



NOTIFIED BODY
No 0191

CERTIFICATE OF TYPE APPROVAL

(EC Certificate of Type Examination - Module B)
(Marine Equipment Directive - 96/98/EC)

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 with ARPA For High Speed Craft (HSC)
(COMMISSION DIRECTIVE 2002/75/EC – ITEM A.1/4.37)

Of system type known and designated as:-

- a) MANTA 1700, 250mm Display, X & S Band HSC Radar/ARPA Systems
- b) MANTA 2000, 250mm Display, X & S Band HSC Radar/ARPA Systems
- c) MANTA 2300, 340mm Display, X & S Band HSC Radar/ARPA 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:

EN 60936-2:1999, "Shipborne Radar for High Speed Craft (HSC)"

EN 60872-1:1999, "Automatic Radar Plotting Aid (ARPA)"

EN 60945 : 2002, "General Requirements for Marine Navigation Equipment"

(being European Standards for Technical Characteristics and Methods of measurements equivalent to IEC 60936-2, IEC 60872-1 and IEC 60945, 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 A820(19), Resolution A823(19) and Resolution A694(17).

SIGNED:

DATE of ISSUE:

30th September 2007

P J Goddard

Authorised Signatory

DATE of EXPIRY :

20th May 2009

Certificate Number:

QQ-MED-08/04-01R5

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

ARPA display and function is compliant with USCG 165.120
(but MED Item A.1/4.37 is not included in the MRA at present)

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



Under the terms of the United Kingdom Statutory Instrument, No 1957 : 1999, the QinetiQ Group PLC (formerly known as DERA) 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 on Marine Equipment and issue Certificates of Type Approval.

Certificate of Type Approval - Schedule 1

MANTA 1700 & MANTA 2000, X-Band HSC Radar/ARPA Systems

The applicant declared that the following units comprise the radar equipment of the system designation a)&b) shown on Page 1. These units have been assessed & tested, and satisfactory details of these units were included in the technical file. These units form systems consistent with the Item Description A1/4.37, given in Annex A1 of Commission Directive 2002/75/EC.

MAIN UNITS Comprising:-

- | | |
|--|---|
| <ol style="list-style-type: none"> 1 Manta 1700 Radar Desktop - 17.1" LCD
 or Manta 2000 Radar Desktop - 20.1" LCD
 or Manta 1700 Console Display - 17.1" LCD
 and Remote Desktop Serial Trackerball
 or Manta 2000 Console Display - 20.1" LCD
 and Remote Desktop Serial Trackerball 2 Radar / ARPA Processor Unit 3 Combined Transceiver/Turning Unit, 10kW, Mk 5 — 40RPM
 or Mk 7 25kW Transceiver Unit (Bulkhead Mount)
 and Mk 5, 40RPM Turning Unit 4 X-Band Antenna (1.8m or 2.4m)
 or Low Profile X-Band Antenna (1.3m, 1.9m or 2.5m) | <p>FSD-A7
 FSD-A1
 FSD-A9
 NNR-A10-3
 FSD-A3
 NNR-A10-3
 NNR-A59
 CAE-A30-8 or CAE-A30-21
 CTX-A8
 CAE-A30-5 or CAE-A30-23
 CAE-A13-2 or CAE-A25
 LPA-A13 or LPA-A19 or LPA-A25</p> |
|--|---|

- | | | | |
|------------|-----------------|--------------|----|
| SOFTWARE:- | Radar-ARPA | Version 2.xx | *1 |
| | ARPA 3 Software | Version 4.xx | *1 |

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

And which may include any item or combination of items from the list of optional items found in schedule 5 on Page 6.

*NOTES:-

- 1 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.
- 2 This certificate supersedes and replaces certificate number QQ-MED-08/04-01R4, dated 26-02-07.

Technical Characteristics

FREQUENCY OF OPERATION	9.410 GHz	±30MHz
PULSE REPETITION FREQUENCY (PRF)	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	10kW or 25kW	(PEP)
RADAR DISPLAY CIRCLE	≥250mm	Effective Diameter
IEC 61162-1 SERIAL (NMEA) PORTS	Listner - 2 Talker - 2	Conformity to IEC 61162-1:2000. Optional multi-input serial controller/interface unit available.
TEMPERATURE RANGE Exposed & IEC 60945 CLASS Protected	-25°C to +70°C -15°C to +55°C.	-- Turning Units & Antenna -- All other units
POWER SOURCE	110-240V AC, 50/60Hz	

Conditions of Issue of this certificate are printed the reverse of Page 7.

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

Certificate Number QQ-MED-08/04-01R5



Certificate of Type Approval - Schedule 2

MANTA 1700 & MANTA 2000, S-Band HSC Radar/ARPA Systems

The applicant declared that the following units comprise the radar equipment of the system designation a)&b) shown on Page 1. These units have been assessed & tested, and satisfactory details of these units were included in the technical file. These units form systems consistent with the Item Description A1/4.37, given in Annex A1 of Commission Directive 2002/75/EC.

MAINUNIT Comprising:-

- | | |
|--|---|
| 1 Manta 1700 Radar Desktop - 17.1" LCD
or Manta 2000 Radar Desktop - 20.1" LCD
or Manta 1700 Console Display - 17.1" LCD
and Remote Desktop Serial Trackerball
or Manta 2000 Console Display - 20.1" LCD
and Remote Desktop Serial Trackerball
2 Radar / ARPA Processor Unit
3 Combined Transceiver/Turning Unit, 30kW, Mk 6 — 40RPM
and Soft Start & Power Supply Unit
or Mk 7 30kW Transceiver Unit (Bulkhead Mount)
and Mk 6, 40RPM Turning Unit
and Soft Start Unit
4 S-Band Antenna, 2.8m
or S-Band Antenna or S-Band Low Profile Antenna, 3.9m | FSD-A7
FSD-A1
FSD-A9
NNR-A10-3
FSD-A3
NNR-A10-3
NNR-A59
CAE-A45 or GTX-A16
CZZ-A14-2 or GTX-A24
CTX-A9
CAE-A41 or GTX-A11
CZZ-A14 or GTX-A24
CAE-A39
CAE-A36 or LPA-A1 or LPA-A3
Version 2.xx *1
Version 4.xx *1 |
|--|---|
- End of List -----

And which may include any item or combination of items from the list of optional items found in schedule 5 on Page 6.

NOTES:-

1. 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.
2. This certificate supersedes and replaces certificate number QQ-MED-08/04-01R4, dated 26-02-07.

Technical Characteristics

FREQUENCY OF OPERATION	3.050 GHz	±10MHz
PULSE REPETITION FREQUENCY (PRF)	3000, 1500, 750, 375	
PULSE LENGTHS	0.05-0.06µs, 0.16-0.25µs, 0.9-1.0µs	Transceiver dependent.
EMISSION CODE	3M00PONAN	
POWER CHARACTERISTIC	30kW	(PEP)
RADAR DISPLAY CIRCLE	≥250mm	Effective Diameter
IEC 61162-1 SERIAL (NMEA) PORTS	Listner - 2 Talker - 2	Conformity to IEC 61162-1:2000. Optional multi-input serial controller/interface unit available.
TEMPERATURE RANGE Exposed & IEC 60945 CLASS Protected	-25°C to +70°C -15°C to +55°C.	-- Turning Units & Antenna -- All other units
POWER SOURCE	110-240V AC, 50/60Hz	A 3 phase supply is used by the S-Band turning unit.

Conditions of Issue of this certificate are printed the reverse of Page 7.

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

Certificate Number QQ-MED-08/04-01R5



Certificate of Type Approval - Schedule 3 MANTA 2300, X-Band HSC Radar/ARPA Systems

The applicant declared that the following units comprise the radar equipment of the system designation c) shown on Page 1. These units have been assessed & tested, and satisfactory details of these units were included in the technical file. These units form systems consistent with the Item Description A1/4.37, given in Annex A1 of Commission Directive 2002/75/EC.

MAIN UNITS Comprising:-

- | | | |
|---|---|---|
| 1 | Manta 2300 Radar Desktop, - 23.1" LCD
or Manta 2300 Console Display - 23.1" LCD
and Remote Desktop Serial Trackerball | FSD-A4
FSD-A6
NNR-A10-3
NNR-A59 |
| 2 | Radar / ARPA Processor Unit | CAE-A30-8 or CAE-A30-21 |
| 3 | Combined Transceiver/Turning Unit, 10kW, Mk 5 — 40RPM
or Mk 7 25kW Transceiver Unit (Bulkhead Mount)
and Mk 5, 40RPM Turning Unit | CTX-A8
CAE-A30-5 or CAE-A30-23 |
| 4 | X-Band Antenna (1.8m or 2.4m)
or Low Profile X-Band Antenna (1.3m, 1.9m or 2.5m) | CAE-A13-2 or CAE-A25
LPA-A13 or LPA-A19 or LPA-A25 |

SOFTWARE:-	Radar-ARPA	Version 2.xx	*1
	ARPA 3 Software	Version 4.xx	*1

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

And which may include any item or combination of items from the list of optional items found in schedule 5 on Page 6.

*NOTES:-

- 1 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.
- 2 This certificate supersedes and replaces certificate number QQ-MED-08/04-01R4, dated 26-02-07.

Technical Characteristics

FREQUENCY OF OPERATION	9.410 GHz	±30MHz
PULSE REPETITION FREQUENCY (PRF)	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	10kW or 25kW	(PEP)
RADAR DISPLAY CIRCLE	≥340mm	Effective Diameter
IEC 61162-1 SERIAL (NMEA) PORTS	Listner - 2 Talker - 2	Conformity to IEC 61162-1:2000. Optional multi-input serial controller/interface unit available.
TEMPERATURE RANGE Exposed & IEC 60945 CLASS Protected	-25°C to +70°C -15°C to +55°C.	-- Turning Units & Antenna -- All other units
POWER SOURCE	110-240V AC, 50/60Hz	

Conditions of Issue of this certificate are printed the reverse of Page 7.

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

Certificate Number QQ-MED-08/04-01R5

Certificate of Type Approval - Schedule 4 MANTA 2300, S-Band HSC Radar/ARPA Systems

The applicant declared that the following units comprise the radar equipment of the system designation c) shown on Page 1. These units have been assessed & tested, and satisfactory details of these units were included in the technical file. These units form systems consistent with the Item Description A1/4.37, given in Annex A1 of Commission Directive 2002/75/EC.

MAIN UNIT Comprising:-

- | | |
|---|-----------------------------|
| 1 Manta 2300 Radar Desktop, - 23.1" LCD | FSD-A4 |
| or Manta 2300 Console Display - 23.1" LCD | FSD-A6 |
| and Remote Desktop Serial Trackerball | NNR-A10-3 |
| 2 Radar / ARPA Processor Unit | NNR-A59 |
| 3 Combined Transceiver/Turning Unit, 30kW, Mk 6 – 40RPM | CAE-A45 or GTX-A16 |
| and Soft Start & Power Supply Unit | CZZ-A14-2 or GTX-A24 |
| or Mk 7 30kW Transceiver Unit (Bulkhead Mount) | CTX-A9 |
| and Mk 6, 40RPM Turning Unit | CAE-A41 or GTX-A11 |
| and Soft Start Unit | CZZ-A14 or GTX-A24 |
| 4 S-Band Antenna, 2.8m | CAE-A39 |
| or S-Band Antenna or S-Band Low Profile Antenna, 3.9m | CAE-A36 or LPA-A1 or LPA-A3 |
| SOFTWARE:- Radar-ARPA | Version 2.xx *1 |
| ARPA 3 Software | Version 4.xx *1 |

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

And which may include any item or combination of items from the list of optional items found in schedule 5 on Page 6.

NOTES:-

- 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.
- This certificate supersedes and replaces certificate number QQ-MED-08/04-01R4, dated 26-02-07.

Technical Characteristics

FREQUENCY OF OPERATION	3.050 GHz	±10MHz
PULSE REPETITION FREQUENCY (PRF)	3000, 1500, 750, 375	
PULSE LENGTHS	0.05-0.06µs, 0.16-0.25µs, 0.9-1.0µs	Transceiver dependent.
EMISSION CODE	3M00PONAN	
POWER CHARACTERISTIC	30kW	(PEP)
RADAR DISPLAY CIRCLE	≥340mm	Effective Diameter
IEC 61162-1 SERIAL (NMEA) PORTS	Listener - 2 Talker - 2	Conformity to IEC 61162-1:2000. Optional multi-input serial controller/interface unit available.
TEMPERATURE RANGE Exposed & IEC 60945 CLASS Protected	-25°C to +70°C -15°C to +55°C.	-- Turning Units & Antenna -- All other units
POWER SOURCE	110-240V AC, 50/60Hz	A 3 phase supply is used by the S-Band turning unit.

Conditions of Issue of this certificate are printed the reverse of Page 7.

QinetiQ
Cody Technology Park
Ively Road, Farnborough
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Certificate Number QQ-MED-08/04-01R5

Certificate of Type Approval - Schedule 5

MANTA, 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 various Kelvin Hughes, Nucleus 3 and MANTA radar systems, and satisfactory details were included in the technical files.

ANCILLARY UNITS:-

Dual Interswitch Unit	HRC-A9	
Ergonomic Trackerball Unit (Ergopod, Right hand)	NNR-A18	
Ergonomic Trackerball Unit (Ergopod, Left hand)	NNR-A18-2	
Remote Keyboard (alpha-numeric)	45-975-0083-001	
Radar Interswitch (CAN Bus – 6 Channel) Unit (RIU)	NNR-A55	
Dual DNC Unit	FSD-A10	*1
Network Audio & Video Control Unit	FSD-A13	*1
Display Network Controller PCB	FSD-A132	*1, 2, 3, 4
NTI Audio & Video Switch Matrix	IT-SM-8x [‡] -AV-LCD	*1, 5
Radar Control Panel Unit	FSD-A11	*1
Radar Control Panel PCB	FSD-A152	*1, 3
Remote Desktop Control Pod	NNR-A10-6	*1
Transceiver Interface Unit (TIU)	NNR-A66	
(incorporates CAN adaptor & cable converter PCBs)		*6
Multi Input Serial Controller (MISC) PCB	NNR-A589	*7
Master/Slave PCB	NNR-A285	*7
Slave Video Kit	NNR-A508	*7
Low Ratio Gyro Kit	HRC-A107	*7

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

* NOTES:-

1. These items form a Display/control interconnection system and may be used to form an adaptive workstation system between units of the Manta Radar and ECDIS. The exact configuration enabled by this system is fixed on commissioning in accordance with an agreed ships operating plan.
2. This item can be fitted as an Internal option to the Processor Unit.
3. This item can be fitted as an internal option to the Display Unit.
4. This item can be fitted as an internal option to the Network Audio & Video Control Unit.
5. The [‡] is a numeral in the range # to 8, and denotes the number of display units which can be included in the interconnection system.
6. Items NNR-A981 and NNR-A67.
7. These items if fitted are Internal options in the Processor Unit.

Conditions of Issue of this certificate are printed the reverse of Page 7.

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Certificate Number QQ-MED-08/04-01R5

Certificate of Type Approval - Schedule 6

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

The following Radar Transceivers, which form part of the systems shown on earlier schedules, have been subject to a measurement procedure as detailed in IEC 60936-1: 2002, Annex D and the guidelines contained in ITU-R Recommendation RM.1177. 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 and SM.1541.

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 (40RPM)	CAE-A30-8	CTX-A332	MSF1425B
25kW, X-Band,Transceiver (Downmast) and Turning Unit (40RPM)	CTX-A8 CAE-A30-5	CTX-A370	MG5437
30kW, S-Band,Transceiver/Turning Unit (40RPM)	CAE-A45*1	CTX-A294	M1302LK
30kW, S-Band,Transceiver (Downmast) and Turning Unit (40RPM)	CTX-A9 CAE-A41	CTX-A370	M1302LK

Note *1 This unit was tested in the form of the CAE-A37 which has a 24RPM gearbox

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-A30-21 Transceiver/Turning unit and GTX-A16 Transceiver unit are identical to those found in the CAE-A30-8 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

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

Description	Model No.	FCC Identity
10kW, X-Band,Transceiver/Turning Unit (40RPM)	CAE-A30-8	CICCAE-A30-8
30kW, S-Band,Transceiver/Turning Unit (40RPM)	CAE-A45	CICCAE-A45
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 overleaf.

QinetiQ
Cody Technology Park
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Certificate Number QQ-MED-08/04-01R5

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