

ENGINEERING MEMO #117

FEB 23, 1977

TO: G. PEERY

FROM: L. J. KING *L. J. King*

SUBJECT: 36-FT STRUCTURAL MODIFICATION (2-14-77 THRU 2-17-77)

THE MODIFICATION STARTED AT 10 AM MONDAY, 2-14-77. SIX -1 PLATES (REF. DWGS. 86D00123 & 00125) WERE INSTALLED. BOBBY WAS GOING TO MAKE SOME MEASUREMENTS IN THE FOLLOWING EVENING TO OBTAIN REFERENCE DATA OF THE TELESCOPE BEFORE MODIFICATION. THE -1 PLATES ADDED 100 LBS ON EACH HALF OF THE REFLECTOR AND WERE ASSUMED TO HAVE NEGLIGIBLE EFFECT ON THE ORIGINAL STR. WE HAD SOME DIFFICULTIES MAINLY DUE TO THE INTERFERENCES BETWEEN THE PLATES AND THE WELDS OF THE EXISTING STRUCTURE. THE FIRST HALF (INSTALLED WITH THE REFLECTOR AT 16 DEG ELEV) WAS NOT FINISHED UNTIL 3 PM (=6X6 MAN-HOURS). WITH THE EXPERIENCES ACCUMULATED, THE OTHER THREE PLATES WERE INSTALLED (WITH REFLECTOR AT ZENITH) LESS THAN 3X3 MAN-HOURS.

ON TUESDAY, THE A AND A' STEEL ANGLES WERE REPLACED BY -7 & -8 ALUMINUM ANGLES. ALL WORK WERE DONE WITH THE REFLECTOR AT ZENITH. IN THE AFTERNOON, WE HAD TRIED TO SETUP THE FEED LIFTING CABLES BUT NOT MUCH ACCOMPLISHED BY THE QUITTING TIME. CONSEQUENTLY, DECISION WAS MADE NOT TO LIFT THE FEED SUPPORTS FOR THE NEXT DAY.

-4 AND -5 ASSEMBLIES WERE INSTALLED WITH RELATIVELY EASE EXCEPT WE NEED ALL THE HELPING HANDS AVAILABLE TO HAND DOWN TWO OF THE FOUR HEAVY B ANGLES FROM THE PLATFORM. THE REMOVED B ANGLES WEIGHTED 300 LBS EACH. IN THE THREE DAYS, WE MADE USE OF ALMOST EVERY TOOL AVAILABLE IN THE DOME, PLUS SOME FROM THE KPNO'S MACHINE SHOP. IT WAS A GREAT EXPERIENCE AND WAS ESPECIALLY THANKFUL TO THE ENTHUSIASTIC WORK BY THE TUCSON GROUP. BY 3:30 PM ALL MODIFICATION WORKS WERE DONE (A TOTAL OF 110 MAN-HOUR MODIFICATION WORK ---- NOT INCLUDING TRAVEL AND TELESCOPE OPERATORS' TIME).

AFTER SUPPER, BOBBY FOUND OUT THAT THE DEL-F (ELEV. FOCAL LENGTH - AZ. FOCAL LENGTH) WAS EXCESSIVELY LARGE AS COMPARED WITH THAT BEFORE MODIFICATION. WE DECIDED TO IMPROVE THIS.

WITH TONY, BOBBY AND MYSELF WORKING ON THE DISH AND JOHN OPERATING THE TELESCOPE, WE MADE FOUR ADJUSTMENTS IN THE 10 HOURS. THESE ARE SUMMARIZED AS FOLLOWS:

DESCRIPTION	DEL-F	AVG. ANT. TEMP.
I REFERENCE DATA (2-14-77) W/ -1 PLATES INSTALLED	-1.9MM	4.8 DEGC
II AFTER STRUCTURAL MODIFICATION COMPLETED (2-16-77)	+7.8MM	9.8 DEGC
III FOUR ADJUSTMENTS (2-16 TO 2-17-77)		
1) REFLECTOR AT 35 DEG FROM ZENITH ALL BOLTS OF THE UPPER HALF OF MOD. MEMBERS WERE LOOSENED THEN RE-TIGHTENED. INTENDED TO RELEASE THE NORMAL FORCE FROM UPPER MAIN LEG	+7.5MM	9.2 DEGC
2) LOOSEN BOLTS OF BOTH SMALL FEED SUPPORTS. COMPRESSIONS FOUND IN BOTH SMALL LEGS WHICH EXPLAINED WHY ADJ. (1) HAD NO EFFECT ON THE DISH.	0 MM	9.0 DEGC
3) LOOSEN SUPPORT BOLTS OF NORTH MAIN FEED SUPPORT. SEPARATION OF FEED SUPPORT FROM THE SURFACE WAS OBSERVED BUT SMALL. TILT REFLECTOR SUCH THAT .032" SHIMS INSERTED UNDER THE SMALL LEGS THEN TIGHTEN ALL BOLTS.	-7.7MM	8.0 DEGC
4) LOOSEN NORTH MAIN FEED SUPPORT, INSERT .032" SHIMS UNDER THE SUPPORT AND TIGHTEN BOLTS.	-2.5MM	6.9 DEGC

IT CAN BE SEEN THAT TO CORRECT THE DEL-F IS JUST A MATTER OF FINDING THE SHIMS OF CORRECT THICKNESS TO BE INSERTED UNDER THE MAIN FEED SUPPORT. THE EFFICIENCY OF THE TELESCOPE, IS NOW 2% LOWER THAN THAT BEFORE THE STRUCTURAL MODIFICATION,

HOWEVER, THIS CAN NOT BE PINNED DOWN UNTIL MORE MEASUREMENTS MADE. THE MAIN CONCERNS ARE:

- (A) WILL THE DEL-F HOLD? IF NOT, DOWEL PINS SHOULD BE INSERTED AT ENDS OF ADDED MEMBERS.
- (B) TO PROVE "DEL-F VS. ELEV. ANGLES" IS RELATIVELY SMALL.

WE HOPE TO GET SOME ANSWERS FOR THESE WHEN BOBBY WILL HAVE SOME TELESCOPE TIME ON 2-25-77.

THE PRESENT GOAL IS TO MAKE THE TELESCOPE AS GOOD AS POSSIBLE. LOST OF SOME EFFICIENCY IS EXPECTED IN THE BEGINNING OF THE STUDY HOPEFULLY NOT AS BIG AS 2% FOUND. THE NEXT THING OR THE MAIN OBJECTIVE OF THE MODIFICATION TO BE PROVEN IS TO WAIT FOR COLD (BELOW 0 DEGC) OR HOT (ABOVE 20 DEGC) WEATHER TO OBTAIN "EFFICIENCY VS. TEMP. PLOT".