Memorable MASINT Moments: Cold War Victories

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I became an optical data analyst at the Foreign Technology Division (FTD) in 1966 under the leadership of Joe Zufall and Ken Miller (the father of measurement and signature intelligence [MASINT]). At that point in time, the branch analyzed optical data (optical intelligence [OPTINT]) and infrared data (infrared intelligence [IRINT]) collected by an airborne platform that flew off the coast of the Kamchatka Peninsula and by radar sensors (radar intelligence [RADINT]) positioned on the island of Shemya. (There was no such thing yet as MASINT, although these capabilities were the foundation of what became MASINT.)

The primary purpose of these sensors was to collect data against Russian intercontinental ballistic missiles (ICBM) reentry tests into the Kamchatka Peninsula. Data from these sensors were used to characterize the optical infrared and radar signatures and to reconstruct the reentry trajectories of the ICBM payloads. In the OPTINT and IRINT area, whenever the airborne system made a collection, the whole optical exploitation office essentially worked on the event on a priority basis with the walls of the office covered with positive enlargements of camera films, optical printouts, spectral plots, visicorder charts displaying electro-optical sensor data, etc. Similar activities were under way in the RADINT area.

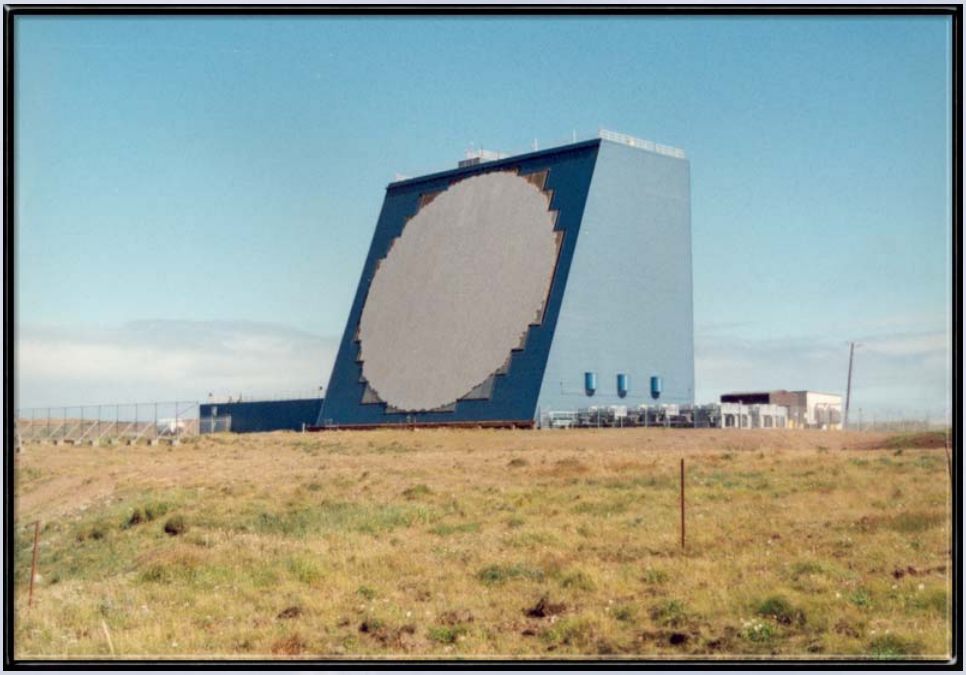
During 1968, I became a trajectory analyst coincident with the arrival of a new trajectory reconstruction program that was developed by Aerospace Corporation in support of NASA's Titan Gemini program. This computer program, known by the name of Modularized Vehicle Simulation (MVS), was used to take radar and airborne optical data collected against the reentry tests of Soviet ICBM's into the Kamchatka Peninsula and characterize the performance of the observed trajectories. Soon after I became a trajectory analyst, the first SS-9 ICBM test with multiple payloads was launched into the Kamchatka. The US airborne platform in the area collected reentry data against the SS-9 using a ballistic streak camera. The radar (noncoherent narrow band) sensors, relatively crude by today's standards, also observed these reentries.

This event was my baptism of fire and I was involved with a very extensive effort to reconstruct the trajectories of the multiple payloads. It is pertinent to point out here that the radars were too far away from the reentry area to observe the atmospheric reentries of these payloads. This was the reason for the airborne system, which was designed to observe, to impact if possible, the actual atmospheric reentries of the Soviet ICBM payloads. The ballistic streak used by the airborne platform consisted of a plate of glass, 7 by 9 inches, which was covered with photosensitive material.

During the reentry, the camera was turned on for the whole event and images of the total reentry event were recorded as downward streaks of light, one for each object observed. In a sense, this became a single large frame of film that, in effect, provided a radiation versus azimuth versus elevation history of the total reentry. Each object on this frame of film was measured to provide an azimuth versus elevation history from the airborne platform to the target. This azimuth versus elevation history was merged with the azimuth versus elevation versus range data collected by the Shemya radars to reconstruct the trajectory of each of the payloads.

For this important collection, an external contractor (Avco Everett, now Textron) familiar with exploitation of optical reentry data was chosen to read out the ballistic streak plate as a cross-check for our in-house analysis. The ballistic streak camera plate was carefully packaged and I hand-carried it to the contractor. Once I arrived at the contractor facility and the ballistic streak camera plate was unpacked, much to our dismay, we discovered that the glass plate had cracked during the trip. However, the contractor was successful in reading out the plate and the information successfully merged with Shemya radar data to reconstruct the trajectories.

FTD was the only organization to determine the trajectories and the associated parameters for this unique test of the SS-9. And while we felt quite pleased with our efforts, we were very surprised to see the ballistic streak camera image (a copy of the resultant large film frame) of this event published on the front page of *The Washington Post*. This presumably was published to provide proof that we were aware that the Russians now had the capability to launch multiple reentry vehicles with a single booster, and to make the Russians aware



COBRA DANE Radar on Shemya Island, Alaska

of what we knew. Quite frankly, I believe that this was the only time in my 40 years with MASINT that I've seen anything previously classified published anywhere. [See also the article in *Aviation Week & Space Technology* published 4 May 1970 on this event.]

During the 1970's, I became responsible for all optical signature exploitation, which was eventually merged with radar signature exploitation. Dean Dykes, one of the radar analysts who worked for me, had a couple of interesting sayings. Keeping in mind that radar data were collected by relatively crude radars (although they were state-of-art when developed), Dean used to say that 85 percent of what one could determine from radar signature data (size, shape, and configuration) was accomplished within the first few days after the data was received. Dean also stated that the difference between analysis and a guess on a Monday morning was all in the way you felt.

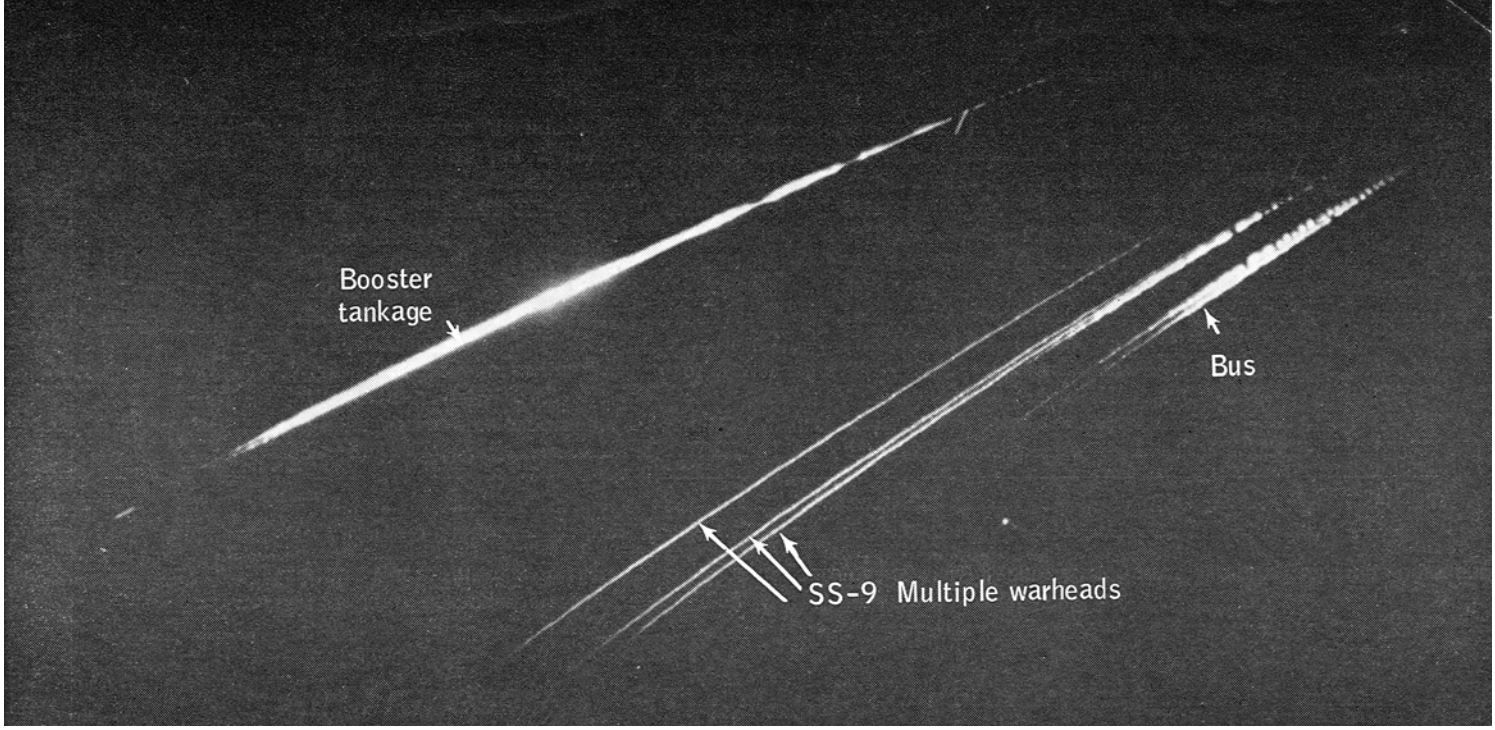
In either case, Dean, who was one of our experienced analysts with great expertise, ascertained from the noncoherent radar data that the SS-11 missile system payload had a triconic configuration. This was contrary to what missile systems analysts throughout the Intelligence Community believed and contrary to what the Central Intelligence Agency (CIA) believed by analyzing the same radar data. It is important to point out that the configuration, shape, and size of the missile payload had very important connotations in terms of the amount of nuclear material that the payload could package. To understand the threat posed by the SS-11, it was critical to resolve this difference in exploitation.

To resolve this disagreement, a meeting of the Guided Missiles and Astronautics Intelligence Committee (GMAIC), which is now called the Weapons Systems and Space Intelligence Committee (WSSIC), was convened. The GMAIC, after receiving many briefings and lengthy discussions, ruled in favor of Dean Dykes' determination that the SS-11 was indeed triconic. A few years later, a newly developed coherent wideband radar, providing a greatly improved capability to determine size, shape, and configuration, validated the fact that the SS-11 was triconic.

Another interesting situation occurred during the late 1970's or 1980's. By then, FTD was also responsible (through Ken Miller) for the exploitation of data collected by an early warning satellite system that collected infrared data from Soviet missile launches. This system notified North American Air Defense Command (NORAD) of every single foreign missile launch it observed. What occurred was that this spaceborne system suddenly started seeing a series of relatively long-duration infrared radiation events that the Defense Intelligence Agency (DIA) decided had to be foreign laser tests.

This caused a tremendous furor, the idea of lasers radiating our early warning satellites. However, because of the nature and extent of the infrared hits, our IRINT analysts ascertained that radiation events could not be from surface-based laser tests. However, DIA refused to accept that and a huge national effort was undertaken to analyze this so-called laser data. It was eventually proven that our infrared analysts were correct; the observed events were not laser-related.

RC-135 RIVET AMBER



Soviet SS-9 multiple-warhead intercontinental ballistic missile (ICBM) is shown upon re-entry into atmosphere during recent accuracy-range test with final impact point in the Pacific. Three multiple-re-entry vehicle (MRV) warheads have an impact of five megatons each. SS-9 MRVs are believed to have been developed specifically as a strike weapon against Air Force/Boeing Minuteman ICBM silo sites. Photo, released by Defense Dept. in effort to gain congressional support for Safeguard system, was taken by a U.S. reconnaissance aircraft. Top streak was made by disintegration of the booster tankage upon re-entry. Center three are the just-released MRV warheads. Lower streak shows burning bus vehicle that carried warheads during boost phase.

Soviet Power Cited to Air Military Budget

By Donald C. Winston

Washington—Soviet Union will become the most powerful military force on earth during the 1970s if present arms trends continue, President Nixon has told congressional leaders.

The rare presidential statement was made in an attempt to prevent defeat of the modified Phase 2 Safeguard anti-ballistic missile (ABM) system and other new weapons developments threatened by a strong Senate bloc.

Demonstrating its fears over the closeness of the impending Senate battle on the Fiscal 1971 defense authorization, the Nixon Administration released fresh intelligence on the Soviet military posture. This was done both directly by the President and through Defense Dept. leaks to congressional leaders.

Main points made by the Nixon Administration are:

- Russia has deployed 122 additional intercontinental ballistic missiles (ICBM) during the past year, while the U.S. has deployed none. In ICBMs, the Soviets now possess not only more long-range missiles than the U.S., but their nuclear delivery capability is substantially greater.
- Last year, the Soviets added eight nuclear missile-firing submarines to its fleet, while the U.S. added none. At the current rate of deployment, by 1974 or 1975 at the latest Soviet missile-firing submarine force will be superior to that of the U.S.
- Russia last year deployed 40 new anti-ballistic missiles around Moscow. Under the current development and deployment rate, the U.S. will not have a single ABM on the ground and operating until 1974 or 1975.
- In addition to what has been operationally deployed, the Russians are currently installing another 125 intercontinental ballistic missiles, building approximately 320 missiles for launch from submarines and are at work on an additional 27 anti-ballistic missile launchers and three major ABM radars.
- Land-based Krug direction-finding receivers were deployed. They can detect radio emissions of ships at ranges up to 6,000 mi. The Krug is used to direct reconnaissance aircraft to enemy fleets. Soviets are also using passive sonar with a range as great as 100 mi. for detecting U.S. ships from the ocean surface.

Administration move was timed to coincide with the opening of the second session of Strategic Arms Limitation Talks (SALT) in Vienna this month. Critics of the Fiscal 1971 defense budget have been increasingly using the talks as an argument for cutting defense spending.

President Nixon told the congressional leaders, “We are interested in arms control; that is why we are at Vienna.” But he said that success of

SALT "hinges on the U.S. having something to trade to the Soviets in return for restraint in their ICBM program."

He said that if the U.S. were to declare a moratorium on the Minuteman 3 multiple independently targeted reentry vehicle (MIRV) and Safeguard, without having a commensurate concession from the Russian, "we will have nothing to trade, and the Soviets will thus have no reason to concede a thing."

The Nixon statement was first made to Republican congressional leaders in a private meeting. Rep. Rogers C. B. Morton (R-Md.), chairman of the Republican National Committee, urged the President to make his remarks available to all congressmen and senators as a means of neutralizing sharp opposition to military spending.

Meanwhile, the House last week was preparing for easy passage of a $20.2-billion procurement authorization bill reported earlier by the House Armed Services Committee.

In its report released last week, the committee said that "it is particularly important at a time when defense expenditures are being reduced and the nuclear threat is being increased to assure that the weapons of our armed forces are the best that can be made available. Since we have clearly fallen behind the Soviets in quantity of weapons, it is particularly important that we improve the quality of our weapons."

It described Safeguard as "the only major addition to our strategic forces in several years," and noted that most new weapons systems underdevelopment "are replacements for aging systems or are required to fill a clearly evident gap in our defensive capability."

In defending its approval of Phase 2 Safeguard deployment, the committee said it sees no evidence that "measured deployment" of ABM will hinder progress of SALT in Vienna.

"The committee would point out, on the contrary, that the first Russian announcement of interest in strategic force limitation talks followed by about 48 hr. the first announcement of our intention to begin deployment of an ABM.

"There were predictions last year that Safeguard would halt the progress of the talks, but…the authorization of Phase 1 has in no way delayed the beginning of SALT," the committee said.

"It should also be noted that the Soviets have test-fired more than twice as many strategic missiles as we have since the begining [sic] of SALT in Helsinki last November and that the Soviets have in no way slowed down their strategic buildup in preparation for SALT," it added.

A similar argument was used to defend approval of Minuteman 3. The committee report noted that deployment of MIRV could be stopped "at such time as an agreement is reached and correspondingly appropriate steps are taken by the Soviets that would make a halt in deployment feasible."
Meanwhile, dissenting views of five committee members and a long list of planned floor amendments to the bill were a preview of opposition the bill is expected to encounter in the Senate later this session.

Few of the House amendments were expected to be adopted under a rule which limited debate to 4 hr.
In the Senate, where rules permit unlimited debate and anti-defense spending sentiment is much higher, the battle over the Fiscal 1971 procurement authorization will be more closely fought.

In a dissenting report filed by Reps. Robert Leggett (D-Calif.), Otis Pike (D-N.Y.), Lucien Nedzi (D-Mich.), Chales Whalen (R-Ohio) and Robert Stafford (R-Vt.) a halt to Safeguard deployment was recommended.

Noting that Safeguard will cost $1.6 billion in Fiscal 1971, including military construction funds not contained in the procurement bill, the report stated, "We can expect expenditures of this magnitude for the next seven-eight years if we are lucky. If we are unlucky, the expenditures will continue for a lifetime."

They declared that Safeguard would not perform the mission assigned to it, and would upset arms talks with the Soviets.

In another dissenting report, Pike, Nedzi and Whalen recommended deletion of $435 million for shipbuilding, $100 million for the Air Force B-1A bomber and $200 million in additional Lockheed C-5A funds to cover cost overruns. Floor amendments to implement the dissenting reports were expected to be introduced.

Other floor amendments to reduce defense spending also were expected

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