

MANNED AIRCRAFT LOSSES OVER THE FORMER YUGOSLAVIA, 1994-1999

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(U) During the decade of the 1990s, the United States and the North Atlantic Treaty Organization (NATO) took part in two air wars over the former Yugoslavia, which was fragmenting into different independent states. One war determined the fate of Bosnia, and the other the fate of Kosovo. In both wars, NATO fought Serb military forces under the direct or indirect leadership of President Slobodan Milosevic, who resisted the independence of Bosnia and the autonomy of Kosovo. Milosevic governed from his headquarters in Belgrade, which served as the capital of both Serbia and Yugoslavia.

(U) In the years between 1994 and 1999, thirteen manned combat aircraft were shot down over Yugoslavia, ten Serbian and three NATO. Twelve of the manned aircraft shot down over Yugoslavia were either destroyed by, or flown by, USAF fighter pilots. A Dutch pilot in the service of NATO shot down an additional Serbian aircraft. Every one of the ten Serbian airplanes shot down was destroyed by aircraft fire, and none by ground fire. Not one of the three NATO airplanes shot down was lost to enemy aircraft fire, all by ground fire. All three of them were USAF aircraft, which is not surprising since the USAF provided the majority of the NATO aircraft in both conflicts. There are useful lessons to be derived from the aircraft losses in these conflicts. Comparing the NATO aerial victories over Serbian aircraft with Serbian victories over NATO aircraft during the decade should reveal much about the utility of shooting down aircraft from the air or from the ground. It should also reveal some of the vulnerabilities of manned aircraft to air and ground fire, regardless of the side for which they were used.¹

(U) The Air War Over Bosnia, 1994-1995

(U) During the early 1990s, three Communist states in eastern Europe began to break up. Czechoslovakia split in two, and the Soviet Union dissolved into fifteen independent republics. These dissolutions took place peacefully. When Yugoslavia also began to fragment, however, war resulted,

because the Serb-dominated federation, which had allowed the secession of Slovenia, resisted the independence of Croatia and Bosnia. Serbs within Croatia and Bosnia also opposed the creation of the new states because they favored a greater Serbia that included them. The civil war within Bosnia threatened food deliveries in Sarajevo, the capital, and the United States and the United Nations responded with a humanitarian airlift called Operation PROVIDE PROMISE (1992-1996). As the violence intensified, the United Nations passed a resolution that set up a no-fly zone over Bosnia. Operation DENY FLIGHT began on April 12, 1993. Its purpose was to prevent warplanes of the belligerents, particularly those of the Serbs, from escalating the conflict or interfering with the humanitarian airlift. Operation DENY FLIGHT enforced United Nations Resolution 816, which banned all flights over Bosnia-Herzegovina not authorized by the United Nations. The no-fly zone was enforced by the North Atlantic Treaty Organization (NATO), of which the United States was the leading member. From Aviano Air Base in Italy, USAF airplanes under the 5th Allied Tactical Air Force began to patrol the skies over Bosnia to discourage Serb aircraft attacks.²

(U) On February 28, 1994, NATO engaged in combat for the first time in its history. A British airborne warning and control system (AWACS) aircraft flying over Hungary detected at least six Serbian J-21 jets that were attacking a factory in the Banja Luka area of Bosnia and warned them to land, exit the no-fly-zone, or be engaged. The AWACS crew also contacted a flight of two F-16s from the 526th Fighter Squadron (86th Fighter Wing) patrolling over Mostar in southern Bosnia. Although already low on fuel, the F-16 pilots quickly flew to the area, spotted the Serbian airplanes, and repeated the warning. The Serbian pilots did not respond, but continued their air strikes on ground targets, in clear violation of the no-fly zone. Cleared to fire, Capt. Robert G. Wright launched one of his radar-guided AIM-120 missiles and destroyed one of the Serbian aircraft. The rest of the J-21s quickly descended to a lower altitude to reduce their radar signature and vulnerability. Captain Wright shot down two more of the J-21s, using shorter-range heat-seeking AIM-9 missiles. His total was three that day. His wingman, Capt. Scott F. O'Grady, also fired an AIM-9 missile at one of the fleeing enemy airplanes, but missed. Wright and O'Grady departed the area to refuel, turning over the mission to two other F-16 pilots from their

squadron, who had arrived to relieve them. Captain Stephen L. Allen used another AIM-9 heat-seeking missile to destroy a fourth J-21, but the remaining two Serbian jets escaped the no-fly zone and returned to their base at Udbina in the Serbian-dominated part of Croatia. Technologically, there was no contest.³

(U) But Serb aircraft were not the only ones shot down during Operation DENY FLIGHT. On April 29, 1995, two unidentified fighter-bombers, probably from the Krajina Serb airfield at Udbina, dropped cluster bombs on Bosnian government positions about four miles south of Bihac. Such violations of the no-fly zone provoked NATO to increase its aerial surveillance. During daylight hours on June 2, USAF Captain O'Grady of the 31st Fighter Wing's 555th Fighter Squadron patrolled the skies over northwestern Bosnia in his F-16C fighter when it was suddenly hit and brought down by an SA-6 surface-to-air missile (SAM) under radar guidance. O'Grady ejected safely, but was forced to evade Bosnian Serb forces for six days before being rescued on June 8 by USMC helicopters from a USN task force in the Mediterranean Sea.⁴

On August 30, 1995, NATO launched Operation DELIBERATE FORCE, an intensive air campaign against Serbian ground targets in Bosnia-Herzegovina. Despite the intensity of that operation, and extensive NATO air attacks on ground targets, neither Serb nor Allied aircraft were shot down. Serbian aircraft did not challenge NATO aircraft, and Serbian ground fire was not effective.⁵

During all of the operations over Bosnia between 1992 and 1995, a total of five aircraft were shot down over Yugoslavia. Using a combination of AIM-9 and AIM-120 missiles, two U.S. Air Force F-16 pilots shot down a total of four Serbian J-21 airplanes on February 28, 1994. Using an SA-6 surface-to-air missile, the Serbs shot down one USAF F-16 fighter on June 2, 1995. Ironically, the downed F-16 pilot had been involved in the same air battle in which the Serbian aircraft were shot down, although he personally earned no aerial victory credits. The score in the Bosnian conflict was USAF: 4, Serbia: 1.

(U) The Air War Over Serbia, 1999

(U) Operation DELIBERATE FORCE, during which NATO aircraft attacked Bosnian Serb targets on the ground in 1995, coupled with a Croatian ground offensive, succeeded in persuading

Slobodan Milosevic to come to terms. He agreed to the partitioning of Bosnia into zones for Muslims, Croats, and Serbs, and recognized that Bosnia was independent of Serb-dominated Yugoslavia. Milosevic was not so eager to recognize an independence movement within Serbia's province of Kosovo, where the majority of the people were ethnic Albanians. In 1999 he authorized a military campaign in Kosovo that drove thousands of ethnic Albanians from their homes and across the border into neighboring countries. This "ethnic cleansing" campaign resulted in another United Nations' authorized operation against the Serbs called Operation ALLIED FORCE. The goal of this air campaign was to remove Serb military forces in Kosovo, replace them with NATO or UN forces, and allow the non-Serb population of Kosovo to return to their homes.⁶

(U) Operation ALLIED FORCE began on March 24, 1999, and marked the first time in the alliance's 50-year history that NATO engaged in hostilities against a sovereign country. Exclusively an air campaign, ALLIED FORCE involved the forces of many different NATO countries, but most important among them was the United States, which provided the leadership and the bulk of the forces employed. NATO launched the war on Serbia not for the national interest of any of its members, but to save the majority of Kosovars from an ethnic cleansing campaign that included both genocide and forced evictions. The United States called its portion of the Operation NOBLE ANVIL.⁷

(U) U.S. Army General Wesley Clark served as NATO commander for Operation ALLIED FORCE, or the Air War Over Serbia. The air campaign magnified the significance of Clark's Combined Force Air Component Commander (CFACC), USAF Lt. Gen. Michael Short, who also served as commander of the Sixteenth Air Force and Allied Air Forces Southern Europe (AIRSOUTH). Lieutenant General Short directed the air campaign from the Combined Air Operations Center (CAOC) at Vicenza, Italy, although most of the combat aircraft were based elsewhere. The Sixteenth Air Force had been the first to employ the expeditionary wing concept. The most important of the American air bases was Aviano in northern Italy, not far from Venice or the border of the former Yugoslavia. On February 19, 1999, the United States Air Forces in Europe (USAFE) activated the 16th Air and Space Expeditionary Task Force-NOBLE ANVIL, with headquarters at Aviano. At the same time, USAFE also activated the 16th and 31st

Air Expeditionary Wings at Aviano, and the 100th Air Expeditionary Wing at RAF Mildenhall in the United Kingdom. As the war intensified, the United States committed more organizations to the effort. The U.S. Navy deployed ships armed with Tomahawk Land Attack Cruise Missiles (TLAMs) to the Adriatic Sea, just off the western coast of the former Yugoslavia.⁸

(U) Although Short served as General Clark's air component commander, organizational structures complicated their direct interaction. Physically separated from Short's headquarters at Vicenza, Clark also relied for air advice on Lieutenant General Short's superior in the Air Force chain of command, USAFE Commander General John Jumper, and Short's superior in the NATO chain of command, U.S. Navy Admiral James O. Ellis, AFSOUTH commander. In other words, in both the United States and NATO chains of command, there was one senior officer between Clark and Short. This arrangement did not facilitate Short's close interaction with Clark on air power employment issues.⁹

(U) NATO faced a Yugoslavian Air Force that included 16 MiG-29 and 80 MiG-21 fighters as well as 28 J-22 and 70 G-4M attack airplanes. Serbian air defenses included more than 800 man-portable SA-7, SA-14, and SA-16 surface-to-air missiles (SAMs) and 130 other low-altitude antiaircraft missiles. Other larger and longer-range missiles included 4 SA-2s, 16 SA-3s, and more than 80 SA-6s. In addition to these, NATO intelligence estimated that the Serbs had more than 400 pieces of antiaircraft artillery. Other enemy forces included about 200,000 ground troops, including some 120,000 in the Yugoslavian Army and the rest in paramilitary forces. These troops possessed about 540 tanks, 630 other armored vehicles, and almost 200 pieces of field artillery. Not all of these forces were employed within Kosovo, which was the special domain of the Yugoslav 3d Army and Serb paramilitary forces in the area. Eventually Milosevic deployed some 40,000 troops and heavy equipment to the disputed province.¹⁰

(U) The U.S. Air Force played the leading role in Operation NOBLE ANVIL, using a variety of weapon systems. On the campaign's opening night, the NATO CAOC managed 214 strike aircraft, including 112 (more than half) from the United States. They struck from Italy, Germany, the United Kingdom, and the United States. Among the most important on the first day were strategic bombers. Venerable B-52 bombers based at RAF Fairford in the United Kingdom launched precision cruise

missiles against Yugoslavia to open the campaign. B-2 bombers entered combat for the first time, flying tremendously long round-trip missions from Whiteman Air Force Base (AFB) in Missouri to Yugoslavia and back (a 29-hour round trip, with numerous aerial refuelings). The B-2s belonged to the 509th Bombardment Wing, and they carried the new Joint Direct Attack Munition (JDAM). The Air Force employed all three of its strategic bomber types during the course of the campaign, including swing-wing B-1s. The U.S. Navy also took part in the initial air strikes, using Tomahawk Land Attack Missiles (TLAMs) to hit, like the bombers, elements of Yugoslavia's integrated air defense system and key military command and control sites. While NATO aircraft from other countries played important roles in the campaign, NATO depended more on the United States than any other country for night operations, precision-guided munitions, identifying aircraft beyond visual range, providing airborne command and control, and furnishing intelligence, surveillance, and reconnaissance.¹¹

(U) On the first day of the conflict, March 24, 1999, the Serbs launched at least a dozen MiG-29s, their best fighters, to intercept NATO's attacking airplanes. The MiGs emerged from the 127th Fighter Aviation Squadron's field at Batajnica, and NATO's airborne warning and control system (AWACS) airplanes detected them. Two USAF F-15C pilots from the 493d Expeditionary Fighter Squadron, Lt. Col. Cesar A. Rodriguez, Jr., and Capt. Michael K. Shower, each shot down one of the MiG-29s, using AIM-120 missiles. A Dutch F-16 pilot shot down another MiG-29 that day, also using an AIM-120. Two days later, March 26, on the third day of ALLIED FORCE, USAF F-15 C pilot Capt. Jeffery G. J. Hwang, from the 493d Expeditionary Fighter Squadron, shot down two more MiG-29s in aerial combat over Yugoslavia. He also used AIM-120 missiles. NATO shot down five of the best Yugoslavian fighters in the first three days of the conflict, with no friendly aircraft losses. All of the aerial victories were scored from beyond visual range, using radar and relatively long-range air intercept missiles. The NATO pilots could not see the enemy aircraft they were shooting at, except on radar, although they could sometimes see the fireballs that resulted from the impact of the missiles they launched.¹²

(U) After the first three days, the Serbs were reluctant to launch their fighters against the NATO airplanes raiding their country. There were several reasons for this. One was that NATO had already shot down five of their aircraft. Another reason was that in the first two days, NATO had also attacked all the major Serb air bases, destroying not only a host of aircraft on the ground, but also many of the runways and ground-based air control facilities on which their pilots depended. During the conflict, NATO reported having destroyed at least 65 Serb aircraft on the ground. A third reason for Serbian reluctance to launch their fighters was so their surface-to-air missiles could be launched with confidence without endangering friendly airplanes.¹³

(U) The NATO air campaign against Yugoslavia was proceeding remarkably well until March 27, the fourth night of the operation, when a Serbian surface-to-air missile (SAM) brought down a USAF F-117 Nighthawk, piloted by Lt. Col. Dale Zelko (call sign VEGA 31) from the 8th Fighter Squadron. The Serbs actually fired two SAMs at Zelko, but only one hit his aircraft. Lieutenant General Short had expected some air losses, but this one was not expected, because the lost aircraft was a stealth fighter famous for its ability to avoid significant enemy radar detection. Enemy SAM fire had succeeded in spite the Serbs' very limited use of their radar, which rendered them vulnerable to Allied fighters equipped with HARM missiles. The news that day was not all bad. Captain John A. "Buster" Cherrey, a USAF A-10 pilot from the 81st Expeditionary Fighter Squadron, located the downed pilot and vectored a helicopter rescue team to save him within eight hours of his being shot down. The combat search and rescue effort involved the cooperative efforts of A-10, MC-130, MH-53, and MH-60 pilots and crews, some of whom flew more than 400 miles. F-16s covering the mission, sustained by KC-135 tankers, remained airborne for more than 9 hours. Cherrey was one of three pilots to earn the Silver Star that day. The others were Capt. James L. Cardoso, the pilot of the lead MH-53 Pave Low helicopter, call sign "Moccasin 60", and Capt. Chad Franks, pilot of the MH-60 Pave Hawk helicopter that picked up Zelko, call sign "Gator 07". Lieutenant Colonel Stephan J. Laushine, 55th Special Operations Squadron commander, led the rescue

mission. The incident contrasted sharply with the aftermath of the 1995 downing of Capt. Scott O'Grady, who had evaded enemy forces for six days before he was rescued.¹⁴

(U) Zelko had already destroyed the most critical command and control target in the heavily defended Belgrade area. Colonel Zoltan Dani, who commanded the 3d Battalion of Serbia's 250th Air Defense Missile Brigade, claimed to have shot down the F-117 using the Isayev S-125 "Neva," designated by the North Atlantic Treaty Organization as the SA-3 "Goa." Dani modified the old Soviet surface-to-air missile's guidance system, of 1960s vintage, in order to increase his chances of shooting down American aircraft. To keep the SA-3 batteries from being targeted successfully by Allied fighters armed with anti-radiation missiles, Dani and his fellow officers limited the times their radar systems were on, and moved them frequently. It is possible that Dani and his crews also worked with visual spotters equipped with infrared and night-vision devices. The F-117 might have become more vulnerable because it flew a route that observers were able to report, or because it became more visible on radar when it turned, or when it opened its weapons bay. There might have been other electromagnetic tools that Dani and his crew were able to use to predict the time and place the F-117 would pass. Zelko considered Dani's achievement a "nice shot".¹⁵

(U) Serb surface-to-air missiles and antiaircraft artillery failed to down a single NATO aircraft during the entire month of April. On the night of May 2, 1999, however, Serbian forces rejoiced over their shooting down of a second NATO aircraft by SA-3 ground fire over Yugoslavia. This time it was a more vulnerable F-16CG, piloted by Lt. Col. David Goldfein (HAMMER 34), commander of the 555th Fighter Squadron, who had just finished an air strike against Serbian surface-to-air missile sites near Novi Sad. Serbian radar could detect the F-16 more easily than it could an F-117. Like Zelko, Goldfein did not stay in enemy territory nearly as long as O'Grady had done in 1995. Within a couple of hours, an MH-60 helicopter crew rescued him. Steve Laushine, who had led the rescue of the F-117 pilot in March, also led this mission, flying in one of two MH-53 Pave Low helicopters that covered the MH-60 Pave Hawk.¹⁶

(U) Unlike ground fire, Serbian aircraft failed to down a single NATO aircraft during the entire campaign. On the other hand, a NATO pilot scored an additional aerial victory on May 4. F-16CG pilot Lt. Col. Michael H. Geczy of the 78th Expeditionary Fighter Squadron shot down another Yugoslavian MIG-29 over Kosovo, the fifth and final USAF aerial victory of Operation ALLIED FORCE, and the sixth such victory by NATO pilots. Geczy used an AIM-120 missile. Notably, all six of the 1999 aerial victories of NATO pilots over Soviet-made MiG-29s over Serbia occurred from beyond visual range. The aerial victors could see the enemy aircraft only on radar, although they could certainly see the explosion that resulted from the impact of their missiles.¹⁷

(U) In summary, during the Air War Over Serbia in 1999, eight manned aircraft were shot down. NATO F-15 and F-16 pilots downed a total of six MiG-29 Serbian aircraft, the best in their enemy's arsenal, using AIM-120 air intercept missiles from beyond visual range. During the same conflict, the Serbs managed to shoot down two manned NATO aircraft, including one F-117 and one F-16, using SA-3 surface-to-air missiles. The score this time was: NATO 6, Serbs: 2.

Conclusion

(U) Thirteen manned airplanes were shot down over Yugoslavia in the two conflicts between NATO and the Serbs between 1992 and 1999. USAF F-16 and F-15 pilots shot down a total of nine Serb aircraft, including four J-21s and five MiG-29s, using a combination of AIM-120 and AIM-9 missiles. A Dutch pilot in the service of NATO shot down an additional Serbian airplane. Serbs shot down a total of three NATO airplanes, all belonging to the USAF. They included two F-16s and one F-117. The culprits: enemy SA-3 and SA-6 missiles. The final score: NATO: 10, Serbs: 3.

(U) There are many reasons why NATO was able to shoot down 10 Serbian aircraft in the air, and yet lost none of its own aircraft to enemy aircraft fire. Obviously, the United States and its NATO allies were many times more powerful and wealthy than Serbia and the Serbian parts of Bosnia, but there were other reasons. International economic sanctions restricted the availability of operational aircraft and parts in Serbia. The country was forced to restrict its flight training because of limited aircraft parts and fuel. The system of fighter pilot training in the United States was superior to that of Serbia as well. The

USAF F-16Cs were technologically far superior to the four small Jastreb-Galeb J-21 airplanes they shot down in 1994, and the F-15Cs and F-16CG airplanes that NATO used in 1999 to shoot down six MiG-29s were also technologically equivalent or superior to their opponents. The air-to-air missiles the NATO and USAF fighters launched were also marvels of technology, superior to those of the Serbs. This was especially true of the AIM-120, which carried its own radar. The fighter pilot could launch a missile, take immediate evasive action, and be reasonably certain that the missile would find its target. The E-3 AWACS aircraft flying in the theater also aided the American fighters immensely, providing target information more comprehensive than that provided by the fighter's own radar. The quantity of NATO aircraft heavily outweighed that of the Serbs. They were based all around Serbia, making that country more vulnerable from many different directions. NATO and USAF fighter tactics were also superior to their enemy, because the Serb fighters depended much more on ground stations that had proven vulnerable to United States and NATO air attacks. Air strikes on enemy airfields, aircraft shelters, and even aircraft on the ground contributed to the failure of Serb pilots to shoot down even one USAF airplane.

(U) USAF aircraft were much more vulnerable to Serbian ground fire than they were to enemy aircraft. By flying high enough and at night, American fighters largely avoided small antiaircraft artillery, gunfire from troops on the ground, and shoulder-fired missiles. The primary threat was from two types of radar-guided surface-to-air missiles whose designs originated in the Soviet Union: the SA-3 and the SA-6. The SA-6 that brought down O'Grady in 1995 was fired during the day. Less expected were the two 1999 losses, partly because they occurred at night, and partly because one of them was an F-117 stealth fighter, less detectable by radar than either the F-15 or the F-16. Serbia minimized its use of radar for its surface-to-air missiles, because radar activation made the sites vulnerable to NATO aircraft. By doing this, Serbia preserved crucial radar sites. Despite its limited and dispersed use of radar, Serbia was still able to shoot down two of the best USAF fighters in 1999 using surface-to-air missiles.

(U) Between 1993 and 1999, NATO downed more than three times as many enemy aircraft (manned) as did the Serbs. In fact, the United States alone shot down three times as many Serb manned aircraft as it lost. The lesson for both NATO and the USAF was to develop more effective

countermeasures against the threat of enemy surface fire, and to retain and improve the instruments and tactics of aerial victory.

(U) Thus far this paper has addressed only manned aircraft losses. During Operation Allied Force in 1999, NATO also deployed a significant number of unmanned aerial vehicles (UAVs) for surveillance, reconnaissance, and target location. They were often sent to areas to which the manned aircraft were not sent because of the high risk involved. For example, most of the NATO airplanes, except for some of the A-10s, flew at altitudes of at least 15,000 feet to protect them against surface-to-air missiles and anti-aircraft artillery. The UAVs were not subject to the same restriction. Partly as a consequence of this increased risk, and partly because they were much slower than the manned aircraft, the UAVs were shot down much more frequently. During the conflict in 1999, NATO lost fifteen unmanned aircraft, but only two manned ones. If one considers all aircraft, and not just manned aircraft, the Serb score compared to the NATO score is different. Considering both conflicts in the 1990s, NATO shot down a total of ten Serb aircraft, all manned. The Serbs shot down a total of 18 NATO aircraft, 3 manned and 15 unmanned. In terms of aircraft attrition over Yugoslavia, disregarding the question of whether the aircraft were manned or not, the relative value of the aircraft, and how riskily they were used, the Serbs shot down more airplanes than NATO did. By the end of the twentieth century, unmanned aircraft had not reached the stage at which they could replace rather than supplement manned aircraft.¹⁸

Table I (U): Ten Serbian Aircraft Shot Down By NATO Aircraft, 1994 and 1999

Serbian aircraft	USAF aircraft	weapon used	date of action	Operation	Name of victor	Unit of victor
Jastreb-Galeb J-21	F-16C 89-2009	AIM-9	28 Feb 1994	Deny Flight	Capt. Stephen L. Allen	526 th Fighter Squadron
Jastreb-Galeb J-21	F-16C 89-2137	AIM-120	28 Feb 1994	Deny Flight	Capt. Robert G. Wright	526 th Fighter Squadron
Jastreb-Galeb J-21	F-16C 89-2137	AIM-9	28 Feb 1994	Deny Flight	Capt. Robert G. Wright	526 th Fighter Squadron
Jastreb-Galeb J-21	F-16C 89-2137	AIM-9	28 Feb 1994	Deny Flight	Capt. Robert G. Wright	526 th Fighter Squadron
MiG-29	F-16AM 86-0033 (Dutch)	AIM-120	24 Mar 1999	Allied Force	Maj. Peter Tankink (Dutch)	322d Squadron (Royal Netherlands Air Force)
MiG-29	F-15C 86-0169	AIM-120	24 Mar 1999	Allied Force	Lt. Col. Cesar A. Rodriguez	493d Exp Fighter Squadron
MiG-29	F-15C 86-0159	AIM-120	24 Mar 1999	Allied Force	Capt. Michael K. Shower	493d Exp Fighter Squadron
MiG-29	F-15C 86-0156	AIM-120	26 Mar 1999	Allied Force	Capt. Jeffery C. J. Hwang	493d Exp Fighter Squadron
MiG-29	F-15C 86-0156	AIM-120	26 Mar 1999	Allied Force	Capt. Jeffery C. J. Hwang	493d Exp Fighter Squadron
MiG-29	F-16CJ 91-0353	AIM-120	4 May 1999	Allied Force	Lt. Col. Michael H. Geczy	78 th Exp Fighter Squadron

Table 2: Three NATO (USAF) Manned Aircraft Shot Down by Serbian Forces, 1995 and 1999

USAF Aircraft shot down	Pilot and His Squadron	Enemy weapon	Guidance system	Date	Time	Pilot Rescued and date
F-16C (Basher 52; serial number 89-2032)	Capt. Scott O'Grady 555th Fighter Sq	SA-6	Radar	2 Jun 1995	Day	Yes (6 days later) 8 Jun 1995
F-117 (Vega 31; serial number 82-0806)	Lt. Col. Dale Zelko 8th Fighter Sq	probably SA-3	Radar	27 Mar 1999	Night	Yes (within 8 hours) 28 Mar 1999
F-16 CG (Hammer 34; serial number 88-0550)	Lt. Col. David Goldfein 555th Fighter Sq	probably SA-3	Radar	2 May 1999	Night	Yes (within 2 hours) 2 May 1999

¹ Department of the Air Force Special Order GB-228 dated 27 May 1994, and accompanying citations; 16th Air and Space Expeditionary Task Force Special Order GF-024 dated 23 August 1999.

² A. Timothy Warnock, editor, *Short of War: Major USAF Contingency Operations, 1947-1997* (Washington, DC: Air Force History and Museums Program, 2000), pp. 219-228.

³ Dr. Karl Mueller, "The Demise of Yugoslavia and the Destruction of Bosnia: Strategic Causes, Effects, and Responses," in *Deliberate Force: A Case Study in Effective Air Campaigning*, edited by Col. Robert C. Owen (Maxwell Air Force Base: Air University Press, 2000), 21; Philip Hadleman, *Combat in the Sky* (St. Paul, MN: MBI Publishing Company, 2003), p. 157; 86th Wing History (S), Jul 1993-Jun 1994, vol. I, pp. 32-48 (Information used is U).

⁴ Dr. Karl Mueller, "The Demise of Yugoslavia and the Destruction of Bosnia: Strategic Causes, Effects, and Responses," in *Deliberate Force: A Case Study in Effective Air Campaigning*, edited by Col. Robert C. Owen (Maxwell Air Force Base: Air University Press, 2000), 24; USAFE History (S/FRD), 1995, vol. I, p. xxi, xxiv (material used is U).

⁵ Col. Robert C. Owen, editor, *Deliberate Force: A Case Study in Effective Air Campaigning* (Maxwell Air Force Base, AL: Air University Press, 2000).

⁶ William M. Butler, *Fifty Years on NATO's Southern Flank: A History of Sixteenth Air Force, 1954-2004* (Aviano Air Base, Italy: Sixteenth Air Force Office of History, 2004), p. 11.

⁷ HQ USAF, The Air War Over Serbia Initial Report (U), 30 Sep 1999 (AFHRA IRIS no. 01149318), 12; Julie Kim, "Kosovo Conflict Chronology: September 1998-March 1999," April 6, 1999, Congressional Research Service (CRS) Report for Congress; "To War in the Balkans," *Air Force Magazine*, vol. 82, no. 5 (May 1999) 16.

⁸ HQ USAF, The Air War Over Serbia Initial Report (U), 30 Sep 1999 (AFHRA IRIS no. 01149318), 8, 20; Col. Christopher E. Haave, USAF, and Lt Col Phil M. Haun, USAF, editors, *A-10s Over Kosovo* (Maxwell AFB, AL: Air University Press, 2003), xiii-xiv, xxix, xxxii, 20-23; Organization Record Card (U) of the 16 Air and Space Expeditionary Task Force-NOBLE ANVIL, at AFHRA/RSO; William M. Butler, *Fifty Years on NATO's Southern Flank: A History of Sixteenth Air Force, 1954-2004* (Aviano AB, Italy: Sixteenth Air Force Office of History, 2004), 11.

⁹ Wesley Clark, *Waging Modern War: Bosnia, Kosovo, and the Future of Combat* (New York: Public Affairs, 2001), 194-195, 361.

¹⁰ HQ USAF, The Air War Over Serbia Initial Report (U), 30 Sep 1999 (AFHRA IRIS no. 01149318), 17, 23.

¹¹ HQ USAF, The Air War Over Serbia Initial Report (U), 30 Sep 1999 (AFHRA IRIS no. 01149318), 21-22; “To War in the Balkans,” *Air Force Magazine*, vol. 82, no. 5 (May 1999), 16; Julie Kim, “Kosovo Conflict Chronology: September 1998-March 1999,” April 6, 1999, Congressional Research Service (CRS) Report for Congress; Interview (U) of Lt. Gen. Michael C. Short, by Public Broadcasting Service (AFHRA IRIS number 01129172, call number K570.051-24, 1998-1999), 17; Roy Handsel, “Talking Paper on B-2 Participation in Operation Allied Force,” given to author during visit to Eglin Air Force Base, home of the 678th Armament Systems Squadron.

¹² 16th Air and Space Expeditionary Task Force, Special Order GF-024 dated 23 August 1999; Interview (U) of Lt. Gen. Michael C. Short, by Public Broadcasting Service (AFHRA IRIS number 01129172, call number K570.051-24, 1998-1999), 10; Lievan Dewitte, “How Dutch F-16AMs Shot Down a MiG-29” from F-16.net website: http://www.f-16.net/news_article607.html; Benjamin S. Lambeth, *NATO’s Air War for Kosovo* (Santa Monica, CA: RAND, 2001), p. 23.

¹³ Anthony H. Cordesman, *The Lessons and Non-Lessons of the Air and Missile Campaign in Kosovo* (Westport, CN: Praeger, 2001), 148; Benjamin S. Lambeth, *NATO’s Air War for Kosovo* (Santa Monica, CA: RAND, 2001).

¹⁴ HQ USAF The Air War Over Serbia Initial Report (U), 30 Sep 1999 (AFHRA IRIS no. 01149318), 23-24; Col. Christopher E. Haave, USAF, and Lt Col Phil M. Haun, USAF, editors, *A-10s Over Kosovo* (Maxwell AFB, AL: Air University Press, 2003), xxix; “To War in the Balkans,” *Air Force Magazine*, vol. 82, no. 5 (May 1999), 17; Interview (U) of Lt. Gen. Michael C. Short, by Public Broadcasting Service (AFHRA IRIS number 01129172, call number K570.051-24, 1998-1999), 22; Dale Zelko e-mail messages to Daniel Haulman, 17 September and 5 October 2009; Darrel Whitcomb, “The Night They Saved Vega 31,” *Air Force Magazine*, vol. 89, no. 12 (December 2006); Rudi Williams, “Daring Rescues Snatch Pilots from Jaws of Enemy,” Defense Link News Article dated 17 Feb 2000.

¹⁵ Benjamin S. Lambeth, *The Transformation of American Air Power* (Ithaca, NY: Cornell University Press, 2000), pp. 200-202; “Serb Discusses 1999 Downing of Stealth,” *USA Today* (26 Oct 2005); Dale Zelko e-mail message to Daniel Haulman, 17 September 2009.

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