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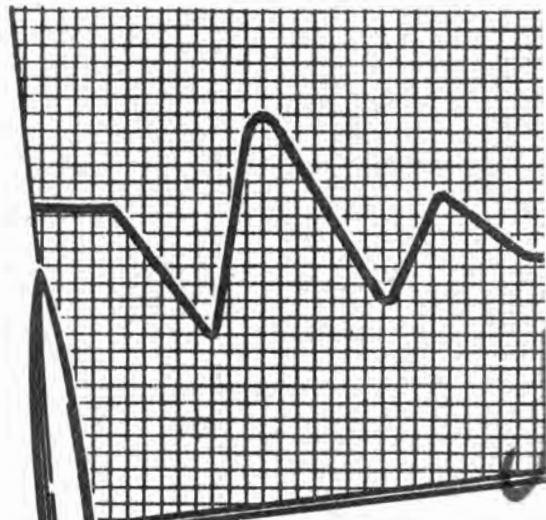
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History of Air Technical Intelligence Center

(AFCIN-4)

WRIGHT-PATTERSON AIR FORCE BASE, OHIO

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HISTORY OF
AIR TECHNICAL INTELLIGENCE CENTER
(AFCIN-4)
Wright-Patterson Air Force Base
Ohio

1 July 1958 - 31 December 1958

Prepared By
Air Intelligence Office
AIR TECHNICAL INTELLIGENCE CENTER
30 January 1959

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AIR TECHNICAL INTELLIGENCE CENTER

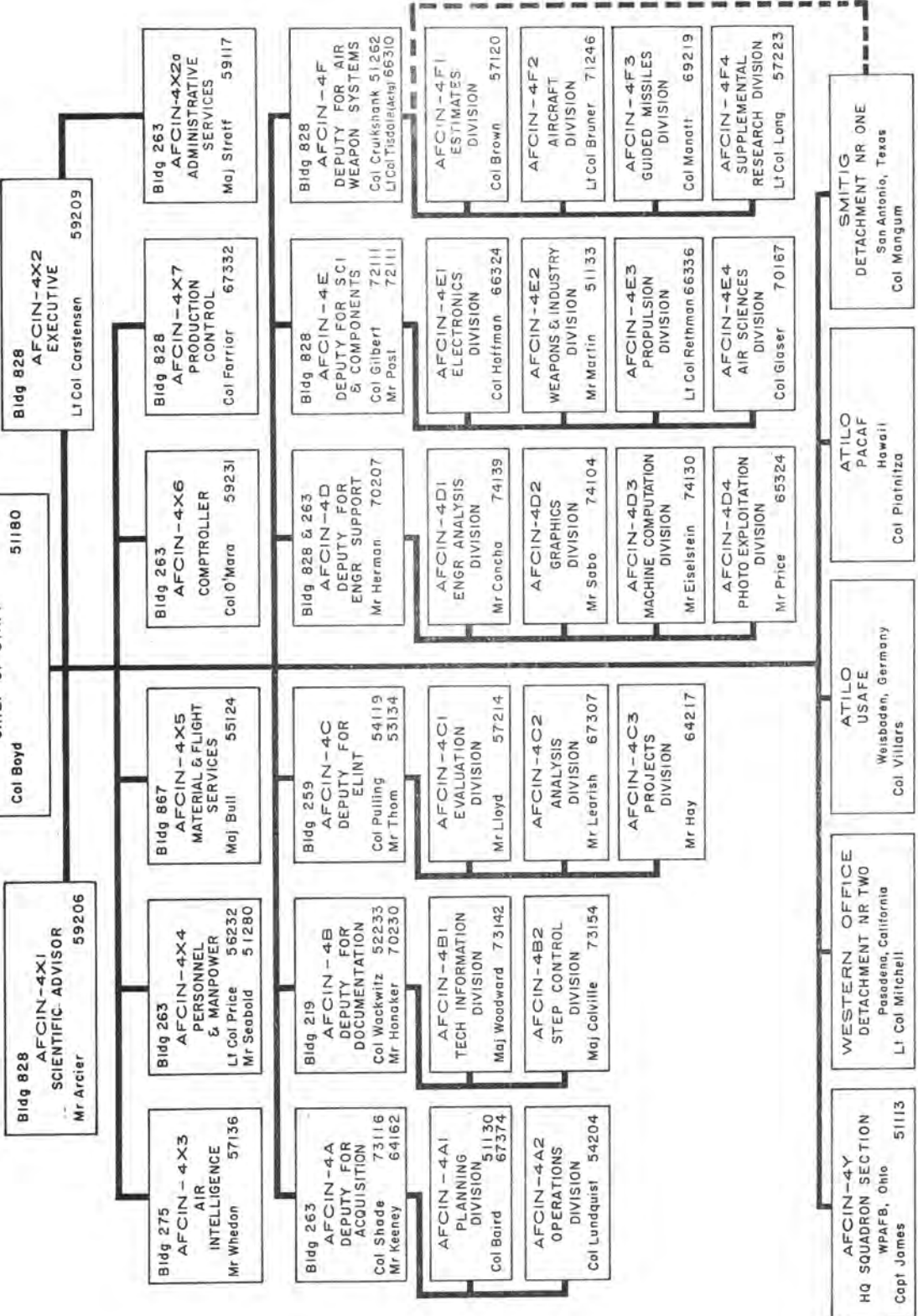
Bldg 828
AFCIN-4
COMMANDER
 64100
 59210

Maj Gen Dougher

DEPUTY COMMANDER
 59210
Col Eriksen

AFCIN-4X
CHIEF OF STAFF
 51180
Col Boyd

Charles B. Dougher
 Charles B. Dougher
 Major General
 Commander



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GLOSSARY

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FOREWORD

TO THE HISTORY OF
THE AIR TECHNICAL INTELLIGENCE CENTER
(AFCIN-4)

For the Period
1 July 1958 - 31 December 1958

This edition of the History reflects special emphasis on the probing of foreign theoretical thinking and areas of potential theoretical breakthrough with possible application to future air weapon systems.

Activities of the Center are presented in separate chapters. Footnotes, if any, are listed at the end of each chapter.

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SECTION I

ATIC ORGANIZATION AND MANAGEMENT

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CHAPTER I

COMMAND ACTIVITIES

MAJOR EVENTS:

A formal change-of-command ceremony was held at ATIC on 8 July 1958 when Major General Watson relinquished command of the 1125th USAF Field Activities Group (Air Technical Intelligence Center) to Colonel John G. Eriksen.^{1/} During this ceremony, Major General James H. Walsh, Assistant Chief of Staff Intelligence, Headquarters, United States Air Force, awarded to General Watson the third highest Air Force award, the Legion of Merit, in recognition of his accomplishments as Commander of the Air Technical Intelligence Center from September 1954 to July 1958. (UNCLASSIFIED)

Major General Charles B. Dougher reported for duty on 10 November 1958 and assumed command of the Air Technical Intelligence Center, vice Colonel Eriksen.^{2/} Colonel Eriksen was assigned to duty as Deputy Commander effective 8 December 1958.

SIGNIFICANT VISITS:

A group of twelve members of the Royal Canadian Air Force visited ATIC in December 1958. The group included Dr. J. C. Arnell, Scientific Advisor to the Chief of Air Staff; Mr. H. Larnder, Director of Scientific Intelligence, Defense Research Board; Group Captain R.B. Ingalls, Director of Intelligence, RCAF; six technical specialists of the Directorate of Air Intelligence, RCAF; Colonel Robert W. Witty, the USAF Air Attache and Captains Marker and Bergeron of Colonel Witty's office. The purpose of the visit was a general over-all briefing of the ATIC Program and discussion of items of particular interest. (~~CONFIDENTIAL~~)(u)

Air Vice Marshal Sydney O. Bufton, Assistant Chief Air Staff for Intelligence, Royal Air Force, accompanied by Group Captain Patrick Burnett, Chief of DDI-2, RAF, and Colonel Archer Lackey, Chief of the USAF Liaison Team, visited ATIC in December for briefings and discussion of ATI estimates of Sino-Soviet Technical Capabilities and Prognostication of Future Capabilities, particularly in the field of guided missiles.

~~(CONFIDENTIAL)~~ (u)

SAG ACTIVITIES:

The Scientific Advisory Group of ATIC (SAG) met in September 1958 to discuss the broad aspects of the Astronautics Program within the Center, and to review the objectives and coordinate program efforts to insure maximum effective exploitation of potential scientific breakthroughs. The area of semi-conductors, particularly with regard to conversion of heat to cold, was identified as of prime potential. The SAG reached a decision to further contract work in this area of solid state physics.

~~(CONFIDENTIAL)~~ (u)

Other areas of scientific and technical interest which the Scientific Advisory Group considered during this period included ball lightning, infrared techniques, ionospheric ducting, Christopholes effect, whistlers, spurious radar returns, and the ARDC-L series of projects. At a later meeting of the SAG in December, it was agreed that this group will point its future endeavors toward ascertaining what is most important in the coming scientific scheme of things rather than toward the evaluation of existing programs. This will involve a greater degree of contact between ATIC scientists and those in a position of guiding US scientific endeavor. This group will establish study groups as necessary to exploit fully those areas of most significant interest for the Center. ~~(CONFIDENTIAL)~~ (u)

SAB-SAG RELATIONSHIPS:

Colonel Eriksen, Commander, ATIC, and Mr. Arcier, Chairman of the SAG, met with the Scientific Advisory Board (SAB) at Ramey AFB in October. Upon their return, they briefed all SAG members on the proceedings of the SAB conference, and areas of prime scientific significance to ATIC, and prepared a new list of ATIC observers to serve on SAB panels. (UNCLASSIFIED)

PROBLEM AREA:

During this reporting period, which continued to reflect an ever-increasing demand for air technical intelligence, ATIC attempted to alleviate to some degree the problems inherent in the use of CIA information.^{3/} ATIC tendered compromise agreements which would allow it varying degrees of latitude in the use of this information, to a CIA Working Group formed by order of General Cabell. The agreements were rejected. It is now apparent that there is no easy solution to this problem, and ATIC is setting up machinery to cope with it on an ad hoc basis, which it hopes will not prove too costly in time and man-hours. The major aspects of living with this problem, aside from the cost involved, appear to be these:

1. It gives CIA a large measure of control over the Air Force air technical intelligence program.
2. It causes substantial delays in the dissemination of air technical intelligence.
3. It necessitates applying, in some instances, CIA-originated controls to Air Force documents, which in turn requires control of reproduction of the material by recipients.
4. It reduces substantially the quantity and scope of air technical intelligence which can be disseminated. This reduction is even more drastic with respect to

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dissemination to foreign nationals.

5. Certain categories of AF personnel are deprived of material for which they have a specific operational requirement (e.g., Air Technical Intelligence Liaison Officers stationed overseas cannot receive material carrying the limitation "No Dissemination Abroad.")

The degree to which any of the foregoing limitations can be modified depends entirely on CIA's willingness to waive the restrictions imposed on the information.

~~(CONFIDENTIAL)~~ (u)

If ATIC finds, after a trial period, that it cannot effectively execute its mission under CIA restrictions, the only recourse will be for the ACS/Ito present the case, perhaps in conjunction with the other military services, for adjudication by the United States Intelligence Bureau. ~~(CONFIDENTIAL)~~ (u)

-
1. GO #12, 1125th USAF F/A Gp, 5 Jul 58
 2. GO #22, 1125th USAF F/A Gp, 10 Nov 58
 3. ATIC HISTORY, 1 January - 30 June 1958, page 10

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CHAPTER 2

MANAGEMENT, CONTROL AND SERVICES

PLANS AND PROGRAMS:

During this period, ATIC completed a thorough review and analysis of programming activities to make Programming a useful instrument for Command control of Center effort which is closely coordinated with the budget cycle. (UNCLASSIFIED)

The major change in documentation for programming was the development of a program document which contains information on each program, project and task sufficiently summarized to point up over-all problem areas and in sufficient detail to permit Command decisions for programming resources. (UNCLASSIFIED)

BUDGET:

In the preparation of the second revision to the P481 Financial Plan for FY 59, ATIC included requirements for items formerly funded by the base but which now become the responsibility of the tenant organization. (UNCLASSIFIED)

STATISTICAL SERVICES:

ATIC expanded statistical services to include auditing and maintenance of a centralized statistical repository of information for use by management personnel throughout the Center; and established procedures for gathering and maintaining on a daily basis, information for classification, and index files containing data on all military and civilian personnel assigned to the Center. (UNCLASSIFIED)

PROCUREMENT AND CONTRACTING:

ATIC procurement actions were delayed for a short time at the beginning of the fiscal year because of the reorganization of AMC's Directorate of Procurement and Production. All contract work, except that which pertained to aeronautical systems, was ordered transferred to the regional Air Materiel Areas. Since this would have a

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great effect on the handling of ATIC contractual requirements, ATIC representatives negotiated with Generals Senter and Warren of AMC who decided that a special procurement center to meet all intelligence requirements would be attached to the newly organized AMC Aeronautical Center, and that procurement personnel well versed in handling intelligence matters would be detailed to that Center. (UNCLASSIFIED)

PRODUCTION CONTROL:

In the latter part of December, the ATIC Production Schedule was adopted as the official document for scheduling actions pertaining to ATIC studies, technical reports, handbooks and working papers.

Customer Surveys were conducted during this period to ascertain applicability, usability and completeness of ATIC end products and support documents. Results of the survey indicated that the support furnished by the Center is satisfactory except in timely reporting of current air technical intelligence. (UNCLASSIFIED)

ORGANIZATIONAL MANAGEMENT:

ATIC effected a number of organizational changes during this reporting period, including establishment of a new office, Chief of Staff^{1/}. Within the structure of staff offices, Administrative Services was organizationally assigned to the Executive; Program Planning Office was discontinued and functions transferred to the Comptroller; a new office, Production Control, was established; and Personnel and Management was re-designated Personnel and Manpower^{2/}. Reorganization of the Comptroller resulted in addition of the Program and Plans Branch to absorb programming functions and redesignation of three other branches^{2/}.

Reorganization of the Deputy for Documentation was completed. The principal change was establishment of the Scientific and Technical Exploitation Program (STEP) Control Division to manage ATIC's participation in the USAF program for exploitation of foreign scientific and technical literature. Other changes included discontinuance

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of two divisions, internal transfer of functions and redesignation of branches which resulted in an internal structure^{3/} as follows:

Technical Information Division
Library Branch
Processing Branch

STEP Control Division
Control and Records Branch
Translation Services Branch

(UNCLASSIFIED)

Under the Deputy for Engineering Support, withdrawal of photo interpretation and related functions from Graphics Division established the Photo Exploitation Division with three branches for analysis, research and processing; and left the Graphics Division with branches for technical illustration, publications and reproduction.^{4/}

Under the Deputy for Science and Components, Propulsion Division was reorganized to keep pace with advancements in propulsion, and branches appropriately redesignated.^{5/}

Under the Deputy for Air Weapon Systems, the Astronautics Branch of the Guided Missiles Division was changed to Space Systems Branch.^{6/}

The Administrative Office in the Deputy for ELINT was discontinued and functions absorbed by the Deputy Office.

In November, ATIC received authority to consolidate the ATILO PACAF offices in Hawaii and Japan into one office to be located in Japan, effective 1 February 1959.^{8/}

MANPOWER MANAGEMENT:

At the beginning of the reporting period, the Center was authorized 266 officers, 151 airmen, 645 civilians, total 1062.^{9/} At the end of the period, manpower authorizations consisted of 271 officers, 158 airmen, 642 civilians, total 1071, an over-all increase of nine spaces.

Throughout the last six months of 1958 minor adjustments were made in manpower distribution, no major redistribution was undertaken. Improved utilization of manpower

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was accomplished by eliminating overlap of functional workloads and clarifying functional responsibilities. These measures permitted manpower shifts for activation of intelligence programs previously deferred because of lack of manpower.

(UNCLASSIFIED)

MANAGEMENT IMPROVEMENT:

A method for notifying components of manning changes between machine runs was added to the mechanized manning data reporting systems installed during the preceding period. Review of organization and functions was completed and results incorporated in ATICM 20-1, "ATIC Organization and Functions Manual," released for publication 31 December 1958.

KEY PERSONNEL CHANGES:

During the period from 1 July 1958 through 31 December 1958, the following changes in key personnel took place within ATIC:

1. Colonel John G. Eriksen, 1330A, assumed duty as Commander ATIC, vice Major General Harold E. Watson, 1520A, effective 5 July 1958.^{10/}
2. Colonel William E. Boyd, 2050A, was relieved from duty as Deputy for Acquisition and assigned as Deputy Commander on 10 July 1958.^{11/}
3. Colonel Meredith H. Shade, A0407127, was assigned duty as Deputy for Acquisition vice Colonel William E. Boyd, 2050A, 10 July 1958.^{11/}
4. Lt Colonel Dale L. Carstensen, 6389A was assigned duty as Command Executive vice Lt Colonel Chester H. Long, 6 August 1958.^{12/}
5. Major Stephen D. Bull, Jr., 12066A, was assigned duty as Chief, Material & Flight Services Office effective 8 August 1958.^{13/}
6. Major Michael J. Stroff, Jr. 20648A, was assigned duty as Chief, Office of Administrative Services effective 8 August 1958.^{13/}

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7. Colonel William O. Farrior, 5124A was assigned duty as Chief, Production Planning Office effective 20 August 1958.^{14/}

8. Major General Charles B. Dougher, 600A assumed duty as Commander, ATIC, 10 November 1958, vice Colonel John G. Eriksen, 1330A.^{15/}

9. Lt Colonel Joseph B. Price, 32951A was assigned duty as Chief, Personnel and Management Officer, 17 November 1958.^{16/}

10. Colonel John G. Eriksen, 1330A assumed duty as Deputy Commander 8 December 1958, vice Colonel William E. Boyd, 2050.^{17/}

11. Colonel William E. Boyd, 2050A was assigned duty as Chief of Staff effective 8 December 1958.^{17/}

During this period two new airman pay grades (E-8 and E-9) were established by Headquarters USAF. ATIC received its first promotion to E-8 in September.

PERSONNEL ADMINISTRATION:

From 1 July through 31 December 1958, a total of 88 new civilians were placed on the payroll of the Center. There was a total of 49 separations, 21 of which were summertime-only employees. This reflected an actual net gain of 39. As of 31 December, the assigned strength was 577 as compared to the authorized strength of 642. The turn-over rate during the period was slightly less than one percent; the average rate for other governmental agencies and industry, as published by the Bureau of Labor Statistics, was 1.8 percent. (UNCLASSIFIED)

The second civilian incentives and awards ceremony was held on 19 December 1958. General Dougher presented 16 awards for outstanding performance and sustained superior accomplishment, one meritorious service award, one cash award for a special act, and eight awards for suggestions. He presented 15 ten-year service awards and two twenty-year service awards. (UNCLASSIFIED)

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The appointment of an Employment Development Officer in August completed the entire staffing of the Civilian Personnel Office. ATIC's Civilian Personnel Office is now self sufficient with the exception of payroll servicing by the Wright-Patterson AFB Finance Officer, and two boards of US Civil Service Examiners attached to WADC and AMC respectively. (UNCLASSIFIED)

The Merit Promotion Program for civilian employees was completed during this period. It is not anticipated that any drastic changes will be made in the in-service placement program which has been in effect in ATIC since early 1956. The existing program appeared to be adequate in terms of employee morale and consistent with the best interests of management. Therefore, for the most part, it will only be necessary to document promotion actions more elaborately under the new program and to publish promotion plans for the information of all interested parties within the Command. (UNCLASSIFIED)

AIR INTELLIGENCE SERVICES:

ATIC continued during this period to provide a full intelligence service to the Air Materiel Command. This service included weekly and ad hoc briefings to the Headquarters staff; and Daily Intelligence Summaries (DINTSUM's), special briefings and estimates for Hq AMC components. (UNCLASSIFIED)

The first issue of the ATIC Weekly Intelligence Summary was published on 17 September 1958. This summary was initiated to relieve the AMC electrical transmission system of the burden of Daily Intelligence Summaries (DINTSUM's) to Air Materiel Areas and Depots. The purpose of WINTSUM is to present a weekly summarized analysis of intelligence, slanted toward the special requirements of AMC, for distribution to Hq AMC, Air Materiel Areas and Depots, ATIC Division offices and other agencies located at Wright-Patterson AFB. (UNCLASSIFIED)

ADMINISTRATIVE SERVICES:

On the occasion of the Lebanon crisis in July, ATIC conducted a test operation

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-
1. GO Nr 26, 11 December 1958, 1125th USAF FAG (HEDCOM USAF)
 2. GO Nr 17, 20 August 1958, and GO Nr 26, 16 Dec 58, 1125th USAF FAG(HEDCOM USAF)
 3. GO Nr 15, 8 Aug 58; GO 21, 13 Oct 58, 1125th USAF FAG (HEDCOM USAF)
 4. GO Nr 21, 13 October 1958, 1125th USAF FAG (HEDCOM USAF)
 5. GO Nr 21, 13 October 1958, 1125th USAF FAG (HEDCOM USAF)
 6. GO Nr 20, 23 September 1958, 1125th USAF FAG (HEDCOM USAF)
 7. GO Nr 21, 13 October 1958, 1125th USAF FAG (HEDCOM USAF)
 8. Confidential Message PFICO-A 16435, 17 November 1958
 9. PAV 59/1/6, 18 June 1958
 10. GO Nr 21, 5 July 1958, 1125th USAF FAG (HEDCOM USAF)
 11. GO Nr 13, 10 July 1958, Par 1 and 2, 1125th USAF FAG (HEDCOM USAF)
 12. GO Nr 14, 6 August 1958, 1125th USAF FAG (HEDCOM USAF)
 13. GO Nr 16, 15 August 1958, Par 1 and 2, 1125th USAF FAG (HEDCOM USAF)
 14. GO Nr 18, 25 August 1958, 1125th USAF FAG (HEDCOM USAF)
 15. GO Nr 22, 10 November 1958, 1125th USAF FAG (HEDCOM USAF)
 16. GO Nr 23, 17 November 1958, 1125th USAF FAG (HEDCOM USAF)
 17. GO Nr 24, 9 December 1958, Para 1 and 2, 1125th USAF FAG (HEDCOM USAF)
 18. Ltr Contract AF 33(600)-38484

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of teletype facilities to determine ability to perform under emergency conditions. Service was provided 16 hours a day, seven days a week for a period of two weeks. (UNCLASSIFIED)

Between 10 November and 3 December, ATIC engaged in a special project for clean-up of reference and working files which was called Operation BON FIRE. As a direct result of this project, 170 cubic feet of paper-work and 540 cubic feet of film were destroyed. At the close of the year, ATIC had 4,750 cubic feet of official records, 48 records-scheduling activities, and 41 persons performing additional duties as assistant records officers. (UNCLASSIFIED)

On 10 December 1958, ATIC's classified communications capability was extended to the Director of Targets, AFCIN-3. (UNCLASSIFIED)

MATERIAL AND FLIGHT SERVICES:

In October 1958, ATIC established a Materiel Planning Group to coordinate specific technical and administrative materiel requirements and to program or plan for fulfillment of those requirements. (UNCLASSIFIED)

In conjunction with long-range planning, a similar objective for the Military Construction Program was initiated to cover a five-year period for the purpose of furnishing ATIC with adequate and integrated facilities within one area of complex. USAF approval of two projects for the 1960 Military Construction Program was given, although not Congressionally funded. These two projects consisted of the expansion of the new ATIC ^{Plan 928} Building and Building 259. (UNCLASSIFIED)

In November, ATIC signed a letter contract with Air Modification Division of Cook Electric Company^{18/}, Vandalia, Ohio, for the two RB-57's maintenance, flight, and modification schedules. ATIC initiated this task to test and evaluate aerial reconnaissance techniques and equipments produced in support of the Technical Objectives Aerial Reconnaissance Program. (~~CONFIDENTIAL~~)(Cv)

The aircraft assigned to ATIC flew 801 hours with seat-passenger miles of 993, 135, and 241, 300 pounds of cargo carried. (UNCLASSIFIED)

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SECTION II

ATIC ACTIVITIES

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CHAPTER 3

COLLECTION PLANNING

+ TECHNICAL RESOURCES:

The period from 1 July through 31 December 1958 marked the acquisition and evaluation of several items of specialized equipment, procurement actions for operational items and initial investigation into new collection techniques.

(UNCLASSIFIED)

Three contractors delivered breadboard, prototype, and field-test models of infrared equipments. One contractor completed and tested breadboard models of an unattended radiometer and scanning camera, and delivered a prototype of a miniaturized, hand-held, infrared radiometer for field test and evaluation. Another contractor tested and evaluated the prototype model of the bolometric infrared scanning camera. Finding that it was too complex and bulky for field use, the contractor further investigated the equipment to build a model of proper size. The other contractor delivered field-test models of an infrared trigger device for integration with camera designs. (~~SECRET~~) (U)

ATIC continued planning for ultimate deployment of the airborne infrared surveillance system, under development by ARDC, to meet air technical intelligence requirements. Allocation of aircraft for the program presented the greatest deterrent to rapid progress and resulted in some slippage. ATIC has submitted a plan for immediate deployment of an interim capability to offset the time delay generated by program re-evaluation and comparison with a new and less sophisticated proposal from another contractor. (~~SECRET~~) (U)

In the electronics area, ATIC began investigation of a novel method of separating mixed voices recorded on magnetic tape and of the design parameters

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needed for an ultrasonic communication system. A variety of portable triggers were produced for unattended on-off control of various equipment. These must be modified for more flexibility in field usage by bringing out leads for recording the amplified input signals. ~~(SECRET)~~(U)

Two versions of a miniature transistorized stable time reference underwent tests during this period. One, small enough to be carried on a man's body, provides consecutive count for 30 days, simultaneous readout for recording on film, with inherent accuracy of one part in 100,000. The other version provides consecutive count for 90 days, sequential readout for recording on tape, with crystal-oven giving an inherent accuracy of one part in ten million. Readout in these versions is to the nearest 0.1 second, accumulative from the start. ~~(SECRET)~~(U)

ATIC received initial prototype models of a solar battery charger and requested additional models for use in the adjustment of voltage and current to suit specific equipment requirements. ~~(SECRET)~~(U)

Preliminary in-house investigation was made of the promising capabilities of the conjugate and transverse-conjugate modes of propagation for detection of large missile and rocket firings from global distances of several thousand miles. ARDC planned for active measurements in both modes, and ATIC made plans for passive tests. ~~(SECRET)~~(U)

The ARDC-OSR contractors set up observation sites at Vero Beach and MacDill AFB in Florida to verify the feasibility of using star scintillation techniques for collection of air technical intelligence during powered and re-entry phases of ballistic-missile flights. ATIC's requirement for an all-weather capability is under consideration for further research. ~~(SECRET)~~(U)

During this period, ATIC received field-calibration and auto-gain control miniaturized equipment for adaptation to existing field operational gear. This

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equipment will improve the quality and usefulness of aircraft-engine acoustic recordings, and the acoustic tape-readout equipment will provide an in-house analysis capability. ~~(SECRET)~~(u)

ATIC accepted for delivery prototype modulated radar-collection equipment and initiated procurement of a portable system with a capability at least equal to that of the current prototype. An operation which uses this technique against foreign targets was initiated in cooperation with the Navy. ~~(SECRET)~~(u)

ATIC contractors completed two major studies in the photographic area and submitted several prototype models of cameras during the last half of 1958. ATIC initiated procurement action for an infrared camera using a near infrared light source for night photography and for a satellite tracking camera; requested fabrication of test models of high-magnification hand-held cameras, and initiated test and evaluation of an unattended periscope camera. The contractor completed the prime-component study phase of the technical objective identification system; ATIC started the flight-test phase of the program with aircraft modification and photographic installation, and initiated contract action for the Infrared/Photo Identification System. ~~(SECRET)~~(u)

The Center continued efforts to acquire a capability for the collection of air technical intelligence information on foreign nuclear-propelled vehicles. WADC performed tests of a portable scintillation detector acquired from the US Coast Guard in Baltimore. These tests indicated that there is a possibility of detection at a range of two miles and a strong probability of detection at ranges of 1000 feet or less. ~~(SECRET)~~(u)

Design drawings obtained from Naval Research Laboratory served as the basis for firm planning to have ARDC miniaturize and personalize a gamma detection device for ATIC. ~~(SECRET)~~(u)

Other planning activities for technical resources concerned equipment systems which can be configured to the replacement aircraft logically assumed to replace present types of aircraft used in the discreet collection of intelligence information. (~~SECRET~~)(u)

HUMAN RESOURCES:

Center representation to meetings of the Exchange Committee of the US Intelligence Board continued. Delegation exchanges of note were initiated in various fields such as elasticity, aviation gas turbines, heavy press industry, aviation medicine, and geophysics equipment; and exchanges continued in other fields, including metallurgical areas. ATIC also participated in other exchange proposals of broad interest to the intelligence community, such as a guided missile exchange proposal, internal instrumentation of satellites, and a proposal to exchange an Aerobee rocket for a Soviet meteorological rocket. (~~SECRET~~)(u)

ATIC continued the exploitation of scientific and technical organizations at both domestic and international conferences which covered subjects of air technical intelligence interest, including nuclear energy, electronics, geophysics, and aeronautics. (~~SECRET~~)(u)

The long-range program to utilize indigenous scientists in various strategically located countries in the production of high-level intelligence studies operated successfully in the Far East. These studies are similar to our Rand reports. The program was expanded during this period to cover two additional countries in the South European - Mediterranean Area. (~~SECRET~~)(u)

ATIC initiated new plans to establish the machinery to utilize the technical specialties and capabilities of Reserve Officers in the performance of the ATIC mission. (~~SECRET~~)(u)

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accomplished by ATIC and other members of the Intelligence Community. Results of the ATIC coverage are believed to have added significantly to the over-all national intelligence attained from this conference. ~~(SECRET)~~(U)

During this period, the Center consolidated its operation to procure foreign technical equipment of Air Intelligence interest under a newly organized effort. Procurement of some significant items, and the exploitation of equipment previously procured, resulted in outstanding research and development actions to obtain a complete radar system, an analog computer, and advanced design helicopter. Two of the three items were received. ~~(SECRET)~~(U)

In summary, the production of intelligence reports in the calendar year 1958 increased almost ten-fold over the total production in 1957. This is attributed to the increased productivity of projects, particularly that concerning the covert intelligence operations of the overseas net. ~~(SECRET)~~(U)

PHOTOGRAPHIC TRAINING AND SERVICES:

ATIC furnished photographic training to thirty-eight Air Attache and ATILC Officers, fourteen airmen, and one civilian. The courses varied in length from special three-day courses, tailored to meet specific and individual requirements, to those of three to eight weeks duration. ~~(CONFIDENTIAL)~~(U)

Special studies and work continued in evaluation of film emulsions, printing techniques, and photographic equipment. Other efforts included monitorship of ATIC's exploitation teams for special targets of opportunity acquisition in the US and overseas. Two alerts for such exploitation occurred during the period of this report with one resulting in movement action to the Far East. The Center undertook a new project concerned with tracking and photographing of earth satellites, and continued its program designed to acquire air intelligence information from acoustic recordings.

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specific targets expanded because of the increasing demands from the field for the type of guidance prepared by ATIC. The production of guidance material was below optimum schedule, however, because of inadequate staff resources. (~~CONFIDENTIAL~~)(U)

FIELD OPERATIONS:

In the area concerned with the off-shore control of an extensive European Collection net, ATIC found no great difficulties were encountered in the control mechanisms. The quality of reports continued to improve and a higher percentage of reports received were on primary targets, which further reflected on their responsiveness to ATIC requirements. Communications continued to be a problem, however, and commercial channels will have to be established for more direct and more frequent contact with the primary source. (~~SECRET~~)(U)

ATIC made significant progress during the period of this history in the area concerned with the collection of technical intelligence information through the utilization of a commercial firm. This firm developed direct contact with the USSR and effected several proposals for commercial cooperation. These trade proposals have resulted in a large number of visits to the commercial organization by notable Russians. Some significant information was obtained as a result of these contacts. The branch office abroad continued its active exploitation of sources available to it and formulated plans for expanding this activity. (~~SECRET~~)(U)

The exploitation of notable American scientists and technicians traveling abroad increased at a steady and expanding rate. The number of such personnel exploited doubled over the previous reporting period. ATIC made plans and preliminary contacts for expanding this effort in the immediate future. Coverage of the 1958 Atoms for Peace Conference was successful in that a completely coordinated effort was

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CHAPTER 4

COLLECTION OPERATIONS

REQUIREMENTS:

During the last half of 1958, the number of outstanding active SRI's increased despite the fact that approximately one-third of the SRI's active at the beginning of the period were cancelled. Data collected on SRI's included a substantial amount in priority classifications. ~~(CONFIDENTIAL)~~(u)

EXPLOITATION:

Requirements for exploitation of foreign fairs, expositions, and meetings continued to be active. In the final phases of the Returnee Exploitation Group (REG) activities, some lucrative sources were made available for exploitation, and substantial amounts of ATI information obtained. The activities conducted by REG have now been transferred to a Scientific Exploitation Section under the Defector Reception Center at Frankfurt, Germany. ~~(CONFIDENTIAL)~~(u)

EVALUATION:

Evaluation of Intelligence Report (IR's) received at ATIC continued to present a problem for which a satisfactory solution is yet to be found. An attempt to install new procedures in the Deputy for Documentation, from which the Deputy for Acquisition would receive a better flow of the evaluation, has not been successful and no marked improvement noted. Since evaluation of reports is a matter of prime operational support, this problem continued to receive attention as a matter of high priority. The Deputy for Acquisition continued to supply substantial background information for evaluation of Air Attache collection efforts. The production of this information is hampered by lack of a satisfactory IR evaluation system, however. ~~(CONFIDENTIAL)~~(u)

GUIDANCE:

Production of guidance material on specified subjects which are geared to

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5,000,000 words when completed. (UNCLASSIFIED)

In November, ATIC completed procurement action on the FY 59 contract with the Language Services Bureau of Washington, D.C. (UNCLASSIFIED)

Under an arrangement between ATIC and the USAF Institute of Technology, the Institute's contractor, Syracuse University, continued translating the Soviet publication "Herald of the Air Fleet" for ATIC. Procurement action was initiated for the award of a direct contract for translation of this periodical during FY 59. (UNCLASSIFIED)

PROJECT WHITE STORK:

At the beginning of this period, arrangements had been concluded for increased utilization of Project white Stork files by personnel of the Directorate of Targets, Office of Assistant Chief of Staff, Intelligence. By the end of 1958, an on-line classified TWX circuit had been installed to expedite the processing of requests and to permit Targets access to ATIC's Technical Information Control Center. (UNCLASSIFIED)

In November of 1958, arrangements were concluded for PWS assistance to the Office of Scientific Intelligence, CIA. By agreement, PWS would provide OSI technical, clerical, and laboratory assistance equivalent to two man-months per month. OSI requirements for information will be coordinated with the ATIC counterpart prior to action by PWS. OSI engineers will provide personal guidance to the TIPS information specialists in order to insure accurate retrieval of information. (~~CONFIDENTIAL~~) (C)

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unclassified. Any reference to ATIC and McGraw-Hill, or "Gold Eagle" as McGraw -Hill, is classified Confidential. (~~CONFIDENTIAL~~)(u)

A contract with Stanford Research Institute became official the last of August 1958. This contract involves two phases: (1) STEP Pilot Operation Analysis, and (2) Systems Study. In December, Stanford submitted a recommended manual pilot operation with reference to the first phase. This recommendation is under study. (~~CONFIDENTIAL~~)(u)

TRANSLATION:

ATIC in-house resources translated a total of 2,000,000 words during the reporting period; this total word-count was comprised of approximately 1,600,000 Russian, 200,000 German, 100,000 French and 100,000 word in other languages. (UNCLASSIFIED)

ATIC continued to monitor developments in machine translation, especially the advances being made by corporations and universities under contract with RADC to produce an automatic dictionary, an electronic print reader, and a high-speed printer. In addition, ATIC methodically followed Soviet research and development in this field by means of scanning literature and first-hand reports prepared by persons visiting the USSR on the efforts being conducted in machine translation there.

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ATIC continued to accumulate highly specialized terms as inputs to the Russian-English Glossary. Compilation of terms was facilitated by the availability of a flexowriter incorporating both the Russian and English alphabets. Brief interim working glossaries were produced routinely for internal translation purposes. (UNCLASSIFIED)

TRANSLATION CONTRACTS:

The quality of translations by the O. W. Leibiger Research Laboratories under FY 57 contract were excellent. Requirements entailed translation of 5,977,462 words. The FY 58 contract, awarded to the same contractor, will encompass approximately

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reasons for the increased activity were the accession lists, book lists, and abstracted accession lists which were published by the Library. These lists inform personnel of the Center of Library acquisitions, and serve as selection lists for analysts to secure documents from the Library. (UNCLASSIFIED)

The relocation of the Library during this report period to a building in another area of the base had an adverse effect on the number of visits to the Library by Center personnel. A Library Liaison Office was established in the new main building in order to maintain communication and liaison with the major segment of ATIC personnel. This office serves as a focal point in disseminating documents to the Center and in returning documents to the Library. (UNCLASSIFIED)

SCIENTIFIC AND TECHNICAL EXPLOITATION PROGRAM (STEP):

With the implementation of the STEP Control Center Operation, this program continued at a more rapid pace. During this period, ATIC processed 10,238 abstracts from 101 Soviet journals and 507 monographic abstracts. When fully operational, STEP will encompass three phases covering the Soviet Union, the Satellite countries, and nations of the Free World. SOV/STEP is operational with 178 journals selected for processing. SAT/STEP is in a pilot stage, with arrangements made for processing 45 satellite journals from 242 selected. FREE/STEP has not entered a pilot stage, but 175 journals have been selected for a pilot program. (~~CONFIDENTIAL~~)(u)

A STEP contract with McGraw-Hill Book Company, Inc., became effective in August 1958. This contractor, as a part of the control environment, will facilitate the program by screening, evaluating, publishing, disseminating and, to a specified degree, translating and abstracting STEP materials. ATIC has assigned five of the 178 SOV/STEP journals to the contractor for abstracting; others will be added as the program develops. The contractor has been given the nickname "Gold Eagle" which is

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CHAPTER 5

DOCUMENTATION

DOCUMENT PROCESSING:

The basis for determining the proper processing of documents is whether the information contained in the report is of the open source (overt) or raw intelligence (covert) type. Under the ATIC-PWS unified documentation system, all raw intelligence information with few exceptions, is forwarded directly to Project White Stork (PWS) for processing. During the recent past, PWS has also been receiving selected open source reports for incorporation into the files of the Technical Intelligence Processing System (TIPS). For the most part, however, all open-source type of information received in ATIC is routed directly to the Technical Intelligence Library where it is held for a designated period of time and then destroyed. (UNCLASSIFIED)

The Mechanized Documentation System, although still in the experimental stage, has the potential of affording ATIC greater security and document control, a means of retrieving information, and a substantial savings of manhours in receipting and listing documents for destruction. At present, all documents received from Air Attache and ATILO personnel are processed into the mechanized system. However, this represents only 12% of ATIC's total take of documents. Limiting factors have been insufficient personnel and equipment. (UNCLASSIFIED)

During the past six months, ATIC's processing activity has accomplished dissemination of all ATIC-originated intelligence reports. This includes reproduction, collation, screening, packaging and dispatching reports to AFCIN-1. At present approximately 70 reports are disseminated each month. (UNCLASSIFIED)

AIR TECHNICAL INTELLIGENCE LIBRARY:

During the last half of 1958, demands for reference and acquisition action, and service to ATI analysts and contractors, continued to increase. The principal

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CHAPTER 6

ELECTRONIC INTELLIGENCE
(ELINT)

GENERAL:

In July, ATIC ELINT representative attended the worldwide ELINT Conference which convened in Hawaii to discuss problems and to exchange information. The ATIC representative who serves as ACS/I QRC Officer attended the Quick Reaction Capability Review meeting which was held in October at the Pentagon. Major problems for consideration by this group included improper use of QRC for long-term items; procedure for all QRC actions including ECM, ELINT, and Intelligence; the loss of QRC items in shipment, failure to "Feed-back" to ARDC the field performance of the equipment, and SAC's inability to procure necessary commercial type of data-processing equipment since ATIC support is no longer available. (~~CONFIDENTIAL~~)(U)

ATIC also provided representation to the Third Annual Electronic Warfare Symposium at the University of Michigan in October; and on several continuing panels and committees with national representation, including the Special ELINT Advisory Group (SEAG) and the Technical ELINT Panel (TEP). The SEAG and TEP are groups established to provide a medium for advice to the ACS/I Electronic Intelligence Coordination Group in technical areas of specialized intelligence. (~~SECRET~~)(U)

Other groups in which ATIC participated were the Reconnaissance Consultation Group, sponsored by Wright Air Development Center, and the ARDC-sponsored Symposium on Electronic Countermeasures and Reconnaissance which was held at Johns Hopkins University in November. ATIC contributions included presentations on Technical Requirements for ELINT Data. (~~CONFIDENTIAL~~)(U)

ELINT REQUIREMENTS AND EVALUATION:

ATIC ELINT personnel continued studies on signal environments, utilizing external

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assistance to research all available information on environments in which ELINT collection operations must be conducted. Mathematical models which can be transferred into computer language are being constructed. A major problem is the variance of atmospheric conditions, depending on the climatology of the area of interest. Twelve standard atmospheres were selected, on the basis of National Bureau of Standards reports, for study to produce an environmental pattern for the present peacetime situation and a relatively accurate prediction of the environment for the 1960-1962 period. ~~(SECRET)~~(U)

ATIC has an interest in Subsystem "F" of the satellite reconnaissance system, WS-117L; although the third phase, operational probably in 1962 or 1963, is the only one which will be capable of doing any significant portion of the technical intelligence job. During this reporting period, ATIC established requirements for this type of vehicle for distribution to contractors, and later added requirements for thermoplastic recording, signal correlation and intra-pulse modulation detection. ~~(SECRET)~~(U)

During the last half of 1958, ATIC performed work on evaluations of four aircraft-based ELINT collection systems. This included assistance to WADC in monitoring the evaluation of proposals for the Electronic Reconnaissance System AN/ASD-1, presently conceived as more beneficial to the technical intelligence field than any previously constructed or proposed collection system. The system will be composed of semi-automatic receivers, automatic receivers, computer, digital and analog recorders, and display devices; and will comprise the most advanced equipment of this type available during the time period 1962-1965. ~~(SECRET)~~(U)

The completed ATIC evaluation of the ERB-47H collection system revealed that the system falls short of the necessary equipment configuration to collect signals of increasing intelligence interest, and is capable of collecting, for the most part, the usual type of signals received in the past. The conclusions were that either a

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new type system should be substituted, or the ERB-47H should undergo extensive equipment modification. ~~(SECRET)~~ (U)

An evaluation of the RB-66C collection system revealed that it is deficient in many respects for technical intelligence collection requirements. In cooperation with TAC, ATIC initiated action to determine the best possible configuration which can be installed to fulfill ATIC requirements. ~~(SECRET)~~ (U)

ATIC submitted requirements on the RC-130 collection system in August. Upon being advised in October that the RC-130 aircraft may not be available, the Center established the modification requirements for conversion of the RC-54 to a vehicle useful for data collection. This aircraft, modified on a semi-annual basis, has been fairly satisfactory, but is not in keeping with the requirements of the state-of-the-art developments. ~~(SECRET)~~ (U)

The Center developed requirements for three ground-based ELINT collection systems during this period. One of these involved work with the USAF Security Service on requirements for the WS-466L system, which not only will be able to collect signals for which it is programmed but also to perform a search function for new and unusual signals. ~~(SECRET)~~ (U)

The other two were concerned with the requirements of specific collection operations for which mobile collection systems were needed to collect the intelligence type of signals available in the operational areas. ATIC engineers designed a mobile van configuration, using existing off-the-shelf items, to satisfy the urgent requirements of one of these operations; and requested Rome Air Development Center to develop the other facility in conformance with the special operational plan. ~~(SECRET)~~ (U)

ELINT CAPABILITY IMPROVEMENT:

During this period, ATIC initiated procurement actions for new and modified equipment to increase the quality and quantity of the data-processing work performed in the ELINT area. (UNCLASSIFIED)

The ATIC contractor started the design, development, fabrication and test of a preliminary model of a video tape recorder, and of a video tape recorder-reproducer. The recorders are for operating two video channels, plus two audio channels, with a recording time of thirty minutes; or operating one video channel, plus two audio channels, with a recording time of sixty minutes. Minimal size and weight are prime objectives in the design of these recorders. ~~(SECRET)~~ (U)

At the same time, action was initiated to procure a tape editing device which provides the capability of a loop playback machine by forming the original tape into a thirty-inch loop around a drum. The tape can be moved over the drum so that successive portions of the tape can be scanned, or the tape motion can be arrested so that the same portion of the tape can be scanned during each revolution of the rotating head. This presents a fixed oscilloscope for detailed study of Polaroid camera photography. ~~(SECRET)~~ (U)

The Center obtained a Pulse Analyzer Group, AN/FLA-2, which the Navy had designed to provide a capability for simulating and demodulating complex modulated pulse signals. With the advent of the wide-band recording capability under development by ATIC, this should provide a capability for analyzing the modulation scheme of telemetry intercepts and permit single-channel demodulation of these intercepts.

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In July work began on the contract for an ELINT Processors Manual, an AF Manual in the 200 series. The contractor developed an outline and drafts for coordination and review. Target date for completion is December 1959. In October, ATIC published the first issue of "Processing Equipment Notes," a series of information letters. Response resulted in an increased mailing list which now totals approximately forty agencies and organizations in the ELINT community. ~~(CONFIDENTIAL)~~ (U)

During this period, ATIC provided engineering support to field activities in all

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aspects of ELINT collection and processing activities associated with Soviet missile activities of all types, and laid plans to modify the installations in existence and to open another collection site. The Center expended considerable effort in formalizing the type of ELINT engineering support to be provided to the USAFE area. A jurisdictional problem arose over the operational control of the contractor's engineers furnished by ATIC to assist USAFE. As a result of findings in a first-hand study, an Electronics Intelligence Support Group was established to work at staff level within the Electronics Intelligence Production Center at Wiesbaden. ~~(SECRET)~~ (U)

The Center provided coordination and technical guidance to the Air Force, Army, Navy, and other facilities engaged in collection operations to secure ELINT data from signals associated with Soviet space and earth-satellite vehicles. ATIC advised the Director of SPACE TRACK on 24 December of intended alert; however, due to communications delays, the message was not delivered to him until 29 December.

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ELINT ANALYSIS:

ATIC achieved notable results in ELINT analysis during this period. Methods and procedures for screening incoming data were improved through mechanization of the major portion of the screening process, thus providing more rapid dissemination of the data and increased capability to determine the parametric limits of interesting signals for analysis. ATIC also received its first items of equipment for reduction of sonics data. ~~(CONFIDENTIAL)~~ (U)

Considerable progress was made in the tail fire-control category, especially under a special collection effort directed against the BADGER aircraft. Further significant data on SCAN THREE signals were established. Signals in the 660-mc band, representing emissions from a possible new Soviet IFF system, were intercepted. An unusually complete description of signal characteristics and set operation of the Soviet precision-approach radar was developed. In November, SAC collected and referred

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to ATIC for analysis ELINT data associated with the USAF lunar-probe attempt. ATIC has not received data collected by the USAFSS, but initial reports indicate no radio interference was noted. ATIC analysis of the SAC material resulted in no conclusive evidence of interference. ~~(SECRET)~~ (U)

PROBLEMS:

A check on the progress at the site in Adana, Turkey, in July revealed that special equipment for this project had been damaged in transit by SAC who handled the shipment. Because of the revolution in Iraq, SAC had ordered a stand-down on this and other ferret missions. The situation was complicated by the fact that the Turkish government had imposed flight regulations which made operations almost impossible. ATIC made an investigation of these restrictions in view of the fact that the best existing airborne reconnaissance system was scheduled for flight test in August and deployment to the site in November. These restrictions were dissolved and the first data from the new system was received in December. ~~(SECRET)~~ (U)

During this period, ATIC discovered that "Group A" signals, which have been issuing from various classes of Soviet ballistic missiles, contained additional complex pulse detail which was not observed previously. ATIC ELINT rushed special equipment to a specific collection site to become a permanent addition to the site and provide a film record of the signals which can be processed in sufficient detail to understand the weapon system. ATIC also discovered an unusual number and variety of complexities in other Soviet noncommunication signals which existing collection facilities could not record adequately for analysis. Vital detail in some of the highest priority intercept situations was not captured, and basic intelligence information which could have facilitated complete understanding of new Soviet weapon systems was lost. Examples of these situations are:

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1. Analysis of a possible new system, the emissions from which contain various types of pulse-group coding peculiarities, was stymied because of inability to reconstruct entire pulsing trains.

2. If recording media were capable of detailing pulse-interval coding, much information about Soviet Distance Measuring Equipment (DME) signals could be revealed. Without this information, the nature of deployment and operational usage of the airborne and ground-based DME complex cannot be determined.

3. In attempt to confirm the air-to-air capability of specific Soviet aircraft, ATIC has searched for an anticipated quadrant reference pulse in SCAN THREE signals. This extra, secondary pulse is expected to appear at only a small fraction of the pulsing rate of the main train. This creates grave doubt that the average ELINT operator can perceive the secondary pulse at all in the live signal, and precludes the attempt to determine the missile function of the aircraft. ~~(SECRET)~~(U)

To overcome these and other similar problems, ATIC planned to furnish to USAFE and PACAF theaters at least one portable and one fixed ensemble which would be available at all times. ELINT data produced by this equipment would facilitate analysis and study of the high-priority signals. ~~(SECRET)~~(U)

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CHAPTER 7

ENGINEERING SUPPORTENGINEERING ANALYSIS:

During the last half of 1958 extensive effort was expended on a new Soviet aircraft designated BOUNDER. ATIC made performance estimates and weight and balance checks for several different missions of this aircraft with different engine installations. ~~(SECRET)~~(U)

An increased amount of effort was exerted in the field of missiles, and the Center developed and refined the ability to run performance checks for different types of staging and flight paths. ATIC also enlarged and refined the Center's engineering-analysis capability in the field of structures and weight estimation.

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COMPUTATION:

Within the past six months, ATIC has installed a new computer which is approximately five times faster than the Readix. The new machine is a 205 Datatron and includes the main frame and console, flexowriter, high-speed photo-electric tape recorder, high-speed tape punch, card input and output, floating point logic, and three magnetic tape handlers. (UNCLASSIFIED)

The scope of problems handled by computers was extended into the field of information handling. By the end of the year, ATIC had programmed a document header information file on the Datatron and started operation. (UNCLASSIFIED)

PHOTO ANALYSIS AND RESEARCH:

ATIC participated in the analysis of Sputnik III Carrier Photography during this period, and in the acquisition of long focal-length photography from the ROTI (recording optical tracking instrument), Boston University and IGOR camera systems. The data reduction of the resulting photography, and analysis of the reduced data,

resulted in over-all dimensions of the rocket carrier. (~~CONFIDENTIAL~~)(U)

Other major analyses included dimensional analysis of the BOUNDER aircraft and of BEAGLE electronic gear. (~~CONFIDENTIAL~~)(U)

ATIC received four new major items of photo-analysis equipment during this period. Other photo equipment received included a microfilm reader-printer and sixteen new items of processing equipment. The new Conserv-a-File made possible the complete conversion of all photographic material to the vertical-filing system arrangement. (UNCLASSIFIED)

GRAPHICS:

The quality of ATIC briefing presentations was improved by the procurement and installation of Transpaque II overhead projectors and allied equipment, and instruction of operating personnel in their operation. (UNCLASSIFIED)

ATIC developed the capability of preparing panoramic vu-graphs for special application within the intelligence community. The application of new equipment and revised techniques resulted in an over-all increase of 22% in production of publications and of 35% in reproduction output. (UNCLASSIFIED)

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CHAPTER 8

PROPULSION

GENERAL:

World-wide interest and progress in the research and development of unconventional propulsion methods, advanced types of propulsion systems and advanced energy-conversion systems for secondary power made it imperative that ATIC provide increased activity in these areas during the period covered by this history. (UNCLASSIFIED)

PETROLEUM FUELS:

In the field of petroleum products, ATIC closely followed the Soviet development of encapsulated fuels and reviewed numerous references on encapsulation of "solidified" gasoline. The encapsulation process is particularly significant since it now seems feasible to encapsulate liquid rocket propellants and thereby impart to liquids many desirable characteristics of solid propellants. ~~(CONFIDENTIAL)~~ (u)

ATIC gave special attention to Soviet work on the prevention, detection and removal of water or ice from jet fuel. This is a problem of major concern to the USAF, since a large number of accidents or near-accidents have been attributed to ice in the fuel system. ~~(CONFIDENTIAL)~~ (u)

The Center reviewed the contractor's report on the thermal stability of jet fuels. It appears from this study that the Soviets are attacking the problem by the use of additives instead of the improvement of refining techniques, and that their experiments with higher boiling fuels may relate to the search for a thermally stable fuel.

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Petroleum product analysis performed for ATIC by the Phoenix Chemical Laboratory^{1/} indicated that the Soviets are maintaining their capability to produce satisfactory products for air weapons. ~~(CONFIDENTIAL)~~ (u)

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RADIATION EFFECTS:

The ATIC contractor completed the preliminary surveillance of Soviet literature on radiation effects upon fuels, fluids and lubricants. Although Soviet interest is apparent, no precise reference to Soviet research was found. (~~CONFIDENTIAL~~)(u)

SYNTHETIC LUBRICANTS:

A recent ATIC study established the existence of a synthetic-lubricant industry in the USSR.^{2/} This considered 750°F as the maximum operation temperature required of aircraft lubricants and fluids. Space flight, however, requires that lubrication be possible at 1000°F for long residence times, and possibly 2000°F for short residence times. Accordingly, an extension of the original study^{3/} was initiated to consider Soviet capabilities to devise novel lubrication methods which could use low eutectic alloys, inert gases, sweeping vapors, etc. (~~CONFIDENTIAL~~)(u)

NUCLEAR FUELS:

The Center initiated a two-phase study of the Soviet chemical technology of nuclear fuels during this period. Phase I, a feasibility determination, tentatively concluded that specific indicators of Soviet activities are too vague or too indeterminate to warrant an intensive study at this time. Consequently, Phase II, originally conceived as an intensive study, will be conducted on a surveillance basis to detect and test promising indicators that may develop. In the meantime, the Soviet claims of priority for a nuclear powered aircraft indicate a confidence in the ability to develop high-temperature, fast, and compact nuclear reactors. (~~CONFIDENTIAL~~)(u)

ADVANCED ENERGY SOURCES:

The contractor^{4/} completed a study of Soviet capabilities to devise and develop new or advanced sources of energy. This study was based on about 150 specific research articles. Tentative conclusions indicated Soviet interest and capabilities in this field and suggested special attention toward the study of ion propellants and plasma jets. (~~CONFIDENTIAL~~)(u)

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ROCKET PROPELLANTS:

With external assistance^{5/}, ATIC completed a study of Soviet capabilities in liquid fluorine research, development and application to rocket engines as a high energy propellant oxidizer. Conclusions were that at the present time the Soviets have the technological ability and natural resources, but are not as far advanced as the US in liquid-fluorine engine research, and will not achieve a liquid-fluorine engine in advance of the US. (~~CONFIDENTIAL~~)(u)

To date, the survey on Soviet liquid ozone research, development^{6/} and application has not uncovered any reliable information to establish the use of liquid ozone or oxygen enriched with ozone in Soviet propulsion systems. However, it has determined that a group of Soviet scientists are studying metal ozonides and peroxidic compounds which may find application in the propellant fields. This research is conducted at the Karpof Institute in Moscow, a known propellant research institution. (~~CONFIDENTIAL~~)(u)

The Soviets are aware of the advantages offered by a storable propellant system. Project WHITE STORK started continuous surveillance of the entire Soviet liquid and solid propellant program, and compilation of information for evaluation.

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COMBUSTION AND BORON:

Present investigation shows that Soviet interest and work in fundamental and applied combustion have continued and are steadily increasing. The contractor^{7/} continued the study in these fields under a new contract. (CONFIDENTIAL)

Examination of Soviet literature has revealed a continued interest in boron chemistry. ATIC negotiated a new contract for the study of boron chemistry.^{8/}

ADVANCED PROPULSION SYSTEMS:

ATIC obtained contractor assistance to determine Soviet capabilities in nuclear-rocket,^{9/} nuclear-ramjet,^{10/} and ionic^{11/} propulsion systems. Procurement action is under way

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to obtain contractor assistance in determining Soviet capability in nuclear gas-turbine propulsion systems and in advanced energy-conversion systems for secondary power. (UNCLASSIFIED)

CURRENT PROPULSION SYSTEMS:

The ATIC contractor^{12/} completed a study of Soviet ramjet engines, and will extend the study to include hypersonic ramjet development potential. Another contractor^{13/} completed a study associated with synthesizing and matching turbojet off-design performance, and started work^{14/} on analysis of the NK-4 turboprop and formulation of a method for synthesizing off-design performance of turbofan and turboprop engines.

~~(CONFIDENTIAL)~~ (U)

Contractual work^{15/} associated with the detailed analysis of the Soviet AM-9 turbojet engine approached completion during this period. ATIC took steps to acquire improved quality reproductions of the detailed drawings on the AM-9 to permit refinements in the in-house design analysis for integration into an ATIC technical report. ~~(SECRET)~~ (U)

PROPELLERS AND ROTORS:

ATIC selected a contractor^{16/} to evaluate a modern Soviet propeller, and provided two AV-50 propellers for examination. ~~(CONFIDENTIAL)~~ (U)

ROCKET PROPULSION:

ATIC surveyed all available information concerning theory and detection of electromagnetic emanations from rocket engines to evaluate the possibility of employing this phenomenon as a positive intelligence - information collection method. Information was inadequate for drawing any conclusions. When additional data are obtained, ATIC will investigate the possibility of deriving analysis methods for obtaining useful propulsion information. ~~(CONFIDENTIAL)~~ (U)

ATIC made another survey to evaluate the possibility of employing wave attenuation

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as a positive intelligence-information collection method in the field of propulsion.

Analysis methods will be established when additional data are obtained. (~~CONFIDENTIAL~~)(U)

The contractor continued analysis of rocket-exhaust patterns.^{17/} Considerable progress was made in determination of rocket-performance data from exhaust flame photography through use of mathematical gas-dynamics analysis techniques. (~~CONFIDENTIAL~~)(U)

ATIC plans continuation of contract activity with the Rocketdyne Division of North American Aviation, Inc., for further study of Soviet capability in the field of large rocket power plants, in light of recently acquired new intelligence information. (~~CONFIDENTIAL~~)(U)

Contractor assistance continued in the intelligence areas of Soviet capability in small rocket engines, both solid and liquid propellant, for aircraft and small missiles; and in rocket-power-plant parametric studies and mathematical analysis techniques. The three top rocket-engine companies in the US are providing industrial assistance for the accomplishment of ATIC's priority products in the field of missiles and space systems. (~~CONFIDENTIAL~~)(U)

-
1. AF 33(600)-38127 Phoenix Chemical Corporation
 2. AF 33(600)-33795 Dow Chemical Company
 3. AF 33(600)-37658 Southwest Research Institute
 4. AF 33(600)-37286 General Electric Company
 5. AF 33(600)-35571 Pensalt Chemical Corporation
 6. AF 33(600)-35497 Welsbach Corporation
 7. AF 33(600)-37437 Combusion and Explosives Research, Inc.
 8. AF 33(600)-33444 Olin Mathieson Chemical Corporation
 9. AF 33(600)-37577 Rocketdyne Division, NAA
 10. AF 33(600)-37598 Marquardt Aviation Company
 11. AF 33(600)-37454 Armour Research Foundation

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- 12. AF 33(600)-34841 Marquardt Aviation Company
- 13. AF 33(600)-33711 Allison Division of General Motors
- 14. AF 33(600)-36731 " " " " "
- 15. AF 33(600)-37542 General Electric Company
- 16. AF 33(600)-37563 Hamilton Standard Division (UAC)
- 17. AF 33(600)-36894 Aerojet General Corporation

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CHAPTER 9

ELECTRONICS

GENERAL:

Early in this reporting period, ATIC planned the tentative formation of a special intelligence group to sift, weigh, coordinate, and bring together completed findings and estimates on the various technologies involved in the whole Soviet electronics complex. This engineering body would integrate all vital information into studies of the strength and weakness of entire electronic systems in actual aircraft, missiles, space vehicles, and ground installations. It would be concerned only with subjects which deal with a total environment, as opposed to one specific electronics area. ATIC believed that this approach could best meet the needs of national defense planning agencies and operational commands for compact and graphic summarizations of Soviet capabilities. (~~CONFIDENTIAL~~)(U)

ATIC laid the ground work for broadening all present investigations on Soviet research and development strength relative to electronic countermeasures, computers, infrared systems, and components for general electronic equipment to assess these threatening areas more profitably. (~~SECRET~~)(U)

ELECTRONIC GUIDANCE AND NAVIGATION:

The Stanford Research Institute completed its study for ATIC on Long Range Navigation, and submitted reports of evaluation of the Soviet KRUG and TAIFUN systems under this contract. (~~SECRET~~)(U)

ASTRONAUTICAL ELECTRONICS:

Activity in this area continued to take an increasing amount of effort because of Soviet successes and subsequent queries from technical intelligence users. Several analyses were made during this period, and a paper on Soviet Satellite Electronics was prepared for presentation at the Canada-UK-US meeting scheduled for January 1959.

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~~SECRET~~INFRARED:

Aerojet-General Corporation, a known leader in the field of military infrared, completed an ATIC study on Soviet Infrared for Aerial Warfare and continued work for ATIC on the subject of Infrared Radiation of Foreign Aircraft. (~~SECRET~~)(U)

ELECTRONIC COMPONENTS:

Litton Industries continued to evaluate for ATIC Soviet-bloc capabilities in the microwave tube area. In addition, procurement documents were initiated for evaluation of Soviet-bloc passive electronic components, including a critical evaluation of Soviet capabilities to develop and produce miniaturized electronic components capable of operation under extreme environmental conditions. (~~SECRET~~)(U)

ELECTRONIC COMPUTERS:

Information pertinent to the Soviet capability in the electronic-computer area increased. Much of the information was from open literature or international symposiums, which indicated that much of the less sensitive Soviet computer work is unclassified. ATIC's contractor continued work on a report in this area. (~~SECRET~~)(U)

ELECTRONIC COUNTERMEASURES:

The Center obtained a limited amount of good data from the Soviet Naval Exercises during the summer of 1958. The deficiency of RB-66 ELINT equipment to receive and analyze ECM signals was the limiting factor in collecting these data. The technical knowledge gained from recordings was not enough to expose any details of the jamming devices used. A very important by-product was that it indicated for the first time that present-day collection equipment is not providing sufficient information to determine the source and intent of many types of interfering signals. (~~SECRET~~)(U)

Sylvania Electric Products completed the report for ATIC on Soviet ECM capabilities and produced two other reports of the aid-to-collectors type. One of these shows radar scopes under various jamming conditions and the other illustrates how ELINT equipment

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can better be employed to receive ECM intelligence information. ~~(SECRET)~~ (U)

COMMUNICATIONS:

The RCA completed the basic study to determine Soviet-bloc communications-system capability and equipment specifications in support of air offensive and defensive operations. This study resulted in a comprehensive analysis of present Soviet air communications, and an estimate of future trends in the Soviet communications field.

~~(SECRET)~~ (U)

Stanford Research Institute completed an assessment of Soviet capability in the field of scatter propagation as applied to air-weapons development. The study indicated new evidence of increasing interest in the field of forward scatter communications, as well as in the use of back scatter techniques. The study implies that a close surveillance of new information should be continued, since evidence points toward Soviet applications of scatter techniques in the near future. ~~(SECRET)~~ (U)

Radiation, Inc., completed ATIC's study of Soviet capabilities in the field of telemetry. This study revealed some interesting system-design trends in the field of telemetry by the Soviets. One of these trends is the apparent attempt to standardize on AM as a carrier with mostly PPM for information channels. Of considerable interest was the program of the Soviet satellites and their associated telemetry. ~~(SECRET)~~ (U)

Work was performed by Convair on a study of Soviet capability in Electronics for Nuclear Powered Aircraft. The report presented an NPA aircraft configuration that the Soviets are likely to use, and which served as a basis for their analysis of the electronics problem resulting from this nuclear environment. ~~(SECRET)~~ (U)

Cook Research completed an ATIC study of Soviet communication modulation techniques during this period. The results of this work contributed significantly to the study of Soviet trends in communications. ~~(CONFIDENTIAL)~~ (U)

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RADAR:

Westinghouse submitted a report on the Airborne Radar study for ATIC, and the Electronic Engineering Company submitted the Handbook of Noncommunications Equipment Radiation Data. In-house effort included a number of radar-coverage diagrams for Soviet radars against US aircraft, and five reports concerning the radar-echo areas of the BISON and BEAGLE aircraft at various frequencies and the RED SPIDER missile.

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CHAPTER 10

ARMAMENT

AIRCRAFT ARMAMENT AND FIRE-CONTROL SYSTEMS:

During this reporting period, ATIC completed technical review and modification of contractual products, "Soviet Bomber Defensive Armament Systems Development,"^{1/} and "Characteristics and Performance of Soviet Fighter Armament Systems;"^{2/} and started the review of another product entitled "Soviet Strategic Bombing Accuracy."^{3/}

(UNCLASSIFIED)

The 1958 revision of the in-house study, "Defensive Fire Coverage Diagrams of Soviet Bomber and Turreted Transport Aircraft," and an in-house study of defensive armament requirements for the Soviet bomber BOUNDER, were completed during this period.

(UNCLASSIFIED)

VULNERABILITY:

The vulnerability investigations by the Ballistic Analysis Laboratory^{4/} of Johns Hopkins University continued during this period. ATIC completed the study, "Vulnerability of BADGER to Various US Air-to-Air Weapons," and supplements to the BEAR and BISON studies; and initiated a contract^{5/} for a vulnerability firing program to support these evaluations. (UNCLASSIFIED)

AIR ORDNANCE AND WARHEADS:

Aerojet General Corporation^{6/} completed the literature-search phase of an ATIC Study on conventional warhead designs and characteristics for Soviet air-to-air rockets and missiles, and surface-to-air missiles. The Ballistics Research Laboratory^{7/}, Aberdeen Proving Ground, completed spark-range ballistic tests to determine stability factors for the Soviet 23mm and 37mm projectiles. ATIC performed data reduction and provided additional information relative to Soviet gun barrels which was required for completed of the final report. (~~CONFIDENTIAL~~) (6)

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AIR-TO-AIR MISSILES:

Sperry Gyroscope Company^{8/} completed a study of the Soviet ShM beam-rider missile on the basis of tail-control guidance. ATIC initiated procurement action to extend the analysis work based on new and other intelligence information which constituted a major performance change in the ShM missile. (~~SECRET~~) (U)

ATIC conducted a study of Soviet capabilities in the semi-active radar-guided air-to-air missile under contract with Bendix Systems Corporation^{9/}. This study of Soviet requirements and most probable design practices is for the purpose of providing estimated configuration and performance characteristics of the 1958 missile and growth potential. (~~SECRET~~) (U)

Aerojet General Avionics Division^{10/}, under contract with ATIC, completed the requirements phase of an analysis of the Soviet capabilities to develop an infrared guided air-to-air missile. This phase involved determining visual detection limits and performance capabilities of Soviet day fighters to effect a daylight missile attack on a target. The next phase involves the estimation of probable Soviet mechanization of an IR missile system to satisfy the requirements. (~~SECRET~~) (U)

BW-CW WEAPONS:

ATIC made additions to the survey of intelligence-information on Soviet and Satellite biological and chemical warfare during this period. This survey was originally requested by Hq ARDC, and is currently in use by both ARDC and the Directorate of Estimates, ACS/I. ATIC activated an additional study entitled "Evaluation of Soviet Chemical and Biological Weapons for Air Delivery." This includes both Soviet aircraft and missile-weapon systems delivering several biological and chemical agents. Contracting for outside support in these studies was in the final stage. (UNCLASSIFIED)

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AAA CAPABILITIES:

The American Machine and Foundry Company ^{11/} continued work on an ATIC study of the characteristics, performance and engagement capabilities of the Soviet towed and self-propelled versions of the 57mm AAA weapon with its various alternative fire-control directors and radars, on-carriage sights and other auxiliaries. To further meet the requirement for a technical appraisal of Soviet low-altitude defense capabilities with nonguided weapons, ATIC initiated a supplementary work proposal for an evaluation of the Soviet 100mm AA gun and additional penetration altitudes for the aircraft selected for study. (~~CONFIDENTIAL~~)(u)

NUCLEAR WEAPONS:

During this period, work continued on a study of non-nuclear components of nuclear weapons ^{12/}. The objective of the study is to develop an estimate of nuclear weapons compatible with Soviet aircraft and missiles. (UNCLASSIFIED)

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1. Contract AF 33(600)-33408, Aircraft Armament Inc., Cockeysville, Md.
 2. Contract AF 33(600)-24502, Crosley Division, AVCO Mfg. Company
 3. Contract AF 33(600)-35622, Haller, Raymond and Brown
 4. Contract AF 33(600)-33898, Ballistic Analysis Laboratory
Johns Hopkins University
 6. MIPR 33-600-9-S-122 Ballistic Research Laboratory
Aberdeen Proving Ground
 7. MIPR 33-600-8-S-179, Ballistic Research Laboratory, Aberdeen Proving Ground
 8. Contract AF 33(600)-36351, Sperry Gyroscope Company
 9. Contract AF 33(600)-37220, Bendix Systems Corporation
 10. Contract AF 33(600)-37163, Aerojet General Avionics Division
 11. Contract AF 33(600)-37529, American Machine and Foundry Company
 12. Contract AF 33(600)-37339, Nuclear Division, Kaman Aircraft Corporation
Albuquerque, New Mexico

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CHAPTER 11

EQUIPMENT

AIR WEAPONS EQUIPMENT:

Significant events during the last half of 1958 in the equipment area included the initiation of several procurement actions to enlarge our support from external assistance, extensive analyses of equipment for the new Soviet bomber BOUNDER, and extensive contributions to activities in the astronautics area. Four new procurements were initiated in the guidance and navigation project, one on the equipment system project, and one on the maintenance effectiveness project. The most active aspects of support to astronautics relate to the human factors of man in space and to pioneering work of the Soviets in the use of parachutes at very high altitudes and at very high speeds.

GUIDANCE AND NAVIGATION:

Among the completed procurement actions for the securing of external assistance, one involves a thorough analysis and re-examination of information for evidence of an intent or capability of the Soviets to effectively use self-contained inertial guidance for their ICBM. Aside from the possibility for improved electronic security, the self-contained type of guidance would greatly increase the mobility of launch sites.

Another involves capabilities and progress of the Soviets toward providing inertial and celestial navigation and stabilization of their astronautic vehicles. All of the world's astronautic vehicles up to this time have tumbled and rolled in more or less random fashions. For the collection of scientific data, for effectively manning a space vehicle, and for exercising any kind of control for the purpose of recovery or navigation, a means of stabilizing the vehicles in fixed attitudes is greatly needed. Also, navigation as applied to space vehicles will

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have some altogether new aspects and will probably depend heavily upon celestial observations.

ATIC is also seeking external assistance to investigate the Soviet position and future capabilities to use new and advanced types of inertial references. Heretofore the fixed stars have constituted our permanent reference points to inertial space, with the gyroscope and accelerometer constituting our only artificial and self-contained references. New scientific concepts offer promise that new and entirely different artificial inertial references, which will be substantially free from error, may be developed. Any Soviet achievements in this regard would materially affect the security and reliability of their aircraft navigation and affect the accuracies of their guided missiles.

AIR WEAPONS RELIABILITY:

During the last half of 1958, ATIC completed a procurement action to secure external assistance in the maintenance and reliability area. Five proposals were received.

AEROMEDICAL EQUIPMENT:

Most significant in the human factors area during this reporting period was the development of information on Soviet experiments wherein living mammals were recovered by parachute from altitudes up to 280 miles. Indicated thereby, were not only outstanding Soviet achievements in the use of parachutes at very high speed and at very high altitudes, but also significant achievements in personnel protective techniques and equipment.

Procurement action was initiated to secure continued external assistance from CONVAIR, San Diego, to extend beyond the work in the human factors area that they are now engaged in.

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ELECTRIC POWER EQUIPMENT:

This reporting period witnessed the first beneficial use by the Soviets of a solar energy converter in a space vehicle. A part of the electrical energy requirements of their Sputnik III was supplied by a system for solar energy conversion, whose principal performance parameters were computed from information contained in press releases and from interpretation of photos of the vehicle.

Efforts by the American Power Jet Company to investigate and report upon the over-all area are continuing on schedule.

AERIAL RECONNAISSANCE EQUIPMENT:

Action to secure external assistance in the examination and interpretation of information on Soviet optical reconnaissance systems was completed and three proposals were received. One of these was found in a technical evaluation to be very acceptable and the recommendation was made that a contract be entered into with the winning competitor.

EQUIPMENT FOR NUCLEAR POWERED AIRCRAFT:

An Intelligence Collection Brief for the guidance and stimulation of information collectors was published to cover those aspects and indicators of aircraft equipment peculiar to the use of nuclear propulsion.

GUIDED MISSILE GROUND TECHNICAL EQUIPMENT:

A contract for external assistance was entered into with the American Machine and Foundry Company, and valuable assistance was received thereunder in the examination and interpretation of information on Soviet missile transport and ground support equipment. This information has permitted the identification of Soviet ballistic missiles in East Germany.

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CHAPTER 12

INDUSTRIAL ENGINEERING AND MATERIALS

PRODUCIBILITY:

In the field of aircraft producibility, ATIC placed primary emphasis on analysis of the new Soviet aircraft, BOUNDER, and on evaluations from a structural and manufacturing standpoint as an aluminum and as a stainless steel aircraft. Reports from Boeing were used in the evaluation to reflect Soviet capability to manufacture a Mach 2 and Mach 3 bomber weapon system. Also accomplished during this period were manufacturing analyses of representative fighters, producibility studies of BLOWLAMP and BACKFIN, and specific contributions in support of various activities concerned with estimates of Soviet capabilities to develop bombers, fighters, and support aircraft, as well as advanced performance weapon systems. ~~(SECRET)~~(U)

ATIC provided representation to the annual US, UK and Canadian Aircraft Production Conference in Ottawa, and participated in discussions on current activities and trends in Soviet and Satellite aircraft industries. ~~(SECRET)~~(U)

In the guided missiles producibility area, the major portion of available effort was applied to the monitorship of two external assistance contracts dealing with a production study of Soviet ICBM's by the Martin Company, and an evaluation of Soviet inertial guidance manufacturing capability by Minneapolis-Honeywell. The Martin contract was completed on 26 December 1958; the contract with Minneapolis-Honeywell was extended for completion by June 1959. ATIC initiated procurement action for studies of Soviet capability to manufacture air-to-surface guided missiles, and a manufacturing analysis of Soviet tactical and intermediate-range ballistic missiles. ATIC completed specific contributions to missile estimates as follows: "Semi-Annual Offensive Missiles Study," "Air-to-

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Surface Offensive GM Weapon Systems," "Surface-to-Surface Offensive GM Weapon Systems," and "Guided Missile Weapon System -Offensive." (~~SECRET~~) (U)

In the propulsion systems producibility area, the Center prepared work statements and initiated procurement action to support "Factors Affecting Soviet Production of Nuclear Propulsion Systems." Activity also continued to review and revise the North American report, "Rocket Engine Producibility Study." (~~SECRET~~) (U)

ATIC completed two studies in the industrial technologies-precision industry area. These were "Status of Welding Technology in the Soviet Bloc Nations," and "A Study of Soviet and Selected Satellite Receiving Tube Manufacturing Technology." Primary emphasis was applied to the monitorship of intelligence data relating to Soviet heavy press technology. An AID article was prepared in this field, and a briefing was given on recent Soviet heavy-press achievements to top level USAF, Army, Navy, BMD, and ARPA personnel investigating heavy-press requirements for the production of current and future ballistic missiles. (~~SECRET~~) (U)

AIR WEAPON MATERIALS:

In the field of metallurgical and inorganic materials, ATIC assisted the Department of Defense by the preparation of a report which evaluated the impact of COCOM embargo removals of certain metals and alloys that can now be purchased by the USSR. The information in this report was submitted by the DOD to the National Security Council. The Center completed three studies and a working paper on the following subjects respectively: "Soviet Research in Surface Active Media," "Soviet Airframe Materials," "Soviet Nuclear Metallurgy - Part I," and "Results of US/USSR Metallurgical Exchanges." (~~SECRET~~) (U)

ATIC presented a briefing on Soviet developments in the metallurgical field, and two briefings on Soviet developments in organic materials, at the ARDC Symposium on Materials held at Dallas, Texas, in July. The two briefings on organic materials were presented later to the Ad Hoc Committee of the IAC in Washington. (UNCLASSIFIED)

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Work continued on a study of the status of polymer materials in the USSR; and on reports and studies covering Soviet air-weapon materials, propulsion materials, and nuclear radiation-resistant polymers for the intelligence and research and development communities. ~~(CONFIDENTIAL)~~ (U)

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CHAPTER 13

AIR SCIENCES

GENERAL:

During the last half of 1958, ATIC took preliminary actions which will form the basis for a nominal but dynamic Air Science Program in the future. The mission was restated, in recognition of the fast reaction time of Soviet science and technology to breakthroughs in the theoretical frontier which established, in essence, a "Dew Line of Technology." The primary mission now reads: "Probe the frontier of foreign theoretical thinking. Isolate, evaluate, and report on those areas of potential theoretical breakthrough having possible application to future Air Weapon Systems." The analysis and evaluation of Unidentified Aerial Phenomena remained as the second part of the over-all mission. (~~CONFIDENTIAL~~)(u)

PROGRAMMING:

Representatives of ATIC and of the Air Force Office of Scientific Research (AFOSR) held extensive discussions in an effort to firm up the future Air Science Program for ATIC so that it would react to the needs of our own basic research program sponsored by AFOSR. (~~CONFIDENTIAL~~)(u)

ATIC also engaged in discussions with key representatives of the Fundamental Science Division of CIA to compare programs of interest and eliminate or avoid any duplication. It was agreed that the field of seismology offered little toward future Air Weapons as such, and that a slightly expanded program within CIA would adequately cover both ATIC and CIA requirements. The result was a plan for ATIC to close out its effort in seismology on or about 1 April 1959. (~~CONFIDENTIAL~~)(u)

In November 1958, the Center initiated a series of monthly presentations in the air-science area on subjects of prime interest to ATIC analysts and staff personnel. The first of these presentations was by Dr. Bobrovnikoff of Ohio State University, and dealt with the threat of Soviet science in the Space Age.

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The December presentation was on "Soviet Research in the Arctic and Antarctic" by Mr. Leonard Dykes of CIA. (~~CONFIDENTIAL~~)(u)

MATHEMATICAL SCIENCE:

During this reporting period, ATIC made two studies pertaining to Soviet Capabilities in Celestial and Nonlinear Mechanics. These emphasized the background and development leading to the launching of Sputniks, ICBM's and other air and space operations. (~~CONFIDENTIAL~~)(u)

To keep Center personnel and others informed of Soviet orientations and increasing emphasis on space operations, ATIC has expended continued effort upon timely technical briefs and AID articles relating to the astronomical sciences. Specific emphasis has been placed on radio astronomy and the applications of magnetohydrodynamics to space operations. Other work during the period was on elasticity and plasticity theory, information theory, and fluid mechanics with emphasis on laminar flow and shock-wave theory. (~~CONFIDENTIAL~~)(u)

GENERAL SCIENCES:

ATIC continued extensive work in several areas of prime importance to us as we move into the space age. An example was the study of Ball Lightning, a subject of considerable interest and whose importance was appreciably enhanced by news released to the effect that the Soviets were planning some sort of technological surprise in an applied use of Ball Lightning. (~~CONFIDENTIAL~~)(u)

Other examples include analysis of work in the USSR in theoretical and radiation chemistry, Soviet activities in Plasma Physics as applied to thermonuclear reactions, and Soviet work in Lattice Interactions. Extensive further projects were initiated in both Plasma and Solid State Physics, and a study completed on the Status of Transistor Materials in Selected Soviet Bloc Nations. (~~CONFIDENTIAL~~)(u)

Work continued on joint endeavors by ATIC and WADC which relate to temperature inversion and ducting in certain European areas, factors relating to signal reception, very-low-frequency transmission, scatter propagation, antenna sizes and high-sensitivity receivers. (~~CONFIDENTIAL~~)(U)

GEOPHYSICAL SCIENCES:

The last half of 1958 was a particularly active one for the Geophysical Sciences Group of ATIC which expanded work relating to input to our own ATIC work, ARDC, CIA, and the Directorate of Targets, ACS/I. ATIC provided a member of the IGY working committee during this period, and as such became actively involved in all IGY problems relating to the Geophysical Sciences, satellite tracking, et cetera. (~~CONFIDENTIAL~~)(U)

During July a project was initiated with the DCS/O to determine the nature and scope of Soviet interest in earth currents. This work is being carried out with the further assistance of the the Rand Corporation and Project White Stork. ATIC's major concern is the amount of effort applied in this area by the Soviets, and the possibility of using their network of earth-current stations for bomb detection and low-grade communications back-up. (~~CONFIDENTIAL~~)(U)

Based upon a specific request from WADC, the Geophysical Sciences Group initiated a study of Soviet Capabilities in Weather Reconnaissance. This deals with instrumentation employed by the Soviets and will be used as guidance material in the development of the multimillion-dollar USAF Weather Reconnaissance System. (~~CONFIDENTIAL~~)(U)

Work continued during this period in direct support to the Directorate of Targets, ACS/I, as related to geomagnetism, gravity, and geodetic data made available through open-source and IGY channels. Extensive work was accomplished also in the exchanges of scientists and information relating to the over-all IGY effort. Considerable

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effort was spent in-house with the Directorate of Research and Development, Air Research and Development Command, Air Force Special Weapons Center and contractor personnel in analysis of the electromagnetic effects of high-altitude nuclear detonations. Specifically, ATIC was concerned with the radar and communications-blackout problems associated with high-level ionization accompanying nuclear explosions.

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AERIAL PHENOMENA:

A total of 310 UFO cases were reported to ATIC during the period from 1 July to 31 December 1958. Fourteen of these are still undergoing evaluation. Of the 296 cases evaluated, the following identifications were possible:

Balloons	25
Aircraft	60
Astro	
(Meteors, etc.)	96
Satellites	4
Other natural	
phenomena	50
Insufficient data	61
Unknown	2

Of significance during the period was the general reduction in the number of cases reported. This reduction, however, was accompanied by an increase in the number of cases of great public interest and those being vigorously pursued by self-appointed experts and UFO organizations of unknown or questionable intent. These cases invariably cause a much greater amount of ATIC effort than would otherwise be warranted. Two Congressional inquiries were answered during the period. Both of these were associated with the more complex cases referred to.

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CHAPTER 14

AIR WEAPON SYSTEMS

ESTIMATES:

As the whole intelligence effort was growing in maturity and becoming the product of a more integrated network, the work of ATIC found its place and established its position within intelligence circles. In this process, the Center responded to the increasing importance of its assignment for integrated intelligence data on air systems environment and national aeronautical capacities.

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Contract negotiations played important roles in estimates for operational and development planning and in national estimates produced by the Center. Northrop continued work on a Soviet air-defense requirements study^{1/}, while Lockheed pursued the determination of technical-performance requirements for Soviet offensive wartime systems^{2/}. A contract with Air Research, Incorporated, (ARINC) explored the subject of human factors in Soviet air weapons development.^{3/} ~~(SECRET)~~ (u)

Briefings and visits to other governmental agencies and contractors included one-time events on subjects of interest in operational and development planning. Soviet air defense from 1962 to 1965 was the subject interest of Naval air-development personnel, Soviet air defense and low-level penetration abilities for CONVAIR, and air technical intelligence on the Soviet strategic threat to the US to Hughes Aircraft Company personnel. The Soviet manned bomber threat through 1963 was covered in a presentation to Army representatives; and the effectiveness of Soviet electronic countermeasures, civil defense, and resistance to low-level, high-speed attack were subjects presented to representative from International Business Machines Corporation. The Soviet low-level air-defense

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environment was also covered in a presentation to Chance Vought Aircraft Company. Other briefings included the subject of Soviet engineering education as preparation for visits to the USSR by members of the American Society for Engineering Education. (~~CONFIDENTIAL~~) (U)

The appearance of BOUNDER late in 1958 caused ATIC to subject the estimate of the Soviet bomber program to careful scrutiny. (UNCLASSIFIED)

ATIC supported the B-70 development program by provision of representatives on the Technical Evaluation Team of WADC's Weapons Guidance Laboratory, to provide a framework for defensive armament projects, and present estimates of the 1965 Soviet air-defense environment to the B-70 Defensive Subsystems Evaluation Team. (~~CONFIDENTIAL~~) (U)

Other support activities included the provision of intelligence data useable in plans for an IM-99 to be employed as an anti-ballistic-missile, to the contractor and the IM-99 Weapon System Project Office. ATIC's contributions and Boeing's reports of the 1960-1970 threat to the US resulted in firm implications for the future of the B-52. (~~SECRET~~) (U)

ATIC furnished support to the contractor and the Air Defense Command by making available intelligence data on the 1970-1975 interceptor, and participated in conferences on the probable opponent of this vehicle in its operational day. Other continuing programs in which ATIC representatives participated included test of the combined air-defense facilities of the Chicago area in the face of electronic counter-measures, a later test of a Nike site and an Aircraft Control and Warning Site during a mock bomber attack, participation in a reevaluation of SAC's low-level penetration study, and another test to evaluate Nike site effectiveness in the face of saturation and intensive jamming. (~~SECRET~~) (U)

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ATIC representatives met with those of CIA and MIT to participate in the preparation of a leading aerodynamicist for a visit to the USSR. A working arrangement for continuing evaluations was effected between ATIC and another leading aerodynamicist and authority on hypersonics. (~~SECRET~~) (U)

STUDIES:

During this period, ATIC produced a detailed analysis to determine feasible configurations that launched Sputnik III and the relationship of the Sputnik III launching vehicle to the Soviet ICBM. Although a single configuration could not be selected as the launching vehicle, the analysis indicated that every Sputnik III earth-satellite vehicle configuration and associated design which was considered possessed inherent operational and performance limitations which would limit their use as an effective operational ICBM. These limitations could possibly be tolerated in an experimental program, when time is not the controlling factor and a scientific environment can be imposed such as in the Space Program. This report also covered Soviet capabilities in areas related to Offensive Guided Missiles. (~~SECRET~~) (U)

Extension of a contract with the Martin Company ^U considered a detailed analysis of three configurations of the Soviet ICBM Weapon System utilizing the weapon-system concept. The previous contract was in its final phases and neared completion with a supplemental report on analysis of the 700-mile missile as a complete weapon system.

FPS-17 RADAR SYSTEM:

Routine and special reporting of the output of the AN/FPS-17 Radar Project continued through this period. ATIC released a detailed analysis report and five preliminary reports covering a six-month period. During data analysis, ATIC discovered indications of serious errors in the radar-beam elevation angles.

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On-site measurements of the antenna feed horns confirmed this error. Because of the difficulty of accurately measuring the energy lobes in space, the true locations of the beams are still in some doubt. An attempt is underway to refine the known angles by a study of intercepts of the Explorer IV satellite. (~~SECRET~~)(u)

Six radar beams were off the air for five hours per day for 33 days during July and early August, due to repainting of the original antenna reflector. In September, radar returns were recorded from severe disturbances in the F2 region of the ionosphere. As in the past, this activity was linked with solar flares and was not missile-related. Since these data are unique and are of some scientific importance, a clearance is being established to release the data to the National Bureau of Standards of Boulder, Colorado. (~~SECRET~~)(u)

ATIC encountered further delays in negotiations for the Special Data Analysis contract. The sole source contractor and AF Procurement were unable to reach agreement on the fee for this contract. A list of alternate contractors was submitted and bids will be invited after a Buyers' Conference. This additional delay will be somewhat offset by the release of this work from the sole-source restriction. (~~CONFIDENTIAL~~)(u)

An exchange of data between this project and the ARDC WIZARD II and Ballistic Missile Early Warning System (BMEWS) projects were established. Visits were exchanged by ATIC and RCA Airborne Systems Laboratory personnel. (~~CONFIDENTIAL~~)(u)

Installation of the FPS-17 on Shemya proceeded, with development of the data-analysis method for this new radar system progressing concurrently. (~~SECRET~~)(u)

OFFENSIVE GUIDED MISSILE WEAPON SYSTEMS:

Two tasks in this area, originally intended to cover only the guidance systems for the aerodynamic type of air-to-surface and surface-to surface missiles, were expanded in scope to cover the complete weapon system. The objective of these tasks is to assess current development and estimate the future capabilities of foreign nations in these respective fields. (~~CONFIDENTIAL~~)(u)

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To improve ATIC's system analysis, action was taken to establish an external assistance contract. Prospective bidders, including Bell Aircraft, Lockheed and Chance-Vought corporations, were briefed on the amount and general level of intelligence data that can be adapted or used directly in the study program so that more realistic proposals can be obtained. ATIC's "Aerodynamic Guided Missile Working Group" participated in these presentations. ~~(CONFIDENTIAL)~~ (U)

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1. AF 33(600)-35637
 2. AF 33(600)-33229
 3. AF 33(600)-37626
 4. AF 33(600)-37756

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GLOSSARY

ACIC	Aeronautical Chart and Information Center
AMA	Air Materiel Area
AMC	Air Materiel Command
APG	Aberdeen Proving Ground
APGC	Air Proving Ground Command
ARDC	Air Research and Development Command
ARPA	Advanced Research Projects Agency
ATILO	Air Technical Intelligence Liaison Officer
BMEWS	Ballistic Missile Early Warning System
CIA	Central Intelligence Agency
DME	Distance Measuring Equipment
ECM	Electronic Countermeasures
ELINT	Electronics Intelligence
ICBM	Intercontinental Ballistic Missile
NASA	National Aeronautics and Space Administration
OSI	Office of Scientific Intelligence
FWS	Project White Stork
RADC	Rome Air Development Center
REG	Returnee Exploitation Group
SAB	Scientific Advisory Board (AF)
SAC	Strategic Air Command
SAG	Scientific Advisory Group (ATIC)
SEAG	Special Elint Advisory Group
SRI	Special Request for Information

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STEP	Scientific and Technical Exploitation Program
TAC	Tactical Air Command
TEP	Technical ELINT Panel
TIPS	Technical Intelligence Processing System
UFO	Unidentified Flying Object
USAFSS	USAF Security Service
WADC	Wright Air Development Center

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