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**DESERT STORM--  
JFACC PROBLEMS ASSOCIATED  
WITH BATTLEFIELD PREPARATION**

BY

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This paper was based on the personal experiences of the author as Special Assistant to CENTAF Director of Campaign Plans, Brigadier General Buster Glosson. The paper examines the joint force air component commander (JTACC) objectives and problems that occurred during DESERT STORM. For example, Phase I, the Strategic Air Campaign, was never successfully completed primarily because of premature acceleration of Phase III, Battlefield Preparation. Having 50 percent of the Marine air withheld from JFACC's control only exacerbated the strategic bombing problem. Another problem was battle damage assessment (BDA). BDA rules defining a tank kill were not standardized and became more restrictive as G-Day approached. This was a problem that had to be resolved in order

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**DESERT STORM--JFACC Problems Associated With  
Battlefield Preparation**

AN INDIVIDUAL STUDY PROJECT

by

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## **ABSTRACT**

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This paper was based on the personal experiences of the author as Special Assistant to CENTAF Director of Campaign Plans, Brigadier General Buster Glosson. The paper examines the joint force air component commander (JFACC) objectives and problems that occurred during DESERT STORM. For example, Phase I, the Strategic Air Campaign, was never successfully completed primarily because of premature acceleration of Phase III, Battlefield Preparation. Having 50 percent of the Marine air withheld from JFACC's control only exacerbated the strategic bombing problem. Another problem was battle damage assessment (BDA). BDA rules defining a tank kill were not standardized and became more restrictive as G-Day approached. This was a problem that had to be resolved in order to insure significant numbers of Iraqi tanks, armored personnel carriers, and artillery were destroyed prior to the onset of ground operations. Finally, this paper addresses some of Army's complaints with the JFACC. Corps commanders wanted to be given a set number of daily sorties and claimed that the JFACC ignored corps inputs. This was understandable for two reasons. There was a lack of timely intelligence available to the corps and the corps commanders were not aware of many CINC constraints placed upon the JFACC.

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# **DESERT STORM--JFACC Problems Associated With Battlefield Preparation**

## **Introduction**

From the first night of the air campaign and for the next 39 days, the joint force air component commander (JFACC) directed air attacks against the Iraqi army both in Kuwait and in Iraq. Yet, as General Norman Schwarzkopf told the Senate Armed Services Committee:

We'd still be waiting to start the ground war if the commanders of Desert Storm had depended on the national agencies to agree that requirements for beginning the offensive had been met.<sup>1</sup>

This paper was based on my personal experiences as Special Assistant to U.S. Air Forces Central Command (CENTAF) Director of Campaign Plans, Brigadier General Buster Glosson. The paper examines the JFACC objectives and problems that occurred during DESERT STORM. For example, Phase I, the Strategic Air Campaign, was never successfully completed primarily because of premature acceleration of Phase III, Battlefield Preparation. Having 50 percent of the Marine air withheld from JFACC's control only exacerbated the strategic bombing problem. Another example, as indicated by General Schwarzkopf, was a problem with battle damage assessment (BDA). BDA rules defining a tank kill were not standardized and became more restrictive as G-Day approached. This had to be resolved in order to insure significant numbers of Iraqi tanks, armored personnel carriers (APCs), and artillery were destroyed prior to the onset of ground operations. Finally,

some of the Army's complaints with the JFACC will be addressed. Corps commanders wanted to be given a set number of daily sorties and claimed that the JFACC ignored corps inputs. This was understandable for two reasons. There was a lack of timely intelligence available to the corps and the corps commanders were not aware of many CINC constraints placed upon the JFACC. These problems show how different service perspectives and mindsets drive "joint" operations. Most likely, these problems will plague the next warfighting JFACC or commander-in-chief (CINC) if not recognized and resolved.

#### **Campaign Objectives**

Before the JFACC problems can be addressed, it is necessary to review the DESERT STORM campaign objectives. On 4 August 1990, President George Bush met with key military and civilian leaders at Camp David to determine a course of action. Included were Secretary of Defense Dick Cheney, General Colin Powell, General Schwarzkopf, and Lieutenant General Chuck Horner, who as the JFACC, briefed air capabilities and options.<sup>2</sup> From this meeting General Horner brought back to his staff the President's objectives as shown in Figure 1.

#### **CAMP DAVID OBJECTIVES**

1. FORCE IRAQ OUT OF KUWAIT
2. DESTROY NBC CAPABILITY (5-10 YEAR SETBACK)
3. MINIMIZE LOSS OF LIFE (BUT DO NOT DRAW OUT THE WAR)
4. MINIMIZE CIVILIAN CASUALTIES

**Figure 1**



On 17 August, General Horner assigned General Glosson as CENTAF Director of Campaign Plans and directed him to develop a detailed offensive operational air campaign. Using the Camp David Objectives and guidance provided by Generals Schwarzkopf and Horner, General Glosson developed the strategic objectives as shown in Figure 2.

### **STRATEGIC OBJECTIVES**

1. SEIZE AIR SUPERIORITY
2. ISOLATE AND INCAPACITATE THE IRAQI LEADERSHIP
3. DESTROY NBC CAPABILITY
4. ELIMINATE IRAQI OFFENSIVE MILITARY CAPABILITY
5. EJECT IRAQI ARMY FROM KUWAIT

**Figure 2**

On 3 September, General Glosson briefed General Schwarzkopf on a four-phased, 32-day air campaign with 178 strategic targets (Figure 3). The CINC approved General Glosson's plan and directed that it be briefed up the chain of command for higher authority review. By 12 October, General Glosson received final approval for the campaign plan after briefing General Powell, Secretary Cheney, and President Bush.

Just prior to General Glosson's briefing to President Bush, the CINC determined that key to the success of theater operations was the requirement to have 50 percent of the Iraqi occupying forces destroyed before launching the ground offensive. For the first time in the history of air power, a CINC's ground scheme of maneuver was dependent on air attriting a significant portion of

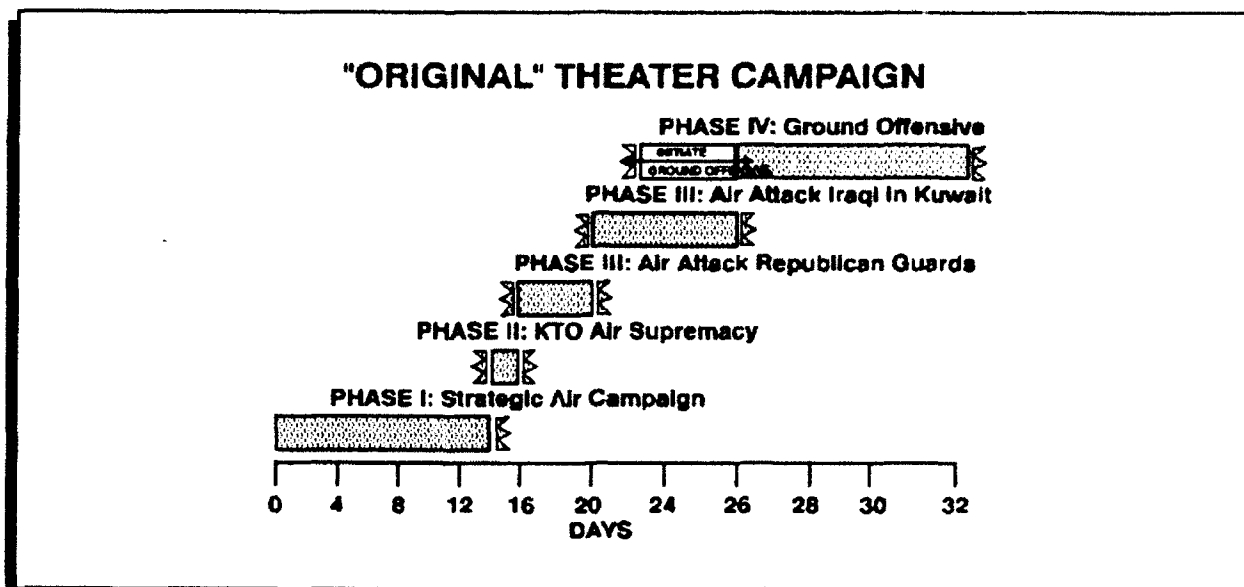


Figure 3

the ground forces.<sup>3</sup> For example, during World War II, the D-Day objective for air was to gain air superiority, isolate Normandy, and cooperate with the invading ground forces during offensive operations. Prior to D-Day, Allied aircraft accomplished this by attacking airfields, rail lines, and bridges. Unlike DESERT STORM, the Allied air forces were not tasked to attrite a certain percentage of enemy tanks, APCs, and artillery before the Allies launched the Normandy ground campaign.<sup>4</sup>

Figure 3 was designated the "original" campaign plan because Iraq significantly increased ground forces after 12 October. The Republican Guards divisions increased from four to six and the divisions in Kuwait increased from 12 to 36. The Coalition also increased its air forces such that the first three phases were able to be executed almost simultaneously.

General Glosson calculated the duration of each phase based on the projected sortie rates available to the JFACC and

estimated sorties required. In addition, the calculations assumed weather good enough to execute each mission or air strike. As it turned out, adverse weather was a significant factor. Its impact will be discussed later in more detail.

Note that the Republican Guards were singled out as part of Phase III. The CINC considered them as one of the enemy's "centers of gravity." In fact, the Republican Guards were Saddam Hussein's elite forces, and had the best equipment and supplies. They were his theater reserves located in Iraq just north of the Kuwait border (Figure 6, page 13).

In addition to reviewing the theater campaign objectives, it is necessary to discuss Central Command's (CENTCOM) targeting process and the command structure that identified Army targets to the JFACC. Knowing the targeting process is important in order to fully appreciate the problems encountered.

#### CENTCOM Targeting

From the start of the air campaign on 17 January 1991, this author prepared a nightly Master Attack Plan targets briefing which was presented to General Schwarzkopf by General Glosson. The briefing described both the targets that were in the current air tasking order (ATO), which was a 24-hour period starting at 0500, and the targets tasked in the next ATO. The strategic targets came from a document General Glosson developed before the war started. The document was called the Master Target List which described each target required to be destroyed. Both

General Powell and General Schwarzkopf kept a copy of the list including a supplement explaining each target's strategic importance.

As the intelligence communities studied Iraq over the months prior to D-Day, the Master Target List grew from 178 to about 350 targets by the start of the air campaign. It was not unusual for each target to have multiple elements requiring destruction. General target categories included nuclear, biological, and chemical (NBC), leadership, command and control, airfield, air defense, military production, oil, electrical, naval, Scud, railroad, bridge, and Republican Guards. Before the war ended, the target list grew to just over 460 as more information came in. Note that targets in Kuwait submitted by ground commanders and associated with battlefield preparation became part of the Deputy CINC's (DCINC) Target List. This list was kept as a separate group, not part of the Master Target List.

Between 17 January and 9 February, the campaign emphasized destroying strategic targets throughout Iraq and Kuwait in addition to Republican Guard forces. On 9 February, Secretary of Defense Cheney and General Powell met with General Schwarzkopf and his staff at CENTCOM Headquarters in Riyadh to discuss the timing of G-Day. After this meeting, the DCINC, Lieutenant General Cal Waller, was given the responsibility of reviewing the targets nominated by the ground commanders and apportioning aircraft. His reviewing process started daily at 1200 hours. In essence, the DCINC was performing as the land component commander

(LCC). At 1800, the DCINC passed his target list to the JFACC (Figure 4). At 1900, at the nightly staff meeting, General

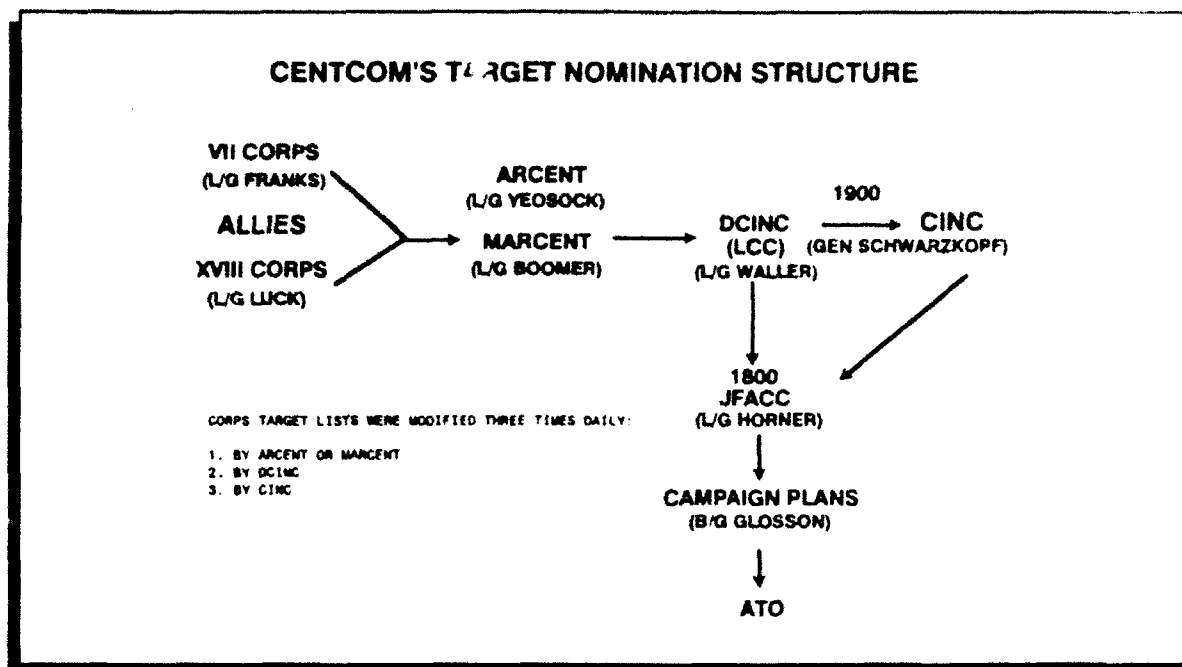


Figure 4

Waller briefed the results to the CINC. Execution of the results was still 34 hours away. During the 34-hour period, the JFACC would allocate aircraft sorties against the DCINC's Target List and publish an ATO. Following the DCINC, General Glosson briefed the strategic targets currently hit or to be hit within 34 hours. In addition, using target data previously provided by the DCINC, General Glosson briefed the total sorties by type of aircraft that were allocated against each Iraqi division in the Kuwait Theater of Operations (KTO). Thus, each night the CINC was briefed on today's, tomorrow's, and the next ATO where he typically made adjustments affecting any one or all.

Having reviewed the campaign objectives and the CENTCOM targeting process, this paper will now focus on the problems the

JFACC experienced during DESERT STORM. The first problem was having to cut short Phase I, Strategic Bombing.

## **JFACC Problems**

### **Strategic Bombing Versus Battlefield Preparation**

During Desert Storm, the technological advantages of America's conventional weapons and doctrine were far superior to Iraq's; yet, for several reasons the JFACC was not able to destroy all of Iraq's strategic targets--specifically chemical and biological weapons. First, U.S. intelligence was incapable of locating several of the key sites prior to conflict termination. Second, there were underground bunkers and hardened facilities that were virtually impenetrable. However, the primary reason was the premature allocation of sorties from strategic bombing to battlefield preparation.

Originally, Phase I, strategic targeting, was estimated to take approximately two weeks, based on attacking 178 targets. As stated previously, the Master Target List doubled by 17 January. Given good weather and flying 1,000 sorties a day, it would have taken at least three weeks of bombing to accomplish the Camp David Objectives.

As Murphy's Law would have it, the weather over Iraq and Kuwait was the worst in 14 years. After the first 18 days of execution, Coalition air had only 7 days of good weather--which was key for strategic bombing. Not only was weather disrupting the campaign; by Day 5, 50 percent of the sorties were diverted

from strategic bombing to battlefield preparation. The CINC reflected:

After two weeks of war, my instincts and experience told me that we'd bombed most of our strategic targets enough to accomplish our campaign objectives; it was now time, I thought, to shift most of our air power onto the army we were about to face in battle.<sup>5</sup>

However, the JFACC felt pressure to accelerate Phase III well before two weeks (Figure 5).<sup>6</sup> In fact, General Glosson personally objected to General Schwarzkopf. The only latitude given General Glosson for strategic bombing was the use of F-117s, F-111Fs, and F-15Es. All other aircraft were directed to be exclusively used in battlefield preparation.<sup>7</sup>

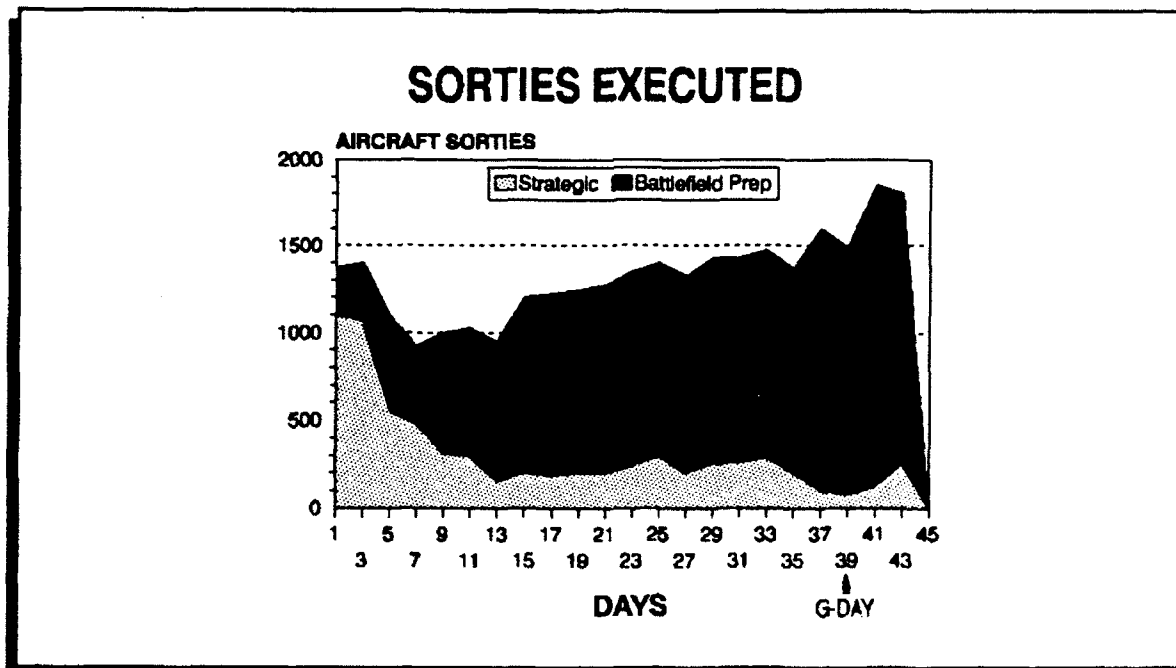


Figure 5

The result of prematurely accelerating Phase III was that Phase I, strategic bombing, was never successfully completed. It remains to be seen whether or not Iraq's NBC capability was set

back 5 to 10 years as President Bush directed. However, it is known that before the United Nations inspectors arrived in May 1991, Baghdad had smuggled to Algeria most of Iraq's nuclear stockpile, some 10 tons of natural uranium.<sup>8</sup>

#### **Marine Air Withheld**

Based on the importance of accomplishing the strategic objectives listed earlier and not knowing exactly when or whether or not a ground war would take place, Air Force doctrine suggests that all air assets should have been made available for use in the strategic campaign and controlled by a single air commander. This would maximize shock and destroy as many targets as possible during the early stages of combat. However, for the duration of the war, 50 percent of Marine air was dedicated to the Marine Central Command Component (MARCENT) and, thus, was not available to the JFACC. All Marine sorties had to be incorporated into the JFACC's ATO, but MARCENT selected targets in their area of responsibility (AOR) for 50 percent of the sorties scheduled to be flown by Marine air. The targets selected by MARCENT were primarily Phase III targets--tanks, APCs, and artillery. The bottom line was that the Marines, knowing they were basically self-contained, wanted to be left alone to execute within their AOR--that is, until they ran out of assets.

Strategic bombing operations in Phase I were shortened over 100 Marine sorties a day. If each corps commander had been given control of a similar number of sorties throughout the war, the strategic campaign would have been months in duration versus



weeks. As previously stated, the result of the JFACC having limited sorties was that strategic targets had to be continuously targeted for the duration of the war.

Not only did the Marines degrade strategic bombing operations by retaining half their sorties--AV-8s and F-18s were not nearly as effective destroying tanks, APCs, and artillery as other Coalition aircraft. During the war, the Air Force fired approximately 5,400 Mavericks primarily from A-10s (over 4,600) and 3,800 GBU-12 laser-guided bombs at Iraqi armor and artillery. Whereas, the Marines only fired less than 100 laser-guided AGM-65E Mavericks which required ground designation.<sup>9</sup> Ground designation was not possible until Coalition soldiers penetrated the Iraqi defenses. Since Marine air could not employ Mavericks in sufficient quantity or employ GBU-12 bombs, rates of AV-8 and F-18 kills-per-sortie against tanks or artillery were less than one third of those for the A-10 or other GBU-12 carrying aircraft. This meant that there were times where Marine air could have been more effectively used against strategic targets such as air defense, oil, or electrical.

During Phase III, the DCINC allocated sorties equally between ground commanders so that each got their "fair share." However, 13 days prior to G-Day it became obvious that Iraq's combat effectiveness was much higher in MARCENT's AOR. MARCENT's rate of attrition was much less than Army Component, Central Command's (ARCENT): Iraq's front-line unit combat effectiveness was 78 percent in MARCENT's AOR compared to 45 percent in

MARCENT's. General Glosson had warned General Schwarzkopf this would happen three weeks earlier. General Schwarzkopf told General Glosson, "...eventually they (MARCENT) will ask for help..."<sup>10</sup>

A disparity in enemy combat potential such as this significantly increased the risk to the Coalition ground forces in MARCENT's AOR. This disparity resulted because a high percentage of Marine air was flown in MARCENT's AOR. As previously noted, Marine air had lower kills-per-sortie against tanks and artillery. To compensate, MARCENT requested additional A-10, F-111, A-6, and F-15Es be allocated to their area in order to reduce Iraqi combat effectiveness to the degree achieved in other sectors.

It should be pointed out that prior to the Marine's special request, the JFACC had already made plans to increase air into MARCENT's area. This was because the JFACC staff was tracking sortie effectiveness against each target set, not just total sorties allocated against any particular target.

Using the principles of unity of command and economy of force, the JFACC would have better managed Iraq's combat effectiveness rate of reduction in MARCENT's AOR and more effectively allocated Marine air than what occurred. To help solve MARCENT's sortie effectiveness problem, the JFACC allocated a lot more sorties to MARCENT's AOR than should have been necessary. This action reduced Iraqi front-line combat effectiveness from 78 percent to 59 percent prior to G-Day. As

will be discussed next, 59 percent was a very conservative battle damage assessment (BDA) number.

### Battle Damage Assessment

The CINC designated both ARCENT and MARCENT responsible for assessing battle damage in their own AOR.<sup>11</sup> The rationale for assigning the responsibility for BDA to both was understandable. If G-Day was to be determined after air attacks had reduced Iraqi combat strength 50 percent, then ARCENT and MARCENT should make that determination, since each was to conduct a major attack within their AOR (Figure 6). However, the problem for the JFACC

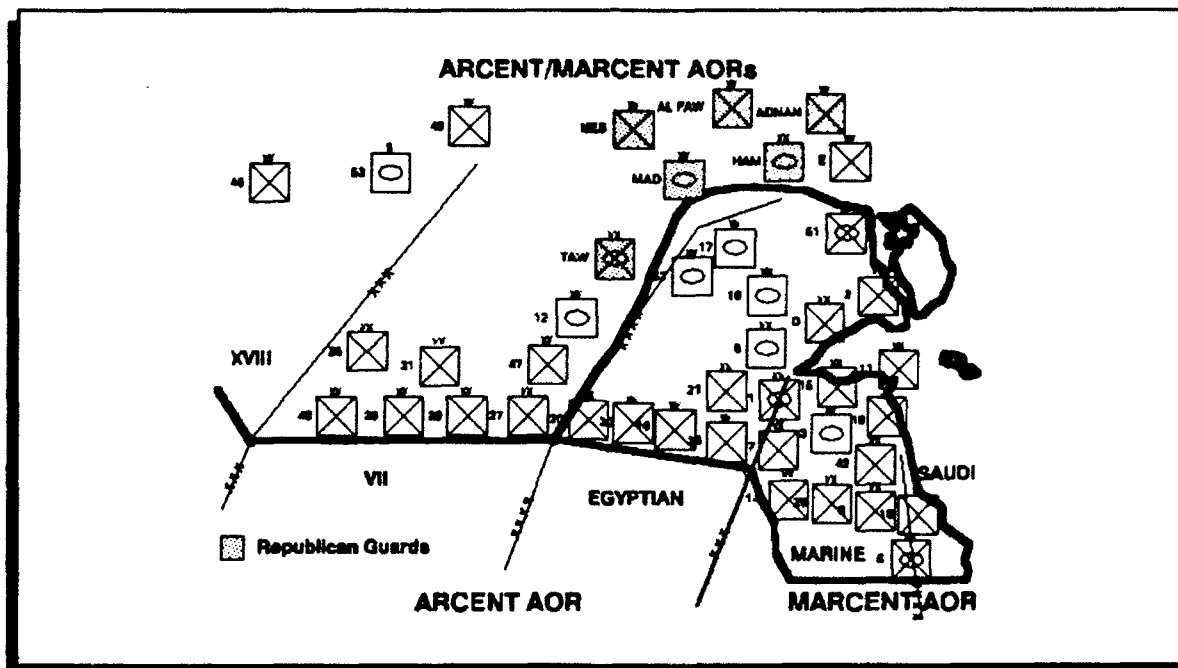


Figure 6

was that the rules defining a tank kill were not standardized between ARCENT and MARCENT. (Tank kill in this context refers to tank, APC, and artillery kills.) In addition, as G-day approached the definition of a tank kill became more restrictive.

In other words, it became increasingly more difficult for the JFACC to be credited a tank kill as the campaign continued.

In Figure 6, note that ARCENT was responsible for nominating targets located in the Egyptian area and MARCENT was responsible for targets in the Saudi area.

Prior to D-Day, the JFACC staff assumed that pilot mission reports would be a primary means for determining the number of tank kills in CENTCOM BDA assessments. What came as a surprise was that most of the Coalition air results were not counted in the BDA assessment! The results of aircraft sorties flown by F-16s, F-111s, and B-52s against tanks and artillery were disregarded by ARCENT. BDA was discussed prior to the war, but no rules were formally established between the JFACC and ARCENT or MARCENT. The following is the sequence of events.

The primary objective in the KTO for the first three weeks, was to attrite the armored divisions of the Republican Guards. The overall objective was to attrite all Iraqi units including the Republican Guards to less than 50 percent prior to G-Day.

Concerning the lack of BDA for the KTO, on 29 January, General Schwarzkopf commented, "Vehicles must be on their back like a dead cockroach before J-2 would assess a kill." Because the system was broken, he said that CENTCOM should use pilot reports.<sup>12</sup>

On 31 January, Lieutenant General John Yeosock, the ARCENT commander, briefed the CINC that the Republican Guards strength was 99 percent. This figure was impossible! For 15 days, a

total of over 4,500 F-16 sorties and 360 B-52 sorties were flown against three of six Republican Guards divisions. The CINC would not let the JFACC bomb the three Guards divisions that were infantry because he wanted to focus bombing on the armored divisions. Even so, the damage inflicted on those units bombed alone made the 99 percent figure implausible. General Yeosock further briefed that the overall Iraqi combat effectiveness in the KTO was 93 percent. Using this rate of reduction--one half percent per day--as a basis for projection, G-Day would be delayed until D+100; the original Phase III objectives were planned to be completed by D+26 as long as weather was not a factor (Figure 3, page 4); actual G-Day was D+38.

On 3 February, I discovered only A-10 mission reports (MISREPs) were being used by ARCENT for BDA (Figure 7). Other

### **ARCENT'S BDA ROE**

1. CONFIRMED BY A-10 MISSION REPORTS WHEN SHOWN AS KILLED
2. CONFIRMED BY IMINT OR SIGINT WHEN SHOWN AS PROBABLE, KILLED, OR DESTROYED
3. UNCONFIRMED BY IMINT OR SIGINT WHEN SHOWN AS POSSIBLE KILLED
4. UNCONFIRMED BY CAS WHEN SHOWN AS PROBABLE KILL

**Figure 7**

Coalition air strikes did not count in BDA unless overhead sensors picked up equipment damage. This practice meant substantial errors would persist. Intelligence collectors were already overloaded from trying to assess the damage from strategic bombing and from trying to locate Scuds. In any case,

assessing individual tank kills was beyond the capability of the intelligence community, as will be discussed later.

An additional source of error was that only three target categories counted toward determining an Iraqi unit's strength-- tanks, APCs, and artillery. The destruction of critical support --ammo depots, supply areas, command posts, food, and water--was ignored because all assessment focused only on combat equipment. So, no matter how degraded their capability, units remained counted as fully effective so long as they had weapons.

Because Coalition air was not able to destroy targets fast enough, General Glosson decided to adjust KTO bombing tactics in several ways. The first step was to get better F-16 results. F-16s were dropping bombs from altitudes that were too high for the pilots to distinguish between vehicles such as tanks or trucks. Even though it was known that ARCENT would still not use BDA taken from F-16 pilot MISREPS, the JFACC staff could expect better sortie effectiveness. Also, by flying lower, F-16 pilots could help resolve intelligence shortfalls by locating concentrations of armor and artillery necessary for follow-on attacks by other aircraft.

Another adjustment was the use of F-16 pilots as Killer Scouts or Fast Forward Air Controllers (FACs). These were formed and directed to "kill boxes" in order to improve target acquisition for incoming flights of aircraft (Figure 8). Kill boxes were predesignated areas measuring 15 by 15 nautical miles laid out across the KTO and containing airspace from the surface

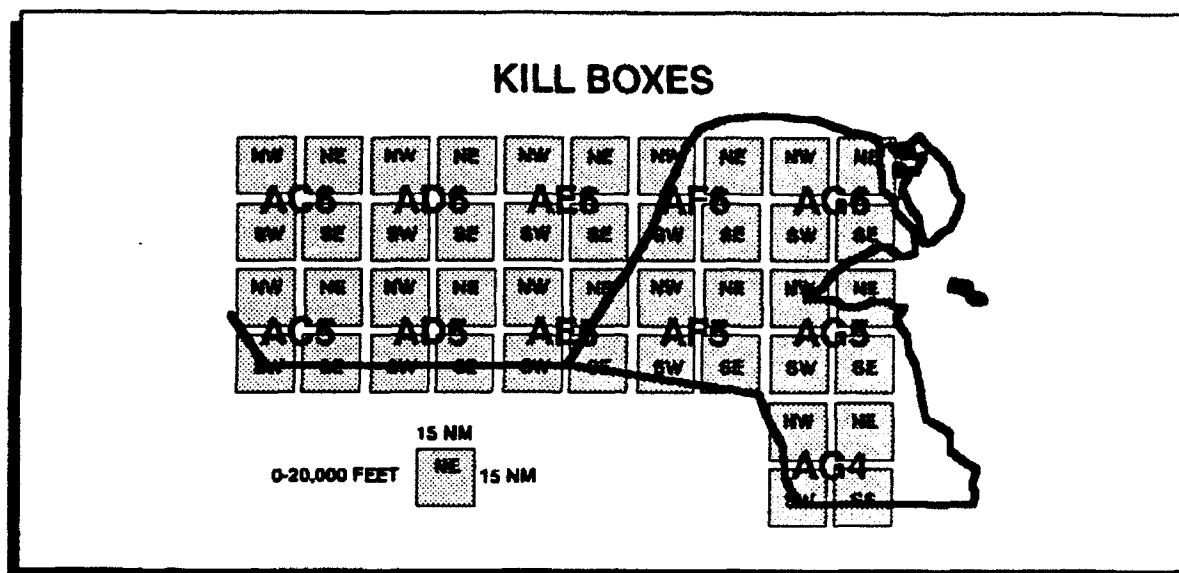


Figure 8

to 20,000 feet. Flights of various aircraft would seek out their primary target in the kill box as directed in the ATO, but drop their ordnance on the most lucrative target identified by the Killer Scout. Target priority was given to artillery, tanks, APCs, then other vehicles.

As a third adjustment, General Glosson assigned F-111Fs, F-15Es, and A-6s to attack armor and artillery at night using laser-guided 500-pound bombs (GBU-12s). The primary reason for this change was caused by Iraqi soldiers having recently buried their tanks. Tanks were buried up to the turret with sand bags placed over the tops while gun barrels were wrapped with rags. This made it very difficult for A-10 pilots to destroy the tanks. During the day, lucrative targets were located by the Killer Scouts and passed on to units having aircraft attacking at night. Initially, only a few sorties were flown in order to test whether or not the buried tanks and artillery could be acquired. On the

night of 9 February, after earlier limited successes, 40 F-111Fs dropping GBU-12s, destroyed over 100 armored vehicles.

The net results were positive, though frustrating. It took several days of pressuring CENTCOM and ARCENT staffs and showing F-111F video film of exploding tanks and artillery before ARCENT agreed to count the BDA. However, ARCENT insisted that the BDA would only be counted if each claimed kill was verified by the unit ground liaison officer (GLO) and submitted by separate report directly to the 513th Military Intelligence Brigade (MIB). Air Force units had GLOs, but not the Navy carrier units. Thus, the A-6 tank kills were not counted by ARCENT. In addition, the Navy felt that pilot MISREPs were sufficient and that additional reports were redundant.

On 9 February Secretary Cheney and General Powell met with General Schwarzkopf and his staff at CENTCOM headquarters in Riyadh to discuss the timing of G-Day. Using data I provided, the JFACC briefed that G-Day could occur as early as D+35, 21 February. This date was possible because of dramatic improvements in CENTCOM's BDA by 9 February. After 3 days of bombing using GBU-12s, enemy strength for the entire KTO decreased 12 percent. The Republican Guards decreased 15 percent. These results occurred after using only a small portion of the available F-111F, F-15E, and A-6 sorties.

As shown in Figure 9, G-Day was predicted to be D+35 based on being able to attrite Iraqi forces two percent a day until combat strength was 50 percent (dotted line). The solid line



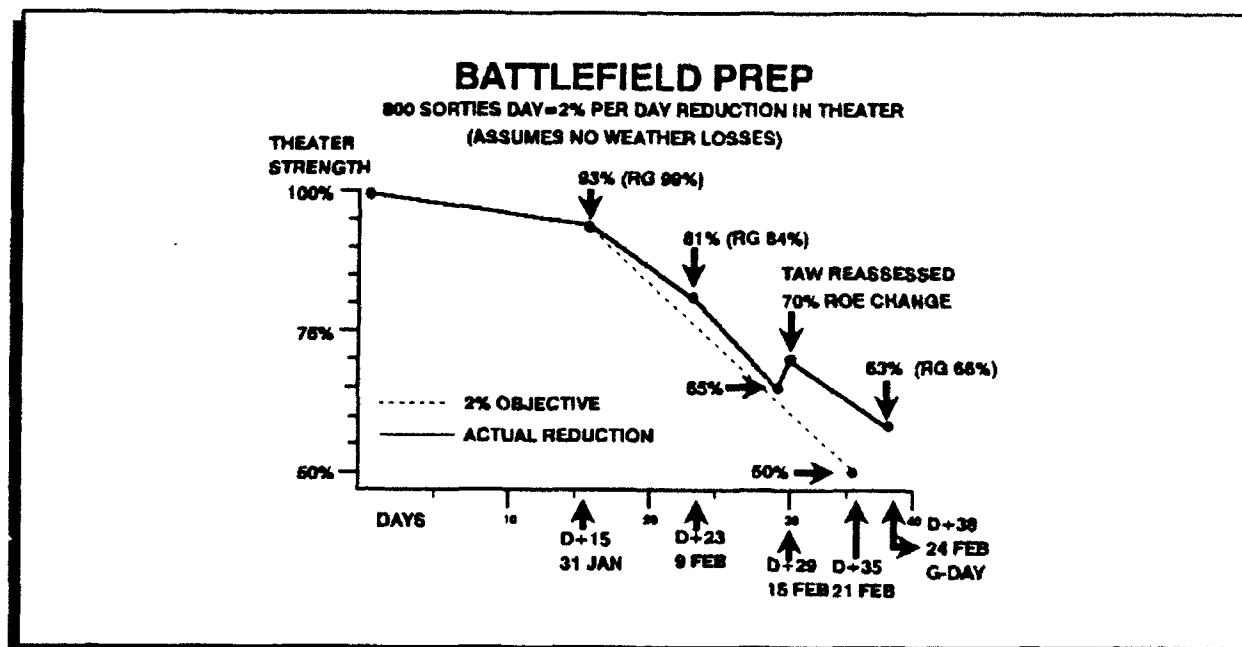


Figure 9

depicts the actual results of the battle preparation bombing phase. Note that on 15 February, the tank kill rules changed. The end result was that by G-Day, the KTO enemy was assessed at 63 percent strength rather than the desired 50 percent.

February 11th was the first day that front-line forces opposing ARCENT fell below 50 percent strength (45 percent). Front-line forces opposing MARCENT were at 78 percent combat effectiveness.

Also, I learned on 11 February that MARCENT BDA rules included MISREPs from A-10s and AV-8s. This was understandable, yet different from ARCENT's. Something else I learned was just as troubling: There were several nights where F-15Es and A-6s were not credited for tank kills in MARCENT's AOR. On a typical night, these aircraft were destroying over 30 artillery pieces or armored vehicles. This was known because each day's aircraft

video results were compared with CENTCOM BDA reports.

Unfortunately, these discrepancies could not be resolved before conflict termination.

On 12 February, the CINC specifically stated during the nightly targets briefing that he did not want to bomb Iraqi units that were below 50 percent strength. His intent was interpreted to mean not to fly aircraft affecting BDA against those specific units. To demonstrate compliance, General Glosson briefed the CINC at the 1900 staff meetings the total sorties by type of aircraft that were allocated against each Iraqi division in the KTO. Aircraft sorties specifically affecting BDA--A-10, F-111F, F-15E, and A-6--were highlighted. So, if a Corps commander wanted a target hit in a division that was at less than 50 percent strength, other Coalition aircraft would be used such as F-16s, B-52s, or Tornados.

Other Coalition aircraft were flying approximately 800 sorties a day. Since other Coalition air MISREPs were not specifically tracked by ARCENT, Army corps commanders had a difficult time assessing JFACC support in their areas of interest.

On 15 February, just when the JFACC staff thought it understood BDA rules, DIA muddied the water by reassessing the Tawakalna Republican Guards division at 74 percent combat effectiveness--26 percent greater strength than CENTCOM's estimate of 48 percent. BDA was derived using overhead and medium altitude sensors. DIA forced ARCENT into increasing

overall combat effectiveness assessments (Figure 9, page 19) and changing their BDA kill criteria. Now, only a third of A-10 and half of F-111F, F-15E, or A-6 kills were credited. This meant that if A-10s claimed to kill 9 tanks, 3 would be counted and if F-111Fs killed 10 tanks, only 5 would be counted as killed. DIA would not believe or could not verify CENTCOM numbers. As a result, more sorties were flown on divisions unnecessarily and figures for enemy combat effectiveness on G-Day obviously overestimated actual Iraqi capability.

The fault lay with DIA's dependence on overhead and medium altitude sensors, which could only detect catastrophic kills, and on the fact that Washington did not have access to the aircraft video tapes. For example, DIA could seldom detect either the damage caused by the A-10's 30-millimeter armor penetrating projectiles, unless the tank blew up, or damage to targets buried in the sand. Furthermore, it took DIA a week just to assess one division out of 42 Iraqi divisions in the KTO. Obviously, intelligence analysts could not keep up with the pace at which Coalition air was now destroying targets throughout the theater of operations.

Besides frustrating the JFACC staff, this situation had a negative affect on various Army units. For example, the 82nd Airborne Division's intelligence personnel lost much of their credibility with the division command group because of recurring inexplicable changes in BDA. How were they to explain why one day the Medina Armor Division of the Republican Guards was 40

percent combat effective and the next day it was back up to 70 percent.<sup>13</sup>

The discrepancies also caused frustration within the command staff. On 20 February, the CINC chastised the DCINC for accepting targets nominated by ground commanders located in Iraqi units below 50 percent strength. The CINC stated he liked how General Glosson was targeting in spite of the DCINC's Target List.

Redundancy among intelligence agencies regarding their own BDA estimates continued to raise doubts. On 21 February as G-Day approached, CIA became nervous about CENTCOM claims of 1700 tank, 900 APC, and 1400 artillery kills.<sup>14</sup> As a result of their own disbelief, CIA briefed President Bush that they could validate only 500 kills. Fortunately, the head of DIA, Rear Admiral Mike McConnell, and Secretary Cheney had seen F-111F tank killing video tapes and recommended the President accept CENTCOM's BDA.

As G-Day approached, ground commanders and the CINC shared divergent concerns, partly owing to faulty reporting and communication practices. Between 20 and 24 February, corps commanders were concerned that they were not getting enough air allocated to the enemy's front-line divisions. On the other hand, the CINC was concerned with reducing Republican Guards strength. Corps commanders were worried about breaching and the CINC was worried about theater reserves. In addition, General Schwarzkopf and General Glosson decided not to attack front-line artillery until three or four days before G-Day to prevent it

from being replaced. On 22 February, in response to VII Corps commander concerns, over 100 artillery pieces were destroyed in the 47th Division by F-111Fs (Figure 6, page 13), but were never recorded by ARCENT. A message was sent by the unit GLO, but was never acknowledged by the 513th MIB. On 23 February, the day before G-Day, Coalition air had reduced ARCENT Iraqi front-line forces to 33 percent and MARCENT front-line forces to 59 percent using the most conservative BDA rules imaginable. Republican Guards were at 66 percent and the overall KTO combat effectiveness was 63 percent.

The collective effect was that on 24 February (G-Day), breaching was relatively easy and close air support (CAS) requirements were less than planned. In fact, three divisions facing the Egyptians were already destroyed by Coalition air and were bypassed to be cleaned up later. Predetermined corps fire support coordination lines (FSCLs) facilitated CAS planning and execution. The preplanned FSCLs made rapid Coalition troop movements easier for Coalition air to respond.<sup>15</sup> In addition, the "Horner Line" was established. This line was 30 nautical miles parallel to and in front of the FSCL. While FACs worked inside the FSCL, Killer Scouts controlled the area between the FSCL and the Horner Line. As the FSCL moved forward, there was constant coordination between the Army ground FACs, airborne FACs, and Killer Scouts. While over 1200 sorties per day were available for CAS, not all were required by the Army. As a result, air interdiction (AI) sorties were flown continuously beyond the FSCL

using Killer Scouts and kill boxes. Any or all of the AI sorties could have been diverted while airborne to CAS targets, had Army ground commanders needed them. As the battle progressed, the 1200 sorties available daily for CAS grew more and more geographically confined because of rapid FSCL movement towards Bashrah (Figure 10).

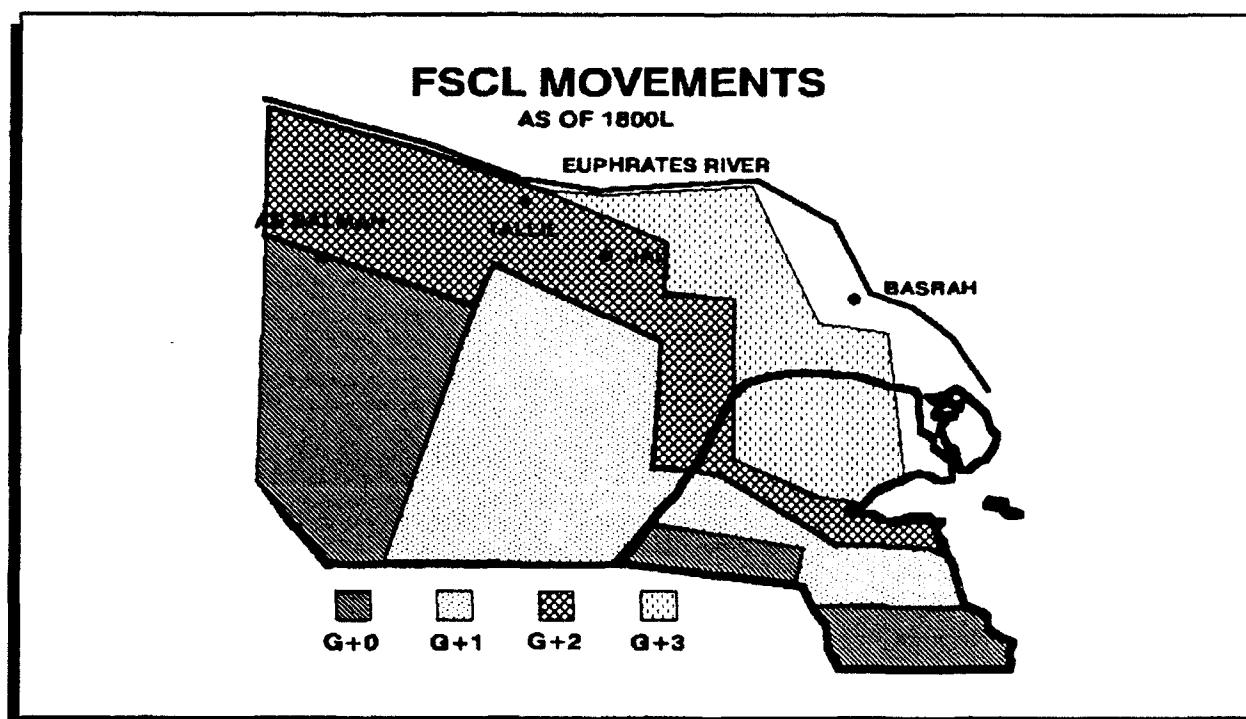


Figure 10

There were times where the rapid FSCL movement hindered air operations while it benefited the enemy. Probably the number one mistake of the ground campaign occurred on G+3. The 7th Corps pushed the FSCL 50 miles beyond their position covering the escape of the Hammurabi and Madina Republican Guards divisions headed north. General Glosson attempted to get General Schwarzkopf to move the FSCL south towards the Kuwait border, but General Franks talked him out of it. As a result, the two

divisions escaped. Overwhelming force could not be applied because every sortie flown inside the FSCL had to be controlled by a FAC.<sup>16</sup>

The degree of success as a result of prior bombing was spectacular, even though ground operations occurred before air was able to attrite enemy forces in the KTO to the stated objective of 50 percent. After two days into the ground war, Coalition army units were already one day ahead of scheduled objectives. As a result, when bad weather hindered available air power, the CINC instructed ground commanders to delay attacks until they could have air support. On 27 February, G+3, a 100-hour cease fire was called. Of the 42 Iraqi divisions facing the Coalition, 39 were listed as combat ineffective or destroyed.<sup>17</sup>

Obviously, the percentage of combat effectiveness was not the only factor used in making the decision for G-Day. The 800 sorties a day flown by Coalition air that were not counted in the BDA combat effectiveness assessments were indirectly impacting the decision.

In addition to attritting combat forces, Coalition air accomplished many other things in theater as far as preparing the battlefield. For 24 hours a day, a barrage of bombs were dropped on Iraqi soldiers. Unlike strategic bombing in cities, aircraft flying in the KTO against enemy troops in the field, could release their weapons against targets obscured by weather. B-52s hit a target in the KTO every 3 hours from 17 January until the end of the war. Over 35,000 attack sorties were flown in the KTO

including 5,600 directed against three divisions of the Republican Guards.<sup>18</sup> One Iraqi officer (EPW) stated he surrendered because of B-52 strikes. "But your position was never attacked by B-52s," his interrogator exclaimed. "That is true," he stated, "but I saw one that had been attacked." Another Iraqi general stated the dramatic difference air attacks made for him and his soldiers:

During the Iran war, my tank was my friend because I could sleep in it and know I was safe...During this war my tank became my enemy...none of my troops would get near a tank at night because they just kept blowing up.<sup>19</sup>

Air neutralized Iraqi fire trenches 6 days prior to G-Day. The CINC wanted to wait until G-6 to ensure that the trenches could not be rebuilt. The F-117s destroyed 32 oil pumping stations and junctions while other aircraft set the residual oil on fire. B-52s helped clear paths through breaching areas. Just prior to G-Day, a massive bombing plan against communications throughout the KTO was completed by F-117s and F-111Fs. This plan forced Iraqi troops to use radios rather than land lines. As a result, command and control was degraded and conversations were exploited.

Air attacks had other collateral effects that impaired Iraqi performance. Iraqi soldiers were starving because air attacks had cut troop supplies of food and water. Over 5 weeks of around-the-clock bombing had a tremendous affect on unit morale. Suffering from low unit morale, hundreds of enemy prisoners-of-war (EPWs) crossed the border. Most EPWs were infested with



lice, covered with sores, sick, demoralized, or in shock. As G-Day approached, frequency of front-line executions of deserting soldiers increased dramatically. Also, a senior officer EPW described very high losses in artillery units caused by casualties and desertions.<sup>20</sup> On the eve of G-Day, CENTCOM conservatively estimated that air attacks had destroyed high numbers representing large proportions of total equipment: 36 percent of the tanks (1800), 30 percent of the APCs (950), and 45 percent of the artillery pieces (1500).<sup>21</sup> As Coalition ground forces launched their offensive, the Iraqi army was demoralized and severely degraded in combat effectiveness. General Powell said:

...air power took a terrible toll, not only by destroying equipment, but by breaking formations and breaking the will of the Iraqi armed forces.

As a result, in the 100 hours of the ground offensive, Coalition forces took into custody over 86,000 Iraqi prisoners.<sup>22</sup>

### **Army Complaints**

Although the ground campaign was a complete success, the Army corps commanders were not satisfied with JFACC operations. This was understandable for two reasons. There was a lack of timely intelligence available to the corps and the corps commanders were not aware of many of the constraints placed upon the JFACC.

#### **Corps Desire For Dedicated Sorties**

Army soldiers view the enemy army as the prime focal of war and everything else is subordinate. Commanders become impatient

with tasks, such as strategic bombing, that interfere with what they want to do.<sup>23</sup> Typically, Army commanders want a dedicated piece of everything they need for their mission and fight hard to get it--even if they don't know what to do with it when they get it! If the corps commanders had their way at DESERT STORM, the responsibility for shaping the battlefield through air interdiction, both prior to and after G-Day, would belong to each corps, not to the JFACC. In addition, each corps commander would be given a set number of daily sorties.

These preferences reflect a basic difference in views about the proper control and use of air assets. If corps commanders were given what they wanted, air operations would have been severely degraded, just as in World War II. During the 1943 North African Campaign, such employment made it impossible for tactical air to achieve air superiority. Lack of such superiority led to the defeat of U.S. forces at Kasserine Pass.<sup>24</sup> General Eisenhower recognized the nature of the problem:

Direct support of ground troops is naturally the method preferred by the immediate commander concerned, but his vision did not extend beyond the local battle. It did not consider the competing demands of individual commanders on a far flung battlefield, each of whom would naturally like to have at his disposal some segment of the Air Force for his own exclusive use.

As a result, Army Field Manual (FM) 100-20, Command and Employment of Air Power, was published in July 1943. That field manual formalized the idea of centralized control of air power.

In DESERT STORM, dedicating a set number of daily sorties to each corps commander would have been just as bad as in World War

II. The number of sorties flown are not important, but the types of aircraft and weapons are. For example, if a corps commander wanted to reduce artillery in his area, 8 F-111Fs each carrying four laser-guided bombs could be allocated for the job. However, if the target was a supply depot, only 3 B-52s each carrying 54 gravity bombs could be used. Furthermore, in reducing combat unit effectiveness--tanks, APCs, and artillery--some aircraft sorties were not counted by the Army for BDA purposes. Thus, requests for dedicated sorties would have tied the JFACC's hands behind his back and diluted the air effort. The JFACC needed to be provided with specific targets and objectives, as was done by the DCINC's target list. The JFACC would allocate aircraft and sorties against the list, and the CINC would review the results at the nightly targets briefing.

After DESERT STORM, VII Corps criticized the Air Force by claiming that, of over 2000 Army-nominated targets, only 300 were actually targeted by air (15 percent). However, the Army also stated that Coalition air did a magnificent job of preparing the battlefield. By examining a VII Corps target list submitted to ARCENT, it can be shown why only 300 targets were selected.<sup>25</sup>

#### **VII Corps Target List**

The corps could normally nominate up to 40 targets a day, prioritize them, and send them on to ARCENT. From ARCENT, the targets would be prioritized with other ARCENT targets and sent to the DCINC (Figure 4, page 7).<sup>26</sup>

Figure 11 provides an illustration for 31 January. Of 42

| VII CORPS TARGET LIST         |                    |                   |                    |
|-------------------------------|--------------------|-------------------|--------------------|
| (42 TARGETS SUBMITTED 31 JAN) |                    |                   |                    |
| OLD TARGETS                   | AAA OR SAMS        | INFANTRY          | ATO TARGETS        |
| 30 DEC ARTY BTRY              | 30 NOV AAA SITE    | UNK INF BN        | 27 JAN CP          |
| 8 JAN COMM SITE               | 29 DEC 8-80 AAA    | 3 JAN INF BN      | 24 JAN LOG SITE    |
| 23 JAN TANK CO                | UNK SA-2 RADAR     | 8 JAN INF BN (-)  | 24 JAN ARTY BN (-) |
| 20 JAN 26 ID CP               | UNK 8-80           | 8 JAN INF BN      | 27 JAN POSS LOG    |
| 24 JAN CP                     | 15 JAN RADAR       | 8 JAN INF BN (-)  | 27 JAN POSS CP     |
| 21 JAN LAA SITE               | 16 JAN 3-SA-89     | 26 JAN INF BN (-) | 28 JAN CP          |
| 19 JAN ARTY BN                | 24 JAN AAA SITE    | 9 JAN INF BN (-)  |                    |
| 24 JAN MECH CO                | 24 JAN AAA SITE    | 19 JAN INF BN     |                    |
| 24 JAN ARTY BN                | 24 JAN AAA         | 30 JAN INF BN     |                    |
| 24 JAN CP                     | 21 JAN AAA         |                   |                    |
| 24 JAN TANK CO                | 25 JAN SIGINT SITE |                   |                    |
| 28 JAN ARTY BN                | 22 JAN SA-6        |                   |                    |
| 24 JAN LOG SITE               | 24 JAN AAA         |                   |                    |
| 24 JAN POSS LOG               |                    |                   |                    |

NOTE: MANY WERE OLD, OUTDATED TARGETS OR PREVIOUSLY HIT.  
DATES WERE LAST VALIDATED DATES.

Figure 11

targets submitted by VII Corps, six were fragged in the ATO (15 percent). Targets were rejected for several reasons. First, the length of time between target submission and its validation was excessive: Typically, corps intelligence was 2-3 days behind CENTCOM's. Some target validations were over a month old. Others were unconfirmed, while still others were hit previously and waiting for BDA results. Second, antiaircraft artillery (AAA) and surface-to-air missiles (SAMS) were not considered valid targets if over a few days old. This rule related to other conditions and standing practices. Coalition air had continuous EF-111 and F-4G area coverage all across the KTO. If AAA or SAMS became a threat, they were immediately destroyed by dedicated suppression of enemy air defense (SEAD) assets. Third, infantry battalion targets were not suitable for Coalition air. Target identification and destruction were nearly impossible, because

troops were in trenches and widely dispersed. Without Napalm or suitable fuel-air explosive, Coalition air was better targeted against food, water, and ammunition depots--targets that indirectly negated the combat effectiveness of the infantry troops. In summary, of 42 targets submitted, 14 were old targets or awaiting BDA (33 percent); 13 were out dated AAA/SAMS (31 percent); 9 were infantry (21 percent). Six good targets remained and were selected for the ATO (15 percent). Obviously, if VII Corps had air to attack all 42 targets, not just enough for those appropriate at the time, many other key targets in theater would have gone unserved. More importantly, many sorties would have been wasted.

According to a VII Corps air liaison officer (ALO) report, the corps target nomination process had three major errors. First, each target received the same measure of merit whether it was a division command post or a single SA-9. Second, no revalidation criteria was set to remove dated mobile targets. Finally, no correlation was attempted for targets reported destroyed by the Air Force, especially when coordinates did not agree exactly with the corps data base.<sup>27</sup>

The target list example should point out two things. First, a corps does not always have the technical expertise or current intelligence necessary to nominate targets appropriate for aircraft. Second, in order to exploit air power and not misuse it, air must be kept centralized, at the theater level under a JFACC.

In DESERT STORM, there was another reason for maintaining centralized control of air. The JFACC needed control of all the air assets in order to respond to the unforeseen circumstances of war. The first occurred almost immediately after the war started. Iraq started firing Scud missiles at Israel--which had tremendous political impact on the Coalition. If Israel retaliated, Syria and other members of the Coalition threatened to withdraw their forces. As a result, the JFACC had to demonstrate to the Israeli military that every means possible was used to neutralize the Scud threat. It had to be obvious to the Israelis that they could not do any better at destroying the missiles. The JFACC attacked every known Scud site and set up continuous aircraft orbits over the Scud launching areas. By the end of the war, over 2,400 sorties were diverted to Scud hunting in order to satisfy Israeli concerns.<sup>28</sup> These were sorties that were not available for strategic bombing or corps support.

There were several other unforeseen situations that occurred. For example, one day Iraq broke out chemical munitions forcing the JFACC to divert aircraft to destroy this time sensitive target. Also, there were many days when weather forced Coalition air to swing from one place to another and from one target category to another. When parts of the KTO were obscured by weather, air was redirected toward strategic targets or into another Corps commander's area. Another example occurred on 29 January at Khafji. There was a major border incident where the Iraqi III Corps moved south to engage friendly forces. During

the second night of attacks, the Iraqi corps commander tried to reinforce the battle with two divisions.<sup>29</sup> A Joint Surveillance and Target Attack Radar System (JSTARS), an airborne radar platform capable of tracking moving vehicles, identified the reinforcements. As units headed south, the JFACC diverted the necessary Air Force, Navy, and Marine night attack aircraft already flying in the Kuwait Theater of Operations. Once aircraft arrived in the area, JSTARS directed air attacks against the moving vehicles. The first diverted aircraft put bombs on target in less than 20 minutes. The bombing continued for 8 hours, decimating the two divisions. By daybreak, the divisions were retreating in disarray. Over 200 armored vehicles were destroyed by air and Khafji was soon abandoned.<sup>30</sup> If aircraft had not been diverted, premature escalation of the war may have occurred. The Coalition ground forces were not in position to start a major offensive nor would have been for another week.

All of the examples above highlight the need for the JFACC to centrally control air in order to react to the unforeseen circumstances of war. By maintaining control, the JFACC could concentrate air power in the most efficient way possible.

#### **JFACC Ignored Corps Inputs**

After the war, VII Corps complained that the corps was denied air prior to G-Day. This was true for several reasons. First, while VII Corps was moving into position, the CINC would not allow the JFACC to target the Iraqi forces out West. The

CINC wanted to limit activities in this area in fear of compromising the Coalition attack plans.

Second, the CINC directed General Glosson not to attack units at less than 50 percent strength. Since almost every unit arrayed in ARCENT's front-lines was less than 50 percent by G-10, this constraint significantly affected corps target lists. The JFACC was required to hit these targets with aircraft that were not counted or tracked by ARCENT. This meant A-10s, F-111s, F-15Es and A-6s were held back from those units. However, at least four sorties of other coalition air were fraggged against every target submitted by the DCINC. Thus, unless the corps was tracking individual pilot mission reports for all aircraft in their AOR, many targets were hit without corps knowledge.<sup>31</sup> If BDA was observed by overhead systems, the earliest it would show up in a report at the corps level would be 4 or 5 days later.

Third, the DCINC had to modify corps commander target lists in order to consolidate, prioritize, and develop a single list within the capabilities of the JFACC. In addition, at the nightly staff meeting, the CINC would modify this list even further.

Finally, not until after the war were corps commanders aware of the CINC's guidance not to attack Iraqi units less than 50 percent strength--apparently reflecting a breakdown in communication between ARCENT and the corps commanders. In addition, corps commanders were concerned with breaching while



the CINC was concerned with getting the Republican Guards theater reserves less than 50 percent.

After the war, VII Corps cited two specific examples where the JFACC did not respond to corps input. Just prior to G-Day, VII Corps requested more artillery be hit in two units that were believed to be greater than 50 percent, the 47th and the 26th Infantry Divisions. General Glosson convinced the CINC to take F-111Fs off Republican Guards units for one night, 22 February, in order to hit the 47th Infantry Division. The 47th Infantry had the largest concentration of artillery in the KTO: Where most divisions had 72 artillery pieces, the 47th had 204 and was in position to swing against either the Egyptians or VII Corps. Over 100 artillery pieces were destroyed that night, but this data was overlooked by ARCENT. Overall combat unit effectiveness prior to G-Day was actually at 34 percent in contrast to 52 percent as ARCENT showed.

In addition to the 47th Division, VII Corps wanted the 26th Infantry hit. It was thought to have 72 artillery pieces, of which 18 were destroyed by A-10s prior to the request. After the initial A-10 kills, artillery targets could not be found by other aircraft--40 F-16s along with a Killer Scout. After G-Day and the destruction of Iraq's 26th Infantry Division, ARCENT revised the artillery count to only 18 artillery pieces in its total inventory. Thus, overall unit strength prior to G-Day was really only 40 percent as compared to 70 percent as initially reported by ARCENT.

After the war, VII Corps also said there was a lack of CAS support. Here the main problem was simply semantics. VII Corps was really referring to the lack of air support provided against its target list prior to G-Day. VII Corps complained about the perception that Coalition air did not perform battlefield preparation in accordance with stated desires. Once G-Day occurred, however, VII Corps was satisfied with CAS support.

It seems that the measure of merit for determining the effectiveness of battlefield preparation should not have been based on the number of targets serviced on the corps commander target list. Rather the measure should have depended on whether or not each corps could execute its scheme of maneuver as planned and based on the number of friendly casualties. During VII Corps' breaching on G-Day, not one artillery round was fired into friendly troops. General Schwarzkopf thought that the scheme of maneuver or ground offensive could take up to 21 days.<sup>32</sup> In fact, he asked General Glosson for assurance that the air intensity could be maintained for 21 days minimum. Not surprising, coalition ground forces completed operations in 4 versus 21 days. Casualty figures were estimated as high as 10,000. Actual combat casualties were less than 100.

### Conclusion

Although DESERT STORM was a tremendous success, it has been pointed out that significant problems did occur. There were problems that could plague the next warfighting CINC or JFACC if not recognized and resolved.

First, the CINC needed to place more emphasis on Phase I, Strategic Bombing. There were many strategic targets on the Master Target List that should have been hit early in the war. It seemed that the CINC failed to consider the weather's disrupting affect on strategic bombing before shifting emphasis to Phase III, Battlefield Preparation. As a result, setting back Iraq's NBC capability 5-10 years as President Bush directed was probably not accomplished. This was not a situation where either the CINC had to execute Phase III early to reduce casualties or continue strategic bombing. There was time to complete both.

During a strategic bombing campaign, it is important that all air assets be controlled by a single air commander. It does not make sense for 50 percent of Marine air to be withheld from JFACC control, especially when a ground war has not yet begun. This situation defied both the principles of unity of command and economy of force.

No one will know for sure what actual percent Iraqi troops were attrited by air prior to G-Day, nor was it critical for making the decision to launch the ground offensive. However, having both ARCENT and MARCENT responsible for assessing BDA in their own AOR was a mistake. To start the next war with possibly having only two aircraft--such as A-10s and AV-8s--as the designated tank killers would be unworkable. Rules for defining a tank kill must be standardized and published at the theater level before G-Day. This would avoid having BDA rules become more difficult as G-Day approached. In addition, it is critical

that aircraft video be exploited daily by the intelligence communities, not just the JFACC staff. Equipment needs to be purchased to allow each wing to transmit its aircraft video to both the JFACC and the Pentagon.

Without question, corps were denied air prior to G-Day, but not by the JFACC. The JFACC attacked every target on the DCINC's Target List. What was missing for the corps in DESERT STORM was feedback to the corps on their targets submitted to ARCENT that "didn't make the cut." Also, BDA was missing for corps targets that were bombed.

Finally, a corps cannot expect to have dedicated sorties. During the war, the close working relationship between the JFACC and the CINC worked superbly. Had the JFACC had to relinquish more control, air's overall effect would have been diluted. In addition, the CINC would have lost the combat synergism associated with centralized control of air. If corps commanders were given dedicated air, the DESERT STORM campaign would have been months in duration versus weeks.

## ENDNOTES

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<sup>4</sup>Department of Military Strategy, Planning and Operations, Operation Overlord, (U.S. Army War College, Carlisle Barracks, PA, 1992), Vol III, 4-7.

<sup>5</sup>Schwarzkopf, 430.

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<sup>9</sup>Department of the Air Force, Reaching Globally, Reaching Powerfully: The United States Air Force in the Gulf War, (Washington, D.C., September 1991), 39.

<sup>10</sup>Glosson, Interview.

<sup>11</sup>Department of Defense, A-S, C-15.

<sup>12</sup>Richard B. H. Lewis, Lieutenant Colonel, U.S. Air Force, "Notes from CINC Staff Meeting," (29 January 1991): D+12.

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<sup>14</sup>Department of Defense, Chapter 1-8, 188.

<sup>15</sup>Lewis, G+0.

<sup>16</sup>Glosson, Interview.

<sup>17</sup>Lewis, G+3.

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- <sup>19</sup>Ibid., 38.
- <sup>20</sup>Ibid., 49.
- <sup>21</sup>Department of Defense, Chapter 1-8, 188.
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- <sup>23</sup>Carl H. Builder, The Masks of War, (Baltimore: Johns Hopkins University Press, 1989), 89.
- <sup>24</sup>Department of the Air Force, Basic Aerospace Doctrine of the United States Air Force, (Washington, D.C., March 1992), AFM 1-1, Volume II, 113.
- <sup>25</sup>Irving L. Halter, Jr., Major, U.S. Air Force, "8th Air Support Operations Group Paper," (29 October 1991): 1.
- <sup>26</sup>Irving L. Halter, Jr., Major, U.S. Air Force, "8th Air Support Operations Group After Action Review Operation Desert Storm," Draft Report (6 November 1991): 15.
- <sup>27</sup>Halter, "8th Air Support Operations Group Paper," 1.
- <sup>28</sup>Department of the Air Force, Reaching Globally, 25.
- <sup>29</sup>Department of Defense, Chapter 1-8, 175.
- <sup>30</sup>Department of the Air Force, Reaching Globally, 45.
- <sup>31</sup>Halter, "8th Air Support Operations Group After Action Review," 16.
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