


National Radio Astronomy Observatory  
Tucson, Arizona

September 11, 1986

MEMORANDUM

TO: D. Hogg  
FROM: John Payne   
SUBJECT: Sterling Mount on 12 M

On 10 September 1986 I ran some tests on the 12 m focus mechanism. This note gives the results of the tests and my thoughts on what to do about the Sterling Mount and subreflector assembly over the next year.

Tests on Focus Mechanism.

A dial gauge was attached to the rear of the Sterling Mount so that the axial movement of the subreflector could be monitored. The focus was then commanded to positions from 10 mm to 60 mm in 5 mm steps via the manual control, the position being read from the position readout. No attempt was made to position the movement to better than  $\pm 0.02$  mm. The results are shown in Table I and are plotted in Figure 1. From this we conclude that the scaling of the mechanism is slightly wrong and, in fact the Sterling Mount moves by a factor of  $\frac{37}{40} = 0.93$  of the value on the readout.

The next test was one in which we attempted to determine how accurately the Sterling Mount would be positioned during normal observations. Choosing the nominal focus of 40 mm the focus was moved in steps of approximately 0.1 mm up to a value of 41 mm. Both the readout and the dial gauge reading were noted. The results are given in Table II and are plotted in Figure 2.

It seems pretty clear from these results that we can position the axial focus to better than 0.004 inches at the present time. At our shortest operating wavelength this represents an accuracy of positioning of  $\frac{\lambda}{8}$  which is ok.

Conclusions and Recommendations.

- 1) Although the Sterling Mount is old and many parts of it are far from ideal its performance is adequate and it should last fine until next summer or longer.
- 2) The present Sterling Mount is overcomplicated and should be redesigned to give a simpler, lighter, more reliable, more precise package. We should budget 15K for components and someone like Ron Maclean's time and aim to have a replacement Sterling Mount for next summer.
- 3) Specific changes that I would recommend would be the following:
  - a) Eliminate the polarization drive. We don't need it and it adds to the complexity of the mechanism.
  - b) Restrict the axial movement to a few centimeters rather than the 10 cm in the existing mechanism.
  - c) Use one motor instead of 4.
  - d) Use an LVDT instead of a pot.
  - e) Make the N-S movement an integral part of the mechanism rather than an add-on feature.

During the coming year we should also repackage the subreflector assembly. The objectives here would be to reduce the weight of the assembly and to add a broad band calibration source suitable for all continuum wavelengths.

JP:mt

c: P. Rhodes  
P. Jewell  
R. Freund

TABLE I

	<u>DIAL GAUGE READING</u>		MILS.
<u>READ OUT (MM)</u>	<u>OUT</u>	<u>IN</u>	
10	000		
15	190	188	
20	369	371	
25	550	550	
30	731	736	
35	919	924	
40	1104	1100	
45	1291	1293	
50	1476	1479	
55	1669	1669	
60	1854	1854	

TABLE II

	<u>READ OUT</u>	<u>DIAL GAUGE</u>
OUT	39.97	1108
	40.09	1111
	40.20	1112
	40.30	1115
	40.42	1120
	40.52	1126
	40.58	1127
	40.69	1131
	40.81	1136
	40.92	1140
	41.03	1144

	<u>READ OUT</u>	<u>DIAL GAUGE</u>
IN	40.88	1142
	40.80	1139
	40.72	1132
	40.60	1131
	40.52	1126
	40.39	1121
	40.28	1119
	40.18	1115
	40.10	1110
	39.99	1109

DIAL GAUGE READING (THOUSANDS OF INCH)

SLOPE = 37 THOUSANDTH / MM.

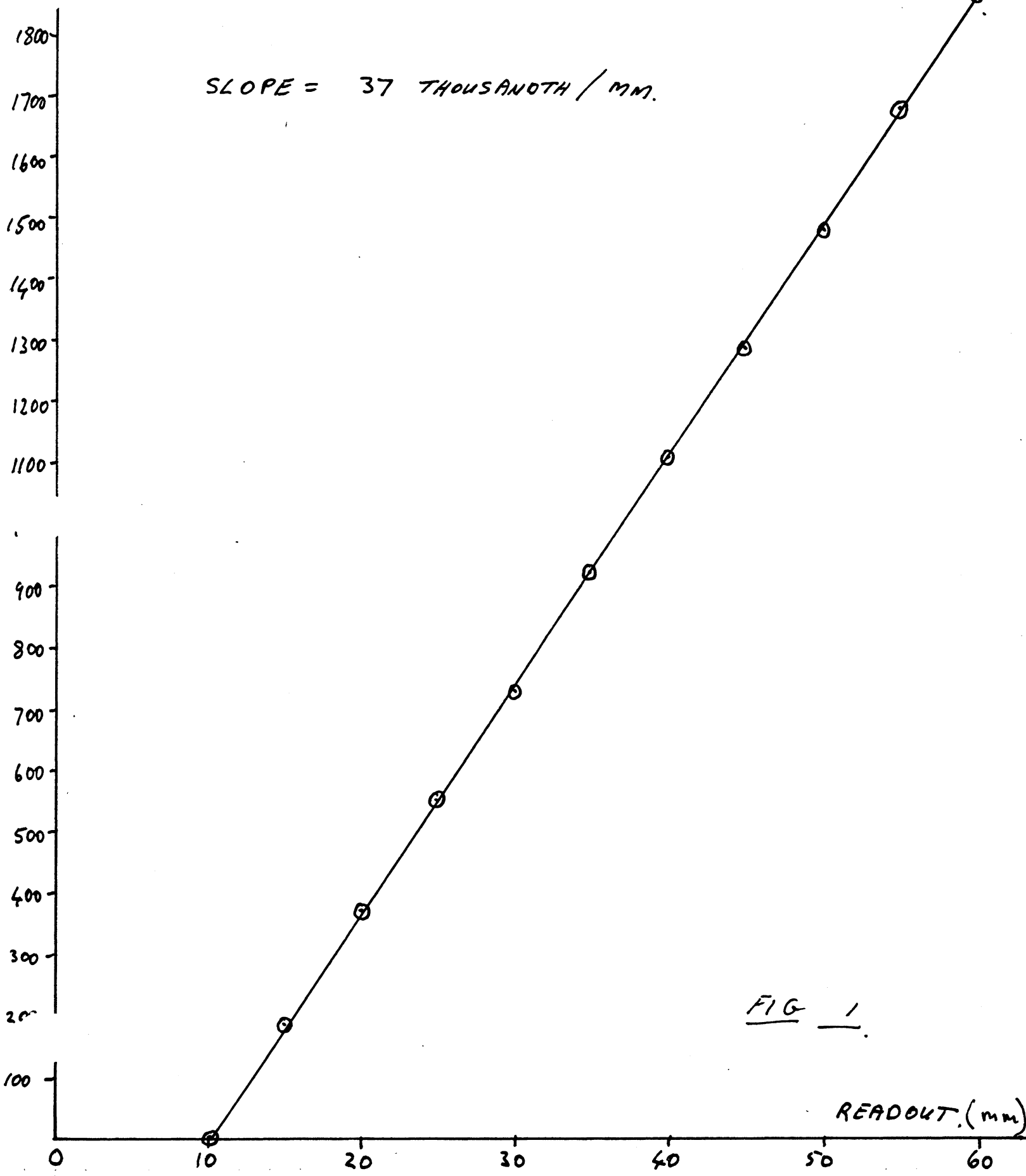


FIG 1

READOUT (mm)

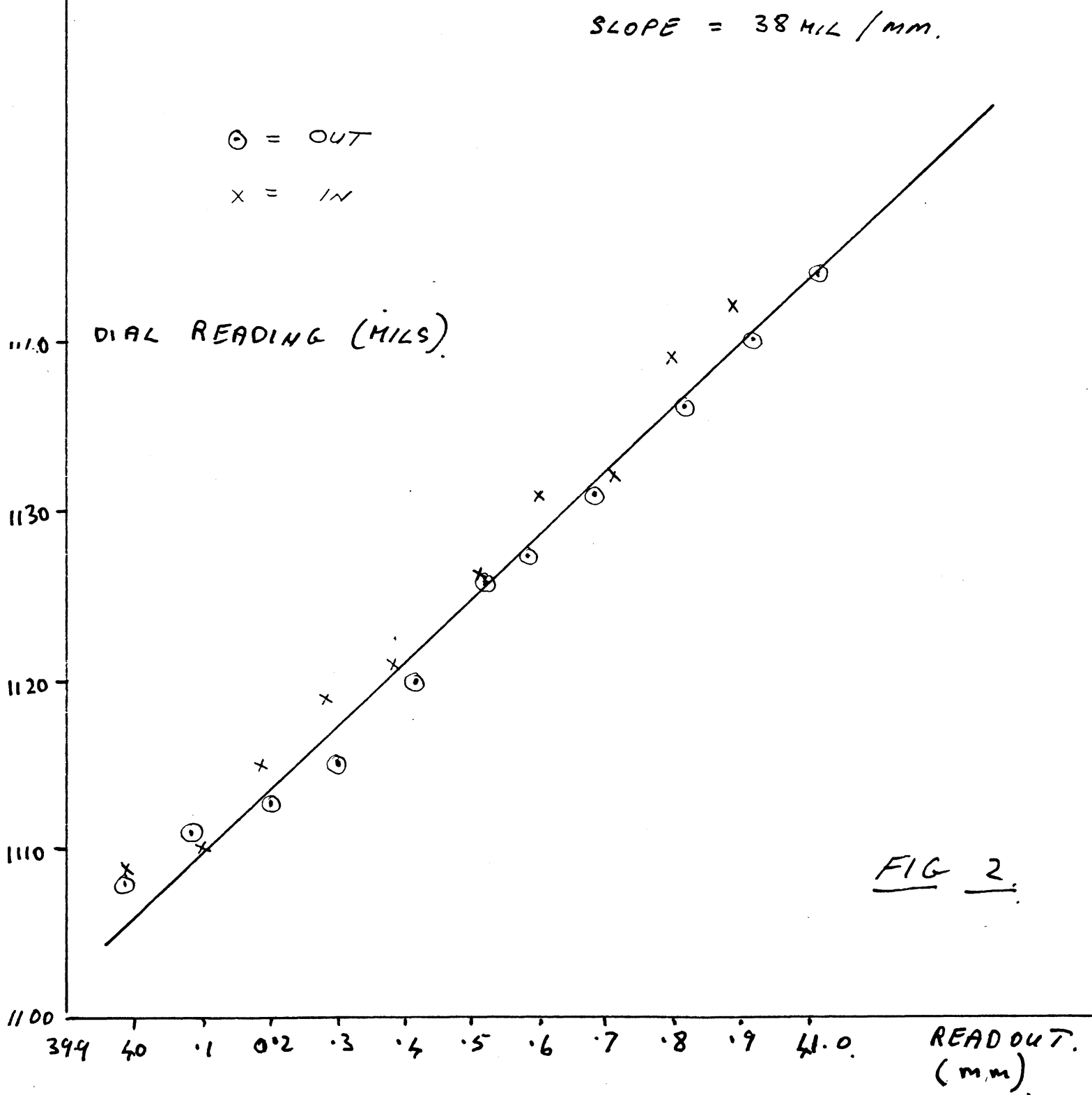


FIG 2.