

**McMurdo Limited**

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**47 CFR SECTION 2.1046 TO 2.1057**

The required tests were either done in-house or at the BABT Product Service Test House.  
Measurements made at McMurdo were carried out by:

**Neil Jordan**, Design Engineer.

**Experience:** 9 years in a design and development environment.

**Qualification:** Higher National Diploma in Electrical and Electronic Engineering.

**Richard Read**, Senior Design Engineer.

**Experience:** 26 years in a design and development environment.

**Qualification:** Higher National Diploma in Electrical and Electronic Engineering.

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

|    |                              |                                     |
|----|------------------------------|-------------------------------------|
| 1. | Spectrum analyser            | Agilent Technologies E4405B         |
| 2. | Frequency counter            | Philips PM6680                      |
| 3. | Signal Generator             | Adret 740A.                         |
| 4. | Digital Storage Oscilloscope | LeCroy LT322                        |
| 5. | Temperature chamber          | Climatic Test Systems / West 4400   |
| 6. | Attenuator                   | N-type 50Ω in-line attenuator 20dB  |
| 7. | Thermometer                  | Comark 2001.                        |
| 8. | Frequency mixer              | SMC CLK703B.                        |
| 9. | Rubidium Frequency Standard  | Frequency Electronics Inc. FE-5680A |

**2.1046: RF POWER OUTPUT**

406 Transmitter: See BABT Test Report.RM608213 sheet 8.

121 Transmitter: See RTCM BABT Test Report RM608213A sheet 6.

**2.1047: MODULATION CHARACTERISTICS**

406 Transmitter: See BABT Test Report RM608213 sheet 9.

121 Transmitter: See RTCM BABT Test Report RM608213A sheet 6.

**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,  $(10\log 0.005)$ .



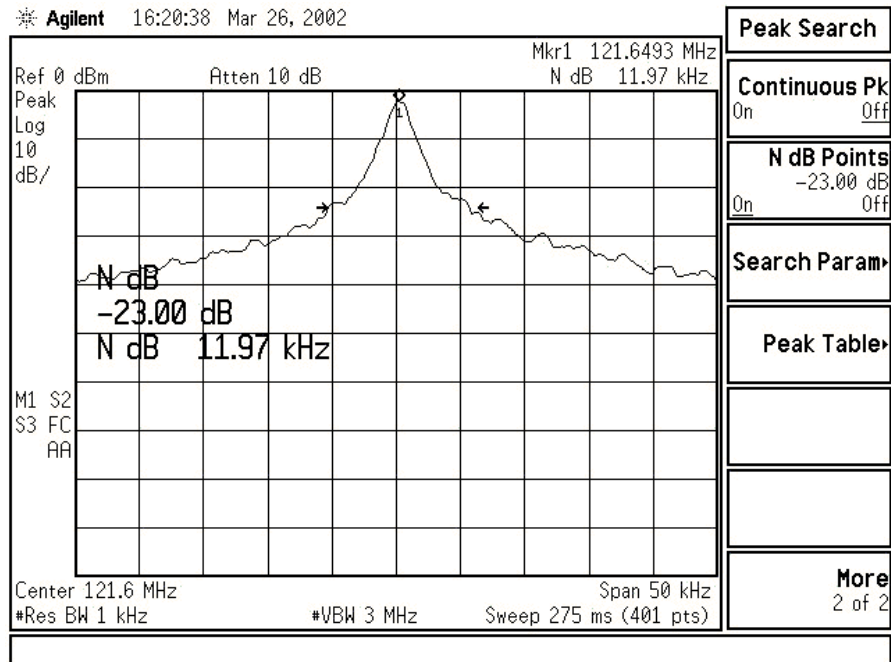
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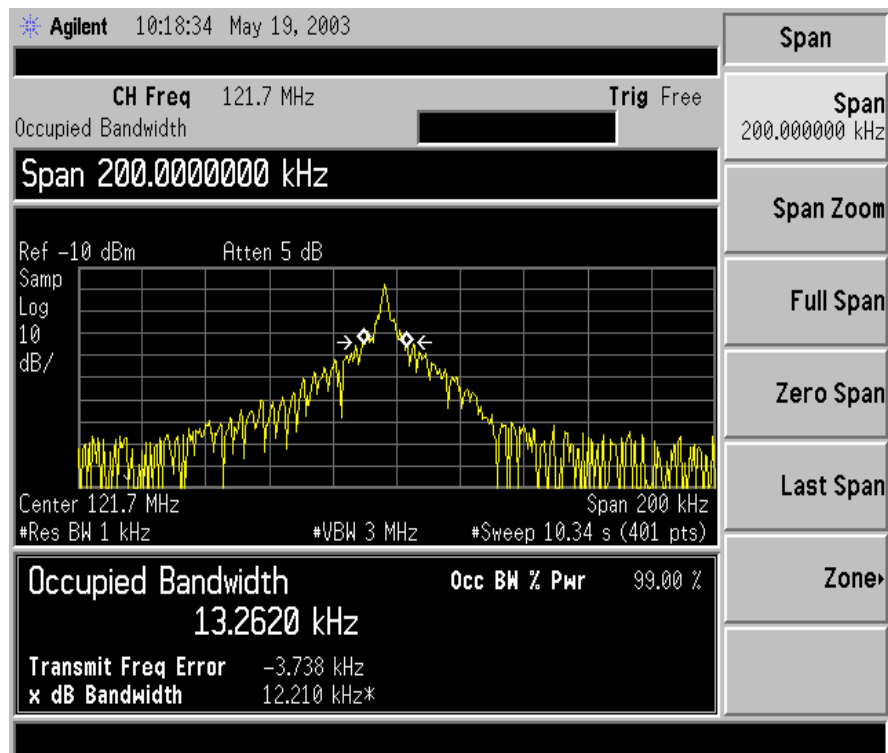
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The screen shot above shows that the occupied bandwidth for the 121MHz transmitter, (with A3X modulation), is 11.97kHz.

The screen shot below was produced in a special Engineering mode that produces a continuous Morse 'P' transmission. It shows that the occupied bandwidth for the 121MHz transmitter, (with A2A modulation), is 13.262kHz.



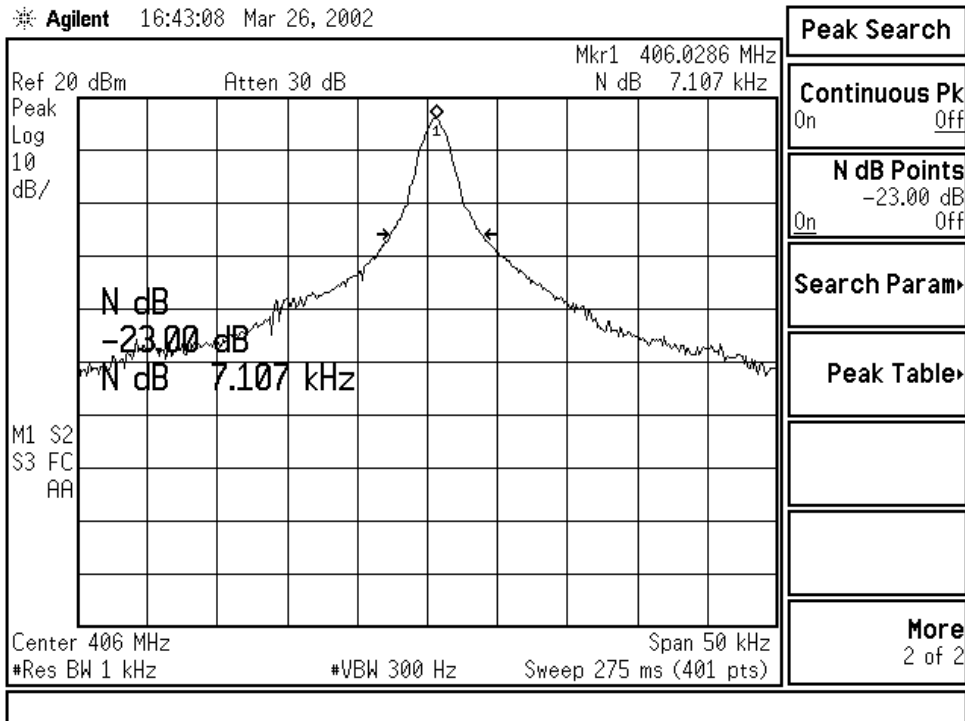
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The screen shot above shows that the occupied bandwidth for the 406MHz transmitter is 7.107kHz.

**2.1051: SPURIOUS EMISSIONS AT ANTENNA TERMINALS**

See also BABT Test Report RM608213 sheets 14,15 and 16.

The unit 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.



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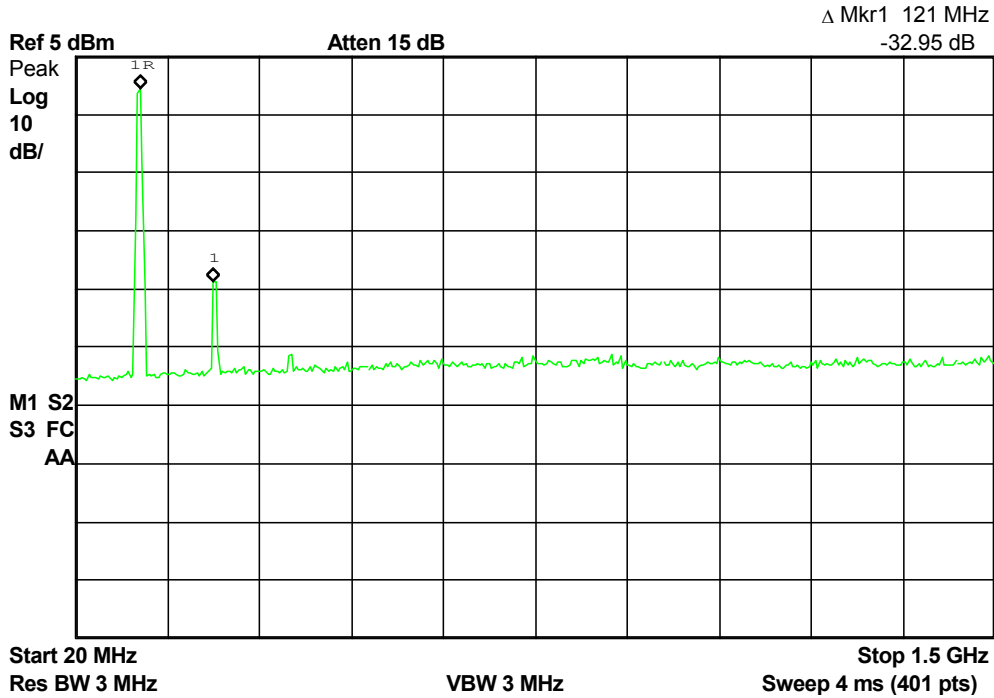
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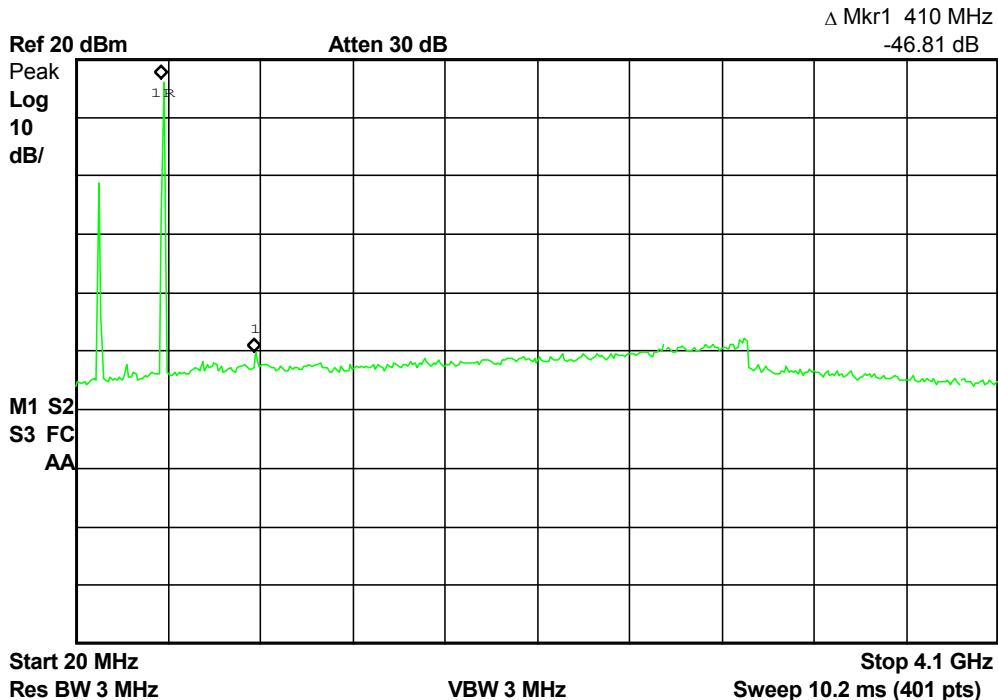


Agilent 11:46:42 Mar 27, 2002



The figure above shows the 121MHz transmitter spectrum. The largest harmonic present is the 2nd harmonic at -32.95dBc.

Agilent 13:19:34 Mar 27, 2002



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The figure above shows the 406MHz transmitter spectrum. The largest harmonic present is the 2nd harmonic at -46.81dBc. ( The signal to the left of the 406MHz carrier is the 121.5MHz transmission, not a harmonic).

**2.1053 FIELD STRENGTH OF SPURIOUS RADIATION**

See BABT Test Report 00608213B.

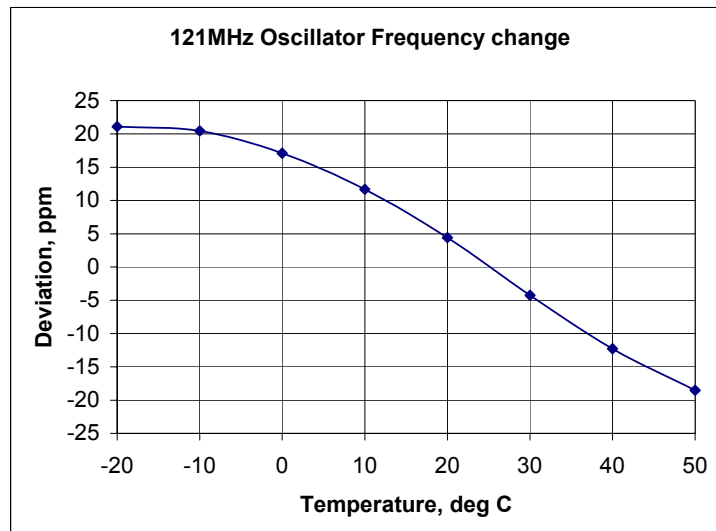
**2.1055: FREQUENCY STABILITY**

Frequency vs. temperature. Offset 121.65MHz test crystal fitted.

Conducted as per the FCC procedure. New battery pack fitted. Soak time 1 hour per step.

| FREQUENCY MHz | TEMPERATURE °C | ERROR * (ppm) |
|---------------|----------------|---------------|
| 121.652567    | -20            | 21.102        |
| 121.652487    | -10            | 20.444        |
| 121.652078    | 0              | 17.082        |
| 121.651420    | 10             | 11.673        |
| 121.650536    | 20             | 4.4063        |
| 121.649483    | 30             | -4.250        |
| 121.648505    | 40             | -12.289       |
| 121.647745    | 50             | -18.537       |

\* Error relative to the nominal centre frequency of 121.65MHz.



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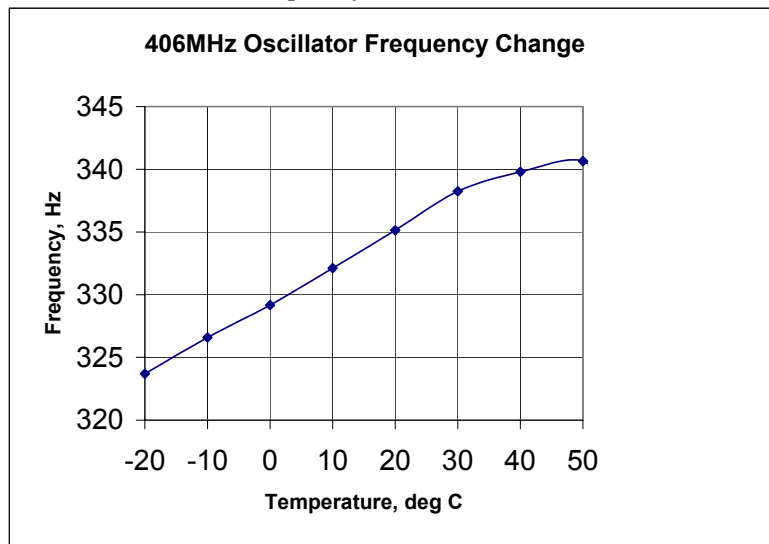
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| FREQUENCY MHz | TEMPERATURE °C | ERROR * (Hz) |
|---------------|----------------|--------------|
| 406.0282370   | -20            | 323.70       |
| 406.02832658  | -10            | 326.58       |
| 406.02832917  | 0              | 329.17       |
| 406.02833212  | 10             | 332.12       |
| 406.02833514  | 20             | 335.14       |
| 406.02833825  | 30             | 338.25       |
| 406.02833980  | 40             | 339.8        |
| 406.02834065  | 50             | 340.65       |

\* Error relative to the nominal centre frequency of 406.028MHz.

**2.1057: Frequency spectrum to be investigated**

See Frequency range statement in BABT Test Report 00608213B.

Richard Read  
Senior Design Engineer  
McMurdo Limited

