

# 2K12 Kub

The **2K12 "Kub"** (Russian: 2K12 "Ky6"; English: cube) (NATO reporting name: **SA-6 "Gainful"**) mobile surface-to-air missile system is a Soviet low to medium-level air defence system designed to protect ground forces from air attack. "2K12" is the GRAU designation of the system.

Each 2K12 battery consists of a number of similar tracked vehicles, one of which carries the **1S91** (SURN vehicle, NATO designation "**Straight Flush**") 25 kW G/H band radar (with a range of 75 km (47 mi)) equipped with a continuous wave illuminator, in addition to an optical sight. The battery usually also includes four triple-missile transporter erector launchers (TELs), and four trucks, each carrying three spare missiles and a crane. The TEL is based on a GM-578 chassis, while the 1S91 radar vehicle is based on a GM-568 chassis, all developed and produced by MMZ.

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2K12 Kub

NATO reporting name: SA-6 "Gainful"



2P25 TEL with missiles elevated, (2K12 Kub SAM of Serbian Army 250th Air Defense Brigade)

Type	Tracked medium-range surface-to-air missile system
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Place of origin	Soviet Union
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#### Service history

In service	1967–present
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Used by	See list of operators
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## Development

The development of the 2K12 was started after 18 July 1958 at the request of the CPSU Central Committee.<sup>[3]</sup> The system was set the requirements of being able to engage aerial targets flying at speeds of 420 to 600 m/s (820–1,200 kn) at altitudes of 100 to 7,000 m (330 to 23,000 ft) at ranges up to 20 km (12 mi), with a single shot kill probability of at least 0.7.<sup>[3]</sup>

The systems design was the responsibility of the now Tikhomirov Scientific Research Institute of Instrument Design (NIIP). In addition to NIIP several other design bureaus were involved in the creation of the Kub missile system including Mytishchi Machine-Building Plant which designed and produced the chassis of the self-propelled components. Many of the design bureaus would later go on to co-operate in the development of the successor to the 2K12 "Kub", the 9K37 "Buk".

First trials of the missile system were started at the end of 1959 to discover a series of problems:

- low power for the missile radar seeker and badly designed nose cone
- missile air inlets design failure
- low quality of heat shield inside the afterburner chamber (titanium was replaced by steel).

In August 1961 Toropov was replaced by Lyapin as the Chief Designer of Vympel and in January 1962 Tikhomirov was replaced by Figurovskiy as the Chief Designer of NIIP. Still, the work was not intensified. Before 1963 only 11 of 83 missiles fired had the seeker head installed; only 3 launches were successful.

Kub downed its first-ever air target on February 18, 1963, during the state trials at Donguz test site, Orenburg Oblast. It was an Ilyushin Il-28 bomber.

The system entered an extended testing period between 1959 and 1966, after overcoming the technical difficulties of producing the 2K12 "Kub" the system was accepted into service on 23 January 1967 and went into production that same year.<sup>[3]</sup>

It is sometimes claimed that the M-11 Shtorm naval system is a version of the 3M9 but this is not the case, as the M-11 Shtorm is a separate system and, unusually for Russian surface-to-air missiles, has no land-based variant.

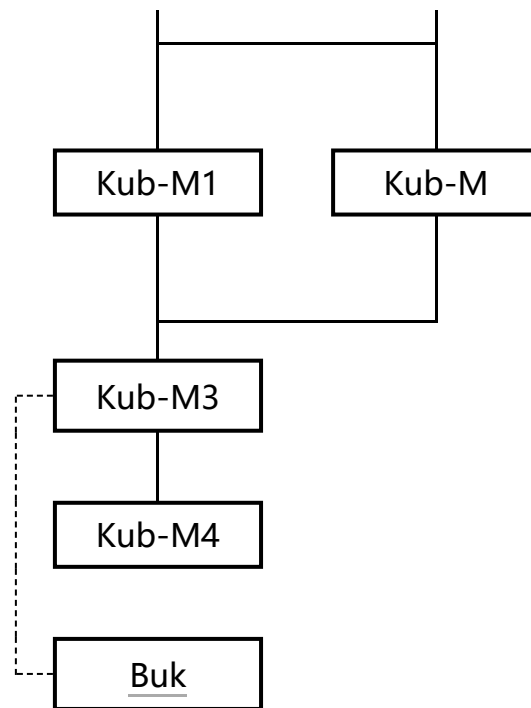
<u>2020 Nagorno-Karabakh war</u>	
<b>Production history</b>	
<b>Designer</b>	<u>NIIP/Vympel</u> <u>MMZ</u> (GM chassis)
<b>Designed</b>	1958–1967
<b>Manufacturer</b>	<u>Ulyanovsk Mechanical Plant</u> (SURNs) <u>ZiK</u> (TELS)
<b>Produced</b>	1968–1985 <sup>[1]</sup>
<b>No. built</b>	500 launchers, 10,000 missiles <sup>[2]</sup>
<b>Variants</b>	2K12 Kub, 2K12E Kvadrat (export version), 2K12M3, 2K12M4
<b>Specifications (2K12 Kub)</b>	
<b>Main armament</b>	3 3M9M4(or variants) guided missiles
<b>Engine</b>	integral rocket motor/ <u>ramjet</u> booster and sustainer motor
<b>Guidance system</b>	command guidance with terminal <u>semi-active radar homing</u> (SARH)

Kub

Kvadrat

The 2K12 "Kub" was recommended for modernisation work in 1967 with the goal of improving combat characteristics (longer range, improved ECCM, reliability and reaction time) established for the new chief designer Ardalion Rastov. A modernised variant underwent trial testing in 1972 eventually being adopted in 1973 as the "Kub-M1".<sup>[3]</sup> The system underwent another modernisation

between 1974 and 1976, again the general combat characteristics of the system were improved with the "Kub-M3" clearing testing and entering service in 1976.<sup>[3]</sup>



After the Rastov visit to Egypt in 1971 to see Kub in operation<sup>[4]</sup> he decided upon the development of a new system, called Buk, where each TEL should have its own fire control radar (TELAR) and is able to engage multiple targets from multiple directions at the same time.

The final major development of the Kub missile system was achieved during the development of its successor, the 9K37 "Buk" in 1974. Although the Buk is the successor to Kub it was decided that both systems could share some interoperability, the result of this decision was the "Kub-M4" system.<sup>[3]</sup> The Kub-M4 used Kub-M3 components which could receive fire control information from the 9A310 transporter erector launcher and radar (TELAR) of the 9K37 Buk. The advantage of interoperability was an increase in the number of fire control channels and available missiles for each system as well as a faster service entry for Buk system components. The Kub-M4 was adopted into service in 1978 following completion of trials.<sup>[3]</sup>


Some early development interpretations of the Buk missile system heavily utilized Kub components, including the 3M9 missile.<sup>[5]</sup>


There are several plans to integrate active radar homing missiles into Kub. For instance, Polish WZU of Grudziadz demonstrated a project of a Sparrow-armed Kub at the MSPO 2008 defence exhibition in Kielce.<sup>[6][7][8]</sup> It is reported also that Vympel initiated some work to use its RVV-AE air-to-air missile to modernise the Kvadrat SAM system.<sup>[9]</sup>

Also, the Czech company RETIA presented a SURN (fire control radar) upgrade featuring an optical channel and new multiple-function color displays as well as the radar upgrade and the IFF system.<sup>[10]</sup>

In 2011 a Kub upgraded launcher (named "2K12 KUB CZ") with three Aspide 2000 missiles in launch containers was presented at the International Exhibition of Defence and Security Technologies (IDET) exposition in Brno. The modifications were made by Retia.<sup>[11]</sup>

### External images

 [Photo of one of the Buk prototype, based on Kub components \(https://web.archive.org/web/20110930180102/http://www.arms-expo.ru/im.xp/057051052053052.jpg\)](https://web.archive.org/web/20110930180102/http://www.arms-expo.ru/im.xp/057051052053052.jpg)

 [Photo of one of the Buk prototype, based on Kub components \(sideview\) \(https://web.archive.org/web/20110930180135/http://www.arms-expo.ru/im.xp/053050053053049053.jpg\)](https://web.archive.org/web/20110930180135/http://www.arms-expo.ru/im.xp/053050053053049053.jpg)

# Description



Rear view of the Kub at the Central Museum of Russian Armed Forces

The 2K12 system shares many components with the 2K11 Krug (SA-4) system. In many ways they are designed to complement each other; 2K11 is effective at long ranges and high altitudes, 2K12 at medium ranges and intermediate altitudes.

The system is able to acquire and begin tracking targets using the 1S91 "Самоходная установка разведки и наведения" (SPRGU - "Self-propelled Reconnaissance and Guidance Unit" / NATO: "Straight Flush" radar) at 75 km (47 mi) and begin illumination and guidance at 28 km (17 mi). IFF is also performed using this radar. It can only guide one or two missiles to a single target at any time. The missile is initially command guided with terminal semi-active radar homing (SARH), with target illumination provided by the "Straight Flush" radar. Detonation is via either

the impact or proximity fuze. On the latest models, this vehicle is also fitted with an optical tracking system which allows engagement without the use of the radar (for active RF emissions stealth reasons, or due to heavy ECM jamming) in which case the effective altitude is limited to 14 km/46000 ft. The optical tracking method also allows engagements to altitudes below that where the radar is able to track targets. Maximum target speed is around Mach 2 for head-on engagements and Mach 1 for tail-chase engagements. Top speed of the missile is approximately Mach 2.8.

In contrast to the elaborate Patriot missile or even the simpler Hawk system fielded by US forces, most of the system rides on two tracked self-propelled vehicles, rather than towed or mounted on trucks, and either the launcher or control vehicle can be set to launch in only 15 minutes after changing location.

## Missiles

The fairly large missiles have an effective range of 4–24 km (2.5–15 miles) and an effective altitude of 50–14,000 m (164–45,931 ft). The missile weighs 599 kg (1,321 lb) and the warhead weighs 56 kg (123 lb). Top missile speed is approx. Mach 2.8. The combined propulsion system 9D16K included solid fuel rocket motor which, when burned out, forms the combustion chamber for a ramjet in a pioneering design putting this missile far ahead of its contemporaries in terms of propulsion.

The missile was fitted with a semi-active radar seeker 1SB4, designed by MNII Agat, which was able to track the target by Doppler frequency since the start. Later upgrades (3M9M3 missile) could do this before the start. Chief Designer of the seeker head was Yu.N. Vekhov, since 1960 – I.G. Akopyan.

In 1977 a new version, the **3M9M1** (DoD designation **SA-6B**) was created with three missiles fitted onto a different chassis (the same as that of the 9K37 "Buk" (NATO reporting name "Gadfly" / DoD **SA-11** ), the 2K12 effective replacement) with an integrated **"Fire Dome"** missile guidance radar. For comparisons between the 2K12, 9K37, see the 9K37 Buk entry.

3M9	
	
Type	Surface-to-air missile
Place of origin	Soviet Union
Production history	
Variants	3M9, 3M9M1, 3M9M3, 3M9M4
Specifications (3M9)	
Mass	599 kg
Length	5,800 mm
Diameter	335 mm
Warhead	Frag-HE



An earlier incremental upgrade saw the 2K12 missiles replaced with the 2K12E versions and this system was known as **Kvadrat** ("Квадрат", meaning *square*). This name was derived from the most common arrangement pattern of the military vehicles of the 2K12 complex, when the 1S91 radar is located at the center and 4x2P25 TELs at the vertices of a square around the radar.

Comparison

Complex (GRAU designation)	Kub	Kub-M1	Kub-M3	Kub-M4 (Buk-M1)
Introduced	1967	1973	1976	1978
Missiles per TEL	3	3	3	3
Engagement range	6–22 km	4–23 km	4–25 km	4–24 km
Engagement altitude	100–7,000 m	80–8,000 m	20–8,000 m	30–14,000 m
Missile speed (Mach)	1.75	1.75	2	2
Maximum target speed (Mach)	1.75	1.75	1.75	1.75
Response Time (seconds)	26–28	22–24	22–24	24
missile Weight, kg	630 kg	630 kg	630 kg	630 kg
Simultaneous engagements	1	1	1	2
Deployment time (minutes)	5	5	5	5

1S91 radar



Radiolocator of 2K12 KUB

SURN **1S91** vehicle included two radar station – a target acquisition and distribution radar 1S11 and a continuous wave illuminator 1S31, in addition to an IFF interrogator and an optical channel.

While 1S31 antenna was installed on the upper section of the superstructure and the 1S11 on the lower, they

Warhead weight	59 kg
Detonation mechanism	Contact and proximity
Wingspan	1.245 m
Propellant	integral rocket motor/ramjet booster and sustainer motor
Operational range	24 kilometres (15 mi)
Flight altitude	Max. 14,000 metres (46,000 ft) Min. 100 metres (330 ft)
Maximum speed	Mach 2.8
Guidance system	semi-active radar homing
Launch platform	2P25 TEL

IVC 3M20M3 Peniye	
Type	Surface-to-air missile training target imitator system
Place of origin	Soviet Union/ <div><div><div><div></div></div><div>Russia</div></div></div>
Specifications	
Mass	600 kg
Length	5,841 mm
Warhead	no
Wingspan	932 mm
Propellant	integral rocket motor/ramjet booster and sustainer motor
Operational range	24 kilometres (15 mi)

could turn around independently. To make the height of the vehicle lower the central cylinder was able to hide inside the prime mover.

The acquisition range of the radar was reported as 50 km (31 mi) for an F-4 Phantom II type of target.

Total weight of the 1S91 vehicle with a crew of 4 was 20.3 tonnes and 2P25 vehicle with 3 missiles and a crew of 3 was 19.5 t.

<b>Flight altitude</b>	500 metres (1,600 ft) – 6,000 metres (20,000 ft)
<b>Maximum speed</b>	200–600 m/s
<b>Guidance system</b>	semi-active radar homing
<b>Launch platform</b>	2P25 TEL

## Additional radar

The 2K12 can also be used at a regimental level, if used as such it can be accompanied by a number of additional radar systems for extended air search at longer range and lower altitude, to supplement the 1S91 "Straight Flush". These systems include the:

- P-12 "Spoon Rest", a VHF early warning radar (also used by the S-75 Dvina), with a 200 kilometres (120 mi) range.
- P-40 "Long Track", an E band early warning radar (also used by the 2K11 Krug and 9K33 Osa), with a 370 kilometres (230 mi) range.
- P-15 "Flat Face A", a UHF early warning radar (also used by the S-125 Neva, with a 150 kilometres (93 mi) range.
- **"Thin Skin"** or **"Side Net"** E band height finding radar (also used by the S-75, 2K11 Krug and S-200, range 240 km/148 miles)
- **"Score Board"** IFF radar

The **"Spoon Rest"** and **"Thin Skin"** are mounted on a truck, **"Long Track"** on a tracked vehicle (a modified AT-T) and **"Flat Face"** on a van. It is unknown what kind of mounting the **"Score Board"** has.

Without the P-40 "Long Track" mobile radar vehicle, the 2K12 is unable to track aircraft at high altitudes.



1S91 first/second operator console



1S91 third operator console



1S91 teleconsole



1S91 main operator console (after upgrade)



1S91 third operator console (after upgrade)



1S91 teleconsole (after upgrade)

## Operational history

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### Middle East

#### Yom Kippur War

The Egyptian and Syrian 2K12s surprised the Israeli military in the 1973 Yom Kippur War, because they were accustomed to having air superiority over the battlefield. The highly mobile 2K12 took a heavy toll on the slower A-4 Skyhawk and even the F-4 Phantom, forming a protective umbrella until they could be removed. The radar warning receivers on the Israeli aircraft did not alert the pilot to the fact that he was being illuminated by the radar. The 2K12 achieved a good performance as a weapon according to a conversation between Israeli General Peled and Henry Kissinger, and was the main anti-air missile in Egyptian inventory to cause Israeli losses followed by the 9K32 Strela-2.<sup>[12]</sup>

The superior low altitude performance of the weapon, and its new CW semi-active missile seeker resulted in a much higher success rate compared to the earlier S-75 Dvina and S-125 Neva systems. While exact losses continue to be disputed, around 40 aircraft are usually cited as lost to SAM shots, and the 2K12 Kub proved the most effective of the three weapons. But in subsequent conflicts, its performance declined as captured examples resulted in effective counter-measures being developed.<sup>[13]</sup>

#### 1982 Lebanon war



Part of a Syrian 2K12 Kub near the Beirut-Damascus highway, and overlooking the Beqaa Valley, in early 1982.

The Syrians also deployed the 2K12 Kub to Lebanon in 1981 after the Israelis shot down Syrian helicopters near Zahlé. The SAM batteries were placed in the Bekaa Valley near the Beirut-Damascus road. They remained close to the existing Syrian air defense system but could not be fully integrated into it. Early in the 1982 Lebanon war, the Israeli Air Force concentrated on suppressing the SAM threat in the Beqaa Valley, launching Operation Mole Cricket 19. The result was a complete success. Several 2K12 Kub batteries, along with S-75s and S-125 systems, were

destroyed in a single day. While Syria's own air defenses remained largely intact, its forces in Lebanon were left exposed to attacks by Israeli strike aircraft for the remainder of the war. It has been reported, however, that at least one Israeli F-4 Phantom fighter-bomber was shot down in the area by an SA-6 on July 24, 1982.<sup>[14]</sup>

## South African Border War

The People's Armed Forces for the Liberation of Angola (FAPLA) procured a number of 2K12 Kub systems from the Soviet Union in 1981.<sup>[15]</sup> According to the Central Intelligence Agency, Angola had obtained sixteen TEL launchers for the 2K12 Kub systems, which were deployed in the Moçâmedes District.<sup>[16]</sup> The South African military noted that the missiles would make it difficult for it to provide air cover for its cross-border operations against guerrillas of the People's Liberation Army of Namibia, which were operating from Angolan sanctuaries.<sup>[17]</sup> All of Angola's 2K12 Kub launchers were destroyed in a South African preemptive strike as part of Operation Protea.<sup>[15]</sup>

2K12 Kub missile sites were also operated by Cuban expeditionary forces in Angola during Operation Excite/Hilti.<sup>[18]</sup> On 26 June 1988, six 3M9M3 missiles launched from a Cuban 2K12 Kub battery were fired at a South African weather balloon being used as a radar decoy over Tchipa.<sup>[18]</sup> South African observers used the firing data to plot the location of the 2K12 Kub launchers and destroyed them in a concentrated bombardment with G5 howitzers.<sup>[18]</sup>

## Western Sahara War

Forces of the Polisario Front acquired two full batteries of 2K12 Kub missiles from Algeria during the Western Sahara War, which they used effectively against the fighters of the Royal Moroccan Air Force, including shooting down two Mirage F1 fighters in 1981 during a major battle in Guelta Zemmur.<sup>[19]</sup>

## Poland

On 19 August 2003, a Polish Air Force Su-22M4K was accidentally shot down by friendly fire during an exercise by a Polish 2K12 Kub battery. The aircraft was flying 21 km (13 mi) from the coast over the Baltic Sea near Ustka. The pilot, General Andrzej Andrzejewski, ejected and was rescued after two hours in the water.<sup>[20]</sup>

## Libya

The system was deployed by Libya during the border dispute with Chad and proved a threat for French aircraft. On 16 February 1986, the system failed in detecting low flying French jets which were attacking the Ouadi Doum airbase. On January 7, 1987, the French Air Force were successful in



destroying a 2K12 Kub radar site in the Faya Largeau area with SEPECAT Jaguars armed with Martel anti-radiation missiles.<sup>[21]</sup>

In March, the Chadian rebels captured Ouadi Doum air base, seizing virtually all heavy equipment used for the defense of this airfield, intact. Most of this equipment was transported to France and the United States in the following days, but some 2K12 Kub systems remained in Chad.<sup>[22]</sup>

With this catastrophe, the Libyan occupation of northern Chad – and the annexation of the Aouzou Strip – was over: by 30 March, the bases at Faya Largeau and Aouzou had to be abandoned. The LARAF now had a completely different task: its Tu-22Bs were to attack the abandoned bases and destroy as much equipment left there as possible. The first strikes were flown in April, and they continued until 8 August 1987, when two Tu-22Bs tasked to strike Aouzou were ambushed by a captured 2K12 Kub battery used by the Chadian Army. One of the bombers was shot down.<sup>[23]</sup>

Libyan air defense, including 2K12 Kub batteries, was active during the 2011 military intervention in Libya.<sup>[24]</sup>

## Iraq

Several 2K12 Kub batteries, along with other SAM systems and military equipment, were supplied to Iraq before and during the Iran–Iraq War as part of large military packages from the Soviet Union. The batteries were active since the start of the war in September 1980, scoring kills against U.S.-supplied Iranian F-4 Phantoms and Northrop F-5s.<sup>[25][26][27]</sup>

Kub systems were active again during the 1991 war. On the opening night of Desert Storm, on 17 January 1991, a B-52G was damaged by a missile. Different versions of this engagement are told. It could have been an S-125 or a 2K12 Kub while other versions report a MiG-29 allegedly fired a R-27R missile and damaged the B-52G.<sup>[28]</sup> However, the U.S. Air Force disputes these claims, stating the bomber was actually hit by friendly fire, an AGM-88 High-speed, Anti-Radiation Missile (HARM) that homed on the fire-control radar of the B-52's tail gun; the jet was subsequently renamed *In HARM's Way*.<sup>[29]</sup> Shortly following this incident, General George Lee Butler announced that the gunner position on B-52 crews would be eliminated, and the gun turrets permanently deactivated, commencing on 1 October 1991.<sup>[30]</sup>

On January 19, 1991, a USAF F-16 (serial 87-228) was shot down by a 2K12 Kub during the massive (though ill-fated) Package Q Strike against a heavily defended Baghdad. It was combat loss number 10 in Operation Desert Storm. The pilot, Captain Harry 'Mike' Roberts, ejected safely but was taken prisoner and freed in March 1991. The aircraft was on a mission to attack the Air Defense Headquarters Building. It had flown 4 combat missions before being lost.<sup>[31]</sup>

In any case, the 2K12 Kub threat was largely controlled by Allied EW assets together with the older S-75s and S-125 missile systems. Most of the losses were due to IR guided SAMs.<sup>[32]</sup>

Kubs continued to be used by the Iraqi military, along with other SAM systems, to challenge the Western imposed no-fly zones during the 1990s and early 2000s. They were not able to shoot down any Coalition aircraft though several sites were destroyed as retaliation. In one incident, on September 11, 1996, during Operation Provide Comfort II, one missile was fired against two USAF F-16 in northern Iraq but missed.<sup>[33]</sup> On December 30, 1998, a 2K12 Kub site near Talil fired 6-8 missiles at aircraft enforcing the Southern Watch component of the NFZ. American F-16s responded by dropping six GBU-12 laser-guided bombs on the site and also launching two HARMs "as a preemptive measure" to warn Iraqi radar operators against carrying out more firings.<sup>[34]</sup>

## Bosnia and Kosovo

Army of Republika Srpska forces, using modified 2K12 Kub systems were successful in shooting down Scott O'Grady's F-16 in 1995<sup>[35][36]</sup> and two to three Croatian AN-2 aircraft that were used as night bombers with improvised 100 kg bombs.<sup>[37]</sup>

One Mi-17 was shot down by a Kub on May 28, 1995, killing the Bosniak Minister Irfan Ljubijankić, and 6 other crew and passengers.<sup>[38]</sup>

During the Kosovo War in 1999, on the first night of the war (March 24/25), a Yugoslav Air Force MiG-29 flown by Maj. Predrag Milutinović was downed by a Kub battery in a friendly fire incident, while approaching Niš Airport after an unsuccessful engagement with NATO aircraft.

The Yugoslav Air Defence had 22 2K12 Kub batteries. Using shoot and scoot tactics, the self-propelled ground system demonstrated a good survivability with only three radars lost in the face of nearly four-hundred AGM-88 shots. As comparison the fixed S-75 and S-125 sites suffered losses to around 66 to 80 percent.<sup>[39]</sup> According to the then-commander of Air force and air defense General Spasoje Smiljanić, during the 78 day campaign, 2K12 Kub had 46 shooting with 70 missiles.<sup>[40]</sup>

## Syrian War














On April 14, 2018, American, British, and French forces launched 103 air-to-surface and cruise missiles targeting sites in Syria. According to the Russian military, twenty-one Kub missiles launched in response allegedly destroyed eleven incoming missiles,<sup>[41]</sup> However, the American Department of Defense stated no Allied missiles were shot down.<sup>[42]</sup>

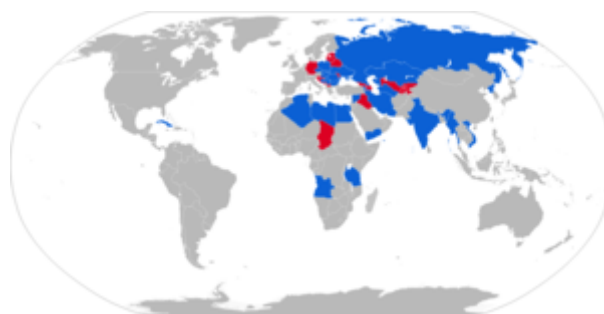
## Yemen Civil War

On 6 June 2019, Houthi forces successfully shot down a USAF MQ-9. CENTCOM officials blamed the shoot down on a Houthi-operated 2K12 Kub system.<sup>[43]</sup>

## Operators

### Current operators

-  Algeria – about 40 2K12s, as of 2012<sup>[44]</sup>
-  Angola – 25 2K12s, as of 2012<sup>[45]</sup>
-  Armenia<sup>[46]</sup>
-  Bulgaria – 20 2K12, as of 2016
-  Bosnia and Herzegovina – 20 2K12, as of 2019
-  Cuba – 25+<sup>[47]</sup>
-  Czech Republic – 4 batteries – 16 launchers and 4 radiolocators<sup>[48][49]</sup>
-  Egypt – 56 2K12s, as of 2012. All modernized and upgraded.<sup>[50]</sup>
-  Ethiopia – unknown number in service.
-  Hungary – 16 2K12s, as of 2012<sup>[51]</sup>
-  India – 180 2K12s, as of 2012<sup>[52]</sup>
-  Iran<sup>[53]</sup>
-  Kazakhstan – 20 2K12s, as of 2012<sup>[54]</sup>



Map of 2K12 operators in blue with former operators in red

-  [Libya](#)<sup>[55]</sup>
-  [Myanmar](#) – Kub Kavadrat-M and Kub 2K12M2 air defence systems received from Belarus.<sup>[56][57]</sup>
-  [North Korea](#)<sup>[58][59]</sup>
-  [Poland](#) – 20 2K12s, as of 2015.<sup>[60]</sup>
-  [Romania](#) – 8 batteries, future upgrading expected and proposed
-  [Russia](#) – Replaced by 9K37 Buk. Current 1 battery 2K12s deployed in [Armenia](#), as of 2012 (retired as of 2015). Also in service as IVC 3M20M3 *Peniye* missile training target imitator system<sup>[61][62]</sup>
-  [Sahrawi Arab Democratic Republic](#)<sup>[63]</sup>
-  [Serbia](#)
  - [Serbian Army](#) – 87 2K12s
-  [Slovakia](#) – 4 2K12s with C2 Tatrapan PVO<sup>[64]</sup>
-  [Syria](#) – 195 2K12s, as of 2012<sup>[65]</sup>
-  [Tanzania](#) – 20 2K12s, as of 2012<sup>[66]</sup>
-  [Turkmenistan](#) – 2+ in service as of 2016<sup>[67]</sup>
-  [Ukraine](#)<sup>[68]</sup>
-  [Vietnam](#)<sup>[69]</sup>
-  [Yemen](#)<sup>[70]</sup>
  - [Houthi](#)









Hungarian modernized 2K12 Kub launcher



3M9 TEL in desert camouflage. Photo by [Nellis AFB](#).

## Former operators

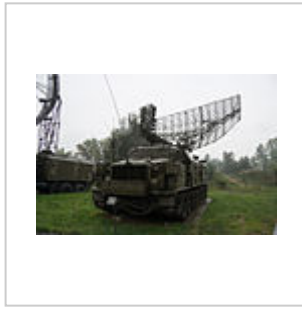
-  [Chad](#)
-  [Czechoslovakia](#) – Passed on to successor states
-  [East Germany](#) – Retired after [German reunification](#)
-  [Iraq](#)
-  [Soviet Union](#) – Passed on to successor states
-  [Yugoslavia](#) – Passed on to successor states<sup>[71]</sup>



Kub 2K12M2 air defence system of Myanmar Army



"Side Net" height finding radar. Photo by Nellis AFB.



P-40 "Long Track" early warning radar. Photo by Nellis AFB.



Kavadat-M air defence systems of Myanmar Army



An 1S91 (Straight Flush) radar of the Hungarian Army's 2K12 Kub missile system

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