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History of the Office of Special Activities

Chapter V

(PERIOD)

From Inception to 1969

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Written by : Helen Kleyla

Robert O'Hern

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CHAPTER V. DEVELOPMENT AND
PROCUREMENT: CONTRACTING
FOR THE U-2

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CHAPTER V. DEVELOPMENT AND PROCUREMENT:
CONTRACTING FOR THE U-2

In early December 1954, Lockheed Aircraft Corporation, the Perkin-Elmer Corporation and Pratt & Whitney Aircraft were given verbal authorization to proceed with work on the airframes, engines and photographic equipment for Project AQUATONE. Pratt & Whitney Aircraft was covered by an existing Air Force contract; the other two companies required a preliminary letter contract as soon as possible to cover the costs they were beginning to incur. Before proceeding with contract negotiations, in order to give the Director of Central Intelligence the benefit of Air Force judgment as to the reasonableness of the Lockheed proposal and the reliability and efficiency of the corporation, Mr. Bissell obtained a letter of endorsement signed by Mr. Trevor Gardner on 27 December 1954 (Annex 19). A similar endorsement with regard to the proposed photographic equipment was obtained from Lt. Gen. Putt on 14 January 1955 (Annex 40).

Lockheed Contract

The original negotiations with Lockheed were carried out in December 1954 by the General Counsel, Mr. Lawrence Houston, with Messrs. C. L. Johnson and Robert Bias. An agreed Letter Contract was signed by the company 3 January 1955 and negotiations began

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immediately on the definitive contract. A "Record of Negotiations, Contract SP-1913" (Annex 41) sets forth complete details of the contracting process and agreements reached as to price (\$22,500,000); terms (fixed price, redeterminable upward or downward at delivery of first aircraft or at the time 75% of costs are incurred); and payment plan. Appendix A of Annex 41 sets forth the scope of work. The original scope of work was increased during the life of the contract by nine major items, including six changes to the aircraft, amounting to \$2.8 million. Even with these added charges the final contract price for the original twenty U-2 aircraft was well within the Lockheed estimate.

A concise historical review in outline form of Contract SP-1913 from its initiation in January 1955 through final settlement in May 1958 was prepared by Lockheed and will be found at Annex 42. Final cost figures were as follows:

Cost	\$17,025,542
Profit	1,952,055
Final price	<u>\$18,977,597</u>
Saving from original estimate \$22,500,000	3,522,403

Reasonable allocation of the price would provide the following prices for items as indicated below:

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20 airplanes (\$656, 948 each)	\$13, 138, 966
Spare parts	3, 153, 858
Ground Handling Equipment	500, 519
Special Hatches	765, 644
Spare Parts Packaging	254, 140
Miscellaneous Items	1, 164, 470

The methods of Lockheed's Advanced Development Projects (ADP), known familiarly as the "Skunk Works", were a major factor in the development and production of the U-2 reconnaissance system. This division of Lockheed had been in operation since 1943 but until the U-2 was put into production in 1955 the ADP produced only experimental prototypes. The development of a production capability by ADP, using the simple, direct techniques of the original "Skunk Works" as opposed to the more involved management techniques used on other comparable projects, allowed for reductions in cost and time which led to the successful fulfillment of this contract.

In a report on ADP methods written in May 1965, Mr. Johnson said:

"The 'Skunk Works' method of operation can be used only when the government, on its side, grants the manufacturer an unusual amount of responsibility and freedom of action in the over-all management, development and production aspects of the program. It is necessary that both the government and the manufacturer have small, competent project offices to work together, and that contracting methods be direct and simple. There is no place for the extensive

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supervision of industry by government which is now so common under Air Force Regulations. . . The objectives, however, of many of these regulations must be obtained by straightforward, simple management revolving around the concept of using a few good people on each side to do the job." 1/

Perkin-Elmer Contract

In December 1954 the Perkin-Elmer Corporation was requested to take on the production of the photographic equipment for the project which had been designed by Dr. James Baker. The original approach was to Mr. Richard Perkin, President of the company, who agreed to undertake the work. Dr. Roderic M. Scott was also knowledgeable of the program since he, as Chief Scientist of Perkin-Elmer, had previously worked on the optics problems with Dr. Baker.

The company began preliminary planning and preparations for the work on the basis of verbal agreement that a redeterminable, fixed-price contract would be negotiated between the Agency and the corporation when the complete scope of work and cost estimates were known. A Letter Contract was signed 5 January 1955 authorizing expenditures up to \$2.5 million, but it took four months of negotiating to arrive at a definitive contract. The principal cause for delay was

1/ LAC/ADP Report No. SP-782F, 25 May 1965. "Some Comments on ADP Operation" by Clarence L. Johnson.

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the insistence by the Perkin-Elmer representative (Dr. Scott) on a strictly commercial type contract with a fixed price not subject to redetermination and at the same time the Agency Contracting Officer's reluctance to enter into a fixed-price contract for articles never produced before and for which half or more of the cost represented a subcontract. (Perkin-Elmer had offered a sub-contract to the Hycon Manufacturing Company of Pasadena for the actual building of the cameras for the project.) The Contracting Officer proposed a government contract binding on both parties, which would remain in the background, and a commercial order which the contractor would use overtly and bill against as a security measure within the corporation. Dr. Scott agreed to the dual type of contract but clung to the idea of a fixed price. He also wished, because of the device of a straw corporation represented by the Agency's New York cut-out through which Perkin-Elmer was to deal, and because of deviation from Armed Services Procurement Regulations, to have the final contract signed on behalf of the Government by an officer of at least Cabinet rank.

Negotiations bogged down and the Letter Contract had to be extended while a mutually acceptable contract was worked out. The

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contract finally signed on 5 May 1955 was Agency-sterile but not Government-sterile. It called for 36 A-1 cameras, 27 A-2's, 6 B's and 6 C's, with a target price of \$5,085,000 (\$4,750,000 cost plus \$340,000 profit), redeterminable at the time 75% of the cost had been expended.

Even before the contract was signed, the first of many modifications to the original photographic configurations was being drawn up in an effort to cut down weight of the payload to acceptable limits and to simplify the system in order to avoid logistic and field maintenance problems. A 24-inch lens was standardized for the A configuration (rather than both 24-inch and 36-inch lenses) and it was agreed that the marginal value of the 12-inch split vertical cameras in the original specifications of the A-1 and A-2 did not warrant their inclusion. At a meeting on 11 March 1955 with Drs. Baker and Scott, the weight problems of the B and C configurations were reviewed.

"It was brought out that film weight for the B could be reduced from 320 pounds to 250 pounds by reducing stereo overlap. With development of a 2 mil base film there could be a further reduction to 180 pounds and with other weight savings which could be accomplished it appeared that the B could be brought down to 460 pounds (the military load spec was 450 pounds).

"The C configuration weight as proposed was 698 pounds and therefore only a radical change could bring it down to

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maximum weight allowable. Dr. Baker proposed modifying the camera for focal length of 144 inches rather than 200, developing thin base film and high gamma emulsion to make up for reduced focal length. With these changes the weight might be pared down to 442 pounds for camera, film, charting camera and periscope." 1/

The first flight test of the A configuration took place in September 1955 and continuous correction of malfunctions, reworking of parts and refinement of techniques (including the training of ground crews in the proper handling and loading) were necessary before operational readiness was reached. The A-2 configuration was deployed first with Detachment A in May 1956 and was used exclusively for the first year of operations by Detachments A and B. The A-1 was not flown operationally until October 1957 by Detachment B and it was also used with good results in typhoon hunting missions in Japan by Detachment C.

The B camera was slow in delivery and functioned poorly during the Detachment B combat readiness tests in July 1956 due mainly to shutter trouble. After reworking and further testing, however, the B camera became the workhorse and was used almost exclusively in the U-2 from the summer of 1958 through 1966 with good results. The first C camera was tested in December 1956 and in January 1957 had

1/ TS-103289, 21 March 1955. Memo for the Files by H. I. Miller.

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one effective mission; it was never used operationally, however, due to complex optical problems inherent in the design, and was later shelved.

Amendments to the original Perkin-Elmer contract covered the furnishing of ground support equipment, the redesign of shutters, lenses and other components, and overhaul of cameras. Separate contracts were negotiated for the furnishing of technical personnel to service the equipment at foreign bases.

On 10 July 1958, Perkin-Elmer made final settlement of its sub-contract with Hycon on the following basis: \$3,707,148.60 approved cost; \$329,100 profit (8.77%); \$69,914 allowed for California tax expense; total \$4,106,000. Subsequent dealings with Hycon by the Project were by direct contract with that company.

Final negotiations between CIA and Perkin-Elmer on the prime contract were held 23 July 1958 to redetermine cost and establish profit. Perkin-Elmer's portion of the final price was \$2,614,141, including a 12% profit, which together with the sub-contract cost totalled \$6,720,141 (later adjusted to \$6,698,906.11 in May 1960). Of this total approximately 6-1/2% represented procurement for the Air Force which was reimbursed with Air Force funds.

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Ramo-Wooldridge Contract

The electronic equipment called for under the Project Outline included: 12 sets of electronic search equipment to be used on photographic missions, together with 3 sets of automatic FERRRET equipment (total \$3 million). Prior to the Agency's assumption of major responsibility for the joint project, the Air Force had chosen Ramo-Wooldridge to produce the electronic equipment on the recommendation of Mr. Donald Quarles (at that time Assistant Secretary of Defense for Research and Development). This choice was questioned by Mr. Ralph Clark (Agency ELINT Staff Officer) since he believed Ramo-Wooldridge skills were mainly in the field of radar rather than search equipment for ELINT collection. Dr. Edward Purcell, member of the Land Panel and adviser to the Project on electronics, also questioned the choice on grounds that Ramo-Wooldridge was fully occupied with its missile contract.

On 5 January 1955 Dr. Burton Miller, representative of Ramo-Wooldridge, met with Mr. Bissell at Project Headquarters, with Messrs. Clark and Purcell also present. Mr. Bissell wished to determine whether Ramo-Wooldridge had the resources to do the job and whether they could give it the priority required in view of their

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other commitments. He also wished to get agreement for Dr. Richard C. Raymond of Haller-Raymond-Brown to consult with Ramo-Wooldridge in order to benefit from his experience in building electronic equipment.

Dr. Miller assured the group that Ramo-Wooldridge was anxious to take on the job and was desirous of diversifying company activities (half of its assets were now tied up in missile contracts). There were plenty of cleared personnel already working on other CIA contracts who could be put to work on the new job and thus he estimated the first units could be built by August 1955. Dr. Miller's confidence and persuasiveness (added to Mr. Quarles' recommendation) obviously quieted any doubts of those present since a letter of intent to purchase the equipment from Ramo-Wooldridge was carried to Los Angeles for signature within the week.

At a meeting with Dr. Miller on 17 February 1955, Drs. Purcell and Raymond and Messrs. Ralph Clark and Herbert Miller reviewed the electronic components to be fabricated and the type of proposal required from Ramo-Wooldridge to support the writing of a definitive contract. At the close of that meeting Dr. Purcell noted that he was favorably impressed by the planning work done thus far and that he

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believed that Ramo-Wooldridge could be counted on to come up with the desired results. ^{1/}

On 7 March 1955 the Project Contracting Officer presented a copy of the proposed contract to Dr. Miller who accepted the terms on behalf of Ramo-Wooldridge with only a few minor changes. Principles agreed to were as follows:

a. The contract would be a cost-plus-fixed-fee type with fee of 8-1/4%. (The Contracting Officer's findings to support use of a cost-plus-fixed-fee contract were that the exact nature and extent of the work covered and the precise method of performing the work could not be established in advance but must be subject to improvisation and change as work progressed; therefore costs of performing the work could not be forecast accurately enough to set a fixed price.)

b. Audit would be by local Air Force auditors; they would not be knowledgeable of Agency interest.

c. Ramo-Wooldridge would bill weekly costs plus 90% of the proportionate fee.

d. Amendments for additional work would be issued as

1/ ~~TS~~-103279, 17 February 1955. Memo for the Record by H. I. Miller.
Subject: Meeting with Dr. Burton Miller.

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soon as scope of work and costs were known; the estimated cost of the first phase was \$309,600 (\$286,000 plus fee of \$23,600).

A contract (No. A-101) in the above amount was signed on 31 March 1955 for the provision of 12 sets of System I. (See Annex 43 on electronic equipment for configuration of electronic systems used by the U-2.) Before the definitive contract could be negotiated, the specifications for the first electronic packages were already in a state of change.

The first and second amendments to the contract with Ramo-Wooldridge authorized an engineering study and the building of a prototype of a communication and navigation system for the U-2. System II was an automatic digital transmission system designed to operate over a range of 4,000 miles using ionospheric sensing and high frequency band. Communication between pilot and ground stations was to be by "canned" messages. An automatic frequency changer, pre-programmed for replying to ground station interrogations, was incorporated originally but was removed on the theory that any emergency or change of course of the aircraft would require pilot initiative, rendering the pre-settings useless.

Delay in readiness of this system and its costliness led to the development of an alternate navigational system (the Baird sextant)

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and the Office of Communications took over the completion and repackaging of System II as a part of the emergency staff communications system of the Agency in June 1957.

Early in 1958 in an attempt to cut back equipment to an austere basis matching the pace of operations, a strenuous effort was made to bring project work at Ramo-Wooldridge to a dead stop, and cutbacks were made in the balance of the systems on order as well as in spares and supporting assemblies. The Project Director indicated to Ramo-Wooldridge that no additional funds could be obligated and if over-runs were expected, still further cutbacks would be made in order to reduce to an absolute minimum the probability of having additional unforeseen financial burdens placed upon the project by Ramo-Wooldridge.

The closing out of the contract required until July 1961 and the subsequent audit and final payment took another year. Meanwhile, in July 1959 an investigation was initiated by the General Accounting Office into contracts between the Air Force and Ramo-Wooldridge due to the company's failure to meet contract terms. This of course brought CIA's business with Ramo-Wooldridge under scrutiny since Air Force contract numbers were being used for cover purposes and

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to facilitate priority deliveries of components used in manufacture of the end items.

In preparation for a meeting between the DCI and the Comptroller General on this subject, the Agency Comptroller (Mr. Edward Saunders) furnished Mr. Dulles the following information:

"Of the rounded \$26 million business with R-W covering the period 1 June 1954 through 31 December 1958, we have one contract in the amount of \$20.4 million awarded in January 1955, covering items we shall identify as Systems I through VI...

"As this equipment was all highly complicated and greatly advanced in the state of the art, it was necessary to procure under contract technical representatives to maintain these items at the overseas bases of operation, totaling to date \$526,450. Another contract was awarded totaling \$1,132,000 to date to cover factory overhaul and repair of the items that could not be serviced in the field.

"These items proved so desirable and were sufficiently advanced that both the U.S. Air Force and the Navy Department solicited our aid in procuring items for them in the rounded amount of \$1.7 million. This was essential because the sensitivity of the program precluded these departments from getting the items through their own resources...

"You may be asked our views with respect to the technical competence of TRW Inc.*; my information, which comes from the technical officials, is that the Agency is satisfied with the items when delivered, however, we feel that the company needs improvement in the area of estimating costs as well as the area of estimating and maintaining delivery schedules.

* TRW is the abbreviation of the new name of the company after the merger with Thompson Products (Thompson Ramo-Wooldridge).

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In fairness to the company, we again bring to mind that the predominance of the items delivered and manufactured were considerably in advance of the state of the art and it may therefore be somewhat unfair to take the firm position that their estimates of cost and delivery time is unsatisfactory. " 1/

The General Accounting Office was insistent upon getting answers in writing to the following questions: (1) Why was Ramo-Wooldridge selected by CIA? (2) At the time of negotiations was CIA aware of the top priority work by Ramo-Wooldridge for the Air Force? (3) Did CIA discuss their proposed work with Air Force before awarding the contract? (4) If so, why did Air Force permit Ramo-Wooldridge services to be diluted in view of the top priority of the work for the Air Force? (5) In negotiations by CIA with Ramo-Wooldridge, what representation did the company make as to availability of personnel, and were any specific individuals named who had been designated to work on the ballistic missile program?

The essence of the Agency reply to the Director of Defense Auditing, GAO, signed by Colonel White on 30 July 1959, was that CIA had no information as to any dilution of Ramo-Wooldridge services to the Air Force resulting from the special project contract, which had

1/ ~~TS~~-155229, 21 July 1959. Memo for DCI from Comptroller/CIA, Subject: Discussion with Comptroller General re TRW, INC.

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been carefully coordinated with the Air Force and Ramo-Wooldridge and neither had interposed any objection nor indicated any problem as to the firm's ability to carry out all its government commitments.^{1/}

Final settlement of Contract A-101, which ran through 25 amendments, was made 12 June 1962 at a cost of \$18,896,247.09, plus fixed fee of \$1,585,331 (total \$20,481,560.09), covering electronic systems, read-out equipment, miscellaneous items of supply, and techreps for the domestic test site for Project AQUATONE; also included were costs of procurement undertaken for the Air Force, CIA Office of Communications, and the P2V program (STPOLLY).

Other Contracts

The principal additional equipment and services developed and/or procured under the U-2 program are outlined below.

APQ-56 Side-looking Radar, Westinghouse Electric. Contract initiated 3 June 1955, on recommendation of the Land Panel, for mapping radar, a modification of the AN/APQ-56 system developed for the B-57, original weight 698 pounds. Weight reduction was accomplished by time-sharing of the right and left scanning with a single recorder producing a continuous record. The record obtained provided a radar

^{1/} DPD-5164-59, 30 July 1959. Letter to Director of Defense Auditing, GAO, from Deputy Director, Support, L. K. White.

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map of the area 2 to 15 miles on either side of the line of flight. This system was flight tested in the summer and fall of 1956 and successfully tied in with the radan and declared operational in January 1957.

Film Processing, Eastman Kodak

a. Engineering Study: Contract initiated 17 June 1955 for an engineering study of film processing and data recording operations and design and installation of equipment. Contract completed 9 March 1959, cost \$257,778.65.

b. Equipment (Film Processing and Minicard): Contract initiated 1 March 1956 for equipment required to set up film processing centers at Eastman's Rochester plant and at CIA Headquarters (PIC). Contract completed 23 March 1961, [redacted]

c. Film Processing Plant: Contract initiated 1 October 1955 for operation and maintenance of the film processing plant to handle processing of U-2 mission film at Eastman's Rochester plant. Contract completed 23 March 1961, cost \$4,595,068.25 (including some satellite program funds).

d. Film: Contract initiated 29 June 1955 for procurement from Eastman of film, paper, chemicals, etc. The new thin-base

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U.S.C., section 403g)

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film to decrease weight, and the new formula for sub-layer and emulsion were developed by Eastman at the instigation of Dr. Land. Contract completed 18 May 1964, cost \$4, 070, 411. (Further film procurement continued under a new contract.)

Sextant, Baird Atomic, Inc. Contract initiated 17 October 1955 for a feasibility study of an automatic celestial navigation system for use in high altitude aircraft, and subsequent construction of 8 (later increased to 24) sextants, spare parts, rear view mirror and services of techreps overseas. This was a manually controlled sextant using the existing periscope as a method of presentation. Contract completed 30 June 1957, cost \$720, 218. 71.

Aeromedical Support, Lovelace Foundation. Contract initiated 28 November 1955 for medical and clinical services to Watertown test site, and U-2 pilot physical and psychological examinations. Services of Lovelace were made available under a USAF contract previous to the writing of this contract. Costs chargeable to the U-2 program as of 30 June 1962 were \$107, 771. 47. At that time the U-2 successor program was blanketed under the same contract, which is still in force.

Personal Equipment, Firewel Co., David Clark Co. Contract initiated 15 January 1956 (before which Firewel had supported the U-2

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under a USAF contract) for personal equipment for pilots including pressure suits, helmets, oxygen regulators, seat packs, etc. Firewel in general developed, with Air Force cooperation, the different items and subcontracted their manufacture to other firms. The Firewel original contract was completed 8 March 1961 at a cost of \$684,489.56, including Air Force funds. In January 1960 direct contracting was begun with David Clark Company which saved the cost of Firewel's subcontracting costs and profit. At that time, the oxygen equipment and suits had become pretty much production items thereby permitting direct procurement without interface problems.

Radan, General Precision Laboratories. Contract initiated 4 April 1956 for Radan equipment for U-2 and P2V programs, plus flyaway kits, bulk spares, test equipment, handbook of instructions and course selector (read-out equipment to be used with APQ-56 side-looking radar). Contract completed 21 April 1960, cost \$618,929.99.

Later contracts included, among others: Research and testing related to radar camouflage program by M. I. T., Scientific Engineering Institute, Edgerton, Germeshausen & Grier, and Westinghouse; additional electronic intelligence collection and countermeasures systems (see Annex 43 for description); numerous additional and

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continuing contracts with Lockheed have covered all manner of fabrication, overhaul, and other services to the project including the fashioning of special hatches, modifications to the U-2 aircraft (1) to take the J-75 engine, (2) for inflight refueling capability, and (3) a carrier-based configuration; also service contracts for techreps, guards, maintenance of an air shuttle service, and cover contracts for hiring pilots. New camera systems were developed by Hycon, Eastman and Itek (see chart at Annex 44 for a listing of all camera systems available to the U-2 as of December 1966).

Procurement for Air Force and Navy

On 11 January 1956 a letter from the Air Force to the DCI requested that CIA contract for U-2 aircraft and equipment on behalf of the Air Force in the amount of \$31 million. The request and a draft reply agreeing to it were discussed at the Bureau of the Budget by the Agency General Counsel. The Director of the Budget reluctantly agreed to the Agency's undertaking this procurement for the Air Force. The reluctance was specifically on the basis that the Budget Director felt the Air Force should be able to set up procedures as secure and effective as those of the Agency. On 26 January 1956, the General Counsel rendered an opinion on the legality of the proposed procurement

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in the following memorandum to the DCI:

"Under normal circumstances it would be routine for the Air Force to undertake its own procurement with the Lockheed Aircraft Corporation through the Air Materiel Command. There is, however, still a very high degree of sensitivity about the original procurement for intelligence purposes. It was to protect this security that procurement was kept out of normal Air Force channels in the first place and to institute the additional procurement through those channels would largely vitiate the elaborate precautions taken to date in the contracting procedures.

"Based solely on the security requirement, I am of the opinion that it is in the national interest and that there is legal authority for this Agency to enter into an arrangement with the Air Force to act as their executive agent for their additional procurement on a reimbursable basis. In addition, I have reviewed this situation with the General Counsel of the Air Force and we are of the joint opinion that such an arrangement would not involve any contravention or evasion of laws and policies applicable to Air Force procurement. The Air Force has expressed an urgent need for additional planes. I believe our current procedures are the most expeditious available and that continuance of our contractual arrangements is an effective and economical procurement mechanism for this purpose.

"Inasmuch as all aspects of the additional procurement will require prior Air Force authorization or approval, I believe the Agency will be well protected in the event of any dispute. Furthermore, this would facilitate the return of the administration of the contracts to normal Air Force channels if and when security would permit." 1/

1/ ~~TS~~-142958, 26 January 1956. Memo to DCI from General Counsel.

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The reply to the Air Force went forward in a letter to Mr. Quarles from Mr. Dulles on 30 January 1956 (full text of letter is in Annex 45) which agreed to take on the procurement of 29 additional aircraft and related equipment for the Air Force, detailed arrangements to be worked out between representatives of the two agencies. The basic general understandings were:

"a. The Air Force will provide necessary funds for the required procurement and will furnish to CIA written requirements for the procurement guidance of CIA. Such written requirements will be authenticated on the part of the Air Force by the signature of... the Air Materiel Command representative in the Weapons System Project Office.

"b. CIA will implement the requirements set forth in writing by the authorized Air Force representative by negotiation of a contract or contracts, for delivery of the required services and supplies. To assure mutual understanding, the authorized Air Force representative will certify that each proposed contract is consistent with and in fulfillment of previously stated Air Force requirements.

"c. The policies and procedures to be followed in connection with contracts negotiated on behalf of the Air Force by CIA shall be the same policies and procedures in effect on CIA contracts for similar procurements under Project AQUA-tone. Requirements set forth by the Armed Services Procurement Regulations shall be complied with to the greatest extent possible, consistent with the unique security considerations inherent in these procurements.

"d. The Air Force and CIA shall maintain close liaison with each other on all aspects of the procurement... and shall consult with each other, utilizing personnel designated for

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this purpose, whenever such consultation is required or indicated." 1/

All aspects of security control were to be the responsibility and province of CIA, and the Air Force was to be guided by CIA in discharging Air Force security responsibilities under this procurement. The Air Force was to furnish cleared personnel to audit the contract accounts.

Procurement for the Air Force under the system thus set up proceeded smoothly with good working relationships between the Project Contracts Staff and the Air Force weapons systems group. There were, of course, problem areas, one of which was in getting the Air Force group to adhere to Project security procedures which were strange to them and apt to be taken somewhat lightly.

Cumulative totals of procurement of U-2 aircraft and related reconnaissance systems and equipment provided for the Air Force by Project contracting mechanisms (and DPD and OSA successively) are shown in Annex 46, covering the period from 1956 through 1966.

In May 1957, the U.S. Navy also requested that CIA procure \$1 million of project-developed equipment, principally photographic,

1/ ~~TS-143314~~, 8 February 1956. Memo for Record, Subject: CIA and DAF Basic Understandings in Connection with Procurement.

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for the Navy, with an additional \$2 million worth of the same equipment to be procured at a later date. A basic understanding in connection with this procurement for the Navy was signed by the DCI on 18 July 1957 (TS-164265); this agreement with the Navy followed the same lines as that for the Air Force.

Since the provisions of Section 10(b) of Public Law 110 were invoked with regard to the funds for the additional procurement, this meant the elimination of GAO audit of the Air Force and Navy procurement. The Project Director suggested that in order to forestall any possible criticism for improper use of Section 10(b), the Director might speak informally to the Comptroller General without revealing substantive secret matters. The General Counsel (Mr. Houston) concurred in not opening the contracts to GAO audit but wanted any contact with GAO to be through himself to his cleared counterpart in GAO rather than at the Director's level.

General Counsel Opinion on Early U-2 Contracting

In June 1956, when one operational detachment had deployed to the field and the initial contracting activities had reached a stage where an appraisal could be made, Mr. Houston reviewed for the DCI's information all the legal authorities under which the Agency

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had acted thus far in the procurement area. He concluded:

"The administration of the contracts has not followed the normal Service practices, as for security reasons it was decided to limit the number of contract officers to the minimum, and the large staffs which normally review contracts in varying aspects were here reduced to one small staff. Within these limitations, however, the administration has been meticulous with particular attention to change orders. All contracts and all changes thereto have been reviewed by the General Counsel or his Deputy and specific approvals on policy or fiscal matters have been obtained from the appropriate approving officers in all cases. Again, granting that this system may work only when dealing with companies which are themselves competent in the running of their business and are familiar with Government procurement, under the circumstances surrounding this Project, we believe the procurement system involved adequately protected the Government, was effective in meeting procurement needs, and through its efficiency and simplicity was economical for the Government." ^{1/}

Later Air Force Procurement

In August 1961 an agreement between CIA and USAF was signed covering contracting assistance through established CIA channels for an Air Force version of the OXCART vehicle. Later with the activation of the National Reconnaissance Program and the blanketing of Air Force as well as Agency reconnaissance projects thereunder, further procurement for the Air Force versions of the A-12, engines and systems were levied on CIA by the Director, National Reconnaissance

^{1/} SAPC-6688, 5 June 1956. Memo to DCI from General Counsel, (see Annex 47 for full text).

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Office, at the behest of the Secretary of Defense. In the spring of 1964, following the surfacing to the press and public of the Air Force "YF-12A", an effort was begun by OSA to divest itself of the responsibility for contracting and security for that program. The result achieved, after two years of discussion, exchanges of memoranda, and writing of legal opinions among CIA, Air Force and NRO officials, was agreement on 28 June 1966 by the D/NRO that appropriate staff should begin considering a time schedule for an orderly transfer of contracting functions from the Agency to the Air Force for the SR-71 and YF-12A aircraft and J-58 engine development programs.

At the end of December 1966 when the decision was made by highest authority to close out the OXCART program effective 1 January 1968, discussions were still going on in the working group and the settlement of the contracting issue then became a part of the NRO instructions for the phasing out of the OXCART program (SCOPE COTTON Decisions Numbers 11 and 12 issued by the Director, NRO (Dr. Alexander Flax) on 3 May 1967). The U-2 procurement (IDEALIST for the Agency and DRAGON LADY for the Air Force) was still considered "black" and was not affected by these decisions.

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Development of Contract Management Staff

In the initial negotiations with Perkin-Elmer in early 1955, when it was decided to use the services of the Office of Logistics, the Project Director felt that the Contracting Officer assigned to write that particular contract could perform his function without necessarily having to be fully cleared into the Project, or even knowing that the photographic equipment being contracted for was intended for aerial reconnaissance. When Mr. George F. Kucera began work on the Perkin-Elmer contract, on detail from the Office of Logistics, it very soon became apparent that this theory of Mr. Bissell's would not work out in practice. It was decided that for the sake of security and efficiency, and of centralized project control, it would be better to give Mr. Kucera a full project briefing and arrange for his transfer to the Project Staff as Contracting Officer. When the first Table of Organization was drawn up, therefore, the position of Contracting Officer was set up under the Development and Procurement Division, headed by Mr. Herbert Miller (who also held the title of Executive Officer), and for the first year of the project Mr. Kucera carried on all contract activities single-handed. He of course had the benefit of the General Counsel's advice and also developed a close working relationship with

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the Project Director, soon becoming one of Mr. Bissell's most trusted assistants.

It was two years from the start of the project before the contracting staff was built up to a degree where it could function as a true procurement office. In the early days when development and procurement were overriding in importance, the Project Director was able to follow personally the development aspects of the project. As other areas began to require more and more of his time, and with the departure of Mr. Herbert Miller from the project staff, Mr. Bissell called on Mr. Kucera to follow the development program as well as procurement activities, which put a rather heavy personal burden on the latter.

In May 1957, Mr. Kucera was named Director of Development and Procurement with special area of responsibility for research and development, and in particular the radar camouflage program which was high on the priority list at the time. [redacted] was named Contracting Officer and [redacted] was named Development Officer. (See Annex 48 for Organization Chart). Thus for the first time, Mr. Kucera was in a position to delegate certain tasks to a competent staff.

Withheld under statutory authority of the
Central Intelligence Agency Act of 1949 (50
U.S.C., section 403g)

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Central Intelligence Agency Act of 1949 (50
U.S.C., section 403g)

With the reorganization of the project staff into the Development Projects Division in early 1959, the research and development and contracting functions were separated into a Development Branch and a Contracts Branch. [redacted] was appointed Chief of the Development Branch, serving only a few months before moving on to head the new Air Proprietary Branch. Mr. John Parangosky succeeded him as Chief of the Development Branch. Mr. Kucera departed the Agency in May 1959 and [redacted] became Chief of the Contracts Branch, serving in that capacity until 21 September 1960 when he was succeeded by [redacted]

After the transfer in February 1962 of the special projects to the cognizance of the Deputy Director (Research), the question arose as to the continuation of current contracting methods, particularly in relation to delegation of contracting authority to Office of Special Activities' Contracts Division. Mr. James A. Cunningham set forth the history and philosophy of procurement under AQUATONE/DPD/OSA for the DD/R substantially as follows:

At the time AQUATONE was established, the Director of Logistics was requested to nominate from the Office of Logistics career service qualified professional procurement individuals to staff the project's Contracts Branch. This relationship continued and is still in being. The delegation of contracting authority has been a direct delegation from the

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DCI and in no sense a redelegation through the DD/S or the D/OL. The original philosophy of this arrangement, in the planning of Messrs. Dulles and Bissell, for these special projects of priority interest to national defense was to use the smallest group possible within a self-contained project organization. The reason for this arrangement was that it was considered impossible to do the sort of job that had to be done using either conventional Agency or conventional Air Force procurement methods, for reasons of security and efficiency.

The Contracting Officer and his staff have nevertheless always contracted in substantial if not complete accord with the Armed Services Procurement Regulations and have never awarded a contract unless the procurement was determined to be inextricably tied to the special project category. Any non-project-peculiar procurement has been given to the Office of Logistics for action.

Contract auditing of procurement by OSA (and its predecessors) has been under the cognizance of the Auditor General of the Air Force. A small group of Air Force contract auditors (about 14 civilians) were divorced from their regular administrative channels and assigned exclusively to render audit service to OSA Contracts Division. In their line of organization they answer directly to (and only to) the Auditor General of the Air Force. They are all cleared to Top Secret. They have become acclimated and sensitive to the covert atmosphere of project business and are considered by the Contracts Division to be an integral part of its team.

In February 1962, the Inspector General's report following inspection of DPD activities (before it became OSA) recommended in view of the peculiar demands of the special projects for logistic support, that the present relationships with the Office of Logistics, CIA, should not be disturbed. 1/

1/ BYE-1993-62, 28 August 1962. Memo for DD/R from AAD/SA, Subject: OSA Procurement Authority.

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U.S.C., section 403g)

Mr. Cunningham's recommendation that the procurement system be continued as currently established was accepted and on 1 September 1962, the delegation of contracting authority to OSA Contracting Officer, [redacted] was approved by the DD/R and the DDCI (then Maj. Gen. Marshall S. Carter). On the departure of [redacted] in October 1966, the same delegation of authority was conferred on his successor, [redacted]

The chart shown at Annex 49, "Status of Contracts, 30 December 1966", gives a breakdown of the total procurement undertaken by the Contracts Staff for all customers between 1955 and 1966, which covers the negotiation of more than 700 contracts worth more than three billion dollars.

Procurement of Additional U-2's

In the spring of 1963 the dwindling U-2 assets in both the CIA and USAF inventories raised the question of a possible additional buy of a sufficient number of aircraft to meet anticipated requirements. While the OXCART vehicle's operational readiness was anticipated within a year, there were still many places in the world where the U-2 with its maneuverability could collect vital intelligence in detailed coverage not possible with any other aircraft system. The DDCI was

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advised by OSA that it appeared feasible to produce an agreed quantity of new U-2's on a time span and at a cost which was considered reasonable. A rough estimate of the cost of ten aircraft with subsystems, cameras and engines was on the order of \$20 million.

The question of additional procurement did not pass the discussion stage for more than a year. As of mid-1964 a new production model of the U-2 existed only on paper in the form of a Lockheed proposal for a "U-2L" (the "L" standing for "long"). The basic feature of the new model was the 60-inch extension of the fuselage permitting installation of a second pressurized equipment bay aft of the main Q bay; this in turn enabled the electronic equipment, currently distributed throughout the airframe and operating in the ambient, to be centralized and pressurized to insure greater reliability as well as reducing drag by cleaning up the outside appendages. A small change in depth of the fuselage and a new plumbing job would also permit in-flight refueling of not only the main but the auxiliary tanks. Hopefully the new model would gain about 500 nautical miles of range and a small improvement in over-all performance. It was anticipated that the Agency and the Air Force would together order 25, if funds were forthcoming from NRO, with production to commence in the fall of 1964.

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In July 1964, OSA through the DD/S&T provided the DDCI with comparative costs for procuring 18 new U-2's (\$30.1 million) as against updating 12 U-2A's to the latest configuration (\$14.3 million). While the former was more costly, a modification program would add drag penalties which would reduce optimum altitude, whereas drag penalties would be eliminated in the new U-2L. Conversion would also reduce wing strength by 15%. The conclusion was therefore that procurement of new U-2L's was the best approach to insure adequate and continued fulfillment of national intelligence requirements.

A meeting of the NRO Executive Committee was scheduled for 1 September 1964 at which OSA was instructed to brief the Committee on the justification for new procurement versus conversion. OSA was warned by Mr. Eugene Kiefer* (who had been assigned to the NRO staff) that there was no need to make a strong pitch to sell the Committee on the U-2L since the decision had already been made to convert enough U-2's to satisfy CIA requirements. This turned out to be the case and purchase of new aircraft was put off in favor of a temporary, piece-meal solution to the problem, and the \$13.5 million for the U-2L FY 1965 program was cut from the OSA budget submission.

* Formerly Assistant for Technology in OSA.

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On 21 June 1965, the Directors of Programs B and D under NRO (Generals Ledford and Geary) outlined to the D/NRO their views for additional U-2 aircraft needs (see Annex 50) and made specific cost comparisons and a recommendation for procurement again on 9 August 1965. The D/NRO (Dr. Brockway McMillan) desired to postpone new procurement for at least a year since, he said, unfortunately the analyses which had been made had not verified an unequivocal requirement to produce an improved U-2. He proposed a program, with the backing of Secretary McNamara, for bringing all Agency and SAC U-2's up to the C configuration with certain specified electronic countermeasures equipment and other modifications included. On 18 October 1965, Dr. McMillan's successor (Dr. Alexander H. Flax) approved the modification program, funds to come from the SAC DRAGON LADY (U-2) budget.

On 21 October 1965, the DCI (then Admiral William Raborn) wrote to Mr. Cyrus R. Vance, Deputy Secretary of Defense:

"We have both received a memorandum from Dr. McMillan detailing his proposal for modernization of the existing CIA/SAC U-2 pool and postponement of additional U-2 procurement. Using attrition rates experienced thus far, it would appear that the total U-2 fleet would drop to approximately half of its present strength before new aircraft ordered a year from now would be available, and that the total number would never reach the minimum acceptable level (27) recommended by Generals Ledford

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and Geary, if the older aircraft are retired as they propose. I do not wish to prejudge this proposal, but do believe that it deserves our careful consideration in the Executive Committee before implementation, since I anticipate a continuing and perhaps increasing need for U-2 reconnaissance coverage round the world." 1/

On 16 May 1966, a further recommendation for a U-2R purchase was made to the D/NRO by the Director of Reconnaissance of CIA, Mr. Huntington Sheldon, based on the Lockheed proposal of 27 December 1965 (LAC Report SP-397, Proposal for U-2R Airplane). The Executive Committee of NRO, two and a half months later on 1 August 1966, approved the production of eight U-2R aircraft with the understanding that in conjunction with the FY 1968 budget a decision would be required on any additional production. In considering the procurement of additional U-2R's beyond the first eight, two different attrition rates were considered (7 per year, and 5 per year). Decision at the 23 November 1966 meeting of the Executive Committee was that four additional U-2R's would be procured and the total 12 deliveries would be stretched out to maintain a follow-on procurement option in the next fiscal year.

1/ BYE-0406-65, 21 October 1965. Letter to Mr. Vance from the DCI.

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At the end of 1966, the final terms of the U-2R procurement were still a matter of debate among the Agency, the Air Force and the NRO, but development of the vehicle and all its supporting systems was going forward with the anticipation of an operating capability by the spring of 1968.

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

14 January 1955

MEMORANDUM FOR DIRECTOR OF CENTRAL INTELLIGENCE

SUBJECT: Project AQUATONE - Photographic Equipment

1. Reference is made to a memorandum, dated 11 January 1955, addressed to you by Dr. Edwin H. Land, which makes certain recommendations with respect to photographic equipment for use in connection with Project AQUATONE.
2. The USAF is familiar with the proposed photo-reconnaissance equipment to be used for this project, and is aware of development changes that may be made as the project develops. Drs. James G. Baker and Edwin H. Land are members of the USAF Scientific Advisory Board, and in this capacity are authorized to submit recommendations on projects of this nature.
3. We have reviewed these recommendations and concur in the feasibility and capability of this equipment in fulfilling the project's requirements. It is our opinion that the expedited development of this equipment now will advance the state-of-the-art many years.


DONALD L. PITT
Lt Gen, USAF
Deputy Chief of Staff,
Development

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RECORD OF NEGOTIATIONS

Lockheed Aircraft Corporation
Burbank, California

Contract No. SP-1913
Amount: \$22,500,000.

I. Background Information

In November 1954, as a result of recommendations made by the Land Panel, the Director of Central Intelligence was authorized and directed to proceed with a covert project having to do with the gathering of intelligence data on the Soviet Union. The project involved the utilization of an extremely high altitude reconnaissance aircraft to serve as the vehicle for carrying photographic and other equipment on flights over the Soviet Union. Project OARFISH is a sub-project of the over-all project and involves only the design and construction, including testing, of the aircraft.

The Lockheed Aircraft Corporation had previously approached the Department of the Air Force with a plan for constructing this high altitude reconnaissance aircraft at a cost of about \$28 million for 20 aircraft, but the Air Force did not, at that time, have a requirement for such a plane. Subsequently, it was brought to the attention of the National Security Council that such an aircraft with precision photographic equipment, might serve to provide vitally needed target information on the location of military and industrial facilities of the Soviet Union. Approval of the project followed.

By letter dated 27 December 1954, signed by Mr. Trevor Gardner, Special Assistant (Research and Development), the Department of the Air Force indicated a keen interest in this high altitude reconnaissance aircraft development from the point of view of its own mission, as well as that of the Agency, and committed itself to furnishing the aircraft engines as part of its contribution, and such other assistance as required.

In December Lockheed was given verbal authorization through Air Force channels to proceed with the development of 20 of the special reconnaissance planes at an estimated total cost of \$22,500,000.00.

Subsequently Mr. C. L. Johnson, Chief Engineer of Lockheed, and Mr. Robert Bias, Lockheed contract representative, met with Mr. Larry Houston, General Counsel for the

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Agency to negotiate a definitive contract. As an interim step for the protection of the Government as well as the Contractor, a Letter Contract was negotiated and signed on 3 January 1955 by the Contractor and subsequently by a representative of the Agency (General C. P. Cabell using the alias [redacted]). Concurrences were obtained in the Letter Contract from the Deputy Director for Support, General Counsel, Comptroller and the Special Assistant to the Director for Planning and Coordination.

Negotiations on a definitive contract proceeded between Mr. Houston of the Agency and Mr. Bias, Contractor's representative. The definitive contract was submitted to the Contractor on February 4, 1955 for his review and signature. It was returned, signed, to the Agency over date of 8 February 1955, but with minor changes recommended. Certain minor typographical changes were made in the contract and it was approved for signature by the Director on 1 March 1955. The contract was signed by the Contracting Officer (Mr. George F. Kucera using the alias [redacted]) on 2 March 1955. Concurrences on signature of the contract proper were obtained from the DDCI, the DD/S, the SA/PC/DCI and the General Counsel.

2. Contractual Arrangements

The definitive contract is a negotiated fixed price type contract with provisions for redetermination of the price upon (1) completion of delivery of the first unit as set forth in the production schedule in Appendix A, or (2) upon expenditure of 75% of the total contract amount as set forth in Part I of the contract (\$22,500,000.00), whichever shall occur first. Redetermination of price shall be on a negotiated basis between the Contracting Officer and the Contractor, using as a basis the statement of costs to be furnished by the Contractor. Provision for audit of the Contractor's books, records and accounts is made in Part III of the contract.

The price set forth in Part I of the contract (\$22,500,000.00) is not a maximum price, but rather is the best estimate available at the time of signing this contract. An effort was made to fix the price of \$22,500,000.00 as the maximum price which could not be exceeded, with provision for downward revision only of the price, but the Contractor would not accept this arrangement

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Central Intelligence Agency Act of 1949 (50
U.S.C., section 403g)

and insisted on a target price of \$22,500,000.00 and a maximum price of \$24,750,000.00 in such case. This procedure would have required the obligation of the larger amount. Accordingly the price was left at \$22,500,000.00 with provision for either upward or downward revision at the predetermined times. The present obligated amount for this contract is \$22,500,000.00 but the possibility exists, of course, that this amount may have to be increased if subsequent negotiations indicate that the actual costs plus profit exceed this amount.

The contractual arrangements provide for an advance payment of \$1,000,000 plus progress payments monthly. However, the maximum amount of all progress payments, plus the advance payment, shall not exceed \$20,250,000 (90% of the contract price) during the life of the contract, the balance of the payments, if any, to be made after completion of the contract and in accordance with the stated price, if any.

This definitive contract supersedes the Letter Contract of the same number and incorporates most of the standard government clauses.

3. Contract Work

The contract work is stated in the contract to be in accordance with Appendix A (Work List dated 10 January 1955) and Appendix B. Appendix A consists of three typewritten pages, with control number DXTSC 1030, and sets forth the items to be furnished and delivery schedules. Appendix B consists of the following brochures:

- | | | |
|-----|------------------------|------------------------|
| (1) | 10383, 10 January 1955 | DXTSC 1030 |
| (2) | 10383, 10 January 1955 | DXTSC 1076 (Amendment) |
| (3) | 10420, 28 January 1955 | DXTSC 1077 |

The contract specifically sets forth that the ground handling equipment referred to in paragraph 13 of Appendix A includes one truck assembly for servicing flight tests conducted by the Contractor under paragraph 11 of Appendix A and for subsequent field maintenance utilization.

4. Payment

Payment Plan for this contract is set forth in a memorandum in the file dated 25 February 1955 and concurred in by the Security Office, the Comptroller, and the General

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Counsel. Provision was made for appropriate approvals of interim payments and for channeling the payments into the Lockheed account through [redacted] interim payments will be made on the basis of periodic invoicing of costs experienced. Total payments, under the basic contract, shall not exceed \$20,250,000, with the balance being withheld until the price is redetermined at the end of the contract (provided redetermination is not made sooner pursuant to Part IV).

5. Documentation of the Contract Record

On January 2, 1955 the DCI issued a certification placing this contract under the provisions of Section 10(b) of P.L. 110.

Authorization for advance payment under this contract was issued by the Deputy Director (Support) on March 22, 1955.

Determination and findings with respect to the use of negotiation rather than formal advertising has been issued by the assigned Contracting Officer.

Copies of the appendices referred to in Part I are on file in the project office and with the Contractor, and agreement has been reached as to the scope of the work involved.

6. Other Factors

In a redeterminable type fixed price contract an overwhelming amount of day-to-day administration is not desirable or required. However the Agency should maintain an intimate touch with the contract so as to be aware of the manner in which costs are being accumulated, types of costs, rate of expenditure and similar matters since this information will be invaluable at the time of negotiations of the redetermined price. An audit of the Contractor's final cost statement may or may not be required and close observation of the contract during its heavy expenditure stages will determine the necessity or lack of necessity for some type of audit.

The matter of amount of fee is not specifically treated in the contract except that it is to be considered as an item in the redetermination of price. It is understood

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that the Contractor has in mind a fee between 9% and 10% of final costs.

It is certain that amendments to the contract will be required for additional work over and above that visualized at the time the present scope of work, and related estimated cost, were negotiated. Such amendments should consider whether additional obligation of funds is necessary at the time such amendments are made, or whether the present allocation of funds is sufficient. Close observation of the actual rate expenditure compared to the estimated rate will determine this information.

(Signed)

GEORGE F. KUCERA
Contracting Officer

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LOCKHEED AIRCRAFT CORP.
Burbank, California

10 January 1955

WORK LIST

1. Engineering design for a high altitude reconnaissance aircraft as described in Appendix B.
2. A report on wind tunnel tests in the Contractor's wind tunnel to establish the aerodynamic characteristics of lift, drag, stability and control, using a 1/10 scale model. These tests also include an airflow distribution test on a fuselage duct model.
3. Experimental type tooling for construction of 20 aircraft with aircraft spares described in Item 10.
4. Three mock-ups of the special equipment bay behind the cockpit, for use in fitting the reconnaissance equipment and studying alternative loads.
5. A stress analysis report describing basic loading conditions for the aircraft and analysis of the complete structure.
6. A static test on the wing, tail and aft fuselage section of the aircraft, and a report on these test results.
7. Progress reports showing financial expenditures, progress of construction and engineering, and photographs of the first aircraft during construction will be furnished every two months, starting 1 February 1955.
8. An air-transportability report on the aircraft, describing means for shipping the disassembled aircraft by cargo aircraft and recommending the best type of cargo aircraft for the job.
9. A short operational analysis of the aircraft to determine optimum usage of the type for the basic mission.
10. Twenty aircraft as described in Appendix B, plus the following aircraft spare parts:

Main wing panels	5 left plus 5 right
Horizontal stabilizers	5
Fin surfaces	5
Main landing gears	10

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Tail landing gears	10
Windshield glasses	10
Canopy assemblies	10
Wheels, main & tail	20 sets
Tires, main & tail	100 sets
Brakes	60 sets
Generators	40
Starters (engine installed parts only)	40
Hydraulic pumps	40
Fuel boost pumps	40
Hydraulic & fuel valves	60
Radomes ARN-6	60 each type
Sump fuel tank bags	40
Refrigerators & outflow valves	40
Canopy pressure seals	40
Electric actuators	40
Ailerons	60
Flaps	5 left, 5 right
Elevators	5 left, 5 right
Rudders	5 sets
Wing tip assemblies	5 sets
Landing gear doors	20
Dive flaps	10
Equipment hatch	5 sets
Air duct entrances	5 sets
Tailpipes	5

Aircraft delivery rate at Burbank is:

#1	-	July 15, 1955
#2	-	Sept. 9, 1955
#3	-	Oct. 14, 1955
#4	-	Nov. 18, 1955
#5	-	Feb. 13, 1956
#6	-	Mar. 5, 1956
#7	-	Mar. 26, 1956
#8	-	Apr. 16, 1956
#9	-	May 4, 1956
#10	-	May 24, 1956
#11	-	June 14, 1956
#12	-	July 5, 1956
#13	-	July 24, 1956
#14	-	Aug. 10, 1956
#15	-	Aug. 29, 1956

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#16 - Sept. 18, 1956
#17 - Oct. 4, 1956
#18 - Oct. 22, 1956
#19 - Nov. 7, 1956
#20 - Nov. 26, 1956

Delivery of the aircraft at Burbank is with the wings, tails and powerplants removed for shipping. Spare parts are packaged for shipping, also.

11. Flight tests on aircraft #1, #2, and #3 during the period between August 1, 1955 and December 1, 1955. In this period the first aircraft will demonstrate its capability to perform the basic mission and work out airplane and powerplant problems. Aircraft #2 will be used for special equipment tests, while aircraft #3 will perform radio and navigation tests. The test site for these flights is assumed to be in continental United States within 500 miles of Burbank, California. A report on these tests will be furnished.
12. Simple flight manuals, maintenance manuals and drawings will be provided for each aircraft.
13. Ground handling equipment of special type required for the project will be designed and provided. No list of such equipment can be prepared at this time, but an arbitrary cost figure is presented in other sections of this contract.
14. A description of the purchasing, accounting and inspection systems used to conduct this program in the Contractor's factory.

The reports referred to above will be submitted no later than December 1, 1955, except that certain maintenance information dependent on actual operation for its determination may be developed later.

Engineering drawings used to construct the aircraft will be provided if desired, but it is mutually understood and agreed that these will be of the minimum number and type required to build the aircraft by Lockheed experimental means.

Lockheed assumes the responsibility of weapon system manager for the construction and testing of the aircraft described.

(Signed) C. L. Johnson

1/10/55

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ANNEX 42

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FORM 1260-62
GROUP 2, EX-100
DECLASSIFIED
DATE 05/14

HISTORICAL REVUE

Lockheed Aircraft Corp.

Contract No. SP-1913

Project

"CHALLENGE"

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BACKGROUND

1. Land Comm. -
 2. PRESIDENT -
 3. CIA -
 4. USAF -
- Contract Go Ahead
- Letter Contract - 22 Dec. 1954
- Signed By - DDCI

DEFINITIVE CONTRACT

NEGOTIATIONS - GEN. COUNSEL

CONTRACT DATE - 2 MARCH 1955

TYPE - Fixed Price Redeterminable -

UPWARD OR DOWNWARD AT

(1) DELIVERY 1st AIRCRAFT OR

(2) 75% OF COSTS INCURRED

NO CEILING PRICE SET

CONTRACT AMOUNT - \$22,500,000

BASIC SCOPE OF WORK

(1) 20 U-2 AIRCRAFT - complete with

PROVISIONS FOR VARIOUS CONFIGURATIONS

(2) SPARE PARTS - GHE

(3) WIND TUNNEL, STATIC AND
FLIGHT TESTS

(4) REPORTS - ENGINEERING, FINANCIAL,

PROGRESS AND OPERATIONAL

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SPECIAL PROVISIONS

(1) AGENCY STERILE - ALIAS

(2) SPECIAL SECURITY PROVISIONS

(3) \$1,000,000 Advance Payment

(4) BAILMENT OF 3 AIRPLANES

(5) CONTRACTOR INSPECTION AND
ACCEPTANCE

INCREASES IN SCOPE

(1) SURVEY FOR TEST SITE

(2) EQUIPPING OF TEST SITE

(3) GUARDS, CRASH AND FIRE PROTECTION

(4) ASSISTANCE IN SETTING UP DEPOT

(5) "ACCOMODATION SALES"

(6) REPAIR OF CRASHED AIRCRAFT

(7) SHOP EQUIPMENT OVERSEAS

(8) ADMINISTRATIVE SERVICES

(9) CHANGES TO AIRCRAFT

(A) Auto-pilot installation

(B) ARC/34 installation

(C) Additional Photo Hatches

(D) SAMPLER Hatches

(E) ELECTRONIC Hatches

(F) IMPROVEMENT Type Mods

COST: ORIGINAL PROPOSAL

COST \$ 20,547,945

PROFIT (9½%) 1,952,055

PRICE \$ 22,500,000

Included No Contingencies

Original Quote To USAF - \$22,000,000

Money Not Available To Obligate Ceiling

Many Unknowns - Testing - Security

Estimated Cost of Increased Scope

COST \$ 2,605,100

PROFIT (9½%) 234,414

PRICE \$ 2,839,514

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DELIVERIES:

BASIC Contract Schedule

<u>1955</u>					<u>1956</u>											
J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N
1	0	1	1	0	0	1	2	1	2	1	2	2	1	2	2	

ACTUAL DELIVERIES

<u>1955</u>					<u>1956</u>											
J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N
1	0	1	1	1	1	1	2	1	1	1	2	1	2	2	1	

ALL SPARES, GHE - DELIVERED CONCURRENT

with A/C and intime To Support Units

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FINAL SETTLEMENT PROCEDURE

- (1) Contractor Proposal - 13 Nov. 1957
- (2) AF Audit Report - 29 Jan. 1958
- (3) Ltr. To Contractor - 24 Feb. 1958
- (4) Contractors' Reply - 21 MAR. 1958
- (5) Negotiations - 15 Apr. 1958
- (6) Contract Amend. - 28 May 1958

Contractors' Final Proposal

(including all INCREASES IN Scope)

COST \$ 17,156,445

PROFIT (11.4%) 1,952,055

PRICE \$ 19,108,500

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SETTLEMENT NEGOTIATIONS

Costs Accepted By AF Audit -

\$16,306,399

Costs Questioned - \$850,046

	<u>Q</u>	<u>A</u>
(1) MAN. ICP	79,925	0
(2) FIELD SER.	80,124	80,124
(3) EXCESSIVE EST. 1957 Ovhd.	5,142	0
(4) OFF SITE Flight TRAIN.	6,430	6,130
(5) MATERIAL Cost TRANS.	20,441	0
(6) SURPLUS MATERIAL	4,109	4,109
(7) Eject. SEAT Cost TRANS.	1,274	0
(8) WORK IN RESTR. AREA.	255,673	253,544
(9) Flight Bonus	123,214	125,542
(10) SPARES IN EXCESS FROM ANTS.	177,334	177,334
(11) ACCOMODATION SALES	53,636	53,636
(12) COST OF BASE EQUIP AUTH.	8,932	8,932
(13) SPARE PARTS	15,604	} 9,792
(14) GHE	448	
(15) SPEC. HATCHES	17,558	
(16) SPARES PACKAGING	70	
(17) MISC.	132	

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Costs Disallowed - \$130,903

GRAND TOTAL Costs Accepted

\$17,025,542

PROFIT:

TARGET Profit - \$1,952,055 (9 1/2% of
Orig Est.
Cost)

FINAL Profit - \$1,952,055 (11.46% of
Final Appr.
Costs)

OR

(9.94% of
Final Appr.
Costs plus Add.
SCOPE of
\$2,605,100)

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FINAL CONTRACT PRICE

Cost	\$	17,025,542
Profit		1,952,055
PRICE	\$	<hr/> 18,977,597

THIS IS A REDUCTION OF \$3,522,403
FROM THE ORIGINAL PRICE OF
\$22,500,000. THIS REDUCTION DOES
NOT INCLUDE THE ADDITIONAL SCOPE
PERFORMED IN THE ESTIMATED
AMOUNT OF \$2,839,514.

ANNEX 43

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ELECTRONIC EQUIPMENT - U-2 PROGRAM

1955 - 1966

System I. (Ramo-Wooldridge, 1955-56)

Originally designed as an S-Band Elint receiver to pick up GCI and air defense signals, the system was changed to include half X-Band receivers to pick up air intercept communications, blind bombing and missile control signals. The system was designed to receive and record on magnetic tape pulsed microwave signals emanating from regions within line-of-sight range of the receiving antennas in the U-2. Up to the end of 1957, System I had been the source of the Project's greatest pay-off in Elint collection. It was replaced in 1959 by System VI.

System II. (Ramo-Wooldridge, 1955-59)

The original communications and navigation system for the U-2 did not work out (see Chapter V, Development and Procurement, p. 12).

System III. (Ramo-Wooldridge, 1955-57) (S. T. L., 1963)

This VHF recorder, developed as the original COMINT collection package for the U-2, was designed to detect automatically and record a sample of all radio signals in the frequency band between 95 and 145 megacycles, including continuous test carrier, CW transmission and AM broadcast, and to record the frequency of the signal and the time of recording. The building of a prototype was authorized in June 1955 and an order for six receivers plus spares and test sets was given in April 1956.

In August 1957 the Project Director advised the Chairman of the Requirements Committee that it was the opinion of the principal customer for System III that, at least as it had been employed to date, this system yielded a product not even of marginal intelligence value. It was suggested that the equipment, rather than operating in a search-and-lock-on mode be pre-set to frequencies on which valuable take might be anticipated, in order to obtain longer and more continuous samples. The system at that point was only carried on experimental

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missions in order to establish its value by positive evidence. On 16 September 1957, the Project Director instructed the Director of Development and Procurement to eliminate System III, and on 26 March 1958, the Contracting Officer instructed Ramo-Wooldridge to transfer System III surplus material to the Navy.

In 1963 System III was resurrected and updated and several OEL personnel were trained by Systems Technology Laboratories of TRW in order to provide for emergency installation and maintenance of the system in case of need. The system has been deleted from the IDEALIST configuration a number of times, the latest date being 1 June 1967. (System XXI will replace.)

System IV. (Ramo-Wooldridge, 1955-58)

This unattended airborne FERRET system was designed to receive and record automatically electromagnetic energy radiation in the general frequency spectrum between 150 and 40,000 megacycles. A very complex system requiring more than two years development and testing, its basic units included 8 frequency-sweeping superheterodyne receivers, 2 crystal video wide open receivers, a 14-channel magnetic tape recorder, an oscilloscope and a film recorder. The engineering study was begun in July 1955 and an acceptable plan with technical exhibit was finally presented by Ramo-Wooldridge in May 1956. The Agency Elint Staff Officer [redacted] recommended acceptance and simultaneous work on the system, read-out equipment and test equipment to avoid any further delay. In October 1956, permission was given for a delay in delivery of the prototype in order to realize a savings of \$150,000 in over-time pay. The prototype was finally delivered to the test site in February 1957. Arrangements were made with the Navy to flight test the system against equipment at Point Mugu Navy Missile Test Center. Testing and rework continued through the summer of 1957 and in September an urgent requirement hastened the final testing for a special mission which was run by Detachment A on 11 October 1957 over the Barents Sea with good results. System IV was used during the next two years on approximately 16 overflight or peripheral missions with fair to excellent results.

The responsibility for operation and maintenance of the equipment was taken over by Project Communications Staff in August 1958. In March 1962 all System IV equipment, valued at \$805,355, was transferred to the Air Force U-2 group since the system was incompatible with the J-75 Project U-2's.

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Central Intelligence Agency Act of 1949 (50
U.S.C., section 403g)

System V. (Ramo-Wooldridge, 1956)

This crystal video system consisted of nine System I units using different antennas tuned to selected bands to permit coverage over the entire frequency range of the equipment, i. e., from 60 to 10,750 megacycles. It received only pulse type signals with moderate sensitivity and the information received was recorded on a 14-channel, 1-inch tape recorder, and two 3-channel, 1/4 inch tape recorders. The disadvantage of this system was that it weighed in excess of 400 pounds leaving no space for any other payload than the tracker camera. A special hatch cover contained all of the antennas.

System V was flown with good results on two missions over the Caspian and Black Seas, one each in 1956 and 1957, and one over the China Coast in 1958. System VI replaced the System V capability.

System VI. (Ramo-Wooldridge, 1958-59)

This system, intended to replace Systems I, III and V, and using cannibalized parts from existing components, received and recorded pulse type data in the frequency range from 50 to 14,000 megacycles in four bands as follows:

P Band	50-300 MC
L Band	300-1000 MC
S Band	1000-8000 MC
X Band	8000-14,000 MC

It consisted of four separate channels to receive and record signals from each of the four frequency bands, using high gain, broadband video amplifiers preceded by antennas designed for each band. Information was recorded on two 3-channel, 1/4 inch tape recorders with each unit receiving and recording signals from two of the four bands. An automatic switching arrangement was incorporated in each channel of the system to permit time sharing of the channel for right and left antenna.

The advantage of this system was that it could be carried along with either the A-2 or B camera. Special A-2 or B hatch covers provided windows, brackets and cabling for System VI components and 20 different configurations of the system were possible. Once System VI was tested

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and available for operational use, it was decided that System IV could be retired and the funds thus saved be used for increasing the collection capabilities of System VI. A total of 18 systems were procured and nine remained in the inventory at the end of 1966. The system was updated to configuration VI-A in 1963, and in 1967 planning was underway to update it again to configuration VI-C.

System VII. (Haller-Raymond-Brown, 1959-60)

This system was proposed by OSI in December 1958 and was designed to intercept and record missile telemetry signals of the pulse position modulation type during the pre-burnout stage of missile launching. The signals to be intercepted were believed to be less than four and certainly less than six simultaneous transmission frequencies; therefore the system envisioned the use of six pick-up heads of high accuracy and high fidelity. The need for the system was immediate and so available equipment was employed throughout. The Ampex 814 Recorder running at 60 ips with a recording time of 12 minutes was selected for the system.

Approval to proceed with System VII was given by the Critical Collections Problems Committee and the Elint Committee of USIB on 10 December 1958, and Haller-Raymond-Brown was authorized to proceed with fabrication of one complete system and spares. The system was delivered to Edwards North Base and tested there in April and May 1959.

Headquarters USAF and CHALICE personnel jointly planned a telemetry mission for 9 June 1959 through Iran which included use of a SAC RB-47 aircraft with manned telemetry collection equipment, and a CHALICE U-2 aircraft with System VII automatic collection equipment. The purpose of the joint planning was to coordinate both efforts and ensure that the aircraft would be on station at the proper time with respect to optimum operation of each equipment. By virtue of the higher altitude of the U-2 (65,000 feet) System VII was able to pick up missile telemetry approximately 80 seconds after missile launch time. This intercept provided 30 seconds of telemetry prior to first stage burn-out and was the first such intercept from a Soviet ICBM launching recorded by the U.S. intelligence community. The RB-47 at

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a lower altitude with manned equipment able to search for and detect new telemetry frequencies, was able to get second stage telemetry which provided confirmatory information for the U-2 intercept. This mutually confirmed information ensured greater precision to analysts determining the size, type and other characteristics of engines used in the missiles.

A third partner in this effort was NSA, who advised the alerted CHALICE and SAC crews at Adana six hours prior to shot time. Take-off timing and flight planning was such that both aircraft were at optimum positions at blast-off time as was planned.

System VII was flown operationally for a year by Detachment B between June 1959 and 1 May 1960 with one excellent, eleven good, two fair and nine poor missions.

System VIII. (Haller-Raymond-Brown)(Procured for U. S. Navy)

This system was a modification of System VII to be installed in a Navy A3D aircraft to obtain telemetry signals from Soviet ICBM impact area in the Pacific. Contractual relationships were handled by DPD with Douglas Aircraft, acting as subcontractor to HRB for installation. DPD and OSI monitored development of the system and DPD Security monitored security aspects of the project, but operational use was the responsibility of the Navy.

System IX. (Granger Associates, 1958)

Early in 1958 an Agency requirement was generated for an electronic countermeasures device, for the P2V program and for the U-2. Investigation by OSI determined that the S-441 Deception Repeater (designed by Dr. Rambo under Air Force/Navy contract in 1956-57) could be repackaged to fulfill the DPD requirement. Responsibility for development was delegated to DPD/Development and Procurement Staff and the initial contract with Granger Associates was written 26 June 1958 for a prototype article, Granger Model 504. The purpose of the system was to provide false angle information to X-Band conical scan airborne intercept radars, which was achieved through the use of

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U.S.C., section 403g)

inverse gain techniques. OSI continued to act as technical adviser on this development and upon completion of the testing of the prototype in May 1959 it was recommended by [] that the Model 504 be produced in limited quantities in a production version capable of operating at maximum altitude of the U-2. System IX was aboard the U-2 which was shot down over Sverdlovsk on 1 May 1960.

Subsequent to the loss of that aircraft and the compromise of the Granger Black Box, it was decided to update or redesign the equipment and a contract was let with Applied Technology Inc. (a new company set up by Dr. William Ayer, who had designed the Granger 504) in December 1962 for a prototype and 14 production units of a new higher-powered model. The first sets were completed in April 1963. Configurations IX-B, IX-C (Air Force), and IX-D represent improved models. System IX-B is still in operational status.

System X. (Haller-Raymond-Brown, 1962)

System X was a modification of System VII engineered specifically for Elint coverage of the Soviet missile site at Sary Shagan. Two sets were ordered in August 1962 in advance of the overflight approval and OSA funded the work conducted by HRB and Lockheed to progress System X toward eventual installation in the U-2. This funding was undertaken with the expectation that the engineering work would be applicable to other aircraft systems such as the RB-57F, if it were decided to use that vehicle on political grounds for collection against the Soviet ABM effort.

In May 1962 with the approval of USIB Chairman (Mr. McCone) OSA tried to get the British to sponsor a U-2 with System X to fly over Sary Shagan from Pakistan. While political efforts were being made by the British with Pakistan for approval, the Air Force was making an effort to adapt System X to an improved version of the RB-57D. Dr. Charyk favored use of the RB-57 rather than the U-2 for this mission, and this was agreed at a USIB meeting in late August of 1962, and the British were disengaged from their efforts. At the same time OSA discontinued contractual responsibility for System X and the Air Force took over.

System XII. (Haller-Raymond-Brown, 1962-64)

System XII was developed as an airborne warning receiver against the SA-2, Soviet surface-to-air missile (SAM). It alerts the pilot with visual and aural signals when a threat radar illuminates his aircraft and instantaneously indicates the azimuth bearing of the illuminating radar. Threat radar signals are discriminated from non-threat signals and if several threat radars illuminate the aircraft simultaneously, the system indicates the direction to each without serious interaction.

Configuration XII-B was developed in 1965 by Applied Technology, Inc. In addition to previous characteristics, it senses and provides proper sector coverage for System 9B and enables System 13C (S and C Band jammer) against SAM TWS guidance radar threats. In December 1966 the system was modified to include a LORO capability by installing a 2500 PRF counter which bypasses the scan rate detector and allows the system to unblank on receipt of a 2500-PRF (+ 10 percent) signal in the receiver pass band. This modified system is designated XII-B-1. Systems XII-B-2 and XII-C are in development by American Electronic Labs.

Systems XIII, XIV, and XV. (Sanders Associates, 1963)

A countermeasures system effective against the FAN SONG radar was developed by combining the ALQ-19 (System XIII) with parts of the ALQ-49 (System XIV) and the ALQ-51 (System XV). This S-Band and C-Band jammer with improved techniques was renamed System XIII-A. This development was undertaken to provide a jammer completely different electrically and mechanically from any known military system in design or inventory. With the initial reluctance of the Joint Chiefs to approve the operational use of System XIII because of the microwave frequency memory loop, a contract was let to design a system which would delete that feature. The goal originally set for this equipment was achieved and a contract was let in August 1964 to develop the new package. Tests were conducted in October-December 1964 against FAN SONG simulation. A request for authorization to replace System XIII with XIII-A in the U-2 operational systems inventory was made to D/NRO on 25 February 1965. This was approved and by the end of May 1965 the first operationally ready unit was installed at Detachment H. Configuration XIII-C was developed by Sanders Associates beginning in September

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1965 (code name MAD MOTH). It included the addition of a 3-tube traveling wave tube transmit chain, LORO recognition circuitry, inverse linear gain capability, and amplitude modulation output techniques, as well as weight-saving features. Nine production units were acquired beginning delivery in July 1966 and an additional seven sets of System XIII-A were subsequently retrofitted to the XIII-C configuration. (The Air Force also procured units for their U-2's, B-57's, and SR-71's.) A configuration XIII-D is being developed by Sanders with greater jamming power and other features.

System XVI.

System XVI was projected as a lightweight, passive Elint collection system to replace Systems III and VI, using many of the components and subsystems already in operational use in Project STSPIN and other programs. For a variety of reasons this system was not developed for operational use in the U-2, the principal problems being size and weight. In July 1964 the decision was made to postpone consideration until the U-2R procurement question was settled.

System XVII. (Haller-Raymond-Brown-Singer, 1964-65)

In October 1963, the USIB concluded with respect to its long-standing requirement for information on the Soviet ABM program that there was a sufficiently high possibility of collecting ground radar emissions from Soviet tests of such systems as to justify development and employment of an effective airborne Elint capability. Such a system would be used to collect against Sary Shagan from over China near the Soviet border. NRO was asked to work toward development of such a capability as soon as possible. On 29 October 1963, the Acting DD/S&T, Col. Giller, instructed OSA to develop a System X type of collection equipment for use in the U-2, working with OEL to develop specifications and configuration.

The new system, designated System XVII, is an unattended specialized receiving system for collection of telemetry and other missile-associated signals from the launch site at distances from 340 to 420 miles. The system continuously searches the frequency

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spectrum between 50 and 8000 megacycles with ten sweep-lock receivers. Known telemetry and other missile-associated signals are monitored using 14 fixed tuned receivers.

Development of the system was authorized in July 1964 and HRB-Singer was awarded a contract on 1 September 1964 for production of two prototypes and some ground support equipment. By the time the system was operationally ready for a mission against Sary Shagan, the tip-off time before an impending launch had been cut to such an extent that it would be practically impossible to prepare and launch a U-2 mission in time to intercept meaningful signals. The only operational use made thus far has been by Detachment H along the China Coast against SAM sites.

BIRDWATCHER (HRB-Singer, 1962-63)

This system is an inhouse Agency design developed by [redacted] of OEL, the purpose being to provide an automatic means of relaying from the airborne vehicle information concerning the status of various aircraft systems during emergency situations. The data transmitted to the ground station is then analyzed to determine the cause and effects of the emergency situation. The system for the U-2C consists of up to 40 input sensors of 20 single channels and 10 dual channels sampling the status of various systems functioning, and a keyer modulator for driving the onboard 618-T-3 HF transmitter. The system can be activated by any one of designated critical sensors, by the pilot of the aircraft, or by the ground site's interrogation signal. The system has been proven operationally and has successfully fulfilled its design purpose.

OSCAR SIERRA. (HRB-Singer, 1965)

This system, designed to augment System XII, is a passive electronic countermeasures system with a broad band receiver operating in the L Band frequency range. The system receives and recognizes a missile guidance signal within a 40-mile radius and provides an alarm which consists of turning on a red light in the pilot's compartment, providing an input to BIRDWATCHER, and turning on System XIII. Three prototypes were deployed after successful tests in February 1965, and six production units were ordered. The Mark III configuration was

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initiated by HRB-Singer in December 1965 and the first prototype flight tested in June 1966 did not perform satisfactorily. At the end of 1966 continued rework and development was being performed on this version.

System XX. (Aerojet General Corp., 1967-68)

An infra-red sensor which detects the after-burner of a pursuing fighter aircraft is in the development stage.

System XXI. (HRB-Singer and Sylvania Electronics Systems, West, Inc.)
(1966-67-68)

An airborne VHF COMINT collecting system designed as a replacement of the obsolete System III is in the development stage.

Single-Side-Band Radio. (Collins Radio, 1960)

The Collins Model 618T radio was chosen to meet the requirement of a light weight communications set to be used principally in the event of need to recall the U-2 during an operational mission.

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50X1, E.O.13526

SPECIAL ELINT PROJECTS

NIGHTLATCH. [redacted]

In late 1958 a new Soviet GCI set was reported by the Air Force. This set was nicknamed BAR LOCK. It was similar to previous Soviet GCI sets in that it utilized two search dishes fixed on a rotating trailer, and multiple transmitters. It differed in having six transmitters instead of the usual five and in persistent reports that the signals were extremely strong.

In view of the excellent performance which the known characteristics should provide, interest in more detailed knowledge of the parameters of this radar was quite high. The major unknowns were (1) peak pulse power; (2) vertical coverage pattern; (3) horizontal antenna patterns and technical competence of the antenna design.

A specialized Elint collection program was initiated in March 1959, testing of the airborne equipment began in June, and field operations commenced in mid-August. During the following three months data was obtained on a number of BAR LOCK and BIG MESH sites in Eastern Europe and about 80% of the necessary data reduction was accomplished. The remainder of the data reduction took place after field operations had terminated.

The development, testing and employment of the special electronic package was provided under contract by [redacted] and the final cost, plus fixed fee, for this work was \$165,427.60. The aircraft and crew to support the operational phase were supplied by the Air Force.

CHAPLAIN. (Joint CIA [redacted] Program)

The purpose of this project was to deploy to a field site location in Pakistan and operate special back scatter radar equipment which was developed for the collection of intelligence concerning missile launchings in the Soviet Union.

A survey team composed of [redacted] officers and [redacted] [redacted] DPD Communications Officer, visited Pakistan arriving 8 April

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1960 and in meetings with the Pakistan Intelligence Service reached agreement on the location of the antenna for Project CHAPLAIN in the Malir Cantonment just outside Karachi.

Deployment to the field began 1 October 1960 as a joint enterprise between CIA [redacted] Total complement was composed of 17 field service techreps (ACF Industries), 5 USAF officers and men, and 1 CIA Staff employee for a total of 23. An Air Force Major commanded the group and the CIA technician was deputy and technical director for the project.

The equipment was developed jointly by OSI and TSD. DPD participation was principally with budgeting for the deployment phase for FY 1961-62, and in obtaining political approval from the Pakistan Government. DPD recommended that either TSD or the Office of Communications furnish the team leader. The man chosen was [redacted] of TSD. Chief, NE Division wished the team to report through the [redacted] although the DD/P felt he should report directly to Headquarters, DPD.

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By mid-July no degree of operational success had been achieved and DPD was in the position of having full responsibility for operational support overseas but with little or no direct responsibility for the technical operation or exploitation of the end product.

In September 1961, [redacted] proposed that the joint project become a fully military one. Ambassador Rountree in Karachi turned down the request of [redacted] for militarization of the project.

In August 1962, it was recommended and agreed that Agency participation be transferred to OEL.

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STATUS OF CONTRACTS - 30 DECEMBER 1966

Funds Obligated under OSA Contracts:

	FY 1955-1962	FY 1963	FY 1964	FY 1965	FY 1966	FY 1967	Total
OSA	\$135,216,361.41	\$130,785,876.99	\$172,285,874.00	\$235,680,911.80	\$178,036,061.65	\$105,772,337.31	\$ 957,777,423.16
CIA Other	8,061,061.02	3,011,940.27	4,136,280.41	11,475,203.90	9,927,798.99	178,839.00	36,791,123.59
USAF	429,139,477.36	250,014,334.60	417,143,234.15	451,327,493.73	485,644,953.46	81,440,322.00	2,114,709,815.30
Navy	3,027,732.48	72,296.77	99,427.92	517,908.79	1,047,513.49	301,615.00	5,066,494.45
Army	572,587.64	2,446,564.00	1,483,295.00	1,437,142.85	366,416.00	9,300.00	6,315,305.49
TOTAL	\$576,017,219.91	\$386,331,012.63	\$595,148,111.48	\$700,438,661.07	\$675,022,743.59	\$187,702,413.31	\$3,120,660,161.99
IDEALIST Total	\$ 80,333,696.73	\$ 11,565,946.72	\$ 9,802,552.66	\$ 15,595,302.69	\$ 13,971,806.16	\$ 4,401,368.56	\$ 135,670,673.52

Total contracts let by OSA, 1955-66: 709 (including 111 for USAF) Payments completed: 284 Contracts currently active: 425

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Central Intelligence Agency
Washington, D. C.

Office of the Director

30 January 1956

The Honorable Donald A. Quarles
Secretary of the Air Force
Washington 25, D. C.

Dear Mr. Quarles:

I refer to Mr. Gardner's letter of 11 January 1956 in which it is requested that this Agency undertake the procurement, for and in behalf of the Air Force, of L-182 * aircraft additional to those presently being procured for Project AQUATONE (TS). The decision that the procurement of airframes and certain other equipment for this Project be undertaken by the Central Intelligence Agency was made concurrently with and as a part of the decision whereby the Project itself was launched. You will remember that the considerations which prompted the undertaking of this major intelligence collection effort by this Agency were the requirement for the tightest possible security and the desire that it be treated as a non-military clandestine activity. The maintenance of security required that knowledge of the activity be confined to the smallest possible circle of people, specifically to many fewer individuals than would normally participate in such procurement were it undertaken in accordance with standard Air Force procedures. In any event, the need for speed required the employment of procedures involving less widespread coordination than those regularly employed by the military departments. These arrangements were understood and agreed between us from the inception of the project and I believe that an unusually high degree of security has been maintained.

We are now advised that the Department of the Air Force has established a firm requirement for 29 additional aircraft and related equipment for the Air Force inventory for the earliest possible delivery. Upon review we are of the opinion that the production by the Lockheed Aircraft Corporation of its model L-182 and related equipment still requires the highest degree of security protection, since knowledge of the existence and performance of the L-182 is

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* U-2.

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the most highly sensitive information concerning Project AQUATONE. From discussions between Air Force and Agency personnel on this subject, it appears that the special security procedures and precautions which have been instituted for this procurement heretofore could not be continued if the Air Force were to undertake its own additional procurement. In order to limit knowledge of this aircraft and inferences as to its intended use, I believe the procedure requested by your Department is in the national interest. Accordingly, this Agency will act as executive agent of the Air Force in the procurement of aircraft and related equipment, which will be carried out in accordance with the principles of the Armed Services Procurement Regulations. As your agent, this Agency will take only such action as shall be specifically requested by your Office.

Detailed arrangements for the administration of this program will be worked out at the earliest opportunity with your representatives, at which time the transfer of approximately \$31,000,000 will be accomplished. Furthermore, we will keep the security aspects of this program under constant review as I am in agreement that the administration of the contracts involved should revert to the normal Air Force system at such time as security requirements permit.

Sincerely,

(Signed)

Allen W. Dulles
Director

Noted: R. M. Macy
Bureau of the Budget

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ANNEX 46

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HISTORY OF USAF FUNDS TRANSFERRED TO CIA/OSA
FOR U-2 AND SYSTEMS PROCUREMENT

29 Feb 1956	FY 1956	\$ 9,000,000.00
18 Apr 1956	FY 1957	22,000,000.00
17 Apr 1957	FY 1958	11,000,000.00
27 Aug 1957	FY 1959	5,000,000.00
10 Sep 1959	FY 1960	2,600,000.00
23 Dec 1959	FY 1960	2,600,000.00
20 Feb 1960	Proj 4076	1,325,000.00
21 Oct 1960	FY 1961	4,200,000.00
28 Jul 1961	FY 1962	4,700,000.00
		<u>\$62,425,000.00</u>
(Transferred to NPIC)		- 140,000.00
		<u>\$62,285,000.00</u>
5 Nov 1962	FY 1963	6,200,000.00
(Transferred to NPIC)		- 193,850.00
		<u>\$68,291,150.00</u>
10 Dec 1962	FY 1963	474,076.00
20 Aug 1963	FY 1964	2,000,000.00
11 Oct 1963	FY 1964	1,100,000.00
30 Dec 1963	FY 1964	3,100,000.00
8 Jun 1964	FY 1964	717,174.00
30 Jun 1964	FY 1964	372,144.00
20 Jul 1964	FY 1965	5,200,000.00
28 Aug 1964	FY 1965	5,200,000.00
7 Oct 1964	FY 1965	600,000.00
2 Jul 1965	FY 1966	4,029,000.00
22 Nov 1965	FY 1966	4,652,000.00
28 Jan 1965	FY 1966	278,000.00
Mar 1966	FY 1966	110,000.00
13 Sep 1966	FY 1967	8,380,000.00
		<u>\$104,503,544.00</u>
	TOTAL	\$104,503,544.00
Less: Cumulative Obligations through 31 December 1966		<u>98,589,321.94</u>
Total Unobligated Balance		<u>\$ 5,914,222.06</u>

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5 June 1956

MEMORANDUM FOR: Director of Central Intelligence

SUBJECT: Contracts - Project AQUATONE

1. This memorandum is for your information.
2. The first phase of our procurement activities under Project AQUATONE is in concrete form and all the contracts are sufficiently developed to allow an appraisal. It appears appropriate to review the situation at this time when the Air Force plans an additional procurement phase of the equipment, particularly from our prime contractor, the Lockheed Aircraft Corporation. To this point the procurement has been joint in nature. The CIA has signed the contracts and has provided the funds for the major procurement items; the Air Force is providing certain Government-furnished equipment and is procuring certain other items which it is in a better position to develop and procure.
3. In considering this joint procurement, it should be kept in mind that the CIA is authorized to exercise the authorities contained in the Armed Services Procurement Act of 1947, including Section 10 thereof. Section 10 is specifically designed to facilitate procurement of supplies and equipment by one agency for another, and the joint procurement of supplies and services required by the agencies. It provides for such assignments and delegations of procurement responsibilities within the Agency as may be desirable and the assignment and delegations of procurement responsibilities from one agency to another or the creation of joint or combined offices to exercise the procurement responsibilities. The procurement program for Project AQUATONE, therefore, is clearly within the contemplation of Section 10 of the Armed Services Procurement Act of 1947.
4. In general, the various contracts let under Project AQUATONE follow normal Government procurement standards although they may differ as to type. In certain instances security or the urgency involved has required alteration of procedures or waivers of certain specific limitations. Insofar as the security precautions are concerned, we

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rely on Section 10(b) of the CIA Act of 1949 in order to have some of the contracts appear either Agency sterile or Government sterile and to issue payments in a secure manner. It is probable that the Air Force does not have the legal authority to achieve such cover arrangements in precisely the same way, although commercial cover has been achieved by the Department of Defense through other devices. On the waiver of limitations, however, we have had little occasion to issue any substantive waivers or exercise unusual authorities which were not available to the Air Force under its own authorities. Consequently, the procurement by the CIA has, to date, been basically no different from that which could be accomplished by the Air Force. A potential difference, however, arises from the fact that we can waive any and all limitations in the event Project security or other considerations requires us to do this, whereas the Air Force could be limited in what can be done in this regard.

5. Consideration was given to the Air Force undertaking this procurement and the following facts were ascertained. A similar proposal from the corporation had previously been rejected by the Air Research and Development Command. The processing in the Air Force under the proposal known as CL 282 had gone on for six to nine months before rejection. If the present proposal in which the CIA had an interest were to be sponsored by the Air Force, it would have to be referred back again to the ARDC for full justification which would of necessity include the CIA's interest. If approved by ARDC it would then have to go through the Air Materiel Command with full coordination under all the Air Force rules and procedures. Only after that could negotiations on the contract itself be instigated. No estimate of the time involved could be made, except that it would be a long drawn out procedure and that necessarily during this procedure a considerable number of offices and individuals would get at least an indication of the purposes for which the procurement was aimed. With time a vital factor and absolute security indispensable, the Air Force channel of procurement was patently impossible.

6. In the opinion of the Air Force officers and officials concerned, there was no method by which the Air Force could short cut this procedure without raising as many questions as might be raised by going through the full coordination process. On the other hand, the CIA from the procurement standpoint alone could enter into the transaction almost

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instantly upon approval by the Director, and it would be necessary to inform only a handful of people outside of those who would know the substantive nature of the Project in any case. Not only would there be far closer security, but also there would be much greater flexibility, which is essential in view of the unknowns to be encountered and the extreme urgency in solving them. It was unanimously agreed, therefore, that the CIA should handle the contracts and funds in an amount estimated to cover the 1955 Fiscal Year needs were allocated. This was approved by the Bureau of the Budget.

7. From the outset it was apparent that if the CIA were to execute the contract, it would have to be some form of a redeterminable fixed-price contract. Fixed-price contracts have the advantage of (i) simpler administration, (ii) minimum of time-consuming delays, (iii) less complex audit procedures, (iv) more responsibility on the Contractor, and (v) generally greater flexibility to cope with unusual conditions which this type of procurement would involve. Security problems, likewise, are simplified. I, therefore, entered into negotiations with Mr. Johnson, the Lockheed Project Engineer, on the basis of a fixed-price arrangement. He set forth a proposal in which the price was stated to be \$22,500,000. At this time we had the information from the Air Force that the similar proposal, previously considered by ARDC as CL-282, had been estimated to involve \$28,000,000. I stated that due to the uncertainty on costs we should probably have some redetermination provision and asked Mr. Johnson if the \$22,500,000 were an outside figure. He asserted that it was, and accordingly I prepared a letter contract which obligated the amount of \$22,500,000. We then began negotiation for a definitive contract with Lockheed, and their Contracting Officer, Mr. Bias, told me that when Mr. Johnson mentioned the figure of \$22,500,000 to the Corporation Comptroller and that there would be a price-redetermination clause, the Comptroller had deemed it prudent to ask for provision for price redetermination upwards from \$22,500,000. I stated that the Agency did not have additional funds to obligate for this purpose at this time, but that if the need arose they could be made available and I would commit the Agency to an upward and downward price redetermination with the profit factor varying inversely with any increase in cost. This was further discussed with Mr. Johnson, who indicated that he had considerable confidence in his estimate of \$22,500,000 as an outside figure, but that there were obviously some unpredictable items. I undertook to point out to Mr. Johnson the method by which we planned

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to operate, including direct negotiation, elimination of detailed and current audit procedures, and over-all simplification of contract procedures, all of which I felt would allow Lockheed to make savings not normally available. Mr. Johnson agreed that this should not only expedite production but also should lead to savings on his estimate, although he was careful to point out that wage rates would be somewhat above normal as they would be utilizing the cream of the Lockheed employees for this Project. The definitive contract was, therefore, negotiated on the \$22,500,000 price with negotiation upwards if cost experience justified; unlimited downwards. No price profit factor was established although we indicated to Messrs. Bias and Johnson that at \$22,500,000 we could not go over the average profit factor on Government contracts, which appeared to be in the neighborhood of 9-1/2% unless substantial savings through economy and efficiency were achieved and that contrariwise, if the expenditures ran over \$22,500,000, we would propose that the profit factor would be reduced.

8. It is important to keep in mind that in the prime contract as well as the others executed by this Agency for Project AQUATONE, the responsibility for performance was put on the Contractor. By performance here is meant more than the actual flight performance of the plane. It is the performance of the whole system with all its interrelated parts, so that the responsibility was not only for a machine which flew at a certain height for a certain distance at a certain speed but also to assure that the flight performance was capable of sustaining the camera, communications, navigation, and other necessary equipment. In normal Air Force procurement, each part and all materiel must meet rigid Air Force specifications and inspection so that as the product comes off the line its performance is largely the result of the Air Force's supervision. Under our Contract No. SP-1913, the contractor was aware of the performance which was required and it is his responsibility to produce this performance in such manner as he deems most effective and efficient. Lockheed, therefore, worked directly with Perkin-Elmer, Hycon, Ramo-Wooldridge, and the rest as a member of a team to evolve a complete and balanced system. In the event of disputes or the need for policy determinations, Lockheed could turn to one place to provide the answers instead of having each aspect staffed through separate staff components as in the Air Force. In certain instances modifications have been required for the Government's purposes over

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and above the original specifications, which will add to costs otherwise contemplated, but these have been or will be reflected in change orders so that the basic concept of SP-1913 is not affected.

9. In considering the circumstances under which SP-1913 was negotiated, it appears that the definitive contract is advantageous both to the Contractor and to the Government. To the Contractor it gave the greatest possible freedom from inspection and supervision while, of course, throwing upon him responsibility for results. Since the contract with the CIA is small for this particular corporation, the incentive is to produce results which would then be attractive to the Air Force and larger procurement. This places a premium on efficiency and performance. From the Government's viewpoint, the price redetermination procedure with provision for upward redetermination tends to eliminate those contingencies which the corporation would put into a fixed-price contract on a new production item. Furthermore, the profit percentage-wise and dollarwise will go up as the Government's expenses are reduced; on the other hand the percentage will go down and perhaps the dollar amount too if the cost to the Government goes up. As of March 25, 1956, the Contractor is ahead of schedule and actual expenditures are some \$3,000,000 under what it was anticipated expenditures would be as of this date. However some \$1,400,000 additional work has been added since inception of the contract. This means that the original work, plus that which has been added by change orders, will still be accomplished under the original contract price, with some residue, provided that no unusual costs are encountered during the next six or seven months.

10. Due to the Contractor's long years of experience with Government contracts, the negotiation on the price redetermination is not inordinately difficult since all cost factors are well established, including such items as overhead allocations. This is bolstered by the fact that the contract provides for inspection and audit of the books and records of the corporation at any time and arrangements are now being made to have the Air Force audit the contract on a secure basis and in accordance with procedures familiar to Lockheed and to the Air Force. Consequently, the contract has the usual benefits and ease of administration and performance of a fixed-price contract with the further benefit to the Government of recovering any contract funds not actually expended for the contract work, by virtue of the redetermination factor. This, of course, is feasible only where a company has had such an extensive course of dealings with the Government that cost elements are well

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settled and both parties are thoroughly familiar with Government procurement practices. Negotiation of the final fee or profit (as a percentage or as a lump sum) is the only area in which difficulties may arise.

11. In connection with procurement which the CIA is undertaking as agent for the Air Force through Contract SP-1914, generally the same practices and procedures are being followed as applied to SP-1913. Since the CIA is, however, the agent of the Air Force, a detailed agreement outlining this agency has been executed between the Agency and the Air Force. In this the Air Force clearly undertakes responsibility for requirements and specifications and for inspection and acceptance and the Central Intelligence Agency performs the contractual functions and administers the contract and any changes thereto, in accordance with the written request of the Air Force. Present known requirements of the Air Force indicate that some 20 to 30 contracts on behalf of the Air Force will have to be processed by us under this arrangement.

12. In the foregoing we have discussed in considerable detail SP-1913, both because it is the major and basic contract and because of all the contracts it is the only one in which there was a departure from normal Government procurement practices as opposed to procedures. Even on that point, which involved the implied commitment of additional funds over and above the immediate obligation of funds, the same result could be achieved by other devices available to armed services procurement agencies. Other contracts with Perkin-Elmer, Hycon, and Westinghouse, etc., are all similar to SP-1913 in the procurement methods utilized and, again, probably are all within the legal authority of the Air Force to procure in this manner. The contract with Ramo-Wooldridge is in all substantive aspects the same as the Air Force would write—a standard cost-plus-a-fixed-fee contract. It is interesting to note that in the so-called unusual type contracts written to date (Lockheed, Perkin-Elmer, Westinghouse, etc.) which provide for upward redetermination of price, no such request for additional funds has been made as yet, and will not, in all probability be made. However the CPFF standard contract has increased considerably in cost over that originally budgeted. This indicates only that it is the nature of the work that determines the ultimate cost to the Government rather than the method of contracting. The administration of the contracts has not followed the normal service practices, as for security reasons it was

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decided to limit the number of contract officers to the minimum, and the large staffs which normally review contracts in varying aspects were here reduced to one small staff. Within these limitations, however, the administration has been meticulous with particular attention to change orders. All contracts and all changes thereto have been reviewed by the General Counsel or his Deputy and specific approvals on policy or fiscal matters have been obtained from the appropriate approving officers in all cases. Again, granting that this system may work only when dealing with companies which are themselves competent in the running of their business and are familiar with Government procurement, under the circumstances surrounding this Project, we believe the procurement system involved adequately protected the Government, was effective in meeting procurement needs, and through its efficiency and simplicity was economical for the Government.

(Signed)
LAWRENCE R. HOUSTON
General Counsel

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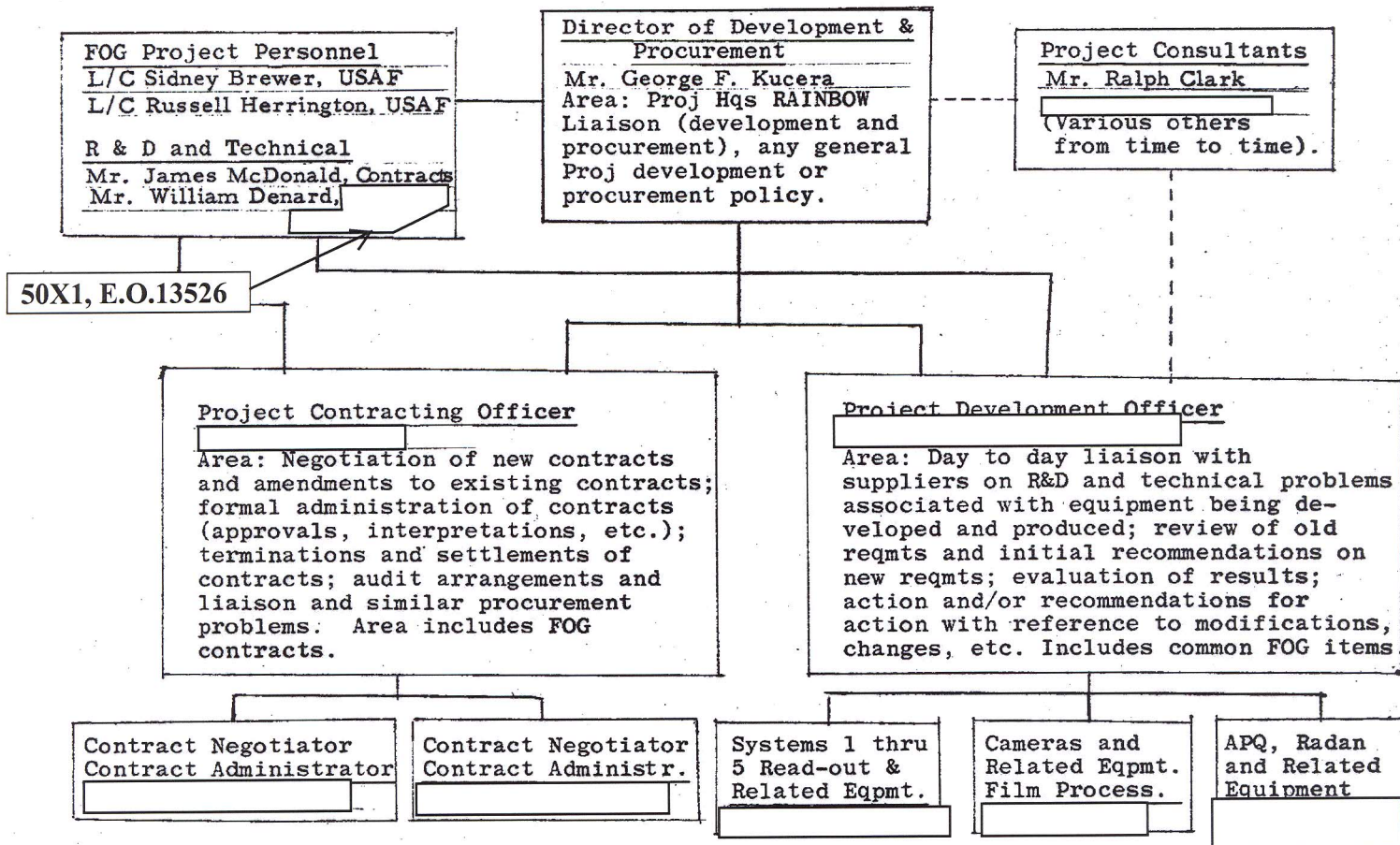
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ANNEX 48

Withheld under statutory authority of the
Central Intelligence Agency Act of 1949 (50
U.S.C., section 403g)

ORGANIZATION CHART -- DEVELOPMENT & PROCUREMENT



Withheld under statutory authority of the
Central Intelligence Agency Act of 1949 (50
U.S.C., section 403g)

Att. to SAPC-16511
11 June 1957

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U-2 CAMERA SYSTEMS

<u>System</u>	<u>Focal Length</u>	<u>Range</u>	<u>Lateral</u>	<u>Ground Resolution</u>	<u>Scale</u>	<u>ROM Cost</u>	<u>Availability/Remarks</u>
Tracker (Perkin-Elmer) *	3"	3000 n. m.	Horizon to Horizon	15'	$\frac{1}{280,000}$		Quantity: 17; fits U-2C
Tracker (T-35)	2"	4000 n. m.	Horizon to Horizon	12'	$\frac{1}{420,000}$	\$10,000	Quantity: 15; fits U-2C & R
Hycan B Camera (framing)	36"	Variable, Max. 3160 n. m.	Horizon to Horizon	3', 30-35 lines AWAR	$\frac{1}{23,300}$	\$120,000	Operational; 8 on hand
Improved Hycan B Camera (framing)	36"	Variable, Max. 3160 n. m.	Horizon to Horizon	2.5', 45 lines AWAR	$\frac{1}{23,300}$	\$120,000	Operational; 3 on hand
Eastman Kodak Camera (Panoramic)	21"	3740 n. m.	55	1.25', 110 lines per mm, low contrast	$\frac{1}{43,000}$	\$950,000	3 ordered for OXCART; 3 mos. time required to configure for U-2.
C Triple Prime (Itek) Panoramic (referred to as the Delta)	24"	3000 n. m.	17.3	10", 120 lines per mm	$\frac{1}{35,000}$	\$168,000	Prototype available with limited spaces for limited operational use.
Dual C Triple Prime (Itek); Convergent Stereo	24"	3000 n. m.	17.3	10", 120 lines per mm	$\frac{1}{35,000}$	#1 \$435,000 #2 301,000 #3 200,000	Delivery of stereo cameras scheduled beginning Feb 64; 4 cameras ordered.

* Original tracker, no longer used by IDEALIST

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altitude, better defensive gear, and improved maneuverability due to redesign will extend on into the 1970's the U-2 capability for overhead reconnaissance of denied areas.

8. A follow-on subsonic reconnaissance aircraft should have the following characteristics:

50X4, E.O.13526

a. Reach in one hour or less.

b. Range of 3,000 N.M. at or above 70,000 feet.

50X4, E.O.13526

c. Mid-range operational altitudes over denied territory at or above

d. Increased maneuverability at altitude to increase the survivability margin against SAM defenses.

e. Integrated, light-weight warning/defensive counter-measures systems.

f. High-altitude engine re-light and flameout prevention.

g. Expanded night photo capability.

h. Real-time read out of selected airborne sensors by a ground station.

i. Infrared defensive system.

j. Internal installation of all sensors and equipment.

k. Compatibility with existing sensor systems.

l. Structurally capable of carrier operation.

m. Structurally capable of conversion for air refueling.

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9. The requirement for U-2 reconnaissance having been stated in paragraph 4, it is appropriate at this point to recommend a new buy. It is our understanding that your memorandum of June 10, 1965, was predicated on not purchasing improved model aircraft; nonetheless, it is the considered judgment of the undersigned that a very definite need for the U-2 abides for covert work and overt surveillance reconnaissance and photo mapping into the distant future. Based on current attrition rates, it is possible to predict that the total U-2 inventory, exclusive of AFSC holdings, could conceivably reduce to 9 or 10 aircraft in a three-year period. Such a figure would be considered a marginal effective national reconnaissance asset. We agree with that part of your June 10 memorandum to up-date all SAC U-2's, but it is our opinion that the conversion should be at a rate faster than specified. We are in consonance with the rest of the proposal as a sound plan basically, but since we are recommending a purchase of new aircraft, we feel its implementation at this time would be premature.

10. To realize the maximum benefit from a new reconnaissance aircraft, the Agency and the USAF (and other interested agencies) should jointly approve and purchase a similar model airframe. Further, this aircraft should be produced in quantity to give both users an operational inventory not later than the end of FY-67. In the meantime, modify all U-2 aircraft in the USAF and Agency inventory to the light-weight J75-13B configuration and standardize sensors and defensive ECM equipment. This will reduce overall spares requirements, provide maximum flexibility of utilization, and permit an orderly phase-out of the equipment at the end of its service life. In addition, a decision to convert the SAC fleet implies a decision to purchase engines immediately.

11. It is recommended that USAF and CIA, in joint enterprise with the contractor, initiate a new buy of an improved U-2. This decision should be made in the near future while tools and dies are readily available. To delay will cause a future purchase to be more difficult and expensive. When the decision is made to purchase, it will be necessary to determine its size, considering the missions and needs of the participating agencies as stated in paragraph 4.

(Signed)

JACK C. LEDFORD
Brigadier General, USAF
Director, Program B, NRO

LEO P. GEARY
Colonel, USAF
Director, Program D,
NRO

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BYE 2614-65

21 June 1965

MEMORANDUM FOR: Director, National Reconnaissance Office

SUBJECT: Future Needs for U-2 Aircraft

REFERENCE: Memorandum from DNRO to Directors,
Programs B and D, dated 22 March 1965,
Subject: Future Needs for U-2 Aircraft
(BYE 36277-65)

1. The measure of denial of covert aerial reconnaissance by the U-2 will depend in large measure upon the rate at which hostile defensive environments, both missile and aircraft, are introduced, and the progress we make toward countering those environments. With introduction of the Systems 13A, 9B, 12B and Oscar Sierra, computer studies show survivability of the U-2 against SAM-defended areas is now above 80%. To improve this survivability rate we must continue our aggressive development and implementation of defensive countermeasures. Development of hostile defensive environments notwithstanding, there will continue to be many requirements for U-2 quality photography, U-2 flexibility and responsiveness to emergency situations, and U-2 economy of operation.

2. Since the first loss in 1960 to the surface-to-air missile, the U-2 has been regarded as vulnerable to the SAM threat. However, with the use of countermeasures and warning devices, as well as judicious mission planning, the U-2 has so far accommodated the problem and survived as an effective intelligence collection capability. In the very recent past, a latent threat, the fighter-interceptor, has loomed as a hazard to the U-2 mission. Whereas the SAM threat can be neutralized by avoiding its lethal range, the high-performance fighter-interceptor is a flexible defense which can seek out the U-2. Countermeasures to the fighter threat have been developed and are being improved. Comprehensive studies indicate 94% survivability of the U-2 against MIG-21 type aircraft when the U-2 employs existing defensive measures. In the future we can maintain and improve this survivability by implementing the program described in this paper.

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3. As was pointed out in the briefing rendered the NRO EXCOM on 1 September 1964, unless new aircraft are put into the U-2 inventory, estimated losses over the next five years will force closure of the U-2 program for lack of aircraft. The total inventory as of 4 June 1965 is 25 aircraft of which 20 are photo-configured. The 25 remain from the original purchase of 55 aircraft. It is interesting and perhaps illustrative to note that of the 30 U-2's lost, only seven were on operational overflights. Of these seven, five aircraft were lost on Agency overflights. Five losses out of 461 overflight missions represents a loss rate of 1.1%. The loss near Key West on 20 November 1963, and that over China on 30 October 1963, were probably caused by aircraft or systems malfunctions not caused by hostile action.

4. In the near future, 1967-1970, the U-2 can profitably operate in any area where there is a requirement to produce high-resolution photography, where it is politically more desirable to conduct covert overflights, and where it can deliver photography more economically than other methods. With an improved aircraft to provide increased altitude and maneuverability and the use of defensive systems now in production or in development, even the present restriction against flying directly over SAM sites will cease to be a valid limitation to unrestricted operational use of the U-2. The requirement for covert strategic search and overt surveillance will continue for the foreseeable future in the following areas:

a. The TACKLE program will continue in China and North Korea. Here the U-2 will cover targets and areas which require high-resolution photography but are not capable of being surveyed quickly or continuously by other less responsive and more expensive capabilities.

b. The major portion of Indonesia can be covered by U-2 missions unless and until the Indonesian fighter capability shows marked improvement beyond any reasonable estimate of their projected force structure.

c. All of Africa can most profitably be photographed on U-2 missions. Defensive system improvements noted above will probably permit SAM-defended targets to be photographed.

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d. The greater part of the Middle East including Saudi Arabia, Iran, Iraq, Yemen and the Levant Coast is a likely target area for U-2 operations.

e. The Sino-Indian Border and Tibet, as well as Sinkiang Province, are now and may remain profitable target areas for the U-2.

f. Southeast Asian countries which may be subverted and infiltrated by the Chicoms (Burma, Malaysia, for example) should be "safe" target areas for a significant portion of the 1967-1970 period.

g. Should the need arise, such as it did in Venezuela, Central and South America, crisis situations can be covered by the U-2 either from land bases or from carriers.

h. ELINT requirements dictate that continued improvement in collection platforms must be made. The aircraft being considered herein will be a considerably better capability.

i. In conjunction with its reconnaissance role the U-2 is capable of performing photo-mapping chores more cheaply and more effectively than current assets.

j. There are indications that NASA has expressed interest in acquiring U-2's for reasons not known, and have mentioned a figure of three aircraft as probably satisfying their needs.

k. Should atmospheric testing be resumed, undoubtedly the U-2 will once again play a significant air sampling role, with particulate and gaseous collection gear.

5. The USSR, its European satellites, Israel, China targets defended by SAM sites and/or latest fighters, the Nile Valley in Egypt and SAM-defended targets in Indonesia have been denied to the U-2 as it now exists. Any area which has a sophisticated air defense system (and the pilots and equipment to use it) such as the USSR has, will probably pose a risk to the continuation of U-2 operations in that country. The very

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depth of the Soviet and European satellite countries' defenses and the quality of the Israeli system deny U-2 coverage of those areas. The area within the lethal radius of a SAM site anywhere in the world is denied to the U-2 in its present configuration, but will become open to the improved U-2.

6. The collection capability of the U-2 in its present or proposed form compares favorably with other systems in that it produces a high-quality product at a competitive cost. It is a more economical instrument to collect photography in lesser-defended areas than is the A-12/SR-71, which should be reserved initially, at least, for areas the U-2 cannot penetrate. Drones, TAGBOARD or Model 147, are committed to a pre-programmed track which is flown only if the guidance system is 100% accurate for the entire mission. A manned aircraft (U-2 included) can be kept on track or returned to track if and when it becomes necessary. In this respect the U-2 is more likely to photograph a specific target, given the same conditions. As a complement to satellite systems, the U-2 can be effective and economical for a significant time, certainly in the 1967-1970 period. As the search/surveillance satellite detects targets worthy of more detailed examination, it also surveys approaches to those targets. Here we have not only target identification but also an up-to-date exposure of defensive sites. This information is the data on which selection of the most profitable follow-on coverage can be made. GAMBIT may be needed but may also be programmed for a higher priority. On the other hand, the U-2 may be able to do the job equally as well, quicker and cheaper.

7. Clearly then, there is a need for a less vulnerable, flexible reconnaissance system capable of acquiring high-resolution photography. Such a system could be a follow-on aircraft to the U-2 which would incorporate an additional altitude capability, a more effective and integrated defense and countermeasures system, and an airframe clean of external drag items. Continuing positive efforts are being made to improve the current U-2's performance through a weight-saving program to increase altitude, through improved ECM, and through new tactics. Although significant progress has already been made, there is, however, a limit which the current U-2 can achieve through such measures, and it falls short of the desired gains a new model can provide. The increased

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