[redacted]

POPPY History

"Text W/ Vu-graphs"

~~Top Secret~~ [redacted]

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BYEMAN ~~TALENT KEYHOLE~~
~~COMINT~~
Control Channels only

~~Top Secret~~

~~TOP SECRET~~ EARPOP ZARF

Slide 1.
(Title)

1. Classification TOP/SECRET/EARPOP ZARF BYEMAN-TALENT KEYHOLE CHANNELS JOINTLY

2. Purpose: (a) to present some of the significant POPPY contributions to the SIGINT Community and (b) to review the history/background of the system.

3. Common Associated Names: POPPY is the BYEMAN program name. REPTILE is the NSA unclassified covername which equates to the NSG unclassified covername SISS ZULU. 7100 is the TALENT/KEYHOLE NRO assigned series in which POPPY is a part. Program C is one of the NRO programs, and is headed by PME-106 (NAVELECSYSCOM). POPPY is one of the Projects under Program C.

(1)

Slide 2.
(POPPY System)

1. In the late '50s, ADM Burke, then CNO, requested inputs from Navy S&T organizations for space related projects in response to the Advanced Research Projects Agency (ARPA). The NRL had developed a submarine crystal video ELINT collection system which they extended to space usage. Their idea was to put a real-time, pulse-for-pulse radar "transponder" in orbit which would relay the intercepts to a ground station which was also in view of the satellite

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Slide 2. (Continued)

The concept was presented to the CHO in March 1958.

2. The program was approved by President Eisenhower in August 1959, and work began on the forerunner of POPPY -- GRAB ~~and a BYEMAN~~ [redacted] or DYNO (NRL name). These were exploratory missions which had six month design lives, although we really didn't know how long they would last.

Slide 3. (GRAB I)

(5)

1. This is a picture of GRAB I, which was the very first U.S. launched reconnaissance satellite.

2. Before I get into the characteristics of the POPPY forerunners, I want to talk about some of the original hardware.

Slide 4. (Hut exterior)

Here is one of our earlier huts. Since our first launch occurred only approximately ~~two years~~ 4 Months after the Powers U-2 incident, all tasks needed the President's personal approval; and the system was tasked only 22 times over the Soviet Union.

Slide 5. (Hut interior)

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The operator on the left monitored the telemetry and tracked the satellites. The operator on the

(3)

Slide 5 (cont.) right monitored the data down links.

Slide 6 (GRAB II) This shows the GRAB II satellite. There was one additional launch between GRAB I and GRAB II on TRANSIT 3A in November 1960, but the booster failed and it was destroyed by the range officer. Back then we assigned designators only after successful launches.

[20" dia
Transit
Dr Van Allen
Poppy
- Bolts shot wrong sequence

Slide 7 (Predicessors)

1. This slide shows the three predicessors of our successful POPPY satellites.

2. All three were Navy/NRL sponsored, and all were launched from the Eastern Test Range at Cape Canaveral on THOR-ABLE STARs.

3. GRAB I was part of the TRANSIT 2A vehicle, which was a navigation/geodetic study. GRAB II/POPPY I were the same satellite, and were on the INJUN 1 package which was a solar radiation study. Handle Via BYEMAN control channels only

4. I want to give you a little background on names. When we started, GRAB was the Black World name for the Project and had an unclassified covername GREB. At that time, the NSA clearance was called WALNUT/HIBBLE,

(4) Slide 7 (continued)

the USN clearance was called POPPY and the USAF clearance was called EARDROP (all black world words). While GRAB II was in orbit, we all got together under one program and called our clearance EARPOP (EARdrop and POPpy combined). The program name was then changed from GRAB to POPPY.

5. POPPY II was on a package of five satellites called COMPOSITE 1, which failed to orbit.

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(2) Slide 8 (Sites)

1. Let's take a look at all the sites associated with the system. In addition to the stations on the slide. COMMSTA Hawaii was used during the GRAB I engineering evaluation. Our first "turn-on" was actually on Hawaii Statehood Day, 4 July 1960.

2. The original collection stations were: [redacted]

3. [redacted] was moved to [redacted] was moved to [redacted] prior to launch of 7101 in 1961.

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4. [redacted] was closed in the early '60s and in 1965 [redacted] was moved to [redacted]

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Slide 8 (continued)

5. [redacted] was a command only station, and was closed in 1965 when [redacted] got the command capability.

6. [redacted] were closed in 1967.

7. [redacted] began operations in 1972, and the green dots indicate the existing collection sites.

Slide 9 (7101)

(b)

1. POPPY III was the first NRO sponsored effort (7101), and the first POPPY launched from the Western Test Range at Vandenburb. Our satellites were launched on a THOR-AGENA D with three other payloads. Both satellites decayed around 1967.

Successful launch by the ^ Because of a THOR-ABL ← impact in C.

the ^ agena fuel did not burn off at proper time but continued to vent until exhausted that is why the effectively elliptical orbit.

2. Interestingly, when we switched from the THOR-ABLE to the THOR-AGENA, we gained additional space. The second satellite was added for better booster-payload compatability rather than for collection requirements.

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3. One of the President's advisors saw that we had two satellites, and suggested we could [redacted] The project was given to the NSA which developed

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[redacted] [redacted] HANDLE VIA BYEMAN ~~TALENT-KEYHOLE~~ COMINT JOINTLY

Slide 9 (continued)

the [redacted] principle, and introduced it to the POPPY program in 1963.

4. Note the extreemly elliptical orbit which caused some interesting passes - maximum duration of intercept ran from only a very few minutes to times longer than the magnetic tapes.

5. A. [redacted]
B.
C.

Slide 10 (7102)

(7)

1. These were launched on a THOR-AGENA D with two other payloads. All three decayed in July 1963.

the agenda did not depict so the orbit could not be circularized and the decayed the satellites in the atmosphere

2. Although the birds were only in orbit for a short time, our collection technology was advancing rapidly. Notice the almost continuous RF coverage through 4100 MHz.

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3. One interesting intercept the [redacted] produced was the detection of the [redacted]

[redacted]

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Slide 11 (Collection Antenna)

When the Navy [redacted] buildings, POPPY began its move into permanent facilities. This is a picture of our pre-1966 collection antenna. Notice that we now have cross-polarization in horizontal/vertical planes.

Slide 12 (Red/Green position)

This was a typical RED/GREEN position which lasted until 1967. The RED and GREEN complexes are the collection positions.

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(10)

Slide 13 (7103 RF bands)

This slide shows the overlapping RFs between the 7103 satellites. Remember that NSA developed the [redacted] this way.

(7104) a 3 axis stab. 7103C

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(9)

Slide 14 (7103C)

This is an artist's conception of ~~7103C, which~~ was our first satellite which contained a gravity gradient boom for stabilization: making it capable of continuous ELINT collection (all the previous satellites tumbled).

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(8)

Slide 15 (7103)

1. The 03s were launched on a Thrust Augmented THOR (TAT)-AGENA D with two other payloads. All three satellites are still in orbit. The 03s also gave us our first circular orbit.

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Slide 15 (continued)

2. The asterix behing the RF indicates that the receivers in the satellites covered this RF range, but not continuous. They were optimized for known Soviet emitters.

3. [redacted]

4. Provided the first indication of [redacted] and identified [redacted]

((When an emitter of this type has an extremely long PD compared to our system (i.e., 2000 usec:100 usec), we see some phase shifting. Also, when the threshold is broken by an emitter's modulation changes, we may detect the changes. When we first detected these phenomona, we compared them to known emitters which had the same kinds of complex modulations such as the [redacted]

Slide 16 (7104 RF Bands)

(12)

The 04 series was our first effort into I-Band, our first capability of back-up receivers and our first attempt at a [redacted] system.

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Slide 17 (7104)

(11)

1. They were launched with four other satellites, which was the first 8-payload launch. All four are still in orbit.

2. All the satellites had three-axis control, and, as can be seen, three of them had thruster capability for parking. Although we couldn't maneuver ALFA, we collected from it until 1968. This was also our first solid RF coverage through I-Band. ← 1ST 9000 MHz in Community.

3. [redacted]

Slide 18

(13) [redacted]

This shows some statistics which were prepared in defense against the critics who were challenging POPPY locating capabilities. Handle Via BYEMAN Control Channels Only

Slide 19 (7105 RF bands)

(15)

The 05s were built mainly for the Soviet ABM critters so we had extremely good coverage through E-band. We also extended our RF into J-Band.

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Slide 20

(7105)

14

1. This was another 8-payload launch on a THOR-AGENA, and all four of our satellites are still in orbit. They were launched in [redacted] like the 04s.

2. The 05s were built with the operational capability to measure signal levels of the [redacted]

3. [redacted]

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Slide 21

(7105)

[redacted]

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Slide 22 (7105)

[redacted]

Slide 23 (Command antenna)

Around 1968, we began our last major upgrade of the ground segment. We went to slant polarization for both the command antennas (here) and the

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Slide 24

collection antennas. narrower beamwidth horiz.

Slide 25

This is the BLUE complex or command position.

Slide 26

This is one of our collection positions.

Slide 27 (7106 RF Bands)

As we have seen, the 05s had great success against the ABM emitters. When the 06s were being planned, SORS decided to [redacted] so we could intercept any associated/unknown emitters which might be operating with the known ABMs. Notice that we have good coverage overlaps through E-Band.

Slide 28 (7106A)

The four 06s were launched on a THORAD-AGENA D with one additional payload. All four are still in orbit.

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Slide 29 (7106)

(18)

1. Notice that we have extended the solid RF coverage into J-Band.

2. BRAVO and DELTA birds suffered catastrophic equipment failures.

3. [redacted]

Slide 30 (7107 RF Band)

(24)

We are now up to our present and last POPPY series. The RF was extended to include part of K-Band. The 34 GHz notch was selected because it is the next low loss RF window after around 15 GHz. Also, there had been developments by the Soviets and some allied countries in this frequency range.

Slide 31 (7107 Nose)

(23)

These are the 07s in place for launch. The 07 series was teh only dedicated POPPY launch.

Slide 32 (Rocket)

(25)

The satellites were launched on a THORAD-AGENA D. This is the 7107s getting ready for launch.

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Slide 33

(Payload)

26

This is what the payloads look like dispensed. The decision was made to target the 07 series against the operational problem as well as the search and technical: therefore, a quicker revisit time became important, and the birds were dispensed [redacted] the orbit. However, we did add a third transmitter to retain some of the simultaneous search capabilities of the 06s.

Slide 34

(7107)

20

[redacted]

Slide 35

(7107)

21

Slide 36

(7107)

22

[redacted]

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~~TOP~~ [redacted]

~~Top Secret~~ [redacted]

Slide 37
(1966 OCSURV)

30

If you're familiar with POPPY, you know I've left out one of our most significant contributions, one which has generated an entire satellite program of its own - Ocean Surveillance through ELINT. This is an old slide which was used to try to convince people that POPPY could actually locate a moving emitter, and shows our first effort against the Soviet Navy.

Slide 38
(OCSURV)

27

1. The NSG proved to the CNO that Ocean Surveillance was worthwhile, and in 1968 ADM Morror made our effort official.

2. As you can see, we began reporting intercepts in a machinable format in 1970. The second half of the slide shows the approximate ten-fold increase in Soviet Combatant locations from our first entire year of [redacted] to the present. Additionally, we follow all routine transits of the Soviet Navy's Surface Fleet and.

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3. during the Defense of the Homeland Exercise, June-July 1971, POPPY accurately followed ship movements with an average processing time of two hours. Also, our intercepts significantly aided in equating the ships to their new

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Slide 38

(continued)

[redacted]

Slide 39

(Monthly OCSURV)

(28)

This slide show the monthly total shipborne locations by year since we started [redacted] reporting. In this case, we have increased our out approximately 20-fold.

Slide 40

(1974 OCSURV)

(29)

This is a matrix of estimates for POPPY 1974, based on 309 days of actual intercept and projected for the entire year.

((I didn't have the January 1974 intercepts (31 days), the first 19 days of February, and 25 June-1 July (7 days) = 56 days. The totals for the 309 days are:

Total Shipborne Locations - 49,413

Undistinguishable from Merchants - 30,428

Combatant/Auxiliaries (non-specific) - 12,780

Specific Hulls - 5,673

Projected for the 365 days are 58,368, 35,942, 15,096 and 6,701 respectively))

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Slide 41 (1st Hut)

We've taken a look at POPPY over the years and some of the neat & crafty things it's done for the community - especially in the technical world. I want to note that we didn't even touch the EOB contributions which POPPY has done routinely over the years. This picture shows our first hut on the Fourth of July, 1960.

Slide 42 (Today's antennas)

(31)

We also discussed some of the background which led us to the system as it now exists; and see that a POPPY is the best ELINT real-time ocean surveillance system - also, although we know very little about the Soviet EMCON procedures, a POPPY with modifications is the best approach to combat the problem.

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(32)

Slide 43

[redacted]

POPPY has done what was expected, and more. It has done so well enough to be the genesis for

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