

**1090-WP-2-05**  
**30 January 2001**

**RTCA Special Committee 186, Working Group 3**

**ADS-B 1090 MOPS**

**Meeting 2**

**Possible Error in Table 2-90**

**Randy Jacobson**  
**UPS Aviation Technologies**  
**Presented by James Maynard**

| <b>SUMMARY</b>  |
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| <b>Describes a possible error in the last line of Table 2-90.</b> |

To: Special Committee 186

From: Randy Jacobson, Software Engineer, UPS – Aviation Technologies

Date: January 17, 2001

RE: RTCA Document DO-260, Table 2-90

I believe there is an error in Table 2-90, the “Verification of Transition Table.” The last line reads

|                         |                         |       |       |       |       |
|-------------------------|-------------------------|-------|-------|-------|-------|
| 87.00000001117587090000 | 87.00001141056418419000 | 00000 | 00000 | 00001 | 10000 |
|-------------------------|-------------------------|-------|-------|-------|-------|

The discrepancy that I note is the  $lat_{low}$  number of this line.

Using the formula described in Appendix A, section A.7.3, to extract the latitude that the receiving ADS-B system will extract from the transmitted message yields an RLat of 87 degrees. Using this as the latitude for the NL function, as described in Appendix A, section A.7.2 part 2.d, yields the following

$$A = 1 - \cos\left(\frac{\pi}{2 \cdot NZ}\right) = 0.005478104631727$$

$$B = \cos^2\left(\frac{2\pi}{180^\circ} \cdot |lat|\right) = (0.052335956242944)^2 = 0.00273905231586335$$

$$C = 1 - \frac{A}{B} = 1 - 2.000000000000010 = -1.000000000000010$$

$\arccos(C) = \text{undefined}$

The sentence immediately following this formula states “For latitudes at or near the N or S pile, where the above formula would either be undefined or yield  $NL(lat) = 0$ , the value returned by the  $NL()$  function shall be 1.” Therefore  $NL(87^\circ) = 1$ .

With this knowledge it follows that an encoded value of 0x00000 should not be used as the encoded value just below the transition value between  $NL() = 1$  and  $NL() = 2$ , but instead should be the value just above the transition value. I believe that the last line on the table should read

|                         |                         |       |       |       |       |
|-------------------------|-------------------------|-------|-------|-------|-------|
| 86.99999427795000000000 | 87.00000001117587090000 | 1FFFF | 00000 | 00000 | 10000 |
|-------------------------|-------------------------|-------|-------|-------|-------|