



## CERTIFICATE OF TYPE APPROVAL

(EC Certificate of Type Examination - Module B)

(Marine Equipment Directive - 96/98/EC, as amended\*1)

**Applicant:-**  
Kelvin Hughes Ltd  
New North Road, Hainault  
Ilford, Essex IG6 2UR  
United Kingdom

**Manufacturer:-**  
Kelvin Hughes Ltd  
New North Road, Hainault  
Ilford, Essex IG6 2UR  
United Kingdom

This is to certify that the applicant has submitted details of a:-

**Shipborne Radar Equipment (IEC 62388 Category 2H)**

(COMMISSION DIRECTIVE 2008/67/EC – ITEM A.1/4.38) \*2

(ALSO COMMISSION DIRECTIVE 2008/67/EC – ITEM A.1/4.45)

Of system types known and designated as:-

a) **SharpEye™, MantaDigital™ (Cat 2) S Band Marine HSC Radar System**

b) **SharpEye™, MantaDigital™ (Cat 2) S Band Marine HSC Chart Radar System**

(Comprising component parts and having technical characteristics shown in shedule 2 to 5)

and that these have been assessed, tested and when used in a combination of component parts as described in the attached schedules, is CERTIFIED as complying with the relevant parts of:

**IEC 62388 : 2007, "Marine Shipborne Radar Equipment" \*2**

**IEC 60945 : 2002, "General Requirements for Marine Navigation Equipment"**

(being Standards for Technical Characteristics and Methods of measurements published by the International Electrotechnical Commission).

It is also RECOGNISED that the equipment conforms to performance standards not inferior to those adopted by the International Maritime Organisation, and which are contained in the relevant parts of Resolution MSC.192(79), Resolution A820(19) and Resolution A694(17).

**\*2 See Statement Re. MED Item No., IEC 62388:2007 and IMO Resolution MSC.192(79) on page 2**

This standard and IMO Resolution is not yet recognised in the Annexes of the Marine Equipment Directive but has replaced the old standards as detailed in the statement.

**SIGNED:**

**R Sharp**

**Authorised Signatory**

**DATE of ISSUE:**

**12<sup>th</sup> March 2009**

**DATE of EXPIRY :**

**16<sup>th</sup> September 2010**

**Interim Certificate Number: QQ-MED-16/08-08Ri**

**This Certificate is Valid until expiry date shown, subject to the standard conditions of issue printed on the attached schedule Kelvin Hughes Ltd are Module D registered with QinetiQ in accord with standard condition 3, ref; Certificate DQAS-06/01-KH001R3.**

QinetiQ  
Cody Technology Park  
Ively Road, Farnborough  
Hampshire. GU14 0LX



Maritime and Coastguard Agency  
The MCA is an Executive Agency of  
the Department for Transport

*Under the terms of the United Kingdom Statutory Instrument, No 1957 : 1999, QinetiQ Ltd has been Notified to the European Commission by the Maritime and Coastguard Agency as a Body authorised to conduct Conformity Assessment procedures under the provisions of the European Council Directive 96/98/EC (as amended) on Marine Equipment and issue Certificates of Type Approval.*

## Schedule 1

### Statement on New “Radar Systems” Standard IEC 62388

The International Maritime Organisation (IMO) adopted RESOLUTION MSC.192(79) on 6 December 2004 On the REVISED PERFORMANCE STANDARDS FOR RADAR EQUIPMENT. These standards are mandated to be implemented on or after 1<sup>st</sup> July 2008.

The Scope recognised that radar should provide the integration and display of radar video, target tracking information, positional data derived from own ships position (EPFS) and geo referenced data. The integration and display of AIS information should be provided to complement radar. The capability of displaying selected parts of Electronic Navigation Charts and other vector chart information may be provided to aid navigation and for position monitoring.

Contained within MSC.192(79) were details of the Differences in the performance requirements for various sizes/categories of ship/craft to which SOLAS applies, these were contained in TABLE 1.

Size of ship/craft	Cat 3	Cat 2	Cat 1
	<500 gt	500 gt to <10,000 gt and HSC<10,000 gt	All ships/craft ≥10,000 gt
Minimum operational display area diameter	180mm Dia.	250mm Dia	320mm Dia
Minimum display area	195 x 195 mm	270 x 270 mm	340 x 340 mm
Auto acquisition of targets	-	-	Yes
Minimum <i>acquired</i> radar target capacity	20	30	40
Minimum <i>activated</i> AIS target capacity	20	30	40
Minimum <i>sleeping</i> AIS target capacity	100	150	200
Trial Manoeuvre	-	-	Yes

In addition radar equipment can optionally conform to two other sets of performance criteria for High Speed Craft and/or for electronic chart display.

IMO resolution MSC.192(79) performance standard was taken by the International Electrotechnical Standards Organisation (IEC) and turned into the International Standard IEC 62388, first edition 2008.

IEC 62388 replaces 7 other standards that covered the various aspects of radar performance; these were IEC 60936-1, IEC 60936-2, IEC 60936-3, IEC 60936-5, IEC 60872-1, IEC 60872-1, IEC 60872-2 and IEC 60872-3.

The Marine Equipment Directive (96/98/EC) details the European procedure for conformity assessment and approval for the range of IMO mandated marine equipment. The particular requirements for each equipment item is listed and the test requirement is detailed in the Equipment Annexes, Current version being contained in the 4<sup>th</sup> amending Directive 2008/67/EC published in the Official Journal L171 dated 1<sup>st</sup> July 2008.

The draft 4<sup>th</sup> Amendment of the MED however does not refer to the revised IMO PS, MSC.192(79) or the new IEC 62388 technical standard. However, in accordance with Amending Directive 2002/84/EC, that International Instruments and testing standards shall be used “in their up-to-date version” this certificate is issued following successful testing and assessment to IEC 62388.

The current MED Annex A.1 equipment list still details the 7 replaced IEC standards against the 6 radar items and so this **statement** also details how QinetiQ will allocate the appropriate categories against MED equipment items for radar systems tested to IEC 62388.

MED Item.	Description	IEC 62388 Category	Radar Display area
A.1/4.34	Radar with ARPA	Cat 1	320mm Dia.
A.1/4.35	Radar with ATA	Cat 2 or Cat 3	250 or 180mm Dia.
A.1/4.36	Radar with EPA	Not Used. (EPA no longer recognised)	
A.1/4.37	HSC with ARPA	Cat 1H	320mm Dia.
A.1/4.38	HSC Radar with ATA	Cat 2H	250mm Dia.
A.1/4.45	Chart Radar	Not Used individually: Suffix 'C' added to any above	

IEC 62388 was also written to include all the appropriate Presentation criteria and performance standards for a shipborne navigation displays as detailed in IMO Resolution MSC.191(79) and therefore any radar compliant with IEC 62388 is also deemed to have presentation standards compliant with Resolution MSC.191(79).

Because no multilateral arrangements are currently agreed for arrangements to cover certification of MSC.192(79) or IEC 62388 standards, QinetiQ is issuing such certificates as detailed above for a two year interim validity period.

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## Schedule 2a –Category 2H Radar SharpEye™, MantaDigital™ Displays & HSC Radar Processor

The applicant declared that the following units form the radar processing and display section of the system designations a) given on Page 1. These units have been assessed & tested, and satisfactory details of these units were included in the technical file. These units form a system consistent with the Item Description A1/4.38, given in Annex A1 of Commission Directive 2008/67/EC and Category 2H of MSC.192(79) and IEC 62388.

SYSTEM comprising of:-

MantaDigital™ 20" Display & Radar Processor (Pedestal Unit including Trackerball)	<b>MDD-A1-20</b>	<b>*1</b>
or MantaDigital™ 20" Desktop Display (including Trackerball)	<b>MDD-A30-20</b>	<b>*1</b>
and MantaDigital™ Radar Processor	<b>MDP-A1</b>	
or MantaDigital™ 20" Console Display	<b>MDD-A20-20</b>	<b>*2</b>
and MantaDigital™ Radar Processor	<b>MDP-A1</b>	
and MantaDigital™ Remote Trackerball	<b>MDD-A110</b>	<b>*2</b>
<b>SOFTWARE:-</b>		
MantaDigital™ Core Software (ZM-2144)	<b>Version 1.xx</b>	<b>*3</b>
Manta Transmitter interface Firmware (ZM-2114)	<b>Version 1.xx</b>	<b>*3</b>
Manta Transmitter interface FPGA (ZM-2160)	<b>Version 1.xx</b>	<b>*3</b>
Manta Display interface Firmware (ZM-2007)	<b>Version 1.xx</b>	<b>*3</b>
Manta Systems interface Firmware (ZM-2008)	<b>Version 1.xx</b>	<b>*3</b>

----- End of List -----

And which may include an item or combination of items from the list of optional items found in schedule 4 on Page 6.

\* NOTES:-

- The Trackerball unit integrated into the control area of this unit may be replaced with one of the other control options listed in schedule 4.
- These units are separately supplied for integrating into a ships bridge console. The Trackerball (MDD-A110) may be replaced with any of the control options listed in schedule 4.
- This approval remains valid for equipment including subsequent Minor software amendments, as allowed by the N.xx format (xx represents numerals), where written details of any such modifications have been submitted to and accepted by QinetiQ.

### Technical Characteristics

RADAR DISPLAY CIRCLE	≥250mm	Effective Diameter
RADAR TARGET CAPACITY <b>ACQUIRED</b>	100 targets	30 minimum for Cat 2
AUTO ACQUISITION OF TARGETS	Yes	Optional for Cat 2
TRIAL MANOEUVRE	Yes	Optional for Cat 2
AIS TARGET CAPACITY <b>ACTIVATED SLEEPING</b>	Up to 500 AIS targets max may be any mix of Activated or Sleeping	Minimum for Cat 2 of 30 Activated Targets and 150 Sleeping Targets is exceeded.
IEC 61162-1 SERIAL (NMEA) PORTS	Listener - 8 Talker - 8	Conformity to IEC 61162-1:2000. Configurable to IEC 61162-2 for AIS port.
TEMPERATURE RANGE Protected & IEC 60945 CLASS.	-15°C to +55°C	All units
POWER SOURCE	110 or 220V- AC, 50/60Hz	Can be configured to use external UPS

**Conditions of Issue of this certificate are printed on Page 8.**

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## Schedule 2b –Category 2HC Radar SharpEye™, MantaDigital™ Displays & HSC Chart Radar Processor

The applicant declared that the following units form the radar processing and display section of the system designations b) given on Page 1. These units have been assessed & tested, and satisfactory details of these units were included in the technical file. These units form a system consistent with the Item Description A1/4.38 and A.1/4.45, given in Annex A1 of Commission Directive 2008/67/EC and Category 2HC of MSC.192(79) and IEC 62388.

SYSTEM comprising of:-

MantaDigital™ 20" Display & Chart Radar Processor (Pedestal Unit including Trackerball)	<b>MDD-A9-20</b>	<b>*1</b>
or MantaDigital™ 20" Desktop Display (including Trackerball)	<b>MDD-A30-20</b>	<b>*1</b>
and MantaDigital™ Chart Radar Processor	<b>MDP-A9</b>	
or MantaDigital™ 20" Console Display	<b>MDD-A20-20</b>	<b>*2</b>
and MantaDigital™ Chart Radar Processor	<b>MDP-A9</b>	
and MantaDigital™ Remote Trackerball	<b>MDD-A110</b>	<b>*2</b>
SOFTWARE:-		
MantaDigital™ Core Software (ZM-2144)	<b>Version 1.xx</b>	<b>*3</b>
Manta Transmitter interface Firmware (ZM-2114)	<b>Version 1.xx</b>	<b>*3</b>
Manta Transmitter interface FPGA (ZM-2160)	<b>Version 1.xx</b>	<b>*3</b>
Manta Display interface Firmware (ZM-2007)	<b>Version 1.xx</b>	<b>*3</b>
Manta Systems interface Firmware (ZM-2008)	<b>Version 1.xx</b>	<b>*3</b>

----- End of List -----

And which may include an item or combination of items from the list of optional items found in schedule 4 on Page 6.

\* NOTES:-

- 1 The Trackerball unit integrated into the control area of this unit may be replaced with one of the other control options listed in schedule 4.
- 2 These units are separately supplied for integrating into a ships bridge console. The Trackerball (MDD-A110) may be replaced with any of the control options listed in schedule 4.
- 3 This approval remains valid for equipment including subsequent Minor software amendments, as allowed by the N.xx format (xx represents numerals), where written details of any such modifications have been submitted to and accepted by QinetiQ.

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### Technical Characteristics

RADAR DISPLAY CIRCLE	≥250mm	Effective Diameter
RADAR TARGET CAPACITY <b>ACQUIRED</b>	100 targets	30 minimum for Cat 2
AUTO ACQUISITION OF TARGETS	Yes	Optional for Cat 2
TRIAL MANOEUVRE	Yes	Optional for Cat 2
AIS TARGET CAPACITY <b>ACTIVATED SLEEPING</b>	Up to 500 AIS targets max may be any mix of Activated or Sleeping	Minimum for Cat 2 of 30 Activated Targets and 150 Sleeping Targets is exceeded.
IEC 61162-1 SERIAL (NMEA) PORTS	Listener - 8 Talker - 8	Conformity to IEC 61162-1:2000. Configurable to IEC 61162-2 for AIS port.
TEMPERATURE RANGE Protected & IEC 60945 CLASS.	-15°C to +55°C	All units
POWER SOURCE	110 or 220V- AC, 50/60Hz	Can be configured to use external UPS

**Conditions of Issue of this certificate are printed on Page 8.**

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Certificate Number **QQ-MED-16/08-08Ri**

## Schedule 3 –Category 2H & 2HC Radar Transceivers SharpEye™, MantaDigital™ HSC Radar & HSC Chart Radar Systems

The applicant declared that the following units form the radar Transceiver section of the system designations given on Page 1. The resulting system has been assessed & tested, and satisfactory details of these units were included in the technical file.  
These units form systems consistent with the Item Description A1/4.38 and A.1/4.45, given in Annex A1 of Commission Directive 2008/67/EC and Category 2H and 2HC of MSC.192(79) and IEC 62388.

**S-BAND TRANSCIVERS:-**

SharpEye™ S-Band Transceiver & Turning Unit  
and Drive control unit  
3.9m, S Band Low Profile antenna

**DTX-A1**                   \*1  
**GTX-A24**               \*1  
**LPA-A3**

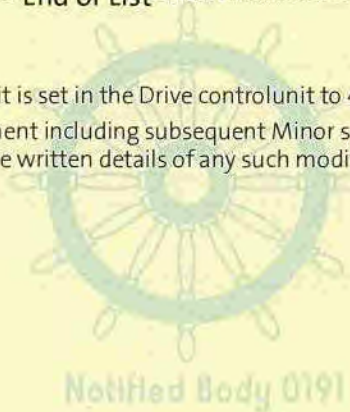
**SOFTWARE:-**       SharpEye™ Core Software (ZM-2165)  
                          SharpEye™ FPGA (ZM-2166)

**Version 1.xx**           \*2  
**Version 1.xx**           \*2

----- End of List -----

**\* NOTES:-**

- 1 The rotational speed of the turning unit is set in the Drive control unit to 46RPM for high speed craft.
- 2 This approval remains valid for equipment including subsequent Minor software amendments, as allowed by the N.xx format (xx represents numerals), where written details of any such modifications have been submitted to and accepted by QinetiQ.



**Technical Characteristics**

FREQUENCY OF OPERATION	2.93 to 3.07 GHz	20MHz instantaneous bandwidth
PULSE REPETITION FREQUENCY	610Hz,1220Hz	
PULSE LENGTHS	0.1µs, 0.2µs, 0.4µs, 0.8µs	Pulse compression and coherent pulse Doppler
EMISSION CODE	20M0F3NAN	Solid State Transmitter
POWER CHARACTERISTIC	170W	(PEP)
TEMPERATURE RANGE & IEC 60945 CLASS	Exposed -25°C to +70°C Protected -15°C to +55°C.	-- Turning Units & Antenna -- All other units
POWER SOURCE	110 or 220V- AC, 50/60Hz	A 3 phase supply is used by the S-Band turning unit.

**Conditions of Issue of this certificate are printed on Page 8.**

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**Certificate Number    *QQ-MED-16/08-08Ri***

## Certificate of Type Approval - Schedule 4

### MantaDigital™ Radar Systems - Ancillary and Optional Units

The applicant declared that the following units may be added to the basic radar systems illustrated in schedules 2 and 3. These units have been assessed & tested in conjunction with MantaDigital™ and SharpEye™ series radar systems, and satisfactory details are included in the technical files.

**ANCILLARY UNITS:-**

MantaDigital™ Keyboard & Trackerball	<b>MDD-A101</b>	<b>*1</b>
MantaDigital™ Control Panel & Trackerball	<b>MDD-A102</b>	<b>*1</b>
MantaDigital™ Trackerball	<b>MDD-A100</b>	<b>*1</b>
MantaDigital™ Remote Keyboard	<b>MDD-A130</b>	<b>*1</b>
Ergonomic Trackerball (Ergopod, right handed)	<b>NNR-A18</b>	<b>*1</b>
Ergonomic Trackerball (Ergopod, left handed)	<b>NNR-A18-2</b>	<b>*1</b>
MantaDigital™ Radar Interswitch Unit (6 display x 6 transceiver)	<b>MDP-A12</b>	
Serial Interface Module (provides 8 additional serial ports)	<b>FSD-A198</b>	<b>*2</b>
Dual DNC Unit	<b>FSD-A10</b>	<b>*3</b>
Network Audio & Video Control Unit	<b>FSD-A13</b>	<b>*3</b>
NTI Audio & Video Switch Matrix	<b>IT-SM-8x‡-AV-LCD</b>	<b>*3, 4</b>

-----End of List-----

**\* NOTES:-**

- 1 These are alternative/additional control options to the standard trackerball.
- 2 This option is an internal module installed inside the MDP-A1 Or MDP-A9 processor unit.
- 3 These items form a display/control interconnection system and may be used to form an adaptive workstation system between units of the MantaDigital™ radar, SharpEye™ radar and MantaDigital™ ECDIS. The exact configuration enabled by this system is fixed on commissioning in accordance with an agreed ships operating plan.
- 4 The ‡ is a numeral in the range 2 to 8 and denotes the number of display units which can be included in the interconnection system.

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## Certificate of Type Approval - Schedule 5

### Statement on Spurious and Out of Band Emissions and the Boundary between these emissions

The following Radar Transceiver, represents part of the systems shown on earlier schedules, has been subject to a measurement procedure as detailed in IEC 60936-1, Annex D, as contained in Amendment 1, dated July 2002 and the guidelines contained in ITU-R Recommendation RM.1177-3. This standard defines the test method and requirements for shipborne radar to meet in order to comply with Appendix S3 of the Radio Regulations and ITU-R Recommendations SM.1539-1 and SM.1541-1.

The results of the measurement procedure were satisfactory and provide sufficient evidence that these Radar Transceivers are compliant with the criteria contained in the stated standards.

The Transceivers Measured were:-

Description	Model No.	SharpEye™ transceiver	Rotary Joint
SharpEye™ Transceiver/Turning Unit	DTX-A1	DTX-A101	GTX-A150-2
SharpEye™ Core Software (ZM-2165)	V.1.xx		
SharpEye™ FPGA (ZM-2166)	V.1.xx		

The test reports detailing the tests and test results obtained are:-

QinetiQ/IS/ICS/CR080251/1

These reports together with manufacturers drawings and declarations also detail the build standard regarding items such as Antenna, waveguide and any filters fitted to the test unit which the test results specifically apply. The SharpEye™ Transceiver is a Solid State design and technical parameters may be controlled /affected by software hence the reference to software version above.

The measurement procedure as detailed in IEC 60936-1, Annex D has now been reproduced in IEC 62388, Annex B and the requirements and references to ITU-R documents are identical. This statement may be taken as applicable to IEC 62388, Annex B compliance.

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Certificates of Type Approval  
Conditions of Issue

1. Each Certificate will be used in its entirety and not reproduced in part.
2. This certificate remains valid until the date shown (normally 5 years) unless cancelled or revoked, provided:-
  - i) the design and manufacture remain unmodified from the specimen tested and recorded in the Technical Construction File;
  - ii) any conditions contained in the schedule are complied with;
  - iii) Should the specified regulations or standards be amended during the validity of this certificate, the product(s) is/are to be re-approved prior to it/they being placed on board vessels to which the amended regulations or standards apply;
  - iv) and, the equipment remains satisfactory in service.
3. The mark of conformity may only be affixed to the equipment listed on this certificate and a manufacturer's Declaration of Conformity issued when the production Quality Assurance requirements laid down in Annex B, of the Directive (96/98/EC) is fully complied with and controlled by a written inspection agreement with a Notified Body. The use of the QinetiQ Notified Body Number (0191) in combination with the Wheelmark implies that the manufacturer is Registered with the QinetiQ Quality Assurance Scheme. A Certificate of Registration is issued to the manufacturer and should be made available on request. The manufacturer is responsible for ensuring that certification renewal and periodic surveillance are maintained.
4. USCG Approval Number, A Mutual Recognition Agreement (MRA) on marine equipment exists between the European Commission and the US Coastguard but only applies to equipment types included in the listing of marine equipment annexed to the MRA. For included equipment a USCG Approval number may be issued. This can be found under the MED certificate number on the first page and should be used on the main identity label of the equipment. Radio and Radar equipment continues to need separate or additional approval by the USA FCC.
5. This certificate does not confer any approval status to this equipment other than defined by, and tested according to the specifications listed on Page 1.
6. The labeling requirements of IMO Resolution A694(17) shall be met. Descriptions of each unit of apparatus forming part of the equipment will be as given on this Certificate. Each unit of equipment will be marked with the minimum safe distance at which it should be mounted from a standard and steering magnetic compass.
7. No unit of apparatus shall be advertised or labeled as "approved" or "certified" on behalf of the Maritime and Coastguard Agency, the Department of Transport or the QinetiQ Group in any sense other than that it is a type that has been assessed as satisfactory against the specification;
8. The manufacturer must advise QinetiQ of any intended changes to the design or production of the equipment which might affect the equipment performance.
9. Minor Modifications to the equipment will be considered on a case-by-case basis. QinetiQ will review any factory test results, in consultation if necessary, with the test facility that conducted the original Type Approval testing on the equipment. QinetiQ will advise the manufacturer if any further testing is required to maintain valid certification.
10. If an equipment manufacturer wishes to have the type approved equipment designated under alternative names (e.g. agent/distributor's name and model number), a separate application should be completed and sent to QinetiQ.

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