

RESOLUTION A.482(XII)

*Adopted on 19 November 1981
Agenda item 10(b)*

**TRAINING IN THE USE OF AUTOMATIC RADAR
PLOTTING AIDS (ARPA)**

THE ASSEMBLY,

RECALLING Article 16(i) of the Convention on the Inter-Governmental Maritime Consultative Organization,

BEARING IN MIND the provisions of Regulation 12, Chapter V, of the International Convention for the Safety of Life at Sea, 1974, and the proposed amendments to that Regulation,

RECOGNIZING that the proper use of automatic radar plotting aids will assist the interpretation of radar data and could reduce risk of collision and pollution of the marine environment,

NOTING resolution 18 of the International Conference on Training and Certification of Seafarers, 1978, which recommended that radar simulator training be given to all masters and deck officers, and resolution 20 of that Conference which invited IMCO to prepare appropriate training requirements or recommendations on training in the use of collision avoidance aids when it had adopted international carriage requirements and operational performance standards for collision avoidance aids,

RECALLING ALSO resolution A.422(XI) by which the Assembly adopted a recommendation on performance standards for automatic radar plotting aids and recommended Governments to ensure that adequate training will be established in the proper use of automatic radar plotting aids to enable masters and deck officers to understand the basic principles of the operation of automatic radar plotting aids, including their capabilities, limitations and possible errors,

HAVING CONSIDERED the recommendation made by the Maritime Safety Committee at its forty-fourth session,

1. ADOPTS the Minimum Requirements for Training in the Use of Automatic Radar Plotting Aids (ARPA) set out in Annex 1 to the present resolution and the Recommended Training Programme in the Operational Use of Automatic Radar Plotting Aids (ARPA) set out in Annex 2 to the present resolution;
2. RECOMMENDS Member Governments:
 - (a) When developing training programmes for courses in the use of automatic radar plotting aids (ARPA), to ensure that such programmes conform to standards not inferior to those specified in Annex 2 to the present resolution;
 - (b) To require all masters, chief mates and officers in charge of a navigational watch on ships fitted with automatic radar plotting aids (ARPA) to be trained in the proper use of such equipment;
 - (c) To ensure that no officer required to undertake ARPA training should conclude such training without having been trained in radar observation and plotting to the standards recommended by IMCO;

3. INVITES Governments to propose, at an appropriate time, relevant amendments to the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978.

ANNEX 1

MINIMUM REQUIREMENTS FOR TRAINING IN THE USE OF AUTOMATIC RADAR PLOTTING AIDS (ARPA)

**(relevant to Chapter II of the International Convention
on Standards of Training, Certification and
Watchkeeping for Seafarers, 1978)**

1 Every master, chief mate and officer in charge of a navigational watch on a ship fitted with an automatic radar plotting aid shall have completed an approved course of training in the use of automatic radar plotting aids.

2 The course shall include the subject matter set out in the Appendix to this Annex.

APPENDIX

MINIMUM TRAINING PROGRAMME IN THE OPERATIONAL USE OF AUTOMATIC RADAR PLOTTING AIDS (ARPA)

1 In addition to the minimum knowledge of radar equipment required by paragraph 4 of the Appendix to Regulation II/2 and paragraph 3 of the Appendix to Regulation II/4 of the 1978 STCW Convention, masters, chief mates and officers in charge of a navigational watch on ships carrying ARPA shall be trained in the fundamentals and operation of ARPA equipment and the interpretation and analysis of information obtained from this equipment.

2 The training shall ensure that the master, chief mate and officers in charge of a navigational watch have:

.1 Knowledge of:

.1.1 the possible risks of over-reliance on ARPA;

.1.2 the principal types of ARPA systems and their display characteristics;

.1.3 the IMCO performance standards for ARPA;

.1.4 factors affecting system performance and accuracy;

.1.5 tracking capabilities and limitations of ARPA;

.1.6 processing delays.

.2 Knowledge of the following and ability to demonstrate that knowledge in conjunction with the use of an ARPA simulator or other effective means approved by the Administration:

.2.1 setting up and maintaining ARPA displays;

- .2.2 when and how to use the operational warnings, their benefits and limitations;
- .2.3 system operational tests;
- .2.4 when and how to obtain information in both relative and true motion modes of display, including:
 - identification of critical echoes;
 - use of exclusion areas in automatic mode;
 - speed and direction of target's relative movement;
 - time to, and predicted range at, target's closest point of approach;
 - course and speed of targets;
 - detecting course and speed changes of targets and the limitations of such information;
 - effect of changes in own ship's course or speed or both;
 - operation of the trial manoeuvre;
- .2.5 manual and automatic acquisition of targets and their respective limitations;
- .2.6 when and how to use true and relative vectors and typical graphic representation of target information and danger areas;
- .2.7 when and how to use information on past positions of targets being tracked;
- .2.8 application of the International Regulations for Preventing Collisions at Sea.

ANNEX 2

RECOMMENDED TRAINING PROGRAMME IN THE OPERATIONAL USE OF AUTOMATIC RADAR PLOTTING AIDS (ARPA)

1 GENERAL

1.1 In addition to the minimum knowledge of radar equipment required by paragraph 4 of the Appendix to Regulation II/2 and paragraph 3 of the Appendix to Regulation II/4 of the 1978 STCW Convention, masters, chief mates and officers in charge of a navigational watch on ships carrying ARPA should be capable of demonstrating, to the satisfaction of the Administration, a knowledge of the fundamentals and operation of ARPA equipment and the interpretation and analysis of information obtained from this equipment.

1.2 Training facilities should include simulators or other effective means approved by the Administration capable of demonstrating the capabilities, limitations and possible errors of ARPA. In introducing this training programme, Administrations should pay due regard to the phasing in of the implementation of the carriage requirements specified in the amendment to Regulation 12 of Chapter V of the 1974 SOLAS Convention.

1.3 The facilities mentioned above should provide a capability such that trainees undergo a series of real-time exercises where the displayed radar information, at the choice of the trainee or as required by the instructor, is either in the ARPA format or in the basic radar format. Such flexibility of presentation will enable realistic exercises to be undertaken, providing for each group of trainees the widest range of displayed information available to the user and thus consolidating his ability to use effectively either basic radar or ARPA systems.

1.4 The ARPA training programme should include all items listed in paragraphs 3 and 4 below.

2 TRAINING PROGRAMME DEVELOPMENT

2.1 Where ARPA training is provided as part of the general training requirements specified in the Appendices to Regulations 11/2 and 11/4 of the 1978 STCW Convention, masters, chief mates and officers in charge of a navigational watch should understand the factors involved in decision making based on the information supplied by ARPA in association with other navigational data inputs, having a similar appreciation of the operational aspects and of system errors of modern electronic navigational systems. This training should be progressive in nature commensurate with responsibilities of the individual and the certificates issued by Administrations under Regulations 11/2 and 11/4 of the 1978 STCW Convention.

3 THEORY AND DEMONSTRATION

3.1 The possible risks of over-reliance on ARPA

3.1.1 Appreciation that ARPA is only a navigational aid and that its limitations, including those of its sensors, make over-reliance on ARPA dangerous, in particular for keeping a look-out. Need to comply at all times with the basic principles and operational guidance for officers in charge of a navigational watch.

3.2 The principal types of ARPA systems and their display characteristics

3.2.1 Knowledge of the principal types of ARPA systems in use; their various display characteristics and an understanding of when to use ground or sea stabilized modes and north-up, course-up or head-up presentations.

3.3 IMCO performance standards for ARPA

3.3.1 An appreciation of the IMCO performance standards for ARPA, in particular the standards relating to accuracy.

3.4 Factors affecting system performance and accuracy

3.4.1 Knowledge of ARPA sensor input performance parameters – radar, compass and speed inputs; effects of sensor malfunction on the accuracy of ARPA data.

3.4.2 Effects of the limitations of radar range and bearing discrimination and accuracy; the limitations of compass and speed input accuracies on the accuracy of ARPA data.

3.4.3 Knowledge of factors which influence vector accuracy.

3.5 Tracking capabilities and limitations

3.5.1 Knowledge of the criteria for the selection of targets by automatic acquisition.

3.5.2 Factors leading to the correct choice of targets for manual acquisition.

3.5.3 Effects on tracking of "lost" targets and target fading.

3.5.4 Circumstances causing "target swap" and its effects on displayed data.

3.6 Processing delays

3.6.1 The delays inherent in the display of processed ARPA information, particularly on acquisition and re-acquisition or when a tracked target manoeuvres.

3.7 When and how to use the operational warnings, their benefits and limitations

3.7.1 Appreciation of the uses, benefits and limitations of ARPA operational warnings; correct setting, where applicable, to avoid spurious interference.

3.8 System operational tests

3.8.1 Methods of testing for malfunctions of ARPA systems including functional self-testing.

3.8.2 Precautions to be taken after a malfunction occurs.

3.9 Manual and automatic acquisition of targets and their respective limitations

3.9.1 Knowledge of the limits imposed on both types of acquisition in multi-target scenarios, effects on acquisition of target fading and target swop.

3.10 When and how to use true and relative vectors and typical graphic representation of target information and danger areas

3.10.1 Thorough knowledge of true and relative vectors; derivation of targets' true courses and speeds.

3.10.2 Threat assessment; derivation of predicted closest point of approach and predicted time to closest point of approach from forward extrapolation of vectors, the use of graphic representation of danger areas.

3.10.3 Effects of alterations of course and/or speed of own ship and/or targets on predicted closest point of approach and predicted time to closest point of approach and danger areas.

3.10.4 Effects of incorrect vectors and danger areas.

3.10.5 Benefit of switching between true and relative vectors.

3.11 When and how to use information on past position of targets being tracked

3.11.1 Knowledge of the derivation of past positions of targets being tracked, recognition of historic data as a means of indicating recent manoeuvring of targets and as a method of checking the validity of the ARPA's tracking.

4 PRACTICE

4.1 Setting up and maintaining displays

4.1.1 The correct starting procedure to obtain the optimum display of ARPA information.

4.1.2 Choice of display presentation; stabilized relative motion displays and true motion displays.

4.1.3 Correct adjustment of all variable radar display controls for optimum display of data.

4.1.4 Selection, as appropriate, of required speed input to ARPA.

4.1.5 Selection of ARPA plotting controls, manual/automatic acquisition, vector/graphic display of data.

4.1.6 Selection of the time scale of vectors/graphics.

4.1.7 Use of exclusion areas when automatic acquisition is employed by ARPA.

4.1.8 Performance checks of radar, compass, speed input sensors and ARPA.

4.2 System operational tests

4.2.1 System checks and determining data accuracy of ARPA including the trial manoeuvre facility by checking against basic radar plot.

4.3 When and how to obtain information from ARPA display

4.3.1 Demonstrate ability to obtain information in both relative and true motion modes of display, including:

- identification of critical echoes;
- speed and direction of target's relative movement;
- time to, and predicted range at, target's closest point of approach;
- courses and speeds of targets;
- detecting course and speed changes of targets and the limitations of such information;
- effect of changes in own ship's course or speed or both;
- operation of the trial manoeuvre.

4.4 Application of the International Regulations for Preventing Collisions at Sea

4.4.1 Analysis of potential collision situations from displayed information, determination and execution of action to avoid close quarter situations in accordance with International Regulations for Preventing Collisions at Sea.