

441A

System 441A, known as COBRA MIST, was initiated to acquire, install, and test the AN/FPS-95 OTH Radar Set in an operational over-seas environment at Orfordness, England, (See ESD History for FY 1972, p. 172 ff.).

System turnover was scheduled for 1 July 1972. However, due to several test delays the turnover was rescheduled for 1 January 1973. In the interim, it was decided to combine the Design Verification System Test (DVST) and Initial Operational Test & Evaluation (IOT&E) in order to expedite the test program.

In the combined DVST and IOT&E during the summer and fall of 1972, a severe noise problem was encountered, which resulted in a reduction in detection Capability. The range related noise had a median value of -65 decibels; in addition, there were noise modulation sidebands 10 to 30 hertz from the carrier with a median value of -60 decibels.

In January 1973, a joint United States/United Kingdom (US/UK) Scientific Assessment Committee (SAC) was formed to analyze the problem. The committee was comprised of:

Dr. M. Balser	Xonics Corporation	Chairman
Prof. E. D. R. Shearman, V. C.	Birmingham University	Member
Dr. J. Aarons	Air Force Cambridge Research Labs	Member
Dr. E. N. Bromley	Radio & Space Research Station	Member
Dr. C. M. Crain	Rand Corporation	Member
Dr. T. Croft	Stanford University	Member
F. A. Kingsley	UK Ministry of Defense	Member
Dr. B. Roberts	Royal Radar Establishment	Member
Wing Commander D. R. J. Evans	Royal Air Force, Orfordness	Secretary

The purpose of the SAC was to:

1. Investigate the fundamental causes of the degradation in performance in the COBRA MIST OTH RADAR.
2. Recommend measures to overcome system deficiencies.
3. Assess the potential radar performance.

The SAC met during the period February-May 1973. In May, the committee issued a final report which contained 10 recommendations, with the following four listed as high priority:

1. Implement a more flexible and effective set of processing and display programs and procedures.
2. Develop and install a pulse compression system with a pulse length of the order of 100 microseconds.
3. Further study, both experimentally and theoretically, the characteristics of excess noise, with the aim of minimizing its effect on radar operations.
4. Provide for strong technical management to carry out the proposed program which must include further technique developments in addition to evaluating operational effectiveness.

The SAC said that given the proposed system modifications and Studies, the system would undoubtedly be greatly enhanced in

performance and potential. The committee added that following the modifications, the system should undergo a series of operational feasibility tests for one year, the results to be the basis for any future decisions on COBRA MIST.

The findings, results, and recommendations of the committee were briefed to the U.S. Secretary of the Air Force (SAF) and the United Kingdom Ministry of Defense (UK/MOD) in May 1973. The result of these briefings was a joint US/UK decision, based on an economic analysis of the requirements, to terminate operations at Orfordness. The decision was publicly announced in London by the Ministry of Defense on 29 Jun 1973.

441A, known as COBRA MIST, is a program to acquire, install, and test the AN/FPS-95 OTH Radar Set in an operational overseas environment. The 441A contractor is RCA; the 441A site is Orfordness, England.

The missions of the 441A AN/FPS-95, an over-the-horizon (OTH) backscatter radar, are to detect and track aircraft; detect missile and earth satellite vehicle launchings; fulfill current and critical intelligence requirements; and to provide a research and development (R&D) testbed for determining optimum backscatter techniques for other operational missions.

By 10 July 1971 the 18th (and last) antenna string was installed. Phasing at high power began on 17 July.

The Rome Air Development Center (RADC) aircraft conducted antenna pattern measurement tests 5-17 August, with the radar operating 10 decibels down. All 18 strings were tested at all ranges, including the side lobes and back lobes. The aircraft long range tests were completed early in September 1971.

The upper catenary nuplaglass rod between mast #38 and string #18 failed on 23 September, and the resultant shock wave caused most of mast 38 and most of mast 39 to crack off at the 120-foot level. The initial assessment indicated the failed rod had previously been rejected by RCA because of a deep transverse cut, and the unit should not have been installed. String 18 was electrically sound, and RCA elected to repair the masts rather than replace them.

A string 13 upper catenary nuplaglass break which had existed for several weeks was repaired by 13 December. The repair was facilitated by the use of a 144-foot extension ladder fire apparatus which RCA purchased under fortuitous circumstances. An Argentine organization had ordered two of these trucks, and subsequently was unable to consummate the purchase.

System Test (Category II) was delayed until 30 August 1971 because of problems with a PDP-computer and the failure of two transmit/receive (T/R) switches.

By 3 September it appeared that problems in integrating all end items into a workable system would delay system test another two or three weeks. The problems did not appear major when considered individually, but the system did not perform in the sense that meaningful data could be retrieved at the displays. Most of the problems appeared to be in the receiver and signal processing areas, since it was known that the transmitters were working and the antenna was radiating at expected power levels.

RCA provided four modification kits for the screen regulators, and system functional tests began on 29 September, except for

Reliability and Maintainability (R&M) test. R&M, which requires operation 24 hours a day, was delayed until 15 October because repair work on the damaged masts had to be done during the daylight hours.

On 9 February 1972 the radar was accepted from the contractor.

Design Verification System Test (DVST)

DVST began on 10 February 1972. Because of a power shortage caused by the strike of British coal miners, the test was suspended on 14 February and resumed on 1 March.

In the DVST, a "noise" problem appeared, and as of 30 June 1972 on-site activity was concentrated on a task force investigation of noise sources and effects, which were considered to be a limiting factor in system performance capability.

Among the prerequisites for the DVST were the XEROX SIGMA V computer and the Signal Analysis Subsystem (SAS).

The SIGMA V, leased from XEROX, arrived on-site on 20 July 1971. Subsequently, it was determined to be economically advantageous, over the life of the system, to buy the computer. Funds for the purchase were released in February 1972.

The SAS, purchased under a contract placed by the Army Security Agency with Interstate Electric Corporation (IEC), was installed during the first week of January 1972.

Originally, the Naval Research Laboratory (NRL) was to be responsible for the integration of the SIGMA V/SAS. When NRL said it would perform only that portion of the integration concerned with software, the integration was made a responsibility of IEC.

Tube Aging Rack

On 19 July 1971 RCA submitted a fixed-price proposal for the tube aging rack which included a quote for \$800,000 more than the original proposal, submitted on a cost-plus-fixed-fee basis. (Aging: allowing a permanent magnet, capacitor, meter, or other device to remain in storage for a period of time, sometimes with voltage applied, until the characteristics of the device become essentially constant.)

After a study to determine the most advantageous approach, the Program Director favored a fixed-price procurement, on the basis that RCA would probably try to recover some of the costs connected with a deficiency correction of the 4641 tube, under the guise of development of the tube aging rack.

By 13 August 1971 RCA's proposal on a fixed-price basis was \$2.6 million, and the Program Office directed that this be negotiated as a fixed-price Supplemental agreement (SA) rather than cost-plus-fixed fee as desired by RCA.

The Defense Contract Administration Services Agency (DCASA) rejected the RCA proposal, and directed resubmission on the basis that the \$800,000 increase in pricing for a fixed-price contract was not justified.

Negotiations were completed in November 1971 at a definitized figure of \$2,446,000.

The tube aging rack was operational on 30 June 1972.

RCA Studies

A contract was placed with RCA on 12 July 1971 for a technical evaluation and cost trade-off study on the inclusion of a second beam capability and the addition of antenna strings to increase the geographical coverage of 441A. Three volumes on the technical aspects of various configurations and a draft volume on the cost trade-off were received in December 1971. The final version of the cost trade-off volume was received in February 1972.

RCA was also given a contract for a study of Automated Data Analysis and Presentation (ADAPT) techniques. The ADAPT study is intended to determine methods of meeting real-time operational requirements through the automation of AN/FPS-95 output. A Government Working Group established for ADAPT held its first meeting on 25 May 1972.

RCA Proposal for Equitable Adjustment

The ESD History for Fiscal Year 1971 (PP. 149-150) noted the RCA proposal for "equitable adjustment" of the 441A contract because of delays in the program.

On 16 July 1971 RCA submitted a revised cost proposal in the amount of \$6.3 million (up from \$5.56 million).

In November 1971 final agreement was reached on a settlement at \$3.05 million.

Cobra Mist

(1) Based on guidance by Hq USAF, the one year Design Verification System Tests planned for this system were terminated after six months on 10 August 1972 and Initial Operational Test and Evaluation (IOT&E) of the system was begun with the Using Command, USAFE as specified by AFR 80-14 in an effort to accelerate the system operational date to January 1973.

(2) The testing revealed that the system was plagued by excessive noise of then undetermined origin which prevented the system from meeting its operational performance requirements. Various on-site and prime contractor efforts to alleviate the problem were unsuccessful and resulted on 29 December 1972 in direction by Hq USAF to terminate the IOT&E and to establish a joint US/UK blue-ribbon scientific team of OTH experts to determine the cause of the noise problem and recommend appropriate fixes. As a result, a Scientific Advisory Committee (SAC) was established which conducted a series of special tests at the site to isolate the noise source(s). The committee published its findings in a final report on 1 May 1973 indicating that the noise problem could be over come by certain system modifications and that the system could be brought into an operational state with certain limitations on its expected capabilities.

(3) On 19 June 1973, the UK was advised that the US has decided to close down the site and deactivate the system on 30 June 1973 based on the SAC findings and other considerations.

Derived from the FOIA material posted to
<http://www.cufon.org/cufon/cobramst.htm>

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RSQ 93/O-138.dg

Dear Mr. Goudie
[Address deleted by CUFON]

This is in reply to your Freedom of Information Act request of 16 February 1993. Your letter was received by the Agency on 22 February 1993 and it was assigned FOIA case Nr. 93-33. We have attached what releasable information we hold on "Project Cobra Mist" as found in the history of the 81st Tactical Fighter Wing. Other documents that we've located on your topic are not within our purview to release. These documents have been forwarded to the appropriate agencies for review, and they will respond directly to you with the results of their declassification determination.

Sincerely

/s/ WARREN A. TREST

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senior Historian

1 Atch
History, 81TFW, Vol 1, pp.
29-30, Apr - Jun 73 (Declas)