

that is not good enough. We should be able to *record* the range of visibility, so as to show whether in fact a ship has been in fog or not. (And that in fact, was, one recalls, a decisive point in the case of the *Andrea Doria* collision.)

from Prof. G. Simeon
(*Istituto Universitario Navale, Naples*)

THE range of radar normally used on ships of the Merchant Navy is more than that of small ships, such as fishing boats, &c. The Regulations specify the range at which navigation lights should be visible for ships of either more or less than 40 tons. The regulations in fact give a definite indication as to the minimum amount of information which would appear to be required for normal navigation. In putting forward proposals which had already been made by the French during the meeting of the French Navigation Institute in Paris in October of last year, and particularly by Messrs. Hugon and Le Moine-Karmor, we would therefore like to propose that there should be placed on these small ships, for use as soon as visibility is lower than what might be considered normal, corner reflectors, which would make them visible on the radar screen at distances not less than the specified range of the lights. In order to reduce as much as possible the effects of interference, two groups might be installed at different heights. Ships which had radar with the minimum characteristics requisite for maritime navigation would then be authorized to move even in fog at a proper speed. These proposals have been stated and illustrated in a memorandum, in Italian, which was presented to the radar conference at Genoa in May 1957.

Radar and the Collision Regulations

from Captains G. Jakobsson and A. Lagerwall

(*Swedish Lloyd and the Transatlantic Shipping Company*)

WHATEVER theoretical and electronic solutions might be recommended and adopted for use on board radar-equipped vessels, we must see to it that in all countries training facilities are established for officers, and that these facilities are also available for senior officers in service who have no other means of learning radar navigation. There is nobody to guide them as to what actions they should take when encountering other vessels in fog. They have to make the decisions themselves, and very often have to make them quickly. The training facilities should be such that they simulate as far as possible actual conditions. Blindfold radar navigation should also be carried out in clear weather and with some responsible person not blindfolded on the bridge to tell the officer at the radar when he is putting the vessel into a dangerous situation. Surprisingly little radar navigation training in this non-hazardous way is carried out on ships at sea in clear weather.

The general view in Sweden is that there is really very little reason to alter or to write new Rules of the Road for radar-equipped vessels. Certain amendments and recommendations, should, however, be made to clarify the existing rules so

that the present state of confusion (whether or not a radar vessel has the right to act in any way other than the Regulations stipulate) is removed. This applies especially to Rules 15 and 16. Regarding Rule 16b we should like to see a recommendation put into force that when a vessel has under radar observation another ship at such close quarters that normally her sound signals should have been heard, but have not, the vessel should act as if a sound signal had been heard, i.e. in full compliance with Rule 16b. Under no circumstances should any new sound signals for radar-vessels be introduced. It would naturally be very dangerous and cause numerous misunderstandings. We also feel that the radar should be kept under constant observation whenever there is a moving object within 3 to 4 miles. Slowing down, or even stopping during the time it takes another ship to get herself out of a critical situation, will not mean a loss of time (and less fuel consumption), since considerable alterations of course as avoiding action with the speed maintained will mean the same.

The fact still remains that the master has liberty in choosing whatever manœuvres he may consider necessary when navigating his ship at sea. It is only after an accident has occurred that the responsibility is questioned, and the master's actions come under somebody else's judgment. When two ships approach each other in poor visibility and under circumstances that would cause risk of collision, the master of a radar-equipped vessel should act as if the other vessel did not have radar. When contemplating his manœuvres he should always bear in mind that he alone takes on the responsibility for the resulting situation, even if he has acted according to the Rules of the Road after visual contact has been established.

Finally, additional sound signals for radar-vessels will only increase the existing difficulties in radar navigation. Further, we are not in favour of intercommunication between vessels for transmitting course and speed information. In our view the problem can only really be solved by a pictorial presentation which as far as possible gives the navigator the aspect of other vessels in as sure a way as the navigator's eyesight gives it to him in clear weather.

from Commander P. C. H. Clissold

It is certain that the Rules of the Road need clarifying and amplifying to make their use by navigators more certain and easy and pretty clear. Even though alteration of the International Regulations may take a long time to bring about the findings and proposals of the Working Group should carry great weight with navigators and with the Courts as to what constitutes good radar practice.

Any alteration or addition to the Rules of the Road ought to be (a) absolutely definite, (b) easy and certain of comprehension and execution, (c) no more than strictly necessary. Possibly fuller remarks might be separately published to amplify the necessarily concise rules—as has already been done in the Amendment (No. 1, 7 Dec. 1956) to the *Admiralty Manual of Navigation*.

Starting with those points already agreed upon in the formal conclusions of the conference (*Journal*, 10, 387), the following amendments are suggested:

Rule 16 (speed to be moderate in fog) to read:

A power-driven vessel hearing, apparently forward of her beam, the fog signal of a vessel the position and intentions of which are not ascertained shall, so far as the circumstances of the case admit, stop her engines, continue on her course until the other vessel is sighted, and then navigate with caution until danger of collision is past.

Para. c (additional)

A vessel in, or knowingly approaching, an area of restricted visibility shall start, test, and keep a continuous watch upon her radar.

A vessel observing upon her radar screen the echo of a vessel which may be proceeding in such a direction as to involve risk of collision forward of her beam and not more than 2 miles distant, shall, so far as the circumstances of the case admit, stop her engines, and then navigate with caution until danger of collision is over.

Preliminary to Part C Add new paragraph 4

Rules 17, 18, 19, 20 (a) and (b), 21 and 24, apply only to vessels which are in sight of one another.

There was general agreement about the foregoing points except the stopping of engines at 2 miles, proposed (but not in the discussion) by Mr. Tor Stuland (10, 390).

The important question whether it is either possible or desirable to lay down a definite course of action for a radar-using vessel avoiding another vessel which may, or may not, have radar, has not yet been settled. It is worth bearing in mind that before the original Rules of the Road were established some thought that no system of rules could be made to work. Any such rule now introduced must be effective whether radar sighting is, or is not, mutual, and should conform to clear-weather practice as closely as possible, besides being definite and simple.

Rule 20 add new para. (c)

(c) (i) In restricted visibility a vessel in radar contact with, but not in sight of, another vessel and proceeding in such a direction as to involve risk of collision with her, shall, if the circumstances of the case admit, avoid passing her within a distance of 2 miles.

(ii) If such a vessel intends to take avoiding action by altering course, such alteration should only be to starboard; sufficient to bring the other vessel upon the port bow; not less than 20 degrees; and made as soon as possible, unless the other vessel bears 70 degrees or more than 70 degrees on the starboard side when the alteration of course may be made in either direction.

(c) (ii) is an endeavour to incorporate M. Hugon's proposal (10, 345) to alter course to twice the bearing on the bow plus 10 degrees, in fine-bow approaches, with other crossing cases. It is proposed as one least restrictive of freedom of action and it may be noted that this prohibition to alter course to port would have avoided collision in all cases to which it applies in the examples quoted by Captain Wylie (10, 320).

from Dr. Adalberto Tempesta

At the time of the international conference held in Genoa, from 16 to 19 May 1957, a legal representative spoke in favour of a flexible and progressive interpretation of the Rules of the Road. Now in Genoa I stated that I felt that the regulations should be modified in order to adapt them to the new situation; and to this effect I made certain recommendations, which I was happy to see approved by many of the seafaring people present. I believe that it is extremely dangerous to indulge in any type of flexible interpretation of the rules as they exist, since this might well give rise to doubts, which could have serious repercussions. I believe that the time has not yet come to amend or alter these rules substantially, but that it might be appropriate to add to them. In Genoa,

I had to propose certain recommendations and I should like to renew these proposals here; the first and third of these recommendations could be added to the Regulations as Rule 34, 6th heading.

The proposals are as follows:

- (1) Every ship detecting a ship echo or ship echoes on her radar screen should immediately try to establish radio contact so as to pass to the other ship(s) her identity, tonnage, position, course, speed and the visibility. She should also request this information from the others. While awaiting a reply she should reduce speed.
- (2) Plotting of the radar information should be made compulsory, to establish the course, speed and closest approach of the other ship.
- (3) An r.t. watch should be compulsory in bad visibility, even in ships below 500 tons, which may not even have radar.

from A Master Mariner

IN the International Regulations for the Prevention of Collision at Sea two factors are indicated as means of averting collision—alteration of course and alteration of speed. I would suggest that in vessels carrying radar much more importance should be attached to the latter alternative.

As has been frequently mentioned, a clear rule is desirable for vessels in radar sight of one another in fog on the lines of the present Rules of the Road for ships in visual range. This rule must be simple both to understand and to operate.

I would suggest that the rule indicated below for vessels crossing might serve as a beginning, since it is simple and it works whether one or both vessels are radar equipped. It appears no more vulnerable than the present Collision Regulations, requires no knowledge of the other vessel's equipment, and the delays caused in practice would probably be less than those occasioned by large alterations of course.

In fog, when two vessels are crossing so as to involve risk of collision, the vessel having the other on her own starboard side shall stop her engines.

When two vessels are crossing so as to involve risk of collision the vessel having the other on her own port side shall reduce her speed to half that at which she has been proceeding.

from Vice-Admiral A. S. Pinke

(Royal Netherlands Navy ret.)

Two changes could help to end the uncertainty that exists under the present Regulations when the right-of-way ship is not sure whether she has been detected by the other. First, it should be emphasized that when two ships have only detected each other by radar, the International Regulations need only be applied so far as good seamanship allows; and second, the give-way ship under the Regulations should always keep clear by altering to starboard or by altering speed.

from Captain Oudet

(French Navy)

DR. MARIENFELD stated (10, 336) that there had been many cases where errors of manoeuvre led only to near-misses and that therefore it is often felt by

navigators that they can carry on in the same way—since a near-miss is a proof that there was no accident. Captain Wylie's paper (10, 320) should help persuade people who feel that nothing can happen to them, that something can, and indeed often does.

I think the rules as they exist should not be amended but that we should add to them parts for ships equipped with radar.

I would suggest the following additions:

PRELIMINARY

1. Once the risk of collision has been established the radar screen must be carefully and continuously watched.
2. When two vessels are not in sight of one another neither has the right of way over the other.
3. Manœuvres undertaken as the result of radar observations should be taken earlier and be bolder than would be the case had the vessels been in sight of one another.

Rule A

Speed in fog should be moderate, bearing in mind the distance of other vessels detected and their speed of approach.

Rule B

- (a) So far as possible vessels should avoid crossing near to each other.
- (b) Every vessel taking avoiding action should take into consideration the possibilities of action and inaction on the part of the other vessel.
- (c) When avoiding action entails an alteration of course, it should be executed bearing in mind the traffic rules laid down in Rules 18, 19, 22 and 25.

Rule C

A power-driven vessel coming close to another vessel forward of her own beam, the position and intentions of which have not been ascertained, shall, so far as the circumstances of the case permit, stop her engines without seeking to disengage, even if no fog signal has been heard.

from R. F. Hansford

(Decca Radar Ltd.)

WE have heard a great deal about the dangers of people getting themselves into situations on radar which they would never allow themselves to get into if they were handling their ships in clear visibility. Now I believe that is not the fault of the International Regulations, or of the radar. I am convinced it is because the people who are using the equipment have no practice in handling their ships on radar. Very often, they handle the ship on radar for the first and the last time in fog. I would like to make the practical suggestion that much good could be done if masters would, from time to time, handle their vessels in good visibility, purely on radar, with a safety lookout in the wings of the bridge. And that the safety lookout, when the radar officer of the watch had got his ship into a frightening position, should bring him out on the bridge and show him what's happened.

My second point concerns fitting corner reflectors to small craft. The trouble is that there are a number of reflectors on the market today which do no more

than lull their users into a false sense of security. If we are going to recommend the fitting of radar reflectors, we should specify what is and what is not a good reflector.

The True-motion Radar Display

from Captain R. G. Swallow, R.N.

(Radio Advisory Service)

TRUE-MOTION radar will tell you the range, compass bearing and true course of target echoes and give you facilities for estimation or calculation of target speed. It will not, however, give you the closest-approach distance without plotting or without using a closest-approach distance calculator.

If, however, it was possible to set own ship's speed to zero without having to revert to the relative display, the true-motion of echoes would change to relative motion in continuation from their present known position on the display, and using the reflection plotter the relative course of an echo could very quickly be observed and extended past own ship's position to show the closest approach distance. Setting own ship's speed back to its correct figure would then put echoes back to true-motion presentation and it would be quickly apparent if any of them had in the interval altered from their original true course.

An unsolved problem of this display is the time lag before alterations of course or speed by a target echo can be definitely appreciated from the movement of echoes on the PPI. The time lag is reduced on the true-motion display but nevertheless some delay still remains.

Finally it must not be forgotten that when true-motion presentation is used, a major part of the problem of manœuvring action for collision avoidance still remains, because, although the course steered by the other vessel may be seen, it is just as difficult to know how to proceed in order to keep her outside a certain safe distance. Before making a decision the situation must be analysed and, as there are no steering rules other than Rules 25 and 27 applicable to ships not in sight of one another, one must reflect before acting.

from J. Th. Verstelle

(Royal Netherlands Hydrographic Office)

TRUE-MOTION radar seems to me a most valuable, simple and elegant solution of the problems of relative motion. Where many ships are involved there is simply no time for the usual procedure of plotting. The conclusion might have been drawn from some of the papers that only in true-motion radar do errors in the assumed course and speed falsify the conclusions. In any particular case, however, the same errors would have been introduced into the normal plot (and into the results from the reflection plotter) and would influence the conclusions in exactly the same way and by exactly the same amount.