[redacted]

UNITED STATES SPACE COMMAND

OPERATIONS DESERT SHIELD AND DESERT STORM

ASSESSMENT

JANUARY 1992

CLASSIFIED BY USCINCSPACE
DECLASSIFY ON OADR

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SECTION 3

EXECUTIVE SUMMARY (U)

SPACE SUPPORT TO DESERT SHIELD AND DESERT STORM

(U) Space forces in Operations Desert Shield and Desert Storm and the people manning and maintaining them per-formed exceptionally well. Across the spectrum, they met the needs of U.S. land, sea, and air forces and, as is often the case, provided capabilities and support not envisioned when the systems were on the acquisition drawing boards, or during years of peacetime, unstressed operations.

(U) Space forces were there when required, but significant effort was needed to optimize their effectiveness. The alerting system that warned of SCUD attacks was essentially constructed from scratch after August 1990. The ground forces who initially deployed had only minimal access to the United States' most effective means of navigation, the Global Positioning System (GPS) and remained so until the U.S. Army used the delay in the war's start to procure and distribute thousands of commercial GPS receivers. Deployed forces received weather data broadcast by satellites and used maps produced from spaceborne platforms. These and other experiences indicate that, in the future, operations plans (OPLANs) and Joint Staff directives must carefully consider the handling and use of space-derived information and support. The benefits of space must become ingrained in joint planning and, more importantly, practiced in exercises at the national, theater, and unit levels.

[redacted]The integration of space-based warning and Patriot anti-tactical ballistic missile (ATBM) fire was one of the great success stories of the war. Space-based and ground-based sensors (Defense Support Program (DSP) satellites and Pirinclik radar) provided TBM warning. This capability was achieved through a reconfiguration of systems designed for strategic warning. DSP was not designed to meet the tactical mission and was operating at the limit of its detection capability.

[redacted]The theater of operations was nearly perfect for DSP detection of tactical ballistic missiles. [redacted]

[redacted]

[redacted] To ensure that U.S. forces will always have the level of protection and warning provided during the war with Iraq, the Follow-on Early Warning System (FEWS) is needed to remedy current DSP deficiencies for both strategic and tactical missile warning missions.

[redacted] In addition to warning, the elimination of mobile-SCUD launchers was a top priority and one of the most difficult tasks of the war. USSPACECOM provided launch locations identified by DSP, allowing U.S. Central Command (USCENTCOM) to vector strike aircraft to attack mobile-SCUD launchers.

(U) Use of space-based navigation and positioning was an unqualified success. The Global Positioning System (GPS) was widely used by U.S. and Allied land, sea, and air forces. From simple land navigation to aerial bombardment, GPS played a major role in achieving mission success. When Iraq invaded Kuwait, the U.S. military did not have enough GPS receivers to meet the needs of the forces that deployed to the Persian Gulf. This necessitated the purchase of thousands of commercial GPS receivers. Because of the dependence of U.S. and Coalition forces on these commercial receivers, the Selective Availability (SA) feature of GPS, which denies highly precise data to non-authorized users, remained off for all of Desert Shield and Desert Storm. Fortunately, our adversary was not able to exploit GPS; however, in future conflicts we will probably face enemies capable of exploiting this very critical system. Therefore, the Commander in Chief, United States Space Command (USCINCSPACE) and the other CINCs and services support the current national policy to preserve highly precise GPS data for authorized users (i.e., leave SA on).

(U) Satellite communication (SATCOM) was the backbone for long-haul and intra-theater connectivity for Desert Shield and Desert Storm. Over 90% of communication into and out of the theater went over communication satellites (COMSATs), with 24% of this traffic being carried by commercial satellites. There were over ten different military and commercial satellite communication systems supporting USCENTCOM operations--with almost as many managers. The system worked well, but experience highlights the need for stronger involvement by a central authority in allocating scarce space communication assets. The proposed Chairman Memorandum of Policy (CMOP) 37 now in staffing provides an opportunity to make needed improvements.

(U) The principal means of acquiring weather data over Iraq was through the Defense Meteorological Satellite Program (DMSP) and civil weather satellites. Weather data and imagery were broadcast directly to U.S. forces and used in all facets of military operations.

(U) The military utility of multi-spectral imagery (MSI) was clearly demonstrated during Desert Shield and Desert Storm. Many of the maps that U.S. forces carried with them of Kuwait City and the area of operations (AO) were made from MSI products. The planning and execution of strike operations were often dependent on MSI data provided by the U.S. commercial LANDSAT spacecraft and its French counterpart,

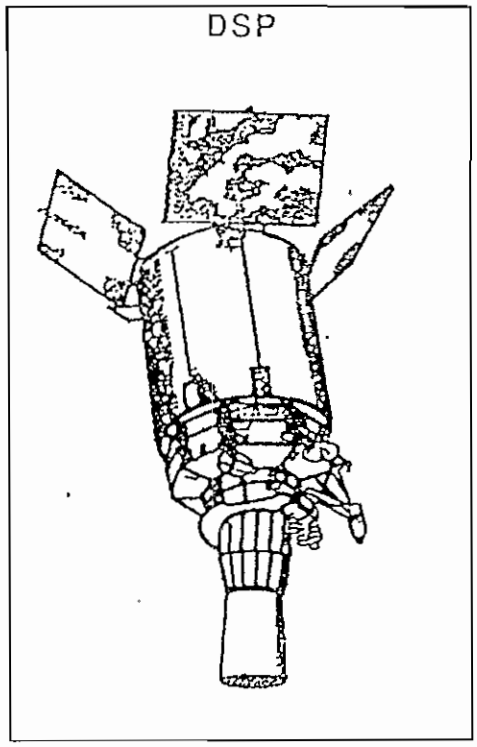
[redacted]

SPOT (Satellite Probatoire d'Observation de la Terre (Exploratory Satellite for Earth Observation)). Although MSI data proved to be invaluable, the continued existence of the U.S. LANDSAT system is in doubt since operations and maintenance costs are funded on an ad hoc basis and the availability of replacement satellites for the currently aging LANDSAT vehicles is questionable.

(U) The lack of a robust U.S. space launch capability was demonstrated during the war when a request for an early launch of a communications satellite could not be considered because of the lack of an intermediate booster--The U.S. has a launch-on-schedule, not launch-on-demand capability. Work on developing reactive launch systems must continue, and the U.S.'s expendable launch vehicle (ELV) capability must be improved.

SECTION 5.1

TACTICAL BALLISTIC MISSILE WARNING (U)



USSPACECOM used Defense Support Program (DSP) satellites and the Pirinclik space surveillance radar to alert U.S. and Coalition forces of Iraqi SCUD missile attacks. They provided an edge that allowed U.S. and Coalition forces to don chemical-protection suits and take defensive action. This also allowed USCINCCENT to alert Coalition members of attacks so that the civilian populace could take shelter. U.S. Space Command and Air Force Space Command operations crews, located half a world away, were uniquely close to the combatants. Daily on the television news, they heard the alert sirens sound and saw the Patriot missiles streaking into the skies to intercept attacking SCUDs. The Patriots used the warning provided by USSPACECOM to cue their batteries and make every shot count. The warning provided by Space Command crews was a critical factor in protecting American and Allied lives during the course of this conflict.

TIMELINE (U)

DATE	EVENT
2 August 1990	Iraq invades Kuwait. USCENTCOM has access to TBM warning
7 August	U.S. Forces deploy to Saudi Arabia
7 August	USCENTCOM voice-warning net (for SCUD alerts) proposed (this voice-warning net was known as the Commander in Chief United States Central Command (USCINCCENT) Execution Net)
9 August	Initiative begun by USSPACECOM and Component Commands to identify the location and potential distribution of terminals (i.e., Constant Source terminals) capable of receiving and processing TBM warning data--TERS
9 August	Pirinclik SPACETRACK radar was placed into a missile warning mode to detect and report Iraqi SCUD launches
10 August	USSPACECOM team sent to USCENTCOM (Rear), MacDill AFB, to coordinate space support for Desert Shield
13 August	USARSPACE conducts Constant Source terminal training in Europe and supervises the deployment of terminals to the AO

[redacted]

14	August	Voice warning active--USSPACECOM Space Command Center (SPACC) implements voice warning procedures (USCINCCENT's Execution Net now connected to USSPACECOM)
27	August	Constant Source terminal is operational at the U.S. Air Forces, U.S Central Command (CENTAF) Control and Reporting Center (CRC), Dhahran, Saudi Arabia
8	September	DSP ground sites enhanced to provide better TBM warning
10	October	[redacted]
19	October	Offer to USCINCCENT to put computer TBM warning (TERS) over DSCS
13	November	USCINCCENT declined TERS-over-DSCS offer
13	November	[redacted]
27	November	
2	December	Iraq launches three SCUD missiles (test)
13	December	[redacted]
26	December	Iraq launches SCUD missile (test)
27	December	USSPACECOM team travels to Saudi Arabia to work problems in receipt of TBM-TERS warning data
28	December	Iraq launches SCUD missile (test)
15	January	SPACC warning displays updated
16	January	Desert Storm begins-[redacted]
17	January	USCENTCOM concurs with changes to voice alert warning messages
17	January	First SCUD attack
21	January	Pirinclik's search pattern modified
23	January	[redacted]
31	January	
1	February	Redundant communications initiated (contingency bent pipe) to guard against loss of access to [redacted] DSP satellite. [redacted]
24	February	Ground war begins
25	February	Last SCUD attack
27	February	Ground war is over
9	March	[redacted]

TIMELINE CLASSIFIED [redacted]

SEQUENCE OF EVENTS (U)

[redacted] On 2 August 1990, Iraq invaded Kuwait. Warning data of SCUD attacks was available to U.S. forces in the area of operations (AO) via the Tactical Event Reporting System (TERS). At that time USCENTCOM (Rear), MacDill AFB, Florida, and U.S.

[redacted]

[redacted]

naval units equipped with the Tactical Receive Equipment (TRE) on the TRE Related Applications (TRAP) system could receive TERS alerts. [1]

[redacted] U.S. force deployments to Saudi Arabia began on 7 August. In support of these forces, the Strategic Air Command (SAC) Liaison Officer at USCENTCOM (Rear) helped USCENTCOM personnel identify a method of disseminating warning of SCUD attacks by broadcasting voice alerts over an existing USCENTCOM communications network (USCINCCENT Execution Net). [2]

[redacted] On 9 August, USSPACECOM and Component Space Command personnel began an initiative to find computer terminals capable of receiving and displaying TERS messages (Constant Source-type terminals). This group also prepared a recommended distribution plan to optimize the effectiveness of these terminals. A USARSPACE representative deployed to Europe and worked with U.S. Army Europe (USAREUR) and U.S. Air Force Europe (USAFE) to orchestrate the training of operators and deployment of Constant Source terminals to the area of operations. By the end of August, six Constant Source terminals were distributed to the CRC and U.S. Air Force wings. [3]

[redacted] Between 2-9 August, negotiations were conducted between USSPACECOM and the Turkish General Staff to utilize the Pirinclik radar to cover and track potential missile launches from Iraq. [redacted] Intensive efforts were undertaken to develop operational procedures at Pirinclik to optimize the radar's missile detection capabilities. [redacted]

[redacted] On 10 August, a USSPACECOM team traveled to USCENTCOM (Rear) to explain the TBM warning process, the use of the Constant Source (TERS) computer warning system, and the enhancements Iraq had made to SCUD missiles to extend their range. The USSPACECOM team and USCENTCOM personnel prepared the TBM voice-warning broadcast format and completed the architecture for a tactical missile voice-warning net. These actions resulted in the connection of USCINCCENT's Execution Net to USSPACECOM and precipitated USCINCCENT's support of deploying Constant Source terminals. [2]

(U) Constant Source terminals began arriving in Saudi Arabia on 17 August. [4] Deployment and training needs for Constant Source-type terminals were addressed by both Air Force and Army Space Commands. Some of the terminals had to be retrofitted with software upgrades to enable the receipt and processing of TERS alerts. Training also had to be given to several units that were not familiar with these terminals or their functions. [5]

[redacted]

By 8 September, DSP ground sites were enhanced to provide better SCUD warning [redacted] (Note. Negotiations were conducted between the Government of Australia (GOA) and USSPACECOM to support GOA requirements for notification to the Minister of Defense upon implementation of these procedures at Woomera, Australia. (The DSP large processing station at Woomera is jointly manned with Australians. Operation of the site is subject to United States and Australian agreement.) New procedures were established for the SPACC to notify the GOA when a specific SCUD warning operation was implemented.] [redacted]

On 19 October, an offer was made to USCINCCENT to place the TERS alerts over DSCS, in addition to the existing FLTSATCOM net. This would get warning data to Saudi Arabia faster and provide greater security [redacted] On 13 November, USCENTCOM declined the TERS-on-DSCS offer [redacted]

On 27 November, the DSP ground site software was enhanced [redacted]

The Iraqis launched test SCUD missiles on 2, 26, and 28 December.

On 27 December, a USSPACECOM team went to Saudi Arabia to assist USCENTCOM personnel in an investigation of problems with the Constant Source terminal located at the CRC. This terminal was receiving SCUD alerts ten minutes after other terminals. (Note. On 4 December, a USARSPACE representative in Dhahran reported that the CRC was receiving TERS alerts 10-15 minutes after launch. USARSPACE briefed USSPACECOM on this on 13 December.) Because of this, some USCENTCOM personnel questioned the reliability of the entire warning process. A problem with the software in this one terminal was found and fixed while the USSPACECOM team also worked with USCENTCOM personnel to refine the SCUD warning process. (Initial procedures called for launch and impact points to be reported in latitude and longitude. Deployed troops found the conversion of latitude and longitude to threat areas to be too time-consuming, and USSPACECOM subsequently passed launch point and azimuth from DSP and impact points in easily understood forms--for DSP: "Launch from southern Iraq, areas at risk are Dhahran and Bahrain;" for Pirinclik: "Launch from southern Iraq, area at risk is ten miles north of

[redacted]

King Khalid Military City."). [12,22] As a result of the review of existing procedures, a complete revision was made to USSPACECOM's SCUD warning process. This resulted in a simplified procedure (using general launch areas and areas at risk) that provided more timely and meaningful warning information. An end-to-end test of the warning system (from DSP Data Distribution Center to TRAP receivers) was also conducted during this visit. This test showed that the warning system worked effectively and identified areas where USCENTCOM could improve operations. [11]

(U) On the 15th of January 1991, SPACC Theater Display Terminal displays (originally for Europe only) were expanded to show the Middle East. [10]

[redacted]

By the 17th, USCENTCOM had concurred with new warning procedures which identified cities as well as general areas which were coming under missile attack. [12] The first SCUD attack came later that day with Israel as the target.

[redacted]every available piece of equipment and operator, not performing strategic warning, was detailed to the tactical warning mission. [redacted] This procedure reduced the risk of a catastrophic equipment failure at DSP ground sites during a SCUD attack. [9]

[redacted]USCINCSPACE approved positioning the satellite in a location that would enhance USSPACECOM's ability to detect Iraqi SCUD launches. [redacted]

[redacted]

[redacted]

The ground war began on the 24th of February, the last SCUD attack occurred on the 25th, and the ground war was over on the 27th.

TACTICAL BALLISTIC MISSILE THREAT (U)

Iraq possessed the SCUD TBM. The basic SCUD-B has a warhead and a range of about Iraq modified this missile and produced a variant called the "AL HUSSEIN" which had a warhead and a range of . (Note. Throughout the time this report was compiled, the identification of the Iraqi SCUD changed between "AL ABBAS" and "AL HUSSEIN.") [15]

A comparison between an intercontinental ballistic missile (ICBM), the type of missile DSP was designed to detect, and a SCUD is shown on Figure 5-1. The infrared (IR) intensity of the rocket exhaust must be above a minimum level for DSP to detect the missile.

The basic SCUD is at the edge of the detection capability of DSP.

However the Iraqis actually employed their modified version of the SCUD, the "AL HUSSEIN,"

The space surveillance radar located at Pirinclik, Turkey, also provided SCUD warning. This radar provided a totally independent method of providing warning and unique data that was beyond the capability of DSP. While DSP provided launch coordinates and azimuth, predicted impact coordinates were provided by Pirinclik. These impact locations from Pirinclik were tailored, at USCENTCOM's request, to ensure only threatened ground forces donned chemical suits. [22]

The reason this reaction time was so important was that the Patriot antitactical ballistic missiles (ATBMs) were dependant on cuing of SCUD launches identified by DSP or Pirinclik.

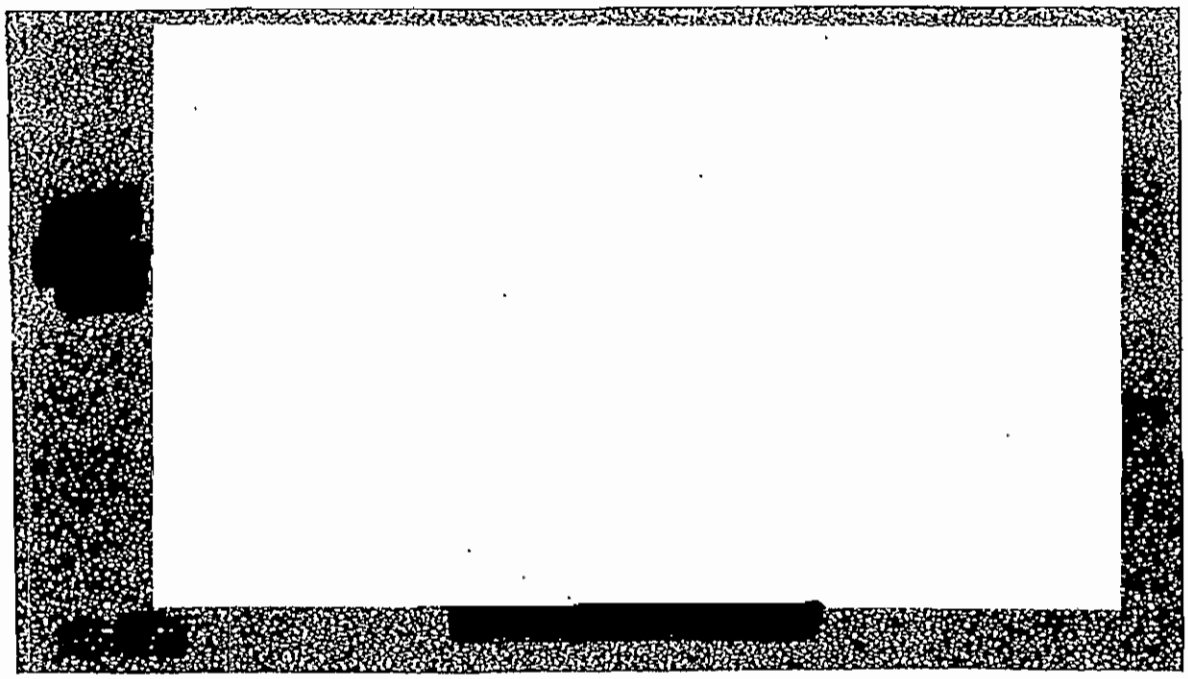


FIGURE [redacted]
Figure 5-1 BALLISTIC MISSILE PROFILES (U)

[redacted] Additionally, this warning gave USCENTCOM personnel time to take protective measures and notify Coalition civil authorities that an attack was under way. [15]

TACTICAL BALLISTIC MISSILE WARNING SYSTEM (U)

(U) TBM warning was provided to USCENTCOM via separate voice and computer networks (see Figures 5-2 and 5-3). Voice warning was broadcast to USCENTCOM Headquarters units and subsequently rebroadcast to subordinate units. The voice warning also went to Pirinclik and Incirlik Air Base in Turkey and to the Patriot units through their battalion and brigade headquarters. The computer or TERS alert was available to anyone who had one of the 57 Constant Source-type receiver (Army (Success Radio), Naval (TRE), and Air Force (Constant Source)) and had configured this receiver to display TERS alerts. These two networks provided redundant alerts that went to multiple agencies throughout the AO. They were mutually supportive and ensured TBM warning got through to the maximum number of U.S. personnel. [11]

(U) USCENTCOM passed warning to Coalition forces, while the NCA provided warning to Israel, and U.S. European Command (EUCOM) provided warning to the Turkish Government and U.S. forces in Turkey. Finally, strategic warning was simultaneously performed for the North American Continent throughout the war. [10]

The following was the sequence of events for voice alerting of a SCUD attack (see Figure 5-2): DSP satellites detected the IR signature of a SCUD launch. The AFSPACECOM crew on duty at a DSP site sent an initial launch alert message to the USSPACECOM Space Command Center (SPACC) located at Peterson AFB, Colorado, and the Missile Warning Center (MWC) located at Cheyenne Mountain AFB, Colorado. [10] The SPACC crew immediately activated the USCINCCENT Execution Net and relayed a SCUD alert. Once DSP had gathered enough data and the MWC had validated the launch, a confirmation or denial message was sent to the SPACC. For actual SCUD attacks, the SPACC crew broadcast a SCUD launch confirmation message and identified the area under attack. If the initial alert was false, the SPACC promptly broadcast a cancellation message. When Pirinclik tracked the SCUD, the Pirinclik crew came up on the Execution Net and passed confirmation information and impact point predictions. As the SCUD alert was being completed, the USSPACECOM Consolidated Intelligence and Warning (CIW) Center contacted USCENTCOM intelligence personnel on a separate line to pass specific launch coordinates. (Note. Launch coordinate information was passed over a different communications line (see section 5.6) to free the SPACC's line for other SCUD launch alerts.) [12]

Simultaneously with the voice confirmation message, the TERS launch report was formatted and dispatched over the TRAP System and the Joint Operation Tactical System (JOTS) (see Figure 5-3). The same information that was displayed on a missile launch confirmation message was converted into a TRAP or JOTS compatible format and transmitted. [17] [redacted]

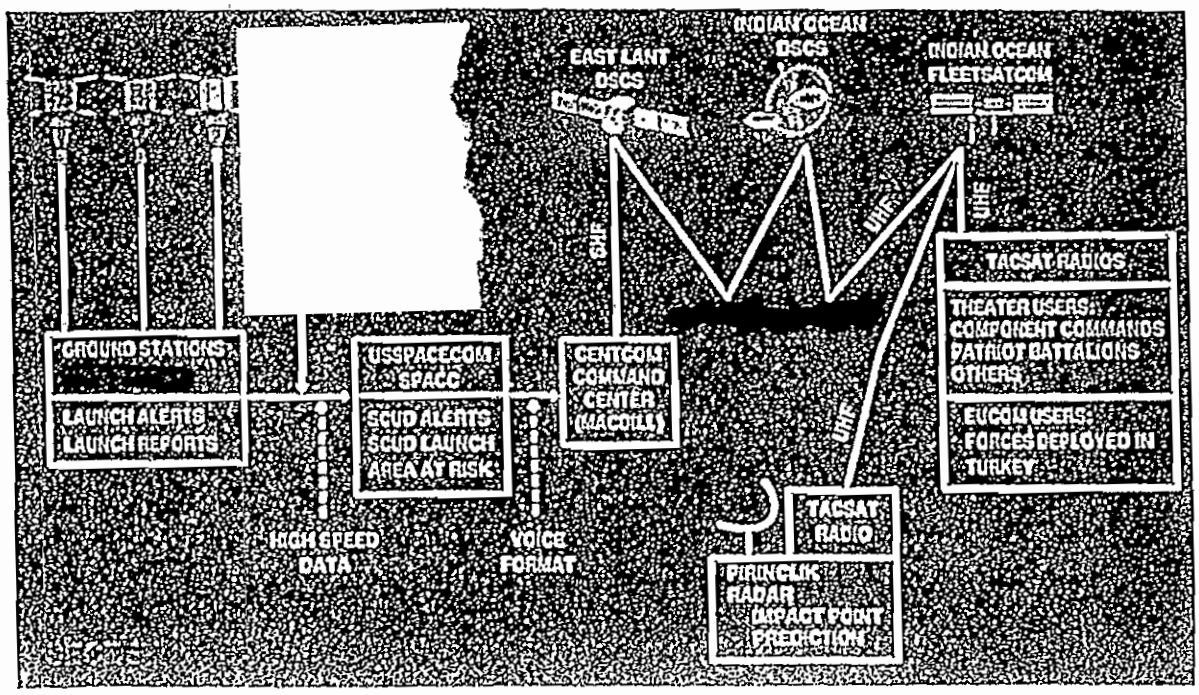


FIGURE [redacted]

Figure 5-2 TACTICAL MISSILE VOICE WARNING NET (U)

[redacted]

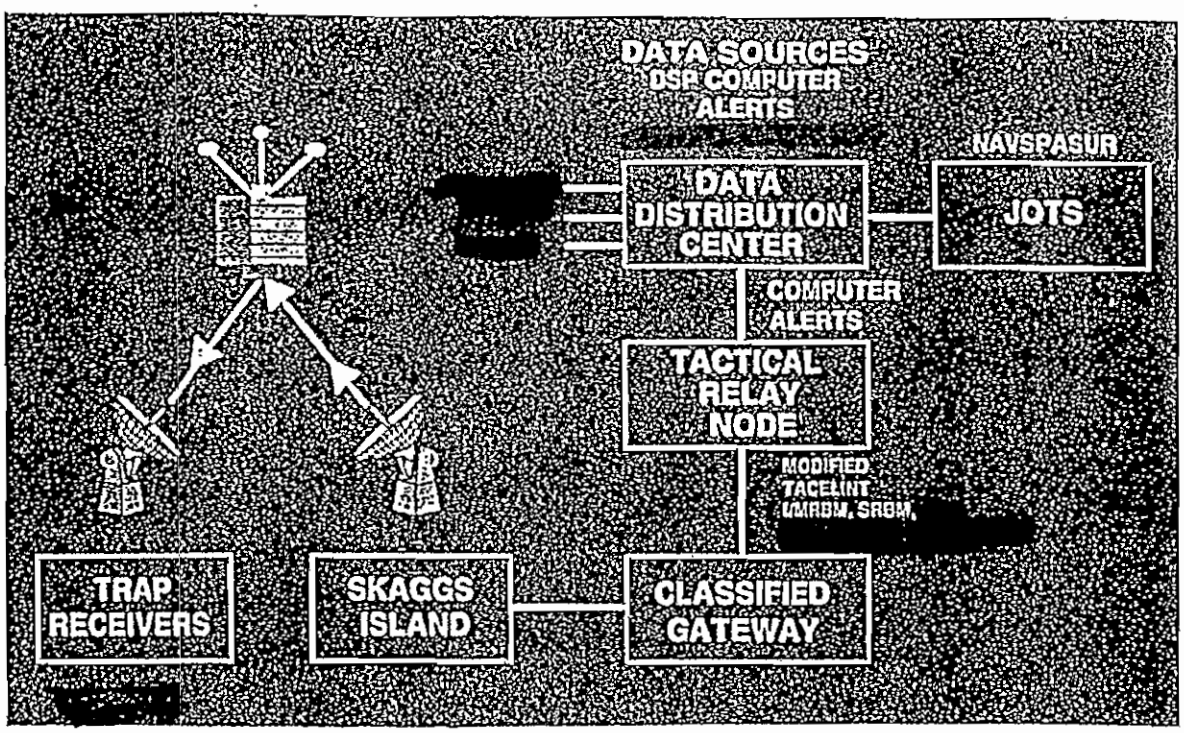


Figure 5-3 TERS ARCHITECTURE (U)

LAUNCH - Zulu time the SCUD was launched.
VOICE - time the SCUD telephonic alert was initiated.
TERS - time that the TERS alert was received.
PIRINCLIK - time Pirinclik released a launch and impact message.
SPACECOM WARNING - time from lift off to receipt of voice warning.
CENTCOM REACTION - time available before SCUD impacts to initiate defensive measures.

Note. Test launches impacted in western Iraq.

[redacted] The reason for this was the time DSP needed to confirm the launch and the transmission time for a TERS message. Additionally, TERS alerts are generated for each DSP site that detects a launch. Therefore, for a single SCUD launch, there could be multiple TERS launch messages.) [3]

TACTICAL BALLISTIC MISSILE WARNING PERFORMANCE (U)

[redacted] The TBM warning provided to USCENTCOM forces for the test SCUD launches in December 1990 is listed at Table 5-1. U.S. forces used this as a training exercise to identify those areas where warning was working well and where it could be improved.

[redacted]

[redacted] USSPACECOM reviewed the lessons learned from the Iraqi test launches with USCENTCOM. USCENTCOM was adamant; they wanted warning, even if it meant that a false message would be periodically received. This required a modification of longstanding strategic procedures to allow USSPACECOM to specifically support a tactical commander. Although strategic procedures were not impacted, new procedures for SCUD launches from Iraq had to be developed, emphasizing speed as well as accuracy. Because of the short flight time of SCUD missiles [redacted] the absolute earliest warning was paramount. [redacted] USCINCCENT was willing to accept some false reports. For the strategic mission, however, false alerts are not acceptable, and absolute credibility was maintained for the strategic mission throughout the war.

[redacted] To meet this need, AFSPACECOM and USSPACECOM personnel modified procedures and trained to meet USCENTCOM's warning needs. [redacted] SPACC crews also stressed the importance of forwarding every possible launch to USCENTCOM. The tactical warning system was streamlined and improved on a near-daily basis. [redacted]

[redacted]

[redacted]

All of these efforts paid off when Desert Storm began (see Table 5-2). [redacted] When U.S. forces were actually under attack, this was normally the minimum time available to take defensive actions. (See the appendix for a full list of SCUD attack timelines.) Due to the work on procedures and training by USSPACECOM, USCENTCOM, and AFSPACECOM, a good warning system was converted into a highly effective operation that met the needs of U.S. forces. The keys were developing straight-forward procedures with USCENTCOM and then taking advantage of opportunities to improve them. [10]

During the war, USSPACECOM detected and reported [redacted] events (see Table 5-3), some of which were multiple [redacted] launches. [redacted]

During the war, [redacted] "SCUD alerts" were called into theater. As the war progressed, DSP crews could tell when an alert was probably caused by something other than a SCUD. [redacted] Following the agreed-to procedure, every potential SCUD attack was called into theater. [redacted] Then, the SPACC would confirm an attack and pass probable target information or cancel the alert. [10]

The tactical warning system employed during the Persian Gulf War was an outstanding success, but it had its risks. The time to make decisions for a SCUD alert

[redacted]

[redacted]

TABLE 5-2 SCUD ALERT TIMES, DESERT STORM (U)

DATE	TARGET	LAUNCH	VOICE	TERS	PIRINCLIK	SPACECOM WARNING	CENTCOM REACTION
[redacted]							

* Warning to Israel provided by the National Command Authority (NCA)

[redacted]

TABLE [redacted]

Table 5-3 OVERALL TACTICAL WARNING PERFORMANCE (U)

ACTIVITY	NUMBER	AVERAGE TIME
SCUD EVENTS	[redacted]	[redacted]
DSP ALERTS		
** VOICE ALERTS		
** CENTCOM REACTION		
DSP CONFIRMATIONS (TERS)*		
PIRINCLIK ALERTS*		
TOTAL VOICE ALERTS		

Note. Only Alerts confirmed by DSP were transmitted by TERS.
Pirinclik recorded [redacted] detections and [redacted] of these were probably SCUDs.

TABLE [redacted]

[redacted]

[redacted]

was very limited [redacted] This action resulted in a tightening of procedures and updates to checklists that proved very effective when the war began. [1]

TACTICAL BALLISTIC MISSILE WARNING ASSESSMENT (U)

(U) The TBM warning process set up by USSPACECOM and USCENTCOM forces worked exceptionally well, but it took months to mature into the finely tuned system that exceeded all expectations during the war.

New procedures were initiated or significantly modified to meet TBM warning requirements. [redacted] Additionally, the Pirinclik radar was effectively tracking [redacted] missiles; but before alerts from this USSPACECOM radar could be broadcast into theater, Pirinclik had to be added to the USCINCCENT's Execution Net. The use of DSP and Pirinclik in this mode also necessitated coordination with host foreign governments to enable warning data to be gathered and relayed.

(U) The SPACC was the center for issuing SCUD alerts. Prior to Desert Shield, the MWC (located in the North American Aerospace Defense Command (NORAD) Cheyenne Mountain Complex, Colorado) was the primary focus for all ballistic missile alerts. The decision to initiate warning from the SPACC, instead of the MWC, was made to preserve the MWC's strategic responsibility to provide warning of ICBM/SLBM attacks against North America. The MWC did, however, act as a backup to the SPACC and was fully capable of performing the same function, if necessary. [19]

(U) Warning was also being received by numerous organizations and relayed throughout Saudi Arabia. Both USSPACECOM and USCENTCOM personnel had to learn to work together and be exceptionally effective in relaying and acting on TBM alert data. All command centers went through a growth process where they adjusted procedures, checklists, and mission aids to meet the interrelated needs of supporting and supported CINCs.

Constant Source-type terminals were employed to receive TBM alert data. These terminals were relatively new devices, and TERS was a system that had only been operational since late July 1990. These terminals and TERS were pressed into service. The Constant Source-type terminals had previously been used primarily for intelligence tasks. Now they were being used for operational TBM warning--a process that demanded unprecedented cooperation between operations and intelligence personnel and the possible relocation of these terminals to operations centers. Training for operating these terminals had to be provided to Army and Air Force personnel when they did not have experience with these terminals. Additionally, software problems had to be found and corrected.

[redacted]

Patriot interceptor missiles became dependent on cuing data from missile warning sensors. This placed additional time constraints on warning data, and getting this data to the theater and distributing it in near-real-time was an absolute necessity. This stressed USSPACECOM and USCENTCOM forces and communications links. All had to work flawlessly.

(U) Provisions for reacting to SCUD attacks did not exist in August 1990. The space annex to USCENTCOM's Operations Plan (USCINCCENT OPLAN 1002-90, DRAFT) stated that "USSPACECOM will provide normal space support: warning, navigation and positioning, mapping, ...". This annex did not say the U.S. Space Command would provide warning in two modes, voice and computer. It didn't say that the warning would be used to cue Patriot batteries. Additionally, nowhere in the OPLAN did it say USCENTCOM would be able to receive, process, display, distribute and react to warning data. (Note. When USCENTCOM tested their portion of the SCUD alert system in Saudi Arabia in late December 1990 and early January 1991, they found that it took up to 40 minutes to get warning out to subordinate units. [18])

In July 1991, USCENTCOM conducted a semi-annual exercise, Exercise Internal Look 90, during which USCENTCOM tested a new OPLAN for Southwest Asia and the Iraqi contingency. USSPACECOM supported this exercise by passing simulated voice ballistic missile warning messages from the SPACC to the USCENTCOM Command Center via STU III telephones. Additionally, a USSPACECOM Missile Warning Systems Staff Officer and a Plans Officer were at USCENTCOM during the exercise and briefed the TBM Warning/TERS cuing capabilities for Patriot operations (Note. This was briefed to USCINCCENT by ARCENT's ADA Brigade Commander later in the day). When Operation Desert Shield commenced, TERS was available to USCENTCOM, but could only be received at a few TRAP and JOTS receivers. Since the tactical receive equipment to display TERS data was service prototype systems, theater-specific concepts to provide further warning to subordinate elements had not yet been developed. A joint USSPACECOM-USCENTCOM team developed the voice warning process from scratch to supplement the TERS on TRAP and JOTS systems. This voice warning system was improved and adjusted after the Iraqi test SCUD launches showed its strong and weak points. During Operation Desert Storm, SCUD warning information transmitted over the USCINCCENT Execution Net was tailored to maximize support provided to U.S. forces in the region.

DSP's performance was clearly much better than expected.

Finally, there were sufficient ground site and command center crew personnel to man all the positions and meet both strategic and tactical warning needs.

[redacted]

[redacted] Pirinclik also performed better than expected. [redacted] Everything worked for this effort--we weren't looking into hills, another radar, or base facilities--and Pirinclik was able to provide warning and impact predictions for the SCUD attacks. [redacted]

[redacted] Operational procedures were changed to meet USCENTCOM's alert requirements and the evolving needs to locate TBM mobile launchers, [redacted] and equipment was relocated to back up vulnerable DSP ground sites. All of these actions could have impacted USCINCSPACE's strategic mission and required approval before they were implemented. The centralized control that USCINCSPACE exercised over the warning systems allowed General Kutyna to rapidly assess recommendations and impacts and approve changes to meet the evolving SCUD threat. [20]

[redacted] USSPACECOM warning capabilities must be improved, or warning support could be limited in future conflicts [redacted]

(U) Future warning sensors must be able to better discriminate between multiple launches and provide more accurate information on impact points. The Follow-On Early Warning System (FEWS) is needed to overcome these limitations and assure U.S. forces the same level of warning support provided in the war with Iraq.

(U) Backups to vulnerable ground sites must be prepositioned. With all the slops pulled out and half of the equipment already in place, the backup-bentpipe at Ascension Island took 45 days to become operational. [14]

(U) A dedicated tactical warning capability is needed. USSPACECOM must be able to simultaneously meet its strategic and tactical warning requirements

[redacted]

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SECTION 8.2

TACTICAL WARNING SUPPORT (U)

(U) USSPACECOM employed systems that were designed for strategic warning or space surveillance to meet the tactical ballistic missile (TBM) warning needs of USCENTCOM forces during Operations Desert Shield and Desert Storm. The space-based system, the Defense Support Program (DSP), was deployed over twenty years ago and updated continuously to meet strategic warning requirements. The ground-based system, the Pirinclik SPACETRACK radar, was deployed in the late 1960s and updated continuously to meet space surveillance requirements.

DEFENSE SUPPORT PROGRAM (U)

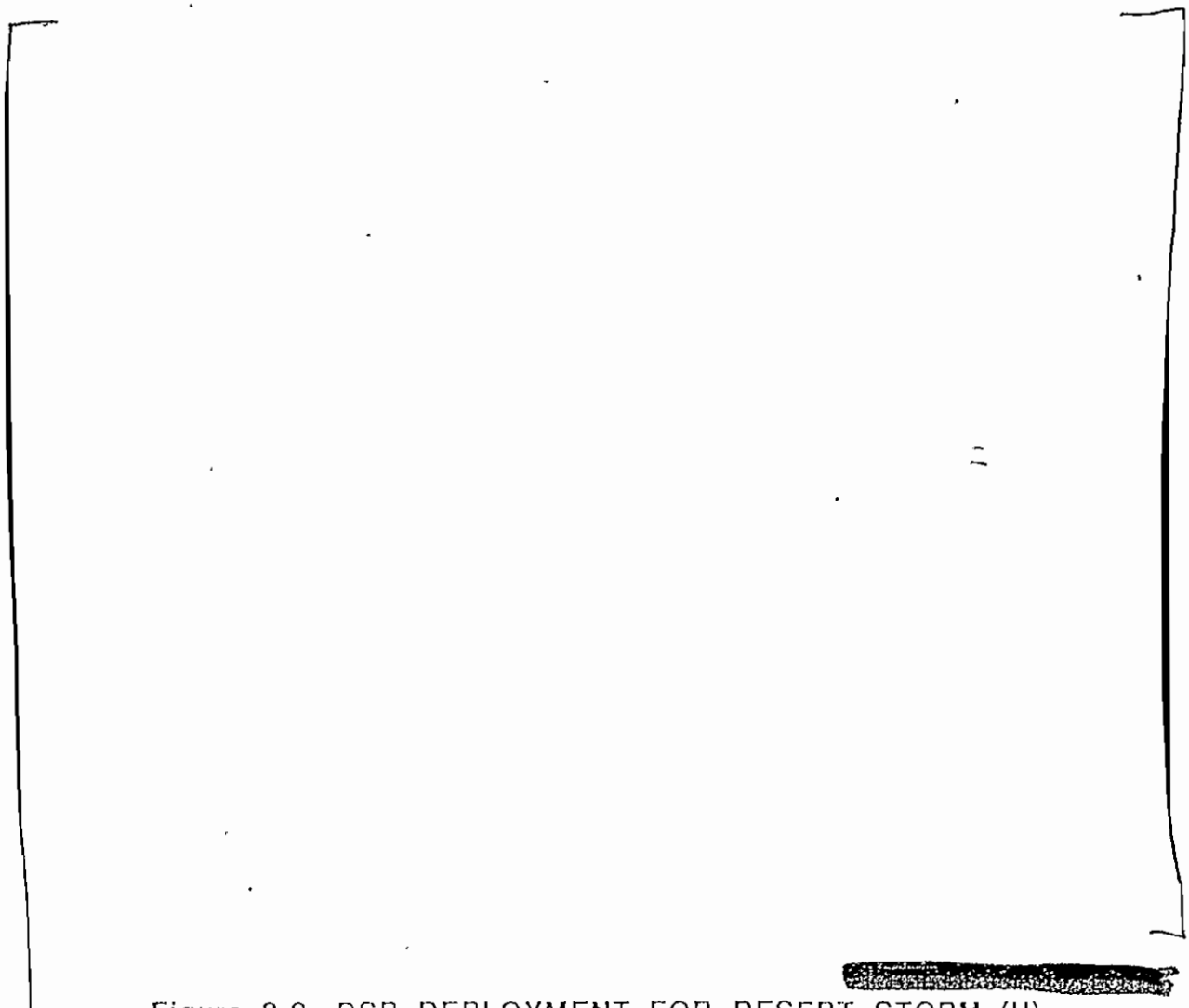
The DSP system consists of satellites at geosynchronous orbit that monitor the earth for infrared (IR) events (see Figure 8-1). If the IR event is bright enough, DSP can detect it.

Figure 8-1, DSP SYSTEM DESCRIPTION (U)

[redacted]

The ground stations that monitor DSP data are at Buckley Air National Guard Base, Colorado (CGS); [redacted] and Woomera, Australia (OGS). These ground stations prepare launch alert and launch report messages. [redacted]

These messages are transmitted over high speed data lines to the NORAD Cheyenne Mountain Complex and the USSPACECOM Space Command Center. These reports are evaluated for strategic and tactical threats and forwarded to national or tactical users. In the case of Desert Storm, SCUD alerts were passed over voice and computer links to USCENTCOM forces. Section 5.1 details how this system operated.



[redacted]

Figure 8-2, DSP DEPLOYMENT FOR DESERT STORM (U)

[redacted]