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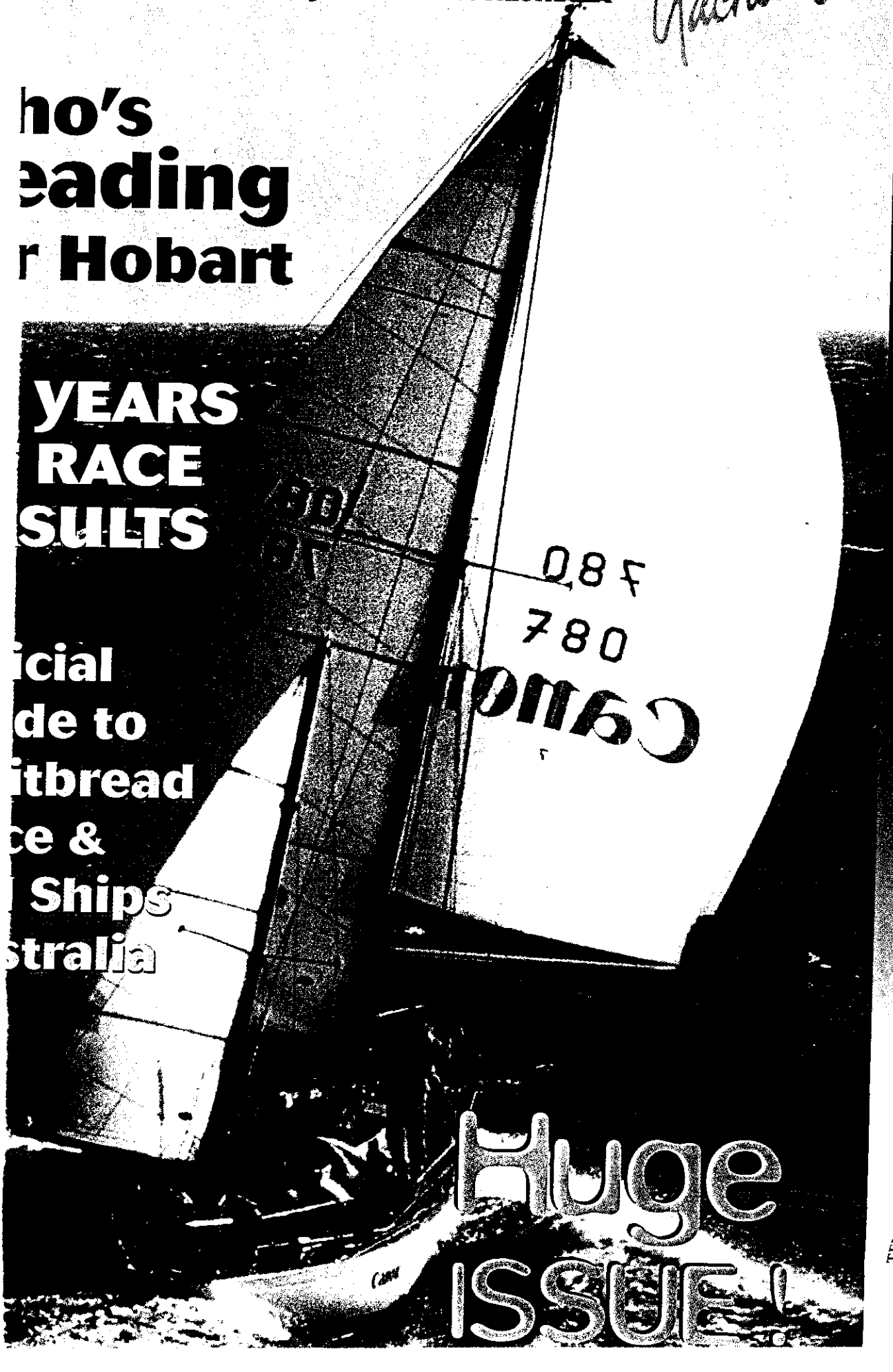

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ISSUE

TELSTRA SYDNEY TO HOBART
1997

Weather Watch

To be or not to be...

A guide to weather prediction at sea with a Hobart race bias

Weather prediction is quite complex at the best of times as there are many variables to be taken into account.

It is made even more complicated at sea than compared to the land when one considers the relative lack of data available to the user.

One way of filling this void, is for YOU to perform regular, say at least every three hours, observations. These observations should include (write it down, our memory often forgets?)the following:

- wind direction and speed
- cloud type
- temperature (air and sea)
- barometric tendency and
- sea and swell conditions

By logging the above variables and noting any trends in conjunction with regular forecasts, you should be able to build up a picture of what is going on around you and in particular it is the observation of cloud, followed by the barometric tendency that will give you an indication of any impending significant changes.

It is these changes with which you are particularly concerned because you know what the weather is at the current time and presumably comfortable with, but changes in both wind direction and speed for example, may affect your future strategy.

You should become very familiar with at least the 10 main cloud types, namely, cirrus,cirrostratus, cirrocumulus (high-level clouds), altocumulus, altostratus (middle-level clouds), nimbostratus, stratocumulus, stratus, cumulus and cumulonimbus (low-level clouds). A very good knowledge of what we call accessory clouds in the trade is also recommended. Some examples of accessory clouds are as follows, arcus clouds which are more commonly known as roll and shelf clouds, mammatus, lenticularis, and pileus just to name a few.

There are many good weather books and cloud charts around for you to buy or borrow that will help you here (check out Boat Books). When you are happy with this aspect (it takes time!!!!) then you can start to concentrate on cloud sequences or trends. It is the sequence or trend that is very important for forecasting. An example of a "must know" cloud trend (outside of the tropics) is that associated with the passage of a cold front.

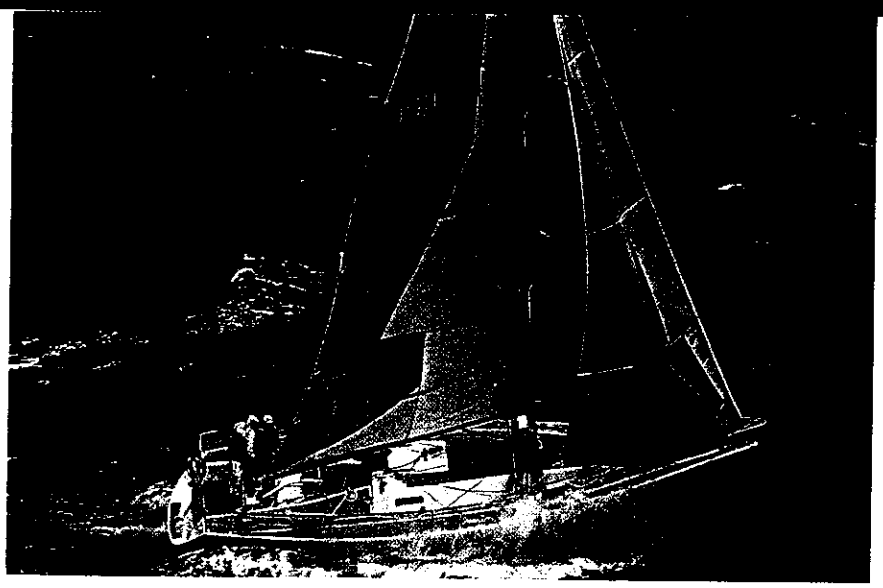
It goes like this, 20 to 36 hours before the arrival of the cold front, we will generally observe high-level clouds, 6 to 12 hours before-hand middle-level cloud will be observed and marking the leading edge of the front at the surface will be our low-level clouds. Please remember that from the point of view of cloud and weather, each cold front will be different, and that some fronts are cloud-free.

The aneroid barometer is your main instrument at sea to sense significant changes. It is the tendency, rise or fall over a time interval, of the pressure that we are interested in and not the instantaneous value. For example, a pressure rise or fall of say 6 hectopascals (6 millibars) or more over a 3 hour period will tell us that either we have at least strong winds or greater now or they are just around the corner!! The greater the pressure change over the three hour period the stronger the winds. Note: On a moving yacht the pressure tendency as calculated by you from the barometer is not for a fixed point.

For example, a yacht planing at 20 kts in an easterly direction while an active cold front is moving in the same direction at 25kts. In this case the barometric tendency on the yacht may show only a small rate of pressure fall whereas a nearby island may show a large fall, thus indicating a vigorous system. In this case the yacht's barometric tendency may be providing slightly misleading information. The equivalent pressure tendency for a stationary point is equal to the following: (pressure tendency on yacht) - (yacht's velocity x pressure gradient)

We will now just concentrate on wind forecasting for a while. The basic weather forecast obtained via radio (write it down or better still record it) will give both wind speed and direction and essentially there is little cause to argue with what the forecaster is suggesting. Please note that wind directions and speeds mentioned in official forecasts (and observations) are for a height of 10 metres (33 feet) above the ocean or land surface and are 10 minute averages. Gusts are generally not mentioned at all in forecasts!! So be aware!.

But we also need to know when a



Queensland yacht *Axicorp Long Distance Challenger* battling south soon after the start of the 1996 Telstra Sydney to Hobart Race. (Pic - Ian Mainsbridge)

cold front, for example, will be passing over us. You can obtain this information from the forecast but this will need to be fine-tuned by the Eye Ball Mark 1 Method, noting the cloud changes (as well as pressure changes) which herald the advance of the cold front and eventually its passage (as discussed above). But it has to be said that by the time you see the signs of the front the changes are probably imminent. Generally the stronger the front, the worse the wind/weather accompanying it. A weak front may pass through your area without any significant impact apart from a shift in the winds and a small drop in temperature) .

Frontal forecasting is difficult especially during the warmer months as fronts can accelerate, slow down or disappear completely whilst making their passage along the NSW south coast. The mountains to the west can retard the passage of the front northward, particularly over and close to the mountains. Meanwhile, closer to the coast and further seawards, the front could be racing northwards at speeds around 30 to 40 knots.

The best example of this behaviour is the Southerly Buster. One sure way of forecasting the arrival of this event and other events, at least during the day, is to look to the south of your position and note the effect of the change on other boats. We can also hope that some low cloud is accompanying the change and note your barometric tendency (falling ahead, rising behind).

With a surface (or MSL = mean sea level) weather map (or analysis or anal) obtained from an onboard weatherfax, you are much more in control of the situation. The orientation and spacing of the isobars will give you a quick, broad picture of the wind situation as well as the position of the major weather features(s). By comparing the current chart with the previous chart, you can estimate the approximate speed of the front (or any other weather system) and hence have a good idea of when the front, and hence a wind change, will arrive in your area (persistence forecasting).

A quick method to help you gauge the speed of the front and hence the approximate wind speed at the surface behind the change is to estimate the wind speed from the isobaric spacing just behind the front. This does unfortunately take some practice!! The average speed of a cold front and its associated low pressure system is approximately 25 knots over southern Australia. A high pressure system moves with an average speed of around 15 knots.

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One of the best tools available via onboard weatherfax is the surface prognosis (prog). This chart indicates either the human's or the computer's thoughts on where weather systems will be positioned at a particular time in the future. This product when used in conjunction with the methods outlined above , will help you more so, for example, establish the time of arrival of the cold front and hence the wind change over your area. Please remember that these charts are a good guide and not gospel!!

Having a weather chart as well as the transmitted weather forecast can give you a great deal of confidence in your ability to predict wind changes at sea. One problem however is the cost of a decent weatherfax. One solution is that most boats do not have a fax because of the costs involved. Don't despair! Coastal Waters and High Seas forecasts prepared by the Bureau of Meteorology are generally an excellent guide and all we need is the barometer, your weather knowledge and the Eye Ball Mark 1 Method to fine-tune the forecast. Good local knowledge gives you a big edge!!

After you predict the general windflow, the job does not stop there! One has to then take into account all the local variations which can affect your forecast.

These local variations are more likely to occur close to the coast (within 10 nm). However even in ocean waters (greater than 10 nm from the coast)variations can still occur. Due to lack of observational data, experience suggests that over the oceans, alternating bands or areas of locally stronger and lighter winds can occur which the ocean or coastal waters forecasts tend to ignore at times.

This is especially true of pure trade wind flow. Gusty winds will occur in the area around a cold front, but some evidence suggests that when we have a tight pressure gradient (isobars close together on a weather chart), the wind arranges itself in corridors of stronger wind interspersed with areas of lighter winds and these stronger winds can be 20 knots or more higher in speed than the average wind speed.

This situation is similar to waves at sea where we talk about average wave heights, but nonetheless there can be some waves at least twice that height.

So in trying to predict or fine-tune

Weather words of wisdom

Your homework begins (beside any reading and/or course-work) at least three weeks before the race commences with the religious collection of daily weather maps from say the Bureau of Meteorology's Weather by Fax service, dial 019 725210 for surface weather maps.You should check this service out further by dialling the main directory on freepoll 1800 630 100 for the main directory and freepoll 1800 061 440 for national services or the Bureau's home page on the World Wide Web **http://www.bom.gov.au** and getting into phase with the weather.

Know the frequency of frontal passages through Sydney, Bass Strait and Hobart (e.g. front through every two days in Hobart and Bass Strait and every three days in Sydney), how intense these frontal passages have been and the track of the front and its associated low pressure system. Information on the state of the East Australia Current can be obtained from the CSIRO home page at **http://www.dmr.csiro.au** also **http://anfi.pacit.tas.gov.au/shyr95/weather/csiro/latest_SST/latest_SST.html** and on a World Wide Web site at: **http://www.rsmas.miami.edu/htbin/imagery/m:eaussiecurgac-0**

Another great site is the Telstra site at: **http://syd-hob97.telstra.com/au**

During the race, listen to the special race forecasts (Radio relay vessel at sked times) and to any other weather (VIS, VIM, AM/FM commercial and ABC stations down the track and for those with mobile phones, the Bureau's Dial-It and 0055 services.

For those with an internet link during the race there is the Bureau's home page **http://www.bom.gov.au**, as well as one courtesy of the Tasmanian Government at **http://anfi.pacit.tas.gov.au/ shyr95/weather/)** and don't forget to monitor oceanographic conditions (your own observations) take down the details and fine-tune the game plan.

Coastal observations as read out in conjunction with coastal waters forecasts, for example, will give you some idea of what lies ahead or inshore of you. But please remember that these observing sites can be markedly affected by local effects, such as the topography around the site and the elevation of the site and most of the time will not be representative of conditions further offshore.

From a wind point of view the Derwent River generally shuts down after 2200 hr. So be prepared for some really light wind work between 2200 and 0700 hr on most occasions.

As far as basic race strategy is concerned, you cannot go past that offered by Tony Shaw in the ORCA Newsletter of November 1993. This excellent strategy was reproduced in last year's race issue.

At the end of the day, it is a feel (an emotional involvement) for the wind which no amount of weather forecasts and charts can generate, which will allow you to predict its behaviour and will take away some of the nasty surprises which seem to catch out yacht skippers who fail to realise the changes taking place.

Good, safe racing.

the wind direction and speed from a weather forecast, or a weather map or better still, both, you should always bear in mind that the wind could be stronger or lighter than the forecast suggests.

We also find that the wind is generally stronger over warm water and less in speed over colder water. If we have warm air over cold water, we have what is called a stable air-sea interface (sailing layer) and hence a marked wind shear situation.

This generally means more twist on port tack and less twist on starboard. With cold air over warm water, we have an unstable air-sea interface and hence a weak wind shear situation. This generally implies straighter leeches. This is one of the reasons why air and sea temperatures should be logged. Sea water temperature should be monitored from a current point-of-view along with GPS or traditional navigation procedures. GPS derived set and drift data should be averaged over a 30 minute period to be of any use.

Inshore the situation can be different again. Here not only can the funnelling/channelling effects around headlands, up and down river valleys and through straits have a significant effect on the strength of the wind, it can also have a marked effect on sea conditions, especially when wind opposes tide or current (remember the 1993 race).

High coastal cliffs/hills or mountains can create problems with both onshore and offshore winds. The rule is keep clear of coastlines by at least 10 times the height of the cliff/hill/mountain. Another rule is that offshore winds increase in speed and back (go left)in direction as they blow out over the water, onshore winds decrease in speed as they approach the land and the direction will veer (go right) a little.

If conditions allow, a sea breeze will setup and will be strongest within say, 5 nm of the coast and will be at its strongest during the mid to late afternoon. Some of the strongest seabreezes occur on the south coast of NSW. Sea breezes along the east Tasmanian Coast are northeasters and become southeasters along the south coast and in the Derwent (if you get there during daylight hours!

Under broad westerly flow, a big lee vortex is generally evident along the east Tasmanian coast. This means that light SE to NE winds will prevail from the coast (apart from sea breezes being strongest within 5 nm of the coast) out to approximately 50 nm. The upshot of all this is that a compromise will have to be struck regarding your position off the coast. A tricky one indeed??

"If conditions allow, a sea breeze will setup and will be strongest within say, 5 nm of the coast and will be at its strongest during the mid to late afternoon"

Reference: The RORC Manual of Weather at Sea by Dag Pike (David & Charles 1994)
Kenn Batt is available for meteorological advice and can be contacted on (02) 99180749 (after-hours) and (02)92961622 (work hours).