

Full Mission GMDSS Simulator for GMDSS Certification Training

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INTRODUCTION.

In order to further enhance the safety of lives at sea, the international maritime community has developed a new system for distress and radio communications utilising the present day technology. This system is a combination of conventional and modern communications equipment and procedures and is known as Global Maritime Distress and Safety System (GMDSS). The implementation will be phased over the period from February 1 1992 until February 1 1999, on which date the system will become mandatory for all ships carrying more than 12 passengers and all cargo vessels over 300 GRT on international voyages.

To assure proper understanding and operation, training is required for those whose responsibilities will include the GMDSS communications. Apart from theoretical knowledge the training requirements comprise operational and procedural skills for both GOC (General Operator Certificate) and ROC (Restricted Operator Certificate).

These skills have to be practised on relevant equipment, but as real equipment is often impractical, costly, or impossible to use, a comprehensive simulator resembling the real system will serve a purpose.

With the introduction of the "full mission" communications simulator for GMDSS and SAR operations a new tool is now available within the range of high quality maritime simulation systems enabling an even more extensive and realistic training environment to be created.

GMDSS FUNCTIONS.

The GMDSS concept has been created with a number of specific functions in mind. This implies which functionalities the training equipment will have to allow practicing for in order to be fully comprehensive:

- alerting:

distress reporting to any unit which can provide or co-ordinate assistance such as a ship in the vicinity or a rescue co-ordination centre. This should be possible in all directions: ship/ship, ship/shore, shore/ship.

- SAR co-ordination:

usually communications required for the co-ordination of ships and aircraft participating in a search. These will include messages between an RCC, on-scene commanders and surface search co-ordinators.

- on-scene communications:

normally probably on MF or VHF bands, between the vessel in distress and the assisting units either on sea or in the air.

- locating signals:

transmissions intended for finding a vessel or people in distress. SART 9 GHz transponders in conjunction with radars on the assisting units are the main elements used.

- marine safety information:

distribution of marine safety messages and warnings of navigational and meteorological nature and automatic reception of such broadcasts. These can be MF, HF, and satellite communications.

- general radiocommunications:

being either between ships and shore-based communication networks for management and operation of the ships, or between ships in order to assist in the safe movements thereof.

GMDSS TRAINING.

The introduction and implementation of GMDSS will obviously require rules to have been developed for the equipment specifications, operational procedures and training and certification of personnel involved in the operations.

Besides the official requirements for training and examination, it appears from experiences so far that there is a definite need for proper training as the equipment is rather diverse and complex to operate and the procedures, although not difficult to understand, are multiple of structure and relatively new and unknown to most users.

The GMDSS GOC and ROC training recommendations or requirements should prepare for the examinations required for issuing the certificates. Although there have been some differences between countries training and examination standards the revised STCW code offers a common training and the European Conference of Postal and Telecommunications Administrations (CEPT) an examination standard.

The examination shall consist of theoretical and practical tests and shall include:

- (A) Knowledge of the basic features of the maritime mobile service and the maritime mobile satellite service.
- (B) Detailed practical knowledge and ability to use equipment of a shipstation
- (C) Operational procedures and detailed practical operation of GMDSS system and sub-systems.
- (D) Miscellaneous skills/ operational procedures for general communications.

In more detail it will, in particular be, the following items which require operational skills rather than theoretical knowledge to be acquired:

- (B1) Knowledge and ability to use in practice the equipment of a ship station.
- (B2) Digital Selective Calling (DSC).
- (B3) Knowledge of the general principles of NBDP and TOR systems. Ability to use maritime NBDP and TOR equipment in practice.
- (B4) Knowledge of the usage of INMARSAT systems. Ability to use INMARSAT equipment, or simulator in practice.
- (C1) Global Maritime Distress and Safety System (GMDSS)
- (C2) INMARSAT
- (C3) NAVTEX
- (C4) Emergency Position Indicating Radio Beacons (EPIRB's)
- (C5) Search and Rescue Transponder (SART)
- (C6) Distress and Safety communication procedures in the GMDSS
- (C7) Search and Rescue Operation (SAR)
- (D1) Ability to use English language, both written and spoken, for the satisfactory exchange of communications relevant to safety of life at sea.

GMDSS TRAINEES.

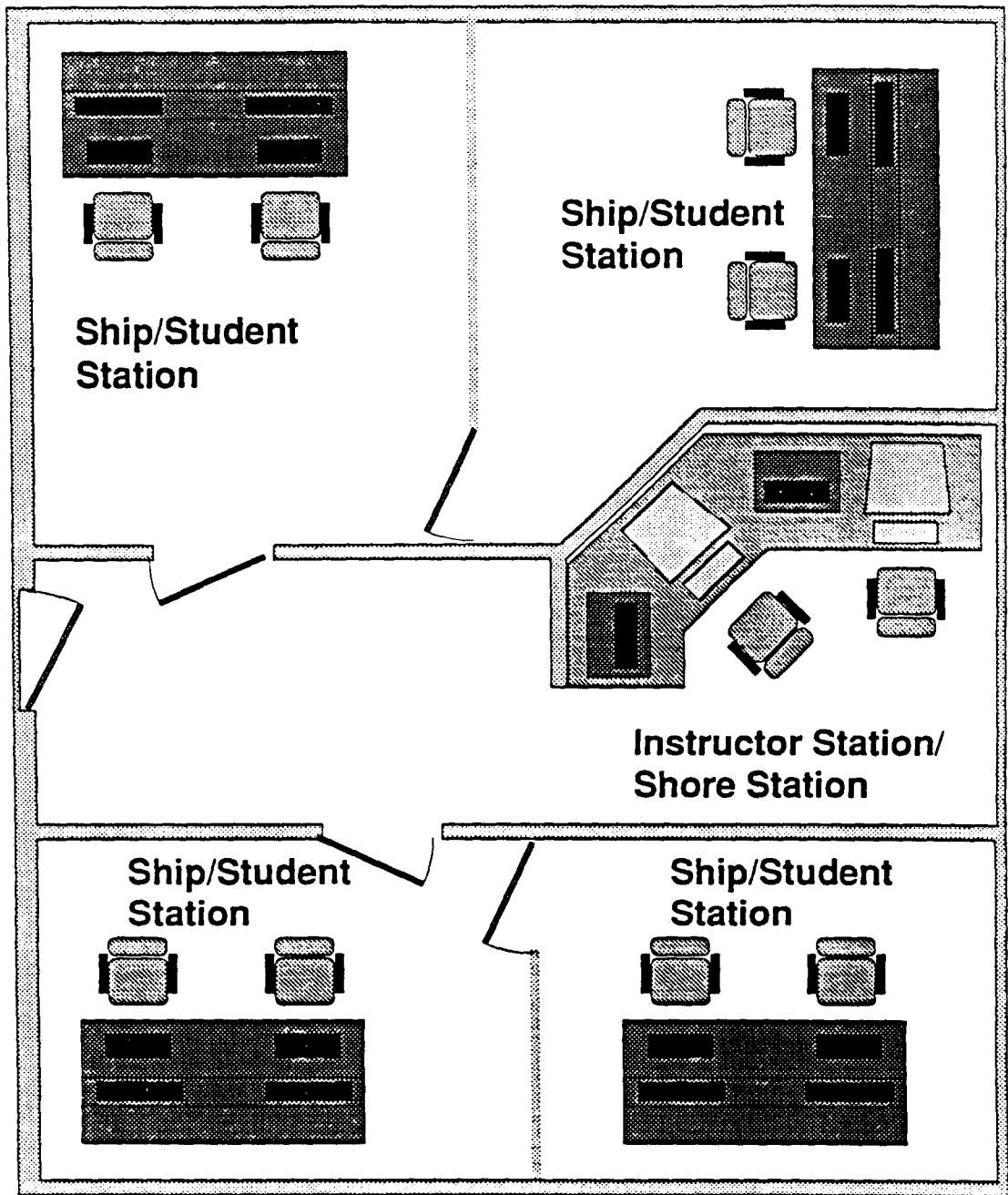
The 1990 International Shipping Federation/Bimco "Survey on Worldwide Demand for and Supply of Seafarers" showed the following figures, which at present might have to be adjusted a bit, offer a good indication of the size of the seafaring population:

1990	400.000 officers operational worldwide 50.000 officers shortage worldwide
2000	350.000 new cadet officers to be trained since 1990 in order to maintain status quo, not considering abnormal wastage of officers or world fleet expansion

This means required training intake of 35.000 officers per year. (At the moment however only some 12.000 are trained per year.)

Between 1990 and 2000 some 400.000 serving officers and yearly some 12.000 (or ideally 35.000) new officers have to be trained for GMDSS certification, including hands-on practical operations on either real or simulated equipment.

Although one could argue that in most countries only half of the above numbers have to be trained, as there is still the distinction of deck and engine department, in certain cases the engineer officers will also be included in GMDSS operations as well as possibly other crew members or ranks. This means that the given figures should probably be reduced by some 25% rather than 50%.



An example of a full mission GMDSS/ SAR trainer.

This still results in 300.000 serving and between 9.000 and 27.000 new officers yearly to be trained from 1990 until 2000. Assuming that half of the serving officers have already been upgraded, as the implementation period of GMDSS is halfway passed, we still arrive at 150.000 serving officers who require GMDSS training.

This means from 1995 onwards 30.000 serving per year, as well as the 9.000 to 27.000 new entrants, totalling between 39.000 and 57.000 officers to be trained yearly until 2000, should proper usage of and qualification for the GMDSS become a reality.

This impressive figure, even though it can be estimated down some thousands, illustrates the seriousness of the training issue and should show to all involved the enormous efforts still to be undertaken, if this shackle in the GMDSS chain is to be forged strong enough to keep the system feasible and effective.

TRAINING EQUIPMENT

Observing the training and examination requirements and the specification of functions of the system to be trained for, one should logically arrive at the conclusion that practical hands-on training is an absolute must.

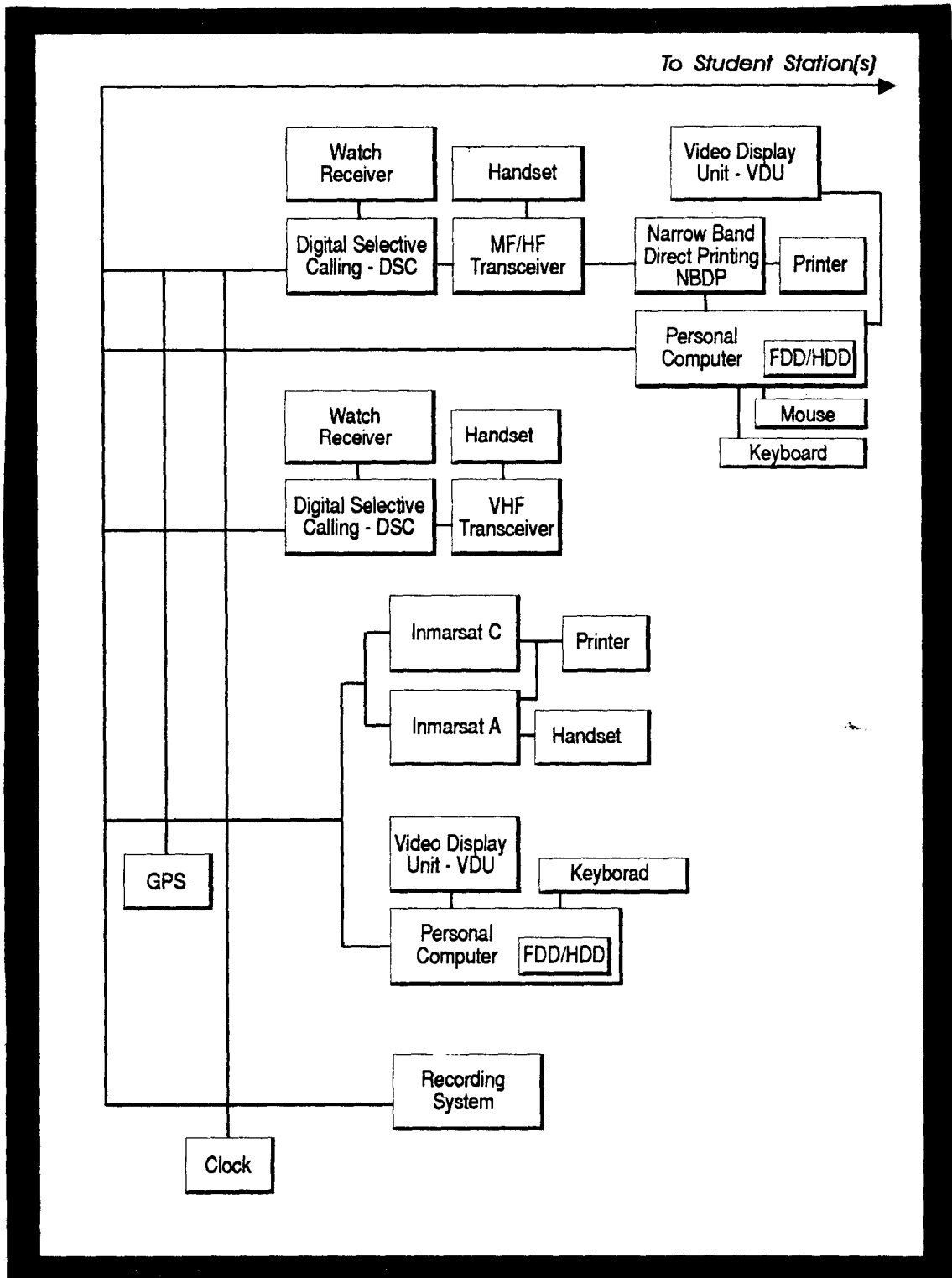
From an educational point of view the application of real equipment in a radio station on board a vessel would probably be the most desirable training tool. As in many training situations the usage of real equipment has a number of distinct disadvantages:

One of the most important elements of the actual GMDSS system is the safety and distress message communication. Working through coast and ship earth stations in the Inmarsat system or coast radio stations in MF or HF mode is thus required. Practising of this element is crucial, both from an overall safety as well as from a rescue co-ordination centre's point of view. The training of these aspects is however difficult on real-life equipment as distress messages are not allowed to be broadcast for practising purposes.

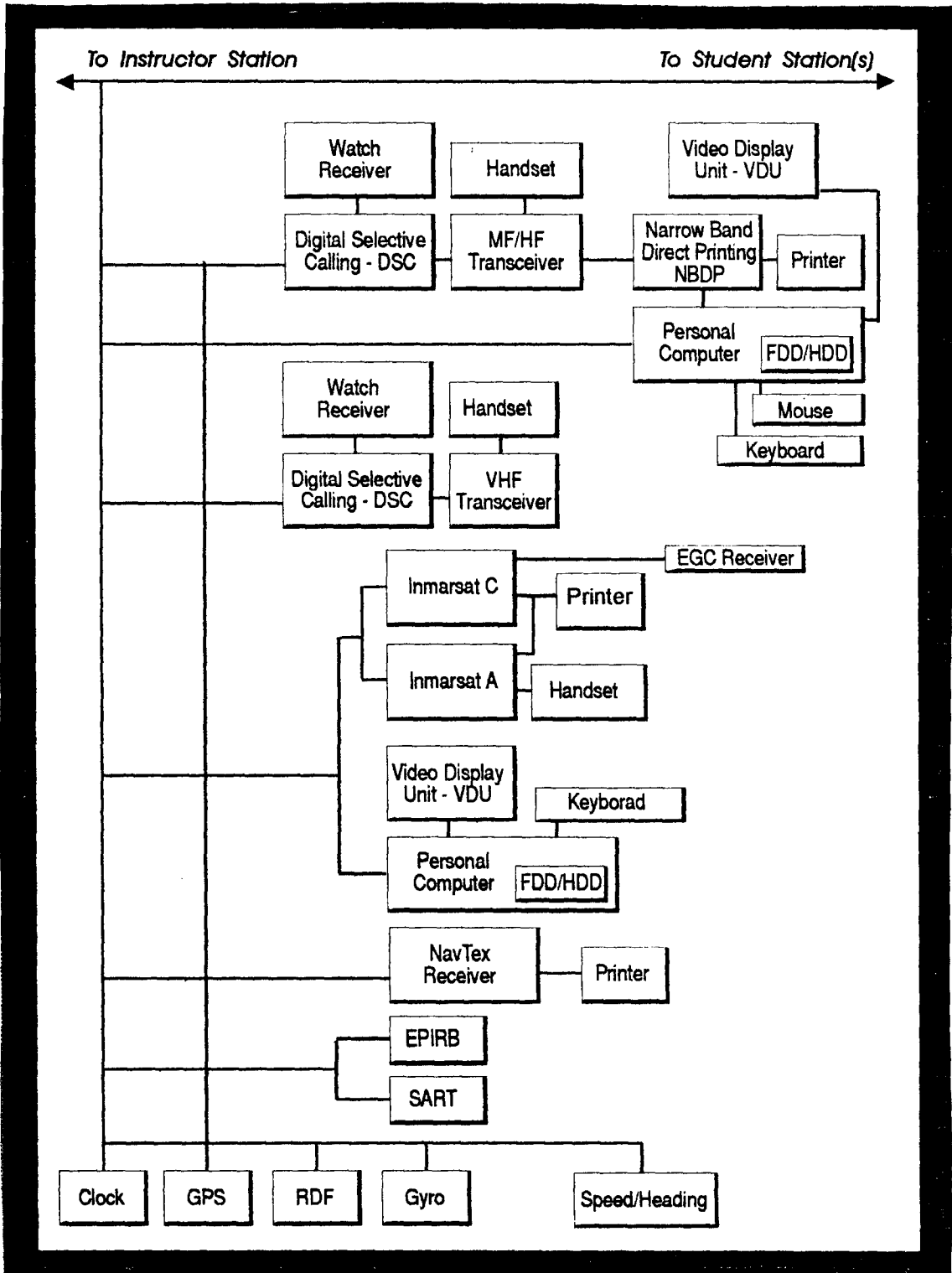
Observations about the enormous number of false alarms and inefficient operation are seriously illustrative of the lack of proper training of these aspects as well as the unfamiliarity with the equipment's design and operation.

Additionally, the release and transmission of EPIRB signals in SAR exercises and Navtex transmissions not being available in all countries where GMDSS certificates are trained for, add to the less positive aspects of real training equipment.

Concept - Instructor Station



Concept - Student Station



Furthermore the considerable costs of real equipment, especially in the case of multiple student stations as well as the costs of on-air practice broadcasts are elements to be taken into consideration when putting together an institute's GMDSS training budget.

SIMULATOR DESCRIPTION.

For training purposes the next best thing to reality is simulated reality which implies a situation as closely resembling the actual workplace as possible. The new full mission GMDSS simulator contains all equipment which is found aboard a vessel for communication, distress and search and rescue purposes and which is necessary to meet all described training objectives and operational functions.

The system consists of a computer network connecting an instructor station with up to 16 student stations which each resemble a simulated radio communications station. The various new and the more conventional items of GMDSS equipment included in the simulator can be listed as follows:

- DSC (Digital selective calling) equipment for MF/HF with watch receiver
- DSC equipment for VHF with Channel 70 watch receiver
- MF/HF transmitter and receiver
- VHF transmitter and receiver
- NBDP (Narrow-band direct printing) telegraphy with printer
- Navtex receiver
- Inmarsat-A ship earth station
- Inmarsat-C ship earth station with EGC receiver
- 406 MHz Cospas Sarsat EPIRB
- 1.6 GHz Inmarsat EPIRB
- 9 GHz SART (search and rescue radar transponder)

The system is built up in a flexible modular way, so it is possible to meet any particular user's specific requirement. The most comprehensive configuration will include all equipment required for the A1 to A4 area's.

From the instructor station there can be communication with the trainee positions and alternatively the trainee stations can also communicate between one another, acting as ships, planes or shorestations. The instructor is able to set up the scenario's in advance and depending on the training objective of a particular session, a certain scenario can be exercised.

All communications and transmissions can be recorded, so the instructor can debrief an exercise with the students, real time or fast time. During the process of the exercise the instructor has the possibilities to dub in debriefing messages, which can not be heard by the trainees.