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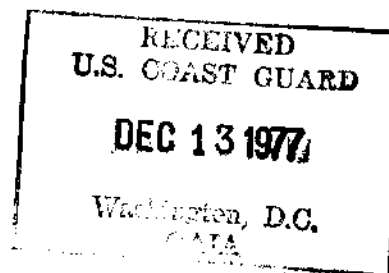
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QUESTIONNAIRE ON USER REQUIREMENTS FOR RADAR
PLOTTING AS AN AID TO COLLISION AVOIDANCE

1. The Joint MSC/MEPC Meeting on Tanker Safety and Pollution Prevention (10-21 October 1977) agreed to instruct the Sub-Committee on Safety of Navigation to prepare, in time for adoption by the 1979 Assembly:
 - (a) performance standards for collision avoidance aids; and
 - (b) requirements for the carriage of such aids on all ships of 10,000 grt and upwards with a view to amending, at the appropriate time, Chapter V of the 1974 Safety Convention.
2. The joint meeting was of the opinion that, in order to develop operational performance standards, it will be necessary to solicit information on user requirements, operational evaluations and essential performance specifications from Administrations and their national professional bodies, for both automated plotting and automatic anti-collision aids. For that purpose a Questionnaire was prepared, which is attached hereto.
3. In order to facilitate the development of such operational performance standards and a subsequent amendment to the 1974 Safety Convention, Member Governments are urgently invited to submit their replies to the attached Questionnaire to the twenty-first session of the Sub-Committee on Safety of Navigation not later than 1 May 1978.
4. Member Governments are also requested to submit, together with the replies to the Questionnaire, information on operational evaluations of automated plotting and automatic anti-collision aids, user requirements and performance specifications of such aids.

ANNEX XQUESTIONNAIRE ON USER REQUIREMENTS FOR RADAR PLOTTING¹/_{*}
AS AN AID TO COLLISION AVOIDANCEIntroduction

The purpose of this questionnaire is to assess the user requirements for automated plotting and automatic anti-collision aids so that appropriate operational performance standards can be prepared for such equipment by the Organization.

Administrations are requested to provide answers to the questions and where possible to give their reasons for the opinions expressed.

General

1. In which operational areas (e.g. open sea, congested waters, pilotage waters and narrow channels) and under what conditions (e.g. weather) is radar plotting needed?
2. Under which of the following circumstances is radar plotting desirable but impractical using manual plotting methods:
 - (a) too many ships;
 - (b) insufficient time;
 - (c) equipment limitations;
 - (d) other circumstances?
3. Is there a need to provide some form of automated assistance in radar plotting to overcome the difficulties given in answers to Question 2 above?
4. What probable benefits, both operational and environmental could result from the carriage of automatic radar plotting aids?

Detection²/

5. Is there a requirement for automatic detection? If the answer is "yes":
 - (a) should the requirement be related to a target range and/or an arc of bearing;

* For explanation of the terms used, see Explanatory Note on page 5 of the questionnaire.

- (b) bearing in mind that 100 per cent probability of automatic detection is unobtainable without an unacceptably high level of false alarms, what probability of automatic detection is acceptable in the chosen area of search;
- (c) what type of targets should be automatically detected?

Acquisition^{3/}

- 6. Is there a need for automatic target acquisition?
- 7. If there is a need for automatic target acquisition, should such acquisition be:
 - (a) fully automatic;
 - (b) fully automatic in relation to target range and/or an arc of bearing;
 - (c) fully automatic with priority according to collision threat?
- 8. If the need for fully automatic acquisition is not foreseen, should a semi-automatic mode be adopted whereby targets are selected by the radar observer and then acquired automatically?
- 9. Is there a need for any form of acquisition other than those described above?
- 10. Should the operator have a choice of acquisition methods?
- 11. In the preferred method of acquisition what is the maximum number of targets that should be acquired?
- 12. What probability of acquisition is acceptable, bearing in mind that 100 per cent probability may be unobtainable?

Tracking^{4/}

- 13. What is the maximum number of targets that need to be tracked at any one time?
- 14. Considering errors can occur, in all methods of plotting, to what degree are the following faults acceptable:
 - (a) target tracking loss;
 - (b) exchange of targets when tracking (target swop);
 - (c) tracking of clutter; and
 - (d) other tracking imperfections?

Determination of collision risk^{5/}

15. What is the maximum number of targets that need to be plotted at any one time?
16. What is the maximum time allowable to assess risk of collision with the most dangerous targets selected for plotting and what criteria should be taken into account in such assessment (e.g. range, relative velocity and rate of change of bearing)?
17. What time interval is considered acceptable for detecting the manoeuvring of other ships?
18. What degree of accuracy is needed for the information obtainable from the radar plot (i.e. closest position of approach (c.p.a.), time of c.p.a., target course and speed, etc.)?
19. What error in "own" ship's course and speed is acceptable when plotting?

Display^{6/}

20. What time interval is considered acceptable for regenerating a full plotting capability after changing range scales, resetting the display, or completing a manoeuvre?
21. In addition to the basic radar p.p.i. and manual plot, what is the most acceptable method of presenting processed data to the observer?
22. What methods of displaying processed data are considered unacceptable?

Situation evaluation^{7/}

23. What further assistance should be provided to the radar observer (e.g. indication of threat priority)?

Manoeuvre evaluation and proposals^{8/}

24. Is there a need for assistance in displaying and evaluating the possible effects of a manually selected trial manoeuvre?
25. Is there a need for recommending automatically a suitable manoeuvre to avoid collision?

Execution and supervision of manoeuvre^{9/}

26. What information should be provided during and after the execution of the manoeuvre (e.g. to enable up-dating of the manoeuvring decision)?

Performance monitoring

27. If automatic plotting aids are provided should this equipment have means to check that it is working correctly?

Alarms

28. What alarms should be provided for alerting the radar observer?
29. What probability of successful operation is required for each alarm?

Ergonomics

30. What ergonomic considerations should be taken into account in the design, installation and operational procedures for radar plotting facilities?

Other matters

31. If an automatic plotting device is provided associated with either of two radars, should it be possible to switch out the device from the radar at the discretion of the user in order to avoid degradation of the basic radar?
32. What amendments should be made to the performance standards for navigational radar equipment (Resolution A.222(VII)) and gyro compasses (Resolution A.280(VIII)) to take account of radar plotting facilities?
33. Is there a need for a performance standard for speed measuring devices which provide an input to radar plotting facilities?
34. In your view are there any aspects of the operation of automatic plotting aids which are not yet fully understood and which suggest a need for research and development?
35. What training facilities, both on board ships and ashore, should be provided to seafarers for the effective use of automated plotting and automatic anti-collision aids?
36. Are there any other factors, including cost benefit related to operational and environmental factors that should be taken into consideration which are not covered by the above questions and would be relevant to the preparation of operational performance standards for automated plotting and automatic anti-collision aids?

EXPLANATORY NOTE

An explanation of the terms used in this Questionnaire is as follows:

- 1/ Radar plotting
The whole process of acquisition, tracking, determining of collision risk, manoeuvre proposals and display of information.
- 2/ Detection
The recognition of the presence of a target.
- 3/ Acquisition
The initiation of a target tracking procedure.
- 4/ Tracking
The systematic manual or automatic process of recording the range and bearing of an echo that has been acquired.
- 5/ Determination of collision risk
The manual or automatic process of establishing the collision risk by manual plotting or equivalent systematic analysis based on target tracking.
- 6/ Display
The means by which anti-collision and/or radar data are presented to the radar observer.
- 7/ Situation evaluation
The process by which the radar observer assesses the collision risk and any other relevant navigational information provided.
- 8/ Manoeuvre evaluation and proposals
The process of displaying the possible effects of manoeuvres selected by the radar observer or recommending a manoeuvre automatically according to predetermined criteria.
- 9/ Execution and supervision of manoeuvre
The process of carrying out a manoeuvre and monitoring the developing station.