Limit Logic in TCS

A new limit logic and overall telescope safety plan was discussed on 5/20/2019 for TCSNG. This document is a description of that discussion. Currently this document will focus on Horizon limits but the basic ideas could be ported to Equatorial limits as well.

New Constraints On Bias and Paddle Rates

We would like to implement a new upper limit on Bias and Paddle (Guide and Drift) rates. There is still discussion about what exactly the upper limit will be but we are currently hovering around 300 arc seconds per second. If a rate is sent to TCS that is higher than the limit one of two things will happen:

1. the rate won't change
2. the rate will be set to the max rate

Note you will not be able to slew with bias rates or the paddle. ===== Limits ===== The new limit logic discussed is a four tiered limit logic. There will be two software limits (S_1 and S_2) and two hardware limits (H_1 and H_2). S_1 **S_1 will act like the current software horizon limits in that You can get passed S_1 by tracking, with bias rates or with the paddle guide and drift rates. You will not be able to move below S_1 using the standard goto functions in TCS. You will be able to move out of this limit but at a reduced rate (around 300 arcseconds per second).** S_2 **S_2 will be a no go zone by goto functions, bias rates and the paddle. Hitting this software limit will be functionally equivalent to hitting the cancel button on the GUI. The telescope will ramp down and come to a stop. You will be able to back out of this limit.** H_1 **H_1 will act the same as S_2 in that the telescope will ramp down to a stop when the limit is hit. The only difference will be that this limit is a hardware limit and immune from bad initialization. You will be able to back out of this limit.** Note it is possible that H_1 is above S_2 H_2 **

This is the last hardware limit and will function the same as the final hardware limit currently at most of our telescopes. As soon as it is hit, it will cut power to the drive system either by powering off the drives or by activating the Safe Torque Off option. You will not be able to back out of this limit with the control system. It will have to be done manually.

Differences From Current System

At our current TCSNG telescope we have one software horizon limit that does not allow goto but does allow bias, tracking and paddle rates.