



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 2 & Cat 2 with Chart option)
(COMMISSION DIRECTIVE 2011/75/EU – ITEM A.1/4.35 CAT 2 RADAR)
(AND ITEM A.1/4.38 (b) CAT 2 RADAR WITH CHART OPTION)

Of system types known and designated as:-

- a) MantaDigital™, X-Band Marine Radar, CAT2 Systems
- b) MantaDigital™, S-Band Marine Radar, CAT2 Systems
- c) MantaDigital™, X-Band Marine Chart Radar, CAT2C Systems
- d) MantaDigital™, S-Band Marine Chart Radar, CAT2C 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 4.35 & 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: 2ND December 2011

DATE of EXPIRY: 19TH September 2015

Certificate Number: QQ-MED-11/10-02R

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

USCG Approval Number: 165.111/EC0191/1110-02
(applies to Item A.1/4.35 ATA (Tracking CAT2), display and function only)

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 2 Radar MantaDigital™ Radar Displays & Processor, CAT2 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™ 20" Display & Radar Processor (Pedestal Unit including Trackerball)		MDD-A1-20	*1
or MantaDigital™ 20" Desktop Display (including Trackerball)		MDD-A30-20	*1
and MantaDigital™ Radar Processor		MDP-A1	
or MantaDigital™ 20" Console Display		MDD-A20-20	*2
and MantaDigital™ Radar Processor		MDP-A1	
and MantaDigital™ Remote Trackerball		MDD-A110	*2
SFTWARE:-MantaDigital™ Core Software	(ZM-2144)	Version 2.x.x	*3
Manta Transmitter interface Firmware	(ZM-2114)	Version 1.x.x	*3
Manta Transmitter interface FPGA	(ZM-2160)	Version 1.x.x	*3
Manta Display interface Firmware	(ZM-2007)	Version 1.x.x	*3
Manta Systems interface Firmware	(ZM-2008)	Version 1.x.x	*3

-----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:-

- 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
- 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.
- 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 ACQUIRED	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 ACTIVATED SLEEPING	≤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	Internal UPS available or configure to external UPS (Kelvin Hughes recommended installation)

Conditions of Issue of this certificate are printed on Page 8

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

Certificate Number **QQ-MED-11/10-02R**

Schedule 1b –Category 2 Radar with Chart Option

MantaDigital™ Displays & Chart Radar Processor, CAT2C Systems

The applicant declared that the following units form the radar processing and display section of the system designations c) & d), 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)	MDD-A9-20	*1
or MantaDigital™ 20" Desktop Display (including Trackerball)	MDD-A30-20	*1
and MantaDigital™ Radar Processor	MDP-A9	
or MantaDigital™ 20" Console Display	MDD-A20-20	*2
and MantaDigital™ Radar Processor	MDP-A9	
and MantaDigital™ Remote Trackerball	MDD-A110	*2
SOFTWARE:-MantaDigital™ Core Software	(ZM-2144)	Version 2.x.x *3
Manta Transmitter interface Firmware	(ZM-2114)	Version 1.x.x *3
Manta Transmitter interface FPGA	(ZM-2160)	Version 1.x.x *3
Manta Display interface Firmware	(ZM-2007)	Version 1.x.x *3
Manta Systems interface Firmware	(ZM-2008)	Version 1.x.x *3

-----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 ACQUIRED	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 ACTIVATED SLEEPING	≤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.
POWER SOURCE	110 or 220V- AC, 50/60Hz	Internal UPS available or 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 2 Radar with Chart Option

MantaDigital™ Displays & Chart Radar Processor, CAT2C Systems

The applicant declared that the following units form the radar processing and display section of the system designations c) & d), 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)	MDD-A1-22	*1
or MantaDigital™ 22" Desktop Display (including Trackerball)	MDD-A30-22	*1
and MantaDigital™ Radar Processor	MDP-A1	
or MantaDigital™ 22" Console Display	MDD-A20-22	*2
and MantaDigital™ Radar Processor	MDP-A1	
and MantaDigital™ Remote Trackerball	MDD-A110	*2
SOFTWARE:-MantaDigital™ Core Software (ZM-2144) Version 2.x.x *3		
Manta Transmitter interface Firmware (ZM-2114)	Version 1.x.x	*3
Manta Transmitter interface FPGA (ZM-2160)	Version 1.x.x	*3
Manta Display interface Firmware (ZM-2007)	Version 1.x.x	*3
Manta Systems interface Firmware (ZM-2008)	Version 1.x.x	*3

-----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	22" 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 ACQUIRED	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 ACTIVATED SLEEPING	≤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	Internal UPS available or configure to external UPS (Kelvin Hughes recommended installation)

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

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Hampshire. GU14 0LX

Certificate Number QQ-MED-11/10-02R

Schedule 2 – Category 2 & 2 with Chart Option Radar Transceivers MantaDigital™ Radar & 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 systems have been assessed & tested, and satisfactory details of these units were included in the technical file.

X-Band Systems:-

10kW, X-Band Transceiver/Turning Unit with transmitter Interface Unit	CAE-A30-20 NNR-A66
Or 25kW X-Band Transceiver/Turning Unit with transmitter Interface Unit	CAE-A12-20 NNR-A66
Or 25kW X-Band Transceiver Unit (Bulkhead Mount) and X-Band Turning Unit	CTX-A8 CAE-A30-22
and 1.3m, 1.9m or 2.5m Low Profile X-Band Antenna	LPA-A13 or LPA-A19 or LPA-A25

S-Band Systems:-

Manta 30kW, Transceiver/Turning Unit	GTX-A16	*1
and Drive control unit	GTX-A24	*1
or Mk 7 30kW Transceiver Unit (Bulkhead Mount)	CTX-A9	
and Manta, Turning Unit	GTX-A11	*1
and Drive control unit	GTX-A24	*1
and 3.9m, S-Band Low Profile Antenna	LPA-A1 or LPA-A3	

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

* NOTES:-

- 1 The rotational speed of the S-Band turning unit is set in the Drive control unit to 23RPM for standard speed craft.

Technical Characteristics

FREQUENCY OF OPERATION	9.410 GHz - X-Band 3.050 GHz – S-Band	±30MHz ±10MHz
PULSE REPETITION FREQUENCY	3000, 1500, 750, 375	
PULSE LENGTHS	0.05-0.07µs, 0.16-0.25µs, 0.6-1.0µs	Transceiver dependent.
EMISSION CODE	3M00P0NAN	
POWER CHARACTERISTIC: - X-Band	10kW or 25kW	(PEP)
POWER CHARACTERISTIC: - S-Band	30kW	(PEP)
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	The S-Band turning units use a 3 phase supply.

Conditions of Issue of this certificate are printed on Page 8

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Cody Technology Park
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Hampshire. GU14 0LX

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

-----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 0r 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.

Conditions of Issue of this certificate are printed on page 8

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Hampshire. GU14 0LX

Certificate Number QQ-MED-11/10-02R

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.	Modulator PCB	Magetron
10kW, X-Band,Transceiver/Turning Unit (24RPM)	CAE-A30-7	CTX-A332	MSF1425B
25kW, X-Band,Transceiver/Turning Unit (24RPM)	CAE-A12-20	CTX-A201-M	MG5437
25kW, X-Band,Transceiver (Downmast) and Turning Unit (24RPM)	CTX-A8 CAE-A30-6	CTX-A370	MG5437
30kW, S-Band,Transceiver (Downmast) and Turning Unit (24RPM)	CTX-A9 CAE-A42	CTX-A370	M1302LK

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

QinetiQ/FST/CMT/TR021828
QinetiQ/FST/CMT/TR022211
QinetiQ/FST/CMT/TR022389
QinetiQ/FST/TR031365
DERA/SS/PSD/CR010109

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.

Transceiver Modules contained in the **CAE-A12-30**, **CAE-A30-20** Transceiver/Turning units and **GTX-A16** Transceiver unit are identical to those found in the **CAE-A12-20**, **CAE-A30-7** and **CTX-A9** units respectively. Since the applicable electronic circuitry and microwave component parts are identical a presumption of conformity can be applied by analogy

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.

For Information the above transceivers also have USA, FCC identities as follows:

Description	Model No.	FCC Identity
10kW, X-Band,Transceiver/Turning Unit (24RPM)	CAE-A30-7	CICCAE-A30-7
25kW, X-Band,Transceiver/Turning Unit (24RPM)	CAE-A12-20	CICCAE-A12-20
25kW, X-Band,Transceiver (Downmast)	CTX-A8	CICCTX-A8
30kW, S-Band,Transceiver (Downmast)	CTX-A9	CICCTX-A9

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

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Ively Road, Farnborough
Hampshire. GU14 0LX

Certificate Number **QQ-MED-11/10-02R**

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
Marine Approval and Testing Service
Cody Technology Park, Room 1005/A5
Ively Road, Farnborough
Hants, GU14 0LX
United Kingdom