IEC TECHNICAL COMMITTEE 80: MARITIME NAVIGATION AND RADIOCOMMUNICATION EQUIPMENT AND SYSTEMS
One of the fundamental trends in the maritime industry over the past decades has been an increasing reliance on electrical and electronic technologies for navigating and communicating. These technologies have moved well out of the mechanical era and fully into the electronic and information age. This is particularly true for equipment on ocean-going cargo and passenger vessels and for industrial fishing fleets but now even applies to the smallest of vessels.

Created in 1980, IEC Technical Committee 80 produces operational and performance requirements together with test methods for maritime navigation and radiocommunication equipment and systems. The committee provides industry with standards that are also accepted by governments as suitable for type approval where this is required by the International Maritime Organization’s SOLAS Convention. TC 80 does this by ensuring that it has representatives from industry, users, governments and test certification bodies. There are currently 20 participating national members in the committee and liaisons with all the major international maritime bodies.

The committee work programme is associated with that of the IMO by mirroring the performance standards adopted by IMO in its resolutions, with associated relevant ITU recommendations.

TC 80 standards support IMO resolutions and non-SOLAS and shore applications. Its scope is “to prepare standards for maritime navigation and radiocommunication equipment and systems, making use of electrotechnical, electronic, electroacoustic, electro-optical and data processing techniques for use on ships and where appropriate on shore”.

By being represented in both IMO and ITU this technical committee can contribute to the performance and technical content of the resolutions and recommendations. This is invaluable to industry, in that the performance and technical standards represent the practical state of current and emerging technology.
The origins of TC 80 date from the 1970s when electromechanical instruments started to be replaced by electronic instruments. In 1978 the IEC set up a working group to propose a possible work programme on “advanced navigational instruments”. The preferred approach was what today would be called “multi-modal” covering land, sea and air applications and the concept envisaged for navigation included related aspects of radiocommunications. Experts from France, Germany, Japan and Norway formed the working group with contributions from:

- International Radio Consultative Committee (CCIR)
- Comité International Radio-Maritime (CIRM)
- International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA)
- Inter-Governmental Maritime Consultative Organization (IMCO, now IMO)
- European Organisation for Civil Aviation Electronics (EUROCAE)
- International Organization for Standardization (ISO).

The working group identified a need for standards for instruments used on ships and possibly aircraft, noted the complex interrelations between IMCO, EUROCAE and ISO and centres of expertise existing within IEC, particularly in TC 18 (Electrical installations of ships and of mobile and fixed offshore units) and the International Special Committee on Radio Interference (CISPR).

The new Technical Committee held its first meeting in June 1980 in Stockholm with delegates from China, France, Germany, Japan, Netherlands, Sweden, UK, USA and Yugoslavia and observers from TC 18 and CIRM. The top priority task identified was standards to support the carriage requirements of the new SOLAS 1974, particularly automatic radar plotting aids (ARPA). TC 80 subsequently specialised into the activity of maritime instruments and has now produced some 48 standards.
When IEC TC 80 was formed there were 20 classification societies, together with the International Association of Classification Societies, numerous statutory authorities, regional standards bodies and IMCO – all with different ideas on what the general requirements should be for equipment to be used on ships.

It quickly became clear that general requirements interrelated environmental issues with other issues concerning the design of the equipment, its power supplies, electromagnetic compatibility (EMC) and safety.

In 1991 the IMO, when discussing the changes which would arise with the introduction of the GMDSS, noted that in future, radio equipment would be installed on the bridge alongside the navigation equipment instead of in a special radio room as hitherto and TC 80 standards subsequently took this into account.

Having attained consensus in IMO for the requirements for equipment used on the bridge of a ship, discussions began with classification societies, with TC 18 and with ISO to align all their general requirements. This resulted in the third edition of IEC 60945 in 1996 which is the industry standard on this subject. This edition also introduced new requirements for software, reflecting the technological changes taking place in equipment design.

A fourth edition of IEC 60945 appeared in 2002 which extended the detail of operational tests, particularly for equipment which is operated through software menus, to reflect the importance given by IMO to human factors. The EMC tests were also extended to contain the increasing problems experienced by the use of ever more electronic equipment on a ship.

The work on general requirements was extended in 2008 by the publication of IEC 62288. This standard harmonizes the requirements for the presentation of navigation-related information on the bridge of a ship to ensure that all navigational displays adopt a consistent human machine interface philosophy and implementation. The standard also provides standardized symbology and terminology.
Interest in standard interfaces to enable navigation equipment to communicate developed in the 1970s. During this decade, CIRM took an interest in standards for gyrocompasses, the National Marine Electronics Association (NMEA) focused on the use of LORAN for controlling an auto-pilot and, later, the IMO became involved during the development of the GMDSS.

By the mid-1980s the interface issue looked like it might polarize into two areas: exchange of navigational information and exchange of radiocommunication information. TC 80 helped to resolve this potential problem by developing standards suitable for all information exchange in the IEC 61162 series which today contains the accepted industry standards.
IEC TC 80 has produced standards for all the equipment which is required by the Safety of Life at Sea (SOLAS) Convention to be carried on the bridge of a ship. This includes the Automatic Identification System (AIS), the Electronic Chart Display and Information System (ECDIS), the Voyage Data Recorder, the radio installation and the radar.

Where appropriate, such as in the case of the Automatic Identification System, TC 80 has also produced standards for equipment intended for use on small vessels which has to interwork with the SOLAS equipment and also for supporting shore-based equipment.

Current interest in IMO is on reducing the workload of the bridge team through better integrated navigation systems and displays and reducing the workload of handling alarms deriving from malfunctions of equipment and navigational warnings. TC 80 is developing standards for Integrated Navigation Systems and Bridge Alarm Management to assist in these areas.

IMO
The International Maritime Organization, founded in 1948, is a specialized agency of the United Nations with headquarters in London and known until 1982 as the Inter-Governmental Maritime Consultative Organization (IMCO). It is a technical organization consisting of member states which has drafted some 40 Conventions and 800 supporting Resolutions.
CIRM
The Comité International Radio-Maritime, or International Maritime Radio Committee, promotes use of electronic technology for shipping and the safety of life at sea, and fosters relations between all organizations concerned with electronic aids to marine navigation and marine radiocommunications.

CIRM was accorded consultative status by IMCO in 1961. It is also a Sector Member of the ITU, and is a Liaison Member both of the ISO and of the IEC.

CIRM provides the Secretary of TC 80 under an agreement with the British Standards Institution.

ISO
At ISO, the International Organization for Standardization, TC 8 deals with ships and marine technology and has subcommittee SC 5 (Navigation and ship operation) which has a liaison with IEC TC 80.

ISO TC 8 standards which complement the work of IEC TC 80, or have been produced jointly, include the following:

- Magnetic compass (25862)
- Ship’s bridge layout (8468)
- Gyro-compass (8728, 16328)
- Radar reflector (8729)
- Echo sounder (9875)
- Heading controller (11674, 16329)
- Night vision (16273)
- Searchlight (17884)
- Programmable electronic systems (17894)
- ECS database (19379)
- Transmitting heading devices (22090)
- Rate of turn indicator (20672)
- Rudder indicator (20673)
- Propeller indicator (22554, 22555)
- Signal lamp (25861) and
- Wind vane (10596)
ABBREVIATIONS

AIS  Automatic Identification Systems
CCIR  International Radio Consultative Committee
      (now part of ITU-R)
CIRM  International Maritime Radio Committee
CISPR  International Special Committee on Radio
       Interference
ECDIS  Electronic Chart Display and Information
       System
ECS  Electronic Chart System
EMC  Electromagnetic Compatibility
GMDSS  Global Maritime Distress and Safety System
IALA  International Association of Marine Aids to
       Navigation and Lighthouse Authorities
IMO  International Maritime Organization
      (formerly IMCO Inter-Governmental
      Maritime Consultative Organization)
ISO  International Organization for
      Standardization
ITU  International Telecommunication Union
LORAN  Long Range Radio-Navigation System
NMEA  National Marine Electronics Association
SOLAS  International Convention for the Safety of
       Life at Sea
RTCM  Radio Technical Commission for Maritime
       Services
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