ISSN 0144 - 1396

AYRS 96

MARCH 1983

OFFSHORE CRUISER DEVELOPMENT

'DOWNTON FLYER'

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THE AMATEUR YACHT RESEARCH SOCIETY

(Founded, June 1955 to encourage Amateur and Individual Yacht Research)

The Society has members in all countries of the world where sailing is a sport. Information for publication comes from members and people interested in sailing or building yachts. Funds come from members subscriptions, from the sale of books and from donations. Any person may join, the subscription for 1982-1983 is £ 10 or $ 20 U.S.A. . New ideas or details of problems are welcomed by the administrator. We try to pass these on to avoid duplication of research and to put people with similar interests in touch with other.

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The Amateur Yacht Research Society is a Limited Company, and a registered educational charity. Membership is open to anyone interested in the improvement of yachts and equipment.

Offshore Cruiser Development Editor's Notes by R.M.Ellison

The yachts described here all sail offshore and are all able to be handled by small crews. The 'Round Britain' race was started in 1966 to develop just such yachts. Piet Viegers suggested in our last number that fast cruisers could use planing hulls and we hope the article from 'Model Boats' is helpful, especially when watching waves made by your hull.

Performance is not regarded by cruising people as being of great importance, note the letter from Tom and Carol Jones. This can be taken too far as shown by the tale of the "Eva L." The yacht was designed as a motor ketch. Unlike many motor yachts she is certainly able to make progress to windward in rough conditions yet she proved too slow to be satisfactory under sail.

The cost of safety and navigation equipment can be the same for a yacht of any size, the weight of the crew is constant while the weight of consumable stores and water increases as the speed of the yacht goes down. Other things being equal, especially the size of the waves, small yachts are slower. To restore the speed small yachts must be built with care and sailed hard. The race results show what can be done and they also show how hard it is for two crew to get maximum performance from a large yacht - of course when cruising maximum speed is not required but sails can to be too much for a man and wife to handle - Chichester thought about 400 sq.ft a maximum for a single sail.

Progress and development seem to go in circles. The ancient Egyptians and Romans used bulb bows. Even pictures of the French fleet attacking the "Mary Rose" in 1545 show 'ram' or bulb bows which were still fitted to British battleships in 1898. Two crew of a Thames sailing barge could handle up to 5,500 sq ft of working sail and in this number Frank MacLear mentions a 79 year old owner and two boys setting 2,000 sq. feet in under a minute. When bulb bows and huge rigs are standard someone will remember that Viking ships did rather well without either. Perhaps we should take more notice of weather conditions in the area in which we sail. 'Standard' production yachts may get the cost down but is a design for a shallow East coast best in the open ocean ? There must be a question as early Dutch ocean traders used leeboards and many yachtsmen from Slocum onwards prefer shallow draft.

Our Society publications are full of ideas and information. Information on self steering, hydrofoils and cruising catamarans was extracted and edited into books. If people can somehow be encouraged to join it would be most useful to have new editions of those books. I hope that this number may help to encourage members to ask friends to join - the more members we have the wider the interest we can cover and the more knowledge we can draw from. As the number of members increases so the cost of administration and printing per member goes down. In 1982 part of our administration cost was recovered for time spent on a court case - this is not likely to be repeated ! If anyone has any suggestion for improving the Society publications or funds we are always pleased to hear.

Comfort before Performance

From Tom & Carol Jones, 3920 Manor St., Philadelphia 19128.

"Vireo", our 27' Wharram cat, averaged 105 miles a day. On the long passages she did about as well as the 40' monohulls, even though they motored in calms. Joao Fraga, who crossed with us from La Palma to Barbados, will attest that we push the boat pretty hard. In the Channel Race at Horta, an Arpege was noticeably faster than we were. Yet the same Arpege left New York the day after we left Cape May, and arrived in the Azores more than a week behind us. I believe that in a seaway, there is no beating a narrow hull.

On the other hand, our accomodation was pretty meager. Claustrophobia woke me and brought me on deck a dozen nights. Even moving as fast as we did -- 10,000 miles in 10 months -- we were at anchor 2/3rds of the time. In another boat of this cost -- size is a meaningless yardstick, except to the very rich -- I would make further sacrifices in performance to obtain more comfort.

"Vireo" may have a new rig, taller and narrower, though very little increase in working area. We may enter her for the multihull Bermuda race.

By Jove, Wimbley,..... obviously the predecessor of the present A.Y.R.S. ; this is a charter tablet of the Atlantis Yelling and Rowing Society!

The Boxall Trophy... Binatone Round Britain & Ireland Race 1982

For the yacht with the highest speed to waterline length ratio.

Place.	Yacht	El. Time	L.W.L.	$\sqrt{L}$	Speed	$V/\sqrt{L}$	Type	
6	Downtown Flyer	231.28	35.8	5.98331	8.1502	1.362	T	1
8	A Cappella	238.25	34.5	5.87367	7.9118	1.347	T	2
7	Gordano Goose	231.72	37	6.08276	8.1348	1.337	T	3
5	I T 82	230.43	38	6.16441	8.1803	1.327	T	4
9	Triple Fantasy	247.35	34	5.83095	7.6207	1.307	T	5
3	Exmouth Challenge	208.7	48	6.928	9.0321	1.303	T	6
1	Colt Cars	207.05	49	7.0	9.1041	1.300	T	7
13	Humdinger	261.62	33.5	5.7874	7.2051	1.245	T	8
10	Skyjack	247.45	40	6.3245	7.6177	1.204	C	9
20	Triple Trappel	290.52	29.5	5.4314	6.4884	1.195	T	10
26	Kurrewa	305.0	28.2	5.3104	6.1803	1.164	M	11
2	Brittany Ferries	207.76	62	7.874	9.0729	1.152	T	12
24	Jeantex 11	297.3	30.5	5.5227	6.3404	1.148	M	13
14	Triple Jack	262.67	40	6.3245	7.1763	1.135	T	14
23	S-L Simpson Lawrenc	296.9	31.5	5.6124	6.3489	1.131	T	15
25	Pepsi	297.4	31.5	5.6125	6.3383	1.129	M	16
15	Arroak	290.67	34	5.8309	6.4850	1.112	T	17
4	Livery Dole 3	227.25	56	7.483	8.2948	1.108	T	18
28	Poppy 11	322.8	28	5.2915	5.8395	1.103	M	19
18	R.J.N. Marine	291.22	35.5	5.9582	6.4728	1.086	M	20
11	Sea Falcon	229.58	61	7.8102	8.2106	1.051	C	21
51	Uncle John's Band	409.1	19.8	4.4497	4.6077	1.035	M	22
41	Sadler Two Niner	382.8	22.8	4.7749	4.9242	1.031	M	23
36	Alice's Mirror	361.7	25.6	5.0596	5.2115	1.030	M	24
22	Boomerang	293.3	39.5	6.2849	6.4251	1.022	C	25
34	Blackjack	355.3	27	5.1961	5.3054	1.021	M	26
56	Quelle Surprise	422.2	19.3	4.3965	4.4647	1.015	M	27
33	Kreepy Krauly	353.6	28	5.2915	5.3308	1.007	M	28
12	Voortrekker 11	256.1	53.7	7.3314	7.3584	1.003	M	29
17	Tuesday's Child	291.0	42	6.4807	6.4765	.999	M	30
39	Ancasta Marine	379.6	24.7	4.9749	4.9657	.998	M	31
31	Freedom Flight	347.2	30	5.4772	5.4291	.991	M	32
37	Proven Sharpe	373.8	26.3	5.1283	5.0428	.983	M	33
29	Gemervescence	335.3	32.8	5.7271	5.6218	.981	M	34
45	Sea Nymph	388.6	24.5	4.9497	4.8507	.980	M	35
52	Footloose	410.5	22	4.6904	4.5919	.979	M	36
53	Mr Speedy	419.2	21.5	4.6368	4.4961	.969	M	37
35	Applejack	361.4	29	5.3851	5.2158	.969	T	38 =
40	Camelot of Wessex	381.6	26	5.0990	4.9397	.968	M	38 =
50	Tortoise	408.6	23	4.7958	4.6133	.962	M	40
47	Blue Nun	402.1	24	4.8989	4.6878	.957	M	41
16	Crusader Sea Wolf	291.0	46	6.7823	6.4772	.955	T	42 =
46	Roo	398.9	24.5	4.9497	4.7255	.955	M	42 =
19	Quest	291.	46	6.7823	6.4692	.954	T	44
38	Whisperer	376.2	27.8	5.2725	5.0106	.950	M	45
32	Moody Eagle	352.3	34	5.8309	5.3505	.918	M	46 =
48	Scheat	407.2	25.4	5.0398	4.6292	.918	M	46 =
55	Skat	421.2	24	4.8989	4.4774	.914	M	48
27	Micro Metalsmiths	305.9	46	6.7823	6.1621	.908	M	49
54	Gefion	420.4	25.2	5.0429	4.4838	.892	M	50 =

Place.	Yacht	El. Time	L.W.L.	L	Speed	V/ L	Type
59	Stormy Rival	424.4	24.8	4.9799	4.4416	.892	M 50 =
42	Eila Rose	382.9	30.7	5.5452	4.9229	.887	M 52
49	Ruined Bruin 2	407.4	27.6	5.2593	4.6269	.880	M 53
30	Ghoster	347.1	39	6.2450	5.4307	.869	M 54
57	Falmouth Bay 11	423.1	27.3	5.2278	4.4552	.852	M 55
44	Taal	388.2	33	5.7445	4.8557	.845	M 56 =
62	Wild Rival	450.4	24.5	4.9497	4.1847	.845	M 56 =
60	P & O Cruising 1V	439.0	26.7	5.1720	4.2938	.830	M 58
43	Abacus	384.1	36	6.0	4.9075	.817	M 59
64	Plunder	473.2	26	5.0990	3.9830	.781	M 60
58	RTZ Comp.Systems	424.2	32.5	5.7009	4.4436	.779	M 61
65	Foreign Exchange	487.8	24.8	4.9800	3.8638	.776	M 62
21	Challenger	292.9	69	8.3066	6.4345	.775	M 63
61	Wish Hound	446.2	30	5.4772	4.2240	.771	M 64
68	Gibbs 11	523.4	22	4.6904	3.6011	.767	M 65
63	Moon Dog	461.6	29	5.3852	4.0836	.758	M 66
67	La Peligrosa	517.4	27	5.1961	3.6428	.701	M 67
69	Golly Wobbler	554.4	24	4.8989	3.4000	.694	M 68
66	Dancing Dolphin	507.8	34	5.8310	3.7122	.636	M 69

Race distance = 1885 miles for yachts with two crew only.

Walter and Joan Green (A Cappela) won class V and finished on a remarkable 8th place overall. They showed their superiority as they did four years ago.

"Tripple Fantasy" found herself sandwiched between the two Green designs. "Humdinger", Walter Green's latest boat really showed how far the 35 foot boats have developed and she was surely the hottest boat around.

The race itself was a unique experience and is just totally different, we enjoyed it ! By Cees Visser & Chris Court

Class V - Millbay Dock. photo by Cees Visser.

Rules for 1985

Rules for 1985

Binatone have again agreed to sponsor the next 'Round Britain and Ireland' race which will start from Plymouth on Saturday 6th July 1985.

The rules again list the object to be a sporting event to encourage the development of suitable boats, gear, supplies and techniques for efficient short-handed cruising under sail and also to test the speed and seaworthiness of widely different types of boats by enabling them to race against each other on equal terms.

The yachts must be propelled by the wind and muscle power of the crew only. The main new rules allow radar and other aids to navigation and insist that non self-righting yachts built after October 1982 must have escape hatches.

The non refundable entry fee is £ 100 and the first 100 yachts will be accepted. Full details are available from the Royal Western Yacht Club of England. Just a note that all the rules can be altered in November 1984 and the boat you have spent three years building might not be allowed to enter. It sounds unlikely but it happened in November 1981 and only a telescope to a blind eye got some of the yachts into the race !

Requirments for monohull hatches to be clear of the water when heeled 90 degrees and relating the size of access hatches to the area of the cockpit instead of the size of a man have gone from the present rules whose requirements seem reasonable for sound offshore yachts.

Sponsored Yachts

There have been private and sponsored yachts in all the races and there have been purpose-built boats starting with "Toria" built and sailed to win the first of the present series in 1966 by Derek Kelsall and Martin Minter-Kemp.

The race makes an excellent trial course for new designs and prototypes. In past races we have welcomed "British Oxygen", "Rogue Wave" and "Manurevia" so the 'super craft' in 1982 were not a revolution or a new departure. What was new was a true proffesional disregard for the spirit of the rules by at least one skipper of an entirly sponsored vessel who was clearly under such pressure to win that he admitted being prepared to ignore International law. It is the first time that three trimarans have been prepared at what to ordinary humans is regardless of cost.

These 'super racers' are testing new ideas in light weight construction and new sail materials which could in future come down to 'normal' costs in the same way as g.r.p. replaced wood or man made fibre replaced cotton sails. I was worried that they would "spoil" the race for those on less expensive yachts but I am happy to report that this was just not the case and everyone enjoyed making the best possible progress with the available funds.

ROUND BRITAIN & IRELAND RACE 1982

Class V : 'a race in a race'

A view from "Triple Trappel" - Cees Visser & Chris Court.

One week before the start all boats came into Millbay Dock - Plymouth.
Big ones, small ones, sponsored and unsponsored.
Crews visited the other yachts and tried to estimate the competition
For many it was a hectic week, dominated by toolbox and glassfibre.

The multihull division of our class: 30-35 ft consisted of 8 boats:

A Cappella	U.S.A.	35 ft	Walter & Joan Green	Tri.
Advocat	U.K.	35 ft	Mike Butterfield, Bill Howell	Cat
Humdinger	U.S.A.	35 ft	Donald Young Shirley Weese	Tri
Jan 11	NZ.	35 ft	Robert Denney Tony Smith	Cat
S-L Simpson Lawrence	UK.	33½ft	Paul Jeffes Bryan Collins	Tri
Triple Fantasy	UK	34 ft	Terry Cooke Andrew Hall	Tri
Triple Trappel	NL.	31½ft	Cees Visser Chris Court	Tri
Twiggy	Aus.	31 ft	Ian Johnston Cathy Hawkins	Tri

"A Cappella" and "Humdinger" were designed by Walter Green, "Jan 11" was an owners design based on two Newick VAL main hulls,"S-L Simpson Lawrence" and "Triple Trappel" were designed by Simpson Wild, "Triple Fantasy" designed by Kelsall,"Twiggy" by Lock Crowther and "Advocat" by her owner and C.P. Ellison.

Class V was the biggest class in this race with a total of 31 boats.

Already a big distinction showed at the dock between the new boats and the older ones.
Mast length, hence lack of canvas put "S-L Simpson Lawrence" and us in a handicapped position, but this is known as a race of breakages, luck and human stamina, the latter specially in the smaller classes.
Although not equipped to win, we did plan to show our heels to as many yachts as possible.

<u>First Leg: Plymouth - Crosshaven</u> (South Ireland)

The start saw the flat-out racers well reefed in a force 3. Because of their big roach, extending aft of the backstay, those boats cannot tack with their main fully up and the helmsman had better remember this, at the risk of losing his mainsail.

The start 10th July 1100 local time.

During the start we were sandwiched between "Colt Cars GB", "Brittany Ferries GB" and "Livery Dole" and felt like a duck sitting in their wake with too many other boats around. "A Cappella" "Humdinger" and "Twiggy" got away in free airs, close reaching to the Eddystone.

Halfway to the Eddystone we made good a few cables on "Humdinger" as crew Shirley had to go to the top of the mast for the halyard, according to the old sea law: who let go - shall go !

After the Eddystone the field became settled. Most monohulls were far behind and the light weather conditions favoured the flat-out racers in our class with a beam reach to the Scilly Isles.

We found ourselves in the company of "S-L Simpson Lawrence", the light 30 ft. "Applejack" - a class VI tri better known as the OSTAR entry "Mark One Tool Hire", and the Dutch 45 ft. Apache catamaran "Boomerang" (Class III).

When it became dark we set our spinnaker on a beam reach and played the tides closing the Scilly Isles. We overtook several boats, including "Boomerang" and "Applejack". "S-L Simpson Lawrence" closed the islands even more and went ahead of us, which we discovered in Crosshaven.

It turned out that the weather pattern had favoured the faster boats in our class as they were able to carry their spinnakers up to the finish. We had to drop ours 50 miles after the Scilly's in veering winds. Later the wind increased to a nasty NE 6, the seas were building up fast making a headsail change necessary.

After Kinsale oilfield the wind dropped but headed us even more. At Crosshaven bay the land influence made it necessary to make some tacks to the finish line in NNE 4 winds.

"Applejack" was still behind us but of nowhere came "Boomerang" and some tactics were necessary to stay ahead of her by one minute. Our finishing time was 20.09 on 11th July, total n.miles sailed 230, average speed 6.97 knots.

The most remarkable result of this first leg was that only 6 monohulls were able to finish within the first thirty boats. We finished 27th overall and 7th in class V.

Second leg: <u>Crosshaven to Castle Bay</u>. (Barra Island)

Our start was at 20.09 on 13th July, in very light winds & fog.

As we had no engine we had expected to be towed to the start line, but both "Applejack" and we were dropped in the narrowest part of the channel with the tide against us half a mile from the line.

We had no wind while we saw other boats motoring to the line and hoisting their spinnaker. So we crossed the line an hour too late, as did "Applejack". We were quite frustrated by this fact but we soon gotin a better mood, finding "S-L Simpson Lawrence", "Boomerang" and some mono's becalmed inshore at sunrise on 14 July.

After we had passed the Fastnet rock and headed for the Atlantic, the weather changed quickly, a NW 6 dead on the nose ! The weather forcast gave a gale NW 8, which meant tacking along the Irish coast.

We planned to take a reef in the mainsail and set the working jib to get some sleep before the gale struck. The gale never came, only some force 7 gusts, and we wasted hours by taking it too easy.

Chris expressed his feelings as he tried (in vain) to get some sleep when he wrote in the logbook:"sleeping down here is like sleeping at the funfair".

The next morning (15 July) we saw "Boomerang" ahead with some monohulls who should not have been there. Up went the genny, the wind was force 5 from NNW which meant a beat along the beautiful West coast of Ireland.

The following morning (16 July) we passed the NW point of Ireland (Eagle Island) and at last the wind backed bringing us back on the rumbline again, however only after being caught twice in the salmon nets of the local fishers. This appeared to be a common problem amoung the other competitors as well.

Now we had a race on our own, no other yachts around us and after 60 miles the wind backed even more to the West and later to the South, force 5 to 6. The spinnaker went up and the fun began, surfing down the waves at 10-14 knots.

Thick fog accompanied us when we closed the Southern islands of the Hebrides but as it is hazardless shoal-free water and when we saw the darker shades of the islands in the fog early morning the 17th, we knew we were approximatly two cables off. Good adrenalin sailing at 10 knots.

We finished at 04.03 on 17th in thick fog and entered Castle Bay unnoticed by their lookout, finding a good anchor spot and a relaxing sleep after the tiring last hours.

Later that day we found out that "S-L Simpson Lawrence" had got further ahead and "Boomerang" had beaten us as well. However to our surprise we were well placed at 23rd overall.

The weather had forced many competitors to retire or to look for shelter in one of the many bays of Ireland. "Jan 11" had capsized off the SW coast of Ireland and we came up one place in class, now being 6th.

It showed again that racing with multihulls implicates risks and much depends on the skippers experience and some luck. One should wonder what will happen with the heavily sponsored boats within the next year. Sponsors ask for performance, performance means putting the limits further and taking even more risks to get value for money. It is all a game like formula 1 car racing.

Total n.miles 533, average speed 6.66 knots.

Third leg: Castle Bay to Lerwick (Shetland Islands)

The day before our start we climbed the hills of Barra and saw the leading boats of our class leaving Castle Bay. At 0405 on 19th of July we started in thick fog beating to Barra Head.

We rounded the off lying rocks in the visible distance (= 90 feet under these conditions), but were becalmed South of Barra Head. After an hour a zephr filled our drifter and we were on our way to St Kilda, an unlit deserted island some 70 nautical miles out in the Atlantic.

Light WSW winds force 2 brought the spinnaker back on deck and after the morning sun lifted the fog we saw another spinnaker behind us with unfamiliar colours. Later fog closed in again. Soon the wind veered West and the genoa was put to work again. Early morning 20th July we heard breaking waves and as a miracle the fog lifted and there was St.Kilda backed by the mysteriously lightened sky of the typical short nights. A few hundred yards away was "Araock", a 36 ft. Newick Tricia trimaran which explained the spinnaker sight of the previous afternoon. She passed us soon, making up for the time she lost by taking shelter in the last leg.

Our course was now to Sula Sgeir another isolated rock 110 nautical miles NE of St.Kilda. It was a good spinnaker reach but on one of those occasions the boat overtook the kite in a surf and she ripped at an untaped bolt on the mast. Emergency repairs made the spinnaker fly again within an hour. It was a pleasant reach to Sula Sgeir with speeds of 11 to 16 knots in a NW 5 to 6.

At 17.30 on 20th July we rounded Sula Sgeir and headed for Muckle Flugga, the most Northen tip of Great Britain . Till midnight we were able to hold the kite on a beam reach but frequent float **burying** at 18 knots bursts made us decide to take her down. This kind of sailing was described by Chris as "riding over the Niagara Falls in a box with the lid on", indeed it was hairy at some times.

Again the leading boats in our class had their own private weather and they were able to leave their kites up in running conditions. Next day, the 21st July, we had a close reach up to Muckle Flugga where we were welcomed by the immense seabird wild-life. To avoid the overfalls we rounded the rock close and entered the lee of the Shetlands.

Gee, flat water, broad reaching under spinnaker at 11-14 knots...... great sailing in force 5 Westerlies. Only to round the Out Skerries and then 30 n.miles to go to the finish, however the wind died and we became becalmed for more than an hour.

The following morning 00.27 the 22nd of July we crossed the line, 24th overall and 5th in class V.

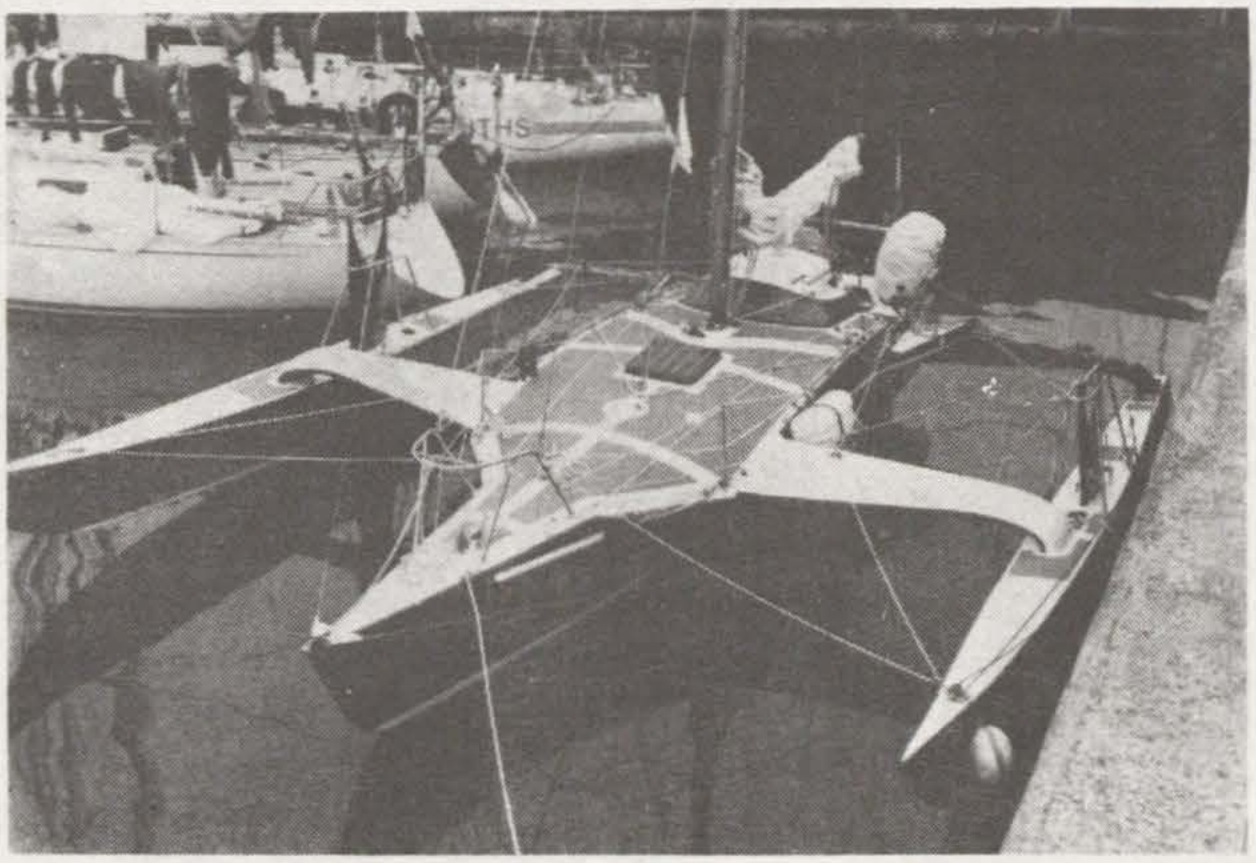
The sad news of the third leg was that the second multihull in our class had capsized: "Twiggy". She showed fantastic performance up to this leg. Cathy and Ian were eager to win and gave the competition a hard time, too hard and on the spinnaker run from Sula Sgeir towards Muckle Flugga she dug in her three bows and made a complete roll over.

18 hours later they were rescued by "Pepsi" (another competitor

The race seemed to be settled in our class, only one monohull could keep up, "Kurrewa", a half size model of a 12m design study by Ian Howlett.

Most of the other monohulls had encountered drifting conditions when they left Castle Bay, as did the class VI trimaran "Applejack". Our company in the race was now limited to a few boats who gave each other a race in a race. Those boats were:

"Challenger"	80½	ft mono	ocean racer	class 1
"Jeantex 11"	54	ft mono	one off racer	class 11
"Pepsi"	40	ft mono	Swan 40 racer	class 1V
"S-L Simpson Lawrence"	33	ft tri	Shifter	class V
"RJN Marine"	39	ft mono	one off racer	class 1V
"Boomerang"	45	ft cat	Apache	class 111



Triple Trappel Lerwick.


Sister Ships SL Simpson - Lawrence Tripple Trappal - Lowestoft.

Fourth leg: Lerwick to Lowestoft

At 00.27 on 24th July we crossed the starting line in unsettled weather and variable winds. We decided on one big run South on the rumb line and no hazzle inshore.

The first seven hours we encountered WSW winds and we went slightly East of the rumbline, afterwards the wind veered to WNW, force 2-3 and we continued parallel to the rumbline but now under spinnaker. The night brought us calms, the spinnaker collapsed and was changed for the drifter which kept us going at $1\frac{1}{2}$ knots. The 'wind' came back to the SW and early morning on 25th even to the South.

We continued our Easterly course in a whisper of wind. The weatherforcast of that morning gave "calm" for Bell Rock. We got the feeling of doing the right thing by going East because Bell Rock is an inshore weather station.

At 10.30, close hauled, our drifter was split in two places by a force 2 puff. That afternoon the wind changed slowly to WNW and increased to a steady force 2.

After midnight, now 26th July, the wind settled in the NNE and increased steadily to force 5. Aaah.....spinnaker again !!

At sunrise we found ourselves in company of "S-L Simpson Lawrence" and "Pepsi" both on an outward course from the shore. We had closed the gap ! "S-L Simpson Lawrence" did not notice us as we were directly in the low sunlight.

Their shock must have been complete since they immediatly opted for a bigger spinnaker. During this manoeuvre a wave grabbed their boat and she broached, breaking her rudderblade. Now in full racing mood and entering 'home waters' we surfed to Lowestoft. We overtook "Pepsi" and by taking the outer route around the sandbanks in front of Lowestoft we even beat boats we had not seen on the horizon before.

Our finish was in the early morning of 27th July at 04.05.

The race was open again. "Boomerang" kept ahead of us by a mere 55 minutes, while "S-L Simpson Lawrence" came in 45 minutes behind us. From the monohulls mentioned previously only RJN Marine consolidated her lead - they went East of the rumbline also.

Total nautical miles sailed: 460, average speed 6.08 knots.

Fifth leg: Lowestoft to Plymouth

Within 2 hours of our start at 04.05 on 29th July, 7 other competitors started as well. The weather forcast promised running conditions force 4 to 6. These were our home waters and we were eager to do well.

The NE-4 wind blew us to the Thames Estuary, the spinnaker set and doing an easy 9 - 11 knots. Things changed rapidly when we crossed the banks with the tide against wind. The wind became a gusty force 7 and the seas steeper. Surfing down the waves at 18 knots we felt the time had come to take the spinnaker down. I went forward to release the guy when she burried her three hulls and I found myself washed against the babystay. The tension on the sheet, because of the sudden speed reduction of the boat, made it impossible to release it from the cleat (we sailed with the sheet in a clambcleat, but the free end in our hands). Chris later told me that he was more concerned about tearing the spinnaker than capsizing the boat. Anyway, doing a "Twiggy" was not our goal and down came the kite, and fast ! Maybe our sloping foredeck, as opposed to "Twiggy's" steep cabin-front, saved us a lot of trouble.

Under genny and full main we felt as if becalmed but the log still showed 10 to 12 knots. After half an hour we became a little nervous when we saw the orange storm spinnaker of "S-L Simpson Lawrence" at the horizon getting bigger and bigger.

At 10.45 she overtook us, we had no smaller spinnaker and just had to wait and see. However for "S-L Simpson Lawrence" it became too hairy as well and they dropped their kite after having passed us.

Two hours later we were in the lead again spotting the E-Goodwins L.V. first and altering course accordingly. At 12.25 we passed the SW Goodwins buoy and the seas became more regular. "S-L Simpson Lawrence" was still 500 yards behind so crawling over the deck,to keep a low profile, we prepared our spinnaker and up she went. Later we understood that they were having lunch below and only discovered our kite when we were already a mile ahead.

The whole day we saw her playing every trick, tacking down-wind etc, but she could not close the gap and during the night her light disappeared.

In the morning it was clear that we had done over 200 miles in 24 hours and I think that to be fast for a 31½ ft multihull. At 07.00 the spinnaker had to come down as the wind shifted to the NNW force 5 but very gusty with peaks into 7. Our speed dropped from 12-16 knots to 9-12 knots, calculations however showed that the rumbline course was the fastest.

After all this fast sailing, the finish was an anticlimax; 3 miles from the finish we were becalmed for 1½ hours and we saw "Challenger" close the gap. At 14.15 a seabreeze ruffled the water and we sculled from windpatch to windpatch till the breeze steadied

With a speed of 5 knots we finished at 15.31 on 30th July, we were in 26 minutes ahead of "Challenger" and 50 minutes ahead of "Boomerang".

We had sailed hard but surely were rewarded by this result ending 4th in class and 20th overall.

Total nautical miles sailed 292, average speed 8.21 knots.

Round Britain Retirements   by R.M. Ellison

It has been suggested that yachts which retire should not be allowed to race again for a period of two races or two years. The intention is to discourage less seaworthy craft and increase the number of finishers.

Fortunately the suggestion did not come from the Royal Western Yacht Club of England - they are always pleased to know that the yachts are safe. I would agree that yachts that have to be rescued should be considered for a ban but they are likely to be modified to cure the problem before another race anyway. Only a fool makes the same mistake twice !

In the race two yachts had to be towed into port, "Twiggy" after 'pitchpoling' and "Douchka" after her rudder carried away. "Jan 11" was destroyed with great difficulty by the Irish navy after she capsized and her crew were rescued. Their 'Locat' beacon did not work properly (flat battery). The rescue plane could only see one man in the life raft and spent several hours looking for the second person. The two crew were in the raft but could not both sit in the entrance because the raft would capsize. "Jan 11" was a 31 foot very light racing catamaran.

The strange catamaran "Passing Wind" was soon dismasted on passage to Crosshaven while other yachts retired with crew or centreboard problems which could not be considered an emergency but presumably there could have been trouble had they continued to race. It seems good seamanship to retire if the yacht or crew are not in'A 1' condition to complete a race or passage.

On "Sabu" we made a good start and were not discouraged to be the slowest multihull as we were 4' shorter than "Applejack". The leading yachts arrived at Crosshaven in under 24 hours which over a course of 230 miles hardly indicates the "drifting conditions" they claimed for the race in the press. In our back position the wind increased to 7 gusting 8 during Sunday evening with a steep short breaking sea.

In these conditions I was most interested in the hydrofoil stabilisers and am pleased to inform those who say the yacht will "fall over if you stop sailing" that this is not true. The large sea anchor of conventional design proved quite totally useless both with the anchor, chain and rope or just with rope. In either case the yacht lay beam on with waves often breaking over the weather 'wing'. After some hours we found it best to roll out a small area of headsail and lash the rudder to windward. The yacht pointed about 60 degrees from the wind making about $1\frac{1}{2}$ knots and perhaps 40 degrees leeway.

During the rough conditions two vertical timber supports bonded to the g.r.p. hull under the mast tore away due to the hull flexing. The cabin top is laminated ply strips and remained intact as did the join to the hull and 'wings' but another small crack started at the join of the aft cockpit bulkhead. Faced with a weather forecast of wind backing from NE to N and warnings of gale 8 I decided against the wishes of my crew to retire. As soon as we turned South the wind started to moderate and the fog and calms set in for the next few days.

Model Powerboat Hull Design

Part two of a series in "Model Boats" August 1982.

By Ron Warring and reprinted with permission, this is one of twelve parts which will be published as a book. We reprint it here to help members understand spray and wave patterns.

It is a well known fact that if a hull with a flat bottom is driven through the water with enough speed it will generate lift and tend to skim over the surface or plane due to the reaction of water displaced downwards - Fig 1A. This lift then virtually supports the whole weight of the hull, the amount of upward force contributed by the buoyancy of the part of the hull actually submerged being negligible by comparison.

The actual reaction force generated when planing is not vertical but inclined backwards. It is the vertical component of this reactive force which is lift, whilst the horizontal component is drag, which has to be overcome by the thrust of the propeller - Fig. 1B. It follows that the ratio of lift to drag (L/D ratio) is a measure of the efficiency of the hull when planing. The higher this ratio the greater the proportion of the reaction force generating useful lift, and the lower the thrust needed to overcome drag. In more direct terms, the faster the hull will travel with a given thrust.

Fig. 1

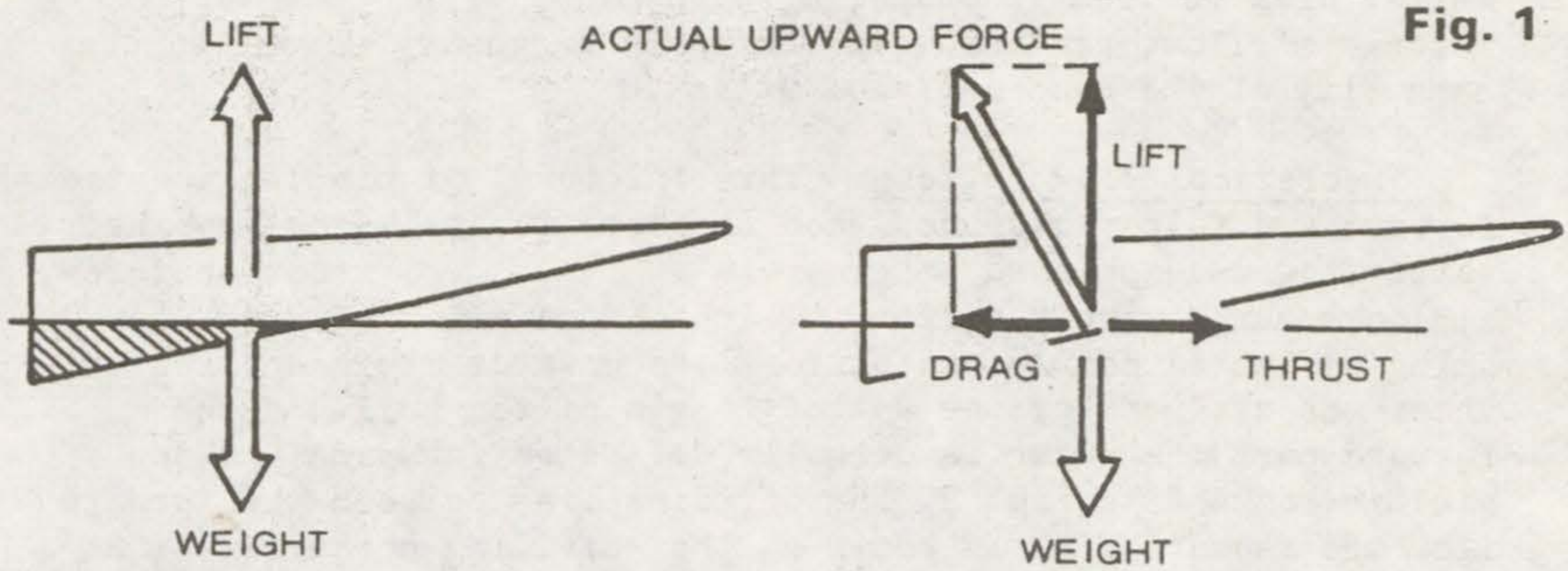
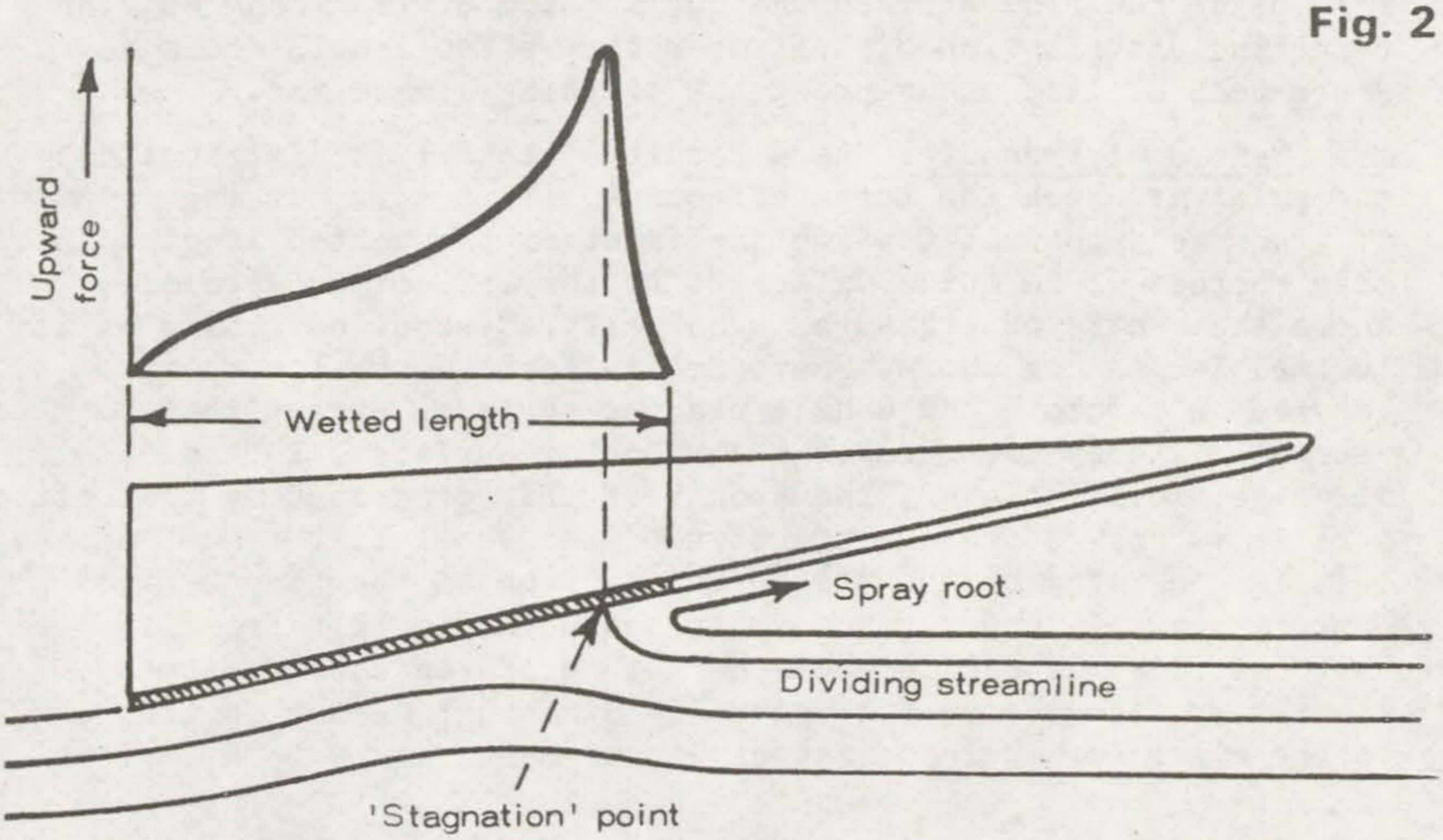


Fig. 2



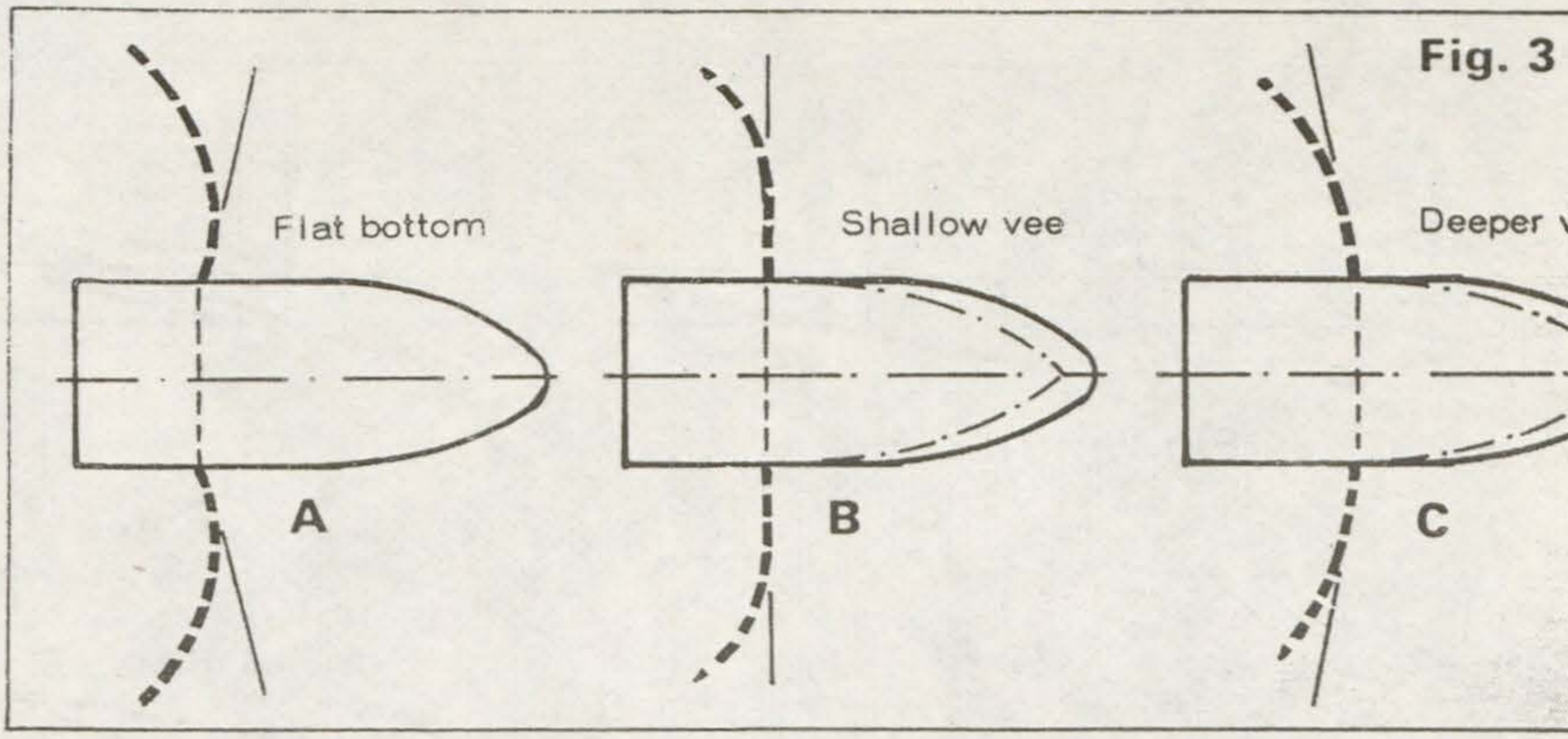
Practical Flow Patterns. The diagram in Fig. 2 shows flow in two dimensions only or theoretical two-dimensional flow for a hull which is infinitely wide and water which has no viscosity. These two factors modify the flow pattern under practical conditions. The fact that the hull has limited width means that there will be a tendency for water pressing against the hull bottom to escape sideways and outwards. The fact that the water has viscosity (and gravity is also present) means that the forward flow in front of the stagnation streamline will tend to be broken up into spray. The ultimate result is something like that shown in Fig.3A, looking at the hull in plan view. Water is thrown forward before breaking into spray and curving backwards.

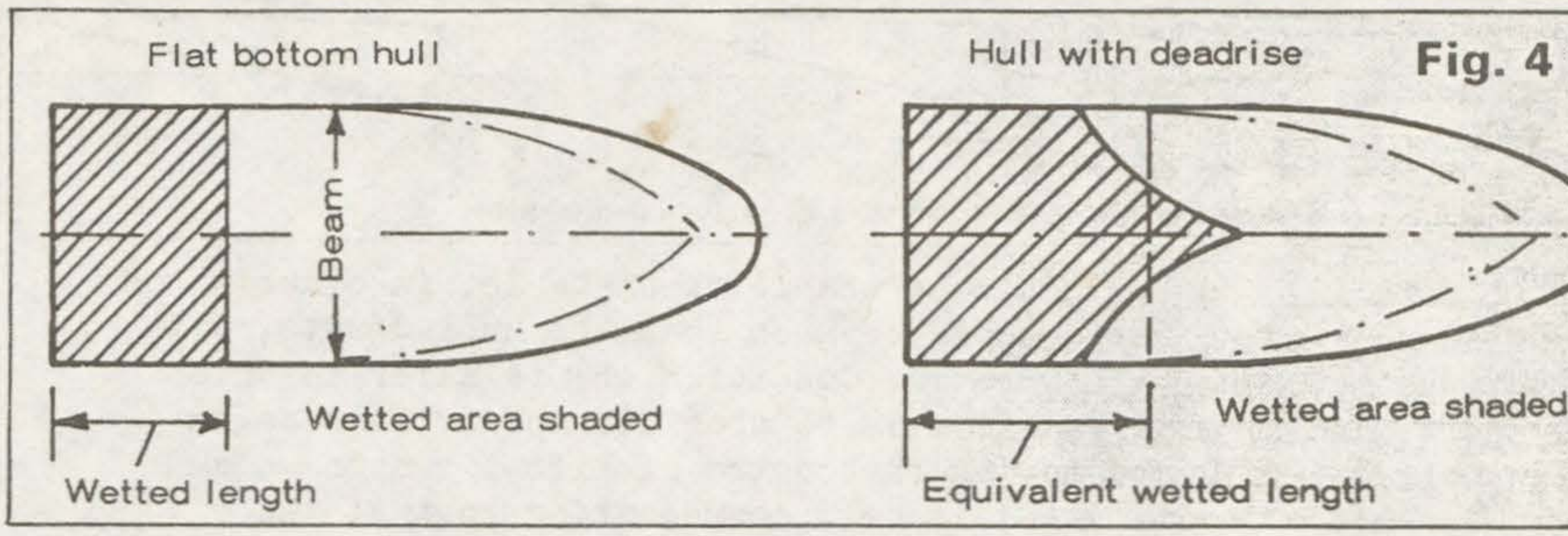
This flow is modified if the bottom of the hull is veed rather than flat i.e. has a substantial deadrise. The vee section will make it easier for the water to escape sideways, which will result in some loss of lift. However this initial sideways flow of solid water is no longer inclined forwards, but at right angles (Fig.3B) or even backwards (Fig.3C), depending on the amount of vee the hull bottom has.

Equally, there is a difference in the shape of the wetted areas of the flat-bottom and vee-bottom planing hulls - Fig 4. With a purely flat-bottom hull the wetted area is rectangular, with relatively short wetted length. With a vee-bottom hull the wetted area is veed in shape; also, because of the greater 'sideways' flow, greater wetted area is necessary to obtain the same lift at the same angle of attack.

Theoretical Flow Pattern. This 'picture' of planing is straightforward and fairly obvious. When it comes to analysing how the water flow is displaced to generate a reaction force, it looks surprisingly different. Instead of all the water flow being deflected neatly and uniformly downwards, this applies only under the aft part of the wetted length of the hull. At the forward part the water is actually deflected forwards and the picture looks like Fig. 2. The dividing line between the forward flow and reaward flow is known as the 'dividing streamline'; at this point the flow strikes the hull bottom at right angles. The resulting distribution of lift over the wetted length shows a sharp peak of lift occuring at the dividing streamline.

Centre of Pressure. As a result of this lift distribution the point at which the total effective lift occurs, or the 'centre of pressure', is well towards the front of the wetted length. In this respect it is quite different to the lift of an aerofoil, where the centre of pressure is normally at about one third of its 'wetted length' or chord. There is, in fact, no real comparison between an aerofoil and a hull planing surface, except that both generate lift by pressure on their bottom surfaces. In the case of an aerofoil, however, the amount of lift generated by the bottom surface is only a small proportion of the total lift (most of the lift is generated by the pressure reduction on the top surface). The planing hull generates all its hydrodynamic lift from its bottom surface. There is one other big difference,too. With a planing surface there is no sign of 'stalling' as the inclination to the water (or angle of attack) increases.





Seeing the spray. Observation of the pattern of spray flow will, in fact, be an indication of the magnitude of the peak lifting force generated by the hull. If the spray emerges from the sides at right angles, or even in a forward direction, peak forces are high. This is a characteristic of flat-bottom hulls and stepped hulls, and is also associated with a 'hard' chine. If the spray emerges rearwards, peak lifting forces are lower, the centre of pressure is rather further aft, and the hull is'softer'. This is a characteristic of a veed bottom or 'prismatic planing hull' as it is called by naval architects. The more rearwards and neater the spray pattern appears, the 'softer' the hull. So 'seeing the spray' is a useful guide to hull design.

One difficulty arises here. On a fullsize craft one can travel aboard and readily observe the particular spray pattern generated. With a model one has to observe the spray pattern from a static point ashore. The same spray pattern will appear different from these two points of view, and it is particularly difficult to assess the merits (or otherwise) of a spray pattern from a fixed observation point.

Running Trim. The running angle adopted by the hull will be determined by the forces involved being in equilibrium. Considering just lift and weight, this would imply that the centre of lift should be exactly under the centre of gravity (CG) of the hull to maintain a constant running angle - Fig. 5A. If the centre of lift is aft of the CG (Fig 5B) the running angle will be reduced, increasing the wetted length and modifying both lift and drag (changing the L/D ratio). If the centre of lift is forward of the CG, trim will be bow-up, decreasing the wetted length and again modifying both lift and drag.

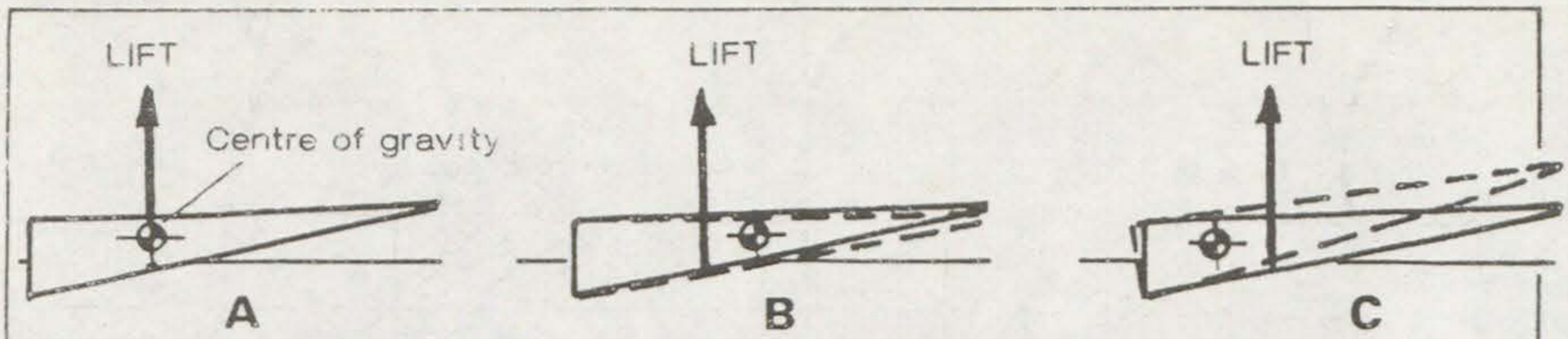


Fig. 5

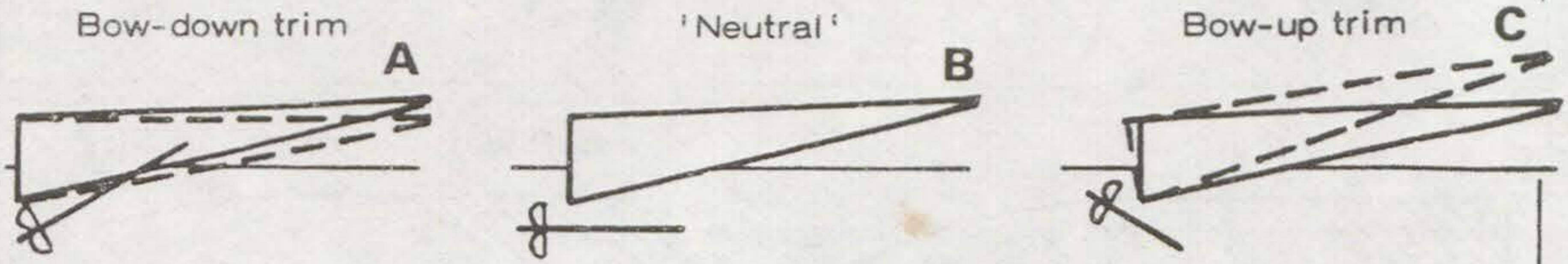


Fig. 6

Propeller thrustline angles greatly exaggerated

Both (B) and (C) could be stable or unstable. In other words the change in L/D ratio could be such that the hulladjusts, with continually changing L/D ratio. Condition (B) is safer in this respect, as its main reaction is to drag off speed, increasing the wetted length and moving the centre of lift forwards as a consequence. Condition (C) is self compensating in that the increasing trim angle and reduced wetted length will cause the centre of lift to move back and at the same time lift will decrease, allowing the hull to fall back into the water. Having changed to position (A), however, the cycle will be repeated and the hull will run with a series of up and down pitching motions.

Propeller Thrust Line. This is an oversimplification of matters, however. Both thepropeller 'thrust line' and the actual fore and aft lines of the hull will also affect the trim or running angle. Theoretically unless the thrust line runs through the centre of gravity of the hull the thrust will generate a bow-up trim force (or bow-down force if it passes above the CG, which would be unusual). In practice it is better to forget relationship to the CG and consider the overall effect of thrust line angle relative to possible changes in thrust line alignment.

Thus with a conventional inboard engine arrangement where the propeller thrust is angled upwards (Fig 6A),the effect is to produce 'bow down trim'. On high-performance models it may be horizontal (Fig 6B) with nominally neutral trim. With an outboard or outdrive, it may be fully adjustable up or down, and the 'up' trim (downward angled thrust line) as in Fig 6C would induce a 'bow up' trim. It is significant, in fact, that the thrust line angle can have a marked effect on the performance of high speed hulls, both model and full size. At least one well known model hull, for example, with an otherwise excellent performance pontential, has poor handling qualities with a conventional thrust line, but its limitations in this respect disappear when fitted with a horizontal prop shaft.

Longitudinal Hull Lines. All hulls will tend to generate a certain trim change when accelerated from a planing condition. With a substantially straight buttock line (Fig 7A and 7B), the faster the hull is driven there is usually a small but positive tendency to trim more bow down as speed is increased. This can quite marked if the buttock line is reflexed or hooked (Fig 7C), which may be used as an expedient to eliminate large changes in trim angle when passing through the hump speed (see later). This form of hull is generally to be avoided on fast models, giving the chine a hook being most useful as a means of 'lateral' trim. A convex buttock line or 'rocker' (Fig 7D) is also to be avoided on a fast hull as it will induce bow-up trim which can be quite exaggerated even with moderate rocker. It is significant, though, that a very small amount of rocker is sometimes introduced on the fastest fullsize racing powerboat hulls to stop them trimming too 'flat' at high speeds.

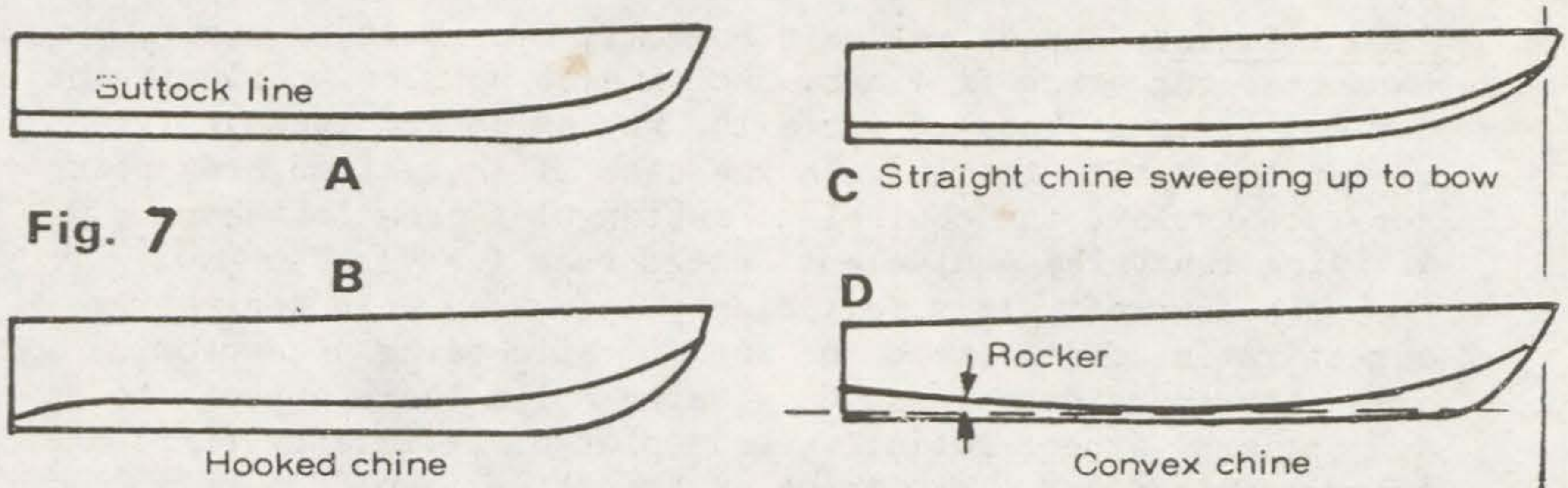


Fig. 7

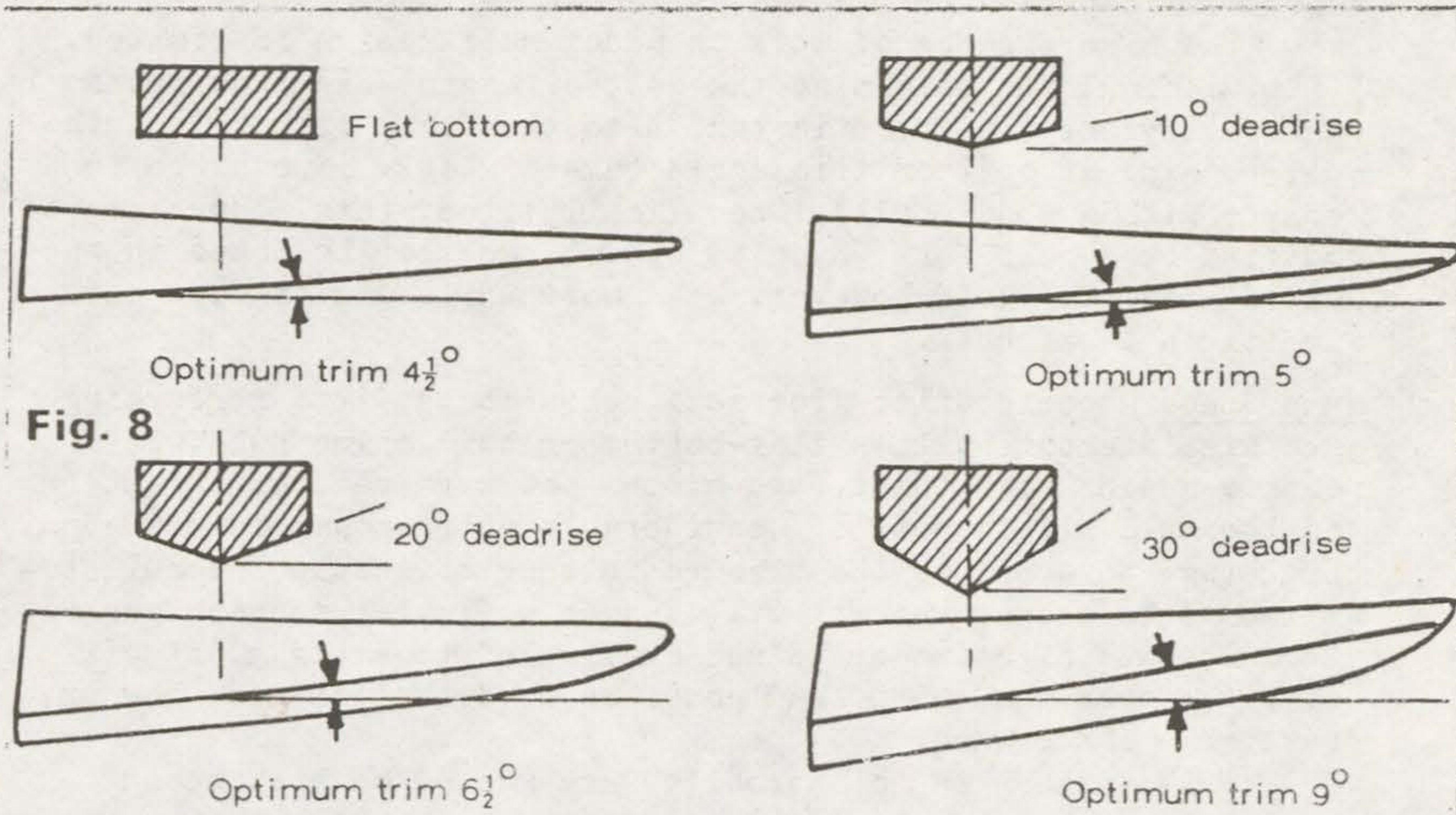


Fig. 8

Optimum Trim. Optimum trim is simply that trim angle which yeilds the maximum L/D ratio for the hull. This is generally reckoned to be $4\frac{1}{2}$ degrees for a flat plate or flat bottomed hull, but rather more for prismatic planing hulls (vee-bottomed hulls). Specific figures used (by full size designers) are (see also Fig 8); 5 degrees for a 10degree deadrise angle, $5\frac{1}{2}$ degrees for a 15° deadrise angle, $6\frac{1}{2}$ degrees for a 20° deadrise angle, $7\frac{1}{2}$ degrees for a 25° deadrise angle and 9 degrees for a 30° deadrise angle.

The deep vee hull does not fit neatly into simple comparisons here. For one thing,comparison on a wetted area basis is no longer valid. Since its optimum trim is at a higher angle of attack than a flat bottom hull it will develop proportionally more lift, so does not necessarily require more wetted area. On the other hand, its L/D value is not likely to be so good - i.e. the drag will be higher. Any attempt at simple comparison is further modified by the fact that deep vee hulls with the addition of spray rails can achieve maximum L/D at lower trim angles than indicated by the above figures.

The model hull designer is at an advantage here. He can adopt optimum trim angles with no practical limitations. On full-size craft, particularly hard chine hulls, small trim angles may have to be used, e.g. to keep the bow far enough down to provide adequate visibility as well as a comfortable angle for people.

Aspect Ratio. Aspect ratio is normally considered a design parameter for aircraft wings, but it also applies to planing hull design. It is defined in a similar way as spread (beam) divided by length (wetted length). In the case of the wetted area being non-rectangular, the equivelent rectangular area is taken by **dividing length by equivelent wetted beam (as in Fig 4).**

On aircraft wings, efficiency increases with increasing aspect ratio, final choice of aspect ratio being a compromise with other considerations. On planing hulls there appears to be an 'optimum' aspect ratio, where a plot of efficiency (L/D) against aspect ratio peaks. This is at an aspect ratio of 2.5.

The significance of this on model hull design is limited. It is difficult to determine the wetted length when running, so it can usually only be guesstimated. Also this peak is based on the hull running at optimum trim angle (again nearly impossible to measure with a model hull). Specifically, too, this figure can be modified by a hull form which is other than flat bottomed in the wetted area. It could however, be a worthwhile design figure to aim for in a ski hull.

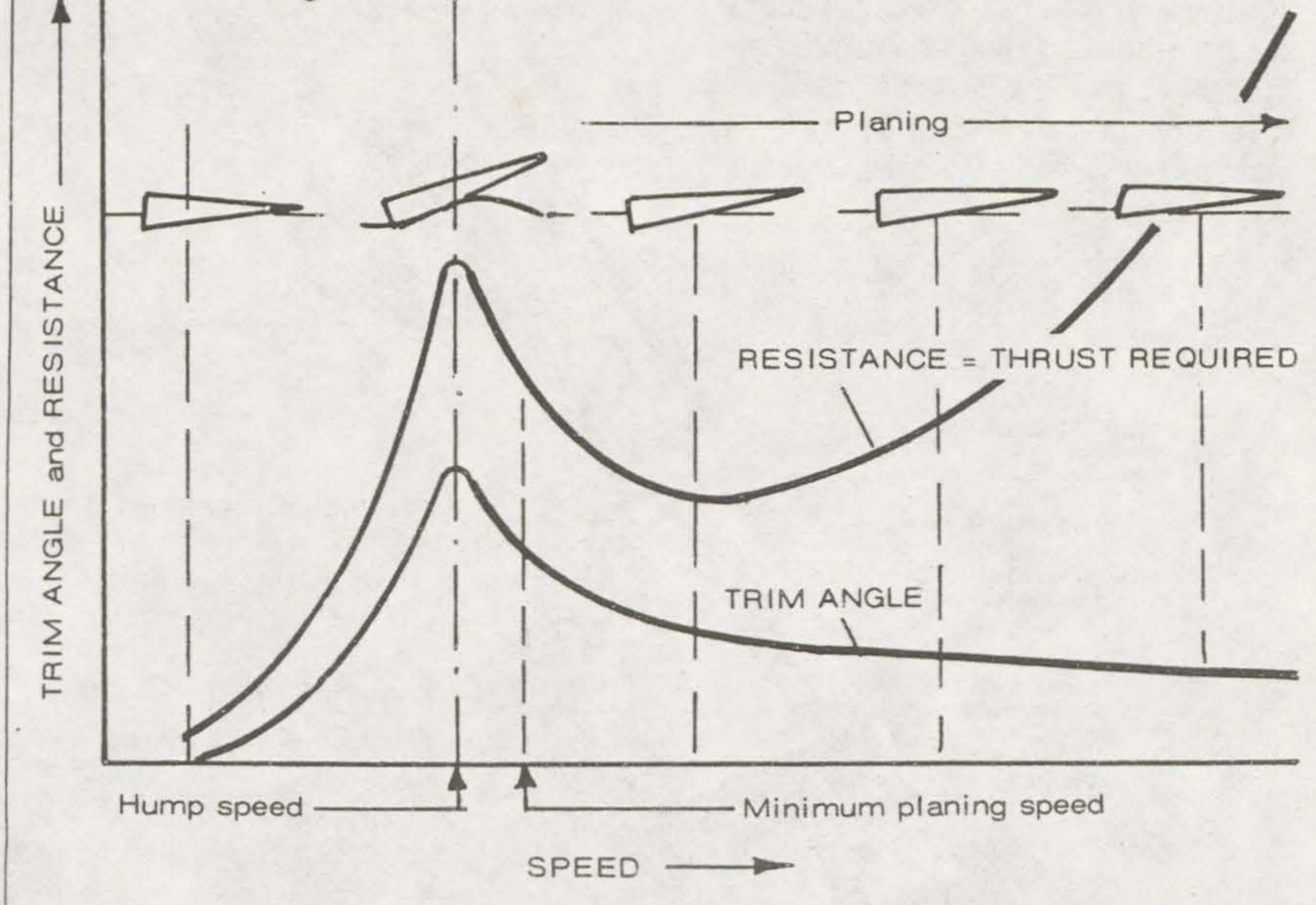
Hump Speed Accelerating from rest, when it is first performing as a displacement hull, a flat-bottom or hard chine hull will reach a speed where the trough of the bow wave reaches the stern and the hull will 'squat'. Considerable extra power is needed at this stage to overcome the high resistance to enable the hull to 'climb' onto plane, when it will assume a flatter running angle.

If sufficient power is not available (see Fig 9) it will never get over the 'hump' and continue to drive forward, bow-up, creating a large wash.

This feature is not normally very marked on high speed models. Their hump speed is low, compared with their maximum speed, and there is usually ample power to accelerate very rapidly through this region of high drag - literally climbing out of the water onto plane like a water skier. Hump speed, however, can well be the barrier with electric powered hard chine hulls with smaller electric motors - and one reason why they cannot achieve planing performance despite the fact that the hull is potentially a 'fast' type.

There are ways of tackling hump speed problems with hull design. The deep-V hull, for example has only a moderate peak trim angle at the hump - considerably less than a hard chine hull. Reducing the total weight and/or more forward location of the CG can also reduce the 'hump'; and ancillary lifting devices at the stern of the hull, such as hooking the chine, fitting wedges or transome flaps, properly used, can almost eliminate any marked hump - a considerable assistance to get a hull planing when it only has marginal power available. The limitation of built-in devices, however, is that once over the hump they can detract from, rather than add to, the planing performance and handling of the craft.

Fig. 9



Planing Hulls : Editors Note. The above may help understand sailboard performance. On kite-powered craft pull from the lines replaces thrust from the propeller.

Edmond Bruce showed that when hull length gets to eight times beam (waterline) the wave causing the 'hump' moves aft enough to release it from the $1.4\sqrt{L}$ limit.

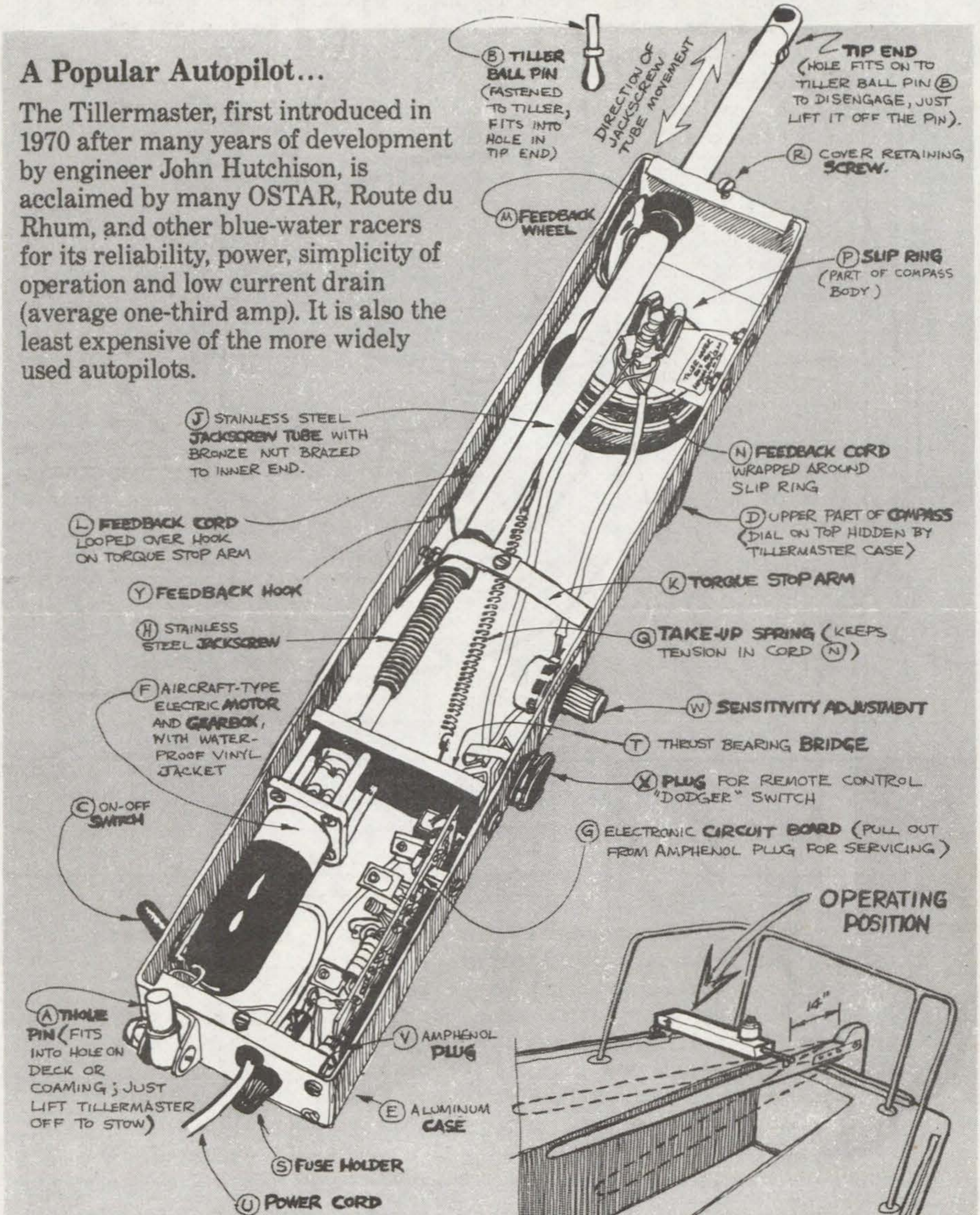
Reducing hull length lowers 'hump' speed, thus "Amaran" and "Triscarph" (three very small floats) quickly plane. Even on the plane the power/speed curve shown is quite steep so that at moderate speed a narrow hull might have less drag.

Scale Bruce said -"If the scaling factor is 10 all linear dimension will be one tenth of full size, areas must be increased by the square of 10, weights increased by the cube and velocities by the square root". For sailing craft this includes wind speed. (eg. a 1/12 model @ 3kts in 6 kts wind = 10.4kts in 20.8 kt wind).

Yacht Racing/Cruising May 1982
By Steve Henkel. Reprinted with permission.

A Popular Autopilot...

The Tillermaster, first introduced in 1970 after many years of development by engineer John Hutchison, is acclaimed by many OSTAR, Route du Rhum, and other blue-water racers for its reliability, power, simplicity of operation and low current drain (average one-third amp). It is also the least expensive of the more widely used autopilots.



.... And How it Works:

1. Fixed to the hull by the thole pin (A) at one end and at the other to the tiller by the tiller ball pin (B), and switched on by switch (C), the Tillermaster steers in a straight line according to the magnetic course dialed at top of compass (D) (mostly hidden by case (E), which is shown upside-down with bottom cover removed).

2. As boat starts to swing away from the dialed course, a photocell within the compass body activates the motor (F) through the solid-state circuit board (G). This only happens when the boat is one-and-one-half or more degrees off course. (A "deadband," the width of which can be adjusted by sensitivity adjustment (W), keeps the autopilot from continuously hunting for the exact course to steer.)

3. Motor (F) turns jackscrew (H), which pushes or pulls jackscrew tube (J) to move tiller (or wheel if adapter is fitted) via tiller ball pin (B) fastened to tiller.

4. As jackscrew tube (J) moves, it carries with it torque stop arm (K), to which is attached a hook (Y) connected to feedback system that prevents oversteering as follows.

5. The feedback cord (L) travels from the feedback hook (Y) to the outer (large) hub of feedback wheel (M), where it is tied off. A continuation of the same cord then goes through a hole in the outer hub and winds the opposite direction around the inner (small) hub; it then travels around the slip ring (P) (which is part of the compass body) and finally attaches to the take-up spring (Q). Thus, when the torque stop arm is moved in either direction by the jackscrew tube, the feedback cord is similarly moved and is kept taut by the take-up spring. Also, since the cord is wrapped around the compass housing (N), the compass rotates slightly every time the jackscrew tube moves. Rotating the compass prevents oversteering by making the autopilot think it has achieved its course correction sooner than it has; thus the jackscrew tube reverses and the tiller returns to a neutral position as the boat (which would otherwise swing too far in the other direction) returns to its proper course. (the factory-calibrated size ratio of the outer to inner hub varies depending upon the individual boat's tendency to oversteer.)

6. When the boat returns to the dialed course, the motor (F) will stop running, at which time the Tillermaster draws only the few milli-amps needed to power the sensing photocell within the compass.

Electric Boat Motors - From Lord St Davids,
15 St Mark's Crescent,
London NW 1.

I have been able to do some research into the electric propulsion of boats through the new 'Electric Boat Association'. I am the Chairman of the private boat-owner members.

Capital costs of going electric are greater than for petrol or diesel, but the lifetime of traction type batteries and motors are very much longer.

Fuel costs for my eight ton canal cruiser are now 5p a mile, and I can get that down further.

Refuelling points are the standard 13 amp sockets found in any house, lock cottage, boatyard or pub. We are mapping all supply points - there are plenty!

An overnight refuel gives me about £ 1 worth of juice, for which I offer the now standard EBA fee of £ 2 for an overnight plug-in if away from my home base.

Of more interest to AYRS members is the fact that the trailered boat turns out to be very easy to electrify. Her recharging points are not limited to waterfront, and her battery charger can be left on shore. If she is a ballasted craft, batteries can replace ballast and she comes out lighter than a petrol or diesel as electric outboards weigh less. Many of our members have trailered craft. They can get reasonable speeds, good cruising ranges, and fuel costs which make the petrol outboard owner weep.

Anyone who wants further details can write to Lord St Davids or the secretary Michael Mayer, E.B.Assn., 34 Berkeley S . Lond. W1X

DESIGN CONSIDERATIONS FOR A HYDROFOIL STABILISED SAILING CRAFT

By M.J. Barnsley BSc.

In 1973, some A.Y.R.S. publications began my interest in hydrofoils, and much experiment with free sailing models followed. Degree project work at Southampton University in 1978, gave more insight into the characteristicts of low aspect ratio foils, and led to the first full sized craft,"Rummen" being launched in 1980.

This discussion is concerned with the design of low aspect ratio foil-stabilised monohulls, suitable for cruising.

Hull Form Requirements :- 1) Low drag at small angles of heel.

2) Low lateral resistance to avoid unloading the foil at small yaw angles.
3) Buoyant bow form to provide a good pitch restoring moment down wind.
4) Good pitch response in waves to avoid pitchpoling and excessive wetting.
5) Sufficient freeboard and hull volume for crew and stores.
6) Minimum windage consistant with the above points.

"Rummen" has a rounded deep vee section, with low freeboard and little flare. It proved to be deficient in respect of most of the above points, and tended to ship green water in steep seas. I now favour a shallow dory hullform, flared to gain hull volume with a moderate waterline beam. Since the monohull foiler needs more pitch-restoring moment from the central hull, than a similar trimaran (where both hull and float contribute to lift), a straight swap of floats for foils could be unsuccessfull.

Hydrofoil Design :- Tank tests at Southampton showed that a vertical hydrofoil of aspect ratio 0:5 can achieve a lift/drag ratio of 6 at a Froude No 1.23 (Froude No. = $V/\sqrt{gL}$ and L = waterline chord) which is better than predicted by high aspect "Lifting line" theory. Efficiency increases with speed, probably due to the rapid decay of wave drag, while the optimum yaw (incidence) was always close to 5 degrees.

As the dihedral is reduced from 90^o, the lift/drag ratio gradually falls until 60^o and subsequently more quickly. At 45^o the best L/D value was 4, and after adding hull drag, the overall windward performance can become rather poor, especially in light winds. When driven harder, the hull tends to lift as the foil supports more of the weight and overall efficiency approaches that of the foil alone (some additional drag is caused by the rudder and after hull sections).

Rough water severely reduces efficiency, due to the shallow penetration and large lateral spread and more work is needed here.

The best of three foil shapes tested was the half parabola with the maximum span at the trailing edge. "Slender body" potential flow theory predicts that for a substantially uncambered body, there is NO LIFT Contribution downstream of the point of maximum span and, despite the theoretical limitations and some camber in real foils, planforms with maximum depth at the trailing edge may well be more efficient. In the case of symmetrical planforms, the centres of pressure are well forward of the centres of area - in fact nearer the centre of the forward half. The theory indicates that a steeper leading edge will bring the centre of pressure forward.

Measurement showed that the net hydrodynamic lift is not normal to the mean span line, but is attenuated by the thickness effect of the foil. The above foils were all 1:20 thickness/chord ratio and experience with free sailing models showed that low aspect foils of thickness ratio higher than 1:10 have high drag. I generally use a simple circular arc section, with a flat high pressure side.

Practical Constraints on Hydrofoil Design:-

1) Buoyancy is needed for static and low speed roll stability.
2) Foils need to withstand the stress and abrasion of taking the ground.
3) They must have strength to cope with large wave-induced loads.
4) The working depth is limited by the need to fly the windward foil clear of the water surface.
5) A reserve of foil area is necessary to permit cross beam clearance above the water.

A buoyancy of 0.25 - 0.3 of the total craft displacement is practicable, but, as argued by Gerald Holtom, low buoyancy foils offer the possibility of self righting ability.

"Rummen's" first foils lacked freeboard and deflected spray over the cross-beams, creating drag, but by increasing foil freeboard in a reverse sheer, the entire crossbeam was effectively shielded and is two feet clear of the surface. With 14' of beam, the ex-Shearwater rig gives a heeling arm of 5' - 6'. The foils are toed-in 5^{o} to reduce the undesirable sideforce contribution from the hull, and were set at 55^{o} dihedral.

Cross-Beams :- Foilers are generally wider than trimarans, so carefull crossbeam design is necessary. Although thin walled closed beams (wings) have good bending and torsional stiffness, they have considerable windage at large apparent wind angles, and can generate substantial lift forces which are worrying with light craft. I now favour double stayed tubes as on Gerald Holtom's "Foiler", which offer reduced windage and relatively easy lightweight construction.

Crossbeam loads and design limits :-

1) Vertical bending due to the righting moment, may be calculated as equal to the sail heeling moment during steady sailing, but rough water may impose shock loads at least equal to the all-up weight of the yacht.

2) Torsion due to fore and aft shifts of the centre of lift by up to half of the chord length. This is less of a problem with high aspect foils.

3) Stress due to foil drag is not a problem if the beam can cope with 1) and 2) above.

4) Side force loads the beam in compression and can cause failure in thin walled structures due to local buckling.

5) Impact loads during collision and berthing may require extra local stiffening, especially the beam/hull joint.

6) Fatigue stress and stiffness must also be considered. I favour a completely stiff structure, although others argue for flexibility which is easily achieved with a foiler.

7) Finally is the question of beam clearance and end connections. Stress is reduced by curving the beam down to meet the foil perpendicularly and wings should have a positive angle of attack to the water, to generate lift if immersed. Tube beams need some fairing of the outer 10% which clips the waves.

<u>Rig Design</u>:- In order to reduce beam and maximise the foil dihedral angle, heeling forces must be minimal, so low rigs are an advantage. I feel that current rigs are too tall, encouraging heel and sail twist, which reduce efficiency. A fully battened low-aspect rig would be better, especially if the boom/deck gap is minimised.

<u>Overall Design Considerations</u> :-

1) The centre of gravity is best kept well aft to avoid pitchpoling.
2) High initial roll stability will prevent adequate foil immersion. Crew weight may be able to counter this, but large craft must keep the foil buoyancy high up, to reduce

large craft must keep the foil buoyancy high up, to reduce
initial stability.
3) There are two main objections to a separate foil and float arrangement - a) float immersion can generate side force and offload the foil thus causing imbalance and instability. b) - Deep high aspect foils need greater heel angles, in order to fly the windward foil.

I am sure that a foiler is potentially faster than its equivalent catamaran or trimaran, though in small craft, failure to use the crew as moveable ballast will incur a speed penalty.

"Rummen" - a heavy boat, with poor foils and rig control - achieved 15 knots at Weymouth, and I anticipate more speed with improved foils. I remain open minded about the application of the foiler to cruising and racing, and think it preferable to avoid clinging doggedly to pet concepts, in order to encourage greater interest in the "sharp end" of sailing boat development.

Recovery of a 'dream' yacht. "Eva L" Returns - Michael Ellison

While on holiday at Agadir on the Atlantic coast of Morocco A.Y.R.S. Vice Chairman Shaun Coleman Malden saw a derelict yacht in the harbour flying the remains of a red ensign. He got on board, noted the registered number and on his return to England managed to trace the owner.

The yacht is the "Eva L" built by Curtis & Pape at Looe in Cornwall in 1970 as a yacht but to the lines of a Zulu Scottish double ended sailing fishing vessel and to comply with the white fish authority standards of construction. Captain Green ordered the yacht for living on board and ocean cruising single handed after he retired from the Merchant Navy having spent many years in command of oil tankers. She had one bunk and generous headroom.

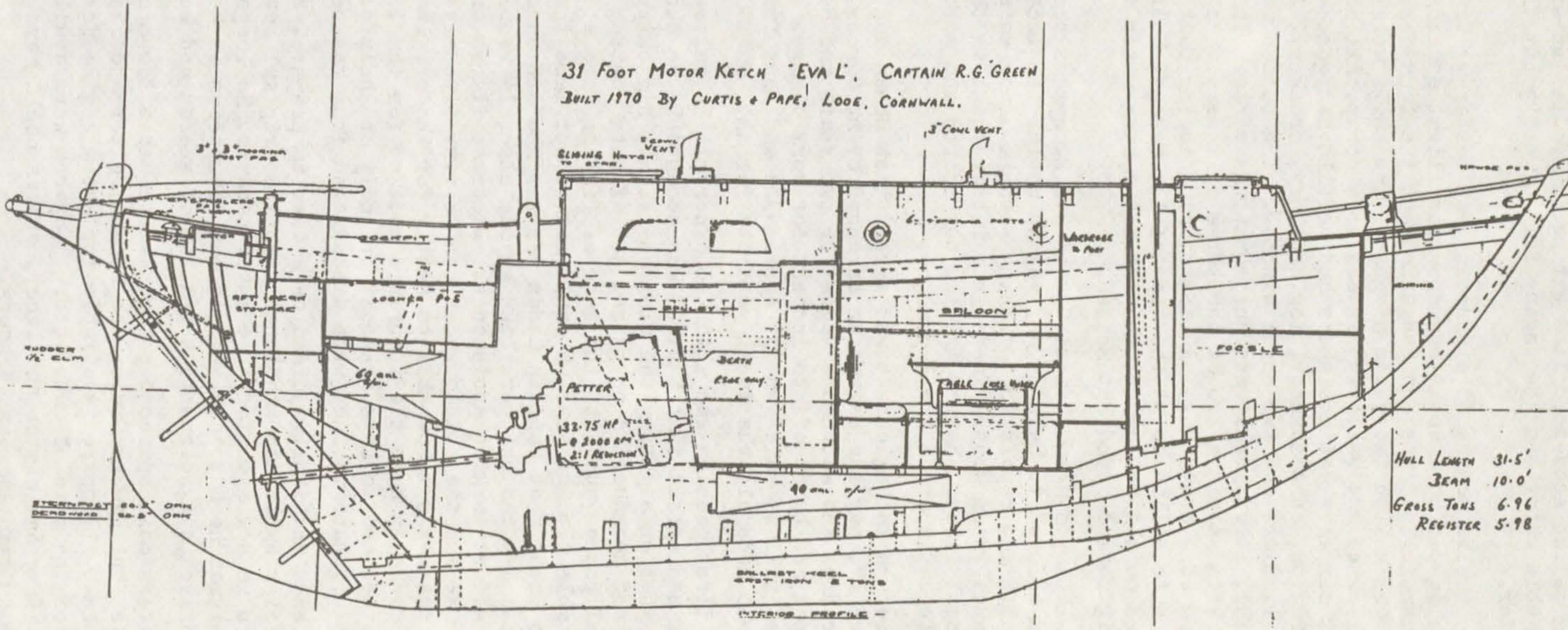
Similar to Colin Archer designs the "Eva L" has a hull length of 31'6", waterline of 25'6", draft of 4'9" and beam of 10'. A bumpkin and Airies self steering extended her length to 35'. In 1976 she was re rigged with Proctor metal masts and a bowsprit enclosed by rails and two roller furling headsails which increased her overall length to 41 feet giving a low and easy to handle rig. She has a Petter 3 cylinder giving 32 h.p. through a fixed three blade propeller at a maximum of about 2,000 r.p.m. and at a comfortable 1,000 r.p.m. maintains five knots and 15 miles per gallon. The fuel tank holds 60 gallons.

The original 2 ton cast iron ballast keel was increased with the new rig and the draft increased from 4'6" to 4'9" but with 'legs' that pin to the hull and hold her upright when aground she can still visit small fishing villages around the coast or use inland waterways. The keel, stem and sternpost are oak with close spaced double oak frames under 1" iroko planks. Plywood deck, low bulwarks, secure hatches and lots of hand holds make up a craft that can stay at sea in any weather.

To improve comfort during storms at sea Captain Green had fitted a vegtable oil container and duel outlet to the galley sink. All merchant seamen are taught the advantages of using oil to stop waves breaking in open water but this is the first time I have found a yacht where it has been used in anger.

The above brief description contains most of the ideas for an 'ideal' ocean cruiser listed in our past numbers.

As with so many dreams there are problems when put to test in the open sea. Captain Green made at least two very slow passages to the West Indies before changing the rig. After the refit he cruised to South America and was towed the last few miles to Cape Town after 110 days at sea. He was at home and not in a hurry but he ran short of fresh water. After a refit he resumed cruising but in February 1979 he became ill after again being short of water for some time. He sighted a sardine fishing fleet off the coast of Morocco and after sending distress flares was rescued and the yacht towed to Agadir. Captain Green was flown home and recovered but was not able to collect his yacht which became a derelict platform for seagulls to rest on and a mooring for visitors. The local club provided a 'watchman' and harbour dues mounted up while



31 FOOT MOTOR KETCH "EVA L". CAPTAIN R.G. GREEN
BUILT 1970 BY CURTIS & PAPE, LOOE, CORNWALL.
3" COWL VENT
COCKPIT
LOCKER P & S
AFT DECK STOWAGE
RUDDER 1½" ELM
60 GAL
PETTER
32.75 HP
@ 2000 RPM
2:1 REDUCTION
BERTH
GALLEY
SALOON
TABLE LEGS UNDER
WARDROBE TO PORT
FOC'S'LE
40 GAL.
BALLAST KEEL
CAST IRON 2 TONS
INTERIOR PROFILE
Hull Length 31.5'
Beam 10.0'
Gross Tons 6.96
Register 5.98

the salvor wanted his fair reward. It was very sad to find on board two 2 gallon soda-acid fire extinguishers filled with fresh drinkable water and the engine full of dirty but fresh cooling water.

After twelve months of discussion and letter writing I flew out to Agadir on a weeks package tour flight and inspected the yacht carefully. The sun had dried out the topsides. The decks were thick with two years of guano. The sails were left as they were when she was towed in and were scrap. All movable gear except six fire extinguishers and refills had gone - dinghy, cushions, radios, echo sounder, log, cutlery, crockery. Also the anchor windlass and two sheet winches. The rudder had been left swinging, it was split and the mountings scrap. The engine had seized with water in two of the three cylinders. The bulwarks to starboard were stove in. An aft mooring/towing post broken probably due to collision at the time of the rescue. There was much seaweed on the bottom but she was not making water and her hull and rig seemed sound but seized.

Local Lloyds agent Ernest Corcos O.B.E. speaks some English and offered to help in any way he could. The local shipyard build and repair wood fishing vessels using mainly iroko and eucalyptus wood. There is a Petter agent in the town and local labour charges are low but spares and material that have to be imported are expensive.

On return to England it was agreed that Shaun and I would buy the "Eva L", pay the salvor as arranged by Mr Corcos, pay the harbour dues and watchmans wages for two years and have the yacht slipped and burnt off to inspect for worm damage. We entered the 'bill of sale' on 1st April 1981 and sent funds to Mr Corcos who made all the local payments for us.

Our first problem was with the owner of the salvage craft. Although he had agreed that £ 1,000 was acceptable he suddenly remembered that on sighting the distress signal his skipper had cut adrift and abandoned a brand new set of nets costing many thousands of pounds and with the loss of fishing time at the most profitable time of year he could not accept less than £5,285. There is no doubt that Captain Green was rescued and under the international law the skipper, like anyone else, is required to make every effort to give assistance. Distress flares are not for casual use and the consequences can be very expensive. In our case Mr Corcos was somehow able to settle for the original agreed sum and we can only hope the insurance made up for the loss. The local fishermen and workers are most friendly and helpful so it would be unfortunate if they were discouraged from rescue duties.

Friends and family joined as a team to prepare. My Father ownes a Daimler ex London ambulance with its original Perkins 'P6' engine which is now a comfortable motor caravan. No longer an active yachtsman he has 'cruised' to most countries in Europe and agreed to drive to Agadir with a trailer of spares and equipment.

Petters main spares depot at Hamble had a few problems with our list but Hawker Sidley who bought Petter and Lister promise to keep all spares available for every engine for at least 15 years from the date of manufacture. Spares were available in Agadir including one piston and liner, others could have been obtained from Casablanca in 24 hours.

Sails, rope, fenders, lifebuoy, pumps and most of the hundred other parts necessary to restore and sail a yacht were bought at Beaulieu 'boat jumble' and carefully serviced. A full list of all the gear 'exported' was signed by customs on our departure by ferry from Portsmouth on 15th July so that we would not have to pay duty on our return. Any yacht which is sold while abroad, even to another British person is liable to value added tax when she returns and so is any yacht which does not return within three years.

Before the overland party of six departed Shaun and his wife took a two week package holiday to watch the slipping and repair of the yacht and construction of the new rudder. I asked that all work and paint used should be as used on the local craft. They took great care and used a diver to measure the hull for blocks before slipping which has to be done quickly because of a constant swell in the harbour. The only surprise was the number of zinc blocks they considered necessary . All the quotations and instructions were given in French by Mr Corcos. One plank had been gouged and toredo had got in for about 9". This was cut out and replaced. The hull had previously been painted in Cape Town three years before, the undercoat or primer was black, possibly epoxy - it certainly protected the hull.

The whole adventure was like an expensive game of 'snakes and ladders'. "Dumbo" the overland vehicle burst a tyre in the early hours of 16th July. We had to replace the spare and none were available in Bordeaux when the garages opened so we drove to Toulouse and had a new one fitted in the afternoon - it was very expensive and the fitter destroyed a tube by refusing to understand. From Toulouse we changed course and climbed up the mountains into Andora. With six people on board including my brother David, my son James and two friends plus tinned food for the voyage plus batteries for "Eva L" it is not surprising that we got a bit hot. Our dinghy on top of the trailer caused little interest as we shot down the rather rough roads into Spain. We paused in many towns and enjoyed two nights at a camp at Toledo before cruising on to Algeciras for the ferry to Tangier. Here we met another 'snake' being charged extra because "Dumbo" is too tall for the side stowage on the ferry and warned that due to 'Ramadan' the banks would be closed in Morocco and we changed some money at an unfavourable rate. Money changers were as usual open all night in Tangier.

We arrived in Tangier on 21st and were about to depart when noticed a trailer wheel bearing about to fail. The bearing is a special size but the main agent promised to get one from Casablanca "tomorrow". The Saying "tomorrow"is famous for never comming. After a lengthy debate we returned to ask "what time tomorrow ?". The answer 0915 was given with such confidence that we decided to wait. It arrived exactly on time, we quickly fitted it and set off to visit Casablanca where all spares for everything seem to be stored. We kept to the coast road kept cool by the sea breeze, the surface is mainly excellent except that stretches of five or even ten miles are being resurfaced and were rough.

When we arrived on 24th July the "Eva L" was back on her mooring and I am pleased my 'crew' had not seen her before the 'restoration' of her hull. No work had been done in the cabin and we soon found that a layer of black soot had come from a leaking engine exhaust and not a smokey oil light. The engine is a vast and solid lump mounted in a prime position in the cabin which makes it easy yo get at. It had seized with one piston at the bottom of its stroke so that the crank could not be moved. Although it was Ramadan the shipyard responded to our call for help and made up a complete new exhaust and silencer. New pistons, liners, valves etc were fitted by my Father and Brother while I organised the sails, rigging, self steering and stores and our two friends made extra bunks and a means of cooking. The fire extinguishers were serviced and flares bought locally to avoid problems with customs in France and Spain. We bought fresh food and sardines. My son was 14 and lives mainly on sausages, unfortunatly he heard that the local ones contain camel meat and refused to try them.

Insurance cover was arranged at Lloyds through St.Margarets Insurances. They were fully informed of the condition of the yacht and agreed cover from the time she was fully seaworthy. We completed satisfactory sea trials under power and sail on 28th July and they were advised by telex by Mr Corcos. Being Ramadan local labour was on overtime rate which was just a snake in the game. Mr Corcos provided a ladder by getting the invoice reduced and then paying £ 100 more than we had transferred to him for repayment 'later'. Meeting such a reliable and helpful man made us forgive minor details like having the spare water container stolen while our attention was diverted.

We sailed from Agadir at sunset on 1st August having David, James and a friend as crew. My Mother and a friend flew out to 'cruise'home overland via Portugal in "Dumbo". They were not sorry to leave the dusty camp site with its infrequent water supply. It only rains about four times a year and then not much.

On the yacht our course was North under power. By 0600 on 2nd the wind was force 6 and at 0900 it was blowing 7 so we hove to under reefed mizzen and jib heading 300 degrees and making 30 degrees leeway at 1½ to 2 knots. By noon the wind was 7 gusting 8 and at 1500 the log reads N'ly 7, heading WNW making West at 1 knot. Sea rough with heavy breakers. Similar conditions until 0800 3rd when the wind moderated to force 5 and the sea reduced. Our friend who had been seasick felt that he might have a fever comming and asked to go ashore - not the gentle cruise he had expected. Conditions continued to improve, by noon we had full jib and mizzen making 050 and at 2100 we started the engine heading for Safi. At 1500 on 4th we followed a fishing boat into the little port of Es Suria an ancient fortress. Without a proper chart or echo sounder I came in with great care as the port looked full. The fishing boat left his berth and came out to guide us in and show us a safe berth alongside. 3 days and 36 hours under engine to make good 74 miles.

At Es Suria the banks were closed and emigration staff had gone home for the day. Our friend cleared customs. I hired a hand cart with 'hand' and walked several miles to a garage to buy 20 litres of diesel for £ 5 and $ 2 for the cart. James cured some of the deck leaks with the mastic gun and David worked on a Honda generator we brought with us but pronounced it scrap. After a quick walk round the fort we departed at sunset under power - wind N'ly 3 with poor visibility. I like to sail at sunset as this gives daylight for preperations and often the onshore breeze dies. Shore lights make navigation easy giving a good fix for departure and there is less danger of collision.

By noon on 5th the wind increased to force 5 and it blew force 5 or 6 on 6th and 7th. Progress and miles per gallon are greatly reduced with head winds of more than force 4. At noon on 7th we had logged 226 miles and tacked from 320 to 060m. By noon on 8th we had 'lost' 3 miles which was confirmed by afternoon sun sight. By Sunday 9th we were fed up with lack of progress and started the engine at 0900. With staysail and mizzen set and 900r.p.m. we made 5 knots at 060 or with mizzen only we made 3 knots at 020m. By noon we celebrated a days run of 42 miles with 240 miles on 019 true to reach Cape St Vincent at the same time the wind eased to force four (N). On 10th at noon we put the revs up to 1100 giving a days run to noon 11th of 115 miles with 27 gallons fuel remaining and 145 miles to Lisbon, we had used 38 gallons with 98 hours running. It was not plain motoring to Lisbon - by 1800 on 12th the wind was NNE force 7 and visibility under two miles and at 1900 we stopped the engine to check a vibration we had not noticed before. We spent the night looking for shore lights and mending the 'Seafix' which had a broken ferrite rod due to rough roads not seas.'Araldite' got it fixing and at 0200 Cape Espichel bore North . A fractured fuel pipe prevented use of the engine but the wind moderated. We'observed' the light about three miles distant at 0425 and David completed repair of the pipe, replaced it and started the engine. In addition to watches to keep a lookout David looked after the engine, James kept the bilge water below the floorboards with bilge pumps and 'mastic' pumps and I was navigator. We found Lisbon by almost continious use of the hand lead being secure in the yacht harbour by 1400.

In Lisbon we found it to be a holiday weekend. We walked up to the international camping site but no sign of 'Dumbo' so we changed a few dollars into local money and caught a bus back. Next morning we went with other skippers of yachts arriving or about to depart to clear customs and received a message that 'Dumbo' had cruised on several days before thinking that we had sailed direct to Plymouth and not knowing of our visit to Es-Suria to land our friend. I had spent my last travellers cheques paying the shipyard and my 'plastic money' cheque card had just expired. Neither the Lloyds or Midland banks in Lisbon could obtain money from England in less than seven days even although I had cheque books and funds in England in both banks. We put aside enough cash for diesel. David 'obtained' a used alternator to replace ours which worked sometimes and we set out to enjoy three days of sight seeing at very little cost. David has an 'Access' card which would not buy fuel but we enjoyed a big meal and obtained a big bag of bread with it before we sailed on Monday evening .

From Lisbon we had calms and fog to Cape Finisterre which we cleared at 0600 on 20th averaging 4.7 knots for the 270 miles at between 900 and 1000 r.p.m.. Once clear of the coast we stopped the engine having a force 4 N'ly breeze and fuel left for 46 hours. Our close hauled course of about 310 changed very slowly so that seven days later we were still close hauled on the same tack heading 060. At 1100 on 27th we started the engine 85 miles West of Scilly Isls and motored to Plymouth berthing at 2320 on 28th with one gallon of fuel remaining.

Notes and Observations

"Eva L" is very suitable as a cruising home in coastal waters and passages of less than 600 miles. For longer voyages propeller drag stops reasonable progress under sail, especially close hauled or in light winds, I fail to understand why Capt. Green did not remove the propellor or fit a two bladed one for his many ocean crossings.

The metal mast has fixed steps to the top. These make it easy to climb the mast but halyards often catch on the steps so that one has to climb up to clear them.

Having a bowsprit and bumpkin makes berthing alongside difficult. Swing the bow in and you spear with the bowsprit or stearn in and foul the self steering .

The original plans show a Taylor parafin stove for cooking. There is a 14 gallon parafin tank beside the cockpit with gravity feed to a tap in the cabin. Cooking was by 'Gaz' with a two burner stove and evidence of a 'waterless cooker' being used.

A Simpson Laurence 400 toilet was originally fitted. Fittings show that another had be tried but at some time a bucket must have proved more reliable. Original equipment also showed an electric anchor winch. It was changed for a hand-power model which was torn out and stolen in Agadir.

With a second person to drop the decompressor lever I could hand start the engine but Capt. Green on his own could not which accounts for the full fuel tank when he was rescued. The return pipe from the fuel pump was taken back to the inlet pipe instead of to the tank. With the yacht sailing the last 20 gallons of fuel could not be used due to air entering the pipe and stopping the engine.

For 1982 I built and raced "Sabu" and I could not restore and cruise "Eva L" at the same time and so we sold her. We did plan to make a modest profit from the adventure but with mooring dues at Plymouth (per registered ton for Eva L in 1960 to 1964 would have cost 20p per week and now costs £ 21 per week with no improvements to the dock or service of any kind) plus the sad state of the used yacht market we had to be satisfied with almost recovering our costs and having saved her from becomming a haulk.

Cruising Without Hard Labour

Frank MacLear, of New York, has for the past ten years been concentrating on labour-saving rigs and equipment for large deep-sea cruising yachts. His objective is to make really large vessels easily manageable by a married couple unaided. His "Falcon 11" and "Aria" incorporate many ideas for the detailed application of power units in a way that racing rules forbid, but which the cruising yachtsman will bless.

For instance his "Falcon 11" has quite often been sailed with just two aboard. All fore and aft sails roll in and out electrically, and these include, starting at the bow: the giant drifter, the genoa and, between the genoa and the mast, a luff-roller-furling storm-staysail. The fourth luff-roller-furling sail is the mainsail which is outside the mast and is boomless, trimming to the centerline backstay. She started out with three sheets rigged to three backstays but in her second year the outer two were eliminated as unnecessary.

"Falcon 11" has rungs right to the very masthead so that when the owner's wife hoists him aloft on an electric winch he can have a foot and hand on a rung at all times, thus relieving the minds of both hoister and hoistee.

"Falcon's" dinghy can be put in the water in ten seconds and can be hoisted in davits and ready for sea in less than one minute.

This vessel may have more equipment within reach of the helmsman than any other in existence. Within reach of the wheel are nine electric winches as well as all navigational gear. Of course when one decides to do everything electrically the design must take a jump in size; for instance "Falcon 11" has two 15kw generators and two large banks of batteries. So she needs to be considerably bigger than she might be without these massive aids.

"Aria 11" is an 86 foot cruising cutter that is sailed by a 79 year old owner and two college boys. No true professionals have been carried on the vessel for the last six years. "Aria" can set 2,000 sq.ft. in less than 40 seconds if two people are doing the job, and in less than 60 seconds if one person is doing the job.

George Kress, "Aria 11"s owner, often brings her to her night's anchorage under sail where other persons might hesitate to navigate a 26 footer without using the engine. "Aria" was one of the earlier sailboats to have a bow-thruster, and it is of considerable help to her when maneuvering in tight spots among other vessels.

"Anore" a 68 foot ketch has cruised many miles under various owners from Venezuela to Canada. She has a MacLear rig with mainsail and mizzen luff roller furling aft, but outside of these masts. Steve McGowan, for many years her captain, says that he was very happy with the boomless mainsail and cannot see why any cruising boat should have a boom.

"Delfinia" has been operating for over ten years in the European waters including the English Channel, the Bay of Biscay and the Mediterranean. She was an early boat with 100% push-button luff-roller-furling sails and she represents the interim step between full boom and no boom, for "Delfina" had a "half-boom" that was pivoted well aft of the mainmast and aft of the helm.

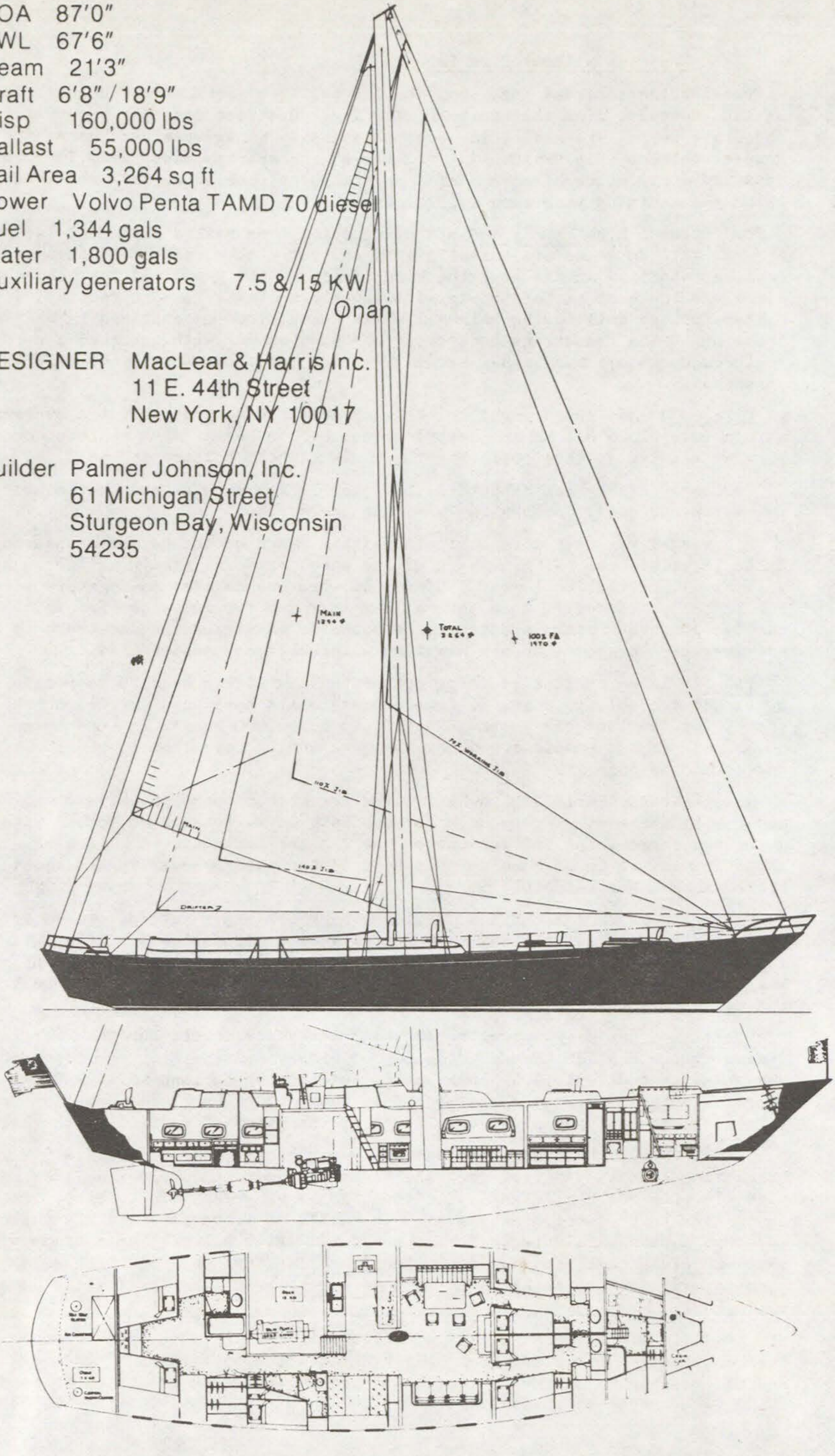
Frank MacLear has two other designs under construction; one is a 94- foot brigantine that is 110 feet over the bowsprit, nearing completion. She has more electric roller furling sails than any other vessel of her size, length, or tonnage in the world, having nine in total. Six are fore and aft sails, and three are square sails. The fore and aft sails all roll up outside of masts in plain sight and the square sails roller furl in front of the yard. This may well be the first yacht to have electric luff roller furling square sails.

"Aquilla" is the most highly experimental cruising yacht that MacLear has ever designed. This craft was built by Eric Goetz in Bristol, Rhode Island and is expected to be the fastest light weather sailboat in the world in 1983. The designer cautiously states that this only holds for winds of less than

LOA 87'0"
LWL 67'6"
Beam 21'3"
Draft 6'8" / 18'9"
Disp 160,000 lbs
Ballast 55,000 lbs
Sail Area 3,264 sq ft
Power Volvo Penta TAMD 70 diesel
Fuel 1,344 gals
Water 1,800 gals
Auxiliary generators 7.5 & 15 KW Onan

DESIGNER MacLear & Harris Inc.
11 E. 44th Street
New York, NY 10017

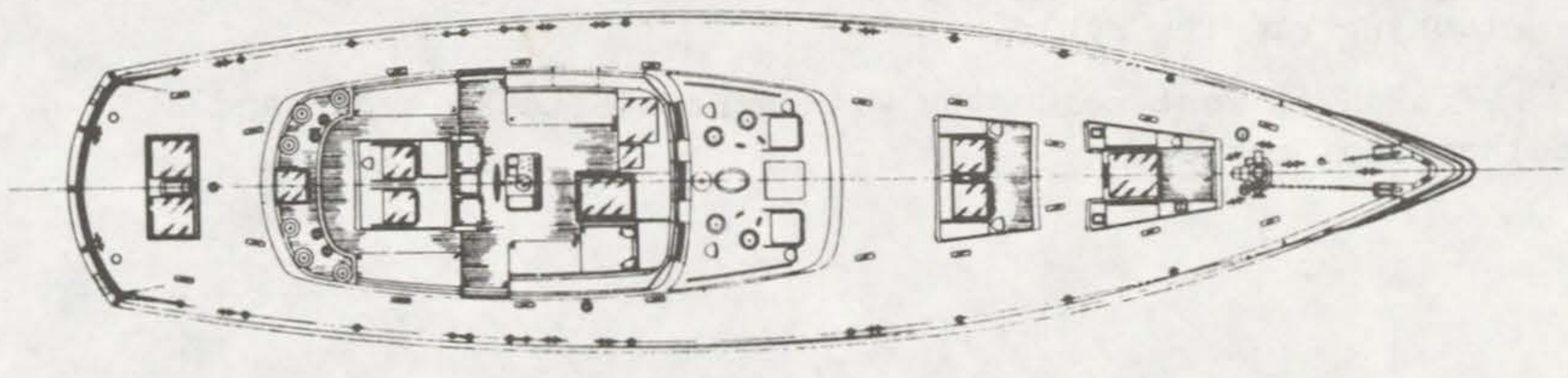
Builder Palmer Johnson, Inc.
61 Michigan Street
Sturgeon Bay, Wisconsin
54235



eight knots at which time the 36,000 pound "Aquilla" can set a 4,000 sq.ft. spinnaker without spinnaker pole. She is certainly the first cutter to have a 140% mainsail, for the clew of her mainsail extends well aft of her permanent backstay and she must deep-reef to go upwind with this sail. On the other hand, when she comes off the wind on a reach or a run her mainsail will unroll by the yard and together with her gigantic drifter which is 77 feet on the foot it would be hard to think of any boat that could out perform her in light weather since there are no J-boats left in existance to reach up 160 feet above the water for light breezes that are not blowing lower down. Aquilla's 8,000 pound keel-centerboard pivots 60 degrees up and down in the usual centerboard fashion but in addition it tilts 60 degrees laterally about a longitudinal axis and can increase the stability substantially by moving weight to windward. In addition to this she can shift 3,000 pounds of seawater when she wishes to take on this water ballast.

There will be more about both of these vessels in a few months and we would rather not go into too much detail at this writing. There will also be released plans of a 50 foot one-couple cruising boat that was in the fall of 1981. This craft is a manual version of the ultimate one-couple boat, and is designed by Frank MacLear. She has three manual luff roller furling sails including a drifter at the end of a bowsprit, a genoa at the stemhead and a mainsail that all luff-roller-furl. The main and the genoa also luff-roller-reef but the drifter is either fully set or fully rolled.

MacLear says:"As I look back on all of these designs having sailed on most of them, I find that one of their assets is that they save an enormous amount of manual labor in sail setting, sail furling, and the avoidance of lugging sails and fighting sails by hand. All of these boats have sailstops in their lockers but they are hardley ever used and may not be taken out even once in a year. Sail covers are unheard of and jumping on top of a deck house to furl the main is a thing of the past. Large headsails are carried right up to the mooring, or heaving docklines. I have been predicting and still predict that push-button sailing will become progressively more and more acceptable and desirable and that there is nothing to be ashamed of in getting electric assistance. No one hesitates to push a button to start their engine, not feeling it necessary to go crank it by hand to enjoy either powering their boat or driving their car. In the same way I believe that sheet winches, halyard winches, electric capstans, and electric luff roller furling sails are going to grow at an extremely rapid rate just as fast as people can afford them and fit them on either existing boats or new boats. To be able to trim a 3,600 sq.ft. sail by oneself is a very pleasant feeling and the fact that the power was stored in a battery instead of stored in three to four peoples muscles makes very little difference in how the boat sails. There are still many ways to get one's exercise and cranking winches and wrestling with sails is not as highly desirable as some people seem to think. I enjoyed heaving the lead and at one point I was quite proficient at doing it at fairly high boat speed in fairly deep water, but now I am perfectly content to throw a switch and read the answer either by analogue or digital readout. Furthermore, I note that the young kids are seldom interested in how the lead used to be heaved and how it was armed. Minds are otherwise occupied, and that may not be so bad !



"Samphire"

"A Sea Boat" by W.E. Smith (Original owner, designer & builder.)

Full details available from Dr W.Edwin Smith, 1028 Robie St., Halifax, N.S. B3H 3C5. (Canada)

Hull & Ballast Description. "Samphire" is built to be able to fulfill the need for an extremely strong and safe, yet economical and easily handled cruiser. She is 52' in overall length, with a waterline length of 43' and displacement of 25 ton. (Reg. 30.56) Rigged as a bipole, staysail schooner, she is built to a set of lines modified from the Bruce Roberts R-50 canoe stern motor-sailer. The entire design produces an immensely strong and able unit which is engineered to be a sea boat.

The hull is constructed with 'C-Flex' (C-65) techniques, and incorporates full length longitudinal stringers on 1 ft. centres, parallel to the waterline. The G.R.P. layup consists of alternating pairs of 18oz W.R and 2oz CSM beginning at one shearline and running to the region of the waterline on the opposite side, and then reverse procedure beginning at the other shearline. The result is a layup of C-Flex and G.R.P. meshed in the most effective possible matrix. Hull thickness is about 2" at the keel, and tapers in the region of the waterline to about 7/8" at shearlines.

Ballast consists of 13,000 lbs of bulldozer track pins, tied into one solid unit by full keel length reinforcing rod (thirty 3/4" X 20' ±) and wire ties. This is grouted with ferroconcrete quality mix to a full weight of 19,000 lb.

General Layout Description. Accommodation on board is very complete including a total of 12 usable berths, large dry bilges, lockers and stowage areas of all possible kinds.

Layout is intended as charter or general cruising in type, and includes two forward, mirror image staterooms with individual deck access. A large hold area for sails, chains & anchors, cordage and bulk stowage is seperated from the main vessel by a watertight collision bulkhead, and is accessible only by deck hatch.

A large and central saloon area and adjacent lounging area are just forward of a most functional galley, complete with the necessary features of serious offshore cruising. A comfortable head with sink and closets for linen is to port of the galley.

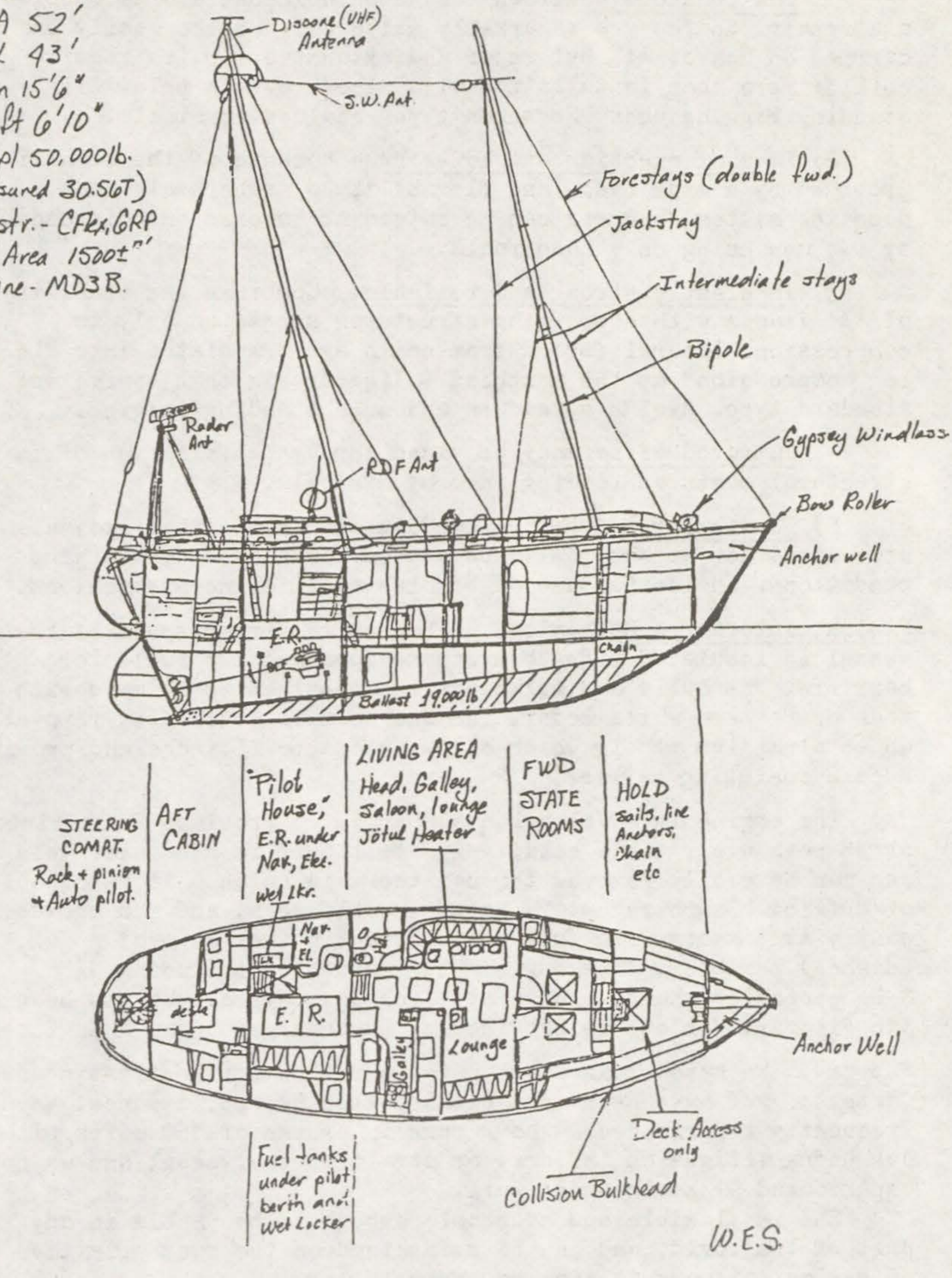
The pilot house includes navigation and electronics, wet locker, pilot berth and settee, with engine room below. An aft cabin doubles as crews quarters plus office and workshop area.

Right aft is the steering compartment with rack & pinion steer , auto pilot, emergency tiller, and stowage for spare coils of standing rigging cable.

Finish is most seaworthy with generous teak, cedar and weatherproof carpet.

SAMPHIRE - Bipole, Stas'l Schooner

LOA 52'
LWL 43'
Beam 15'6"
Draft 6'10"
Displ 50,000lb.
(Measured 30.56T)
Constr. - CFex,GRP
Sail Area 1500±'"
Engine - MD3B.



W.E.S.

Bipole Rig. Features: The bipole rig has several distinct advantages:

1) Low technology allows easy and inexpensive construction and repair. Spares are remarkably universal and can easily be carried on board. All but major and extensive repairs require nothing more than installation of a sleeve over a pole. All standing rigging uses "Norseman type" sealock terminals.

2) Ease of erection and lowering - because of the stability provided by a wide base, and flexibility of tabernacle deck mounting system, the rig can be raised or lowered and disassembled by two men using only hand tools.

3) Inherently strong and reliable. Combines the stability of 'A' frames with supporting structures subjected only to compression. Lateral forces from sails are translated into "Lee leg compression" at the masthead - lighter rig than equivelent standard type. Avoids spreaders and much standing rigging.

4) Improved efficiency provided through elimination of structural masts at leading edge of airfoils.

5) Flexibility - various configurations of jibs, staysails, etc. possible for best ballance and performance under varying conditions. Incidental use of bipoles as lifeline staunchions.

Finish, Interior & Mechanics. The entire living space of the vessel is insulated with 1" urethane foam and two reflector barriers. The hulls and bulkheads are sheathed or trimmed with teak or Eastern white cedar. The deckhead is covered by removable white aluminium panels which allow access to fittings and provide a fire resisting barrier.

The engine is a Volvo Penta MD3B which provides 25 continuous or 35 peak h.p., This relatively small unit is hand startable and can be easily removed through the main hatch. It is capable of driving "Samphire" at 7+ knots in calm seas, and can cruise easily at 5 knots with fuel consumption in the range of ½ gal. (diesel) per hour. The engineering hardware, including 1¼" S.S. propeller shaft, bronze stuffing box, stern tube and bearing, 316 alloy rudder etc is provided by Lunenburg Foundry & Engineers.

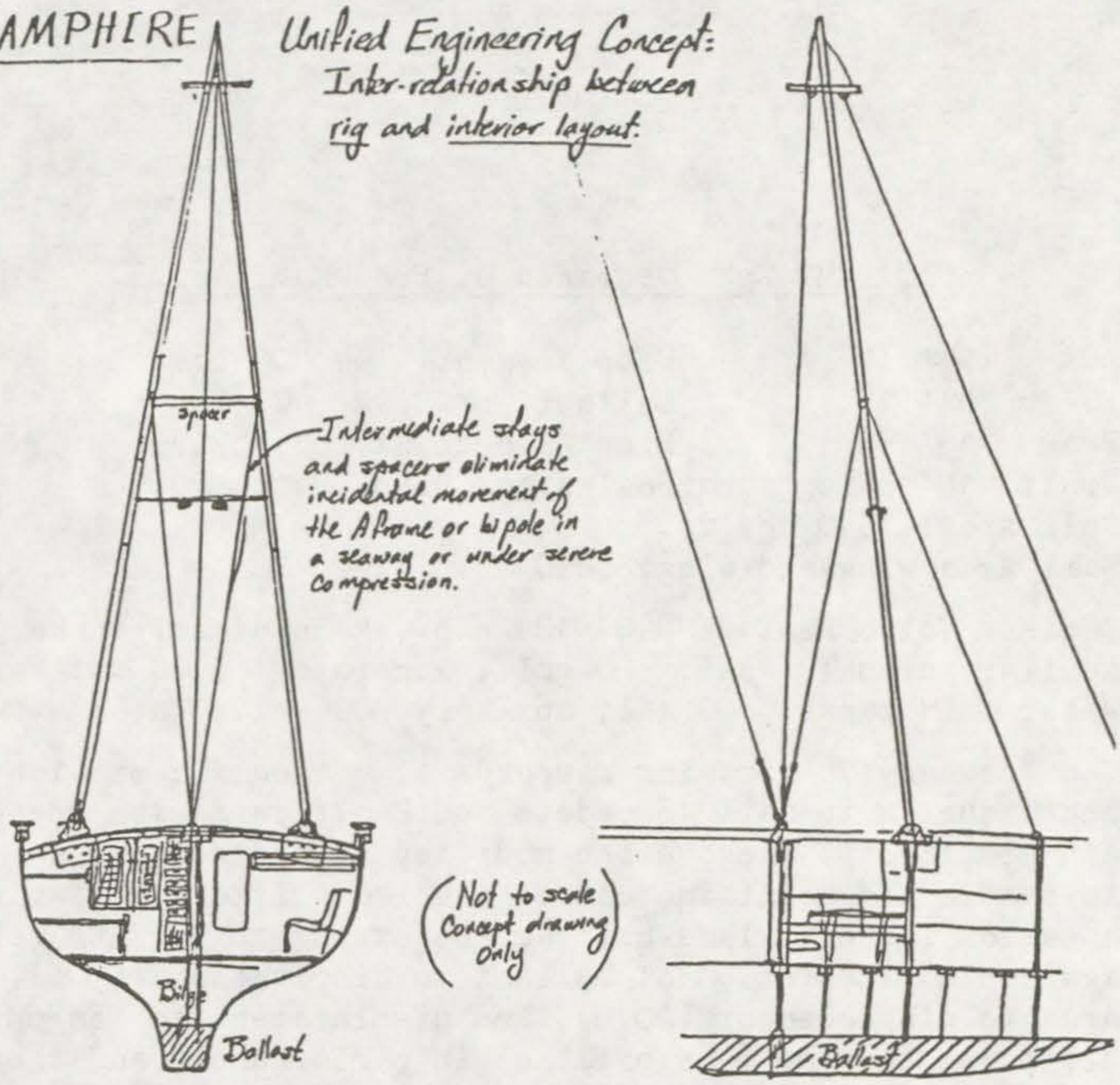
Summary. We have cruised extensively in the North Atlantic and Caribbean and have been most pleased with her performance. We have frequently experienced 24 hour runs in excess of 150 miles without undue fatigue on the crew or strain on the vessel and we have experienced 9+ knots under sail.

She is flexible and adaptable enough to be usable in any part of the world, and can be maintained on the most primitive of marine railways at minimum expense.

"Samphire" is more comfortable frequenting remote harbours or long distance cruising than sitting in a group of sleek yacht club beauties, and makes no pretense at being anything but a good, solid, honest SEA BOAT.

SAMPHIRE

Unified Engineering Concept:
Inter-relationship between rig and interior layout.

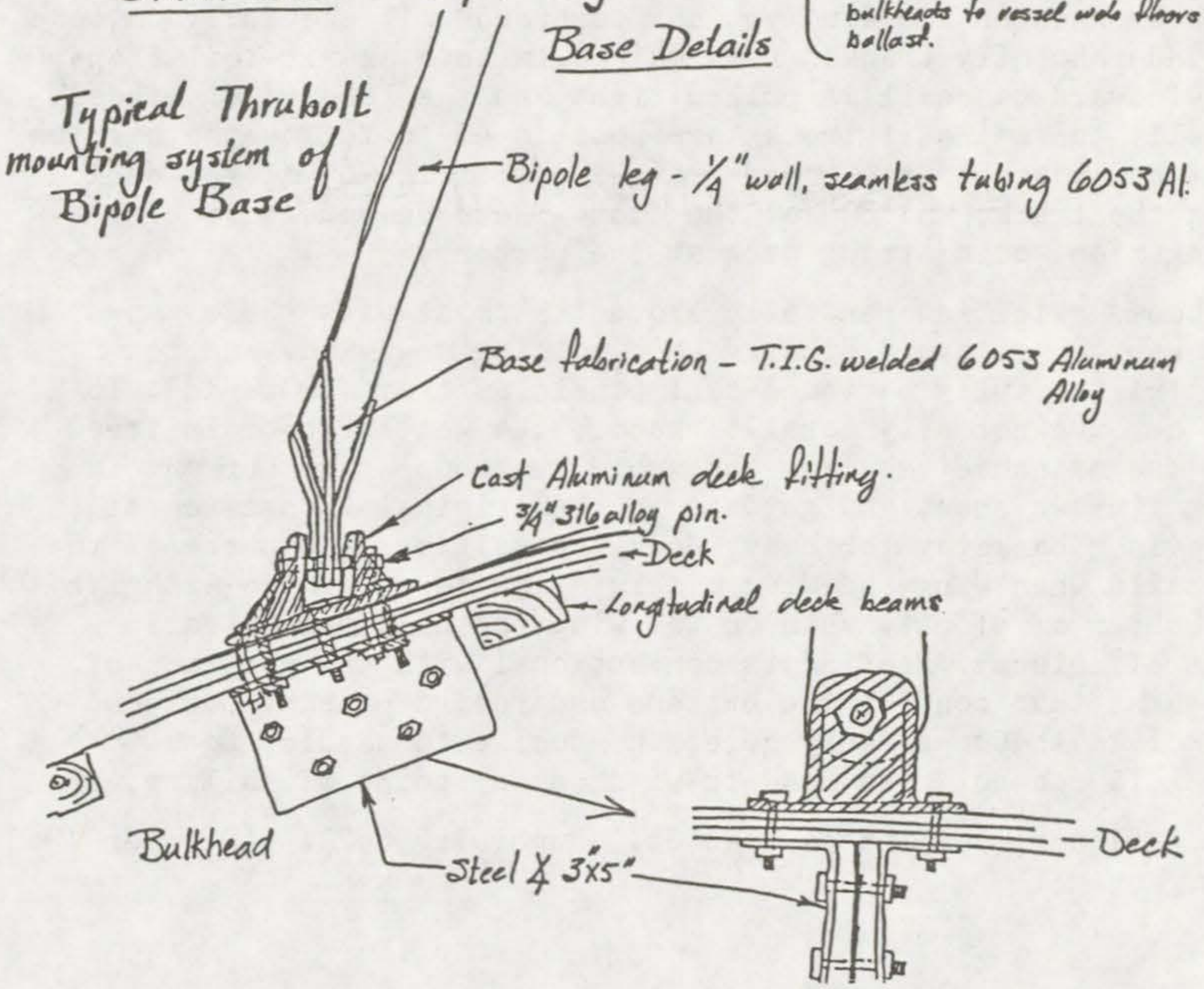


The vessel layout plays an important role in the integral strength and unified engineering concept of SAMPHIRE.

Bipoles stand on major bulkheads and are bolted to them, and Jack stays and forestays also tie into major bulkheads with ½" SS "U Bolts" and forces are run down bulkheads to vessel wide floors + ballast.

SAMPHIRE – Bipole Rig

Base Details



"ACADEMY 76" Designed by Fred Madlener.

LOA	76' 3"	Displacement	44,800 lbs
LWL	61' 1"	Ballast	22,400 lbs
Beam	16' 9"	Disp./Length Ratio:	87.75
Draft	10' 6"	Sail Area/ Disp. Ratio	20.5

Sail Area: 1610 sq. ft.
Sail Area wing-and-wing:3,220 sq. ft.

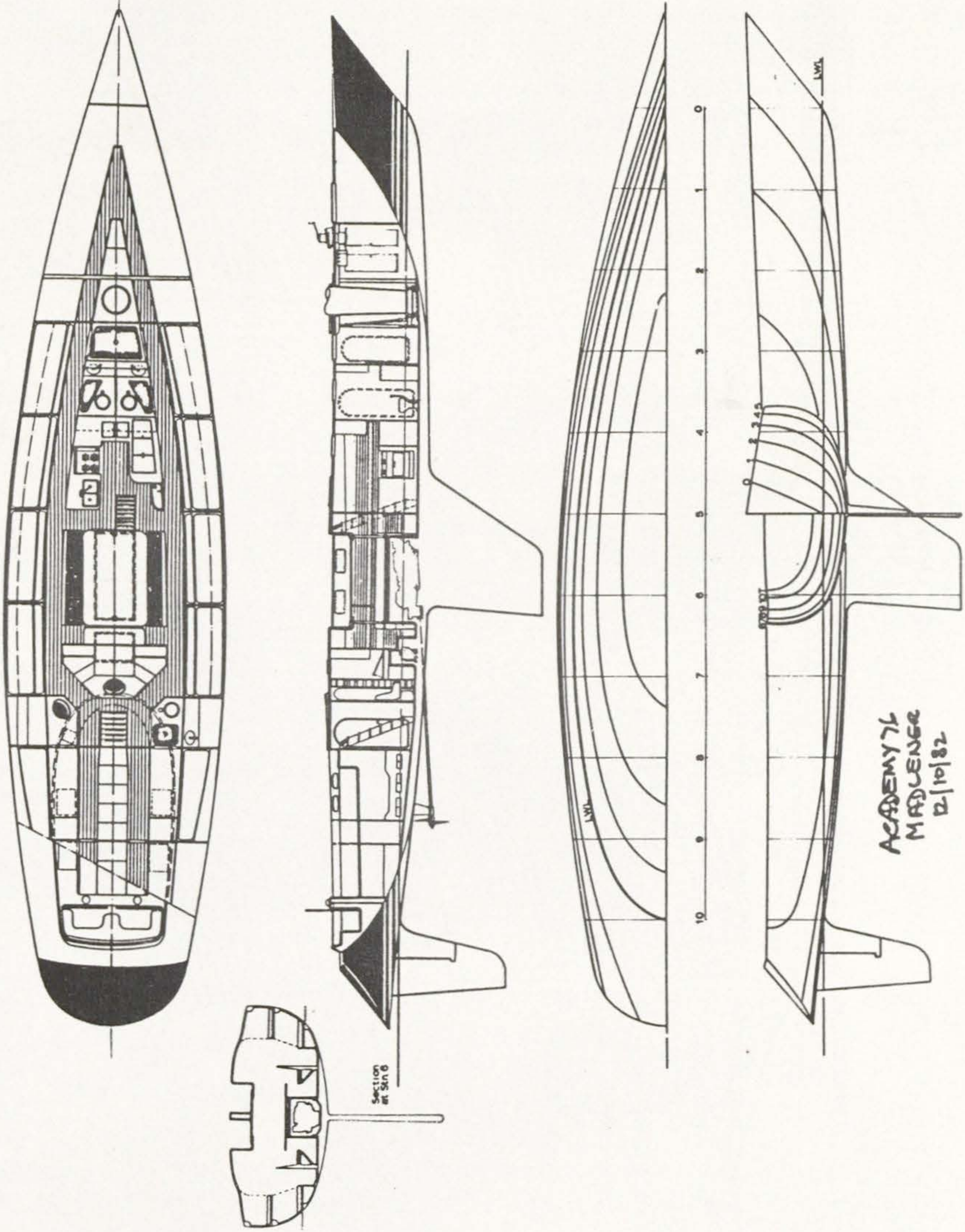
Engine: Volvo Penta TMD40A 124 h.p., Main diesel tanks 300 gal; auxilary diesel tanks: 300 gal., Generator: 3500 wat Faryman. Water main tanks: 300 gal; auxilary 300 gal., Water marker: OML.

The "Academy 76" drawing responds to a specific mission for the boat: she is to sail 16 cadets and 2 officers with speed, safety and simplicity. I chose the modified Ljungstrom rig as the easiest to handle and maintain, and so the least likely to fail; I chose a carbon fibre-S glass hull as the strongest for its weight available. The ratios of ballast to displacement (50%), sail area to displacement (20.5), and displacement to length (87.75) all point to good possibilities in performance, and they are made possible by the new generation of materials now in general use in I.O.R. fleets. Of course simple construction and light interiors are required to hold down displacement.

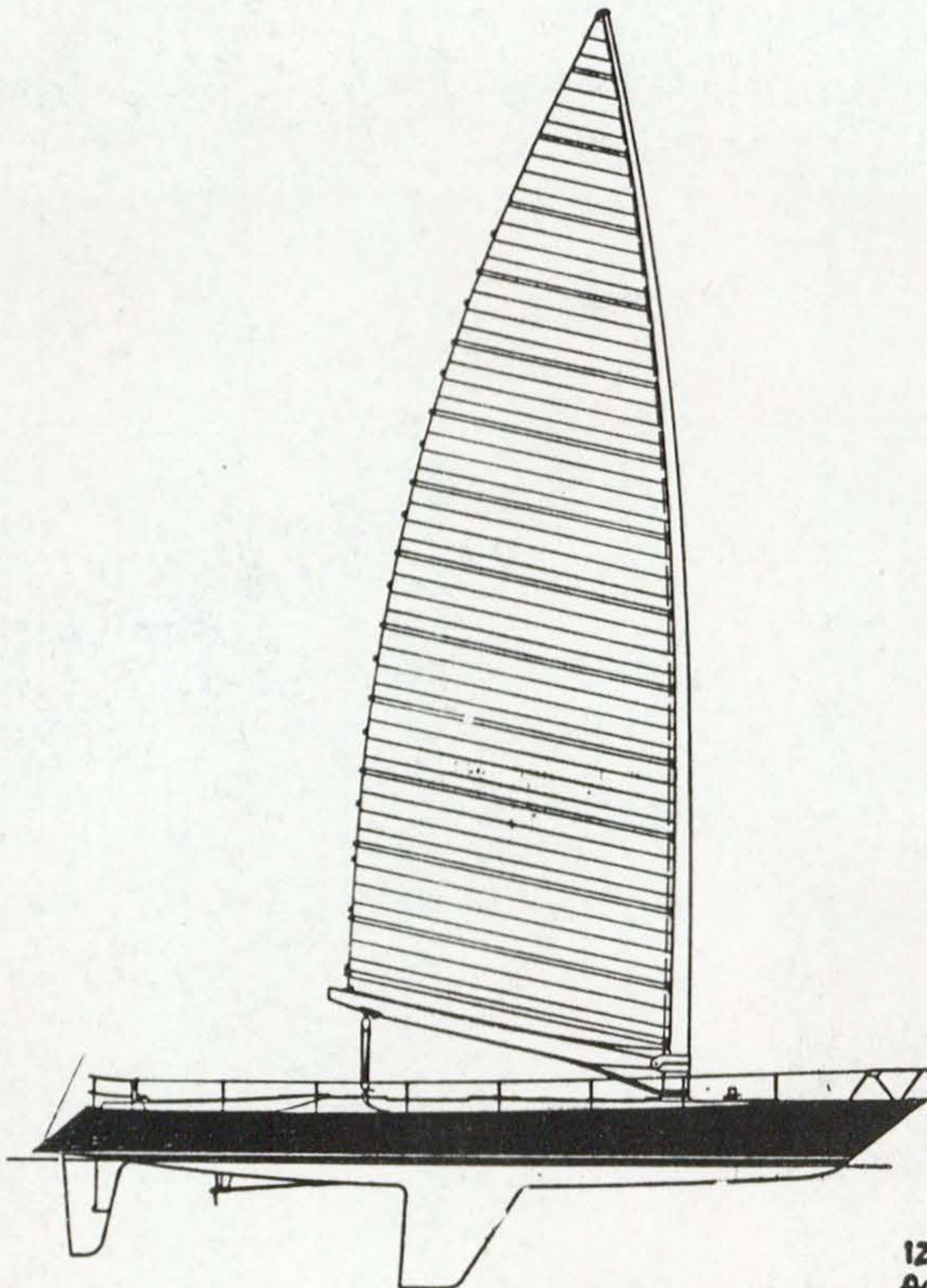
The rotating spar weighs about the same as a conventional one though it has a much lower center of gravity. By rotating it slightly when on the wind you can push and pull the fully battened and independently tracked twin mainsails into an air-foil shape; the windward mainsail is pulled tight and the leeward one freed. Normally the mainsail tracks are positioned to follow the airflow as it comes around the round spar. The spar is 26" at the deck, 6" at the truck, and 22" at the foot. These diameters require a strong step and a strong deck at the partners.

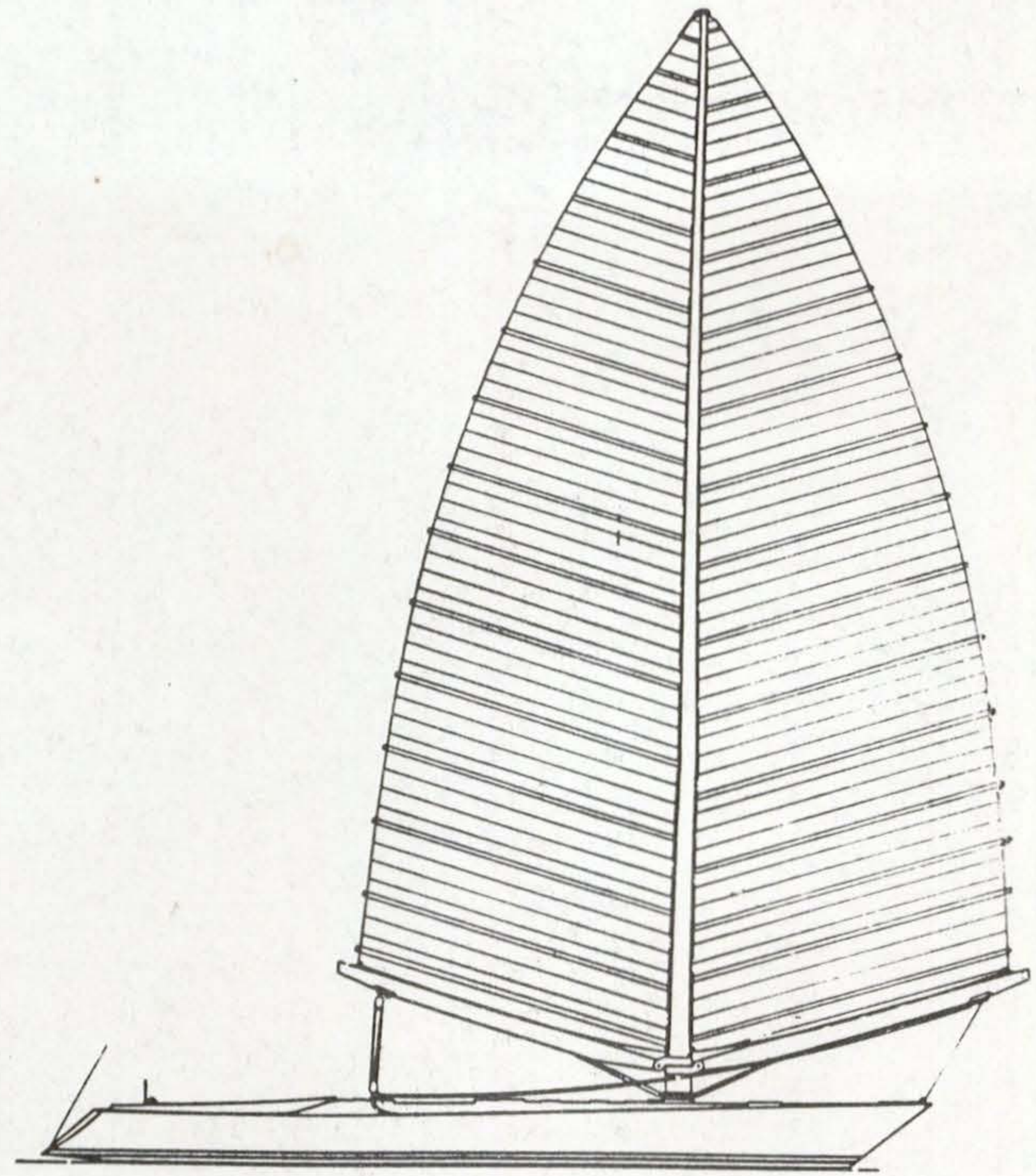
The booms swing independently around the mast with their vangs. They cant up to avoid dipping when rolling downwind, and to parallel the fully battened sail panels as they are reefed. To wing out the normally parallel booms, the weather boom is freed from the mainsheet shackle that hold the booms together and is given its own sheet and guy. As in the original Ljungstrom rig, there is a backstay for heavy downwind sailing. The shape of the mainsails when wing-and-wing offers a low aspect ratio with its low center of effort. When on the wind the high aspect ratio gives efficiency. Reefing is conventional with the addition of lazyjacks that control the battens and reefed panels. Battened sails like these are very quiet and docile to handle. Both mainsails can be freed head-to-wind on any point of sailing.

From Madlener, 1923 Ke'eaumoku St., Honolulu 96822. (October 1982)



Section at Stn 8
LWL
ACADEMY 76
MADLENER
12/10/82





12-10-82
ACADEMY '16
MADLENBA