GBT Memo No. 14

NATIONAL RADIO ASTRONOMY OBSERVATORY
Charlottesville, Virginia

September 22, 1989

MEMORANDUM:

TO: D. Heeschen

FROM: J. Payne

SUBJECT: High-Frequency Performance of GBT

A group of us (Larry, Lee, Fred, John) met this morning to discuss the 100-m surface. As a prelude to our discussions, we wrote down the surface error budget as best we could. The numbers we came up with are significantly different from those in the proposal.

1) Panel Errors (based on VLBA panels)

	Microns
Manufacturing	70
Gravity	75
Thermal (0.2°C/m in plane of panel)	50
Wind (15 mph)	40
Total (rss)	120

2) Panel Assembly Errors

	Microns
Manufacturing (i.e., setting)	70
Gravity (calculated by Lee)	75
Thermal (guess)	50
Wind (guess)	40
Total (rss)	120

3) Subreflector (small, carbon fiber)

Estimated 70 microns

4) Surface Measuring and Closed-Loop Control

Estimated 100 microns

This is the error remaining after gravitational and thermal distortions are removed by the active control system.

These numbers differ from the proposal as indicated in the table below:

	This Estimate (microns)	Proposal (microns)
Panel	120	70
Panel assembly	120	-
Subreflector	70	70
TOTAL	184	99
Minimum operating wavelength with perfectly adjusted surface ($\lambda = 16\ \sigma$)	3.0 mm	1.6 mm

Estimated additional errors for measurement and closed-loop control = 100 microns.

Total surface error = 210 microns.

λ_{min} (16 σ) = 3.4 mm (88 GHz)

cc: F. Schwab
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