



# 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:-

**Radar Equipment for High Speed Craft applications  
(IEC 62388 Category 2H & 2HSC with Chart option)  
(COMMISSION DIRECTIVE 2011/75/EU – ITEM A.1/4.37 FOR HIGH SPEED CRAFT RADAR  
AND ITEM A.1/4.38 (d) CAT 2 FOR HSC WITH CHART OPTION)**

Of system types known and designated as:-

- a) SharpEye™ MantaDigital™ S-Band Marine HSC Radar, CAT2H Systems
  - b) SharpEye™ MantaDigital™ S-Band Marine HSC Chart Radar, CAT2HC Systems
- (Comprising component parts and having technical characteristics shown in schedules 1 to 4)

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 : 2008, "Marine Shipborne Radar Equipment"
- IEC 60945 : 2002, "General Requirements for Marine Navigation Equipment"
- IEC 62288 : 2008 "Presentation of navigation-related information on shipborne navigational displays"

(being testing standards listed in column 5 of Annex A.1 of Directive 2011/75/EU for Item 4.37 & 4.38)

Note: The presentation standard of this equipment has been assessed against clauses in IEC 62388:2008 derived from IMO Resolution MSC.191(79) and which equate those published in IEC 62288:2008.

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.191(79), Resolution MSC.192(79) and Resolution A694(17).

**SIGNED:**

R Sharp                      Authorised Signatory

**DATE of ISSUE:**            2<sup>nd</sup> December 2011

**DATE of EXPIRY :**            19<sup>th</sup> September 2015

**Certificate Number:**        QQ-MED-14/10-02R

**EU/USCG Mutual Recognition Agreement  
Council Decision 2004/425/EC**

*HSC Radar is not currently included in the USCG/EU MRA*

**This Certificate is Valid until expiry date shown, subject to the  
standard conditions of issue printed on page 8**

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 1a –Category 2H & 2HSC with Chart Option SharpEye™, MantaDigital™ HSC Radar Displays & Processor, CAT2H Systems

The applicant declared that the following units form the radar processing and display section of the system designation a), given on Page 1. These units have been assessed & tested, and satisfactory details of these units were included in the technical file.

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>
SFTWARE:-MantaDigital™ Core Software	(ZM-2144)	<b>Version 2.x.x</b>	<b>*3</b>
Manta Transmitter interface Firmware	(ZM-2114)	<b>Version 1.x.x</b>	<b>*3</b>
Manta Transmitter interface FPGA	(ZM-2160)	<b>Version 1.x.x</b>	<b>*3</b>
Manta Display interface Firmware	(ZM-2007)	<b>Version 1.x.x</b>	<b>*3</b>
Manta Systems interface Firmware	(ZM-2008)	<b>Version 1.x.x</b>	<b>*3</b>

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

The system will include a suitable transceiver selected from Schedule 2 and may also include ancillary items from the list of optional items found in Schedule 3 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 3.
- 2 These units are supplied separately for integrating into a ships bridge console. The Trackerball (MDD-A110) may be replaced with one of the other control options listed in Schedule 3.
- 3 Software Modification: This approval is valid for equipment including subsequent software versions provided written details of such versions have been submitted to and accepted by a Notified Body.

### Technical Characteristics

PRESENTATION DISPLAY TYPE	20" Colour LCD	IEC 62288:2008 Category :- Full operational radar display Multi-function trackerball and on-screen controls allows quick & easy control functions and data entry.
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>	≤500 ≤500 (500 max, any mix)	30 minimum for Cat 2 150 minimum for Cat 2
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 & 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	Can be configure to external UPS (Kelvin Hughes recommended installation)

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

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## Schedule 1b –Category 2H & 2HSC with Chart Option SharpEye™, MantaDigital™ HSC Displays & Chart Radar Processor, CAT2HC Systems

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.

SYSTEM comprising of:-

MantaDigital™ 20" Display & 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™ Radar Processor	<b>MDP-A9</b>	
or MantaDigital™ 20" Console Display	<b>MDD-A20-20</b>	<b>*2</b>
and MantaDigital™ 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 2.x.x</b>	<b>*3</b>
Manta Transmitter interface Firmware (ZM-2114)	<b>Version 1.x.x</b>	<b>*3</b>
Manta Transmitter interface FPGA (ZM-2160)	<b>Version 1.x.x</b>	<b>*3</b>
Manta Display interface Firmware (ZM-2007)	<b>Version 1.x.x</b>	<b>*3</b>
Manta Systems interface Firmware (ZM-2008)	<b>Version 1.x.x</b>	<b>*3</b>

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

The system will include a suitable transceiver selected from Schedule 2 and may also include ancillary items from the list of optional items found in Schedule 3 on Page 6.

- 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 3.
- 2 These units are supplied separately for integrating into a ships bridge console. The Trackerball (MDD-A110) may be replaced with one of the other control options listed in Schedule 3.
- 3 Software Modification: This approval is valid for equipment including subsequent software versions provided written details of such versions have been submitted to and accepted by a Notified Body.

### Technical Characteristics

PRESENTATION DISPLAY TYPE	20" Colour LCD	IEC 62288:2008 Category :- Full operational radar display Multi-function trackerball and on-screen controls allows quick & easy control functions and data entry.
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>	≤500 ≤500 (500 max, any mix)	30 minimum for Cat 2 150 minimum for Cat 2
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 & IEC 60945 CLASS	Exposed Protected -25°C to +70°C -15°C to +55°C.	-- Turning Units & Antenna -- All other units
POWER SOURCE	110 or 220V- AC, 50/60Hz	Can be configure to external UPS (Kelvin Hughes recommended installation)

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

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# Schedule 1c –Category 2H & 2HSC with Chart Option SharpEye™, MantaDigital™ HSC Displays & Chart Radar Processor, CAT2HC Systems

The applicant declared that the following units form the radar processing and display section of the system designations a) & b), given on Page 1. These units have been assessed & tested, and satisfactory details of these units were included in the technical file.

SYSTEM comprising of:-

MantaDigital™ 22" Display & Radar Processor (Pedestal Unit including Trackerball)	<b>MDD-A1-22</b>	<b>*1</b>
or MantaDigital™ 22" Desktop Display (including Trackerball)	<b>MDD-A30-22</b>	<b>*1</b>
and MantaDigital™ Radar Processor	<b>MDP-A1</b>	
or MantaDigital™ 22" Console Display	<b>MDD-A20-22</b>	<b>*2</b>
and MantaDigital™ Radar Processor	<b>MDP-A1</b>	
and MantaDigital™ Remote Trackerball	<b>MDD-A110</b>	<b>*2</b>
SOFTWARE:-MantaDigital™ Core Software (ZM-2144) <b>Version 2.x.x</b> <b>*3</b>		
Manta Transmitter interface Firmware (ZM-2114)	<b>Version 1.x.x</b>	<b>*3</b>
Manta Transmitter interface FPGA (ZM-2160)	<b>Version 1.x.x</b>	<b>*3</b>
Manta Display interface Firmware (ZM-2007)	<b>Version 1.x.x</b>	<b>*3</b>
Manta Systems interface Firmware (ZM-2008)	<b>Version 1.x.x</b>	<b>*3</b>
----- End of List -----		

The system will include a suitable transceiver selected from Schedule 2 and may also include ancillary items from the list of optional items found in Schedule 3 on Page 6.

- 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 3.
- 2 These units are supplied separately for integrating into a ships bridge console. The Trackerball (MDD-A110) may be replaced with one of the other control options listed in Schedule 3.
- 3 Software Modification: This approval is valid for equipment including subsequent software versions provided written details of such versions have been submitted to and accepted by a Notified Body.

## Technical Characteristics

PRESENTATION DISPLAY TYPE	<b>22" Colour LCD</b>	IEC 62288:2008 Category :- Full operational radar display Multi-function trackerball and on-screen controls allows quick & easy control functions and data entry.
RADAR DISPLAY CIRCLE	≥250mm	Effective Diameter
RADAR TARGET CAPACITY <b>ACQUIRED</b>	<b>100 targets</b>	30 minimum for Cat 2
AUTO ACQUISITION OF TARGETS	<b>Yes</b>	Optional for Cat 2
TRIAL MANOEUVRE	<b>Yes</b>	Optional for Cat 2
AIS TARGET CAPACITY <b>ACTIVATED</b> <b>SLEEPING</b>	≤500 ≤500 (500 max, any mix)	30 minimum for Cat 2 150 minimum for Cat 2
IEC 61162-1 SERIAL (NMEA) PORTS	Listener - <b>8</b> Talker - <b>8</b>	Conformity to IEC 61162-1:2000. Configurable to IEC 61162-2 for AIS port.
TEMPERATURE RANGE & IEC 60945 CLASS	Exposed Protected -25°C to +70°C -15°C to +55°C.	-- Turning Units & Antenna -- All other units
POWER SOURCE	<b>110 or 220V- AC, 50/60Hz</b>	Can be configure to external UPS (Kelvin Hughes recommended installation)

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

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## Schedule 2 –Category 2H & 2HSC with Chart Option

### SharpEye™, MantaDigital™

### HSC Radar & Chart Radar, CAT2HC Systems

The applicant declared that in conjunction with a radar display/processing equipment selected from either Schedule 1a or 1b, the following radar Transceiver units form operational Radar/Chart Radar of the system designations given on Page 1. The resulting systems have been assessed & tested, and satisfactory details of these units were included in the technical file.

S-Band Systems:-

SharpEye™, Solid State Transceiver/Turning Unit	DTX-A1	*1
and Drive control unit	GTX-A24	*1
and 3.9m, S-Band Low Profile Antenna	LPA-A3	
<b>SOFTWARE:-</b> Sharpeye™ Core Software (ZM-2165)	<b>Version 1.xx</b>	<b>*2</b>
Sharpeye™ DTX-A101 FPGA (ZM-2166)	<b>Version 1.xx</b>	<b>*2</b>
or Sharpeye™ DTX-A201 FPGA (ZM-2234)	<b>Version 1.xx</b>	<b>*2, 3</b>
-----End of List-----		

\* NOTES:-

- 1 The rotational speed of the S-Band turning unit is set in the Drive control unit to 46RPM for High Speed Craft (HSC).
- 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.
- 3 Revised solid state transceiver module with increased receiver signal processing power.

### Technical Characteristics

FREQUENCY OF OPERATION	2.93 to 3.07 GHz – S-Band	20MHz instantaneous bandwidth
PULSE REPETITION FREQUENCY	1220Hz, 610Hz	
PULSE LENGTHS	0.1µs, 5µs, 30 µs, & -60µs	Pulse compression and coherent pulse Doppler
EMISSION CODE	20M0F3NAN	Solid State Transmitter
POWER CHARACTERISTIC: - S-Band	170W	(PEP)
TEMPERATURE RANGE Exposed & IEC 60945 CLASS Protected	-25°C to +70°C -15°C to +55°C.	-- Turning Unit & Antenna -- All other units
POWER SOURCE	110 or 220V- AC, 50/60Hz	The S-Band turning units use a 3 phase supply.

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## Certificate of Type Approval - Schedule 3

### 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 1 to 4. 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 & pencil tray	<b>MDD-A100</b>	<b>*1</b>
MantaDigital™ Remote Keyboard	<b>MDD-A130</b>	<b>*1</b>
Ergonomic Trackerball (Ergopod, right handed)	<b>NRR-A18</b>	<b>*1</b>
Ergonomic Trackerball (Ergopod, left handed)	<b>NRR-A18-2</b>	<b>*1</b>
MantaDigital™ Radar Interswitch Unit (6 display x 6 transceiver)	<b>MDD-A12</b>	
Serial Interface Module (provides 8 additional 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-8<sup>‡</sup>-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 <sup>‡</sup> is a numeral in the range 2 to 8 and denotes the number of display units which can be included in the interconnection system.

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

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# Certificate of Type Approval - Schedule 4

## 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.	Solid-State Transceiver Module	Rotary Joint
SharpEye™, S-Band, Transceiver/ Turning Unit	<b>DTX-A1</b>	DTX-A101	GTX-A150-2
Software:- SharpEye™ Core (ZM-2165)	<b>V.1.00</b>		
SharpEye™ FPGA (ZM-2166)	<b>V.1.00</b>		

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, rotary joint 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 modification hence reference to the software version used in testing.

The measurement procedure as detailed in IEC 60936-1, Annex D has since the test report above has now been included in IEC 62388 as Annex Band the requirements and ITU-R document references are identical. This statement may be taken as applicable to IEC 62388, Annex B compliance.

Post these Spurious Emissions & OoB tests Kelvin Hughes have produced a modified version of the solid-state transceiver module (part No. **DTX-A201**) and upgraded the software for the FPGA processor to **ZM-2234**. They declare that the only changes are to the received signal processing and there is no change to the transmitter circuitry or software controlling the transmitter characteristics. On that basis QinetiQ are satisfied to accept the analogy to the above compliance.

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

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**Certificate Number**      **QQ-MED-14/10-02R**

**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.

QinetiQ Ltd  
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