

Report

April 2024



PERSISTENT PERILS

Illicit MANPADS in the MENA Region

Matt Schroeder



Security Assessment
in North Africa



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Ministry of Foreign Affairs of the
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Credits

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Cover photo: Fighters from the Lebanese militant group Hezbollah train in Aaramta village in the Jezzine District, southern Lebanon, Sunday 21 May 2023.

Source: AP Photo/Hassan Ammar (2023)

About the author and acknowledgements

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About the SANA project

The Security Assessment in North Africa is a multi-year project of the Small Arms Survey that supports those engaged in building a more secure environment in North Africa and the Sahel-Sahara region. The project produces timely, evidence-based research and analysis on the availability and circulation of small arms, the dynamics of emerging armed groups, and related insecurity. The research stresses the effects of uprisings and armed conflicts in the region on security-related issues.

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For more information, please visit: www.smallarmssurvey.org/sana

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List of abbreviations and acronyms

APEC	Asia-Pacific Economic Cooperation forum
EOD	Explosive ordnance disposal
GNA	Government of National Accord
IS	Islamic State
IS-SP	Islamic State-Sinai Province
JEM	Justice and Equality Movement
LAAF	Libyan Arab Armed Forces
MANPADS	Man-portable air defence system(s)
MENA	Middle East and North Africa
PIJ	Palestinian Islamic Jihad
PKK	Kurdistan Workers' Party
RPG	Rocket-propelled grenade
RSF	Rapid Support Forces

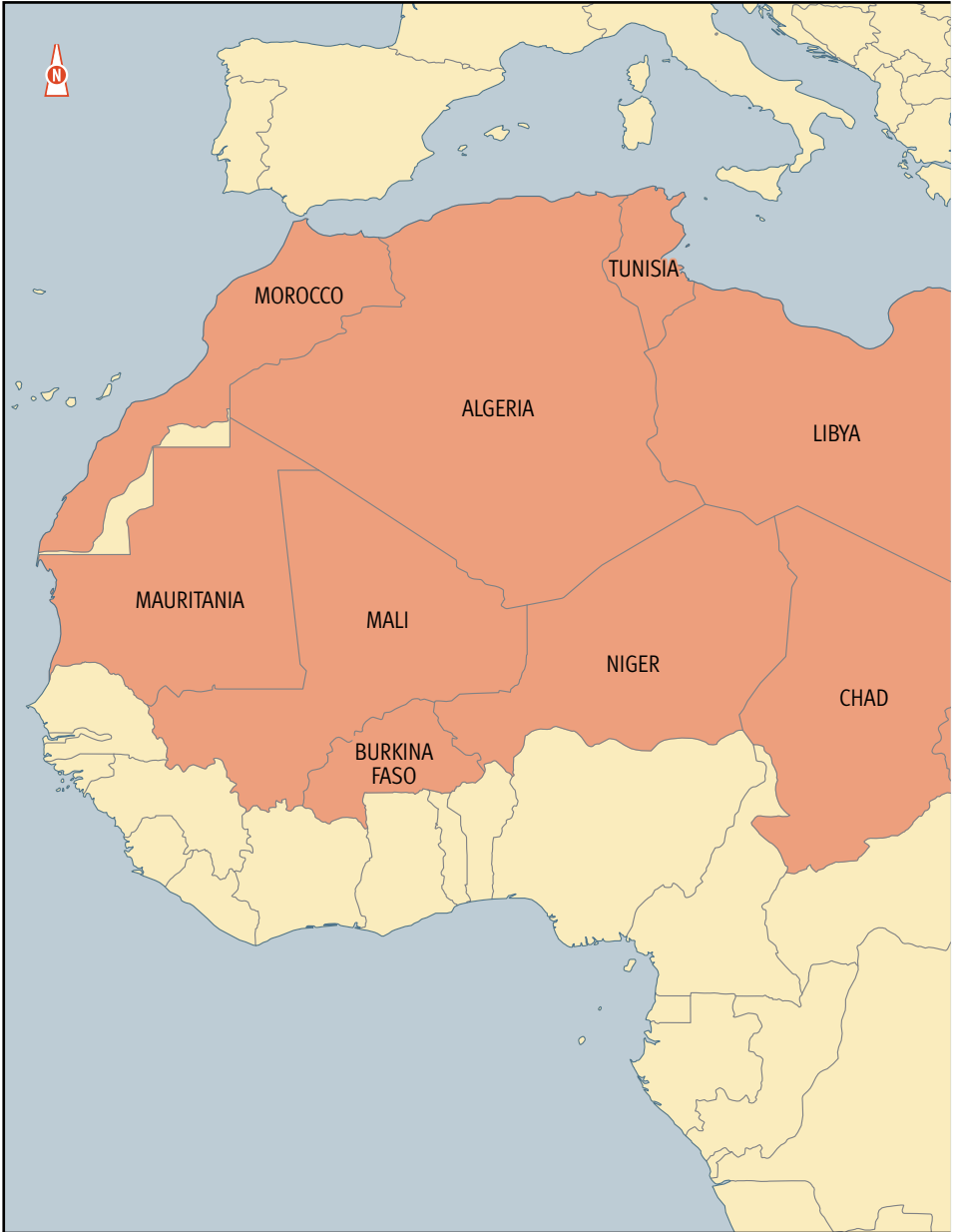
Executive summary

The illicit acquisition and use of man-portable air defence systems (MANPADS) poses an acute threat to military and civilian aircraft. Since 1970, armed groups have hit dozens of civilian aircraft with MANPADS, killing more than 1,000 civilians (US DoS, 2023, p. 37). The international community has taken numerous steps to reduce illicit proliferation, but the MANPADS threat persists, especially in the Middle East and North Africa (MENA) region, which accounted for nearly three-quarters of documented illicit MANPADS activity worldwide from 2011 to 2021 (Schroeder, 2022).¹ Illicit MANPADS in the MENA region range from 50-year-old Soviet Strela-2s to recently produced Chinese-designed FN-6 and QW-18 pattern systems. As in previous eras, first-generation systems comprise the majority of illicit MANPADS in the region. Of greater concern are the numerous advanced MANPADS acquired by armed groups, particularly groups supported by Iran. Not only do advanced MANPADS poses a greater threat to aircraft than their older counterparts, but the continued failure to prevent the illicit proliferation of these systems undermines counter-MANPADS norms and regimes painstakingly assembled and promoted over the last two decades.

Key findings

- In spite of long-standing international efforts to curb the illicit proliferation of MANPADS, armed groups in the MENA region continue to acquire and use these systems. The Survey identified reports of 12 different models of illicit MANPADS in the arsenals of armed groups in 13 of the 26 MENA states from 2015 to mid-2023.
- Chinese-designed MANPADS are gradually supplanting Soviet/Russian models as the most commonly encountered illicit advanced MANPADS in the MENA region. Existing evidence indicates that most of these MANPADS come from the states that imported them.
- First-generation Strela-2-pattern MANPADS remain the most widely proliferated systems. The Survey found reports of these systems or their components in all 13 of the affected MENA states, and they were the only illicit MANPADS identified in four states.
- Interviews with munitions experts indicate that common assumptions about the lifespan of first-generation MANPADS are often incorrect. These assumptions are further undermined by successful launches of decades-old Strela-2-pattern MANPADS in the Gaza Strip and Iraq.
- Armed groups in at least nine MENA states had access to advanced MANPADS during the time period studied. This is notable because advanced MANPADS are significantly more capable than older systems.
- The continued proliferation of advanced MANPADS, and particularly systems manufactured since 2005, calls into question the commitment of some states to fully implement key international counter-MANPADS norms and guidelines.
- Transfers from foreign governments are the primary source of advanced MANPADS for armed groups in the MENA region. Of these governments, existing evidence suggests that Iran is the most geographically prolific supplier in the MENA region.
- No MANPADS made by Western states were identified outside of government control in the MENA region during the time period studied, suggesting that their export controls and stockpile security practices remain robust.

Map 1 Overview of the MENA region



Source: Small Arms Survey/SANA Project

“No threat is more serious to aviation’ than the small, light-weight surface-to-air missiles collectively known as MANPADS.”

Introduction

During a meeting of the Asia-Pacific Economic Cooperation (APEC) forum in 2003, then US Secretary of State Colin Powell solemnly observed that ‘no threat is more serious to aviation’ than the small, lightweight surface-to-air missiles collectively known as MANPADS (Shenon, 2003). Powell’s comments were not without merit. The US State Department estimates that MANPADS attacks on civilian aircraft have killed more than 1,000 people since 1970 (US DoS, 2023, p. 37). A month after the Secretary’s speech, television footage of the burning wing of a DHL cargo plane struck by a MANPADS as it departed from Baghdad International Airport underscored the threat posed by these missiles, including in the MENA region (Aviation Safety Network, 2003). That imagery—along with a failed attempt to shoot down an Israeli airliner in Mombasa, Kenya, a year earlier²—galvanized an international response that led to the disposal of tens of thousands of surplus MANPADS, the strengthening of controls in depots holding thousands more missiles, and the adoption or endorsement of robust guidelines on export controls by more than 100 countries, including the world’s largest MANPADS exporters.³

Despite these accomplishments, the threat persists. In a 2022 study, the Small Arms Survey identified 406 unique reports of illicit possession and transfers of MANPADS in 32 countries and territories on five continents from 2011 to 2021. As in previous decades, the MENA region accounted for the majority of these incidents (Schroeder, 2022). This Report provides an in-depth analysis of the illicit proliferation of MANPADS in the MENA region, with a particular focus on advanced (third- and fourth-generation) systems (see Map 1). The paper builds upon previous Survey studies of illicit MANPADS in the region, including a 2014 Issue Brief on Syria and a 2015 Issue Brief on North Africa.⁴ It draws on imagery and information collected since 2015 to identify the type, model, generation, and country of design of illicit MANPADS. When available, the Survey also gathered and analysed data from the markings on MANPADS components, which often include a production year, manufacturer, and lot number. This data was then combined with other information to identify the likely sources of illicit MANPADS for some armed groups. The Report also summarizes notable changes in regional MANPADS proliferation patterns since 2015, and scrutinizes common assumptions about the life span of illicit first-generation systems. Finally, it assesses the implications of recent proliferation patterns for international norms and agreements.

MANPADS are short-range surface-to-air missile systems that are typically fired from the operator’s shoulder. Most MANPADS consist of four main components: a missile, a launch tube, a reusable gripstock (launcher), and a disposable battery or battery coolant unit. The first MANPADS were fielded in the late 1960s by the United States and the Soviet Union.⁵ Since then, five generations of MANPADS have been produced in more than 20 countries and exported to more than 100 countries on nearly every continent. ●



The Survey's 'Database of Illicit MANPADS' . . . contains several hundred unique reports of illicit possession of MANPADS in the MENA region."

Methodology

Terms and definitions

This Report uses a slightly modified version of the definition of ‘MANPADS’ found in the Wassenaar Arrangement’s Elements for Export Controls of MANPADS, which defines MANPADS as:

- (a) surface-to-air missile systems designed to be man-portable and carried and fired by a single individual; and
- (b) other surface-to-air missile systems designed to be operated and fired by more than one individual acting as a crew and portable by several individuals (WAS, 2007, art. 1.1).

Systems in subcategory (b), which are often referred to as CREWPADS (crew-portable air defence systems), are excluded from the definition of ‘MANPADS’ used in this study. The term ‘advanced MANPADS’ is used to refer to third- and fourth-generation systems, which includes the following systems documented in this Report: Soviet Igla; Russian Igla-S; and Chinese-designed FN-6-, QW-1-, and QW-18-pattern systems (DIA, 2004a, slide 7).⁶

When referring to specific models of MANPADS, this Report uses the transliterated model designation assigned by the country of origin (such as Strela-2M). When referring generally to a model of MANPADS and its foreign variants, or when the exact model is not known, the term ‘pattern’ is used. A common example is ‘Strela-2 pattern’, which refers to the Soviet Strela-2 and Strela-2M along with the numerous variants produced in China (HN-5 pattern), Egypt (Sakr Eye), Iran (Sahand), North Korea, Pakistan (Anza I), and various eastern European countries, among others.

The Report focuses on the illicit possession, transfer, and use of MANPADS, which is defined as MANPADS or components that are possessed (held), transferred, or used in violation of national or international law. The Survey uses the term ‘illicit’ rather than ‘illegal’ to account for cases of unclear or contested legality. Illicit transfers involve the movement of illicitly held MANPADS within or across national borders, usually accompanied by a change in ownership.

This Report uses the UN’s definition of ‘shelf life’, which refers to ‘the manufacturer’s recommended maximum time that ammunition can be stored, and during which the defined quality remains acceptable under expected (or specified) conditions of storage’ (UNDPO, 2020, p. 21). While the definition refers specifically to ammunition, the same general concept is applicable to other parts of a weapon system as well. The term ‘life span’ is used here to refer to the actual amount of time during which an armament or round of ammunition remains functional.⁷

Data sources and research methods

This Report draws on a wide array of source materials, including, but not limited to, data and imagery collected by journalists and researchers in the field, declassified government documents, imagery posted on social media, interviews with governmental and non-governmental experts, and reports by UN panels of experts. The data is stored in the Survey's 'Database of Illicit MANPADS' (Small Arms Survey, n.d.), which contains several hundred unique reports of illicit possession of MANPADS in the MENA region from 2011 to May 2023.

The database entries are divided into two categories of cases: category I and category II. Category I cases are those for which imagery of the illicitly held or transferred MANPADS or components is available from one or more 'select sources'. For the purposes of the database, select sources are government entities, certain armed groups,⁸ UN panels of experts, and journalists and private researchers physically located in the area where illicit possession was documented or illicit transfers took place. Category I cases also include cases documented in other sources when the Survey was able to corroborate key information about the case.

Category II cases are those for which imagery of illicit MANPADS or components is available but the source of the imagery is either unidentified or not included in the list of select sources. Reports of illicit MANPADS that do not include imagery of the systems are excluded from the database, as are reports containing—or deemed likely to contain—false, misleading, or manipulated imagery or information. ●



[A]ssumptions that all first-generation systems are not a threat simply because of their age or time spent outside of government depots are not supported by existing evidence.”

The illicit proliferation of MANPADS in the MENA region

As noted above, this Report covers illicit MANPADS activity in the MENA region from January 2015 to August 2023. The Survey identified 237 reports of illicit possession, transfers, and use of at least 12 different models of MANPADS in 13 MENA states (Small Arms Survey, n.d.). Illicit end users of these systems range from quasi-state entities to local arms dealers, but the majority of reports concerned the possession or use of MANPADS by established armed groups.

Armed groups in possession of MANPADS were present in half of the 26 states in the region during some or all of the time period studied (see Annexe 1). The percentage of affected countries and the number of groups involved are significantly higher than in other regions of the world (Schroeder, 2022; see Table 2).

It should be noted that not all of the MANPADS identified by the Survey are complete systems. Nearly half of all cases analysed by the Survey featured incomplete MANPADS.⁹ Similarly, in two of the 13 affected states (Niger and Tunisia) only incomplete MANPADS were identified, meaning that there is no publicly available evidence of complete systems in these states (Small Arms Survey, n.d.).

Illicit possession and use of first- and second-generation MANPADS

Prevalence and functionality of first-generation Strela-2-pattern MANPADS

As in previous decades, the most frequently documented and widely proliferated models of MANPADS in the MENA region remain first-generation Strela-2-pattern systems.¹⁰ The Survey identified Strela-2-pattern MANPADS or components in all 13 affected states, and they were the only reported illicit MANPADS in four states (see Annexe 1). Most were Strela-2Ms but the Survey also identified a handful of the older Strela-2 systems, along with at least two Chinese HN-5 MANPADS displayed by rebels in Sudan and two HN-5 gripstocks spotted in the Gaza Strip (Small Arms Survey, n.d.; see Image 1).

Strela-2-pattern MANPADS were first fielded in the late 1960s and are among the oldest systems in circulation (Berman et al., 2017, p. 1). Manufacture dates stencilled on the Strela-2M launch tubes reviewed by the Survey during the period 2015–20 range from 1971 to 1987 (Small Arms Survey, n.d.). Assuming that the markings are authentic,¹¹ the missiles were between 32 and 47 years old when they were seized, found, or displayed (see Images 2–7).

A common assumption is that MANPADS have a limited shelf life and the system's shelf life roughly corresponds with its life span. Publicly available estimates for the

shelf life of Strela-2M MANPADS range from 10 to 22 years (Schroeder, 2013, p. 64). In some cases, Strela-pattern systems that are beyond their estimated shelf life are indeed non-functional due to a combination of advanced age, suboptimal storage conditions, and mishandling. In 2012, Syrian rebels told journalist C.J. Chivers that none of the 50 Strela-2-pattern MANPADS seized from a Syrian military base in 2012 were operational, and only three of four Igla-1 MANPADS were functional (Chivers, 2013). The remaining Strela-2-pattern MANPADS that were looted from government stocks during Syria's war are now a decade older and have spent several additional years outside of government depots, raising doubts about their operational status and whether they pose a threat to aircraft.

Imagery of other Strela-pattern MANPADS and components raise similar questions about the functionality of some of the other illicit Strelas identified by the Survey. Several of the images of illicit Strela-2Ms reveal that they were damaged, caked with dirt, or found with other munitions that were rusted or showed other obvious signs of deterioration due to improper storage. This is especially true of MANPADS found in legacy arms caches in Iraq, Libya, and Yemen (see Images 8–10). It would, however, be a mistake to assume that all illicit Strela-2-pattern MANPADS in the MENA region are non-functional. US government documents obtained under the Freedom of Information Act indicate that the shelf life of first- and second-generation MANPADS can exceed

Image 1 Chinese gripstock displayed by al-Quds Brigades in the Gaza Strip, 2023



Notes: A Chinese SK-5 gripstock displayed by al-Quds Brigades (the military wing of the Palestinian Islamic Jihad (PIJ) group) during an event in the Gaza Strip in May 2023. The model designation is visible despite a poorly executed attempt to paint over the markings.

Source: El Saife (2023)

Images 2–7 Imagery of the markings on the launch tubes of illicit Strela-2M-pattern MANPADS in the MENA region, 2015–20



Notes: Strela-2M launch tube found by Turkish authorities, 2020, manufactured in 1981 (2); launch tube reportedly displayed by a member of Islamic State-Sinai Province (IS-SP) in Egypt, circa 2019, manufactured in 1977 (3); MANPADS in a crate filmed in Syria, circa 2018, manufactured in 1971 (4); MANPADS displayed by the Nasser Salahedeen Brigades in Gaza,¹² 2015, manufactured in 1977 (5); launch tube seized by Turkish authorities, 2019, manufactured in 1987 (6); screenshot from video footage of a launch tube reportedly taken in the Gaza Strip, circa 2020, manufactured in 1977 (7).

Sources: Small Arms Survey (n.d.) (2, 3, 4, 6, 7); Quds Net New Agency/NurPhoto via Getty Images (2015) (5)

Images 8–10 Strela-2-pattern MANPADS components found in arms caches in Iraq, 2017 and 2019



Notes: Strela-2-pattern MANPADS launch tube found with rusted weapons in Iraq, 2017 (8); arms cache containing two Strela-2-pattern launch tubes found in a cave near Mosul, Iraq, 2019 (9, 10).

Sources: Iraqi MoD (2017) (8); SouthFront (2019) (9, 10)

25 years, an assessment that is supported by technical evaluations of Strela-pattern MANPADS in the MENA region and elsewhere (DIA, 2004c, pp. 25–29).

Peruvian Strela-2M MANPADS manufactured in 1971 were still ‘in fully functional condition’, despite basic storage conditions and no maintenance, according to explosive ordnance disposal (EOD) technician Colin King who examined them in 2019. King and his team tested several of the systems’ components, including their batteries, all of which ‘produced correct voltage for at least 15 minutes’ (see Images 11–12). When asked if the Peruvian military’s MANPADS were representative of Strela-2Ms more generally, King responded that the operational state of the missiles ‘are in line with weapons of that era, provided they’ve been kept in dry storage’. He concluded by cautioning against believing common claims about the life span of munitions. ‘We spend a lot of time studying the effects of ageing on ammunition [. . .]. We often find that popular assumptions are contradicted by the hard evidence from exploitation.’¹³

Images 11–12 48-year-old Strela-2-pattern MANPADS components examined by EOD technicians



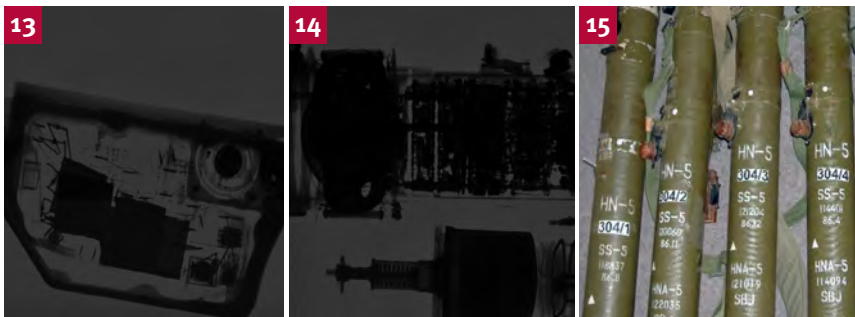
Notes: Disassembled Strela-2M missile manufactured in 1971 (11); testing equipment for Strela-2-pattern batteries (12). An examination of the missile revealed that it was still functional. The testing equipment revealed that, despite their advanced age, the batteries were still capable of ‘produc[ing] the correct voltage for at least 15 minutes’.

Source: Fenix Insight Ltd (2019)

Other assessments of Strela-2M MANPADS have yielded similar findings. International experts who tested decades-old Libyan Strela-2M MANPADS components in 2013 found that some were ‘still serviceable despite their age’ (UNSC, 2014, p. 92).

Similarly, Drew Prater, a former US EOD technician who inspected illicit MANPADS in South Asia in 2006, told the Survey that he found no signs of ‘external degradation or any noticeable internal degradation on X-rays’ in the approximately three dozen systems he examined, which included Strela-2-pattern MANPADS.¹⁴ The systems

Images 13–15 MANPADS components and X-rays examined by a US EOD technician in South Asia, 2006



Notes: X-rays of a MANPADS gripstock (13) and a battery and launch tube (14); Chinese HN-5 launch tubes (15).

Source: Drew A. Prater (2006)

appeared to have all of their original components—that is, there were no signs that any of the MANPADS had been refurbished. The technician provided the Survey with photos of the MANPADS and X-rays of key components (see Images 13–15).

The Survey asked Prater to estimate the likelihood that Strela-2-pattern MANPADS manufactured in the 1970s would still be functional in various scenarios. His responses are reproduced in Table 1.

While the MANPADS examined by Prater appeared to be functional, he did note that the same may not be true for other older MANPADS, especially those subjected to rough handling or suboptimal storage conditions. Moisture, direct exposure to sunlight, and excessive vibration during transport—conditions that many looted and diverted MANPADS are likely to have been exposed to at some point—can damage key components. The proportion of Strela-2-pattern systems in the MENA region rendered unusable as a result is unknown and perhaps unknowable. What is clear, however, is that assumptions that all first-generation systems are not a threat simply because of their age or time spent outside of government depots are not supported by existing evidence.¹⁵

Recent missile launches by armed groups in the Gaza Strip, Iraq, Libya, and Syria are perhaps the most compelling evidence of the continued threat posed by Strela-2-pattern MANPADS (see Images 16–20). These incidents confirm that key components of at least some Strela-2-pattern missiles remain functional.

Notably, all but one of the MANPADS in Images 14–18 are equipped with improvised batteries, which may indicate that armed groups in the region do not have access to factory-built batteries or that available batteries are no longer functional. It could also indicate, however, that improvised batteries have a longer charge than their factory-built counterparts.

It should be noted that, even when functional, Strela-2-pattern MANPADS do not pose the same threat as recent-generation systems. First-generation MANPADS are

Table 1 Likelihood that Strela-2-pattern MANPADS manufactured in the 1970s would still be functional today in three different scenarios

Storage conditions	Likelihood of still being functional
Stored in a purpose-built, climate-controlled depot with regular professional maintenance	Highly likely
Stored in a non-military building with no maintenance in the MENA region	Possible
Stored in a buried arms cache in the MENA region	Likely

Source: Correspondence with Drew A. Prater, former US EOD technician, 25 May 2023

Images 16–20 Launches of Strela-2-pattern MANPADS in Iraq and Gaza, 2020–23



Notes: Launches of Strela-2-pattern MANPADS by the Ezzedeen al-Qassam Brigades (the military wing of Hamas) (16, 17) and al-Quds Brigades (18) in 2022, by the Revenge of Muhandis Brigade in Iraq in 2020 (19), and by the Ezzedeen al-Qassam Brigades in 2023 (20).

Sources: Small Arms Survey (n.d.) (16, 17, 18); Weiss and Truzman (2020) (19); Ezzedeen al-Qassam Brigades (n.d.) (20)

significantly less capable than their modern counterparts. The infrared seekers and guidance systems in Strela-2-pattern MANPADS are susceptible to flares and other simple aircraft-mounted counter-measures, and are generally limited to tail-chase engagements (meaning that the operator must usually be behind the target for the missile’s seeker to lock on to the aircraft). Strela-2s and Strela-2Ms also have smaller warheads, shorter engagement ranges, and more limited fusing. For these reasons, Strela-2-pattern MANPADS are less likely to hit targeted aircraft than more recently fielded MANPADS, and significantly less likely to hit fast-moving military aircraft. Degradation of or damage to key components due to suboptimal storage conditions or rough handling may further reduce the likelihood of a successful attack even if the missile is still capable of launching.

Illicit possession of second-generation MANPADS

Armed groups in the MENA region have also acquired a limited number of second-generation MANPADS, mainly Soviet-designed Igla-1 systems. The Survey identified at least 27 reports of illicit possession of second-generation systems in six countries

Images 21–23 Igla-1-pattern MANPADS in the possession of armed groups in the MENA region, 2016–23



Notes: Multiple Igla-1-pattern MANPADS displayed by members of Lebanese Hezbollah during military drills in 2023 (21); Igla-1-pattern launch tube seized from the PKK in Türkiye in 2017 (22); Igla-1-pattern launch tube seized from IS by Iraqi authorities in 2016 (23).

Sources: War Noir (2023a) (21); Karadağ and Karadağ (2017) (22); Boone (2016) (23)

(Small Arms Survey, n.d.). Illicit end users include al-Qaeda in the Arabian Peninsula, the non-state armed group Islamic State (IS) and its affiliates, Lebanese Hezbollah, the Libyan National Army (LNA), the Kurdistan Workers' Party (PKK), and the Houthi movement (Ansar Allah), among other groups (see Images 21–23).

The Strela-3 and Igla-1 are technological upgrades over first-generation Strela-2 pattern systems. Their nitrogen-cooled seekers are more sensitive and less vulnerable to background radiation and basic counter-measures than their predecessors. Improvements to the guidance system and the larger warhead of the Igla-1 increase its lethality compared with Strela-2-pattern MANPADS, and the Strela-3 and Igla-1 have longer ranges and higher effective altitudes than most first-generation systems. For these reasons, second-generation MANPADS are widely considered to be a greater threat than the more numerous Strela-2-pattern systems.

In practice, the more-recent-generation MANPADS do not always outperform their older counterparts against all targets, as illustrated by the successful attack on a DHL

Box 1 Illicit North Korean MANPADS in the MENA region

Armed groups in the MENA region have also acquired an unknown quantity of North Korean HT-16 MANPADS—a variant of the Soviet-designed Igla-1. Externally, the HT-16 is similar in appearance to the Igla-1, but little is known about its internal components or how the performance of the system compares to the older Igla-1.¹⁶ The first known sighting of the HT-16 outside of North Korea occurred in 2014, when anti-government forces posted photos of themselves reportedly holding the systems at a captured Syrian government airbase. Since then, armed groups have posted several additional photos of the systems in Syria (see Images 24–27).

The HT-16 has also proliferated to the Gaza Strip, where the Ezzedein al-Qassam Brigades (the military wing of Hamas) has displayed them in military parades (see Images 28–29).

Identifying the source (or sources) of the HT-16 MANPADS is difficult. The North Korean government is highly unlikely to respond favourably to trace requests, and the markings on illicit North Korean MANPADS do not match the few sets of available markings on North Korean systems documented outside of Syria and the Gaza Strip. It is possible

Images 24–27 North Korean HT-16 MANPADS in Syria



Notes: Collected images of North Korean HT-16 MANPADS in various locations within Syria.

Sources: Oliemans and Mitzer (2016) (24, 25); AENN/YouTube (2013), via Small Arms Survey (n.d.) (26); BM-21 GRAD (2016) (27)

Images 28–29 North Korean MANPADS displayed by members of the Ezzedein al-Qassam Brigades, 2021



Notes: Ezzedein al-Qassam Brigades members displaying North Korean MANPADS in northern Gaza, May 2021 (28) and in Gaza City, June 2021 (29).

Sources: Ezzedein al-Qassam Brigades (n.d.)

- ▶ that the systems came directly from North Korea. UN investigators have documented multiple transfers of military technology from the North Korean government to the Syrian government,¹⁷ but have not reported on illicit MANPADS transfers to Syria, per se. The number of illicit transfers documented by investigators is limited, however, so the absence of MANPADS from UN reports of illicit trafficking to Syria does not rule out North Korea as the direct source of the missiles.

Another possibility is that the systems were transferred to Syria via a third party, such as Iran. The Iranian government has served as a conduit for North Korean weapons in the past, including MANPADS,¹⁸ and Tehran's relationships with the Syrian government and Hamas make Iran the most likely candidate. Definitively linking Iran to the North Korean MANPADS would, however, require additional evidence that is not currently in the public domain.

A300 aircraft as it was departing from Baghdad International Airport in 2003. The assailants fired two MANPADS missiles—a second-generation Strela-3 and a first-generation Strela-2M. It was the older Strela-2M that hit the plane (DIA, 2004b, slide 17). This example highlights an important caveat regarding the MANPADS threat: the technological improvements of later-generation systems are less significant when the target is a large, defenceless civilian plane, which is more vulnerable to older MANPADS than small, fast-moving military planes and helicopters, and fixed-wing aircraft equipped with modern counter-measures.

Illicit proliferation of advanced MANPADS

Of greater concern are the advanced (third- and fourth-generation) MANPADS currently circulating in the MENA region. The Survey identified reports of illicit possession of advanced MANPADS in nine MENA states—more than in any other region of the world (see Table 2).¹⁹

The data also indicates that the illicit acquisition of advanced MANPADS is not an isolated event in most of the affected countries. Multiple models of advanced systems were acquired by armed groups and other unauthorized end users in at least seven states, and multiple groups acquired advanced systems in at least six states (Small Arms Survey, n.d.). This level of proliferation is unique to the MENA region.

Table 2 lists the models of advanced MANPADS identified in the MENA region from January 2015 to August 2023 by country, armed group, and year.

Table 2 Illicit possession of advanced MANPADS in the MENA region, 2015–23

Country	Armed group	Model	Generation	Year(s) documented Case category (1/2)* Complete system (c/p/u)**
Egypt	Islamic State-Sinai Province (IS-SP) ²⁰	Igla-S	3	2015 (2/c)
Iraq	Unclear	Igla	3	2022 (1/p)
	Kata'ib Hezbollah	QW-1 pattern	3	2015 (2/u)
		QW-18 pattern	3	2015 (2/u)
	Kurdish Peshmerga	Igla	3	2016 (1/c)
Lebanon	Arms dealer with alleged ties to Abdullah Azzam Brigades	FN-6	4	2016 (1/c)
	Hezbollah	QW-1 pattern	3	2023 (1/u)
		QW-18 pattern	3	2020 (1/u); 2023 (1/u)
Libya	Unclear	Anza II	3	2015 (1/p)
		FN-6 pattern	4	2020 (2/p)

Country	Armed group	Model	Generation	Year(s) documented Case category (1/2)* Complete system (c/p/u)**
	Islamic State (IS)	Igla-S	3	2018 (2/u)
	Government of National Accord (GNA) ²¹	FN-6 pattern	4	2019 (2/c, 1/u); 2020 (2/p)
		QW-18 pattern	3	2020 (2/u)
	Libyan Arab Armed Forces (LAAF) ²²	FN-6	4	2019 (1/u)
Palestinian Territories	Al-Quds Brigades (military wing of the Palestinian Islamic Jihad, PIJ)	Igla	3	2016 (1/u); 2018 (1/u); 2019 (2/c); 2020 (2/u); 2021 (1/c); 2022 (1/c); 2023 (1/u)
	Ezzedeen al-Qassam Brigades (military wing of Hamas)	QW-18	3	2018 (1/p)
Sudan	Justice and Equality Movement (JEM)	Igla	3	2018 (1/p)
	Rapid Support Forces (RSF)	Igla	3	2023 (2/c)
		Igla-S	3	2023 (2/p)
		FN-6 pattern	4	2023 (1/c)
Syria	Unclear	Igla pattern	3	2017 (2/u); 2018 (1/u)
		Igla-S	3	2017 (2/p); 2018 (2/p)
		FN-6	4	2015 (2/u); 2016 (2/c)
	Free Syrian Army	FN-6	4	2016 (2/u); 2018 (2/p)
	Islamic State (IS)	FN-6	4	2018 (2/p)
	Other rebel groups ²³	QW-1 pattern	3	2016 (2/p)
		FN-6	4	2016 (2/c)
	Unspecified 'Islamic rebels', 'militants', 'rebels', 'terrorists'	FN-6	4	2016 (1/c)

Country	Armed group	Model	Generation	Year(s) documented Case category (1/2)* Complete system (c/p/u)**
Türkiye	Kurdistan Workers' Party (PKK)	Igla	3	2016 (2/c); 2017 (1/p)
Yemen	Unclear	Igla-S	3	2018 (2/u)
		QW-18 pattern	3	2023 (2/p)
	Houthi movement (Ansar Allah)	QW-1 pattern	3	2022 (1/u)
		QW-18 pattern	3	2022 (1/u)

Notes: * '1' = category I cases; '2' = category II cases. ** 'c' = complete system (missile in launch tube, gripstock, battery unit); 'p' = partial (one or more key component is not visible in available imagery); 'u' = unclear. In most of the incidents categorized as 'unclear', a gripstock, battery unit, and launch tube are visible, but it is unclear whether there is a missile in the launch tube.

Source: Small Arms Survey (n.d.)

The models and sources of illicit MANPADS vary from state to state, and reflect the conflict dynamics in both the affected state and neighbouring states, including relationships between local armed groups and foreign governments. All of the models of advanced MANPADS listed in Table 2 are Chinese, Russian/Soviet, and North Korean designs, with Russian and Chinese designs accounting for most illicit possession in the region. The widespread proliferation of Chinese-designed systems marks a notable departure from past proliferation patterns. A 2001 study of MANPADS acquisition by non-state armed groups worldwide from 1996 to 2001 identified just one MENA group in possession of Chinese-designed MANPADS (and only one model) (Hunter, 2001, p. 43). A similar study on illicit possession of MANPADS from 1998 to 2013 found an increase in the proliferation of Chinese systems, but their acquisition by armed groups was still relatively limited—just three groups in three MENA states (Small Arms Survey, 2013, pp. 1–5).²⁴ In contrast, the Survey found evidence of illicit possession of Chinese-designed MANPADS by at least 14 different groups in seven MENA states over a shorter time period (from 2015 to mid-2023) (Small Arms Survey, n.d.).

There are three primary sources of illicit advanced MANPADS in the region: transfers by external governments to proxy groups, retransfers and seizures by and from other armed groups, and looted government stockpiles. Historically, covert government arms transfers to proxy groups have been a major source of illicit MANPADS, including recent-generation MANPADS. In the early 1970s, recently fielded Strela-2-pattern MANPADS supplied by Libyan dictator Muammar Qaddafi were used in the first documented plots to shoot down commercial airliners. A decade later, anti-Soviet rebels

in Afghanistan used newly manufactured Stinger missiles supplied by the United States to bring down dozens of Russian and Afghan government aircraft (Schroeder, Smith, and Stohl, 2007, pp. 64, 85). In both cases, the new systems were not widely available and would have been nearly impossible for armed groups to obtain without assistance from friendly governments. The same is true of most of the advanced MANPADS in the possession of armed groups in the MENA region since 2015, including the FN-6s circulating in Syria and in neighbouring states and the QW-pattern systems acquired by armed groups in Gaza, Iraq, Lebanon, and Yemen.²⁵

The key difference between state-sponsored MANPADS smuggling in previous decades and recent transfers to armed groups is that the latter is a violation of the global normative counter-MANPADS framework established in the early 2000s (WAS, 2007). This framework includes detailed sets of guidelines on the transfer and storage of MANPADS adopted by the members of four major international organizations: APEC, the Organization for Security and Cooperation in Europe (OSCE), the Organization of American States (OAS), and the Wassenaar Arrangement. The guidelines were also endorsed by the UN General Assembly and the International Civil Aviation Organization, making them as close to universally applicable as possible.

Key provisions of these guidelines include:

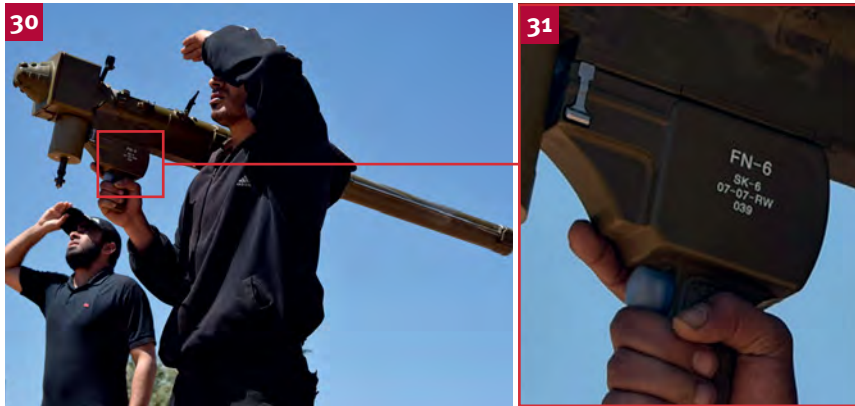
- a de facto prohibition on transfers of MANPADS to non-state actors without authorization by the importing state;²⁶
- a requirement that decisions to authorize MANPADS exports will ‘take into account the potential for diversion or misuse in the recipient country [and] the recipient government’s ability and willingness to protect against unauthorized re-transfers, loss, theft and diversion’; and
- a requirement that every exporting government ‘will assure itself of the recipient government’s guarantees [. . .] not to re-export MANPADS except with the prior consent of the exporting government’ (WAS, 2007, paras. 3.1, 3.7, 3.8).

Combined, these provisions effectively ban transfers to armed groups and discourage transfers to governments that are likely to divert imported MANPADS to unauthorized end users, including armed groups. As illustrated below, adherence to these provisions is far from universal. Each violation weakens these guidelines and the norms that underpin them, and calls into question the commitment of some states to key international security norms and agreements.

Illicit Chinese-designed FN-6 MANPADS

Among the most notable MANPADS proliferation events of the last 20 years was the covert delivery of several dozen Chinese-designed FN-6 MANPADS to Syrian armed

Images 30–31 A Syrian militant on patrol with an FN-6 MANPADS, 2016



Notes: Complete FN-6 MANPADS in the possession of a Syrian militant near Homs (30); markings on the gripstock indicating that it was manufactured in 2007 (31). The production dates on FN-6 MANPADS in Syria reviewed by the Survey are consistent with claims that the systems came from Sudan.

Source: Mahmoud Taha/AFP

groups in or around 2012 (see Images 30–31). Unidentified government officials and Syrian rebels reportedly told the *New York Times* that the Qatari government had purchased the missiles from Sudan and then transported them through Türkiye (Mazzetti, Chivers, and Schmitt, 2013). Sudanese officials denied the claim, but the limited number of other potential sources, the identification of other recently manufactured Sudanese munitions in rebel stockpiles, and the dates of production on gripstocks and launch tubes reviewed by the Survey are consistent with the *New York Times'* assertions (Chivers and Schmitt, 2013).

Images 32–33 FN-6 MANPADS in Iraq and Lebanon



Notes: An IS fighter launching an FN-6 MANPADS at an Iraqi military helicopter near Baiji, Iraq in 2014 (32); an FN-6 MANPADS found in an arms cache belonging to an al-Qaeda-affiliated arms dealer in Majdal Anjar, Lebanon (33).

Sources: Grossman (2014) (32); Lebanese Armed Forces (2016) (33)

Images 34–35 FN-6 MANPADS displayed by Libyan combatants in 2019



Notes: A member of a GNA-aligned ‘militia’ holding a complete FN-6 MANPADS, November 2019 (34); a member of the LAAF holding an FN-6 next to a truck bearing the logo of a militia linked to the GNA, April 2019 (35).

Source: Mansour (2019) (34); Berkowitz (2019) (35)

Some of the FN-6s were later acquired by extremists and criminals in neighbouring states, including IS members in Iraq (see Image 32). IS used an FN-6 to shoot down an Iraqi military helicopter in 2014.²⁷ Two years later, Lebanese authorities seized a complete FN-6-pattern MANPADS from an arms trafficker with alleged ties to the Abdullah Azzam Brigades—an al-Qaeda affiliate group in Lebanon (Lebanese Armed Forces, 2016; see Image 33). The Survey was unable to definitively identify the source of the seized FN-6, but it most likely came from Syria given the relatively large numbers of FN-6s circulating in that country during this time period, the absence of any known domestic sources of this particular model of MANPADS, and previous Lebanese seizures of arms trafficked from Syria.

In Libya, both Government of National Accord (GNA)- and LNA-affiliated forces also possess FN-6 MANPADS. In 2019 and 2020, social media accounts connected to the GNA and the LNA posted photos of FN-6 MANPADS reportedly seized from the other group. Additional photos of FN-6 MANPADS displayed by the GNA were posted online in November 2019 and February 2020 (see Images 34–35).

The Rapid Support Forces (RSF) in Sudan has also acquired multiple FN-6 MANPADS. In May 2023, members of the RSF displayed four FN-6 MANPADS launch tubes, at least one of which was equipped with a battery unit and a gripstock, at the Presidential Palace in Khartoum (see Images 36–37).

Images 36–37 FN-6 MANPADS displayed by the RSF in Sudan, 2023



Notes: Video screenshots of RSF members displaying four FN-6 MANPADS launch tubes, showing a gripstock and battery attached to the middle-left tube (36) and a close-up of one of the FN-6 launch tubes (37).

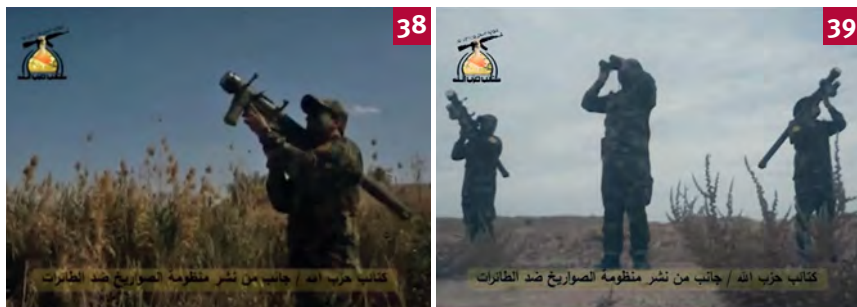
Source: War Noir (2023b; 2023c) (36, 37)

The video showing the MANPADS was posted shortly after the *Wall Street Journal* published an article claiming that the Russian mercenary group Wagner had offered to supply the leader of the RSF, Lt. Gen. Mohamed Hamdan Dagalo, with unspecified MANPADS stored in neighbouring Central African Republic (Malsin and Faucon, 2023). Lt. Gen. Dagalo reportedly refused the offer but speculation that the FN-6s came from Wagner proliferated online nonetheless. A more likely explanation is that the RSF obtained the missiles from looted military stocks. The Sudanese government is a known importer of FN-6 MANPADS from China and has announced plans to produce a locally made version called the Nayzak (SADJ, 2023). While it is unclear whether the Nayzak was in production when the RSF acquired its FN-6s, the most likely source of the systems was seized Sudanese military stocks.²⁸

Illicit Chinese-designed QW-pattern MANPADS

Armed groups in several MENA states have also acquired Chinese-designed QW-1- and QW-18-pattern MANPADS, systems that are rarely encountered outside of government arsenals in other regions. The first publicly available imagery of illicit QW series MANPADS in the MENA region came from Iraq, where Shia groups acquired and used multiple QW-1-pattern systems shortly after the US invasion in 2003.²⁹ While QW-1-

Images 38–39 QW-pattern MANPADS displayed by Kata’ib Hezbollah in Iraq, 2015



Notes: Screenshots from a video showing a member of Kata’ib Hezbollah with a QW-1-pattern MANPADS (38) and two QW-18-pattern MANPADS (39). The video features Kata’ib Hezbollah’s logo (top left of frame), and the individuals holding the MANPADS are wearing patches associated with the group.

Source: Kata’ib Hezbollah (2015)

pattern MANPADS never constituted more than a small minority of illicit MANPADS in Iraq during this time period, declassified records indicate that coalition forces seized seven QW-1 MANPADS in a single operation (US Central Command, 2008a).

In 2015, Kata’ib Hezbollah, a militant Iraqi Shia group, released a video showing its members carrying multiple QW-1- and QW-18-pattern MANPADS. The acquisition of QW-1 MANPADS by Shia groups in Iraq had been documented repeatedly from 2004 onwards, but the video released in 2015 was the first hard evidence of illicit QW-18-pattern MANPADS in Iraq (see Images 38–39).

In Lebanon, Hezbollah has also acquired numerous QW series MANPADS, which are occasionally displayed during military exercises.³⁰ The most notable public display of the systems occurred during a military exercise held in southern Lebanon in May 2023. At least 11 complete MANPADS are visible in photos and video footage of the event, including multiple QW-1- and QW-18-pattern systems (see Images 40–42). The QW-pattern MANPADS appear to be recently manufactured; markings on three of the gripstocks indicate they were produced in 2016 and 2017.³¹ The remaining MANPADS displayed during the drills were second-generation Soviet-designed Igla-1-pattern systems, which have proliferated widely in the MENA region (see Image 40).

Imagery from the 2023 military exercise is also notable because of the quantity and types of MANPADS displayed by Hezbollah. The MANPADS seized from—or displayed by—armed groups in the MENA region and elsewhere are typically a hodgepodge of ageing first-generation systems along with a much smaller number of advanced MANPADS. While far from rivalling state arsenals, Hezbollah’s inventory of MANPADS is larger, newer, and more uniform than their peers’.

Images 40–42 MANPADS displayed during military drills held by Hezbollah, southern Lebanon, 2023



Notes: Hezbollah members displaying at least ten MANPADS, including five QW-18-pattern systems (red boxes), four Igla-1-pattern systems (yellow boxes), and one QW-1-pattern system (blue box) (40); markings on one of the QW-18-pattern MANPADS gripstocks indicating that the item was manufactured in 2016 (41). The oddly shaped '8' in 'SK-18', however, raises the possibility that some or all of the gripstocks have been re-marked (42).

Sources: Marwan Naamani/dpa/Alamy Live News (40); Aziz Taher/Reuters (41, 42)

In the Palestinian Territories, Ezzedein al-Qassam Brigades' advanced MANPADS consist primarily of Soviet-designed Igla-pattern MANPADS but also include at least a small number of QW-series gripstocks, which were first spotted at a military parade organized by the group in 2018. The Survey identified at least three QW-18 (SK-18) gripstocks attached to Soviet Strela-2-pattern launch tubes—an unusual combination not previously identified in publicly available sources (see Images 43–47). Whether the gripstocks are compatible with Strela-pattern missiles is unclear, along with the reason for the unusual pairing. One possibility is that the group's MANPADS holdings are limited, as is their ability to acquire additional components for their Soviet-designed systems. Nevertheless, it is another interesting example of the gradual encroachment of Chinese-designed systems in the traditionally Soviet/Russian-dominated market for illicit MANPADS.

Images 43–47 QW-18-pattern gripstocks displayed by members of the Ezzedein al-Qassam Brigades, 2018



Notes: Members of the Ezzedein al-Qassam Brigades displaying QW-18 gripstocks during a military parade commemorating Hamas' 31st anniversary. 'SK18' is the model designator for a QW-18 gripstock. All of the gripstocks are attached to Strela-2-pattern launch tubes, a previously unseen pairing.

Sources: Defense-arab.com (2018) (43, 44, 45); Ezzedein al-Qassam Brigades (2018) (46, 47)

Image 48 QW-18-pattern MANPADS found on the *Jihan*, 2013



Notes: Case containing missiles in launch tubes, battery units, and a gripstock for QW-18-pattern MANPADS, found on the ship *Jihan*, transiting from Iran to Yemen in mid-January 2013.

Source: Confidential

The final group in the MENA region that has acquired QW-series MANPADS is the Houthi movement in Yemen. The Houthis' attempts to acquire QW-series MANPADS date back to at least January 2013, when Yemeni authorities interdicted an arms shipment containing 67 MANPADS components, including 35 missiles, gripstocks, and battery units for QW-18-pattern systems (see Image 48).³² The components and other weapons were found on the *Jihan*, a ship that travelled from Iran to the coast of Yemen starting in mid-January (UNSC, 2013a, paras. 46–55).

In the years that followed the interdiction of the *Jihan* in 2013, Yemeni and Saudi authorities seized numerous Strela-2 and Strela-3 systems but no additional public evidence of transfers of QW-pattern MANPADS surfaced until the Houthis displayed two of the systems during a military ceremony in August 2022. Video footage of the ceremony shows at least one QW-18 and one QW-1-pattern MANPADS, along with multiple Strela-2M and Strela-3 systems (see Images 49–50).

The Survey was unable to substantiate other reports of illicit QW-pattern MANPADS in the region. In 2016, an image reportedly showing a rebel in Syria holding a QW-1-pattern launch tube appeared on social media. There are no distinctive geographic features that would allow for the geolocation of the MANPADS, and the identity and organizational affiliation of the individual holding the launch tube are not identifiable.³³

Images 49–50 QW-18- and QW-1-pattern MANPADS displayed by Houthi soldiers, 2022



Notes: Houthi soldiers displaying QW-18-pattern MANPADS (49) and QW-1-pattern MANPADS (50) during a military graduation ceremony in the Sixth Military District, Amran, Yemen, August 2022.

Sources: Ansarollah.net (n.d.)

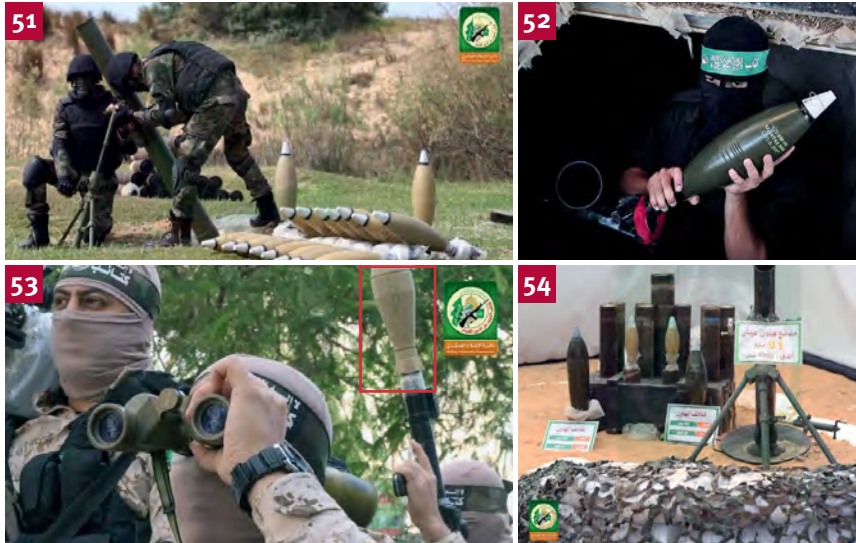
Four years later, photos reportedly taken in Libya of uniformed individuals standing next to a QW-18 MANPADS in a container were posted on X. The tweet erroneously identifies the system as a ‘Stinger’ and points to Türkiye as the source.³⁴ A patch on the uniform of one of the individuals is similar to patches worn by the Libyan GNA but, because the faces of the individuals are redacted and the photos were taken in a nondescript building, UN investigators and other analysts were unable to confirm that the photos were indeed taken in Libya (UNSC, 2021a, p. 191; 2021b, p. 3). The Survey was unable to find any additional evidence of QW-series MANPADS in Syria or Libya.

Like the FN-6 MANPADS supplied to Syrian rebels, the most likely source of the illicit QW-pattern MANPADS circulating in the MENA region is a foreign government, and the government most likely to supply MANPADS to Hamas, Hezbollah and Kata’ib Hezbollah, the Ezzedeen al-Qassam Brigades, and the Houthis is Iran. Iran is the only known government with both QW-1- and QW-18-pattern MANPADS in its arsenals other than China. Publicly available data indicates that the Iranian government imported QW-1 MANPADS in the 1990s and QW-18 MANPADS in the early 2000s before assembling the systems domestically as the Misagh-1 and Misagh-2 (Jane’s Group, 2021). Theoretically, it would be possible for armed groups seeking both QW-1 and QW-18 MANPADS to acquire QW-1s in one importing state and QW-18s in a different importing state, but this is extremely unlikely—especially given that none of the other known importers of the QW-1 or QW-18 are located in the MENA region or have a known affiliation with any of the four armed groups that have acquired the systems.³⁵

Furthermore, all four groups are known recipients of Iranian military support. Officials from Hamas have publicly identified Iran as a source of arms and other materiel, going as far as to openly thank them for their assistance (Siegal, 2021). Other groups are less forthcoming regarding their receipt of Iranian military largesse, but evidence of it is readily available in the public domain. Iranian support for Shia groups in Iraq, which include Kata’ib Hezbollah, is evident in the large quantities of Iranian arms and ammunition that have flowed into Iraq since the early 2000s (Schroeder and King, 2012, pp. 317–29). Publicly available imagery of seized arms caches shows hundreds of Iranian artillery rockets, blocks of explosives, and RPG and mortar rounds,³⁶ some of which were found with QW-series MANPADS and components.³⁷ Iranian weapons were delivered to Iraq in such large quantities and over so many years that it is highly unlikely that senior Iranian leaders did not know of and at least tacitly approve the transfers.

The Houthis are another major recipient of Iranian arms, as evidenced by the thousands of weapons seized en route from Iran to Yemen in recent years. The most notable seizure was the shipment found on the *Jihan*, which (as noted above) contained 67 MANPADS components. After a careful review of available evidence, including interviews with crew members, analysis of waypoint data retrieved from GPS devices found on board the ship, and physical examinations of the seized weapons and their packaging, UN investigators and private analysts identified Iran as the most likely source

Images 51–54 Iranian mortar and RPG rounds displayed by the Ezzedein al-Qassam Brigades, 2014–23



Notes: Multiple 120 mm Iranian mortar rounds on display in photos of a training exercise (51, 52); Iranian PG-7-AT-1 round displayed during a military parade (53); multiple Iranian mortar rounds of different calibres displayed at a military weapons exhibition (54).

Sources: Ezzedein al-Qassam Brigades (2014; n.d.) (51, 52); Ezzedein al-Qassam Brigades (n.d.) (53, 54)

of the weapons (CAR, 2018, p. 24; UNSC, 2015, p. 38; US DoS, 2014, pp. 9, 229).³⁸ Since then, naval forces have interdicted more than a dozen maritime arms shipments bound for the Houthis that were subsequently linked to Iran.

Similarly, Iranian arms and ammunition are readily identifiable in images of military parades and training exercises held by the Ezzedein al-Qassam Brigades. The website of the Ezzedein al-Qassam Brigades includes photos of dozens of Iranian munitions, including 60 mm, 81 mm, and 120 mm mortar rounds and ammunition for RPG-7 pattern launchers (see Images 51–54).

The markings on QW-series MANPADS seized from—and displayed by—the four armed groups are also consistent with claims that Iran is a prominent source of illicit MANPADS in the region. Photos obtained by the Survey reveal that at least one of the SK-18-pattern gripstocks found on the *Jihan* was manufactured in the same year and had the same lot number as the two SK-18 gripstocks spotted in the Gaza Strip in 2018 (Small Arms Survey, n.d.). Furthermore, the serial numbers on the gripstocks displayed by the Ezzedein al-Qassam Brigades and those found on the *Jihan* are just nine and ten digits apart, respectively, strongly suggesting they came from the same source (see

Images 55–57). As noted above, evidence collected by the UN and private research organizations clearly links the arms shipment on the *Jihan* to Iran. Given these linkages, the nearly identical markings on the gripstocks, and the various other Iranian arms and ammunition received by the Ezzedein al-Qassam Brigades, the group’s QW-18-pattern gripstocks very likely came from Iran, either directly or through a third party.

While Iran is likely the proximate source for the QW-series MANPADS obtained by these groups, China shares some responsibility given its role as Iran’s supplier of MANPADS and possibly MANPADS technology. As noted above, China exported large quantities of MANPADS to Iran over a long period of time, despite decades of Iranian support for violent, non-state armed groups.

Box 2 Iranian-supplied Strela-pattern MANPADS

Iran has also supplied—or attempted to supply—other models of MANPADS to armed groups in the MENA region. The Iranian-linked arms shipment found on the *Jihan* in 2013 included 10 Strela-2M-pattern missiles and launch tubes; 2 Strela-2-pattern gripstocks; and 20 Strela-2-pattern battery units (see Image 55) (US Central Command, 2013a; 2013b). The model designator of the missile and the exterior physical characteristics of the launch tubes are very similar to those of other Strela-2-pattern MANPADS, making it difficult to differentiate between Iranian-sourced Strela-2-pattern systems and other Strela-2s. The markings on the launch tubes appear to indicate that the missiles were manufactured in 2011, which would mean that they were less than two years old when they were interdicted. Assuming that the missiles were indeed manufactured in 2011, they are, by far, the most recently produced Strela-2-pattern MANPADS of those for which the Survey has data on the date of manufacture. Whether other Iranian shipments of Strela-2-pattern MANPADS were successfully delivered to armed groups is unclear.

Image 55 Interdicted Strela-2M-pattern MANPADS, 2013



Notes: Strela-2M-pattern MANPADS found aboard the *Jihan*, en route from Iran to Yemen, in 2013.

Source: Confidential

Images 56–58 QW-18-pattern MANPADS gripstocks with nearly identical markings, 2013 and 2018



Notes: An SK-18 gripstock found in an Iranian arms shipment to the Houthis in 2013 (56); SK-18 gripstocks displayed by the Ezzedeen al-Qassam Brigades in the Gaza Strip in 2018 (57, 58). The gripstocks spotted in the Gaza Strip have the same manufacture date and lot number as the Iranian-supplied MANPADS seized five years earlier.

Sources: Confidential (56); Defense-arab.com (2018) (57, 58)

Illicit Soviet/Russian Igla and Igla-S MANPADS

Until recently, Soviet/Russian Igla-series MANPADS accounted for the majority of advanced MANPADS outside of government control. The top spot now belongs to Chinese-designed systems, but Igla-series MANPADS are still widespread and are the only known advanced MANPADS acquired by armed groups in Egypt and Türkiye, where they have been used in at least two attacks on government aircraft.

The attack in Türkiye, which occurred in May 2016, was captured in a video that was later posted on Gerfla TV, a media outlet affiliated with the PKK (Gerfla TV, 2016). The video shows the launch of an Igla missile that appears to strike an AH-1W helicopter, which slowly falls to the ground (see Images 59–60). The Turkish government initially blamed the crash on a mechanical failure, but later conceded that it may have been shot down by an unspecified ‘air defence weapon’ (Hürriyet, 2016).

The Turkish military seized additional MANPADS or components on at least 14 different occasions over the next seven years, including multiple Igla components, in Iraq, Syria, and Türkiye (Small Arms Survey, n.d.). Despite their demonstrated access to MANPADS, the AH-1W helicopter is the only known Turkish military aircraft lost to missile attacks by Kurdish groups in the time period studied.

Images 59–60 MANPADS attack on a Turkish military helicopter, 2016



Notes: Screenshots from a video showing an attack on a Turkish AH-1W Cobra helicopter in Hakkari province in 2016. The attack, using an Igla-S-type MANPADS, successfully brought down the aircraft.

Source: Gerfîla TV (2016)

Igla-S MANPADS have been identified in Egypt and Syria. The Igla-S was first produced in the early 2000s and was Russia’s most advanced MANPADS until the introduction of the Verba a decade later. Igla-S MANPADS were first spotted in Syria in February 2013, when a video of members of the Farouq Brigades placing an Igla-S MANPADS in a truck was posted on YouTube (see Image 61). The video is the first documented acquisition of an Igla-S in a MANPADS configuration by a non-state group anywhere in the world. Later that year, the Authenticity and Development Front posted a video showing its members displaying four generations of MANPADS—another first (see Image 62). Imagery of several additional Igla-S launch tubes (without gripstocks) have been posted on social media since 2015.

Images 61–62 Syrian rebels holding Igla-S MANPADS, 2013



Notes: Members of the Farouq Brigades holding an Igla-S launch tube with an Igla-1 gripstock (61); members of the Authenticity and Development Front displaying four generations of MANPADS—from left to right: a first-generation Strela-2 pattern, a fourth-generation FN-6, a third-generation Igla-S, and a second-generation Igla-1 (62).

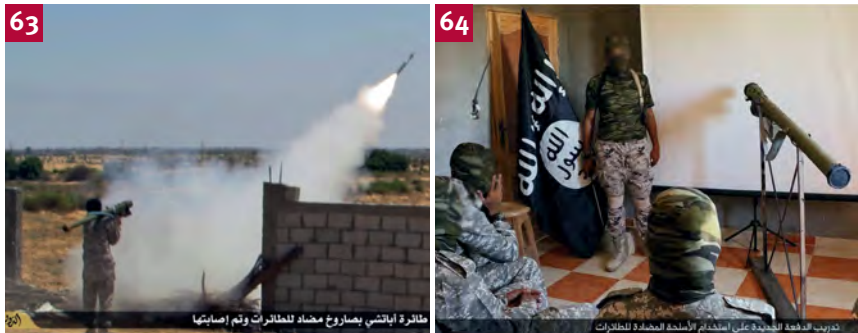
Sources: Ugarit News, 2013 (61); Alasala Watanmya, via Small Arms Survey (n.d.) (62)

Illicit Igla-S MANPADS in Egypt were first shown in a training video posted online by the group IS-SP, an affiliate of IS, based in the Sinai Peninsula. The video shows the launch of an Igla-S missile, which allegedly struck and damaged a military helicopter. Another video posted a year later shows a complete Igla-S MANPADS on a stand and a launch tube leaning against a wall (see Images 63–64).

The source, or sources, of the illicit Igla-S MANPADS in the MENA region is unclear. Russia is known to have exported vehicle-mounted Strelts to several states prior to 2013, including Libya and Syria (before their stocks were looted). Russian officials claimed, however, that no gripstocks were exported as part of these deals, and that the missiles themselves were incompatible with gripstocks.³⁹ Given the Kremlin’s penchant for disinformation, it is possible that Russia exported gripstocks as well as vehicle-mounted systems, or that the missiles were compatible with Igla-series gripstocks, but there is insufficient evidence in the public domain to make any definitive statements about the origins of the illicit Igla-S MANPADS in the MENA region.

The other MENA states in which illicit Igla-series MANPADS or components have been identified since 2015 are Iraq, the Palestinian Territories, Syria, and Sudan.⁴⁰ Most of the Igla MANPADS identified in Iraq are in the possession of Kurdish groups (Small Arms Survey, n.d.). Notably, the only Palestinian group with access to complete advanced MANPADS is al-Quds Brigades, the military wing of the PIJ. Imagery of military parades and other public events organized by the group reveals that it has had access to Igla MANPADS since at least 2016, and footage from a commemoration ceremony held in May 2023 shows at least four complete Igla MANPADS, along with an equal number of Strela-2-pattern systems (see Image 65). Until this event, only two Iglas had been displayed at a single event. Whether this is a full accounting of the group’s MANPADS is unknown.

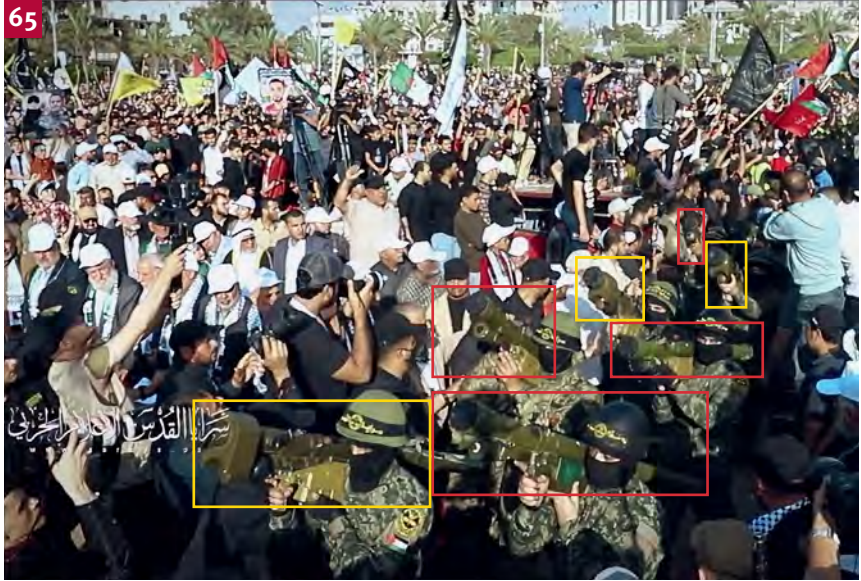
Images 63–64 IS-SP-affiliated fighters with Igla-S MANPADS, 2015



Notes: Launch of an Igla-S MANPADS reportedly by a member of IS-SP in Egypt, 2015 (63); video purportedly showing an IS-SP training session in which two Igla-S missiles are visible, circa 2015 (64).

Sources: Al Jazeera (2015); Binnie and Lappin (2015)

Image 65 Igla and Strela MANPADS displayed by members of al-Quds Brigades, May 2023



Notes: Al-Quds Brigades members displaying eight MANPADS, including three Igla systems (yellow boxes) and four Strela-2-pattern systems (red boxes). A fourth Igla is visible in other photos from the event.

Source: Al-Quds Brigades (2023)

The Survey was unable to find any evidence that other Palestinian armed groups have acquired advanced MANPADS. As noted above, the Ezzedein al-Qassam Brigades have displayed HT-16 MANPADS and QW-18-pattern gripstocks but no complete third- or fourth-generation systems, and imagery of other Palestinian groups only shows Strela-2-pattern MANPADS. Thus, existing evidence indicates that al-Quds Brigades have the most advanced MANPADS arsenal, although it is possible that the Ezzedein al-Qassam Brigades and other groups' military wings have chosen not to display their newer systems for strategic reasons.

The most recent sighting of illicit advanced Russian MANPADS occurred in Sudan in 2023. The video of the Igla MANPADS was posted on 24 May, the same day a Sudanese Air Force fighter jet crashed near Omdurman. The video shows an RSF fighter holding an Igla MANPADS and proclaiming that the RSF 'has shot down a MiG' and 'are on the lookout to shoot down more planes' (Prestige, 2023a). Shortly after the crash, the RSF published a statement indicating that it had shot down the plane, contradicting government claims that the plane crashed due to engine failure (RSF, 2023; *Sudan Tribune*, 2023).

Images 66–68 RSF fighter with Igla MANPADS allegedly bringing down a plane, 2023



Notes: An RSF member holding an Igla MANPADS (66, 67) after allegedly firing and bringing down a Sudanese military fighter plane (68).

Sources: Prestige (2023a; 2023b)

Publicly available video footage shows the burning plane but not the moment that the fire was ignited, making it difficult to determine whether the plane was indeed hit by a missile (see Images 66–68).

The plane crash and the posting of the video of the Igla MANPADS occurred approximately a month after CNN accused the Russian mercenary group Wagner of air-dropping surface-to-air missiles to the RSF units located in north-west Sudan (Elbagir et al., 2023). Wagner’s leader denied the accusations but, a month later, the US government confirmed that the group supplied surface-to-air missiles to the RSF (US DoT, 2023). Neither the media reports nor the US government identified the model of missiles, but the Igla is the most likely given Wagner’s presumed access to that particular model of MANPADS in Ukraine and possibly elsewhere. While that fact alone does not prove Wagner supplied the Igla missile displayed by the RSF (which could have been acquired from a different supplier in the region), it does make the allegations by the United States and the international media more plausible.⁴¹ Given Wagner’s close ties to the Russian government, its involvement in illicit transfers of MANPADS to the RSF would be another significant blow to the counter-MANPADS norms and agreements developed since the early 2000s. ●



The illicit possession and use of MANPADS remains a serious problem in the MENA region.”

Conclusion

As demonstrated above, the illicit possession and use of MANPADS remains a serious problem in the MENA region. The Survey identified illicit MANPADS activity in half of the 26 states in the region, and multiple models were spotted in nine states. First-generation Strela-2-pattern MANPADS remain the most frequently encountered illicit systems, but newer and more capable MANPADS are nearly as widespread; armed groups in nine states had access to one or more models of advanced (third- or fourth-generation) systems in the time period studied.

While advanced MANPADS pose the most acute threat to military and civilian aircraft, first-generation systems can be nearly as dangerous to certain aircraft, as evidenced by the attack on the Airbus A300 in Iraq in 2003. Despite their advanced age, an unknown number of Strela-2-pattern MANPADS are still functional, a worrisome prospect given their widespread availability in the MENA region and beyond.

The sources of illicit MANPADS in the region are often difficult to identify, especially with regards to older models that have been exported widely and have been available on black markets for decades. That said, existing evidence indicates that covert transfers by foreign governments remain a major source of certain models of MANPADS, especially Chinese-designed FN-6- and QW-series systems. These systems have proliferated widely in the MENA region over the past 15 years, and now rival Russian/Soviet models as the most frequently documented advanced MANPADS. Tehran is the most likely source of the majority of illicit QW-series systems, which have been acquired almost exclusively by armed groups with known ties to the Iranian government or its proxy forces. Other importers of Chinese MANPADS are reportedly the source of the illicit FN-6s spotted in Iraq, Lebanon, and Syria, although a lack of publicly available evidence precludes a definitive assessment of these reports.

The fielding of entirely indigenously produced systems by the Iranian and North Korean defence industries, combined with the demonstrated willingness of those two governments to supply MANPADS to armed groups and embargoed regimes, poses a significant challenge for counter-MANPADS efforts. Both states are already heavily sanctioned and are largely impervious to international censure, making it difficult to shape their behaviour. This challenge is compounded by worsening diplomatic relations between Russia, China, and the West, which complicates efforts to impose additional sanctions on proliferators, and limits opportunities for other meaningful multilateral initiatives. These changes have significant implications for counter-MANPADS efforts and risk undermining two decades of work to curb the illicit proliferation of MANPADS. ●

Annexe

Table A1 Illicit possession of MANPADS in the MENA region, 2015–August 2023

Country	Armed group	Model	Generation	Year(s) documented Case category (1/2)* Complete system (c/p/u)**
Algeria	Unclear	Strela-2 pattern	1	2016 (1/p); 2019 (1/p); 2021 (1/u); 2022 (1/p)
Chad	Council of Military Command for the Salvation of the Republic (CCMSR) ⁴²	Strela-2 pattern	1	2018 (2/u)
Egypt	'Terrorists' in Sinai	Strela-2 pattern	1	2019 (1/u)
	Unclear	Strela-2 pattern	1	2017 (2/p)
	Islamic State-Sinai Province (IS-SP)	Strela-2 pattern	1	2017 (2/u); 2019 (1/u)
		Igla-S	3	2015 (2/c)
Iraq	Unclear	Unclear	Unclear	2015 (2/p)
		Strela-2 pattern	1	2017 (1/p); 2019 (1/p)
		Igla pattern	3	2022 (1/p)
	Revenge of Muhandis Brigade	Strela-2 pattern	1	2020 (2/c)

Country	Armed group	Model	Generation	Year(s) documented Case category (1/2)* Complete system (c/p/u)**
	Islamic State (IS)	Unclear	Unclear	2016 (2/c, 1/p); 2018 (1/p); 2021 (2/p); 2022 (1/p)
		Strela-2 pattern	1	2016 (1/p); 2017 (2/c)
		Strela-3 pattern	2	2016 (2/u)
		Igla-1 pattern	2	2015 (2/p); 2016 (1/p)
	Kata'ib Hezbollah	QW-1 pattern	3	2015 (2/u)
		QW-18 pattern	3	2015 (2/u)
	Kurdistan Workers' Party (PKK)	Unclear	Unclear	2020 (1/p)
		Strela-2 pattern	1	2019 (1/p); 2020 (1/p); 2021 (1/p)
	Kurdish Peshmerga	Igla pattern	3	2016 (1/c)
	Lebanon	Arms dealer with alleged ties to the Abdullah Azzam Brigades	FN-6	4
Hezbollah		Strela-2 pattern	1	2019 (2/u)
		Igla-1 pattern	2	2017 (1/c); 2020 (1/u); 2023 (1/u)
		QW-1 pattern	3	2023 (1/u)
		QW-18 pattern	3	2020 (1/u); 2023 (1/u)
Libya	Unclear	Unclear	Unclear	2016 (2/p)
		Strela-2 pattern	1	2015 (1/p); 2016 (2/p); 2018 (2/p); 2023 (2/p)
		Anza II	3	2015 (1/p)
		FN-6 pattern	4	2020 (2/p)

Country	Armed group	Model	Generation	Year(s) documented Case category (1/2)* Complete system (c/p/u)**
	Derna Protection Force	Strela-2 pattern	1	2018 (2/p)
	Government of National Accord (GNA) ⁴³	Strela-2 pattern	1	2019 (2/c)
		FN-6 pattern	4	2019 (2/c, 1/u); 2020 (2/p)
		QW-18 pattern	3	2020 (2/u)
	IS ⁴⁴	Unclear	Unclear	2015 (2/p)
		Strela-2 pattern	1	2015 (2/p); 2017 (2/p)
		Igla-S	3	2018 (2/u)
	Libyan Arab Armed Forces (LAAF)	Strela-2 pattern	1	2018 (2/p); 2019 (2/u); 2020 (2/p)
		Igla-1 pattern	2	2020 (2/u)
		FN-6	4	2019 (1/u)
	Mujahedeen Shura Council of Derna fighters	Unclear	Unclear	2016 (2/p)
'Wagner mercenaries'	Strela-2 pattern	1	2021 (1/p)	
Niger	Islamic State in the Greater Sahara (IS-GS)	Strela-2 pattern	1	2019 (2/p)
Palestinian Territories	Unclear	Strela-2 pattern	1	2022 (2/u)
	Abdul Qader Hussein Brigades	Strela-2 pattern	1	2015 (2/c)
	Abu Ali Mustapha Brigades (military wing of the Popular Front for the Liberation of Palestine)	Strela-2 pattern	1	2017 (2/p); 2021 (1/p)

Country	Armed group	Model	Generation	Year(s) documented Case category (1/2)* Complete system (c/p/u)**
	Al-Quds Brigades (military wing of the Palestinian Islamic Jihad, PIJ)	Strela-2 pattern	1	2016 (1/u); 2019 (2/u); 2020 (1/c); 2021 (1/c); 2022 (1/c); 2023 (1/c)
		Igla	3	2016 (1/u); 2018 (1/u); 2019 (2/c); 2020 (2/u); 2021 (1/c); 2022 (1/c); 2023 (1/u)
	Al-Mujahedeen Brigades	Unclear	Unclear	2023 (1/c)
		Strela-2 pattern	1	2015 (1/u); 2017 (1/c); 2020 (2/u)
	Nasser Salahedeen Brigades	Strela-2 pattern	1	2015 (1/u); 2016 (1/p); 2018 (1/p); 2020 (1/p)
	Ezzedeem al-Qassam Brigades (military wing of Hamas)	Unclear	Unclear	2021 (1/u)
		Strela-2 pattern	1	2015 (1/c); 2016 (1/u); 2017 (1/c); 2018 (1/u); 2019 (1/u); 2020 (2/c); 2021 (1/u); 2022 (1/c); 2023 (1/c)
		HT-16	Unknown	2021 (1/u)
		QW-18	3	2018 (1/p)
	Jaish al-Islam	Strela-2 pattern	1	2018 (2/u)
Sudan	Justice and Equality Movement (JEM)	Igla pattern	3	2018 (1/p)
		Unclear	Unclear	2023 (2/c)
	Rapid Support Forces (RSF)	HN-5	1	2023 (1/c)
		Strela-2 pattern	1	2023 (1/u)
		FN-6 pattern	4	2023 (1/c)
		Igla	3	2023 (2/c)
Igla-S	3	2023 (2/p)		

Country	Armed group	Model	Generation	Year(s) documented Case category (1/2)* Complete system (c/p/u)**
Syria	Unclear	Strela-2 pattern	1	2016 (2/c); 2017 (2/u); 2018 (1/p, 2/u); 2020 (1/p)
		Igla-1 pattern	2	2016 (1/c); 2017 (2/p); 2020 (1/p)
		HT-16	Unclear	2015 (2/u); 2016 (2/c)
		Igla pattern	3	2017 (2/u); 2018 (1/u)
		Igla-S	3	2017 (2/p); 2018 (2/p)
		FN-6	4	2015 (2/u); 2016 (2/c)
	Free Syrian Army	Strela-2 pattern	1	2015 (2/p); 2017 (2/c); 2018 (1/p)
		Igla pattern	2 or 3	2015 (2/c)
		FN-6	4	2016 (2/u); 2018 (2/p)
	IS	Unclear	Unclear	2017 (2/p); 2021 (2/p)
		Strela-2 pattern ⁴⁵	1	2017 (2/p); 2018 (1/p)
		Igla pattern/ Igla-1 pattern	3/2	2015 (1/p)
		FN-6	4	2018 (2/p)
	Other rebel groups ⁴⁶	Unclear	Unclear	2016 (2/p)
		Strela-2 pattern	1	2015 (2/u); 2016 (2/u); 2017 (2/u)
		QW-1 pattern	3	2016 (2/p)
		FN-6	4	2016 (2/c)
	Unspecified 'Islamic rebels', 'militants', 'rebels', 'terrorists'	Unclear	Unclear	2015 (2/u)
		Strela-2 pattern	1	2019 (2/u); 2021 (1/p)
		Strela pattern	1 or 2	2019 (1/p)

Country	Armed group	Model	Generation	Year(s) documented Case category (1/2)* Complete system (c/p/u)**
		Igla-1 pattern	2	2019 (1/p); 2022 (1/p)
		FN-6	4	2016 (1/c)
Tunisia	Talal al-Saidi	Strela-2 pattern	1	2016 (2/p)
Türkiye	Unspecified	Strela-2 pattern	1	2018 (1/p)
	PKK	Unclear	Unclear	2018 (2/p)
		Strela-2 pattern	1	2017 (1/p); 2019 (2/p); 2020 (1/p)
		Igla-1 pattern	2	2017 (1/p); 2018 (1/p)
		Igla pattern	3	2016 (2/c); 2017 (1/p)
Yemen	Unclear	Unclear	Unclear	2017 (2/u); 2018 (2/p); 2019 (2/p)
		Strela-2 pattern	1	2017 (2/p); 2018 (1/p); 2019 (2/p); 2022 (2/p); 2023 (2/p)
		Strela-3 pattern	2	2016 (1/p); 2017 (2/u)
		Igla-S	3	2018 (2/u)
		QW-18 pattern	3	2023 (2/p)
	Al-Qaeda in the Arabian Peninsula	Strela-3	2	2017 (2/u)
	Houthis and affiliates	Unclear	Unclear	2017 (2/u); 2018 (1/p); 2019 (2/u); 2020 (1/p)
		Strela-2 pattern	1	2015 (2/u); 2016 (2/c); 2017 (1/c); 2018 (1/p); 2020 (1/p); 2021 (1/p); 2022 (1/u)
		Strela-3 pattern	2	2016 (2/p); 2018 (1/p), 2019 (2/u); 2022 (1/u)

Country	Armed group	Model	Generation	Year(s) documented Case category (1/2)* Complete system (c/p/u)**
		QW-1 pattern	3	2022 (1/u)
		QW-18 pattern	3	2022 (1/u)
	IS	Unclear	Unclear	2019 (2/p)
		Strela-2 pattern	1	2020 (2/p)

Notes: * '1' = category I cases; '2' = category II cases. ** 'c' = complete system (missile in launch tube, grip-stock, battery unit); 'p' = partial (one or more key component is not visible in available imagery); 'u' = unclear. In most of the incidents categorized as 'unclear', a gripstock, battery unit, and launch tube are visible, but it is unclear whether there is a missile in the launch tube.

Endnotes

- 1 For the purposes of this Report, the MENA region refers to the following countries and territories: Algeria, Bahrain, Burkina Faso, Chad, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Mali, Mauritania, Morocco, Niger, Oman, Palestinian Territories, Qatar, Saudi Arabia, Sudan, Syria, Tunisia, Türkiye, the United Arab Emirates, and Yemen. The paper uses the term ‘states’ as shorthand for ‘countries and territories’ (see Map 1).
- 2 For more information on the Mombasa incident, see Schroeder (2013, p. 1).
- 3 See Schroeder (2013, p. 20) and US DoS (2023, p. 11).
- 4 See Schroeder (2014; 2015).
- 5 For more information on the history of MANPADS, see Berman et al. (2017).
- 6 To date, there is no evidence for the proliferation of fifth-generation MANPADS outside of government stocks.
- 7 The terms ‘serviceable’, ‘functional’, and ‘operational’ are used interchangeably.
- 8 The groups included in this category are those with an established online presence that includes imagery of group members with MANPADS or MANPADS components.
- 9 As noted above, a functional MANPADS consists of a missile in a launch tube, a gripstock, and a battery. The absence of any of these components renders the system inoperable.
- 10 See Schroeder (2014; 2015). Most of the Strela-2-pattern MANPADS listed in Table 2 are Strela-2Ms, an upgraded version of the original Strela-2 that was produced in large numbers and exported widely.
- 11 Some unauthorized end users attempt to conceal the source of illicit MANPADS by painting over or repainting the markings on key components, raising the possibility that some of the markings in the photographs examined by the Survey are falsified. The Survey has no reason to believe that this practice is common, however.
- 12 The Nasser Salahedeen Brigades are the armed wing of the Popular Resistance Committees (PRC), which comprise a number of Palestinian militant organizations operating in the Gaza Strip.
- 13 Author email correspondences with Colin King, Chief Intelligence Officer, Fenix Insight Ltd, May and June 2023.
- 14 Author correspondence with Drew A. Prater, former US EOD technician, 25 May 2023.
- 15 It should be noted that concerns about the functionality of illicit MANPADS are not limited to first-generation systems. Anti-government fighters in Syria interviewed by the *New York Times* reported significant problems with the newer systems they received. ‘Most of the FN-6s

- that we got didn't work', noted one commander, who claimed that some of the malfunctioning missiles had exploded during use, killing or wounding six of his men (Chivers and Schmitt, 2013).
- 16 The HT-16 differs from the Igla-1 in at least two ways: firstly, the connector for the battery coolant unit (BCU) is located closer to the opening of the launch tube and thus the BCU sits closer to the opening of the launch tube; and secondly, instead of the Igla-1's tri-cone tip, the HT-16 missile has an aerodynamic spike similar to the Igla's.
 - 17 See, for example, UNSC (2017, p. 15; 2018, pp. 48–53).
 - 18 See, for example, UNSC (2013b).
 - 19 For a recent analysis of advanced MANPADS in other parts of the world, see Table 1 in Schroeder (2022).
 - 20 IS-SP is referred to as Wilayat Sinai in Arabic.
 - 21 The GNA refers to the UN-recognized government of Libya, based in Tripoli, including affiliated forces.
 - 22 The LAAF (sometimes known as the 'Libyan National Army' or 'LNA') refers to the House of Representatives–affiliated government, based in Benghazi and under the control of Gen. Khalifa Haftar. The advanced MANPADS included in this table were seized by the GNA.
 - 23 These groups include Ahrar al-Sham, Ajnad al-Kavkaz, Jabhat Ansar al-Islam, Jaish al-Haramoun, Jaish al-Mujahedeen, Jaish al-Islam, and Liwa al-Tawhid.
 - 24 These states are Chad (HN-5—reported), Iraq (QW-1—likely), and Lebanon (QW-1—reported).
 - 25 Libya and Syria are not included because evidence of illicit possession of QW-pattern MANPADS is limited to a single, unverifiable social media post.
 - 26 The exact wording of the provision in the Wassenaar Arrangement's Elements for Export Controls of MANPADS is as follows: 'Decisions to permit MANPADS exports will be made by the exporting government by competent authorities at senior policy level and only to foreign governments or to agents specifically authorised to act on behalf of a government after presentation of an official EUC [end-user certificate] certified by the Government of the receiving country' (WAS, 2007, para. 3.1). The guidelines adopted by other international organizations contain a similar provision.
 - 27 See Gibbons-Neff (2014); Grossman (2014); UK MoD (2016); and LIGOCO (2016, p. 58).
 - 28 As of May 2023, the website of the Military Industries Corporation, the company developing the Nayzak, still referred to the system as the 'XX-6'. Such designations often indicate that the system in question is still under development (Military Industries Corporation, n.d.).
 - 29 See, for example, US Central Command (2008a; 2008b; 2009; n.d., p. 7) and US DoD (2007).
 - 30 In December 2020, Hezbollah-owned al-Manar Television posted a compilation of footage from various training events, which included a brief shot of an individual on the back of a motorcycle holding a complete QW-18-pattern system. It was the first publicly available imagery of Hezbollah's QW-18-pattern MANPADS. See al-Manar TV (2020).
 - 31 See Image 42 and AP Photos/Hassan Ammar (2023a; 2023b).
 - 32 The full list of MANPADS components includes the following: Strela-2M missiles and launch tubes (9M32M) (n=10); Strela-2-pattern gripstocks (n=2); Strela-2-pattern battery units (n=20); QW-1M missiles in SS-18 launch tubes (n=10); QW-18-pattern gripstocks (SK-18) (n=5); and QW-18-pattern BCUs (DL-18) (n=20) (US Central Command, 2013a; 2013b).
 - 33 See Komar (2016). More recently, the Alma Research and Education Center published an article claiming that Iran had transferred 'dozens of shoulder-fired anti-aircraft Mithaq 1 missiles to the Shia militias in the Albu Kamal - Deir ez Zor area of Syria'. Citing 'local indications', the article also claims that a Hezbollah operative was sent to Syria to train the

militias in the use of the systems (Beeri, 2023). The article contained no imagery of the missiles and, when queried by the Survey, the Center declined to provide additional information about the transfer.

- 34 See UNSC (2021a, p. 191).
- 35 States that are reported or confirmed to have imported QW-1 and QW-18 MANPADS are, respectively, Iran and Pakistan (QW-1) and Iran, Peru, and Uzbekistan (QW-18). China's reports to the UN Arms Register also list transfers of unspecified MANPADS to Bangladesh, Cambodia, Ghana, Jordan, Malaysia, and Pakistan (UNROCA, 2009; 2016; 2022; 2023). Media reports indicate that Malaysia imported FN-6 MANPADS and that Jordan is producing a variant of the FN-6 under licence. See Blake and Adam (2016).
- 36 Many munitions produced in Iran are readily identifiable as Iranian by their colour and marking schemes. See, for example, Schroeder (2014, pp. 27–37).
- 37 Declassified US military documents include numerous photos of—and references to—QW-1-pattern MANPADS found with Iranian-made weapons or in caches linked to Iranian-backed groups. See, for example, US Central Command (2008a; 2009). These documents indicate that Kata'ib Hezbollah has had access to QW-18-pattern MANPADS (identified as 'Misagh-2s') since at least 2010 (US Central Command, 2011, p. 8).
- 38 UN investigators disagreed on the strength of the evidence linking the weapons to Iran. As summarized in the UN Panel of Experts report of June 2013, '[t]he Panel reached two sets of conclusions: five members concluded that the shipment is a violation of paragraph 5 of Resolution 1747 (2007); and three members concluded that it is a probable violation of paragraph 5 of Resolution 1747 (2007)' (UNSC, 2013b, p. 15).
- 39 See RIA Novosti (2007); Russia & CIS General Newswire (2013); and Schroeder (2013, pp. 11, 25).
- 40 Libya and Yemen are not included in this list because of the tenuous nature of the reports of illicit Igla-pattern MANPADS in these countries.
- 41 Several states and armed groups in the region, including the JEM, are known to possess Igla MANPADS. See UNSC (2019, p. 35).
- 42 The CCMR is referred to as the Conseil de commandement militaire pour le salut de la République in French.
- 43 The GNA refers to the UN-recognized government of Libya, based in Tripoli, including affiliated forces.
- 44 Reported seizures of Igla-S launch tubes were excluded because of the likelihood that the tubes were for vehicle-mounted Strelets launchers.
- 45 Possibly inert.
- 46 These groups include Ahrar al-Sham, Ajnad al-Kavkaz, Jabhat Ansar al-Islam, Jaish al-Haramoun, Jaish al-Mujahideen, Jaish al-Islam, and Liwa al-Tawhid.

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