MARINE INFORMATION NOTE

MIN 445 (M+F)

Maritime and Coastguard Agency

Navigation Safety: Electronic Chart Display and Information System (ECDIS) – Use of ECDIS as Primary Means of Navigation (PMN).

Notice to all Ship Masters, Fishing Vessel Skippers, Masters of Commercially and Privately Operated Yachts and Sail Training Vessels, Shipping Companies, Ship and Fishing Vessel Operators, Recognised Organisations, Nautical Colleges and Third Party ECDIS Training Service Providers, Notified Bodies and ECDIS Equipment Manufacturers.

This MIN should be read in conjunction with MGN 285 and MGN 379. It replaces and cancels MIN 426.
This MIN expires 1 October 2013

Summary

Amendments to Chapter V of SOLAS, in force since 1 January 2011, included mandatory carriage requirement of ECDIS for certain vessels on a rolling time-table commencing 1 July 2012 to 1 July 2018. These amendments also accepted ECDIS, as an alternative to paper charts, to comply with the chart carriage requirement. This notice clarifies the requirements for use of ECDIS as the primary means of navigation.

1. Introduction/ Background

1.1 Chapter V of the Safety of Life at Sea (SOLAS) Convention is given legal effect in UK legislation through the Merchant Shipping (Safety of Navigation) Regulations 2002 (SI 2002 No.1473), as amended.

1.2 Amendments to SOLAS Chapter V, arising from resolutions at IMO Maritime Safety Committee at its 86th session (MSC.282(86)), were adopted on 5 June 2009 and entered in force on 1 January 2011.

2. Revised Carriage Requirements

2.1 Amendments to SOLAS Chapter V, arising from Resolution MSC.282(86), which were adopted on 5 June 2009 and resulted in revisions to Regulation 19.2, are as follows:

Regulation 19 – Carriage requirements for shipborne navigational systems and equipment

In paragraph 2.1, the existing subparagraph .4 is replaced by the following:

".4 nautical charts and nautical publications to plan and display the ship's route for the intended voyage and to plot and monitor positions throughout the voyage. An electronic chart display and information system (ECDIS) is also accepted as meeting the chart carriage requirements of this subparagraph. Ships to which paragraph 2.10 applies shall comply with the carriage requirements for ECDIS detailed therein;"

After the existing paragraph 2.9, the new paragraphs 2.10 and 2.11 are added as follows:

"2.10 Ships engaged on international voyages shall be fitted with an Electronic Chart Display and Information System (ECDIS) as follows:

.1   passenger ships of 500 gross tonnage and upwards constructed on or after 1 July 2012;

.2   tankers of 3,000 gross tonnage and upwards constructed on or after 1 July 2012;

.3   cargo ships, other than tankers, of 10,000 gross tonnage and upwards constructed on or after 1 July 2013;

.4   cargo ships, other than tankers, of 3,000 gross tonnage and upwards but less than 10,000 gross tonnage constructed on or after 1 July 2014;

.5   passenger ships of 500 gross tonnage and upwards constructed before 1 July 2012, not later than the first survey* on or after 1 July 2014;

.6   tankers of 3,000 gross tonnage and upwards constructed before 1 July 2012, not later than the first survey* on or after 1 July 2015;

.7   cargo ships, other than tankers, of 50,000 gross tonnage and upwards constructed before 1 July 2013, not later than the first survey* on or after 1 July 2016;

.8   cargo ships, other than tankers, of 20,000 gross tonnage and upwards but less than 50,000 gross tonnage constructed before 1 July 2013, not later than the first survey* on or after 1 July 2017; and

.9   cargo ships, other than tankers, of 10,000 gross tonnage and upwards but less than 20,000 gross tonnage constructed before 1 July 2013, not later than the first survey* on or after 1 July 2018.

2.11 Administrations may exempt ships from the application of the requirements of paragraph 2.10 when such ships will be taken permanently out of service within two years after the implementation date specified in subparagraphs 2.10.5 to 2.10.9 of paragraph 2.10."

*Refer to the unified interpretation of the term "first survey" as stated in SOLAS regulations.(MSC.1/Circ.1290).

2.2   Paragraph 13.8.2 of High-speed craft (HSC) Code, 2000, as amended, details the SOLAS carriage requirements for HSC, which   shall be fitted with an ECDIS as follows:
– *craft constructed on or after 1 July 2008;*
– *craft constructed before 1 July 2008, not later than 1 July 2010.*

3. General Principles of ECDIS usage as Primary Means of Navigation

An ECDIS, to comply with the SOLAS carriage requirement, Ch V Regulation 19.2.1.4, is acceptable only if:
– *the equipment is type approved, as stated in paragraph 5.3.2;*
– *it is using official Electronic Navigational Charts (ENC) or, with certain conditions being satisfied as in paragraph 5.5, is using official Raster Navigational Charts (RNC);*
– *the navigating officers are qualified and competent in its use;*
– *the carriage and use of the equipment as primary means of navigation is correctly annotated in the Record of Equipment;*
– *the ship's safety management system (SMS) includes relevant requirements and procedures associated with the carriage and operational use of the ECDIS; and*
– *it is capable of displaying the current version of the International Hydrograhic Organization(IHO) Presentation Library for ECDIS, as stated in section 7.1.*

4. Record of Equipment

4.1   For a UK registered vessel using ECDIS as PMN, whether as mandatory or voluntary carriage, the "Record of Equipment" (RoE) attached to the relevant safety certificate under SOLAS (*e.g. Passenger Ship Safety Certificate - Form P; Cargo Ship Safety Equipment Certificate - Form E; Cargo Ship Safety Certificate - Form C*) needs to indicate this provision. In addition, the RoE must also clearly state the back-up arrangement in place. For existing vessels which are adopting the ECDIS as PMN in place of paper charts, the current RoE may need to be suitably amended to reflect the above changes.

5. Adequate Back-up

5.1   MCA considers that the following will meet the adequate back-up requirements for ECDIS:
i) an independent, fully compliant second ECDIS unit, connected to ship's main and emergency power supplies; or
ii) an appropriate folio of paper nautical charts (APC) (as stated in SOLAS Ch V, Reg. 19.2.1.5 footnote).

5.2   It is important that adequate independent back-up arrangements are provided to ensure safe navigation in case of ECDIS failure. Such arrangements include facilities enabling a safe take-over of the ECDIS functions in order to ensure that an ECDIS failure does not result in a hazardous situation. The ship's safety management system (SMS) must recognise and suitably account for this.

5.3   The back-up ECDIS must, therefore, be loaded with relevant official charts and the voyage plan before commencement of the voyage. Similarly, if APC is being used as the back-up, it must be readily available and the voyage plan must be indicated on the charts. The back-up arrangement must be ready for immediate use, particularly when in confined waters.

6. Compliant ECDIS

6.1 Each ECDIS, main unit and back-up if applicable, must be type approved to Marine Equipment Directive (MED) Wheelmark standards which cover requirements of applicable IMO performance standards, as explained below. MSN 1734 and 1735 (as amended) provide details of the type approval requirements and notified bodies.

6.2 The performance standards for ECDIS have been revised and updated since their inception in November 1995. As a result, depending on the date of installation, ECDIS units are required to comply with one of the two IMO performance standards:

    i) ECDIS equipment installed on or after 1st January 2009 must comply with the current revised performance standards for ECDIS (IMO Resolution MSC.232(82));

    ii) ECDIS equipment installed on or after 1st January 1996 but before 1st January 2009 may comply with the older performance standards (IMO Resolution A.817(19), as amended by IMO Resolution MSC.86(70)). However, such equipment may not be able to display all the contents of an ENC in accordance with the current IHO Presentation Library, as explained in paragraph 7.

6.3 ECDIS equipment installed before 1st January 1996 may not comply with any of the above IMO performance standards and, therefore, may not be considered an IMO-compliant ECDIS.

6.4 The ship's navigating officers must have completed suitable programmes of ECDIS generic and ship-specific equipment familiarisation training before being allowed to keep navigation watch on these vessels. The Master of the vessel should be able to produce suitable evidence to prove this. **MIN 442** (Training for ECDIS as Primary Means of Navigation) provides details of these training requirements. The MIN also stipulates UK flagged ships' Minimum Safe Manning Document requirements related to the ECDIS competence of the navigating officers.

7. ECDIS – Modes of Operation

7.1 Although the primary mode of operation of ECDIS requires the use of official Electronic Navigational Charts (ENC), under certain circumstances where ENCs are not available the ECDIS International Maritime Organisation (IMO) performance standards allow the use of official Raster Navigational Charts (RNC). ECDIS may be capable of operating with both ENCs and RNCs. However, when used in the Raster Chart Display System (RCDS) mode, the performance standards stipulate that the system has to be used "in conjunction with an appropriate folio of up-to-date paper charts" (APC).

7.2 The appropriate folio of paper charts (APC) should contain full coverage of charts of a "general" scale of the planned route or full coverage at "overview" scale where "general" scale coverage does not exist. Full coverage at "coastal" scale should also be carried for sections of the planned route that include waters that are intricate or congested or where navigation is constrained (e.g. areas containing Traffic Separation Schemes). Larger scale charts should be carried where these are deemed by the Master of the vessel to be necessary to ensure safe navigation. The definition of APC is provided in detail within Appendix 7 of Resolution MSC 232(82), The Revised Performance Standards for ECDIS.

7.3　In addition to the carriage of paper charts as stated above, MCA requires a suitable risk-assessment to be carried out prior to using ECDIS in RCDS mode. **MGN 285** (Electronic Charts – The Use of Risk Assessment Methodology When Operating ECDIS in the Raster Chart Display System (RCDS) Mode) provides more guidance on this.

8. ECDIS – Apparent Anomalies

8.1　In 2010 it was discovered that some models of some ECDIS equipment might not, under certain circumstances, display all navigationally significant features or activate appropriate alarms. That led to an investigation of some other models of ECDIS equipment which showed similar but not identical anomalies.

8.2　The issue of ECDIS anomalies was progressively raised internationally for remedial action to these potential navigational problems and, in July 2012, IMO issued its most recent safety of navigation circular, SN.1/Circ. 312 – "Operating Anomalies Identified Within ECDIS". This provides guidance and work-arounds to address the following:
- the potential for some ECDIS to exhibit display and alarm-behaviour anomalies;
- the characteristics of these anomalies;
- the list of the currently identified anomalies and related advice;
- the existence and use of the International Hydrographic Organization (IHO) Data Presentation and Performance Check (DPPC) dataset and to ensure that all installed ECDIS and training equipment is checked; and
- application of guidance in MSC.1/Circ.1391 dated 7 December 2010, in particular to encourage vessels using ECDIS to report anomalies with sufficient detail on the equipment and ENCs to allow analysis.

See the text of SN.1/Circ. 312 at Annex 1.

8.3　Mariners using ECDIS are reminded not to rely solely on automated voyage planning and monitoring checks and alarms. Some ECDIS appear only to undertake route check functions on larger scale ENCs and therefore alarms might not activate. This may not be clearly indicated on the ECDIS display. Mariners should always undertake careful visual inspection of the entire planned route using the 'Other / All' display mode to confirm that it, and any deviations from it, is clear of dangers. The single most effective tool that can be used by the ship operating company to establish that their ECDIS are operating correctly is the application of the IHO DPPC as mentioned above, and see especially Annex 2. While this MIN cancels the earlier MIN 426 which detailed the IHO guidelines, it is important that ships and operating companies continue to report test results to the IHO and to the MCA.

9. Maintenance of ECDIS Software

9.1　The IHO ECDIS Standard S-52, Specifications for Chart Content and Display Aspects of ECDIS and its Annex A, the IHO Presentation Library (PL) for ECDIS comprise a set of specifications, plus a symbol library, colour tables, look-up tables and symbolization rules, which link every object class and attribute of the ECDIS internal data base (SENC) to the appropriate presentation of the ECDIS display. The PL provides details and procedures for implementing the display specifications contained in S-52 by decoding and symbolising the elements of the SENC.

9.2　An ECDIS that is not updated to the latest version of IHO standards may not meet the chart carriage requirement as set out in SOLAS Regulation V/19.2.1.4. IMO has issued suitable guidelines in a Safety of Navigation circular, SN.1/Circ.266/Rev.1 on the need to maintain ECDIS software. ECDIS installed prior to January 2009, may not be able to display all the features of the current IHO Presentation Library (S-52 Appendix 2,

The following link provides a list of the latest IHO standards that apply to ECDIS equipment: www.iho.int/mtg_docs/enc/ECDIS-ENC_StdsIn_Force.htm

9.3   The manufacturers of ECDIS equipment have agreed to publish information on the latest versions of the software used to operate their equipment, in order to help clarify certain anomalies that had been identified with some older systems.

The information will be posted on the website of the International Hydrographic Organization (IHO), and will include links to enable ships to download the latest versions of the operating software, if necessary.

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More Information

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Safer Lives, Safer Ships, Cleaner Seas

IMO Safety of Navigation Circular, July 2012

SN.1/Circ.312 - OPERATING ANOMALIES IDENTIFIED WITHIN ECDIS

Introduction

1. The following information and guidance is provided to assist all those involved in the use of ECDIS.

ECDIS anomalies

2. A number of ECDIS operating anomalies have been identified. Due to the complex nature of ECDIS, and in particular because it involves a mix of hardware, software and data, it is possible that further anomalies may exist.

3. These anomalies are particularly apparent in ECDIS units that have been built and type-approved to ECDIS Performance Standards (resolution A.817(19), as amended), (i.e. before 2009). However, ECDIS units type-approved to the revised ECDIS Performance Standards (resolution MSC.232(82)) are still vulnerable to the limitations in appendix, item 5(a).

4. An ECDIS anomaly is an unexpected or unintended behaviour of an ECDIS unit which may affect the use of the equipment or navigational decisions made by the user.

5. Examples include, but are not limited to:

    • failure to display a navigational feature correctly, such as:

        –   navigation areas recently recognized by IMO such as PSSA (Particularly Sensitive Sea Area) and ASL (Archipelagic Sea Lanes);
        –   lights with complex characteristics; and
        –   underwater features and isolated dangers;
        –   failure to detect objects by "route checking" in voyage planning mode;
        –   failure to alarm correctly; and
        –   failure to manage a number of alarms correctly.

6. The existence of such anomalies highlights the importance of maintaining ECDIS software to ensure that operational capability and reliability are maintained in accordance with SN.1/Circ.266/Rev.1. It is recommended that appropriate checks are made with the equipment manufacturer. This is of particular importance where ECDIS is the only source of chart information available.

7. A list of the known anomalies with advice, and information on whether or not the DPPC dataset checks for each anomaly, is in the appendix.

IHO ECDIS Data Presentation and Performance Check (DPPC) dataset

IHO has produced an ECDIS DPPC dataset that allows mariners to check some important aspects of the operation of their ECDIS. This dataset contains two fictitious ENC cells which navigating officers can load into their ECDIS units to assess operating performance and to determine whether there may be any display anomalies that either need to be remedied or otherwise managed in the way that the ECDIS is operated. If the check highlights a problem, the accompanying guidance notes with the check dataset offer suggested courses of action. The check dataset and accompanying instructions can be obtained from ENC service providers, or can be downloaded from the IHO website at:
http://www.iho.int/srv1/index.php?option=com_content&view=article&id=585:news&catid=166:1news-links&Itemid=828

Appendix

LIST OF ECDIS APPARENT OPERATING AND DISPLAY ANOMALIES (NOT IN PRIORITY ORDER)

In the following list, items 1, 2, 3, 4, 5(b), 6, 7, and 11 are checked by the IHO DPPC dataset dated November 2011:

1. Inability to correctly display symbols for recently-approved IMO features such as ASLs or PSSAs (SN.1/Circ.266/Rev.1 refers) – ECDIS equipment that does not have the latest version of the IHO Presentation Library installed will, instead of displaying the correct symbol, either show question marks (?) or nothing at all. In some cases the ECDIS may fail to load an ENC that includes such data. An ECDIS retains its type approval certificate regardless of the version of the Presentation Library installed.

Workaround – interrogate any "?" symbol displayed using the "pick report" or refer to paper charts and/or publications.

2. Incorrect display of foul areas and obstructions in some ECDIS equipment – some ECDIS models do not show some underwater features in Standard display mode as expected (however they do activate appropriate alarms). These features are only displayed when the "All" or "Other" display mode is used. Also in some cases different symbols are used to depict these features.

Workaround – use Mode "All" or "Other".

3. On some occasions some stranded/dangerous wrecks and obstructions may not display in any mode; it is believed that this is limited to some ECDIS versions from a single manufacturer who has now produced a software amendment to resolve the problem.

Workaround – use paper charts.

4. An object that falls on a contour line may fail to display in "Standard" Mode in some ECDIS equipment.

Workaround – use Mode "All" or "Other".

5. Small (point) land areas, especially those depicted only on small scale (usage band 1 and 2) ENCs may not always be clearly displayed and do not always activate alarms in route planning or route monitoring modes in some ECDIS equipment:
   (a) it is possible for small land features to be obscured by other chart detail such as names or contour labels; and
   (b) some ECDIS equipment may not conduct route checks on small scale ENCs and may not therefore provide an appropriate warning. Where this is the case the land area may not be detected by the "look-ahead" function during route monitoring.

Workaround – careful manual inspection of the largest scale ENC available.

Due to the limitations of ECDIS referred to in 5(a) above, mariners (even those using the most modern systems) should always undertake careful visual inspection of the entire planned route using the "Other/All" display mode to confirm that it, and any deviations from it, are clear of dangers.

6. Incorrect display of the coloured arcs of light sectors – some ECDIS may not display the coloured arcs of complex lights as intended. This is especially prevalent where the sectors straddle 0/360deg (North).

Workaround – use "pick report" function to check light sectors.

7. Some early models of ECDIS are unable to display correctly time-variable data encoded in ENCs. For example features with Date Start and Date End attributes used for the implementation of new Traffic Routeing measures in ENCs may not be depicted correctly; the result being that both old and new instances are displayed simultaneously. Tests for this were not included in IEC61174 Ed1.

Workaround – use "pick report" function to determine Start/End date/time.

8. Tidal stream data not available in usable form – some early models of ECDIS only provide a comma-separated list of values which is difficult to interpret and use.

Workaround – use Tidal Stream Atlases external to ECDIS.

9. Display of anchorage, berth and channel names may not be easily visible to the mariner and the radius of a maximum swinging circle may not be shown.

Workaround – use "All" or "Other" display mode and "pick report" function to obtain swinging circle information; VTS/Port Authority communications will be able to clarify any necessary names.

10. Three hundred and sixty degree landfall lights not always prominent in comparison to shorter range sector lights.

Workaround – mariners to be aware – use "pick report" to verify light characteristic.

11. ENCs may include certain shoal soundings, especially reported depths, which have been encoded in such a way that they do not display in "Standard" Mode and might not activate an alarm even where the depth is less than the safety contour setting. Most Hydrographic Offices have reported to the IHO that they have updated the relevant ENCs to ensure that significant depths are displayed in Standard Mode.

Workaround – operate in a display Mode where all soundings are shown.

12. Areas of foul ground that have no known depth value may be depicted in some ECDIS as isolated dangers and shown in "Standard" mode; this can result in unnecessary screen clutter.

Workaround – no workaround for clutter problem, mariners to be aware and use "pick report" function to determine if the feature is a danger.

13. Where ECDIS includes an option to show isolated dangers in waters shoaler than the safety contour value the symbology used may vary between manufacturers.

Workaround – mariners to be aware and to use "All" or "Other" Mode when operating in such areas.

14. Screen clutter can be a problem when displaying smaller scale ENCs for areas where larger scale coverage is also loaded in ECDIS. This can be more apparent when the user zooms out. This is due to a combination of each manufacturer's ENC loading strategy and the individual ENC producer's encoding policy. Where HOs use SCAMIN (scale minimum) attributes on chart features then this problem is minimized. The intention of the IHO standard is that ECDIS should not display ENC data which has a compilation scale significantly different from the display scale in use. Improvements could be made, in future, by adopting a standardized ENC loading strategy based on a scale range defined within the ENC.

Workaround – the situation can be improved through use of the standard display mode during voyage monitoring and appropriate (but not over) use of the zoom function. This technique has been included in the IMO 1-27 Model Course syllabus.

15. In some ECDIS equipment the text for some notes in the ENC may be truncated or not displayed at all, and therefore is not available to the mariner.

Workaround – no workaround available; mariners should advise ENC service providers where they observe this problem.

16. Unnecessary alarms and indications – feedback from mariners shows that ECDIS can produce excessive and distracting alarms. This is due to a combination of the interpretation of the requirements of the ECDIS Performance Standards and the ENC encoding. Some control over the number of alarms and indications is available to the mariner in ECDIS built to the revised Performance Standards (resolution MSC.232(82)) but this is not always recognized.

Workaround – the methods available to minimize alarms are included in the IMO 1-27 Model Course syllabus.

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ECDIS presentation check data set

1. The presentation and performance check data set was issued by the IHO and distributed by ENC service providers in October and November 2011. The IHO letter, data check instructions and reporting method, and some background information, are at :

> Letter to Ship Masters, Owners and Operators
> http://www.iho.int/iho_pubs/ECDIS/ECDIS_check-Accompanying_letter.pdf
>
> Instructions for completing the check
> http://www.iho.int/iho_pubs/ECDIS/ECDIS_check-Instructions_for_Mariners.pdf
>
> Reporting the results of the check
> http://www.iho.int/iho_pubs/ECDIS/ECDIS_check-Reporting_form.pdf
>
> Background information
> http://www.iho.int/iho_pubs/ECDIS/ECDIS_check-Background_paper.pdf
>
> The check data set itself is available at:-
> http://www.iho.int/iho_pubs/ECDIS/ENC_CheckData.zip

1.1   The check data distribution was heralded by a letter sent from the MCA to UK and British fleet ship operating companies through the UK Ship Register and Red Ensign Group e-mail distribution system.

1.2   The global results to date haven't been encouraging – just over 900 responses have been received world-wide. The report data findings are, understandably, being carefully controlled by the IHO because of their sensitive nature and so it is not possible to determine what proportion of UK and British ships have complied with the check data test. The MCA, however, needs more assurance about the degree to which UK and British ships have applied the test, therefore addressees should report the completion of the tests and the test results.

2. Reporting the presentation and performance check data test results

2.1   As soon as practicable, addressees should:

> a.   obtain the IHO presentation and performance check data test;
> b.   ensure that the test is applied on board ship and ashore as appropriate;
> c.   report the result of the test to the IHO (see section 1 above); and
> d.   inform the MCA of the results of the tests (see section 2.3 below).

2.2   The IHO will be responsible for the confidentiality and commercial sensitivity of the data.

2.3   The MCA needs to know:

> a.   Whether the ECDIS fitted is in use as a situational awareness aid (SA) or is being used as the primary means of navigation (PMN) (each ECDIS fitted should be included), or is used ashore (A); and
> b.   Whether or not each ECDIS has been subject to the presentation and performance check data set test, and, in each case, whether the results have been reported to the IHO.

For 2.3(b) above, the following codes should be used:

Z   Check data set not received on board;
Y   Check data set received on board but not trusted and not applied;
X   Check data set received on board but would not work in ECDIS;
W   Check data set received on board but other reasons prevented its application (e.g. lack of time);
V   Check data set applied and worked, results reported;
U   Check data set applied and worked, results not reported: Reason for not Reporting:
        (a) Company policy;
        (b) communications difficulty;
        (c) forgot to submit report.

This should be reported in the following format to the email address: ECDISreport@mcga.gov.uk

Company	Ship's name	*SA or PMN or A	Tested	Reported to IHO
Ocean Ships Ltd	MV SAUSY SUE	ECDIS 1 PMN	Yes	No U(a)
		ECDIS 2 PMN	Yes	No U(a)
Ocean Passages Ltd	MV RANGER X	ECDIS 1 SA	No Z	No
Ocean Seas Ltd	MV TELEGRAPH	ECDIS 1 PMN	No Y	No
Ocean Stream Ltd	MV TRICKLE	ECDIS 1 PMN	No X	No
ACME Training Inc	Simulator Number 2	ECDIS 1 A	Yes	Yes

3   Reporting on apparent anomalies

3.1   Although MIN 426 is hereby cancelled, IMO MSC.1/Circ.1391 on "Operating Anomalies Identified with ECDIS" is still extant. Accordingly if ECDIS users discover anomalies other than those demonstrated by the check data set, they should continue to report the following details to the MCA using the email address - ECDISreport@mcga.gov.uk:

a. ECDIS: Manufacturer, model name/type, serial number (if available), software version;
b. ENC: Issue (e.g. UKHO), cell name (e.g. GB40282A), edition number and latest update number applied;
c. Date-time group (local);
d. Description of anomaly, including location (in lat/long or otherwise), screen shots (if possible);
e. Details of system settings at time of use including display mode and display scale, ideally shown as screen shots; and
f. Rectifying action (if any).

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