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ФАКУЛЬТЕТ НАВИГАЦИИ И СВЯЗИ

Кафедра английского языка навигации и связи

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SUPPLEMENTARY READING IN ESP

(For students of radio engineering and communication)

Учебно-методическое пособие

Рекомендовано к изданию Редакционно-издательской комиссией ГУМРФ имени адмирала С. О. Макарова

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Учебно-методическое пособие составлено для проведения практических занятий по профессиональному английскому языку с курсантами старших курсов, изучающими профессиональный английский язык в сфере радиоинженерии и коммуникации.

Содержит аутентичные тексты для чтения, разнообразные задания для закрепления профессиональной лексики и тренировки грамматических конструкций.

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TEXT 1

Before you read

Exercise 1. Discuss with your partner the following questions:

- What do you know about Marine Communication System?
- What kind of advanced Marine communication and navigation can you name?

What Marine Communication Systems Are Used in the Maritime Industry?

Radio telecommunication at sea had undergone a sea change in the last century. After the days of semaphores and flags (which is still relevant today in some cases), radio brought about a drastic change in marine communication at sea. From the early years of the last century, ships started fitting radio for communicating distress signals among themselves and with the shore. Radio telegraphy using Morse code was used in the early part of the twentieth century for marine communication. In the seventies, after considering the studies of the International Telecommunication Union, IMO brought about a system where ship-to-ship or ship-to-shore communication was put into action with some degree of automation, wherein a skilled radio officer keeping 24×7 watch was not required.

Marine communication between ships or with the shore was carried with the help of on board systems through shore stations and even satellites. While ship-to-ship communication was brought about by VHF radio, Digital Selective Calling (DSC) came up with digitally remote control commands to transmit or receive distress alert, urgent or safety calls, or routine priority messages. DSC controllers can now be integrated with the VHF radio as per SOLAS (Safety of Life at Sea) convention.

Satellite services, as opposed to terrestrial communication systems, need the help of geo-stationary satellites for transmitting and receiving signals, where the range of shore stations cannot reach. These marine communication services are provided by INMARSAT (a commercial company) and COSPAS – SARSAT (a multi-national government funded agency).While

INMARSAT gives the scope of two way communications, the CorpasSarsat has a system that is limited to reception of signals from emergency position and places with no facilities of two way marine communications, indicating radio beacons (EPIRB).

For international operational requirements, the Global Maritime Distress Safety System (GMDSS) has divided the world in four sub areas. These are four geographical divisions named as A1, A2, A3 and A4.Different radio communication systems are required by the vessel to be carried on board ships, depending on the area of operation of that particular vessel.

A1 – It's about 20- 30 nautical miles from the coast, which is under coverage of at least one VHF coast radio station in which continuous DSC alerting is available. Equipment used: A VHF, a DSC and a NAVTEX receiver (a navigational telex for receiving maritime and meteorological information).

A2 – This area notionally should cover 400 nautical miles off shore but in practice it extends up to 100 nautical miles off shore but this should exclude A1 areas.Equipment used: A DSC, and radio telephone (MF radio range) plus the equipment required for A1 areas.

A3 – This is the area excluding the A1 & A2 areas. But the coverage is within 70 degrees north and 70 degree south latitude and is within INMARSAT geostationary satellite range, where continuous alerting is available. Equipment used: A high frequency radio and/ or INMARSAT, a system of receiving MSI (Maritime Safety Information) plus the other remaining systems for A1 and A2 areas.

A4 – These are the areas outside sea areas of A1, A2 and A3. These are essentially the Polar Regions North and South of 70 degree of latitude. Equipment used: HF radio service plus those required for other areas.

All oceans are covered by HF marine communication services for which the IMO requires to have two coast stations per ocean region. Today almost all ships are fitted with satellite terminal for Ship Security Alerts System (SSAS) and for long range identification and tracking as per SOLAS requirements.

On distress, Search and Rescue operations from Maritime Rescue Coordination centers are carried out among other methods, with the help of most of these marine navigation tools. Naturally, the sea has become a lot

safer with these gadgets and other important navigation tools recommended by the IMO and as enshrined in GMDSS.

By AmitavaChakrabarty | In: Marine Navigation | Last Updated on September 1, 2021
Marine Communication Systems Used in the Maritime Industry (marineinsight.com)

Exercise 2. Answer the following questions:

1) How has the marine situation changed since the implementation of all the systems mentioned in the text?
2) What changes in marine communication have been made in the second part of the 20th century?
3) What's the difference between INMARSAT and COSPAS-SARSAT?
4) What's the vision of the world according to GMDSS?
5) Does A2 geographical area cover A1 area?
6) What equipment is required on the territory of 4th geographical area? Enumerate.

Exercise 3. Are these sentences true or false?

1) The last time Morse code was used was in the beginning of 2020.
2) INMARSAT and COSPAS-SARSAT are both satellite services.
3) IMO suggested to divide the world in 4 areas.
4) A4 areas include A1 and A2 areas, but exclude A3 one.
5) Modern navigation tools have made sea voyages more dangerous.

Exercise 4. Find and learn Russian equivalents for the following words and expressions. Explain them in English.

was carried	a)
convention	b)
Satellite services	c)
radio beacons	d)
vessel	e)
equipment	f)
radio range	g)
latitude	h)

Exercise 5. Prepare a presentation/report/summary on the topic of the text.

TEXT 2

Before you read

Exercise 1. Discuss with your partner the following questions:

- What types of survival radios do you know?
- What is the purpose of them?
- What are the pros and cons of these devices?

A Brief Introduction to Survival Radios

Survival radios are radios for communication which help ships and ships' crew during emergencies. A survival radio forms one of the most essential parts of the survival tools of the marine industry. The emergency radio operation is approved internationally under the Global Maritime Distress Safety System.

An Emergency radio is mainly used to send signals to international radio channels or frequencies. The survival radio came into application in the marine industry after the Titanic incident in 1912. From that time onwards, the technology of survival radios has been constantly developing and improving.As survival tools, in the early days, Morse code was transmitted over the survival radio frequencies at the time of emergencies. But the survival radios of that time were limited by accessibility problems over long distance areas. This is why theVHF radio technology was adopted into the survival radio system at the time of World War II.

However, in today's times the technology of survival radios has developed even further. Survival radios are built-in with GPS (Global Positioning System) so as to enable the person receiving the emergency signal to correctly pinpoint where the ship sending the distress signal is located on the water.In addition to the GPS fitted in the survival tools, other modern technologies are also equipped in the survival radios. Two of the other technologies include a Distance Measuring Equipment and communicators which can be used with the help of satellites.

Applying the technology of survival radios to a ship is advantageous especially if the ship's route is tricky and through dangerous waters. Dangers include not just unpredictable winds, tides and currents but also the threat of

pirates.The threat of piracy has increased manifold in present times. By using survival radios as survival tools, the crew of the ship can effectively alert not just other ships about the danger but also indicate the coast guard about the location and position of the threat in the water.

Survival radios are not very expensive. They are moderately priced between US $ 30 -50. In fact the cheapest emergency radio is priced around US $ 7.

Survival radios have been a part of the marine industry for some decades now and the major features – efficiency and reliability make the emergency radio very popular in the present era. Even in the days to come, with multiple developments in the marine communication technology, the survival radios will continue to be the best.

By Laxmi | In: Marine Safety | Last Updated on October 24, 2019

A Brief Introduction to Survival Radios (marineinsight.com)

Exercise 2. Answer the following questions:

1) What changes have survival radios undergone since the beginning of 20tg century?
2) When was an Emergency radio implemented first?
3) What problems of survival radios were in the past?
4) What is the benefit of GPS in survival radios?
5) In what cases are survival radios especially needed?
6) Why do people choose the emergency radio nowadays?

Exercise 3. Complete the sentences gaps with one word, some words or a phrase.

1) _____ affirmed the survival radio globally.
2) During the World War II the survival radio was fitted with _____.
3) All modern survival radios are equipped with _____ in order to _____.
4) There are many dangerous situations on sea which can be prevented or solved with the help of the survival radio, including _____ _____.

Exercise 4. Find and learn Russian equivalents for the following words and expressions. Explain them in English.

1. crew	a)
2. essential parts	b)
3. emergencies	c)
4. came into application	d)
5. survival	e)
6. pinpoint	f)
7. ship's route	g)
8. through dangerous waters	h)
1. currents	i)
2. tides	j)
3. unpredictable	k)
4. alert	l)
5. reliability	m)

Exercise 5. Prepare a presentation/report/summary on the topic of the text.

TEXT 3

Before you read

Exercise 1. Discuss with your partner the following questions:

- How many marine jobs do you know?
- What are the most famous/prestigious of them? Why do think so?
- Being a radio officer – is it necessary to get the higher education diploma?

Obsolete-yet-Famous Marine Jobs: Radio Officers

The profession of a radio officer is a very important profession in the maritime field; but it's something that has been going low for quite a while in today's times. A radio officer is a person who helps to monitor and keep track of the communications aspect in a ship. The name 'radio officer' came into existence because in the olden days, there used to be radios which were used as tools of communication between the coast guard and the ship.

As a part of merchant navy jobs, the profession of radio officers involves a lot of requirements. Individuals are required to have a basic high school

certificate to apply for the post of radio officers. In addition, individuals also need to clear written examinations to get the licensing for the post of a radio officer. Such licenses are known as the 'Radio-Telegraph Operator's License.' There are specific grades assigned to this license which are known as 'First Class' or 'Second Class.'

The licensing exam is a very extensive exam as it encompasses subjects like 'How to send and receive messages through Morse code', 'The different marine rules set up by coast guards of various countries' and most importantly 'The operating system of the coast guards and other naval authority in different countries.' The reason why these subjects are included is because as a radio officer, a person will be required to operate not just in local waters but also in international oceanic and sea-limits as well.

In today's times, the radio officers' job, as a part of the merchant marines has become much more varied. A radio officer, these days has to work not only with radios but also with advanced and essential gadgets like computers. As merchant marines, radio officers also get regular reports about the weather in the oceanic and sea areas where the ship is positioned.

It has to be noted that the profession of radio officers is something that requires round-the-clock alertness and vigilance. This is why radio officers work generally on a shift system. The shift system includes two-three four-hour rotations in a day. This four-hour rotation is conducted once in the morning and once in the evening, giving a radio officer a gap of at least eight hours in between.

Radio officers, it has to be understood are not just a part of passenger ships. They are also essential in cargo vessels because of the very nature of the ship. In addition, ships utilised solely for the purposes of oil drilling in the high seas also employ the services of radio officers as a part of merchant navy jobs.

However, one major problem when it comes to jobs in merchant marines like that of a radio officer is that the pay is not so good and the scope of getting a promotion is also not that much. Keeping these aspects in mind, one has to decide whether one wants to take up the profession of a radio officer or not, especially in the time where they have almost become obsolete.

By MI News Network | In: Marine Careers | Last Updated on November 12, 2019 Obsolete-yet-Famous Marine Jobs: Radio Officers (marineinsight.com)

Exercise 2. Answer the following questions:

1) What functions do radio officers fulfill?
2) What does the job of radio officer require?
3) What topics can a person passing the licensing exam come across?
4) Does a radio officer work only in his home country?
5) Why do radio officers work on a shift system?
6) What are the disadvantages of being a radio officer?

Exercise 3. Correct the wrong sentences.

1) To become a radio officer one needs to graduate from the University with a degree.
2) The licensing exam includes a limited number of subjects, concerning only local matters.
3) Radio officer only deals with radios.
4) Radio officers work the half of the day and then change.
5) Being a radio officer is a very prospective and highly paid job.

Exercise 4. Find and learn Russian equivalents for the following words and expressions. Explain them in English.

1. getting a promotion	a)
2. keep track	b)
3. coast guard	c)
4. merchant navy jobs	d)
5. to involve	e)
6. license	f)
7. naval authority	g)
8. to vary (varied)	h)
9. cargo vessels	i)
10. oil drilling	j)

Exercise 5. Prepare a presentation/report/summary on the topic of the text.

TEXT 4

Before you read

Exercise 1. Discuss with your partner the following questions:

- What new devices and gadgets connected with marine travelling do you know?
- Which of them do you consider the most / the least important? Why?
- What are the advantages and disadvantages of all of them?

Revolutionising Marine Travel: Marine VHF Radios, Marine GPS and Marine Autopilots

Consumers Marine products involves the usage of a variety of equipment which are important and relevant in marine travel and without which marine adventuring and travel can become risky and dangerous. Consumers Marine, as the name suggests caters to the consumers of marine traveling offering them the necessary support system and technological back-up required to maintain their intended route and position in the water.

And the equipments that are offered to Consumers Marine are vast in terms of variety so that potential clients and users might get to choose their marine equipment from a larger collection than a smaller one. Of all the equipment involved, the three main equipment that form the core of Consumers Marine are the Marine VHF Radios, Marine GPS Systems and the Marine Autopilots.

All the three above mentioned Consumers Marine equipment are important and relevant in their own way and in the contemporary times have gone a long way in easing the complexity of travelling through waters.

Marine VHF Radios are two-way communicators which are used to transfer and receive messages. However, the most important function of a Marine VHF Radio is that it is very helpful when it comes to sending distress signals across the channels to coast guards and other ships and boats in the periphery. Also, certain Marine VHF Radios can be used for the purposes of making calls through a marine operator for a certain sum making it double up as a telephonic communicator too.

Another important aspect of Marine VHF Radios is the fact that they come in two main categories: portable ones and non-portable ones. The portable

ones have waterproof coverings and are battery operated in order to facilitate the power transmission. The fixed or the non-portable Marine VHF Radios cover a lot of aerial ground, their source of power transmission and energy, huger in comparison to their portable counterparts and are therefore far more feasible in terms of their operational facilities.

Marine GPS Systems have become an essential apparatus when it comes to marine travelling. Just like their counterparts fixed in cars, Marine GPS Systems help ships and boats stay on course especially in areas where the marine life-forms thrive.

Also, Marine GPS Systems enable shipmen to pinpoint the location of other ships so as to avoid any collision in the waters and thus cause damage to people and cargo aboard the ships. It is important to note that Marine GPS Systems come with protective waterproofing, have buttons and dials which can be operated even through gloves and most important of all offer easy usability to all kinds of marine travelers.

Marine Autopilots form the third and final support system of Consumers Marine. In the olden days, a ship had to be physically maneuvered by the captain leaving no scope for the captain to mingle with the rest of the crew of the ship. In contemporary times however, the emergence of Marine Autopilots have solved the problem of physically manoeuvring the ship or the boat, thus allowing the captain far more flexibility in his operations. Marine Autopilots are available in a wide array of forms. They can be classified from complex models to simple ones thus offering support not only to experienced seafarers but also newer and fresher ones as well. Marine Autopilots also rely on Marine GPS Systems thus making these two equipments dependent on each other to a larger extent.

The development and evolution that has taken place in marine traveling is reflected by the recent expectations of Consumers Marine. As times have changed, the demand for products and equipments by Consumers Marine has also changed. Equipments like Marine VHF Radios, Marine GPS Systems and Marine Autopilots, in today's times have become the core necessity of any kind of marine traveling because without them one can actually get lost in the huge maze of water surrounding the earth – both literally as well as figuratively.

By Hiteshk | In: Marine Navigation | Last Updated on November 21, 2019
Revolutionising Marine Travel: Marine VHF Radios, Marine GPS and Marine Autopilots (marineinsight.com)

Exercise 2. Answer the following questions:

1) What is Consumers Marine mostly based on?
2) Is there a limited choice of Consumers Marine equipment?
3) What are the main functions of VHF Radios?
4) Which type of VHF Radios can be used underwater?
5) How can GPS system help to save cargo and passengers?
6) How have Marine Autopilots made the captain's life easier?

Exercise 3. Choose the correct option.

1) Consumers Marine provide seafarers with _____
a) equipment
b) food
c) outfit/uniform
d) specialists.

2) VHF radio can be used as a tool which_____
a) sends and receives distress signals
b) enables voice calls
c) turns on an alarm in distress situations
d) helps to navigate the vessel

3) _____ cover a lot of aerial ground and have powerful transmission and energy.
a) portable VHF Radios
b) non-portable VHF Radios
c) all types of VHF Radios

4)_____ is waterproof, furnished with buttons and can operate even if the person wears gloves.
a) Marine Autopilot

b) VHF Radio
c) Marine GPS system

5) _____ gives a pilot more freedom and reduces chances of pilot's isolation.
a) Marine Autopilot
b) VHF Radio
c) Marine GPS system

Exercise 4. Find and learn Russian equivalents for the following words and expressions. Explain them in English.

1. to reflect	a)
2. relevant	b)
3.to mention	c)
4. complexity	d)
5. contemporary times	e)
6. to transfer messages	f)
7. waterproof coverings	g)
8. feasible	h)
9. to avoid any collision	i)
10. to mingle	j)
11. to allow	k)
12. to solve the problem	l)
13. flexibility	m)
1. to dependent on	n)

Exercise 5. Prepare a presentation/report/summary on the topic of the text.

TEXT 5

Before you read

Exercise 1. Discuss with your partner the following questions:

- What is Navigation system?
- What different types of navigation system do you know?
- What are the responsibilities and duties of a ship pilot?

What Marine Navigation Systems and Electronic Tools Are Used by Ship's Pilot?

Today, piloting in restricted waters has become a highly specialized job aided by modern technology. Gadgets, instruments and software tools are always in the process of evolving as newer advancements in the navigation aids and technology take place.

Gone are the days when one had to anchor during mist, fog or blizzards when visibility comes down to almost zero. Also, gone are the days when one had to take a position fix taking into consideration the external reference points across the navigating channels and plotting lines using a bearing indicator.

The point of intersection of the lines on the chart used to give the position of the vessel. The point of intersection was called fix. Today, GPS, or a space assisted "Global Positioning System" has taken over and has virtually become indispensable for any sort of aerial, land or marine navigation. Moreover, new advanced control systems, which offer higher accuracy and integrity to the GPS, are always in the process of development to bolster the existing positioning system. Every ship today uses several navigational equipment tools for utmost safety.

Marine Navigation System

Previously navigators used to depend solely upon nautical charts, which were actually plotted on papers and were the official database of the government authorized hydrographic departments. Those charts used to give a two dimensional view of the sea or river bed and its topography to assist safe navigation.

Charts also indicate navigational hazards, sudden elevations on the sea bed, wrecks that block the navigation channel in restricted water, any kind of local man-made structures, position of the bridges, ports, structures on shore, position of the guiding buoys, turrets, obelisks and other shore references. These charts were prepared by the hydrographic departments and were updated after certain gaps, which made navigation vulnerable to sudden changes on the sea bed of the channel.

Physical charts also used huge space block in the chart room on the bridge where charts were placed. To avoid this Electronic Nautical Charts were developed to move on from the paper to the digital variety.

There are two main types of ENCs, the raster chart and the vector chart. While the first is merely a scanned variety of the earlier paper navigational charts discussed, the second is more data oriented. Though they are hidden, the data at a particular position are instantly given when sought for (with a click of the mouse or pressing a button). This disclosure is achieved when the ENC is customized by the navigational software, like ECDIS or Electronic chart Display Information System.

All the electronic nautical charts conform to the guidelines of International Hydrographic Organization. Moreover, these charts are regularly updated according to the resolution adopted by the IMO which invited governments of member countries to conduct hydrographic surveys and publish and disseminate nautical information for safe navigation. The member governments should coordinate amongst themselves, wherever necessary, to timely update the information and ensure greatest possible uniformity in the published charts.

Numerous chart plotting software also exist in the market which can be quite handy for navigation. One such is SEA CLARE, which is pc based software for windows 2000 and above. When connected to GPS, it shows current position, speed and heading of the vessel in real time. New charts can be fed automatically in text file and tracks can be saved for later viewing. Entries can be manually updated and entered. Numerous waypoints can be created to assist navigation. The GPS transmission capability must however be of a bit modern version called NMEA 0183 (which is a specification or protocol developed by The National Marine Electronic Association, Maryland, USA).

Other bridge instruments which conform to this protocol can be connected to have various data on the screen along with the chart. Data like depth of water below keel, wind direction, ship's heading from gyro, and even AIS can be connected to locate nearing vessel movements.

A simpler version called PC PLOTTER is generally used by smaller crafts for yachting, fishing, and is fitted with a low cost Dual Channel Parallel AIS Receiver which can receive signals from large and small ships.

AIS is the vessel tracking system to locate other ships in the vicinity by automatically exchanging data with nearby ships and AIS base stations. Local VTMS (Vessel Traffic Management Systems) / VTS (Vessel Traffic Service)

is offered by ports where traffic is pretty busy but here the AIS acts as an additional supporting instrument. More details about AIS can be found here.

Another instrument that reduces the work load of the officer on watch and pilots is the marine RADAR fitted with ARPA. Radar, as we all know is a Radio Detection and ranging device that is capable of reflecting electromagnetic wave. Ships, aircrafts, buildings, motor vehicles, marshy lands, water body, low lying cloud chunks all reflect radio waves and hence are visible on the screen. The ARPA can calculate the speed of the tracked vessel, its course and forecast the closest point of approach. Relative speed between the vessel and a static point like a land mass can be calculated, and collision point and time indicated. Modern integrated ARPA has replaced the initial stand-alone with better end result for the captain and his staff.

Maris, a Norwegian company, has another chart system based on ECDIS called Pilot Mate, which integrates with the bridge gadgets quickly. Here real time update for available drafts is received over email and so is tidal information, display of real color guiding ENC buoys, update history management etc. Route planning and monitoring are added advantages of this system.

Thus we see that chart work with dividers, set-squares, sextant, and other tools have given way to a more digital environment on the bridge, thus almost eliminating the chances of human error. A truly digitally integrated system on the bridge virtually eliminates the chances of being aground or getting completely lost at the sea.

By AmitavaChakrabarty | In: Marine Navigation | Last Updated on June 26, 2020Marine Navigation Systems and Electronic Tools Used by Ship's Pilot (marineinsight.com)

Exercise 2. Answer the following questions:

1) In what way have the electronic tools changed the life of seamen?
2) What is called "fix" among seamen?
3) What did navigator use to orientate in the sea in older times? What are the disadvantages of this obsolete approach?
4) What are the differences between 2 types of ENCs?
5) Who is responsible for the update of electronic nautical charts?
6) Which software is used more often for hobbies than for professional navigation?
7) What is the marine Radar fitted with?

Exercise 3.Are these sentences true or false?

1) Nowadays every vessel would be moored if the weather conditions make it difficult to see.

2) Paper charts occupied a lot of space on the bridge earlier.

3) The second type of ENC should be equipped by navigational software to work properly.

4) ENC's update is not compulsory.

5) SEA CPARE software can work on its own and show the location, speed and direction of a vessel.

6) AIS serves to track other ships nearby.

Exercise 4. Find and learn Russian equivalents for the following words and expressions. Explain them in English.

1. restricted waters	a)
2. visibility	b)
3. reference points	c)
4. bearing indicator	d)
5. utmost	e)
6. hazards	f)
7. surveys	g)
8. currentposition	h)
9. the vicinity	i)
10. forecast	j)
11. approach	k)

Exercise 5. Prepare a presentation/report/summary on the topic of the text.

TEXT 6

Before you read

Exercise 1. Discuss with your partner the following questions.

- What is an integrated system?
- What is Integrated Bridge System (IBS)?
- What is the core component of all IBS?

What is Integrated Bridge System (IBS) on Ships?

IBS is defined as a series of interconnected and closely grouped screens and modules allowing centralised access to navigational, propulsion, control and monitoring information. The aim of IBS is to increase safe and efficient ship management by the qualified personnel. It is a combination of systems, which are interconnected to allow a centralized monitoring of various navigational tools. IBS allows acquiring and control of sensor information of a number of operations such as passage execution, communication, machinery control, and safety and security.

Integrated bridge system (IBS) is a kind of navigation management system which links other systems to provide all the details pertaining to ship's navigation at one place. It is to note that not all types of ships have the same type of IBS. The system would vary according to the design of the ship's bridge, various types of equipment used by the ship, and general layout of the equipment of the bridge.

The IBS system should support two or more of the following aspects:

- Execution of passage
- Communications
- Machinery control
- Cargo operations
- Safety and security

IBS is not mandatory on ships. Its installation and design criteria is laid out by classification societies such as the NAV1 class for LR, the W1-OC class from DNC are examples of class arrangements for IBS. Factors determining the layout includes bridge design, type of equipment fitted and their positioning on the bridge. IBS can be clubbed under four major parts:

- Technical System
- Human Operator
- MMI (Man Machine Interface)
- Operational Guidelines

The IBS usually consists of:

- Autopilot
- Dual Radar/ARPA
- Gyro

- Position fixing systems
- Dual ECDIS setup (Master + Backup)
- Conning Display (available at the coming position to show information that summarises the important navigational sensors on passages and at the port. Provides OOW with central place to monitor sensors and console settings)
- Power distribution system
- Steering gear
- GMDSS

According to SOLAS Chapter V, Reg 19, para 6 “Integrated bridge systems shall be so arranged that failure of one sub-system is brought to the immediate attention of the officer in charge of the navigational watch by audible and visual alarms, and does not cause failure to any other sub-system. In case of failure in one part of an integrated navigational system, it shall be possible to operate each other individual item of equipment or part of the system separately”

Alarm System

An alarm system links all the above-mentioned systems and gives out audio and visual signal in case of an emergency condition. (There can be more systems connected to the IBS and to the alarm system)

In most ships, an additional alarm connected to the IBS is also fitted in the cabins of navigational officers. This alarm provides a signal in the cabins within 30 seconds in case the officer in charge fails to acknowledge an alarm. The alarm system should also include a watch safety or fitness alarm to monitor the alertness of the OOW. A number of alarm acknowledgement points, each with a pre-warning alarm to give the OOW notices that the alarm is about to be activated should be available around the bridge. As with the failure is the OOW to acknowledge a navigation alarm, if the fitness time interval expires, an alarm should away from the bridge.

Power Supply

Guidelines laid out for IBS states that should the IBS be subjected to an orderly shut down, it will restart and present itself in the default state. In

case that it is shut down inadvertently, the IBS should, upon restart, be restored to full functionality with the configuration in use prior to shutting down. The power supply shall be:

- From main as well as emergency sources with automatic changeover
- From transitional source of electric power
- Critical parts of the IBS should also be connected to a reserve source

Though IBS is an excellent system for navigation, officers on watch shouldn't completely rely on the equipment but should pay proper attention to visual navigational watchkeeping techniques as well.

Also, proper guidelines should be provided on the bridge manual as to when to use and when not to use the Integrated Bridge System (IBS).

Difference between IBS and INS

INS is a combination of navigational data and systems interconnected to enhance safe navigation of the vessel. IBS interconnects various other systems along with the INS to increase overall management efficiency. It can be said that the INS is specific while the IBS is general in approach. Though IBS is an excellent system for navigation, officers on watch shouldn't completely rely on the equipment but should pay proper attention to visual navigational watchkeeping techniques as well. Also, proper guidelines should be provided on the bridge manual as to when to use and when not to use the Integrated Bridge System (IBS).

By Shilavadra Bhattacharjee | In: Marine Navigation | Last Updated on September 7, 2021
What is Integrated Bridge System (IBS) on Ships? (marineinsight.com)

Exercise 2. Answer the following questions:

1) Why would seamen need IBS on ship if it's not a mandatory tool?

2) What's the connection between IBS and different navigational tools and systems?

3) Is that true that all IBSs are the same? What does the choice of each depend on?

4) What does IBS comprise of?

5) How does SOLAS suppose IBS should work in case of any system breakdown?

6) What system produces signals when the situation on ship becomes dangerous?
7) What are the sources of IBS power supply?

Exercise 3. Finish the sentences.

1) IBS permits to get and control data of different operations, like ...
2) The layout of the IBS depends on...
3) To monitor the alertness of the OOW the alarm system should include...
4) Working with IBS officers on watch should...
5) INS is a mixture of ...

Exercise 4. Find and learn Russian equivalents for the following words and expressions. Explain them in English.

1. execution of passage	a)
2. mandatory	b)
3. determining	c)
4. steering gear	d)
5. arrange	e)
6. alarm system	f)
7. rely on	g)
8. provided	h)

Exercise 5. Prepare a presentation/report/summary on the topic of the text.

TEXT 7

Before you read

Exercise 1. Discuss with your partner the following questions:

- Can you give the definition of the word “Navigation”?
- What types of navigation equipment do you know?
- What are navigation resources?
- What other types of equipment except navigation are there on all the modern ships?

30 Types of Navigation Equipment and Resources Used Onboard Modern Ships

Gone are the days when a ship navigation officer had to take help of unconventional ways to plan and navigate a voyage at sea. Today, a ship officer has myriad of marine navigation equipment which makes his life a lot simpler, thanks to the advancement in technology. Moreover, present-day seafarers are trained so as to know the functioning and operation of all modern day navigational equipment that has made the journey at sea smoother and safer.

With modern day facilities and automation, a ship today has several advanced navigation equipment systems which give accurate data for the voyage. Herein, we have enlisted 30 types of navigational equipment, both old and new, which are present on all merchant ships.

1. Gyro Compass

It is used for finding the right direction. Unlike magnetic compass, gyro compass is not hampered by an external magnetic field. It is used to find the correct North Position, which is also the earth's rotational axis to provide a stable directional source. Its repeater system must be present in the steering platform for emergency steering.

2. Radar

The seagoing vessels depend on S-band and X-band frequency radar system for navigation as it can detect targets and display the information on the screen such as the distance of the ship from land, any floating objects (an island, rocks, iceberg etc.), other vessels, and obstacles to avoid a collision. It is a rotating antenna which discovers the surrounding area of the ship.

3. Magnetic Compass

The magnetic compass work in conjunction with the magnetic field of the earth and is the essential means of the direction indicating device. It is used to get a planned course for the voyage. This ship navigation equipment is usually fitted at the centre line of the ship on the monkey island. A transmitting magnetic type compass is fitted so that the output can be displayed in the bridge panel.

4. Auto Pilot

The ship bridge layout is filled with equipment and tools used for navigation. The autopilot is considered to be one of the most effective bridge navi-

gational equipment as it assists the human operator in controlling the ship by keeping the steering in autopilot, which allows them to concentrate on broad aspects of the operation.

It is a combination of hydraulic, mechanical, and electrical system and is used to control the ship's steering system from a remote location (Navigation bridge).

5. ARPA

Automatic Radar Plotting Aid displays the position of a ship and other vessels nearby. The radar displays the position of the ships in the vicinity and selects the course for the vessel by avoiding any kind of collision.

This bridge navigational equipment constantly monitors the ship's surrounding and automatically acquires the number of targets, in this case; ships, boats, stationary or floating objects etc., and plot their speeds and courses respectively. It also presents them as vectors on the display screen and constantly update the parameters with each turn of the antenna by calculating their nearest points of approach to own ship and also the time before this will occur.

6. Automatic Tracking Aid

Just like ARPA, automatic tracking aid displays the information on tracked targets in graphic and numeric to generate a planned layout for a safer and collision-free course.

Usually, a large size target measuring 800 m or more in the circumference is considered as a landmass and not tracked. Echoes less than 800 m are deemed as targets to be tracked.

7. Speed & Distance Log Device

This bridge equipment on a ship is used to measure the speed and the distance travelled by a ship from a set point. By calculating the same, ETA of the ship is adjusted or given to the port authority and agent.

8. Echo Sounder

There are many modern ship navigation tools present on ship and echo sounder is one of the instruments which has been in the play from almost 100 years now. It is used to measure the depth of the water below the ship's bottom using sound waves which work on the principle of transmission of sound waves and an audio pulse which will bounce off a reflecting layer, returning as an echo to the source.

9. Electronic Chart Display Information System
ECDIS
ECDIS is a development in the navigational chart system used in naval vessels and ships. With the use of the electronic navigation equipment, it has become easier for a ship's navigating crew to pinpoint locations, and attaining directions are easier than before.
10. Automatic Identification system
AIS is also among the types of a navigation system which helps to pinpoint the location and other navigational statistics of ships. AIS uses VHF radio channels as transmitters and receivers to send and receive messages between ships which endeavours to fulfill a lot of responsibilities.
As per the regulation enforced by The International Maritime Organisation (IMO), all passengers' vessels and commercial ships over 299 Gross Tonnage (GT) sailing in the international to carry a Class A AIS transponder.
11. Long Range Tracking and Identification (LRIT) System
LRIT is an international tracking and identification system incorporated by the IMO under its SOLAS convention to ensure a thorough tracking system for ships of 300 gross tons and above which are on international voyages across the world. This maritime equipment is fitted to improve the maritime domain awareness.
12. Rudder Angle Indicator
Rudder angle indicator, as the name indicates, provides the angle of the rudder. The display is provided on the navigation bridge equipment console so that the ship navigation officer can control the rate of turn and rudder angle of the ship. The indication is also provided in the bridge wing and engine control room.
13. Voyage Data Recorder
A VDR or voyage data recorder is a crucial instrument among the ship navigation equipment list which is installed on a ship to continuously record vital information related to the operation of a vessel. It contains a voice recording system for a period of at least the last 12 hours. This recording is recovered and made use of for investigation in events of accidents. The importance of VDR is similar to a "black box" installed on an airplane.
14. Rate of turn indicator
This navigational tool indicates how fast the ship is turning at a steady rate (useful during pilotage and manoeuvring), normally shown as a number of

degrees turned. The rate a ship is turning is measured in degrees per minute. This essential tool assists a coxswain in steering a course safely.

15. GPS Receiver

A Global Positioning System (GPS) receiver is a display system used to show the ship's location with the help of Global positioning satellite in the earth's orbit.

With the record of the ship's positions, the speed, course, and the time is taken to cover the distance between "two marked positions" can be calculated.

16. Sound Reception System

This acoustic system is required for a ship with a fully enclosed type bridge. It enables the navigating officer inside the cabin to listen to the sound signals (such as fog or ship's horn) from other ships in the vicinity. This is fitted in ships bridge equipment console and helps the navigating officer to conduct the look-out duty as per the International Regulations for Preventing Collisions at Sea.

17. Navigational Lights

All boats – whether big or small are required to have night lights as a part of the navigation systems. This system was introduced in the year 1838 by the United States and then was followed by the United Kingdom in 1849. In the year 1889, the International Maritime Conference was established by the United States to establish proper guidelines to prevent marine accidents. In the year 1897, these rules were officially adopted internationally. The navigation lights are one of the most critical navigation equipment needed for sailing in high seas as it enables self vessel being clearly visible to other ships in the vicinity.

18. Ship Whistle

A ship's horn is known as a whistle and it is generally provided in duplicate. One is driven by air and the other is electrically operated. The whistle should be both manually and electrically operational from the bridge.

Among different instruments used in difficult navigation such as bad weather, fog, poor visibility, high traffic etc., the ship's whistle or horn helps in alerting the nearby vessels. During an emergency, the horn is used to notify and alert the ship's crew and other vessels nearby.

19. Daylight Signalling Lamp

They are light-signalling devices used for emergency signalling in the day time (and can also be used during the night). Like other emergency ship instruments, the energy source for the lamp is not solely dependent on the ship's main power supply. Also, the lamp enclosure should be weather and seawater- proof material.

20. Pilot Card

It is an informative booklet provided to the ship's pilot. It consists of the dimension, draught, turning circle, manoeuvring, propulsion equipment and other navigation tools and instruments list of the vessel for safe manoeuvring.

21. Voyage Plan

A voyage Plan must be present onboard for referring past voyage plans or planning a future voyage. Among the different aids to navigation carried on a ship, a voyage plan is a tool for the deck officer to ensure the safety of the ship from a commercial and legal perspective too. It is prepared by gathering different information such as weather, meteorological, ship's current and future cargo data, other navigational data etc.

22. Forecastle Bell

It is used to mark the presence of the ship in fog or bad weather and sound the alarm in case of an emergency, along with the ship's main horn or whistle.

23. Manoeuvring Booklet

In this booklet, the performance of the propulsion plant and the ship during manoeuvring in different weathers and situations is recorded for quick reference. The important content of the manoeuvring booklet are:

- Ships General description
- Manoeuvring characteristics in deep water
- Stopping and speed control characteristics in deep water
- Manoeuvring characteristics in shallow water
- Manoeuvring characteristics in wind
- Manoeuvring characteristics at low speed
- Additional information

24. Black Ball Shape

It is a day time signalling shape used to determine the characteristics of the vessel with a different arrangement of ball shapes. For e.g. a vessel at an-

chor will show a black ball at the foremost end of the forecastle and a ship not under command shows two black balls in a vertical line on her highest mast.

25. Record of Navigation Activities

All the navigational activities which are performed by the ship's officers and crew using different navigation equipment on the bridge must be recorded and kept on board for ready reference. This is mandatory and the most important log book.

26. Record of Maintenance of Navigational Equipment

The hard copy of all the ship navigation system and equipment list must be present as records onboard ships for ready reference of port and regulatory authorities and must be signed by master and duty officers of the ship.

27. Wheelhouse Posters

Present in the Navigation bridge, it displays detailed information of manoeuvring characteristics of the ship including turning circle, stopping and manoeuvring characteristics of the vessel.

28. Transmitting Heading Devise

Transmitting Heading Devise or THD is an electronic device which is used to display the information of the vessel's true heading. The THDs compliance information is provided in chapter V of the SOLAS Convention.

29. Black Diamond Shape

When the ship is being towed or when a vessel is unable to manoeuvres on itself, a black diamond shape is shown during the day time.

30. Ship Flags

Various types of ship flags with different colours and signs are used to indicate a navigation ship's position. Signal flags are they are commonly known, have been used since the ancient times and are still used on all vessels.

These are the different bridge equipment and their uses which are installed on the ship to assist the deck officer for navigating the vessel safely. If we missed any equipment or you want to add more to the list, please comment below.

By KaranC | In: Marine Navigation | Last Updated on September 3, 2021 30 Types of Navigation Equipment and Resources Use Onboard Modern Ships (marineinsight.com)

Exercise 2. Answer the following questions:

1) Group the 30 types of navigational equipment mentioned in the text (for example, visual, sound, paper. etc.)
2) What information can the radar provide a ship crew with?
3) What's the difference between gyro and magnetic compass?
4) Which tool helps to control the ship's navigation from distance?
5) How does the Echo Sounder work?
6) Which tool(s) aim(s) at identifying the location?
7) Which tool is compulsory for international voyages?
8) What's the point of having VDR on a ship?
9) What's the most important function of navigational lights?
10) What tool (s) can attract nearby vessels in case of emergency?
11) What requirement should the daylight signalling lamp meet?
12) What does a voyage plan consist of?
13) What do two black balls on a ship's mast mean?
14) What does a black diamond shape on a ship mean?

Exercise 3.Find and correct false sentences.

1) Gyro compass may have difficulties working properly because of the external magnetic field.
2) ARPA chooses the path for ship taking into account the position of the nearest vessels.
3) A target which is 900 meters in circumference can be tracked by the ATA.
4) Only commercial ships over 299 GT sailing abroad are supposed to have class A AIS transponder.
5) LRIT is used by all kinds of ships which are on international voyages across the globe.
6) Rudder Angle Indicator helps the navigator to control the of turn and rudder angle of the vessel.
7) The rate the ship is turning is shown in centimetres per hour.
8) Sound Reception System is essential for the ship's with an open type bridge.
9) A whistle on bridge can be both manual or electrical, the choice of which is made by the navigator.
10) Pilot card is an ID card for the staff of the vessel.

11) A ship can use the Forecastle bell to indicate its presence during the bad weather.
12) The most significant log book on board is a manoeuvring booklet.
13) The colour and/or the sign of the vessel's flag symbolises its position.

Exercise 4. Find and learn Russian equivalents for the following words and expressions. Explain them in English.

1. gyro compass	a)
2. stable	b)
3.to float	c)
4. obstacles	d)
5. remote	e)
6. acquire	f)
7. layout	g)
8. circumference	h)
9. to ensure	i)
10. domain	j)
11. awareness	k)
12. coxswain	l)
13.to alert	m)
14. draught	n)
1. turning circle	o)
2. Forecastle Bell	p)
3. to determine	q)
4. anchor	r)
5. wheelhouse	s)

Exercise 5. Prepare a presentation/report/summary on the topic of the text.

TEXT 8

Before you read

Exercise 1. Discuss with your partner the following questions:

- Do you know what ECDIS stands for?
- Do you believe that ECDIS will become the dominating navigation system? Why/why not?

Pros and Cons of ECDIS Or Paperless Navigation Of Ships

A mere 15 years back, navigators would have scoffed at the idea of Paperless Navigation on big ocean going ships. After all, since centuries, navigational paper charts had been the heart and soul of ship navigation. Imagining that a day would come where we'd no longer have them onboard was nothing short of blasphemy.

Every single navigating officer who's been out at sea "long enough" still fondly recollects joining vessels with his own treasured Chart Correction Pen. However, the unthinkable did happen. The transition started slowly with smaller vessels like pleasure crafts, tug boats and yachts. But now, armed with the IMO mandate for compulsory ECDIS carriage, the big vessels such as the super tankers and giant container vessels are also running smoothly without paper charts. Who's responsible for this change? Well it is none other than the Electronic Chart Display and Information System aka ECDIS.

Although, a bit biased towards the old school paper chart navigation, I cannot deny the fact that ECDIS does have an edge over paper charts. Let's discuss some of the pros and cons of paperless navigation.

The Pros:

1. Availability: One of the great advantages of ECDIS over paper charts is the availability of electronic charts – especially when voyage orders are received at the last minute. Gone are the days when Second Mates huddled over the good old NP 131 (chart catalogue) to determine what charts they require for the voyage. This was followed by the arduous task of ordering these charts and hoping that they arrive in time. More often than not, this proved a major challenge especially on tramper trades which tend to get last minute voyage orders. With vessels going chartless, all that the Second Mate needs to do now is plot a rough course in the voyage planner and a list of all the required paper charts is populated. The Master then emails this list to the chart supplier, who will then send the activation codes for those charts. A task that with skill and practice required hours now takes a few minutes.

2. Speed and Accuracy: With ECDIS as the primary source of navigation, the Navigating Officer can plan and summarise the passage much faster than on Paper Charts. Most ECDIS units have a facility where the waypoints can be imported into an excel format which reduces the effort to

manually input the waypoints when compiling the Voyage Plan. Daily reporting data such as Distance to Go, Distance Covered, Average Speed, etc. can be done quickly with hardly any effort.

3. Corrections: Before the advent of paperless navigation, the largest chunk of the Navigating Officer's work time was consumed in Correcting Charts. Correcting charts with speed and accuracy was a skill that took a long time to master. Even then there was a possibility of the occasional erroneous correction. The Temporary and Preliminary (T&P) Notices were especially tedious since these came without tracings and required a thick file to be maintained. Keeping the world folio updated was a matter of pride which came with a lot of bragging rights. All that has changed with paperless navigation. The Navigating Officer now receives weekly updates to the Electronic Charts via Email which he has to download onto a zip drive and upload them to the ECDIS. Even the dreaded T&P notices are now shown electronically on the ECDIS.

4. Continuous Monitoring of Vessel's Position: One of the single biggest advantages of the ECDIS over paper charts is its ability to enable the user to see the vessel's position in real time without user action. The ECDIS is interfaced with both the vessel's independent GPS transceivers, thereby making the system work even if one fails. However, we all know that GPS signals can be unreliable and are prone to errors occasionally. This problem can be overcome by using the Radar Overlay and Echo Referencing facility in the ECDIS and Radar. The Radars need to be interfaced with the ECDIS for this. Once this is done, the user will have to activate the overlay tab of the ECDIS which will super impose the Radar Screen on the ECDIS. By checking that the Radar Echo is matching with the ECDIS display, one can be assured that the positions can be relied upon.

Another feature enabling continuous position monitoring, especially during coastal navigation is ARPA Echo Referencing. This is done by acquiring a fixed / stationary target such as a small island, lighthouse, rock etc. on the Radar (ARPA) and then activating the ARPA tab on the ECDIS. Next step is to deselect the Secondary Position Source on the ECDIS as GPS and select Echo Reference in its place. Once enabled, this gives the user visual indication of the past tracks of both the Primary (GPS) and Secondary (Echo Reference) position fixing modes.

Finally, one can also use the Radar Range and Bearings to plot positions on the ECDIS display, just like on paper charts. All types of ECDIS these days come with an option of manually plotting the position using the Range / Bearing method. One simply has to take the range and bearing from a suitable radar object and plot this on the ECDIS by using the Range / Bearing function of the ECDIS itself. In ECDIS terminology, this is referred to as a Line of Position (LOP). A time stamp is printed on the ECDIS screen (see figure below) with both the GPS positions and the LOP. This serves as a ready indication of any offset present between the GPS and Radar fixes.

5. Anti-Grounding Alarms and Settings: Though ECDIS has now evolved into a full-fledged primary source of navigation, it was born as an Anti-Grounding aid to Navigation. Even to this day, the ability of the ECDIS to warn the user of approaching shallow waters make it one of the most useful equipment on the bridge. The user has complete flexibility to determine these safety settings on the ECDIS. Most companies' will have strict guidelines on the minimum safety parameter settings. As a minimum, the following serves as a general guideline.

Safety Frame (Look Ahead): This is the setting which will sound an alarm if the vessel is within the limit specified. It should generally be set at not lower than 10 minutes in Open waters depending on the Speed of the Vessel. This may be lowered in coastal waters based on the situation.

Shallow Contour: This setting indicates the non-navigable area and marks the boundary outside of which the vessel may safely navigate. Crossing this boundary will result in the vessel running aground. Is usually indicated by a Deep Blue Colour which marks the non-navigable area. Usually set to a value of the present deepest draught of the vessel (without any squat or ukc factored in).

Safety Depth: This marks and highlights the minimum depth required for the vessel to remain safely afloat. As a thumb rule, Safety Depth = Deepest Static Draught + Anticipated Squat + Company's Min UKC.

Safety Contour: In general, the Safety Contour may be set equal to but not lower than the Safety Depth setting. Waters with depths lower than the Safety Contour should be construed as No-Go Area. The Master may set the Safety Contour to a value higher than the Safety Depth if he determines that an additional safety buffer would be required depending on the prevailing

circumstances and conditions. Indicated by a Grey Coloured area on the ECDIS.

Deep Contour: This setting is very handy for vessels engaged in operations such as Tank Cleaning or Ballast Water Exchange where it is mandatory to carry out the operation in waters exceeding a certain depth. Vessel's not engaged in such operations may set this value as deemed appropriate but in any event this should not be lower than the Safety Contour. Indicated by a white coloured area on the ECDIS screen.

Colour Coded Indications of the Deep Blue Shallow Contour (18 mtrs), Grey Safety Contour (20 mtrs) and the White Deep Contour (30 mtrs).

6. User Determined Alarm Settings: While there are certain safety critical alarms that are ON by defaults and cannot be changed, there are a host of other alarms and warnings which may be switched on or off by the User depending on the situation. Prudence should be exercised when activating / deactivating alarms and warnings. Too many alarms could result in Alarm Deafness (more on this later) and too few alarms might result in a false sense of Safety. It is of utmost importance that the Navigational Watchkeeping Officer is fully familiar with all the Alarms and Warnings which have been activated. A handover checklist of the alarms and warnings should be completed before taking over the watch. Prior taking over the watch, it is essential to note down what warnings / alarms are already in place.

7. Enhances Search and Rescue Capability onboard: Modern ECDIS units have the option of interfacing NAVTEX and EGC with the ECDIS display. Warnings and Alerts are automatically displayed on the ECDIS screen, whilst at the same time giving an audible and visual indication on the unit itself. Quick Range and Bearings are obtained by the Electronic Range and Bearing Line (ERBL) function. This enables the user to quickly determine if the vessel is in a position of providing assistance to the distressed craft.

The ECDIS unit also has a Man Overboard (MOB) function which can be activated in the event of a person falling overboard. This marks the position / datum which is used as a reference for Recover and Rescue.

8. Cost Efficient: Although, Electronic charts are by no means cheap, they still have an edge over paper charts dollar for dollar. Electronic Chart Permits are obtained electronically with minimum data usage. Paper charts though, have to be delivered physically which involved handling fees by the

agents, especially if ordered at the last minute. On rare occasions vessel's had to divert only to pick up charts if the voyage was changed at the last minute. This involved massive costs such as Agency fees, Boat costs etc. All this can be avoided by using Electronic Charts.

9. Environmentally Friendly: Remember having to dispose of all those old charts many of which were never used? Now imagine hundreds and thousands of vessels doing the same. Not to mention the phenomenal amount of paper that is used to print out blocks, tracings and T&P notices. This doesn't happen with the ECDIS. The ECDIS does pack in a strong punch in reducing the carbon footprint of every vessel which goes paperless.

Here are some of the things that go on to prove that nothing in this world is perfect. No, not even the ECDIS!

Cons:

1. Over-Reliance: With an equipment which is seemingly fool-proof, there is a tendency for navigators to over rely on it. The consequences can be disastrous. Every once in a while you see an erring Third Mate tunnel visioned on the ECDIS. The ability and need to keep a proper visual look out cannot be over emphasised here. No matter how good the ECDIS is, its performance still largely depends upon the inputs. A vessel could have switched off its AIS and hence might not be displayed on the ECDIS. If the Radar Overlay is not turned on, the vessel will just not be seen on the ECDIS display. Hence, it is very critical that Navigators continue to maintain an efficient lookout and a good radar watch. The purpose of the ECDIS is to facilitate efficient navigation, not to substitute it. It is still vitally important to practice essential skills such as Radar Plotting, Sights, Compass Errors etc which will come in handy in the event of an ECDIS breakdown. Also, it is very important to go through the company's procedures in the event of ECDIS failure.

2. Garbage In Garbage Out (GIGO): ECDIS at the end of the day, is a machine and depends solely on the type of inputs that it receives. Erroneous position inputs from the GPS or loss of GPS signal can have grave consequences with the ECDIS going in DR mode. If the alarm is missed out, the result can be disastrous. Hence, it is vitally important to check the performance of sensors and to carry out frequent comparisons between the primary and secondary means of position fixing. Other inputs such as the GYRO,

Anemometer, Echo Sounder, Navtex, etc should be frequently verified independently to ensure smooth operation.

3. Wrong Settings: Feeding in wrong parameters for safety critical settings such as the Safety Depths, Safety Contours etc can give a false sense of safety. It is extremely important that the Master himself checks these settings each time they are changed. These settings should be password protected and every Navigator should verify them each time prior taking over the watch. Alarms should not be deactivated without strong reason and never just for the sake of avoiding frequent alarms. All the alarms in use should be properly documented and their switching on and off should be controlled by a defined procedure.

4. Alarm Deafness: If alarms start going off too frequently, the navigator could end up in a dangerous situation called Alarm Deafness. This leads to the watch keeper acknowledging the alarm even without checking what it was. He will eventually run out of luck and there could be an occasion where he might miss out on a critical warning such as approaching shallow contour. Hence, alarms should be carefully chosen which are appropriate to the prevailing conditions. Every single alarm should be checked and investigated prior acknowledging.

5. System Lag: Modern ECDIS software can have a lot of data to display. And with various equipment interfaced with the ECDIS, the system can slow down very easily leading to system lag. The hardware needs to keep up with the software and frequent upgrades are necessary. A higher RAM and a higher graphics card is a must.

6. Different Types: Navigation on paper charts was a skill which had to be mastered just once. It was then just routine practice which kept one in tune with things. However, this does not happen with ECDIS. Different vessels will have different types of ECDIS equipment. Even if the essential features are the same, it still takes a lot of fiddling around until one gets comfortable with the machine. With today's busy schedule, it is not uncommon for navigators to take over duties at the gangway itself. It is then left to colleagues onboard to familiarise him with various equipment. To overcome this problem, many flag states have made it mandatory for every seafarer to undergo type specific ECDIS training prior joining the vessel. Type Specific training has to be imparted by the equipment manufacturer and cannot be substituted

by onboard training by the Master. Logistically, it is extremely difficult for every navigator to undergo this type specific training especially when there is a need to embark on a short notice. A work around is that some companies have decided to select a single Equipment manufacturer to supply the company's fleet with ECDIS equipment. (Eg. Maersk Tankers has chosen TRANSAS as their supplier). This eases the training bottleneck considerably.

7. Anomalies: Every navigator needs to be aware of the anomalies present in that particular equipment. It could be a simple use of the SCAMIN (Scale Minimum) function or something serious where certain depths or symbols might not be visible at a particular scale or appear differently. Complete familiarisation with the ECDIS equipment is a must.

8. Information Overload: It is very easy to over feed information on the ECDIS. A lot of data which was earlier marked on charts such as position for calling Master, notices to Engine Room, Echo Sounder Switch on points, Port Control VHF channels etc now have to be fed on the ECDIS. The user needs to be aware that some of this information can be missed out in the clutter of information already present on the ECDIS. Larger ECDIS screens and better use of the Passage Plan Hard Copy should be used as a workaround.

9. Resistance to Change: Although this sounds like a trivial issue, it can be quite problematic. Most of the present day navigators have grown up in an era where paper charts was the only means of navigation. Not having these onboard could for them mean not having an aid on which they have relied all their lives. The transition cannot be easy and this could create a mental block for many. Hence it is vital, that senior navigators embrace this new technology with open arms and do their bit to improve the process of change. Shipping companies, flag states and Training Institutes need to identity this issue and encourage senior seafarers to undergo frequent refresher courses.

All said and done, ECDIS is here to stay. This is the future and one cannot just wish it away. As the saying goes," if you can't win them, join them". It is in every navigator's interest to join in on the ECDIS bandwagon. It cannot be disputed that even with all its follies, ECDIS is a fantastic piece of equipment and is here to stay.

By NiharHerwadkar | In: Marine Navigation | Last Updated on June 28, 2021
Pros and Cons of ECDIS Or Paperless Navigation Of Ships (marineinsight.com)

Exercise 2. Answer the following questions:

1) What are the main advantages of ECDIS as well as disadvantages (just enumerate)?
2) Which vessels used paperless navigation earlier than anyone else?
3) What function of ECDIS has replaced manual typing of data (e.g. plan)?
4) How has the paperless navigation changed the way charts being corrected?
5) What tool(s) help(s) to solve the problem of precise identification of the ship's position?
6) What are the basic settings on the ECDIS?
7) What does the depth of the safety contour setting depend on?
8) Why is it important to have alarms on board in moderation?
9) What service does the ECDIS provide to rescue people overboard?
10) Which are more expensive - electronic or paper charts? Why?
11) Why navigators can't rely solely on the ECDIS?
12) What type of security do the ECDIS settings have?
13) Why does every seafarer have to attend special training before going onboard?
14) What mental problem do some seafarers face when they are supposed to work with electronic charts?

Exercise 3. Complete the sentences gaps with one word or a phrase.

1) Nowadays not only small vessels, but giant container ones can work without _____ charts.
2) _____ of electronic charts is considered to be one of the most crucial advantages of paperless charts.
3) _____ charts was a very time-consuming process, before the ECDIS was implemented.
4) ECDIS provides users with the info about the vessel's current _____.
5) The position on ECDIS can be plotted _____, just like on paper charts.

6) Almost all companies have strict regulations on the minimum _____.

7) _____ function provides the Quick Range and Bearings on ship.

8) ECDIS is considered to be _____ friendly, because it reduces the carbon footprint of vessels.

9) Before taking over the watch every officer on duty should verify password protected _____.

10) The danger of different equipment interfacing is known as a system _____.

11) With the paperless charts a lot of _____, which was marked on paper charts, now have to be fed on the ECDIS.

Exercise 4. Find and learn Russian equivalents for the following words and expressions. Explain them in English.

scoffed	a)
Blasphemy	b)
Availability	c)
Accuracy	d)
Average	e)
Occasionally	f)
target	g)
shallow waters	h)
safety buffer	i)
circumstances	j)
Prudence	k)
Rescue	l)
Disastrous	m)
substitute	n)
Alarm Deafness	o)
fiddling	p)
Resistance	q)
trivial issue	r)
refresher courses	s)

Exercise 5. Prepare a presentation/report/summary on the topic of the text.

TEXT 9

Before you read

Exercise 1. Discuss with your partner the following questions:

- What is a radar?
- What are the functions of radars?
- Can you explain the work of a radar?
- Are there various types of them? If YES, what are they?

Marine Radars and Their Use in the Shipping Industry

The marine radar is equipment that is perhaps used the most on the ship's bridge by the OOW in carrying out a safe navigational watch.

What is Marine Radar?

A mandatory aid to navigation, the radar is used in identifying, tracking (with integrated ARPA) and positioning of vessels (including one's own vessel) among other things in order to adhere to the COLREGs so as to safely navigate a ship from one point to another.

The marine radar is classified under the x-band (10 GHz) or S-band (3GHz) frequencies. The x-band, being of higher frequency is used for a sharper image and better resolution whereas the S-band is used especially when in rain or fog as well as for identification and tracking.

Tracking ship devices are compulsory as per COLREGS (International Regulations for Preventing Collisions at Sea).SOLAS Chapter 5, Regulation 19 states that "All ships of 3000 gross tonnages and upwards shall, in addition to meeting the requirements of paragraph 2.5, have a 3 GHz radar or where considered appropriate by the Administration a second 9 GHz radar, or other means to determine and display the range and bearing of other surface craft, obstructions, buoys, shorelines and navigational marks to assist in navigation and in collision avoidance, which are functionally independent of those referred to in paragraph."

With the help of ship radar, accidents can be prevented at sea with the use of the various inherent functionalities of the radar (determining the CPA and the TCPA, EBL, VRM etc). However, even while the ships are docked in the port, with the help of these radars, the coast guard, VTS and the other authorities can use them to monitor the traffic in the small radar range.

The ship radar has a screen (referred to as the Plan Position Indicator) that displays all the targets that are present within the radar range. Since all the objects are clearly visible on the screen, navigating and monitoring the position of the ship becomes really feasible, hence the term 'aid to navigation.'

Main Features of the Marine Radars

The main features of the marine radars can be explained as follows:

The parabolic radar antenna transmits and receives electromagnetic waves; as far as a target being displayed is concerned, that is basically the wave that bounced off a certain object that paints itself on the PPI (Plan Position Indicator)

The frequency and the time taken by the flashes to return (reflections) to the radar receiver of the ship helps to find out whether the route of the boat can be continued with or not. The transmission and receiving of the pulse travels twice the distance in going and hitting the target and back; therefore, the target displayed on the PPI is basically halved with regard to its range

On the PPI, the reflections can be seen so that identifying the actual distance of the objects can be even easier. The same paint on the PPI can be also be checked for the determination of the bearing of the target.

How Does Marine Radar Works

The term "Radar" is an acronym for "Radio Detection and Ranging". The marine radar works on the basic principle of electromagnetic waves. The radar antenna sends the high-speed electromagnetic waves to establish the location, which is the distance, the velocity and the direction the wave travelled along with the altitude of the object, moving or stationary. Electromagnetic energy travels through air at a high constant speed, equivalent to the speed of light (300,000 kilometres per second). The object may vary from ships, boats, terrain, weather formation, cost etc.

Let us understand how does the marine radar works:

The radar system out electromagnetic waves as a high-speed, signal which will travel several miles in the direction of radar facing. If there are no objects in the direction of the wave, the radar screen will show blank.If there is an object, which will reflect the wave back to the radar, the computer set up of the radar will determine the distance between the ship and the object along with its location. Hence, it can be said that the radar basically reads two things – the position of the object and the direction of the same.

Position of the object: The radar antenna is continuously rotating on top of the ship sending and receiving signals. Hence, the radar is sweeping the signals all around the ship. As the radar pulse waves are reflected by an object, it will travel in the same direction and will be received by the radar detecting the position of the object. When the pulses are received back, the computer screen will log the position.

Distance from the ship: as the radar antenna is constantly sending and receiving signals from the object on the way of the electromagnetic signal, the received signal is sent back to the computer unit, which calculates the time taken for the signal to reflect back to the radar. Once the computer knows the time, it will calculate the distance by using the speed and time formula.

Uses of Marine Radar

To calculate range and bearing of a target and thereafter use the information to determine speed, course etc

- Integration with other shipboard equipment (such as ECDIS) to derive precise data
- Navigating own vessel and her course with regard to collision avoidance
- Fixing the ship's position using terrestrial objects such as lighthouses, buoys etc
- Differentiating between targets in high traffic density areas
- Determination of the weather, to an extent
- Use by VTS in controlling coastal traffic
- Usage of features such as parallel indexing to ensure safe navigation
- Alleviating workload on the OOW on the bridge
- Used extensively in pilotage that covers the above aspects

The marine radar is a much bigger subject than is laid out in the article which only skims the surface of the operation and the uses of the radar.As an OOW, it is important to be thorough with the radar and study its operation and features extensively along with the limitations of the radar.

The most important point about marine radars is that the screens used to view the position of the objects are either LED screens or monochrome screens.With such perfect screens, the clarity of the objects is highlighted

even further. Also since these screens are waterproof there is no threat of interruption to the ship radar system in times of rough weather.

The tracking ship system has further been developed to include even boats. This means that even boat owners can be assured of their vessel's safety while on the water.

One major advantage of marine radars is that the power and electricity consumption by them is far too less. This means that the marine radars are not just user-friendly but also help the shipowner to regulate the cost of power and electricity.

Radar has been a major instrument to help marine navigation since the past six decades. Over the years, radar technology has developed to include not just aircraft but ships as well. Marine travel and safety thus have become very feasible. It can be hoped, that in the future more such tracking devices will be developed so that several marine accidents and casualties can be prevented.

By ShilavadraBhattacharjee | In: Marine Navigation | Last Updated on August 30, 2021
Marine Radars and their Use in the Shipping Industry (marineinsight.com)

Exercise 2. Answer the following questions:

1) How can an accident be prevented with the help of marine radar?
2) In what weather conditions are X-band and S-band used?
3) What part of the ship radar shows the situation in the vicinity? How does it work?
4) What details does the radar give about the object being identified?
5) What are the advantages of monochrome screens of marine radars?

Exercise 3.Are these sentences true or false?

1) Marine radars can be used only when the ship's at sea.
2) A certain marine object's electromagnetic wave can be identified and reflected by the radar antenna.
3) The location established by the radar antenna includes the direction and speed of the vessel.
4) If the wave of the radar doesn't identify any object, the screen will remain black.
5) There are 2 types of screen that marine radars may have.
6) Marine radars can be expensive equipment for a ship-owner.

Exercise 4. Find and learn Russian equivalents for the following words and expressions. Try to explain them in English.

1. compulsory	a)
2. surface	b)
3. velocity	c)
4. altitude	d)
5. alleviating workload	e)
6. consumption	f)
7. clarity	g)

Exercise 5. Prepare a presentation/report/summary on the topic of the text.

TEXT 10

Before you read

Exercise 1. Discuss with your partner the following questions:

- What is NAVTEX?
- How is NAVTEX connected with Maritime Safety Information?
- Can you explain how this device works?

NAVTEX On Ships: Working, Types Of Messages and Advantages

It is of utmost importance that every navigating officer ensures the safety of the vessel and its crew. Accidents can happen to the most cautious and prudent of navigator.Right from the start of voyage planning, the navigator needs up to date information that will affect the passage of the ship. The most important information to vessels is information related to safety including Maritime Safety Information.

Maritime Safety Information includes navigational and meteorological warnings, meteorological forecasts, warnings about dangers to navigation, warnings of missing vessels and other urgent messages pertaining to the safety of the vessel and its crew. Constant monitoring to pick up wanted information among a vast volume of messages is not very practical with a

limited radio system. The NAVTEX system provides all navigating officers with up to the minute information automatically.

NAVTEX, an acronym for navigational telex (navigational text messages) is a device used on-board the vessels to provide short range Maritime Safety Information in coastal waters automatically.

It can be used in ships of all types and sizes. The area covered by Navtex can extend as far as 400 nautical miles from the broadcast station. A NAVTEX receiver onboard prints out navigational and meteorological warnings and forecasts as well as urgent Marine Safety Information to ships.

It forms a vital element of the Global Maritime Distress Safety System (GMDSS). Navtex uses the feature of radio telex or Narrow Band Direct Printing (NBDP) for the automatic broadcast of information.

The Navtex works on a frequency of 518 kHz in the medium frequency band. 490 kHz frequency is also used by some countries for broadcasts in the national languages, also known as national navtex. Where medium frequency reception is difficult, transmissions are made on 4209.5 kHz. The default setting in a Navtex is 518 kHz. The entire world is divided into 21 areas known as NAVAREAS (including 5 areas recently introduced for the Arctic region) for the purpose of distributing this information. Each Navarea has multiple navtex stations which further helps in transmitting the messages.

SELECTION OF STATIONS

All navtex receivers are programmable to enable the navigating officer to ensure that only messages from selected Navtex Stations are displayed or printed.The SELECTING STATION menu under the Menu option in a Navtex Receiver allows the officer to select the desired stations he/she wants to receive automatically or manually.On automatic selection, the navtex receives Marine Safety Information for the area the ship happens to be in continuously and without any user involvement.

If a ship's position data is fed from any navigating equipment like GPS, the Navtex will automatically decide in which NAVAREA the ship is navigating presently and thus select the appropriate Navtex Stations.In the manual mode, the navigating officer can select what stations he/she wishes to receive.

A list of Navtex Stations can be found in the Admiralty List of Radio Signals Volume 3 Part 1 and in the List of Coast Stations and Special Service Stations (List IV) for reference.

TYPES OF MESSAGES

The Navtex receives the following kind of messages:

A= Navigational Warning

B= Meteorological Warning

C= Ice report

D= Search and Rescue Information/ piracy and armed robbery

E= Meteorological forecast

F= Pilot messages

G= AIS messages(formerly Decca messages)

H= Loran C messages

I= Omega messages

J= Satnav messages (GPS or GLONASS)

K= Other electronic navigational aid system messages

L= navigational warnings (additional)

M to U= Reserve

V= Notice to fisherman

W to Y= Reserve

Z= No messages on hand

The navtex receiver can be set to ignore certain types of messages, however, messages A,B,D and L because of their importance cannot be rejected by navigating officers.

Audible alarms can also be generated when message type A,B,D or L is received. It should only be possible to reset this alarm manually.

We should also note that when programming the type of messages to receive, it is wise to ensure that only those which are required and necessary are programmed for the reception.Otherwise, a good deal of paper will be wasted or one will have to scroll through a mass of messages if the broadcasts are received in soft copy.

THE FORMAT OF THE MESSAGE

The message in a Navtex Receiver appears in the following format:

ZCZC b1 b2 b3 b4 MAIN MESSAGE NNNN

ZCZC: It is the start code. It indicates the beginning of the message.

B1: This character represents the Station ID.
B2: This character is called the Subject Indicator. It is used to represent the type of message. (A to Z)
The characters B1 and B2 are used by the navtex receivers to reject messages from stations of concerning subjects of no interest to the officer.
B3 and B4: B3 and B4 is a 2 digit serial number for each message.
NNNN: This indicates the end of the message.
The characters B3 and B4 are used by receivers to keep already received message from being repeated.
Below is an example of a message:
ZCZC OA20
WZ 1593
Scotland, West Coast
The North cardinal light buoy 58.01.2N 005.27.1W
have been permanently withdrawn.
Cancel WZ 1562
NNNN
Every Navtex message has information within the message header. In the above message:
The letter “O” indicates a broadcast from the Navtex station, here Portpatrick radio.
“A” indicates a Navigational warning category message.
‘20’ indicates the navigational warning message priority sequence.

ADVANTAGES OF HAVING NAVTEX ONBOARD THE SHIPS:
Navtex is a form of extra insurance and aid in the peace of mind. It is a very convenient way of monitoring navigational warnings, meteorological warnings, search and rescue information and other data for ships sailing within 200 to 400 nautical miles off the coast. It thus provides pertinent navigational and weather-related information in real-time.As Navtex receiver receives messages automatically it is quite a user friendly. An officer of the watch does not have to monitor it regularly or be physically present at a fixed time.There is also no requirement for retuning of the receiver. This not only saves time but also stops an officer from being distracted on the bridge.With the information received from the Navtex receiver, passage

plan can be amended as required for the safety of the vessel.An officer of the watch can attend to any distress warning in the vicinity. He is also aware of the expected weather and can plan accordingly. Thus a Navtex forms an integral part of the bridge navigational equipment.

NAVTEX RECEIVER CHECKLIST

Every officer should make sure that there are sufficient rolls of Navtex paper available onboard at all times.

It is important to check that there is paper in the receiver so that one does not miss out any important messages.

It is advisable to leave the Navtex ON at all times to avoid the chance of losing vital information that might affect the vessel during its voyage.

Make sure that the operating manual is available on the bridge.

A plastic copy of the NAVAREAs/METAREAs in which the vessel is likely to sail, showing the Navtex stations, their coverage ranges and their respective time schedules should be made available next to the equipment.

A handy guide for programming, status and auto testing procedures can be made and kept with the equipment.

Routine tests should be carried out to check the performance of the equipment.

Extra care should be taken not to confuse the programming of B1 characters (station designators) with those of B2 characters (type of messages).

Navtex is mandatory to be carried by all SOLAS approved vessels. It is small but powerful equipment. It provides safety information that can be tailored as per one's particular needs.

By Paromita Mukherjee | In: Marine Navigation | Last Updated on September 3, 2021
NAVTEX On Ships: Working, Types Of Messages And Advantages (marineinsight.com)

Exercise 2. Answer the following questions:

1) What does NAVTEX provide every ship crew with?
2) What distance ahead can NAVTEX forecast a potential hazard?
3) What does "NAVAREAS" stand for?
4) What are the two modes NAVTEX offers?
5) What types of messages are of utmost importance and therefore cannot be ignored?

6) What is the principle of decoding messages in the NAVTEX Receiver?
7) How does NAVTEX make the life of officers on watch easier?
8) What do officers have to check before dealing with NAVTEX?

Exercise 3.Choose the right option.

1) The most important information for the ship and its crew is related to _____

a) working hours
b) safety
c) equipment onboard.

2) There are _____ NAVAREAS.
a) five
b) twenty
c) twenty one

3) In _____ mode, the navigator can choose the the station himself, not receiving Marine Safety Information for the current area of the ship.
a) automatic
b) desired
c) manual

4) In order not to waste a lot of paper and time, it's better to program only _____ messages for the reception.
a) meteorological
b) necessary
c) short

5) In the NAVTEX message characters _____ indicate digits and stop already received messages from being duplicated.
a) B1 and B2
b) NNNN
c) B3 and B4

6) In order to check the operation of the equipment every officer should take _____ prior to the voyage.
a) rolls of NAVTEX paper

b) routine tests
c) an exam

Exercise 4. Find and learn Russian equivalents for the following words and expressions. Explain them in English.

1. cautious	a)
2. prudent	b)
3. urgent	c)
4. default setting	d)
5. manual mode	e)
6. to reject	f)
7. insurance	g)
8. to be aware	h)
9. sufficient	i)

Exercise 5. Prepare a presentation/report/summary on the topic of the text.

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