Improved Worldwide Performance (1980s)

(U) Overview

The 1980s can be characterized by relative stability of the collection resource set of facilities, but they had to cope with the increasing scope and complexity of the Soviet, and the PRC target set. Figure 66 shows the DEFSMAC detected and reported on missile and space events and issued reports on those events. In 1980, DEFSMAC detected and reported on over-estimates on those events.

Figure 67 gives a historical perspective of Soviet missile activities from 1945 to the early 1980s. May 18, 1980, marked the first test firing by the PRC of an ICBM into a broad ocean area. There was also a concerted effort to equip the

- 1945-1985: "FIRST" GENERATION MISSILES (ORIGIN IN GERMAN MISSILE PROGRAM)
- MID 50s TO MID 60s: "SECOND GENERATION ICBMs
- EARLIEST AERODYNAMIC SYSTEMS
- 1962 CUBAN MISSILE CRISIS: ORIGIN OF REQUIREMENT FOR "FOURTH" GENERATION ICBMs
- MID 1960s: 69, 70, 71, 72
- THIRD GENERATION ICBM DEPLOYMENT
- TESTING ADVANCED AERODYNAMIC SYSTEMS
- LIMITED ICBM DEPLOYMENT
- LATE 60s [VIETNAM WARS]: ORIGIN OF NEED FOR ADVANCED TACTICAL AERODYNAMIC & BALLISTIC SYSTEMS
- FIRST ABM AND IMPROVED SAMS DEPLOYED
- EARLY 1970s: START OF TESTING OF FOURTH GENERATION ICBMs
- 1973 MIDEAST WARS: STIMULUS FOR FUTURE TACTICAL SYSTEMS (SAM, ABM, AAM)
- LATE 1970s: INITIAL DEPLOYMENT OF THIRD GENERATION ICBMs AND NEW SAMS
- DEVELOPMENT OF LOCK-DOWN/SHOOT-DOWN AAM
- INITIAL TESTS OF ADVANCED CRUISE MISSILES
- EARLY 1980s: "SMART" AERODYNAMIC WEAPONS
- ICBM ACCURACY IMPROVEMENTS (1982)
- UNCONVENTIONAL DEFENSIVE SYSTEMS
sets back to NSA. By the end of the 1980s, DEFSMAC was covering missile and space launches a year and issuing over product reports, including over TACREP reports. 49 Figure 68 shows the "traditional Soviet and PRC missile and space launch and testing locations. Figure 69 shows

*(S//TK) Telemetry had a major role in monitoring the SALT/START Accords as it could verify the number of reentry vehicles any given missile was flying.

(U) DEFSMAC and Other Management Changes

(U) By 1980 the Center that was authorized in 1964 and developed in the late 1960s and 1970s had
come a long way. Many of the people who established the center continued to grow as the Center grew, while some moved on to related activities at NSA or DIA. The “founders” often gathered for DEFSMAC anniversary or other commemorative events. Figure 70 shows some of the key personnel in the development of the Center at such an event.

(U) The decade started with Mr. James W. Pryde as director of DEFSMAC, followed from the middle of 1980 to the middle of 1983 by Richard L. Bernard. Roy E. Crippen from 1983 to 1986, and E.Crippen and (withheld PL 86-36/50 USC 3605 from 1986 to 1990.

(U//FOUO) By 1980 there were well over people working in the Center from NSA and DIA integrated into three “directorates.” James Pryde from NSA was the DEFSMAC director. Colonel Joseph Wortman, USAF, from DIA was the deputy director. The Intelligence Directorate, headed by Dominic Colella from DIA, handled the reporting of events once the Current Operations branch did the initial reporting. There were three subdirectorates: Missile Systems (INM), Space Systems (INS), and Spacecraft Operations (INO). The Operations Directorate was headed by R. Steven Smith from NSA. There were three subdirectorates: Operations Resources Management (OPM), Target Development (OPD), and Current Operations (OPW) or “The Watch,” where the twenty-four-hour-a-day operations were maintained. The third directorate was the Data Systems Directorate, or SY, headed by NSA “Map Power Study” in 1983 accounted for 130 people assigned.

(U) The general functions of the center had not significantly changed since 1964. The growth of the intelligence targets had changed and grown. The names of some of the significant organizations participating in DEFSMAC operations, or receiving DEFSMAC “product” reports are shown in figure 71. Some of the DEFSMAC products and services are shown in figure 72.
(U) The physical "plant" that housed the DEFSMAC operations area, reporting area, computer systems area, and the resources management activities had expanded in bits and pieces over the almost twenty years of the Center's existence. By the early 1980s, it was still functional but needed some major upgrading, such as raised flooring in the computer and reporting areas to better accommodate increased automation. Only further incremental changes needed to be made to the "watch" area and the communications areas. The figures on this page show the areas just prior to the 1983 modernization.
Figure 77 is the operations management area, called the Analysis Control Center (ACC). After the modernization was completed in early 1983, a dedication ceremony was arranged, as shown in figure 78, and was attended by Lieutenant General Lincoln D. Faurer, USAF, director of NSA/CSS, and Lieutenant General James A. Williams, USA, director of DIA. Figure 79 shows the senior managers who officiated at the ribbon cutting ceremony for the modernized center. Figure 80 shows the DEFSMAC director's office after the modernization.

By late 1988, DEFSMAC had embarked on an ambitious project to expand and regularize the reporting of selected Soviet activity that could provide support to U.S. operations around the world. The effort was given the acronym OPFIS, Operational FIS. The effort would...
require additional field analysis equipment at several of the overhead systems ground stations, at the SPACOL and PL sites. The plan also required additional automation within NSA and DEFSMAC as well. The effort was strongly supported by the U.S. Space Command. The reports would be patterned after the SIGINT time-sensitive Tactical Reports, or TACREPs. The plan was formally announced to the customer community, and TACREP reporting was initiated in March of 1989. The effort tapered off in the mid-1990s as the threat from Russia was reduced, and the Soviet

(6) In 1982 Lieutenant General James Abramson, USAF, then Associate Administrator for Space Flight at NASA, visited DEFSMAC. He was shown and told about the U.S. capability against the Soviet space program.  

(U/FOUO) In 1985 DIA consolidated several functions within DIA to increase the visibility and support to DEFSMAC. What was formerly the Technical Collection Operations Branch, DC-7B, and the Defense Special Missile and Astronautics Center, DC-DS, were combined to form the MASINT and DEFSMAC Division, DC-6.  

(6) By 1985 the W Office of Space and Missiles had fully solidified its mission and its organization had matured. W1 had several technical assistants assigned to the office-level organization, including the TEBAC chairman. W1 was the Collection
Fig. 81. Growth of foreign missile and space activities from 1955 to 1987

Management and Current Reporting Division and formed the NSA nucleus in DEFSMAC. W14 was the Space Division and W15 was the Missiles Division. W16 comprised the Astronautics Research and Computer Systems Division, and W18 handled Special Projects, mostly telemetry analysis equipment. The W19 National Telemetry Processing Center (NTPC) provided the processing of missile and space telemetry signals and coordinated intelligence community participation in such signal processing.59

(U) In early 1989 DEFSMAC commemorated its twenty-five continuous years of operations with an anniversary ceremony and summary of its rich history.59 Figure 81 shows the growth of foreign missile and space activities from 1955 to 1987. Figure 82 shows Colonel Frederick Engleman, USAF (the

DEFSMAC deputy director in 1989), former DEFSMAC directors Mr. Charles Tevis, Mr. Gordon Stark, Mr. James Pryde, Mr. Richard Bernard, and the 1989 DEFSMAC director, prior to cutting the commemorative cake, decorated for the occasion with the special modified seal, as shown in figures 83 and figure 84.

(U) Fig. 82. Commemorative cake cutting ceremony (1989)

(U) Fig. 83. Cake decoration

(U)/FOUO) Fig. 84. Special modification to DEFSMAC seal for commemorative event

(TS//SI) By the end of the 1980s, DEFSMAC was operating over 1,440 point-to-point communications circuits with real-time "OPSCOMM" capabilities to key worldwide time-sensitive collection
locations and to key recipients of DEFSMAC reports, particularly missile and space launch reports. Secure voice communications and satellite communications links provided by NSA were also available, including the conference capability between DEFSMAC, the

The SOCOMM network was also available to DEFSMAC, as well as the GENSER and CRITICOMM systems. The DEFSMAC communications by this time had grown to the point that a new and modern communications “patch panel” was installed in 1989. The original OPSCOMM communications patch panel that had been installed in 1966, much modified, was replaced with a computer-based telecommunication switch. Figure 85 shows the ceremonial cutting of the input cable to the patch panel so it could be removed, presided over by Robert Wetzel on the left, the telecommunications project supervisor for the effort, and Paul Johnson, director, DEFSMAC.

(U//FOUO) Fig. 85. The ceremonial cutting of the input cable to the patch panel so it could be removed

Also by the late 1980s, it was clear that expanding requirements and operational constraints required a new and complete review of the DEFSMAC operations, particularly the communications and computer support for the center. An ambitious plan was created called Part 1, 1990-1992, for the near-term improvements that needed to be made. This plan was issued in mid-1989 and indicated that DEFSMAC needed another forty-eight people authorized, eight from DIA and forty from NSA, and a significant increase in computer automation and communications developments. (Part two of the concept covering Mid-to Long-Term Requirements would be issued in 1991 and will be discussed in the next chapter.) As a follow-on to Part 1 of the DEFSMAC 2000 plan, the director of DEFSMAC met with the director of DIA to personally request the additional eight “billets” from DIA. The reception initially was positive, but soon the end of the Cold War and the overall billet reductions that DIA was soon to receive meant that the DIA billet increase to DEFSMAC never materialized.

There was increased DEFSMAC support to USSPACECOM activities, including NORAD, after USSPACECOM was formed in 1985. When the MOA was signed, USSPACECOM was scheduled to put four to five people in DEFSMAC. As USSPACECOM became fully aware of its responsibilities and developed its operating procedures, it became apparent that both DEFSMAC and USSPACECOM would benefit from having exchange officers. NSA/DEFSMAC provided the first exchange officer to USSPACECOM under a Memorandum of Understanding (MOU) reached in May of 1987. That position is still filled by an NSA individual with DEFSMAC experience. (A more comprehensive MOU was to be developed and will be discussed in the next chapter.)

Part of the DEFSMAC operations “POI” function got easier in the late 1980s. With the signing of the START agreement in 1988, the Soviet Union notified the U.S. in advance of all ICBM and SLBM test launches.
(U) Overhead Satellite Collection

(TS/TK) By the early 1980s, several aspects of collection and processing were being automated at the to provide more timely information as well as reduce the manual work required to produce intelligence information. One of the initial major projects was called An example of the new capability was its processing of the Type.
(ASAT) system being tested by the Soviets. The

In the early 1980s, the obsolete VHF antenna system and SHF antenna system in Sinop, Turkey, were replaced by project HIPPODROME. These are the subsystems in the foreground covered by the two large radomes in figure 88. Figure 89 shows the town of Sinop that is at the “foot” of the hill that houses the facilities at Sinop. HIPPODROME was the only major missile and space telemetry collection facility still operated by the U.S., in this case the United States Army Security Agency (USASA), later to become the U.S. Army Intelligence and Security Command (INSCOM).
(6) The other major ground locations were all operated by foreign governments as part of bilateral agreements with NSA on TELINT activities. The

Figure 90 shows photos of these facilities as they appeared in the early 1980s. The addition of the transportable systems, discussed later in this chapter, would add back a substantial U.S. presence to offset any problems that should arise with the host countries operating the TELINT/FIS facilities. The government also operated some small remote FIS collection facilities under the set of projects, discussed later in this chapter.
1990s. Figure 96 shows a winter view of the facility. The outward appearance of the facility has not significantly changed since the installation in 1967, although many equipment improvements had been made to the antennas and to the equipment inside the building.

The...have expanded to three different locations and Figure 97 shows a summer photo of the site, again high in the mountains. Figure 98 shows the equipment configuration...
for the site, mostly fixed tuned receivers that were preset to telemetry frequencies.

(S//S) a TELINT signal search system with an extended frequency range, was built and operated for a short time to look for that might not be heard at other ground sites.

(S//S) In the late 1970s it became apparent that there needed to be "tactical" collection and reporting of events to the U.S. Space Command. A USAF, primarily Electronic Security Command (ESC) – the successor to the Air Force Security Service (AFSS) – and NSA joint effort was started under the Tactical Cryptologic Program (TCP) to establish a set of QRC transportable telemetry collection systems that could also serve as "gap fillers" for the conventional major ground collection sites. The overall set of systems was

In this mission control was exercised by the Analysis and Control Center (ACC) located adjacent to DEFSMAC. The...
OAMP The Optical Aircraft Measurement Program (OAMP) came to fruition in 1988. It was sponsored by the U.S. Army Strategic Defense Command (USASDC) and operated by the U.S. Air Force Strategic Air Command (SAC), usually flying from Shemya Island to cover the Kamchatka Russian ICBM impact area. With the reduction in priority and scope of the Russian ICBM program in the late 1990s, the configuration of the air craft that was scheduled to be converted to a configured aircraft.

(U) Deep Space Collection

With the closure of the USASA- and then NSA-operated STONE-HOUSE facility in Asmara, Ethiopia, in the 1970s, NSA was dependent on facilities operated by other countries where collection from Europe or Asia was needed. The previous chapter briefly discussed "The Missing Link," a reference to a Soviet command link that was postulated to exist to command their planetary space probes.
The aircraft continued to be sponsored by SAC and operated by Detachment 1 of the 6th Strategic Wing out of Eielson AFB, Alaska.
(U) Sea-based Efforts

COBRA JUDY started operations in the early 1980s as a major seaborne platform in the Pacific operations area.
(U) More NSA and GCHQ Collaboration

GCHQ had always been the point of contact for NSA in arranging for coverage scientists. After the closure of STONEHOUSE, was critical in covering approaching their mission targets. In the early 1980s, NSA and GCHQ dialog continued on the use of facilities for and an equipment upgrade was completed in 1984.

Since the late 1970s, GCHQ, now a participant in the ground site operations at the site, at times assisted in the telemetry analysis at NSA or at the site. During the

GCHQ is also a full participant, along with Canada, in several working groups (including TEBAC) on missile and space topics and has hosted several annual meetings for the groups. The 1980s saw the rapid development of Intelsat, Soviet, and other countries' satellite communications systems. The Soviet Union alone had eight types of communications satellites, many with multiple vehicles in each class. Several

site locations and systems were added to those developed and installed in the
The JCS normally responds, and is often chosen as the focal point for the operation. When it is available and can reach the area in time, the OBIS (COBRA JUDY) is deployed. Figure 113 shows the OBIS platform with the COBRA JUDY phased-array radar at the right of the photo and the antennas in the background. The USAF deploys one of the aircraft and DESMAC usually sends an analyst to act as a focal point for information. Additional secure communications circuits are established to and to the various air and sea platforms.
that are expected to participate. Figure 114 shows a trajectory of an extended range test firing of an SLBM, and figure 115 shows a trajectory of another extended range test firing of the same SLBM. When the actual launch occurs, DEFSMAC alerts the assets in the area via satellite communications.
Fig. 115. A typical array and positioning of the assets - 1980
(U) Table 3-1 shows a typical set of assets in the mid-1980s. In some cases existing facilities needed to be augmented to cope with some of the newer telemetry transmissions from Soviet and PRC launches.

(9) NSA often implemented efforts in conjunction with these assets. These were usually against very important targets.
Table 3-2. PL 86-36/50 efforts in the 1980s

(U) Collection Summary

By the early 1980s, the wide array of ground field collection sites that had been developed during the late 1960s and the 1970s was requiring additional efforts.

Fig. 121. DEFSMAC primary SIGINT assets
NSA had used "EDL," which by this time had become GTE Systems – Sylvania Systems Group – Western Division, to design, build, and install most of the larger facilities. These included ANDERS and several other systems or subsystems at other locations. NSA jointly funded an engineering consulting, repair, training, fly-away technical support, spare parts "depot" at Sylvania. NSA managed the contract.

In the late 1980s the original project name was changed to TELINT and that contract remains in effect today, some twenty years later. The individual depicted on the logo is who started his career while in the U.S. Army Security Agency at the site, and then became an NSA civilian and for many years was responsible for implementing many TELINT systems modifications and expansions. He later joined GTE, now part of General Dynamics and is responsible for supervising the management of the contract for General Dynamics. Mr. is another example of someone who found the TELINT/FIS activities a challenging area in which to spend over thirty years of his career.

A major effort was initiated in the early 1980s to standardize TELINT collection data formats into the FIS Data Interchange (FISDI) format and through electrical communications. (U) FIS Signal Processing
send the data to NSA as data files rather than the expensive, bulky and costly couriersing of analog magnetic tapes. At the time the cost of leasing (or owning) secure satellite or cable communication channels made the concept not feasible, and it was only partially implemented.

(6) Several equipment configurations developed for field site equipment, mostly computer based by this time, were needed to meet the increases in TELINT.  

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(4) A field processor, was installed at the site in 1983. A processor for PPM signals, was provided to JABEGER.

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(4) A computer-based processor for PL 86-36/50 USC signals, was scheduled for HIPPODROME in the mid-1980s to

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(4) Built by HRB, installation was delayed several years because of international policy problems between Turkey and the U.S. It cost over $6M and was finally installed in late 1989. The system, fully occupying seven equipment racks, could process.

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(6) The program developed the PL 86-36/50 field processing system and installed it at all of the sites. It was one of the first field systems to prepare computer FISDI tape outputs, described below. (See figure 127.)

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(6) Initially used for processing in the mid-1970s, the DERF focus changed in the early 1980s. By the late 1980s DERF was targeting against...
In 1984 the DELF telemetry signal processor was built and deployed to the facility in this processor, contained in six racks of equipment, provided an almost all-digital and very flexible signal processor for telemetry signals expected from the Soviet systems at that time. (See figures 129 and 130.) The equipment was developed by FWS/EMR primarily to automatically produce TARs and FISDI data files. The systems can also produce data for EAR reports on unknown signal modes. Additional systems were built and installed at the NSA NTPC. At the NSA NTPC, the DELF was used in conjunction with to produce TAR reports and to develop software modifications for the field sites. The DELF equipment at the field sites analyzed telemetry from and first identified the use of.
(5) **Soviet Manned Voice Processing**

(5) The MSOC (Manned Space Operation Center) was established in DEF SMAC in 1981 for more timely reporting of Soviet manned space activity for both DoD and NASA requirements. High interest in Soviet manned flight started in 1971.  

(5) A number of major computer processing upgrades were in progress or completed in the 1980s for DEF MAC. The continued application of experienced NSA and DIA programmers fully integrated into DEF MAC optimized this process.
and improved mission performance. Figure 133 shows the major “Present” computer functions and projects in DEFSMAC in the mid-1980s, and figure 134 shows the “Future” efforts that were planned. Appendix C provides a table that lists most of the major projects and systems developed or used to support DEFSMAC from the 1960s through the 1990s.

(U) Important Analytic Results

In 1988 the Soviets tested their space shuttle “Buran” with an unmanned launch from the Baykonur cosmodrome (called Tyuratam in U.S. classified reporting) with a recovery of the spacecraft on a runway at the Baykonur facility. The Soviets were so proud of this event that they provided extensive newspaper and television reporting, and the FBIS was able to provide an almost complete description of the event from these reports.
participants in the exchange of the FIS material and intelligence product that was derived from the material. In the early 1980s, the DCI formally approved the release of such pertinent material and participants in the exchange of FIS material and intelligence product that was derived from the material. In the early 1980s, the DCI formally approved the release of such pertinent material, and became more actively involved in FIS activities. Figure 136 shows the growth of foreign missile launches detected by all of the sources available to DEFSMAC; the total reached almost in 1989. As shown in figure 137, the
SPACE LAUNCHES:

- Launch rates don't reflect full scope of activity
- 200 active spacecraft in orbit continuously
- Support: manned, scientific, NAv/Cal/Met/Geo
- Communications
- Reconnaissance/Surveillance

(TS/TK) Fig. 137. Foreign space launches detected by all of the sources available to DEFSMAC

DEFSMAC Reporting:
- Immediate - one to five minutes
- Follow-up 30-60 minutes
- Supplemental as appropriate

MISSILES SATELLITES MANNED SPACE OPS
72 HOURS APERIODIC MISSION DURATION

(TS/TK) Fig. 138. DEFSMAC reporting
operations and/or reports of Soviet ELINT or photographic detection of these operations.94

(U) 1980s Summary

The growth of foreign missile and space activities during the 1980s was significant. There were over 3,200 missile and over 80 space launches; DEFSMAC generated over 6,500 product reports on these activities. DEFSMAC provided the field sites with over 230,000 NORAD satellite ephemeris two-line element sets and issued over 2,500 support messages. The FIS field sites generated over 38,000 Telemetry Analysis Reports (TARs).95

Providing the U.S. knowledge of Soviet ICBM and SLBM missile warhead performance was a key intelligence topic throughout the 1980s. The triad of information on this topic from their coverage of the Kamchatka Soviet missile test impact area using telemetry, radar and optical sensors. In 1983 a complete review of the participation was performed by the USAF with participation of all of the DoD users of that information.96 Figure 139 shows how this triad provided geographic coverage of the Kamchatka impact area, and Figure 140 shows the contributions these sensors made to key Soviet missile intelligence factors.

Another key analysis and reporting capability by NSA and DEFSMAC in the 1980s was the series of reports. These reports, based on Soviet FIS data, projected when Soviet
Fig. 139. How telemetry, radar, and optical sensors provided geographic coverage of the Kamchatka impact.

Fig. 140. The contributions telemetry, radar, and optical sensors made to key Soviet missile intelligence factors.
(U//FOUO) Table 3-3 provides an interesting comparison of FISINT collection and field analysis and reporting in the late 1980s. All reports are based on NSA/CSS United States Intelligence Directive (USSID) 105 - Foreign Instrumentation Signals Technical Reporting.

(U) 1980s Lessons Learned

- Lesson 1 – Centralized tip-off and collection coordination continued to be the key ingredient in gathering and producing successful intelligence information on missile and space activities. As the geographic locations used by the Soviets and PRC continued to grow, even more reliance was placed on DEFSMAC to coordinate the various data collection platforms to obtain optimum intelligence information and results.

(U) Lesson 2 – The engineering and operational improvements made to almost all the FIS collection systems in the 1980s produced a very robust collection effort. It was achieved mostly by people and contractor teams who had “grown up” with the early FIS collection and could apply their knowledge appropriately. By the 1980s many people at NSA and other government and contractor teams that participated with collection and processing efforts in the 1960s and 1970s were in key management positions. These people led efforts to efficiently and expertly develop needed FIS collection and field processing systems and procedures for the U.S., and in many cases foreign partners' efforts.
(U) Lesson 3 – Processing of telemetry FIS data obtained by the various collection systems continued to be a technical and management challenge, despite continual efforts to improve the efficiency and effectiveness of the process. An effort (called FL 86-36/39) to reduce the extensive number of large, heavy, and bulky magnetic tapes that were being couriered back to NSA and CIA by electrically forwarding digitized data was found to be too expensive. Considerable efforts to improve the magnetic tape and information databases were implemented. In the end, only the demise of the Soviet Union brought a solution to this in the early 1990s.

(PS/TF) Lesson 4 – Too much security compartmentation added complexities to the DEFSMAC coordination role.