

In March 2011, while many of the arms depots belonging to the government of Libya were being looted, Stratfor wrote about how the weapons taken from Libyan government stockpiles could end up being used to fuel violence in the region and beyond. Since then we have seen Tuareg militants, who were previously employed by the regime of former Libyan leader Moammar Gadhafi, leave Libya with sizable stockpiles of weapons and return to their homes in northern Mali, where they have successfully wrested control of the region away from the Malian government, writes Scott Stewart.

These Tuareg militants were aided greatly in their battle against the government by the hundreds of light pickup trucks mounted with crew-served heavy weapons that they looted from Libyan depots. These vehicles, known as "technicals," permitted the Tuareg rebels to outmaneuver and at times outgun the Malian military. Moreover, we have recently received reports that Tuareg rebels also brought back a sizable quantity of SA-7b shoulder fired surface-to-air missiles, also known as man-portable air defense systems (MANPADS).

While we have not yet seen reports of the Tuaregs using these missiles, reports of close interaction between the Tuaregs in northern Mali and regional jihadist franchise al Qaeda in the Islamic Maghreb (AQIM) raise concern that AQIM could buy or somehow acquire them from the Tuaregs. We have seen unconfirmed reports of AQIM fighters possessing MANPADS, and Algerian authorities have seized MANPADS among the weapons being smuggled into the country from Libya. For example, in mid-February, Algerian authorities seized 15 SA-24 and 28 SA-7 Russian-made MANPADS at a location in the southern desert called In Amenas.

For the Tuareg militants, the MANPADS are seen as a way to protect themselves against attack by government aircraft. They also serve the same function for AQIM, which has been attacked by Mauritanian aircraft in northern Mali. However, the possession of such weapons by a group like AQIM also raises the possibility of their being used against civilian aircraft in a terrorist attack -- a threat we will now examine in more detail.

Uses and Weaknesses of MANPADS

MANPADS were first fielded in the late 1960s, and since that time more than 1 million have been fielded by at least 25 different countries that manufacture them. These include large countries such as the United States, Russia and China as well as smaller countries such as North Korea, Iran and Pakistan.

By definition, MANPADS are designed to be man-portable. The missiles are balanced on and fired from the shooter's shoulder, and the launch tube averages roughly 1.5 meters (5 feet) in length and 7 centimeters (3 inches) in diameter. Since MANPADS are intended to be operated by infantry soldiers on the front lines, durability is an important part of their design. Also, while

the guidance mechanism within the missile itself can be quite complex, a simple targeting interface makes most MANPADS relatively easy to operate.

The SA-7 has a kill zone with an upper limit of 1,300 meters, while some newer models can reach altitudes of more than 3,658 meters. The average range of MANPADS is 4.8 kilometers (about 3 miles). This means that most large commercial aircraft, which generally cruise at around 9,140 meters, are out of the range of MANPADS, but the weapon can be employed against them effectively during the extremely vulnerable takeoff and landing portions of a flight or when they are operating at lower altitudes.

Despite their rugged design, MANPADS are not without limitations. Some research suggests that battery life makes the weapon obsolete after about 22 years. Missiles treated roughly, stored poorly and not maintained well may not last anywhere near that long. Since replacement batteries can be found on the black market, battery life is not necessarily a key limiting factor. For example, two SA-7s used by al Qaeda to target an Israeli civilian flight over Mombasa, Kenya, in 2002 were 28 years old and appeared to be fully functional. It is believed they did not hit their target due to countermeasures employed by the aircraft. Some of the classified U.S. military reports released by WikiLeaks indicted that, many times in Iraq and Afghanistan, the older SA-7s were ejected from their tubes and had engine ignition but failed to acquire and lock onto the intended target. This may also have been the case in the Mombasa attack.

Perhaps the most limiting factor to MANPADS' utility has to do with the kind of aircraft being targeted. As MANPADS were developed and refined for military use, so were countermeasures for military aircraft. This means that most modern military aircraft are equipped with countermeasures that are effective against older models of MANPADS. Due to budget constraints, however, most commercial airliners and general aviation aircraft are not equipped with military-style countermeasures systems, which can alert a pilot that a missile has been launched so proper action can be taken, including evasive maneuvers, the deployment of infrared flares to decoy the missile or lasers to blind the missile's seeker. Industry estimates indicate that outfitting and maintaining the entire U.S. airline fleet with countermeasures that could foil missiles would cost \$40 billion. Because of the high cost of such defensive systems, the bulk of the civilian aviation fleet worldwide remains undefended and vulnerable to MANPADS.

MANPADS in Terrorist Attacks

The SA-7 was first deployed by the Soviet army in 1968 and was sent to North Vietnam, where it was used in combat against American military aircraft in the early 1970s. But it did not take long for militant groups to understand how the weapons could be utilized in a terrorist attack. In January and September 1973, Black September militants attempted to use SA-7s against Israeli civilian aircraft in Rome (the January flight was carrying then-Prime Minister Golda Meir). Both attempts were thwarted in their final minutes.

Two years later, the first successful MANPADS attack against a civilian aircraft occurred when North Vietnamese forces launched an SA-7 missile against an Air Vietnam flight, resulting in the deaths of all 26 passengers and crewmembers. One of the most famous civilian MANPADS

attacks was in 1994, when two SA-16s were used to shoot down a Rwandan government flight, killing the presidents of Rwanda and Burundi and sparking the Rwandan genocide, which resulted in approximately 800,000 deaths in 100 days (the identity of the attackers remains a matter of debate). Over the years, MANPADS attacks have been plotted and actively attempted in at least 20 countries, resulting in more than 900 civilian fatalities. The most recent MANPADS attack that resulted in loss of life was the strike by al Shabaab over Somalia in 2007 against a Belarusian cargo plane. Eleven people were killed. The attack reportedly involved a Russian SA-18 that was manufactured in Russia in 1995. It was one of a batch of SA-18s sent from Russia to Eritrea, some of which were provided to the Somali jihadist group.

A MANPADS attack does not necessarily mean certain death for an aircrew and passengers. In fact, some civilian airliners hit by MANPADS have made emergency landings without loss of human life. In November 2004, a DHL Airbus 300 was struck in the left wing by a MANPADS after leaving Baghdad International Airport on a mail delivery flight. While the aircraft was badly damaged and one engine caught fire, the pilot still was able to land safely.

The man-portable facet of MANPADS severely limits the size of the warhead that the weapon can carry compared to larger surface-to-air missile systems. They are also designed to engage and destroy low-flying military aircraft densely packed with fuel and ordnance. Because of this, MANPADS are not ideally suited for bringing down large civilian aircraft. Though airliners are hardly designed to absorb a missile strike, the damage a single MANPADS can inflict may not be catastrophic. MANPADS systems employ infrared seekers that are drawn to the heat signature of an aircraft's engine, and therefore tend to hit the engine. Large commercial jets are designed to be able to fly and land if they lose an engine, and because of these factors, nearly 30 percent of the commercial aircraft struck by MANPADS have managed to make some sort of emergency or crash landing without loss of life, despite, in some cases, sustaining significant structural damage to the aircraft.

Still, the threat is not insignificant. The other 70 percent of civilian planes that have been hit by MANPADS have crashed with considerable loss of life. Indeed, on departure from or approach to an airport, airliners do have to traverse predictable airspace at low altitudes -- well within the engagement envelope of MANPADS -- and their airframes are under considerable stress. An attack at low altitude also provides the pilot less time to react and recover from an attack before the aircraft strikes the ground. These lower-level phases of flight also frequently occur over large swaths of built-up urban terrain that would be impossible to search and secure, even temporarily. Due to the noise involved with living under a flight path, this is usually low-rent real estate. With flight paths so well established, even casual observers generally have a sense of when and where large, low-flying aircraft can be found at any given time over their city.

Outlook

As noted in Stratfor's previous coverage of the MANPADS threat, since 1973 at least 30 civilian aircraft have been brought down and approximately 920 civilians have been killed by MANPADS attacks. These attacks brought about the concerted international effort to remove these weapons from the black and gray arms markets. Because of these efforts, attempts to use MANPADS against civilian airliners were down about 66 percent from 2000 to 2010

compared to the previous decade. Nevertheless, sting operations and seizures of illicit arms shipments clearly demonstrate that militant groups continue to work to acquire the weapons. There are at least 11 active non-state militant groups that are believed to possess MANPADS, and we have seen MANPADS employed sporadically in the wars in Iraq and Afghanistan. There are more than 10 other groups, such as the Revolutionary Armed Forces of Colombia, that have been making efforts to obtain them. While there is no evidence that these groups now have them in their arsenals, their efforts may have become easier as missiles from Libya have trickled onto the black arms market.

Estimates vary widely, but it appears that the Libyans had an inventory of 20,000 MANPADS. It appears that the SA-7b seems to have been the most common MANPADS in the Libyan inventory, though there were also several far more advanced SA-24 missiles (the latest Russian design) that were intended to be used in vehicle-mounted launchers sold to the Libyans but that could be used as MANPADS if they were paired with the proper gripstocks and battery coolant units. Of those 20,000 missiles, teams from the United States and NATO have secured roughly 5,000; another 5,000 are thought to be in the hands of the various Libyan militias and to still be in the country. That leaves a remainder of 10,000 missiles. While a number of them were destroyed by NATO airstrikes or launched at aircraft, it is believed that somewhere around half have been smuggled out of the country. For obvious reasons, obtaining an accurate number of missiles is very difficult. Indeed, with a variety of parties involved in the smuggling, it is doubtful that anyone knows for sure how many missiles have been smuggled out of Libya.

The U.S. government has designated \$40 million for a program intended to buy back Libyan MANPADS, but clearly many of them have already made it out of the country. In addition to the February seizure in Algeria, Egyptian authorities seized eight SA-24 missiles in the Sinai Peninsula in September 2011. A month earlier, two Israeli Cobra helicopters came under fire from a MANPADS fired from Sinai during a multi-stage attack launched from Sinai that resulted in the deaths of eight Israelis. The missile missed the Cobras. Indeed, the Jerusalem Post reported that, due to the perceived increase in the MANPADS threat from Sinai, commercial aircraft landing in Eilat have changed their approach pattern.

To date, we are not aware of any attacks or attempted attacks against commercial airliners using MANPADS taken from Libyan stocks. But with the missiles in the hands of Palestinian militants in Sinai and Gaza as well as in the inventory of groups such as AQIM, there is a legitimate concern that they will be used in an attack in the immediate future. Jihadists have long had a fixation on aviation as a target. With increases in airline passenger and luggage screening, MANPADS provide jihadists with the means to bypass those security measures and conduct attacks against civilian aircraft. They may have problems getting missiles into Europe or North America, but with active jihadist franchises in Afghanistan, Pakistan, Yemen, Somalia and North Africa, there is a very real threat of a MANPADS attack directed against U.S.- or European-flagged carriers in those regions. But with a year now gone since the Libyan weapons stockpiles were looted, Libyan MANPADS could be almost anywhere in the world, and it is somewhat surprising that they have not been more widely used.

(c) www.Stratfor.com All rights reserved. Reproduced with permission