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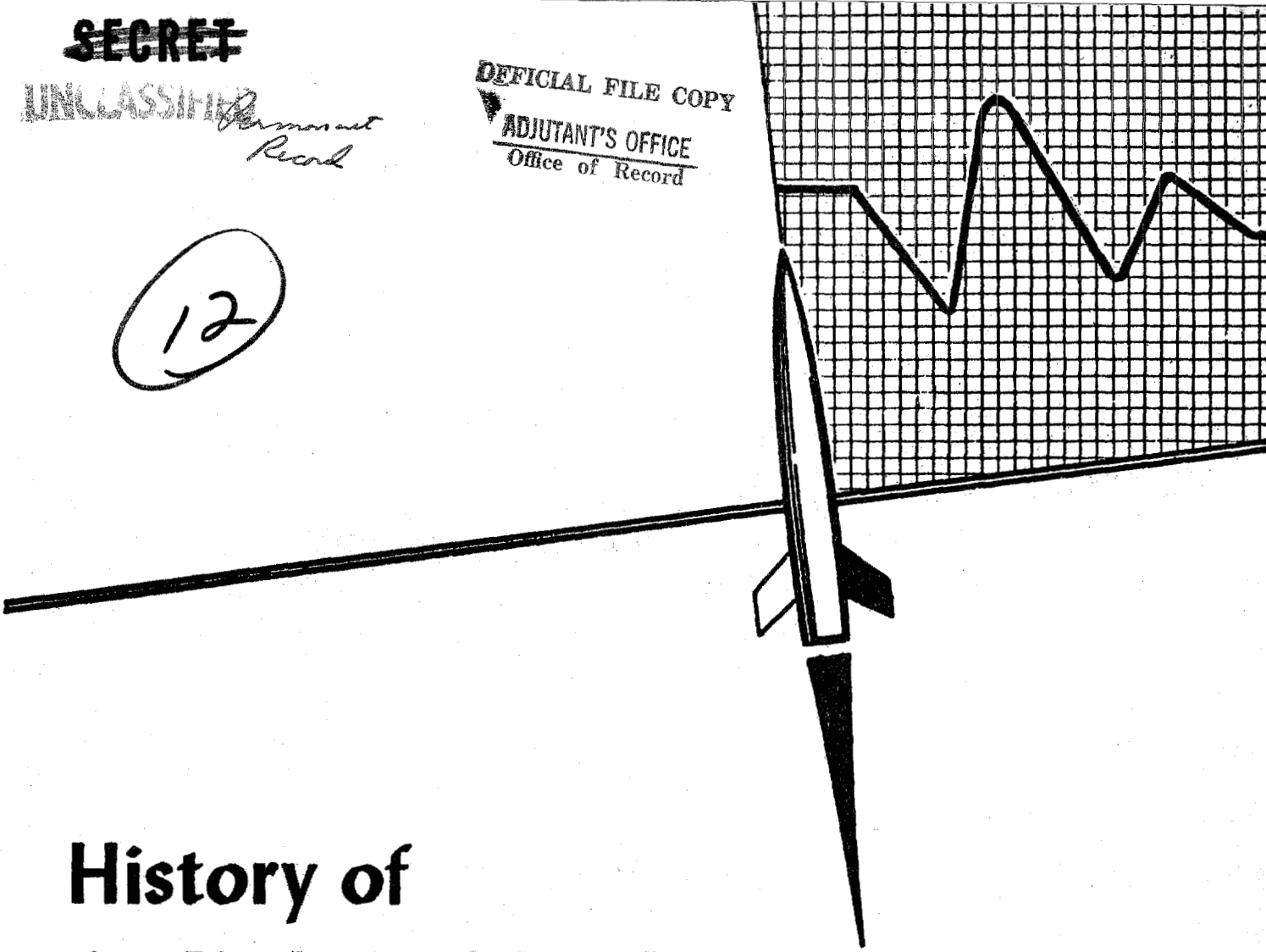

# History of
# Air Technical Intelligence Center
## (AFCIN-4)

## WRIGHT-PATTERSON AIR FORCE BASE, OHIO



## 1 JULY 1957 - 31 DECEMBER 1957

COPY NR. 4

T 58-2436

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Project Blue Book

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FOREWORD

TO THE HISTORY OF

THE AIR TECHNICAL INTELLIGENCE CENTER

(AFCIN-4)

For the Period

1 July 1957 - 31 December 1957

This edition of the History of the Air Technical Intelligence Center reveals our awareness of increased future responsibilities for preventing surprise by recognizing those areas within which scientific and technological breakthroughs threaten US superiority. Preparation for meeting these responsibilities called for re-evaluation of programs, reassessment of priorities, and review of requirements in terms of personnel, funds, tools, equipment, and facilities.

Programmed activities of the Center are presented in separate chapters. Production activities reflect the degree to which requirements for intelligence implicit to the mission of ATIC were met. Footnotes, if any, are listed at the end of each chapter.

SECTION I

# ATIC ORGANIZATION AND MANAGEMENT

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# HISTORY OF

# AIR TECHNICAL INTELLIGENCE CENTER

# (AFCIN-4)

# Wright-Patterson Air Force Base

# Ohio

1 July 1957 - 31 December 1957

Prepared By

Air Intelligence Office

AIR TECHNICAL INTELLIGENCE CENTER

31 January 1958

# AIR TECHNICAL INTELLIGENCE CENTER

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BRIG GEN WATSON 64100 59209

**AFCIN-4X**
DEPUTY COMMANDER
COL ERIKSEN 59210 51180

Harold E. Watson
HAROLD E. WATSON
BRIGADIER GENERAL
COMMANDER

BLDG 263
**AFCIN-4X1**
SCIENTIFIC ADVISOR
MR ARCIER 59206

BLDG 263
**AFCIN-4X2**
EXECUTIVE
LT COL LONG 59209

BLDG 263
**AFCIN-4X2a**
ADJUTANT
MAJ CONNAIR 59117

BLDG 264
**AFCIN-4X2b**
PERSONNEL & MANAGEMENT
LT COL MCGARITY 56232
MR SEABOLD 51280

BLDG 264
**AFCIN-4X2c**
COMPTROLLER
COL O'MARA 59231

BLDG 275
**AFCIN-4X3**
AIR INTELLIGENCE
MR WHEBON 57136

BLDG 263
**AFCIN-4X4**
PROGRAM PLANNING
COL COOK 67332

BLDG 367
**AFCIN-4X5**
MATERIAL & FLIGHT SERVICES OFFICE
LT COL BROWN 55124

BLDG 263
**AFCIN-4A**
DEPUTY FOR ACQUISITION
COL WEINBRENNER 73116
MR KEENEY 64162

BLDG 263
**AFCIN-4B**
DEPUTY FOR DOCUMENTATION
COL WACKWITZ 52233
MR HONAKER 70230

BLDG 259
**AFCIN-4C**
DEPUTY FOR ELINT
COL PULLING 54119
MR THOM 53134

BLDG 263
**AFCIN-4D**
DEPUTY FOR ENGR SUPPORT
MR HERMAN 70207

BLDG 263
**AFCIN-4E**
DEPUTY FOR SCI COMPONENTS
COL GILBERT 72111
MR POST 72111

BLDG 263
**AFCIN-4F**
DEPUTY FOR AIR WEAPON SYSTEMS
COL VILLARS 51262
LT COL PRENTISS 66310

**AFCIN-4A1**
PLANNING DIVISION
COL SHADE 51130 67374

**AFCIN-4A2**
OPERATIONS DIVISION
COL BAIRD 54204

**AFCIN-4B1**
TECH INFORMATION DIVISION
MAJ WOODWARD 66320

**AFCIN-4B2**
TRANSLATION DIVISION
CAPT COLVILLE 66322

**AFCIN-4B3**
SPECIAL PROJECTS DIVISION
MAJ BARTON 70245

**AFCIN-4C1**
EVALUATION DIVISION
MR LLOYD 57214

**AFCIN-4C2**
ANALYSIS DIVISION
MR LEARISH 67307

**AFCIN-4C3**
PROJECTS DIVISION
MR HAY 64217

**AFCIN-4C4**
OPERATIONS & TRAINING DIVISION

**AFCIN-4D1**
ENGR ANALYSIS DIVISION
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**AFCIN-4D2**
GRAPHICS DIVISION
MR PRICE, JR 65324

**AFCIN-4D3**
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**AFCIN-4E2**
WEAPONS & INDUSTRY DIVISION
MR MARTIN 51133

**AFCIN-4E3**
PROPULSION DIVISION
LT COL RETHMAN 66336

**AFCIN-4E4**
AIR SCIENCES DIVISION
DR MILEY 70167

**AFCIN-4F1**
ESTIMATES DIVISION
LT COL SANDERS 57120

**AFCIN-4F2**
AIRCRAFT DIVISION
COL FARRIOR 71246

**AFCIN-4F3**
GUIDED MISSILES DIVISION
LT COL MANNATT 69219

**AFCIN-4F4**
SUPPLEMENTAL RESEARCH DIVISION
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**AFCIN-4Y**
HQ SQUADRON SECTION
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**WESTERN OFFICE**
DETACHMENT NR TWO
PASADENA, CALIFORNIA
LT COL MITCHELL

**ATILO**
USAFE
WEISBADEN, GERMANY
COL HUNDT

**ATILO**
PACAF
HAWAII
COL PIATNITZA

**SMITIG**
DETACHMENT NR ONE
SAN ANTONIO, TEXAS
COL MANGUM

18 NOV 1957

# CHAPTER 1

## COMMAND AFFAIRS

### SIGNIFICANT VISITS AND BRIEFINGS:

During the period from 1 July 1957 to 31 December 1957, special groups were guests of the Air Technical Intelligence Center for discussion of their particular intelligence interests. A group of key personnel of the National Security Agency visited ATIC on 5 August in connection with NSA-ATIC matters of mutual concern. The Reconnaissance Panel of the Scientific Advisory Board came to the Center in mid-July for briefings on key Center projects in the reconnaissance field. The Air Force ELINT Survey Team presented a briefing in October to general officers and key personnel of AMC, ARDC, WADC, and ATIC on the findings of the team. (UNCLASSIFIED)

Key personnel of the staff of ATIC presented orientation briefings and led discussions of ATIC activities for other visitors including the newly assigned Commander of the Air Research and Development Command and his deputy, the Bureau of Aeronautics General Representative (BAGR) of Wright-Patterson Air Force Base and his party, and a group from Syracuse University Research Center, including persons who had been instrumental in the establishment of a Scientific Intelligence Center there. (UNCLASSIFIED)

Air Vice Marshal William M. L. MacDonald, Assistant Chief, Air Staff, Intelligence of the British Air Ministry visited ATIC in December as part of his final tour of USAF installations while serving in his present capacity. ATIC conducted familiarization tours for other groups including reserve officers from the Washington area to acquaint them with the technical portion

of the ACS/I mission and capabilities, and newly assigned AFCIN key officers to discuss ATIC's operations. (UNCLASSIFIED)

Brig Gen H. E. Watson and a group of key ATIC personnel spent the last half of September on a trip through the Far East. The first stop on this tour was at the newly established Air Technical Intelligence Liaison Office at Headquarters PACAF, Hickam AFB, T. H. They visited the Director of Intelligence and other members of the intelligence group at Headquarters PACAF before proceeding to Tokyo where they visited the ATIL Office, and to Tachikawa AFB, Japan, where they visited the ELINT operation. While in Tokyo, General Watson had a discussion on technical intelligence with Ambassador McArthur. In Formosa, General Watson met with the Air Attache and the staff of the Chinese Air Force; and in Hong Kong with the Air Attache there. He met with the Commander of the 13th AF, his deputy, and the Deputy for Intelligence in the Philippines on the return trip to Hickam AFB. (SECRET)

In summation, it was concluded from observations and discussions during this trip that many unexploited opportunities for technical intelligence exist in the Far East and must not be neglected. General Watson reported his findings and recommendations to the ACS/I, Hq USAF. (SECRET)

SIGNIFICANT PROGRAMS:

With guided missiles having become a major Soviet threat, ATIC stressed the management and direction of programs for assessing the maximum Soviet capabilities in the guided missile and the space vehicle fields. Broad plans were formulated whereby all the major technologies contributing to the design, development, and production of these advanced war weapons, including some previously dormant, will be investigated. In this way, ATIC expects

ultimately to establish firm appraisals of sciences, materials, technologies, and components having a direct bearing on Soviet missile and space vehicle projects now in effect or expected to be undertaken in the future. During this period, ATIC initiated an intensive inquiry into USSR activity in the field of space travel. At the same time, a policy of multiple research on Soviet scientific concepts behind the idea of space travel was put into effect. This required heavier concentration on applied and basic sciences. (CONFIDENTIAL)

ATIC participated in ARDC's coordinated effort in the observation of Soviet earth satellites with the express purpose of obtaining orbital and scientific information and provided technical and acquisitional assistance as required. Although ATIC did not share in the operational aspects of this project, it monitored the program for intelligence exploitation. (SECRET)

Upon approval of the ATIC Scientific Consultants Program in November, the Center faced problems which delayed implementation of the program by 31 December 1957. Of the 45 Purchase Requests (not including $1-year types) submitted before 1 July 1957, only 20 were committed by Administrative Commitment Document at the close of this report period. This meant that only $70,000 could be obligated, whereas a commitment of $180,000 by the end of 1957 had been anticipated. (CONFIDENTIAL)

Security restraints also hindered progress. Considerable time was lost in obtaining clearances for new consultants. This situation, coupled with a procurement time-lag because of unwieldy procedures in renegotiating existing contracts with private individuals, kept the Scientific Consultants Program from moving along at a desirable pace. (UNCLASSIFIED)

EXTERNAL RELATIONSHIPS:

Representatives of ATIC attended a meeting called by the Interdepartment Committee on Scientific Research and Development in October for discussion of the national program for exploitation of Soviet scientific literature which is being developed under its direction. The committee, composed of representatives of 14 major components of the US Government, established a sub-committee to make recommendations concerning the development of the Soviet scientific literature exploitation program. Air Force representation on this sub-committee includes ATIC personnel. This sub-committee and its working group was established for the purpose of nation-wide effort organized for the collection, screening, translation, evaluation and dissemination of foreign language (principally Soviet) scientific and technical publications to researchers throughout the United States. (SECRET)

The Chairman of the ATIC Scientific Advisory Group and other ATIC representatives presented briefings to the Nuclear Panel and other panels of the Scientific Advisory Board at the Radiation Laboratory, University of California, in November. Subjects covered in these briefings included Soviet Turbine Engines, Soviet Aircraft Nuclear Propulsion, Soviet Rocket Engines, and Soviet Fuels and Propellants. This panel was interested in proved facts and in the analysis of known hardware. The panel felt, however, that deductive reasoning based on capabilities and military requirements would not fill their needs; they suggested instead that ATIC effort be concentrated on specific significant items of intelligence information. (SECRET)

CHAPTER 2

## MANAGEMENT AND CONTROL

### PLANS AND PROGRAMS:

ATIC continued implementation of the Program-Project-Task (PPT) procedures during this period and issued instructions for formal documentation of programming of total ATIC resources, including ATIC manhours as well as contractual resources. The PPT Index was published 15 July 1957. Further progress was made toward formal programming documentation of some 709 tasks for use in development and defense of the FY 59 Budget Estimate, for initiating FY 58 expenditures for presentation to the Policy Executive Panel (PEP) of the ACS/I, and for determination of priorities as the basis for allocation of ATIC resources at all echelons. (UNCLASSIFIED)

ATIC requirements were determined for the Ad Hoc Committee established[1] to develop and test Air Force requirements for Combat Intelligence reporting during the initial phase of a nuclear war. (UNCLASSIFIED)

Statements of specific ATIC responsibilities and functions for intelligence support to AMC were published as Supplement No. 1 to AFR 200-1. (UNCLASSIFIED)

### FINANCIAL AND CONTRACT MANAGEMENT:

ATIC introduced a new accounting method of pre-commitment accounting designed to provide a more comprehensive and flexible method of control and an indication of progress versus program. (UNCLASSIFIED)

The Center accomplished a considerable saving of ATIC P481 funds by arrangements for funding of ATILO supplies and equipment (excluding contingency items) by USAFE and PACAF. (UNCLASSIFIED)

ATIC developed and implemented the following systems and procedures:

1. A system whereby preliminary control of supply and equipment funds is exercised by the office having primary responsibility for their expenditure.

2. A fund-control system which permits use of blanket travel orders by selected personnel of the Center.

3. Funding procedures for ATILO/PACAF to support operations. (UNCLASSIFIED)

Problems in the area of contract management concerned delays in the initial stage of consultant-type purchase requests. Some were held up because of security interpretations and the security of contractual facilities, thus causing still further delay at the close of 1957. (UNCLASSIFIED)

STATISTICAL ANALYSIS:

As a result of the Civilian Personnel Monthly Fund Limitations imposed in August 1957, ATIC developed and maintained daily controls on civilian pay and fringe benefits, produced overtime statistics from which overtime hours were apportioned weekly to components of the Center, and provided cost data on personnel actions and detailed projected costs of pay and fringe benefits resulting from the engineers' and scientists' pay increase. (UNCLASSIFIED)

The Comptroller's Notebook, "Dollar for Dollar", was expanded to include Technical Publications resulting from expenditure of labor and dollars within each project or task. (UNCLASSIFIED)

ATIC began a compilation of all active contracts to show a narrative of contract objectives and any changes or supplements. (UNCLASSIFIED)

ORGANIZATIONAL MANAGEMENT:

Only one change occurred in ATIC's organizational structure during the last half of 1957. In November, the Machine Computation Division, Deputy for

Engineering Support, was established with two branches — Machine Programming Branch and Machine Operation Branch.[2] The functions of this division were previously assigned to the Computer Branch, Engineering Analysis Division. The expanded workload and increased emphasis on the utilization of machine methods to resolve administrative as well as engineering problems justified the placement of this function at division level. (UNCLASSIFIED)

Whereas the organizational structure of the Deputy for ELINT did not change, functions were clarified and increased responsibilities assigned in the area of non-communications intelligence.[3] (UNCLASSIFIED)

KEY PERSONNEL CHANGES:

During the period from 1 July 1957 through 31 December 1957, the following key personnel changes took place within the Center:

1. Colonel Donald Wackwitz was assigned as Deputy for Documentation, effective 10 September 1957, vice Colonel William Boyd, reassigned to duty as Assistant to the Deputy for Documentation.[4]

2. Colonel Cledous Mangum[5] was reassigned as Commander, Detachment #1. effective 9 September 1957, vice Colonel Earl McFarland,[6] reassigned to the Central Control Group, Office of the Secretary of Defense.

3. Colonel Barton S. Pulling was assigned Deputy for ELINT,[7] effective 9 September 1957, vice Colonel Mangum, transferred.

4. Lt Colonel Robert G. Brown was assigned Chief of the Material and Flight Services Office,[8] effective 30 October 1957. (UNCLASSIFIED)

MANPOWER MANAGEMENT:

The Center received an additional 45 airman and five civilian allotments during this period of reporting. These increases did not satisfy the

recognized requirements nor lessen the acuteness of the manpower situation. The Department of Defense austerity measures which imposed a dollar ceiling on P481 funds made the responsibility for the utilization of available manpower resources to meet workload demands increasingly complex. When the dollar ceiling was later lifted the manpower problem was not resolved nor the requirements satisfied, despite the fact that the temporarily imposed restriction had the good effect of enforcing maximum economy-mindedness. Soviet breakthroughs in space exploitation and missile development increased the demand for ATIC products and services far beyond the ability of ATIC to supply. (CONFIDENTIAL)

At the close of the year, authorized[8] and assigned strengths were:

| | OFFICERS | AIRMEN | CIVILIANS | TOTAL |
|---|---|---|---|---|
| AUTHORIZED | 197 | 146 | 430 | 773 |
| ASSIGNED | 197 | 132 | 401 | 730 |

PERSONNEL ADMINISTRATION:

The August 1957 cut-back in civilian payroll funds resulted in a cease-hire order and a stoppage of all paid overtime. ATIC experienced its first Reduction-in-Force (RIF) in an effort to reach a lower dollar ceiling limitation by 31 October 1957. When funds were restored, the RIF was cancelled and ATIC found itself thirty (30) civilian employees under authorized strength. During November and December recruiting efforts were resumed, but considerable difficulty was experienced in re-stabilizing the civilian work force. (UNCLASSIFIED)

During this period, the recently established ATIC Civilian Incentives and Awards Committee approved six (6) Outstanding Performance Ratings and/or

Sustained Superior Accomplishment Awards resulting in a cash disbursement of $1,500.00. (UNCLASSIFIED)

The summertime employment program which began in July proved quite successful. The eight (8) typists and stenographers on the payroll during July, August, and a part of September proved most valuable in assisting to eliminate peak workloads throughout the Center. The program was modest since it was on a trial basis. (UNCLASSIFIED)

The turnover rate of civilian employees increased during this period, primarily because of the RIF and the natural scare which accompanies such an effort. The rate of 3.8% during the last half of 1957 was excessive; however, the average for the entire year of 1957 was only 1.57%, a rate below the average turnover rate for both Government and Industry which is approximately 2.5%. (UNCLASSIFIED)

During December 1957, ATIC granted salary increases to 88 engineers and physical scientists, effective 5 January 1958. The increase for each individual ranged between $215.00 to $1,080.00 a year, with an over-all average of approximately $700.00 a year. The total cost of the entire increase will be approximately $80,000.00 a year for ATIC. (UNCLASSIFIED)

ATIC completed a study on the ELINT Career Program for the establishment of proper identifiers to classify assigned military personnel who are qualified as electronics collectors and analyzers. (UNCLASSIFIED)

AIR INTELLIGENCE SERVICES:

The Air Technical Intelligence Center published on 1 November 1957 a special issue of the ATIC Bulletin. This issue was devoted exclusively to Soviet work in space satellites and related fields and consisted entirely of reprints of information which had appeared in previous editions. The purpose

was to allow a comparison of isolated statements on this subject, most of them from Soviet sources, made over a period of years prior to the launching of Sputnik and including officially released information made public by the Soviets after the launchings. This compilation of items revealed that statements made prior to the launching (some as early as 1955) were, in general, valid and borne out by subsequent events. Most of the Soviet statements were public announcements which indicate a freedom from security classification on scientific developments, even though these developments have definite long-range military implications. (UNCLASSIFIED)

ATIC made plans for a survey of recipients of the ATIC Bulletin to obtain suggestions for its improvement and possible expansion. This determination was brought about by discontinuance of the Air Intelligence Digest and recognition of a void created by this action. A survey was the means selected by which ATIC could evaluate its Bulletin and determine to what extent this publication could fulfill the need for an AF intelligence periodical. (UNCLASSIFIED)

During the reporting period, ATIC continued intelligence services to the Air Materiel Command. These services included weekly briefings to the AMC Commander and Staff, briefings to components of AMC, and numerous intelligence estimates. (UNCLASSIFIED)

MATERIAL AND FLIGHT SERVICES:

During this report period, the Material and Flight Services activity made tremendous strides in setting its house in order after the reorganization of March 1957. Problems concerned the requirements for a complete inventory of supply items within ATIC, and the necessity for purchasing many normally stocked items through local purchase. (UNCLASSIFIED)

The ATIC assigned aircraft flew an all-time high of 826 hours and transported 805 passengers and 100,160 pounds of cargo. Special-mission time in the air totaled 139 hours. (UNCLASSIFIED)

Progress of the new ATIC building was satisfactory; however, modification to house a new computer resulted in another 90-day delay in occupancy. (UNCLASSIFIED)

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1. AFCIN-X1 C/S, 12 August 1957
2. 1125th USAF FAG (HEDCOM USAF) GO Nr 10, 18 November 1957
3. Memo from General Lewis, 19 Dec 57, Subject: "(C) Functions of ATIC in the Field of Non-Communications Intercept and Analysis"
4. PERAM Nr 42, pars 3 and 4, 19 December 1957
5. PERAM Nr 42, par 1, 19 Dec 57
6. Special Order Nr 95, par 1, 27 Aug 57
7. PERAM Nr 39, par 1, 9 September 1957
8. PERAM Nr 53, par 1, 25 November 1957
9. PAV Nr 58/2/5, dated 4 October 1957

## SECTION II

## ATIC ACTIVITIES

# CHAPTER 3

## COLLECTION PLANNING

### TECHNICAL RESOURCES:

The six-month period ending December 1957 was marked by an increasing tempo in the effort to formulate acquisition plans which would result in effective devices for the collection of technical intelligence. Unquestionably, the accelerated effort was prompted by the dramatic revelations of the Soviet scientific and technological state of the arts and its implications. (UNCLASSIFIED)

ATIC determined that the seismic and micro-sampling areas needed more basic research and development before specific application to collection problems could be programmed. The Center transferred projects in these areas to RADC, but will continue to maintain liaison with RADC and levy specific requirements on them as these techniques develop. (CONFIDENTIAL)

In the photographic area, ATIC completed a technical evaluation of the Konica (Japanese) aerial camera. The camera was determined to be light and simple but required too much basic modification to satisfy ACS/I needs. Further in-house technical investigations of new art resulted in reports and proposals on fibre optics systems, pressure sensitive paper, collapsible long focal length optics, hand-held stabilizing devices and balloon-carried photographic search systems. Active tasks were initiated on fibre optics, stabilizing devices, pressure sensitive paper, and design characteristics were developed and procurement data forwarded for a portable long range oblique photographic system suitable for employment from unmodified conventional cargo aircraft and for modified long focal length Rolleiflex and Speed

Graphic camera. The final review of the technical proposal for Phase I of the Technical Objectives Identification System was completed and revised work statements forwarded for contract initiation. Contractor proposals for the Zenith camera system and for a design study on a 35 mm stereo camera were also evaluated and forwarded for procurement action. (S)

ATIC actively participated in the planning and conduct of feasibility tests (Exercise NEW PRODUCT) on the airborne acoustic surveillance system pioneered by White Sands Signal Agency. The tests proved the potential of the long range system for collecting useful missile data and resulted in the initiation of an active project to refine and further test equipment and operating procedures. (S)

In the field of Acoustics Intelligence Acquisition, the technology for the collection of air technical intelligence information on foreign aircraft and missile propulsion units continued to be explored. Domestic tests were conducted to improve technology of recording and analysis. The operational recordings which were analyzed provided collateral information of intelligence estimates. Domestic tests conducted to improve operational techniques neared completion during this report period and ATIC initiated plans to implement a foreign collection program. (S)

ATIC's Technical Review resulted in a newly activated project to adapt and test present AEC upper air sampling techniques to the collection and evaluation of missile combustion products, and a project to conduct a feasibility study on the use of the star scintillation technique to record missile firings and obtain track data. (S)

The Center participated in the panel review conducted by the ARDC's Ad

Hoc Committee which reaffirmed the feasibility of the airborne Infra Red search and track system (HAPPY HOME) for satisfying the requirements for foreign ICBM technical intelligence data. When budget limitations necessitated cancellation of the original project, a proposal for a new, less sophisticated and less costly system was prepared for the necessary evaluation and coordination. (SECRET)

ATIC tested prototypes and operational models of several new items during the period. In the electronics area, ten QRC-34 sub-miniature receiver sets were received for testing before release to field activities. These sets were designed for preliminary acquisition of limited data on radar signals. A prototype of the QRC-51 alerter, a self-contained set for warning an operator of the presence of either radar signals or sounds, was delivered and tested with satisfactory results. The Type I (voice), Type II (sonic) and Type III (data) recorders were delivered and underwent preliminary testing. The Type I units were factory modified and four units readied for release to operational activities as soon as instruction manuals are prepared. (SECRET)

In the photographic area, the periscopic camera prototype was delivered, tested and returned to the contractor for correction of deficiencies. The ground stereo camera prototype was also received and tested. It is now being modified by the contractor prior to approval of design for field items. (SECRET)

Prototypes of seismic and acoustic trigger units were tested extensively with excellent results. These small units were used in conjunction with tape recorders to record sound data on aircraft. They can be used with cameras, recorders and other collection devices to turn them on and off automatically

in response to acoustic, seismic or R.F. signals. The breadboard model of the IR camera trigger was tested and design approved, and drawings were approved on the integrated trigger-camera-power packet system. Procurement was approved for ten field test items of the IR trigger for delivery in February 1958. (SECRET)

A breadboard model of the unattended IR radiometer was tested at Patrick Air Force Base. The unit functioned satisfactorily in searching for and recording data on missiles. A prototype model is now under procurement. Also, ATIC let a contract for an improved, miniaturized attended IR radiometer to be used to collect data on aircraft. Both the lead sulphide and bolometric IR cameras were tested and performed satisfactorily. Operational test items are now under procurement. (SECRET)

ATIC personnel coordinated and assisted in contractor efforts during the ROUND ROBIN exercises against the two Soviet TU-104 transport visits to McGuire Air Force Base. The acoustic and radar data which were obtained proved very useful to ATIC analysts in producing technical reports on the aircraft power plants. (SECRET)

HUMAN RESOURCES:

In the field of human resources, ATIC concentrated on studies of selective geographical areas to determine technical intelligence collection possibilities. The purpose of these studies was to accomplish the following objectives:

1. Determine the sociological, political, economic and military factors in Communist Bloc and neutral countries, inasmuch as these factors reveal a pattern, a course of action likely to be pursued by nations in their orientation towards the two great ideological blocs.

2. Collect information on Communist Bloc economic penetration in underdeveloped countries. Such information served to provide intelligence on the character and the nature of activities engaged in by Communist Bloc technicians who are an important element in the Communist over-all plan of subversion. (SECRET)

Action was taken to implement Project TWELVE APOSTLES. The objective of this project is to utilize the services of indigenous scientists in various countries, especially those strategically located in relation to the Soviet Union, to provide studies similar to those produced by the RAND Corporation for the U. S. Air Force. (SECRET)

The ATILO Program was highlighted by a proposal which, in effect, transfers ATILO positions currently with the Fifth Air Force to Air Attache's office in Tokyo. Authorization for this move remains to be obtained from ACS/I office. (SECRET)

CHAPTER 4

## COLLECTION OPERATIONS

REQUIREMENTS:

ATIC took aggressive action during this period to reduce the number of SRI's of relatively low priority to permit collectors to concentrate efforts on Priority Requirements for Information (PRI's). The number of new SRI's initiated within ATIC during this report period indicates general areas of interest:

| | |
|---|---|
| Weapons and Industry | 71 |
| Electronics | 36 |
| Propulsion | 29 |
| Aircraft | 18 |
| Guided Missiles | 12 |
| Air Sciences | 5 |
| Documentation and Engineering Support | 5 |
| Estimates | 3 |
| TOTAL: | 179 |

(UNCLASSIFIED)

EXPLOITATION:

Exploitation of foreign fairs, expositions, and meetings continued with the issuance of 32 SRI's to oversea collection offices and 31 to domestic sources. Eighteen of these SRI's covered trade fairs which are mainly of interest in the weapons and industry areas and electronics field. Of the SRI's in the scientific fields, principal interests were in the areas of propulsion, air sciences, electronics, and weapons and industry. (~~CONFIDENTIAL~~)

Nine new sources were made available to ATIC under the REG program during this report period. Thirty-five reports containing guided missile information were received, and 11 reports in other interest areas. (~~CONFIDENTIAL~~)

ATIC developed a new procedure for reporting domestic source information to Collection, ACS/I, which expedited the handling of new domestic SRI's and eliminated the old system of reporting on a monthly basis. Procedures to be followed by AF Plant Representatives and Air Procurement District personnel in contributing to ATIC's program for collection from domestic sources were simplified. (CONFIDENTIAL)

EVALUATION:

During this report period, ATIC made 186 evaluations of reports principally in the interest areas of weapons and industry, aircraft, electronics, propulsion, and air sciences. (SECRET)

GUIDANCE:

Major effort was directed toward completion of the AF series of intelligence collection guidance manuals. Completion of the manual on Research Facilities marked completion of the series which called for eleven manuals on the principal engineering fields of ATI interest. (UNCLASSIFIED)

The concept of Observation Guides has been so widely accepted by field collectors that initial distribution is now made to all collectors in primary areas. ATIC produced two of these guides during this period and one supplement. "Observation Guide for Special Missile Project", and "Indicators of ICBM Manufacture, Static Test, Transport", became "best sellers" and necessitated reprinting. Reproducible master copies were furnished to the Army since ATIC could not otherwise satisfy the demand. (CONFIDENTIAL)

PHOTOGRAPHIC TRAINING AND SERVICES:

Between 1 July and 31 December 1957, 39 air attache officers, 29 attache airmen, 11 ATILO officers, and five ATILO airmen received training under

ATIC's various photo training programs. Special training sessions were conducted for eight selected officer and civilian personnel. (UNCLASSIFIED)

Work continued throughout this period to develop "in-house" photographic capability for ATIC, but this appeared to have reached the highest level possible until facilities are available in the new building. (UNCLASSIFIED)

FIELD OPERATIONS:

ATIC accelerated efforts to create facilities which would furnish the air technical intelligence information required to support the War Plans in the Joint Chiefs of Staff Program for Planning Intelligence Objectives identified by the Scientific Estimates Committee of the Intelligence Advisory Committee. (UNCLASSIFIED)

Procurement action continued with respect to special equipment and devices in support of the ATILO and Air Attache systems, Air Intelligence Service organizations and other intelligence agencies. (UNCLASSIFIED)

CHAPTER 5

DOCUMENTATION

UNIFIED ATIC-PWS DOCUMENTATION SYSTEM:

Under the unified system of documentation of the Air Technical Intelligence Center and Battelle Memorial Institute (Project White Stork), ATIC routed practically all of the raw intelligence information received during this period to PWS for processing into the Technical Intelligence Processing System (TIPS) files.[1] A change in procedures for destruction of processed documents provided for their return to ATIC for a retention period of undefined limits. (CONFIDENTIAL)

UNITED STATES FOREIGN INFORMATION CENTER (USFIC):

ATIC continued to implement USFIC operations throughout the year and to accelerate program development. Production of abstracts reached a total of 6300, and exploitation of journals numbered 68 by 31 December 1957. Plans were completed for the improvement of technical and linguistic quality of abstracts. These plans included acceleration of the program, contractual assistance by research institutes, and special training of German abstractors.[2] (CONFIDENTIAL)

In December, at a seminar held at Battelle Institute, representatives of leading universities and research centers re-evaluated the direction and adequacy of the TIPS-USFIC concept and discussed the problem of Soviet literature exploitation and the means of implementing the collection, translation and review of Soviet open literature. (UNCLASSIFIED)

FOREIGN LANGUAGE EXPLOITATION:

In September 1957, ATIC served on a subcommittee, and participated as a member of the working group established to charter a nation-wide program for

collecting, organizing, and disseminating unclassified abstracts and translations to US researchers. The Office of Technical Services, Department of Commerce, is the executive agency responsible for the dissemination. (UNCLASSIFIED)

Added impetus on scientific and technical advances increased expenditures for purchase of books and periodicals by Center personnel and ATILO teams. ATIC expected completion of FY-57 translation contract by February 1958, Fy-58 by 30 September. Procurement of contractual translation service for FY-59 was proposed for AMC action. (~~CONFIDENTIAL~~)

AUTOMATIC TRANSLATION DEVICE:

At Rome Air Development Center (RADC), ATIC representatives inspected the status of research and development of an automatic translation device. This project is now in the development stage. Objectives are to:

1. Produce a lexicon or dictionary suitable for automatic interrogation and capable of automatic output of voltages equivalent to English letters, words or phrases,

2. Produce equipment that will scan printed or typed alpha-numeric characters and recognize their individual shapes for character-identification purposes, and

3. Obtain high speed printers that will accept and print data from high rate machines.

Electronic problems have been resolved, but considerable language analysis and machine programming remain to be accomplished. (~~CONFIDENTIAL~~)

AIR TECHNICAL INTELLIGENCE LIBRARY:

ATIC continued to develop plans for a Technical Intelligence Library to perform all library services for the Center. Included in these services

are the indexing of all material received, compilation of various catalogs, maintenance of circulation and loan records, reference work, research functions, and provision of other services from all available information and intelligence media. (UNCLASSIFIED)

The primary objective was to consolidate documentary services and centralize the various document collections presently scattered throughout the Center. The library would have a control room for locating every document being translated or evaluated, identifying the current user, recording technical work in progress by foreign nations, and cataloging contractor reports within the Center to prevent analysts from placing duplicate orders. (UNCLASSIFIED)

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1. ATIC History, 1 Jan 57 - 30 Jun 57, page 22
2. ATIC History, 1 Jan 57 - 30 Jun 57, page 23

CHAPTER 6

# ELECTRONICS INTELLIGENCE (ELINT)

GENERAL:

ATIC participated in the Hq USAF-sponsored survey of world-wide ELINT collection, processing, and equipment development facilities. The survey considered the time period from 1957 to 1965 in reviewing both the equipment and facilities in-being and under development. It found no complete ground or airborne system which would adequately satisfy ELINT requirements; but found a number of techniques which, if developed and produced in an optimum combination to form a working system, would satisfy many of the current ELINT requirements. (SECRET)

ELINT EVALUATION:

Requirements and Standards:

ELINT engineers of ATIC concentrated on the compilation of ELINT data requirements. This compilation, originally titled "USAF Specific ELINT Collection Requirements", was expanded in both scope and format to include information in support of requirements and the title changed to "USAF ELINT Objectives and Requirements List", to be published in four volumes. The accomplishment of this task was essential in order to provide the basis for direction of immediate collection activity and for collection planning, and to provide guidance in the writing of requirements for ELINT collection and processing systems and the analysis and data-reduction effort. The task was of such scope as to require personnel in excess of those available at ATIC. (SECRET)

During the latter part of the year, ATIC sought approval for contractual assistance in the field of Specific Requirements and made plans for

equivalent action in the ELINT signal environment field. In July the Melpar Corporation[1] began establishing the effect of signal densities upon accuracy requirements. Specific problems included studies of radar beam width measurement, polarization factors, missile guidance, etc., and resulted in publication late in October of a study entitled "Preliminary Study on Beamwidth Measurement." These studies provided specific answers in respect to recommended methods of measurement. Melpar continued to provide analog data to show the relationship of type and accuracy of measurement to information content which will provide a firmer basis for the writing of system requirements for ELINT equipment and systems. [redacted]

Systems Evaluation:

Frederick Research Corporation concluded contractual arrangements[2] to catalog pertinent engineering and related data on all USAF systems and components. These catalogs will serve essentially everyone in the AF ELINT community as a ready reference to the capability of a system or component, a basis for the writing of data and system requirements, and a reference for recommendations for system modifications which may be needed to satisfy intelligence requirements. (UNCLASSIFIED)

The University of Michigan completed a study[3] to determine whether additional intelligence regarding target behavior might be obtained from an analysis of the observed variations in signal strength from the AN/FPS-17 radar. The report[4] indicated very little fluctuations or fading could be caused by the Faraday Effect. This analysis indicated that the fading in the data can be accounted for in terms of the separation of the missile and the

tumbling. More generally, it indicated that when there is separation many frequencies will occur and the return will show a characteristic complexity. There appeared to be no obvious inconsistency between radar cross-section data and present intelligence estimates of certain Soviet missiles. Upon completion of the contract, the University of Michigan personnel recommended a modification of the radar which would provide the capability to determine more accurately the target's shape. A by-product of this modification would be increased dynamic range of the receiver. (SECRET)

Statistical Design and Control:

During this six-month period, progress was made in an internal ATIC effort to determine the quality of ELINT data and of the related systems from a statistical analysis of ELINT intercept summary cards. ATIC planned a more extensive program to establish an AF-wide ELINT statistical quality control system for implementation through contractual action during the coming year, but found it necessary to defer action on this system. (CONFIDENTIAL)

Atic initiated a contract with Armour Research Foundation[5] to provide an analysis of ATIC ELINT operations, with a view to future applications of a modified AN/GSQ-17 (the data processing portion of the RD-58 reconnaissance system). ATIC is using the statistical assistance available from this contract in several related areas, including summary card analysis. (CONFIDENTIAL)

Additional statistical work, accomplished internally, included assistance to Hq SAC in connection with location of emitters, based on AN/APD-4 data. (CONFIDENTIAL)

ELINT ANALYSIS:

The ELINT activity of ATIC continued to improve its capability for processing signal intercepts by refining the analysis team approach. Two analysis

teams — missile and airborne-electronics — became operational. ([redacted])

The usefulness of the ATIC Signal Review as a medium of dissemination of timely ELINT information was expanded. Format, style, and the system of distribution were improved. ATIC started reproducing all copies for distribution instead of sending reproducible masters overseas. (UNCLASSIFIED)

The amount of analysis and collection guidance to ELINT units in the field increased considerably, with particular emphasis on assistance to the theater mission planners and intermediate processing centers, as well as the USAF Security Service ground intercept station program. ([redacted])

Missiles:

Intercepts of Soviet telemetry by the ground sites increased during the last six months of 1957. Improvement in quality and duration of these intercepts was evident. ATIC processed work by Lockheed[6] on tapes of these signals. There was good evidence that two telemetry intercepts included pre-burnout data. ([redacted])

Two telemetry intercepts, identified as a new type and labeled "D", were analyzed and reported by ATIC. At least one later intercept was of the same type. ([redacted])

Airborne Electronics:

ATIC began analysis of several signals reported as tail fire control intercepts. Basic electrical characteristics resembled those of the Soviet AAI radar SCAN ODD, but the scan characteristics differed greatly. More detailed analysis indicated a track-while-scan capability. ([redacted])

Work on SCAN THREE signals continued during this report period. ATIC made progress in verifying pulse synchronization of the two related systems as well

as in determining polarization, but did not establish firm values for these parameters. Recently received high-fidelity recordings of these signals should aid materially in the study of illumination shape beam width and radar field-of-view studies, and in the study of mode switching characteristics, which will firmly establish a definite relationship between the two scan systems attributed to this radar. (SECRET)

ATIC initiated a two-fold study of signals reported as MUSHROOM type in October 1957. The preliminary study was to determine the number of different radars indicated by the relatively large amount of data available; the detailed study to determine accurate electrical characteristics of each radar type discovered in the preliminary study. (SECRET)

A valuable analysis tool which ATIC developed during this period was a method of determining mathematically the antenna beam width and spiral scan coverage angle from intercept recordings of a spiral scan signal. (SECRET)

Ground Electronics:

Recent intercepts in the European area indicated the existence of a new type of radar similar to TOKEN. ATIC established megacycle emissions associated with this radar. (SECRET)

A study of laboratory techniques for more accurate PRF measurements continued. ATIC tested and analyzed methods using a QRC-6 reference tone, recorded with the signal under study on the same wire recording. This method permitted determination of three distinct ranges of PRF's on confirmed WHIFF and suspected FIRE CAN signals, one of which might indicate a new type of anti-aircraft fire control radar. (SECRET)

Sputnik I and II:

ATIC's ELINT activity screened and analyzed data on Sputnik I and on Sputnik II. This involved analysis of data obtained locally and the collation of reports from other agencies. The reports received were conflicting as to the evidence of intelligence transmitted by the emissions and, therefore, ATIC could draw no positive conclusions. (SECRET)

Intercept Summary Card Storage System:

The standard IBM system for collection and processing of intercept data was extended from an AF-wide to a joint ELINT-wide system, including the Army and Navy. The participating services agreed on the adoption of the new system at a meeting in November and scheduled implementation for 1 January 1958. (CONFIDENTIAL)

Publications:

During the last half of 1957, ATIC published twelve issues of the ATIC Signal Review and a report entitled "1957 Review of Advances in ELINT." (UNCLASSIFIED)

CAPABILITY IMPROVEMENT:

Analysis Techniques:

ATIC initiated a program during this report period for standardization of equipment for ELINT processing. Type classifications of data-analysis consoles were secured for stock-listing purposes and included in authorization documents for the Intermediate Processing Centers. (CONFIDENTIAL)

Logistical support of ELINT Processing Centers included obtaining accessory items from equipment already on hand, testing new items, and initiating procurement in quantity. (CONFIDENTIAL)

Recent commercial developments of video tape recording have progressed to such a point that procurement was initiated for a modified commercial item to be used for ELINT collection. A high-speed continuous strip camera has been developed for ELINT processing which increased the film-speed capability 35 feet per second. (UNCLASSIFIED)

ATIC installed the tape storage unit and the second section of a Reference File of Typical Signals in December. Preliminary evaluation indicated that, in attempting to satisfy many requirements with a single system, its operation became too complex. (UNCLASSIFIED)

Four of the approximately six different prototype spectrum analyzers for ELINT processing were delivered to ATIC during this report period. Evaluations did not progress to the point of making a determination of suitability and applicability. (UNCLASSIFIED)

Procurement action was initiated to obtain an ELINT Processors' Manual to include descriptions of hardware and techniques for ELINT data processing. (UNCLASSIFIED)

Intercept Techniques:

ATIC faced two problems in connection with the first Master Time System for use in Security Service installations. The bandwidth of the signal produced does not lend itself readily to transmission with present AF equipment, and the analysis equipment is not capable of reading the short-time code groups produced. [redacted]

ATIC took action to provide special interception and recording of telemetry signals. Significant intelligence was derived from intercepts made with advanced equipment, but considerable difficulty was experienced in determining the actual pulse structure and the characteristics of the signals intercepted. Recent

advances in the development of new equipments could contribute greatly toward improving the fidelity and resolution of recorded data, but special technical skills and operational procedures will be needed for their proper application. To meet the objective set up by the National Security Council, this task is being performed in two phases. The first phase progressed rapidly and the second phase will be a priority item for the first half of calendar year 1958. (SECRET)

In December 1957, Stanford Research Institute completed the design and fabrication of the direction finding equipment to be installed at the USAFE and PACAF Sites. (CONFIDENTIAL)

Field Support:

ATIC provided support to the Intermediate Processing Centers and other ELINT activities through shipments of electronic equipment including tape recorders, signal analysis consoles, oscillographs, oscilloscopes, receivers, antennas, and other items not available through normal supply channels. (CONFIDENTIAL)

ATIC furnished consulting engineers during the equipping of three ferret aircraft, participated in planning the flight tests of these aircraft, and initiated a program for certain ferret missions to provide an intercept platform in a more advantageous position for receiving signals from missiles. Progress included formulation of concepts, and the development of the various phases of outfitting a plane and of plans for operations. (SECRET)

TRAINING:

ATIC gave formalized ELINT Training Course to nine airmen from the USAFSS, one airman from TAC, one officer and one airman from the Alaskan Air Command ELINT Processing Center, and one officer from the Royal Danish Air Force; and

completed the training of its first ELINT Air Technical Intelligence Liaison Officer. (UNCLASSIFIED)

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1. AF33(600)-35585
2. AF33(600)-35713
3. AF33(600)-34359
4. "Analysis of An/FPS-17 Radar Data", August 1957
5. AF33(600)-35644
6. AF30(602)-1614

CHAPTER 7

## ENGINEERING SUPPORT

ENGINEERING ANALYSIS:

Representatives of ATIC, the Deputy Director of Intelligence (Technical) for Great Britain, and the National Aeronautical Establishment (NAE) of Canada, held conferences during this report period which resulted in joint weight and drag estimates on all Soviet bombers, fighters, and cargo aircraft. The final drag estimate on BACKFIN was accomplished during these conferences. (CONFIDENTIAL)

Engineering analyses made by ATIC in the bomber and fighter areas during the last half of 1957 included:

1. Weight estimates, drag analyses, and performance analyses for BLOWLAMP, BISON, and BADGER based on the 19,800-lb and 22,000-lb SLST engines;

2. Design layouts of BADGER, BISON, and BACKFIN;

3. Weight estimates for FITTER and FISHPOT based on revised physical dimensions and consequent adjustments;

4. Recalculated performance analyses for FACEPLATE and FISHBED A and B;

5. Specific data on bombers and fighters in answer to requests by ACS/I, SAC, and AF contractors. (SECRET)

Engineering support in the missile area included weight estimates, design layout, and structural and performance analyses of two versions of surface-to-surface missiles; and performance analyses of an air-to-surface missile. (SECRET)

The Test Engineering Division, WADC, completed its proposed flight-test schedule for the Soviet-type helicopter received in December. (CONFIDENTIAL)

COMPUTERS:

The Electro Data Division of Burroughs delivered to ATIC in December the high-speed general-purpose digital computer with floating point arithmetic and three magnetic tape handlers. (Unclassified)

Anticipating the arrival of the Datatron, ATIC reprogrammed nearly all the problems currently programmed for the Readix for this new machine. At present the the entire set of calculations for the reduction of FPS-17 data to real range and velocity, determination of eccentricity, apogee, and time of flight, is automatically set in motion by a few punch cards. ([redacted])

A second large problemwas the programming of fighter-bomber air duels. This resulted in solving a complex set of equations representing collision courses for fighter aircraft against nominal bombers with one, two, and three gun turrets. Solutions were presented in curve form from which the analyst can determine expected survival of given aircraft. ([redacted])

Considerable effort went into the formulation of a mathematical simulation of an air defense environment. This model will permit analysts to change weapon characteristics, tactics, operational doctrine and deployment to better understand the characteristics and action of air defense. (Unclassified)

PHOTO ANALYSIS:

The 40th Anniversary of the October Revolution saw the start of a new photo-analysis era -- the detailed photo interpretation of missiles and missile carriers. A photo analysis report of Sputnik I carrier by ATIC was based on the first known 500" f.l. photographs of an object at approximately 200 miles. ([redacted])

New equipment which ATIC acquired for photo analysis included a 16mm sound projector, glass scales graduated to .1mm, and Bausch and Lomb magnifiers. (Unclassified)

TECHNICAL ILLUSTRATION:

The drawing of inboard profiles of Soviet aircraft and missiles gained momentum and importance during this period. ATIC personnel attended seminars sponsored by Technifax Corporation to study new techniques and materials used in the make-up and presentation of audio-visuals. (Unclassified)

New machines for use in technical-illustration and graphic-data work were acquired. These included:

1. An Ozamatic reproduction machine for processing vu-foils and other diazo-sensitive materials,

2. An Expeditor Photostat machine, and

3. A Flexowriter Programatic Automatic Writing Machine.

This last mentioned machine has accomplished a 60% manhour savings in the cataloging of photographic intelligence information. (Unclassified)

REPRODUCTION:

Production figures continued to increase in almost every phase of reproduction. Multilith production has increased 15% and platemaking 10% during the last six months. New equipment for reproduction included an Expeditor Photostat machine, special light boxes and multiple copy controls, padding press, and multilith exposure frame. (Unclassified)

# CHAPTER 8

## PROPULSION

PROPULSION SYSTEMS:

Combustion and Explosive Research Incorporated submitted the final report on a study[1] of the status of fundamental and applied combustion and gas dynamics research in the USSR during this report period. ATIC initiated procurement action to extend the existing contract to provide continuous surveillance of Soviet progress in this area of technology through FY 58. (C[redacted])

ROCKET PROPULSION:

Aerojet General Corporation completed an analysis[2] which determined propellant combinations and rocket engine design-performance data from analysis of rocket exhaust pattern photography. ATIC determined that additional work was needed during the contract period and initiated procurement action for: (1) additional gas dynamic analysis for evaluation of rocket powerplants with overexpanded (high altitude) nozzles, and (2) further study of spectrographic equipment to assist in determining propellant combination by identification of certain chemical species in the exhaust flame. ([redacted])

Rocketdyne Division of North American Aviation, Inc., continued work to determine Soviet capability to develop ICBM and satellite rocket powerplants including the most probable propulsion systems design and performance. The contractor's extensive research provided a larger volume of material for analysis and evaluation than initially anticipated. ATIC effected a six-month no-cost extension to the contract for effective incorporation of this material. (C[redacted])

NUCLEAR PROPULSION:

ATIC received the final draft of one phase of the study[4] to determine Soviet capability to develop an aircraft nuclear propulsion system from General Electric Company and is incorporating it into an ATIC Study which will also contain additional consultant contributions from Dr. Herbert S. Isbin,[5] Dr. Albert B. Van Rennes,[6] Dr. Vance Sailor,[7] and Dr. David Williams.[8] (CONFIDENTIAL)

ATIC decided upon contractor assistance for investigation of Soviet capabilities in advanced nuclear propulsion systems and initiated procurement action to determine capabilities in nuclear-rocket, nuclear-ramjet, and ionic-rocket propulsion systems. (CONFIDENTIAL)

ROTOR BLADES:

In September 1957, ATIC forwarded to Project White Stork a statement of work for a study of helicopter blades, rotors, etc., in the USSR. TNS indicated that a counter proposal would be forthcoming, and that lack of adequate manpower would delay the program by six months. (CONFIDENTIAL)

RECIPROCATING POWER PLANTS:

ATIC prepared an extensive test program for the entire propulsion system -- power plant, transmission unit, and main and tail rotors -- for the helicopter air weapon system designated SHORT TAIL. (CONFIDENTIAL)

RAMJET PROPULSION:

Marquardt Aircraft Company contracted to establish flight performance and physical characteristics of Soviet ramjets for specific missile applications through the 1956 period, and completed 25% of the work[9] on schedule. (CONFIDENTIAL)

TURBOJET PROPULSION:

Allison Division of General Motors Corporation completed about 95% of a

project[10] which will formulate methods for obtaining engine component performance and for matching gas turbine components. ATIC extended the contract to include creation of similar methods for analyzing turboprop and turbofan power plants. (CONFIDENTIAL)

An in-house study covering deficiencies in the early turbojet engines in CAMEL, BADGER, and BISON aircraft, and performance improvements of later engine models, was completed during this period. (CONFIDENTIAL)

Pratt & Whitney Division of United Aircraft Corporation continued work[11] to determine Soviet capability to develop a high speed turbojet engine. ATIC initiated two supplemental agreements for the firm analysis of the Soviet capability to develop a high subsonic Mach number turboprop engine and a supersonic propeller and control system. (CONFIDENTIAL)

ATIC initiated procurement action to establish a contract with the General Electric Company in support of the ATIC efforts to conduct altitude performance analysis of specific Soviet gas turbine power plants. (CONFIDENTIAL)

FUELS AND LUBRICANTS:

Five technical reports and studies approached completion during this period: "Aircraft Fuels from Soviet Crude Oils,"[12] "Boron Chemistry Research in the USSR,"[13] "Hydrogen Research in the USSR,"[14] "Soviet Synthetic Lubricant Development,"[15] and "Determination of Propellants and Key Rocket Performance Design Information from Analysis of Rocket Exhaust Patterns."[16] (CONFIDENTIAL)

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1. AF 33(600)-33600
2. AF 33(600)-33497
3. AF 33(600)-33106
4. AF 33(038)-21102
5. AF 33(600)-33030

6. AF 33(600)-33192
7. AF 33(600)-35426
8. RWS
9. AF 33(600)-34841
10. AF 33(600)-33711
11. AF 33(600)-33689
12. PCS-22
13. AF 33(600)-33179 (Olin-Mathieson Chemical Corporation)
14. AF 33(600)-33396 (Arthur D. Little Company)
15. AF 33(600)-33795 (Dow Chemical Company)
16. AF 33(600)-33497 (Aerojet General Corporation)

CHAPTER 9

ELECTRONICS

GENERAL:

During the last half of 1957, ATIC gave special attention to the new PACAF ATILO electronics office in Hawaii to see how its basic duties were being implemented and to promote closer contact between the PACAF ATILO office and Hq PACAF. (Unclassified)

In December, a significant study[1] on Soviet electronics was released to fulfill requests from outside Government agencies. The study reviews the operating potential and design values of Soviet-Bloc airborne and ground electronic equipment now in operation or under development for future use in the Iron Curtain countries. It gives a brief chart-type portrayal of specific items involved in radar, missile guidance, communications, and navigations; and also covers countermeasures, infrared, and computers. This particular study represented a condensation of electronic data which had already appeared in other ATIC documents or which was to be published in the near future. (SECRET)

During the past six months, ATIC used contractual assistance more than ever to assess Soviet electronics know-how, and took steps to enlist the aid of prominent commercial technical firms to help analysts in evaluating foreign equipment and systems, including several phases of ground radar, airborne radar, and electronic guidance. ATIC formulated plans to seek out eminent scientific consultants in these three fields. (CONFIDENTIAL)

RADAR:

During this report period, ATIC started an in-house study designed to

summarize the latest performance characteristics of airborne radar. It was prepared in advance of the yearly basic study because of important new information in the rapidly advancing radar capabilities of the Soviet Bloc. (SECRET)

ATIC awarded to Radiation Incorporated, through WADC contract, [2] work on the measurement of the radar echo areas of foreign aircraft. Measurements were started on two Soviet bombers and one surface-to-surface guided missile. (SECRET)

A contract was awarded to the Electronics Engineering Company for the revision of the handbook on Electromagnetic Radiation. This handbook lists the essential characteristics of all known radar and navigational emitters throughout the world. (CONFIDENTIAL)

ELECTRONIC GUIDANCE SYSTEMS AND DEVICES:

During the past six months, ATIC personnel spent a total of four man-months in Germany to obtain information on special circuitry and sub-systems associated with missile guidance. (SECRET)

The General Electric Company furnished to ATIC the final report on the analysis of the YO YO missile guidance radar and associated equipment. This is a very complete analysis of the capabilities of the YO YO and its electronic equipment. (SECRET)

ELECTRONIC NAVIGATION:

ATIC completed four reports on Soviet electronic navigation apparatus during this report period. Items evaluated included Soviet distance measuring equipment, type SD-1; Soviet automatic radio compass, type ARK-5; Soviet radio altimeter, type RV-2; and a Soviet marker beacon receiver. (SECRET)

Foreign low-frequency/very-low-frequency navigational intercepts were analyzed, and a revision to the Handbook of Soviet and Satellite Navigational Electronics

Equipment was prepared. (SECRET)

ATIC entered into a contract with Stanford Research Institute to provide consultation services on long-range navigation matters during the balance of FY 58, and started negotiations for other contracts to provide ATIC with general assistance in both the long-range and short-range Soviet navigation fields as well as consultation services for short-range navigation. (SECRET)

Active participation in the exploitation of the TU-104 and the LF/VLF overseas program were important phases of electronic navigation intelligence activity during this period. (SECRET)

ELECTRONIC COMMUNICATIONS:

ATIC granted a six-month extension to RCA on the study[3] depicting the technical aspects of Soviet air communications. This study is expected to result in an extremely comprehensive analysis of present Soviet air communications and a good estimate of future trends in this field. This is the first attempt to accomplish an all-source study of this subject. It is expected to prove valuable to US operational and R&D planners, as well as to the US intelligence community. (SECRET)

A project to determine Soviet-Bloc capabilities in the field of telemetry was initiated during this period. Emphasis will be placed on systems and equipment now in use and those likely to be used in the future by the Soviets in connection with missile and aircraft testing. (SECRET)

ELECTRONIC COUNTERMEASURES, COMPONENTS, AND TEST EQUIPMENT:

Interest in electronic countermeasures continued at a high level due to greatly increased Soviet activity in this area. The contract with Sylvania for assistance in ECM analysis was completed and a new contractor program was initiated in December. Other activity in the field included completion of two intelligence

studies, and briefings to Weapon System Equipment Groups (WSEG), to the ECM Symposium at the University of Michigan, and to numerous ARDC weapon-system and sub-system contractors. (SECRET)

Interest of outside agencies in Infrared continued to increase. Two phase were involved, Soviet capabilities and the infrared radiation of Soviet aircraft and missiles. ATIC initiated contractual assistance programs in both areas. (Unclassified)

ATIC completed a survey of Soviet literature in electronic circuit theory,[4] with the assistance of Project WHITE STORK. The report was intended as a research aid, and is expected to be of value in supporting the work in all phases of electronics. (CONFIDENTIAL)

Other studies which ATIC initiated during this period included a study of Soviet microwave-tube capabilities and a study of Soviet computer capabilities. WHITE STORK prepared a manuscript of a small internal effort in the computer field which utilized a collation of intelligence information made by Ramo-Wooldridge in a trail of recovery techniques this firm is developing. (Unclassified)

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1. "Present and Future Estimates of Soviet-Bloc Electronic Capabilities"
2. AF 33(600)-28959
3. "Technical Aspects of Soviet Air Communications."
4. TIR-EL-57-4

CHAPTER 10

ARMAMENT

AIRCRAFT ARMAMENT AND FIRE CONTROL SYSTEMS:

During this report period, Aircraft Armaments, Inc., Cockeysville, Maryland, continued work for ATIC on the analysis and evaluation of Soviet defensive armament systems.[1] ATIC gave preliminary approval to the armament installation configuration studies for BISON, BEAR, BADGER and BLOWLAMP which were completed in the prior report period. Two circumstances occurred which resulted in a delay in the defensive armament study -- a breakdown in the ATIC READIX computer and negotiation for additional funds to cover an overrun on the contract. (Unclassified)

ATIC completed half of the lead-pursuit (US gun-armed fighters versus the Soviet bombers) duel computations, and part of the lead-collision (US rocket-armed fighters versus the Soviet bombers) duel computations. (~~CONFIDENTIAL~~)

Crosley Division, AVCO Manufacturing Corporation continued work on the contracted study of the "Characteristics and Performance of Soviet Fighter Armament Systems."[2] Approximately three-fourths of the armament system configuration layout drawing work was completed by Crosley. Initial computer runs were made on the mathematical duels to check the problem on the Crosley IBM computer. The first phase of the duel analysis portion of the study included run off of the passive survival probabilities for the Soviet fighter aircraft. The armament-system layout work resulted in changes to certain of the Soviet fighter armament-system estimates. (Unclassified)

Contract negotiations for services to analyze significant Soviet bombing accuracy data resulted in a contract[3] with Haller, Raymond and Brown, Inc. The

research phase of this contract was almost complete by the end of December 1957. (CONFIDENTIAL)

ATIC initiated an in-house project to produce defensive fire-coverage diagrams of Soviet bomber and transport aircraft, distributed the study entitled "Defensive Fire Coverage Diagrams of Soviet Bomber and Transport Aircraft," and made a preliminary study of BACKFIN. (Unclassified)

VULNERABILITY:

The contract with the Ballistics Analysis Laboratory, The Johns Hopkins University,[4] for vulnerability and lethality studies of foreign aircraft and weapons expired on 1 November 1957. One ATI study[5] was completed and distributed; drafts were completed in November of two other studies, "Vulnerability of BEAR to Various Air-to-Air Weapons" and "Vulnerability of BISON to Various US Air-to-Air Weapons." Procurement action was initiated during this report period for extension of the vulnerability studies to include BADGER, BACKFIN and BLOWLAMP. (Unclassified)

AIR ORDNANCE AND WARHEADS:

ATIC undertook the processing of color movie film of two separate night firing tests performed at the Air Proving Ground Center to provide Soviet aircraft gun-fire recognition aids for Hq FEAF. (CONFIDENTIAL)

Visual inspection was made on Czech-manufactured NR-23 and N-37 aircraft guns for comparison with Soviet-produced guns. An instrumented firing test indicated that the Czech NR-23 gun fired 100 rds/min slower than the Soviet model. This discrepancy may have been caused by the deterioration of the Czech guns due to immersion in salt water. No ammunition was available to check the cyclic rate of the Czech N-47 gun. (SECRET)

ATIC initiated three major programs in this area during the last half of 1957:

1. Exterior ballistic determination programs to acquire a better knowledge on the characteristics of Soviet aircraft ammunition.

2. A USAF in-house program, with the assistance of the Ballistics Laboratory of APGC, to establish ballistic coefficients for the 23-mm projectile with large initial yaw, as induced by cross-wind firing from a high speed bomber. This program was scheduled at the Ordnance Corps, Ballistic Research Laboratory at Aberdeen Proving Ground.

3. A program to determine the Soviet 37-mm projectile statility when fired at high initial fighter aircraft speeds. (~~CONFIDENTIAL~~)

ATIC performed an in-house study to estimate and evaluate the warhead on the Soviet B-200 surface-to-air missile. Three basic designs were investigated -- high-explosive blast, fragmentation, and sub-caliber cluster warheads. Effectiveness evaluations were performed on the single shot probability of kills on each design including a wide range in warhead weights. (~~SECRET~~)

SURFACE-TO-AIR DEFENSE ANALYZER:

The development program with American Machine and Foundry[6] for a universal analyzer to evaluate the effectiveness of the Leningrad surface-to-air defense system to an attacking bomber was demonstrated at Hq SAC. Requirements were satisfactorily attained for the high-altitude approach. The low-altitude attack analysis was not sufficiently "debugged" to permit a complete runout on the IBM-704 computer. ATIC contracted with AMF for an extension in time to demonstrate the satisfactory operation of the analyzer in the low-level attack condition. (~~CONFIDENTIAL~~)

SPECIAL WEAPONS:

ATIC personnel participated in four meetings of the BW-CW Working Groups of JTIS during this period. At two of these meetings, they presented ATIC investigations on the chemical spray systems in Soviet Bloc aircraft. (SECRET)

Contributions to ATIC studies and estimates concerning nuclear weapons capability emphasized missile warheads. (CONFIDENTIAL)

During this period, ATIC sought contractual services to provide studies on Soviet nuclear weapons with the emphasis on compatibility with aircraft and missiles, and flight and terminal ballistics. Included was a technical design study of a modified Soviet 37-mm aircraft gun to determine its performance characteristics, an estimate on the characteristics of Soviet warheads (non-nuclear) compatible with significant surface-to-air and air-to-air missiles, and the reloading of Soviet aircraft gun cartridge cases for further test firing to obtain gun performance and terminal ballistics information. (SECRET)

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1. AF 33(600)-33408
2. AF 33(600)-24502, Call Letter Nr 7
3. AF 33(600)-35622
4. AF 33(600)-33898
5. TIS-WI-57-8
6. AF 33(600)-31900

CHAPTER 11

EQUIPMENT

AIR-WEAPONS EQUIPMENT:

July 1957 to January 1958 marked a period of great activity in the air weapons equipment area. The first part of this period was highlighted by the two visits of the Soviet transport TU-104A to the United States. The second part was largely dominated by events related to the launching of the two Soviet Sputniks and the public displays of guided missiles in Moscow during October. ATIC made several new and significant intelligence findings. (CONFIDENTIAL)

The two principal accomplishments which were expedited by the visit of the Soviet transport were the exploitation of the Soviet automatic astro compasses or sun trackers and the automatic dead reckoning navigation system. Both of these items resulted in specific requirements being levied upon ATIC by Hq, SAC. (SECRET)

The exploitation of both of these equipment systems utilized information from various sources, and, in the case of the automatic navigation system, previously unintelligible information from widely divergent sources became remarkably intelligible and useful when put together. Exploitation of these systems enabled ATIC to confirm Soviet trends as expressed in a comprehensive published article by the Chief of Navigation Service for the Soviet Air Force. In this article, General Sokolov reviewed current Soviet weaknesses in navigation equipment and detailed Soviet plans for improvement. Among these expressed plans, the article stated that the automation of flight-crew functions must be expedited and the

complexity of equipment necessary to accomplish this must be accepted. (SECRET)

Principal problems originating with the advent of the Sputniks related to ballistic missile guidance, airborne electrical power sources of long life, and to protective equipment for sending a mammal into space. (SECRET)

Although the actual Sputnik orbits became fairly well known, the intended orbits were unknown, and therefore specific evaluations of guidance accuracy were not possible. It was apparent, however, that the Soviets achieved adequate guidance accuracy to accomplish the general purpose of the satellites. ATIC took advantage of the opportunity afforded by these events to emphasize to those involved with missile accuracy estimates that the guidance system cannot be more effective than the stabilization system through which guidance commands are executed. Aslo stressed was the consideration that missile accuracy cannot be determined from the bench performance of inertial elements, and that the effects of the flights environment may be greater than those from bench instrument errors. (SECRET)

Specific requirements to estimate the life of the electrical power source of Sputnik I, and to evaluate the possibility of an improved source of electrical power for Sputnik II were satisfied. By technical analysis in both cases, ATIC correctly interpreted Soviet announcements to the effect that the batteries of the first satellite would last for three weeks, and also correctly estimated that no new or unusual power source was used on the second satellite. This emphasized the importance of the study, "Unconventional Batteries for Soviet Air Weapons," and indirectly assisted in expediting contractual activity. (SECRET)

The fact of the living mammal in Sputnik II created no difficult problems relating to protective equipment, but did create an urgent requirement that its

significance be recognized. The appealing explanation that the purpose of the "dogged" Sputnik was "to secure physiological data" requires emphasis of the fact that among the objectives of the USSR is not included the furtherance of science for its own sake. Rather, ATIC believes thatSoviet efforts are directed to those activities with prospects of military or political effects. In this case, the event to create the effect would be the successful manning of a space vehicle. Aside from immediate blushing honors to Soviet prestige, such a capability to man a space vehicle, ballistic missile, or skip-glide device, if only during development flight test, would have a difficult-to-estimate effect upon developmental capabilities. ATIC expedited the study, "Soviet Aircrew Protective Equipment." (SECRET)

At the close of 1957, several problems, some of severe consequence, confronted the maintenance and equipment personnel of ATIC. The first of these was the growing need to know what lies ahead in regard to Soviet exploitation of inertial techniques. Soviet activities in the sciences are very apparent, and current Soviet operational equipment includes an autonomous navigation system using an intertial reference through the means of an automatic sun tracker for heading information. Ground speed, derived from aerodynamic effects and wind information, is used, but it is potentially capable of great improvement if secured from inertial sources. One of the great advantages of inertial devices, their inherent security, operates to reduce the information ATIC needs. This work progressed very well with the contractual assistance from the Minneapolis-Honeywell Regulator Company. (SECRET)

Another problem related to the manning of Soviet weapons. In the impending "race for space" a significant part of the total effort will be devoted to making the weapons and vehicles inhabitable. If Soviet progress in this area can be

evaluated, countering action can be planned, and the psychological and political effects of Soviet accomplishments can be effectively deflated. (SECRET)

The remaining major problem relates to maintenance as affecting Soviet aircraft serviceability and guided missile reliability. The importance of this matter is more than obvious, but the problem remaines of evolving a method for applying technical intelligence to this purpose which would be feasible with available facilities. This work continued with the contractual assistance from Project WHITE STORK. (SECRET)

CHAPTER 12

MATERIALS

METALLURGY AND INORGANIC MATERIALS:

During the last half of 1957 ATIC uncovered and confirmed the following new information:

1. The Soviets have developed a method for rolling stainless steel produced by powder metallurgical methods. This development represents a definite advance over US and western developments in stainless steel powder metallurgical production techniques. (SECRET)

2. The Soviets are going to erect two new scientific institutions for metallurgical research and education. These facilities will reportedly be used for development of air-weapon metals. (SECRET)

ATIC further confirmed the information that Soviet blast-furnace technology is advanced over that in the US. (Unclassified)

The Metallurgy Group of ATIC took steps to aid Republic Steel Corporation by supplying them with detailed data on Soviet blast-furnace technology and Soviet steel-alloy compositions. ATIC extended a similar service to the Aeronautical Research Laboratory and to the NACA Subcommittee for heat resistant materials. (Unclassified)

ORGANIC CHEMISTRY:

ATIC reviewed considerable data in the field of polymer chemistry during the last half of 1957. A total of more than 400 magazines, articles and books were reviewed in the polymer field to assess the Soviet status in the field of rubber and plastics, especially in the sandwich construction materials for supersonic aircraft. ATIC determined that a sandwich material with a foam plastic core is at least one type of structure under consideration by the USSR. (SECRET)

ATIC identified the following trends in the USSR with respect to rubber and plastics:

1. Production capacity will be shifted from polybutadiene rubber to other improved general-purpose rubbers.

2. The production of several emulsion-polymerized rubbers will either be undertaken or increased. (These include low temperature rubbers, oil-extended silicate-filled and a combination of oil-extended and silicate-filled rubbers, carboxylic rubbers, and those produced by cationic emulsifiers.)

3. Production of isoprene rubbers highly important to air weapons.

4. The development of new rubbers resistant to low and high temperatures and to corrosive media.

All of these are important to future air weapons. (SECRET)

ATIC ascertained indications of Soviet interest in the use of radioisotopes and process control, and recognized strong indications that the Soviets have more than a passive interest in polyvinyl chloride for film for clothing as a protection against radioactive fall-out. (SECRET)

CHAPTER 13

## INDUSTRIAL ENGINEERING

AIR WEAPONS PRODUCBILITY:

North American Aviation, Inc., completed manufacturing analyses of the Soviet jet fighters FACEPLATE and FISHBED in October 1957. By the end of December, ATIC had started a manufacturing analysis study. (SECRET)

Boeing Aircraft Company made considerable progress in the study "Factors Affecting Soviet Supersonic Bomber Production." Boeing completed Phase I of the contract in November 1957, outlining in detail the critical manufacturing problems, and alternative methods of production associated with three classes of supersonic bombers. ATIC prepared Phase II of the analysis in December, to select specific manufacturing methods and materials based on Soviet philosophy and intelligence information. Boeing continued with Phase II with an analysis of the effect of specific methods and materials on bomber performance and producibility. (SECRET)

Douglas Aircraft Corporation completed the manufacturing analysis of BLOWLAMP in December 1957, and started a producibility comparison of BLOWLAMP and BACKFIN. ATIC extended the completion date of the study. (CONFIDENTIAL)

In October 1957, ATIC received copies of the "Handbook of World War II and Post War Production and Productivity in the US Airframe Industry" from the AMC Industrial Resources activity. This was an ATIC project with the analysis and report prepared by AMC. ATIC made the report available to Targets, ACS/I, and to ORR/CIA to assist in formulating foreign-aircraft production estimates. (CONFIDENTIAL)

PRECISION MANUFACTURING TECHNIQUES:

ATIC initiated several manufacturing "state-of-the-art" studies during this period which have a bearing on ascertaining Soviet capability and trends in the manufacture of air weapons and components. These included a review and evaluation of the Soviet "state-of-the-art" in welding and high-speed machining. ATIC planned to extend coverage to studies in casting, forging, extrusion, and sheet-metal forming, and to direct effort toward fabrication techniques developed by Soviet aviation institutes as well as those related directly or indirectly to air-weapon materials and production processes. (SECRET)

GUIDED MISSILE PRODUCIBILITY:

Minneapolis-Honeywell proceeded rapidly in analyzing the critical aspects of missile guidance and control systems manufacture. Phase I was virtually complete by 31 December 1957. This phase of the contract dealt with an analysis of critical manufacturing aspects of gyroscopes, accelerometers, platforms and airborne computers as related to design and performance characteristics. (SECRET)

Convair's report, "ICBM Manufacturing Analysis," served as valuable reference material for the intelligence community and assisted AF intelligence activities considerably in answering priority requirements. The analysis covered ICBM production lead times and possible production acceleration schedules leading to estimates of Soviet ICBM operational availability dates. (SECRET)

In December, ATIC began procurement negotiations with the Glenn L. Martin Company for a contract to evaluate the producibility characteristics of a two-stage long-range non-pressurized missile differing in concept from an "Atlas" airframe. (SECRET)

PROPULSION SYSTEMS PRODUCIBILITY:

ATIC forwarded the Soviet 100-ton rocket engine manufacturing analysis report prepared by North American to Targets, ACS/I, in advance of a preliminary study to be prepared by ATIC. (SECRET)

In July 1957, ATIC received copies of the report, "Mobilization Parameters for the US Aero Engine Industry," from the AMC Industrial Resources activity. This was an ATIC project with the analysis and report prepared by AMC. ATIC made the report available to Targets and to ORR/CIA to assist in formulating foreign engine production estimates. (CONFIDENTIAL)

# CHAPTER 14

## AIR SCIENCES

### SEISMOLOGY:

ATIC released a preliminary study[1] of Soviet capabilities in seismology before the close of the year 1957. The study suggests that the Soviet potentialities in seismology are high, as evidenced by the well developed work in theoretical seismology. Major emphasis seems to be on the theory of wave propagation, the determination of seismicities of regions within the USSR, and earthquake prediction. As a result of preliminary analysis, ATIC concluded that the Soviets have enough capability in seismology to warrant a more detailed study than was represented by this report and initiated such a detailed study. (SECRET)

### ACOUSTICS:

A final report[2] on "Survey of Soviet Acoustics" was completed. It included specific evidence concerning Soviet application of fine structure analysis of acoustic spectra to the solution of problems encountered in the development and maintenance of aircraft engines. Indirect evidences pointed to deep theoretical knowledge in many fields combined with much crossing of the barriers of the traditional sciences by prominent individual scientists (and of the "pure applied" barrier which is characteristic of European, and to some extent of American, science) and to extensive and effective experimental research in which ingenuity often replaced ideal instruments and equipments. The conclusions were that realistic planning by the US may be based on the assumption that the Soviet estimate of

practical usefulness in their particular strategic and tactical situation, and not lack of capability, will limit their application of fine structure analysis to military situations. (SECRET)

CELESTIAL MECHANICS:

During this period, a report was completed in celestial mechanics (utilizing translations of 375 research papers) which reveals that the Soviet capability in this subject is more than equal to that of the US. The Soviets have applied and refined the long established classical theory and have devoted considerable effort to the comparatively new fields of stability and variable mass, as well as to new developments in qualitative methods concerned with the restricted three-body problems. This emphasis on new fields and methods is tending to develop a sound lead in some important and modern branches of celestial mechanics. Soviet research in this area is integrated well with other research, both within a specific facility and as a part of the national effort to attain Soviet objectives. Since the 1930's, the Soviets have utilized celestial mechanics toward these objectives by developing basic knowledge and by applying this knowledge to programs of Air Force interest. (SECRET)

NONLINEAR MECHANICS:

The subject of nonlinear mechanics, in which the Russians have been leaders since the beginnings of the subject in 1892, claimed the interest of ATIC during this period. ATIC produced a report which concluded that the Soviets are enhancing their capabilities by strides in giving superior interest to nonlinear mechanics, and that their current interests are associated with

technical developments. Linear differential equations afford good approximations to physical problems so long as the variables are kept within certain limits; but an age of high velocities, high pressures, high voltages, and varying resistances in circuits impose new patterns in which differential equations are no longer linear. (SECRET)

AIRGLOW AND AURORAE RESEARCH:

During the last half of 1957, work was continued on a study to determine the scientific competency of the USSR and the Satellites in night-airglow and aurorae research in terms of Air Force significance. The general level of the Soviet scientific competency in these fields is substantially lower than that of the West (including the US) but the International Geophysical Year emphasis and good support by the Soviet Government have accelerated Soviet programs. The Soviets know US programs well, but US scientists have only meagre knowledge about their programs. (SECRET)

OTHER BASIC SCIENCES EMPHASES:

ATIC continued work on reports concerning meteorics and geomagnetism. Basic science studies were in progress or initiated in wave propagation, solid state physics, selected areas of physics and chemistry, information theory, Boolean algebra, solar-terrestrial relationships, atmospheric optics, geodesy and gravimetry, seismology, theory of materials used in transitors, and other fields of science. (CONFIDENTIAL)

UNIDENTIFIED FLYING OBJECTS:

The number of UFO reports increased considerably since the last report period. ATIC received some 779 reports during the last half of 1957, 529 more than in the first half of the year. (UNCLASSIFIED)

ATIC compiled material for a briefing to the Office of the Assistant Secretary of Defense which covered primary problems including insufficient number of investigative units, press and public relations problems, unofficial UFO organizations and their influence, and the requirement for a clear-cut policy regarding the separation of UFO responsibilities. (UNCLASSIFIED)

In December, UFO policy was revised whereby the SAFIS would have all public relations functions; ATIC, the technical analyses; and ADC, the collection. (UNCLASSIFIED)

1. TIS-SC-57-2
2. AF33(600)-34084, Melpar, Inc.

CHAPTER 15

## AIR WARFARE AND WEAPON SYSTEMS

INTEGRATED PRODUCTS:

ATIC received significant new intelligence information prior to publication of the scheduled annual revision of AIE-11, "The Threat of Military Surprise from Soviet Technological Superiority," which necessitated a new scheduled date for release. ~~(CONFIDENTIAL)~~

A revision of the "Estimated Characteristics of Soviet Air Weapons" was distributed in October. Format was completely changed in order to present estimates as integrated weapon systems. ~~(CONFIDENTIAL)~~

A total of forty-one contributions were made by ATIC to ARDC project offices and their contractors during the last half of 1957 on the expected Soviet opposition to weapon and sub-systems undergoing development or system-requirement studies. These development projects and requirements studies included the following: extended range Matador missile (Martin Co.); low altitude strategic bomber (Boeing-Wichita Company sponsored), B-58 (Convair); low altitude strategic bomber (Convair); Quail bomber decoy (McDonald Aircraft); SR-118, strategic penetration aids (McDonald Aircraft); passive homing systems for Soviet ground radars (Bendix, Detroit); offensive ECM development (Stanford Research Institute); SR-118, strategic penetration aids (Stanford Research Institute, Emerson Electric, General Electric); electronic reconnaissance system (Airborne Instrument Laboratories); offensive ECM sub-systems for post-1961 (Sperry Gyroscope); SR-151, drone

decoy study (Ryan Aero); advanced fighter-bombers (NAA, Columbus); Regulus II as an ASM (Chance-Vought); electronic countermeasures against Soviet systems (Martin Company, Sperry Gyroscope); SR-159, ground ECM support study (Martin Company); SR-149, Mach 3 nuclear ramjet low-altitude strategic missile (NAA Missile Division); SR-165, system characteristics for a Matador replacement (Goodyear Aircraft); post-1960 tactical bomber requirements (AFDAP); SAGE management program (Hq ARDC); ARDC-SAC strategic penetration model (Institute for Air Weapons Research, University of Chicago). (SECRET)

TECHNICAL EFFECTIVENESS OF THE SOVIET AIR DEFENSE WARFARE SYSTEM:

A study of low-altitude considerations resulting from work accomplished by the Armour Research Foundation, under contract, was completed and reproduced as an internal AF intelligence working paper. ATIC was in the process of evaluating additional work by the contractor at the end of 1957. Work on Soviet air defense requirements by Project WHITE STORK continued. (CONFIDENTIAL)

TECHNICAL CAPABILITY OF THE SOVIET AIR DEFENSE WARFARE SYSTEM:

ATIC began active work on this study during the latter part of this report period. (UNCLASSIFIED)

SOVIET CAPABILITY FOR ACTIVE DEFENSE AGAINST THE ICBM:

Work continued during this period and procurement action was initiated for an extension of the contract with the University of Michigan for exploitation of pertinent foreign scientific literature. (CONFIDENTIAL)

THE SOVIET STRATEGIC AIR WARFARE SYSTEM:

ATIC planned Phase II work by Lockheed Aircraft Corporation on a study of the technical effectiveness of the Soviet strategic air warfare system.

ATIC began active work on a study of the technical capability of the Soviet strategic air warfare system during the latter part of the report period. (CONFIDENTIAL)

THE SOVIET TACTICAL AIR WARFARE SYSTEM:

At the close of 1957, ATIC was in process of evaluating a report by Northrop Aircraft on Phase I, analysis model development and analysis of most sensitive parameters of weapons performance. Work progressed on a study of technical capability of the Soviet tactical air warfare system which will include pertinent results of the work performed by Northrop under contract. (CONFIDENTIAL)

SOVIET CAPABILITY TO DEVELOP AND LAUNCH A MILITARY EARTH SATELLITE:

When ATIC published a study on this subject dated 1 October 1957, the task was revised to include the total subject of Soviet Capabilities in Astronautics. By the close of 1957, ATIC was negotiating with the Martin Company for external assistance in this study. (CONFIDENTIAL)

An increased amount of unprogrammed work was accomplished during the latter half of 1957. Probably the most significant was a study on "Relative Emphasis on Ballistic Missiles and Manned Bombers in Soviet Strategic Weapons Development" for use as an internal AF intelligence working paper. (CONFIDENTIAL)

ATIC initiated two major studies in this area during this period. One covered the training, motivation, career opportunities, etc., of Soviet scientific and technical personnel as one of the underlying factors in the

USSR air research and development programs. Another study of mathematical simulation methodology was planned to include the development of a series of mathematical models to achieve a more rapid analysis capability than now exists through individual external assistance contracts. (CONFIDENTIAL)

AIRCRAFT WEAPON SYSTEMS:

During the last half of 1957, ATIC initiated four studies of new Soviet aircraft: BACKFIN, a jet bomber; COOT, a turboprop transport, COOKER, a turbojet transport; and HOOK, a turbine-powered helicopter. Characteristics and performance data on these aircraft were determined. (SECRET)

In July a Polish built version of the Soviet HARE helicopter was made available to ATIC for analysis and evaluation to include the physical characteristics, performance and capability. ATIC arranged with WADC for flight tests, physical inspection, and component tests. Only brief physical inspection of the helicopter was completed by the close of the year, but translation of its maintenance and operations manual was accomplished and distributed. (SECRET)

Convair Division, General Dynamics Corporation completed reports on "Soviet Capability to Develop a Supersonic Manned Medium Bomber Weapon System," and Boeing Aircraft Company submitted reports on the "Soviet Air-to-Air Refueling Capabilities." Northrup Aircraft, Inc., completed Phase I report on "Soviet Capability to Develop a Supersonic All-Weather System," and ATIC took action to obtain continued external assistance upon termination of the original contract. (CONFIDENTIAL)

North American Aviation and Convair Division each completed a report encompassing the analysis and evaluation of specific Soviet fighters. ATIC

prepared handbook sheets for the Characteristics and Performance Handbook covering twelve Soviet aircraft. (CONFIDENTIAL)

ATIC participated in planning for the technical exploitation of any Soviet/CLEAT/TU-114 flight to the US at the meeting of ACS/I personnel in December. (CONFIDENTIAL)

GUIDED MISSILE WEAPON SYSTEMS:

ATIC concluded a working agreement with the Air Force Ballistic Missiles Division, ARDC, Los Angeles, in December. This agreement and an associated contract with Ramo-Wooldridge Corporation provides the best capabilities of AFBMD for the solution of specific guided missile intelligence problems. (CONFIDENTIAL)

The Offensive Missile Program of ATIC produced during this period the first revision to the basic study "Soviet Offensive Guided Missile Capabilities," and two TOP SECRET supplements. These supplements were entitled "(SECRET) Analysis of Data Collected by the AN/FPS-17 Radar System," and "(UNCL) Telemetry Analysis." (SECRET)

The first study under the Defensive Missile Program of ATIC, "Soviet Defensive Guided Missile Capabilities," was released early in this report period and the first revision started before the close of the year. (CONFIDENTIAL)

A study completed jointly by ATIC and the Glenn L. Martin Company was released in December, "Concept for Development of an Intelligence Analysis Guide for an ICBM Weapon System." (CONFIDENTIAL)

NATIONAL AND JOINT COMMAND AND AIR STAFF SUPPORT:

During this period, ATIC forwarded eight contributions for the NIS program. Contributions to NIE's included estimates regarding Communist China and Soviet

Capabilities and Probable Courses of Action Through 1962. Other support included a contribution to the Air Defense Force AIS, and to JIC/636, Over-all Intelligence Estimate for Planning. (~~CONFIDENTIAL~~)

In the air-warfare and weapon-systems area, ATIC completed twelve studies and reports and made thirteen major contributions to studies and estimates by other agencies. Other products included 72 technical briefs, 41 SIRAB items, 10 COSIB items, and two feature articles. (UNCLASSIFIED)

## GLOSSARY

| | |
|---|---|
| AFAC | Air Force Armament Center |
| AI | Airborne Intercept |
| AMC | Air Materiel Command |
| APGC | Air Proving Ground Command |
| ARDC | Air Research and Development Command |
| ATILO | Air Technical Intelligence Liaison Officer |
| CIA | Central Intelligence Agency |
| DDI (Tech) | Deputy Director of Intelligence, Technical (Great Britain) |
| ECM | Electronic Countermeasures |
| ELINT | Electronics Intelligence |
| FY | Fiscal Year |
| ICBM | Intercontinental Ballistic Missile |
| ICGL | Intelligence Collection Guidance Letter |
| ICGM | Intelligence Collection Guidance Manual |
| IGY | International Geophysical Year |
| JIB | Joint Intelligence Bureau |
| JTIS | Joint Technical Intelligence Subcommittee |
| PEP | Policy Executive Panel |
| PPT | Program - Project - Task |
| RADC | Rome Air Development Center |
| REG | Returnee Exploitation Group |
| SAB | Scientific Advisory Board (AF) |
| SAC | Strategic Air Command |
| SAG | Scientific Advisory Group (ATIC) |
| SEC | Scientific Estimates Committee |

| | |
|---|---|
| TAC | Tactical Air Command |
| TIPS | Technical Intelligence Processing System |
| UFO | Unidentified Flying Objects |
| USFIC | US Foreign Air Information Center |
| VHF | Very-high frequency |
| VLF | Very-low frequency |
| WADC | Wright Air Development Center |

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INDEX (Jul - Dec 1957)

AIR TECHNICAL INTELLIGENCE CENTER
WRIGHT-PATTERSON AIR FORCE BASE
OHIO

OFFICIAL FILE COPY

ADJUTANT'S OFFICE
Office of Record

28 October 1957

MEMORANDUM FOR ALL PERSONNEL, AIR TECHNICAL INTELLIGENCE CENTER

SUBJECT: Wearing of the Unit Emblem

1. Arrangements have been made for the manufacture in color of the unit emblem of the Air Technical Intelligence Center, suitable for wearing on clothing. The emblem may be worn on flight, athletic, and fatigue clothing.

2. Unit emblems for all athletic uniforms have been purchased from unit funds and arrangements have been made for placing them on athletic uniforms. Emblems desired by personnel assigned to the Air Technical Intelligence Center may be purchased at cost at either the Adjutant's Office or the Squadron Orderly Room.

3. Wearing of the emblem on Air Force service or dress uniforms is not authorized.

Harold E. Watson

HAROLD E. WATSON
Brigadier General, USAF
Commander

OFFICIAL FILE COPY

ADJUTANT'S OFFICE
Office of Record
OCT 3 1 1957

AFPMP-12-C-3

SUBJECT: Emblem for Air Technical Intelligence Center

TO: Commander
Air Technical Intelligence Center
Wright-Patterson Air Force Base
Ohio

1. Reference is made to paragraph 3 of 1st Indorsement from this headquarters, 29 July 1957, to your letter AFCIN-4, 9 July 1957, Subject: Request for Approval of Air Technical Intelligence Center Organizational Emblem.

2. Inclosed are four (4) copies of the flag device, Drawing No. 5-101-71, for reproduction of the organizational flag.

FOR THE CHIEF OF STAFF:

1 Incl
Flag dwg (in quad)
No. 5-101-71

cc: AMC

J. R. BALIGA
Major, USAF
Asst Chief, Awards Branch
Personnel Services Division
Directorate of Military Personnel

Permanent record to be returned when no longer

OFFICIAL FILE COPY

ADJUTANT'S OFFICE
Office of Record

Basic Ltr fr Air Technical Intel Center, USAF, Wright-Patterson AFB, Ohio, subj: Request for Approval of Air Technical Intelligence Center Organizational Emblem, dtd 9 Jul 57

AFPMP-12-C-3 1st Ind

JUL 29 1957

Dept of the Air Force, Hq USAF, Washington 25, D. C.

TO: Commander, Air Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio

1. In accordance with AFR 900-3, 14 September 1955, the following emblem is approved for the Air Technical Intelligence Center:

CENTER EMBLEM: On a shield azure (blue), a polar projection of the globe, voided of the field, grid lines sable (black), land areas argent (white), surmounted by a sphinx in profile or (Air Force yellow), all below an aerial symbol in dexter chief, pointing to dexter and a symbol of three intersecting orbits in sinister chief, of the last; outlines and details of the second throughout.

SIGNIFICANCE: The theme of our emblem symbolizes our mission, "Air Intelligence, Worldwide." The polar projection of the earth's surface represents world-wide activities. The Sphinx is the established symbol of Intelligence. The aerial symbol on the upper left represents the interest of ATIC in aerial equipment, vehicles, etc. The symbol (intersecting orbits) on the upper right represents the ATIC interest in science and technology.

2. Inclosed is the official painting of the emblem described above, to be forwarded to the unit for file and guidance in reproduction.

3. Copies of the flag device drawing will be forwarded upon completion of action by this headquarters.

FOR THE CHIEF OF STAFF:

J. R. BELGARD
Lieutenant Colonel, USAF
Chief, Awards Branch
Personnel Services Division
Directorate of Military Personnel

2 Incls
1. Cy w/d
Added 1 incl
2. Official emblem painting

cc: AMC

AIR TECHNICAL INTELLIGENCE CENTER
UNITED STATES AIR FORCE
WRIGHT-PATTERSON AIR FORCE BASE
OHIO

AFCIN-4 9 July 1957

SUBJECT: Request for Approval of Air Technical Intelligence Center Organizational Emblem

TO: Directorate of Military Personnel
Headquarters USAF
Attn: Personnel Services Division
Washington 25, D. C.

1. It is requested that the inclosed emblem be approved in accordance with AFR 900-3 as the official emblem of the Air Technical Intelligence Center. The Air Technical Intelligence Center is organized under, reports to, and performs the technical portion of the mission of the Assistant Chief of Staff/Intelligence, Headquarters USAF. The theme of the inclosed emblem is: "Air Technical Intelligence, Worldwide."

2. The polar projection of the earth's surface represents world-wide activities.

3. The Sphinx is the established symbol of Intelligence.

4. The aerial symbol on the upper left represents the interest of ATIC in aerial equipment, vehicles, etc.

5. The symbol (intersecting orbits) on the upper right represents the ATIC interest in science and technology.

6. The coloring is as follows: Field, light blue; Land areas on polar projection, silver; Aerial symbol, intersecting orbits and sphinx, gold.

7. It is realized that the placing of the gold sphinx against the silver-colored land areas is not recognized by some heraldic

authorities. If the approving authority does not permit this "metal against metal," permission is granted to the approving authority to revise the coloring as necessary.

Harold E. Watson

HAROLD E. WATSON
Brigadier General, USAF
Commander

1 Incl
ATIC proposed
emblem (in dup)

4X2B

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON 25, D. C.

AFPMP-12

19 JUL 1957

SUBJECT: Request for Approval of Air Technical Intelligence Center Organizational Emblem

TO: Commander
Air Technical Intelligence Center
Wright-Patterson Air Force Base
Ohio

1. Reference is made to your letter AFCIN-4, 9 July 1957, subject as above.

2. The approved emblem will be forwarded to your headquarters as soon as an official painting is completed. Flag drawings will be forwarded at a later date. Every effort will be made to expedite this matter.

FOR THE CHIEF OF STAFF:

J. R. BELGARD
Lieutenant Colonel, USAF
Chief, Awards Branch
Personnel Services Division
Directorate of Military Personnel