FOREWORD

This handbook is intended for the guidance of radio operators:

(a) On Australian vessels which are voluntarily fitted with marine VHF radiotelephony and marine VHF radiotelephony with Digital Selective Calling (DSC) capability.

(b) On Australian vessels which are compulsorily fitted with marine VHF radiotelephony and marine VHF radiotelephony with Digital Selective Calling (DSC) capability.

It is the recommended textbook for candidates undertaking the Marine Radio Operators VHF Certificate of Proficiency (MROVCP) examination.

Procedures and requirements outlined in the handbook are based on the International Radio Regulations formulated by the International Telecommunication Union (ITU), on provisions governing the use of radio transmitters in Australia laid down in the *Radiocommunications Act 1992*, and on radiocommunications station licence conditions set by the Australian Communications and Media Authority (ACMA).

Careful observance of the procedures covered by this handbook is essential for the efficient exchange of communications in the marine radiocommunications service, particularly when the safety of life at sea is concerned. Special attention should be given to those sections dealing with distress, urgency and safety.

It should be noted that no provision of this handbook, the International Radio Regulations, or the *Radiocommunications Act 1992*, prevents the use by a vessel in distress of any means at its disposal to attract attention, make known its position and obtain help.

Similarly, no provision of this handbook, the International Radio Regulations, or the *Radiocommunications Act 1992*, prevents the use by vessels engaged in search and rescue operations of any means at their disposal to assist a vessel in distress.

This booklet is based on extracts from the Marine Radio Operators Handbook 2008 and reflects the new arrangements for maritime communication stations from 1 July 2002. These arrangements include substantial changes to the frequencies monitored by these stations for distress and safety, and changed requirements for ships wishing to participate in the AUSREP reporting system.

It also contains information about the Global Maritime Distress and Safety System (GMDSS) marine communications techniques which are available for use by small vessels in Australia. The system uses advanced technology and automation to ensure that search and rescue authorities, as well as ships in the vicinity of an emergency, are alerted reliably and rapidly. Both satellite and terrestrial communications form essential components of the GMDSS.

The Australian Maritime College (AMC) acknowledges the contribution of ACMA, the Australian Maritime Safety Authority (AMSA), the Bureau of Meteorology, Telstra, and the Governments of the States and the Northern Territory in the preparation of this Handbook.

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INTRODUCTION TO MARINE VHF

OPERATOR REQUIREMENTS

RADIO LICENCE INFORMATION

Under the *Radiocommunications Act 1992*, the installation and operation of marine radio equipment aboard any Australian vessel must be authorised by a licence. In the case of marine VHF equipment on board an Australian vessel this is authorised by a maritime ship station class licence. A copy of this class licence is available from ACMA. Radio call signs are no longer issued by ACMA for marine VHF. However existing radio call signs may still be used.

The class licence does not authorize the operation of a 'home base'. Except in special cases, marine radio equipment in private residences will not be authorised by ACMA.

OPERATORS QUALIFICATIONS

As a minimum, under the above licence conditions, all operators of marine VHF equipment are required to posses the Marine Radio Operators VHF Certificate of Proficiency (MROVCP) as issued by the Office of Maritime Communications (OMC), a branch of the AMC, on behalf of ACMA.

MARINE VHF

GENERAL

National and International systems exist to provide prompt and effective search and rescue assistance to ships in distress. By complying with the following procedures, ship station operators can ensure that these systems continue to work effectively for the benefit of all mariners.

Fig. 1 Transceiver

The transmission of false or deceptive distress, urgency or safety messages is strictly forbidden. Extremely severe penalties, including imprisonment exist, under the *Radiocommunications Act 1992*, for any person found guilty of making such a transmission.

All radiotelephony distress, urgency and safety calls and messages should be spoken slowly and clearly. The phonetic alphabet and figure code should be used if necessary. Use of the standard marine vocabulary is recommended in the case of language difficulties.

FREQUENCY OF MARINE VHF

FREQUENCY SPECTRUM

The International Telecommunication Union (ITU) has allocated various bands of frequencies throughout the frequency spectrum for maritime use. The frequency spectrum is divided into eight bands, of which frequencies for maritime VHF use fall between 30 to 300 megahertz (MHz).

The VHF channel plan, as described in the International Radio Regulations, shows a total of 59 VHF channels are available for marine use; (See Table of Transmitting Frequencies in the VHF Maritime Mobile Band,)

56 (48 duplex channels, and 8 simplex channels) for radiotelephone;

1 (Channel 70) is for Digital Selective Calling (DSC); and

2 (Channel 87B, AIS1, and 88B, AIS2) are exclusively for Automatic Identification Systems (AIS).

RANGE OF VHF

Due to the propagation conditions at VHF that part of the radio wave emitted from the transmitter (surface or ground wave) only follows the curvature of the earth's surface for a limited distance. Range at VHF is therefore considered as 'short' and dependent on the combined height of the transmitting and receiving antennas.

Generally speaking range at VHF is slightly greater than the visual line of sight of the combined antennas, the higher the antenna the greater the ranges. During certain atmospheric conditions, particularly during the summer months, the 'ground wave', may be refracted round the earth's surface for a far greater range than would normally be expected at VHF. This phenomenon is known as 'ducting' and should not be regarded as normal.

TYPICAL VHF RANGES

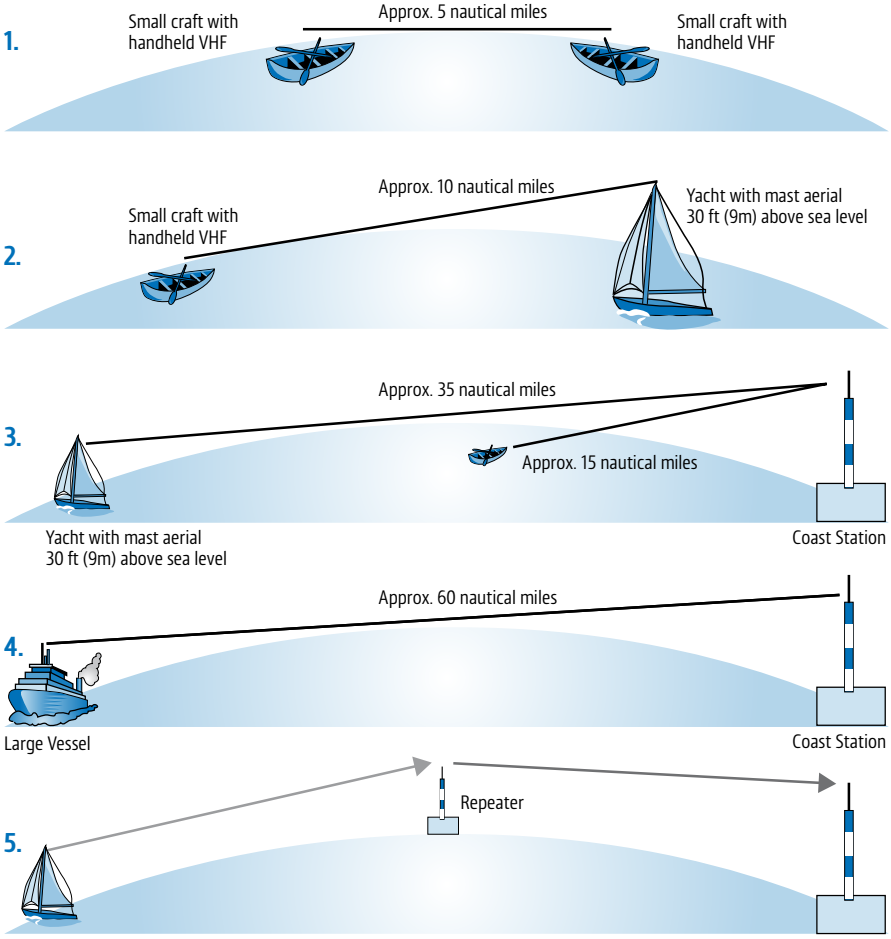


Fig. 2

VHF MARINE RADIO EQUIPMENT

PRINCIPLE OF OPERATION

VHF marine equipment offers a communications range between vessels of up to 20 km (10.8 nautical miles) and between vessel and shore of 50 km (27 nautical miles), and possibly significantly greater;

>> a safety service provided by limited coast stations operated by marine rescue and other organisations;

>> the advantages of being relatively inexpensive, of providing the highest quality signal, of suffering least from interference caused by atmospheric or ignition sources, and of providing access to a radiotelephone service (not available in Australia); but

>> the disadvantage of suffering blind spots behind cliffs, sand hills and heavy vegetation.

VHF marine equipment is suitable for small vessels remaining relatively close to the coast and within range of limited coast stations operating on VHF channels.

VHF marine equipment fitted with Digital Selective Calling facilities may offer a single button distress facility and automatic watch keeping.

THE MAJOR PARTS OF RADIO EQUIPMENT

GENERAL

Marine radio equipment operating in the VHF band is made up of three major parts:

>> the power supply;

>> the transceiver; and

>> the antenna or aerial.

Each part is dependent on the other. A fault in any one of the parts will not allow the equipment to function correctly.

The power to operate the radio equipment may be supplied by the vessels engine or from an independent battery.

The transmitter and receiver are combined into a single unit and commonly referred to as the 'Transceiver'. The Digital Selective Calling (DSC) unit may be further integrated with the transceiver.

The antenna for a marine VHF transceiver should be mounted as high as possible, preferably at the top of a mast, in order to give greater range, and is described as 'A short vertical whip or rod antenna'. Ultra-violet radiation will cause fibre glassed whip antennas to deteriorate after many years of service to a point where moisture can penetrate the layers of insulation. This will seriously affect radiation efficiency and replacement or re-fibreglassing will be necessary.

TRANSCEIVER CONTROLS

This section details the functions of important operator controls which may be found on marine VHF radio equipment. Not all will be found on each brand of equipment. Transceiver controls may be identified differently by individual manufacturers but will have the same purpose:

ON/OFF AND VOLUME CONTROL. Often these functions are combined into a single control. It is used to turn the equipment on or off, and to adjust the level of signals coming from the loudspeaker.

SQUELCH CONTROL. This control allows the operator to stop the constant and annoying, internally generated, background roar from the receiver in the absence of an incoming signal. On VHF marine equipment, it is usually an adjustable control.

The correct setting is such that the roar just cannot be heard. Further operation of the control is undesirable as this will progressively desensitise the receiver and may prevent reception of weak signals.

CHANNEL SELECTOR. This control is used to select the channel on which transmission or reception is required.

DUAL WATCH (DW). This control will be found on the majority of VHF equipment. In operation it will permit the operator to keep a listening watch on a working channel and Channel 16. This is NOT to be confused with scanning desirable or selected VHF channels.

SCAN. This control may be available on some brands of marine VHF equipment. Not to be confused with the Dual Watch control. This control may offer the operator the choice of scanning all the marine VHF channels, or selected channels.

POWER SELECTOR. This control varies the power of the transmitted signal. International regulations restrict the output power of Marine VHF to 25 Watt maximum. On VHF marine equipment it may be marked '25W/1W' (25 Watts or 1 Watt) or 'high/low'. The use of more power than is required to communicate satisfactorily is a breach of the International Radio Regulations, may cause unnecessary interference, and drains the battery supplying the equipment at a faster rate. Correct transmit power setting is generally referred to as "Minimum power to maintain reliable communication".

INTERNATIONAL/USA CONTROL. This control may be found on some VHF marine equipment. It is provided by the manufacturer to permit communications with stations in the USA which do not conform to the International VHF channel plan. It is important that this control is kept in the 'International' position at all times unless in the coastal waters of the USA. Some manufacturers of marine VHF supplied to Australian operators may have 'International' substituted by 'Aus'.

GENERAL CARE AND MAINTENANCE

Vessel owners should be aware that, on occasions, a power supply fuse will blow when the transceiver is malfunctioning and for no apparent reason. It is recommended that a supply of fuses of the manufacturer's recommended value be carried on board. For safe keeping spare fuses could be contained in an old plastic film container.

VHF MARINE REPEATERS

PRINCIPLE OF OPERATION

VHF communication range depends mainly on the height of the antennas of the transmitting and receiving stations. By using VHF marine repeater stations, the range of ship to ship, ship to shore and shore to ship communications can be significantly increased.

VHF marine repeaters are unmanned shore installations usually located at geographically high points. They are designed to transmit and receive simultaneously and will retransmit or 'repeat' all signals received. Retransmitted signals can be received by any station listening on the repeater channel.

Limited coast stations operated by marine rescue organisations routinely monitor VHF repeater channels operating in their area.

Not all coastal areas of Australia are served by VHF marine repeaters.

VHF MARINE REPEATER CHANNELS

VHF marine repeaters operate in the **DUPLEX** mode on channels **21, 22, 80, 81** or **82**.

For their own safety, boat owners should ensure that they are familiar with the location and operating channel of their local repeater.

Digital Selective Calling alerts using VHF must be confined to channel 70 and will not operate through repeaters.

USE OF VHF MARINE REPEATERS

In most cases VHF marine repeaters are installed and maintained by marine rescue organisations as a service to mariners and are available for use by all licensed VHF ship stations. However, in order to minimise congestion, if direct ship to ship or ship to shore communications are possible on a non-repeater channel, this must be used in preference.

Repeater channels must not be used as 'chatter channels'. Communications must be restricted to those concerning the movements of vessels and safety of vessels and persons. To discourage lengthy conversations, repeaters will incorporate an automatic time restriction of approximately thirty seconds.

If not apparent by monitoring, a ship station can gain an indication of its ability to access a repeater by momentarily depressing the microphone button. If a brief (approximately one second) burst or 'tail' of noise is heard from the loudspeaker when the button is released, then the vessel is activating the repeater. If a 'tail' is not heard, it is probable that the vessel is out of range of the repeater.

Operators using VHF equipment equipped with an 'International' or 'Aus' channel switch should note that it is essential that the switch be in the 'International' or 'Aus' position to access repeaters.

STATIONS FOR MARINE COMMUNICATIONS

LIMITED COAST STATIONS

Limited coast stations are stations on land established for the purpose of communicating with vessels at sea. These stations are primarily responsible for the safety of movement and operation of vessels within their local area. These stations are not licensed to handle public correspondence.

There are no fixed hours for the radio service provided by limited coast stations and many do not offer a continuous service. Hours of service are determined by local requirements or, in some cases, by State Government legislation.

In the interest of safety boat operators should familiarize themselves with services available to their area of operations. Limited coast stations generally fall into the category of marine rescue units, yacht clubs or fishing cooperatives.

STATION IDENTIFICATION

Transmission without identification is forbidden. All transmissions should be identified by the vessel's name, any other identity (if available) or by other means, such as the Maritime Mobile Service Identity (MMSI) issued to a vessel's Digital Selective Calling (DSC) unit.

OPERATING PROCEDURES

National and International systems exist to provide prompt and effective search and rescue assistance to ships in distress. By complying with procedures in this chapter, ship station operators can ensure that these systems continue to work effectively for the benefit of all mariners.

All radiotelephony distress, urgency and safety calls and messages should be spoken slowly and clearly. The phonetic alphabet and figure code should be used if necessary. Use of the standard marine vocabulary is recommended in the case of language difficulties.

AUTHORITY OF THE MASTER

A ship radio station and the service it provides are placed under the authority of the master, skipper, or the person responsible for the safety of the vessel.

PRIORITY OF COMMUNICATIONS

All radiotelephony communications have been prioritised as follows:

>> **DISTRESS CALLS,** messages and traffic are broadcast to all stations on distress channels;

>> **URGENCY CALLS,** messages and traffic may be broadcast to all stations or transmitted to an individual station on channels allocated for distress communications or on a working channel if the message is of an urgent medical request or repetition of an overdue vessel report.

>> **SAFETY CALLS** and messages may be broadcast to all stations or transmitted to an individual station. The safety message will always be transmitted on a working channel. An acknowledgment is not expected for a safety broadcast.

>> **GENERAL OR ROUTINE** communications will always be transmitted to an individual station on a working channel.

RADIOTELEPHONY CALLING & WORKING CHANNELS Channels allocated to ship and limited coast stations are categorised as either calling or working channels:

>> Calling channels are for establishing the initial contact with other stations; and

>> Working channels are for the exchange of messages or conducting public correspondence by radiotelephone.

Common Channel	Channels MHz	Communication with	Purpose
Ch 77	156.875	Ship stations	General or routine communications
Ch 73	156.750	Limited coast and ship stations (Yacht & Pleasure craft)	Calling and working
Ch 72	156.625	Limited coast and ship stations	Calling and working
Ch 71	156.575	Limited coast and ship stations (Professional Fishing vessels)	Calling and working
Ch 70	156.525	All stations	DSC distress, urgency, safety and routine alerting
Ch 67	156.375	All stations	Distress, urgency and safety calling (supp. to Ch 16)
Ch 16	156.800	All stations	International Radiotelephony distress, urgency, safety and calling channel
Ch 13	156.650	Ship stations	Intership Maritime Safety Information. May be used by Port Authorities for vessel harbour movements communications.
Ch 6	156.300	Ship and aircraft	Co-ordinated Search and Rescue (SAR). May be used by Port Authorities for tug to ship berthing communications

PROTECTION OF CHANNELS

It is important that channels are used only for the purpose for which they have been assigned, e.g. channels authorised for calling are not used as working channels. Channels authorised for calling coast stations are not used for calling ship stations.

SECRECY OF COMMUNICATIONS

Article 17 of the ITU Radio Regulations prohibits the unauthorised interception of Radio Communications not intended for the general use of the public.

Secrecy of communications does not apply to the broadcast of distress, urgency or safety traffic addressed to all stations.

WATCH KEEPING

Whilst at sea it is a requirement for small craft to maintain a listening watch on Channel 16. Commercial vessels are currently required to maintain a continuous listening watch on Channel 16.

SILENCE PERIODS

The International regulations no longer require silence periods to be observed on the distress and calling frequencies. Silence Periods for radiotelephony are from the hour and half hour for a period of three minutes. It is the practice in all Australian waters to observe silence periods on the radiotelephony distress VHF Channel 16.

During communications difficulties the recommended time for the transmission of distress traffic is during a silence period. Those vessels that come under the Safety of Life at Sea (SOLAS) regulations maintain a continuous watch on VHF DSC channel 70 and a listening watch on channel 16.

UNNECESSARY COMMUNICATIONS

Transmission should be as brief as possible, non essential remarks, bad language and unnecessary conversations should be avoided. It is an offence under the *Radiocommunications Act 1992*, to use a transmitter in a manner that may cause a reasonable person to feel threatened or harassed.

TEST TRANSMISSIONS

Test transmissions should be made on a working channel and kept to a minimum or avoided altogether on distress, urgency, or safety channels. If, after technical maintenance, or prior to departing port, it is necessary to test the radio equipment, approval from the nearest coast or limited coast station may be required.

LOG KEEPING

Operators should keep a record of all distress alerts and messages transmitted or received. Particulars should include the station or stations with which the messages were exchanged, the channels used and the date and times of the transmission and reception. Without an official log book an exercise book could be drawn up. (see page 34).

PHONETIC ALPHABET AND FIGURE CODE

When experiencing difficulties with the exchange of radio communications, i.e. language difficulties, it may be necessary to exchange communications by the use of the Phonetic Alphabet, especially during distress communications situations. (see page 40).

CONTROL OF COMMUNICATIONS

During routine communications between ship to shore and ship to ship the station being called 'controls' the communication process. In order that communications may be conducted efficiently, and with the minimum of delay, instructions issued by coast or limited coast stations should be conducted without delay.

REVISION QUESTIONS

1] Is a Radio Licence required for the operation of Marine VHF transmitters?

2] Is a Radio Operators Certificate required for the operation of Marine VHF?

3] What part of the VHF radio wave is used for communications purposes?

4] Generally speaking what range does the VHF have? Short, medium or long range?

5] Generally speaking what determines the range of marine VHF?

6] Where would you mount the VHF antenna?

7] What is the purpose of the 'Squelch' control?

8] What channels are monitored with the 'dual watch' control' activated?

9] What is the maximum transmit power allowed for marine VHF?

10] What is the minimum power permitted for marine VHF transmissions?

11] What marine VHF channel is dedicated for VHF DSC?

12] What marine VHF channel is reserved for the exchange of ship to ship marine safety information?

13] What marine VHF channel may be used for ship to aircraft coordinating search and rescue?

14] What marine VHF channel is reserved for ship to ship general communications?

15] What is the required power setting should you require operating on VHF Ch 15 or 17?

16] What is a marine VHF Relay station?

17] What is the purpose of a Limited Coast Radio Station?

18] What services do Limited Coast Radio Stations provide?

19] What do you understand about 'Station Identification' during transmission?

20] How are radio transmissions identified?

21] Whose authority is the vessel's radio station placed under?

22] What is the order of priority of marine communications traffic:

23] What marine VHF channel is used for distress calling and messages

24] What is the supplementary channel for channel 16?

25] What is the SIMPLEX mode of transmission?

26] When would the DUPLEX mode of transmission be used?

27] What do you understand about 'Confidentiality or Secrecy of transmission'?

28] What is a calling channel?

29] What is a working channel?

30] What type of channel would a Maritime Safety Information message be broadcast on?

31] What marine VHF channel should a listening watch be maintained on whilst at sea?

32] When are the Silence Periods on marine radiotelephony channels?

33] What information is required to be entered into the radio log book?

34] What is the correct phonetic spelling of the word 'MAGNILOQUENT'?

35] Generally speaking what type of station controls the communication process?

ROUTINE CALLING PROCEDURES

ROUTINE CALLING

Before transmitting, the operator should listen for a period long enough to be satisfied that harmful interference will not be caused to communications already in place.

Marine VHF Channels established for calling purposes are not to be used for the exchange of routine messages.

When using radiotelephony channels in the VHF marine band and communications are good the initial call may be simplified as follows:

>> The name and/or other identifying information of the station being called once only;

>> The words THIS IS;

>> The name and/or other identifying information of the station calling, spoken twice;

>> The purpose of the call;

>> The suggested working channel for the exchange of messages; followed by

>> The word OVER. (The invitation to reply)

AN EXAMPLE FOR A ROUTINE SHIP TO SHORE INITIAL CALL ON CHANNEL 16:

Station called	.....Coast Guard
The words "this is"	THIS IS
The station calling (x2)	Cyclopse Cyclopse 503000100
	On Ch 16, Position report, suggest Channel 73
	OVER

REPLYING TO CALLS

The Limited coast station reply could be abbreviated in a similar manner to the call:

AN EXAMPLE FOR A ROUTINE SHORE TO SHIP REPLY:

Station called	Cyclopse 503000100
The words "this is"	THIS IS
The station calling (x2)	.....Coast Guard, ...Coast Guard
	Romeo change to Channel 73
	OVER

At this point both stations change to the suggested working VHF channel and the vessel initiates the call again.

Transmission without station identification is forbidden. Once contact has been established station identification may be shortened to just the station name:

AN EXAMPLE FOR A ROUTINE SHIP TO SHORE INITIAL CALL ON THE AGREED WORKING CHANNEL:

Station called	.....Coast Guard
The words "this is"	THIS IS
The station calling (x2)	Cyclopse Cyclopse 503000100
	On Ch 73 How do you read me? (What is my readability?)
	OVER

AN EXAMPLE FOR A ROUTINE SHORE TO SHIP REPLY :

The words "this is"	THIS IS
The station calling	.....Coast Guard
	Readability loud and clear (five by five) go ahead with your position report
	OVER

THE VESSEL CONTINUES:

The words "this is"	THIS IS
The station calling	Cyclopse
Sending Position	Position report Cyclopes 503000100 anchored in position
	.....etc. No further traffic
	OVER

The limited coast station receives and acknowledges the position report:

THE LIMITED COAST STATION ACKNOWLEDGES RECEIPT OF THE MESSAGE:

The words "this is"	THIS IS
The station calling	.....Coast Guard
Acknowledgement	Romeo, your position report received, No traffic for your vessel, returning to Channel 16 and standing by,
	.....Coast Guard
	OUT (indicating the end of communications between the two stations)

At this point both stations return to monitoring Channel 16.

REPEATING CALLS

If no immediate reply is received to the initial call, wait two minutes and repeat the call. After two calls wait a further three minutes before calling again. At this point it may be necessary to call another station or to consider whether the required station is in range. Restrictions with regard to repetition of calls do not apply to distress or urgency calls.

DIFFICULTIES IN ESTABLISHING CONTACT WITH OTHER STATIONS

When a station receives a call and is not certain for whom the call was intended, it should not reply, instead wait for a repetition of the call. When a station receives a call which is intended for it, but is uncertain of the caller, then the called station may reply requesting identity of the calling station.

DISTRESS CALLING PROCEDURES

RESPONSIBILITY

State and Territory police forces, using the resources of recognized volunteer marine rescue organizations, as well as their own Water Police, co-ordinate most inshore boating emergencies.

AUTHORITY TO TRANSMIT A DISTRESS CALL AND MESSAGE

A distress priority message may only be sent on the authority of the master, skipper, or the person responsible for the safety of the vessel.

CHANNEL FOR DISTRESS

The International Marine VHF channel for distress radiotelephony communication is Channel 16. In Australian waters VHF Channel 67 is the supplementary to Channel 16.

DISTRESS ALERT

If the equipment is installed onboard, priority should be given to transmitting a DSC Distress Alert on VHF Ch 70 followed by the distress call and message on VHF Ch 16.

THE DISTRESS SIGNAL

The distress signal is the word MAYDAY. The transmission of the distress signal indicates that the vessel, or persons onboard that vessel, are in GRAVE AND IMMINENT DANGER and require immediate assistance.

THE DISTRESS CALL

The distress call and message is broadcast to ALL STATIONS, in the SIMPLEX mode of transmission. The radiotelephony distress call consists of:

>> the distress signal MAYDAY, spoken three times;

>> the words THIS IS;

>> the name and any other identity of the vessel in distress, spoken three times.

THE DISTRESS MESSAGE

The radiotelephony distress message consists of:

>> the distress signal MAYDAY;

>> the name and any other identity of the vessel in distress;

>> particulars of its position;

>> the nature of the distress, the kind of assistance desired;

>> any other information which may facilitate rescue; followed by

>> the word OVER, the invitation to respond.

The distress call and message may be repeated as often as necessary, especially during silence periods, until an answer is received.

If no answer is received on distress channels, the message should be repeated on any other available channel where attention might be attracted.

EXAMPLE OF A COMPLETE DISTRESS CALL AND MESSAGE:

The VHF DSC Distress Alert, if facility fitted, followed by:

Distress call

Distress signal (x3)	**MAYDAY, MAYDAY, MAYDAY**
Words "this is"	THIS IS
Station calling (x3)	SCAMP SCAMP SCAMP 503000123 (For vessels equipped only with VHF a ship station licence is not required and therefore a radio call sign will not have been allocated).

Distress message

Distress signal	**MAYDAY**
Name/MMSI	SCAMP 503000123
Position	50 NAUTICAL MILES DUE EAST FROM POINT DANGER
Nature of distress	SINKING AFTER STRIKING SUBMERGED OBJECT.
Other information (If time permits)	ESTIMATE FURTHER 15 MINUTES AFLOAT. 20 METRE MOTOR CRUISER RED HULL WHITE SUPERSTRUCTURE 4 PERSONS ONBOARD EPIRB ACTIVATED
	OVER

DISTRESS POSITION INFORMATION

Preference should be given to indicating the position by latitude and longitude (degrees and minutes and decimal points of a minute if necessary, North or South, East or West); or true bearing and distance (the unit of distance should always be specified, for example, nautical miles or kilometres) from a known geographical point (for example 045 degrees true from Point Danger, 24 nautical miles); or a precise geographical location (for example, in the case of a vessel running aground). Where latitude and longitude are not used, care must be taken to ensure that the position given cannot be confused with any other place or geographical point.

If afloat and drifting, the rate and direction of drift could be stated in the distress message.

DISTRESS TRAFFIC

All communications relating to the immediate assistance required by the vessel in distress, including search and rescue and on-scene should use the distress signal **MAYDAY** to precede each call and message.

ACCEPTANCE OF DISTRESS CALLS AND MESSAGES

The obligation to accept distress calls is absolute and must be given priority over all other communications.

AUTHORITY TO TRANSMIT A DISTRESS ACKNOWLEDGEMENT

A distress acknowledgement may only be sent on the authority of the master, skipper, or the person responsible for the safety of the vessel.

OBLIGATION TO ACKNOWLEDGE RECEIPT OF A DISTRESS MESSAGE

Ship stations that receive a distress message from another vessel which is, beyond any possible doubt, in their vicinity, should immediately acknowledge receipt. However, in areas where reliable communications with a limited coast station is practicable, ship stations should defer this acknowledgment for a short interval to allow the limited coast station to acknowledge receipt.

Ship stations which receive a distress message from another vessel which, beyond any possible doubt, is not in their vicinity should defer their acknowledgment to allow vessels nearer to the distressed vessel to acknowledge without interference.

Ship stations which receive a distress message from another vessel which, beyond any possible doubt, is a long distance away, need not acknowledge receipt unless this distress message has not been acknowledged by any other station.

When a ship station hears a distress message which has not been acknowledged by other stations, but is not itself in a position to provide assistance, it should acknowledge the call and then take steps to attract the attention of a limited coast radio station or vessels which might be able to assist.

ACKNOWLEDGMENT OF RECEIPT OF A DISTRESS MESSAGE

Acknowledgment of receipt of a distress message by a vessel, limited coast radio station should be made in the following way:

>> The distress signal **MAYDAY**;

>> The name and any other identity of the station sending the distress message, spoken three times

>> The words THIS IS

>> The name and any other identity of the station acknowledging receipt, spoken three times;

>> The word **RECEIVED**;

>> The distress signal **MAYDAY**.

>> OVER

EXAMPLE OF AN ACKNOWLEDGMENT OR RECEIPT OF A DISTRESS MESSAGE BY A SHIP STATION

Distress Traffic	**MAYDAY**
Distress vessel (x3)	.....
The words "this is"	THIS IS
Station calling (x3)	.....
The acknowledgement	**RECEIVED MAYDAY**
	OVER

As soon as possible after this acknowledgment a ship station should transmit the following information:

>> its position;

>> the speed at which it is proceeding; and

>> the approximate time it will take to reach the distress scene.

CONTROL OF DISTRESS TRAFFIC

The control of distress traffic is the responsibility of the vessel in distress. However, this station may delegate the control of distress traffic to another vessel, or limited coast radio station.

The vessel in distress or the station in control of distress traffic may impose silence on any or all stations interfering with distress traffic by sending the instruction **SEELONCE MAYDAY**. This instruction must not be used by any station other than the vessel in distress, or the station controlling distress traffic.

EXAMPLE OF A MESSAGE BY THE DISTRESS VESSEL OR THE CONTROL STATION IMPOSING SILENCE:

Distress traffic:	**MAYDAY**
Addressed to: (x3)	All stations, all stations, all stations
The words "this is"	THIS IS
Station calling (x3)	(Name of calling station)
The signal:	**SEELONCE MAYDAY**

If another station near the distressed vessel believes that silence is necessary it should use the instruction **SEELONCE DISTRESS**.

EXAMPLE OF A MESSAGE BY STATION NEAR THE DISTRESS VESSEL IMPOSING SILENCE:

Distress traffic:	**MAYDAY**
Addressed to: (x3)	All stations, all stations, all stations
The words "this is"	THIS IS
Station calling (x 3)	(Name of calling station)
The signal:	**SEELONCE DISTRESS**

Any station which has knowledge of distress traffic and cannot provide assistance should continue to monitor the traffic until such time that it is obvious assistance is being provided.

Any station which is aware of distress traffic, and is not taking part in it, is forbidden to transmit on any channel which is being used for that traffic.

Ship stations not involved in the exchange of distress traffic may, while continuing to monitor the situation, resume normal radio service when distress traffic is well established and on the conditions that distress traffic channels are not used and no interference is caused to distress traffic.

RESUMPTION OF RESTRICTED WORKING

Should the station controlling distress traffic consider that complete silence is no longer required on the distress channel, the station should transmit on that channel a message addressed to all stations indicating that restricted working may be resumed. Ship stations may then resume use of the distress channel for normal purposes, but in a cautious manner and being aware that the channel may still be required for distress traffic.

The message to announce resumption of restricted working should take the following form:

>> the distress signal MAYDAY;

>> the call ALL STATIONS, spoken three times;

>> the words THIS IS;

>> the name and any other identity of the station sending the message;

>> the time the message originated;

>> the name and any other identity of the vessel in distress

>> the word **PRU-DONCE**.

EXAMPLE OF THE DISTRESS VESSEL OR THE CONTROL STATION IMPOSING 'RESTRICTED WORKING' ON THE DISTRESS CHANNEL:

Distress traffic:	**MAYDAY**
Addressed to: (x3)	All stations, all stations, all stations
The words "this is"	THIS IS
The station calling (x3)	(Name of calling station)
Time of the message	**..... GMT ***
The identity of the Distress vessel:	(Name of distress vessel)
The signal:	**PRU-DONCE**

*** Greenwich Mean Time (GMT) may be in local time.**

RESUMPTION OF NORMAL WORKING

When distress traffic has ceased on a channel that has been used for distress traffic, the station that has been controlling that traffic should transmit a message addressed to all stations indicating that normal working may be resumed. The message announcing resumption of normal working should take the following form:

>> the distress signal MAYDAY;

>> the call ALL STATIONS, spoken three times;

>> the words THIS IS;

>> the name and any other identity of the station sending the message;

>> the time the message originated;

>> the name and any other identity of the vessel which was in distress;

>> the words **SEELONCE FEENEE**.

EXAMPLE OF THE DISTRESS VESSEL OR THE CONTROL STATION ADVISING RESUMPTION OF 'NORMAL WORKING' ON THE DISTRESS CHANNEL:

Distress traffic:	**MAYDAY**
Addressed to: (x3)	All stations, all stations, all stations
The words "this is"	THIS IS
The station calling (x3)	(Name of calling station)
Time of the message	**..... GMT***
The identity of the Distress vessel:	(Name of distress vessel)
The signal:	**SEELONCE FEENEE**

*** Greenwich Mean Time (GMT) may be in local time.**

TRANSMISSION OF A DISTRESS MESSAGE BY A STATION NOT ITSELF IN DISTRESS

A ship or limited coast station which learns of a vessel in distress may transmit a distress message on behalf of that vessel when:

>> The distress vessel can not transmit a distress message; or

>> Although not in a position to assist, a vessel in the vicinity has not heard an acknowledgement; or

>> The Master, Skipper, or the person responsible for distress communications, a maritime communication station or a limited coast station considers that further assistance is necessary.

EXAMPLE OF A DISTRESS MESSAGE RECEIVED AND THEN RELAYED BY ANOTHER STATION

VHF DSC DISTRESS RELAY ALERT followed by spoken message.

Mayday relay call (x3)	**MAYDAY RELAY, MAYDAY RELAY, MAYDAY RELAY**
The words "this is"	THIS IS
Station calling (x3)	(Name of relay station) .....
The Mayday message	(Repeat of original Mayday message).....
	OVER

EXAMPLE OF A DISTRESS MESSAGE CREATED AND BROADCAST BY A STATION ON BEHALF OF A SHIP STATION

VHF DSC DISTRESS RELAY ALERT followed by spoken message.

Mayday relay signal (x3)	**MAYDAY RELAY, MAYDAY RELAY, MAYDAY RELAY**
The words "this is"	THIS IS
Calling Station (x3)	(Name of Coast Station) .....
The Mayday relay message	**MAYDAY RELAY**, name of vessel in distress, position, nature of distress and any other information (persons onboard)
	OVER

THE URGENCY SIGNAL

The urgency signal consists of the words PAN PAN, and indicates that the caller has an urgent message to transmit concerning the safety of the vessel, aircraft or person. It has priority over all other communications except distress.

The urgency signal may be used to precede a message concerning a 'man overboard' where urgent assistance is required to locate that person.

The urgency message may only be sent on the authority of the Master, Skipper or person responsible for the safety of the vessel. The urgency message may be broadcast to all stations on the distress, urgency or safety channel (Ch16) or to an individual station on a working channel after the announcement on Ch16.

A lengthy urgency message requesting medical advice or assistance, or repetition of a message relating to a vessel overdue would also be transmitted on a working channel. The caller may request an acknowledgement for the reception of such a message.

EXAMPLE OF THE BROADCAST OF AN URGENCY CALL:

Urgency signal (x3)	**PAN PAN, PAN PAN, PAN PAN**
Addressed to: (x3)	.....Coast Guard
The words "this is"	THIS IS
The station calling (x3)	(Name of calling station)
Urgency message	Request urgent medical assistance, crew member sustained a broken leg, suggest change to channel 67
	OVER

EXAMPLE OF THE BROADCAST OF AN URGENCY CALL:

Urgency signal (x3)	**PAN PAN, PAN PAN, PAN PAN**
Addressed to: (x3)	All stations, all stations, all stations
The words "this is"	THIS IS
The station calling (x3)	(Name of calling station)
Urgency message	In position ..... broken rudder, no steerage request tow to shore
	OVER

The urgency situation should be cancelled by the station of origin once the urgency situation is finalised.

THE SAFETY SIGNAL

The safety signal consist of the word SECURITE (pronounced SAY-CURE-E-TAY), and indicates that the caller is about to broadcast a message concerning an important navigational or weather warning. It has priority over all other messages except distress or urgency messages.

The safety warning is announced on the distress, urgency or safety channel (Ch 16) with the safety message being broadcast on a working channel. An acknowledgement is not required.

EXAMPLE FOR THE BROADCAST OF SAFETY CALL FROM A VESSEL:

Safety signal (x3)	**SECURITE, SECURITE, SECURITE**
Addressed to: (x3)	All stations, all stations, all stations
The words "this is"	THIS IS
The station calling (x3)	(Name of calling station)
Safety alert	Navigation warning listen on Channel 13

EXAMPLE FOR THE BROADCAST OF SAFETY CALL FROM A COAST STATION:

Safety signal (x3)	**SECURITE, SECURITE, SECURITE**
Addressed to: (x3)	All stations, all stations, all stations
The words "this is"	THIS IS
The station calling (x3)	(Name of calling station)
Safety alert	Navigation warning listen on Channel 67

REVISION QUESTIONS

36] What marine VHF channel may be used for routine or general communications?

37] What should the caller do prior to transmission?

38] What should you do next if you are unsure of the identity of the calling station?

39] What should you do next if you are unsure of the identity of the station being called?

40] What does the word 'ROMEO' indicate during radio telephony communications?

41] What does the word 'OVER' indicate during radio telephony communications?

42] What does the word 'OUT' indicate during radio telephony communications?

43] What should you do next if your routine call has not been replied to?

44] What should you do next if your distress call and message have not been acknowledged?

45] To whom is a routine or general message addressed?

46] What type of channel should be used for the exchange of routine or general messages?

47] What marine VHF channel is used for radio telephony distress communications?

48] What is the radio telephony distress signal?

49] What is the definition of the distress signal?

50] Whose authority is required before using the distress signal?

51] To whom is the distress broadcast addressed?

52] What transmission mode is used for a distress broadcast?

53] What is the sequence for a distress call?

54] What is the first word of a distress message?

55] What is the correct sequence for a distress message?

56] What is your obligation with respect to accepting distress traffic?

57] What should you do next on hearing, or receiving, a distress alert?

58] Whose authority is required before acknowledging a distress alert?

59] What is the expression used to acknowledge a distress call and message by radio telephone?

60] What word is used to precede all radiotelephony distress traffic?

61] What station controls radiotelephony distress traffic?

62] What expression should be used, by the station in control of distress traffic, to impose silence on the distress channel?

63] What expression should be used, by a station not in control of the distress situation, to impose silence on other stations operating during distress communications?

64] What expression should be used by, the station in control of distress traffic, to advise all stations that restricted communications may take place on the distress channel?

65] What expression is used, by the station in control of distress traffic, to advise that normal traffic may now continue on the distress channel?

66] What is the radiotelephony urgency priority signal?

67] What is the definition of the urgency priority signal?

68] What type of message is preceded by the urgency signal?

69] What channel is used for the transmission of an urgency message?

70] To whom is the urgency message addressed?

71] What is the radiotelephony safety signal?

72] What is the definition of the safety priority signal?

73] What type of message is preceded by the safety signal?

74] What channel is used for the transmission of a safety message?

75] Is an acknowledgement expected for a safety broadcast?

DIGITAL SELECTIVE CALLING (DSC)

GENERAL

Digital Selective Calling (DSC) was first introduced to mariners with the commencement of the Global Maritime Distress and Safety System (GMDSS), primarily for vessels compulsorily equipped with marine radio communications equipment.

Marine VHF DSC operates on Channel 70. The DSC alert is transmitted via the VHF unit on Channel 70, and is comparable to a telephone paging system. The DSC is designed, in many ways, to replicate what an operator may say when operating radiotelephony equipment. DSC is also designed to take the place of an operator continuously monitoring the International distress channel 16. However, regulatory authorities have decided that operators of marine VHF should, when at sea, continue to monitor Channel 16 indefinitely.

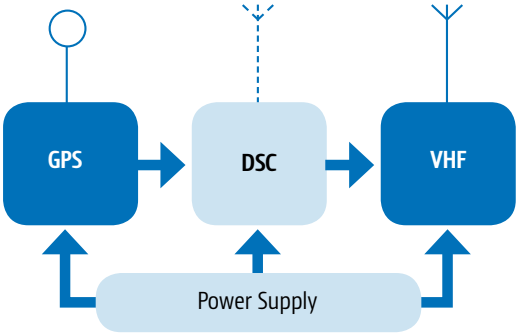


Fig. 3
DSC Block diagram

DSC-CAPABLE EQUIPMENT

VHF transceivers with DSC facilities are available for small vessels. Many marine VHF units have the DSC facility inbuilt with the ability to interface a Global Position System (GPS) receiver, to the DSC, in order to ensure accurate and up to date position information that will be automatically included in a distress alert. DSC equipment may also offer the operator the facility to manually update vessel position information.

STATION IDENTITY

In order to use DSC techniques the VHF DSC controller must be permanently programmed with a unique nine digit identification number known as a Maritime Mobile Service Identity (MMSI). The MMSI is issued by AMSA upon request. ***See www.amsa.gov.au/AUSSAR/AMSA89.pdf***

The first three digits, known as the Maritime Identity Digits (MID) of the MMSI indicate the country of registry.

The MID for Australian vessels is 503 followed by six digits uniquely identifying the vessel itself.

Coast stations are identified by the first two digits of the MMSI as two zeros i.e. 00 followed by the MID, followed by four digits identifying the station itself: 00503xxxx

Recently a new series of MMSI No's have been issued to; Specialist Search and Rescue Aircraft commencing with111, followed by the MID and a further three digits. Whilst Aids to Navigation, e.g. Lightships have an MMSI of 99 followed by the MID and a further four digits:

- >> Vessel 503xxxxxx;
- >> Group 0503xxxxx;
- >> Coast Station 00503xxxx;
- >> SAR Aircraft 111503xxx; and
- >> Aids to Navigation 99503xxxx. (Lightships etc)

TRANSMISSION OF A DSC ALERT

The DSC transmission, on Channel 70, is a brief burst of digital data, typically 0.5 seconds in duration. This channel is protected and should not be used for any other type of transmission.

DSC is a semi-automated method of establishing the initial contact between stations. Once the initial contact has been made subsequent radiotelephone communications should continue on any one of the marine VHF channels, depending on the priority of the service required.

INFORMATION CONTAINED IN A DSC ALERT

VHF marine radio equipment fitted with Digital Selective Calling may offer a single-button distress facility and automated watch keeping. The DSC Alert contains the following information as digitised data:

>> The identity of the transmitting station (MMSI);

>> The priority of the alert (distress, urgency, safety or routine); and

>> Stations being called (all stations or an individual station).

DSC ALERT FORMATS

The International DSC system provides for the following types of alerts:

>> Distress alerts – implicitly addressed to All Stations

>> Distress alert acknowledgement – normally transmitted by coast stations or limited coast stations only. May be used by ship stations under specific circumstances.

>> Distress alert relay – normally transmitted by coast stations or limited coast stations only. May be used by ship stations under specific circumstances.

>> All stations – used to alert all stations that a distress, urgency or safety alert is about to follow.

>> Selective or single station – used to alert an individual station that an urgency, safety or routine alert is to follow.

DSC DISTRESS ALERT PROCEDURES

As with a radiotelephony distress call, the DSC distress alert may only be sent on the authority of the Master, Skipper or person responsible for the safety of the vessel. The DSC distress alert also indicates that the vessel or persons onboard that vessel is in grave and immanent danger and request immediate assistance.

All stations receiving a DSC distress alert must immediately cease all transmission capable of interfering with distress communications.

DISTRESS POSITION INFORMATION

With GPS interfacing position information will automatically be inserted into the distress alert and give an indication of when that position was last updated.

Following the International Telecommunications Union (Radio Regulations) ITU(RR): If the position is not updated within 23.5 hours the section indicating Latitude will show five 9s and the section indicating Longitude will show five 9s. The section indicating the time of the position will show four 8s. Some manufacturers will insert a series of asterisks (*) to replace the digits of position and time information if the position has not been updated. On vessels compulsorily fitted with DSC it may be necessary to update the position information no later than four hours, with a warning system to indicate that the position requires updating. **Therefore the position and time at which it was last updated will always be indicated.**

DSC ALERT INFORMATION

A DSC Alert may contain all or some of the following information as digitised data:

>> the identity of the calling station (MMSI);

>> the station being called (a specific station or all stations);

>> the priority of the alert - distress, urgency, safety or routine; and

>> the position of the calling station and an indication of when the position was last updated.

TRANSMISSION OF A DSC DISTRESS ALERT

Operators of VHF DSC may have the option to transmit the distress alert by:

>> A dedicated Distress Alert Button;

>> Editing of the Distress Alert menu; or

>> Selection of the distress priority from a standard menu, if provided.

Some DSCs may offer the operator the option of selecting the distress priority from a transmission menu with a further option of editing the distress alert by selecting and transmitting the nature of the distress situation e.g. 'on fire', 'collision' or 'abandoning ship'.

However, the primary function of a distress alert is to advise All Stations of the distress situation and the location of the distress vessel.

REPETITION OF DISTRESS ALERTS

The acknowledgement of a VHF distress alert should be anticipated from a coast or limited coast station. However, if an acknowledgement is not received for the DSC distress alert then it will automatically be repeated at approximately four minute intervals for five transmissions.

ACKNOWLEDGEMENT OF A VHF DSC DISTRESS ALERT

Ship stations receiving a distress alert from another vessel should take note of the contents and immediately listen on Channel 16 for any radiotelephony MAYDAY traffic that should follow.

If a MAYDAY is received on VHF Channel 16 it should be acknowledged using the standard radiotelephony procedure. Once the DSC distress acknowledgement is received the repeat DSC distress alert is cancelled.

An acknowledgement is not required if the receiving vessel is unable to assist. Ship stations receiving a DSC distress alert from another vessel may acknowledge by DSC if:

>> Mayday traffic has not been heard on Channel 16 within 5 minutes

>> No other stations have been heard communicating with the vessel in distress; and

>> The DSC distress alert is repeated.

CANCELLATION OF AN INADVERTENT DSC DISTRESS ALERT

In the event of an accidental transmission of a DSC distress alert the transmitting station should immediately:

>> Switch off the VHF transceiver (this will block any transmission repeats of the DSC alert which would continue until an acknowledgement is received);

>> Switch on the VHF transceiver and select Channel 16; and then

>> Broadcast an 'All stations' call, indicating the vessel's name, MMSI, time of the accidental alert and an expression of cancellation of the distress alert.

REVISION QUESTIONS

76] What information is included in all VHF DSC alerts?

77] How is a VHF DSC receiver controller identified?

78] What Australian organisation issues VHF DSC identity numbers?

79] What do the first three digits of a vessel's MMSI indicate?

80] What type of station will be issued with an MMSI commencing with 0?

81] What type of station will be issued with an MMSI commencing with 00?

82] What other navigational equipment is highly recommended to be interfaced with the DSC unit?

83] What marine VHF channel is used for DSC distress alerting?

84] What should you do next after receiving a VHF DSC distress alert?

85] How would you acknowledge a VHF DSC distress alert?

86] What information is included in all VHF DSC distress alerts?

87] On receiving a VHF DSC distress alert, should you acknowledge by DSC?

88] What happens if a DSC distress alert is not acknowledged immediately?

89] To whom is a routine priority alert addressed?

90] What information is required in order to transmit a routine priority alert to another vessel?

91] What should the operator do next if a DSC distress alert has been accidentally transmitted?

EMERGENCY POSITION INDICATING RADIO BEACONS, EPIRBS

GENERAL

EPIRBs are authorized under a class licence and as such do not require an individual radio communications licence. An EPIRB is described as a small, self-contained, battery-operated radio transmitter which is both watertight and buoyant.

The essential purpose of an EPIRB is to assist in determining the position of survivors in search and rescue operations. The EPIRB should not be considered as an alternative to an approved marine radio transceiver.

Operation of the EPIRB should be a simple two step action, and once switched on or activated, should not be switched off until rescue has been completed. International Radio Regulations state that the EPIRB battery should be capable of **supplying power to the EPIRB for a minimum of 48 hours**.

LOCAL USER TERMINALS

Stations established on land for the purpose of receiving signals from the Cospas-Sarsat satellites are known as known as Local User Terminals (LUTs).

There are two LUTs in Australia, one located at Albany, in Western Australia, and another at Bundaberg, Queensland, both of which are linked to the Rescue Coordination Centre (RCC) Canberra. Another LUT located at Wellington, New Zealand, is also linked to RCC Canberra.

TYPE OF EPIRB

There is currently only one type of EPIRB available for all craft:

>> The EPIRB operating on UHF frequencies of 406.025 MHz, 406.028 MHz and 406.037 MHz has recently been made available. Each commonly referred to as the 406 MHz EPIRB.

IDENTIFICATION OF A 406 MHz EPIRB

Purchasers of a 406 MHz EPIRB are required to complete a registration form which in turn is lodged with the Australian Maritime Safety Authority Canberra. The 406 MHz EPIRB has a unique identity code which is transmitted as part of its digitised signal and indicates its country of registration. RCCs around the world can therefore identify the vessel to which an activated EPIRB belongs.

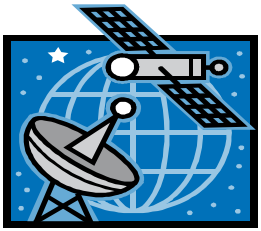
THE COSPAS-SARSAT INTERNATIONAL SATELLITE SYSTEM

The COSPAS-SARSAT satellite system is an International consortium of The United States of America, Canada, France and Russia designed to locate an activated EPIRB operating on a 406. MHz frequency. The system uses four low earth orbiting satellites, LEOS, each making a complete low earth **POLAR ORBIT**, at between **700** and **1000 km** altitude, in approximately **100 minutes**. At least one of these orbiting satellites is in 'line of sight' of any point on the earth's surface at a maximum interval of no longer than three hours. Orbiting satellites in the COSPAS-SARSAT system have a viewing range, or footprint, approximately **2000 km** either side of its track across the surface of the earth.

The system also uses five satellites that are **GEO STATIONARY**, in fixed positions, some **36,000 km** above the equator.

METHODS OF DETECTION AND LOCATION

THE 406 MHz EPIRB



The 406 MHz EPIRB transmits a short burst of digital data on the frequencies of 406.025 MHz, 406.028 MHz and 406.037 MHz. This burst of data is typically a 5 watt signal of 0.5 of a second duration every 50 seconds.

The 406 MHz EPIRB manufactured to Australian specifications also transmits on 121.5 MHz for aircraft homing purposes. Transmission on 121.5 MHz simultaneously radiates a continuous series of distinctive descending tones which contains no station identification.

The 406 MHz EPIRB is therefore capable of being detected by:

>> Aircraft within range AND monitoring the civil aviation frequency of 121.5 MHz; and

>> Satellites operating in the COSPAS-SARSAT system.

DETECTION BY SATELLITE

Satellites monitoring 406.025 MHz can receive the digitised burst of data and relay the signal back to earth in the **'real time'** mode, as long as the EPIRB and LUT are in the satellite footprint at the same time.

Because signals from a 406 MHz EPIRB are in a digitised form, they can also be stored in the satellite's memory. As the satellite's path brings it into view of an LUT, information, including time of first detection, is retrieved from the satellite's memory and relayed down to the LUT. This information is processed and passed to a rescue co-ordination centre, providing both an alert and a position. This is said to be in the **'Global'** mode. Position accuracy is better than 5 km (2.7 nautical miles).

EPIRBs operating on 406.028 and 406.037 MHz operate in a similar manner to the 406.025 MHz EPIRB. However, the 406.028 and 406.037 MHz EPIRB also have an inbuilt Global Position System (GPS) unit installed. Once activated the GPS unit can receive position information from GPS satellites and within 5 minutes include that information in the burst of data that is received by the LUT which is then relayed to the RCC. Position accuracy is to within 150 metres of the activated EPIRB.

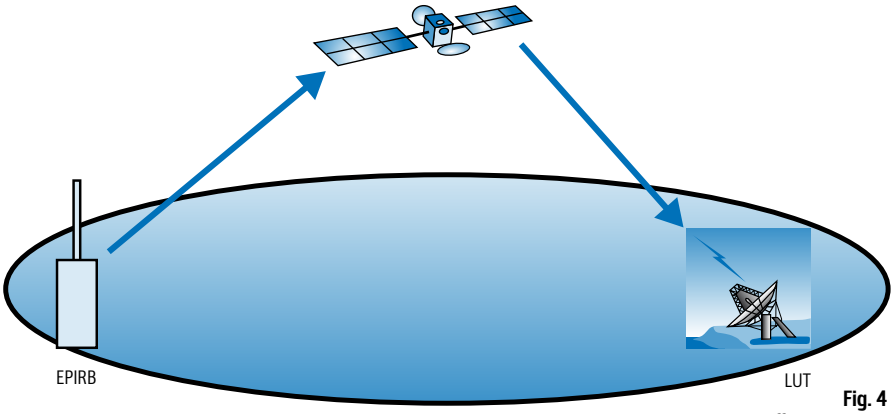


Fig. 4
Satellite Footprint

ACTIVATION OF THE 406 MHz EPIRB

GENERAL

Two types of 406 MHz EPIRBs are manufactured:

>> Those requiring manual activation, the controls of which may simply be on or off; and

>> Those that can be activated manually in addition to those capable of being kept in a float free bracket and released automatically by way of a hydrostatic release system. The arming of this type may also offer the operator the choice of 'off', 'on', 'auto' and a 'testing' facility.

ACCIDENTAL ACTIVATION OF AN EPIRB

The RCC should immediately be advised by telephone, 1800 641 792 (24 hour service) or if at sea, via a coast radio station, a limited coast station or another vessel if the owners of an EPIRB discover that it has accidentally been activated. There are no penalties for advising of accidental activation of an EPIRB.

SERVICING OF EPIRBS

An EPIRB must not be tested except strictly in accordance with manufacturer's instructions. Owners of EPIRBs should refer to the relevant regulation concerning performance verification tests and the owner's manual concerning servicing and recommended battery replacement dates. Hydrostatic release mechanisms should be inspected and serviced at regular intervals.

STOWAGE OF EPIRBS

EPIRBs should be stowed in a safe easily accessible position, or in a secure 'float free' bracket.

REVISION QUESTIONS

92] What is the general description of an EPIRB?

93] What is the purpose of an EPIRB?

94] Is an EPIRB acceptable as an alternative to a radio transceiver?

95] For how long should the EPIRB operate once switched on?

96] When should the EPIRB be switched off?

97] What frequencies does the small inexpensive EPIRB operate on?

98] How is this small EPIRB detected?

99] With what organisation should the purchasers of a 406 MHz type EPIRB register with?

100] What information is included in the 406 MHz EPIRB transmission?

101] What type of signal is transmitted by the 406 MHz EPIRB?

102] What type of signal is transmitted on the aviation emergency frequency of 121.5 MHz?

103] How is the 406 MHz EPIRB detected?

104] What mode does the 406 MHz EPIRB operate?

105] What satellite system can detect or receive EPIRB signals?

106] What type of satellites are stationary over the equator?

107] What type of satellites are in orbit around the Earth's surface?

108] What type of orbit is maintained by the orbiting satellites?

109] What is the approximate duration of the orbiting satellites?

110] What type of station receives EPIRB information from the satellite system?

111] Where are the land stations located in Australia that receive EPIRB information relayed from the Satellite system?

112] What are the limitations of a 121.5 MHz EPIRB?

113] What are the advantages of the 406.025 MHz EPIRB?

114] What are the advantages of the 406.028 MHz EPIRB?

115] How should an EPIRB be tested?

116] What must you do if you accidentally activate an EPIRB?

SEARCH AND RESCUE TRANSPONDERS

GENERAL

A Search and Rescue Transponder, or SART, is a battery-powered portable device, which may be used by a survival craft to indicate its position to searching aircraft and vessels.

The SART operates in the 9.3 to 9.5 GHz band and will respond only to radar equipment operating on those frequencies (X Band, 3 Centimetre radar). The SART will not respond to 3 GHz (S band, 10 Centimetre) radar. The SART should operate in the standby mode for a minimum of 96 hours with a further eight hours of transmission.

POSITIONING OF THE SART

Under no circumstances should the SART be placed in the water. The SART should be mounted at least one metre above the water line. When in the survival craft survivors should position the SART as high as possible with the aid of an oar or the lifeboat mast. Some manufacturers will supply the SART with a short telescopic type mast of approximately one metre in length.

SART OPERATION

Once switched on the SART will scan the X Band of radar frequencies. When a searching radar is detected the SART will lock onto that particular radar frequency and commence to transmit on the entire X Band, thus enabling all vessels in the vicinity to receive an indication of the SART transmission.

On detecting signals from distant radar equipment, an activated SART will generate a series of response signals of twelve blips which will be displayed on the receiving radar screen, extending in a line, approx 5 to 8 nautical miles in length, outward from the SART position, along its line of bearing. This unique radar signal is easily recognised and the rescue vessel or aircraft can locate the survivors. (See Fig. 5 & 6)

An interrogated SART will provide proof to survivors of operations by means of an audible and/or visible flashing light.

LOCATION DISTANCES

A SART should respond to a ship's radar with a scanner height of 15 metres at a distance of at least 5 nautical miles.

Once locked on to a searching radar there will be a slight delay in the changeover from the SART's standby or receive mode to transmit mode. This slight delay may cause a small position error up to 150 metres on the radar screen of the blip associated with the position of the SART. Subsequent radar sweeps will confirm the actual location of the SART.

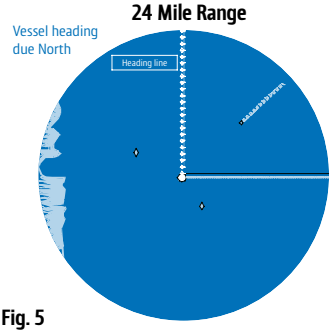


Fig. 5
SART indication as seen on a marine radar on a bearing of 045°T. (Radar Display set to North Up)

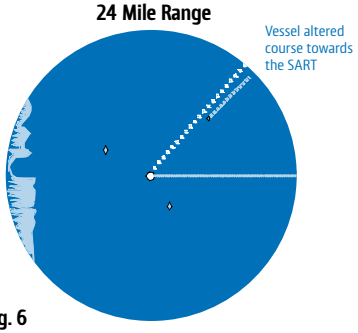


Fig. 6
Image on the radar once the vessel has altered course to head towards the SART position

REVISION QUESTIONS

117] What is the general description of a SART?

118] What type of marine radar is capable of detecting an activated SART?

119] Once 'activated' for how long should the SART be capable of transmitting?

120] When switched to the 'Standby' mode, what band of frequencies will the SART scan?

121] When switched on to the 'Standby' mode for how long should the SART be capable of operating?

122] How should the SART be positioned for survival operations?

123] What is the recommended height for positioning the SART?

124] How is a SART transmission identified?

125] How many miles does the SART signal extend to?

126] How would a survivor be alerted to the fact that the SART has been activated?

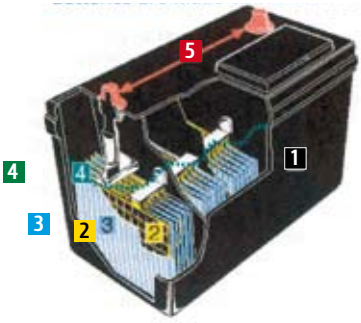
POWER SUPPLIES

THE MARINE BATTERY

Most marine batteries used on boats are of the lead-acid variety. Lead-acid cells consist of a combination of lead and lead peroxide plates. These plates are kept in a solution of sulphuric acid and water (the electrolyte) which produces a potential difference between the plates, and current can flow when a load, such as a marine radio is connected. During this 'discharge' cycle the sulphuric acid or the material in the plates is used up. The potential difference no longer exists and current can no longer flow. This process is reversed by passing a current through the cell in the opposite direction and this is known as 'charging'.

BATTERY CONSTRUCTION (courtesy of Battery Council International)

Batteries are made of five basic components:



1. A resilient Plastic container.
2. Positive and negative internal plates made of lead.
3. Plate separators made of porous synthetic material.
4. Electrolyte, a dilute solution of sulfuric acid and water better known as battery acid.
5. Lead terminals, the connection point between the battery and whatever it powers.

Fig. 7
Battery construction

CELL VOLTAGE

Each lead-acid cell has a nominal voltage of 2 volts. A physically larger cell does not supply a higher voltage (Volts). Cells in a battery are combined to give a total battery voltage. i.e. three cells to produce a 6 Volt battery, or six cells to produce a 12 Volt battery. Each cell will have a filler cap to enable topping up of the electrolyte by distilled or demineralised water. Three filler caps indicate a 6 Volt battery.

CELL CAPACITY

Electrical current is measured in amperes (amps). Each lead-acid battery has the capacity to supply an amount of current over a specific time and is known as its Ampere Hour Capacity (AHC). A large cell has the ability to provide a higher AHC over a short period of time or a low current over a longer period of time. Manufacturers will specify the AHC of an individual battery type.

BATTERY CONNECTION

Batteries can be connected to each other, in order to provide a total operating voltage.

SERIES connections, where the negative terminal of one battery is connected to the positive terminal of another battery. i.e. two 6 Volt batteries of equal AHC connected together in order to produce a 12 Volt operating voltage with an AHC of each battery.

PARALLEL connections, whereby all the positive terminals, of a bank of batteries, are connected together, and all the negative terminals are connected together. In the following Fig. two 6 Volt batteries with equal AHC connected together in parallel will produce a total of 6 Volt with an AHC of the sum of the AHC of each battery, and therefore a longer period overall for current to flow.

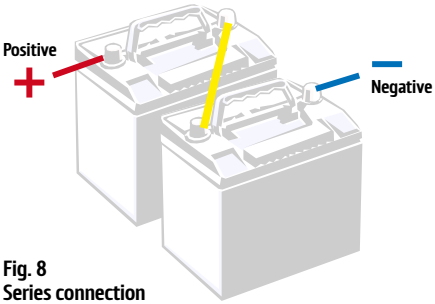


Fig. 8
Series connection

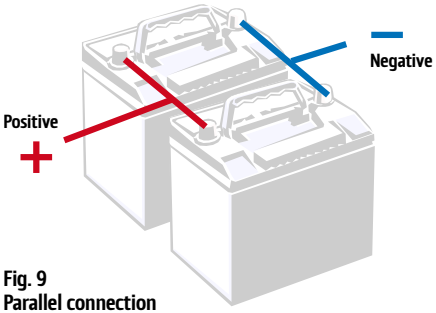


Fig. 9
Parallel connection

BATTERY HAZARDS

There are two hazards associated with lead-acid batteries that ship station operators should be aware of:

>> the risk of explosion; and

>> the risk of chemical burns.

As a result of the chemical process occurring within the cells of a battery during charging, **Hydrogen** gas is produced. When mixed with air, this can form a highly explosive mixture which can be ignited by a naked flame, a lighted cigarette, or a spark.

The spark caused by making or breaking an electrical connection in the vicinity of the charging battery may be sufficient to ignite the hydrogen-air mixture. Batteries should be located as close to the radio equipment as possible, and placed in a well ventilated container or locker. If using metal tools, to work on battery connections, extreme care must be taken to ensure that terminals are not short-circuited.

The electrolyte in battery cells consists of a mixture of water and **Sulphuric** acid. It is sufficiently concentrated, particularly after charging, to damage eyes, skin or clothes if spilt or splashed. Immediate and prolonged application of running water is recommended to minimise its effect.

It is recommended that eye protection, gloves, etc be worn when a person is carrying out maintenance on batteries. Batteries should not be topped-up whilst on charge.

ESSENTIAL BATTERY MAINTENANCE

The functioning of radio equipment is dependent on power supplied by the battery. If it is to provide adequate performance in the event of an emergency, regular and careful maintenance is required.

A battery's service life also depends on the manner in which it is treated. To ensure the best performance from a battery it is important that a battery:

>> is kept clean, dry and free from terminal corrosion;

>> has the electrolyte kept at the correct level; and

>> is kept correctly charged.

BATTERY CLEANLINESS

A battery top should be kept clean. A dirty battery top may hold spilt electrolyte on its surface thereby providing a path for the electrical current to leak away. It is important to keep the outside surfaces of a battery dry and free of contamination.

Corrosion forming on terminal clamps may seriously affect, or even prevent, the ability of the battery to supply current. Corrosion will be evident by the formation of a white-green powder between the battery terminals and the terminal clamps. In this situation, the terminal clamp should be removed and both it and the terminal post cleaned.

To minimise the likelihood of corrosion, terminal posts and clamps should be lightly smeared with Vaseline™ or petroleum jelly.

A battery which is near flat, defective or have corrosion of battery terminals may be able to provide sufficient current to operate the receiver, but not the transmitter. Should the transmitter fail to operate and dial lights or channel display dim significantly when the button is operated, the battery should be suspected.

ELECTROLYTE LEVEL

The level of electrolyte inside a battery is important. As a result of the chemical action inside a battery, water is lost. This should be replaced with distilled or demineralised water.

Seawater must not be used under any circumstances. The level of the electrolyte should be maintained at approximately 10 mm above the plates unless otherwise specified by the manufacturer. If the electrolyte level is too high, it may overflow during charging providing an unwanted discharge path. If the electrolyte is too low, the plates are exposed to the air and permanent damage and loss of capacity may result.

It may be noticed that a battery that is nearing the end of its useful life will require more frequent topping-up than has been previously necessary. Low-maintenance batteries will require infrequent topping-up. Maintenance-free batteries may require none at all.

CORRECT CHARGING

To provide the best service, a battery must be correctly charged. Both overcharging and undercharging can seriously affect its performance.

On small vessels the usual means of charging the radio battery will be an alternator or generator attached to the vessel's engine. An associated regulator, which reduces the charging current as necessary, should prevent overcharging.

Vessels that are used frequently (say, several times each week) should have no problem maintaining a fully charged radio battery. However, on vessels that are used relatively infrequently (say, once every few weeks), it is likely that during storage even a battery that starts as fully charged, will self-discharge and go flat.

For safety reasons, it is important that a small boat owner is able to determine the general condition of a battery and its ability to supply current over a period of time (its capacity). An indication of the level of charge in a battery may be obtained by either:

>> measuring the specific gravity of the electrolyte; or

>> measuring the on-load terminal voltage.

MEASURING THE SPECIFIC GRAVITY

The specific gravity, also called the relative density, of the electrolyte (the liquid inside the battery) varies proportionally with the amount of charge in the battery. It is highest when the battery is fully charged and lowest when the battery is fully discharged or flat. It follows that the amount of charge in a battery can be determined by measuring the specific gravity of the electrolyte. A simple, inexpensive device called a **hydrometer** is used to measure specific gravity.

In general, for a fully charged battery the specific gravity should measure about **1.250**. Half charge will be indicated by a reading of 1.200 and fully discharged by 1.150. All cells in a battery should indicate a similar specific gravity. A variation of more than about 0.025 will indicate a faulty cell and the battery should be replaced.

Specific gravity readings should not be taken immediately after topping-up a cell as the added water will float towards the top of the cell and give a false reading. Charging for thirty minutes or more after topping-up will mix the electrolyte and allow accurate readings. Top up the battery before charging as the pouring of

cold distilled water onto hot acid in the battery will cause splatter. Batteries which have cells where specific gravity readings fail to rise, or respond poorly to adequate charging, should be replaced.

MEASURING THE ON-LOAD TERMINAL VOLTAGE

Measurement of the terminal voltage when a battery is supplying current to a load, such as a transmitting radio, will also provide an indication of the amount of charge in a battery. This measurement is known as the on-load terminal voltage.

For a 12-volt battery, the on-load terminal voltage should not fall below approximately 11.4 volts while transmitting. If the voltage does fall significantly below this figure, the battery requires charging. If after charging, the on-load terminal voltage still falls significantly below 11.4 volts, it is an indication of a faulty cell and the battery should be replaced.

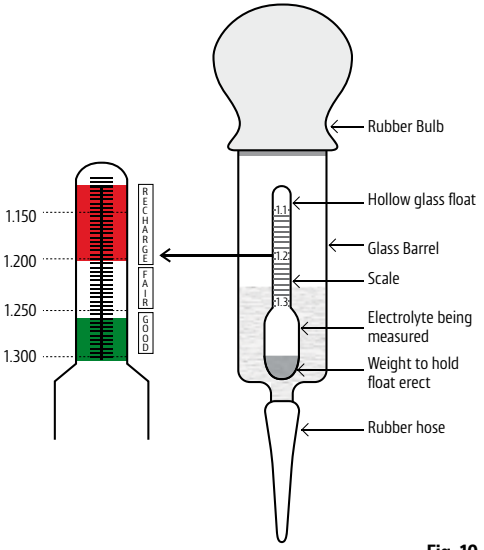


Fig. 10
Hydrometer

Measurement of the off-load (when the battery is idle) terminal voltage of a battery is a poor indication of its condition.

LOSS OF CAPACITY

A battery will suffer a gradual loss of capacity during its life. This is inevitable and the battery should be replaced when the capacity loss becomes significant. Many lead-acid batteries have a commercial life of only two to three years. However, the useful life of a battery can be considerably shortened by:

>> operating a battery in a low state of charge for long periods;

>> allowing a battery to stand in a discharged state for long periods;

>> leaving a charged battery for long periods without periodic charging; and

>> overcharging.

MAINTENANCE FREE BATTERIES

Maintenance free Lead – Acid or Gel type batteries are becoming increasingly more popular and available to mariners. Users of these types of batteries are recommended to follow the manufacturer's guidelines in ascertaining the condition of the battery regarding replacement. On vessels where it is mandatory to carry an independent emergency means of electrical supply, for communications equipment, it may also be a requirement to replace 'maintenance free' batteries after a short operational period of 1 year.

CONNECTION OF BATTERIES DURING EMERGENCIES

For a vessel with more than a single bank of batteries it is highly recommended to connect the batteries in parallel during emergency situations. The battery on/off or interchange switch will indicate if this is possible.

REVISION QUESTIONS

127] What is the most common type of battery available for marine use?

128] What is the nominal voltage per cell, of a Lead Acid battery?

129] What is a batteries' ability to produce current known as?

130] What is the total voltage of two 6 Volt batteries connected in series?

131] What is the total voltage of two 6 Volt batteries connected in parallel?

132] What is the total voltage of two 12 Volt batteries connected in series?

133] What is the total voltage of two 12 Volt batteries connected in parallel?

134] What is the total AHC for two batteries connected in series?

135] What is the total AHC for two batteries connected in parallel?

136] What type of gas is produced by a lead acid battery during the charging process?

137] What is the liquid in battery known as?

138] What is the liquid, in a lead acid battery, a mixture of?

139] What type of acid is contained in the liquid of a lead acid battery?

140] At what level should the liquid in the lead acid battery be maintained?

141] What should the electrolyte be topped up with?

142] How is corrosion on a lead acid battery terminal minimised?

143] How is the basic maintenance of a battery maintained?

144] What is the basic method of determining the operating condition of the lead acid battery?

145] What instrument is used to determine the condition of a lead acid battery?

146] What is the specific gravity per cell, of a well maintained lead acid?

147] How is it recommended to connect two banks of batteries in the event of an emergency?

SUGGESTED FORMAT FOR A RADIO LOGBOOK PAGE

Name of Vessel:

Any other identity:

MMSI:

Date and Time	Station/MMSI from	Station/MMSI to	Details of Calls, Signals & Distress Working	Frequency/Channel

TABLE OF TRANSMITTING FREQUENCIES IN THE VHF MARITIME MOBILE BAND

Extracted from Appendix 18 (WRC 2000) to the ITU Radio Regulations

NOTE: The channels of the present Appendix, with the exception of channels 06, 13, 15, 16, 17, 70, 75 and 76, may also be used for high-speed data and facsimile transmissions, subject to special arrangement between interested and affected administrations.

The channels of the present Appendix, but preferably channel 28 and with the exception of channels 06, 13, 15, 16, 17, 70, 75 and 76, may be used for direct-printing telegraphy and data transmission, subject to special arrangement between interested and affected administrations.

The frequencies in this table may also be used for radiocommunications on inland waterways in accordance with the conditions specified in No. 5.226

Channel designator	Notes*	Transmitting frequencies (MHz)		Inter-ship	Port operations and ship movements		Public correspondence
		Ship stations	Coast stations		Single frequency	Two frequency	
60		156.025	160.625			X	X
01		156.050	160.650			X	X
61	m), o)	156.075	160.675		X	X	X
02	m), o)	156.100	160.700		X	X	X
62	m), o)	156.125	160.725		X	X	X
03	m), o)	156.150	160.750		X	X	X
63	m), o)	156.175	160.775		X	X	X
04	m), o)	156.200	160.800		X	X	X
64	m), o)	156.225	160.825		X	X	X
05	m), o)	156.250	160.850		X	X	X
65	m), o)	156.275	160.875		X	X	X
06	f)	156.300		X			
66		156.325	160.925			X	X
07		156.350	160.950			X	X
67	h)	156.375	156.375	X	X		
08		156.400		X			
68		156.425	156.425		X		
09	i)	156.450	156.450	X	X		
69		156.475	156.475	X	X		
10	h)	156.500	156.500	X	X		
70	j)	156.525	156.525	Digital selective calling for distress, safety and calling			
11		156.550	156.550		X		
71		156.575	156.575		X		
12		156.600	156.600		X		
72	i)	156.625		X			
13	k)	156.650	156.650	X	X		
73	h), i)	156.675	156.675	X	X		
14		156.700	156.700		X		
74		156.725	156.725		X		
15	g)	156.750	156.750	X	X		
75	n)	156.775			X		
16		156.800	156.800	DISTRESS, SAFETY AND CALLING			
76	n)	156.825			X		
17	g)	156.850	156.850	X	X		
77		156.875		X			
18	m)	156.900	161.500		X	X	X

Channel designator	Notes*	Transmitting frequencies (MHz)		Inter-ship	Port operations and ship movements		Public correspondence
		Ship stations	Coast stations		Single frequency	Two frequency	
78		156.925	161.525			X	X
19		156.950	161.550			X	X
79		156.975	161.575			X	X
20		157.000	161.600			X	X
80		157.025	161.625			X	X
21		157.050	161.650			X	X
81		157.075	161.675			X	X
22	m)	157.100	161.700		X	X	X
82	m), o)	157.125	161.725		X	X	X
23	m), o)	157.150	161.750		X	X	X
83	m), o)	157.175	161.775		X	X	X
24	m), o)	157.200	161.800		X	X	X
84	m), o)	157.225	161.825		X	X	X
25	m), o)	157.250	161.850		X	X	X
85	m), o)	157.275	161.875		X	X	X
26	m), o)	157.300	161.900		X	X	X
86	m), o)	157.325	161.925		X	X	X
27		157.350	161.950			X	X
87		157.375			X		
28		157.400	162.000			X	X
88	h)	157.425			X		
AIS 1	l)	161.975	161.975				
AIS 2	l)	162.025	162.025				

TABLE NOTES:

a) Administrations may designate frequencies in the intership, port operations and ship movement services for use by light aircraft and helicopters to communicate with ships participating coast stations in predominantly maritime support operations. However, the use of the channels which are shared with public correspondence shall be subject to prior agreement interested and affected administrations.

b) The channels of the present Appendix, with the exception of Channels 06, 13, 15, 16, 17, 70, 75 and 76, may also be used for high-speed data facsimile transmissions, subject to special arrangement between interested and affected administrations.

c) The channels of the present Appendix, but preferably Channel 28 and with the exception of Channels 06, 13, 15, 16, 17, 70, 75 and 76, may be used for direct-printing telegraphy and data transmission, subject to special arrangement between interested and affected administrations.

d) The frequencies used in this table may also be used for radiocommunications on inland waterways.

e) Administrations having an urgent need to reduce local congestion may apply 12.5 kHz Channel interleaving on a non-interference basis to 25 kHz channels, provided:

- Recommendation ITU-R M.1084-2 shall be taken into account when changing to 12.5 kHz Channels;
- it shall not affect the 25 kHz Channels of the Appendix 4 maritime mobile distress and safety frequencies, especially the Channels 06, 13, 15, 16, 17, and 70, nor the technical characteristics mentioned in Recommendation ITU-R M.489-2 for those channels;
- implementation of 12.5 kHz channel interleaving and consequential national requirements shall be subject to prior agreement between the implementing administrations and administrations whose ship stations or services may be affected.

f) The frequency 156.300 MHz (Channel 06) may also be used for communication between ship stations and aircraft stations engaged in co-ordinated search and rescue operations. Ship stations shall avoid harmful interference to such communications on Channel 06 as well as to communications between aircraft stations, ice-breakers and assisted ships during ice seasons.

g) Channels 15 and 17 may also be used for on-board communications provided the effective radiated power does not exceed 1 W, and subject to the national regulations of the administration concerned when these channels are used in its territorial waters.

h) Within the European Maritime Area and in Canada, these frequencies (Channels 10, 67, 73) may also be used, if so required, by the individual administrations concerned, for communication between ship stations, aircraft stations and participating land stations engaged in co-ordinated search and rescue and anti-pollution operations in local areas.

i) The preferred first three frequencies for the purpose indicated in Note a) are 156.450 MHz (channel 09), 156.625 MHz (channel 72) and 156.675 MHz (channel 73).

j) Channel 70 is to be used exclusively for Digital Selective Calling for distress, safety and calling.

k) Channel 13 is designated for use on a worldwide basis as a navigation safety communication channel, primarily for intership navigation safety communications. It may also be used for the ship movement and port operations service subject to the national regulations of the administrations concerned.

l) These Channels (AIS 1 and AIS 2) will be used for an automatic ship identification and surveillance system capable of providing worldwide operation on high seas, unless other frequencies are designated on a regional basis for this purpose.

m) These Channels (18 and 82 to 86) may be operated as single frequency channels, subject to special arrangement between interested or affected administrations.

n) The use of these channels (75 and 76) should be restricted to navigation-related communications only and all precautions should be taken to avoid harmful interference to channel 16, e.g. by limiting the output power to 1 W or by means of geographical separation.

o) These Channels may be used to provide bands for initial testing and the possible future introduction of new technologies, subject to special arrangement between interested or affected administrations. Stations using these channels or bands for the testing and the possible future introduction of new technologies shall not cause harmful interference to, and shall not claim protection from, other stations operating in accordance with ITU Radio Regulations / Volume 1 / Chapter S11 – Frequencies / Article S5 / Frequency allocations.

MARINE VHF CHANNELS FOR USE BY SHIP STATIONS (EXTRACT FROM THE MARINE RADIO OPERATORS HANDBOOK (OMC 2006)

TABLE 1. Professional Fishing Vessels Frequencies

Carrier Frequency (Tx/Rx) & Channel No.	Communicating with	Purpose
156.575 MHz (Ch 71)	Limited coast and ship stations	Calling and working
156.625 MHz (Ch 72)	Ship Stations	Calling and working
156.875 MHz (Ch 77)	Ship Stations	Calling and working

TABLE 2. Commercial Vessel Frequencies

Carrier Frequency (Tx/Rx) & Channel No.	Communicating with	Purpose
156.300 MHz (Ch 6)	Ship Stations	Calling and working
156.400 MHz (Ch 8)	Ship Stations	Calling and working
156.625 MHz (Ch 72)	Ship Stations	Calling and working
156.725 MHz (Ch 74)	Limited coast stations and ship stations	Calling and working
156.925/161.525 MHz (Ch 78)	Limited coast stations	Calling and working

TABLE 3. Yachts and Pleasure Vessels Frequencies

Carrier Frequency (Tx/Rx) & Channel No.	Communicating with	Purpose
156.625 MHz (Ch 72)	Ship stations	Calling and working
156.675 MHz (Ch 73)	Limited coast and ship stations	Calling and working
156.875 MHz (Ch 77)	Ship stations	Calling and working

TABLE 4. Port Operations Frequencies

Carrier Frequency (Tx/Rx) & Channel No.	Communicating with	Purpose
156.300 MHz (Ch 6)	Ship stations	Calling and working
156.400 MHz (Ch 8)	Ship stations	Calling and working
156.425 MHz (Ch 68)	Limited coast stations	Calling and working
156.450 MHz (Ch 9)	Limited coast stations and ship stations	Calling and working
156.500 MHz (Ch 10)	Limited coast stations and ship stations	Calling and working
156.550 MHz (Ch 11)	Limited coast stations	Calling and working
156.600 MHz (Ch 12)	Limited coast stations	Calling and working
156.625 MHz (Ch 72)	Ship stations	Calling and working
156.650 MHz (Ch 13)	Limited coast stations and ship stations	Calling and working
156.700 MHz (Ch 14)	Limited coast stations	Calling and working
156.975/161.575 MHz (Ch 79)	Limited coast stations	Calling and working
157.000/161.600 MHz (Ch 20)	Limited coast stations	Calling and working

TABLE 5. Public Correspondence Channels

Ship stations may use those VHF frequencies detailed by their provider for public correspondence.

Subject to the International Radio Regulations, when operating outside Australian territorial waters, ship stations may use any maritime mobile frequency authorised by those regulations. Details may be found in the Manual for Use by the Maritime Mobile and Maritime Mobile-Satellite Service, published by the International Telecommunication Union.

TABLE 6. VHF Marine Repeater Channels

Carrier Frequency (Tx/Rx) & Channel No.	Communicating with	Purpose
157.050/161.650 MHz (Ch 21)	Limited coast and ship stations via repeaters	Vessel movements, safety of vessels and persons
157.100/161.700 MHz (Ch 22)	Limited coast and ship stations via repeaters	Vessel movements, safety of vessels and persons
157.025/161.625 MHz (Ch 80)	Limited coast and ship stations via repeaters	Vessel movements, safety of vessels and persons
157.075/161.675 MHz (Ch 81)	Limited coast and ship stations via repeaters	Vessel movements, safety of vessels and persons
157.125/161.725 MHz (Ch 82)	Limited coast and ship stations via repeaters	Vessel movements, safety of vessels and persons

PHONETIC ALPHABET

When spelling is necessary, only the following spelling table should be used:

Letter to be transmitted	Code word to be used	Spoken as *
A	Alfa	**AL** FAH
B	Bravo	**BRAH VOH**
C	Charlie	**CHAR** LEE or SHAR LEE
D	Delta	**DELL** TAH
E	Echo	**ECK** OH
F	Foxtrot	**FOKS** TROT
G	Golf	GOLF
H	Hotel	HOH **TELL**
I	India	**IN** DEE AH
J	Juliet	**JEW** LEE ETT
K	Kilo	**KEY** LOH
L	Lima	**LEE** MAH
M	Mike	MIKE
N	November	NO **VEM** BER
O	Oscar	**OSS** CAH
P	Papa	**PAH** PAH
Q	Quebec	KEH **BECK**
R	Romeo	**ROW** ME OH
S	Sierra	SEE **AIR** RAH
T	Tango	**TAN** GO
U	Uniform	**YOU NEE** FORM or **OO NEE** FORM
V	Victor	**VIK** TAH
W	Whiskey	**WISS** KEY
X	X-ray	**ECKS** RAY
Y	Yankee	**YANG** KEY
Z	Zulu	**ZOO** LOO

MISCELLANEOUS

Letter to be transmitted	Code word to be used	Spoken as **
R	Your message is received and understood	ROMEO
Over	Invitation to reply	OVER
Out	This transmission is ended	OUT
Decimal point	Decimal	DAY-SEE-MAL
Full stop	Stop	STOP
Comma	Comma	COMMA
/	Oblique Stroke	**OBLIQUE**

* The syllables to be emphasised are underlined.
**Each syllable should be equally emphasised.

FIGURE CODE

A few digits and numbers have a modified pronunciation compared to general English:

Letter to be transmitted	Code word to be used	Spoken as **
0	zero	**ZEER**OH
1	one	WUN
2	two	TOO
3	three	**TREE**
4	four	**FOW**ER
5	five	**FIFE**
6	six	SEKS
7	seven	SEVEN
8	eight	AIT
9	nine	**NINER**
10	One zero	WUNZEEROH
1000	thousand	**TOUS**AND

DEFINITION

SIMPLEX	Transmission and reception taking place on a single frequency
DUPLEX	Simultaneous transmission and reception taking place on separate but paired frequencies

STANDARD MARINE COMMUNICATION PHRASES

English is the language most widely used at sea. To facilitate radiotelephony communications, the International Maritime Organisation has compiled a vocabulary of frequently used words and phrases in a book entitled IMO Standard Marine Communication Phrases (SMCP) 2002. The complete SMCP is also available at the IMO website at: http://www.imo.org.

In the interests of accuracy, brevity and clarity it is sound practice for operators to use the standard vocabulary when possible.

A selection of the standard vocabulary is contained in the following paragraphs.

MESSAGE MARKERS

If necessary, messages passed by radiotelephony may be preceded by the following message markers:

"Instruction" Indicates that the following message implies the intention of the sender to influence the recipient(s) by a regulation.

"Advice" Indicates that the following message implies the intention of the sender to influence the recipient(s) by a recommendation.

"Warning" Indicates that the following message informs other traffic participants about dangers.

"Information" Indicates that the following message is restricted to observed facts.

"Question" Indicates the following message is of interrogative character.

"Answer" Indicates the following message is of interrogative character.

"Request" Indicates that the content of the following message is asking for action with respect to the ship.

"Intention" Indicates that the following message informs others about immediate navigational actions intended to be taken.

Responses Where the answer to a question is in the affirmative, say: "Yes" followed by the appropriate phrase in full.

Where the answer to a question is in the negative, say: "No" followed by the appropriate phrase in full.

Where the information is not immediately available, but soon will be, say: "Stand by".

Where the information cannot be obtained, say: "No information".

Where a message is not properly heard, say: "Say again".

Where a message is not understood, say: "Message not understood".

Miscellaneous Phrases

What is your name (and any other identity)?

How do you read me ?

I read you. . .

Bad/one with signal strength one (i.e barely perceptible)

Poor/two with signal strength two (i.e. weak)

Fair/three with signal strength three (i.e. fairly good)

Good/four with signal strength four (i.e. good)

Excellent/five with signal strength five (i.e. very good)

Stand by on VHF channel....

Change to channel....

I cannot read you (pass your message through..../Advise try channel....)

I cannot understand you. Please use the Standard Marine Vocabulary/International Code of Signals.

Corrections When a mistake is made in a message, say:

"Mistake...." followed by the word:

"Correction..." plus the corrected part of the message.

Example: "My present speed is 14 knots – mistake.

Correction, my present speed is 12 knots, one-two knots"

Readiness Go ahead, I am ready/not ready to receive your message

I do not have channel.... Please use channel....

Repetition If any parts of the message are considered sufficiently important to need particular emphasis, use the word "repeat", e.g. "Do not repeat do not overtake".

Acknowledgement	Romeo
Position	When latitude and longitude are used, these should be expressed in degrees and minutes (and decimals of a minute, if necessary), north or south of the Equator and east or west of Greenwich. When the position is related to a mark, the mark shall be a well-defined charted object. The bearing shall be in the 360-degree notation from true north and shall be that of the position from the mark.
Courses	Courses should always be expressed in the 360-degree notation from true north (unless otherwise stated). Whether this is to, or from, a mark can be stated.
Bearings	The bearing of the mark or vessel concerned is the bearing in the 360- degree notation from true north (unless otherwise stated), except in the case of relative bearings. Bearings may be either from the mark or from the vessel.
Distances	Distances should be expressed in nautical miles or cables (tenths of a nautical mile), otherwise in kilometres or metres. The unit should always be stated.
Speed	Speed should be expressed in knots (without further notation meaning speed through the water). "Ground speed" meaning speed over the ground.
Numbers	Numbers should be transmitted by speaking each digit separately, for example one five zero for 150
Geographical Names	Place names used should be those on the chart or Sailing Directions in use. Should these not be understood, latitude and longitude should be used.
Time	Time should be expressed in the 24-hour notation indicating whether UTC, zone-time or local shore time is being used.

INTERNET WEBSITES OF MARINE INTEREST

www.acma.gov.au	Australian Communications & Media Authority
www.amsa.gov.au	Australian Maritime Safety Authority
www.anta.gov.au	Australian National Training Authority
www.bom.gov.au	Bureau of Meteorology
www.cospas-sarsat.com	Cospas Sarsat System
www.gmdss.com.au	Global Maritime Distress and Safety System
www.imo.org	International Maritime Organisation
www.inmarsat.com	International Maritime Satellite Service
www.itu.int	International Telecommunications Union
www.ntis.gov.au	National Training Information Service
www.admiraltyleisure.co.uk	British Admiralty/Products/Publications/Maritime Communications

CONTACT DETAILS

Office of Maritime Communications Australian Maritime College (AMC)

Internet
www.amcom.amc.edu.au

Central Office
Newnham Way
Newnham 7250 *or*
Locked Bag 1394
Launceston Tasmania 7250
Freecall 1300 365 262
Telephone (03) 6324 9869
Facsimile (03) 6324 9885
Email: amcom@amc.edu.au

Australian Search and Rescue (a division of the Australian Maritime Safety Authority)

GPO Box 2181
Canberra ACT 2601
Email: aussarquery@amsa.gov.au

Emergency Phone Numbers:
1800 641 792
1800 622 153

Australian Communications & Media Authority (ACMA)

Internet
www.acma.gov.au

Central Office - Canberra
Purple Building, Benjamin Offices
Belconnen ACT 2617
PO Box 78
Belconnen ACT 2616
Telephone (02) 6219 5555
Facsimile (02) 6219 5353

Outside Sydney, Brisbane, Melbourne, Perth and Cairns areas
(A call to this number can be made from outside the listed areas and will be charged at the local rate, except for mobile phones, which are timed.)
Telephone 1300 850 115

Bureau of Meteorology

Internet
www.bom.gov.au

Head Office - Melbourne
150 Lonsdale St.
Melbourne Vic
PO Box 1289K
Melbourne Vic 3001
Telephone (03) 9669 4000
Facsimile (03) 9669 4699

National Communications Manager
Telephone (03) 9669 4224

National Marine Weather Services Manager
Telephone (03) 9669 4510