

Marine Communication

(Speech held by Leon at Open House, Ellös, 23 August 2003)



Two Types of Communications and their Sub-Groups

According to my view, there are two types of marine communication equipment available. I call these "**Marine Safety Equipment**" and "**Mobile Telephones**". These two types should not be mixed up.

I remember in the early 1990's, when the GSM cell phone was new, there were many articles written in the boat press, comparing the VHF with the Cell-phone asking whether you should have one or the other onboard. Many articles claimed the VHF becoming "dead" within due course and that soon only GSM would be used onboard. For making telephone calls to shore this might have become true, but I think everybody today understands the vast difference between these two types of equipment and that they rather compliment each other than compete.

When going through the **Marine Safety Equipment** side, I make some sub-groups following the GMDSS system.

- What is GMDSS?

GMDSS is the standard to which professional ships comply re their communication equipment. Although yachts do not have to follow GMDSS, it is good to read what is stipulated and to take it as an advice what you should have installed for the areas

A1 = close to shore (Range of VHF = 30 nm)

A2 = Offshore (Range of Medium Frequency/MF = 150 nm from shore)

A3 = High Seas (Range of Inmarsat Global Beam = approx 70 deg N to 70 deg S)

A4 = Polar Region.

Approved equipment should then comply with the GMDSS rules, meaning that they fulfil the minimum requirements of GMDSS. A good page on GMDSS I have found [here](#).

While yachts are not GMDSS compliant, it is a good idea to look what is required for the professional shipping industry and then pick what you think is appropriate for your own boat.

I have summed up the GMDSS regions A1 to A4 into two groups for us sailors: "**Coastal Area**" (=A1) and "**Offshore Area**" (=A2 and A3). The Polar Regions withing GMDSS (=A4) are left to the more adventurous amongst us.

When I later will talk about the other category - the **MOBILE TELEPHONES** - I equally divide up these devices into subgroups. Here I distinguish between "**Coastal Sailing**", need for "**Global Voice + E-mail**" and finally the need for "**Global Voice + E-mail + Surfing the Internet + High Speed Data (HSD)**".

Applications

Before I start going through equipment by equipment, I want to mention what I call the "Application" of the device, since I think you should always keep in mind what

your equipment can do for you.

Let me give some examples of application:

- Safety & Distress calls
- Social calls to family and friends
- Business Calls, e.g. working from your boat
- Sending and Receiving E-mails, both private and business
- Surfing the Internet
- Receiving Weather information

This last application, namely to receive weather information, has such an importance, that I wish to distinguish between some ways of receiving these:

- we can listen to **Broadcasts** being sent out
- we can receive **Text** with weather forecasts
- we can receive **Pictures** with weather charts
- we can receive **GRIB** files

GRIB-Files

Now what are GRIB-files? This is a fairly new and very convenient way to receive weather information. The only demand is that you can send and receive e-mails with a small attachment.

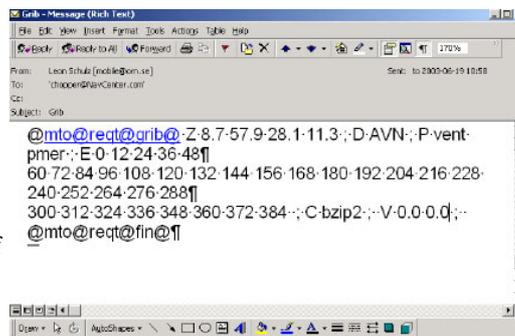
By sending off a short e-mail only consisting of a few text lines (see example to the right), one sends a request to receive a so called GRIB file as an attachment. The text file contains information regarding which area you are interested in, how long forecast you require and what type of weather information you need (wind, current, pressure etc).

The GRIB-file then received a couple of minutes later, only contains weather information, while the computer programme provides the user interface, the underlying charts and graphical display. Transmission can thus be held as inexpensive as possible with file sizes between 8 and 45 kb depending on used computer programme, length of forecast and amount of requested information (wind, current, pressure, temperature etc.). Some interesting weather computer programmes working with e-mail as data source are:

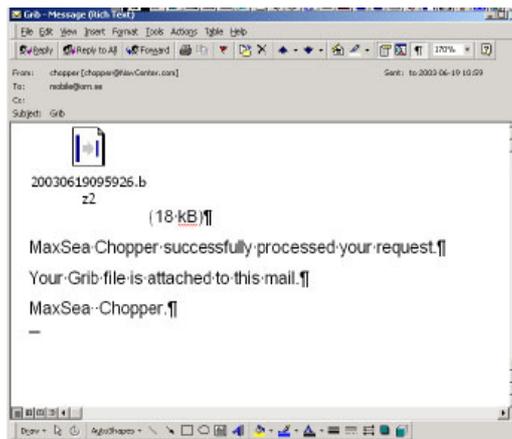
- o [MaxSea](#)
- o [RayTech Navigator](#)
- o [Xaxero](#)
- o [Marine Computing](#)
- o [Transas](#)
- o [Bon Voyage](#)
- o [BuoyWeather](#)

If you wish to have a complete navigational programme also reading a variety of chart types integrated with a weather module, I suggest you could look at MaxSea. If you only are interested in a GRIB-file viewer without any additional navigational features, my personal favorite is [WindPlot](#) by Xaxero.

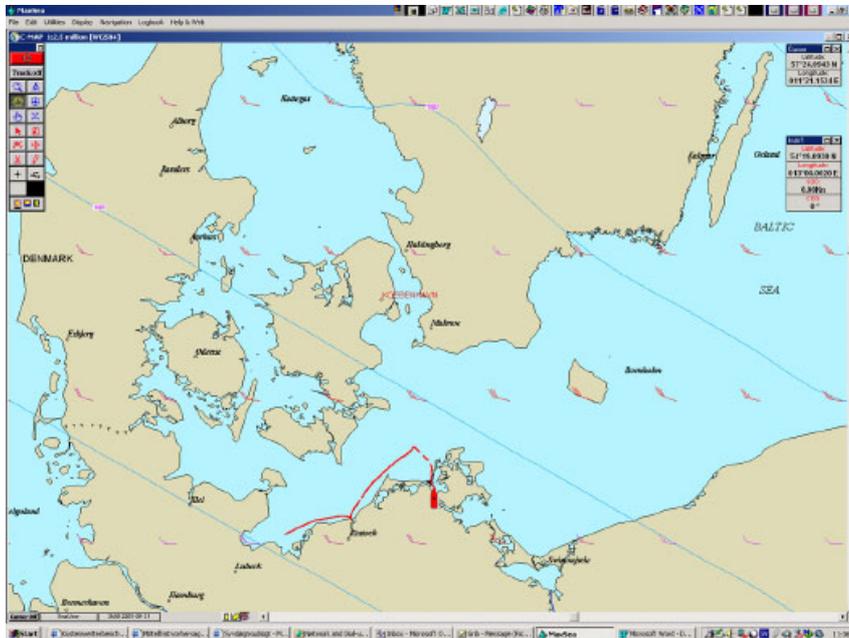
For more information re this feature there is an interesting test in the British publication [Yachting World](#) / January 2003.



A small text file is being sent to request a GRIB-file with weather data



A couple of minutes later an e-mail arrives with an attached file, held very small and is thus suitable to receive also with slow means of data communications.



The result: wind-flags and pressure forecasts on top of our navigational chart plotter made by NOAA valid for the forthcoming 5 days! And best of all: it is totally free!

I have tested the accuracy of the GRIB files both for our own Scandinavian waters, but I also regularly make forecasts for fellow sailors sailing in the Pacific and I get very good feed-back. NOAA, the American weather specialists, certainly make a great job for us mariners!

Marine Safety Equipment - Coastal Area

Are you now ready for the journey through the various types of equipment?

As announced, lets start with the GMDSS requirements made for the two areas "Coastal" (A1) and "Offshore" (A2-A3)

First we look at the Coastal Area and check which applications they can fulfil. Here is what you should carry according to GMDSS for Coastal sailing.

Fixed VHF	Safety and Distress	Yes, with DSC
	Social calls	Yes, but simplex
	Business Calls	Technically yes, but practically No
	E-mail	Technically yes, but practically No
	Surfing	No
	Weather by Voice	Yes
	Weather by Text	No
	Weather by Pictures	No
	GRIB-files	No



Some comments on the Fixed VHF:

The VHF is the primary ship-to-ship communication device. It has a short range (approx 30 nm) and channel 16 is monitored throughout the world. This has not changed with the implementation of GMDSS in 1999 and the invention of DSC (Digital Selective Calling).

Some seem to think that the implementation of GMDSS and DSC has outsourced the listening of channel 16. I have even read in respected yachting publications lately that DSC is a "flop" and the readers are being recommended to stick to the classic VHF without DSC facility. I do not have that opinion and believe that DSC is a vital safety device. DSC is an asset not a threat. Yes, it is correct that you no longer would need to listen to channel 16, but this does not mean that you don't do this any longer.

Let me give an example. On the open seas I often do like the "big boys" do and call up vessels on VHF channel 16 if a situation of possible collision occurs. "Vessel with blue hull and white top on North-East course just passed bow 3, this is sailing Vessel Regina on your 2 o'clock position", I typically broadcast by VHF. Almost always I get a prompt answer. After me asking if he has any suggestions on my amendment of my course, the big vessel not seldom changes his and passes behind me. Very polite! So channel 16 is, in fact, still monitored.

But have you ever sailed on a sunny Saturday afternoon during summer? Channel 16 seems to be used for calling every yacht visible on the bay. To overcome all this chatting, DSC overrides all the speaking by sending of your distress call digitally an efficiently with your own position taken from the GPS. But please only use the DSC-button in a real emergency! In all other cases I would suggest calling the coast station on a working channel not triggering the alarm on all boats with DSC reception around!

And why not try to call the boat you know by its MMSI number instead of calling the vessel on channel 16? Your friend will be called up directly! By this, the channel 16 will also enjoy a reduced engagement.

Social calls from boat to boat with not a too large distance has already been mentioned, but the classic ability to call into the telephone system via a coast station is also worth mentioning. Some coastal stations even allow direct call via DSC, i.e. you just enter the MMSI number of the coastal station followed by the telephone number required and you are directly connected with your friend ashore. Admittedly, not very private (anybody can listen in) and also in simplex, (you can only speak one at the time). This simplex makes it also very impractical for business calls.

Not so known is the ability to send and receive E-mails by connecting a modem to your VHF, but who would do that? It is much easier to do with a GSM cell phone. And if you invest in a modem, you would in first place connect it to your SSB, which has a much further range. But, it is technically possible to send and receive e-mails via VHF.

For weather reception there are many coastal stations sending weather forecasts or at least gale warnings. So you are able to listen to voice broadcasts on your VHF.

2 portable VHF's	Safety and Distress	Yes, but no DSC
	Social calls	Yes, but simplex
	Business Calls	Technically yes, but practically No
	E-mail	No
	Surfing	No
	Weather by Voice	Yes
	Weather by Text	No
	Weather by Pictures	No
	GRIB-files	No



Some comments on the portable VHF's:

Two portable VHF's are required for GMDSS vessels, which yachts obviously are not. I find the portable VHF being very useful, both to take into your grab-bag in case of an abandon ship situation, but also on a daily basis, in the dinghy or as a mobile phone calling the "mother vessel".

For a yacht, two portable VHF's is to overdo it, maybe, so one is enough here, I think.

For the rest, it is similar to the fixed VHF, but has no DSC facility.

NAVTEX	Safety and Distress	No
	Social calls	No
	Business Calls	No
	E-mail	No
	Surfing	No
	Weather by Voice	No
	Weather by Text	Yes
	Weather by Pictures	No
	GRIB-files	No



Some comments on the NAVTEX:

NAVTEX, primarily working in Europe, automatically sends out weather information and navigational warnings with a range of approx. 300 nm.

Being sent on 512 kHz, you could as well connect a SSB to your PC to receive these text broadcasts, but it is so much more convenient to have it fixed installed not having to follow any time of broadcast. The text messages are memorized and displayed on a text display, alternatively, in some versions, printed out on a paper.

I find a Navtex very useful and inexpensive to install and the information is broadcasted free of charge.

EPIRB	Safety and Distress	Yes
	Social calls	No
	Business Calls	No
	E-mail	No
	Surfing	No
	Weather by Voice	No
	Weather by Text	No
	Weather by Pictures	No
	GRIB-files	No



Some comments on the EPIRB:

The EPIRB comes in various versions. Its task is to send an automatic distress call in case of emergency.

The 121.5 MHz only version should no longer be used other than for PLB's (Personal Mini-EPIRBs you hang around your neck or are even built in a watch). These PLB's work on 121,5 MHz, but are only intended for homing in a man overboard situation. I would not use an EPIRB that only has 121,5 as its emergency frequency, since most of its alarms are false alarms.

The SARSAT/COSPAS version on 406.025 MHz is, instead, an adequate type of EPIRB which comes in various sizes (i.e. various sizes of batteries and thus time of transmitting), where the new type with built-in GPS gives a more accurate position report than the ones without built-in GPS. Many EPIRB's also have a hydrostatic release unit (very often the renown H-20 by Swedish company Hammar) allowing the EPIRB to float free automatically in case the ship sinks. For that reason, the EPIRB obviously should be mounted in a place so obstacles do not prevent it to float up (The hydrostatic release unit H20 releases the EPIRB at a water pressure corresponding to 40 cm under water).

There is also the EPIRB type working as an Inmarsat E emergency transmitter, using Inmarsat's geostationary satellites which also is a very good system.

The biggest advantage of the EPIRB is that it does not need any operation in case of emergency, it starts automatically and does its job without asking. This is also its biggest draw-back: since you get no acknowledge of the receipt of your emergency call, you never know if you ever were heard, which psychologically is not very good, as well as the fact that false alarms are not unusual.

It is crucial that the vessels identification, thus the MMSI number, is stored in the EPIRB and that your MRCC (Maritime Rescue Coordination Centre) has stored your details behind that MMSI-number. This increases the chances of getting rescued enormously. Imagine the difference: a non-registered EPIRB starts to send an alert. It is being picked up, the position is defined, but you don't know anything about the owner, the vessel or the chance of that this is a real alarm. On the other hand, if a correctly programmed EPIRB with an MMSI number is triggered and the MRCC has all the details about the vessel in question, they will call the telephone number(s) stored at the MRCC asking how likely it is that the EPIRB of that specific vessel could be calling for help on that specific position. The person on the other end of the line (e.g. a member of the family or a good friend) could then confirm that this boat is actually sailing in that region currently and thus, it could be very likely that they need help.

So, do your homework and register your EPIRB correctly!

SART	Safety and Distress	Yes
	Social calls	No
	Business Calls	No

	E-mail	No
	Surfing	No
	Weather by Voice	No
	Weather by Text	No
	Weather by Pictures	No
	GRIB-files	No



Some comments on the SART:

GMDSS compliant vessels need to carry a Search And Rescue Transponder (SART). This is a transmitter you have in your life raft making it easier for SAR (Search And Rescue vessels) to home the life raft for easier finding.

While a properly registered EPIRB is a very good safety device, I think the SART is a bit overkill on yacht, so I do not recommend a SART.

Marine Safety Equipment - Offshore

How about leaving the VHF-range and heading further offshore? What does GMDSS recommend yachties to carry here?

Are you ready for the dream sail leaving your continent behind?

SSB	Safety and Distress	Yes, including DSC
	Social calls	Yes, especially HAM-radio
	Business Calls	No
	E-mail	Yes, with modem, free for HAM, but "tricky"
	Surfing	No
	Weather by Voice	Yes
	Weather by Text	Yes, e.g. Navtex info via PC
	Weather by Pictures	Yes, e.g. Weather faxes via PC
	GRIB-files	Yes, if e-mail is enabled



Sailor's new 150W SSB (above) and the SCS E-mail modem (left)

Some comments on the SSB:

The short-wave radio, often called the SSB ("Single Side Band"), has many times been declared dead. Nevertheless, more and more sailors install and use SSB and new radios are being launched regularly. The big manufacturers (ICOM for pleasure crafts and FURUNO and SAILOR for the professional fishing and shipping industry), have recently all launched new digitalized 150W devises.

To sum up, one could declare the SSB, or MF/HF-radio as it should be called, to be the long distance VHF. It has similarities in features like simplex ship-to-ship communications and a DSC emergency button but here.

The modern SSB is actually two devices in one: First of all it is a Marine Radio with marine frequencies, DSC and with the official GMDSS status. But secondly, it often can be "opened" to become a HAM radio, sending on different frequencies. Not very long time ago, all major marine SSB's were not able to send on the HAM frequencies at all. By opening up the HAM frequencies in a Marine SSB, you also get access to the LSB (Lower Side Band) not used on Marine bands, but well for HAM enthusiasts. Why am I writing this? Simply because before buying a marine SSB; make sure it can also act as a HAM radio. Why? Because it is on the HAM-

radio frequencies all the fun takes place, the yachting community, and it is here you will be able to send and receive e-mail free of charge, thanks to thousands of enthusiastic HAM:ers around the world.

So let's say you have now chosen your radio, and most sailors end up by the price competitive ICOM radio, while Furuno and Sailor make the better ones and are thus preferred by the professional shipping and fishing industry. Next step is to receive the authority to use your new equipment.

To receive the long range certificate for operating a marine SSB, you need to obtain a licence similar to your VHF-license. I find this license being not much more difficult to pass than the VHF-license.

To send on the popular HAM-frequencies, however, you need to become a radio amateur. This is far more time consuming. The license comes in two classes, but it is the highest class you wish to obtain, since only this allows you to use the high frequencies for long distance communication. This involves both a technical test and still today, you also need to be able to send and receive Morse code. For many, the hurdle is the Morse-alphabet. While they have decreased the required Morse speed a couple of years ago, it still takes half a year or so to pass the exam. I have done it, so I know! Women are said to pass it quicker...

There is an international HAM conference taking place in due course, and it is predicted that there is a chance to withdraw the requirement of knowing Morse to become a radio amateur. Time will tell.

Next hurdle after the equipment and the exam is the installation. To install an SSB is not done overnight and is quite difficult. The transceiver needs a lot of power and the antenna installation is a challenging task. Earthing is crucial and you need a lot of copper plates outside your hull, if you not happen to have a metal hull boat that is. The isolated backstay makes a perfect antenna and most SSB's of today come with an automatic antenna tuner (ATU), which is to be installed as close as possible to both earth and the backstay. The feeder cable to from the ATU and the backstay is part of the active antenna and should definitely not lay close to the non-isolated backstay (thus the lower part of the backstay) as so often seen. Ideally, the feeder cable should be lead in a 30 degrees angle to the backstay or, as we have it, with a distance to the backstay. So, my clear recommendation is to get some professional person to install the SSB for you.

Final hurdle: It is not just to switch on the SSB and start talking. The frequencies have to be chosen with care, depending on the time of the day (night is actually better), the distance and even the activity of the sun (!). This is all due to the fact that the radio waves are being reflected between the earth and the ionosphere and depending on how good and how high the refraction up in the sky is for the day, you can either reach your friend or not. It is like bouncing a ball between a floor and roof trying to find the correct angle to through the ball to get your friend further away to catch the ball without moving. A bit tricky, so to speak.

This applies for sending and receiving E-mails via SSB and a modem as well, of course. The SCS modem with the Pactor III protocol is definitely preferred by most sailors. It does not work out of the box, but with some testing and fiddling around, it works and, as indicated, free E-mails over the whole world via HAM-radio! There are various providers and systems, e.g. Winlink2000 and Sailmail, which are said to work very well. Some even allow you to receive attachments, such as the useful GRIB-files.

There is also modern software available, helping you to choose the closest shore station using input from your position, as well as choosing the best frequency depending on the time of the day. There is a good article on this issue in American Cruising World / November 2003, page 51. You are welcome to contact us, if you need help to obtain the article.

Reading all this, it is understandable that the SSB has been declared dead many times and it is surprising how many long distance sailors actually have and use their SSB for E-mail and social calls from ship to ship.

Worth mentioning is also that installing of a SSB-receiver (thus no transmitting) does not need any complicated installation (a keel bolt as earth is enough, for instance), it does not need any license and it still gives you all necessary information like weather fax and broadcasts. You may listen to the HAM-radio community, but, obviously, you can not send and take part actively if you have a SSB receiver only.

Let me end this introduction to the SSB by quoting two ARC-sailors (Atlantic Rally

for Cruisers from 2002):

- "I cannot stress enough the difference SSB made to our enjoyment of the ARC"
- "Good after lengthy set-up"

Inmarsat C	Safety and Distress	Yes, including Distress Button
	Social calls	No
	Business Calls	No
	E-mail	Yes, but costly: 0.01\$/char.
	Surfing	No
	Weather by Voice	No
	Weather by Text	Yes, incl navigational warnings
	Weather by Pictures	No
	GRIB-files	No



Some comments on the Inmarsat-C:

Inmarsat-C is a mature satellite product and has been existing for some 15 years now. As from user-friendliness, it is very much the opposite to the SSB.

It is a text-only transceiver working slowly with 600 baud only. Attachments are not possible and thus no GRIB-files can be received.

The Inmarsat-C, and its new sister the Mini-C, has the following tasks:

- Sending a distress signal
- Receiving the free weather forecasts and navigational warnings (world-wide)
- E-mail sending and receiving
- Tracking, i.e. automatically sending out your position with the built-in GPS
- Remote control of the vessel

Inmarsat-C covers the whole world via Inmarsat's global beam satellites (see below, from 70 deg North to 70 deg south, so practically all regions except for polar regions).

The setup is out of the box and the new Mini-C both consumes hardly any energy and has everything built into the antenna, including GPS, transceiver and everything!

It is very reliable, works in any condition and you are always "online" with the system. Compared to working with a modem (SSB, Iridium or Fleet, see below), you don't have to log in to anywhere, finding an SMTP server etc to send a mail. Just write and send it off! The reception of E-mails is also instantaneously, so it is not necessary to go dial up a network just to find out that you have no E-mails.

There is no annual fee and all information broadcasted is also free (as with the Navtex). You just pay by the character being sent, which is approx. one American cent per character. This may not sound very expensive, but it is, if the text gets long. I would consider the Inmarsat C being the perfect e-mail backup system for short, SMS-like, text messages.

Depending on the Inmarsat-C provider you choose, you either pay for incoming E-mails as well (not the automatically sent safety and weather info, obviously) or these E-mails are being billed to the sender. TELEMAR, for instance, offers the service of sending bills to registered senders of E-mails to your boat, thus avoiding spam mails which you otherwise would have to pay for, similar of "collect calls" by telephone.

Sending a distress message by pressing one button only in addition to an EPIRB also enhances the ability of rescue, since if two distress messages come from the same vessel, the chance of being considered a false alarm decreases dramatically.

The future of the Inmarsat-C system is very interesting. Tracking facility is only one thing, where you send off you position regularly to be sent to family and friends or even being published on a web-page. Even more interesting is the alarm facility still to be implemented, where a message could be sent off when the boat leaves dock without authority, i.e. is being stolen. Tracking could then start automatically, or the engine being cut of to idle trottle via Inmarsat C's remote control facility.

Again, let me end this introduction with some comments for the recent ARC:

- "Excellent message, e-mail, weather forecasts, position reporting in the ARC"

- "Easy to use"

Inm-B & Fleet77	Safety and Distress	Yes
	Social calls	Yes
	Business Calls	Yes
	E-mail	Yes
	Surfing	Yes
	Weather by Voice	Yes
	Weather by Text	Yes
	Weather by Pictures	Yes
	GRIB-files	Yes



Some comments on the Inmarsat B an Fleet77:

The new Inmarsat Fleet77 and its predecessor Inmarsat-B both fulfil GMDSS requirements and are thus part of GMDSS. Inmarsat-B is being replaced by Fleet77, so I will not go into detail with Inmarsat-B.

Fleet77 will be presented below and is only being mentioned here because it is part of GMDSS. However, as we will see later on, Fleet77 is not very suitable on a yacht.

Continue reading about marine mobile telephones. Click [here!](#)