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SHORT HISTORICAL EXPLANATION, WS 117L
DISCOVERER, SENTRY AND MIDAS CHRONOLOGY
1946-1959

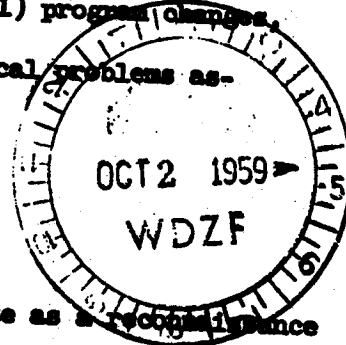
I. Introduction.

Activities in the WS 117L Program can be divided into three fairly well-defined time periods:

- a. Pre-Sputnik
- b. Early post-Sputnik
- c. ARPA Management

The transition phases between each of these periods were marked by rapid change and intense activity by all personnel associated with the program. The two most significant elements which characterized the program following the pre-Sputnik period are (1) program changes, and (2) progress and success in solving the technical problems associated with satellite reconnaissance needs.

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II. Pre-Sputnik Period.

The concept of using an earth-circling satellite as a reconnaissance vehicle was taken under investigation by the newly created RAND corporation in 1946. Their studies continued through 1953. As early as April 1951,¹ RAND concluded that such a project was feasible and within our capability. In the RAND Project Feedback (1954) summary report,² it was concluded that a reconnaissance satellite employing a television sensor could begin flight tests within four (4) years and completely operational system tests could be performed in the sixth (6th) year following program initiation. This assumed the availability of a booster.

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In the period 1948-1954, aside from the RAND investigation, no overall effort was made to undertake an adequately supported objective program. However, the Air Force did let feasibility studies for critical satellite subsystem to RCA, EAA, Bendix and others.

During late 1954 to early 1955, the Air Force established system requirements for a satellite reconnaissance weapon system with the publication of the final RAND report. Under Lt Colonel William G. King, Jr., a small WSFO was established at WADC. Design proposals were let, and a series of tasks, designed to explore problem areas, were undertaken. The Air Force also issued a GOR for the system.³ It appears that the main efforts and resources of the Department of Defense were directed toward Project Vanguard⁴ with the view of supporting the I. G. Y. and achieving the resulting prestige and psychological benefits, rather than a military system.

In accordance with instructions from Lt General Thomas Power, management of the program was transferred from Detachment #1, Hq ARDC, to what is now AFEMD on 15 February 1956. This transfer appears to have been effected to prevent interference with the ballistic missile program since the satellite required an Atlas booster.

Under control of the ballistic missile development agency, this interference could be minimized. Moreover, some benefits might accrue if it were handled by an agency devoted to accelerated development.

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During the period from January 1956 to October 1957, the new Air Force management agency, AFPM, established a development plan and program for an Advanced Reconnaissance System (ARS), WS 117L. The Division established an office under Colonel Otto Glasser and Commander Robert Truax. WS 117L was assigned a priority of 1-A and a precedence of 1-6 in August of 1955⁵. In the spring of 1956, upon evaluation of system design studies performed during 1955 by RCA, Glenn Martin and Lockheed Aircraft, a joint Air Force Board found Lockheed Aircraft best qualified, and recommended they be awarded a development contract for WS 117L. A contract was awarded them as prime system contractor in October 1956. Despite the high priority given the program, funding was not provided for implementation. Initially, \$3.0M were provided against a \$32.1M requirement for FY 1957. Eventually this amount was increased in increments to \$13.9 M during the year. However, the funds provided were for use only for R and D work (P-600), which made it virtually impossible to conduct a balanced program. Repeated ARDC (AFPM) efforts were made to relieve this situation with no appreciable effect.

As the result of repeated requests for relief, guidance was received from DCS/D, USAF, Lt General D. L. Putt. In a letter⁶ to ARDC in March 1957, he stated, "Your staff is familiar with the Secretary's (Secretary Donald A. Quarles) views in this regard and that resultant definite slow down is in order." This letter also

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specified that no orbital testing would take place prior to January 1960 and that the development of WS 117L "should be conducted along conventional lines."

The remainder of that period from March 1957 to October 1957, the WS 117L program proceeded slowly within the limitations imposed by available funds. Some technical progress was made, but of equal importance, a capable contractor team had been assembled and a broad base established which permitted the rapid expansion which was to follow.

In summary, the period January 1956 to October 1957, was characterized by program study at high levels and "business as usual."

III. Early Post-Sputnik

The effects of Sputnik I were profound. Immediately steps were taken by Hq USAF to accelerate the missile and satellite (WS 117L) programs.

By late January 1958, overtime restriction on WS 117L contractors had been removed, and the C/S USAF had approved a program acceleration plan. In early February 1958 the President assigned the WS 117L highest national priority equal to that of the ballistic missile program. The accelerated plan included a Thor-boosted program with a recoverable payload, increased WS 117L vehicle production and Atlas-boosted flights beginning in early 1959.

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This accelerated program was approved "in principle" by Secretary of Defense Neil McElroy in late February 1958 with instructions that the program be conducted under ARPA direction and that AFEND submit a new development plan. While the WS 117L program was not officially transferred to ARPA cognizance until 19 May 1958, the influence of the ARPA had a direct impact on the program after February 1958.

In summary the period, October 1957 through February 1958 was one of rapid change, and expansion culminating in the management of the WS 117L program being assigned to the ARPA.

IV. ARPA Management (March 1958 to Present)

Within a few days, (28 Feb 58) after WS 117L had been placed under the ARPA, Mr. Roy Johnson, in a memorandum to the Secretary of the Air Force, initiated the first of many program changes which were to occur in the next year. These ARPA instructions to the Air Force provided for program acceleration and highest national priority, deletion of the Air Force proposed early interim recoverable capsule reconnaissance capability for the Thor-boosted program, and recommended that the Thor-boosted program be used as a cheaper and more available booster for engineering testing. Further, the WS 117L-Thor combination could be used for experimental recovery flights with animals. (It is to be noted that a recoverable reconnaissance payload capability for Atlas was placed in the program by ARPA approximately a year later.)

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In April 1958, the biosatellite recovery program was added to the WS 117L program.

In May 1958, the program was renamed Sentry and placed under ARPA by DOD Directive 3200.5.

On 30 June 1958, the ARPA published ARPA Order No. 9-58 and instructed AFBMD to submit new development and financial plans.

On 1 July 1958, AFBMD published a new Advanced Reconnaissance System (WS 117L) Development Plan (the second plan of CY 1958). This plan included FY 1958-\$60.M; FY 1959-\$215.M; later revised to FY 1958-\$67.M; FY 1959-\$198.M. The plan contained both a Thor and Atlas boosted program.

In mid-July 1958, Mr. Roy Johnson, Director, ARPA, informed the Secretary of the Air Force that \$215.M would be programmed for WS 117L in FY 1959. This total would include the biomedical recovery program. In early August, the Thor-boosted program was increased by ARPA from ten flights to nineteen flights. These additional flights were to have biomedical and space phenomenon measurements as objectives, and the total program was still to be kept within the FY 1959, \$215M ceiling. New development plans were again requested by ARPA.

On 15 September 1958, AFBMD published Advanced Reconnaissance System (WS 117L) Development Plan (third plan of CY 1958) which called for FY 1959, \$231M; FY 1960, \$296M.

On 17 September 1958, AFBMD recommended an acceleration of the infrared program and published the Attack Alarm Development Plan.

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(This later became MIDAS). This action was taken in view of the importance of the early development of an improved missile warning system. Enthusiastic support for this program was received from many high officials throughout the Air Force.

In late September 1958, Mr. Johnson informed AFEMD that he was unable to approve the current SENTRY Development Plan, in view of the fact that it exceeded established fund ceilings in FY 1959 and that the proposed FY 1960 budget was excessive. Mr. Johnson dispatched an ARPA Ad Hoc project group to AFEMD to investigate, evaluate and recommend an ARPA SENTRY Program.

In October 1958, the ARPA directed AFEMD to cancel the AFMTC phase of the SENTRY program but to retain the associated Atlas boosters on order for future use.

In early December 1958, as the outgrowth of the ARPA Ad Hoc Project Group, Mr. Roy Johnson initiated a series of reprogramming actions which culminated in a complete reorientation of the WS 117L program. During the period, December 1958 through January 1959, a complete program reevaluation was accomplished; three separate programs were identified and three new development plans were prepared, one for each of the new programs; SENTRY, DISCOVERER and MIDAS, (the 4th set of development plans in a calendar year).

In mid-February 1959, ARPA "in general" approved the DISCOVERER and SENTRY Development Plans. These were the first such approved plans that the WS 117L system had. In early March 1959, the first phase of a three-phase MIDAS program received approval.

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In summary, the year under ARPA management has been characterized by indecision, instability, and rapid changes in program objectives and funding. For example, between April and September 1958, the WS 117L funding level was changed seven times.

Depending upon the definition chosen, the program has undergone eight major program changes under ARPA. The newly formed ARPA began the immediate management of a very large and complex program while both undermanned and uncertain as to their position in the government. The evidence indicates that the technique of "having a bag full of answers to which one applies problems" has been used, i.e., fund ceilings into which the program must be made to fit.

In the same time period, remarkable progress has been accomplished in that from the time of program initiation in April 1956 (publication of first development plan) until the first successful DISCOVERER launch, 28 February 1959, the lapse time has been three years. The majority of this work has been accomplished within the last one and one-half years.

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FOOTNOTES

1. Utility of a Satellite Vehicle for Reconnaissance; R-217, RAND Corporation, April 1951, p 80.
2. Project Feedback Summary Report, R-262, Vol 2, RAND Corporation, March 1954, p 56.
3. ARDC System Requirement No. 5, GOR 80 (SA-2c).
4. NEC action 5520.
5. USAF (DCS/D) Development Directive No. 85
6. Ltr, DCS/D, USAF to Comdr, ARDC, Subject: (U) Planning and Funding Requirements for WS 117L, dtd March 1957.

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WS 117L
DISCOVERER, SENTRY AND MIDAS PROGRAM AND FUNDING CHRONOLOGY
1946-1959*

- 1946-47 RAND Corporation investigated the feasibility of a satellite as a reconnaissance vehicle. These studies continued through 1953.
- 12 Jan 48 General Hoyt S. Vandenberg, in a policy statement on a satellite vehicle, noted that R and D on a satellite vehicle should be pursued as rapidly as state of the art permitted.
- 1951 Air Force let feasibility studies for critical satellite subsystems to RCA, NAA, Bendix, Flader, Chalmers and Vitro Companies.
- Feb 54 Final RAND report on Advanced Reconnaissance System. System feasibility was established. Development was recommended.
- 27 Nov 54 ARDC published System Requirement No. 5 on Advanced Reconnaissance System.
- 16 Mar 55 Air Force issued GOR 80(SA-2c) for a strategic reconnaissance satellite weapon system.
- Mar 55 Design study proposals solicited from IAC, RCA, Martin, Bell Telephone. Bell Telephone declined to propose.
- May 55 NSC action 5520 directed the Department of Defense to develop capability of launching small scientific satellite by 1958. Effort not to prejudice or interfere with other satellites for research or intelligence. Emphasized peaceful purposes. Would be a technical step to demonstrated satellite achievement with prestige and psychological benefits. Cost estimated as \$15-20M. (Vanguard the result).
- Oct 55 General Power directed that Advanced Reconnaissance System development program be transferred to WDD.
- 13 Jan 56 Memorandum of Understanding on transfer of Advanced Reconnaissance System from ARDC Detachment No. 1 to WDD. Generals Schriever and Estes agreed WDD office would be established about 15 February 1956, take over Advanced Reconnaissance System program.

* Prepared by the Air Force Ballistic Missile Division Historian.

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- 14 Jan 56 WDD published a WS 117L Preliminary Development Plan in response to a request from Hq ARDC. Based on a possible need to demonstrate an orbital capability within the IGY, total cost was estimated at \$95.5M.
- 12-20
Mar 56 A joint ARDC-WDD-WADC-AMC contractor evaluation board met at Wright-Patterson AFB to evaluate the 117L design studies prepared by RCA, Glenn L. Martin, and Lockheed Aircraft. Board found Lockheed as best qualified and recommended award of contract to Lockheed for development of WS 117L.
- 2 Apr 56 WDD published WS 117L Advanced Reconnaissance System Development Plan. R and D contract funds for system estimated at: FY 1956, \$7.0M; FY 1957, \$32.1M; FY 1958, \$75.6M.
- 22 May 56 WDD authorized to announce Lockheed selection, expend remaining Project 1115 funds on 117L. No other funds available at moment.
- 24 Jul 56 WDD Development Plan for WS 117L approved by Hq USAF.
- 3 Aug 56 USAF (DCS/D) issued Development Directive No. 85 on WS 117L, Advanced Reconnaissance System. WS 117L given 1A priority, 1-6 precedence rating. But "because of fund limitations, only \$3M of FY 1957 P-600 series funds are available to your Command to initiate this development."
- 28 Aug 56 WDD pointed out the effect of FY 1957 WS 117L fund limitations on WS 117L development, and requested \$21.9M additional FY 1957 funds for the program.
- 23 Oct 56 USAF again cited limitations on WS 117L P-600 funds. Guidance given WDD included: 1) prolong development, 2) maintain minimum balanced rate of development progress on vehicle and components instead of on Development Plan target completion dates. TWX stated that Headquarters attempting to reprogram \$7.M more P-600 FY 1957 funds.
- 29 Oct 56 USAF source selection board awarded prime contract on WS 117L to Missile Systems Division, Lockheed Aircraft (Contract AF 04(647)-97).
- 21 Nov 56 WDD submitted FY 1957 WS 117L fund requirements totalling \$17.8M in P-100 and 200 to DCS/D.
- 29 Nov 56 Secretary of the Air Force Donald Quarles was briefed on WS 117L status and program.

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10 Dec 56

Lt General D. L. Putt, DCS/D, informed ARDC that FY 1957 P-600 funds for WS 117L had been increased from \$3M to \$5M, and efforts were under way to reprogram \$5M more. For management planning, WSS should count on \$10M total P-600 for FY 1958 also. Other efforts would be made to get P-100 and 200 funds. Other guidance: 1) develop and test components, 2) do not make mockup until advised, 3) do not plan launch before FY 1961.

30 Jan 57

Commander, WDD, informed DCS/D that lack of FY 1957 P-100 and 200 funds was preventing procurement of materiel and equipment essential to maintaining a balanced system oriented development program, and that P-600 funds ceilings for FY 1958 were considered inadequate to meet the program minimum component development and test needs.

9 Feb 57

Answering a Department of Defense request, WDD furnished DCS/D with material on possible use of WS 117L as IGY satellite. Indicated it could be done at cost of \$66M by late 1958 or early 1959 if ATLAS development was satisfactory. WDD not enthusiastic about approach because of possible interference, short development time, order of confidence.

11 Feb 57

WDD warned LMED that they had \$8.5M on contract through 30 June 1957, and that they should not overcommit.

6 Mar 57

ARDC received guidance letter from DCS/D, USAF on planning and funding requirements for WS 117L. Indicated that P-100 and 200 FY 1957 funds were over-programmed. Mention was made of Secretary Quarles' views regarding a definite slow-down, and emphasis on component development to insure greater success. No orbital testing was to be undertaken in development prior to January 1960. Development of WS 117L should be conducted along conventional lines. Establish a Weapons System Program Office at WDD. \$10M P-600 funds were available. For FY 1958, estimates were that a total of \$35M would be available for WS 117L.

2 Apr 57

WDD published Systems Development Plan, Advanced Reconnaissance System, WS 117L for various degrees of operational uses, 1960-1965. Funding needs estimated through 1965 totalled \$223.7M.

8 Jul 57

LMED informed AFMSD* they needed \$7.9M to fund the WS 117L program between 15 August and 30 November 1957.

* Name of Western Development Division (WDD) was changed to Air Force Ballistic Missile Division (AFBMD) 1 June 1957.

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- 10 Jul 57 WS 117L assigned unclassified nickname New Horizon.
- 13 Aug 57 IMED informed by AFEMD that WS 117L FY 1958 funds totaling \$3.9M were available to carry the program through 30 October 1957. Adjust program accordingly.
- 21 Aug 57 AFEMD informed IMED that WS 117L FY 1958 P-600 funds could not exceed \$9.6M, with no more than 50% expended in the first six months.
- 3 Sep 57 AFEMD informed by DCS/D that only \$10M P-600 FY 1957 WS 117L funds were available, and as yet no P-100 or 200 funds, though efforts were being made. Limit activity to \$10M funds. Authority to mockup vehicles granted.
- 16 Sep 57 Air Council reviewed, approved WS 117L program as presented, approved go-ahead as fast as possible consistent with good management.
- 19 Sep 57 AFEMD submitted WS 117L FY 1958 and 1959 austere funding requirements to DCS/D. Stated that \$48M in FY 1958 would allow initiation of the flight test program by mid-CY 1958.
- 9 Oct 57 Following Sputnik, in answer to Hq USAF request as to efforts and resources required to accelerate the ICBM and IRBM, an estimate was made for WS 117L. AFEMD pointed out that a large amount of funds would be needed to regain lost time due to fund strictures and lack of firm program approval. With \$99.2M FY 1958 and \$121.7M FY 1959 funds program could be advanced six months to one year if priority were given effort.
- 10 Oct 57 AFEMD requested interim FY 1958 procurement authority of at least \$4M P-100 and \$1M P-200 funds by 25 October to prevent a work stoppage.
- 10 Oct 57 Secretary of the Air Force James Douglas approved the WS 117L program as presented to the Air Council as a planning objective, subject to Mr. Quarles' review.
- 15 Oct 57 \$35.1M (FY 1958) P-100 funds authorized WS 117L by DCS/D. Later (19 October) AFEMD told to limit obligations on this procurement authorization to \$15.5M through January 1958. This was rescinded in November. No P-200 funds to date.
- 16 Oct 57 DS/D Donald Quarles was again briefed on WS 117L, without resolution of need for acceleration.

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- 12 Nov 57 RAND Research Memorandum 2012, A Family of Recoverable Reconnaissance Satellites published. Prepared by M. E. Davies, A. H. Katz and others, it proposed using THOR plus Aerojet (second stage of Vanguard) as boosters.
- 27 Nov 57 AFMMD requested that ICBM/IREM overtime policies be extended to WS 117L, replacing the existing 2% of programmed manhours overtime limitation.
- 20 Dec 57 Subsystem "G", WS 117L, (ICBM Attack Alarm) preliminary design completed. Fabrication of experimental payload units begun.
- 6 Jan 58 IMED submitted a program acceleration plan for WS 117L (IMED-2832) as requested by AFMMD in November 1957. Accelerated program was based on Thor-boosted early flight with a recoverable capsule as proposed by RAND. Flights to begin in late 1958. Increase manufacture of IMED vehicles. Atlas-boosted flights to begin in early 1959. General Schriever approved plan in principle, subject to reviews of special areas.
- 21 Jan 58 AFMMD notified that Assistant Secretary of Air Force (Material) had approved use of overtime on WS 117L "as may be necessary to meet the approved objective".
- 22 Jan 58 Program acceleration plan submitted. Plan included a photographic reconnaissance configuration of a Thor-boosted recoverable reconnaissance package.
- 23 Jan 58 Chief of Staff USAF approved acceleration of WS 117L program. FY 1958 funds would be provided when actually required.
- 29 Jan 58 Contract AF 04(647)-181 given IMED for Thor-boosted test vehicles. This became the DISCOVERER program.
- Feb 58 Hq USAF considered expanding Project Able to include WS 117L test vehicles. AFMMD recommended against this because 1) Able configuration not yet proven; 2) would disrupt Able schedules. After several successful launches, their use as WS 117L test vehicles could be reprogrammed if authority to proceed were given immediately.
- 3 Feb 58 President Dwight D. Eisenhower directed that highest and equal national priority be given to ballistic missiles, satellites and defense programs. (ICBM, IREM, WS 117L, WS 224A)

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- 24 Feb 58 Secretary of Defense Neil McElroy approved in principle the proposed acceleration of WS 117L to be conducted under direction of ARPA. AFEMD to submit a development plan.
- 26 Feb 58 WS 117L Site Selection Board convened at AFEMD. Board chaired by Colonel F. C. E. Oder, members from AFEMD, SAC, AMC, Hq USAF. Board to select tracking and data acquisition sites for the system.
- 28 Feb 58 Mr. Roy Johnson, ARPA, in a memorandum to the Secretary of the Air Force concluded that:
- a. ATLAS/WS 117L Project should be accelerated and given highest national priority in order to attain IOC at earliest date.
 - b. Thor-boosted interim reconnaissance system with light-weight recoverable capsule was a duplication of "a." Do not pursue this program.
 - c. To attain early flights of Lockheed second stage, Air Force may find it desirable to use Thor-boosted test firings. Thor boosters cheaper and available sooner than ATLAS, also could be used with second-stage Lockheed vehicle for experimental recovery flights with animals.
- Mar 58 AFEMD activity in interim visual reconnaissance program (II A) terminated in accordance with Mr. Johnson's message of 28 February.
- 4 Mar 58 Chief of Staff, USAF, directed that WS 117L and other space projects which depend on the use of IC/IREM's be administered in same manner and with same procedures as IC/IREM programs. ("Gillette procedures"). AFCEM to be central point of contact, coordination. Approved development plans would constitute action documents.
- 4 Mar 58 OSD approved acceleration of WS 117L to include launching satellite test vehicles based on THOR booster.
- 12 Mar 58 Lockheed notified that Hq USAF had disapproved the WS 117L recoverable reconnaissance payload program. (WS 117L Program IIA). IMED notified to reorient THOR-booster WS 117L program for acceleration using THOR-boosted flights for early WS 117L tests--orbital flights for exercise of ground-space communication network, concept for recoverable capsule, for aero-medical research flights.

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- 14 Mar 58 AFBMC reviewed accelerated WS 117L program, agreed on use of THOR booster for system test in orbital satellites.
- 19 Mar 58 AFBMD informed that all statements on the nature and timing of ARPA missile and satellite projects will come from OSD.
- Apr 58 AFBMD requested by USAF to revise 15 March WS 117L Development Plan financial annex to downward from \$214M to \$152M. Keep program flexible.
- Apr 58 Biosatellite programs added to Advanced Reconnaissance System--recoverable capsule.
- Apr 58 UMEH engine development initiated.
- 28 Apr 58 DOD directed interchange of technical information and visits on satellites and space programs between US Army and Air Force up to SECRET. Refer other cases to headquarters.
- 30 Apr 58 NORAD expressed interest in infrared capability of WS 117L as an air defense attack alarm against ICBM launches.
- May-Jun 58 Ft Stevens, Oregon, selected as location of WS 117L NW tracking and data acquisition station.
- May 58 Advanced Reconnaissance System renamed SENTRY.
- 9 May 58 Lt General Francis H. Griswold, V/CinC/SAC, in a letter to Commander ARDC, pointed out that SAC enthusiastically supported WS 117L. Reconnaissance features a tremendous potential, especially infrared, photographic, electronic. Also a requirement for a communications satellite, high altitude (22,000 miles) advanced surveillance systems.
- 19 May 58 Cognizance over WS 117L assigned to ARPA. (DOD Directive 3200.5)
- 19 May 58 Subsystem "G" (ICBM Attack Alarm) Engineering Analysis completed.
- 21-22
May 58 First meeting, ARS Weapon System Phasing Group.
- 20 Jun 58 USAF informed major commands that WS 117L carried highest national priority, DK rating of .011 Brickbat, precedence rating of 1-1. Informed commands that field activities would begin in early 1959.

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- 30 Jun 58 ARPA Order No. 9-58 issued. Announced Sec Defense had approved the assumption of responsibility for the Advanced Reconnaissance System (WS 117L) by ARPA. AFEMD to continue the project: to submit a detailed development and financial plan to ARPA. \$22.7M made available initially.
- 1 Jul 58 AFEMD Advanced Reconnaissance System (WS 117L) "New Horizon" Development Plan published. Funding program FY 58, \$60M; FY 59, \$215M, later revised to FY 58, \$67M; FY 59, \$198M. Plan contained both THOR-boosted version for component test and demonstration of orbital capability, and ATLAS-boosted reconnaissance program.
- Jul 58 Initial arrangements made by AFEMD to organize a unit capable of aerial recovery of WS 117L capsules. 9/C119J aircraft to be used. "Aerial Snatch" called Project Hot Hand. Aircraft to come from TAC, 6593d Test Squadron (Special) activated by ARDC GO 38, effective 1 August 1958. Unit to be based at Hickam AFB.
- Jul 58 WS 117L Site Selection Board selected NE tracking and data acquisition station site at New Boston Gunnery Range, N.H. Only site which met criteria and BOD needs.
- 8 Jul 58 ARPA noted to Secretary of Defense that the question of the operating agency for WS 117L should be reviewed in the light that many agencies have an interest in the information.
- Jul 58 ARPA expressed interest in features of WS 117L (subsystem "G") as an infrared attack alarm system.
- 15 Jul 58 ARPA directed that monthly and quarterly progress reports on WS 117L be forwarded directly to them. Form prescribed by ARPA.
- 17 Jul 58 ARPA Order No. 9-58 funds increased to \$30.7M to purchase four WS 117L upper stages. (Amendment No. 1)
- 18 Jul 58 Air Force authorized by ARPA to procure long lead time items to support THOR-WS 117L firing schedule which is to begin in November 58.
- 20 Jul 58 ARPA requested briefing on WS 117L with special reference to applicability of subsystems and components to other uses such as communications, weather, and scientific measurements, use of ground components for general satellite tracking. Also wanted information on advanced reconnaissance satellite--engines, television, infrared, power supplies.

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- 20 Jul 58 Director, ARPA, informed Sec Air Force \$215M was programmed for WS 117L in FY 1959. \$30.7M available to AFEMD. Balance subject to Congressional action, BOB apportionment. Total included bio-medical project. AFEMD informally requested to submit a new development and funding plan within these limitations, and to indicate how they would use more money if additional funds are available.
- 22 Jul 58 ARDC GO No. 38 designated and organized 6593d Test Squadron (Special)--purpose - for aerial recovery of satellite payloads. (In place of AFFTC for training, Aug-Dec 58, then to Hickam AFB, Hawaii.) Squadron assigned to Det #2, ARDC, AFEMD, for administrative and operational control.
- 22 Jul 58 Ottumwa, Iowa (Naval Air Station) picked for location of WS 117L Central Tracking and Data Acquisition station.
- 28 Jul 58 AFEMD held technical review of Attack Alarm System. Probability of success quite high.
- Aug 58 New Boston Bombing Range, Grenier AFB, N.H., approved as site of Northeast tracking and data acquisition station.
- 4 Aug 58 ARPA Order No. 9-58 funds increased to \$50.7M. (Amendment No. 2).
- 5 Aug 58 Procurement of long lead time items authorized. THOR-WS 117L vehicle procurement increased an additional 9 over the 10 authorized to a total of 19. Intent to utilize these for bio-medical and other measurements of space phenomena. Prepare new development plan based on \$215M FY 1959 ARPA program.
- 22 Aug 58 AFEMD established a Management Survey Team to look into all aspects of WS 117L Program Management at INED, IAC. (ARDC SO M-770)
- 25 Aug 58 ARPA Order No. 9-58 funds increased to \$70.7M. (Amendment No. 3).
- Sep 58 WS 117L interim tracking and telemetry facilities beneficially occupied at Vandenberg AFB, California; Naval Air Station, Pt Mugu, California; Kaena Point, Oahu, Hawaii; Annette Island, Alaska; Kodiak Island, Alaska.
- Sep 58 Former Naval Air Station at Ottumwa, Iowa, approved as the site of the WS 117L central tracking and data acquisition station.

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- 15 Sep 58 AFEMD published Advanced Reconnaissance System (WS 117L) Development Plan. Contained both TRON and ATLAS-boosted phases of program. Funding program, FY 59, \$231M; FY 60, \$296M. Plan is profusely illustrated and explanatory in detail.
- 15 Sep 58 AFEMD published SENTRY Operational Annex to Advanced Reconnaissance System Development Plan. Contained operational concept, command responsibilities, system characteristics. Operations, personnel and training, logistics, facilities, schedules, funding program.
- 17 Sep 58 AFEMD recommended acceleration of Attack Alarm Development. Development Plan prepared which included: August 1959 first test launch and January 1961 first operational launch.
- 17 Sep 58 ARPA requested that term SENTRY instead of WS 117L be applied to Atlas Operational Capability previously designated as Pioneer visual, Pioneer ferret. Budget these separately, budget rest of program as improved military space systems.
- 22 Sep 58 General Power, CINCSAC, briefed on Attack Alarm Development Plan. General Anderson, ARDC, Air Force Ballistic Missile Committee and Air Force Staff briefed on Attack Alarm Development Plan.
- 23 Sep 58 In a personal TWX, General Power informed General Lelky that he was distressed over the reluctance of agencies to support an early reconnaissance and infrared attack alarm features of WS 117L.
- 25 Sep 58 ARPA Order No. 9-58 funds increased to \$136.2M. (Amendment No. 4).
- 25 Sep 58 Attack Alarm Development Plan transmitted to ARPA.
- 25 Sep 58 Director, ARPA, informed AFEMD he was not able to approve current SENTRY Development Plan. Reasons: AFEMD FY 1959 funding plan exceeded ceiling of \$215.M; achievements of major program objectives have been substantially delayed in spite of proposed funding level increases; FY 1960 budget is in excess of a considered realistic funding level. ARPA sent an Ad Hoc Project Group out to investigate, evaluate and recommend.
- 27 Sep 58 GOR No. 80(SA-2c) amended to include specific requirement for ICBM warning and tracking.

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- 29 Sep 58 Responsibility for execution of ARPA Order No. 9-58 transferred from Commander AFEMD, to Commander ARDC. (Amendment No. 5)
- 3 Oct 58 ARPA Ad Hoc Committee advised contractor that Attack Alarm would not be supported as part of SENTRY program.
- 7 Oct 58 In a personal message, General LeMay informed General Power that the Air Staff was solidly behind WS 117L, but basic budgetary restrictions prevented reprogramming response to this problem in a manner similar to wholly Air Force programs. In his opinion ARPA was also sympathetic but was suffering under the curse of an arbitrarily imposed financial ceiling. Assured General Power that USAF was providing support for ICBM Attack Alarm System.
- 8 Oct 58 AFEMD informed ARDC of ARPA apparent intent not to fund Attack Alarm development during FY 1959.
- 10 Oct 58 ARPA directed AFEMD to cancel all actions in WS 117L SENTRY program directed toward an ATLAS launch capability at AFMTC, but not to cancel boosters since they may be used at Vandenberg AFB.
- 10 Oct 58 AFEMD informed ARDC that \$1.8M required to continue Attack Alarm from 15 October thru 15 December.
- 14 Oct 58 Hq USAF directed work continue on Attack Alarm development with funds to be provided.
- 24 Oct 58 Hq USAF provided Attack Alarm funds required to continue program to 15 December.
- 27 Oct 58 General Partridge briefed on Attack Alarm Development Plan.
- 1 Nov 58 DCS/D authorized \$2.4M FY 1958 P-244 funds for WS 117L.
- 5 Nov 58 ARPA Order No. 38-59 proposed THOR-boosted flight to test Attack Alarm payload, ARPA funds program \$.75M for period November thru January 1959. The study and development begun as subsystem "G" of WS 117L was to be continued in accordance with order as an independent project to result in an orbitally flight tested missile defense alarm satellite. (MIDAS).
- 17 Nov 58 ARPA Order No. 41-59 authorized the design and construction of Sentry launch complex at Pt Arguello at \$6.65M.

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Nov 58 Strategic, Air Defense and Reconnaissance panels of Weapons Board briefed on capability of MIDAS system.
- 25 Nov 58 ARPA directed ARDC to eliminate two of the small primate shots from the DISCOVERER test series. Two mouse, and one small primate shot were authorized. The two cancelled small primate boosters were to be reassigned.
- 4 Dec 58 Mr. Roy W. Johnson, Director, ARPA, informed the Under Secretary of the Air Force that a program to develop a number of systems and techniques which would be employed in the operation of space vehicles had been inaugurated. This program, to be known as DISCOVERER, was to include THOR launchings associated with WS 117L plus other similar projects not operationally oriented. DISCOVERER-THOR costs were to be separated from WS 117L program (SEWERY). Separate development plans and progress reports were to be made for each. Tentative reallocation of funds were as follows: DISCOVERER, FY 1959, \$108M; FY 1960, \$60M. SEWERY, FY 1959, \$10M; FY 1960, \$100M. Secretary of Defense and ARPA agreed to assign IOC for SEWERY to ARDC "for the next several years and until final objectives are obtained." Tentative "centers" for the program were to be operated by ARDC.
- 5 Dec 58 Mr. Roy W. Johnson, Director, ARPA, informed Under Secretary of the Air Force that reorientations of the DISCOVERER and SEWERY programs were proposed, and a study and review would be made. For this review, Air Force was to assume that \$213.3M was available in FY 1959 and \$160M in FY 1960. AFEMD should not exceed these resources. In areas where cancellations were contemplated, no procurements beyond those absolutely necessary should be made.
- 7 Dec 58 Mr. Roy W. Johnson revised his 25 November 1958 letter concerning biomedical payloads for DISCOVERER program to provide for one successful primate recovery up to a total of three attempts, if necessary and desired, to be in lieu of payloads in the series of 13 flight vehicles.
- 11 Dec 58 Responsibility for execution of ARPA Order No. 9-58 transferred from Commander, ARDC to Secretary of the Air Force (Amendment No. 6).
- 11 Dec 58 AFEMD informed USAF that \$9.3M was needed to continue Super "G" Attack Alarm (MIDAS) from 15 December 1958 to 15 February 1959.

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- 15 Dec 58 Hq USAF funded MIDAS \$1.5M for 15 December thru 15 January 1959.
- 15 Dec 58 AFMD briefed AF and ARPA on WS 117L reorientation in response to 4, 5 December ARPA directives. AFMD also submitted alternate program reorientation suggestions.
- 16 Dec 58 ARPA Order No. 48-59 to Sec AF requested Sec AF to continue study, development, and launch operations originally associated with the THOR phase of SENTRY program under ARPA Order No. 9-58, as an independent project identified as DISCOVERER-THOR Project. Earlier costs will be transferred to the new project. Prepare a new financial plan by 15 January 1959.
- 17 Dec 58 Mr. Roy Johnson, in a memorandum for the U/Sec AF, stated that the fundamental objectives of the ARPA SENTRY R and D program should be development of improved area reconnaissance with recovery techniques, point reconnaissance development. Surveillance should be based on planned film readout, reconnaissance on film recovery. Fly recoverable ATLAS-boosted capsule early in 1961, with surveillance camera system in mid-1961. Funds for ARPA SENTRY: FY 59, \$215M; FY 60, \$160M. 1959 figure includes 13 DISCOVERER flights. To meet fund limitations, USAF requested to delete: 1) high energy fuels program for second stage; 2) development and test of 6 readout cameras and to consider use of recoverable ATLAS space vehicle as test bed for surveillance camera and ferret systems; and to consider use of ATLAS with 1960 operational recovery program for additional uses, etc. Mr. Johnson announced that ARPA supported USAF proposed operational program as presented.
- 19 Dec 58 Amendment No. 1 to ARPA Order 41-59 authorized construction of a Guided Missile Assembly Building for SENTRY program at Vandenberg AFB site. Increased funds from \$6.65M to \$9.82M.
- 19 Dec 58 Air Force contracts with IMED (-97, -181) combined.
- Late
Dec 58 First THOR boosted DISCOVERER on pad at Vandenberg AFB awaiting launch.
- Dec 58 -
Jan 59 Intense activity at AFMD in separating various phases of the WS 117L program, preparing separate development plans on THOR-DISCOVERER, SENTRY, MIDAS, and CARROUSEL phases of the program.

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- 15 Jan 59 Hq USAF funded MIDAS \$1.5M (P-600) for 15 January 1959 thru 15 February 1959.
- 19 Jan 59 Amendment No. 7 to ARPA Order 9-58 increased available WS 117L funds from \$136.2M to \$138.2M.
- 21 Jan 59 First launch attempt of a DISCOVERER from Vandenberg AFB. Launch terminated at T-60 by premature firing of the ullage rockets. Both the satellite vehicle and the THOR booster suffered damage. Launch date was set back to late February.
- 28-30
Jan 59 Mr. McIntyre, Mr. Johnson and Air Staff briefed on proposed Joint ARPA/USAF development of MIDAS.
- 30 Jan 59 AFEMD published four new development plans--DISCOVERER, MIDAS, SENTRY and CARROUSEL. Plans in accordance with ARPA-directed reoriented program.
- 2-4 Feb 59 Hq USAF, AFDC and ARPA briefed on DISCOVERER, SENTRY and CARROUSEL Development Plans. The proposed CARROUSEL was removed from further consideration.
- 12 Feb 59 Mr. McIntyre in a memorandum for Secretary of Defense re-emphasized Air Force position as to the urgency of the development of the MIDAS system and stated that the Air Force considered MIDAS to be of highest priority. Mr. McIntyre recommended that the SAF approve the fund augmentation requested by the ARPA stating ARPA's request for emergency funds for MIDAS be considered as a prior claim to any Air Force requests for emergency funds.
- 16 Feb 59 Amendment No. 1 to ARPA Order 48-59 approved "in general" the DISCOVERER program as presented to the ARPA on 4 February 1959. The approval authorized a 13-vehicle program and made available \$104.3M for FY 1959.
- 16 Feb 59 Amendment No. 8 to ARPA Order 9-58 approved "in general" the reoriented SENTRY program as presented to the ARPA on 4 February. Total funds authorized on ARPA Order 9-58 were decreased from \$148.2M to \$96.6M for FY 1959.
- 17 Feb 59 ARPA Order 60-59 made \$1.1M available to defray the cost of modification and operation of the downrange telemetry ship, Pvt Joe E. Mann, thru 30 June 1959. The order announced that effective 1 July 1959 operational and funding responsibility for the ship would be transferred to the Pacific Missile Range.

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- 28 Feb 59 DISCOVERER I-163-1022 successfully launched at 1349 hours from Vandenberg AFB.
- 2 Mar 59 Amendment No. 1 to ARPA Order 38-59 approved, subject to review, Phase I only of the MIDAS program and increased available funds under the order from \$.75M to \$.8.0M. Instructions were given to AFEMD to submit plan for the procurement of ATLAS boosters and space vehicles for Phases II and III, long lead time items.
- 18 Mar 59 AFEMD directed by AFAHF to hold the six boosters removed by ARPA in Amendment 1 to ARPA Order 48-59, (Program reduction from 19 to 13) on production, notify AF when funds for these six were required.
- 24 Mar 59 Amendment No. 2 to ARPA Order 48-59 approved the development and funding plan dated 30 January 1959 for the DISCOVERER Program. The approval provided for a 13-vehicle program.
- 3 Apr 59 Amendment No. 10 to ARPA Order 9-58 approved the AFEMD SENTRY Development Plan of 30 January 1959 "to the extent it pertains to payload programs of visual readout visual recovery, and ferret readout".
- 10 Apr 59 Amendment No. 4 to ARPA Order 17-50 directed AFEMD to modify the Ball-Bustler stage to obtain dual burning capability, simplify guidance and control, and structures to contain payloads of arbitrary shapes that may be carried; increase propellant capacity (\$.1M). Deliver and launch at Pacific Missile Range two THOR-HUSTLER vehicles suitable for 215 pound TRANSIT #2 payload in 400 n.mi. circular orbit.
- 13 Apr 59 DISCOVERER II launched from Vandenberg AFB. Satellite orbited, but because of cumulative adjustment of the orbital ejection timer, the capsule was probably ejected in the Spitzbergen, Norway, area. An unsuccessful area search (terminated 22 April) was conducted.
- ~~16~~ Apr 59 By ARPA Order 38-59, ⁵⁹ Amendment No. 3, Phase I of the MIDAS Development Plan (FY \$20.2M) was approved. Program objective strongly reoriented to give priority to quantitative scientific and engineering data, with objective to predict success or failure of an operational alarm system, improvement and design.

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- 1 May 59 AFEMD submitted DISCOVERER Development Plan dated 30 April to Mr. Malcolm A. MacIntyre, Under Secretary of the Air Force. Major change over earlier 1 January plan was addition of ten flights, making a total of 25 flights.
- 8 May 59 Mr. M. A. MacIntyre, Under Secretary of the Air Force, requested that the Secretary of Defense designate the Air Force as service responsible for operational employment and utilization of the MIDAS system.
- 18 May 59 AFEMD informed by AFDAT that WS 117L had been removed from Master Urgency List, and DISCOVERER and SENTRY put on it with DX ratings. Action was underway to obtain (from NSC or NASC) a DX rating for MIDAS. AF priority for all three programs remained as 1-A with 1-1 precedence.
- 20 May 59 Amendment No. 4, ARPA Order 48-59 approved DISCOVERER Development and Funding Plan dated 30 April 1959, on the 25-vehicle program. Funds were increased from \$104.3M to \$121.9M.
- 20 May 59 Amendment No. 4 to ARPA Order 38-59 increased funds for MIDAS from \$10.8M to \$22.8M.
- 26 May 59 ARPA directed that the mapping program be deleted from SENTRY. DMSD notified.
- 3 Jun 59 DISCOVERER III launched from Vandenberg AFB. Failed to achieve orbit because of less than nominal second stage performance and incorrect Pt. Mugu radar data indicating firing time. Data was received on the four mice passengers.
- 24 Jun 59 AFEMD was informed that ARPA had laid down ground rules for the initial FY 1960 budget determination. These were: SENTRY \$135.M, with SENTRY recovery program (\$25M) to be deferred pending review; DISCOVERER, \$35.M for extension and completion of the series; MIDAS \$18.M ARPA funds, with assumption Air Force will fund \$28.9M when Phase II was approved. No increments to the above funds were available. AFEMD was to submit revised development plans based on the above instructions. Until FY 1960 appropriations word was received, funds would be on a monthly basis.
- 25 Jun 59 DISCOVERER IV launched from Vandenberg AFB on a Polar orbit. While the launch was successful, the vehicle failed to achieve orbit because of less than normal second stage performance.

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- 15 Jul 59 Revised DISCOVERER, SENTRY, MIDAS development plans submitted to ARPA, as required in 24 June instructions.
- 20 Jul 59 ARPA, USAF, ARDC, briefed on programs outlined in the revised development plans.

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