GLOBAL MARITIME DISTRESS AND SAFETY SYSTEM (GMDSS)

- OLD SYSTEM
  - ALL PASSENGER VESSELS AND CARGO SHIPS OF 1600 GROSS TONS UPWARD HAD TO MAINTAIN A CONTINUOUS MORSE RADIO WATCH ON 500 kHz
  - ALL PASSENGER SHIPS AND CARGO VESSLS OF 500 GROSS TONS UPWARD ALSO HAD TO MAINTAIN A CONTINUOUS RADIO TELEPHONY WATCH ON 2182kHz AND CHANNEL 16

GMDSS

- ALTHOUGH THE SYSTEM WAS RELIABLE IT HAD SHORTCOMINGS:
  - Relatively short range
  - Manual alerting only
  - Required aural watchkeeping.

GMDSS

- NEW SYSTEM
  - GMDSS REPLACES THE 500 kHz MORSE SYSTEM
  - IT IS AUTOMATED AND PROVIDES SHIP TO SHIP AND SHIP TO SHORE ALERTING.
  - APPLIES TO ALL PASSENGER SHIPS AND TO CARGO VESSELS OF 300 GROSS TONS PLUS ON INTERNATIONAL VOYAGES

GMDSS CONCEPT

- IN THE PAST DISTRESS AND SAFETY RELIED PRIMARILY ON THE SHIP IN DISTRESS ALERTING ANOTHER SHIP FOR ASSISTANCE.
- GMDSS EMPHASISES THE ABILITY TO ALERT SAR AUTHORITIES ASHORE AS WELL AS SHIPPING IN THE VICINITY TO ENSURE A CO-ORDINATED RESPONSE
- SHORE BASED AUTHORITIES NOW HAVE THE PRIMARY ROLE OF CO-ORDINATING ASSISTANCE AND RESCUE OPERATIONS

GMDSS CONCEPT

- IN GMDSS THE INITIAL ACKNOWLEDGEMENT OF A DISTRESS ALERT SHOULD BE BY THE SHORE BASED AUTHORITIES..
- SUBSEQUENT ACTIONS AND COMMS SHOULD BE CONTROLLED BY THE RESCUE CO-ORDINATION CENTRE

NAVIGATIONAL SEA AREAS

- GMDSS IS BASED ON THE CONCEPT OF USING 4 MARINE COMMS SEA AREAS TO DETERMINE THE OPERATIONAL, MAINTENANCE AND PERSONNEL REQUIREMENTS FOR MARITIME RADIO COMMS
- THE SEA AREAS DESIGNATED AS A1 ; A2 ; A3; A4 ARE SPLIT UP AS FOLLOWS:

SEA AREA A1

- WITHIN RADIO TELEPHONE COVERAGE OF AT LEAST ONE VHF COAST STATION IN WHICH CONTINUOUS DSC (DIGITAL SELECTIVE CALLING) ALERTING IS AVAILABLE, IE AREA EXTENDING UP TO 50 NAUTICAL MILES FROM THE COAST STATION

SEA AREA A2

- AREA, EXCLUDING SEA AREA 1, WITHING THE RADIO TELEPHONE COVERAGE OF AT LEAST ONE MF COAST STATION IN WHICH DSC ALERTING IS AVAILABLE. THIS AREA TYPICALLY EXTENDS UP TO 150 NAUTICAL MILES OFF-SHORE, BUT WOULD EXCLUDE ANY A1 AREAS. IN PRACTICE SATISFACTORY COVERAGE MY OFTEN BE ACHIEVED OUT TO 400 NAUTICAL MILES OFF-SHORE

SEA AREA A3

- AREA EXCLUDING SEA AREAS A1 AND A2, WITHIN THE COVERAGE OF AN INMARSAT GEOSTATIONARY SATELLITE IN WHICH CONTINUOUS DSC ALERTING IS AVAILABLE. THIS AREA LIES BETWEEN LATITUDES 70° NORTH AND SOUTH BUT EXCLUDES AREAS A1 AND A2.

SEA AREA A4

- AREA OUTSIDE SEA AREAS A1, A2 AND A3. THIS IS ESSENTIALLY THE POLAR REGIONS NORTH OF LATITUDE 70° NORTH AND SOUTH OF LATITUDE 70° SOUTH. IT EXCLUDES ANY OTHER AREA

OPERATIONAL DETAILS

- WORLD-WIDE COVERAGE IS ACHIEVED BY A COMBINATION OF SATELLITE AND TERRESTRIAL SYSTEMS
- THE AREAS ARE DEFINED ACCORDING TO THE COVERAGE OF VHF, MF, HF COAST RADIO STATIONS AND INMARSAT SERVICES.
- THE AREA OF OPERATIONS OF A VESSEL DETERMINES THE TYPE OF COMMS EQUIPEMENT IT SHALL CARRY

SEA AREA A 1

- DISTANCE: 20 TO 50 NAUTICAL MILES FROM A COAST STATION
- RADIO BAND: VHF
- FREQUENCIES: CHANNEL 70 DSC OR CHANNEL 16
- EPIRB'S: EITHER L BAND (1.6 GHz) OR 406 MHz COSPAS-SARSAT OR VHF EPIRB
- SURVIVAL CRAFT: 9GHz TRANSPONDER (SART), VHF PORTABLE RADIO (CH16 AND ONE OTHER)

SEA AREA A2

- DISTANCE: 50 TO 400 NAUTICAL MILES
- RADIO BAND: VHF AND MF
- FREQUENCIES: AS FOR A1 PLUS 2187,5 KHz DSC OR 2182 KHz RT, 2174 KHz NBDP, 518 KHz NAVTEX
- EPIRB'S: L BAND (1.6 GHz) 406 MHz COSPAS-SARSAT
- SURVIVAL CRAFT: 9GHz TRANSPONDER (SART), VHF PORTABLE RADIO (CH16 AND ONE OTHER)

SEA AREA A3

- DISTANCE : 70° N TO 70° S
- RADIO BAND: HF OR SATELLITE, MF , VHF
- FREQUENCIES : AS FOR A2 PLUS 1.5 – 1.6 GHz ALERTING, PLUS ALL HF FREQUENCIES
- EPIRB'S : L BAND (1.6 GHz) OR 406 MHz COSPAS – SARSAT
- SURVIVAL CRAFT: 9GHz TRANSPONDER (SART), VHF PORTABLE RADIO (CH16 AND ONE OTHER)

SEA AREA A4

- DISTANCE : NORTH OF 70° N AND SOUTH OF 70° S
- RADIO BANDS : HF, MF, VHF
- FREQUENCIES : AS FOR A2 PLUS ALL HF FREQUENCIES
- EPIRB'S : 406 MHz COSPAS-SARSAT
- SURVIVAL CRAFT: 9GHz TRANSPONDER (SART), VHF PORTABLE RADIO (CH16 AND ONE OTHER)

RADIO WATCHKEEPING

- RADIO WATCHKEEPING IS AUTOMATIC WITH GMDSS. WHEN RECEIVING EQUIPMENT IS ACTIVATED AN OPERATOR IS ALERTED. AFTER THIS FURTHER DISTRESS AND SAFETY COMMS ARE CARIED OUT ON RADIO TELEPHONE OR RADIO TELEGRAPHY
- WHEN NO COMMS ARE IN PROGRESS, OPERATORS (WATCHKEEPING OFFICERS ARE REQUIRED TO MONITOR THE FOLLOWING:

RADIO WATCHKEEPING

- WATCHKEEPING OFFICERS ARE REQUIRED TO MONITOR THE FOLLOWING:
  - THAT THE EQUIPMENT IS IN SERVICE AND FULLY OPERATIONAL.
  - THAT THE EQUIPMENT IS PROPERLY SET UP TO PERFORM THE MANDATORY GMDSS FUNCTIONS. THIS IS DONE BY CARRYING OUT REGULAR TESTS ACCORDING TO GMDSS REGULATIONS

GMDSS SUB-SYSTEMS

- DSC TERRESTRIAL COMMS SYSTEM
  - DEDICATED FREQUENCIES MADE AVAILABLE FOR MARITIME COMMS OPERATING IN THE VHF, MF AND HF BANDS PROVIDING LONG, MEDIUM AND SHORT RANGE COMMS.
  - USE IS MADE OF DSC TECHNOLOGY WHICH PROVIDES A MEANS OF CALLING A STATION OR GROUP OF STATIONS USING DIGITAL TECHNIQUES

DSC TERRESTRIAL COMMS SUB-SYSTEM

- THE BASIC IDEA IS TO PROVIDE AN AUTOMATED CALLING SYSTEM FOR INITIAL CONTACT
- THE SYSTEM ALOWS FOR THE NAME OF THE VESSEL, THE NATURE OF THE DISTRESS AND THE LAST RECORDED POSITION TO BE DISPLAYED OR PRINTED ON RECEIPT OF A DISTRESS CALL.
- DISTRESS PRIORITY SHIP TO SHORE CALLS RECEIVE PRIORITY OVER ALL OTHER TRAFFIC AND ARE ROUTED TO THE NEAREST RESCUE CO-ORDINATION CENTRE

SATELLITE COMMS SUB-SYSTEM

- SATELLITE NETWORKS PROVIDE A FULL RANGE OF COMMS SERVICES WHICH COVERS ALL GENERAL COMMS REQUIREMENTS AS WELL AS DISTRESS AND SAFETY REQUIREMENTS

MARITIME SAFETY INFORMATION SUB-SYSTEM (MSI)

- MSI INCLUDES ALL MET AND NAV WARNINGS, MET FORECASTS AND OTHER URGENT SAFETY RELATED MESSAGES OF VITAL IMPORTANCE TO ALL SHIPS AT SEA.
- THIS IS BROADCAST BY MF TELEX (NAVTEX) FOR LOCAL MSI AND BY SATELLITE OR HF TELEX FOR LONG RANGE MSI.

EPIRB SUB-SYSTEM (EMERGENCY POSITION INDICATING RADIO BEACON)

- EPIRB ALERTING IS DONE BY INMARSAT AND COSPAS-SARSAT.
- FULL GLOBAL COVERAGE IS PROVIDED THE POLAR ORBITING COSPAS-SARSAT SYSTEM WHICH USES DOPPLER FREQUENCY SHIFT TECHNIQUES TO ESTABLISH THE VESSEL'S POSITION
- SOME 406MHz EPIRB'S HAVE AN INTERFACE WITH THE SHIP'S NAV SYSTEM WHICH ENABLES THEM TO PASS THEIR POSITION DIRECTLY

EPIRB SUB-SYSTEM

- A 121.5 MHz SIGNAL FACILITY IS PROVIDED ON MOST COSPAS-SARSAT EPIRBS WHICH PROVIDES A HOMING SIGNAL FOR SEARCHING AIRCRAFT.
- INMARSAT EPIRBS OPERATE ON L BAND AND WILL TRANSMIT THEIR POSITION DIRECTLY USING INFO OBTAINED FROM THE SHIP'S NAV SYSTEM. INMARSAT DOES NOT COVER THE POLAR REGIONS.

SEARCH AND RESCUE TRANSPONDER SUB-SYSTEM (SART)

- IT IS A PORTABLE RADAR TRANSPONDER WHICH IS DESIGNED TO PROVIDE A LOCATING SIGNAL.
- IT IS DESIGNED TO BE CARRIED IN SURVIVAL CRAFT
- WHEN A 9 GHz RADAR INTERROGATES THE SART, IT WILL PROVIDE A SERIES OF 12 DOTS ON THE RADAR DISPLAY SHOWING THE COURSE TO STEER TO INTERCEPT THE SART.

GMDSS FUNCTIONS

- THERE ARE 9 FUNCTIONS WHICH THE GMDSS SYSTEM IS DESIGNED TO CARRY OUT

TRANSMISSION OF SHIP TO SHORE DISTRESS ALERTS BY TWO SEPARATE AND INDEPENDENT MEANS

- The details are contained on the individual ship's radio safety certificate
- For example a ship in area A1 would use VHF DSC equipment as the primary means and the EPIRB as the secondary
- Ships in area A4 would use HF DSC equipment as the primary means and a 406 MHz EPIRB as secondary.

RECEPTION OF SHORE TO SHIP DISTRESS ALERTS

- If a ship sends a distress signal via an EPIRB or Inmarsat C satellite terminal, any ship in the vicinity will not be aware of the distress until the shore authorities relay the distress details by sending a DSC call and/ or a satellite call to all ships within a defined area.

TRANSMISSION AND RECEPTION OF SHIP – SHIP DISTRESS ALERTS

- A ship in distress can alert other ships in the vicinity by sending a DSC distress alert on VHF and MF and follow it up with a distress voice message on channel 16 or 2182 KHz. HF DSC is reserved for long-range work and is intended for alerting shore-based authorities

TRANSMISSION AND RECPTION OF SAR COORDINATING COMMS

- This is to enable ships to perform SAR co-ordination functions described in the IAMSAR manual.
- It includes the use of radio telex (called Narrow Band Direct Printing – NBDP) between ships involved in the SAR

TRANSMISSION AND RECEPTION OF ON-SCENE COMMUNICATIONS

- It involves the use of short to medium range comms during the course of the operation.
- Ships must be able to communicate with aircraft, other ships and shore authorities using dedicated GMDSS frequencies for voice and NBDP comms
- Frequencies for RT use are:

TRANSMISSION AND RECEPTION OF ON- SCENE COMMS

- RT frequencies:
  - VHF Channel 16 and Channel 6 (inter ship and ship aircraft comms
  - VHF (121.5 MHz & 123.1 MHz) Ship aircraft comms (compulsory for passenger vessels)
  - MF (2182 KHz) distress and safety voice comms
  - HF (3023 KHz – ship aircraft, 4125 KHz – ship shore, ship ship, 5680 KHz – ship aircraft.

TRANSMISSION AND RECEPTION OF LOCATING SIGNALS

- Locating and homing signals are provided for in GMDSS by EPIRBs and SARTs.
- SARTs are intended for use in survival craft to provide a homing signal for ships and aircraft engaged in SAR operations.
- SARTs operate in the navigation radar frequency (X band)

TRANSMISSION AND RECEPTION OF MARITIME SAFETY INFORMATION (MSI)

- GMDSS provides two independent systems for broadcasting MSI namely, NAVTEX and Safety Net.
- Nav and Met warnings, met forecasts and other urgent safety related messages for a given area (NAVAREA) are broadcast over NAVTEX and Safety Net

TRANSMISSION & RECEPTION OF GENERAL COMMS TO AND FROM SHORE BASED RADIO SYSTEMS

- GMDSS provides facilities for all types of commercial and personal comms over commercial telecomms networks

TRANSMISSION OF BRIDGE TO BRIDGE COMMUNICATIONS

- SOLAS REQUIRES THAT ACCESS TO VHF COMMUNICATION EQUIPMENT MUST BE AVAILABLE AT THE POSITION THE SHIP IS NORMALLY NAVIGATED AND CONTROLLED FROM
- THIS INCLUDES THE OPERATION OF CHANNEL 13 WHICH IS RESERVED FOR INTERSHIP COMMS RELATING TO THE SAFETY OF NAVIGATION

PERSONNEL REQUIREMENTS

- THE RADIO REGS MAKE PROVISION FOR 4 CLASSES OF OPERATOR
  - 1ST CLASS RADIO-ELECTRONIC CERT - INCLUDES FULL ON-BOARD MAINTENANCE
  - 2ND CLASS RADIO ELECTRONIC CERT - INCLUDES LIMITED ON-BOARD MAINTENANCE
  - GENERAL OPERATOR'S CERT - WORLD WIDE OPERATION, BUT NO MAINTENANCE
  - RESTRICTED OPERATOR'S CERT - FOR AREA A1 AND A1 SHIPS

MINIMUM OPERATOR REQUIREMENTS FOR VESSELS

- SHIPS OPERATING WITHIN RANGE OF A VHF COAST STATION – ROC OPERATOR
- SHIPS OPERATING BEYOND THE RANGE OF VHF COASTAL STATIONS – GOC OPERATOR
- THE INTERNATIONAL CONVENTION ON STCW REQUIRE THAT ALL DECK OFFICERS SHALL HOLD AN APPROPRIATE QUALIFICATION TO OPERATE VHF COMMS EQUIPMENT. FOR GMDSS SHIPS THIS MEANS ROC

KNOWLEDGE REQUIREMENTS OF OFFICERS

- DETAILLED PRACTICAL KNOWLEDGE OF THE OPERATION OF ALL GMDSS SUB-SYSTEMS AND EQUIPMENT
- ABILITY TO SEND AND RECEIVE CORRECTLY BY RADIO TELEPHONE AND NBDP
- DETAILLED KNOWLEDGE Of THE REGS APPLYING TO RADIO COMMS, KNOWLEDGE OF THE DOCS RELATING TO CHARGES FOR RADIO COMMS AND KNOWLEDGE OF THOSE PROVISIONS OF SOLAS WHICH RELATE TO RADIO

KNOWLEDGE REQUIREMENTS OF OFFICERS (CONT)

- SUFFICIENT KNOWLEDGE OF ONE OF THE WORKING LANGUAGES OF THE ITU (FRENCH, ENGLISH OR SPANISH.
- CANDIDATES MUST BE ABLE TO EXPRESS THEMSELVES SATISFACTORILY IN THAT LANGUAGE, BOTH ORALLY AND IN WRITING

AVAILABILITY OF EQUIPMENT

- THERE ARE THREE OPTIONS
  - At-sea maintenance
  - Shore-based maintenance
  - Duplication of equipment
  - Ships operating in areas a1 and a2 must nominate one option.
  - Ships operating in areas a3 and a4 must nominate two options
  - Details of the options applicable are contained in the radio safety certificate

NON GMDSS VESSELS & RADIO COMMS SERVICES

- IT IS COMPULSORY FOR ALL SOLAS VESSELS TO HAVE GMDSS EQUIP. THIS MEANS ALL PASSENGER VESSELS AND CARGO VESSELS OF 300 TONS ON INTERNATIONAL VOYAGES
- THERE ARE ALSO A VERY LARGE NUMBER OF VESSELS THAT DON'T UNDERTAKE INTERNATIONAL VOYAGES AND DO NOT HAVE TO COMPLY WITH GMDSS., IE FISHING VESSELS, WARSHIPS, YACHTS. ETC. THE INDIVIDUAL FLAG STATES MUST PROVIDE SAFETY AND DISTRESS SERVICES FOR THESE VESSELS

MARITIME MOBILE SERVICE IDENTITY (MMSI) NUMBERS

- EACH GMDSS SHIPSTATION IS ALLOCATED ITS OWN UNIQUE 9 DIGIT MMSI NUMBER WHICH IS INCLUDED AUTOMATICALLY IN EACH DSC CALL MADE BY THE STATION.
- INCLUDED IN THE MMSI NUMBER ARE THE MARITIME IDENTIFICATION DIGITS (MID) WHICH IDENTIFY THE COUNTRY LICENSING/CONTROLLING THE STATION
- THREE TYPES OF MMSI NUMBERS ARE IN COMMON USE TO IDENTIFY INDIVIDUAL SHIPS, GROUPS OF SHIPS AND COAST STATIONS.

MMSI NUMBERS (CONT)

- THE FOLLOWING ARE EXAMPLES USING THE MID 232 (UNITED KINGDOM)
  - a. Ship station – 232001021
  - b. Group of stations – 023201143
  - c. Coast station - 002320018


FURUNO
GMDSS
A3 Area
Console
AC FAILURE LIGHT