



Missile Defense

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▶ STANDARD VERSION

The PATRIOT/TORNADO Fratricide: It Could Happen Again

On the night of March 22, 2003, two British Royal Air Force Tornados were returning to the Ali Al Salem Air Base in Kuwait after a mission in Iraq. The lead aircraft, whose radio call sign was Yahoo 75, made it back safely. The tail aircraft, Yahoo 76, was shot down by a U.S. Patriot missile defense battery guarding the airbase. Both crew on-board the Tornado were killed instantly.

The U.S. and British governments held independent investigations of the fratricide. On May 17, 2004, they released in-tandem their determinations of what caused the Patriot battery to target a friendly aircraft. Both investigation boards stated that the Patriot's radar had read the Tornado as an anti-radiation missile (ARM), that the Tornado's Identification Friend or Foe (IFF) beacon apparently wasn't working, and that the Patriot crew fired in self-defense. The U.S. investigation board summarized, "The incident occurred as a result of asynchronous processes and procedures across the coalition force."

However, the British investigation did not entirely concur with this assessment. It points to Patriot ARM rules of engagement, Patriot IFF procedures, the Tornado's IFF serviceability, and overly-broad criteria for Patriot ARM classification, among others, as contributory factors to the accident. The British report is available to the public in its entirety. While the U.S. report is unclassified, many sections have been redacted to a classified level and thus been blacked out, seemingly at random. Reading through what was not deemed to be classified in the appendices of the U.S. investigation, it becomes apparent that the way the Patriot is designed and operated, it could very likely have another deadly friendly fire incident.

"I DO NOT FEEL COMFORTABLE WITH OVER 80 PERCENT OF THE ECS CREWS IN MY BATTALION"

The U.S. Patriot battery involved was C/5-52 Air Defense Artillery (ADA). It was kitted with Patriot Advanced Capability (PAC)-2 missiles, not the PAC-3 missiles that

it had been trained to handle, since the PAC-3 equipment hadn't caught up with them yet from the United States. C/5-52 ADA was based in Camp New Jersey, Kuwait, and was tasked to defend the 3rd Infantry Division and 101st Tactical Assembly Areas, as well as the 11th Aviation Regiment. It was riding high after reportedly destroying an Iraqi theater ballistic missile (TBM) on March 20, 2003.

However, this elation was based on shaky support. The battery had rushed through its training in order to get to the Iraqi theater. According to the published U.S. report, "The TCO [tactical control officer] and her crew completed their certification just prior to deployment. That fact alone indicates that they were inexperienced... However, they had passed the required certification and demonstrated through questions in their statements the basic knowledge necessary to identify and engage threatening targets IAW [in accordance with] the rules of engagement in the theater."

But the battery's Fire Control Platoon Leader and Battery Trainer, who was supposed to have the most technical knowledge about the Patriot in the area and was responsible for training, felt otherwise. He pointed out that, unlike every other battery in 5-52, the C Battery was not able to do a mission readiness exercise due to time constraints. This would have confirmed before being deployed that they could do their job in combat. He noted that the TCO who authorized the Patriot launch had failed her Air Battery test the first time she took it. She passed it the second time, but got to skip the 72-hour wait between tests that normally is procedure in these matters, again because of the compressed preparation schedule. And the C Battery didn't get any additional training once it arrived in-theater, so its rushed certification would have to hold them through whatever combat tossed at them.

The Fire Control Platoon leader swore in an official statement about the fratricide that it wasn't just this battery that wasn't properly or completely trained: "I do not feel comfortable with over 80 percent of the ECS [Engagement Control Station] crews in my battalion when it comes to going to war, due to lack of training issues."

UNREALISTIC TRAINING

This unease arose from how the Patriot crews were trained to almost unthinkingly respond to presumed threats. The Fire Control Platoon leader pointed out, "...when you train, you're taught to react so quickly because the Air Battles that we train on, in my opinion, are unrealistic. They are to [sic], there are too many things going on at one time, so all it trains you to do is just react. And that is just fine, but out here it is more complicated than that."

His warning is borne out by the British investigation, which notes that the Patriot battery in question had less than one minute to make its decision on what to do. Also, a C Battery crew member testified, "...we saw the ARM coming down toward us, it popped out so quick, you know, it was, no time to react, it [was] just shoot it down. That's what we're trained to do. We're trained to identify it, and you know check it out before we engage with it. Like I said, it just happened so quick, it was so close, honest it really wasn't much time."

TOO-BROAD CRITERIA FOR WHAT COULD BE AN ARM

This lack of clear and complete training for the Patriot crews was compounded by faulty Patriot technology. The Patriot's radar identifies objects based on characteristics which are inputted by software programmers. In this case, generic ARM classification criteria were programmed into the Patriot's radar. No emphasis was put on clarifying the very specific types of ARM threats that Iraq might field. Consequently, when Yahoo 76 dipped down toward the Ali Al Salem airbase and dropped its speed in order to land, it briefly took on the characteristics of a generic ARM (which are launched from aircraft and drop down on their targets). The Patriot radar mistakenly classified the Tornado as an ARM. The U.K. board of investigation believed that the criteria "should have been much tauter."

Standard operating procedure for Patriot crews when they think they see an ARM is to engage it with IFF. There are five different IFF modes. Mode 1 is an unencrypted code, while Mode 4 is an encrypted one. According to the U.S. report, the lead Tornado, Yahoo 75, was squawking all IFF codes, but Yahoo 76 wasn't broadcasting any. Before the fratricide, a nearby airborne surveillance system had identified the second aircraft as friendly based on the single set of IFF returns.

FAULTY IFF ON THE GROUND, IN THE AIR

After Yahoo 76 showed up as an ARM, C Battery tried to engage it with IFF. The Tornado's Mode 4 IFF had been tested before it left the ground, but it appeared not to be working once the aircraft was in the sky. The U.K. board determined that it must have broken down due to a power supply failure.

But this was complicated by the fact that the Patriot battery didn't have its Mode 1 codes loaded the day of the fratricide. The Fire Control Platoon leader had been on-duty the day before the fratricide, and he said that at that point, Mode 1 had been loaded into the system. So there was something that caused the Patriot's IFF system not to be operational in Mode 1. The Fire Control Platoon leader postulated that if the system had gone down and needed to be rebooted, that could have caused it to lose the Mode 1 codes. If there were any problems with the system, they should have shown up in the log.

The report released to the general public had a lot of areas blackened out by Pentagon classifiers. One log did report that the Air Defense Systems Integrator (ADSI) was receiving too many radar tracks for it to handle, and, in the words of the operator on March 22, 2055Z: "ADSI backs up and AMDWS [Air and Missile Defense Work Station] wont [sic] receive tracks MDB reset." But it is unclear if this was related to the C Battery.

SPURIOUS TRACKS CLUTTERING THE RADAR PICTURE

The Patriot crews had another consideration to manage: false or spurious tracks. These objects were bedeviling Patriot crews, making an already-difficult job even more taxing. On March 22, B/2-43 reported that it "auto-engaged a spurious track, missile fired before they could override...SPACE CONFIRMED SPURIOUS." Later that same

day, C/6-52 also had a spurious track, as did Kuwaiti Patriot batteries 1 and 2. The U.S. board's fratricide report had an index titled, "Patriot Spurious Tracks," but it was blackened entirely except for one introductory paragraph. It obviously was a serious problem, since the Patriot's training simulations didn't include spurious tracks. Thus the crews found themselves trying to react without hesitation and under urgent pressure to false alarm signals that looked like real enemy missiles.

Because of the spurious tracks that kept popping up and the C battery's limited training, it was very important that they confirm any possible ARMs with the Information and Coordination Central (ICC) to discuss possible courses of action. This double-checking is Patriot operating procedure and supposed to prevent fratricide. However, the Fire Control Officer at the Control Reporting Center (CRC) testified about a call he received on March 22 from the officer who authorized the Patriot launch: "...she asked me if I had a [blackened] on scope. I looked up at the GCCS [Global Command and Control System] and saw nothing. SSG [name blackened] proceeded to call space. I asked MSG [name blackened] (ops coordinator) if he had any [blackened] on their scope. He said no. I looked up at the ADSI and saw nothing. Just as I told 1LT [name blackened] 'I had nothing on scope' she stated, 'What? Charlie has a confirmed kill [blackened].' Then she said it again."

The officer decided independently to launch at what she thought was an ARM. The CRC/ICC "did not approve or were aware of any Patriot engagement;" and the command post's response after the Patriot launch was to hit the floor, then get on the walkie-talkie and say, "ECS, this is CP, what the F..k [sic] was that?"

POOR COMMUNICATIONS ISOLATED THE PATRIOT BATTERY

Also hampering confirmation of any possible ARMs was malfunctioning equipment. Communication with higher-ups was almost non-existent, as the cell phones were rarely getting signals and the hand-held walkie-talkie was only working sporadically. In fact, at one point, a runner had to be sent out to find out why the ECS external alarm had gone off. And the C Battery's electronic data recorder, in the words of the officer who authorized the Patriot launch, had been "touch and go the entire time we've been here," but the day before the fratricide, "just went kaput." The British board concluded, "The lack of communications equipment meant that the Patriot crew did not have access to the widest possible 'picture' of the airspace around them to build situational awareness. The Board considered it likely that a better understanding of the wider operational picture would have helped the Patriot crew, who would then have been more likely to identify ZG710 [Yahoo 76] as a friendly track, albeit one without a working IFF."

NOT AN "ASYNCHRONOUS" EVENT

The Tornado/Patriot fratricide cannot be traced to a single cause. It was a combination of a green Patriot crew that was untrained on how to handle spurious tracks, trying to figure out a flawed radar, isolated from higher-ups due to bad equipment, and unable to confirm if what they saw was an ARM due to a malfunctioning IFF beacon on the Tornado and a lack of IFF codes on the ground. In other words, bad procedures coincided with bad technology to put the Patriot crew in a dreadful position and the Tornado crew in a lethal one. It was not an "asynchronous" event, as the U.S.

investigation claimed, because all those pieces could fall into place again unless steps are taken to fix the Patriot's radar, clean up communications, and establish all-encompassing operating procedures among U.S and allies to identify friendly aircraft. Given how popular the Patriot missile defense system is among members of Congress and how much financial support the program is being given to rush its deployment worldwide, it would be easy to ignore these problems. It also would be a grave mistake.

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