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ART-C-10

19 Nov 62

BIT ~~ELINT~~ PROGRAM

Purpose and History:

The BIT ~~ELINT~~ program was initiated by the [redacted] office of SAFSP in 1964. Primary purpose was to determine the interest of the Soviet HEN HOUSE radar network in tracking the CORONA vehicle, including the pattern and modes of operation, and thus to obtain information which could assist in the development of effective countermeasures against the system. Secondarily, any information which could be of general interest to the intelligence community was to be gathered.

The program was in part a follow-on to an earlier effort called "Stopper." A number of these ~~ELINT~~ systems had been built for flight on the 698BJ vehicle. This program was cancelled late in 1962 before the system was ready. Subsequently, six Stoppers were flown on [redacted] vehicles with very indifferent results, marred by some equipment failures.

BIT Hardware:

The receiver units are built by Sylvania Electronic Systems, Western Operation, at Mountain View, California, under direct contract from SAFSP. Finished units are delivered as GFE to the Research Payload Group at Lockheed, Sunnyvale. This Group is responsible for overseeing all systems integration, vehicle installation, and checkout. Antennas are built by another Lockheed department and integrated by research payloads. Basic requirements given to [redacted] were that: (1) the equipment must be designed for installation in the experimental payloads section on the aft rack of the CORONA vehicle, (2) weight and power minimized, and (3) data storage and readout via the Agena telemetry system. A continuing design philosophy has been to provide sufficient sensitivity for good interception of side lobe data. This feature considerably enhances the number of intercepts. Analysis of radar target interest is greatly facilitated by its frequency scan mode; thus, side lobe measurements which include a fairly accurate frequency supply the main beam bearings and type of operation - track-while-scan or lock-on.

BIT I: This was a fixed tune, tuned radio frequency receiver, covering the range 153-163 MHz. A pulse width qualifier inhibits data recording of radars with pulse durations less than 20 microsecouds (to eliminate TALL KINGS primarily). Parameters measured are frequency to within 0.5 MHz, pulse amplitude, pulse count together with time of intercept.

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BIT II: A voltage tuned superheterodyne, sweeping through the range 150-300 MHz in approximately seven seconds, locking up for four seconds on any qualified signal. Pulse width qualification—measure pulse amplitude, pulse width, and the three time intervals between four consecutive pulses. This feature permits detection of interlaced pulses from two radars.

BIT III: This design did not progress beyond the proposal stage.

BIT IV: Introduced in 1967. A fixed tune receiver for 152-164 MHz coverage and a sweeping receiver for the range 700-1000 MHz, which is covered in 6½ seconds with 32 steps. A common signal measurement logic for pulse interval and pulse width is shared between the two receivers on a 50-50 duty cycle of 1.2 seconds each.

BIT IVA: A modification introduced in May 1969, adding coverage of 1880-2020 and 2105-2245 MHz, which is superheterodyned into the 700-1000 MHz receiver. L-band and S-band coverage is time shared with the S-band having priority. This equipment is presently used on all CORONA and GAMBIT missions.

BIT V: Employed two receivers, one for 153 to 183 MHz, the other sweeping through 700-2200 MHz. Used on seven GAMBIT missions beginning March 1968, ending June 1969. Replaced by BIT IVA.

BIT VI, VII, VIII: These were proposed receivers of increased complexity which were not pursued to hardware status.

BIT IX: Will be introduced on GAMBIT vehicle 4777 to be launched April 1970. Employs three separate receivers covering [redacted]

Antennas: For BIT I a half wave loop antenna mounted directly on the receiver box cover was utilized. On BIT II and succeeding designs an expandable antenna, called a "Lollypop" from its obvious similarity, is being employed. This is a planar logarithmic spiral of gold deposited on a dacron cloth substrate. The cloth is mounted within an inflatable tubular structure which in deflated condition is packed into a small box which is mounted on the aft rack.

Data Processing:

CORONA - BIT data is stripped from vehicle T/M by LMSC and forwarded to Sylvania for analysis. Reports are submitted initially by message as data is received and as hard copy reports after mission completion and full analysis. Lead time is typically 45 days for message reports and four months for final reports. Distribution is to NSA, DIA, CIA, Redstone, FTD, SAFSP, Hq USAF, and TRW.

Report content includes orbit by orbit summary of intercept opportunities for each known site, actual intercepts (main and side lobe), time and duration, track or scan, and comments on patterns of activity and any unusual signal characteristics.

GAMBIT - An arrangement worked out recently provides for processing, analysis, and reporting by LMSC at a savings of cost and time. The goal is one day for message reports after a Cook pass and 30 days after mission for final reports. Distribution and content same as above.

Costs:

(Per Mission)	BIT IVA	$50K
	BIT IX	$70K
	Antenna	$15K
	Data Processing, Analysis and Reporting	$15K

Program Results:

A substantial amount of data has been obtained on HEN HOUSE signal characteristics and the operational patterns of individual sites. Consistent coverage of S-band (TRIAD) began April 1969. Only one intercept has been obtained to date. This was on 12 August, during the 324th orbit of Vehicle No. 1652 just prior to mission termination.

Future Program:

BIT IVA will continue on each CORONA mission and on GAMBIT through Vehicle 4776. BIT IX will be on each GAMBIT commencing with Vehicle 4777 and on all HEXAGON missions. Program will continue to be responsive to changes in Soviet

radar order of battle as they become known. Additional emphasis is being given to data analysis by [redacted] program in support of survivability contingency planning efforts. Rapid review and analysis of BIT data is considered vital to establishing patterns of Soviet antisatellite activity and to anticipating the character and timing of possible hostile interference.