The Files - Project 2112 12 March 1959

25X1A9a [redacted]

Trip Report - Beacon Tests at Eglin Air Force Base

1. On 4 March 1959 a trip was made to Eglin AFB to participate in testing beaconry equipment developed for Air Division by the [redacted] Present for the tests were:

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25X1A5a1 [redacted]

Air Division
/CT-OR
25X1A9a - OC-E/R&D-EP

2. Preliminary testing of the beacon was made Tuesday, 3 March 1959. On these tests, the aircraft was flown at an altitude of 500 feet and at this altitude the aircraft's ADF system picked up the beacon from approximately 3 miles. After the tests were finished, 25X1A5a1 [redacted] was not satisfied that the ADF system was functioning properly so he requested that Air Force radio maintenance personnel check the system. Also, 25X1A5a1 [redacted] reworked the beacon transmitter doubling the output power to 4 watts. This was done before Messrs. [redacted] 25X1A9a [redacted] arrived at Eglin; therefore, this output of 4 watts has not been verified.

3. Tests in which the undersigned participated were run for approximately two hours on 4 March. These tests consisted of repeated passes over the beacon which was placed on Range 70 at Eglin Air Force Base. Range 70 contains ground markers that were used as guides in determining the distances from the beacon at which various signal strengths were received. Prior to the tests, [redacted] had installed 25X1A5
a Pierson KE-93 receiver with "S" meter in the RB-69 aircraft - this
25X1A5a1 receiver with the [redacted] constructed ferrite antenna was used to observe signal strengths of the beacon for all passes. Approaches made at an altitude of 500 feet failed to activate the receiver at distances in excess of one mile; tests at 200 feet altitude were unreadable beyond 1/2 mile and one pass at 80 feet was limited in range to approximately 1/4 mile. The air speed of the aircraft for all tests was approximately 140 knots, with the exception of the 80-foot pass with an airspeed of 180 knots.

4. During the above tests, azimuth bearings were made with the aircraft's ADF equipment. At the 500-foot level discernable signal strengths were available from a distance of four miles; at the 200-foot level this distance was reduced to 2 miles and no reading was taken during the 80-foot pass. While the azimuth bearings were quite accurate and a good over-beacon indicator reversal was obtained, the aircraft's pilot did not consider that homing runs on the beacon from the extreme edges of the reception area would be possible. He explained the function of the ADF to be sure that accurate runs could not be made until the ADF was receiving a signal considerably stronger than that received at the first encounter. Homing passes made against the beacon based on low signal strengths were subject to up to a 20 degree error and resulted in the aircraft following a circular course tangential to the true line required to approach the beacon. Messrs. [redacted] and [redacted] stated they were not sure the aircraft's ADF equipments were functioning properly even after the Eglin Air Force maintenance crews checked the equipment and stated, after the tests, that all equipment employed during the tests was functioning properly. Since the aircraft's crew had no means of determining when a suffiecient signal strength was being received, homing runs without visual reference to the ground were not possible. The aircraft's navigator stated the opinion that the beacon could not be located electronically if its position was not previously known.

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5. During discussions between all concerned after the above tests were concluded, the undersigned requested that tests of the ranging circuitry of the beacon system be conducted. Since all agreed that further development work would be necessary to extend the range of the equipment before ranging tests could be conducted with an aircraft, the request was made for a ground-to-ground reduced distance check to determine if the equipment would function at all. Messrs. [redacted] declined to initiate any such tests.

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6. [redacted] was again closely queried concerning the actual system to be employed in keying the aircraft's LF transmission equipment. He stated the airborne unit contained a keyer circuit which would key the ART-13 on a frequency slightly over 2 mc at a rate of 1 cps with a pulse width of 0.1 second; upon receipt of this pulse, the ground beacon would reply with a 0.8 second pulse on a frequency of 1690 kc. This portion of the system was neither activated nor installed in such a manner as would permit testing.

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7. While discussing the possibility of increasing the range of the beacon, [redacted] suggested that a directional antenna be used. [redacted] stated that this could not be employed since the system must be omni-directional. [redacted] disagreed, saying that the beacon need not be omni-directional because the agent on the ground would know the direction from which the aircraft was coming.

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8. Comments - We consider the current series of tests to be inconclusive as to whether or not the concept is feasible. Additionally, the [redacted] appears not to have developed equipment with the

proper parameters to satisfy Agency beacony requirements. Since the units must be so completely reworked, we recommend a decision be made as to the advisability of continuing contractual relations with the [redacted] Should the decision be to so continue, we further recommend (a) that Agency requirements, accepted by the Technical Requirements Board, be made known to the [redacted] as firm system requirements, including provision for operation involving the Helio-Carrier aircraft and, (b) that further tests of the beacon system involving government personnel and/or equipments not be conducted until appropriate ground-to-ground system checks have been completed and a suitable progress report forwarded to Headquarters. 25X1A5a1 25X1A5a1 25X1A5a1

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