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TALE KEYHOLE-COMINT
CONTROL SYSTEMS JOINTLY

HANDLE VIA
BYEMAN
CONTROL SYSTEM

UTILIZATION
OF
NRP U-2R AIRCRAFT

7 November 1969

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[REDACTED]
Dr. F. Robert Naka, DDNRO, Chairman

[REDACTED] CIA

Lt. Col. Mitchell D. Erkelens, USAF

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NSA, DIA, NRO, USAF reviews completed

MORI/CDF Pages 2 thru 43_____

IDEALIST

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I. INTRODUCTION

The ^{CIA}DNRO through the auspices of the CIA, Office of Special Activities, maintains a fleet of six U-2R aircraft which are available for covert photographic and SIGINT missions. At the present time, the principal deployed unit, with two U-2R aircraft, is [redacted] From this base, [redacted] conduct missions along the coast and at times over mainland Communist China. With the assistance of the U. S. Navy carrier forces and the [redacted] [redacted] an additional capability for worldwide deployment has been demonstrated.

The Strategic Air Command also maintains an additional fleet of six U-2R aircraft of which two U-2Rs are deployed against the national requirement in Southeast Asia and the island of Cuba.

There are ten U-2C aircraft in the NRP inventory, two of which are used for test and training missions with the remainder in flyable storage.

The Air Force Systems Command also operates three older U-2s as platforms for carrying experimental equipment.

II. STATEMENT OF THE PROBLEM

In the past [redacted] mainland China on many penetration missions in the U-2 but since September 1968 the aircraft [redacted] have been restricted to flying 20 miles off the coast of China. To obtain permission for these flights, it has been necessary for the DNRO to make a monthly request to the 303 Committee. Inclement weather and extraordinary political considerations, [redacted], have reduced the frequency of overflights in calendar year 1968 to three missions while seven peripheral missions were flown. In calendar year 1969, no overflights have been authorized, but eight peripheral missions have been flown as of this date.

The present FY 1970 and the forecast 1971 costs for the U-2 Program are approximately [redacted] Considering the infrequent overflights and the dollar expenditure, the question

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has arisen: "Is the available capability worth the price?" Therefore, a committee¹ was established to determine:

1. The national requirement for the U-2R capability.
2. The least expensive posture and mode of operation to continue such a capability.

III. DETERMINATIONS

A formal statement of the value of the reconnaissance by a U-2R has been received from the DIA and is included in this report as Attachment A.

Summarizing the memoranda, the primary mission of the U-2R is photographic intelligence. The secondary mission is ELINT. Each mission is planned in accordance with the COMIREX target deck for the photographic portion and CIA for the ELINT portion. The photographic collection is evidently of some value, having for example been the first to detect aircraft at an airfield near Shanghai and data on a suspect advanced weapons related facility. By comparison, satellite photography is often hindered by cloud cover in the South China area.

However, the ELINT collection is considered to be of marginal value, presumably because DIA receives a routine early readout of the slow-speed tape from the Pacific Electronics Center, [REDACTED]

It is of interest to note that the Chinese Communists consider the U-2R to be a prime target for intercept and cause the entire air defense to be activated. This permits the collection of very valuable operational (as opposed to technical) ELINT. Both the NSA and CIA/OSI analyze the high-speed tape and believe that unique data have been gathered as reported in Attachments B and C.

The CIA/OSA purchased the 12 U-2Rs and has performed all the testing of the aircraft as well as installation and testing

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Col. [REDACTED] USAF
Dr. F. Robert Naka, DDNRO, Chairman

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of systems. The first U-2R was delivered in August 1967 and the twelfth, in December 1968. CIA/OSA turned six U-2Rs over to the Strategic Air Command and trained the initial pilots.

25X1 The CIA U-2R can be deployed worldwide on 24 hours' notice either from the home base at Edwards Air Force Base or its operational base at [REDACTED] For a single operational mission from a deployment base, only one C-141 carrying support personnel and the fly-away kit of spares and AGE equipment need accompany the U-2R. Fuel must be brought in separately, however. For sustained mission capability from a deployed base, more support is naturally required.

As a reliable, safe aircraft, the U-2R has exceeded its expectations. Normal attrition was forecast to have been two aircraft by now. The difficult period of aircraft test and pilot transition and training has been completed and about 5,000 hours have been flown without a single loss.

25X1 The survivability of the U-2R flying against mainland China is high. The MIG-21 lacks the altitude capability to [REDACTED]

be planned to fly around these sites and, if a previously unlocated SA-2 is encountered, sufficient warning equipment is carried aboard a U-2R to permit employment of evasive [REDACTED] 25X1

25X1 In areas of considerable cloud cover, reconnaissance is more easily accomplished from aircraft than satellite. Aircraft can be rescheduled for favorable photography whereas unmanned satellites are committed to an orbit on launch. In addition, an airborne mapping radar is presently feasible in the aircraft state of the art but not in the satellite-borne case [REDACTED]

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The U-2R is the only covert manned aircraft in the NRO inventory. It is easily deployed for crisis reconnaissance. Daily photographic missions can be flown. Although the SR-71 can be flown for the NRO in time of stress, it is known to be a Strategic Air Command aircraft and its functions may be mistaken. Further, it is more difficult and much more expensive to deploy and employ.

Combining the two fleets has been examined from time to time and the conclusions have been, and still are, that it is not economical or palatable because of construction costs, security problems, personnel transfers, political considerations, mission assignment, etc. As long as there are more than eight U-2Rs in the inventory, combining the fleets does not seem reasonable.

Any changes in the basing at [] should be coordinated with the Department of State. Since the agreement is up for renewal next March, any change should be planned now.

IV. RECOMMENDATIONS

The CIA U-2R fleet should be retained in a covert operational posture under the present political environment. Daily photographic missions can be flown if the need arises.

The Strategic Air Command fleet should also be retained in an operational posture to satisfy present overt national requirements.

The NRP budget for the U-2R should be maintained as low as is reasonably consistent with keeping the capability for operational employment. About [] per year is considered a reasonable amount.

The present configuration of the U-2R should be frozen until procurement of advanced equipments is required. For example, the installation of the [] should be completed, but the [] should not be procured.

In August 1969 the CIA/OSA reduced its operating budget in FY 1970 from FY 1969 by about [] Depending upon the international situation and considering lead time and costs, the CIA/OSA should continue cost reduction programs.

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Worldwide deployment exercises, such as [redacted] and use of the U. S. Navy aircraft carriers should be continued. Contingency worldwide deployment plans should be completed and consideration given to a deployment

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Research and development programs to insure aircraft survivability; increased performance; and determination of new mission capabilities, such as ELINT [redacted] should be conducted provided the cost is modest.

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Cost sharing in programs, such as [redacted] of equatorial zones being attempted by the Army Topographic Command, should be pursued. Collateral missions (such as photographing the California oil slick, snow depth, etc.) during training missions should be continued. A plan for recoupment of mission costs from the requesting agencies should be considered.

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Combining of the CIA and Strategic Air Command fleets should be considered when the mission accomplishment capability of either unit is being degraded by aircraft attrition. The combined fleet should be expected to be about eight aircraft by the time the amalgamation has been completed. At the present time, North Base appears to be the best location.

Should there be a substantial change in the intelligence community's requirements or a major political variant, then a re-examination of the U-2 retainability as an NRP asset would be warranted.

V. DISCUSSION

A. Sources of Data

To determine the requirement for continuation of the U-2 reconnaissance capability, briefings were obtained from the COMIREX, SORS, CIA, NPIC, NSA, and DIA. Although the committee's principal emphasis was on the U-2R, whenever possible, briefings on related systems were obtained. For example, the committee was exposed to the manned SR-71; the drones, TAGBOARD and 147T; and satellites. The value of crisis reconnaissance was discussed with the CIA.

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The committee visited various Air Force bases and installations to determine comparative values; uses, costs,

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and operational capabilities of aircraft, drones, and satellites. At Davis Monthan Air Force Base (SAC) the H-147 drone and the Strategic Air Command U-2 Detachment were observed. At Edwards Air Force Base the CIA U-2 Detachment and AFSC U-2 facility were visited. The Lockheed facility at Palmdale, used for IRAN of the U-2 and storage of the A-12, was also visited. Capabilities of the SR-71 and TAGBOARD drone at Beale Air Force Base were investigated.

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Mr. William McAfee of the State Department on the present and possible future political restrictions to U-2 overflight of denied territory and on a comparison of the U-2 and other reconnaissance vehicles as related to the political impact of each.

B. Requirements

Attachments A, B, and C are letters relating to the value of the U-2R reconnaissance received from the Defense Intelligence Agency, the National Security Agency, and the CIA/Office of Scientific Intelligence.

C. History of Operations

Procurement of U-2 Aircraft. The NRO purchased all 12 U-2R aircraft. The CIA/OSA took delivery of all aircraft, installed all systems aboard, tested the aircraft, trained the initial pilots, and delivered six aircraft to SAC while retaining six.

The CIA/OSA for the NRO performed and is performing all the R&D tests for the entire 12 aircraft, including such things as life support equipment.

Other Costs. The NRO purchased all new systems (cameras, ECM) and spares for the 12 aircraft and delivered them to the Air Force Depot at Warner Robins Air Force Base. The Air Force maintains the inventory and delivers the equipment to both fleets.

Both the CIA and SAC supply additional funds to maintain their operational capability. For example,

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support personnel at Davis Monthan Air Force Base.

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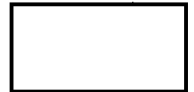
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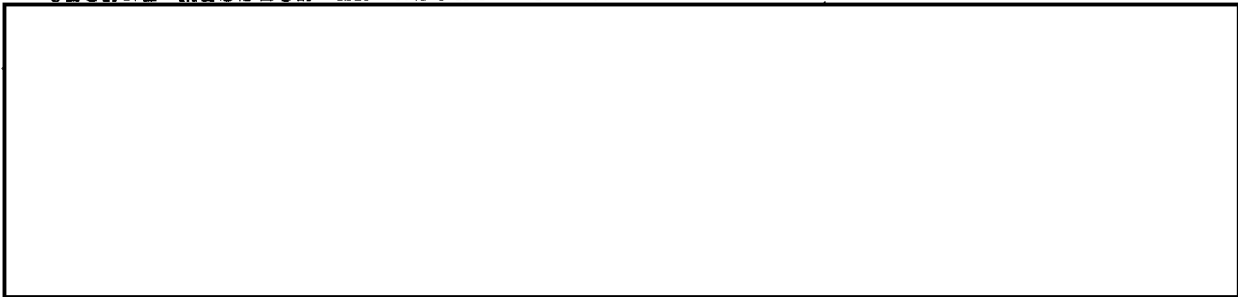
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Present Posture. The CIA aircraft force consists of four planes at Edwards Air Force Base (Detachment G) and two at the Far East deployment base [redacted] (Detachment H). All aircraft are maintained in an "operationally ready" posture. Both bases have a capability for worldwide deployment on a 24-hour notice and, depending on the deployment base distance, could be airborne on an operational mission in about 45 to 55 hours after notification.

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MIG aircraft and SA-2 missiles. Sufficient camera equipment and [redacted] are maintained at all U-2 bases to satisfy those requirements levied by the intelligence community.

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At present the CIA detachment [redacted] is limited to peripheral missions 20 miles off the coast of China. A list of the missions flown during calendar years 1968 and 1969 is attached (Attachment D). A map showing the coverage provided during these flights is shown in Attachment E. (Note: Not shown is the coverage of Laos, Cambodia, and Cuba by the USAF/SAC.)

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Detachment G at Edwards Air Force Base is responsible for maintaining a deployment capability worldwide, training all pilots [redacted], and performing the necessary R&D for maintaining the aircraft--both CIA and SAC--in an operationally ready posture, i.e., systems, sensors, aircraft performance, etc. A list of the U-2 oriented activities provided by the CIA R&D division is attached (Attachment F).

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A prodigious effort of the test phase is the qualification of the developed ECM systems. This is discussed in detail in Attachment G.

The CIA detachments have flown 3,153 hours in calendar year 1968--2,073 hours in the U-2C and 1,080 hours in the U-2R. During 1969 (cut-off date is 1 October) they have flown 1,761 hours in the U-2R and 355 hours in the U-2C.

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The Air Force Strategic Air Command maintains a fleet of six U-2Rs--four at the home base of Davis Monthan AFB, one at McCoy Air Force Base for Cuban coverage, and one a [REDACTED] for use over Laos and Cambodia. Eighteen Air Force pilots are trained and operationally ready to satisfy mission requirements levied on this unit.

In addition to the above, the CIA and USAF detachments provide aircraft, sensors, etc., as necessary to satisfy a myriad of requests from many departments of the Government. 1,058 sorties were flown during the past calendar year in support of these ancillary flights. However, these were flown during training missions. A list is shown at Attachment H.

D. Capabilities

The U-2R, a very high-altitude [REDACTED] aircraft with long range capability [REDACTED] nautical miles) is well suited to various unique missions. Some of these missions are comparable to those being provided by other aircraft but the high altitude and long endurance makes it particularly suitable for specific penetration areas, i.e., Cuba, Laos, South China, etc. The ECM equipment oriented against SAM sites and airborne intercept, plus the aircraft's capability to fly above those levels necessary for co-altitude aircraft intercept, enhance its probability of returning from penetration missions. (Note: See paragraph E for survivability discussion)

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The various missions capable of being flown by the U-2 are as follows:

1. Photographic. The U-2 carries various proven photographic systems which include the H Camera, B Camera, Optical Bar, and Delta III Camera. These configurations are capable of providing coverage varying from specific pinpointed targets through a horizon-to-horizon coverage by the tracker.

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From time to time, the subject of combining the CIA and SAC fleets on a single base has been considered. The notion is that such a combining would result in more economical operations, particularly since two aircraft were expected to be lost during the period of aircraft tests and pilot transition and training. It is significant, however, that no aircraft have been lost to date. A recent study² concerning the combining of the fleets at Davis Monthan Air Force Base concluded that the costs of the new facilities required, about [] would be prohibitive. In addition, about [] would be expended in moving the detachment. Interrogation of the commanders at Edwards North Base, Davis Monthan AFB, and Beale AFB resulted in the same answer. As Air Force bases are phased down in economy moves, it might be possible to employ one of these bases for consolidation. Such a move would still require the costs of relocation. [] was considered as an alternate combined fleet base but was rejected because of higher costs and compromise of a covert base.

G. U-2 Program Costs

The determination of program costs is predicated on the following ground rules. The line items listed herein are only those that reflect direct operating and maintenance costs for both fleets, the negative film and community duplicate film requirements, and the known investment costs (FY 1969 new systems procurement). The Air Force and CIA contributions, although substantial, were not included since this study covers only the FY 1971 NRP dollars.

A description of each line item is as follows:

1. U-2R Investment. Included in this is procurement of electronic and photographic systems, i.e.,

²"Relocation of IDEALIST Project to Davis Monthan AFB, Arizona" 14 March 1967, []

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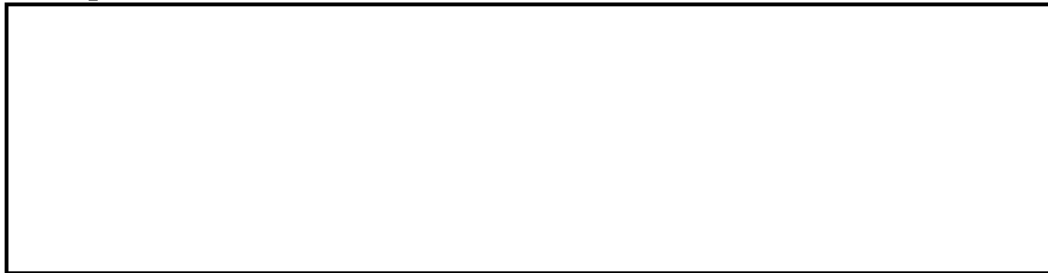
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IRIS II, OS MK III, etc. No investment figures are given other than those actually approved by the DNRO. For example, in FY 1970 the U-2R investment request was [] of which [] was approved. A budgetary submission would include items such as [] and others; but this approval would depend on enemy threat, aircraft safety, etc. As such, these items are not included in the FY 1971 operating and maintenance costs since the U-2R Program could very well operate for several years without additional investment.

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2. U-2 Common. This includes the necessary spares, overhaul and repair of spares, factory engineering, materiel handling, and security necessary for supporting all the fleets (including the AFSC aircraft). It supports the airframe, cameras, electronic systems, and life support equipment.

3. IDEALIST (CIA) Peculiar. This item provides for the necessary technical representatives, spares, and modification kits for those items which are peculiar to the CIA effort only. It further



4. SENIOR YEAR (SAC) Peculiar. This includes those items of spares, modifications to equipment, technical representatives, and other minor peculiar items that are required for sustaining the SAC fleet, other than items that are common to all 12 aircraft.

5. General R&D (U-2R Aircraft Related Only). The amount shown for FY 1971 is an arbitrary figure which assumed a requirement for various projects and studies which would enhance the survivability and performance of the U-2 aircraft.

6. [] The amounts shown here are for the completion of the operational capability

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for this equipment in FY 1970. FY 1971 forecast costs were not included pending a release by higher authority for this type of mission.

7. U-2 Film. This provides for the negative film used by both SAC and the IDEALIST Program plus the duplicate film required by the intelligence community for the IDEALIST take.

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U-2R PROGRAM COSTS

<u>Line Item</u>	<u>FY 1969 Obligations</u>	<u>FY 1970 Approvals</u>	<u>FY 1971 Forecast</u>	25X1
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U-2R Investment

U-2 Common

IDEALIST (CIA) Peculiar

SENIOR YEAR (SAC) Peculiar

General R&D

U-2 Film

TOTALS

[] and IRIS II

**Countermeasures R&D related to U-2s
not included in these tabulations

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DEFENSE INTELLIGENCE AGENCY
WASHINGTON, D.C. 20301

24 NOV 1969

S-0941/XX

SUBJECT: Evaluation of CHURCH DOOR Mission C259C Results (S)

TO: Dr. F. Robert Naka
Deputy Under Secretary of the Air Force (Space Systems)

1. (S) The CHURCH DOOR mission flown on [] provided the best quality coverage received from this source during the past year. The following results were obtained:

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a. The presence of the G class ballistic missile submarine (SSB) at the [] There was no apparent change in the sail area of the submarine, indicating that no modification of the unit has taken place.

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b. The location of three R class submarines underway [] This is the first CHURCH DOOR photography of submarines underway since mission []

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c. Two minor ground installations were covered which had not been photographed since []

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d. The operational status of 12 airfields, eight occupied and four unoccupied, along the []

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e. The operational status of one SAM site was confirmed as active with six possible SA-2's on launchers.

f. A probable agricultural landing strip at [] was noted for the first time. The lack of construction activity and materials plus the local terrain indicates this is not construction of a jet capable airfield at this location.

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g. Other coverage from this mission was of a routine nature but provided the oblique coverage valuable to coast and landing beaches, ports and other coastal installations.

2. (S) As indicated in the previous DIA evaluation, the primary value of these missions is as a supplement to other collection systems. Despite the lack of highly significant information from this mission, it is still believed that the CHURCH DOOR Program is a valuable asset in support of special DOD intelligence needs.

FOR THE DIRECTOR

Francis R. Cappelletti

FRANCIS R. CAPPELLETTI
Colonel, USAF
Chief, Special Activities Office

Attachment A

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DEFENSE INTELLIGENCE AGENCY
WASHINGTON, D.C. 20301



21 OCT 1969

SUBJECT: CHURCH DOOR PROGRAM

TO: Dr. F. Robert Naka
Deputy Director, National Reconnaissance Office

In response to your verbal request, the attached Tabs represent the DIA view on the value of the CHURCH DOOR Program. Specifically addressed are the CHURCH DOOR imagery capability (TAB A), and the CHURCH DOOR capability (TAB B).

FOR THE DIRECTOR

Francis R. Cappelletti
FRANCIS R. CAPPELLETTI
Colonel, USAF
Chief, Special Activities Office

2 Enclosures a/s

Attachment A

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SUBJ: CHURCH DOOR IMAGERY CAPABILITY

1. The CHURCH DOOR Program, although seriously degraded by operational limitations during the past few years, remains a valuable adjunct to the KH-4 [] collection systems. Its chief merits are the coverage provided of bonus targets [] particularly in areas of difficult weather such as that encountered in [] and along other coastal areas; the location of new coastal targets; and the lower classification of the coverage which permits a much larger work force to be applied in all phases of intelligence production.

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2. Initially the CHURCH DOOR photography was used by DIAAP analysts as a primary source of information for the compilation of Lines of Communication Studies, Urban Area Analyses, Demography Studies and a variety of targeting studies. The photographs also provided a ready source of illustrative material for many widely disseminated collateral studies on [] without the expense and delays that accompany downgrading/decontrol of more sensitive photography for this purpose.

3. The overall value of the Program has diminished in the past few years in direct proportion to the reduction in coverage and resolution. The present standoff mode has resulted in long oblique photos of a relatively narrow band along [] and has increased the problems of ground haze and terrain masking. These problems were further compounded by changing from the 3-8 foot average resolution HR 73-B ("B" Configuration) Camera System to the 6- to 8-foot estimated resolution 111-B ("H" Configuration) Camera System. Stated in terms of interpretability, this means from good to poor resolution or from specific identification of essential elements of information to "probable vehicles and/or equipment."

4. Despite the foregoing problems, CHURCH DOOR photography continues to provide information on the dispersal and activities at []

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and

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HUMINT-reported activities along the [] The most recent examples of CHURCH DOOR-derived information are the discovery of 19 fighter aircraft at [] which was thought to be abandoned and the discovery of an []

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[]. The attached chart indicates that Immediate Photographic Interpretation Reports of the last eight missions showed 622 targets were covered with more than 40 percent fair to good quality photos and an additional 40 percent with poor quality photos but targets were still identifiable.

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1 Enclosure a/s

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Enclosure 1

CHURCH DOOR COVERAGE

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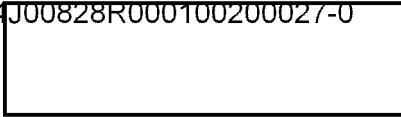
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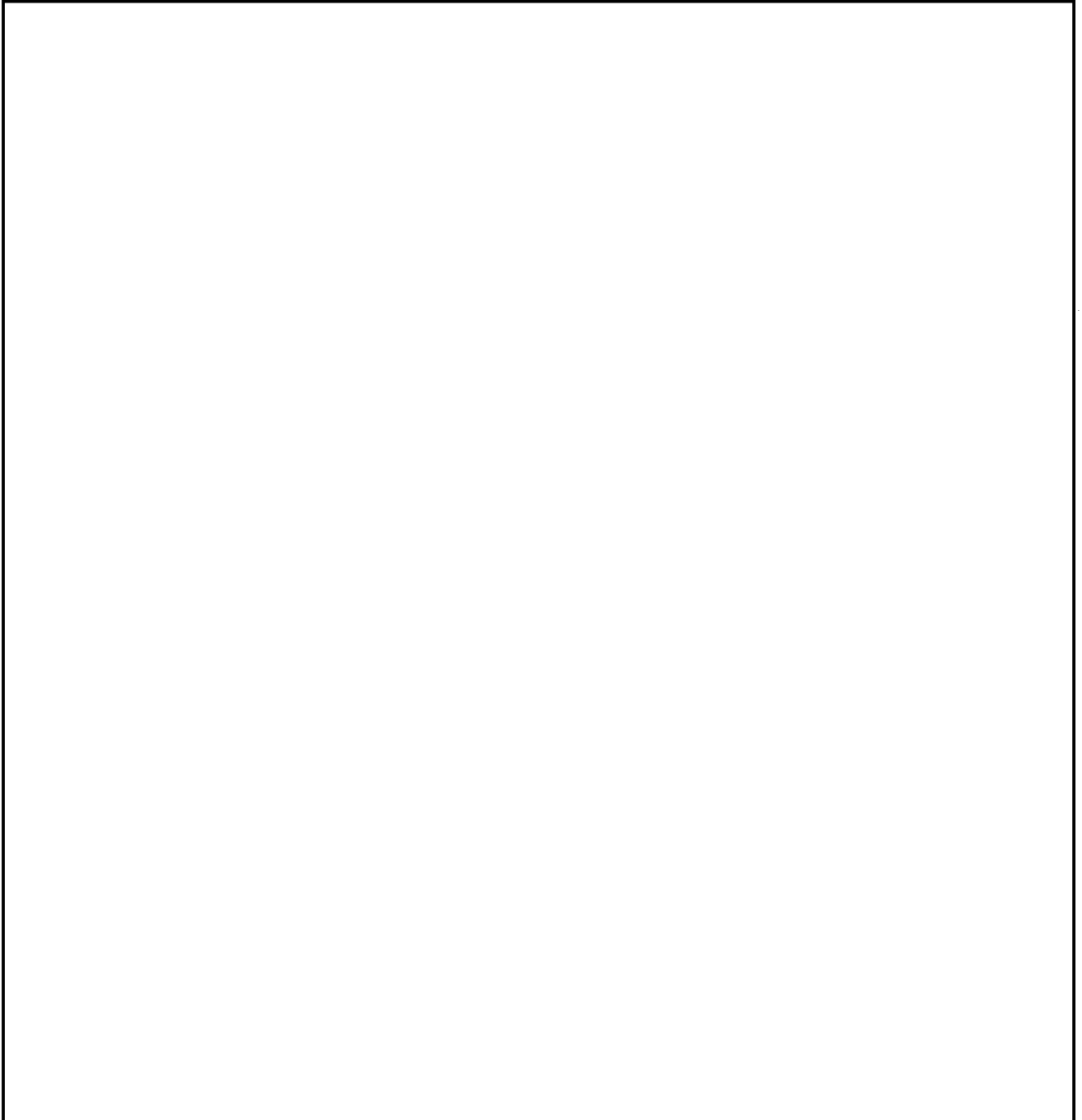
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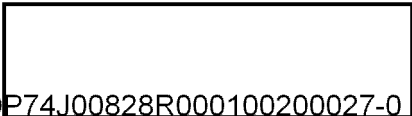
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OPTIONAL FORM NO. 10
MAY 1962 EDITION
GSA FPMR (41 CFR) 101-11.6

UNITED STATES GOVERNMENT

Memorandum

Approved For Release 2006/08/22 : CIA-RDP74J00828R000100200027-0



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Attachment B

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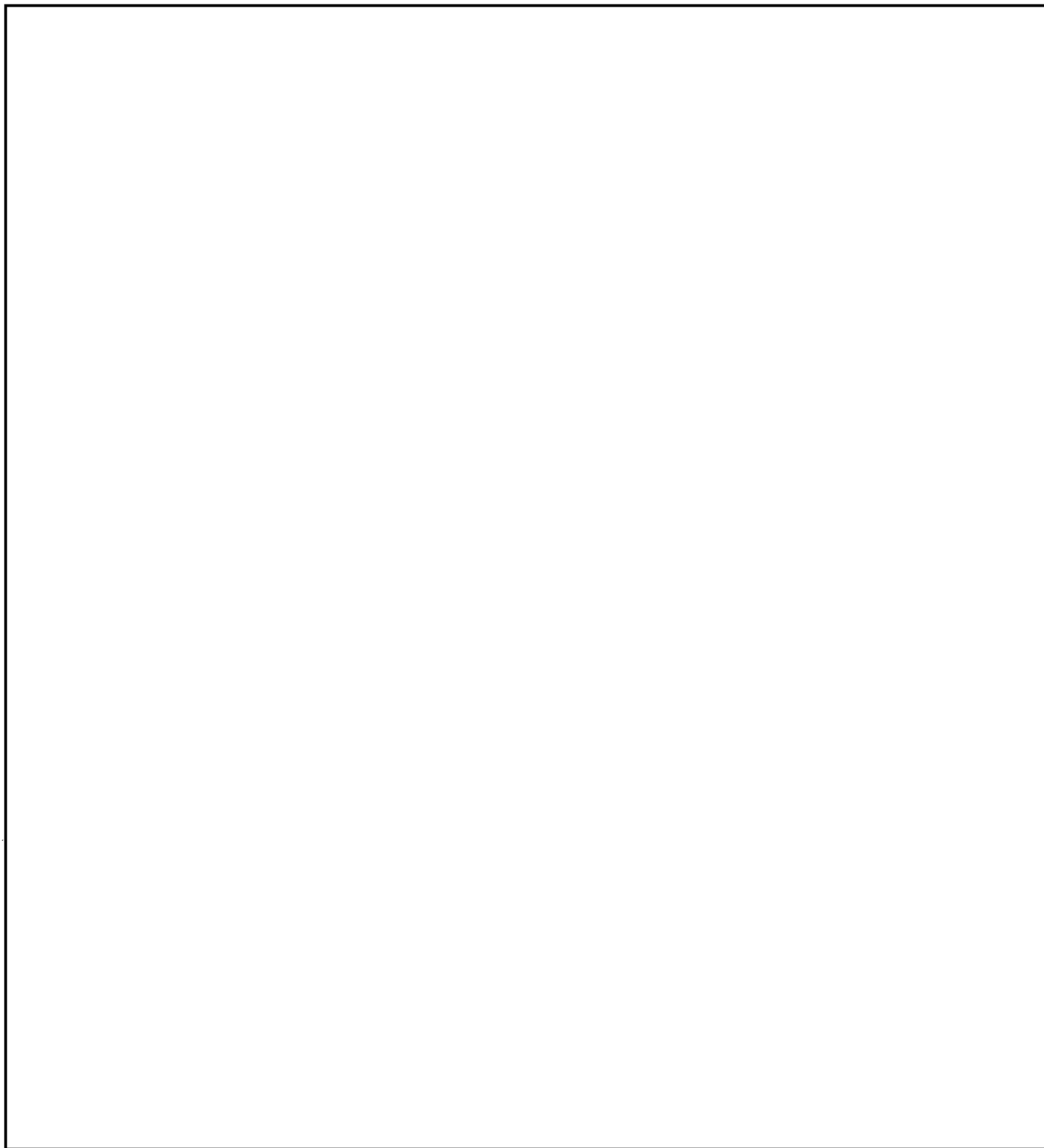




NATIONAL SECURITY AGENCY
FORT GEORGE G. MEADE, MARYLAND 20755

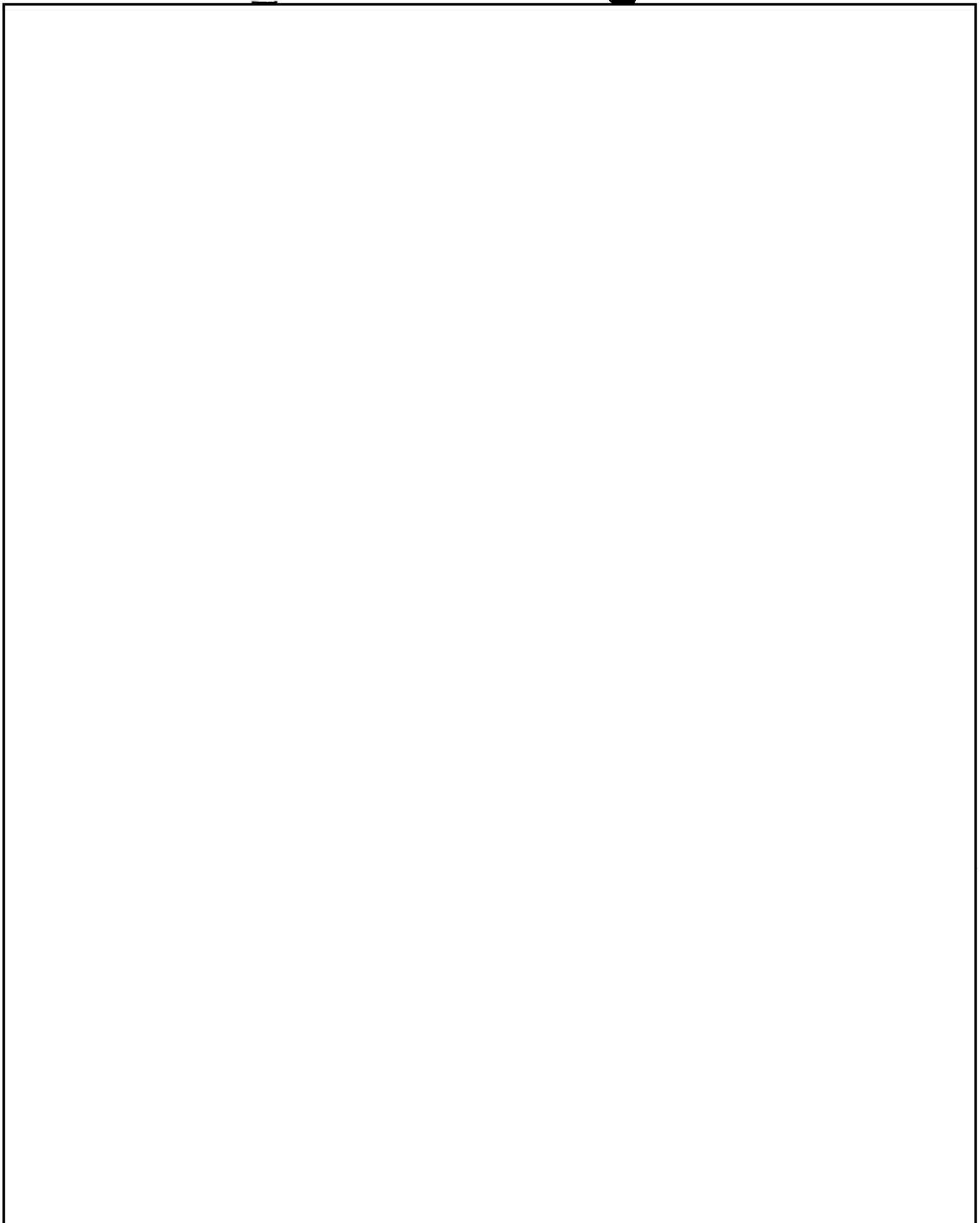
NSA Briefing Dr. Naka, 10 October

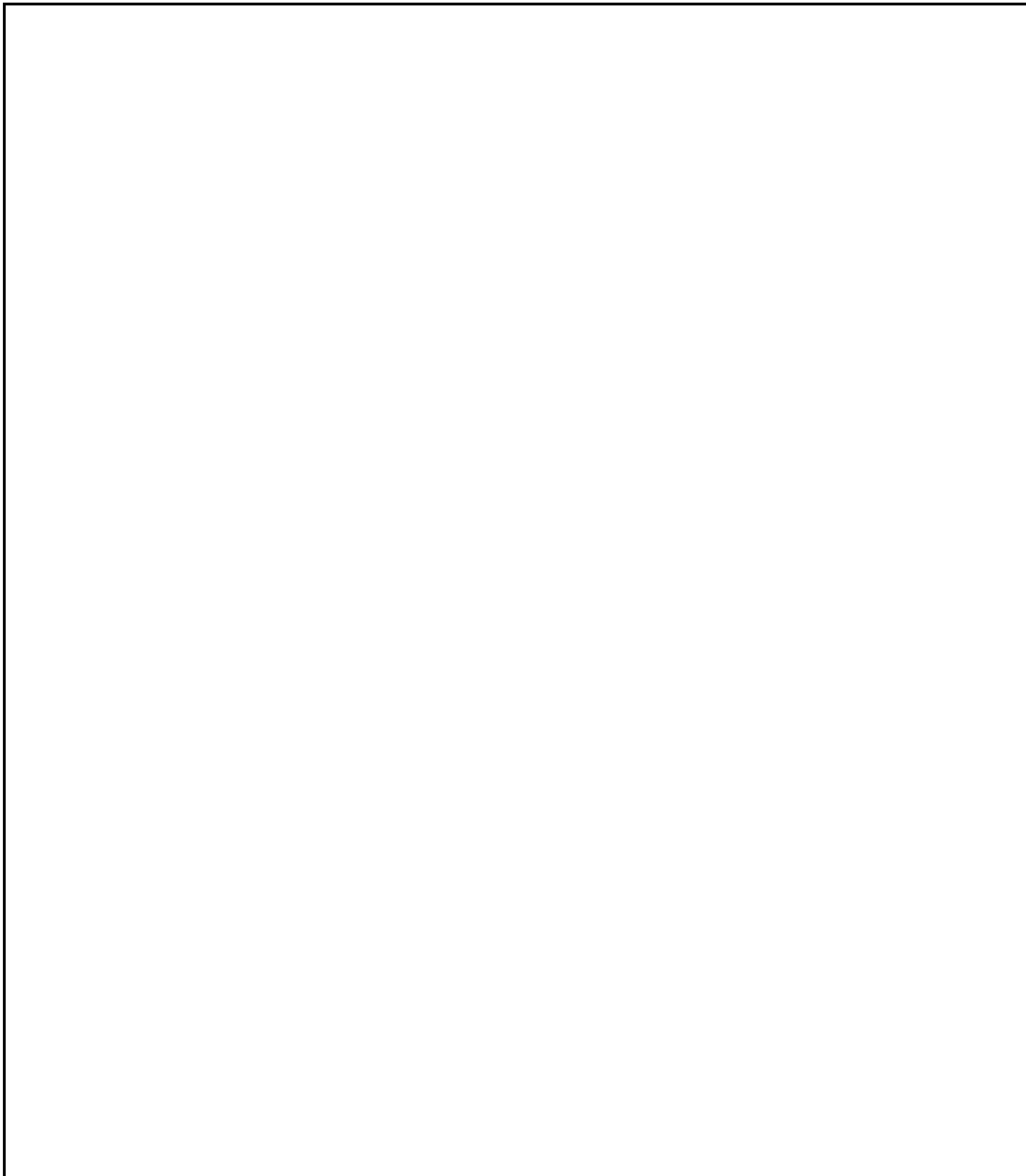
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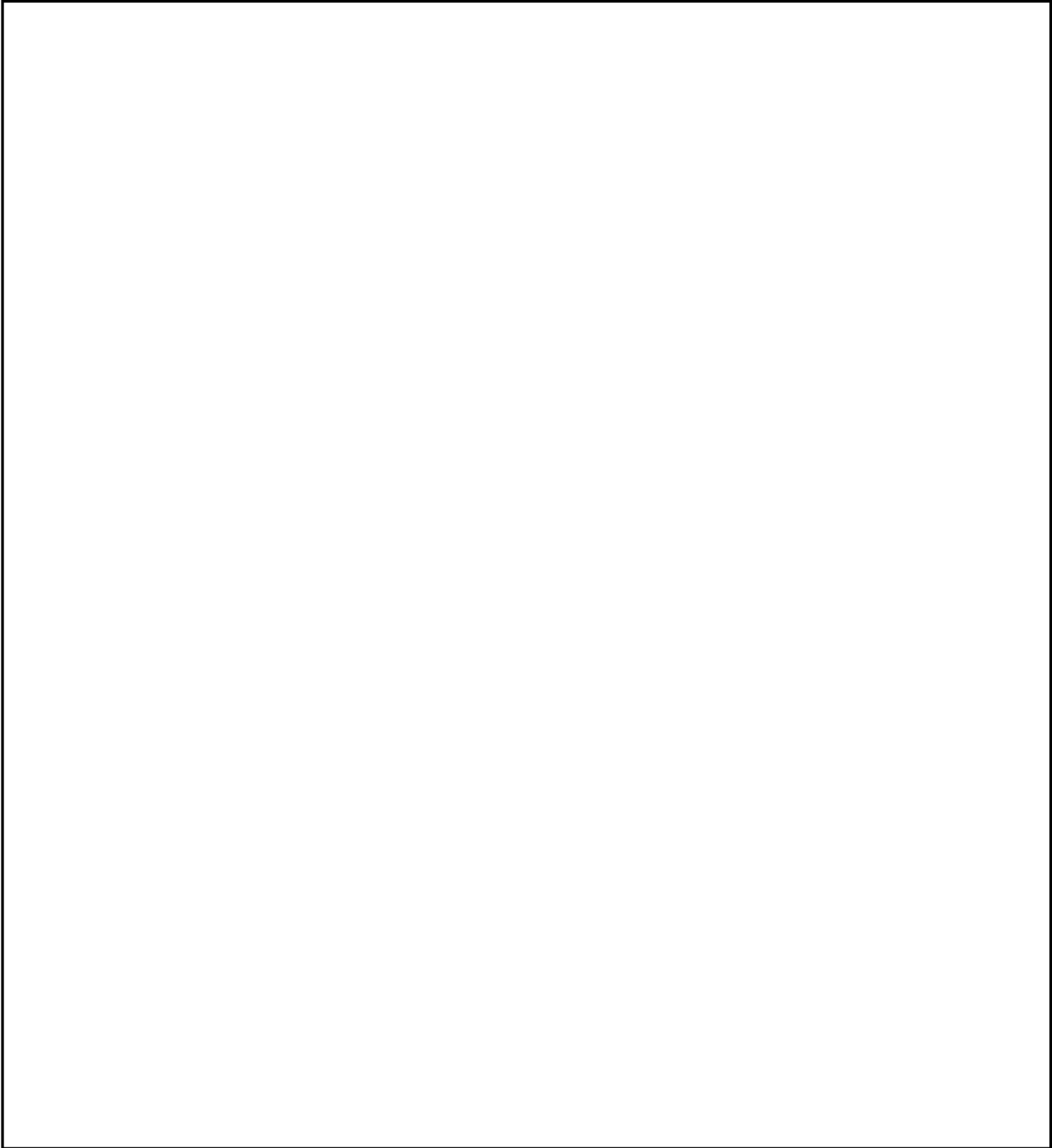


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WASHINGTON, D.C. 20505

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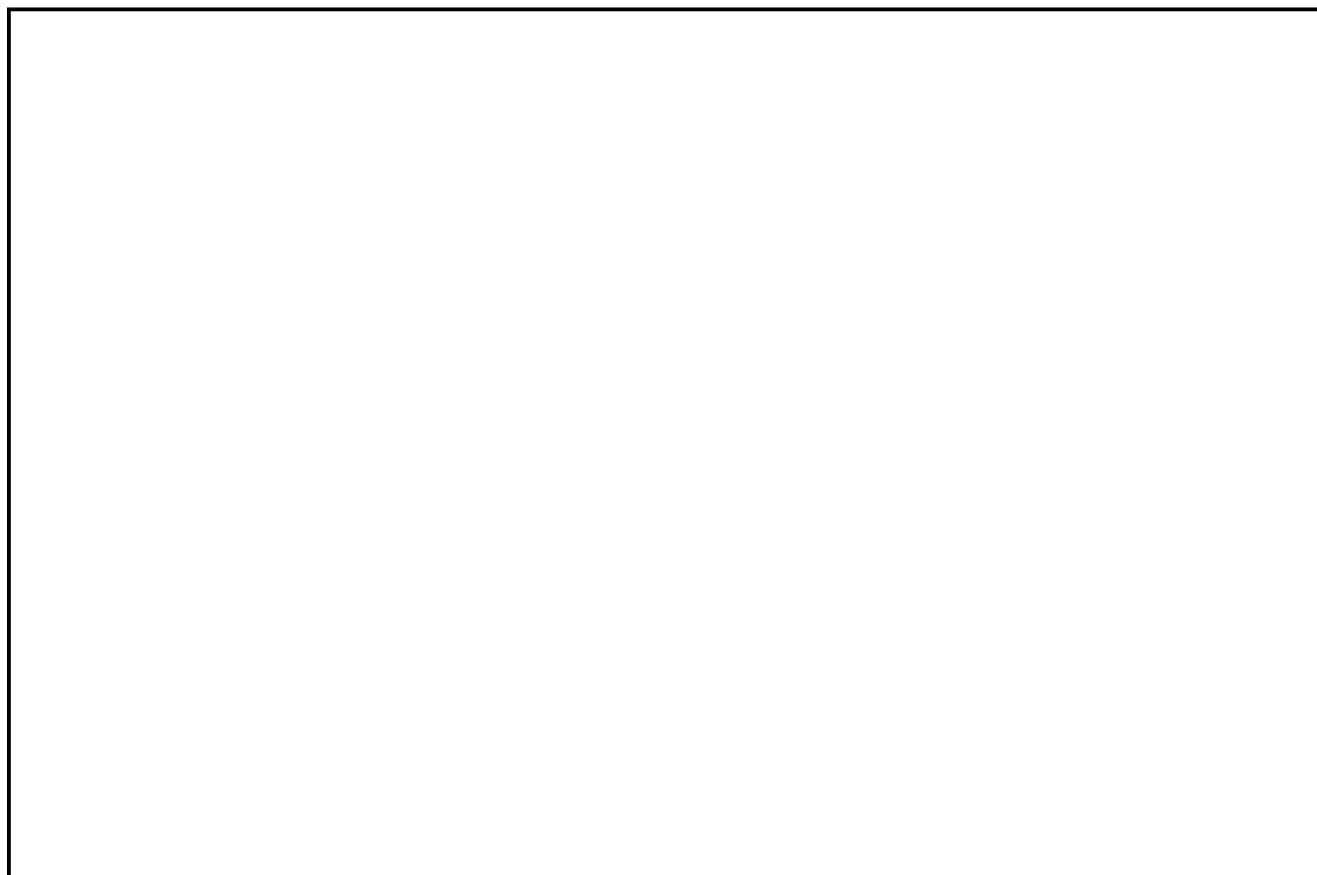
MEMORANDUM FOR: Deputy Director, National Reconnaissance
Office

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SUBJECT: SIGINT Highlights Provided by [Redacted]
U-2 Flights During the Past Two Years

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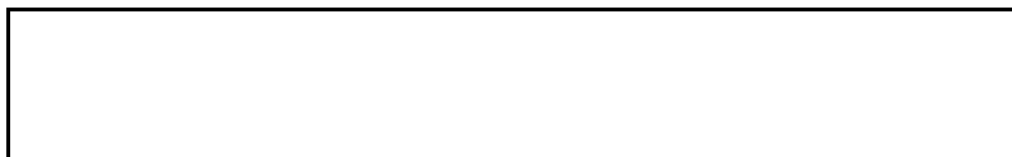
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4. Individual SIGINT highlight examples from [Redacted] program during the past two years are outlined below:

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Attachment C to



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OSA R&D - CALENDAR 1968 & 1969

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U-2 ORIENTED ACTIVITIES

1. U-2R Development Program Management:

Development Flight Test through 15 Oct 1968
Systems Development and Problem Resolution

- A. Aircraft Performance Evaluation
- B. Propulsion, Interface & Performance
- C. Ejector Assymetric Thrust
- D. Assymetric Fuel Feed
- E. Air Conditioning & Pressurization
- F. Engine Oil Cooling
- G. Constant Speed Drive & Hydraulic Oil Cooking
- H. Stability & Control
- I. Structural Demonstration
- J. Oxygen System
- K. DC Generator Cooling
- L. Tail Limit Cycle Vibration
- M. Q-Bay Temperature & Environment
- N. Mission Equipment & Interface

Follow-On Flight Test - 1969

- A. Installed Engine Performance Calibration
& Establish Engine Pressure Ratio Curve

2. Optical Bar Camera Development & Flight Test 1968 & 1969.

3. [REDACTED] Engineering, Development, and Flight Test
IOC 19 May 19694. Drag Reduction - General R&D 1968 & 1969

An investigation to prove the feasibility of a drag reduction theory and apply this theory to the U-2R has been underway during this time period. The feasibility of this theory has been conclusively demonstrated with induced drag reductions of up to 30% recorded in the wind tunnel. However, translating this research type hardware will require more investigation and wind tunnel testing.

5. J-75 Performance Improvement - General R&D Studies 1969

Funded studies have been completed by LAC on the effects of proposed J75-P-13B engine performance improvements

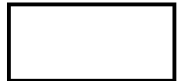
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on performance of the U-2R aircraft and a final report has been received. Results of the LAC study indicate that the engine growth step of primary interest to R&D could provide several possible aircraft performance improvements such as an increase of 1450 ft. in altitude with a slight reduction in total range but an increase of 500 nautical miles in range  altitude or an increased payload capability of 2000 lbs. over the current mission profile with a slight loss in total range.

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6. Low Altitude Quiet U-2R - General R&D Studies 1969

The Lockheed preliminary investigation of the U-2 is nearing completion. The study indicates that a significant quieting can be obtained. The sound level is still somewhat above background noise at 200 ft; however, the ability to detect the presence of the aircraft will be markedly reduced. A development program would be required to solve some of the air inlet technical problems associated with quieting the U-2 without reducing inlet and propulsion reliability. Further testing is programmed to determine if substantial quieting is in fact necessary for covert nighttime penetration.

As part of this study, a very preliminary investigation was conducted of alternate approaches to accomplish a covert low altitude mission. The study indicated that there may be a number of existing commercial aircraft with the capability to perform a completely low altitude mission. The silencing problem for these aircraft would be considerably less complex than to silence the U-2 and, additionally, they could probably be silenced to a lower noise level. The trade-off, however, may be in range. The study of these alternate aircraft is continuing in greater depth and the results will be available during the next quarter.


7. Improved Navigation System - General R&D Studies 1969

The Honeywell Corporation has completed the preliminary design effort of the Honeywell Update System interfaced with the U-2R doppler system to improve the navigation accuracy. The estimated error build-up for this system is a maximum CEP = 0.5 n.m. every 90 minutes. A briefing has been prepared summarizing the concept and capability.

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8. Infra-Red Suppression - General R&D Studies 1968

Analytical studies and scale model hardware tests were conducted to evaluate various schemes for reducing the IR signature of the J75-P-13B engine in the U-2R aircraft.

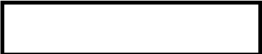
9. High Altitude Engine Relight Improvement - 1969

General R&D development and flight test resulted in engine combustion section burner can modification yielding an 8000 ft. altitude increase in engine relight capability.

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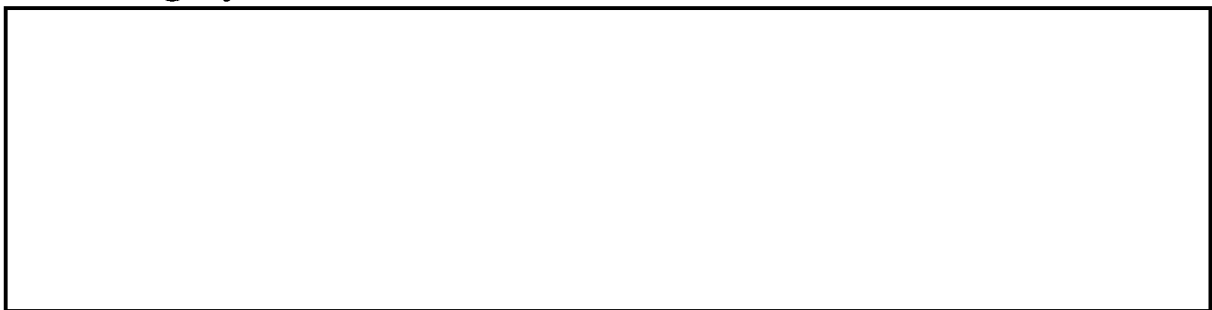
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OSA AVIONICS DIVISION - NOTES ON SYSTEMS QUALIFICATION
AND TEST FACILITY

The primary responsibilities of the Avionics Division, OSA are to equip and support [redacted] Systems aboard the U-2C and U-2R reconnaissance flights of the Agency and the Air Force. In this role the Avionics Division responds to national requirements for exploiting [redacted] data radiated by the opposition and by supplying technical advice for the development of systems - their installation in the vehicles; flight, qualifications and acceptance testing and also the quantity procurement of operational systems to equip the U-2 fleets. (Note the actual ECM development is performed by OEL/CIA under NRO auspices).

Flight test instrumentation, developed under the Avionics sponsorship, is tailored to stimulate real life parameters; as currently known by the Intelligence community. These parameters are coordinated with system R and D components and with the available Intelligence data so that systems installed on the U-2 vehicles will respond adequately and reliably.

Within the past two years, full scale range simulators have been developed and upgraded so that [redacted] systems are exercised adequately to prove their capability in pilot alerting and [redacted] Active stimulation of systems are provided by a series of [redacted] Tests. The following systems were operationally qualified by these tests:



Additional passive and associated auxiliary equipment were tested for operational reliability with the [redacted] Tests; these were:

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a. [redacted] collection systems

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b. [redacted] collection system

c. Flow time code generator - providing time correlation for data and operations

d. Data Recorders - acceptance testing performed on the types GPAR-C and MC machines.

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[redacted] tests were supported and conducted on a new [redacted] resulting in its qualification and installation in the U-2R inventory for protection of the vehicle against [redacted] aircraft. This system is currently deployed in the Air Force and Agency fleets.

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