**White Paper**

# Comparison of RPC00A and RPC00B TREs

21 August 2006

**Purpose:** This paper describes the technical differences between the RPC00A and RPC00B Tagged Record Extensions (TREs) as used in the National Imagery Transmission Format Standard (NITFS).

**Background:**  In the later part of the 1990’s, a determination was made to extend the use of the RPC00A TRE to a wider community of users, to include tactical airborne and commercial satellite sources of imagery. Unfortunately, the documentation prepared for the tactical and commercial use of RPC00A expressed the sequence of the terms for the rationale polynomial equations in an order different from that used by the systems initially deploying RPC00A. The difference in implementation was only discovered after significant numbers of commercial imagery products had been produced. A determination was made to differentiate between the two sequences of terms by renaming the TRE as RPC00B for the tactical/commercial sequence.

**Discussion:**

There are two know differences between the deployed capabilities of RPC00A and RPC00B.

1. *Coefficient Sequence*. While the data field structure of the RPC00A and RPC00B TREs is identical, except for the identifier field value, the underlying rational function polynomial equations for which the polynomial coefficients are populated in the TREs are different. The order of the 20 sets of coefficients specified for RPC000B does not match the order of the 20 sets of coefficients specified for RPC00A.
2. *Error Terms*. The methodology to populate and use the two error terms, ERR\_BIAS and ERR\_RANDOM, may be different between the two user communities. The airborne and commercial implementers collaborated on a common use for the error terms for RPC00B. Analysis for difference with RPC00A practice was not available at the time this paper was written. Even so, fundament flaws in the RPC approach for managing error have been addressed in the follow-on effort to define Replacement Sensor Model (RSM).

The RPC rational function polynomial equations are generally defined as:

 and 

The rational function polynomial equation sequence of coefficients for **RPC00B** is:



The rational function polynomial equation sequence of coefficients for **RPC00A** is:



**To change RPC00B ⇒ RPC00A:**

|  |  |  |
| --- | --- | --- |
| **C8 ⇒ C9**  **C9 ⇒ C10**  **C10 ⇒ C11**  **C11 ⇒ C8** |  | **C13 ⇔ C15** |
|  |
| **C14 ⇔ C18** |
|  |
| **C17 ⇔ C19** |

**Summary:**

This paper summarizes the differences between RPC00A and RPC00B TREs. The difference in sequence of coefficient terms is identified. The difference in use of error terms is not conclusive, and will need additional research to ascertain common practice for RPC00A.