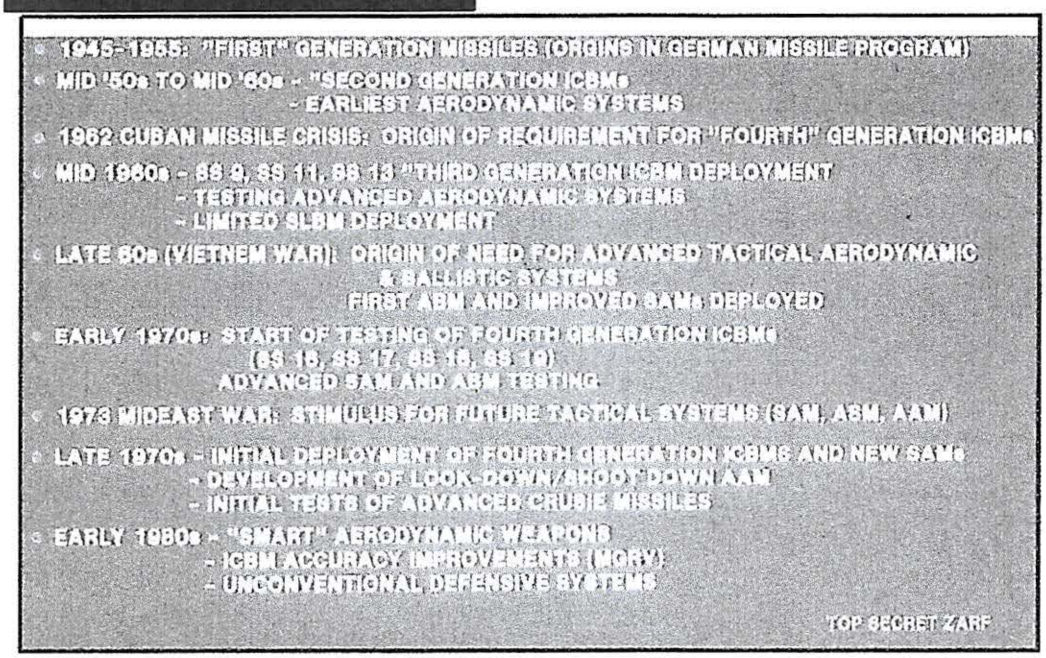
(U) Chapter 3
Improved Worldwide Performance (1980s)

(U) Overview

~~(S//SI//TK)~~ 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 [redacted] the PRC target set. Figure 66 shows [redacted] In 1980 DEFSMAC detected and reported on [redacted] missile and space events and issued over [redacted]eports on those events.[48] 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 [redacted]

[redacted]

(~~S//SI~~) Fig. 66. [redacted]



(TS//TK) Fig. 67. Historical perspective of Soviet missile activities from 1945 to the early 1980s

[redacted]

sets back to NSA. By the end of the 1980s, DEFSMAC was covering [redacted] missile and space launches a year and issuing over [redacted] product reports, including over [redacted] TACREP reports.[49] Figure 68 shows the "traditional Soviet and PRC missile and space launch and testing locations. Figure 69 shows [redacted]

(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. [redacted]

[redacted]

(S) Fig. 68. Traditional Soviet and PRC missile launch and testing locations (1980)

[redacted]

(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.

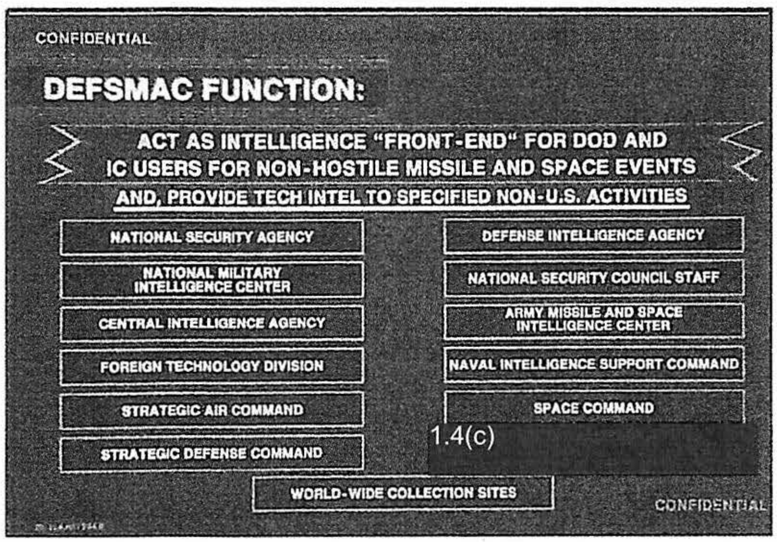
[redacted]

(U//FOUO) Fig. 70. DEFSMAC pioneers

(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 [redacted] from 1986 to 1990.

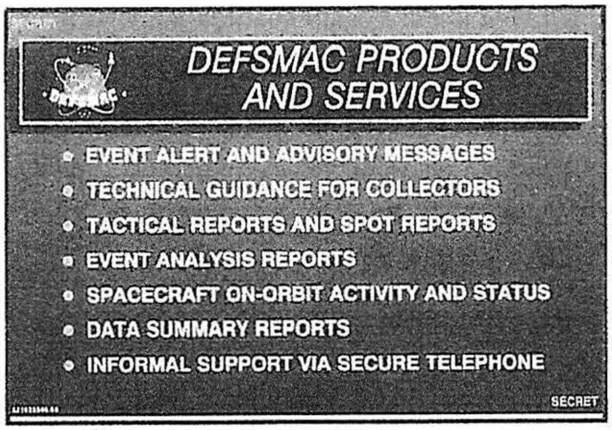
(U//FOUO) By 1980 there were well over [redacted] people working in the Center from NSA and DIA integrated into three "directorates." James Pryde from NSA was the DEFSMAC director. Colonel Joseph Wortman, USAF, from DIA was the deputy director. The Intelligence Directorate, headed by Dominic Colella 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 [redacted] from NSA. Its three subdirectorates were Programs Development (SYP), Operations Support (SYO), and Multi-Systems Support (SYS). A small staff element completed the organization.[50] An NSA "Manpower Study" in 1983 accounted for 130 people assigned

[redacted]



(C) Fig. 71. Significant participants in DEFSMAC operations

(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.



(S) Fig. 72. DEFSMAC products and services

(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.

PL 86-36/50 USC 3605

[redacted]

(S//SI) Fig. 73. Mission director's area

PL 86-36/50 USC 3605

[redacted]

(S) Fig. 74. COMMS Area, View 1

PL 86-36/50 USC 3605

[redacted]

(S) Fig. 75. COMMS Area, View 2

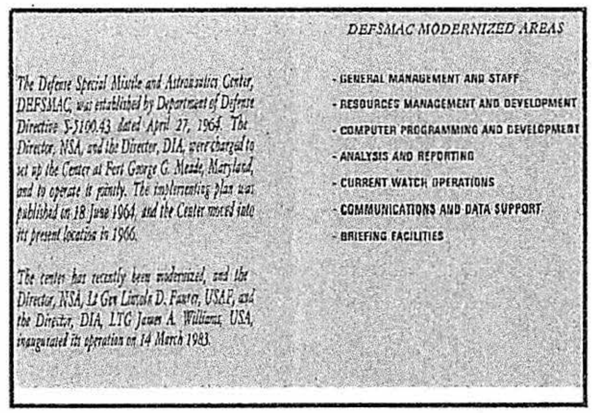
PL 86-36/50 USC 3605

[redacted]

(S) Fig. 76. COMMS Area, View 3

PL 86-36/50 USC 3605 [redacted]

~~(S)~~ Fig. 77 PL 86-36/50 USC [redacted] operations area



(U) Fig. 78. Dedication ceremony

Figure 77 is the PL 86-36/50 USC 3605 [redacted] 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.

PL 86-36/50 USC 3605 [redacted]

(U) Fig. 79. Senior managers who officiated at the ribbon cutting ceremony for the 1983 modernized center

PL 86-36/50 USC 3605 [redacted]

(U) Fig. 80. Modernized DEFSMAC director's office

1.4(c) [redacted]

1.4(c) [redacted]

~~(S)~~ By late 1988, DEFSMAC had embarked on an ambitious project to expand and regularize the reporting of selected Soviet 1.4(c) [redacted] 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 [redacted] 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.[52] The effort tapered off in the mid-1990s as the threat from Russia was reduced, and the Soviet [redacted]

1.4(c)

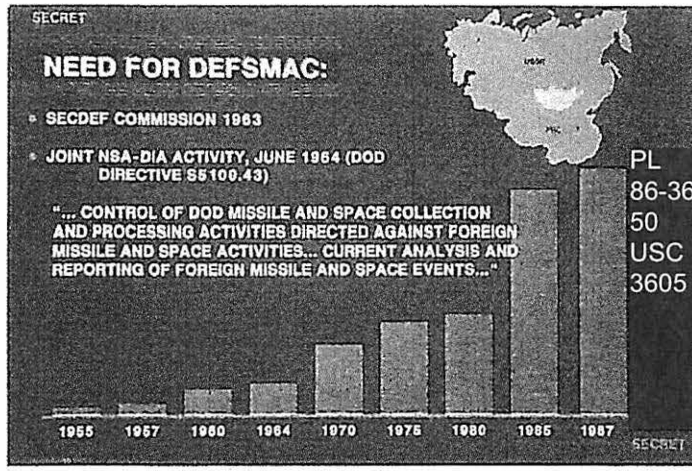
(C) In late 1982 the NSA "PROD" SIGINT organization made moves to centralize all SIGINT tasking into one organization, designated P5. The W1 Office of Space and Missiles successfully countered the thrust that would have had the W11 Operations Resource Management Branch (OPM) absorbed into the P5 organization. The key argument against the thrust was that missile and space SIGINT tasking needed to remain physically and organizationally close to DEFSMAC for effectiveness, and it remained in W1. (The same thrust was later made in 1992 when the "new W" centralized tasking into W9T7, and this time the thrust succeeded, and the new W9T7 did include missile and space tasking.)[54]

(S) 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. [redacted]

1.4(c)

(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.[57]

(C) By 1985 the W1 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. W11 was the Collection



PL 86-36/50 USC 3605 [redacted]

~~(S)~~ Fig. 81. Growth of foreign missile and space activities from 1955 to 1987

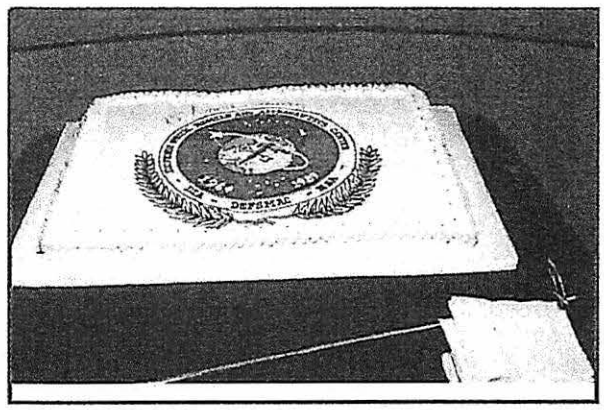
Management and Current Reporting Division and formed the NSA nucleus in DEFSMAC. W14 was the Space Division and W15 was the Missiles Division. W16 comprised the Astronautics Research and Computer Systems Division, and W18 handled Special Projects, mostly telemetry analysis equipment. The W19 National Telemetry Processing Center (NTPC) provided the processing of missile and space telemetry signals and coordinated intelligence community participation in such signal processing.[58]

(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

PL 86-36/50 USC 3605 [redacted]

~~(S)~~ Fig. 82. Commemorative cake cutting ceremony (1989)

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, [redacted] PL 86-36/50 USC 3605 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. 83. Cake decoration

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

~~(TS//TK)~~ By the end of the 1980s, DEFSMAC was operating over [redacted] 1.4(c) 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 [redacted] conference capability between DEFSMAC, the [redacted] The SOCOMM network [redacted] 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. [60] 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 [redacted] on the left, the telecommunications project supervisor for the effort, and [redacted] director, DEFSMAC.

[redacted]

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

~~(S)~~ 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. [61] (Part two of the concept covering Mid-to Long-Term Requirements would be issued in 1991 and will be discussed in the next chapter.)[62] 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.[63]

~~(S)~~ There was increased DEFSMAC support to USSPACECOM activities, including NORAD, after USSPACECOM was formed in 1985. [64] 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. [65] (A more comprehensive MOU was to be developed and will be discussed in the next chapter.)

~~(S//SI)~~ 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. [66] [redacted]

[redacted]

(U) Overhead Satellite Collection

[redacted]

[redacted]

~~(TS//TK)~~ By the early 1980s, several aspects of [redacted] collection and processing were being automated at the [redacted] 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 [redacted] An example of the new capability was its processing of the Type [redacted]

[redacted]

(ASAT) system being tested by the Soviets. The [redacted]

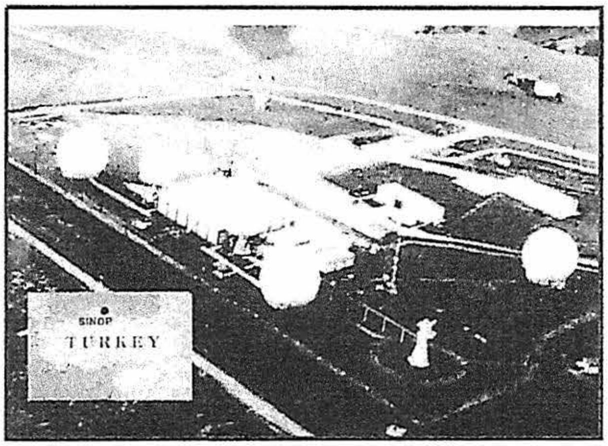
[redacted]

[redacted]

(TS//TK) A second major effort at [redacted] during the early 1980s was the [redacted] project. This [redacted]

(U) Ground Collection

(S) **HIPPODROME** In the early 1980s, the obsolete VHF antenna system and SHF antenna system in Sinop, Turkey, were replaced by project [redacted] 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 [redacted] facilities at Sinop.[71] 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).



(U//FOUO) Fig. 88. Hippodrome complex

[redacted]

(S) The other major ground locations were all operated by foreign governments as part of bilateral agreements with NSA on TELINT activities. The [redacted] Figure 90 shows photos of these facilities as they appeared in the early 1980s. The addition of the transportable [redacted] 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 [redacted] government also operated some small remote FIS collection facilities under the [redacted] set of projects, discussed later in this chapter.

[redacted]

(S) Fig. 90. Major ground FIS collection sites

1.4(c)

[redacted]

[redacted]

satellite coverage from [redacted]

1990s. Figure 96 shows a winter view of the [redacted] 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.

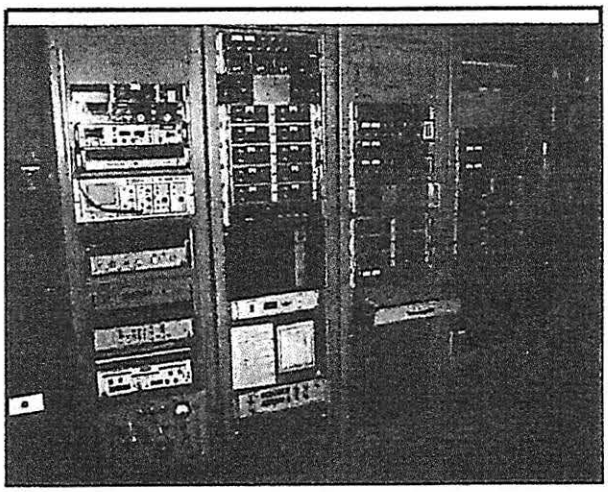
(S) The [redacted] have expanded to three different locations and figure 97 shows a summer photo of the [redacted] site, again high in the mountains [redacted] Figure 98 shows the equipment configuration

[redacted]

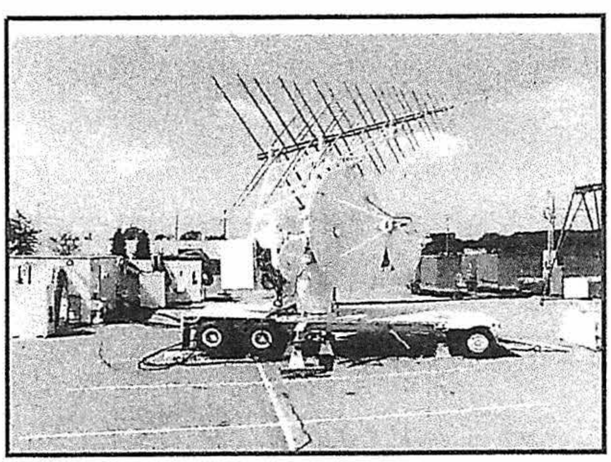
for the site, mostly fixed tuned receivers that were preset to [redacted] telemetry frequencies.

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

~~(S//SI)~~ [redacted] 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 [redacted] The sites reported some results directly to AFSPACECOM as an input to the Satellite Attack Warning System (SAWS) and also collected telemetry to support NSA analytic efforts. NSA assisted ESC in defining the systems capabilities and set up processing and reporting requirements and procedures for the telemetry collection and field analysis. [redacted] mission control was exercised by the Analysis and Control Center (ACC) located adjacent to DEFSMAC.[73] The [redacted]



~~(S)~~ Fig. 98. [redacted] equipment configuration



~~(C)~~ Fig. 99. [redacted]

1.4(c) [redacted]

1.4(c) [redacted]

1.4(c) [redacted]

(U) Deep Space Collection

1.4(c) [redacted] With the closure of the USASA- and then NSA-operated STONEHOUSE 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. 1.4(c) [redacted]

(U) Airborne Collection

1.4(c) [redacted]

~~(S)~~ **OAMP** The Optical Aircraft Measurement Program (OAMP) came to fruition in 1988. 1.4(c) [redacted] 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.[74] (With the reduction in priority and scope of the Russian ICBM program in the late 1990s, the PL 86-36/50 USC 3605 [redacted] 1.4(c) [redacted] was scheduled to be converted to a PL 86-36/50 USC 3605 [redacted] configured aircraft.)

1.4(c) [redacted]

1.4(c) [redacted]

~~(S)~~ The 1.4(c) [redacted] aircraft continued to be sponsored by SAC and operated by Detachment 1 of the 6th Strategic Wing out of Eielson AFB, Alaska. 1.4(c) [redacted]

1.4(c) [redacted]

1.4(c) [redacted]

PL 86-36/50 USC 3605 [redacted]

1.4(c) [redacted]

(U) Sea-based Efforts

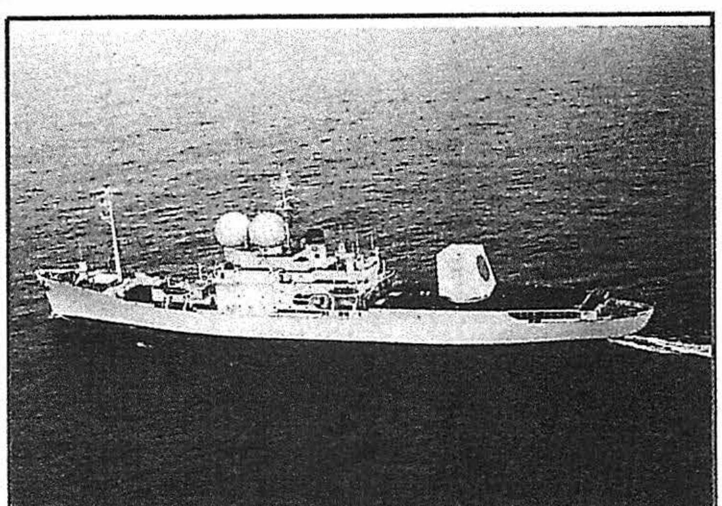
1.4(c) [redacted]

~~(S)~~ **COBRA JUDY** started operations in the early 1980s as a major seaborne 1.4(c) [redacted] platform in the Pacific operations area. 1.4(c) [redacted]

1.4(c) [redacted]

1.4(c) [redacted]

1.4(c) [redacted]



(U//FOUO Fig. 107. COBRA JUDY

[redacted]

(U) More NSA and GCHQ Collaboration

[redacted] GCHQ had always been the point of contact for NSA in arranging for coverage [redacted] scientists. After the closure of STONEHOUSE, [redacted] was critical in covering [redacted] approaching their mission targets.[78] In the early 1980s, NSA and GCHQ dialog continued on the use of [redacted] facilities for [redacted] and an equipment upgrade was completed in 1984.

[redacted]

[redacted] NSA Office of Space and Missiles (W1), DEFSMAC, and U.K. collaboration continued in the 1980s on many fronts. The [redacted] GCHQ, now a participant in the ground site operations at [redacted] at times assisted in the telemetry analysis at NSA or at the site. During the [redacted] Since the late 1970s, [redacted]

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.[80] Figure 109 shows the 1980s location of [redacted] facilities that contributed to signals collection on foreign missile and space targets.

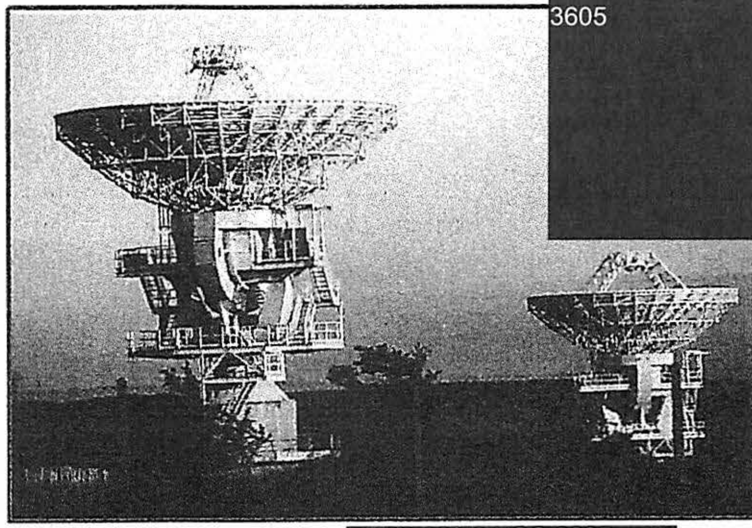
(U) [redacted]

~~(S)~~ 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 [redacted] site locations and systems were added to those developed and installed in the

1.4(c)

[redacted]

[redacted]



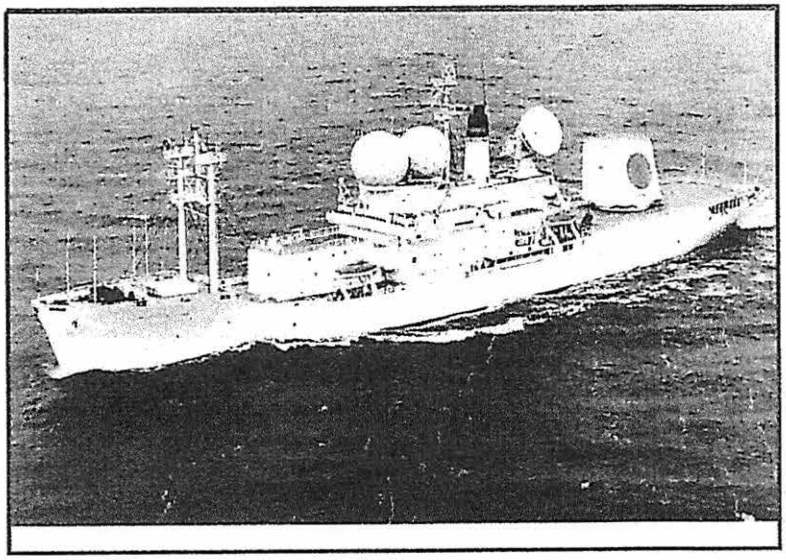
(U//FOUO) Fig. 111 [redacted]

(U//FOUO) Fig. 112 [redacted]
(radome at the bottom of the photograph)

[redacted] The JCS normally responds, and [redacted] is often chosen as the focal point for the operation. [redacted] 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 [redacted] The USAF deploys one of the [redacted] aircraft and DEFSMAC usually sends an analyst to [redacted] to act as a focal point for information. Additional secure communications circuits are established to [redacted] and to the various air and sea platforms

(U) [redacted]

[redacted]

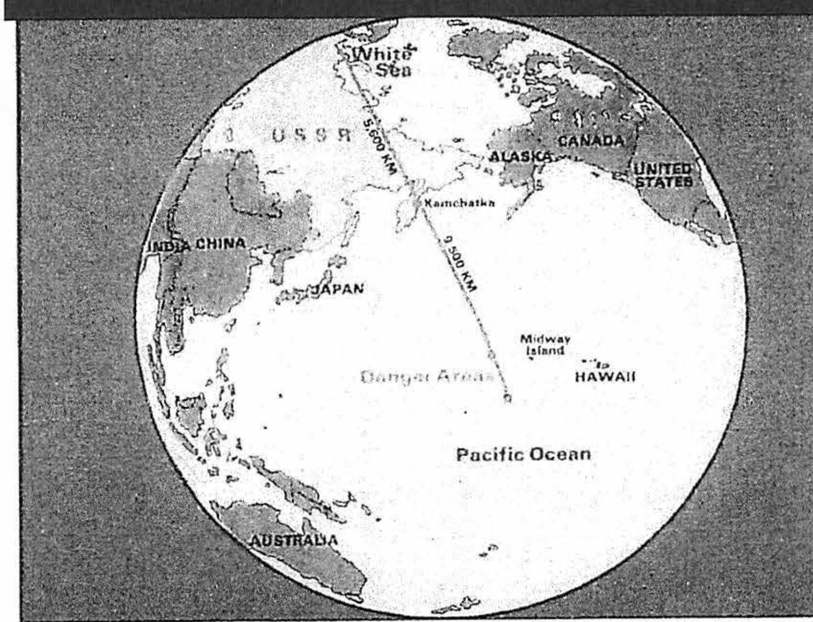


(U//FOUO) Fig. 113. COBRA JUDY

1.4(c) [redacted]

that are expected to participate. Figure 114 shows a trajectory of an extended range test firing of an SLBM, and figure 115 shows a 1.4(c) [redacted]

When the actual launch occurs, DEFSMAC alerts the assets in the area via satellite communications 1.4(c) [redacted]



~~(S)~~ Fig.114. A trajectory of an extended range test firing of an SLBM

1.4(c) [redacted]

~~(S)~~ Fig. 115. A typical array and positioning of the 1.4(c) [redacted] assets –1980

1.4(c) [redacted]

1.4(c)

[redacted]

1.4(c)

[redacted]

[redacted]

(U) Table 3-1 shows a typical set of assets [redacted] in the mid-1980s.[82]

(U) [redacted]

[redacted]

some cases existing facilities needed to be augmented to cope with some of the newer telemetry transmissions from Soviet and PRC launches.

~~(S)~~ NSA often implemented [redacted] efforts in conjunction [redacted] These were usually against very important [redacted]

[redacted]

Year	Project Name	Location	Target
1982	1.4(c) [redacted]		
1984			
1985			
1987			
1988			
1988			
1988			
1989			

~~(S)~~ Table 3-2 PL 86-36/50 USC 3605 [redacted] fforts in the 1980s

1.4(c) [redacted]

~~(TS//TK)~~ Fig. 121. DEFSMAC primary SIGINT assets

(U) Collection Summary

~~(TS//TK)~~ The collection assets available to DEFSMAC for FIS collection in the 1970s and 1980s PL 86-36/50 [redacted] PL 86-36/50 USC 3605 [redacted]

~~(C)~~ 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

(~~TS//TK~~) Fig. 122. DEFSMAC primary SIGINT assets planned for the later part of the 1980s and 1990s (not all of which materialized)

[redacted]

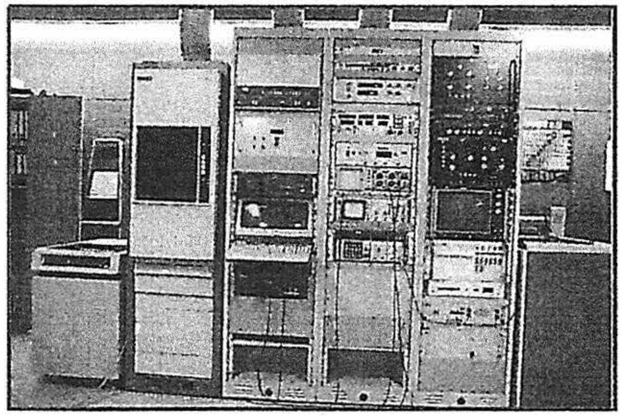
(TS//TK//NF) Fig. 123 and 124. Similar portrayals for the non-SIGINT assets targeted against foreign missile and space intelligence targets. [redacted]

more and more maintenance efforts. [redacted] 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 [redacted] ANDERS, [redacted] and several other systems or subsystems at other locations. [redacted] NSA jointly funded an engineering consulting, repair, training, fly-away technical support, spare parts "depot" at Sylvania. NSA managed the contract [redacted][83] In the late 1980s the original [redacted]project name was changed to [redacted] and that contract remains in effect today, some twenty years later. The individual depicted on the [redacted]ogo is [redacted] who started his career while in the U.S. Army Security Agency at the [redacted]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 [redacted]ontract for General Dynamics. Mr. [redacted] is another example of someone who found the TELINT/FIS activities a challenging area in which to spend over thirty years of his career.

[redacted]

(U) FIS Signal Processing

~~(S)~~ [redacted] 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 send the data to NSA as data files rather than the expensive, bulky and costly couriering 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.



(S) Fig. 126. The [redacted] equipment at the [redacted] site

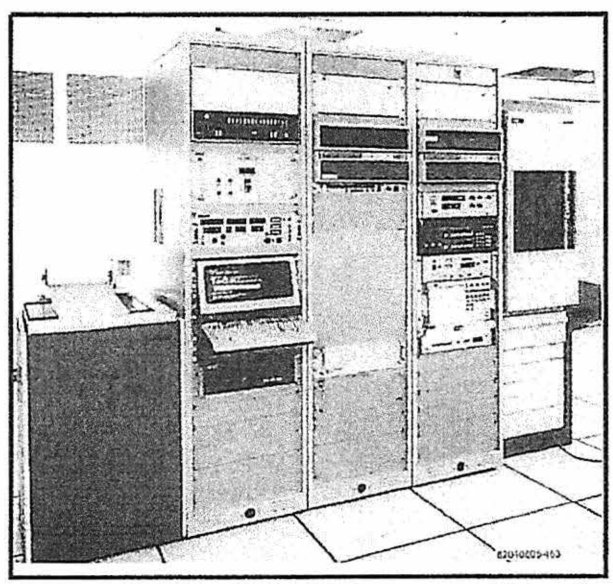
(S) Several equipment configurations developed for field site equipment, mostly computer based by this time, were needed to meet the increases in TELINT [redacted] a [redacted] field processor, was installed at [redacted] in 1983. [redacted] a processor for PPM signals, was provided to JAEGER.

[redacted]

(S) [redacted] a computer-based processor for [redacted] and other [redacted] signals, was scheduled for HIPPODROME in the mid-1980s to [redacted] 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, [redacted]

[redacted] purchased a major field telemetry processor called [redacted] and installed it at [redacted] in 1981 for [redacted] processing. (See figure 126.)

(S) The [redacted] program developed the [redacted] Analysis System [redacted] field processing system and installed it at all of the [redacted] sites. [redacted] (deployed in 1982) was one of the first field systems to prepare computer FISDI tape outputs, described below.[84] (See figure 127.)



(S) Fig. 127. The [redacted] signal processing subsystem

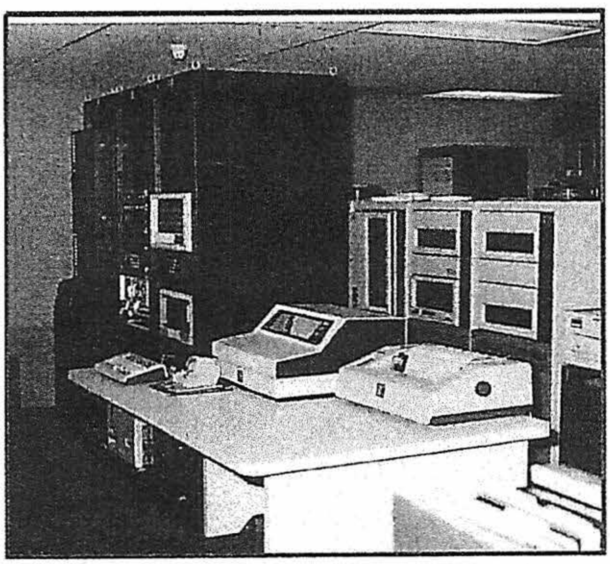
(TS//TK) Initially used for [redacted] processing in the mid-1970s, the DERF focus changed [redacted] in the early 1980s. By the late 1980s DERF was targeting against [redacted]

DERF PROCESSING FACILITY VAX 11/780

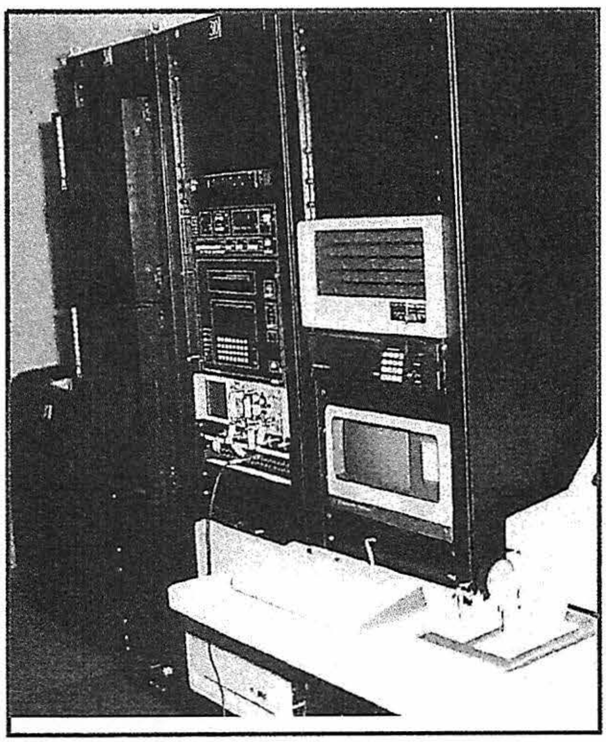
PL 86-36/50 USC 3605 [redacted]

(U) Fig.128. DERF facility in 1982, using a VAX 11/780 as the primary digital data manipulator

~~(S)~~ In 1984 the DELF telemetry signal processor was built and deployed to the 1.4(c) [redacted] facility in 1.4(c) [redacted] This processor, contained in six racks of equipment, provided an almost all-digital and very flexible signal processor for telemetry 1.4(c) [redacted] signals expected from the Soviet 1.4(c) [redacted] 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 PL 86-36/50 USC 3605 [redacted] and at NSA in the NTPC. At the NSA NTPC, the DELF was used in conjunction with PL 86-36/50 USC 3605 [redacted] to produce TAR reports and to develop software modifications for the field sites. The DELF equipment at the field sites analyzed telemetry from 1.4(c) [redacted] and first identified the use of 1.4(c) [redacted] 1.4(c) [redacted] 1.4(c) [redacted]



(U//FOUO) Fig. 129. DELF equipment system, including the storage disk drives

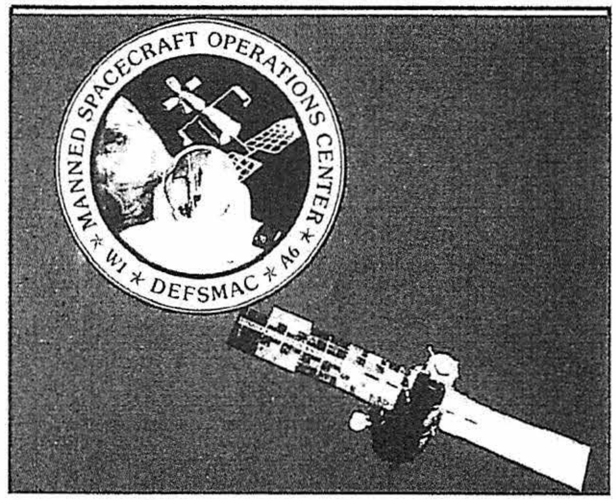


(U//FOUO) Fig. 130. DELF equipment operating console

1.4(c) [redacted]

(S) Soviet Manned Voice Processing

(S) The MSOC (Manned Space Operation Center) was established in DEFSMAC in 1981 for more timely reporting of Soviet manned space activity for both DoD and NASA requirements. [87] High interest in Soviet manned flight started in 1971. 1.4(c) [redacted]



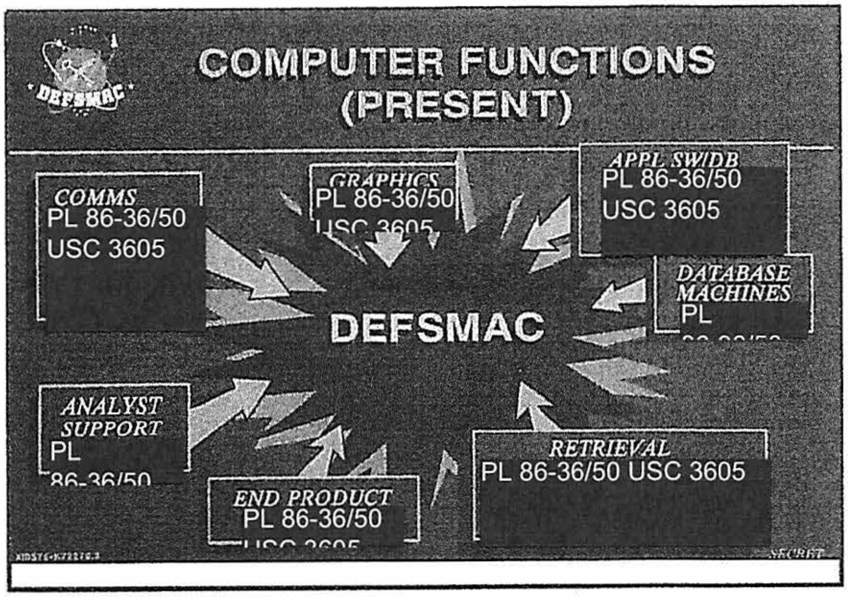
(U//FOUO) Fig. 131. MSOC logo

(U) DEFSMAC Computer Status

(C) A number of major computer processing upgrades were in progress or completed in the 1980s for DEFSMAC. The continued application of experienced NSA and DIA programmers fully integrated into DEFSMAC optimized this process

1.4(c) [redacted]

(TS//SI) Fig. 132. January through June 1987 activities on MIR

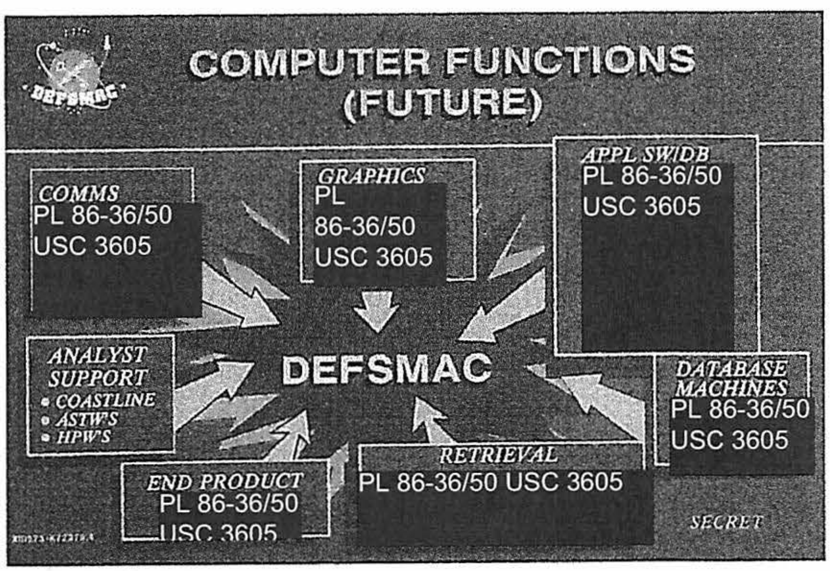


~~(S)~~ Fig. 133. The major computer functions and projects in DEFSMAC in the mid-1980s

and improved mission performance.[88] 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

~~(S)~~ 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



~~(S)~~ Fig. 134. "Future" efforts planned for the late 1980s

[redacted]

~~(S)~~ Fig. 135. Soviet Space Shuttle, [redacted]

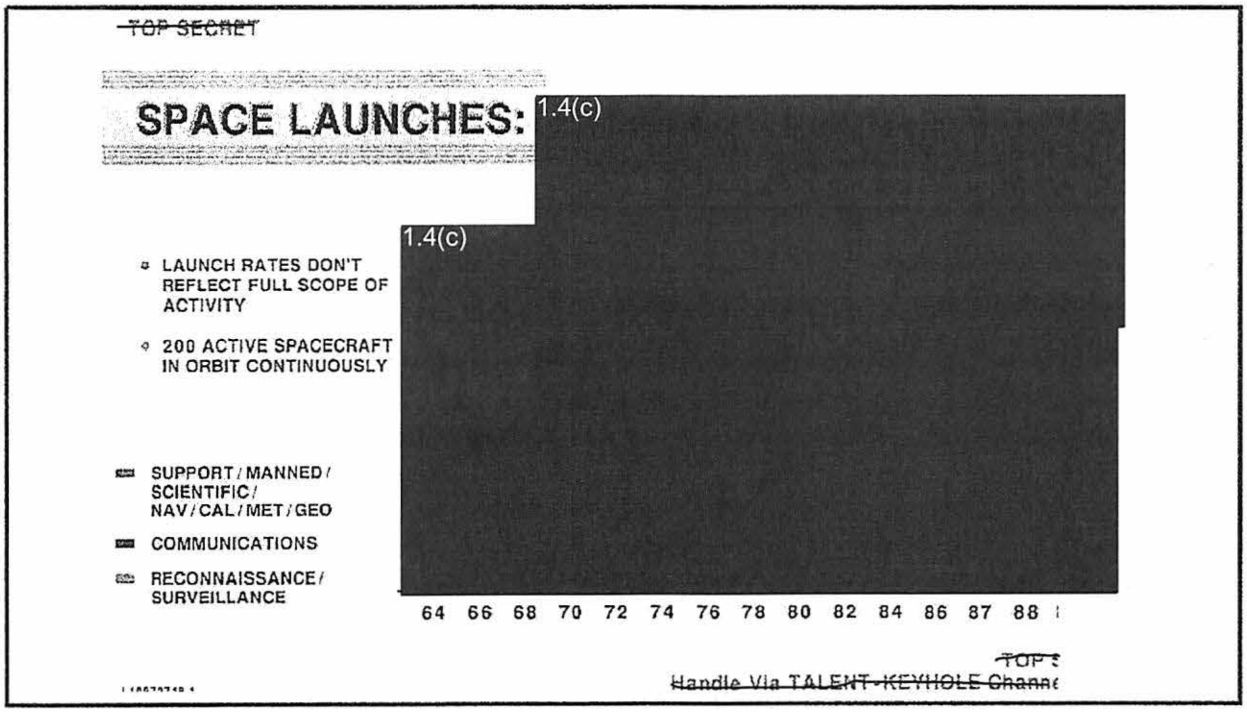
sources.[89] Figure 135 shows the space shuttle [redacted]

[redacted]

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 [redacted] became more actively involved in FIS activities.[90] Figure 136 shows the growth of foreign missile launches detected by all of the sources available to DEFSMAC; the total reached almost [redacted] in 1989. As shown in figure 137, the

[redacted]

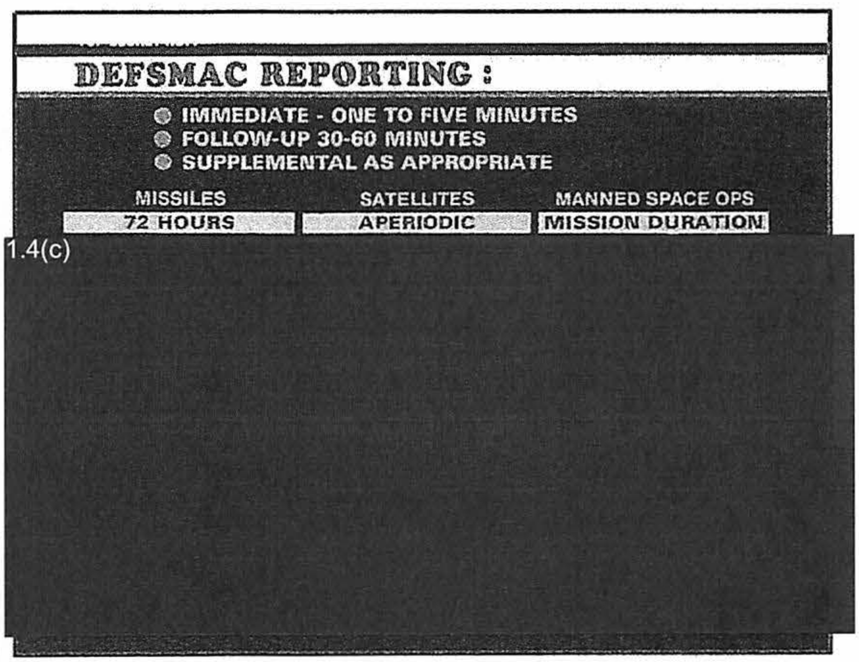
~~(TS//TK)~~ Fig.136. Growth of foreign missile launches.



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

1.4(c) [redacted]

1.4(c) [redacted] One of the newest uses of the FIS exploitation of Soviet satellite data was spearheaded by NSA(W14) and DEFSMAC during the 1.4(c) [redacted] 1.4(c) [redacted] Through the use of data collected by the 1.4(c) [redacted] 1.4(c) [redacted]



(TS//SI) Fig. 138. DEFSMAC reporting

[redacted]

~~(S)~~ Another key analysis and reporting capability by NSA and DEFSMAC in the 1980s was the [redacted] series of reports. These reports, based on Soviet [redacted] FIS data, projected when Soviet [redacted] operations and/or reports of Soviet ELINT or photographic detection of these operations.[94]

(U) 1980s Summary

~~(S)~~ 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]

~~(S)~~ Providing the U.S. knowledge of Soviet ICBM and SLBM missile warhead performance was a key intelligence topic throughout the 1980s. The triad of [redacted] contributed [redacted] 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 [redacted] 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.

1.4(c) [redacted]

~~(S)~~ Fig.139. How telemetry, radar, and optical sensors provided geographic coverage of the Kamchatka impact

1.4(c) [redacted]

~~(S)~~ Fig. 140. The contributions telemetry, radar, and optical sensors made to key Soviet missile intelligence factors

Site/Ship Name	LSRs	TARS	TRAMS	Tapes Made	Tapes Sent
[redacted]	[redacted]				
TOTAL					

NOTES:
*- Site sent 3,457 FISDI tapes which reduced analog tapes needed at NSA
LSR – Launch Summary Report
TAR – Telemetry Analysis Report
TRAM – Tracking Message
Tapes Sent – Requested by NSA for probable further analysis
No data available for [redacted] sites
(e.g. [redacted]

~~(S)~~ Table 3.3. Field analysis and reporting comparisons - 1988

(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

~~(S)~~ **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, [redacted] 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 [redacted] 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.

~~(TS//TK)~~ **Lesson 4 – Too much security compartmentation added complexities to the DEFSMAC coordination role.** [redacted]