RCP02 V16 Release Notes

These notes cover changes made to the RCP02 code since release V15 of 13 October 1998. If you are upgrading from an earlier release, please read those notes also.

Bug Repairs

1. Repaired an error in the type in of the ”Second position break point” field in the ”Position Servo” setup menu. The value could not be reduced from whatever value was currently in that slot. This bug has remained unnoticed for more than a year.

New Features

1. The RCP02 velocity servo has been improved to include a velocity error integral feedback term, in addition to the proportional error feedback term and bias terms that have always been available. The error integral effectively removes any remaining steady-state velocity bias from the servo, and guarantees that scans will run at precisely their requested speed.

Setup Changes

1. The “Velocity <AZ/EL>” servo setup command now includes the following questions to configure the error integral feedback term.

   ```
   Apply velocity error integral correction: YES
     Characteristic time of the integral:  2.00 sec
     Maximum resulting drive bias:  +/–25.00 D–Units
   ```

   The new feature is switched On/Off using the first question.

   The second question establishes the characteristic time T_0 of the integral, which is defined as follows. Suppose that a fixed velocity error E was sustained for a period of time. The proportional feedback term would produce a drive $D=SE$, where S is the velocity feedback slope. Then, if that same error E were applied to the integrator for T_0 seconds, the same drive term D would also result.

   The gain of the integrator effectively is established by T_0 ; larger times produce smaller gains. One rule of thumb (Ziegler–Nichols) for a first guess of S and T_0 is to disable the integral feedback, and increase S until reaching a value S_u , at which the antenna goes into unstable oscillation with an observed period P_u. Reasonable first settings will then be obtained with $S = S_u / 2.2$, and $T_0 = 2.2 P_u$.

   The integral can be clamped (the so called “anti-windup” feature) to prevent it from drifting into large values when the antenna is not in equilibrium. This clamp value is expressed as the maximum drive correction that can be contributed from the integral term alone. If your antenna is well characterized by its sustaining drives and nominal drive slopes, then this clamp value can be reduced (since the nominal guesses do not need to be adjusted very much). This will help reduce brief overshoots that can be caused by the integral feedback.