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The Files - RD-125, T.O. 6

31 March 1959

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25X1A2d1 Trip Report - [REDACTED] Antenna

25X1A5a1 1. On 24 March 1959 the undersigned visited the [REDACTED] Palo Alto, California, to discuss technical problems originating from the field concerning the [REDACTED] antenna installation. Participating in the discussions were:

25X1A5a1 [REDACTED]

25X1A9a [REDACTED] - OC-E/R+D-EP

25X1A2d1 2. During the last two months, a considerable amount of correspondence has been exchanged between the [REDACTED] station and Headquarters. Descriptions of system difficulties have not always been consistent in consecutive dispatches from the field. However, it is probable that a reasonably comprehensive grasp of the problems resulting from the field installation has been extracted from the sum total of the correspondence. In this report the technical problems will be discussed separately, along with proposed solutions.

25X1A5a1 3. Hydraulic Elevation System on the 60-Foot and 30-Foot Antennas - Following installation of the 60-foot and 30-foot antennas at the [REDACTED] station, it was discovered that the hydraulic elevation mechanisms for both of these antennas were inadequate for the job. The force required to pump the 60-foot dish into a different elevation was considerably in excess of that which could be exerted by one man. The residual line pressure in the hydraulic lines furthermore, was in excess of 1,000 lbs. per square inch, which is probably too high a residual pressure for an elevation system of this type. [REDACTED] is now procuring two electrically operated jack screw devices which will be sent to the field, and which will replace the hydraulic elevation mechanisms on both the 60 and 30-foot antennas. It is felt that greater reliability will be gained as well as a reduction in operating effort.

25X1A5a1 4. Azimuth Indicator on 60-foot Antenna - The azimuth indicator on the 60-foot antenna has been reported as unsatisfactory by the field. Apparently, there now exists a 5 to 10 degree slop in the indicator system which makes it impossible to accurately determine the azimuth bearing of the antenna. [REDACTED] feels the difficulty lies in the

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azimuth indicator gearbox on the selsyn for the 60-foot dish. A new gear box is now being procured and will be sent to the field as soon as possible. Installation of the gear box is a simple bolt-on procedure.

5. Defective Filters - The filter on Band 3 is inoperative and the Band 4 filter has been repaired in the field and is questionable. These filters will be repaired or replaced by the [REDACTED]

6. Noisy Blower Motors - In the upper five bands of the antenna system, brush type blower motors were used in the gimbal boxes housing the preamplifiers. The noise from these motors has made the traveling wave tubes in the preamplifiers completely inoperative. These motors will all be replaced. A problem has existed in trying to find a synchronous motor of the proper size which will supply the 20 cubic feet per minute cooling which the preamplifiers require. Suitable motors have been located, however, and should be available for delivery to the field within two weeks.

7. Interference from Polarization Changing Mechanism - The Band 7 polarization changing mechanism has been causing electrical interference in the system. However, in a recent letter to [REDACTED] dated 18 March 1959, [REDACTED] states that the interference generated by the Band 7 polarization drive has been remedied and was attributable to a dirty commutator. This problem, then, appears to have been solved and no further action is contemplated at this time.

8. Band 5 Traveling Wave Tube - The field has encountered difficulty in focusing the Band 5 TWT in the magnetic field of the focussing solenoid. To bring the helix current down to 100 microamps, it has been necessary to locate the tube directly against one side of the solenoid cavity. Even with the tube placed at this limit of adjustment, the resulting helix current of 100 microamps is greatly in excess of the [REDACTED] data, which stipulates a helix current of only 4 microamps. In an attempt to remedy this trouble, the field substituted another TWT, with similar results. [REDACTED] who was consulted on this problem, feels that the trouble most probably lies in the solenoid, which may be defective. Accordingly, a new solenoid of the proper type is being sent to the field for a trial substitution in the Band 5 preamplifier. If the new solenoid works, the old one may be sent back to the supplier, [REDACTED]. If it should turn out that the solenoid was not defective, then the solution to this problem will have to be pursued further.

9. Excessive Play in the Band 3 Elevation Mechanism - It was found that the Band 3 14-foot dish had a tendency to oscillate in a moderate wind. It was originally felt that this oscillation was due to too much play in the elevation mechanism itself, but further investigation seems to indicate that the torque on the 14-foot dish in a reasonably high

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wind is simply too great for the antenna mount. The field has engineered corrective measures by placing an adjustable steel brace from the bottom of the dish to the yoke. In [redacted] letter to [redacted] dated 18 March 1959, he states that the situation is now under control.

10. Undelivered Contract Items - Neither spare parts nor instruction manuals for the antenna system have yet been supplied to the field. [redacted] has indicated that the instruction manuals should be available for shipment to the field by 6 April 1959. An amendment to the contract is now being processed to provide for delivery of spare parts to the field.

11. Antenna Pattern Measurements and Sensitivity Check - Antenna pattern measurements were not completed in the field since the outputs of the signal generators were inadequate to conduct these tests. However, antenna beamwidth measurements were made to the 3 db points, and these measurements check out very closely with those made in Palo Alto. The complete antenna pattern measurements, made in Palo Alto, have been sent to the field for reference use. [redacted] feels that any appreciable difference between the antenna pattern measurements made in Palo Alto and those which could be made in the field (providing there were sufficient RF power available) could only be due to an extreme physical distortion of the antenna dishes themselves. Sensitivity checks were taken, but only the Band 4 checkout was completed to the satisfaction of the field personnel. [redacted] feels that discrepancies between the theoretically predicted sensitivity and the experimentally achieved sensitivity were due entirely to experimental error. The following conditions existing during the sensitivity checks should be noted:

1. The Bands 1, 2 and 3 antennas could not be depressed in elevation sufficiently to get a good line of sight into the transmitting antenna.
2. [redacted] engineers were using only rough estimates of the gain of the horn antennas which they were using for transmission from the signaling generators.
3. Path loss calculations used in the sensitivity check were only rough estimates.

In the bands whose sensitivity was questionable, it was noted that sensitivity decreased with increasing frequency, an indication that the transmitting antenna and receiving antenna may not have been properly aligned. [redacted] noted this data characteristic repeating itself on the Bands 5, 6 and 7 antennas. Therefore, to assure proper alignment of the final remaining antenna to be checked out, the Band 4 antenna, they removed the stops from the antenna elevation mechanism. With these stops removed, it was possible to depress the antenna below the 20° negative elevation which had been the lower limit of the Bands 5 through 7 antennas. With the stops removed, it was possible to check very thoroughly the alignment

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of both transmitting and receiving antennas on the Band 4 tests. The experimental sensitivity reading obtained agrees very closely with the theoretically predicted sensitivity of that band. [REDACTED] feels that the sensitivity of the system as tested in Palo Alto. The traveling wave tube preamplifiers were checked out in the field with good results. VSWR measurements were taken in the field which agreed very closely with those taken in Palo Alto. Any loss of sensitivity, in the field, would be due to extreme antenna distortion or to the low loss line. The former possibility can be discarded at once, and the latter possibility is very unlikely.

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12. Subsequent to the installation of the antenna system, difficulties with periodic and intermittent oscillation of the TWT's for Bands 3 and 5 were reported. This problem was discussed in [REDACTED] dispatch dated 11 February 1959, but in subsequent correspondence no reference has been made to the difficulty. Additional information is needed from the field before action can be taken to remedy the situation.

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13. It is generally felt that the technical problems encountered in this new antenna installation are relatively minor. Every effort is being made to correct those difficulties which still exist and at the present time it does not appear necessary to send additional [REDACTED] personnel to the field to effect repairs. In the event that it is found desirable to have complete antenna pattern measurements made for the system, the [REDACTED] personnel are prepared to return to the site to complete the full system checkout.

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