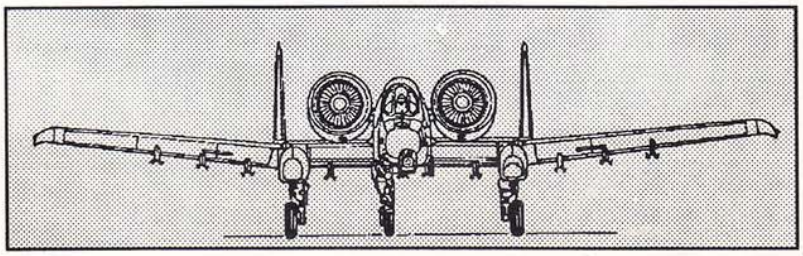
SACRAMENTO AIR LOGISTICS CENTER

ORAL HISTORY #8

A-10 AIRCRAFT BATTLE DAMAGE REPAIR IN OPERATION DESERT STORM



Conducted by

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Introduction

The only aircraft in United States Air Force history designed specifically for the close air support mission, the A-10 "Thunderbolt II" played a prominent part in the recent Persian Gulf War. All told, 144 A-10/OA-10 aircraft from five separate units participated in Operation Desert Storm;[1] together, they conducted more than 8,100 sorties, maintained a mission capable rate of 95.7 percent (five percent above A-10 peacetime rates) and had the highest sortie rate of any USAF aircraft.

During the six-week war A-10s destroyed prodigious quantities of Iraqi tanks, artillery and other armored fighting vehicles. U.S Army preliminary estimates were that A-10 units destroyed between 1,000 and 2,000 enemy tanks and over 2,000 artillery pieces. According to another source, A-10s were credited with destroying more than 1,000 tanks, 1,200 artillery pieces and about 2,000 other military vehicles. Confirmed kills included 967 tanks, 926 artillery pieces, 1,306 trucks, 501 armored personnel carriers and 28 command posts.[2] A-10 aircraft were also used successfully to hunt SCUD missiles in western Iraq, suppress enemy air defenses and to attack early warning radars. Indeed, interviews with captured Iraqi military personnel underscored the overall effectiveness of the A-10--a "seemingly ubiquitous threat" that delivered its weapons with deadly accuracy.[3]

Often exposed to withering anti-aircraft fire and surface-to-air missile threats, the slow (albeit highly maneuverable) A-10s incurred extensive combat damage during Desert Storm. Five A-10s were lost in action, while another was destroyed attempting to land at a forward operating location. Nearly 20 more of the close support aircraft sustained significant battle

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[1] The aircraft were drawn from the following USAF organizations: 23d Tactical Fighter Wing (TFW), England AFB, LA (48 acft); 354th TFW, Myrtle Beach AFB (48 acft); 10th TFW, RAF Alconbury, U.K., (18 acft); 926th Tactical Fighter Group, Naval Air Station, New Orleans, LA (18 acft); 602d Tactical Air Control Wing, Davis-Monthan AFB, AZ (12 acft). All of the aircraft were A-10s, except those from the 602d TACW, which were OA-10 Forward Air Control aircraft. Brfg, 354 TFW(P)/DO/MA, Operation Desert Storm A-10 Combat Recap, 23 TFW(P) and 354 TFW(P), n.d.; Intvw, Dr. Craig Luther, historian, with Paul Whitfield, LASO, 10 Sep 91.

[2] Brfg, 354 TFW(P)/DO/MA, Operation Desert Storm A-10 Combat Recap, 23 TFW(P) and 354 TFW(P), n.d.; Breck W. Henderson, "Air Force Pilot Tests A-10's Toughness in Battle, Aviation Week & Space Technology, 5 August 1991, p 43.

[3] According to an Iraqi captain captured by American forces on 24 February 1991, the single most recognizable and feared aircraft at low level was the A-10. Not only did the actual bombing run of the A-10 evoke terror, but the plane's ability to loiter around a target area prior to its attack caused additional anxiety, since Iraqi soldiers were unsure of the chosen target. Brfg, 354 TFW(P)/DO/MA, Operation Desert Storm A-10 Combat Recap, 23 TFW(P) and 354 TFW(P), n.d.; Air Force White Paper, Air Force Performance in Desert Storm, April 1991.

damage; in fact, roughly half (about 70) of all the A-10s committed to the Gulf War suffered some type of damage.[4]

The vital task of repairing battle damaged A-10s and returning them to combat fell to the aircraft battle damage repair (ABDR) specialists of the Sacramento Air Logistics Center's 2951st Combat Logistics Support Squadron (CLSS).[5] From late December 1990 to mid- January 1991, the 2951st CLSS deployed four ABDR teams (96 military personnel) from McClellan Air Force Base to Saudi Arabia to accomplish the A-10 ABDR mission; each team included an experienced A-10 battle damage repair engineer with the rank of captain. Team personnel supported an A-10 main operating base and two A-10 forward operating locations.[6]

From 17 January to 8 March 1991 these ABDR teams performed major repairs on approximately 20 battle damaged A-10s. One of these aircraft had over 380 holes in its fuselage, while several more required depot-level repairs for the changeout of outer wings, center wings and empennage sections. Despite such challenges all but one of the battle damaged planes were successfully returned to service.[7]

In addition to fixing A-10s, McClellan's ABDR technicians conducted major repairs on an F-16 fighter and minor repairs on a C-5 transport and a Kuwaiti Air Force C-130; they even applied their expertise to the repair of trucks, front-end loaders and at least two Army helicopters. Throughout the conflict A-10 ABDR team personnel were ably supported by their

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[4] Many of the damages concerned undocumented cases of relatively minor problems. Breck W. Henderson, "A-10 'Warthogs' Damaged Heavily In Gulf War But Survived to Fly Again," Aviation Week & Space Technology, 5 August 1991, p 42. For a summary of A-10 aircraft battle damage see, Brfg, 354 TFW(P)/DO/MA, Operation Desert Storm Combat Recap, 23 TFW(P) and 354 TFW(P), n.d. See also, Rprt, 2951 CLSS/MA, "2951 CLSS Maintenance Involvement in Operation Desert Shield and Desert Storm," n.d.

[5] Established in 1967, the 2951st CLSS provides mobile logistics support (including aircraft maintenance, supply and distribution functions) to USAF forces worldwide. During the Vietnam war, 2951st CLSS personnel served with the Rapid Area Maintenance (RAM) teams stationed in Southeast Asia (SEA). The RAM teams provided depot-level battle damage repair and aircraft recovery for USAF forces fighting in the SEA theater. (For a study of RAM team operations see, SM-ALC Oral History No. 7, "The RAM Team Experience in Vietnam, 1965-75: Rapid Area Maintenance on USAF Aircraft.") Today, the 2951st CLSS performs depot modifications and repairs on A-7, A-10, F-15 and F-111 aircraft at McClellan AFB and in the field via depot field teams; moreover, the squadron provides the **entire** Air Force capability for deployable aircraft battle damage repair on A-10 and F-111 aircraft. "SMAMA Creates Elite Squadron," The Spacemaker, 8 March 1968; Hist, Sacramento Air Logistics Center, 1 Oct 89 - 30 Sep 90, SM-ALC Historical Study 98, pp 23-24; AFLC Special Order G-29, 24 October 1967.

[6] Rprt, 2951 CLSS/MA, "2951 CLSS Maintenance Involvement In Operation Desert Shield and Desert Storm," n.d.

[7] Ibid.

engineers, who served as technical advisors and designed repairs for damages often beyond the scope of the technical orders that governed the ABDR activity.[8]

Because the A-10 was the only USAF weapon system with heavy battle damage during the Persian Gulf War, it was the only aircraft that saw contemporary ABDR concepts[9] thoroughly put to the test in the field. This oral history will show that, although the A-10 ABDR technicians and engineers were well-trained for the ABDR role, they encountered unforseen challenges and obstacles that militated against their ability to perform the mission. For example, their ABDR equipment kits proved "totally inadequate" for the tasks at hand, lacking as they did the tools, power, lighting and electrical sources needed to repair the extensive damages encountered in the war. Fortunately, the "War Wagon" ABDR kits from RAF Alconbury were found to be a highly efficient alternative equipment source; in fact, the A-10 ABDR teams used the Alconbury kits almost exclusively in place of their own inadequate equipment.[10]

The Gulf War also made clear that aircraft battle damage repair teams must be fully prepared and equipped to accomplish the more complex heavy maintenance (depot-level) mission--not just the less ambitious repairs envisaged under pre-Desert Storm ABDR philosophy.[11] Yet as the following statement by an A-10 ABDR engineer illustrates, this challenge was also met successfully: "The principal lesson learned for us was that our ABDR

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[8] Rprt, 2951 CLSS/MA, "2951 CLSS Maintenance Involvement in Operation Desert Shield and Desert Storm," n.d.; Ltr, Capt Phil Idle to Dr. Craig Luther, April 1991.

[9] Air Force Logistics Command's ABDR program got underway in the late 1970s. According to Technical Order 1-1H-39 (the generic ABDR T.O.), "ABDR's primary goal is to restore sufficient structural strength and systems serviceability to permit damaged aircraft to continue combat operations, with at least partial mission capability...The secondary objective is to perform the necessary maintenance actions to allow extensively damaged aircraft to make a one-time flight to its home station, rear base, or major repair facility..." For background on the origins of the Sacramento ALC ABDR program see, Hist, Sacramento Air Logistics Center, 1 Oct 78 - 30 Sep 79, Historical Study No. 78, pp 94-96. According to this SM-ALC study, in January 1979 the 2951st CLSS began development of aircraft battle damage repair handbooks for A-10 and F-111 aircraft: "These handbooks were quite different from most Air Force maintenance and technical manuals and were limited in use to ABDR purposes. The repairs were for contingency operations or 10-day sortie type actions. The repairs were to be simple and use only common type parts and hardware. The repair jobs were to take no more than 24 hours to accomplish, and they didn't need to be engineered type fixes. The goal was to make the aircraft usable enough to fly at least one more partially effective mission. The squadron completed work on the handbooks by 1 June 1979."

[10] Lesson Learned, 2951 CLSS/MA, "CLSS ABDR Kits," n.d.

[11] Placed in a historical context, the A-10 ABDR experience in Desert Storm revealed that ABDR teams must have the resources to function similarly to the RAM teams of the Vietnam era.

teams represent a depot-level repair capability **in the field** (author's emphasis) that can do repairs well beyond what traditional battle damage repair philosophy says we should."[12]

Participating in this oral history interview are five individuals who contributed significantly to the A-10 aircraft battle damage repair effort: Lt Jack R. Cooley, SMSgt Brian E. Beebe, Capt Francis "Buc" X. McRory, Capt Robert B. Poe and Capt Phillip J. Idle.[13] Collectively, these men offer meaningful insight into A-10 ABDR activities and lessons learned during Operation Desert Storm. Equally important, their words illuminate the drama, the destructiveness, and the awesome technical proficiency of modern conventional warfare.

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[12] Breck W. Henderson, "A-10 'Warthogs' Damaged Heavily In Gulf War But Survived to Fly Again," Aviation Week & Space Technology, 5 August 1991, p 42.

[13] Lt Cooley (2951st CLSS) commanded all 2951st CLSS ABDR personnel deployed to Saudi Arabia; on 15 July 1991 he was promoted to captain. SMSgt Beebe (2951st CLSS) commanded the A-10 ABDR team deployed to one of the A-10 forward operating locations; on 1 September 1991 he was promoted to chief master sergeant. During Desert Storm, Capts McRory, Poe and Idle (A-10 engineers) were assigned to the System Engineering Branch of the A-7/A-10 System Program Management Division (Aircraft Management Directorate, Sacramento ALC).

Oral History #8

A-10 Aircraft Battle Damage Repair in Operation Desert Storm

conducted by

Dr. Craig W. H. Luther

Office of History

Sacramento Air Logistics Center

North Highlands, California

Session One

2 July 1991

Luther: Operation Desert Storm was the first time that contemporary aircraft battle damage repair [ABDR] concepts were actually implemented. Let's discuss the concept and objectives of aircraft battle damage repair as they existed prior to Desert Storm.

Sgt Beebe: I think one of the lessons learned from our initial philosophy is that ABDR is not just a 24-hour repair concept but rather a multi-faceted repair concept whose objective is to generate multiple combat sorties. Other lessons learned concerned the heavy maintenance concept and the crash damage concept, in addition to what we learned about the ABDR repair concept itself.

Capt Poe: As a result of Desert Storm, the -39 has already been updated to remove the 24-hour guidelines for ABDR.[1] [Under the pre-war philosophy] if a repair was going to require more than 24 hours you would push the plane to the side. We removed that guideline and it is now left to the deputy chief of maintenance [DCM] to decide how you are going to direct your efforts.

Luther: Are you saying that if a repair would take longer than 24 hours it was beyond the

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[1] Each USAF aircraft type has a -39 ("dash" 39) technical order (T.O.) that provides guidelines governing battle damage repair in wartime. The technical order that addresses A-10 ABDR is 1A-10A-39. A generic T.O. (1-1H-39) addresses all repairs not covered by a weapon system specific -39.

parameters of the -39?

Capt Poe: It was beyond the time limits and the philosophy of ABDR. The old philosophy was to give the aircraft back to the unit and let them repair it, while the expertise in ABDR would be used to do quick, battle damage repairs on aircraft. And that is just not how it worked out [during Desert Storm]. We worked for the DCM when we were [in-theater], and if he wanted us to fix the jet we fixed it.

Lt Cooley: When we arrived in Saudi Arabia we thought there were going to be two types of broken aircraft: hard broke, which might require many weeks to get spare parts to fix; and soft broke, which we would be able to turn out in less than a day. That never materialized--we never used a specially designated area for soft broke aircraft. We treated all jets as either quick fix, which we turned right at the end runway sites, or as hard broke.

Capt Idle: Another aspect to the old ABDR philosophy was that **all** damage was to be repaired, be it simple sheet metal repairs, patches, or major structural repairs. Yet what we found, particularly with the ABDR engineers, was that much of the time the damage to the structure was such that we did not have to repair it. And that is another lesson learned we must look at--the ability to distinguish between an airframe that is damaged severely enough to require repair and one that is still airworthy enough to be left alone and sent back into the air right away.

Capt McRory: Another departure from pre-war concepts concerned Category 5 structures. This is heavy, load-bearing structure. In the past there were very tight damage tolerance limits established in the generic -39 technical order. But most of [the Category 5 damage][2] was way beyond anything in a technical order, so we had to deal with it and determine if the aircraft was airworthy or not with this [damage]. On the surface that may not seem significant, but it is a very significant departure from current philosophy.

Luther: So the original ABDR concept needs to be expanded to encompass certain types of repairs that had not been provided for.

Sgt Beebe: That's true. We also learned that the nature of the repairs that were accomplished at a forward operating location [FOL] were very different from those accomplished at the main operating base [MOB]. This was primarily due to the resources available (or not available) at the FOL, which determined the end repair result, the reidentification of the repair and the documentation process. If repairs started at the FOL, the temporary repair would be installed and the aircraft would then be ferried back to the main operating base, where they would further initiate documentation to perform more permanent repairs on the aircraft to make it flyable.

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[2] Category 5 damage is defined in the -39 technical order as non-repairable damage. An example would be a broken wing spar.

Luther: What about pre-war ABDR training concepts?

Sgt Beebe: If I could begin I'd like to address our technician training. I think that our technicians were well trained as far as documentation, technical data and airframes on which we trained--with the exception was that we did not have A-10s to practice on. We also did not know the magnitude of damage to be expected, although our training was very effective for what we did deal with in aircraft battle damage.

Luther: Your training had been accomplished using either the generic -39 or the F-4 -39, had it not?

Sgt Beebe: That's true, with an F-4 or an F-105 airframe to practice on as well as a pre-production F-111. In November 1990 we received our first A-10 aircraft to practice ABDR on, but such training was not available to us prior to that.

Luther: How well did training on an F-4 airframe prepare you to do battle damage repair on an A-10?

Lt Cooley: The F-4 worked fine for practicing on electrical and hydraulic systems because it is somewhat similar to the A-10 in those areas. But when we get into structural repairs the aircraft are totally different. The skin of the F-4 is a structural member, which gave our technicians the wrong idea about the need for patches. This caused some turmoil during the war. Our guys believed that if it was not patched, it was not fixed. It took some retraining to get them to realize that sometimes drilling additional holes to put on a patch weakened the structure more than just putting on some tape or leaving the aircraft alone. Do you have anything to add, Capt Poe?

Capt Poe: Well, that was exactly the problem. It's a mind set. And, as you said, an F-4 must be patched if it gets a hole in it. With the A-10 you can literally take most of the skins off and the plane will still fly.

Luther: So, unlike the F-4, the A-10 can continue to fly with holes in it or with parts missing from the aircraft.

Capt Poe: And parts, you're right. That's what it is designed to do. The A-10 is not a supersonic airplane.

Capt Idle: An aircraft that we fixed at the FOL, even though the repair was temporary, we literally just patched over what was left of the vertical cap. It wasn't there but the airplane flew just as well as if the original structure was there. Yeah, this airplane can fly with some parts missing.

Luther: So then the consensus is that your pre-war training was adequate in most respects, with the exception that certain structural repairs were different on the A-10 than on the F-4.

Capt McRory: That's true from the perspective of the ABDR technicians and assessors.

Luther: What about from the perspective of the engineers?

Capt McRory: We knew before the conflict even started that, in general, the engineers training was inadequate. It wasn't up to snuff for several reasons. We received outstanding training side-by-side with the technicians in the technician course and assessor course, and in small arms and chemical and biological warfare, for example. But when it came to the role of the engineer to handle repairs for damage outside the -39, you had a varying degree of competence. This was through no fault of any particular engineer, it was a matter of where he was assigned and worked.

Fortunately, we deployed with quite a wide breadth of experience. We had two very experienced structural engineers, a systems engineer and a composites engineer. We all had something to contribute to the repair when called upon. Yet we still saw that we needed to bring all engineers up to a certain level of competence, and that will entail specific training on the aircraft to which he is assigned--so he becomes very familiar with the airplane and knows what to do when he runs into this unreparable or Category 5 structure, or has something strange crop up on him. For example, we had a couple of strange problems occur in the systems area.

Capt Poe: There was one thing that we [the engineers] did miss over there. The CLSS [combat logistics support squadron] and the A-10 wing maintenance personnel in Saudi Arabia just assumed that the engineers were maintenance oriented. But none of the engineers get experience from the operational maintenance side.

Capt McRory: In general that's true, unless we picked it up in the past.

Capt Poe: There is a school, the maintenance officers' short course. We're going to recommend that all engineers go through this course so we can speak the same language as the maintenance officers.

Capt McRory: Also, we have already received invitations from our DCM in Saudi Arabia, Colonel Rupright,[3] to have the engineers come out on a periodic basis--perhaps once a year or every two years--to observe a maintenance officer of the same rank and get a feel for what the flight line is like. So when we hit the ground we are immediately effective and have some credibility out there.

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[3] Colonel William C. Rupright served as the Deputy Chief of Maintenance for both the 23d and the 354th Tactical Fighter Wings in the Persian Gulf. All of the A-10 ABDR teams from Sacramento ALC were subordinated to Colonel Rupright.

Capt Idle: Another thing we are doing with our ABDR training is recommending that the main A-10 operating units--such as the 23d and the 354th tactical fighter wings--let us participate in their field exercises, since most of them have never seen a CLSS team and have never had to deal with an engineer or the ABDR concept. This would give them a chance to see what we can do for them and give us some quality time with the maintenance organization. So when we do go to war and deploy to an operating base the DCM can come up to us and say "I know what you guys do," as opposed to saying "Why are you here?" That would make things a lot easier for everyone.

Lt Cooley: The middle of a conflict is not the time for the DCM to come to us and say, "What can you do for me?" The DCM needs to know before hand what we can do for him.

Capt Idle: We all dealt with that to a certain extent.

Luther: Apparently there was a problem with the DCM for the dual wing, Colonel Rupright, being unaware of what you had to bring to his operation.

Capt Idle: Because he'd never seen us in action. He'd never had to deal with a depot.

Capt McRory: Well, the CLSS has worked in a depot field team [DFT] status with Colonel Rupright, so he knows a lot of our people on a first name basis. But when you throw him into an ABDR role in a war it is a different twist, a different role.

Luther: Are you saying that the depot field team TCTO [Time Compliance Technical Order] repairs that you perform periodically during peacetime didn't give Colonel Rupright a feel for what you could do with ABDR in a wartime environment?

Lt Cooley: I'd say the people he really didn't understand were the engineers. He knew what my CLSS guys could give him, because he has dealt with us on DFT and knew we could do heavy maintenance for him. Yet he needed to know in more detail what the engineers could give him--what flexibility they gave him.

Capt Poe: In the same vein, the CLSS didn't really even know what we [the engineers] could give them.

Lt Cooley: That's true.

Capt Poe: They knew on the surface what we could do for them, but they really didn't know what we do day-to-day. For example, why would an engineer know how to order parts? Well, heck, we are the ones who got the parts in the book so we can repair and replace these things! It's part of our job as structural engineers to know about these parts. [This lack of understanding of our mission] is something we are working to change now when they have the

assessor course or an FTD [Field Training Detachment] course, or something. Maybe we can work things so an engineer comes in and explains to the people just what we do.

Luther: At this point I'd like to discuss just what an aircraft battle damage repair team consists of in terms of personnel, skills mix, equipment, and so on.

Sgt Beebe: For the A-10 in particular it is a 24-person team composed of engine, APG [aircraft general], structural, electrical, guidance control and egress specialties. They are supported by a host of other specialists, making for an integrated team. The capstone to the team is the engineer, who assists in making the necessary structural decisions and offers engineering assistance. That is how the teams are designed to operate. They are self-sufficient.

Lt Cooley: Within those teams you would basically have three lead assessors. They are your ranking technicians and receive extra training to develop repairs or to read into the T.O. [technical order] to find those repairs. You normally have a structures guy, an electrical expert and an APG. They serve as an interface between the team chief, the engineer and the technicians; they work mostly with the engineers to ensure that repairs are adequate.

Luther: I assume assessors do just what the word denotes--they assess damage.

Lt Cooley: That's right. They look at the damage and determine what repairs are necessary. They are also responsible for the quality of the repair. They actually "buy off" the repair of the airplane.

Capt Poe: Sgt Beebe said that the [CLSS teams consist of] 24 men, but really it is a 21-man UTC [Unit Type Code] with a 2-man engine team and an engineer. So, as teams go, we'd be a 24-man, one UTC team. But in the old philosophy of the big war plan, there were not enough bodies to go around, so they might add engineers, engine troops, or they might split up the team. And that is something we have thought about--that if we are all a team, we should deploy as a team.

Sgt Beebe: One significant impact concerning the design of the team is the rivet work force, which has combined the hydraulics, APG and engine specialties into one specialty. It is a training upgrade that merges three specialties--engines, hydraulics and crew chiefs--into one AFSC [Air Force Specialty Code].

Lt Cooley: It is supposed to be a force multiplier of some sort, but what it really does is dilute all three of those skills. For example, instead of having a guy who's had 20 years experience in hydraulics, you are now taking him and telling him he is engine qualified even though he may have very few hours of engine experience. Yet he's being told he's an engine troop and to go fix the engine.

Luther: What role and responsibilities were envisaged for the A-10 engineers prior to Desert Storm?

Capt Idle: We were technical advisors. Most importantly, it was our role to ensure that the airframe was structurally sound--airworthy. We designed repairs for structures that otherwise would be trashed; determined if heavy maintenance was required and interfaced with the DCM.

Luther: Would you design repairs specifically for damage outside the -39?

Capt Idle: Not necessarily. There might be a repair in the -39 and we might choose to redesign that repair and make it less complex. It all depended on the damage. And as we stated before, there might be occasions when you opt **not** to do the repair at all for fear of weakening the structure. Most of it was on-site calls. You just had to analyze the structure and determine what had to be done to make the plane fly--to make it fully mission capable. Do I have to do anything? Or should I perform a complicated repair? And if the repair was complicated do I have the resources to make the part?

Sgt Beebe: Equipment substitution is the key factor in making the repairs if the -39 prescribed a certain type rivet pattern for a specific type of material. You would consult the engineer and ask if you could substitute material called for in the tech order with what was available in the ABDR kit. Again, our equipment limitations were very strongly brought out in what the CLSS had in the equipment area of ABDR kits. Basically, we used our ABDR kits as a backup to the ABDR kits provided by USAFE [United States Air Forces in Europe]--the "war wagons." They were a life-saver to the efficiency of our operations.

Capt McRory: We can't stress too much that we [the engineers] are consultants. Our role got a little muddled during the war for several reasons. Yet, in hindsight, we are consultants. And it is the responsibility of the assessor to call upon the engineer when he thinks the engineer is needed. We tried to establish a rapport so we could have our nose into damages without being in the way. That is what we strove for while we were over there.

Luther: You could recommend repairs and give advise, but I don't believe you had any actual authority over CLSS personnel despite your higher rank. Is that correct?

Capt McRory: Well, we have the authority to ensure that the plane is structurally sound.

Capt Poe: Correct. We had the stress analysis that Fairchild[4] used to develop the [A-10] -39. The way the -39 was put together is that they would develop a repair for a general area, take

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[4] The Fairchild Republic Corporation designed and manufactured the A-10 aircraft. All told, Fairchild produced 713 of the close support aircraft, with the final production A-10 delivered to the Air Force in February 1984.

the worst case in that area, and return it to equivalent strength. By knowing how the -39 was put together, you could see if the damage was away from the high stress area and actually eliminate or greatly reduce the necessary repairs. If we weren't there the [CLSS] technician would have no alternative but to do the full repair. That is where we came in. By looking over his shoulder and seeing the repair, even though it was a -39 repair, we could say, "Wait, maybe we can do something a little different." Keep in mind that we're now taking these [wartime] repairs off and having to devise peacetime repairs over repairs that were done. And now they're more involved.

Sgt Beebe: And this all adds to the ABDR philosophy of accomplishing the temporary repair, which is designed as a 1.0 safety factor rather than a 2.0 peacetime safety factor.

Luther: I'd like to address the training issue again. Apparently, your training exercises really didn't repair you for the kind of damage you found in the Gulf. Does anyone want to elaborate on this?

Capt Poe: The damage we saw [in the Gulf] was very extensive. In a training exercise we'd practice on and repair one hole. But over there we had so much accumulative damage that you really had to sit back and examine it from a common sense point of view. For example, a tail is shot off. Sure, we could fix five or six holes on the tail, but what is the ramification of the total repair to the entire structure? We really didn't get that kind of training as engineers. [Looked at from the assessor's perspective] do we just put one big patch on the whole thing? It was a different experience. So, instead of just taking a practice airplane and punching a bunch of holes in it, I think we can do a lot of it on the chalkboard [by examining] what would we do if a certain control surface incurred such major damage.

Luther: So the training you received before the war was much narrower in focus and not really realistic in comparison to what you encountered during Desert Storm?

Lt Cooley: [Our pre-war training] was just designed to test structural, electrical and hydraulic repairs. We scaled the training down so we could save the airframe. What we will do in the future with the A-10 we have now is to simulate [both] damage and remove and replace, because in many cases that's what it entails. You just can't put a patch on it.

Sgt Beebe: Before we went to war--and looking at the F-4 as a training aircraft--we would design a repair for the engineers that said, for example, that the canopy seal on the right side of the aircraft is completely destroyed--design a repair and show us the paperwork that proves it's an effective fix. We would design the repair and determine on paper that it worked. Yet during the war we discovered that, when you actually accomplished repairs on the A-10, you could see the multiple systems that were damaged--the hydraulic, electrical, cable and mechanical systems--and how they all interfaced to affect your flight controls, power plants and support systems. That was something we never knew before the war that we learned during

Desert Storm.

Capt McRory: I'd like to add that at both the main operating base and FOL 1 [King Khalid Military City], we had the opportunity to work on F-16 aircraft. At the FOL they also worked on a C-5. After the war I attended an Air Force Reserve DCM conference and an F-16 DCM asked me, "Captain, do you think that our training is adequate." When he told me he was training on F-4s I said, "Absolutely not." I told him that each aircraft has a unique structure and unique problems when it's hit.

Luther: In other words, an A-10 ABDR engineer or technician really needs to train on an A-10.

Capt McRory: Absolutely, plus pick up some residual training on all other aircraft you may have to repair.

Capt Poe: Exactly, we do A-10s. That's our specialty. But you need to be ready for anything. When that F-16 hit our ramp, we didn't even have a -39 for an F-16. At best what we can do is use the generic -39 and do equivalent strength repairs, which are often far more encompassing than a repair that just returns [the aircraft] back to a safety margin of 1.0

Luther: Apparently the generic -39 prepared you rather well. If I remember correctly that F-16 came in around 21 January having sustained some 14 separate damages. Yet when you were able to examine an F-16 -39 after making the repairs you found that 13 of the repairs were on the mark.[5]

Capt McRory: On the mark.

Capt Poe: Well, [during our repair of that aircraft] we spoke with the F-16 engineer. So he had some input into what we were doing.

Luther: And where was he?

Capt McRory: He was in Bahrain.

Lt Cooley: Some of our CLSS technicians had F-16 experience and that did help.

Capt McRory: Yes, definitely. And we had F-16s stationed at [the main operating location]. As a side note, I guess what has stuck in my mind about our training is that there were some frustrating times [during the war]. But the record shows that everyone did an outstanding job. So there is always the human factor--the ingenuity that every individual brought with him. That

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[5] For a summary of A-10 aircraft battle damage, and repair work performed by 2951st CLSS ABDR personnel, see Rprt, 2951 CLSS/MA, "Recap of A-10 ABDR Work Completed During Desert Storm," March 1991.

came through loud and clear.

Luther: So, despite intensive training the war was very much a learning experience.

Sgt Beebe: Very much so. We had to adapt to a number of things. One instance that comes to mind is that we had a C-5 come to the FOL and we had to do immediate repairs. The MAC [Military Airlift Command] aircrew came to us and asked us to fix the leading edge flap. This was not battle damage. [The damage] had occurred during flight and had to be fixed on the spot; the ABDR capability was the only one that could address it. Fortunately, we had people who had worked heavy aircraft before and they knew what to do to return the C-5 to mission capable status.

We were also called upon by the Kuwaiti Air Force to accomplish repairs on a C-130 that turned out to be peacetime repairs. So, again, we had gone outside the ABDR philosophy and performed repairs during wartime that were not specifically battle damage repairs.

Luther: So the ABDR philosophy is expanding to encompass many different types of repairs.

Sgt Beebe: Yes it is.

Capt Poe: In the same vein, the [engineers] dealt with problems with nose landing gear doors coming off and with bent fuel probes [on the A-10].

Luther: And neither problem specifically involved ABDR repairs.

Capt Poe: And yet the DCM used us as a resource on Tiger teams to solve these problems.

Sgt Beebe: We also fixed fuel lines on a duce-and-a-half [an Army transportation truck]; hydraulic lines on a K-loader, which was for carrying freight onto a C-5; and front-end loaders for civil engineering so they could continue operations on the runway. So, again, as far as you can stretch ABDR as a concept, it applies to anything mechanical.

Luther: It sounds like you were kind of a "Jack-of-all-trades."

Sgt Beebe: Very much so. And limited resources are the only thing that is going to limit your capability. So equipment is the key to what you can or cannot do.

Luther: We'll get back to equipment later, because I know there were some concerns in that area. But I'd like now to discuss your participation in the deployments to the APOEs [Aerial

Ports of Embarkation] back in August 1990 as Operation Desert Shield got underway.[6]

Sgt Beebe: Our initial deployment last August was a valuable lesson--not only in preparation but in frustration as well. We learned first hand how to get off an aircraft and how our plans showed that the aerial ports did not expect us nor knew what to do with us once we arrived. As a result, we had to start from the ground up to determine billeting, feeding, our continuing travel arrangements, and to open a line of communication to figure out where we were going next and how long we would be at the port of entry.

Luther: Apparently, the deployments to Myrtle Beach and England AFBs were something of a fiasco. What were the principal problems during this deployment and how did we attempt to resolve them in terms of lessons learned? For example, as Sgt Beebe has just pointed out, the APOEs did not even know that the ABDR teams from McClellan were coming. How could that happen?

Capt McRory: I had the opportunity to be at Headquarters AFLC last week and talked with our program manager there. I asked him several times to give me some idea how that happened. When we finally got to the question of war plans--there was a draft TPFDD [Time Phased Force Deployment Data] that, despite being a draft, was used as the real thing because there was nothing else to work with. They started shooting the teams out from AFLC before the tactical bases were even notified. We had been placed on alert and shot out of here before our host bases came up on their own TPFDD.

Luther: In other words, before they had even been formally tasked?

McRory: Exactly.

Luther: What other problems did you encounter?

Lt Cooley: Our deployment worked fine. We got our stuff together in record time, got on a plane and got out of here. The problem it highlighted was what Sgt Beebe said--the host base was not ready for us because AFLC may have reacted prematurely.

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[6] On Saturday afternoon, 11 August 1990, four A-10 ABDR teams departed Sacramento Metropolitan Airport (via a commercial charter aircraft) and flew to their APOE, Myrtle Beach AFB. Early the next morning a fifth A-10 ABDR team left McClellan on a Coast Guard C-130 bound for Davis-Monthan AFB. Each ABDR team was accompanied by a two-man engine team and a one-man engineering element. The team dispatched to Davis-Monthan quickly moved on to England AFB; however, neither Myrtle Beach nor England were prepared for the arrival of the A-10 ABDR teams. For reasons that included the lack of in-kingdom accommodations and unavailable airlift (ABDR teams were a low priority vis-a-vis combat personnel and equipment), none of the teams deployed to Saudi Arabia. On 1-2 September they returned to McClellan, where they remained on-call.

Capt Poe: We were called real late in the evening by the Battle Staff. It was a very intense time, following [Iraq's invasion of Kuwait]. The [aerial ports] didn't know we were coming. I think we were notified at 10:00 p.m.; at three o'clock the next morning we were all scheduled on commercial flights to New Orleans. So things still did work. Things seemed to work a little quicker than normally, in fact.

Luther: That is, the system worked in getting your people on a plane and getting them out of here.

Capt Poe: If you threw Desert Shield in front of anything, it seemed people would get out of the way and let you go first. And we saw that. Yet after we got to England AFB we were just a couple of little fish in a very big pond.

Luther: So what you are saying is that the problem was not the mobilization here at McClellan--that **that** worked rather smoothly.

Capt Poe: That's correct.

Capt McRory: [Our mobilization] worked fairly well for the engineers. We had done a lot of leg work beforehand. Looking back to about a year-and-a-half ago, the engineers had it rather easy--for example, the CLSS supported all [the engineers'] mobility bags, and so forth. Then we were put on separate UTCs and had to have our own account. To make a long story longer, we had supply people on base who were quite willing to shoot us out of here and into a war zone inadequately supplied. We really had to work hard. We knew things were starting to happen and we literally went over [to supply] en masse and forced this individual to give us what we needed to be prepared for war. So, there were some hurdles we had to overcome before we deployed. The actual deployment went very smoothly once we were linked up here on base with all of our gear. But there were some headaches ahead of time.

Capt Poe: As Capt McRory alluded to, can you imagine some guy telling you that he is not going to give you the right size chemical suit when you know it's inside that bag because he doesn't want to open up that bag? It just got to be ridiculous.

Luther: Sounds like you ran up against a hard-nosed bureaucrat.

Capt Poe: We couldn't try on the new chem suits because we couldn't take them out of the bag. If you took them out of the bag they weren't any good. We were told not to open them yet we didn't know whether they fit. It just didn't make any sense. We didn't know what size these new suits were. So, one of them got opened and we tried it out.

Capt McRory: This fella [in supply] went so far as to say, "When you come home, you'd better have four chem suits with you and they better be what I gave you."

Capt Poe: And [he said] "They'd better be the right size too, or you're going to get charged!"

Lt Cooley: On top of that was the weapons issue. Someone in their infinite wisdom had dropped the CLSS requirement to maintain weapon proficiency.

Luther: On the M-16?

Lt Cooley: Yeah.

[general laughter]

Capt McRory: That was good!

Lt Cooley: Then all of a sudden Desert Shield kicks off and the orders say that we must deploy with weapons--one per person. We had to scramble around to try to get the SPs [Security Police] to kick loose some weapons for us. And we managed to get, what, about 20 of them together for roughly 100 people?--not exactly adequate for our needs.

Capt Poe: The majority of my team got qualified [on the M-16] at England Air Force Base!

Lt Cooley: That was true for us as well at Myrtle Beach. We got our people qualified at Myrtle Beach.

Luther: So you both left for your aerial ports without being weapons qualified on the M-16 and you received the training there.

Sgt Beebe: We left McClellan without the proper training. The prerequisite was, have you ever fired an M-16.

Lt Cooley: Basically, do you recognize it two out of three times!

[general laughter]

Sgt Beebe: We also learned that we needed to get weapons cargo couriers trained for the next deployment. We did not have them [due to the lack of a] previous weapons tasking.

Luther: Captain Poe, your team went to England Air Force Base and you stayed there for about three weeks. What did you do while you were there?

Capt Poe: We were lucky. We turned our deployment into an actual depot field team, because they had work that needed to get done on an airplane. So, we were able to change over to a DFT. We got rental cars and stayed off base. [The 23d TFW] had a plane that had a crack in

the wing closeout panel, which is the wet area on the A-10 wing. We did that repair. The [23d TFW] also had some planes getting ready to deploy that lacked the AIM-9 capability. As a result, Chief Jefferson[7] volunteered his crew to augment a depot team that was already there to turn out twice as many airplanes and ensure that every plane that deployed could handle at least one AIM-9 on one side. So we actually functioned as a depot field team; at the same time, we were getting ready to deploy [to the Middle East] every night. We were always getting ready to leave tomorrow. We were integrated into the [wing] maintenance team and we were busy. We earned our money the three weeks we were there. There was no golf and there were no days off.

Sgt Beebe: I'd just like to add that our mobilization through the McClellan processing line did go smoothly. We got all of our medication and shots through the processing line. Once we got to Myrtle Beach we did get all of our billeting accomplished. During our delay there we also inventoried all of our chem gear to find out its limitations, which we **did** find out as far as the M258 chemical decontamination kits were concerned.[8] That was something we had not discovered here on base.

Luther: Some of the kits were defective, were they not?

Sgt Beebe: Yes, they were. What would happen is the number two packages would explode under heat. That rendered them unserviceable.

Lt Cooley: They still haven't solved that problem.

Sgt Beebe: In addition to getting the M-16 training [while at the APOE], we got people trained in self-aide buddy care.

Lt Cooley: We did some refresher -39 assessor training as well. We also augmented their phase crew and cranked out their jets.

Luther: Both you and Sgt Beebe were at Myrtle Beach.

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[7] The reference is to CMSgt James T. Jefferson, the Chief Enlisted Manager for Maintenance for the 2951st CLSS. Chief Jefferson deployed to the Middle East in late December 1990 and returned to McClellan on 12 March 1991. He commanded A-10 ABDR personnel in Saudi Arabia prior to the arrival of Lt Cooley just after the onset of Operation Desert Storm.

[8] In preparation for mobility processing at McClellan AFB, supply personnel observed that the number two packets in the M258A1 decontamination kits (chemical warfare defense equipment) had bloated. Some 300 of the packets were found to be defective. As a result, the 2951st CLSS directed that ABDR teams deployed to the APOEs conduct inspections of their decontamination kits. Soon thereafter, the 2951st dispatched 75 replacement packets to Myrtle Beach and recommended that the team at England obtain replacement assets from the local IEU (Individual Equipment Issue).

Lt Cooley: Yes.

Capt McRory: Yeah, I straightened out my slice!

[general laughter]

Luther: Captain Poe, I think you mentioned to me that you kind of lived on "pins and needles" while you were at the APOE; that several times you felt your team was about to deploy--had a transport lined up--but was then bumped in favor of combat troops and their equipment. Did any of you get the feeling that, as logistics personnel, you were kind of second class citizens--definitely second priority?

Lt Cooley: Oh yeah. We felt that as soon as the bibles and basketballs were loaded, they'd be putting our stuff on next!

Capt McRory: The popcorn machine made it before we did.

Capt Poe: At England we sold ourselves to them. We put in 12 hour days and made it clear that we were committed to their wing...There were CLSS guys out there volunteering to help load planes. People who hadn't crew-chiefed in a long time were getting back to crew chiefing A-10s. And we were kind of excited about it--if you can be excited about going to war. We were actually integrated into the wing.

Sgt Beebe: Another very critical factor concerning our stay during the initial deployment was the equipment--getting the equipment on the cargo pallets staged for further deployment. We could watch our pallets actually backing up as the aircraft were being loaded. There were pallets stacked all over the aerial port side of Myrtle Beach that were awaiting transportation. And as you were awaiting transportation, your cargo would move farther and farther back. Well, if your cargo had to move concurrently with your people, you would be delayed until you could get a matched flight with cargo and people to go at the same time.

Luther: So you could literally see your priority slipping with your cargo.

Sgt Beebe: Yes.

Capt McRory: When we pulled out of McClellan, our joint commander here, Colonel Bullock,[9] gave us a send off and said, "Go to Myrtle Beach, have a good three weeks, and we'll see you." And that is what happened, almost to the day. We went to Myrtle Beach, had a good three

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[9] Colonel Donald C. Bullock headed the Sacramento ALC Aircraft Management Directorate from its establishment in September 1990 to early July 1991. In August 1990 he was chief of the air logistics center's now defunct Directorate of Maintenance.

weeks, then came back to McClellan.

Luther: What are you saying? That he knew you'd be coming right back to McClellan and not deploying overseas?

Lt Cooley: No, he was trying to lighten the load. The original plan, if Saddam had kept going [into Saudi Arabia following his invasion of Kuwait], was for all 96 of us who went to Myrtle Beach, as well as the team that went to England AFB, to go on to King Khalid Military City. If Saddam had kept rolling with his tanks a lot of us might not have come back. Colonel Bullock knew that. So to make it a little easier on us he tried to make a joke, but it turned out to be the truth.

Luther: You all returned to McClellan on 1-2 September. However, three CLSS personnel dispatched with you to Myrtle Beach actually deployed to the AOR [Area of Responsibility, i.e., Saudi Arabia]. Apparently, they stayed a few days and returned to McClellan with a wealth of information about what the ABDR teams would actually need if they did indeed deploy overseas. What was this information they brought back and how did it assist your deployment to Saudi Arabia in December and January?

Sgt Beebe: It allowed us to look at the mobility gear in our bags, which we found was not set up to go to the Desert. Things like sun blocker, thirst quenchers, dehydrated foods, additional shower gear--those types of things that we had not initially thought of. [The three CLSSers who deployed to the AOR] also enabled us to learn what it was like to be in a bare-base operation--the fact that your tent might be a block away from the nearest latrine; where your drinking water was; where your food facilities were; what arrangements were available to us as far as hot meals or if you had to eat MREs [Meals Ready to Eat]. Again, they taught us what to be prepared for when we did actually get over there. We found out the importance of the basic necessities--like water and toilet paper.

Capt McRory: And the importance of "creature comforts" to break the boredom--a small radio or something like that.

Capt Poe: I thought the photographs they brought back were important. I hadn't been able to picture Saudi Arabia; I thought it was just sand dunes. Believe me, the photos painted a very ugly picture of what it was going to be like. Yet when we got there this base had been built in the intervening six months, so it didn't turn out that bad...[But initially] we had just assumed there was going to be nothing.

Luther: So the deployment of your colleagues to the AOR enabled you to work out some very basic, yet essential, issues you would face when you finally deployed to the Gulf.

Sgt Beebe: It did teach us, for example, that you absolutely needed to have a set of dust goggles

for all conditions. That was something [we could not have anticipated]. There was no way we could have fathomed how much dust would get into everything that you own. We learned that we had to put our clothes and other items in zip-lock bags to keep some of the dirt out. It taught us to bring extra amounts of soap--more of the basic necessities to make sure that we could maintain our health standards to a reasonable degree.

Capt Idle: Lots of batteries.

Capt Poe: But when we got there--that was another thing. I mean I brought all this soap with me and I still have it at home!

Capt McRory: That's right. We were overwhelmed.

Capt Poe: There were so many packages arriving addressed to "any serviceman" that there weren't enough servicemen to open them all! So all the essentials were there...There was more stuff than you could possibly imagine. In fact, there was so much candy sent by people you could have eaten it 24 hours-a-day! Everywhere you went you grabbed some candy...It was great. But when [the three CLSSers deployed in August] none of that was there, not even toilet paper.

Luther: Sgt Beebe, you referred to the drinking water requirement. U.S. service personnel in Gulf were directed to drink many gallons of water per day. Yet I read recently that, in North Africa during World War II, Rommel's Africa Corps soldiers got by on something like a liter of water a day--in any case, a fraction of the daily drinking water allotment for Desert Shield. Why the disparity?

Sgt Beebe: [In reference to our drinking requirement] logistics personnel were looking at the type of gear we were operating in. I think they went on the premise that we would be in full chemical gear 24 hours-a-day. And it did come about that we spent an extended period of time in our chem gear. We slept in it and worked in it 10-12 days at a time. Then we'd swap suits.

Lt Cooley: Take it off and take a shower just to put the suits back on. God that sucked!

Sgt Beebe: Once you changed suits you'd keep the old one. But the longer you kept the suits on the more water you consumed.

Luther: Given the concern about the effectiveness of U.S. military chemical warfare equipment, did you have confidence in that equipment?

Sgt Beebe: The biggest transformation we had was on the aircraft going over there. And I think this was true for all of us. Depending on when you arrived over there, you knew that, once you had access to your equipment, you wanted to change the filters. You [became

intimately familiar with] your chem gear so that you knew it inside and out--especially with the inspection of the mask.

Capt Poe: We took our masks off maybe a couple of days before we left [Saudi Arabia]. I mean you couldn't get serviced--you couldn't get food, your mail, or use the BX unless you had your mask. They wouldn't serve you.

Luther: Now this was where?

Capt Poe: This was at King Fahd International Airport [the main operating base for A-10 aircraft]. It didn't matter what you did. If you didn't have your mask you weren't going to get serviced.

Capt Idle: It was that way at KKMC, too.

Capt Poe: After a while [wearing our masks] just got to be a habit...One thing about the chem suit: we were prepared for the heat, but we really weren't prepared for the cold. Well, that chem suit kept you warm; we wore our chem suits a lot just to stay warm.

Capt McRory: Especially on a night shift. The guys at the end of runway would throw them on even when we weren't necessarily required to wear them. Carrying around the pouch for your mask, hood and gloves--I think it became like an appendage. And when you finally took it off you found yourself reaching for it and feeling naked without it.

Luther: Eventually, the SCUD missile threat turned out to be less than first anticipated and wearing the chem gear and going through the alarms became routine. When did you stop wearing the equipment?

Capt Idle: At KKMC I'd say we stopped wearing it about three weeks into the war. At that time we were told we could take our suits off but we still had to carry them with us. So we walked around with bags, with our suits and our booties. And we still had our web belt and our canteen and all that stuff on.

Luther: Now King Khalid Military City was one of two A-10 forward operating locations. Where was the other A-10 FOL?

Capt Idle: That was Al-Jawf.

Capt McRory: To the far west.

Luther: How far were the two FOLs from the main operating location?

Capt Poe: A long way.

Lt Cooley: Hours away.

Sgt Beebe: FOL 1 [KKMC] was approximately an hour-and-a-half by air [from the MOB].

Lt Cooley: Al-Jawf was about a three hour ride to King Fahd on a C-130.

Luther: So the FOLs were close to the Iraqi border.

Capt Poe: Yes, and let me tell you a story about that. Before any CLSS personnel had arrived at [Al-Jawf], two CLSS people were needed to go to a classified FOL 12 miles from the border. This was shortly before the war started. There were two guys that the chief said were going. And yet those two guys were allowed to volunteer--it wasn't like "You're going and you're going!" It amazed me, because a C-130 was going to land [at the FOL] just long enough to let them get out. Later we found out that this FOL [i.e., Al-Jawf] was actually some 60 miles from the border, and that the sand was so [soft] there that there was no way a tank could go through it. So, they really weren't in that much danger. But when those guys left for the FOL they were really concerned that they were just going to be 12 miles from the border and well within the range of enemy artillery.

Lt Cooley: Those two guys weren't really volunteers. Both Chief Jefferson and myself went through a lot of heartburn choosing those people. We told them they were going without knowing what type of conditions they would be getting into. At one point we weren't sure we would ever see them again.

Luther: How did you choose them?

Lt Cooley: Based on their skills. We need a good A-10 APG and a good assessor/sheet metal person.

Luther: Captain McRory, I have a question for you. Getting back to the initial deployment in August, one of the problems was the lack of A-10 ABDR engineering kits. This was a long-standing concern, for the ABDR Program Office here at McClellan had promised you such kits for several years yet they had never materialized. Why did you need the kits and how did you finally manage to put them together?

Capt McRory: Well, we felt we needed to have some basic tools--some measurement devices, flashlights, pencils, pens, a calculator.

Luther: And none of this was included in your mobility equipment?

Capt McRory: No, it was totally separate. My understanding--and I think [Captains Poe and Idle] can verify this--is that, over several years, the Program Office would come to us and say, "What would you like to have in a kit?" They would solicit a list, the list would go in, but nothing would come out the other end. So, we were getting ready to deploy and we all got together and again decided what should be in the kit. There was a representative there from the ABDR Program Office, and, when we tried to determine how we would get the kits, he said with a straight face, "You won't see those kits for two years." So we decided we had to pursue a different route. We went back to what used to be [the Directorate of] Materiel Management and tried to find some money to make our own kits.

Luther: This was before the deployment in December - January?

Capt McRory: When did we finally get those kits?

Capt Poe: We had the kits for our deployment in December.

Capt Idle: We developed important things for the kit that not too many people had thought about. For example, we had an instamatic camera, which enabled us to take pictures of battle damage and gave us a record to review later on. We also had things like drawing aids, circle templates, pads and paper, crayons, chalk.

Capt McRory: Very basic things.

Capt Idle: It wasn't complicated stuff. The calculators we had were solar operated. You could buy them at the BX for $12.00. But they served a purpose.

Luther: It surprises me that you didn't even have a camera. The History Office at McClellan has a mobility requirement and the staff sergeant in HO has a requirement for a camera in one of his mobility bags.

Capt McRory: The engineers as a group are still not very well represented and our requirements are not very well stated. That's the real problem. And to this day it's still a problem. We need to have a separate funding line to equip the engineers with kits with good cameras. The Polaroid instamatics we had weren't very good. Anyhow, we got funding and tasked a couple of the engineers to go out and get everything we needed. They worked with an individual in the ABDR Program Office, who helped them. We put together the kits and everyone signed them out.

Luther: One final question before we discuss the actual deployments to Saudi Arabia: what were the most critical things accomplished from the beginning of September through late December (when the first CLSS team went overseas) to make for a more effective deployment?

Capt Poe: From the engineering standpoint it was the engineering kit. Plus the fact that I knew where I was going. I knew the location and I was able to bring things with me that I never would have thought of bringing [in August]--things that were very useful when I got over there. A little bit of the tension was gone because I knew where I was going. The first time we left we really had no idea.

Lt Cooley: We were able to prepare our families. When we left in August I got a phone call at 2:00 a.m telling me to come on in. That was it. [The wait for the deployment to the AOR] gave us a few months to take care of wills and get our finances in order.

Capt Idle: The engineers were allowed to go down to the command post [the Logistics Readiness Center] whenever we wanted--to go in there and listen to the daily briefings, look at the TPFFDs and their current status, read the classified messages, and so forth.
CLSS members were also invited to come down there. That gave us the opportunity to keep up to date on what was going on in the Gulf--where the Iraqi troops were building up, what they were doing. We were allowed to ask questions such as, "If I go to this location what can I expect? What kind of airplanes were there?" We were well informed.

Luther: So the element of uncertainty was reduced because you were much better informed.

Sgt Beebe: During our initial deployment to Myrtle Beach, we were allowed to go to another site to get rain gear for our people; we also managed to get 96 people outfitted in the desert camouflage fatigues. I might add that our initial deployment was from August to September 1990, and our final deployment from January to March 1991.

Luther: Looking at the deployment to the AOR--Capt Poe, your team left first in late December.

Lt Cooley: There were three UTCs: his UTC went, the engine UTC went and the main team left a day or two later.

Capt Poe: Well, they got there a week later. When we left it was great. We got on a C-141 here at McClellan, and that same C-141 took us all the way to Riyadh. Then from Riyadh you basically stuck your thumb out. There is really no one to give you any help--you just tell them where you need to go and they tell you to try to find a ride. We ended up getting to Dhahran and then had to find some way to get to King Fadh. But there were so many people going different ways that it wasn't that big a deal...I understand there was a big holdup at McGuire AFB [New Jersey]?

Capt McRory: No, the holdup was at Dover AFB.

Capt Poe: You see, we bypassed that. We went all the way through. It was great.

Luther: Sgt Beebe, your team went through the APOE at Dover AFB.

Sgt Beebe: We left McClellan and got to Dover,[10] where we were delayed approximately four days. Once again equipment came into play, for you could not keep your equipment with your people and get your entire team out intact.

Capt Idle: It came down to a choice. I was acting troop commander, and I'd go up to the operations center [at Dover] to find a ride and say, "I have 24 people and two pallets." They'd say, "Ok, we'll give you this tasking, so show up at such-and-such a time at the processing center." We'd show up; then we'd sit for three or four hours. This happened day in and day out. Finally they said, "Look, we've got a spot for 23 people but no pallets." This was a complement of four C-5s that an Army colonel had gotten for himself and some of the teams he was taking over there. They told us to take it or leave it. At the same time they told us they could put our pallets on a commercial contract airlifter. So you can send your 23 people in one direction and the pallets in another and hope that eventually you get to the same location. And that is what we had to do. We had a cargo courier, who was responsible for keeping the cargo. He went down to Dhahran and we went on to Riyadh after a stay at Torrejon [Air Base, Spain]. We had trouble trying to keep track of him--trying to find out where he was. When we got to Riyadh we were told we could sit there anywhere from one day to a week, because everyone was trying to get somewhere. I eventually had to call CENTAF [Central Air Forces][11] and beg, borrow and steal to get them to requisition an airlift. We finally got a C-130 to show up to take us to our final destination. It was, what, two days?

Sgt Beebe: I believe so. I guess what we learned in the transition to get to our final destination was that Dover was not ready as an APOE to deliver the number of people and equipment they had as a tasking. When we got on to Torrejon you could see the difference overnight.

Luther: In terms of preparedness?

Sgt Beebe: Yes. They were ready and able to assist us; the delay was only approximately four hours. They had set up a Red Cross facility for us to get a shower, eat and rest on cots--there were blankets available to us--before we continued our journey forward. Then we went on to Dhahran and were assigned quarters there overnight, again awaiting transportation to our final destination. But you could see at each point, as we stopped off, the degree of readiness and preparation at each station. And as we got to our final destination they finally said, "Yes, we have a spot for you." We arrived with all of our luggage, got a tent, and had to look at two or three inches of water to set ourselves in. That was our welcome at our final destination.

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[10] SMSgt Beebe, Capt Idle and one A-10 ABDR team departed McClellan on the afternoon of January 8th and arrived at Dover AFB late that evening.

[11] The air component of U.S. Central Command.

Capt McRory: The interesting thing was that, as each team deployed, people would call back and try to give advice to the team following them. So when Capt Idle got stuck in Dover, he told us that we had to have some civilian clothes. So we all packed up civilian clothes.

Our experiences were quite different. We shot out of here and landed in Dover;[12] they told us [we'd have a two day wait]. So I sent everyone to chow and we got bedded down. That was a total fiasco. As Sgt Beebe mentioned, they were not ready to handle us. We were taking rooms from Marines that had been told to catch a C-5. Here we were in the middle of the night. We were three hours behind [due to the time zone change]. It was about 2300 hours there, so it was 2000 or 2100 hours for us. Anyhow, we were trying to settle into our bunks when all these Marines came through the door telling us to get the hell out of their bunks. It was total chaos. We finally got more of less bedded down after shuffling around rooms and trying to fit everyone in an empty cot. So, everyone went their own way...because we had two days before an aircraft would come. A small band of us went to the chow hall and I peeled off and went to the ops center. I asked them if we would really have to wait two days. They said no, and told us if we got our people together in an hour, they could have us on a plane. So here we went from two days to an hour and our people had scattered to the four winds. We eventually gathered everyone together, sat and waited, and finally got on a plane to Torrejon.

We got through Dover quickly, but when we got to Torrejon it was just a comedy of errors. We got on a plane five times, I think.

Lt Cooley: Yes, but that had nothing to do with the facilities, which as Sgt Beebe has said were much better. They were ready to take us [at Torrejon]. They had cots laid out, a place to eat. The problem was the airlift wasn't really ready...They weren't ready to move us out.

Luther: Was it a situation where, once again, you were being bumped from the plane in favor of combat personnel?

Lt Cooley: No, we just happened to catch several bad jets. A C-5 rolled up, we got on it, but it had engine problems. So we had to get off it. Another time we got on an airplane and had a Marine as our troop commander. He had a few of his guys with him, but the majority of the aircraft was full of CLSS personnel. When we got about two hours out [from Torrejon] and the first SCUD attack had hit Dhahran, he realized that not everyone on the aircraft had chem warfare equipment. So we turned around and went back so the Marines could get what they needed.

Capt Poe: Really, are you serious?

Capt McRory: Yes. We were two hours out from Torrejon when we got turned around. The

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[12] Capt McRory, Lt Cooley and the third A-10 ABDR team departed McClellan on 16 January, arriving at the Dover air terminal just in time to hear a radio announcement that Desert Storm had begun. For additional details see, Ltr, Capt Francis X. McRory to Dr. Craig Luther, 7 May 1991 (SM-ALC archives).

interesting thing was that the Marine couldn't count past 12. He'd keep trying to count heads but would get to 12 and lose it every time.

Capt Idle: At Dover our pallets were stored in a secure area because our guns were on there. Well, we had our guns, "A" bags, our "C" bags and our chem gear in back packs--all of our stuff--expecting to all depart as one big happy family. Then we found out we had to depart without our gear, which was to go on another airplane. Well, we got three or four guys and literally stole a bus and got a guy to take us to the loading area. We took a pallet apart and got our back packs, for there was no way I was going to Saudi Arabia without my chem gear. Marines are expendable, I guess. So we had to depalletize, get our gear, repalletize, and it started to rain. And we're outside doing this so we can catch this C-5. When we get over to the airplane the loadmaster looks at us and says, "Well, we can get **you** on the plane but I don't know if we're going to get your equipment on." We told him, "Sorry, it's going." We could have gone all the way over there without our chem gear.

Sgt Beebe: The significance of this is that, as our team was trying to go forward, we were getting nearer and nearer to the 15th of January. And we wanted to be in-country, because [hostilities appeared imminent]. So we wanted to get there with our gear on and get at least a few hours of preparation.

Luther: Well, there had been that last minute flurry of diplomatic activity, with Secretary of State Baker meeting with the Iraqi foreign minister. And we had set 15 January as a deadline for Saddam to comply with the United Nations resolutions and begin to pull his forces out of Kuwait. So the thinking must have been that hostilities could begin anytime after the deadline.

Capt Poe: No, no. We thought they would begin **before** the 15th. We would go to briefings in the day--during the stand ups--and Intelligence would tell us that [the Iraqis] were going to hit us today--they know we're going to hit them, so they'll hit us first. That was about the 13th of January. And everyday it was the same thing: they're going to try to get us.

Lt Cooley: We were trying to get out there and the T.V. is showing SCUD attacks. We didn't know what we were getting into. Dhahran had already been attacked once before we got there. We were just a couple hours out and we had to go down to the belly of the C-5, break out the pallet, pass out all the gear and suit up, because we didn't know what [we were coming into]. We got off the plane in full chem gear. We didn't know what to expect at Dhahran.

Luther: So the war started just as you flew in.

Lt Cooley: It started as we were on our way. We didn't know what we were getting into.

Luther: What were you thinking at the time? What were your emotions?

Capt Idle: Emotions?

Capt McRory: I had a camouflage chem suit on and I was sweating so badly. I think everyone was just so overwhelmed with...

Lt Cooley: The heartbeat was way up!

Capt McRory: Oh yeah. You didn't know what to expect. Because you're in a C-5, which is like flying in a cave. Then all of a sudden you land and leave the aircraft and everybody's walking around in chem gear. It's chaotic. To make it worse, I talked to Capt Poe just before I departed McClellan. He had been very upbeat [in our phone conversations] the couple weeks before I got there. Then the day before I left he said, "Oh my, I can't tell you what's going on. Oh God, get over here!"

[general laughter]

Lt Cooley: I got a phone call from Chief Jefferson just before we left and he said "We need you here now."

Capt Poe: It was one of those moments you remember: the war is about to begin and I'm sitting around a table with all the colonels --they were all in the DCM shack-- talking about when it was going to start. They had the times. I'm thinking to myself, "What is going to happen to [prevent a war], because it sure looks like its going to happen."

Luther: How did you know with certainty on the 16th that we were going to launch our strike the next morning?

Capt Poe: About eight o'clock that evening they called us all together and went over the plan. The first A-10 wasn't going to leave until four in the morning, but the war itself would begin at 2:00 a.m.

Capt Idle: We got our [information] for our Intelligence guy. We had an exercise at seven o'clock the night before the attack. They wanted to see who knew how to put the [chem] gear on--who was capable and who wasn't. After that, I got to know a first lieutenant from England, an Intelligence guy, and he said flat out, "Don't go to sleep. Somewhere around 2:30 in the morning you can expect something to happen." I told all my team. And, what was it, 2:44 in the morning when [the war began]?

Capt Poe: I [recall how I learned] it was really going to happen. That night [January 16th] I was laying in my bunk trying to get some sleep and this airman comes in and tells us we've been ordered to put our chem suits on. And I'm thinking that this has gone beyond the stage of a drill. Everybody in that camp slept in their chem gear. It was pretty eerie. Then the planes

started taking off.

Lt Cooley: It was even worse when they told us we had to take those tablets.

Capt Idle: That was it! The little PT tabs--that's a preantidote for nerve agent. They give you this little packet [for use] in case of nerve gas.

Capt Poe: But you don't **ever** take them.

Capt Idle: Unless you're ordered to take them. And they came up and told us to take them. That was the realization for me [that war was beginning].

Capt Poe: [The tablets] give most people a severe case of diarrhea. And its not like we're in the States--there's not a bathroom in every corner! And your taking these tablets that you've always trained with, but you've been admonished not to **ever**, **ever** take them unless told to do so. Yet now they want you to start taking them. And you keep thinking, "They know something."

Lt Cooley: As soon as Capt McRory and I showed up, Capt Poe told us to start taking our tablets. I thought to myself, "You've got to be kidding me. I'm not taking those things."

Sgt Beebe: Well, we arrived in-country after a successful trip...One of [my responsibilities as the team leader] was to make sure that each [team member] knew where the bunkers were. We had many instances where we didn't have bunkers right next to our tents. We also learned that the bunkers were not well-designed. In fact, some people were actually lost because of [poor] bunker construction. Again, one of the things that goes through your mind (as you feel the ultimate responsibility for your entire team) is to make sure that you don't lose anyone to something foolish. Because you need every one of them to accomplish the repairs on the aircraft.

Lt Cooley: As you spread out running to all these different bunkers you lose contact--you have no idea where your people are. So, if there was an attack, we'd have had a hard time finding our people and knowing if they were all available.

Capt Poe: When you train you keep track of your people. The first thing you do is count bodies. But with so many people over there you don't know where they are.

Luther: What was security like at King Fahd, the main operating location?

Capt Poe: Unbelievable. When I first got there [in late December] you could actually go downtown. There was an entry point coming onto the base; an entry point going into the general living area; and another entry point going onto the Air Force living area. So there were

three entry control points before you got to your tent. It was the same way on the flight line.

Lt Cooley: With the amount of Army that was between all the layers of entry control points we were pretty secure. And the Patriot missiles had us pretty well protected from SCUDs.

Luther: Did any of you take any special anti-terrorist precautions?

Capt Poe: They asked the officers to wear their guns. At one of the briefings they told us not just to suspect terrorism, but that we were going to **have** terrorism. It was another threat. You'd walk around at night--I've never seen a darker place in my life. And this gun was somehow going to protect you from someone a half-mile away with a night vision scope.

Capt McRory: We even got to the point that, when we approached the gate guard and he saluted us, we'd say, "Do you really have to do that?" You were totally exposed. The check point into the flight line had miles and miles of desert. Someone could have easily sat there and picked you off. Looking back, that didn't happen. But at the time we're saluting the guard thinking, "Don't do that; don't single out the officers [for a potential terrorist]."

Sgt Beebe: By the second day at the FOL we were told not to salute anywhere in the compound and where we lived. However, we also had a problem with communication between where we worked and where we lived...The problem was how to [know] when to go into the bunker. At times you would hear that there was an alert over the Giant Voice [communication system]; other times you would not hear it. If you were at work sometimes you'd hear it; if you were in your living quarters you might not hear it at all. So communication became very, very critical. You needed to know when and how to respond. And sometimes you wouldn't hear anything, you'd just look up; if you saw vapor trails you knew it was time to get in the bunker.

Luther: How far was the tent city from your work areas at both the main operating base and FOL 1?

Capt McRory: About a mile [at the MOB].

Lt Cooley: It depended on where you were headed. There were two operating areas within the main operating base. The north area was about a mile's walk from the tent city; the south area was more like three miles. The north area was where the 23rd TFW was stationed, while the 354th was in the south area. There were two distinct wings [at the MOB].

Sgt Beebe: At FOL 1 our living quarters were roughly 12 miles from the work area...

Luther: Capt McRory, you have mentioned to me that the main operating base had extensive maintenance and support facilities. Would you describe these facilities and how adequate were they for what you had to do?

Capt McRory: Well, when I say extensive, everything is relative. The AMUs [Aircraft Maintenance Units attached to the A-10 fighter wings] deployed and they took everything that they could with them. There were back shops; there were shops that could repair structural items. I believe we had an avionics repair capability. There was a separate supply warehouse there and so forth. There was also an indigenous repair shop there for the airport that had a lot of capability. And we used it to various degrees, as did the AMUs. So we had a lot of capability, relatively speaking. There could have been a lot more there, and that's another lesson learned. That some of the back shops could be better equipped.

Luther: Capt Idle, you reached FOL 1 just before the war began.

Capt Idle: We got in-country, into Riyadh, about the 14th of January. But it still took us another day-and-a-half to reach our final destination at KKMC. I believe we got there on the 15th of January, late at night.

Sgt Beebe: That's correct.

Capt Idle: We landed on this runway; they dropped us off. We then walked over to a makeshift personnel processing center. It took forever to get transportation to the main base [at the FOL]. We only got there because we happened to get a buck sergeant who had been loaned out to the transportation office. He was very good to us and bent over backwards. He took me and another guy back to the base. He got a bus to get the rest of our people. When we got to the main base--as Sgt Beebe said--the only thing they had available for us was a tent with three inches of standing water in it. [The only reason this tent was available] was because no one else wanted to sleep there.

Luther: Was the FOL right at King Khalid Military City or just outside of there?

Capt Idle: It was about 12 miles away. So we had to drive a distance.

Sgt Beebe: [But the FOL was still a part of] KKMC, it's just that our quarters were 12 miles from where we worked.

Capt Idle: It's all within the boundaries of the military city there.

Luther: Would you describe the FOL location and the facilities?

Capt Idle: A patch of dirt with a bunch of tents on it. That's basically all it was. They just took a patch of desert area and started throwing up tents wherever they could. The problem was, when it rained, the tents that were in the low spots got full of water. [This was because the Civil Engineering people] didn't have all their supplies and materials to reinforce the tents, the floors. So, for a while, you were living in a water-logged tent. In addition, some of us

were dispersed for the first few days--they put us wherever they could park us. It took us almost two weeks to get dedicated tents just for us. And when we got those tents we literally conned C-E into giving us materials to build floors, because we were in low areas. Very few of the tents had floors. The roads were just dirt roads.

Luther: So an FOL is described as "bare base" and KKMC was definitely that.

Sgt Beebe: It was bare base. And your troop commander [Capt Idle] makes sure you get to your final destination so you can perform your mission. Once you get there, your team chief has to set up all of your shifts, your supervision and operating capability... Again, when we landed there, we got dispersed everywhere. And it was very difficult, if you had an immediate threat, to figure out who was missing. If you had someone who was taking a shower or in the latrine, you couldn't tell who was missing and who was there. So you had to find a way to get your entire team back together. In this interim two week period [before we got our dedicated tents], we were able to get two tents set aside for our people so we could live together. Still, it took darn near until the end of the conflict to get bunkers [built] next to our tents.

Capt Idle: We had difficulty with transportation. They just didn't have enough vehicles to support everyone. There was a bus service that went back and forth. But for a while the busses were dedicated to the weapons people, who were needed there for the hot pits, the weapons loading and the munitions dump. So, in our effort to get a dayshift team out [to their work area] we were finally able to get a small Toyota, four-passenger pickup truck. I mean, we're trying to get some people out there and having to tell others to catch a bus later and that we'll meet them out there. It took a while but we finally convinced the transportation people that we needed [a larger vehicle] to transport our entire team. So they finally traded vehicles with us. We got a van, and that worked out quite well. But as Sgt Beebe said, as team chief he's trying to get his team organized so they can start working shifts--start getting into the grind of doing of the work. Yet he's having a hell of a time trying to find a way for us to do our job.

Luther: Why was it that issues as fundamental as basic accommodations and transportation at your site seemed to pose such serious obstacles?

Sgt Beebe: Nobody knows you're coming. That's the key point.

Luther: Even at this late stage in the game?

Sgt Beebe: Even at this late stage. We knew we were supposed to be there, but the host units didn't know when or how many, or even if we were coming.

Capt Poe: We knew you guys were going to be there. So did Chief Jefferson and Colonel Rupright.

Sgt Beebe: The people we supported didn't know we were coming.

Capt Idle: The loading people didn't know we were showing up.

Luther: So it was August revisited in a sense.

Sgt Beebe: In a way, yes. The forward operating location concept is gas, bombs and bullets. We were there to support that location and that operational commitment. So, as you got there, you set everything up and got it going. Well, getting it going was a task in itself; once you've got it running, you have to divide the team and support the existing workload. What you didn't understand was that you not only supported A-10s, but that you supported everything that hit that runway. The limitations you encountered were that you had an ILS [Instrument Landing System] that had no strobe capability...The significance of this is that you have airplanes that can't find the runway in a duststorm. So what added to our already heightened degree of energy was the fact that the airplanes can't find the runway. You also had planes that were running out of fuel. So any aircraft that was looking for a runway was looking for **your** runway. When they can't find it, you have crashes if they run out of fuel.

Luther: So it may be an A-10 FOL, but that doesn't mean you're not going to get a lot of stray birds.

Sgt Beebe: We got everything, all different kinds of planes from all different countries--cargo planes, fighters. If it flew, it landed at our base. I think there were only three types of aircraft that did not land at our base. But again, [as an FOL] you are a primary gas station and a primary reload area, and you have to be geared for that.

Luther: And you weren't really prepared for that?

Sgt Beebe: Not when we left McClellan. We had no idea or concept of how big it was going to be or what it was going to be. And you cannot educate people as to what to expect.

Capt Idle: It took innovation. If you wanted something done, you had to barter, to dicker, make promises you knew you weren't going to keep. You did whatever it took to get the job done. I offered my services to C-E many times, putting in doors, floors and other things in exchange for them placing me next on the list for bunkers. We fixed a front-end loader so that they could continue to build the bunkers. It was part of our mission to help out the whole base, but there was self-interest involved too. I wanted floors in our tent. So we bartered with them. I said, "Give us the materials [to build floors] and I'll help you put doors up someday.

Sgt Beebe: At both locations...you also had a working commitment to build revetments for your aircraft to protect them in case of mishaps.

Luther: I think one of the lessons here is that training can only prepare you for so much. Certainly in wartime you cannot anticipate every problem that may arise. You just have to think on your feet. You have to innovate.

Sgt Beebe: That's the key.

Capt McRory: Be innovative...What took me by surprise was that you became very adept at survival. It came down to very basic things. You realized that you had to take care of yourself and your team. And there were many days when you looked around and felt that nobody was going to take care of you; that you were absolutely out for yourself. It could be anything--food, water, blankets, throw rugs on a floor, shelving, whatever.

Luther: Our discussion brings to mind the old war movie with Steve McQueen, "The Great Escape," where they had one guy in their prison camp who was the scrounger. It seems in wartime you always need a scrounger.

Capt McRory: Absolutely.

Capt Idle: I became the scrounger.

Capt McRory: Someone who has that car salesman smile and who can lie with a straight face to get you what you need.

Sgt Beebe: It's survivability for your team. It's not strictly self-interest. You have an obligation to protect your entire team.
And the higher the level of supervision, the greater your obligation to make sure you bring them all back [safely].

Capt McRory: That's true. I guess the point I'm trying to make is that you definitely could see a difference between the folks who'd been there for awhile, and who belonged to the 23d and the 354th, and us coming in as a separate unit. It was self-survival, and I mean that in the unit sense. We definitely had to fend for ourselves.

Capt Idle: We even dealt with foreign nationals--other coalition member troops. We had a French detachment that was at the de-arm area out on the flight line. It was a photo-journalist team that was there to document the war. They were taking pictures of the crew chiefs and the planes coming in. We set up an [arrangement] with them. They needed things every so often, or needed help getting items; in exchange, they supplied us with fresh French bread every day. That doesn't sound like a big deal, but at eight o'clock in the morning a fresh role of French bread really went a long way.

Sgt Beebe: [The bread] became one of our bartering tools.

Capt Idle: It really did! If we had an extra half loaf of French bread, and we needed to go to the AMU and get something done, we just waived it at them and said, "Let's make a deal, guys."

Sgt Beebe: The difference between the main operating base and the FOL is that you absolutely had no resources to speak of [at the latter location]. There was a taxi-way and a runway; if you had a crashed aircraft, you got it off the runway and waited for the next one to land. [In contrast], the main operating base had a much greater number of people and a greater number of aircraft. The FOL is designed to house a limited number of airplanes, while your main base supports the entire wing. At the MOB you have more people, more equipment and a greater ability to perform the mission.

Luther: But you made good use of the ABDR kits from RAF Alconbury [England], the so-called "war wagons", at the FOL.[13]

Sgt Beebe: Yes we did. They were our life-saver. Our CLSS kits were an absolute limitation, as far as performance and efficiency were concerned. They were absolutely ineffective and need to be reworked entirely. [What we needed was] a lighting capability, an electric capability, an air capability and pneumatic tools.

Luther: Even though the main operating base had considerably more resources, you apparently faced some of the same resource problems there as you faced at the two FOL locations.

Capt McRory: Oh sure. I think the philosophy was [the same at both locations]--to get the plane back to the using command as quickly as possible. It was just a different degree of repair that we would do in the rear.

Sgt Beebe: It's the difference between a repair capability and a replace capability. We had a repair capability to get the plane back to the main operating base, [while] they had a replacement capability with a greater timeline given to them--with a greater number of possessed aircraft--to put the aircraft up and fix it.

Lt Cooley: That had something to do with the perceived threat, I believe. They didn't want any airplanes to be tied to the ground at the FOL. If they had to bug out, they wanted everything to be out of there. [On the other hand], they didn't think King Fahd would be attacked--at least not with troops and tanks rolling in. So they could afford to have broken

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[13] According to a lesson learned compiled by the 2951st CLSS, "On several occasions the need arose for ABDR kits at the A-10 forward operating locations. These locations were bare base with minimal support equipment. The RAF Alconbury War Wagons were the exact configuration for this purpose...The RAF Alconbury kits were used exclusively for the FOL operations as well as for supporting the A-10 duel wing [at the main operating location]." Lesson Learned, 2951 CLSS/MA, "CLSS ABDR Kits," n.d.

aircraft.

Capt Idle: They kept us in a mind-set at the FOL that [what we were doing] was strictly temporary--that we might be leaving at any time. At one time they discussed taking us up to the second FOL.

Capt McRory: They did the same with us [at the MOB]. They talked about moving us up into Kuwait as the war progressed.

Luther: Were any CLSS personnel actually stationed at the second FOL at Al-Jawf?

Lt Cooley: We had at least two people there at all times. At one time we had 14 people there.

Luther: Were those deployed to Al-Jawf taken from KKMC?

Capt Idle: No. None of our team ever went [to Al-Jawf]. Although they talked about sending some of our people up there.

Sgt Beebe: They wanted to move the entire FOL 1 operation over there.

Lt Cooley: At one point Col Rupright wanted an entire team from the main operating base to go to Al-Jawf and operate from there. But it just wasn't feasible. It wasn't supportable. The facilities were not there to hold the people, plus they didn't have enough [ABDR work] for an entire team. As long as we had two technicians there and communications contact we could always dispatch more people.

Luther: We've discussed your deployments, some of the problems you faced in getting to your work sites in-theater, the work sites themselves, and so forth. I'd like now to get to the heart of the matter and discuss in detail your actual ABDR work during the Persian Gulf War. In this context, what were the most common and the least common types of A-10 aircraft battle damage you encountered during the war?

Capt Idle: The most common minor damages we encountered at the FOL were holes in the horizontal and vertical stabilizer leading edges and in the fuselage. A lot of little stuff, like nicks and dings. Occasionally, there were bigger holes in the wings. And most of that [entailed] just a quick look to see if there was any internal damage; then we'd slap some speed tape on it and send it on its way. At our FOL we had three aircraft land with real severe damage. [A-10 S/N 76-540] sustained damage to the horizontal and vertical stabs and fuselage; it required some temporary repairs to get it back to the main base. We also had two aircraft that crashed. Both of them had SAM [surface-to-air] missile hits right in the aft fuselage. Both hits were in the same spot and the aircraft crashed attempting to land.

Luther: Looking at the damage inflicted on A-10 aircraft during the war it struck me that there was a lot of damage to the horizontal and vertical stabilizers. Why was this so? Had the Iraqi's discovered a vulnerability on the aircraft?

Capt Poe: [Addressing Capt Idle] You say [the planes] were hit by SAMs, but one of the things that shocked me was that the pilots didn't really know what they were getting hit by. In fact, they sent teams out there [in an effort to determine] what was hitting them. One of the theories I heard was that the Iraqis were using a hand-held, infrared, heat-seeking type of missile. And where would it hit but in the tail, because of the tail pipes. Yet the A-10 we had out here [A-10 S/N 80-186]...it's really strange, it looks as if the missile entered the fuselage, went down the tail, and blew up in the back. There was an entry wound just aft of the nacelle, and it looks like the projectile went in there and then blew up the aft end. There is no way it could have come in the aft end and caused [the type of hole that it did].

Lt Cooley: That's exactly right. The entry came from behind the wing and exited out the back of the tail. It also went from the top down through the bottom of the aircraft.

Luther: The Iraqis did have the SA-7 hand-held launcher. According to one source, it had a range of about 6.25 miles.[14]

Capt Poe: The aircraft that had its wing blown up and made the newspaper [A-10 S/N 82-664], the one with that 20 feet of wing gone--that appeared to [have been hit by] a 57mm round or something. Whatever it was it exploded when it entered the wing. It looked like the ribs inside were laid down like trees. Here again we were told, I think by a group of pilots, to let them know if we found any of the shrapnel. They wanted to find out what the Iraqis were shooting at them.

Sgt Beebe: The three major damages we encountered were structural damage between the two engines and the aft fuselage; the empennage area; and all of the flight controls, rudders and elevators on that portion of the aircraft. Anytime the aircraft was coming toward the enemy with its gun facing them, they would wait until the aircraft turned away [to fire at it]. Consequently, they found the point between the engines to be most vulnerable to attack the hydraulic, electric and mechanical systems. Yet even after they were hit the pilots would say

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[14] In 1990 the "typical unit-based air defenses of a first-line Iraqi armored division consisted of 15 self-propelled SA-6 launchers carrying three missiles with a 37-mile range, five self-propelled SA-8 launchers carrying four missiles with an eight-mile range, 27 hand-held SA-7 launchers with a 6.25 mile range, 16 SA-9 launchers carrying four missiles with a 4.35 mile range, and 16 ZSU-23-4 four-barrel 23-mm self-propelled antiaircraft guns to counter low-flying strike planes up to 1.25 miles away. Iraqi mechanized divisions had 81 SA-7 launchers, triple the number found in armored units." David Segal, "Desert Storm and Division Air Defense," In: Armed Forces Journal International, May 1991, p 34.

they still had pitch control when, in fact, they had no systems left. And that was evident on the three aircraft that did return.

We had a fourth aircraft that came in that had damage to the number two engine (in the nacelle area) from small arms fire as near as we could determine. We were also able to repair this aircraft and send it back off.

Luther: So the damage ran the gambit from small arms fire to SAM damage.

Capt Poe: The A-10s were restricted to certain altitudes. If you take a 23mm shell, and the [aircraft] is at 8000 feet, then the shell has very little velocity. But if you consider the velocity of the aircraft and what's left of that of the shell, you can still get penetration.

Sgt Beebe: That's a true statement. Yet when we debriefed the pilots, not one pilot would ever say that he went below the prescribed altitude.

Capt Poe: ...We had one instance where it looked like an [AA] bullet hit the windscreen. Here again, you get a pilot who's in a dive, and a bullet that's coming up, and the plane runs into it--whether the bullet's going down or coming up it's still going to make a small hole.

Luther: In USAF planning for a war in Europe it was envisioned that the A-10 would conduct its tank killing mission below 1000 feet. But in the Gulf war many missions were conducted above 10,000 feet.[15]

Sgt Beebe: Above 10,000. I believe that, as the conflict progressed, the prescribed altitude [below which the pilot was not to conduct his mission] was lowered to about 6000 feet. They never told us that they went lower than 6000 feet.

Capt Poe: The only reasons they could fly lower than that was in the air rescue role or in [direct support of the Army], such as when they were fighting at Khafji in Saudi Arabia.[16] They went down low then because they were supporting the Army, and they have to be able to

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[15] During Desert Storm A-10 pilots were exposed to "enormous amounts of anti-aircraft fire." Based on an assessment of the risk from such fire, A-10 aircraft were at first restricted to flying altitudes above 10,000 feet; about mid-February the altitude restriction was significantly reduced. Despite such restrictions A-10 pilots were **always** authorized to fly below the restricted altitude when necessary to successfully complete the mission. Intvw, Dr. Craig Luther, historian, with Col Robert H. Haden, Deputy Commander for Operations, 354th Tactical Fighter Wing, 28 August 1991.

[16] On January 29th armored columns of the Iraqi 5th Mechanized Division advanced into Khafji, a practically deserted town six miles south of the Saudi border with Kuwait. Supported by U.S. air forces and artillery, troops from Saudi Arabia and Qatar recaptured the town two days later following spirited house-to-house fighting. Otto Friedrich, Ed., Desert Storm, The War in the Persian Gulf, A Time Book, Time Warner Publishing, 1991, p 71.

[distinguish friend from foe].

Lt Cooley: Many of the A-10 missions were with Maverick missiles.[17] And they didn't need to be very low to launch Mavericks.

Capt Poe: Capt Idle alluded to a lot of damage [they repaired]. But those holes were not from battle damage. They were self-inflicted by [their own] bombs.

Luther: The firing pins.

Capt Poe: Yes. An A-10 is accustomed to coming down low, dropping its bombs, and popping up. Now, when you [operate] at 10,000 feet, it isn't as critical to pull back. So they'd drop their bombs and they'd be at a low angle-of-attack and all of their pins were just bouncing right off them.

Luther: So what you're saying is that they changed their tactics prior to Desert Storm.

Sgt Beebe: Yes. I would say that they got different marching orders as things progressed. New rules of engagement for how they could perform as pilots. Again, each time we got a battle damaged aircraft in, the DCO would grab his pilot out of the cockpit and not let us talk to him immediately. The DCM felt the pilot first needed a recovery period. So our ABDR assessors did not get to talk immediately to the pilots about their flight configurations.

Luther: Could you not begin your repairs until you had talked to the pilots?

Capt Idle: You needed to know certain things. You needed to know if the pilot had problems with his aircraft. For example, was he having problems with his elevator rudder?

Sgt Beebe: The flight parameters could not be determined until we debriefed the pilot.

Capt Idle: And that could have a major impact. For example, if there was a little hole in the fuselage somewhere, and the pilot says he was having big problems with a particular flight control, or that hydraulic pressure was [fluctuating] up and down--that leads the assessor to dig

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[17] The AGM-65 Maverick is a rocket-propelled, air-to-ground missile for use against field fortifications, SAM sites and armored vehicles; all Mavericks possess optical (television) guidance systems, although later versions of the missile (D and G models) have infrared enhanced guidance systems. A-10 aircraft launched roughly 90 percent of all Maverick missiles used during the Persian Gulf War. Other A-10 munitions expended in quantity included MK-82 and MK-84 general purpose bombs, CBU-52 and CBU-58 antimaterial munitions and CBU-87 combined effects munitions. A-10 aircraft also fired close to one million rounds of 30mm ammunition from their GAU-8/A Avenger 30mm rotary cannon. AFP 136-3, Armament--U.S. Air Force Munitions and Missiles, Department of the Air Force, March 1986; Brfg, 354 TFW(P)/DO/MA, Operation Desert Storm A-10 Combat Recap, n.d.; Air Force Magazine, June 1991, p 15; Intvw, Dr Craig Luther, historian, with Chuck Thompson, LASES, 26 Aug 1991.

a little deeper. Maybe there's damage inside the system. But if the DCO wisks the pilot off to get the party line straight the assessor is left out in the dark. Then when it comes time to review the ABDR records, the Form 97s, the assessor is required to fill in the flight parameters--altitude, airspeed, unusual conditions and so forth.

Luther: So that initial contact between the pilot of a damaged aircraft and the assessor is of critical importance.

Capt Idle: Oh, very critical.

Lt Cooley: Aircraft [A-10 S/N 77-268] came in with a small hole no bigger than a little chip. [The bullet penetrated the aircraft], hit a couple of electrical bundles, went through a flight control rod...

Capt Poe: Right through the middle of it.

Lt Cooley: But without talking to the pilot we'd have had no idea [about the extent of the damage]. It would have just looked like a small hole--put some tape over it and send it off. We needed to know that he was having some trouble. So we opened the panel and looked behind it to find additional damage.

Capt Idle: How would it have looked if we hadn't been able to talk to the pilot; if we'd just put speedtape over the hole and he takes off? And then he experiences severe problems and crashes. Yeah, [the initial contact between the assessor and the pilot] was critical, and that was a source of frustration at times.

Sgt Beebe: Another A-10 that landed at our FOL had shelled an engine--in other words, the nose cone from the front of the engine went through the engine casing--and, once again, it was not immediately apparent what type of [shell] fire the pilot had gone through. We didn't understand what had made the nose cone come off, but we did find damage to the nacelle area. Repairing the nacelle is a part of battle damage repair, but we also went through an engine change as a result of whatever the pilot ran into.

Capt Idle: And we did have one bird strike...A bird, perhaps a sea gull, struck an A-10 in the nose, badly bending it inward. We did not repair the damage; we changed a few rivets and sent the aircraft back into combat.

Capt McRory: At the ABDR conference after the war there was a lot of talk about self-inflicted wounds because of the way the planes were flying. And this [talk] was across the gambit, it wasn't just about the A-10. For anyone carrying bombs it was a big problem.

Capt Poe: It became obvious what was self-inflicted damage and what wasn't. At the beginning

of the war we weren't sure. And here again, we [repaired] that self-inflicted damage. They didn't care if it was self-inflicted or not, it was BDR so we went out and took care of it. The CLSS was used in the ICTs [integrated combat teams] to keep those planes flying and we didn't differentiate [about the origins of the damage]. We just fixed it and pressed on.

Sgt Beebe: Perhaps about three weeks into the FOL operations, we had another F-16 unit come in and cooperate with us on their F-16s. We had one F-16 that returned with significant battle damage. He had declared an emergency and come in, but was unable to get his nose gear to come down. So he landed without his nose gear down. We ended up assisting another CLSS ABDR team in disassembling that aircraft and shipping it back to a depot facility. [There were] in excess of 25 individual damages to that F-16.

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Session Two

3 July 1991

Luther: Continuing our discussion of battle damage repairs, what were the most challenging A-10 repairs you performed and why were they a challenge?

Capt Poe: There were four. One that went into KKMC [A-10 S/N 76-540]; one that went into Al-Jawf [A-10 S/N 77-255]; and two [A-10 S/N 80-186 and A-10 S/N 82-664] that came back to King Fahd.

Lt Cooley: I would add an F-16 [S/N 88-488] to that.

Capt Poe: Correct, that F-16 was a major damaged aircraft.

Luther: I'd like to discuss some of these aircraft in detail and the particular challenges they posed.

Capt Idle: Well, aircraft 540[18] was a challenge, primarily because it was at the FOL, so we faced time, equipment and material constraints. That [aircraft] presented a problem because the left side of the aft fuselage had three of its main longerons severely damaged--all on the same side. That immediately placed the damage beyond T.O. limits. The lower surface of the left hand horizontal stabilizer was also severely damaged; the main spar lower cap, the lower skin, several ribs, stringers, and the vertical attach fittings on the left hand vertical were damaged as well.

All of that damage individually put the aircraft beyond the normal -39 limits. But we couldn't leave the plane sitting there. From my viewpoint it presented a unique opportunity for me to work with the assessors and look at each individual damage to determine what needed to be done to get the plane airborne and back to King Fahd. We opted to leave the longerons alone

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[18] During a mission on 31 January, A-10 540 sustained serious battle damage. Although both hydraulic systems were destroyed, the pilot was able to use his manual backup flight control system to return safely to FOL 1. A-10 ABDR technicians performed temporary repairs on the aircraft through early March; the plane then returned to its home base at Naval Air Station, New Orleans, Louisiana (926th TFG). Following the decision **not** to proceed with permanent repairs (due to prohibitive costs), A-10 540 was ordered to McClellan AFB, where (after supplying parts for other A-10s) it will go on permanent display at the McClellan Aviation Museum. The aircraft arrived at McClellan on 22 August 1991.

and not do any repairs to them at all, with the exception of speedtaping them. Same thing with the vertical fittings, where we opted in most cases just to clean off any of the sharp edges and nicks, but to leave the rest of it alone and not do any repairs--not try to make any fittings or sheet metal repairs. The horizontal stab was most unique, because the lower cap was severely damaged and that is one of the more highly loaded members.

Luther: Can you explain what you mean by highly loaded?

Capt Idle: The horizontal stab has three spars that go the length of it--forward, main and rear. The main spar has a high amount of tension load on the top surface and compression loads on the bottom, because the vertical tail is trying to bend it. You have to determine how severe the damage is and whether the structure that was left was going to withstand the stresses from the vertical tail and the joint. We didn't want to remove any more structure to try to gain access and clean up stuff, because the more fasteners you remove, the more structure you remove, the weaker it gets. And we couldn't very well rebuild it completely.

Luther: You mention that many of these repairs were beyond the -39. And at an FOL you are principally prepared to perform repairs within the parameters of the -39.

Capt Idle: Correct.

Luther: So, did you draw on additional resources or equipment from the main operating base?

Capt Idle: No. I used what I had available in my kits...I took the stress analysis book that Fairchild used to develop the -39. So I had the loads, the stresses--a lot of information with which to analyze the existing structure to determine the loss of strength and what I could do to rebuild it enough to get the [aircraft] home. I also relied heavily on the assessor and the technicians, using their ingenuity. I came up with an analysis and with a rough concept for a repair. Then we sat down with the assessor and the mechanics and I said, "Ok, here's what I think we need to do. You tell me if it's going to work--if you can do it. [Tell me] how difficult it's going to be and what we need to change to make [the repair] easier--what can we eliminate." Things like trying to pick up existing fastener patterns; trying to go around stuff. So, between my analysis and the experience of the CLSS sheet metal guys, we came up with and completed temporary repairs that brought the aircraft up to enough strength to get it back to King Fahd.

Sgt Beebe: Again, how this works is that your assessor designs the repairs. He assesses all the damage of all affected systems. Once he performs an assessment, he determines the amount of time and the number of specialties [needed to perform the repair]. For example, when the structural people design the repair, what we do is consult with the engineer to make sure that it will withstand the load factors imposed on the flight control surface. It is the engineering approval that allows the aircraft to fly, but your technicians actually assess, perform and install the repair, with the concurrence of the engineers concerning its airworthiness.

Another peculiar repair for aircraft 540...We had multiple damages to electrical, structural and hydraulic systems (particularly to the latter system). This aircraft came back with both hydraulic systems cavitated. Now, the -39 stipulates that you can fly the A-10 aircraft with one system completely gone. The hydraulic system is so designed that, when you lose a certain amount of hydraulic fluid out of the system, the reservoir is automatically shut off. However, it cannot shut off fast enough to prevent cavitating the hydraulic pump. So we performed all of the electrical, structural and hydraulic repairs. And what we found as we completed those repairs was that, on the right system, we still could not get a minimum 3000 pounds pressure for the pilot to take the aircraft. We were allowed by -39 requirements to not have all of that pressure. What the pilot understood was that he would not have emergency brake systems, which is allowed by the -39. We went back to the DCM and he told us that the aircraft would not be flown without all of the emergency systems available. So, even though our -39 said we could do that, he told us we could not. What happened was that we ended up "K-balling" [cannibalizing] a hydraulic pump off an engine and reinstalling it on aircraft 540. Even though we had tech data saying you could fly the aircraft without this system being operational, we were forced to do that so the pilot would have all emergency systems available to him.

What was also unusual about aircraft 540 was the bottom stab cap to the vertical fin, which was eliminated. We took all of that off. It was actually an unbalanced condition, for the right side had the bottom stab cap [but] the left side we removed and elected to leave nothing on there except to cover the surface. And that is what was unique about this aircraft to get it back to the MOB.

Luther: In terms of lessons learned, what was most unique or insightful about the repair work done on this plane?

Sgt Beebe: We'd never done that type of repair, where you left an entire surface off an aircraft. There had never been a need to do that. So there was some experimentation involved. If the decision is made to release an aircraft for flight, and it is a ferry-flight, and you have a "Red-X' condition[19] where [the DCM] has to downgrade it and approve it for flight, the pilot also has to accept the aircraft under those conditions. With a ferry-flight there are a number of limitations that we put in the documentation. [The pilot] had something like six flight control restrictions just to ferry the aircraft back to the main operating base--[restrictions concerning] G-loads, turns, all those types of things that are imposed on the aircraft that the pilot needs to know before he will accept it.

Capt McRory: I'd like to clarify one thing concerning the lower cap on the left vertical stabilizer. Capt Idle and I talked about that on the phone...I guess what I never made clear is that I know a little about the history of the A-10. That aircraft was flight tested missing a whole bunch of stuff. So when Capt Idle and I talked, I had no reservation about saying that I knew

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[19] A "Red-X" condition is a safety of flight condition that grounds an aircraft until the required repairs can be made.

the plane would fly. The A-10 is so "dirty" you can take a lot off that plane and fly it.

Luther: What do you mean when you describe the A-10 as a "dirty" aircraft?

Capt McRory: When we say dirty, we are talking about parasitic drag. The A-10 has a lot of buttonhead fasteners; very blunt leading and trailing edges. It also has 11 pylon stations--just a lot of things hanging off the aircraft that increase its drag in comparison to a "clean" airplane, such as an F-15 or an F-16.

Capt Poe: When that plane [A-10 540] got to us [at the MOB], it was pretty cut-and-dried on the horizontal [stabilizer]. We looked at Capt Idle's analysis and determined that the aircraft would not be fully mission capable with the repair they did. If we wanted a FMC [fully mission capable] airplane, it was going to have to get a new horizontal stabilizer.

There were some other damages that the three engineers at King Fahd looked at. We couldn't really do any repairs...so it was really fly as is, or don't fly. We did several NDI inspections [nondestructive inspections], found out there were no cracks, had the holes cleaned up, and let it go as is. What we did was remove some of the margin of safety. There is an inherent margin of safety on top of the design loads; by removing that margin of safety you come back to a margin of safety of 1.0

Capt McRory: A safety factor of 1.0

Sgt Beebe: This was the first aircraft with which we experienced **replacing** flight controls in lieu of [repairing them] because there was so much destruction to those flight controls. What we had were flight controls for which we did not know the weight and balance conditions. It was just [a case of] removing and replacing the parts and flying the plane out as is, for you have no weight and balance capability.

Luther: So there were several unique aspects to the work accomplished on aircraft 540.

Sgt Beebe: Very much so.

Luther: I'd like to discuss A-10 664. Apparently, that plane was both hit and in for repairs on several occasions.

Capt Poe: I think that aircraft got hit three times. We did three separate battle damage repairs on it.

Sgt Beebe: Aircraft 664 had originally come through KKMC with a hit to the left leading edge area.

Luther: The leading edge panel?

Sgt Beebe: Yes. There's a wrap-around panel that goes on the leading edge of the wing. What we did was perform a repair to this wrap-around panel; we also repaired some wires inside of the panel, as well as some structure to the wrap-around panel and some internal structure as well. We also repaired two hydraulic lines that had taken a hit.

Capt Idle: But all we did was speedtape the leading edge. That's all we did. We left a hole in the front spar.

Capt Poe: When we got it, we did a -3[20] repair on the leading edge, on the spar web. We fixed the wing skin, too. That plane was hit again about a week later [on or about January 28th]. And then it was hit...had most of its wing blown off a couple of weeks later [on or about February 6th]. The wing was literally destroyed--20 feet of skin gone, the leading edge gone. It looked like something had gone inside the airplane, blown up, and laid the ribs down just like trees. It took a major rib, where the wings attached, and blew it into the rib that separates the wet wing from the dry wing--what we call the close out rib. It completely cracked that, which made the center wing no longer serviceable. When that plane landed, it landed with a flat tire. And it had a Maverick missile hanging onto a pod that was barely there. It was a [question] of how we were going to get the plane off the runway.

Luther: That Maverick was armed and ready to fire?

Capt Poe: A Maverick can only be armed after it's been fired. We found out that you can fire a Maverick off an airplane into a revetment and it won't blow up.

Luther: That's very interesting. How was that ascertained!

[general laughter]

Lt Cooley: It was the "Cajuns" with the 926th [TFW]. They fired one off into a revetment for us and caused some commotion. But it didn't [explode], just the rocket motor burned. I guess the missile has to reach a certain speed before it becomes armed.

Capt Poe: It has to be in flight a certain amount of time--like a bomb that drops and spins off the fuse. It was really pretty neat. In fact, they couldn't get [the missile] out of the revetment, so they just reveted the bomb inside there and wrote "unexploded ordnance;" they told us they'd take care of it after the war.

It was not a comedy of errors like we originally thought. What it **was** was the squat switch...When the landing gear are down, and there is pressure on it, it pushes a switch that

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[20] Simply stated, -3 technical orders (for example, 1A-10A-3) govern peacetime structural repairs. The -3 T.O. requires a safety standard of 1.5 for such repairs, compared to a decreased standard of 1.0 for -39 battle damage repairs.

disengages all weapons systems. And that switch wasn't any good...The people working on the plane were surprised; they got a first-hand view of what it looks like for a Maverick to launch!

Luther: Were you all impressed by the ability of the A-10 to take punishment and continue to perform its mission? Or had you expected that?

Capt McRory: Well, as I said, having some knowledge of the history of the airplane, and being familiar with the prime item specification and the survivability features stated in there...there were a lot of things stated in black and white that said this plane could fly with half the tail gone; with one spar completely broken in half, etcetera. But that had never been tested. The only tests, as I mentioned earlier, was when some panels were removed and the plane flown in a fairly benign flight envelope--like a ferry-flight. So, to see it first-hand; to see what these old engineers [had accomplished]...In the engineering world we talk about the guys with the white shirts and the skinny black ties, who used to really know how to do it on paper. [When] they designed the airplane, they really knew what they were doing. There's a lot of experience from World War II [era] aircraft designed into the A-10; you can see that when you look at the aircraft--it has the double finned tail, the high engines, and so forth.

Luther: In appearance the A-10 rather reminds me of the German World War II dive bomber, the Stuka--the lines on both aircraft are very similar.

Capt McRory: Yeah, same with the Boeing bombers. The tail was **very** similar. It all came down to survivability. And it was gratifying to see that the A-10 actually was as rugged as advertised.

Capt Poe: Then you get the pilot to come down and you look at this plane [664]. And the wing is shot off, but the pilot acts like it was no big deal and says that [the aircraft] just yawed a little to the right. I mean he's got no leading edge! It's just like throwing your hand outside of a window and getting pushed back, and he says it yawed a little bit to the right.

Capt McRory: And you don't even know how that wing was producing lift.

Sgt Beebe: I'd say that the pilots' greatest affection for the A-10 was the redundancy of the flight control systems. They could not say enough about having backup systems that helped them return to base safely. So when they had no hydraulics, they still had systems that enabled them to get home.

Luther: The manual reversion.

Sgt Beebe: The manual reversion, yes.

Luther: No matter how much one trains, war will always bring surprises. In this context, what

strikes me as ironic is that the first major battle damage repair you confronted was not what you had trained for all those years--it was not an A-10, but an F-16. We've already touched on this [F-16 repair] but I'd like to explore it in more detail. Capt McRory, when you and Capt Hargis[21] examined the damage to that F-16 you detected a phenomenon known as hydraulic ram. Can you explain what is meant by hydraulic ram and how you went about fixing that plane?

Capt McRory: One particular damage on the left wing, I believe around wing station #140...a small projectile had entered the lower skin of the wing and left about a 3/4 inch diameter hole. But on the upper wing skin was a 14-inch long crack. We had seen this phenomenon in films of what we call live fire testing, where wet wings--by wet we mean they're filled with fuel--are mocked up in a test stand and then shot with projectiles--23mm, etcetera. What you see happen is a small entry hole and a huge exit hole, where fuel squirts out high into the air. It was sort of gratifying to see it first hand. That might not excite most people, but from an engineering standpoint it was significant to see the phenomenon first hand.

Capt Poe: In December 1990 [shortly before deployment to Saudi Arabia] we had an ABDR exercise. We designed a damage that assumed hydraulic ram was going to work. The engineers designed a hydraulic ram [scenario]--a bullet going into the A-10 and causing internal damage you couldn't see due to hydraulic ram. What that did was make the engineer think, well, I've got one entry hole and no exit hole...is there any additional damage? We made [the engineer assigned to solve the problem] go through the steps, and he found that there actually was [additional damage]. Because if you ask the right questions and ask for the right type of inspections, [you] will lead him to additional damage that needed repair. Here again, [that exercise] was all on paper--we didn't know if that was actually going to be the case. But on the A-10 it might be the case because of the fuel foam. You're not going to have the same kind of effect, but that energy's got to go somewhere.

Sgt Beebe: At KKMC, we had only one F-16 that was damaged; it was damaged to the point that the aircraft had to be disassembled for shipment back to the depot. It was a declared an IFE [in-flight emergency], and when we looked at the aircraft itself it had over 25 hits. It was disassembled and shipped. If we go back to the ABDR philosophy...when they declare an IFE, you know that you have crash damage and/or battle damage. You learn that from how the pilot briefs the ground controller on the nature of the in-flight emergency--whether he took battle damage or just has a major system that's down. And all of your ABDR and crash recovery teams are going to be part of the emergency response effort to help recover the aircraft.

Luther: Looking at the very basic repair of speedtaping a bullet hole caused by, say, small arms

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[21] Capt Stephen D. Hargis was the other ABDR engineer (in addition to Capts McRory, Poe and Idle) who deployed under Operation Desert Storm. He left McClellan for the Gulf on 18 January and returned on 10 March. Capt Hargis was stationed at the A-10 main operating location.

fire, how did you make that call--to speedtape or not to speedtape a hole in an aircraft?

Lt Cooley: It's spelled out in the -39. You just look at the amount of damage and [the -39] tells you if it needs to be taped, or if it's too large (too much damage) and you have to go to a bigger patch or to an engineer to find out what needs to be done next. It's very crystal clear.

Luther: But apparently some of the holes were not patched.

Lt Cooley: That was an engineering call.

Capt Poe: I don't think any holes went out without at least putting speedtape on them. If you don't speedtape the hole the air alone can cause additional damage. So, if we say no repair was done, many times that still includes a dress-up and a speedtape.

Lt Cooley: A lot of times when we talk about not patching we're talking about an internal thing that was left alone, like a rib that was damaged. We wouldn't patch that, but the external skin would get some sort of tape or a patch on it, just for cosmetic purposes...

Capt Poe: And to prevent additional damage from breaking up the airflow around that.

Luther: You mention internal damage. One of the challenges you faced during the Gulf war was determining the angle of ricocheted bullets--when a bullet gets inside an aircraft and knocks around--and the damage they might have caused. What kind of a challenge did that pose?

Capt Poe: It was an F-16...one of the shrapnel pieces went into the tail feathers. By following it around you could actually determine where it went. Its path was not predictable; you had to go in and find out where it hit--it nicked here, then ricocheted down and went back up. It was interesting to find that a hole in the side of the fuselage actually exited the tail feathers. The same thing basically happened to A-10 186. The entry, of course it was very obvious, was just after the engine, and it followed the fuselage back and blew up at the tail. [In A-10 268], as Lt Cooley mentioned earlier, the bullet entered the side and then went right through the middle of a control rod, nicked a few wires and went into the titanium tub. [So] when you get in there you just can't look at the surface, you've got to follow [the path of the projectile].

Capt McRory: Correct me if I'm wrong, but on A-10 664 the right wing was hit and we swapped out the left engine. Something skipped across the backbone and the left engine was actually "fodded out" [i.e., had sustained foreign object damage]...There was an impact point on the backbone of the aircraft. Stuff just goes in every direction, depending upon the attitude of the airplane.

Luther: It says here [looking at a document] that the outboard and center wing sections were removed and replaced on A-10 664.

Capt McRory: The outer right wing and the center wing.

Lt Cooley: On A-10 268 not only did it enter on the left-hand side, but we also had damage to the engine cell on the right-hand side.

Capt McRory: That's right, we did on that aircraft.

Sgt Beebe: We look at the trajectory of the object that hits the aircraft...and this is important because it is the very first inspection the assessor is going to perform. It's called a UXO [unexploded ordnance] inspection. It basically determines the entry and exit points of the projectile that has hit the aircraft; it tells you that [the projectile] may come in one area of the aircraft but may exit an entirely different area; and it may travel through numerous systems that affect multiple systems operation on the aircraft.

Luther: So your ABDR training had anticipated and prepared you for this problem.

Lt Cooley: But none of our assessors had ever really seen it before. In FTD [Field Training Detachment]...there's a jet out there into which they had actually fired some bullets and you traced the path. They go through and trace the bullet trajectory, but that's the only experience they'd ever had. So, [the Gulf war] was the first time they really had to earn their keep and trace down the bullets. It's just like [a bullet] going inside the human body--it will bounce off a bone...

Capt McRory: Especially shrapnel. It's not a nice projectile; it just tumbles, and it's going to go wherever it goes.

Sgt Beebe: It is particularly important to trace the trajectory of the shrapnel because, as it affects these multiple systems, it is particularly troublesome to the electrical system--it can become buried in the wire bundles. And you don't know that it's there until the systems fail.

Capt McRory: We had that problem with the F-16 that we fixed at King Fahd.

Luther: Some of the repairs you accomplished were routine and fell within the -39. Yet many of them--perhaps more than were anticipated during training--fell under the rubric of heavy maintenance. Roughly what percentage of repairs were routine and what percentage heavy maintenance?

Capt Poe: I think every one of the major airplanes [on which we worked] had its share of BDR repairs and of standard repairs. For example, the A-10 that had some 380 holes in it [A-10 S/N 77-255]--we replaced the right outboard wing panel. That eliminated about two thirds of the holes, but there were still another 100 holes in that airplane that had to be addressed. So, it was a combination [of BDR and standard repairs]--except for A-10 664, which was almost totally

heavy maintenance. We replaced the center wing and outboard wing panel and the pods [on that aircraft], which is all heavy maintenance.

Sgt Beebe: As these aircraft came into the de-arm area, one of the things we learned (in addition to doing the crash damage, the heavy maintenance and the battle damage [repair]), was that we had one particular aircraft that came into the de-arm area and could not stop. That can be attributed to the multiple missions the aircraft were flying and that the brake systems themselves were worn out. But you wouldn't find out until the aircraft wouldn't stop if the inspections weren't performed. So we did do some brake changes on aircraft as a result of that.

Luther: How does one distinquish between a routine repair and heavy maintenance? They overlap, do they not?

Sgt Beebe: How long [the repair] takes.

Capt Idle: How long it takes; the severity of damage.

Lt Cooley: When you start dealing with a lot of removal and replace you're starting to get into heavy maintenance, as opposed to battle damage. Battle damage [repair] is designed to patch and to speedtape--[its] a quick fix. When we start taking off wing sections we are definitely into heavy maintenance.

Capt Poe: But sometimes it is actually quicker to replace a vertical than to do a major repair on it; if you have a vertical available, it would be better to do a swap, and, as time permits, repair the [damaged] one.

Luther: One of the things we were doing here at the McClellan in support of Desert Storm was surging the repair and production of spare parts to keep the aircraft mission capable. How well supplied were you at the main operating base with spare parts so you could make these replacements?

Capt McRory: Not anticipating the damages we saw, we didn't have the large parts on hand. There were a lot of mission capable requests [MICAPs] out there for smaller items--line replaceable units [LRUs]. So, there was a different perspective. When you are at war...you need the part now. The depot will turn something around in a phenomenal amount of time [by peacetime standards]--a matter of days--but when you've got a broken plane it seems like forever. And the DCM doesn't understand why he doesn't have the part the day after he requests it.

Capt Poe: There was a large WRSK [war readiness spares kit] kit in Europe; before I left [for the Gulf], I went through the inventory of that kit by part numbers. Yet when we got in-theater we found that, although we had the kits, the parts had not been maintained; the kits had been

robbed from to maintain the wings in Europe. The parts just weren't there. That was rather a rude awakening. I had kind of assumed that all the stuff was there...I'm talking about major structural components.

Lt Cooley: Wings...

Sgt Beebe: Rudders, elevators and flight control components.

Capt Poe: We're not talking about parts like actuators. We didn't seem to have a big problem with...

Capt McRory: Well, even at that level there were problems. What we found out as we ordered parts--or attempted to order parts--was that you could go to the supply person on base and they would spit out their lists with order numbers. Then we would call back to the depot [McClellan] and talk to our supply people and they'd have a completely different list--the [lists] weren't even close. So, somewhere between the front and the rear there was a huge disconnect. They were singing from two different song sheets throughout the war--what was communicated back to McClellan wasn't necessarily the requirement.

Luther: We've already touched on this topic several times but I'd like to go back to it because it intrigues me. In early February A-10 255 landed at FOL 2 with over 380 holes in it. Apparently, an ABDR team was dispatched from the main operating base to help ready the aircraft for a one-time flight back to the MOB. How do you repair an aircraft with some 380 holes in it? Secondly, is the A-10 the only aircraft that can sustain such punishment and return to base?

Capt Poe: I think the A-10 is the only **fighter** aircraft that could take that kind of punishment. I believe a B-52 or a larger tanker might be able to handle [such damage], but it would have a lot of fuel leaks. Did we have a fuel leak on that A-10?

Lt Cooley: Yeah, we did.

Capt Poe: One little [leak] that went through the plastic panel?

Lt Cooley: That's right. When we sent the team out we had fuel experts, structures and APG, and they did cap off the fuel...As far as the structural damage--there were a lot of holes but they were spread out enough across the entire aircraft.

Capt Poe: There was no engineer dispersed on this...What we did was...I got SMSgt Johnson[22] on the phone and we broke the wing into sections; he told me how many holes there were in [a particular] section and how large they were, and I turned them into one hole and determined how much of the area was gone. And this was just to fly the airplane back--we aren't talking fully mission capable. Then we went through some of the Category 5 damage--damage that would ground the airplane immediately.

Here again, you here over the phone that the plane has 383 holes in it and you think to yourself, "Why am I even going out and looking at it." But after talking with him, you found out that there were very few major systems damaged. [But the plane] was just a mess--you could see light.

Lt Cooley: Swiss cheese!

Capt Poe: When you stood underneath the wing you could look up and see the sun.

Luther: It was sprayed by anti-aircraft fire?

Capt Poe: Yeah. It was pretty much...

Capt McRory: We have several cases of aircraft with damage that were still flying. It was a common sense call. There was always the concern that, although the plane had made it back to the base, it was [about to break], and if the pilot took off again something **was** going to break. That was the main concern. You kind of look for those things up front; if you didn't find anything it made you feel a lot better--you knew the plane would probably make it back on a ferry flight.

Capt Poe: That's exactly the point. It's hard to go to someone and tell him the plane can't fly anymore, and the pilot says, "Well, I flew it in. And I wasn't flying on a ferry flight coming back."

Luther: Did the -39 prepare you to deal with an aircraft with 383 holes in it?

[laughter]

Capt Poe: No.

Sgt Beebe: I'd have to say that the pilots, in all instances where they had major damage, were still willing to fly the aircraft if we told them it was ready to go--holes or no holes. They would

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[22] SMSgt Henry M. Johnson III (2951st CLSS) was team chief of the 14-man ABDR team that readied A-10 255 for its one-time flight from FOL 2 back to King Fahd International Airport. Sgt Johnson served in the Gulf from mid-January until his return to McClellan on 11 March.

take it with limited systems; they would take it with temporary repairs...They were anxious to get back in the planes and fly. If we told them it was good they took our word.

Luther: So, the pilots had faith in you and in their machines.

Sgt Beebe: [They had faith in] both.

Lt Cooley: ...There were a lot of holes [in A-10 255] but they didn't cause a lot of problems.

Capt Poe: Whatever happened must have been right underneath the right wing, because that had holes you could see that went from the bottom up to the top. If that wing would have been wet [i.e., loaded with fuel], the plane would have blown up. If that had been an F-16...

Lt Cooley: Or an F-4, it would have been a smokin' hole.

Capt Poe: Yeah.

Sgt Beebe: If we could discuss aircraft 664 for just one more minute. Part of the reassembly effort to put A-10 664 back together did come back to KKMC. That was due to aircraft [A-10 S/N 79-181], which had crashed. As [the ABDR teams at King Fahd] started to put 664 back together, they lacked numerous parts. We had to run a save list on A-10 181 to save everything that was serviceable or useable before that aircraft was condemned, [demilitarized] and buried. In doing so we learned a number of lessons about the wire bundles themselves. And we did end up taking a very, very large group of wire harnesses off the right wing of aircraft 181 to help put 664 back together.

Luther: What were those lessons?

Sgt Beebe: As we looked at the wire [bundles], we had to make sure they would in fact support the weapon stations--the pylons on the aircraft. There was an AIM-9 modification[23] that had a wire bundle that ran from approximately Panel F-16 all the way down the right side of the pylon--the main landing gear pod. And that wire bundle was completely destroyed on aircraft 664. In doing their assessment our electricians said, "We don't need a wire, we need everything that goes in that landing gear pod." So, it wasn't just electrical strictly--it was hydraulics, it was pitot-static systems; it was everything that goes into those pod areas and the leading edge

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[23] In recent years A-10 aircraft have been modified to carry and launch the AIM-9L Sidewinder missile, providing the weapon system with a long-overdue air-to-air defensive capability. However, because U.S. and coalition forces enjoyed total command of the air, only one AIM-9 was fired by A-10 aircraft during the Gulf War. See Brfg, 354 TFW(P)/DO/MA, Operation Desert Storm A-10 Combat Recap, n.d. (Note: In this document two Sidewinder launchings are erroneously credited to the 23d Tactical Air Support Squadron [602d TACW], which actually fired none of the missiles).

of the wing. What we did (as they told us their requirements) was go out to aircraft 181, take everything off that we could get off, and put it on a truck to send it back to the main operating base to put that other aircraft back together. On aircraft 181 we did take some horizontal stabilizer bolts--mount bolts--off to help put A-10 540 back together.

Capt Poe: When [our ABDR technicians] took the pods off...they went through there and [found] some misaligned holes, but we knew that was coming...The A-10 is a mix and match airplane. But when you take something that has been riveted on to [one A-10], it's not going to fit [another A-10]. A horizontal, a vertical, a wing--the major structures are all going to fit. But a pod--a pod is drilled to fit. And now you're taking something that was drilled to fit one airplane and saying, "Well, most of the holes line up but not all of them."

Luther: It's drilled to fit a particular A-10?

Lt Cooley: Yes. You can't easily take a major construction part off of an A-10 and put it on another A-10. Each one is individual and unique.

Capt Poe: And yet [our technicians] were able to do that **twice**.

Sgt Beebe: So, as they did the wing change on aircraft 664, and got that finished, they also had to put a brand new landing gear pod on the aircraft, because it was destroyed as well. And they needed parts to put that landing gear pod together.

Luther: In several documents I have come across it is estimated that the repairs you did in the Gulf saved approximately 200 - 300 sorties. How does one make such an estimate?

Capt Idle: Who said that?

Capt Poe: Who's report was it in?

Luther: I've seen it in several, actually.

Capt Poe: We're looking for that information right now...It's something that can be quantified--all of the sorties these airplanes were able to go back and do [following repair work on them]. Plus, when you look at even the [minor] damage that we fixed...by being able to go out to the ICTs [Integrated Combat Teams] and fix damage, as opposed to shutting the plane down, pulling panels off...Right now, Capt Idle is in the process of compiling a serious figure that can be justified on how many sorties we saved. I don't think the [200 - 300 sortie figure] is out of the ballpark, but I don't know where that figure came from. It also puts a dollar amount on the value of a CLSS team.

Capt McRory: Just saving the four aircraft [that suffered extensive damage]--we figure on today's market that's about $40,000,000 worth of aircraft.

Lt Cooley: If we'd have taken some of those flaps off that we just speedtaped, it would have taken additional days; those airplanes would not have been able to fly. There would have been a much greater impact.

Capt Idle: What about all of those holes in the horizontal stabs that were speedtaped...

Lt Cooley: And the pods-- some of those pylons that were damaged that we fixed.

Capt Poe: All of the bases that [participated in Desert Storm] are now getting back to us on how much damage they are repairing as a result of damage suffered during the war. The sheet metal people are keeping records of everything they do. In other words, if they pull off a piece of speedtape and do a -3 repair, they are annotating that. That's all going to come back [to us] and be compiled; from that, we should be able to get a very precise number and a value of what a CLSS team is worth. Maybe we will be able to equate that to what it's going to cost to keep us trained--and this is what we will bring you in a Desert Storm-type scenario.

Sgt Beebe: That will have two results. It's going to save you resources in the ABDR war wagon kit as far as what you can repair, so it conserves those resources. It also saves on your WRSK kits, which you don't use because you only have a limited number. Again, we don't have a dollar value on how many WRSK kit items that we saved for additional aircraft.

Lt Cooley: It also saves on your airlift, when you don't have to request that additional parts be sent to you.

Luther: So what you're saying is that you earn your keep.

Sgt Beebe: Yes, and while you're saving all of those assets; when you have, say, a crashed aircraft that becomes your "cannon ball" aircraft [from which parts are cannibalized]--that becomes your forward supply point to help service other aircraft. That also has to be included in the equation of the savings. If you lose an aircraft that becomes a Category 5 aircraft, you take everything useable off of it to support other planes.

Luther: Speaking of earning your keep, do you feel that the aircraft maintenance units and the DCMs in the operational world now have a greater appreciation for what you can do for them than prior to Desert Storm?

Capt McRory: Absolutely.

Lt Cooley: I know that the 23d and the 354th do. But I can't speak for the rest of the units.

We were pretty unique as far as the amount of damage we [repaired]. But definitely the A-10 world knows the value of the CLSS.

Luther: Unique throughout the Air Force?

Lt Cooley: Yeah, the rest of the [USAF] weapon systems didn't see the battle damage that the A-10 saw. The B-52s had about two; the F-16s--we took care of most of their work, so their guys didn't do much. [to Capt McRory:] Did you get more [input] from the conference?

Capt McRory: The general comments at the Lessons Learned ABDR Conference (June 24 - 26 at Wright-Patterson AFB) were that all of the units there were real happy to see CLSS show up. From the users' standpoint they were always happy, in the first place, just to have extra bodies. And then when they learned what capabilities the CLSS brought with them, they were really happy to see us and hope we come to the next war! They even were courteous enough to include the engineers in those comments.

Luther: I'd like to explore in more detail some of the obstacles you faced in performing your work. In this context, it seems that the working relationship between CLSS personnel and the engineers was sometimes tense. I've read the lessons learned, and, from the engineers' perspective, there was the feeling that the CLSS was not aware of and did not fully exploit the engineers' capabilities. Conversely, the CLSS personnel often felt that the A-10 engineers were interfering with the work the CLSS was trying to get done. Clearly, there is a wide chasm between those two perspectives. Let's discuss that.

[general laughter]

Sgt Beebe: From the FOL perspective, I believe we had a unique opportunity to have just one engineer and one ABDR team; they were able to establish a situation where we could get the work done and consult the engineer, who was also busy helping us in the arm and de-arm area to recover aircraft. We basically made him a technician when we didn't require his engineering expertise. That worked out very well. Again, when we determined how we were going to get the repairs done on the major damages, we went to the engineer and said, "Ok, here's what our people have designed, will it work?" And Capt Idle could [consult] with my assessor, Sgt Gaines,[24] and say, "Here's the engineering data based on the damage;" and the assessor could say, "Here's what I think will work, do you think it's structurally sound." You look at the 1.0 safety margin and decide if it will work.

I think [as far as the major damages were concerned] we didn't have a problem at all; there was a harmonious working relationship in that particular arena. The problem was that we lacked the organizational unity to specify just how the engineers integrate with the CLSS teams.

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[24] MSgt Allan W. Gaines (2951st CLSS) served at FOL 1 as an A-10 battle damage repair assessor and night shift supervisor.

What do we do? Do we put the engineers at one central location and draw them in as we need them? Or do we deploy them with the teams? In this particular conflict we [took the latter approach]. In another conflict it may happen entirely differently. But we have not written it down as to how it's supposed to happen.

Luther: In other words, it had not been determined befor the war how the engineers would be integrated into the CLSS activity?

Sgt Beebe: No, it had not. We operate primarily from UTCs, which are the teams. And an engineer deploys with each team--each A-10 team or [with the team] from any other weapon system you support. So you have three separate UTCs that go as one unit to [a given] destination, and they work as an entire team to perform the requisite repairs.

Capt Poe: I think one of the critical points Sgt Beebe hit on is the team. They had one team [at the FOL] that **worked** as a team. Before the other teams arrived at King Fahd, we had one team that **worked** as one team. Then you threw in two more teams at King Fahd, and there was a conflict between the CLSS and the engineers about who's in charge and who's doing what? I don't think there was a clear [chain of command], and I've noted in my diary when things just finally came to a head. That was something that shouldn't have been in question; it should have been agreed upon that, hey, you're a captain [but] you're not in charge [of CLSS personnel], and we don't want to hear that the DCM has put you in charge.

Luther: But apparently the DCM did think the engineers were in charge, did he not?

Capt Poe: When we first started the question never came up. It's assumed by most people when a captain is deployed on a team as a team member that he's in charge. And before the other teams got there, it wasn't even brought up. I was in the loop; there was no getting me out of that loop. But the [team] chief made all of the decisions concerning the [team]. We had no problem. But when you threw in two more captains, another lieutenant and three more senior master sergeants--there were just too many people...There is a problem between the engineers and the CLSS. And that's something that...man, it's a big rock and every year we chip a little more away from it.

Luther: What is the problem?

Capt Idle: Most of it involves misunderstandings--the fact that [the engineers and CLSS] had never trained hard together. The CLSS never got the opportunity to learn what our capabilities are; what we can give to the CLSS [in terms of] experience, our knowledge of the airframe, and so forth. We don't have the opportunity to work with them, so we don't know how their organization is set up; we don't know how they work or what their particular functions are. It's like throwing apples and oranges together and saying, "Ok, work well together." It's going to take time.

Lt Cooley: [Looking again at the problem created by multiple teams]--prior to my team's arrival at King Fahd, we had never practiced with multiple teams. When we do a hard stand exercise, one team goes out and fixes the airplane; when they are done, that's it. We had never set multiple teams out [on an exercise]. We were geared toward a war in the European theater. You'd send three UTCs out to a single location, just like Capt Idle and Sgt Beebe at the FOL.

Luther: In other words, you'd send one team to a location.

Lt Cooley: One engineer, one team. At this point it opened our eyes to something. Since we'd never really practiced with a given engineer, the engineers never really got to be a part of the team. Now in Capt Poe's case, he had worked with Chief Jefferson a lot; they did many exercises together and had built some team unity. [Conversely], Capt McRory and I had never been out on any exercises before. I don't think Capt Idle or Sgt Beebe had either.

Luther: Chief Jefferson had commanded the CLSS teams in the Gulf prior to your arrival.

Lt Cooley: That's right. Before I arrived.

Capt Poe: I don't know of any problems at all that Chief Jefferson and I had prior to the arrival of the second CLSS team. When the second and third team arrived there was so much turmoil that I can't even remember what happened.

Luther: So the problem arose when you interjected multiple teams into a single location?

Capt Poe: Yeah, I think that's the key.

Lt Cooley: Another problem was that they wanted another team, because the mission needed two teams to get the job done. Chief Jefferson and I were both ready for that. But for some reason they sent a third team that we really didn't need; and we had to deal with that and make it work. That caused some conflict, because the [third team] didn't feel wanted; they didn't feel they were needed, and that caused some disunity. We no longer had the teamwork; we had to go through the process of rebuilding teams again. But we got over that; by the time the war was over we had [overcome the problem].

Capt Poe: We had a ninety-plus man team, with three captains, a lieutenant, a chief and three senior master sergeants.

Luther: Do you feel that in the future multiple teams should train together?

Lt Cooley: We should at least go to our team chiefs and let them know how to handle it; [let them know] what's going to happen. We need to provide a united Sacramento front to the DCMs and we weren't doing that up front. It took us a while to reach that point.

Capt Poe: It needs to be discussed--the definite chain of command when a second team arrives [and] how the two teams will integrate.

Luther: Sgt Beebe, you wanted to discuss the relationship between the CLSS assessors, the team chiefs and the engineers.

Sgt Beebe: What I'd like to do is just outline the -39 requirements as you look at the AFTO Form 97, which is your ABDR repair sheet. The assessor formulates the repair for each damage and tells the technicians how they are going to accomplish the repair. On the back of the Form 97, you have a release for each repair that's completed; after all the damage has been repaired, the team chief reviews the repairs. The engineer is the approving authority who says the aircraft is airworthy, if you require engineering instruction. That's primarily how the engineer is used until you get into the crash damage area, which is entirely separate. Down at the bottom of the Form 97 it will be either the assessor or the team chief who releases the aircraft for flight from the battle damage repair.

We were also able to use our engineer because we were introduced to the [issue of] crash damaged aircraft, which could not be released from the active inventory until the engineer prepared the instruction [stating] it was not economically feasible to repair the crash damaged aircraft. He had to formulate a statement and put it on the back of the Form 97 saying that the aircraft was damaged beyond repair; he had to get this back to the A-10 system program manager and say, "Delete this aircraft; it's attrited due to the war."

Luther: But one of the points made here was that, at FOL 1, the CLSS had no problems working with the engineer.

Sgt Beebe: We did work together. The engineer would provide the engineering expertise for both the crash damage and the battle damage repairs. We also used him in a number of capacities in the arm, de-arm areas, because he was a part of our team.

Luther: Capt Von Hawley, the Chief of Maintenance for the 2951st CLSS, asserted in one of his lessons learned that "engineers frequently interfered with the managing of the teams." How did that perception arise?

Sgt Beebe: When one leaves McClellan through the mobility line, the engineers become the troop commanders by virtue of rank. That's understood. The engineers get the teams together, put them on the plane and get them to the final destination. After the team reaches its destination, control of the team reverts to the CLSS team chief. The problem [concerning management of the teams] was that the DCMs did not understand how our teams are set up. The DCM is going to look at the collars of each person, find the highest ranking person, and, by virtue of rank, put him in charge of the team. So, I think that's how it got started.

Capt McRory: Even in peacetime [the engineers and CLSS] live in two different worlds; we

operate completely differently. So there are misconceptions on both sides. Sometimes when an engineer offers his opinion, a CLSS person may interpret that as the engineer meddling in his business. Many times we are just trying to add our expertise. The CLSS may not understand that we have the expertise to help them out in a certain situation, and that's why we're suggesting they do something in a certain manner. It comes down to personalities in many cases.

Luther: I don't remember the precise context, but there was one instance when an A-10 was grounded because you lacked a piece of equipment to remove part of the wing. As a result, one of the engineers--it might have been you, Capt McRory--went to the CLSS technicians and said he could design equipment to do that, but the CLSS wanted to wait on a piece of equipment to come in from the states, which would have grounded the aircraft for weeks. Is the issue here that the CLSS just didn't understand what the engineers capabilities were?

Capt McRory: Probably. We hadn't worked enough side-by-side with the CLSS. Capt Poe has been working structures forever, while Capt Idle has worked F-15s and I've worked heavy maintenance in civilian life, so I'm very familiar with rigging. But if you don't work with a person day-to-day, you won't know what his skills are; you don't have the interrelationship that you need.

Lt Cooley: My feelings on that [grounded aircraft] is that I wasn't getting a lot of pressure from the DCM to fix it that quickly. I had the responsibility for the lives of those people and I didn't want to risk it with a makeshift system, regardless of how strong Capt McRory felt it was going to be. I knew that the proper equipment was coming--I'd talked to the transportation people and to CENTAF--and that the repair could be done by a T.O. We could have deviated from the T.O. but I didn't feel it was worth the risk. It was my call.

Capt McRory: We have no problem with that, but what I'm trying to establish is that, in future conflicts, we can bring a lot of capability if we get stuck. And Lt Cooley is correct, we had all the time in the world to play with that wing.

Capt Idle: We make the recommendations, but [the CLSS] doesn't necessarily have to follow them; it's their call.

Capt McRory: Lt Cooley made the final call and that was it; we went along with it. He said, "No, I don't want to do it that way;" and we said, "fine."

Luther: So, the CLSS doesn't have to follow the recommendations of the engineers.

Lt Cooley: We have two choices. We follow the technical data, or we can listen to the engineer, because they have the SPM [system program manager] authority to deviate. Those are our only options.

Capt Idle: [The engineers] have the ultimate responsibility to ensure the aircraft is airworthy and safe. [Lt Cooley] has the ultimate responsibility to ensure that the repairs and procedures are followed; but, like he said, he's also got responsibility for his people. So he's got to weigh one against the other. If there was a big time crunch perhaps he would have had to do what Capt McRory recommended...

Capt McRory: We had all the time in the world.

Capt Idle: It's all judgement calls. But the more we work together, the better the CLSS will understand what we can offer them.

Luther: One of the themes emerging from our discussion is that of the overcompartmentalization and lack of teamwork and integration as far as training is concerned--and that pertains not only to ABDR training on aircraft, where you generally trained on relatively small, specific types of damage that didn't prepare you for the extensive battle damage you faced during the war, but to engineers not training with the CLSS and the CLSS not training with the operational commands. It seems that in all these areas there needs to be more integration and teamwork.

Lt Cooley: The bottom line is money. We only have so many aircraft to train on, so we can't destroy them all for the sake of realistic training. And because there's not enough TDY funding, we can't go as a unit with the engineers to major command exercises and perform actual battle damage repair simulations and work with the host units we would support in wartime. If we had unlimited funds...

Capt McRory: Even if [we had unlimited funds] wars continually prove that you cannot plan for every contingency; there's always that learning curve and the team building exercise Lt Cooley has talked about. We went through that, and we reached a point where we were functioning as a well-oiled machine, but the war was over.

Luther: Addressing the equipment issue, I'd like to discuss the CLSS ABDR kits with which you deployed. Apparently, the size and weight of these kits were restricted by CRAF [Civilian Reserve Air Fleet] requirements. Capt McRory, I believe it was you who maintained that these kits were a "joke"--that they were not used and that the war wagons from Alconbury were used almost exclusively in their place. What was wrong with the CLSS kits and why were the Alconbury kits better? Secondly, what needs to be done to ensure that, next time, you deploy with the equipment you need?

Lt Cooley: Well the [CLSS] kits contain fasteners, hardware and materials. What they lack that the war wagons give you are power supplies, tools, electrical sources, lighting--everything it takes to do the job. However AFLC came up with the concept, the CLSS kit was just designed to go in and steal other resources from the host units in order to perform our mission. [But the host units] don't bring additional air sources and light sources to support us--they expect us to

show up and be able to do our job. That's why we need to go to the war wagon style where you have everything...

Capt Poe: Aren't the [CLSS] kits made for landing on a runway that has nothing but a runway--no buildings or anything. Because there are non-power tools in the kits. So, weren't the kits designed to just have a C-130 drop you off with your kit and fix the damage with minimal ground support equipment?

Lt Cooley: You can do that [in cases of] minimal damage, but you are still relying upon the host unit to provide you with air sources and light sources and...

Capt Poe: No air, no light...that's what my understanding of the CLSS kit was. It was just bare base to go in and set up your own little shop.

Capt McRory: When I said the [CLSS kits] were a joke, I meant they were a joke for our situation in the Gulf; they were totally inadequate for the damage we were getting.

Luther: But the kits were in line with the original ABDR philosophy of going to a bare base--an FOL type--operation.

Sgt Beebe: Yes, and that's predicated on perhaps a 1982 requirement that got updated with kit updates; yet they never redid how the kits were put together--they never released us from the CRAF requirement. AFLC was still saddled with that. On the other hand, USAFE was not saddled with that requirement, and that's why they were able to use their kits as rolling stock, put them on a plane, and send them to the AOR...It was a painful lesson for us. With the war wagons we had the accessibility and the speed with which to accomplish the repairs and actually get the planes back in commission sooner. Had we relied solely on the CLSS kits...

Lt Cooley: We'd still be there trying to fix those airplanes.

Sgt Beebe: [The repairs] would have been done, but not in an economical or feasible way.

Luther: Did other units in addition to the 10th Tactical Fighter Wing deploy with the war wagons?

Lt Cooley: The 23d and the 354th Tactical Fighter Wings brought war wagons as well.

Capt Poe: But the war wagons from Alconbury were "Cadillacs." They were designed by a CLSS individual who had his restraints removed and was able to put together a war wagon...These people know what needs go in the kits, that's no secret. But they are restrained by regulations.

Sgt Beebe: I guess the beauty of it is that Europe was responsible for the area to which we deployed...That's why Alconbury supported it with their equipment--it was their responsibility to support that geographic area. Again, if you take away the [restrictions] from AFLC, they could very much mirror [the Alconbury war wagons]. What we have to do is to say "If you take away the restrictions and give us the money we need to build the kits, we'll build them."

Luther: So what you need are kits that will provide you with **all** the equipment and power sources you need to become autonomous--that is, independent of others for the resources you need.

Lt Cooley: That's right.

Sgt Beebe: Yes, absolutely. And we can do that. Now all we have to do is to convince AFLC that our kits need to be rolling stock rather than fit a CRAF requirement.

Luther: I assume this issue has been briefed to Headquarters AFLC?

Capt McRory: Yes. It has gone to the deputy chief of staff at Headquarters AFLC; it was also continuously discussed at the ABDR conference. There are many different philosophies out there. During the conference it seemed to come to a head that TAC [Tactical Air Command] in particular was going to recommend that the user supply these kits so we can eliminate the airlift requirement for AFLC--and so the kits would be there when we showed up. That sounds good--like many of the other theories that weren't tested in ABDR. But I think the [best solution] would be for the CLSS to control their own assets, so when they deploy they have what they need and it's not stuck in a port somewhere.

Lt Cooley: And we'd also know it was there...We saw the kits from England AFB, Myrtle Beach, Davis-Monthan and Alconbury--they all had somewhat similar kits but they were all different. You don't need to go through those learning curves. If we have to hit the ground and A-10s are coming down damaged, we don't want to have to find out where everything is and what's not there. We should know that. Our guys should just be able to open [a kit] and go to work.

Capt Poe: The kits did lack a couple of things--and that's the RAM aspect, the heavy maintenance...

Lt Cooley: The slings.

Luther: By RAM, you are referring to the Rapid Area Maintenance teams that performed aircraft battle damage repair during the Vietnam War.

Capt Poe: Yeah, we didn't have the heavy maintenance [equipment]. And here again, I believe

both AMUs said that they brought it with them, but neither one of them had it.

Luther: You anticipated my next question--that the kits have to be configured for the heavy maintenance mission as well.

Sgt Beebe: Yes, that's why we need to change our mission statement to incorporate heavy maintenance and crash damage.

Luther: Another problem area--and this goes all the way back to the initial deployment in August 1990--is that AFLC personnel were not integrated into the deployment plans of the operational units [the fighter wings]. What can be done to ensure that CLSS, the engineers, and so forth, are fully integrated into such deployment plans, so the problems you encountered with billeting, transportation, equipment, and so forth, are laid to rest?

Sgt Beebe: All the Plans and Programs entities at the MAJCOMs need to get together and discuss the plans and programs for how each [unit] will integrate with the other to support the mission requirement.

Capt McRory: And once that's put down on paper, it needs to be funnelled down to the units for review to make sure things make sense and that they can support the plans.

Sgt Beebe: Then you will get the people, the equipment and the materiel to the proper places. We will also be able to plan our training to ensure that we meet all the [criteria].

Luther: According to Capt Hawley's lessons learned list, on a number of occasions time and energy were lost because your contacts at CENTAF Forward in Riyadh lacked specific knowledge of the A-10 weapon system. As a result, the CLSS managers sometimes had a difficult time communicating their needs to these CENTAF contacts. What was the problem?

Lt Cooley: [The problem was] that we were talking to morons, idiots! These people didn't know the A-10. So when we called and said we needed equipment, or parts, or anything to support the aircraft, they would question whether we really needed that. Well, we would not call them if we didn't need it. That wasted a lot of time; we spent days arguing back and forth with CENTAF [forward] before they would go to CENTAF rearward or USAFE and say, "Send us a center wing, or send us the equipment to change a center wing, because we don't have it here." If there had been someone there who knew the A-10, he would have understood that we needed those parts to do the work.

Sgt Beebe: I think perhaps some of the people on the staff at CENTAF may have been logisticians rather than maintenance people familiar with the operations we were conducting.

Capt McRory: Again, you're going to run into that in every war; you're going to have staff

personnel who have never been anywhere else but in an office.

Luther: To close our discussion of lessons learned, I'd like each of you to describe your most meaningful lesson learned or insight during Operation Desert Storm. Let's begin with Lt Cooley.

Lt Cooley: I would say we had a lot more capability than any of us had thought. And if we had been more aware of what each of our capabilities were, we probably could have done even more. So, perhaps we need to practice better.

Capt McRory: I'll [second] that. In the briefings we've done since the war, it keeps coming back to team building--over and over again. Just good communication and good relationships among all the players--the users, the CLSS folks, the engineers...even headquarters.

Capt Idle: I learned that a lot of the younger guys at our FOL--the two-stripers and three-stripers who didn't know much about the systems or the structures--were really eager to learn. They were constantly asking questions and looking to the senior ranking guys. I myself learned a lot from the team guys; I often conversed with the assessors--Sgt Gaines, Sgt Finlon.[25] That opened my eyes to what they really could do--whether it was coming up with innovative sheet metal repairs, hydraulic fixes, looking at the systems.

Luther: So you gained a better appreciation for the CLSS guys.

Capt Idle: From the maintenance side. They taught me how to crew-chief F-16s. [They] taught me a lot of things I normally would have never done, like working in the de-arm area. They refreshed me on assessing and on forms. At the same time, I had an opportunity to teach them something about structures and how loads are applied. It was just a good educational experience for all of us.

Capt Poe: Touching on what Lt Cooley and Capt McRory said, ABDR is not to be taken lightly. When we went out and trained, many of us had the attitude that [a war] was never going to happen. So why am I wearing this chem suit? Who cares. For the guys with [Desert Storm] experience, I don't think [that kind of an attitude] will be a problem in the future; but there will continue to be a problem with new people coming in and saying, "We're never going to really have to do this." Last year at this time I don't think any one of us would have believed [we would have gone through what we did].

Luther: I suppose it's human nature for one to believe it's never going to happen to him.

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[25] Sgt Emmett R. Finlon (2951st CLSS) served as an A-10 battle damage repair assessor and shift supervisor at FOL 1.

Sgt Beebe: I think we have a half million witnesses who deployed for [Operation Desert Storm] who can definitely tell you they would place their absolute faith in their chemical gear; they understand how it works.

I'd also like to mention my night shift supervisor, MSgt Aguon.[26] He introduced us to [our first experience with] a crash damaged aircraft. That involved an aircraft looking for a runway the pilot couldn't find because he was low on fuel. So our first introduction--aside from the battle damage--was an aircraft running out of fuel, and you have to go out and pick up the pieces. That is how we got introduced to crash damage at the FOL; and you're going to have more of that when you're just gas, bombs and bullets and pilots can't find the runway; you're going to have near misses and safety will be the most important aspect of your operation. Again, you have to rely on your people, because you're asking for their imagination and creativity to accomplish the repairs that are not outlined in the textbook; you're asking them to go above and beyond. And it's not through absolute muscle that you get their cooperation in performing the mission--you have to cultivate their trust to bring out the best in their ability.

Luther: I'd like to ask you about one tragic occurrence at FOL 1. I believe it was the 27th of February when a badly damaged A-10 [S/N 79-197] coming in on manual reversion misjudged its approach. The plane hit the ground short of the runway, cartwheeled, and the pilot was killed.

Capt Idle: He didn't misjudge his approach. He just landed short; all he had was engines.

Sgt Beebe: He thought he had pitch control, but he did not. He hit on one [landing] gear first and sheared it--that landing gear ended up approximatley a mile from the impact site. After he sheared the gear he went forward and ended up turning over completely. And for an entire maintenance operation to witness that...that's really what you bring home and hope you never see again. We were mortified by that. When the pilot gets in the plane he knows the risk; and those who work on the flight line to maintain the aircraft are exposed to that risk. But you also have personnel at the support facilities at the other end; maybe they're off-shift, but they're still exposed to the same risk if the plane doesn't land near the runway and drops its tanks two tents away from the mess tent. So everyone in the area is exposed to the same elements anywhere you have aircraft maintenance and flying operations. When you can't get the airplane to its proper area everyone is at risk. Even when you can confine the aircraft [to its proper area], and you have a declared in-flight emergency, every maintenance person available is going to come down to the flight line. They're all waiting to respond to that aircraft; to find out what they can do. And the base commander, the fire department, the weapons technician, the fire rescue team that's trying to get the pilot out of the plane--each one of those people has a vital part in recovering the aircraft. So anytime you have an IFE, every maintenance and weapons operation on the base ceases until that emergency has [been resolved].

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[26] MSgt Juan A. Aguon (2951st CLSS) served at FOL 1 as a sheetmetal assessor and night shift supervisor. He retired from the Air Force in August 1991.

Luther: And the pilot--seeing him killed must make the stark reality of war really hit home.

Sgt Beebe: It's graphic. And to compound the tragedy you have people who make stupid mistakes and stupid decisions--people who say, "I need a maintenance team to come out here and help recover some of [the aircraft]." And you look at the aircraft and can see that rounds are still going off. To further compound the error, the person making these decisions was too close to the runway and actually got hit by a piece of the aircraft--his vehicle got hit. And his colonel is asking him, "What were you doing that close to a flying aircraft?" That was in direct violation of [both] flying regulations and ground operations; in fact, it violated everything we learned in the maintenance arena, period.

Luther: Capt Idle, do you have anything to add?

Capt Idle: It was the airfield manager. He wanted a better look. He heard the IFE on his radio and wanted to get a better look. So he drives out to the end of the runway and parked his truck in what he believed to be a safe spot. He's sitting in his nice little truck and wants to watch the airplane come in!

Luther: Are you saying he was "rubber-necking?"

Sgt Beebe: Yes.

Capt Idle: Yeah, and he got hit.

Sgt Beebe: These IFEs are so important to us that we actually evacuated the end-of-runway crew [i.e., the arm crew], because they were too close. You have an aircraft coming in and it's loaded. And when you know or suspect that the aircraft will land short, you have to evacuate everything in the path of that aircraft. It's a moving object. As I said, both the pilots and the maintenance personnel are cognizant of the risks involved in air operations. And you just accept those risks.

Luther: My next question concerns the support you received from here at McClellan. In this context, how frequent was the engineers' contact with the A-10 SPM office and what kind of support did it provide you? As a follow-up, what needs to be done (if anything) to improve that support?

Capt McRory: Well, Capt Poe initiated contact [with McClellan] as soon as he got in-country. We probably talked with our engineering branch two or three times per week on the average.

Capt Poe: Yeah, we had set times that we would call...

Capt McRory: There was some frustration, because we were trying to relate problems--real-time

flight-line problems, wartime problems--back to folks who were not in that mind set. But overall, [McClellan] was extremely supportive. We have to make sure that that channel of communication remains open in the future. We're always going to need that communication link to talk with experts on everything conceivable about an airplane. You just run into a myriad of problems.

Luther: Can either of you think of any cases where engineering or other support from McClellan proved critical?

Capt Poe: The center wing. We called [McClellan]...and, here again, we were asked to let the system pretty much work itself. I think we all knew there was no center wing in the inventory. The CLSS knew that and we knew that. So we got back to our people and they asked, "Ok, where are our static displays?" They went through the list and we got a center wing--an asset that didn't exist--relatively quickly.

Luther: In other words, the center wing was never considered a spare part?

Lt Cooley: It wasn't a spare part. It was out in the hard-stand area on our A-10 ABDR training aircraft; they took it from that jet. I asked for engineering support here at Sacramento to look it over; [then] it was crated up and shipped to us.

Capt Poe: Because of cracks in the close-out rib, we have replaced numerous center wings. And we've used up all the spare center wings. We had a couple other spare center wings that were in this USAFE WRSK kit that have never been kept up with TCTOs, so they wouldn't have worked. So, we just didn't have a center wing.

Capt McRory: There was something that struck Capt Poe and myself as humorous. Was it President's Day that was coming up?

Capt Poe: Oh, God, that was hilarious.

Capt McRory: A three-day weekend?

Lt Cooley: [And McClellan says] "We can't work that!"

Capt Poe: "We'll call you back Monday."

Capt McRory: [chuckling] So Col Rupright says, "Get a hold of your people and let them know that I'm going to call your colonel and find out what's going on with these parts. That was a Friday. We called, and they first said, "Well, Col [Rupright], the A-10 SPM will be on leave or TDY next week." We said, "Well someone's got to be ready to answer [Col Rupright's] questions." And their response was, "Well, it's a three-day weekend, you know." [general

laughter] And here the SCUDs are coming in over our heads blowing up. It was so ridiculous we couldn't do anything but laugh; we about fell out of our chair laughing.

Luther: I imagine it's understandable if the intensity, the sense of urgency, here at McClellan was not as great as with you in an actual war zone.

Capt McRory: It's hard for [those back at Sacramento] to relate [to our experience]. Even after war, when we tried to press home some of the lessons learned we've all discussed [during these interview sessions]...people listen to you and their eyes glaze over because they weren't there; they can't feel it, touch it, taste it. That can be frustrating at times.

Capt Poe: The contact [with McClellan] was good for other reasons, too. We would call--and just hearing voices from home--we would call at set times and they'd have conference calls. They had representatives from every system in the [A-10 System Engineering] branch office. So any problems we had at all we were able to bring up. We'd talk about the bent fuel probe, the landing gear doors, and certain things that we would take for granted here. We'd say, "You need to do this, and this." And it would be done by the next phone call.

Sgt Beebe: That brings us to two limiting factors we faced at the FOL. One [of these factors] was that we couldn't make any telephone calls out. So, you were definitely limited to the resources available to you right there. The luxury for us was to be able to call the main operating base; but we could not call back to our units here [at McClellan] at all.

Capt Poe: I could call my main unit much easier than I could ever get ahold of Capt Idle.

Capt Idle: You could call us but we couldn't call you guys, because we didn't have the communications. They didn't exist.

Sgt Beebe: That was corrected by the commander.

Capt McRory: We couldn't even call you when we were redeploying. We tried to get hold of you and we couldn't.

Sgt Beebe: So the luxury for us was to have the AT&T credit card that allowed us to "reach out and touch someone" as long as we were willing to pay the freight! And that became vital, because one of the morale boosters we used for ourselves was to call back [to McClellan] to find out what the line numbers were...

Lt Cooley: For the staff sergeant promotees...

Sgt Beebe: Because no one would [keep us informed] on personnel issues. We were lost in a vacuum. The life saver for us was going, for example, to the Army mail distribution center and

seeing pallets of mail as far as you could see in three directions. The other [morale booster] was just being able to make the commercial phone calls home.

Luther: That helped to at least diminish your sense of isolation.

Sgt Beebe: Yes. Those were the only things we had.

Luther: I'd like now to address some miscellaneous issues. Sgt Beebe, recently you and I discussed some of the emotions you felt during the Gulf conflict. Would you please elaborate on that?

Sgt Beebe: From everyone over there you saw the entire spectrum of human emotions: sadness, anger, frustration. And in many cases there was nowhere to vent that frustration. I think many of us brought it home with--you had so much to contend with. Adding to the stress was that you didn't know what was happening on the home front. The isolation [enabled you] to see a more profound picture of people's emotions--if one were apt to get angry, that anger was intensified by the isolation; if someone were sad, you knew it. There was no way to completely [suppress such feelings]--the team felt them; I think all the teams felt them. And you could observe that from the time we deployed, through the actual conflict itself, to the absolute satisfaction of coming home through Europe. Even before we came back there was a feeling of pride and happiness when that landing gear retracted in the well as we left Saudi Arabia...When we got to Europe our reception in Germany was just overwhelming; and there was more to follow when we finally got home. But I guess the proudest moment we had was just knowing that everyone we'd brought with us [made it home safely].

Luther: It appears that A-10 pilots played a significant part in causing the so-called "highway of death," where a large Iraqi column was decimated attempting to flee down the road from Kuwait to Iraq. What about the attitudes and emotions of the pilots? Did they change over the course of this 42-day conflict?

Capt Poe: One of my SOS [Squadron Officers' School] buddies--both Capt McRory and I talked to him a couple of times. I don't know how to describe it; [the fighting] was just something he felt he had to do. There was no hesitation.

Capt McRory: He was pumped.

Capt Poe: Yeah, his boss got shot down. His boss was the one who was shot down that they were talking to on the radio. And he was saying, "You'd better hurry because [the Iraqis] are coming." And then they [captured] him...I talked to my buddy about this and he just put it out of his mind. [Such misfortune] was part of the job. Then again, this guy was really gung-ho.

Sgt Beebe: We watched the pilots training before the war began. And I guess they had a

natural arrogance, as if to say "I'm ready for anything the [enemy] can throw at me." But as the conflict began and you saw them coming back with the initial battle damage, their entire mood changed. Now they couldn't operate on bravado; they had to operate on their skills. They did feel that the titanium bathtub around them was very much a factor in how they felt protected. Again, the ground crews and air crews have a relationship to make sure that everything works mechanically. The pilots go off to [conduct their sorties] loaded with ordnance; when they come back you see the enthusiasm as they return with a clean airplane. They were ready to jump out of the cockpit they were so excited. Yet when they lost an aircraft, when one went down, that very same aircrew member would come back and look like he was devastated; he'd emerge from the cockpit just wringing in sweat. So, very different emotions. Some were very gung-ho; others [really had doubts] as to why they were there; and still others were just extremely calm. But you could see the normal arrogance at the outset; then when they started to take some hits you'd see a change [in attitude]. What adds to that is that you have active duty pilots, reserve pilots, and Air National Guard pilots all coming from different walks of life. So the pilots would return from their missions and you'd see this entire spectrum of emotions: excitement, anger, solitude. Obviously, they were all relieved when it was all over. But [during the war] you could watch them detach themselves from what they had to do.

What most impressed me concerning someone's emotions was to see Capt Biley[27] emerge from his crashed aircraft and say, "I'm just fine." We took him back the next day to look at his plane, which was still at the end of the runway, and he said, "I walked away from death." He felt very fortunate, but we thought he would [be alarmed] to learn that he had had no pitch control. So for him to say, "I won," was really remarkable for us to see in person. I think that helps to explain why the DCO is the first one who wants the pilot in his truck as soon as the aircraft lands. We don't need to talk about maintenance for the first couple of hours [after a sortie].

Luther: Here in the states we all watched the daily briefings and were riveted to our television sets when the briefers showed video of bombing runs displaying the efficacy of our smart weapons. Capt Poe, you and the others saw these strike videos on a regular basis. I think you referred to them as "attack video cartoons."

Capt Poe: They were called cartoons.

Luther: Can you describe the strike videos that you saw?

Capt Poe: You could watch the Mavericks. You'd see the A-10s go out and the video of the Mavericks and what they locked on to. You could hear the pilots breathing and talking...We

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[27] The reference is to Capt Richard T. Biley, an A-10 pilot with the 23d Tactical Fighter Wing. His aircraft (S/N 79-181) was destroyed on landing at FOL 1 on 22 February 1991.

saw that all the time. Then the Marines and the Army brought some of their tapes over one night...[These tapes] showed three Apache helicopters attacking a cluster of buildings. The helicopters would blow up one building after another, and you could hear the pilots talking to one another as if it were a game. You'd see [Iraqis] running from one building to another seeking cover; then that building would blow up. Then you'd see another Iraqi running from a building, and he'd choose the wrong building and it would be destroyed. And the pilots continued to talk to one another selecting buildings to destroy. It was like a big video game. It's all in FLIR [forward looking infrared radar]--you could see the little lighted bodies of the Iraqis running around. It was total devastation. And the film ends when there is nothing left--no buildings, no people running around anymore. I'm talking about an entire field that must have had ten structures on it. They were blown apart. The pilots just picked them off at random; they never missed. They were fighting a war [at long distance].

Luther: Did you see any video of the A-10s actually taking out Iraqi tanks or artillery pieces?

Capt Poe: Well, you'd see the Mavericks lock on. But once he fired the missile he lost the video [so you didn't see the actual impact on target].

Luther: According to a reputable source, the A-10s fired roughly 90 percent of all Mavericks expended during the Gulf war.

Sgt Beebe: I think the pilots were very anxious for the ground crews to see [the damage they were inflicting]. That's part of how they motivate us, by letting us see the fruits of our labor. It's their way of saying, "Here's why we work as long and as hard as we do and why we need your expertise."

Luther: A major focus of the media at the beginning of the war was the SCUD missile attacks--not, in my opinion, because these attacks had any special military significance, but because they were so visually dramatic. I remember watching one CNN reporter visibly shaken as a SCUD attack began, fumbling with his chem gear while hundreds of millions of people looked on. No doubt you all have some interesting SCUD stories, but Capt McRory I'd like to address this question to you. Just after you arrived in Saudi Arabia you were watching the NFC [National Football Conference] championship game. Why don't you take it from there.

Capt McRory: Like Lt Cooley and everyone else on the team, I had been up for three or four days [when I arrived at the main operating base]. Capt Poe took me out...I never hit the sack; he woke up when we got there at four in the morning. We ate and then began a tour of the base. I met all these people. I was walking around in a total fog. We were invited to watch an NFL playoff game involving the [San Francisco] 49ers. We were watching the game and I was dozing in and out. I was in a cloud.

I don't know what triggered it, but I noticed some movement in the room, although I didn't pay much attention to it. Then Capt Poe kicked the stool out from under me and said, "We've

got a red alert!" So we all jumped up and started to run. Chief Ewing[28] heard on his radio that it was a false alarm, so we all stopped for a moment. Then, all of a sudden, the siren [the Giant Voice] went off, and we all went squeezing out the door again. We jumped in a bunker next to our tent and the T.V. is blaring; then we hear Tom Brokaw break in and say "Saudi Arabia is under SCUD attack." It was that fast! Our alarm goes off and suddenly from the other side of the world Tom Brokaw is telling us we're under SCUD attack! Five seconds later we heard a couple of booms over our head.

Luther: That's what they call real-time reporting!

Capt McRory: It was just amazing. I don't even think I had time to put my mask on.

Capt Poe: I had mine on!

[general laughter]

Capt McRory: Well, you guys were gone, and I was half asleep trailing you out. It was incredible. I can just barely remember watching footage of the Vietnam war as a child; that [footage] was all prerecorded as far as I recall.

Luther: I remember that also. We might have seen footage from Vietnam several days after the actual events had occurred.

Capt McRory: But this [Tom Brokaw's report] was real-time. It was too much. Everywhere you went there was a television...CNN was doing this real-time reporting and it got to the point that we just shut it off--you couldn't stomach it any longer.

Luther: Did the television coverage war make the war seem more real or less real to you?

Lt Cooley: Less real...

Capt McRory: Less real. It was just like watching murders on T.V. I think if you see a murder on T.V. it doesn't seem real, you've been watching the videos of them for so long. You become inured to it.

Luther: Do we have any other "SCUD stories," for want of a better term?

Sgt Beebe: From the FOL perspective, I remember our very first night at the dining hall. We had just come out of the dining hall and I remember someone yelling, "SCUD alert!" They

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[28] CMSgt Wilson R. Ewing, Jr., was the maintenance superintendent for the 23d Tactical Fighter Wing.

were running up and down the main path where the dining hall was yelling "SCUD alert!" Well, if you'd just arrived there as we had, you really didn't know what that meant. It's not the same as Alarm Red. So you had this state of fear that was really elevated, because you don't know what "SCUD alert" means or how to respond to it. If they'd said Alarm Red, we would have known how to react...But we had not received an orientation briefing--it was canceled due to the outbreak of the war. So we didn't know what SCUD alert meant. And that was our introduction to [the war].

Luther: Early on the morning of February 23rd, a SCUD missile impacted roughly two miles outside tent city at the main operating location. I'd like those of you who were at the MOB to describe that incident.

Lt Cooley: That morning I was preparing to send some people out to FOL 2 [Al-Jawf]. I was in the chow hall with SMSgt Loera[29] and two technicians. We heard the alarm go off, but by that point it had become rather routine; we knew it was time for the five o'clock SCUD. We went out to the bunker and put our chem gear on. Then we looked up and saw this huge flash and heard a loud boom. We said, "Holy shit, they just hit the north end of the ramp!" It looked to me as if it had hit the area I had just left. So as soon as the alarm condition reverted to yellow, we got in our truck, raced over to that part of the ramp, and discovered that, luckily, no one was hurt. The SCUD hadn't landed on the facility. But you guys [Capts McRory and Poe]...you later went out to the impact site. I saw pictures of the site [where the SCUD had landed], and you could see tent city from where that site was. If this was one of those SCUDs landing harmlessly in the desert...

Capt Poe: And that's what the Army said--they knew it was going to land harmlessly in the desert.

Luther: Patriots were not fired at this SCUD?

Capt Poe: Patriots did not fire.

Lt Cooley: But [the SCUD impact] definitely woke us up--at least the CLSS people and the engineers--[and made it clear] that this was not business as usual anymore; that we had to become more vigilant. Had the people at Dhahran [been more vigilant] when they were hit by that SCUD they'd probably be alive today.

Luther: So by the latter stage of the war a certain complacency had set in concerning these SCUD attacks, and that complacency was perhaps responsible for the deaths of the Army reserve

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[29] SMSgt Joe Loera (2951st CLSS), an egress systems specialist, served as an A-10 ABDR team chief at King Fahd.

personnel at Dhahran.[30]

Lt Cooley: If they had responded [with greater vigilance] they would be alive today. They had become used to the alarm responses, and so many of the SCUDs were taken out by the Patriots. In our case the missiles were passing over us on their way to Dhahran or Riyadh, so a lot of people started to become complacent; they were watching the SCUDs go by rather than ducking into a bunker. I'm sure that you experienced that as well, Sgt Beebe.

Sgt Beebe: Yes we did. We did become more complacent. But toward the end of the war the Iraqi's did direct a SCUD at KKMC, and we were not alerted on the flight line. This was right after I had walked out of a maintenance staff meeting. All we saw was the vapor trails of the in-coming SCUD. Fortunately when [the missile] hit it missed the bomb and fuel dumps and all of the ICT [integrated combat turn] areas. The missile landed in the desert, but it was close enough--it landed between where we worked and where we lived. We actually had people go out--after the EOD [explosive ordnance disposal] people had gotten done with it--and pick up pieces of the SCUD. The missile landed in close enough proximity to us, but we were never warned. That created a degree of realism that told us we had to be alert at all times; we couldn't afford to be complacent.

Luther: What about other impressions of the war--the B-52 operations against the Republican Guards, for example. Did any of you see any of the bombers or hear any of the explosions?

Capt Idle: We woke up one morning and got out to our worksite about 6:30 a.m. We were waiting around for the first A-10s to show up and we happened to look up in the sky. We saw a big squadron of B-52s--they were high up but you could make them out very clearly. They had a seven-ship F-15 formation leading them in, and you knew where they were going. They were headed north. I spent most of that afternoon looking for them coming back. I figured that, because they went north, they'd have to come back south. But they didn't return by the same route. That was a great spectacle--to be able to see a [formation] of B-52s. And you knew exactly what their mission was.

Capt Poe: I saw maintenance personnel loading BLU-82s--the 15,000 pound bombs--on the C-130s.[31] That was unbelievable...They were so big. And you kick them out the back of

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[30] Monday, February 25th, saw the worst Allied disaster of the war: "At 8:23 p.m., the warhead of an Iraqi Scud missile, which had broken apart in flight, landed on a warehouse near Dhahran that had been turned into a U.S. military barracks. Twenty-eight soldiers died and approximately 100 were wounded. Many of the troops were eating dinner; some were asleep." Otto Friedrich, Ed., Desert Storm--The War in the Persian Gulf, A Time Book, Time Warner Publishing, 1991, p 78.

[31] During Desert Storm the 8th Special Operations Squadron (USAF) dropped 11 BLU-82 "Daisy Cutter" bombs--all that were in-theater--with devastating results. The blast from the 15,000-lb. bombs, which were dropped from the squadron's MC-130H Combat Talon aircraft, resembled a nuclear explosion. The squadron dropped two

a C-130.

Sgt Beebe: The "daisy cutters."

Lt Cooley: You could have destroyed an island with those.

Capt McRory: We had F-16s at both of our operating locations. And after the first few nights the F-16s were taking off constantly, as were the A-10s. The F-16s would take off all through the night and you'd sleep right through it. It was just like a volcano exploding in your ear but you got accustomed to it.

Luther: I think the common theme in what you're all saying is that human beings eventually adapt to such extreme and extraordinary conditions.

Sgt Beebe: It's not a matter of choice; it's a matter of survival and the defense mechanisms of the human body. It's how you keep yourself intact. It all relates to survivability.

Lt Cooley: It was amazing to discover just how much those little "creature comforts" meant to you. For example, going out and finding a couple pieces of wood to lay your clothing on, so you didn't have to leave them in a bag on the floor. You had something--that was your piece of furniture. Anything you could get for your people meant something--like getting them blankets so they didn't have to sleep in sleeping bags.

Luther: Speaking of morale boosters, how did it affect you to know that most Americans supported your efforts? Conversely, what impact did the anti-war movement in the United States have on you?

Capt Poe: You know, we saw that [media coverage of the anti-war movement]. And I think all of us assumed it was the media attempting to hype the controversy. But when I talked to my wife, or to my mother or sister, the very first thing they would say is that [the anti-war people] didn't represent the views of most Americans. My family wanted to make sure that I knew that the media was not accurately representing the views of most people...My wife said, "You wouldn't believe all the flags and yellow ribbons." That made you feel good.

Capt Idle: About three weeks after I returned from Saudi Arabia, my wife and I went to a party with some friends. There was a lady at the party who was one of the more outspoken anti-war protesters here in Sacramento. She found out that I had been over there in the war, so we started to talk. I figured she was going to tell me how cruel and brutal I was and that the war

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of the BLU-82s on the night of February 6th to open a corridor through Iraqi minefields and defensive berms. Benjamin F. Schemmer, "8th Special Ops Squadron Nicknamed 8th Bomb Squadron After BLU-82 Missions," In: Armed Forces Journal International, July 1991, p 37.

was a big mistake. Well, she expressed her opinions as to why she felt it was wrong to go to war, but believe it or not, she turned right around and told me that some of the war protesters still supported the servicemen and women who went over there, because they [the protesters] understood it was our job--that we had to go there. So, right or wrong, they supported the people who were doing the job.

Luther: I think many in the anti-war movement made an effort to distinquish between governmental policies they found repugnant and the servicemen and women who carried out those policies.

Sgt Beebe: [The bottom line is] that we are tasked to perform. That's all we can do [as members of the armed forces]. We don't have any political interest. What we **do** have is a job and a commitment to our country. And we know in our hearts that we are protecting our freedoms.

Luther: I appreciate what you're saying, but what if you were placed into a situation [as a solider] where you fervently disagreed with our government's policies? What would you do?

Sgt Beebe: If I ever found myself in that situation I would resign. But [enlisted personnel] are not offered that opportunity. Commissioned officers can resign their commissions, while we have to retire if we are eligible or go out under other than favorable circumstances. Or we can be a conscientious objector.

Capt McRory: Well, in this case most of us [i.e., the officers] probably could not have resigned.

Capt Idle: No, we couldn't have gotten out.

Capt McRory: I have no sympathy for those who, overnight, became conscientious objectors. I completely respect that view, but the day you realize you are a conscientious objector you should get out.

Capt Idle: Especially a couple of Marines who had been in the service for quite some time; knowing full well that they had signed up to defend their country and go to war if necessary. Then all of a sudden they get orders to deploy and turn around and declare that they are conscientious objectors and won't participate.

Lt Cooley: In addition to the conscientious objectors, I had a problem with some of the reservists and National Guard people who had real heartburn because they suddenly had to fulfill their commitment. Now they had to give up their full time jobs [in civilian life] and do a full time job with us.

Capt Idle: I have a bone to pick with that as well. You kept hearing all these sympathetic stories [in the media] about the [reservists and Guard personnel] saying, "How are we supposed to live on [military] pay?" [laughter] How do you expect us to maintain our families on this income?" Well I'd like to ask those people this: What do you think we [the military] live on every day of our lives? And there are state programs to subsidize them but no one subsidized us. Yet they made a big deal of that.

Sgt Beebe: I think another relevant issue that irritated all of us was that much of the local [Sacramento area] media coverage was focused on the Guard and reserve units and not on the active military.

Luther: I think there were reasons for that. Firstly, there were Guard units from central California that participated in Desert Storm. Secondly, I think from the perspective of the media that reservists and Guard personnel called to active duty make a good human interest story. In other words, it's one thing to send active duty personnel off to war--that's expected. But if you uproot someone from his civilian career, take him away from his family and so on, that's a so-called human interest story.

Lt Cooley: Even with [active military] the media focused on people who were expecting children yet having to deploy...That's what the media focused upon and not upon the fact that **everyone** was facing the same hardships. The media was worried more about the few women we had with us and how they would be treated. But I didn't think in terms of men or women; they were all just soldiers or technicians to me. I expected everyone to do their job, regardless of their gender.

Luther: I believe roughly six percent of U.S. military personnel in the Gulf were female. What were your experiences working with female soldiers.

Capt Idle: We had some women [at the FOL] and they did their job. We had no problem with that. When they were told to do something they did it.

Sgt Beebe: We had a married military couple who worked in the same unit.

Capt Idle: And they worked fine together. They maintained a professional stature; they kept the personal relationship separate. We had females out there loading bombs, pumping gas and scrubbing dishes. And I don't think we had a single complainer...Yeah, we did--we had one woman in the chow hall who was a complainer. And she was more of less just complaining about the living conditions [on the base]. But most of the women--the medics who were there, for example--they didn't have any heartburn; they knew what they were there for.

Luther: Did the war change your attitudes--whatever they might have been--about men and women working together in wartime?

Sgt Beebe: The first persons we looked for were the medics. To know the medical staff you had available was extremely reassuring. And that started from our deployment and departure from Travis AFB. One of the aircraft that accompanied us was entirely filled with medical staff, and they ended up in part at our final destination. So, gender didn't matter. What mattered was what they could do.

Lt Cooley: Regardless of sex, all of our CLSS technicians were capable of doing any job. The only problem was that having men and women together complicated our billeting arrangements. Other than that, gender made no difference.

Sgt Beebe: If I may add one more thing...From the FOL perspective I can't tell you how many media we had, but we had media people all over the place who wanted to cover every aspect of our operations. When they first arrived, we were not told what we could or could not say to the media. But as the war progressed the restraints were loosened to the point that we could tell the media a little bit more about what we did. In fact, I think the media had more access than we had as far as what they could do or see...They had access to any aspect of the war they wanted to cover.

Capt McRory: We were not briefed at all when the media came out and talked to us. We'd look to the public affairs officer for guidance as far as what we could or could not say.

Lt Cooley: The media put us in uncomfortable situations from time to time. They'd ask questions and it wasn't clear to us whether we were dealing with classified information...It seemed like they had more access to information than we did.

Sgt Beebe: We had all the major networks [at the FOL]; we had aviation journalists; we had the entire spectrum of journalists there to document the events.

Luther: And they went about their activities with very few restraints?

Sgt Beebe: Yes.

Luther: Well, the impression here in the states was that the media was chafing under all kinds of restrictions on what they could see, say, or do.

Capt Idle: That might have been Army [policy].

Sgt Beebe: The media had guidance and they had [military] escorts, but I think they were virtually unimpeded in doing their job.

Luther: Some of them were a little too unimpeded, like the CBS journalist Bob Simon.[32]

Capt McRory: That was very ironic to me. I remember watching a CNN interview with Bob Simon, and he was on his high horse about [military restrictions] on the media. He was really vehement about it. And we were thinking, "What is this guy's problem." Then he disappears a couple weeks later. And the joke was, "I wonder which side got him!" [laughter]

Luther: What about the hundreds of fires the Iraqi forces set late in the war that destroyed Kuwait's oil fields. Did you actually see the fires?

Sgt Beebe: We saw the smoke.

Capt Poe: Yeah, to get to KKMC you turn left at the oil fire! I'm serious, that's how you'd find it. There's one road and this big oil fire, you turn left [at the fire] and KKMC is eight hours down the road.

Lt Cooley: It was black. It would be noon and look like the moon out there. I'm sure it was causing some problems with our lungs. It looked like night in the heat of the day. The sky was heavy black; you'd see this faint light in the sky and that was the sun.

Luther: That was the view from the main operating base?

Lt Cooley: Yes. About 70 miles from the Kuwaiti border.

Capt Idle: At the FOL we saw the clouds of black smoke rolling in. it was like thunderclouds rolling in, but without rain.

Sgt Beebe: You'd look north and it was black--pitch black.

Capt McRory: If it wasn't right over the top of you, which it was most of the time, you'd look north and it was like a huge storm coming in.

Capt Poe: And the A-10s had problems with that smoke.

Sgt Beebe: Yes they did.

Luther: To wrap up this interview, I'd like to give each of you the opportunity to make final comments on any topic pertaining to your part in Operation Desert Storm. Capt McRory, why

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[32] Iraqi troops captured a four-man CBS News crew led by correspondent Bob Simon near the Saudi-Iraqi border. The men were taken to Baghdad, where their captors interrogated and beat them. They were released at the end of the war following the intervention of Soviet President Mikhail Gorbachev.

don't we begin with you.

Capt McRory: In hindsight, I wouldn't have missed [Desert Storm] for anything. As an engineer and an officer it has been an outstanding experience, although I don't know if I realized that at first. But it was really my pleasure and honor to deploy with the 2951st CLSS.

Sgt Beebe: I would just like to say that from the onset, when President Bush gave General Schwarzkopf the autonomy to conduct the war, that made a real difference to us. [We were given the freedom] to go and prosecute the war...And that made all the difference in the world to me. That is one of the things I will most remember. Again, the support we received from our unit and from our families, and the reception we got upon our return, will be the memories that we keep.

Lt Cooley: It was extremely satisfying to see all the training we had done for so many years put to use and to see it work. We had to be flexible and make some adjustments, but it was extremely satisfying to see the engineers, the maintenance officers and the technicians all come together and make it happen. We didn't always have guidelines, but from our experience hopefully we can develop them so that, next time, things can go even better.

Capt Poe: Well, when I think back 20 years from now I'm going to remember leaving, and not wanting to leave. I'm going to remember the few days before the war and the fear of the unknown. I don't think much of the war sticks [in my memory], but the SCUD attacks will stick. I think the main thing that I will remember is walking through an airport in Atlanta [returning from Desert Storm] in my uniform and seeing people clap as I walked by...That's something I will never forget. We were at a bar, and a [civilian] came up and just laid 20 dollars on the bar to buy us drinks.

Sgt Beebe: That's the difference between the last conflict I was in [Vietnam] and this one--the reception we got. In Vietnam I was stationed in Thailand in a combat support role...and to come back from there and to just be ignored or despised. This time it felt entirely different, and the role we played was entirely different.

Capt Idle: I think [I will remember] the opportunity to actually perform what I had been trained to do. I spent enlisted time as an ammo troop, thinking I'd never see the bombs and bullets actually used [in battle]; and maintaining them was getting routine. And then being an aircraft engineer and in ABDR and wondering [what purpose that served]. So I was proud to be part of the war effort too--to be a part of the team that kept it all going. I especially liked the welcome home--getting off that Coast Guard C-130 [at McClellan] and seeing not only our family and friends, but all the civilian workers and the generals and colonels. A lot of that will stay with me. The constant show of support everyone gave us told us that we weren't alone.

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COLLECTION OF PHOTOGRAPHS

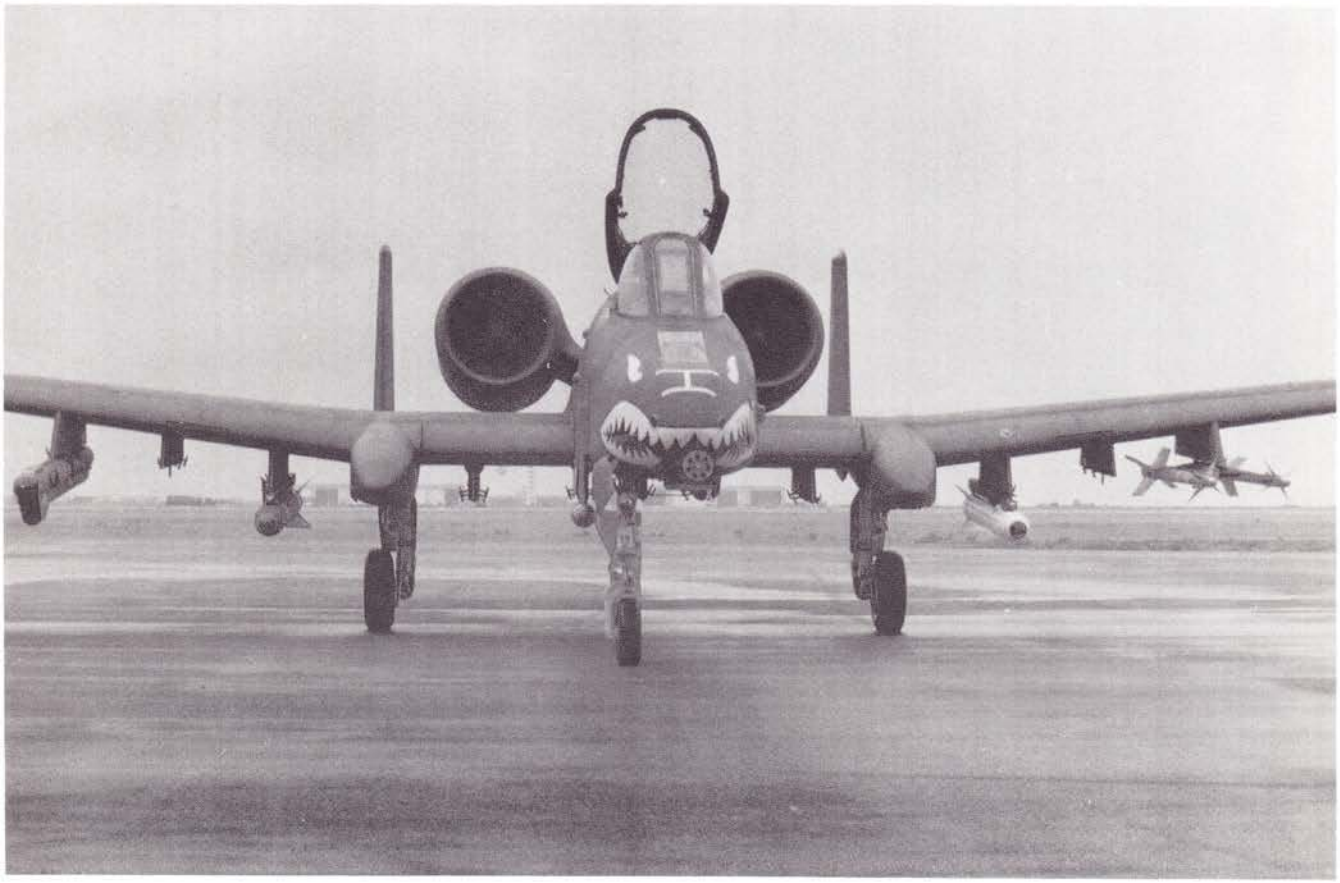

Figure 1 - An A-10 belonging to the 23d Tactical Fighter Wing moves into the de-arm area at FOL 1. The aircraft is carrying two AGM-65 Maverick missiles, two AIM-9L Sidewinder missiles and an electronic countermeasures pod.

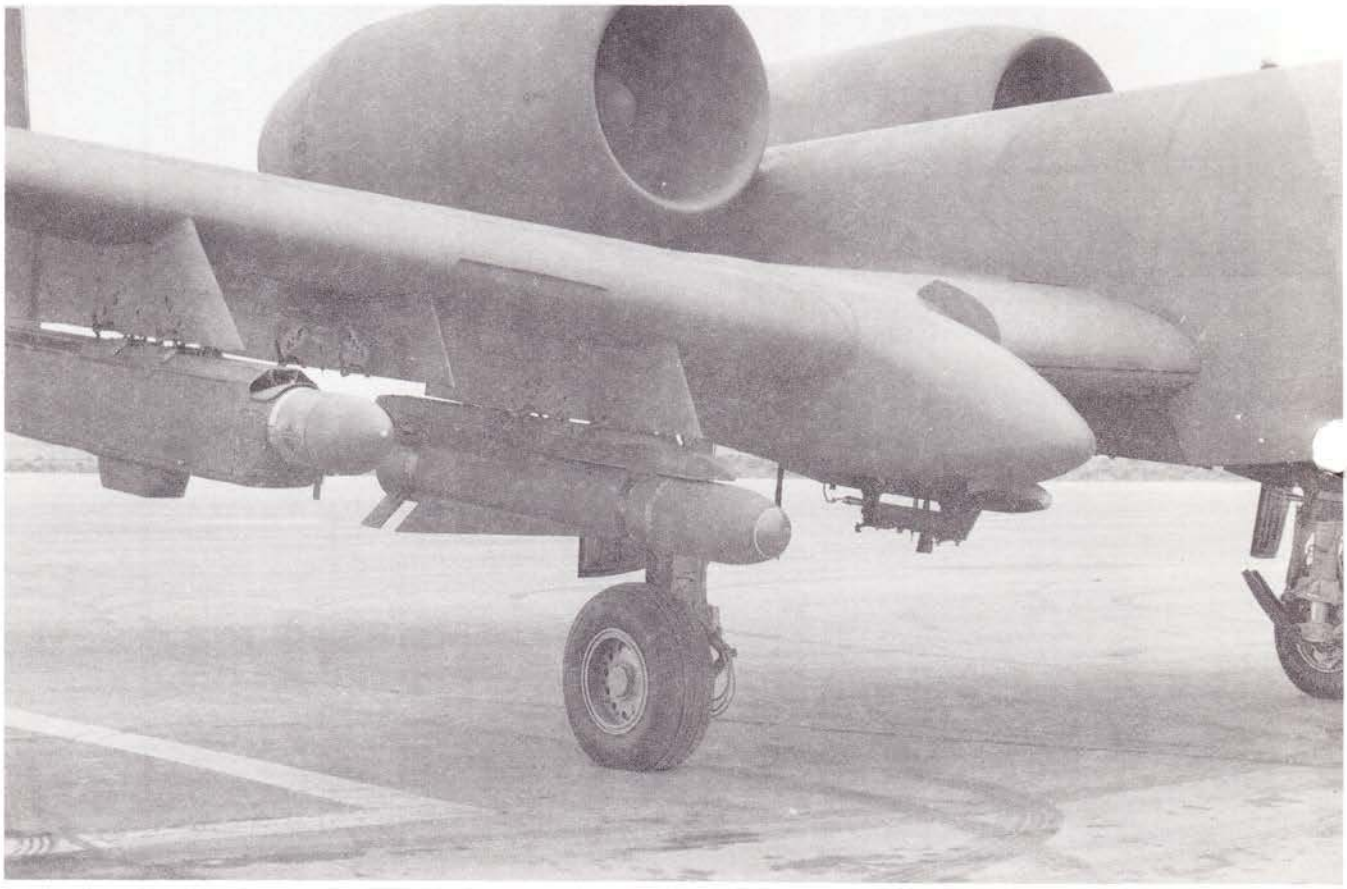

Figure 2 - Close-up view of an AGM-65 Maverick missile and an ECM pod mounted under the wing of an A-10.

Figure 3 - 23d Tactical Fighter Wing A-10--its GAU-8/A 30mm anti-tank gun is clearly visible mounted in the nose section of the fuselage.

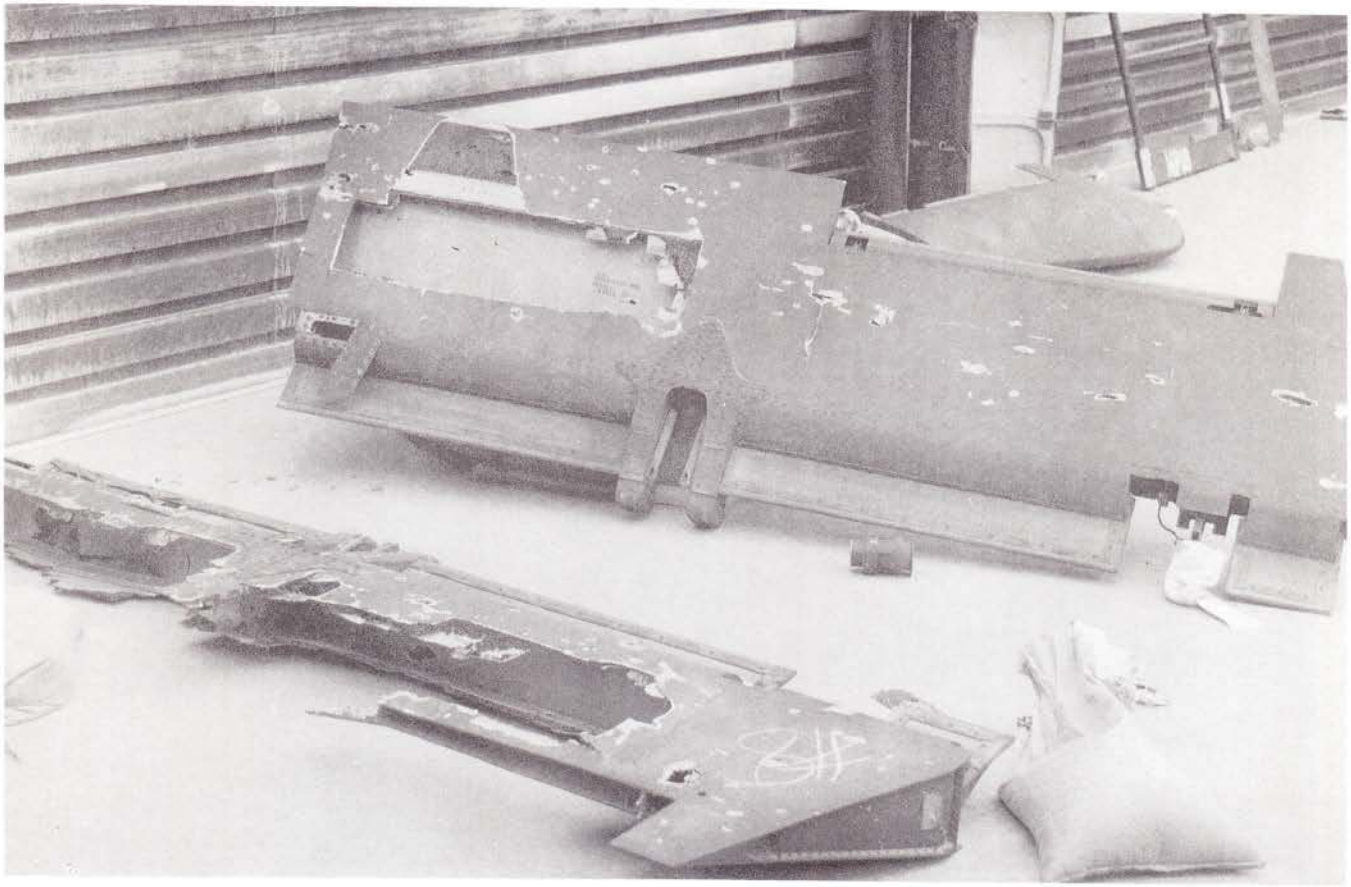

Figure 5 - Damaged elevators, A-10 S/N 80-186.

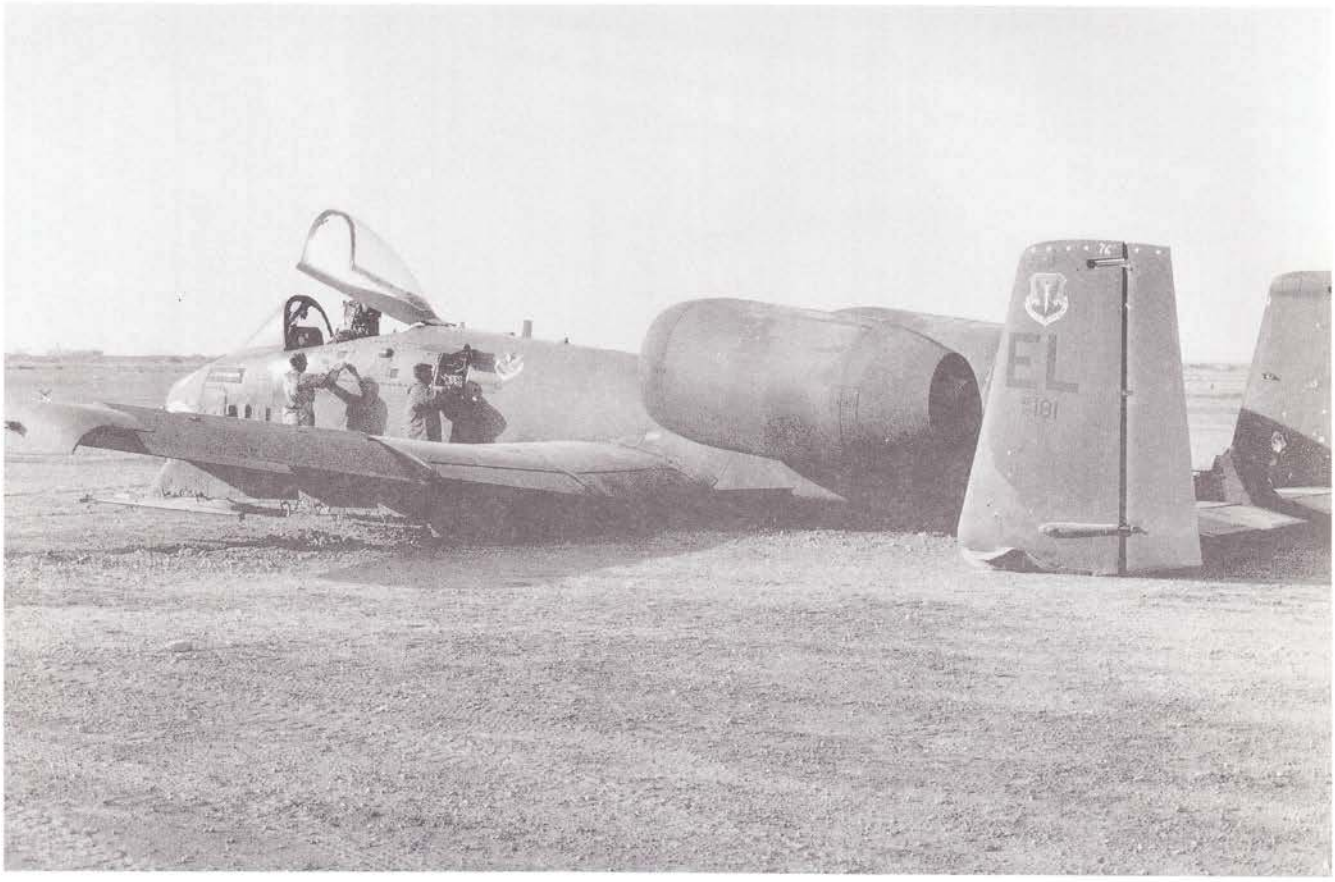

Figure 6 - A-10 S/N 79-181 as it came to rest after crash landing at FOL 1.

Figure 7 - A-10 S/N 79-181 showing some of its battle damage. Standing next to the aircraft is its fortunate pilot, Capt Richard Biley.

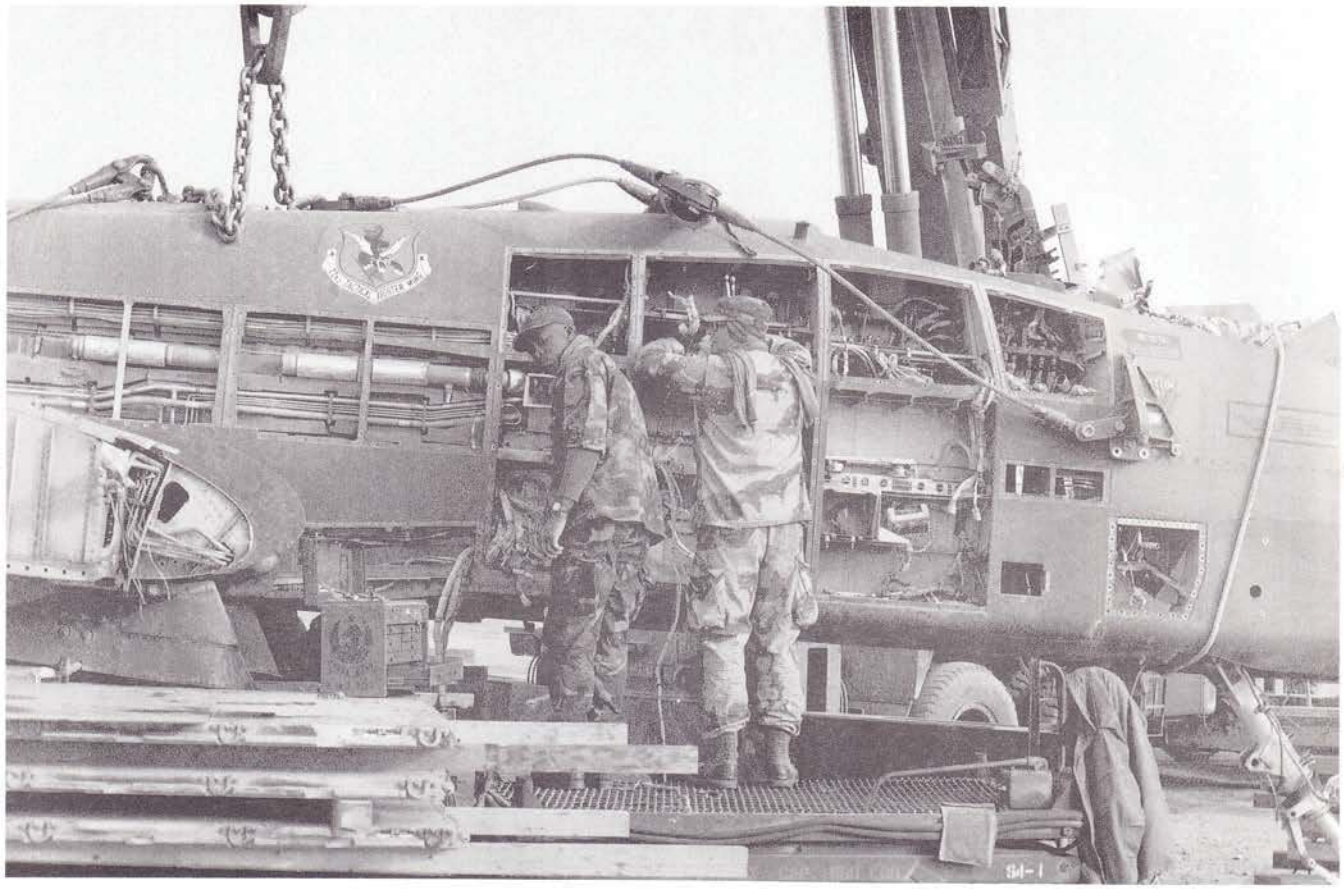

Figure 8 - Parts being removed from A-10 S/N 79-181. Aircraft was then demilitarized and destroyed in place.

Figure 9 - Taxiway at King Khalid Military City (FOL 1). The two A-10s in foreground have just left the de-arm area and are heading down to the hotpits for refueling.

Figure 10 - "Tent City" at FOL 1.

Figure 11 - A Patriot missile battery outside of King Fahd International Airport.

Figure 12 - This F-4G crash landed at FOL 1 after running out of fuel. Both crew members ejected safely. SMSgt Beebe is standing on the horizontal stabilizer.

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