

REX Radiometer Response to Comments

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1. Appendix A

1.1 Section E, REX Radiometer

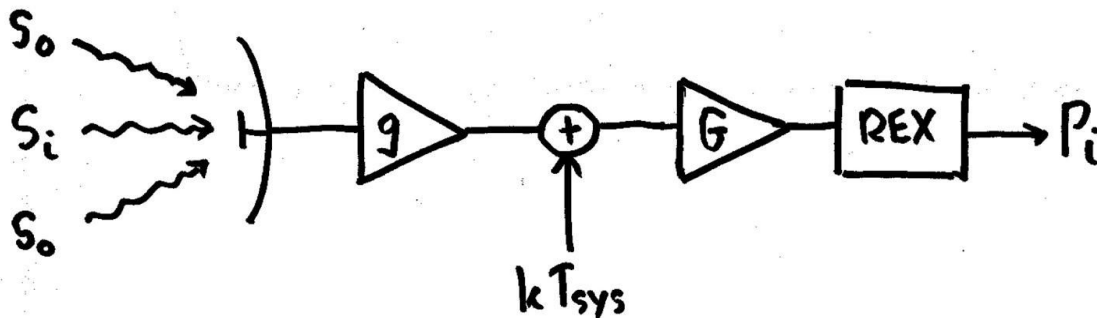
Model

The reviewer comments:

“I don't believe the equation at the top of page 8 can be solved for the system temperature. First, I believe there is a typo and it should be written: “

$$P_{\text{REX}} = g\Phi_{\text{source}} + kT_o$$

The reviewer's proposed revision leads to the accompanying figure:



and the reviewer's development of an analytical demonstration of the inability to measure the X-band Receiver's system temperature, T_{sys} .

Both the revision of the equation, and the revision of the figure stem from the reassignment of the injection of white noise, i.e. kT_{sys} . The original injection point presented in the REX Radiometer documentation was behind the antenna and feed, and just ahead of the gain stage (labeled “ g ” in the above figure). The revision moves the injection point for the system noise to after the first gain stage. It is common in radiometry to reference the system noise, i.e. kT_{sys} , to the location before the first gain stage. This reference choice affords a

gain-independent value for T_{sys} . The “pre-first-LNA” assignment of T_{sys} , is used commonly in radiometry.

A gain-independent measurement for T_{sys} is essential for radiometry because thermal energy illuminating the antenna is additive to T_{sys} , and can thus be directly scaled to physical value. If the original injection point for T_{sys} is retained, then the REX Radiometric discussion on the method for measuring T_{sys} remains valid and the estimates for T_{sys} stand.