may be a few drops of oil for the pump lever. Leaks can occur at hose clips and gaskets. They may need tightening and a gasket may have to be replaced. Soap and detergent may cause the pump to bind. A spoon ful of cooking oil is a good cure.

Electrical system

The 12 volt electrical system circuit diagrams are shown in fig. 25 and 26. Some electric wires are led through conduits in the deck, see fig. 4. With engine ALBIN O-22 the battery capacity is 60 ampere hours. With engine MD 6A the VEGA electrical system has two separate battery circuits, one 34 Ah starter battery charged by the engine starter generator (DC) and one 60 Ah lightning battery charged by the alternator (AC).

WARNING! With engine MD 6A and alternator do not switch off the starter key when the engine is running because the charging regulator could be damaged.

Fan, lamps etc, have 8 amps **fuses,** 25 mm (1") long (Bosch NSG ¾ Z). Festoon **bulbs** in navigation lights, and reading lights are 12 volt, 10 watts, 44 mm (1¾") long (OSRAM 6411). Cabin roof lights have 12 volt, 15 watts bulbs with bayonet base BA 15d (OSRAM 7430). Instrument light: 12 volt, 2 watts (OSRAM 3898) and warning lights: 12 volt, 2 watts (OSRAM 3796).

10 watts bulbs use about 0.83 amp. and 15 watts bulbs about 1.25 amps. When sailing in darkness 3 running lights and one light inside may be used continously: $3 \times 0.83 + 1.25 = 3.75$ amps. A 60 ampere hours battery would be discharged in 15 hours. Two batteries or connecting a spare battery would double this time.

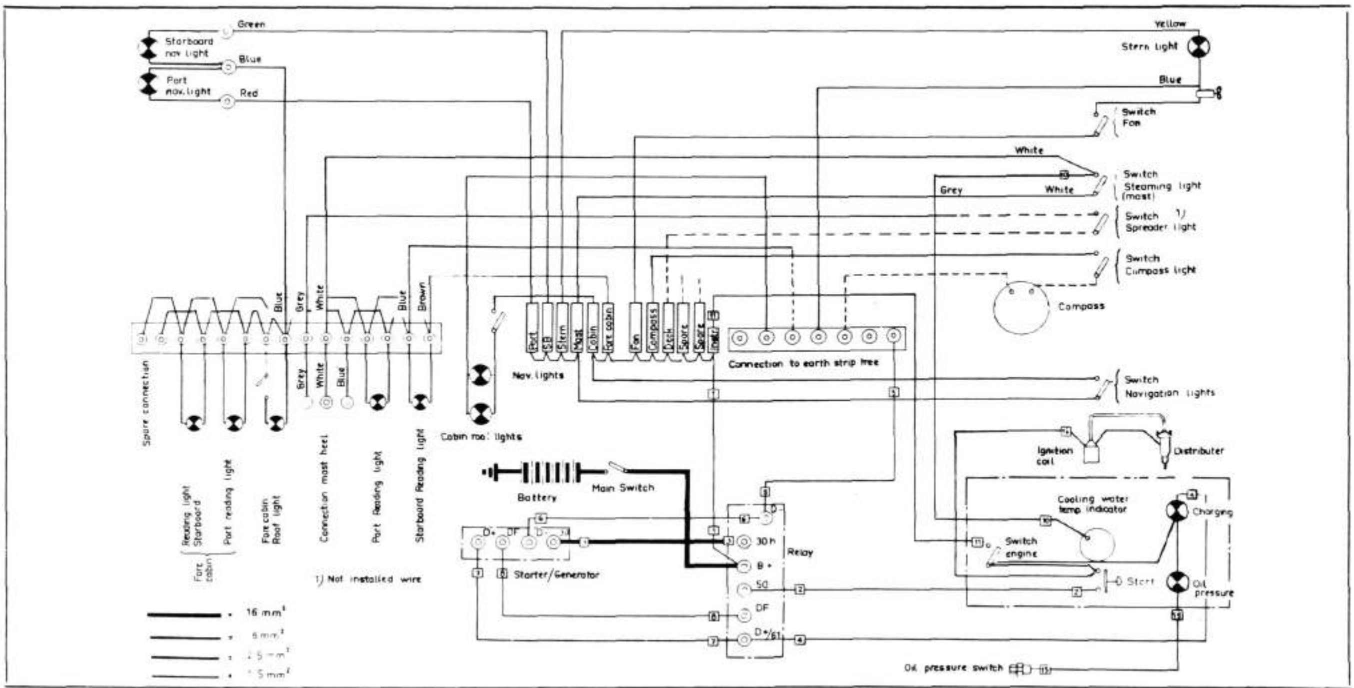


Fig. 25. Circuit diagram for VEGA — ALBIN O-22 with battery ignition and starter/generator.

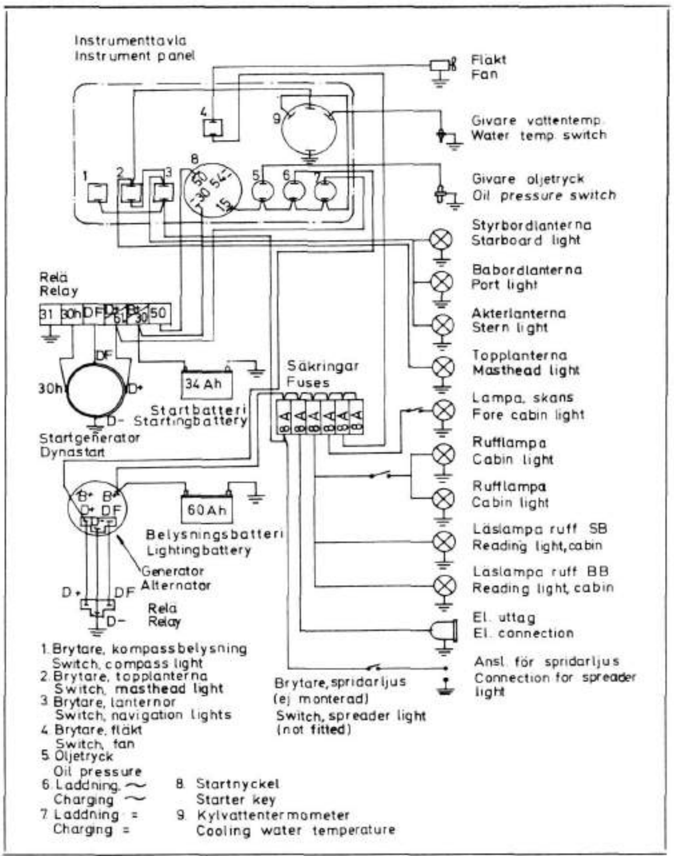


Fig. 26. Circuit diagram for VEGA. VOLVO PENTA MD6A with starter generator and alternator.

If any lamp, fan, etc should not function when turned on, check the fuse. If the fuse is alright it is either the lamp (fan) that is out of action or a bad connection. Should the fuse be blown fit a replacement. If this should blow there is short circuit in the wiring or the fixture.

The ALBIN O-22 engine requires electric current for ignition, even when started by hand. However if the battery is discharged there is usually enough power left for hand starting. Should this fail, it is possible to connect dry batteries (fig. 27) or a suitable transistor radio battery for hand starting.

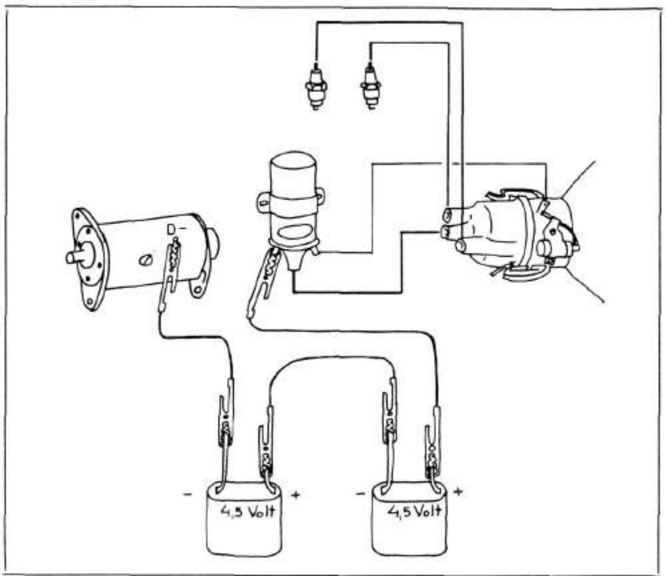


Fig. 27. Dry batteries used to produce ignition current for ALBIN O-22.

Equipment

Safety equipment

For offshore racing certain equipment is compulsory. Some of the items are included in the standard equipment of your VEGA, (e.g. pulpits, lifelines, handrails, pump etc).

Rules regarding compulsory equipment are based on long experience and can be judged to be what is necessary for any long voyage. The safety rules may be different in different countries, but listed below is what is usually considered necessary.

1. A **rubber dinghy or liferaft** with CO_2 bottle: Special liferafts fill the requirements for lifesafing, but can be used only for that purpose. A rubber dinghy can be used also as a tender. For inshore sailing a simple rubber dinghy without automatic inflating can be used. If towed or kept on deck inflated such a dinghy is a good lifesaving devise too.

2. An **anchor** with warp and at least 2 fathoms of chain: The short chain prevents chafe near the anchor and also makes the anchor more efficient. In some waters it may be necessary to use a longer chain or maybe all chain. On rock or kelp a heavy anchor is necessary — in that case the shape is not so important.

   As a storm anchor an ADMIRALTY (Fisherman) type anchor of about 18 kg (40 lbs) is to be preferred. A 12 kgms (25 lbs) light-weight anchor (CQR, Northill or Danforth) can also be used, but is less efficient than the heavier one.

   An 9 kgms (20 lbs) Danforth anchor should be used normally. This will hold in most conditions unless the bottom is very bad.

3. Two **fire extinguishers:** One has to be of certified type (min. 2 kg). One extinguisher must be mounted on the bulkhead easily accessible or in an unlocked seat. A spare extinguisher (maybe a smaller model) ought to be easily accessible in the fore cabin.

4. A **first aid kit.**

5. **Flares** (at least 6 red). Parachute flares or rockets are best. Red hand flares are good for short distances. Flares and rockets must be changed every 3rd year.

6. Two powerful **electric hand lamps.**

7. **Life jackets** for each crew member. Certified jackets may be large and cumbersome. Special sailing vests or floating jackets may be better. It may be better to use a less effective, easily worn floation than one which is not used because it is less handy to wear.

8. **Safety harness** should be worn by everybody on deck when leaving the cockpit in heavy weather. This is the most important piece of safety equipment.

9. **Lifebuoy** with self-igniting light. Buoys are best painted in an orange or yellow colour to be easily visible. Horseshoe model in a soft material is preferable.

10. **Fog signal:** Any simple horn can be used.

Additional equipment

The **compass** should be a stable and easily readable type, preferably with built in lighting, which can be connected to the electric system. Earlier the compass was fitted under a window in the bridge deck which had great advantages — easy installation, protection, easily visible — but also disadvantages — too close to the engine and the electric circuit. A vertical compass on either side of the cabin door high up on the bulkheads is better, but more expensive and uses space on the bulkheads. This is recommended now. NOTE that the hoops of the standard spray-hood are magnetic and can cause different deviation in different positions (the hoops are easily changed). Different compass installations are shown in fig. 28.

A **wind indicator** at the masthead can be either a burgee, simple vane indicator or a devise that registers the wind direction on an electric instrument below. Personally I prefer the "Windex". It is a very sensitive mechanical vane indicator giving very good help both when beating and running under spinnaker.

A **radio receiver** is necessary for weather information. A good transistor receiver with medium and long wave bands can also be used for radio direction finding.

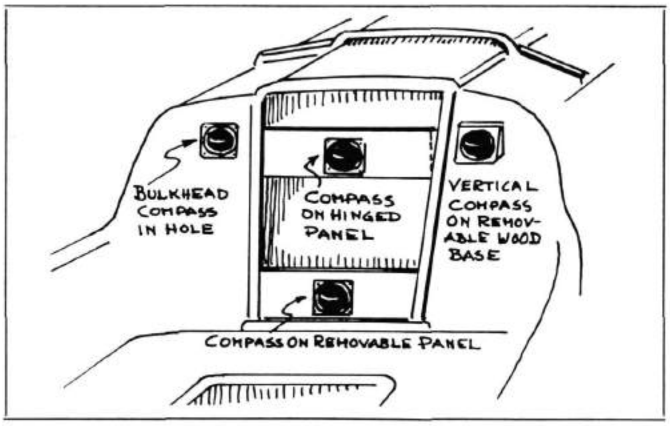


Fig. 28. Suggestions for compass installation.

There are also numerous other devises that can be of help: Speedometer, log, echo sounder, special navigation equipment, galley utensils, etc, but they are outside the scope of this handbook.

Glassfibre and maintenance

The advantages of glassfibre construction

Glassfibre reinforced plastic has very quickly become the leading material for hulls and decks for pleasure crafts. This depends mainly on the following:

1. The material is more economical for series production than any other material used today.
2. It has great strength in relation to weight; stronger than wood and steel.
3. It has good ageing properties — much better than wood or steel.
4. The maintenance costs are low — small yearly upkeep.
5. It is easy to repair — see below.

Care of the plastic surfaces

Glassfibre plastic surfaces are easy to maintain. Lack of maintenance will not cause the material to deteriorate but without care the surfaces will look bad and the value of the boat will decrease. Regular cleaning, waxing and polishing are needed.

Cleaning

Wash with water and ordinary synthetic detergents. The deck pattern can be scrubbed dry with a clean brush and some cleaning powder. Heavily soiled parts can be cleaned with one of the degreasing detergents recommended for cars or special boat cleaners. It is also possible to use soap. With care also acetone and carbon tetrachloride can be used. Avoid using scouring powders, strong alkalis (caustic soda), ammonia or any unknown detergents. Stains, small scratches and dull parts can be polished or burnished to regain the gloss.

Waxing and polishing

A well polished surface protects the gelcoat and is less easily soiled and makes the boat look better. Polishing puts off the time when it becomes necessary to paint the plastic because of looks. For polishing, use a boat, car or floor wax containing Carnauba Wax. It should be used in the same manner as when polishing a car. Do not use silikon polish, since this is very difficult to remove before repairing or painting. A boat should be waxed and polished at least once a year.

Repairing small damages

The VEGA small repair kit is used for repairing minor damages in the gelcoat and the outer part of the lamination. For more complicated repairs, contact a specialist.

Prepairing for a repair

Remove dirt in the damage area. Roughen up the surface in the damaged area with an abrasive paper. Remove the dust thoroughly and check carefully that the damage is free from moisture.

Mixing and application of the gelcoat

Use a piece of board or a piece of wood and mix the gelcoat with the hardener thoroughly. The enclosed putty stick can be used for mixing and application. $^{1}/_{25}$ of hardener should be used. (This can be approximated).

The ready mixed gelcoat hardens in 15—20 minutes at 18°C (65°F). The surface of the repair should be slightly higher than the surrounding parts to allow for shrinkage and burnishing. This is easily achieved through using masking tape, as shown in fig. 29.

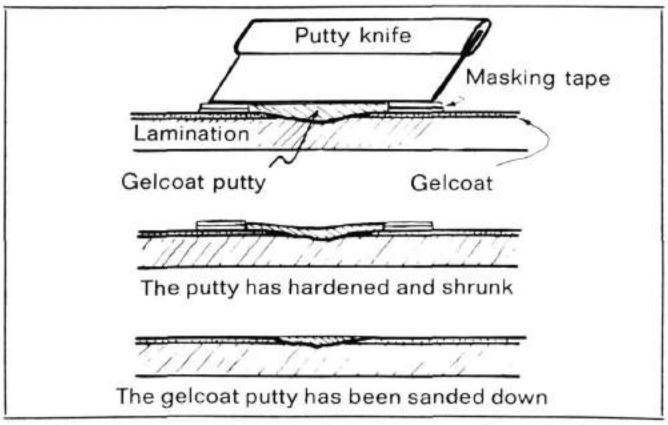


Fig. 29. Using masking tape it is easy to get the right thickness when repairing a gelcoat damage and to avoid to smear around the damage.

Finishing of a repair

Sand down the top of the hardened gelcoat with abrasive paper No. 220. While the gelcoat is hardening and still rubbery, a sharp knife can be used to cut away excess material. Continue with wet and dry paper No. 400 and 600 in mentioned order.

Be careful not to damage the surrounding gelcoat. Where possible, use a sanding block. Finally the repair should be burnished and waxed (see above).

General instructions

If the air temperature is below 15°C (60°F), use a heater to dry out and then heat the damage in order to speed up the hardening. Do not put the heater too close. Hands and tools can be cleaned in acetone. A slight difference in colour between the old and the new gelcoat will disappear after a few months of exposure to weather and sun.

The VEGA repair kit consists of:

200 grams deck gelcoat
200 grams hull gelcoat
40 grams of hardener in a tube
One "putty stick"
2 abrasive papers no 220
2 abrasive papers no 400
2 abrasive papers no 600

Painting on plastic surfaces

With care the plastic surfaces can be kept in good shape for several years without painting. Sooner or later they get so scratched and damaged that it becomes necessary to paint the boat. Maybe another colour is required. The quality will not be lowered if a boat is painted, provided that the right kind of paint is used in the right manner. Modern two-pot polyurethane paints are just as strong as a gelcoat and have an equally long life. A painted boat does not have to be repainted annually.

To get good results it is necessary to prepare the surfaces well. No wax or grease must be left. The surfaces should be cleaned with white spirit or a polyurethane thinner, (silicon wax cannot be removed). Then the surface should be sanded with a fine wet and dry paper to get a good grip for the paint. Wash with a lot of water. Follow the instructions from the paint manufacturer carefully. For the bottom a primer is needed. This may be necessary on all surfaces. If the original bottom paint (Geveco Racing Special) is to be used, it is not necessary to sand down or prime. A good washdown is sufficient. If another bottom paint is to be used, it is necessary to sand the bottom and then use a primer. To paint the bottom you need app. 1.5 litres (1½ quart). Paint removers or a blow torch must not be used, since they may damage the glassfibre lamination.

Winter storage and Spring commissioning

When stored for the winter your VEGA should stand on her cradle or have blocks under the keel and shores fore and aft, see fig. 30. Other methods can be used; study boats stored locally.

A winter cover can be anything from a complete boathouse to a simple cover, the same as used when the boat was delivered. It needs a support to prevent it from sagging down in the centre of cockpit.

The mast should be supported straight and stored in a dry place. The spreaders should be taken off, but standing and running rigging may be left.

Before covering up, all loose equipment should be removed and the boat cleaned thoroughly. To avoid damages from freezing you must pay attention to a few things:

1. Winterize the engine (see engine chapter).

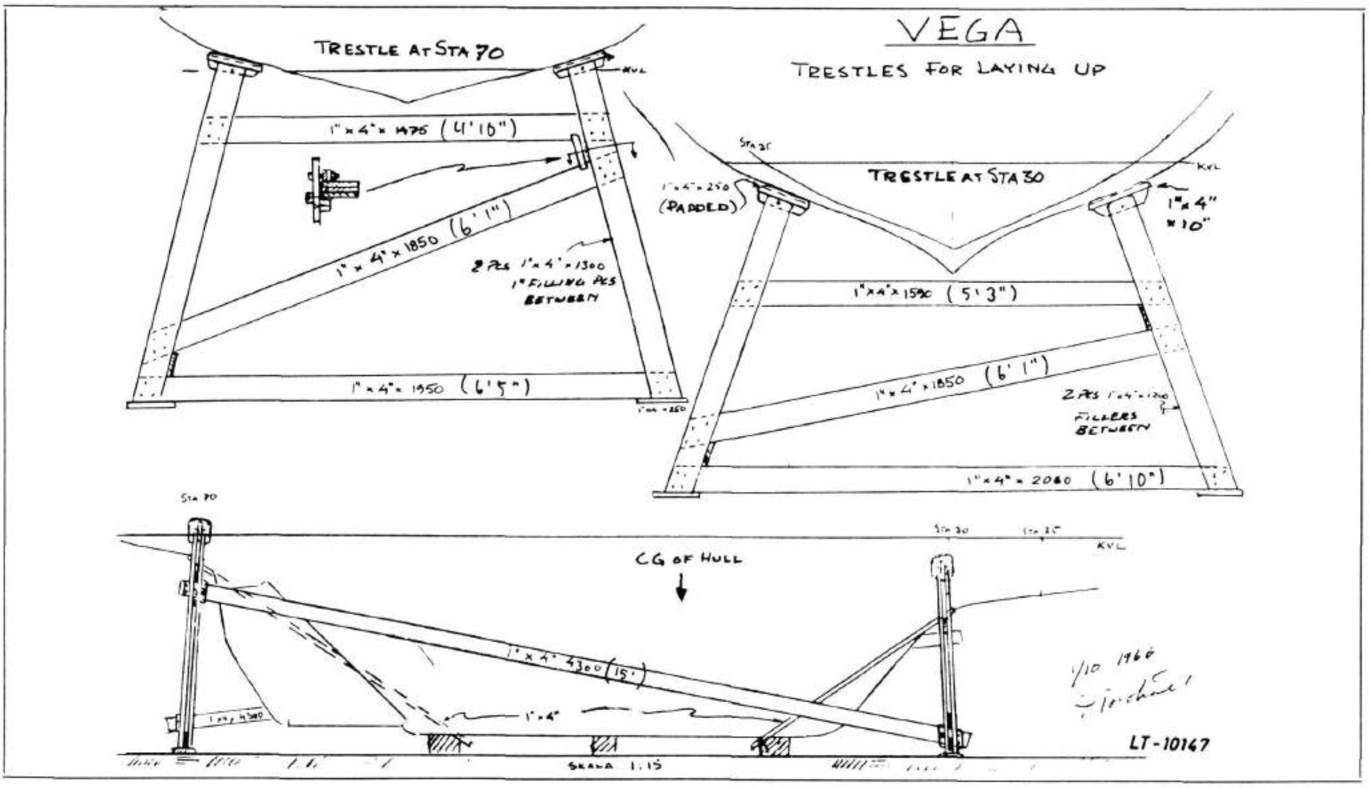


Fig. 30

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Tie her up right

Fenders

The plastic models which can be blown up with air are very good. A size of at least 10 cm×40 cm (4"×16") will give adequate protection if 3 are used on each side. Make them fast with a bowline or a round turn and two half hitches. Fenders should be put out when arriving at the quay and taken in as the mooring is left. Never have the fenders out when underway.

Lines

Suitable material for mooring lines and anchor lines are polyester (Terylene, Dacron), polyamid (Nylon, Perlon) and polypropylene. For an anchor line long fibre Polyamid is best, Polypropylene is least expensive. Between the anchor line and the anchor you should use 2 to 3 metres of chain.

Polypropylene is suitable and economical for use as mooring lines but the diameter should be larger than when polyester or polyamid is used. A lighter line of 8 mm (3/8") diam. would be heavy enough for temporary mooring. A large eyesplice in one end of the mooring line is convenient. Permanent mooring lines should be at least 18 to 20 mm (3/4"—7/8") in diametre of either polyester or polyamid. In difficult or dangerous places the diametre should be increased. Lines that are not used should be stowed in a cool dry place, out of direct sunlight. A piece of plastic tube slipped over the mooring lines where they pass through fairleads, etc., will prevent chafe at that point. Never tie up so that a line can shafe against sharp corners as they are easily worn through. Before synthetic rope is cut, bind or tape where the cut will be then singe the ends in a flame. This will melt the fibres together and prevent the rope from unraveling.

Mooring

Synthetic lines are very slippery so the mooring lines must be tied very carefully. The knots you use must not slip yet must be easily untied. The methods and the knots shown here fill these requirements. For tying up the following knots are best:

1. Bowline.
2. Round turn and two half hitches.
3. Fishermans bend with a half hitch.

Fig. 32—34 may give some ideas about the proper way to moor a boat.

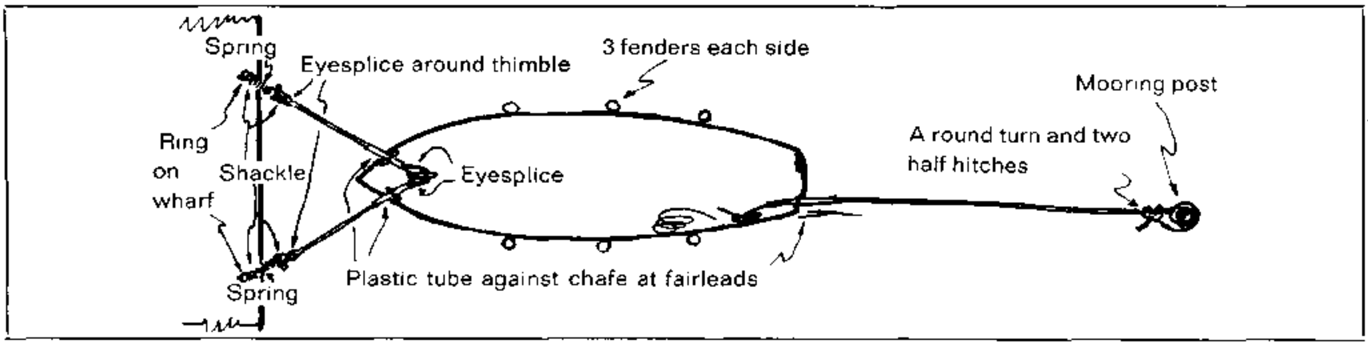

Fig. 32. Permanent mooring (example). Always leave some slack in your mooring lines to allow for variations in water level or motion caused by wash from passing boats.

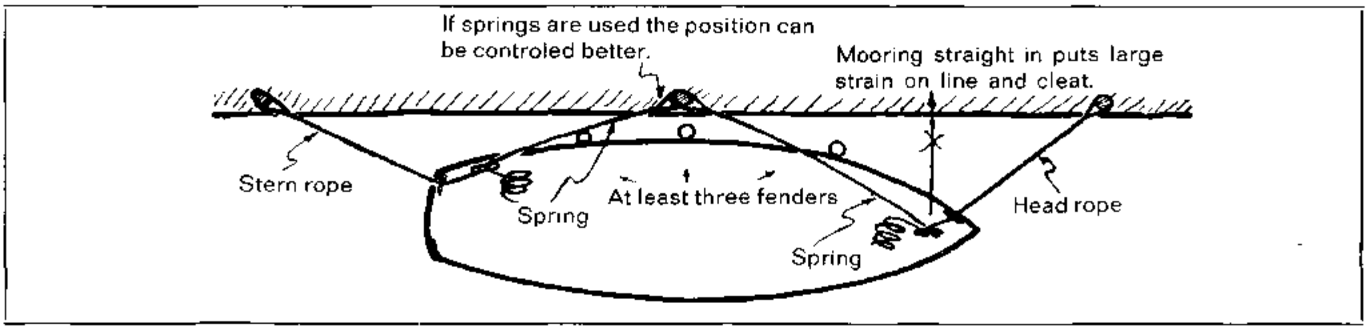

Fig. 33. Mooring alongside a quay. Make fast the end of line on shore and make fast on the cleat on deck so that the part of the line that is not needed is on board (handy for adjustments).

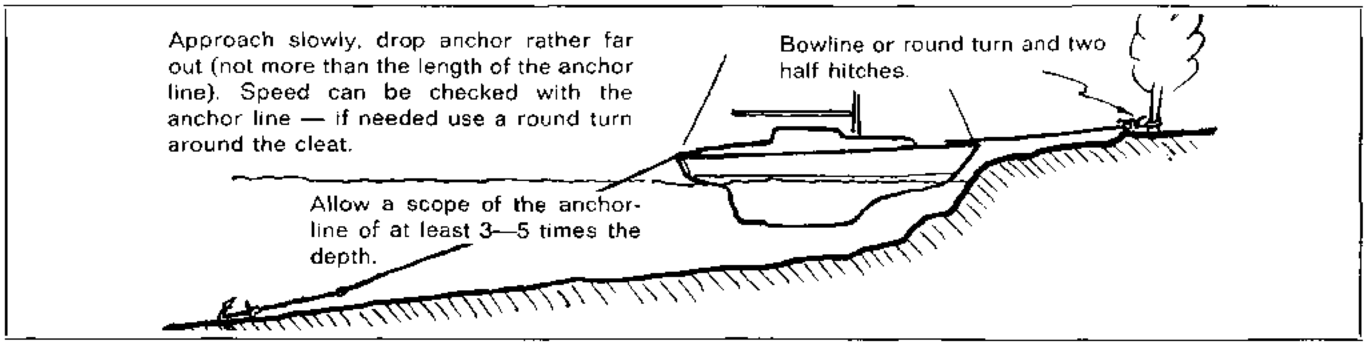

Fig. 34. Temporary mooring with the stem against the shore or a wharf.

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Racing

One who has not raced has never learnt how to sail efficiently. First when comparing with other boats, it is possible to find out how well tuned your boat is and how great your own sailing skill is. When racing it is important to make quick sail changes. Therefore racing experience gives greater ability to use and manouver a boat in difficult conditions. This will make cruising and family sailing more satisfying.

You can race the VEGA in different ways, offshore or round the bouy according to different handicap rules or in a VEGA one design class. With the quick growth of the VEGA class, one design racing will be possible in many areas. In Sweden, with 800 VEGA:s sailing, a lot of races are open for the VEGA one design class.

There are VEGA clubs in all Scandinavian countries and in Great Britain. Other countries will follow. These clubs have joined in the VEGA ONE DESIGN ASSOCIATION (VODA), which governs the rules for the VEGA one design class.

The new International Offshore Rule (I.O.R.) for measuring offshore racing yachts is now accepted by most countries and will be used in the future in many countries. The I.O.R. rating for VEGA is approx. 6.56 m (21.53 ft) and the time correction factor (T.C.F.) is 0.7245.

In England the Portsmouth number 95 has been used for calculating handicap for the VEGA in some local handicap races.

Some final advises: Read the Yacht Racing Rules and the VEGA rules. Tune the boat and the crew. Plan all races in advance. Sail as many races as possible to get experience and training.

Rules for the VEGA Class

(approved 1970)

The hull, ballast, rudder, deck, rig and spars and the location of engine and water tank shall be in accordance with the following drawings and specifications:

Line drawings (P. Brohall 6/12 —64)	No. 59-1
Deck lamination drawing (P. Brohall August/September —65)	No. 59-7
Accommodation drawing (Larsson Trade AB) 26/8 —68	No. LT-153
Sail plan (P. Brohall) 29/11 —69 rev. 12/11 —70	No. 59-4:5
Specification of plastic hull (P. Brohall) 13/11 —70	

L.o.a.	8250 mm±15 mm
L.w.l.	7000 mm
Beam	2460 mm±15 mm
Draft	1170 mm
Ballast	915 kilos (lead 100 kilos, iron 740 kilos, plastic/sand filling 75 kilos)
Displacement	2300 kilos
Floating marks	Forward 1116 mm from deck level measured along steam. Aft 350 mm from lowest point of transom measured forward along the hull on the centre line.
Engine	Type Albin O-21 or O-22 or other engine with at least the same weight with the present standard propeller or a propeller with the same propeller factor according to IOR.

In order to allow the owner a personal choise regarding fittings and equipment these may be changed or added, but not to the extent that the displacement is influenced. Ballast exceeding the above figure must not be carried.

Measurement rule

IOR is the basic rule. If not otherwise stated IOR Mark II 1970 and its measuring procedures shall be used where applicable.

Class certificate

The rules for the Vega class — or when the one-design class is approved a Vega class certificate must be carried aboard when racing. The mentioned rules or certificate shall have a statement that the sails carried aboard are measured and stamped in the proper manner. The rules or certificate shall be signed by the owner confirming that the yacht fully corresponds with the rules or certificate and that no alterations contrary to the class rules have been made. The committee of the National Vega Associations have the right to grant exemptions from the class rules or certificate for Vega yachts with divergent masts supplied not later than October 28th, 1970, after written application from owner.

Mainsail

Length of battens Nos. 1 and 4 to be 630 mm.

Length of battens Nos. 2 and 3 to be 700 mm.

Weight of mainsail cloth not to be less than 250 grams per sq.metre.

Length of headboard not to exceed 114 mm.

Distance from lowest point of headboard to centre of top batten pocket to be 1580 mm as a minimum. The distances between the other batten pockets to be about equal.

The insignia of the mainsail to include only a black V-mark with a red star and the serial number of the yacht, unless National authority has prescribed otherwise.

Clew outhaul for mainsail is optional.

Tie-down reefing and roller reefing may be used as well as a device for flattening the mainsail. Mainsail halyard winch may be fitted to the mast. The mainsail shall be sheeted from the boom end. A kicking strap may be attached to the chain plates or mast step fitting.

Foresail

Perpendicular (LP)	4650 mm
Foretriangle height (I)	9340 mm
Foretriangle base (J)	3100 mm

Battens may be used in jib and genoa jib provided that:

a) Length of a batten is max. 8% of "J" — equals 248 mm.

b) Fore end of the batten to be forward of the centre of the mast.

c) Not more than 4 battens are allowed, spaced evenly along the whole leach.

Jib and genoa jibs to be sheeted to tracks fitted to the foot rail.

Spinnaker

Luff/leach	max. 9340 mm
Width	max. 5580 mm

The width of the spinnaker on its half height must not be less than 75% of the maximum width of the spinnaker.

Foresails with an area larger than the standard jib (jib no. 1) shall be measured and stamped by a measurer or a sailmaker appointed by a National authority. This also applies to spinnaker staysails, all spinnakers and main sails.

Remeasurement and restamping of all sails in question shall be made every fourth year.

Sheeting of sails through a block at the boom end is not allowed.

The number of sails carried aboard the yacht is optional.

Rig and spars

Mast and boom to be made of aluminium alloy. When replacing a mast or boom the new one shall be measured and approved by a measurer.

Measurement marks (black painted bands, 25 mm wide) shall be located on mast and boom as follows. The upper edge of the mast's lower band shall be located 811 mm from the lower end of the mast. The lower edge of the mast's upper band shall be located 7900 mm above the upper edge of the lower band (8711 mm above the lower end of the mast). The inner edge of the boom band shall be located 3300 mm from the bottom of the mast's gooseneck track.

Total length of the **mast** not to be less than 9000 mm.

An imaginary point of intersection between the foreside of the mast and the extension of the forestay not to be more than 9084 mm above the lower end of the mast.

The weight of the mast including spreaders, tracks, spinnaker boom eye, shroud and stay tangs, steaming light with electric wiring, and sheaves for halyards, but excluding stays, shrouds, halyards, winches or extra mast top light, not to be less than 30 kilos. This corresponds to a weight of the mast tube profile (without luff groove) of approx. 2.5 kilos per meter. The dimension of the profile not to be less than 135×95 mm and of uniform thickness and not tapered. The mast's centre of gravity (equipped according to the above) not to be lower than 4450 mm above the lower end of the mast.

The bolts for the main shroud tangs not to be located lower than 8600 mm above the lower end of the mast, and the tangs for the lower shrouds must not be lower than 4450 mm above the lower end of the mast.

The spreaders to have a minimum length of 755 mm, measured from the mast to the position of the main shroud. The mast to have a track for the mainsail slides. Internal halyards must not be fitted in the mast.

The boom: Length from boom end to mast 3500±50 mm. The boom to have a maximum profile height of 105 mm and a minimum weight (including roller reefing gear and mast slide) of 6.75 kilos.

The length of **the spinnaker pole** measured from the centerline of the yacht to the extreme outer end of the pole must not exceed 3100 mm, when the pole is set athwartships and horizontally.

The spinnaker pole not to be carried higher than 2075 mm above the lower end of the mast.

All shrouds and stays to be 1×19 stainless steel wire rope, minimum diameter 5 mm. An inner forestay must not be fitted on the yacht. Attachements of main and lower shrouds must not be moved from the foot rail. A trimming device on the bridle of the backstay may be used.

Lifelines

There shall be at least one lifeline at a height of at least 300 mm above deck. The lifelines need not be fixed to the aft stanchion of the fore pulpit, but the height of the lifeline at this point shall be at least 100 mm above deck.

Accommodation

The accommodation must not be altered in such a manner that the displacement of the yacht is obviously reduced.

Navigational aids

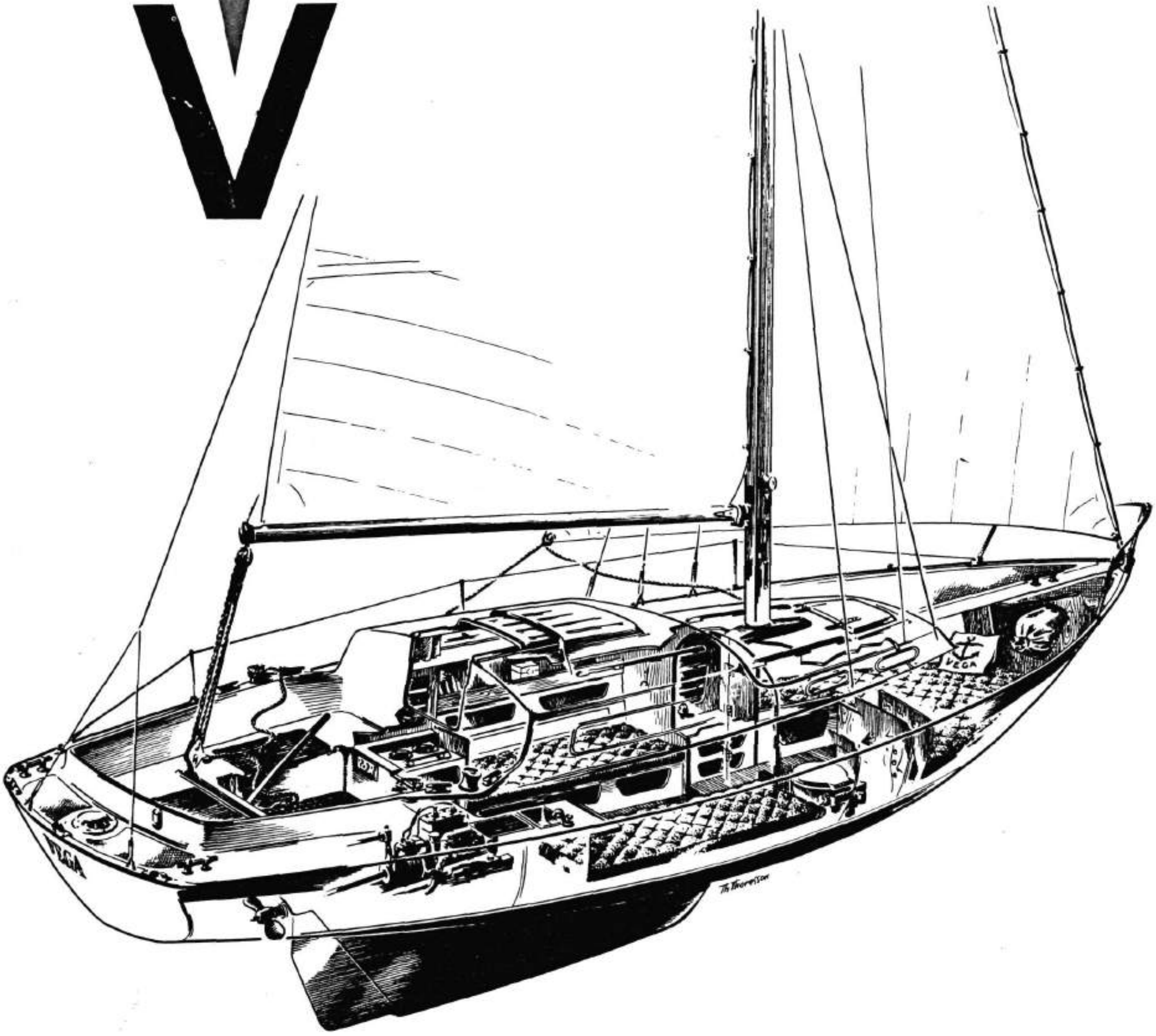
Radio and electronic aids may be used in accordance with the R.O.R.C. Regulations 1970.

Safety equipment for ocean racing

In accordance with the R.O.R.C. Regulations 1970. The life raft shall be located on deck at the mast during ocean racing.

Rules for the Vega-class

Proposals for changing the rules can be made at the annual meetings held by the Vega Clubs or at an extra meeting announced at the annual meeting, at which a majority of two thirds is required for a request to the National Vega Association in question. National associations to remit all proposals to the VEGA ONE DESIGN ASSOCIATION (VODA). VODA then issues recommendations to all the National Vega Associations. Rules for the Vega-class are approved by the Danish, Finish, and Norwegian Vega Clubs, the Vega Clubs in Gothenburg and in Stockholm, Sweden as well as by the Swedish Vega Association at the "Kristinehamn Meeting" Nov. 7—8th, 1970, and are for the present valid as a uniform Scandinavian Vega-rule.



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SEGEL/Sail	LIKLÄNGD MM / Length FÖR Luff	AKTER Leach	UNDER Foot	DUKVIKT Weight GR/M²	VERKL.YTA Real area M²	ANM. Notes
STORSEGEL Main sail	7900 25' 11"	8450[1] 27' 8¾"	3300 10' 10"	250	14,8 159 ◊	[1] RUNDA/Roach 300 LATTOR/Battens 630 & 700
LÄTTVINDSGENUA Light genoa	9400 30' 10"	9120 29' 11"	4900[2] 16' 1⅞"	170	22,6 243 ◊	[2] RUNDA/Round 250
STANDARD GENUA Gen.purpose genoa	9250 30' 4¼"	8700 28' 6¼"	4650 15' 3"	230	19,7 212 ◊	
FOCK NR.1 Jib	8400 27' 6¾"	7340 24' 1⅜"	3700 12' 1¾"	250	13,5 145 ◊	STROPP 0,9 M Pennant 3'
FOCK NR.2 Jib	7100 23' 3½"	5800 19' ⅜"	3150 10' 4"	250	8,9 96 ◊	STROPP 2,25 M. Pennant 7' 5"
REVAD/Reefed	5700	4280	2640		5,4 58 ◊	
DRIFTER	9500 31' 2"	8000 26' 3"	5500[2] 18' ½"	110	23,0 248 ◊	UTAN HAKAR Set flying
STANDARD SPINNAKER Gen.purpose	MAX.LIKLÄNGD Luff/Leach 9320 30' 7"	MAX. BREDD Width 5570 18' 3¼"		50	~47 506 ◊	STANDARD INKL. 9220/30' 3" LÄTTV./Light 27 g/m²

VEGA

SEGELRITNING

I.O.R.

SEGELMÄTNING ENLIGT I.O.R.

I ≈ 9,40 M. J = 3,10 M P = 7,90 M E = 3,30 M

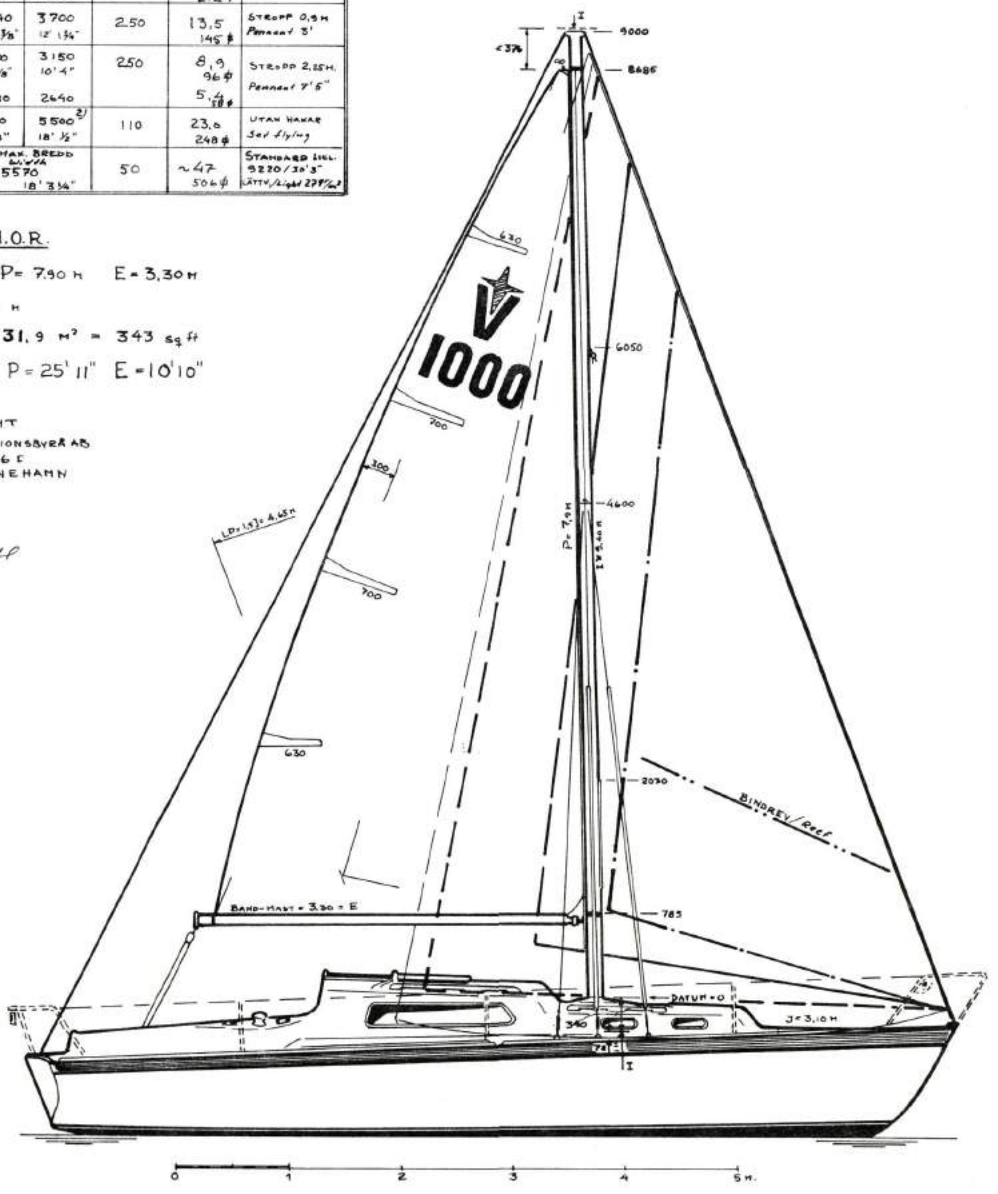
RSAF = 21,9 M² RSAM = 10,0 M

RSAT = MÄTT SEGELYTA = 31,9 M² = 343 sq ft

I ≈ 30' 10" J = 10' 2" P = 25' 11" E = 10' 10"

29/11 1969

P. Brohäll



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Trycksak 217