

**McMurdo Limited**

Silver Point, Airport Service Road, Portsmouth, Hampshire, UK PO3 5PB

Phone: +44 (0) 23 9262 3900

Fax: +44 (0) 23 9262 3998

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**47 CFR PART 95 Sub-part K**

The required tests were done in-house and 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.

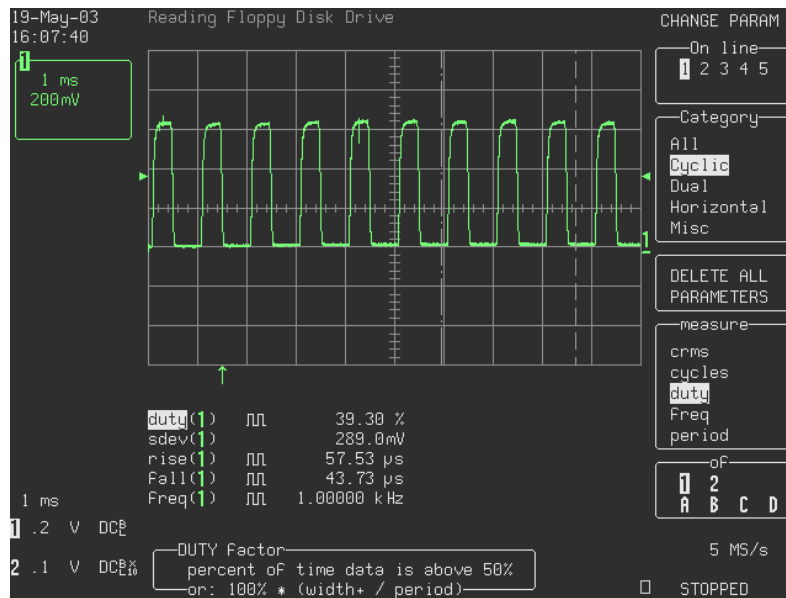
The following calibrated test equipment was used.

- |                                 |                                   |
|---------------------------------|-----------------------------------|
| 1. Spectrum analyser            | Agilent Technologies E4405B       |
| 2. Digital Storage Oscilloscope | LeCroy LT322                      |
| 3. Temperature chamber          | Climatic Test Systems / West 4400 |
| 4. Thermometer                  | Comark 2001.                      |

**RTCM Addendum Requirement:**

Modulation Frequency

An audio signal swept upward or downward by not less than 700 Hz within the range 300 to 1600 Hz except that during the dot and dash intervals of the Morse P the signal shall be modulated at  $1000 \pm 50$  Hz.



The plot above shows the Modulation duty-cycle for the Fastfind Plus with Morse P transmission. The modulation frequency is 1kHz.

The modulation factor for the Fastfind Plus with Morse P transmission.



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$$M = \frac{V_{\max} - V_{\min}}{V_{\max} + V_{\min}}$$

$$M = \frac{648mV - 33mV}{648mV + 33mV} = 0.903$$

Sweep repetition rate = 2.9Hz.

**Signal Enhancement Test (Limits >30% Power in 30Hz)**

(For a 2K00A2A transmission. The A3X transmission is reported in BABT Test Report RM608213A sheet 6).

$$\frac{\text{carrierpower}}{\text{totalpower}} = \log_{10} -1 \left[ \frac{dBc - dBt}{10} \right]$$

Fastfind Plus with Morse P transmission

$$dBt = -17.98dB + 10\text{Log } 0.39 = -22.07dB$$

$$dBc = -23.62dB$$

$$\%Power = \text{Log}_{10} -1 \times \frac{-23.62 - (-22.07)}{10} = \mathbf{69\%}$$



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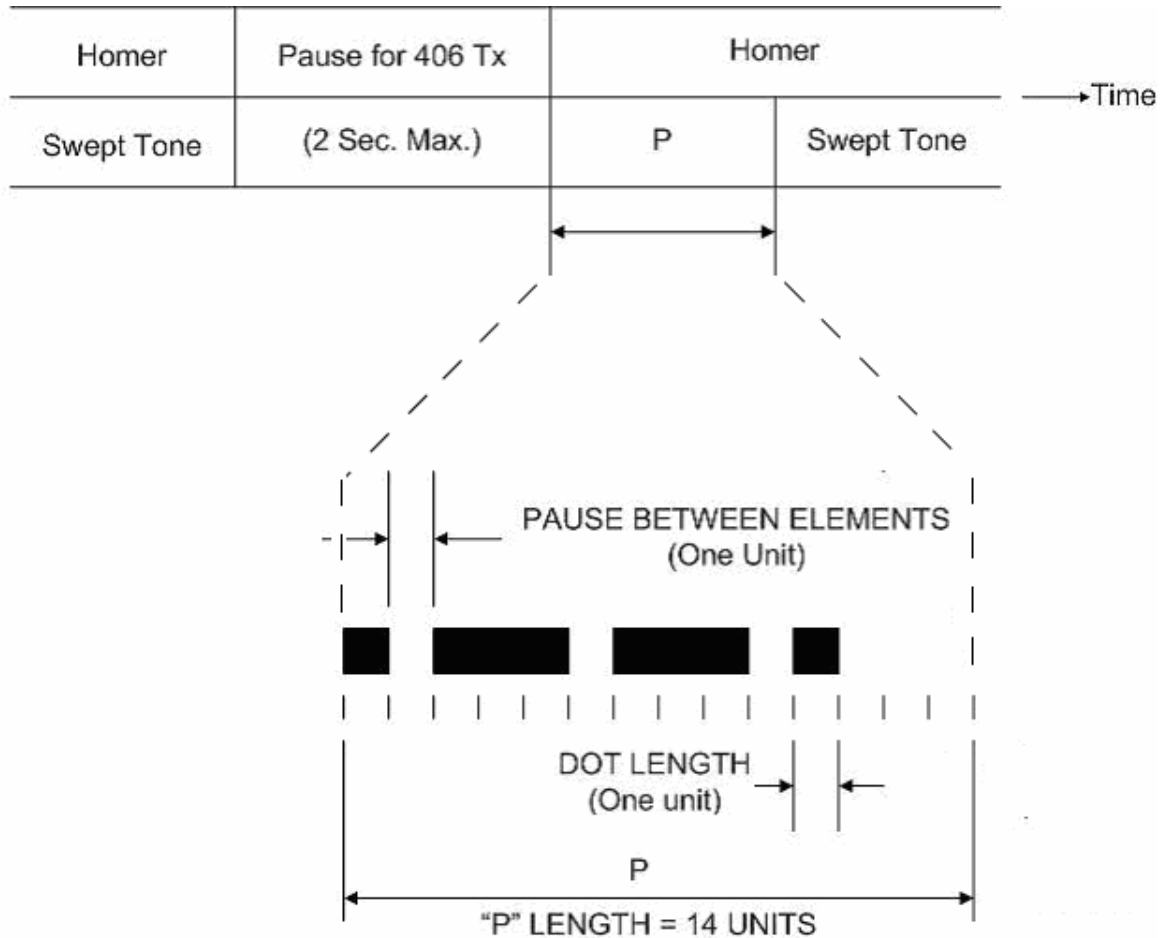
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[www.mcmurdo.co.uk](http://www.mcmurdo.co.uk)**RTCM Addendum Requirement:**Modulation<sup>2</sup>

Amplitude modulated (3K20A3X) except that a Morse P (2K00A2A) shall be inserted immediately following the (2 s maximum) interruption of the homer signal as indicated in the Figure 2-0 with a dot length (one unit) equal to 115 ms  $\pm$  5%.



<sup>2</sup> The A3X emission must have a clearly defined carrier frequency distinct from the modulation sideband components. At least 30% of the total power emitted during any transmission cycle with or without modulation should be contained within  $\pm 30$  Hz of the carrier frequency. Additionally, if the emission is interrupted by the transmission of the 406 MHz burst, the carrier frequency must not shift more than  $\pm 30$  Hz.

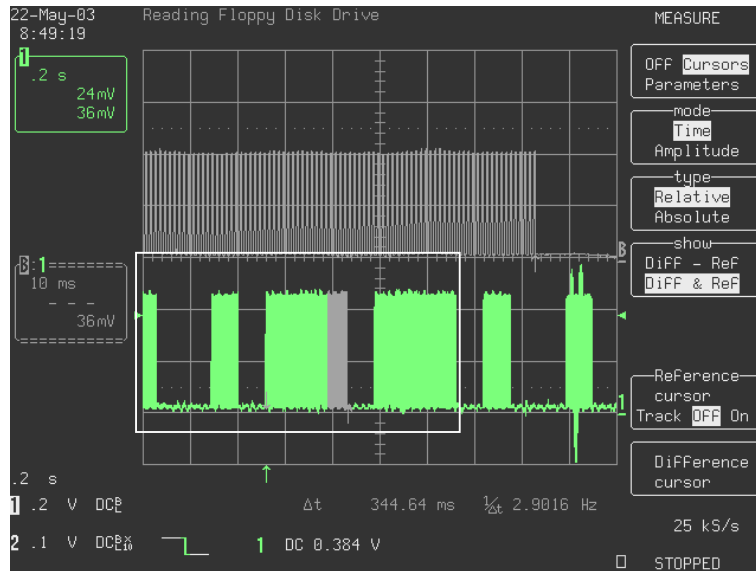


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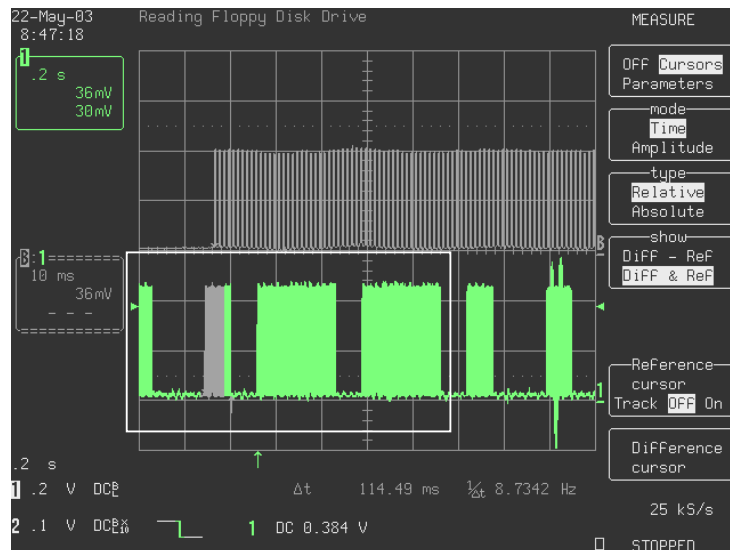
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[www.mcmurdo.co.uk](http://www.mcmurdo.co.uk)**Morse P transmission timings (-40°C, +25°C, +55°C)**Limits : The dot length (one unit) is equal to  $115\text{ms} \pm 5\%$ .

The above plot shows the Morse P transmission in the enclosed box. The dash timing at 25°C is 344.64ms.



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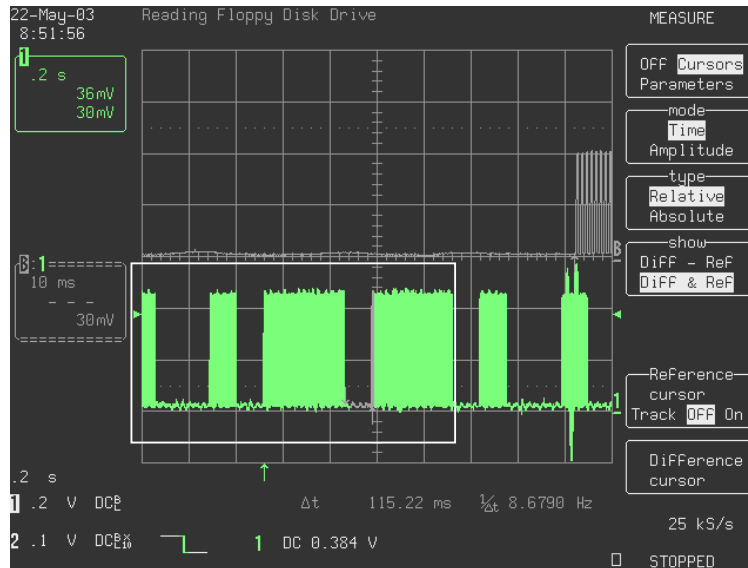
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The above plot shows the Morse P transmission in the enclosed box. The dot timing at 25°C is 114.49ms.



The above plot shows the Morse P transmission in the enclosed box. The dot *space* timing at 25°C is 115.22ms.



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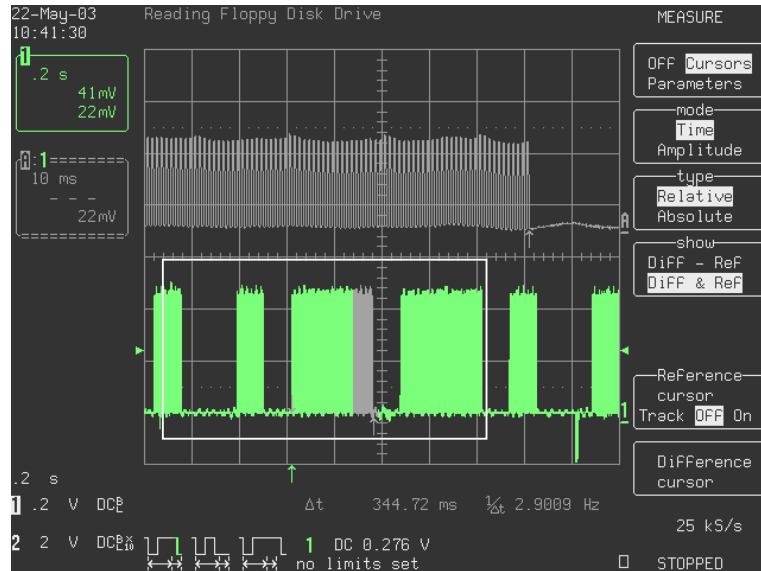
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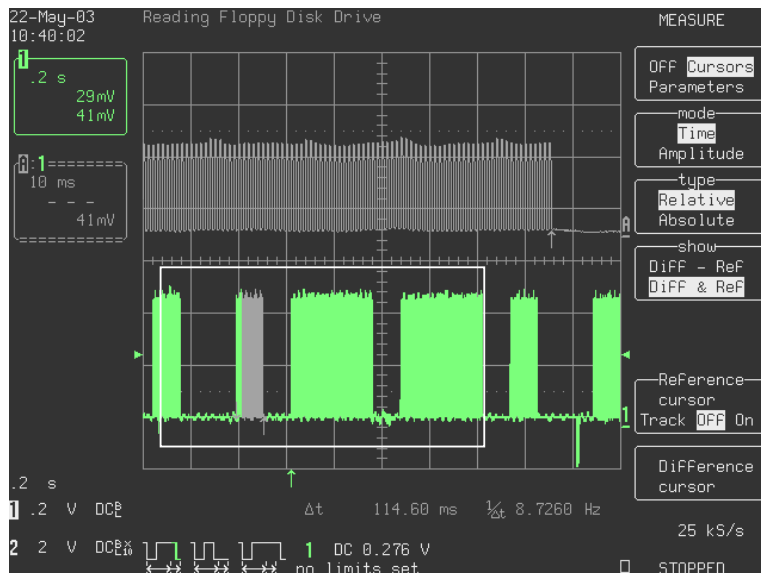
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## -40°C Tests



The plot above shows the Morse P transmission in the enclosed box. The dash timing at -40°C is 344.72ms.



The above plot shows the Morse P transmission in the enclosed box. The dot timing at -40°C is 114.60ms.



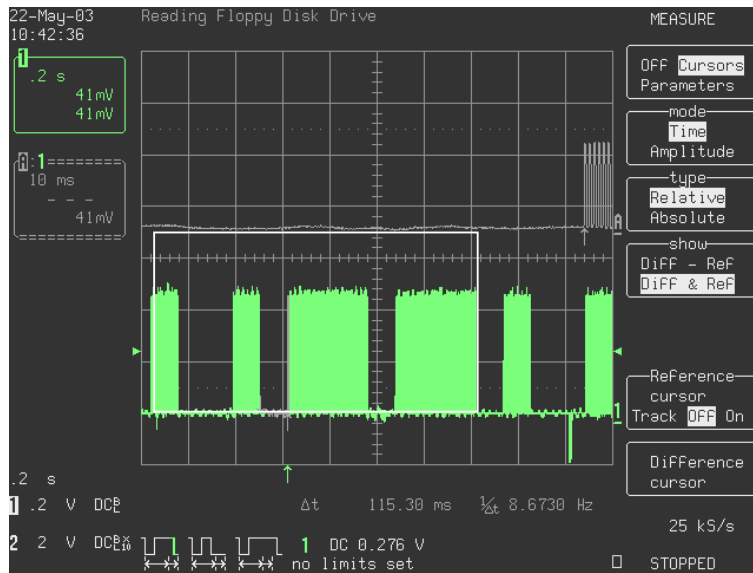
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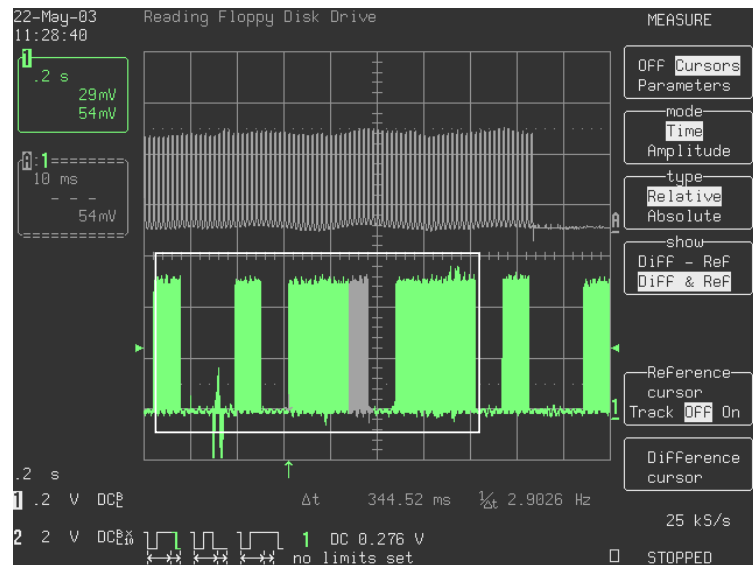
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The above plot shows the Morse P transmission in the enclosed box. The dot space timing at -40°C is 115.30ms.

## +55°C Tests



The above plot shows the Morse P transmission in the enclosed box. The dash timing at 55°C is 344.52ms.

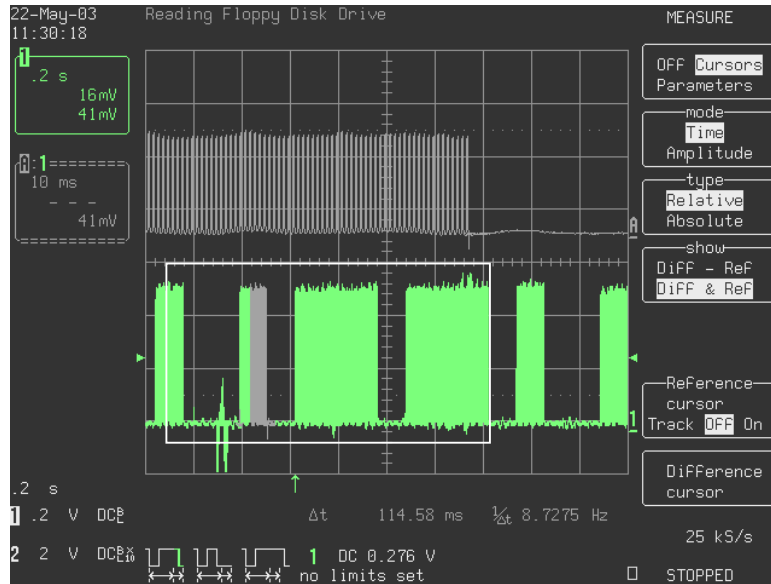


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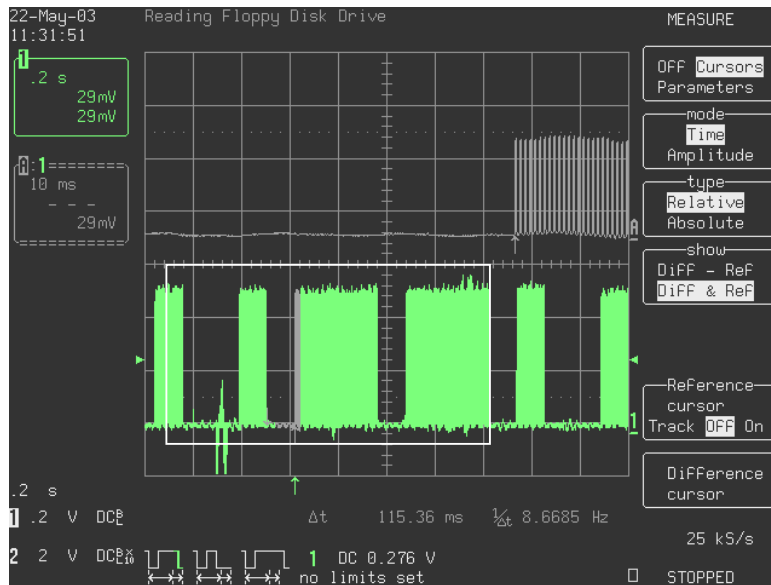
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The above plot shows the Morse P transmission in the enclosed box. The dot timing at 55°C is 114.58ms.



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The above plot shows the Morse P transmission in the enclosed box. The dot space timing at 55°C is 115.36ms.

Richard Read  
Senior Engineer  
McMurdo Limited.

