



# MULTIPLE MIRROR TELESCOPE OBSERVATORY

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MMTO Internal Technical Memorandum 85-5

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Re: Autoguiding Techniques

Date: December 31, 1985

In this memorandum, possible combinations of automatic guiding techniques are reviewed, priorities are assigned for the implementation of the more useful techniques, and a schedule is proposed for offering these features in routine operation.

## I. Techniques

The attached table shows 13 possible autoguiding configurations, some of which are more usable than others. There are four basic techniques:

A. Mount only. This method measures common mode tracking error only and sends the corrections either to the mount or to the secondaries. If the corrections are sent to the mount, they must be sent over the link from the TCS computer to the mount computer. There is sufficient range of motion of the secondaries that they will not reach their stops for an estimated integration time of at least 30 minutes. The main problem with this method is that there are no flexure coefficient corrections; however, short term errors are predominantly common mode.

This method can be used with the field rotating or not rotating, with stacked or unstacked images, with spillover light from stacked or unstacked images, and with any instrument having a reflecting surface at the focal plane. The situation in which this method is most likely to be used is when the images from individual telescopes are so faint that the combined light from all 6 telescopes must be used to produce a bright enough image for autoguiding.

Software exists for this method.

B. Rotating sector. This method uses a mask at the pupil plane so that only nonadjacent images are relayed in sequential groups to the acquisition TV. Corrections for the individual images can then be measured sequentially and sent to the secondaries. Both common mode and differential corrections are determined as before.

Current hardware limits moving from one sector to the next in less than 3 seconds. If one allows 2 seconds for measuring image position, then each image will be updated twice a minute if one image is sectored at a time or four times a minute if two images are sectored at a time. This is too slow to correct for the bulk of common mode tracking error. Increasing this speed will require rebuilding the pupil wheel drive.

This method may be used for stacked and unstacked images, for spilled light or guide stars, and for rotating and non-rotating top box, though the