



Ref. T2/4.01

TRIALS IN WHICH THE OFFICER OF THE NAVIGATIONAL WATCH ACTS AS
THE SOLE LOOKE-OUT IN PERIODS OF DARKNESS

Since the Maritime Safety Committee at its fifty-ninth session approved the provisional guidelines on the conduct of trials in which the officer of the navigational watch acts as the sole look-out in periods of darkness (MSC 59/33, paragraph 11.23), the Sub-Committee on Safety of Navigation and the Sub-Committee on Standards of Training and Watchkeeping have further considered the provisional guidelines and the reporting form in MSC/Circ.566 issued on 2 July 1991.

From these considerations, an interest in other related subjects and issues to be addressed in the STW and NAV Sub-Committees analysis of the results of the trials has emerged. These subjects and issues are identified in the annexed outline of subjects and issues to be addressed in the STW and NAV Sub-Committees analysis of the results of trials conducted in accordance with MSC/Circ.566.

To facilitate the analysis being prepared, it will be helpful to receive information related to the additional subjects which are underlined in the annex.

The Sub-Committee acknowledges that Administrations carrying out trials in accordance with MSC/Circ.566 might not have prepared an analysis or collected data concerning subjects and issues underlined in the annex.

On the other hand, the Sub-Committee has invited Administrations involved in trials to take into consideration if materials already collected might have any relevance to subjects and issues raised.

The analysis of trial results will be conducted at the fortieth session of the NAV Sub-Committee scheduled for September 1994.

ANNEX**OUTLINE OF SUBJECTS AND ISSUES TO BE ADDRESSED
IN THE STW AND NAV SUB-COMMITTEES ANALYSIS OF
THE RESULTS OF THE TRIALS CONDUCTED
IN ACCORDANCE WITH MSC/Circ.566****1 INTRODUCTION****.1 Background:****.2 MSC Terms of Reference:**

The Committee agreed the following terms of reference for the two Sub-Committees (NAV 37/2/5, paragraph 25):

- .2.1** to prepare a comprehensive analysis of the results reports of trial results submitted in accordance with the provisional guidelines, with an assessment of the specific conditions under which the practice of one-man watchkeeping during periods of darkness can and cannot be considered to conform with the principles established in rule 5 of COLREG 72, regulation II/1 of the 1978 STCW Convention and the relevant IMO resolutions;
- .2.2** to identify the factors which were considered critical to safety during the trials;
- .2.3** to assess the extent to which the human factor must be taken into account when a vessel is operating with a one-man bridge watch;
- .2.4** to the extent the sub-committees conclude that the practice of one-man watchkeeping in periods of darkness can be permitted safely, to revise the provisional guidelines as final guidelines in the form of an IMO resolution; and
- .2.5** the STW Sub-Committee in co-operation with the NAV Sub-Committee should prepare draft texts of any amendments to the 1978 STCW Convention which may be considered appropriate and necessary as a result of the evaluation of trial results.

- .3 Purpose of Trials (MSC/Circ.566, annex, paragraphs 1 to 3):
- .3.1 To collect information which will facilitate deliberations by the Organization on the practice of allowing the officer of the navigational watch to act as sole look-out in periods of darkness.
- .3.2 To determine whether and under what conditions the officer of the navigational watch can safely perform the duties of the look-out in periods of darkness.
- .3.3 To evaluate such matters as what constitutes:
- an acceptable bridge layout;
 - an appropriate level of control equipment and instrumentation;
 - safe and healthy operational procedures.

2 FINDINGS (Based on trials results)

.1 Tabulation of Data:

.1.1 Number and type of ships:

Flag	Type	Trade area	Number	Reference
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.1.2 Tonnage of ships participating in trials:

Flag	<1600 grt	1600-10000 grt	10000-25000 grt	>25000 grt
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.1.3 Total watch-hours and nautical miles under trial conditions:

Flag	Total hours	Total NMS	Reference
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.2 Bridge instrumentation and design:

.2.1 Instrumentation

Instruments:	Per cent (%) ships fitted:
- automatic radar plotting aid (ARPA)	
- electronic position-fixing system	
- gyro compass systems	
- automatic steering system	
- speed log system	
- echo sounding system	
- whistle control system	
- internal communication system	
- external communication system	
- watch alarm system with alarm transfer system	
- collision warning system without alarm transfer system	
- collision warning system with alarm transfer system	
- grounding and off-track warning system with alarm transfer system	
- grounding and off-track warning system without alarm transfer system	
- automatic graphic position display	
- appliance for recording VHF calls	
- paging system and means of acknowledgement	
- rasterscan radar display	
- NAVTEX or EGC receiver	
- sound reception system	
- <u>approved for the GMDSS</u>	

.2.2 Bridge design/configuration, indicate also location of GMDSS console, if any, in relation to other instrumentation at the work station:

.2.3 What is the national ship safety authority's (NSSA) view of the scope of bridge design and instrumentation as prescribed by paragraphs 10 to 17 of the provisional guidelines (MSC/Circ.566)?

Response: # of NSSA's:

Too large

Adequate

Too narrow

.3 Bridge Safety and other monitoring systems:

.3.1 Bridge Safety System:

.3.1.1 Percent of ships participating in trials on which initial signal emitted by alarm is:

Light:	Sound:	Both:
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.3.1.2 Maximum Interval between required acknowledgements:

Max. Time lapse	% of ships participating:
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12 minutes

9 minutes

.3.1.3 Minimum Interval between required acknowledgements:

Min. Time lapse	% of ships participating:
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9 minutes

5 minutes

3 minutes

.3.1.4 Period before alarm signal is transferred to other locations on ships:

Period	% of ships participating:
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25 seconds

30 seconds

50 seconds

.3.1.5 Type and location of acknowledgement devices:

Location:	Type:	% of ships participating:
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Reset buttons at shiphandling consoles at the centre and bridge wings.
Activation of ARPA-radars, echo sounder, Voyage Management System and engine manoeuvring consoles will reset the watch alarm.

Reset buttons at the main control console and at the front chart table.
Activation of the two radars will reset the watch alarm.

Location:	Type:	% of ships participating:
Reset buttons at the steering stand and in both bridge wings. Activation of the Voyage Management System, the autopilot and the two radars will reset the alarm.		
Pushbottons at:		
- one-man-navigating and manoeuvring workstation		
- conning position port side		
- chart table		
- technical workstation		
- both bridge wings		
Pushbottons at:		
- one-man-navigating and manoeuvring workstation		
- conning position each port and starboard		
- chart table		
- both bridge wings		
Mushroom-shaped pushbottons at:		
- one-man-navigating and manoeuvring workstation		
- monitoring workstation		
- safety workstation		
- communication workstation		
- conning position port side		
- both bridge wings		

.3 Bridge Safety and other monitoring systems (continued):

.3.1.6 Location on ship where unacknowledged alarm signal is transferred:

Location:	% of ships participating:
- master's quarters	
- back-up navigator's quarters	
- ship's offices	
- messrooms, day rooms, relevant public areas	
- portable device carried by master	
- _____	

.3.1.7 On what percent of the ships participating in the trials would the ship's general alarm automatically be sounded if the transfer alarm is not acknowledged?

.3.1.8 The back-up navigator is expected to arrive on the bridge in how many minutes after the transfer alarm is activated:

Minute(s):

% of ships participating:

.3.2 Other Monitoring Systems:

System:

% of ships participating:

- Collision warning system without alarm transfer
- Collision warning system with alarm transfer
- Grounding and off-track warning system with alarm transfer
- Grounding and off-track warning system without alarm transfer

.3 Bridge Safety and other monitoring systems (continued):

- .3.3 What is the national ship safety authority's (NSSA) view of the scope of the provisions for monitoring systems as prescribed by paragraphs 19-24 of the Provisional Guidelines (MSC/Circ.566)?

Response:

% of NSSA's reporting:

Too large

Adequate

Too narrow

- .3.4 Which other technical equipment or systems have been adopted according to paragraph 32 of the Guidelines?

.4 Watchstanding and back-up arrangements:

- .4.1 How many officers on board during the trials were certificated for serving as officer of the navigational watch?

Number of officers:

% of ships participating:

- .4.2 What watchkeeping schedule was maintained during the trials?

Watchkeeping schedule:

% of ships participating:

4 hrs on/8 hrs off

- hrs on/- hrs off

- .4.3 What watchkeeping system was maintained to ensure proper radio watch was maintained during the trials? (i.e., was a radio operator on watch at any time while the ship was being operated with a single-man bridge watch? What were the communications responsibilities of the officer of the navigational watch?)

- VHF digital selective calling radio
- VHF radiotelephone
+ channel 16 guard
+ channel 13 guard (or other intership navigation channel)
- MF digital selective calling radio
- MF radiotelephone watch on 2.182 kHz
- INMARSAT ship earth station calls
- NAVTEX receiver
- INMARSAT SafetyNET receiver
- HF digital selective calling radio.

.4.4 What back up arrangements were in place during the trials?

Was an individual who was exclusively responsible for radio operations carried on board during the trials?

What additional responsibilities associated with radiocommunications were determined to require the officer of the watch to call for assistance on the bridge (e.g., by an able-bodied seaman to attend the helm)?

Was a radio operator designated by the master as one of the individuals to provide assistance if needed by the officer of the watch?

.4.5 Were independent observers on board the ship during the trials?

.5 Officer of the Navigational Watch:

.5.1 Qualifications, training and experience

.5.1.1 What % of officers participating in the trials held certificates as radio operators?

What % held GMDSS operator certificates?

Certificate % of officers participating in trials:

Master/Chief Mate
1600 grt or more

Master/Chief Mate
200-1600 grt

Officer of Navigational Watch
of ships 200 grt or more

Certificates as radio operators

GMDSS operator certificates

.5.1.2 What % of the individuals participating in the trials as officers of the navigational watch had the following periods of experience as qualified officers of the navigational watch?

Period: % of officers participating in trials:

12-24 months

24-36 months

36-60 months

over 5 years

.5.1.3 What % of the individuals participating in the trials as officers of the navigational watch had the following periods of experience on the particular ship involved in the trials?

Period: % of officers participating in trials:

less than 1 month
1 - 6 months
6 - 12 months
over 1 year

.5.1.4 What special training was provided to individuals who participated in trials as officers of the navigational watch?

.5.1.5 Were individuals who participated in trials as officer of the navigational watch required to be certificated as (GMDSS) radio operators?

.5.1.6 What is the national ship safety authority's (NSSA) view of the scope of the qualifications of the officer of the watch as prescribed by paragraphs 33 to 35 of the provisional guidelines (MSC/Circ.566)?

Response: # of NSSA's:

Too large

Adequate

Too narrow

.5.2 Physical and mental fitness

.6 Operational and environmental conditions:

.6.1 How often was one-man watchkeeping at night terminated for the following reasons:

Reason: Number:

Change in weather
Reduced visibility
Increased traffic density
Danger to navigation
Equipment failure
Illness
Fatigue
Others

- .6.2 What is the national ship safety authority's (NSSA) view of the scope of operational and environmental conditions imposed by paragraph 9 of the provisional guidelines (MSC/Circ.566)?

Response: # of NSSA's:

Too large

Adequate

Too narrow

- .7 General Assessment by Administrations which authorized and monitored trials in accordance with the provisional guidelines (MSC/Circ.566):

3 **ANALYSIS**

- .1 Human Factors Assessment:*

.1 Watch management

Was the officer of the watch, acting as the sole person conducting the bridge watch, always able to give priority to the handling of distress calls, maritime safety information or other information affecting safety of life at sea?

.2 Workstation

Was the workstation specially designed (or was the bridge specially modified) to enable the officer of the watch to perform duties most efficiently? If so, what special consideration were reflected in the design?

.3 Physical activity

Did the bridge layout allow the officer to move easily from place to place on the bridge? Did the officer have to sit for extended periods?

.4 Alarms

Did the bridge safety alarm require acknowledgement in a manner which interfered in any way with the performance of routine watchstanding duties? Was the officer required to move from the workstation to acknowledge the bridge safety alarm? Was the alarm perceived by any watch officer to be a nuisance, or to be professionally demeaning? Did the master consult with the individual watch officers in setting the intervals at which the bridge safety alarm would require acknowledgement?

* REFERENCE: NAV 38/2/3, ANNEX 1, "List of matters for use in examining subject areas which may have human factor implications.

.5 Workload

Was any measurement of workload made during the trials? Were any cognitive factors (such as increase demand for short term memory or higher levels of concentration) assessed during the trials? If so, what measurements or assessments resulted? Was the workload considered to be different in any way from the workload associated with traditional watchstanding assignments? If so, in what ways?

.6 Fitness and self assessment

What specific standards of fitness were applied to the individuals who served as watch officers during trials? For example what eyesight or hearing standards were applicable? Were any tests performed such as a vigilance or mental alertness test? A drug or alcohol test? A psychological profile? Stress test? Was the watch officer asked to perform any vigilance or mental alertness test during the watch? If so, what kind of test was used? Was the officer required to make entries on a bridge procedures check-off list? Was there any other means used to assess the watch officer's ability to know when the workload was about to exceed his or her ability to accomplish all tasks required properly? If so, what means was used?

.7 Watch limitation

Was there any limitation on the maximum continuous period during which an officer of the watch could act as the sole look-out in periods of darkness? If so, what was the reason or basis for this limitation? What other work hour limitations or rest period requirements applied to the individuals who served as watch officers during during trials? Were these officers exempt from any other duties (e.g., in port cargo handling duties, administrative tasks, etc.) for which they would ordinarily be responsible?

.8 Calling for assistance

Was there any attempt to assess the willingness of a watch officer to call for assistance during a trial? If so, what assessment resulted? How did the trial arrangements take into consideration the possibility that a watch officer might be reluctant to 'admit' to a need for assistance as the workload increased, or to reveal an illness or feeling of fatigue?

.9 Automation dependency

Was there any attempt to assess a tendency on the part of watch officers to depend on the automated/integrated system to perform essential tasks, to the neglect of routine watchstanding tasks or duties? Was an effort made to asses the extent to which a watch officer might focus attention on one component of the system to the neglect of other components (e.g., relying on an electronic chart and neglecting the radar)? if such assessments were made, what did they indicate?

.10 Social interaction

Was any assessment made of the effects of isolation during trial operations (i.e., the lack of contacts with other crewmembers or opportunities for conversation)? If so, what assessment resulted?

.11 Back-up arrangements

Were any efforts made to establish precisely how long it would take for the back-up navigator or look-out to arrive on the bridge, adjust to night vision, and assess the situation, when assistance was requested? What were the results of these efforts?

.12 Post-trial Interviews

Were the individuals who participated as watch officers in the trials interviewed to elicit their personal assessment of the experience, including the adequacy of their qualifications and training, the workload, the lack of social intercourse, the bridge layout and instrumentation, etc.? If so, what views were expressed?

.13 Human Factor modifications

Does the Administration recommend any changes to the watchkeeping arrangements or shipboard conditions which existed during the trials now, as a result of any information learned during the trials regarding the limits of effective human performance?

.14 Human Factors specialist

Was a professional human factors specialist involved at any stage of the trial? If so, at what stage? What were the specialist's relevant professional credentials? What role did the specialist play?

.2 Rule 5 of COLREG 72:

.3 Regulation II/1 of the 1978 STCW Convention:

.4 IMO Resolution A.481(XII):

4 CONCLUSIONS AND RECOMMENDATIONS

.1 Factors considered critical to safety:

.2 Revisions of provisional guidelines:

(REFERENCE: NAV 37/WP.3, Annex, "Proposals submitted to NAV and STW for Revising the Provisional Guidelines in MSC/Circ.566).

.3 Amendments to the 1978 STCW Convention:

5 RELATED DOCUMENTS TO BE TAKEN INTO ACCOUNT IN THE STW/NAV ANALYSIS, INCLUDING THE FOLLOWING:

MSC/Circ.566
NAV 37/8 (France)
NAV 37/8/1 (United States)
MSC 59/11/6 (ICFTU)
NAV 38/8 (Germany)
NAV 38/INF.5 (Germany)
STW 24/16 (Denmark)
NAV 39/7 (Germany)
NAV 39/7/2 (Norway)