

The MAROB Voluntary Marine Observation Program

(With instructions specific for sending MAROBs via Pangolin's Offshore Reporter Software)

All Information with Respect to the MAROB Program is Preliminary and Subject to Revision

What is the MAROB Program?

The MAROB Program is an experimental voluntary marine observation program of the National Weather Service in the early stages of development. It seeks the participation of all mariners, both commercial and recreational, which are not part of the more in-depth Voluntary Observing Ship (VOS) program. It is the goal of the program to collect as many marine observations as practicable, to improve the accuracy of coastal, offshore and high seas forecasts, by taking advantage of technological advancements in marine communications and the proliferation of the Internet.

Who May Participate in the MAROB Program?

Any mariner is welcome to participate in the MAROB program. However, we ask that commercial vessels, which are routinely underway, consider participating in the international Voluntary Observing Ship (VOS) program, see www.vos.noaa.gov or call 1-228-688-1457 for information.

I Have Some Concern about Piracy or my Competition

If you have some concern about piracy or your competition (e.g. while racing or fishing) you should likely not participate in a voluntary vessel position or weather reporting system such as MAROB where your position is widely disseminated and may become known to others. Where some degree anonymity is desired, use the identity "SHIP" in your report. Never enter a report with a false position

What Training is Required to Participate in MAROB?

At present, no training is required to participate in the MAROB Program. However, many local National Weather Service Forecast Offices conduct training for mariners and we encourage you to contact them to learn of available training sessions.

How May I Contact My Local Forecast Office?

Telephone numbers for local forecast offices may often be found in the telephone directory white/blue pages under "United States Government"; "Commerce Department"; "National Weather Service". Or see www.nws.noaa.gov/organization.html for links to webpages containing phone numbers and/or e-mail addresses.

Do I Need to Register in Advance to Participate in MAROB?

At present, no advance registration is required to participate in the MAROB program however, individual MAROB reporting schemes may have registration requirements.

What is the Required Accuracy of MAROB Observations?

There are not yet any required standards of accuracy for the MAROB program.

From What Areas Should MAROBs Be Sent?

In order to be of value to forecasters, MAROB observations should be sent from vessels in the unprotected waters of the high seas, offshore, and coastal areas, including waters of the Great Lakes and large, open, bodies of water such Long Island Sound, Chesapeake Bay and Biscayne Bay. Observations should not be sent from areas such as harbors and inlets where the observed conditions are not representative of the surrounding open waters.

How Often and When Should Observations be Sent?

Weather forecasts are generated on a 6-hour cycle using observations collected at 0, 6, 12, and 18 UTC. These times are referred to as the synoptic observation times. Observations collected at these times are of most value to forecasters, with those collected at the intermediate synoptic times of 3, 9, 15 and 21 UTC and other times to be of somewhat lesser value.

Observations should be taken on or immediately after the hour and forwarded to the National Weather Service as soon as practicable, preferably within 1 hour of the observation time. The value of observations begins to diminish rapidly after about 3 hours; however, all observations may be used for climatological research.

Due to the limited number of observation systems in marine areas, each and every voluntary marine observation is of great value to forecasters. Never hesitate to forward an observation.

In the event of inclement weather, and/or where the observed conditions differ significantly from the forecast conditions, forward observations immediately and at intervals not exceeding 3 hours if practicable. **NEVER place your vessel in potential danger for the purpose of collecting weather observations.**

Who Pays For Any Equipment Costs and Telecommunication Charges?

Mariners voluntarily participate in the MAROB program and any communications charges, the cost of any observing equipment, or incidental expenses, will not be reimbursed by the National Weather Service.

Why Does the MAROB Program Use the Data Format of the VOS Program?

The MAROB format is identical to that of the VOS program with the exception that "MAROB" replaces "BBXX". This format was selected as a great deal of infrastructure is already in place within the National Weather Service to decode and utilize observations. However, this format has the disadvantage that the resolution of several data elements is more suitable to the high seas than coastal areas. In the long term, a unique format may be developed for MAROBs.

Why Don't MAROB Reporting Schemes Collect More Observation Parameters?

Although MAROBs may contain any of the observation elements of the VOS format, in general, MAROB reporting schemes will implement a small subset of those available in order to encourage a greater number of mariners to participate in the program by not presenting a seemingly complex report form. The subset of observations collected may vary between reporting schemes.

How May I Send a MAROB?

The National Weather Service is in the process of developing cooperative arrangements with organizations such as the U.S. Power Squadrons, the U.S. Coast Guard Auxiliary, the WinLink 2000 Global Radio Network, the Maritime Mobile Service Network, CruiseEmail.com, Oceans, Sailmail, SkyMate, MarineNet Wireless and the YOTREP Reporting System, to both train observers and forward observations to NWS. Technologies utilized may include cellular telephone, HF Marine radio, MF Marine radio, VHF Marine Radio, Ham Radio, Webforms and e-mail.

In several cases, MAROB reporting schemes will work in conjunction with vessel position reporting systems such as WinLink's Position Reporter, the Maritime Mobile Service Network's ShipTrak, and the YOTREPs Reporter, to enhance the safety of mariners.

At present, mariners may participate in the MAROB program in any of several ways:

1. By sending in YOTREPs (pronounced Yacht Reps) using Pangolin's Offshore Reporter software. see www.pangolin.co.nz This function may be performed directly aboard the vessel or the observation data forwarded to a volunteer ashore. YOTREPs are converted to the MAROB format and forwarded to the National Weather Service by Pangolin Software. See instructions below.
2. By sending in YOTREPs via WINLINK (www.winlink.org) or SAILMAIL (www.sailmail.com) using their AIRMAIL software. AIRMAIL will be upgraded in the near future for greater compatibility with the MAROB program.
3. By entering the observed data into Pangolin's freeware program PANMAROB.exe and sending the encoded data to the National Weather Service via e-mail. See:
<http://www.nws.noaa.gov/om/marine/panmarobhelp.pdf> This function may be performed directly aboard the vessel or the observation data forwarded to a volunteer ashore.

4. By sending in YOTREPS via e-mail in the WINLINK/AIRMAIL format style See:
<http://www.nws.noaa.gov/om/marine/panemailhelp.pdf> This function may be performed directly aboard the vessel or the observation data forwarded to a volunteer ashore. YOTREPs are converted to the MAROB format and forwarded to the National Weather Service by Pangolin Software, see www.pangolin.co.nz
5. For the real “power user”, by entering the observation data into the AMVER/SEAS software (see <http://www.vos.noaa.gov/>) of the Voluntary Observing Ship (VOS) program and sending the encoded data to the National Weather Service via e-mail. This option is only recommended for those familiar with the VOS program. Save the observation data using the Transmit/Save ASCII function to the met.txt file, and copy/paste the applicable data into an e-mail of a format described in the procedure for sending MAROBs via PANMAROB.exe above. This function may be performed directly aboard the vessel or the observation data forwarded to a volunteer ashore.
6. By manually encoding the observation data following the guidance of the NWS Observing Handbook No 1 (www.nws.noaa.gov/om/marine/handbk1.pdf), and sending the encoded data to the National Weather Service via e-mail in the format described in the procedure for sending MAROBs using PANMAROB.exe above. This option is only recommended for those familiar with the VOS program. This function may be performed directly aboard the vessel or the observation data forwarded to a volunteer ashore.
7. Using WINLINK’s QTH Reporter restricted webpage which is intended for the net control operators of large maritime mobile ham nets. Send an e-mail to marine.weather@noaa.gov for further information. See: <http://www.nws.noaa.gov/om/marine/qthrephelp.pdf>

Note: Any reference to a commercial product or service does not imply any endorsement by the National Weather Service as to function or suitability for your purpose or environment.

How Will I know if my MAROB Has Been Received by the National Weather Service?

Links to the last MAROBs received may be found at www.nws.noaa.gov/om/marine/forecast.htm#marob
An online database of recently received MAROBs may be established in the future.

Using the YOTREP Offshore Reporter software, YOTREPs may be retrieved from the YOTREP server and plotted with other YOTREPs using the “Get Reports” and mapping functions of the program. See program documentation for details.

Using the PAMAROB freeware, an e-mail will be sent to the mariner if an observation has passed initial format checks. This feature may be removed at a later time based on user feedback. No e-mail will be returned if the observation contains any format errors.

Where Can I Learn More About the National Weather Service Marine Products and Services?

Visit webpage www.nws.noaa.gov/om/marine/home.htm

Is There an Awards Program Established for Participants In the MAROB Program?

It is a long-range goal of the MAROB program to establish an awards program to recognize the voluntary efforts of mariners who actively participate in the program.

How Can I Have Any Questions Answered About the MAROB Program?

Due to the volume of inquiries we receive, the preferred means of communication is via e-mail at: marine.weather@noaa.gov If you feel you cannot adequately state your question in an e-mail, we may be reached via telephone at: 1-301-713-1677 x128

To find the latest information on the MAROB program, see www.nws.noaa.gov/om/marine/marob.htm
As this program is in its early stages of development, changes may be frequent.
Any feedback on the MAROB Program would also be greatly appreciated.

How to Send a MAROBs using Pangolin's YOTREP Offshore Reporter

1. Download the latest version of Pangolin's YOTREP Offshore Reporter software from the Pangolin webpage at: <http://www.pangolin.co.nz/>
2. Run the program by clicking on the YOTREPS Reporter icon on your Desktop.
3. Use the YOTREPS Offshore Reporter "HELP" function to gain some familiarity the functions of the program.

Note...In order to use functions relevant to the entry and editing of observations, left-click your mouse somewhere on the right half of your screen. In order to use the map functions, left-click your mouse somewhere on the left half of the screen. To expand/contract the size of the map, left-click your mouse on the right margin of the map and drag the margin to your right.

4. Select your preferred units under the TOOLS/OPTIONS Window.
5. Select "Extended YOTREPS" under the TOOLS/OPTIONS/REPORTER DEFAULTS/FILE SAVE FORMAT Window
6. Create a new YOTREP report file by using the File/New function. Generate a new observation report by using the EDIT/ADD A REPORT function or clicking on the green "+" icon on the toolbar menu. Enter the observation data into the report form. (See guidance in subsequent pages). Only enter observation values for parameters for which you have some degree of confidence, leave others blank. Click "OK" when complete. If you are a shoreside establishment relaying multiple observations, repeat for additional vessel observations.
7. Using the software, there are two ways to send in YOTREPs
 - A. Using the "Send to YOTREPS Direct" option is available only if you are directly connected to the Internet. Before doing this, you must enter a valid access code under the TOOLS/OPTIONS/ACCESS CODE Window. To obtain an access code, send an e-mail to mike@pangolin.co.nz giving the name of your vessel, callsign of vessel (if any), and e-mail address. If you are a shoreside establishment which is relaying reports, provide your e-mail address and a short description of your intended operation, e.g. "Net Control Operator of the Happy Mariners Ham net operating on 14.xxx kHz Mon-FRI 1000-1200 UTC". To use the "Send to YOTREPS Direct" option, click on the FILE/SEND TO YOTREPS DIRECT function or click on the "Send to YOTREPS Direct" icon on the toolbar.
 - B. Using the "Send by E-mail" option. This method has the advantage that it keeps a record of your outgoing YOTREP reports in your e-mail's systems SENT directory, and can be used aboard vessels with no direct Internet capability, but who do have e-mail. The down side is that YOTREP Offshore Reporter interfaces to your e-mail system through a MAPI interface which may not work in all situations, such as if you are on a LAN using remote corporate e-mail software, or use non-MAPI compliant e-mail software such as AIRMAIL. Before using this option, you must enter yotreps@pangolin.co.nz under the TOOLS/OPTIONS/ACCESS CODES/E-MAIL OUTGOING Window. Although no access code is currently required using this mode, please send an e-mail to mike@pangolin.co.nz, giving the name of your vessel, callsign of vessel (if any), and e-mail address. If you are a shoreside establishment which is relaying reports, provide your e-mail address and a short description of your intended operation, e.g. "Net Control Operator of the Happy Mariners Ham net operating on 14.xxx kHz Mon-FRI 1000-1200 UTC. To use the "Send by E-mail" option, click on the FILE/SEND REPORT TO YOUR EMAIL function or click on the "Send by E-mail" icon on the toolbar.

8. In the event the observation is received successfully, your observation may be retrieved from the YOTREP server and plotted with other YOTREPs using the "Get Reports" and mapping functions of the program. See the program "HELP" function for details.
9. Entering the Report Data:

The screenshot shows a Windows-style dialog box titled "Vessel Position and Weather Observation Report Form". The interface is organized into several groups of input fields:

- Identifier:** A text input field with a red dot indicator.
- Date Time (UTC):** Two input fields: "Date" (mm/dd/yyyy) and "Time (UTC)" (hhmm). A "Now" button is available to automatically fill these fields.
- Position:**
 - Latitude:** Input fields for Deg. (checkboxes for North/South), Min. (checkboxes for North/South).
 - Longitude:** Input fields for Deg. (checkboxes for East/West), Min. (checkboxes for East/West), and a "Cover" percentage input field.
- Units:** A group of checkboxes for units: *True (checked), *Mag, Metres, °C, Feet, °F.
- Boat:** Input fields for Course and Speed (Kts).
- True Wind:** Input fields for Direction and Speed (Kts).
- Wind Waves:** Input fields for Height and Period (secs).
- Primary Swell:** Input fields for True direction, Height, and Period (secs).
- Cloud and visibility:** Input fields for Cover (%) and Visibility (nm).
- Barometric pressure:** Input fields for Bar (hPa) and 3 hour tendency (hPa).
- Temperatures:** Input fields for Air (deg) and Sea (deg).
- Essential fields:** A red dot indicator.

At the bottom are "OK" and "Cancel" buttons.

Identifier: Amateur radio or vessel call sign consisting of three to nine alphanumeric characters (A-Z,0-9, no spaces). For vessels without a radio call sign, the vessel's name or another selected identity may be used, however, the identity selected should be made to be distinctive, e.g. "MJ7465867" vs.

"MARYJANE". Where some degree anonymity is desired, use the identity "SHIP". For testing purposes, use the identity "TEST", and enter position data only with no weather data. If you are a shoreside establishment relaying observations, use the identity of the vessel, not your own.

Date: Date (UTC) on which the actual observation was taken in the form mm/dd/yyyy (month/day/year) At 0000 UTC, *enter the date just beginning, not the day which has just ended. Forgetting to advance the date at 0000 UTC is a common observer error.* The "NOW" button may be used to enter the date/time automatically provided your PC clock was properly initialized with the correct time, time zone and daylight savings time flag at the time the clock was set.

Time: Enter time (UTC) on which the actual observation was taken in the form hh:mm (hours :minutes, 24-hour clock). The "NOW" button may be used to enter the date/time automatically provided your PC clock was properly initialized with the correct time, time zone, and daylight savings time flag at the time the clock was set. Observations should be taken on or immediately after the hour, and the program assumes this. If taken slightly before the hour, round up to the next hour, e.g. edit 1756 to become 1800, otherwise the program will round your observation time to the previous hour, i.e. 1700 when the observation is encoded.

Some time zone conversions for U.S. waters

0000PST=0100MST=0200CST=0300EST=0800UTC(e.g. add +5 hrs to EST to obtain UTC)

0000PDT=0100MDT=0200CDT=0300EDT=0700UTC(e.g. add +4 hrs to EDT to obtain UTC)

[when converted time >= 2400, subtract 2400 and add 1 day to the date]

Latitude: Vessel latitude, in degrees and minutes, rounded to the nearest minute.

North/South: Select applicable hemisphere.

Longitude: Vessel longitude, in degrees and minutes, rounded to the nearest minute.

East/West: Select applicable hemisphere.

Units °True/°Mag: Select whether course and directions will be entered with respect to true or magnetic north. If magnetic is selected, the program uses an internal correction table to compute true north during the encoding process.

Units Meters/Feet: Select whether wave height will be entered in units of feet or meters.

Units °C/°F: Select whether temperatures will be entered in units of Centigrade or Fahrenheit.

Boat Course: If in transit, enter the vessel course over ground in degrees true/magnetic. Leave blank if course or speed is erratic.

Boat Speed: If in transit, enter the vessel speed over ground in knots. Leave blank if course or speed is erratic.

True Wind Direction: Enter true direction, in degrees, from which wind is blowing. This is a mean direction averaged over a period of ten minutes, referred to north. Determine true wind direction from either (1) the orientation of sea (wind) waves, or streaks of foam on the sea surface, or (2) the apparent wind direction observed aboard vessel.

Method (1) is easiest, because it provides true wind direction independent of the vessel's movement. Sight along the lines of the sea wave crests. Since true wind direction is the same as the direction from which the sea waves are coming, the true wind direction is perpendicular (90°) to the advancing waves crests. Also, use lines of foam on the sea surface (which may appear for Force 7 or greater wind speeds). Wind blown foam streaks are parallel to the direction of the true wind.

Method (2) determines true wind direction from the apparent wind (the wind experienced on board when the vessel is underway). Apparent wind results from two motions — the actual motion of the air (true wind), and the motion of the vessel. Apparent wind direction is best determined by facing directly into the wind on the windward side of the vessel. Other good apparent wind indicators are funnel smoke, the orientation of shipboard flags or pennants, or a wind vane. Once apparent wind direction is obtained, you must remove the motion of the vessel to obtain true wind. See below for methods of determining true wind from apparent wind.

Report the mean wind direction over the ten-minute period immediately preceding observation time. If this time period includes an abrupt change in wind direction, only average data obtained after the change. If using apparent or relative wind direction, remember to determine the true wind before reporting.

True Wind Speed: True wind speed in knots, measured or estimated. Use either (1) the appearance of the sea surface (the sea state) and the Beaufort scale, (2) an anemometer, or (3) the effects of the wind on people or objects aboard vessel.

Method (1) relies on the action of the wind to create sea waves, and results in a true wind estimate, so there is no need to factor out the motion of the vessel. These assume steady state conditions which implies the wind direction and speed have been relatively steady over many hours.

Beaufort Scale - The Beaufort wind scale is a system used to estimate and report wind speeds when no measuring apparatus is available. It was invented in the early 19th Century by Admiral Sir Francis Beaufort of the British Navy as a way to interpret winds from conditions at sea.

Beaufort Force 0 - Wind less than 1 KT, Calm, Sea surface smooth and mirror-like. Smoke rises vertically.

Beaufort Force 1 - Wind 1-3 KT, Light Air, Scaly ripples, no foam crests. Smoke drift indicates wind direction, still wind vanes.

Beaufort Force 2 - Wind 4-6 KT, Light Breeze, Small wavelets, crests glassy, no breaking waves. Wind felt on face, leaves rustle, vanes begin to move.

Beaufort Force 3 - Wind 7-10 KT, Gentle Breeze, Large wavelets, crests begin to break, scattered whitecaps. Leaves and small twigs constantly moving, light flags extended

Beaufort Force 4 - Winds 11-16 KT, Moderate Breeze, Small waves 1-4 ft. becoming longer, numerous whitecaps. Dust, leaves, and loose paper lifted, small tree branches move.

Beaufort Force 5 - Winds 17-21 KT, Fresh Breeze, Moderate waves 4-8 ft taking longer form, many whitecaps, some spray. Small trees in leaf begin to sway.

Beaufort Force 6 - Winds 22-27 KT, Strong Breeze, Larger waves 8-13 ft, whitecaps common, more spray. Larger tree branches moving, whistling in wires.

Beaufort Force 7 - Winds 28-33 KT, Near Gale, Sea heaps up, waves 13-20 ft, white foam streaks off breakers. Whole trees moving, resistance felt walking against wind.

Beaufort Force 8 - Winds 34-40 KT Gale, Moderately high (13-20 ft) waves of greater length, edges of crests begin to break into spindrift, foam blown in streaks. Whole trees in motion, resistance felt walking against wind

Beaufort Force 9 - Winds 41-47 KT, Strong Gale, High waves (20 ft), sea begins to roll, dense streaks of foam, spray may reduce visibility. Slight structural damage occurs, slate blows off roofs.

Beaufort Force 10 - Winds 48-55 KT, Storm, Very high waves (20-30 ft) with overhanging crests, sea white densely blown foam, heavy rolling, lowered visibility. Seldom experienced on land, trees broken or uprooted, "considerable structural damage"

Beaufort Force 11 - Winds 56-63 KT, Violent Storm, Exceptionally high (30-45 ft) waves, foam patches cover sea, visibility more reduced.

Beaufort Force 12 - Winds 64+ KT, Hurricane, Air filled with foam, waves over 45 ft, sea completely white with driving spray, visibility greatly reduced.

If using method (2), make sure your anemometer is properly calibrated, and located so the vessel's superstructure will not interfere with air motion. An anemometer provides an apparent wind measurement. Apparent wind is the wind you experience aboard a moving vessel, and is a combination of the actual air motion across the water, and the vessel's motion. The only time there is no apparent wind aboard vessel is when the vessel is moving in the same direction and with the same speed as the true wind. On a moving vessel, the direction of the true wind is always on the same side and aft of the direction of the apparent wind. The faster the vessel moves, the more the apparent wind draws ahead of the true wind. To remove the vessel's motion and determine true wind, you may use the graphical method.

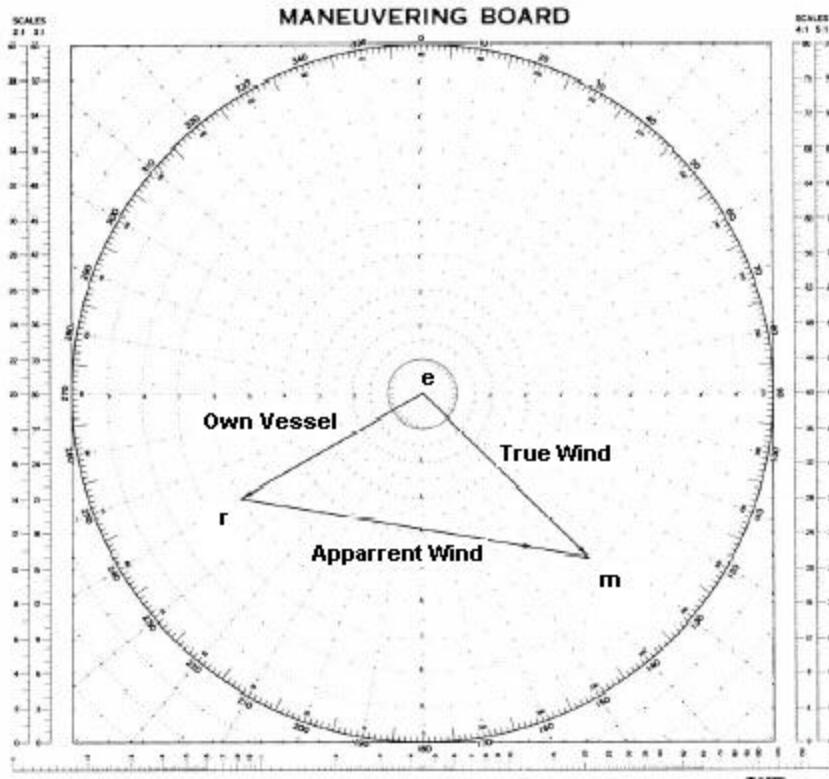
Method (3) also provides an apparent wind, so like method (2), requires removal of the vessel's motion to determine true wind. Use method (3) when the sea surface cannot be seen (such as on very dark nights), and when an anemometer is not available.

True and Apparent Wind

An observer aboard a vessel proceeding through still air experiences an apparent wind which is from dead ahead and has an apparent speed equal to the speed of the vessel. Thus, if the actual or true wind is zero and the speed of the vessel is 10 knots, the apparent wind is from dead ahead at 10 knots. If the true wind is from dead ahead at 15 knots, and the speed of the vessel is 10 knots, the apparent wind is $15 + 10 = 25$ knots from dead ahead. If the vessel reverses course, the apparent wind is $15 - 10 = 5$ knots, from dead astern. The apparent wind is the vector sum of the true wind and the reciprocal of the vessel's course and speed vector. Since wind vanes and anemometers measure apparent wind, the usual problem aboard a vessel equipped with an anemometer is to convert apparent wind to true wind. There are several ways of doing this. Perhaps the simplest is by the graphical solution illustrated in the following example:

Example 1: A vessel is proceeding on course 240° at a speed of 18 knots. The apparent wind is from 040° relative to the bow at 30 knots.

Solution: First starting from the center of a nautical maneuvering board or using graph paper, plot the vessel's vector "er," at 240° , length 18 knots/units. Next plot the relative wind's vector from r, in a direction of 100° (the reciprocal of 280°) length 30 knots/units. The true wind is from the center to the end of this vector or line "em." Use parallel rulers to transfer the wind vector to the center for an accurate reading. Answer: True wind is from 315° at 20 knots.



Wind Wave Height: The vertical distance between trough and crest of wind waves in units of meters/feet. It is best for the observer to locate on the side of the vessel from which the waves are coming. On very dark nights or in dense fog, estimate the wave height based on the last clear sighting, and whether wind speed or vessel's motion have changed. Consider only the larger well-formed waves near the center of the wave group. Estimate the average height of these larger waves, and disregard the lesser waves. There is a tendency to underestimate wave height if you are fifty feet or more above the sea surface. Your visual estimate may be more accurate from a lower deck.

Wind Wave Period: The period of wind waves in seconds. Wave period is the time between the passage of two successive wave crests (or successive troughs) past a fixed point. Count seconds, preferably with a watch or stopwatch. Note a small object (such as a piece of wood thrown overboard), a piece of seaweed, patch of foam, or a bird floating on the water. Start counting when the object reaches the crest of the first well formed wave. As the crest passes, the object will pass into the trough, then to the next crest, etc. Divide the total elapsed time by the number of crests passing under the object to obtain the period. For measuring mean period of a wave system, only consider the higher waves in the center of each group of well-formed waves. Any flat or badly formed waves should not be used.

Primary Swell True Direction: Enter true direction, in degrees, from which the primary swell is coming. Swell Waves are wind-generated waves that have traveled out of their generating area. Swell characteristically exhibits smoother, more regular and uniform crests and a longer period than wind waves. The primary swell system has higher waves than any secondary swell waves which may exist. It is best for the observer to locate on the side of the vessel from which the waves are coming. It may help to move up or down in the vessel (by changing levels or deck) to obtain the best possible view. On very dark nights, or in dense fog, estimate the height of the swell waves based on the last clear sighting, and whether swell waves have since changed based on the wind speed or vessel's motion. On bright moonlit nights, swell waves can often be observed. When determining swell wave characteristics, always select the larger, well formed swell waves of the wave system being observed.

Primary Swell Height: Height of primary swell waves, in Meters/Feet. Swell wave height is the vertical distance between trough and crest. Swell Waves are wind-generated waves that have traveled out of their generating area. Swell characteristically exhibits smoother, more regular and uniform crests and a longer period than wind waves. The primary swell system has higher waves than any secondary swell waves which may exist. It is best for the observer to locate on the side of the vessel from which the waves are coming. It may help to move up or down in the vessel (by changing levels or deck) to obtain the best possible view. On very dark nights, or in dense fog, estimate the height of the swell waves based on the last clear sighting, and whether swell waves have since changed based on the wind speed or vessel's motion. On bright moonlit nights, swell waves can often be observed. When determining swell wave characteristics, always select the larger, well formed swell waves of the wave system being observed.

Primary Swell Period: Period of primary swell waves, in seconds. Period is the time it takes two successive swell wave crests to pass a fixed point, same as for wind wave period. Count the seconds, preferably with a watch or stopwatch. Note a small object, a piece of seaweed, patch of foam, even a bird floating on the water. Start counting when the object reaches the crest of the first well-formed swell wave. Note the time the object reaches the next crest and the crest after that. Record the average period for several of the larger, well-formed swell waves.

Visibility: Visibility in nautical miles. Visibility is the greatest distance an object can be seen and identified. Report prevailing visibility — the maximum visibility common to one half or more of the horizon circle.

Cloud Cover: The total percent of the sky covered by clouds of all types. A mackerel sky (Altocumulus, stratocumulus, or cirrocumulus covering the whole sky) should be coded as 90%, since breaks are always present in these cloud forms. When observing clouds through fog, base your estimate on the amount of clouds that can be seen through the fog. When a completely clear sky is observed through fog or haze, report as 0%.

Barometric Pressure hPa: Barometric pressure in hPa (Hectopascals). If entered in terms of inches, in the range of 23.00-33.00, the program will recognize that the units are in inches and convert to hPa during the encoding. $hPa = MB = \text{inches} \times 33.864$. Barometers are typically calibrated for sea level at the factory. If installed on larger vessels correct the reading according to the following formula: Pressure correction = $0.037''/\text{ft}$ or $0.1214 \text{ hPa}/\text{meter}$ elevation above sea level (add this correction to observed value). To eliminate the need to apply a correction, barometers may be calibrated to read the sea surface pressure by adjusting the barometer to read the value sea level pressure reported by the local NOAA Weather Radio station or other suitable reference, and subsequent comparisons to assure accuracy.

Barometric Pressure 3 hr Tendency hPa: Change in barometric over the past 3 hours. Use the actual change in pressure over the past 3 hours, e.g. not the 24-hour pressure change divided by 8. Enter in same units as **Barometric Pressure hPa**. Include negative sign if applicable. Do not apply an elevation correction to this value.

Air temperature: Air temperature, in whole degrees and tenths of a degree Celsius/Fahrenheit. Include negative sign if applicable. When reading a thermometer, the eye should be at the same level as the end of the mercury/alcohol column. Take the reading from the windward side of the vessel in a stream of air fresh from the sea, which has not been in contact with, or passed over the vessel. The thermometer should be shielded from radiation, precipitation, and spray. If a fixed location is used, one should be installed on each side of the vessel, so the observation can always be made from the windward side. If a portable thermometer is used, allow sufficient time for the thermometer to adjust to the outside temperature.

Sea Surface Temperature: Sea surface water temperature in whole degrees and tenths of a degree, Celsius/Fahrenheit. Include negative sign if applicable. The temperature to be observed is that of the sea surface representative of conditions in the near-surface mixing layer underlying the water surface. Typically measured using a bucket to retrieve a sample of the surface water, and a portable thermometer. Allow sufficient time for the thermometer reading to adjust to the water temperature.

CLEAR Button: The CLEAR button may be used to clear the current observation values and begin entry of a new observation.

OK Button: Upon completion of entry of the observation values , use the OK button to accept the report and return to the Main Menu.

This documentation file may be found at www.nws.noaa.gov/om/marine/panrephelp.pdf

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Version: September 02, 2003; 10:35 AM