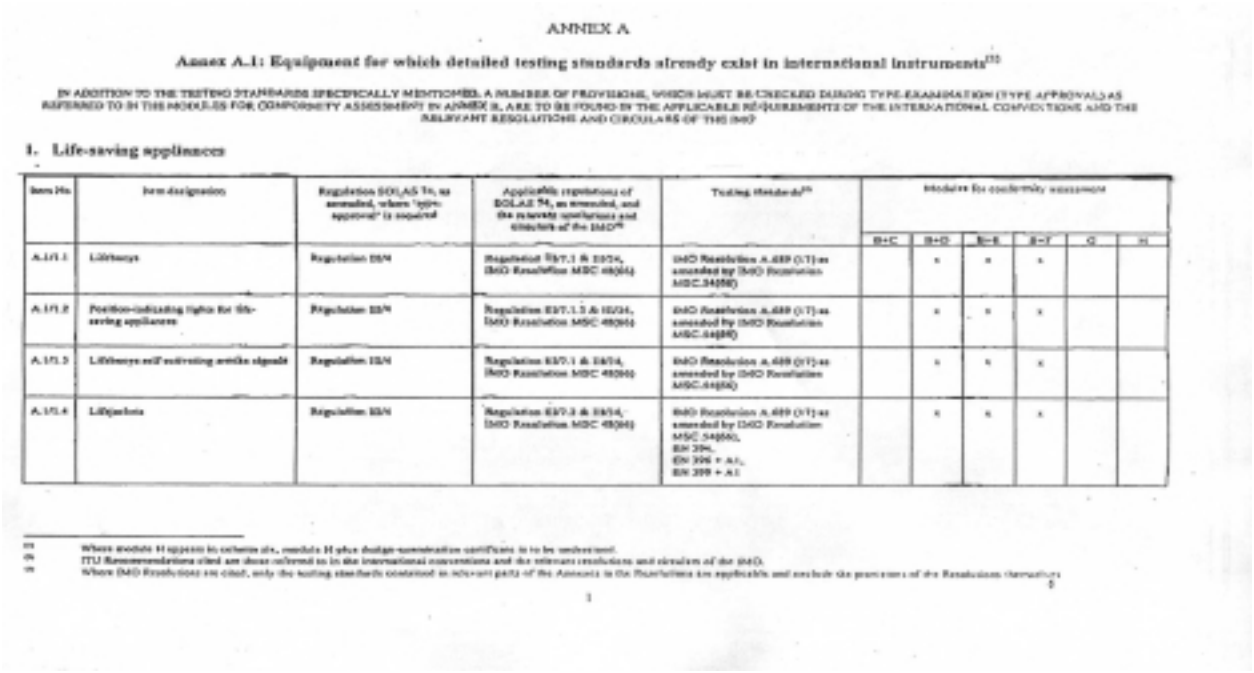
FCC ID: KLS-87-200
Response to E-Mail received 11th December 2000 for Application to FCC for McMurdo R3 Radio

Our response to the FCC E-Mail of 11th Dec 2000 is set out below in the same order :-

1) Maritime Rules Branch to be contacted to help determine the proper category for this unit.

2) The Aeronautical VHF Radio is specifically not listed in Section 80.1101, however the applicable IMO, IEC etc etc standards and regulations are listed in the European Marine Equipment Directive ANNEX A.1/5.16 , which is scanned in below:-



ANNEX A

Annex A.1: Equipment for which detailed testing standards already exist in international instruments[15]

IN ADDITION TO THE TESTING STANDARDS SPECIFICALLY MENTIONED, A NUMBER OF PROVISIONS, WHICH MUST BE CHECKED DURING TYPE-EXAMINATION (TYPE APPROVAL) AS REFERRED TO IN THE MODULES FOR CONFORMITY ASSESSMENT IN ANNEX II, ARE TO BE FOUND IN THE APPLICABLE REQUIREMENTS OF THE INTERNATIONAL CONVENTIONS AND THE RELEVANT RESOLUTIONS AND CIRCULARS OF THE IMO

1. Life-saving appliances

Item No.	Item designation	Regulation SOLAS 74, as amended, where "type-approval" is required	Applicable regulations of SOLAS 74, as amended, and the relevant resolutions and circulars of the IMO[16]	Testing standards[17]	Modules for conformity assessment					
					B+C	B+D	B+E	B+F	G	H
A.1/1.1	Lifebuoys	Regulation III/4	Regulation III/7.1 & III/34, IMO Resolution MSC 48(66)	IMO Resolution A.689 (17) as amended by IMO Resolution MSC.34(63)		x	x	x		
A.1/1.2	Position-indicating lights for life-saving appliances	Regulation III/4	Regulation III/7.1.3 & III/34, IMO Resolution MSC 48(66)	IMO Resolution A.689 (17) as amended by IMO Resolution MSC.54(18)		x	x	x		
A.1/1.3	Lifebuoys self-activating smoke signals	Regulation III/4	Regulation III/7.1 & III/34, IMO Resolution MSC 48(66)	IMO Resolution A.689 (17) as amended by IMO Resolution MSC.54(18)		x	x	x		
A.1/1.4	Lifejackets	Regulation III/4	Regulation III/7.2 & III/34, IMO Resolution MSC 48(66)	IMO Resolution A.689 (17) as amended by IMO Resolution MSC.54(18), EN 394, EN 396 + A1, EN 399 + A1		x	x	x		

[15] Where module H appears in column six, module H plus design examination certificate is to be understood.
[16] ITU Recommendations cited are those referred to in the international conventions and the relevant resolutions and circulars of the IMO.
[17] Where IMO Resolutions are cited, only the testing standards contained in relevant parts of the Annexes to the Resolutions are applicable and exclude the provisions of the Resolutions themselves.

A.1/5.14	MF/HF radio installation capable of transmitting and receiving DSC, NBDP and radiotelephony	Regulation IV/14, Regulation X/3	Regulation IV/ 10.2.1, Regulation X/3, IMO Resolution A.613 (15), IMO Resolution A.694 (17), IMO Resolution A.806 (19), IMO Resolution A.813 (19), IMO Resolution MSC 68 (68) Annex 3, ITU-R 476, ITU-R 492, ITU-R 493, ITU-R 541, ITU-R 625	ETS 300 338, ETS 300 373 + A.1, ETS 300 067 + A1, EN 60945; IEC 61097-3, IEC 61097-9, IEC 61097-11, IEC 60945		x	x	x	x	
A.1/5.15	Radiotelephone MF/HF DSC watch keeping receiver	Regulation IV/14, Regulation X/3	Regulation IV/10.2.2, Regulation X/3, IMO Resolution A.613 (15), IMO Resolution A.694 (17), IMO Resolution A.806 (19), IMO Resolution A.813 (19), IMO Resolution MSC 68 (68) Annex 3, ITU-R 493	ETS 300 338, ETS 300 373 EN 301 033, EN 60945; IEC 61097-3, IEC 61097-8, IEC 60945		x	x	x	x	
A.1/5.16	Aeronautical two way VHF radio telephone apparatus	Regulation IV/14, Regulation X/3	Regulation IV/7.5, Regulation X/3, IMO Resolution A.694 (17), IMO Resolution A.813 (19), IMO performance standards (under development by COMSAR)	ICAO Convention, Annex 10 Radio Regulations, Appendix 37A, TS 101 089, EN 60945; IEC\60945		x	x	x	x	

2) contd

To assist with the box numbered A.1/5.16 above the following information is provided:-

IMO performance standards (under development by COMSAR) is the IMO Resolution MSC 80(70).

TS 101 089 is the European ETSI standard.

Our compliance statement follows:

CFR 47 PART 80.1101(b)

Para	REQUIREMENT	STATUS
1	IMO RESOLUTION A.694(17)	Not GMDSS, Aeronautical band only. Compliant sections 2 through 9
2	CCIT RECOMMENDATION E.161	Not applicable. No keypad. Channels accessible by toggle switch.
3	CCIT RECOMMENDATION Q.11	Not applicable. No keypad. Channels accessible by toggle switch.
4	IEC-PUBLICATION 92-101	Not applicable. Not connected to ship supply.
5	IEC-PUBLICATION 533	Not applicable. Not permanently on, emergency communications only.
6	IEC-PUBLICATION 945	Compliant with relevant parts.
7	ISO STANDARD 3791	Not applicable. No keypad. Channels accessible by toggle switch.

FCC 47 PART 80.1101(c)

Para	REQUIREMENT	STATUS
1	IMO RESOLUTION A.525(13)	Not applicable. No printing capabilities.
2	IMO RESOLUTION A.609(15)	Not applicable. Aeronautical band only.
3	IMO RESOLUTION A.610(15)	Not applicable.
4	IMO RESOLUTION A.613(15)	Not applicable.
4(ii)	CCIR Recommendations 493-4	Not applicable.
4(iii)	CCIR Recommendations 625-1	Not applicable.
4(iv)	IMO RESOLUTION A.700(17)	Not applicable.
5	IMO RESOLUTION A.611(15)	Not applicable
6	IMO RESOLUTION A.604(15)	Not applicable.
7	IMO RESOLUTION A.605(15)	Not applicable. Aeronautical band only.
8	IMO RESOLUTION A.698(17)	Not applicable. Not INMARSAT equipped. Aeronautical band only.
9	IMO RESOLUTION A.663(16)	Not applicable. Not INMARSAT equipped. Aeronautical band only.
10	IMO RESOLUTION A.664(16)	Not applicable. Not INMARSAT equipped. Aeronautical band only.

3) Response to follow FCC R&R Section 2.1033(c)

(1) Manufacturer Name and Address:-

Norbit A/S, Postboks 141, N-7501 Stjørdal, NORWAY.

Tel: 0047 74 820430 Fax: 0047 74820431

Applicant for Certification:-

McMurdo Ltd, Rodney Road, Fratton Ind Estate, Portsmouth, Hampshire, England. PO4 8SG.

Tel: 0044 2392 775014 Fax: 0044 2392 827707

(2) FCC Identifier: KLS-87-200

(3) User Manual - already submitted.

(4) Type of Emission: Emission code:- A3E

(5) Frequency Range:- Transmit: 121.5 MHz or 123.1 MHz
Receive: 121.5 MHz or 123.1 MHz

(6) Range of Operating Power:- 0.1Watt EIRP

(7) None - Not applicable

(8) The dc voltage applied:- 3 volts

(9) Not Applicable – Factory pre-set.

(10) Schematic Drawings:- already submitted.

(11) Photograph of labels:- already submitted.

(12) Photographs:- already submitted.

(13) Not Applicable - Analogue Modulation Technique

(14) See 2.1046 to 2.1057 below.

(15) Not Applicable

(16) Not Applicable

(17) Not Applicable

47 CFR SECTION 2.1046 TO 2.1057

Where measurements have been made in house, the following test equipment was used.

1.	Spectrum analyser	Hewlett Packard ESA-L1500A
2.	Frequency counter	Philips PM6680
3.	Temperature chamber	Montford BMC24
4.	Attenuator	N-type 50Ω in-line attenuator 10dB
5.	Thermometer	Comark 2001
6.	Rubidium Frequency Standard	FEI Communications FE-5680A *
7.	Digital Storage Oscilloscope	LeCroy 9304AM
8.	Sweep/ function generator	Thandar TG502

* Used for frequency stability measurements only.

All measurements made by Richard Read, Senior Design Engineer.

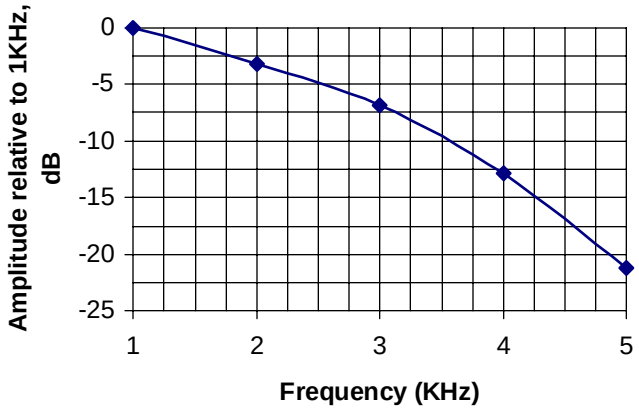
2.1046: RF power output

The output power to the antenna was measured as 21.3dBm, (135mW), using a spectrum analyser. (This figure does not include cable loss, which is estimated as 0.5dB.)
Test report no. 97/7096/4 page 8 gives the carrier power as 140mW.

2.1047: Modulation characteristics

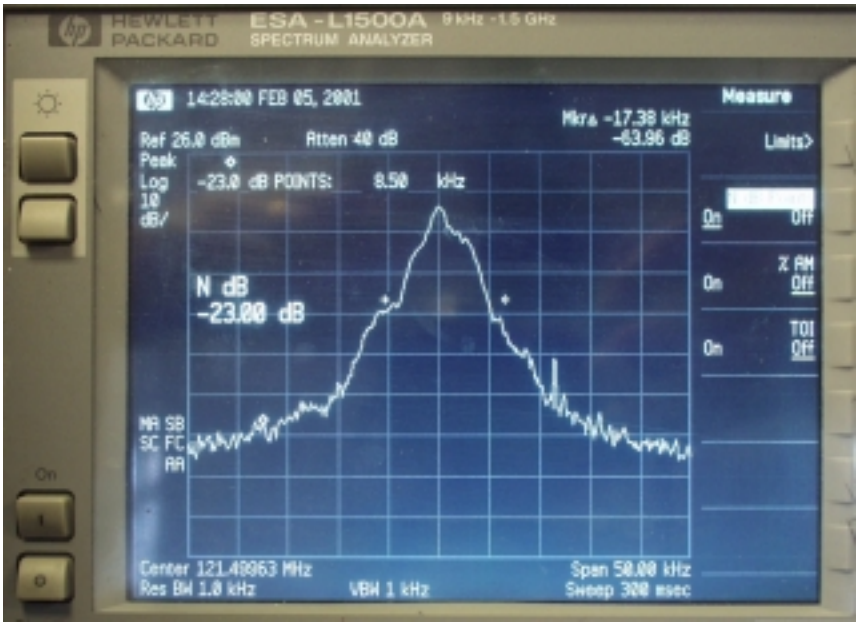
The microphone was disconnected and the audio pre-amp was fed with the output of an audio sweep generator. (It was not possible to view the response directly, as the DSO has no X-input!). Readings were taken at spot frequencies.

Frequency kHz	Output V pk-pk	Relative gain dB
1	1.5	0
2	1.04	-3.2
3	0.68	-6.9
4	0.34	-12.9
5	0.13	-21.2



2.1049: Occupied bandwidth

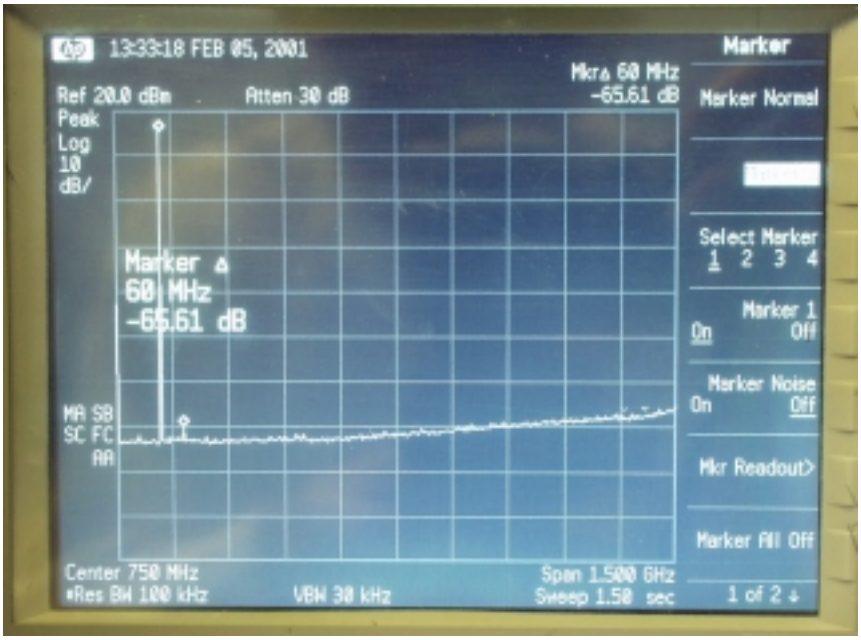
The FCC definition of occupied bandwidth is' the frequency bandwidth such that below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 per cent of the total mean power radiated'.
This corresponds to the 23dB bandwidth, (10log0.005).



Modulation was applied with a swept signal ramping from 1KHz to 5KHz.
The figure above shows that the occupied bandwidth for the 121.5MHz transmission is 8.5kHz.

2.1051: Spurious emissions at antenna terminals

The R3 VHF radio is not designed to operate without an antenna; the antenna is an integral part of the unit. However, measurements of the spectrum at the transmitter output are shown below. The limit of 1.5GHz is the limitation of the available test equipment.



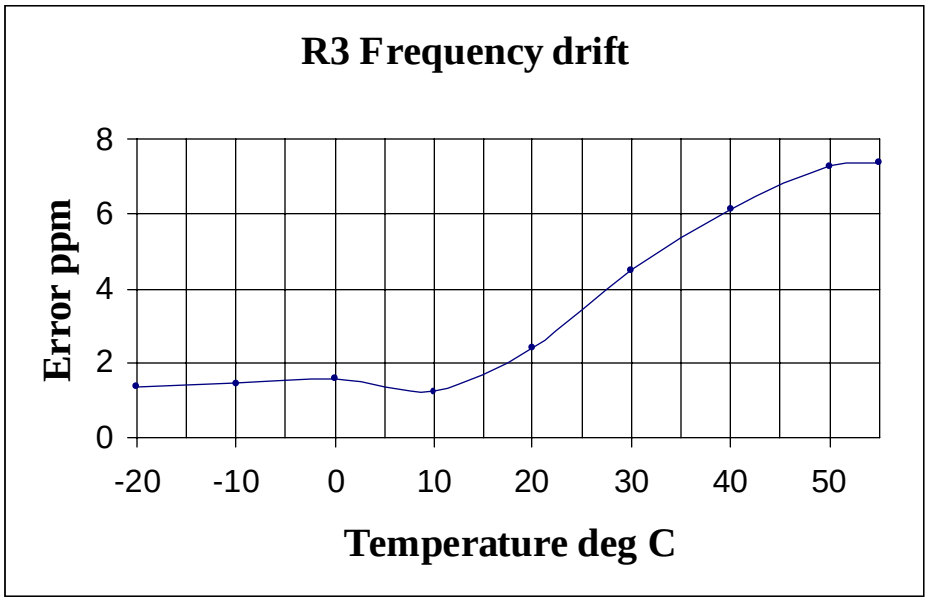
2.1053: Field strength of spurious radiation

Refer to performance test report no. 97/7096/4 page 18.

2.1055: Frequency stability

Measurements were carried out in 10 C steps between -20 C and +50 C as required under part 80 of the rules. All measurements made with the frequency counter referenced to a Rubidium frequency standard.

Temperature, degrees C	Frequency, MHz	Error from nominal. ppm	Error Hz
-20	121.4998345	1.362139918	165.5
-10	121.4998215	1.469135802	178.5
0	121.4998058	1.598353909	194.2
10	121.4998514	1.223045268	148.6
20	121.4997064	2.416460905	293.6
30	121.4994565	4.473251029	543.5
40	121.4992581	6.106172839	741.9
50	121.4991171	7.266666667	882.9
55	121.4991047	7.36872428	895.3



2.1057: Frequency spectrum to be investigated

The maximum frequency of operation is 123.1MHz; therefore the maximum frequency investigated was 1.231GHz.
The radiated tests performed on page 18 of test report 97/7096/3 extended to 4GHz.
All spurious measurements were within allowed limits.

Richard Read for McMurdo Ltd.

3) Items listed as confidential, **please take off this confidentially request**.

R Read/S Metcalf
McMurdo Limited