S-300 missile system

The **S-300** (NATO reporting name *SA-10 Grumble*) is a series of initially Soviet and later Russian long range surface-to-air missile systems produced by NPO Almaz, based on the initial S-300P version. The S-300 system was developed to defend against aircraft and cruise missiles for the Soviet Air Defence Forces. Subsequent variations were developed to intercept ballistic missiles. The S-300 system was first deployed by the Soviet Union in 1979, designed for the air defence of large industrial and administrative facilities, military bases and control of airspace against enemy strike aircraft. The system is fully automated, though manual observation and operation are also possible.[3][5] Components may be near the central command post, or as distant as 40 km. Each radar provides target designation for the central command post. The command post compares the data received from the targeting radars up to 80 km apart, filtering false targets, a difficult task at such great distances.[6] The central command post features both active and passive target detection modes.[7][8]

The project-managing developer of the S-300 is Almaz-Antey. S-300 uses missiles developed by both MKB "Fakel" and NPO Novator design bureaus (separate government corporations, previously named "OKB-2" and "OKB-8").

The S-300 was regarded as a potent in 2006.[9] An evolved version of the S-300 system is the S-400 (NATO reporting name *SA-21 Growler*), which entered limited service in 2004.

S-300 Family
NATO reporting name: SA-10 Grumble, SA-12 Giant/Gladiator, SA-20 Gargoyle

S-300 anti-aircraft missile system at the Victory Parade, Red Square, 9 May 2009.

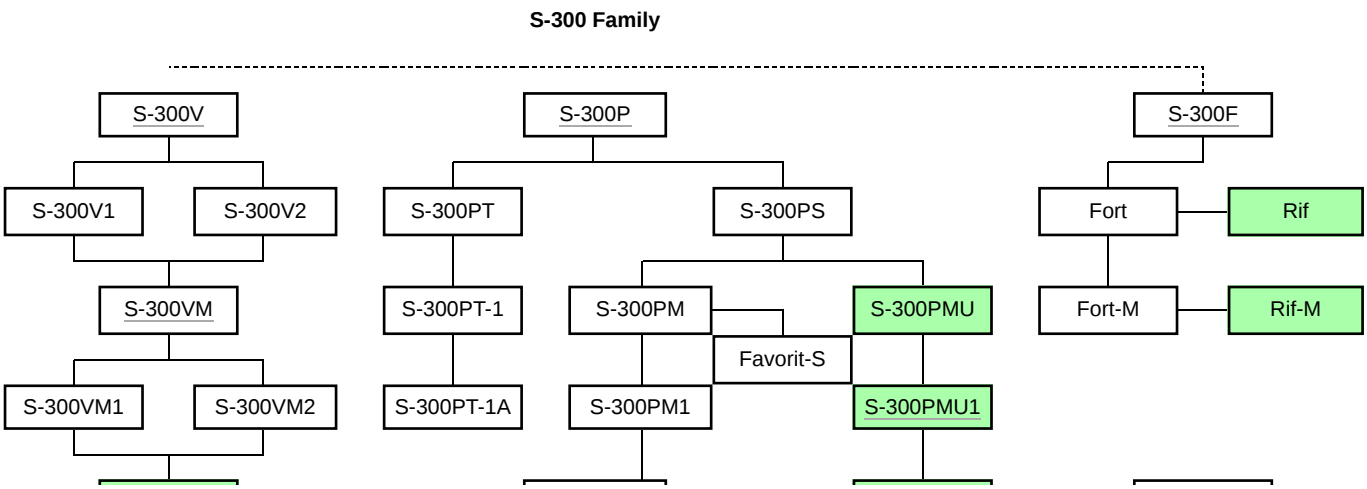
Type	Long-range SAM system
Place of origin	Soviet Union
Service history	
In service	1978–present
Used by	See list of operators
Production history	
Designer	Almaz-Antey. NPO Almaz (lead designer) NIIP (radars) MKB Fakel (missile designer for S-300P series) NPO Novator (missile designer for S-300V series) MNIIRE Altair (Naval version designer)
Designed	1967–2005[1]
Manufacturer	MZiK[2]
Produced	1975[3]–2011 (for PS and PM)[4] V/F - free.
Variants	see variants

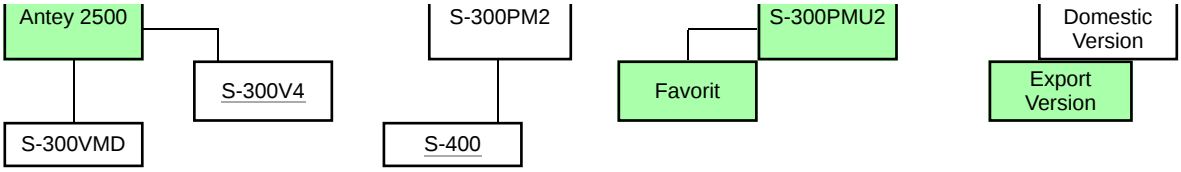
Contents

Variations and upgrades

Serial production started in 1975.[3] The tests have been completed in 1978 (P) and 1983 (V + 1987 for anti-ballistic V).[10] Numerous versions have since emerged with different missiles, improved radars, better resistance to countermeasures, longer range and better capability against short-range ballistic missiles or targets flying at very low altitude. There are currently three main variations.

S-300 system family tree





S-300P

Land-based S-300P (SA-10)

Slovak S-300P-TELs, ready to launch

The **S-300P** (transliterated from Russian *C-300П*, NATO reporting name *SA-10 Grumble*) is the original version of the S-300 system which became operational in 1978.[1] In 1987, over 80 of these sites were active, mainly in the area around Moscow. The *P* suffix stand for *PVO-Strany* (country air defence system). An S-300PT unit consists of a 36D6 (NATO reporting name *TIN SHIELD*) surveillance radar, a 30N6 (*FLAP LID*) fire control system and 5P85-1 launch vehicles. The 5P85-1 vehicle is a semi-trailer truck. Usually a 76N6 (*CLAM SHELL*) low altitude detection radar is also a part of the unit.[11]

This system broke substantial new ground, including the use of a passive electronically scanned array radar and multiple engagements on the same Fire-control system (FCS). Nevertheless, it had some limitations. It took over one hour to set up this semi-mobile system for firing and the hot vertical launch method employed scorched the TEL.[12]

It was originally intended to fit the Track Via Missile (TVM) guidance system onto this model. However, the TVM system had problems tracking targets below 500 m. Rather than accept the limitation, the Soviets decided that the tracking of low altitude targets was a must and decided to use a pure command-guidance system until the TVM head was ready.[12] This allowed the minimum engagement altitude to be set at 25 m.

9S32 engagement radar

Improvements to the S-300P have resulted in several major subversions for both the internal and the export market. The S-300PT-1 and S-300PT-1A (SA-10b/c) are incremental upgrades of the original S300PT system. They introduce the 5V55KD missile and the cold launch method thereafter employed. Time to readiness was reduced to 30 minutes and trajectory optimizations allowed the 5V55KD to reach a range of 75 km.[12]

Two S-300-PM missile TEL and a 'Flap Lid' radar

The **S-300PS**/**S-300PM** (Russian *C-300ПС*/*C-300ПМ*, NATO reporting name *SA-10d/e*) was introduced in 1985 and is the only version thought to have been fitted with a nuclear warhead. This model saw the introduction of the modern TEL and mobile radar and command-post vehicles that were all based on the MAZ-7910 8 × 8 truck.[1] This model also featured the new 5V55R missiles which increased maximum engagement range to 90 km (56 mi) and introduced a terminal semi-active radar homing (SARH) guidance mode. The surveillance radar of these systems was designated 30N6. Also introduced with this version was the distinction between self-propelled and towed TELs. The towed TEL is designated 5P85T. Mobile TELs were the 5P85S and 5P85D. The 5P85D was a "slave" TEL, being controlled by a 5P85S "master" TEL. The "master" TEL is identifiable thanks to the large equipment container behind the cabin; in the "slave" TEL this area is not enclosed and is used for cable or spare tyre storage.

The next modernisation, called the **S-300PMU** (Russian *C-300ПМУ*, US DoD designation *SA-10f*) was introduced in 1992 for the export market and featured the upgraded 5V55U missile which still utilised the intermediate SARH terminal guidance method and smaller warhead of the 5V55R but increased the engagement envelope to give this missile roughly the same range and altitude capabilities as the newer 48N6 missile (max. range 150 km/93 mi). The radars were also upgraded, with the surveillance radar for the S-300PMU being designated 64N6 (BIG BIRD) and the illumination and guidance radar being designated 30N6-1 in the GRAU index.

- S-300P total produced: 3000 launchers, 28,000 missiles for the S-300P[13]

S-300PMU-1/2 (SA-20)

The **S-300PMU-1** (Russian: С-300ПМУ-1, US DoD designation *SA-20A*, NATO reporting name *SA-20 Gargoyle*) was also introduced in 1993 with the new and larger 48N6 missiles for the first time in a land-based system and introduced all the same performance improvements from the S300FM version including the increased speed, range, TVM guidance and ABM capability.[14][15] The warhead is slightly smaller than the naval version at 143 kg (315 lb). This version also saw the introduction of the new and more capable 30N6E2 TOMB STONE radar.

S-300PMU-2 64N6E2 acquisition radar (part of 83M6E2 command post)

The S-300PMU-1 was introduced in 1993 and for the first time introduces several different kinds of missiles in a single system. In addition to the 5V55R and 48N6E missiles the S-300PMU-1 can utilise two new missiles, the 9M96E1 and 9M96E2. Both are significantly smaller than the previous missiles at 330 and 420 kg (730 and 930 lb) respectively, and carry smaller 24 kg (53 lb) warhead. The 9M96E1 has an engagement range of 1–40 km (0.62–25 mi) and the 9M96E2 of 1–120 km (0.62–75 mi). They are still carried 4 per TEL. Rather than just relying on aerodynamic fins for manoeuvring, they use a gas-dynamic system which allows them to have an excellent probability of kill (P_k) despite the much smaller warhead. The P_k is estimated at 0.7 against a tactical ballistic missile for either missile. The S-300PMU-1 typically uses the 83M6E command and control system, although it is also compatible with the older Baikal-1E and Senezh-M1E CCS command and control systems. The 83M6E system incorporates the 64N6E (*BIG BIRD*) surveillance/detection radar. The fire control/illumination and guidance radar used is the 30N6E(1), optionally matched with a 76N6 low altitude detection radar and a 96L6E all altitude detection radar. The 83M6E command and control system can control up to 12 TELs, both the self-propelled 5P85SE vehicle and the 5P85TE towed launchers. Generally support vehicles are also included, such as the 40V6M tow vehicle, intended for lifting of the antenna post.

China is building its own version of the S-300PMU-1, called **HQ-10**.[16]

The **S-300PMU-2** *Favourite* (Russian: С-300ПМУ-2 Фавор*ит* – *Favourite*, DoD designation *SA-20B*), introduced in 1997 (presented ready 1996), is an upgrade to the S-300PMU-1 with range extended once again to 195 km (121 mi) with the introduction of the 48N6E2 missile. This system is apparently capable against not just short range ballistic missiles, but now also medium range ballistic missiles. It uses the 83M6E2 command and control system, consisting of the 54K6E2 command post vehicle and the 64N6E2 surveillance/detection radar. It employs the 30N6E2 fire control/illumination and guidance radar. Like the S-300PMU-1, 12 TELs can be controlled, with any mix of 5P85SE2 self-propelled and 5P85TE2 trailer launchers. Optionally it can make use of the 96L6E all altitude detection radar and 76N6 low altitude detection radar.[17]

S-300PMU-2 vehicles. From left to right: 64N6E2 detection radar 54K6E2 command post and 5P85 TEL.

S-300F

Sea-based S-300F (SA-N-6)

The **S-300F** *Fort* (Russian *С-300Ф Форт*, DoD designation *SA-N-6*, *F* suffix for *Flot*, Russian for *fleet*) was introduced in 1984 as the original ship-based (naval) version of the S-300P system developed by *Altair* with the new 5V55RM missile with range extended to 7–90 km (4.3–56 mi; 3.8–49 nmi) and maximum target speed up to Mach 4 while engagement altitude was reduced to 25–25,000 m (82–82,021 ft). The naval version utilises the TOP SAIL or TOP STEER, TOP PAIR and 3R41 Volna (TOP DOME) radar and utilises command guidance with a terminal semi-active radar homing (SARH) mode. Its first installation and sea trials were on a Kara class cruiser and it is also installed on Slava class cruisers and Kirov class battlecruisers. It is stored in eight (Slava) or twelve (Kirov) 8-missile rotary launchers below decks. The export version of this system is known as *Rif* (Russian *Риф – reef*). The NATO name, found also in colloquial use, is *"Grumble"*.


Close up view of SA-N-6 launchers on *Marshal Ustinov*.

Sea-based S-300FM (SA-N-20)

The **S-300FM** *Fort-M* (Russian *С-300ФМ*, DoD designation *SA-N-20*) is another naval version of the system, installed only on the *Kirov*-class cruiser *Pyotr Velikiy*, and introduced the new 48N6 missile. It was introduced in 1990 and increased missile speed to approximately Mach 6 for a maximum target engagement speed of up to Mach 8.5, increased the warhead size to 150 kg (330 lb) and increased the engagement range yet again to 5–150 km (3.1–93 mi) as well as opening the altitude envelope to 10–27 km (6.2–16.8 mi). The new missiles also introduced the ultimate track-via-missile guidance method and brought with it the ability to intercept short-range ballistic missiles. This system makes use of the TOMB STONE MOD rather than TOP DOME radar. The export version is called the *Rif-M*. Two Rif-M systems were purchased by China in 2002 and installed on the Type 051C air-defence guided missile destroyers.

Both naval versions are believed to include a secondary infrared terminal seeker, similar to the newer US Standard missile system, probably to reduce the system's vulnerability to saturation. This also allows the missile to engage contacts over the radar horizon, such as warships or sea-skimming anti-ship missiles.

S-300V (SA-12)

In service 1984.


S-300V (SA-12a Gladiator)

The 9K81 **S-300V** *Antey-300* (Russian *9K81 С-300В Антей-300* – named after *Antaeus*, NATO reporting name *SA-12 Gladiator/Giant*) varies from the other designs in the series. This complex is not part of the C-300, including is designed by another developer.[18] It was built by Antey rather than Almaz,[19] and its 9M82 and 9M83 missiles were designed by NPO Novator. The *V* suffix stands for *Voyska* (ground forces). It was designed to form the top tier army air defence system, providing a defence against ballistic missiles, cruise missiles and aircraft, replacing the *SA-4 Ganef*. The "GLADIATOR" missiles have a maximum engagement range of around 75 km (47 mi) while the "GIANT" missiles can engage targets out to 100 km (62 mi) and up to altitudes of around 32 km (20 mi). In both cases the warhead is around 150 kg (330 lb).

Radar modes are different and it requires the use of all methods of jamming, while S-300V system works completely passive mode.[18]

While it was created from the same project, hence the common S-300 designation, different priorities resulted in a design quite different from the other versions. The S-300V system is carried on tracked MT-T transporters, which gives it better cross-country mobility than even the S-300Ps on 8 × 8 wheeled transporters. It is also somewhat more distributed than the S-300P's. For example, while both have mechanically-scanning radar for target acquisition (9S15 *BILL BOARD A*), the battery level 9S32 *GRILL PAN* has an autonomous search ability and SARH delegated to illumination radar on TELARs. The early 30N6 *FLAP LID* on the S-300P handles tracking and illumination, but is not equipped with an autonomous search capability (later upgraded). 9S15 can simultaneously carry out an active search for goals (3 coordinates) and passive (2 position).[8]

Chance to destroy a target by using single missilean interceptor (The official source)[20] Adopted in service in 1983 (1983 just using the missile 9M83), fully accepted in 1988.[8][20] [21]

9M83 /Chance/ MGM-52 Lance..... 0,5-0,65

9M82 /Chance/ MGM-31 Pershing..... 0,4-0,6

9M83 /Chance/ aircraft..... 0,7-0,9

9M82 /Chance/ SRAM rocket..... 0,5-0,7

The S-300V places a greater emphasis on the ABM, with the dedicated 9M82 (SA-12B *Giant*) Anti-Ballistic missile. This missile is larger and only two can be held on each TELAR. It also has a dedicated ABM radar: the 9S19 *HIGH SCREEN* phased array radar at battalion level. A typical S-300V battalion is made up out of a target detection and designation unit, a guidance radar and up to 6 TELARs. The detection and designation unit consists of the 9S457-1 command post, a 9S15MV or 9S15MT *BILL BOARD* all-round surveillance radar and 9S19M2 *HIGH SCREEN* sector surveillance radar.[22] The S-300V uses the 9S32-1 *GRILL PAN* multi-channel guidance radar. Four types of missile-launcher vehicles can be used with the system:[23]


SA-12 high altitude surface-to-air missile systems

- Transporter erector and radar (TELAR) vehicles, which not only transport the missiles, but also fire and guide them (includes radar illumination and targeting as well[24]). There are two models: the 9A83-1 TELAR holding four 9M83 *GLADIATOR* missiles and the 9A82 TELAR holding two 9M82 *GIANT* missiles.[23]
- Launcher/loader vehicles (LLV), which transport the missiles and can reload the TELARs, and also fire missiles under the control of a TELAR. There are two models: the 9A84 LLV holding two 9M83 GLADIATOR missiles and the 9A85 LLV holding two 9M82 GIANT missiles.[23]

Target detection range:[25]


9S15M Obzor-3 acquisition radar

- 9S15M - 10 m^2 - 330 km and 3 m^2 - 240 km.
- 9S19M2 - 175 km (? m2) and two passive electronically scanned arrays, very high resistance to interference.
- 9S32M (TELAR 9A82/9A83) range is limited to 200 km, can work independently or target designation from the C-300B, or a variety of other target designation data systems (AWACS aircraft and various ground-based radar). The size of 0.1 square metres (of the target - warhead of a ballistic missile) at ranges up to 140 km, and not less than 120. Alogically 9S32 detection range - MGM-52 Lance 60 km, aircraft missiles 80 km, fighter or ballistic missile MGM-31 Pershing 140 km.[26][27]
- Size of 0.05 square meters at a distance of 30 km (aiming system in the rocket (10/3 seconds before the missiles hit the target)[28]) in addition, the guidance system inside the rocket, supplements for missile guidance systems on commands from the 9A82 / 9A83 and 9S32, and missile guidance systems to passively on the radar illumination and radiation of 9A82 / 9A83.[28]

S-300V system may be controlled by an upper level command post system 9S52 Polyana-D4 integrating it with Buk missile system into a brigade.

China has built its own version of the S-300V called **HQ-18**.[29]

S-300VM (SA-23)

The system is available abroad (1996)

The **S-300VM** (*Antey 2500*) is an upgrade to the S-300V. It consists of a new command post vehicle, the 9S457ME and a selection of new radars. These consist of the 9S15M2, 9S15MT2E and 9S15MV2E all-round surveillance radars, and the 9S19ME sector surveillance radar. The upgraded guidance radar has the Grau index 9S32ME. The system can still employ up to six TELARs, the 9A84ME launchers (up to 4 × 9M83ME missile) and up to 6 launcher/loader vehicles assigned to each launcher (2 × 9M83ME missile each). An upgraded version, dubbed S-300V4 will be delivered to

the Russian army in 2011.[30]

The Antey-2500 complex is the export version developed separately from the S-300 family and has been exported to Venezuela for an estimated export price of 1 billion dollars. The system has one type of missile in two versions, basic and amended with a sustainer stage that doubles the range (up to 200 km (120 mi), according to other data up to 250 km (160 mi)) and can simultaneously engage up to 24 aircraft or 16 ballistic targets in various combinations.

- Became the first system in the world capable of simultaneously engaging cruise missiles, aircraft and ballistic targets. It also contains a private sector radar for countering areas affected by interference.[31]

S-300V4

Also called S-300VMD.[32] Official government data (according to the official statement of the general designer) - S-300V4 - Opportunity is S-400. S-300V4 as compared with the earlier S-300V is actually a new air defense system, created on modern element base. During its development the individual solutions from the previous generation of systems were used, but in general this is a new technique. Only such a system S-300 is used for the Russian Ground Forces (after 2012).

- Longer than 200 km range, the S-300VMD with 300 km range.

It is able to destroy the AWACS at a very large distance and thus do not allow others to get the planes targeting while in passive mode.[33][34]

- Different versions of the NPO Novator 9M82MD[35] S-300V4 missiles have a range of 400 km at Mach 7.5 or a range of 350 km at Mach 9 and can destroy maneuvering targets even at very high altitudes.[36][37] Gladiator rockets significantly less.
- The system is available abroad, 2016 (Antey 4000).[38]

S-400 (SA-21)

The **S-400** *Triumf* (Russian *С-400 «Триумф»*, formerly known as the S-300PMU-3/С-300ПМУ-3, NATO reporting name *SA-21 Growler*) was introduced in 1999 and features a new, much larger missile with 2 per TEL. The new complex is totally different. The project has been encountering delays since its original announcement and deployment has only begun on a small scale in 2006. With an engagement range of up to 400 km (250 mi), depending on the missile variant used, and specifically designed to counter stealth, it is by far the most advanced version incorporating the ability to survive PGM threats and counter advanced jammers by using automatic frequency hopping.[39]

Specifications

An important quality of all complexes of the family of S-300 is the ability to work in various combinations within a single modification and within the same complex, between the modifications (limited), as well as through a variety of mobile superior command posts to line up in a battery of any composition, quantity, modifications, location and so on including the introduction of other air defence systems into a common battery.[40] the System for the defence of the major industrial and administrative objects, military bases and control points from the shock means of air-space attack of the enemy. Capable of hitting ballistic and aerodynamic targets. Became the first multi-channel anti-aircraft missile system, is able to accompany each system (ADMS) to 6 goals and build them up to 12 missiles. When creating funds management (FM), consisting of paragraph combat control and radar detection, solved the problem of automatic track initiation of up to one hundred goals and effective management divisions, located at a distance of 30–40 km from the (FM).

For the first time established a system with full automation of combat operation. All tasks—detection, tracking, target setting is considered, target designation, development of target designation, target acquisition, maintenance, capture, tracking and missile guidance, assessment of results of firing system capable of dealing automatically with the help of digital computing facilities. The operator functions are to control over the work of funds and implementation of the launch of rockets. In a complex environment, you can manually intervene in the course of combat operation. None of the previous systems possessed these qualities. Vertical launch missiles provided bombardment of targets flying from any direction without the reversal of the launcher in the direction of the shooting.[31][41]

Missiles are guided by the 30N6 FLAP LID or naval 3R41 Volna (TOP DOME) radar using command guidance with terminal semi-active radar homing. Later versions use the 30N6 FLAP LID B or TOMB STONE radar to guide the missiles via command guidance/seeker-aided ground guidance (SAGG). SAGG is similar to the Patriot's TVM guidance scheme. The earlier 30N6 FLAP LID A can guide up to four missiles at a time to up to four targets, and can track up to 24 targets at once. The 30N6E FLAP LID B can guide up to two missiles per target to up to six targets simultaneously. Targets flying at up to Mach 2.5 can be successfully engaged or around Mach 8.5 for later models. One missile can be launched every three seconds. The mobile control centre is able to manage up to 12 TELs simultaneously.

The original warhead weighed 100 kg (220 lb), intermediate warheads weighed 133 kg (293 lb) and the latest warhead weighs 143 kg (315 lb). All are equipped with a proximity fuse and contact fuse. The missiles themselves weigh between 1,450 and 1,800 kg (3,200 and 3,970 lb). Missiles are catapulted clear of the launching tubes before their rocket motor fires, and can accelerate at up to 100 *g* (1 km/s²). They launch straight upwards and then tip over towards their target, removing the need to aim the missiles before launch. The missiles are steered with a combination of control fins and through thrust vectoring vanes. The sections below give exact specifications of the radar and missiles in the different S-300 versions. It should be noted that since the S-300PM most vehicles are interchangeable across variations.

Radar

The 30N6 FLAP LID A is mounted on a small trailer. The 64N6 BIG BIRD is mounted on a large trailer along with a generator and typically towed with the now familiar 8-wheeled truck. The 76N6 CLAM SHELL (5N66M[42] etc.) is mounted on a large trailer with a mast which is between 24 and 39 m (79 and 128 ft) tall. Usually is used with a mast. Target detection range of 90 km if altitude of the target of 500 meters above the ground (with a mast).[42]

The original S-300P utilises a combination of the 5N66M continuous-wave radar Doppler radar for target acquisition and the 30N6 FLAP LID A I/J-band phased array digitally steered tracking and engagement radar. Both are mounted on trailers. In addition there is a trailer-mounted command centre and up to twelve trailer-mounted erector/launchers with four missiles each. The S-300PS/PM is similar but uses an upgraded 30N6 tracking and engagement radar with the command post integrated and has truck-mounted TELs.

If employed in an anti-ballistic missile or anti-cruise missile role, the 64N6 BIG BIRD E/F-band radar would also be included with the battery. It is capable of detecting ballistic missile class targets up to 1,000 km (620 mi) away travelling at up to 10,000 km/h (6,200 mph) and cruise missile class targets up to 300 km (190 mi) away. It also employs electronic beam steering and performs a scan once every twelve seconds.

The 36D6 TIN SHIELD radar can also be used to augment the S-300 system to provide earlier target detection than the FLAP LID radar allows. It can detect a missile-sized target flying at an altitude of 60 metres (200 ft) at least 20 km (12 mi) away, at an altitude of 100 m (330 ft) at least 30 km (19 mi) away, and at high altitude up to 175 km (109 mi) away. In addition a 64N6 BIG BIRD E/F band target acquisition radar can be used which has a maximum detection range of 300 km (190 mi).

The S-300 FC Radar Flap Lid can be mounted on a standard pylon.

Surveillance radar

GRAU index	NATO reporting name	Specialisation	Target detection range	Simultaneously detected targets	NATO frequency band	First used with	Notes
36D6	TIN SHIELD	–	180–360 km (110–220 mi)	120	E/F	S-300P	Industrial designation: ST-68UM 350 kW to 1.23 MW signal strength
76N6	CLAM SHELL	Low altitude detection			I	S-300P	
76N6	CLAM SHELL	Low altitude detection	120 km (75 mi)	180	I	S-300PMU	1.4 kW FM continuous wave
64N6	BIG BIRD	Regiment radar	300 km (190 mi)	300	C	S-300PMU-1	
96L6E	CHEESE BOARD	All altitude detection	300 km	100		S-300PMU-1	
9S15	BILL BOARD	–	250 km (160 mi)	250	S	S-300V	
9S19	HIGH SCREEN	Sector tracking		16		S-300V	
MR-75[43]	TOP STEER	Naval	300 km		D/E	S-300F	
MR-800 Voskhod[43]	TOP PAIR	Naval	200 km (120 mi)		C/D/E/F	S-300F	

Target tracking/missile guidance

GRAU index	NATO reporting name	NATO frequency band	Target detection range	Simultaneously tracked targets	Simultaneously engaged targets	First used with	Notes
30N6	FLAP LID A	I/J		4	4	S-300P	
30N6E(1)	FLAP LID B	H-J	200 km (120 mi)	6	6	S-300PMU	Phased array
30N6E2	FLAP LID B	I/J	200 km	6	6	S-300PMU-2	
9S32-1	GRILL PAN	Multi-band	140–150 km (87–93 mi)	6	6	S-300V	
3R41 Volna	TOP DOME	I/J	100 km (62 mi)			S-300F	

Extrasystemic Radar (greater effectiveness)

Compared. C-300 its own listed above. Includes powerful 91N6E Anti – stealth range 150,[44] RCS 4scm 390 km, 0.4 m2 for 240 km.[45] Extrasystemic Radar multiply abilityApproximately 4-fold.

- Anti – stealth: Protivnik-GE, Gamma-DE UHF radar 0.1 m2 for 240 km[46]
- United against all targets "Niobium" RLS (not excluding ballistic or stealth). Mobility 5 minutes. Frequency band S and UHF. Detection range of 600 km (1 sqm to 430 km), the target speed of 8000 km / h, 4791 miles, Mach 6.35. For detection, the owner of the state to transfer command of targeting items (in this application, the maximum speed grows from subordinates systems).[47][48] Stealth. Quote - However, U.S. Air Force officials were dismissive of the technique. “Just because something is technically possible doesn't make it tactically feasible,” one Air Force official with extensive stealth aircraft experience explained. All locators "Nebo" family have a double for the army air defence.[49][50]

Missiles

two types of missiles for the Russian SA-20 anti-air complex

Missile specifications

GRAU index	Year	Range	Maximum velocity	Maximum target Speed	Length	Diameter	Weight	Warhead	Guidance	First used with
5V55K[51]/ 5V55R[52]	1978/1982[53]	47 km (29 mi) 75 km	1,700 m/s (3,800 mph)	1,150 m/s (2,572 mph)	7 m (23 ft)	450mm	1,450 kg (3,200 lb)	100 kg (220 lb)	Command	
5V55R/5V55KD[54]	after 1982[52]	75/90 km (/56mile)	1,700 m/s (3,800 mph)	1,150 m/s (2,572 mph)	7 m (23 ft)	450mm	1,450 kg (3,200 lb)	133 kg (293 lb)	SARH	
5V55U	1992	150 km (93 mi)	2,000 m/s (4,470 mph)		7 m (23 ft)	450mm	1,470 kg (3,240 lb)	133 kg (293 lb)	SARH	
48N6	accepted on arms 1993[55]	150 km (93 mi)	2,000 m/s (4,470 mph)	2,800 m/s (6,415 mph)	7.5 m (25 ft)	500mm	1,780 kg (3,920 lb)	≈150 kg (330 lb)	Track-via-missile (TVM)	
48N6E2	1992	195 km (121 mi)	2,000 m/s (4,470 mph)	2,800 m/s (6,415 mph)	7.5 m (25 ft)	500mm	1,800 kg (4,000 lb)	150 kg (330 lb)	TVM	
9M82	1984	13–100 km (8.1–62.1 mi) 30 km (98,000 ft) alt	2,400 m/s (5,400 mph)				420 kg (930 lb)	150 kg (330 lb)	SARH by TELAR	S-300V
9M83	1984	6–75 km (3.7–46.6 mi) 25 km (82,000 ft) alt	1,700 m/s (3,800 mph)					150 kg (330 lb)	SARH by TELAR	S-300V
9M83ME	1990	200 km (120 mi)							SARH by TELAR	S-300VM
9M96E1	1999	40 km (25 mi)	900 m/s[56] (2,010 mph)	4,800–5,000 m/s (10,737–11,185 mph)			330 kg (730 lb)	24 kg (53 lb)	Active radar homing	S-400
9M96E2	1999	120 km (75 mi)	1,000 m/s[56] (2,240 mph)	4,800–5,000 m/s (10,737–11,185 mph)			420 kg (930 lb)	24 kg (53 lb)	Active Radar Homing	S-400
40N6	2000	400 km (250 mi)							Active Radar Homing	S-400

Means of camouflage and protection

- Masking components of S-300 systems are used in full-scale inflatable layouts,[57] equipped with additional devices simulation of electromagnetic radiation in the infrared, optical and radar,[58] (photo shoot 1, photo shoot 2).

Can also use other means of masking, like camouflage nets and placement of the components of C-300 in the trenches that considerably complicates the detection from long range. Station interference with radar enemy, SPN-30, Veil-1.[40]

- Protection. Additional elements of protection is the placement of components of C-300 in the trenches (practiced as placing on the hills for a better view and more rapid care of th horizon, and in the trenches for stealth and protection against fragments of explosions)photo shoot 1, photo shoot 2.

Composite element to counter the radar missile program is for S-300 system Paperboy-E,[40][59] the likelihood of intercepting missiles PIS type of HARM is 0.85 for missiles with active radar-guided, heat or body-managed system pointing the probability of interception of 0.85–0.99. Under the interception perceived inability of the object to cause harm because of his hit miss the tar get

Comparison with other systems

Official designation of unit		S-300PMU[60]	S-300PMU1[61]	S-300PMU2[40]	S-300VM[40]/S-300V4[62]	Patriot PAC-2[63]	Patriot PAC-3[64]
Range of, km	aerodynamic target	5–90	5–150	3–200	200 (400)[65]	3–96	15, at most 20[66] / 0.3-20[67]
	ballistic targets	at most 35	at most 40	5–40	40	20	15–45[68] (20)[69] possible max 50[67]
Height defeat, km	aerodynamic target	0.025–27	0.01–27	0.01–27	0.025–30 /?-37	0.06–24	15[69]
	ballistic targets	(?)	(?)	2–25	1–30	3–12[70]	15(?).[69] 15, possible max 20.[66]
Maximum target speed, m/s		1,150, at most 1,300 (for the escort 3000)[70]	at most 2,800 (for the escort 10000)[61][70]	at most 2,800	4,500 of ballistic targets[40]	at most 2,200[70]	at most 1,600[69]
Maximum speed of the rocket complex, m/s		at most 2,000[60]	2000[61]	1,900	2,600 and 1,700[69]/7.5M or 9M (more 3000) and (?)	1,700[71]	(?) approximately 1,500[67]
Number of simultaneously guided anti-aircraft missiles by one unit		at most 12	at most 12	at most 72[72]	at most 48[32]	at most 9	
Number of simultaneously engaged targets by one unit		at most 6	at most 6	at most 36[72]	at most 24[73]	at most 9	at most 9
Mass of a rocket, kg		1,400–1,600	(?)	330–1,900	(?)	900	312
Warhead weight, kg		150	(?)	180[74]	(?)	91	74
Minimum time between missile launches, seconds		3–5	3–5	3 (0 at start from different CARRIERS MISSILES)	1.5 (0 at start from different CARRIERS MISSILES)	3–4 (1[71] at start from different CARRIERS MISSILES)	(?)
The set up time and clotting time of starting complex, mins		5	5	5	5	15/30[70]	15/30(?)
Means of transportation		Wheeled	Wheeled	Wheeled	CATERPILLAR	semi trailer	semi trailer

Combat history

The system has put in strong performances in real-world exercises.[75] In 1991, 1992 and 1993, various versions of the S-300 had successfully destroyed ballistic missiles and other objects in exercises, with a high success rate (90% or more if 1 missile interceptor is used).[75][76][77][78] In 1995, it was the first system in the world to successfully destroy a R-17 Elbrus Scud missile in the air.[78] China is to test the S-300PMU2 effectiveness in destroying targets in real exercises. This UAV (4.6 km) and simulator a strategic bomber aircraft (186 km), tactical missile (range of the system to the point of interception 34 km and a height of 17.7 km) and also against pinpoint missile. Although none of the S-300 versions have fired a missile in a conflict, it is considered a very capable SAM system that poses a significant hazard even to the most advanced aircraft or other airborne targets. In April 2005, NATO had a combat exercise in France and Germany called *Trial Hammer 05* to practice Suppression of Enemy Air Defenses missions.[79][80][81] Participating countries were pleased that the Slovak Air Force brought a S-300PMU along, providing a unique opportunity for NATO to become familiar with the system.

Israel's purchase of F-35 Lightning II fighters was allegedly motivated in part to nullify the threat of S-300 missiles that were, at the time the fighters were initially sought, subject to a potential arms sale to Iran.[82][83]

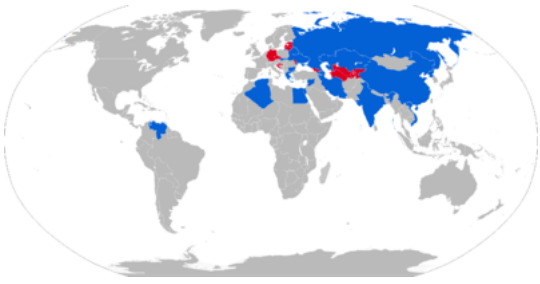
The system can destroy ground targets at a range of 120 km (19,000 fragments or 36,000 according to various missiles). If the S-300 missiles are launched against ballistic missile launched, the range reaches up to 400 km.[10][84]

In 2010, Russia announced that its military had deployed the S-300 systems in breakaway Abkhazia in 2008, leading to condemnation from the government of Georgia.[85]

After a Russian Sukhoi Su-24 was shot down over Syria in November 2015, Russia deployed S-300 and S-400 to the region - some to the Khmeimim Air Base, some with the Russian cruiser *Moskva*.[86]

Operators and other versions

The S-300 is mainly used in Eastern Europe and Asia although sources are inconsistent about which countries possess the system.[87]



Map with S-300 operators in blue and former operators in red

- Algeria – 8 Regiments of S-300PMU2 Favorite[88][89]
- Armenia – S-300PS (SA-10)[90]
- Azerbaijan bought two S-300PMU-2/SA-20B SAM battalions in 2010[91]
- Belarus – S-300PS systems delivered from Russia in 2007 to replace older S-300 model in Belarusian inventory.[92] Four divisions of S-300 missiles to be delivered in 2014.[93]
- Bulgaria – ten S-300 launchers, divided into two units with five launchers each.[94]
- People's Republic of China – China was the first customer of S-300PMU-2.[16] China also built the HQ-15 with the maximum range upgraded from 150 to 200 km (93 to 124 mi). The total number of the S-300PMU/1/2 and HQ-15/18 batteries in PLA are approximately 40 and 60 respectively as of 2008.[95] The total number of the missiles is well above 1,600, with about 300 launcher platforms. Five such SAM battalions are deployed and in active duty around Beijing region, six battalions in Taiwan strait region and the rest in major cities like Shanghai, Chengdu and Dalian. Two Rif (SA-N-6) systems were purchased in 2002 for the Chinese Navy for the Type 051C destroyers. By 2011, it had obtained 15 battalions (4 systems) of the S-300PMU-2.[96]
- Egypt – The S-300VM "Antey-2500" missile system was ordered in 2014, as part of a multi-billion Egyptian-Russian arms deal signed later that year.[97][98] The $1 billion contract comprises 4 batteries, a command post and other external elements.[99][100] In 2015, Russia started delivering the system components, Egyptian soldiers began their

training in Russian training centers.[101] By the end of 2017, all batteries were delivered to Egypt.[102] Russia is in talks with Egypt on the delivery of additional Antey-2500 systems.[103]


A S-300 of the Bulgarian Air Force

- Greece[104] – S-300 PMU1 system acquired after the Cyprus Missile Crisis and operated by HAF on Crete consisting of 1 Battalions/4 batteries/16 launchers / 80 missiles.[105] Greece first fired an S-300 during the White Eagle 2013 military exercise, which was the first time it was used since it had been bought 14 years earlier.[106]
- India – S-300 air defence platforms (from Russia).[107][108]
- Iran - Originally purchased in 2007, Iran's S-300 order was blocked until April 2015 when the Kremlin lifted its self-imposed ban on the sale due to international lifting of some sanctions against Iran. The country purchased and received an unknown number of S-300 (probably the S-300PMU2 system, a modified version of the S-300PMU1[109]) in 2016, it was fully tested and implemented in 2017. Iran received four S-300PMU2 batteries from Russia in 2016, each consisting of a 96L6E target acquisition radar, a 30N6E2 target engagement radar, and four 5P85TE2 towed transporter-erector-launchers (TELs).[110] These systems are supported by two 64N6E2 battle management radars and linked using FL-95 antenna masts. Iran also owns an unknown number of a domestically produced Bavar 373, developed before the arrival of Russian S-300 system.


Russian S-300PMU2 during the Victory Day Parade 2009

- Kazakhstan[13][111] – 10 battalions after the refurbishment (PS - version)[112] (2009 or later), 5 free of charge (2014),[113] and 5 free of charge (2015)[114]
- North Korea[115][116]
- Russia – All variations. (1900 (S-300PT/PS/PMU, 200 S-300V/S-300V1 in 2010 year)),[117] 2000 in total launchers.[118] All production in 1994 (actually 1990) or older all the complexes S-300PM have been repairing and upgrading (Favorite-S).[119] S-300P/PT have been retired before 2008, some S-300PS in service, but were to be retired in 2012–2013.
Modernization of all units of the version S-300P to the version S-300PM1 was to end in 2014. Resource of each taken increased by 5 years. PM 1 continued to version PM 2.[120] By 2015 S-300V4 was to have been delivered. Modernization of all S-300V to the version S-300V4 was to end in 2012.[121][122]
- Slovakia – One battery S-300PMU and 48 missiles type 5V55R inherited from Czechoslovakia. 3 missiles were fired during exercise in Bulgaria in 2015.[123]
- Syria - An order for 6 systems was signed in 2010.[124] Syrian crews underwent training in Russia and some of the S-300 components were delivered to Syria in 2013. Later due to the weapons trade embargo against Syria and on request of Israel the deliveries were halted.[a] After the Russian Su-24 shootdown in November 2015, batteries of the S-300 missile system were officialy deployed in the Latakia province for protection of the Russian naval base and warships in Tartus. These are operated by Russian crews.[130] Russia was reconsidering the deliveries of the S-300 to Syria after the missile strikes against Syria in April 2018, but this did not happen.[131]

  Following the downing of Russian Il-20 aircraft in Syria in September 2018, for which Russia held Israel responsible, Russian defense minister Sergey Shoygu on 24 September said that within two weeks, the Syrian army will receive S-300 systems. Though the variant was not specified, the stated range of the system is to be 250 km.[132][133][134][135][136] On 2 October 2018, Sergey Shoygu told president Vladimir Putin during a meeting broadcast that the delivery of the S-300 system to Syria had been completed a day prior.[137][138] On 8 October 2018, Russian news agency TASS reported that three S-300PM battalions had been given to Syria free of charge, citing "On 1 October three battalion sets of S-300PM systems of eight launchers each were delivered to Syria,". According to the source, the deliveries included also more than 100 surface-to-air missiles for each battalion.[139]

- Ukraine – S-300PS, S-300PMU, S-300V and others.[140] Only six systems have been repaired since 2004; as a result only 40% of Ukrainian S-300 systems were in good condition prior to 2014.[141] The crisis with Russia resulted in a program of accelerated modernisation,[142] with at least 4 batteries overhauled in the period 2014-15. 34 launchers remained in the Crimea after 2014 Russian annexation of Crimea.[143]
- Venezuela - Ordered 2 battalions of S-300VM "Antey-2500", delivered in May 2012.[144][145]
- Vietnam - Bought two S-300PMU-1 for nearly $300 million[146] and RLS 96L6 after 2009[128][147]. Bought S-300 PMU-2 in 2012.[148]

Former operators

- Czechoslovakia – One battalion created in 1990. Passed to Slovakia in 1993.
- East Germany – Passed on to West German Army.
- Germany – Retired after re-unification.
- Georgia
- Moldova
- Turkmenistan
- United States – S-300P purchased from Belarus (1994). The system was devoid of electronics.[149] S300V was purchased in Russia officially in the 1990s (complete set (except for 9S32 GRILL PAN multi-channel guidance radar)).[150][151]
- Uzbekistan

Cancelled

- Cyprus – S-300 PMU1 system transferred to Greece after the Cyprus Missile Crisis and operated by HAF on Crete.

Comparable SAMs

- List of Medium-range and Long-range SAMs

See also

- List of Long-Range SAMs
- S-300VM
- S-350E Vityaz
- S-400
- S-500
- Bavar 373[152]

Notes

a. Russian President Vladimir Putin ordered the acceleration of highly advanced Russian weapons supplies to Syria. Referring to S-300 anti-air systems and the nuclear-capable 9K720 Iskander (NATO named SS-26 Stone) surface missiles. Since Syrian Air Defense Force teams have already trained in the Russian Federation on the handling of the S-300 interceptor batteries, they can go into service as soon as they are landed by one of Russia's daily airlifts to Syria. Russian air defence officials will supervise their deployment and prepare them for operation.[125][126] According to President Vladimir Putin, components of the S-300 have been delivered to Syria but the delivery has not been completed.[127] 2 SA-20B (4 batalions), contract 2010, fully prepared in 2012.[128] Centre for Analysis of World Arms Trade (armstrade.org/english.shtml) SA-20B actually received in 2013.[129]

References

1. "Almaz/Antei Concern of Air Defence S-300P (NATO SA-10 'Grumble') family of low to high-altitude surface-to-air missile systems" (http://www8.janes.com/Search/documentView.do?docId=/content1/janesdata/yb/jlad/jlad0108.htm) Jane's. 16 January 2008. Retrieved 4 August 2008.
2. "Big Russian flotilla led by Admiral Kuznetsov carrier heads for Syrian port" (http://www.debka.com/headline.php?hid=5526) *DEBKAfile*. 21 August 2008. Retrieved 22 August 2008.
3. "Кремль опроверг информацию о готовности РФ поставить Ирану С-300" (http://www.km.ru/node/720374/comments5) *KM.RU Новости - новости дня, новости России, последние новости и комментарии*. Retrieved 1 April 2015.
4. "ЦАМТО / Новости / Прекращение производства ЗРС С-300 касается систем С-300ПС и С-300ПМ" (http://armstrade.org/includes/periodics/news/2011/0823/101093323/detail.shtml) *armstrade.org*. 23 August 2011. Retrieved 1 April 2015.
5. Редактор. "Комплекс С-300В впервые поразил мишени-имитаторы ОТБР" (http://army-news.ru/2010/10/kompleks-s300-vpervye-porazil/) *army-news.ru*. Retrieved 27 November 2015.
6. "Авиация НАТО против сирийских С-300" (http://topwar.ru/28808-aviaciya-nato-protiv-siriyskih-s300.html) *topwar.ru*. Retrieved 1 April 2015.
7. "Зенитно ракетный комплекс С-300 ПМУ-1" (http://www.kapyar.ru/index.php?pg=243). *kapyar.ru*. Retrieved 1 April 2015.
8. "Зенитно-ракетная система С-300В (СССР/Россия)" (http://www.modernarmy.ru/article/278/zenitno-raketnaya-sistema-s-300v) *modernarmy.ru*. Retrieved 27 November 2015.
9. "International Assessment and Strategy Center > Research > Almaz S-300 – China's "Offensive" Air Defense" (https://web.archive.org/web/20110928142727/http://www.strategycenter.net/research/pubID.93/pub_detail.asp). Strategycenter.net. 25 February 2006. Archived from the original (http://www.strategycenter.net/research/pubID.93/pub_detail.asp) on 28 September 2011. Retrieved 14 November 2011.
10. "Система С-300П" (http://www.soldiering.ru/army/airdefence/russia/c-300.php). *soldiering.ru*. Retrieved 1 April 2015.
11. "Encyclopedia Astronautica – "S-300"" (https://web.archive.org/web/20100430054736/http://www.astronautix.com/lvs/s300.htm) Archived from the original (http://www.astronautix.com/lvs/s300.htm) on 30 April 2010. Retrieved 5 September 2008.
12. German: *http://www.dtig.org/docs/sa-10.pdf*
13. "Anti-Aircraft Missiles & Systems, ракеты и системы ПВО России" (https://web.archive.org/web/20121223072244/http://www.inbsite.com/missiles2.html) Inbsite.com. Archived from the original (http://inbsite.com/missiles2.html) on 23 December 2012. Retrieved 13 August 2012.
14. "S-300/Favorit (SA-10 'Grumble'/SA-20 'Gargoyle')" (http://www8.janes.com/Search/documentView.do?docId=/content1/janesdata/binder/jsws/jsws0179.htm) Jane's. 8 February 2008. Retrieved 4 August 2008.
15. S-300 PMU2 SA-20B Gargoyle B Surface-to-Air missile (http://www.armyrecognition.com/s-300_variants_sol_air_missile_system_russia_uk/s-300pmu2_s-300_pmu2_sa-20b_gargoyle_b_surface_to_air_defense_missile_system_technical_data_sheet_uk.html) Archived (https://web.archive.org/web/20130522172519/http://www.armyrecognition.com/s-300_variants_sol_air_missile_system_russia_uk/s-300pmu2_s-300_pmu2_sa-20b_gargoyle_b_surface_to_air_defense_missile_system_technical_data_sheet_uk.html) 22 May 2013 at the Wayback Machine
16. "MissileThreat – "Hongqi-10 (HQ-10)"" (https://web.archive.org/web/20130405072843/http://missilethreat.com/defense-systems/hongqi-10-hq-10/) Archived from the original (http://missilethreat.com/defense-systems/hongqi-10-hq-10/) on 5 April 2013. Retrieved 5 September 2008.
17. "Almaz Scientific Industrial Corporation – "FAVORIT S-300 PMU2 SURFACE-TO-AIR MISSILE SYSTEM"" (https://web.archive.org/web/20060127051724/http://www.raspletin.ru/eng/lists/favorit.html) Archived from the original (http://www.raspletin.ru/eng/lists/favorit.html) on 27 January 2006. Retrieved 23 June 2006.
18. "Зенитно-ракетная система С-300В (СССР/Россия)" (http://www.modernarmy.ru/article/278/zenitno-raketnaya-sistema-s-300v) *www.modernarmy.ru*. Retrieved 21 July 2017.
19. "S-300V/Antey 2500 (SA-12 'Gladiator/Giant')" (http://search.janes.com/Search/documentView.do%3FdocId%3D/content1/janesdata/binder/jsws/jsws0181.htm) Jane's. 13 February 2008. Retrieved 4 August 2008.
20. "Ракетный комплекс С-300В4 пополнит ВС России" (http://www.rg.ru/2014/12/18/raketa1-site.html). *Российская газета*. Retrieved 27 November 2015.
21. "С- 300В" (http://pvo.guns.ru/s300v/s300vhtm). *guns.ru*. Retrieved 27 November 2015.
22. "Federation of American Scientists – "S-300V SA-12A Gladiator and SA-12B Giant – Russia/Soviet Nuclear Forces"" (https://fas.org/nuke/guide/russia/airdef/s-300vhtm). Retrieved 5 September 2008.
23. "*S-300V, SA-12A GLADIATOR and SA-12B GIANT, HQ-18*" (https://fas.org/nuke/guide/russia/airdef/s-300vhtm). Retrieved 14 November 2014.
24. "С- 300В - Пусковая установка 9А83 и 9А82" (http://pvo.guns.ru/s300v/s300v_5.htm). *guns.ru*. Retrieved 1 April 2015.
25. Евгений Даманцев. "Перевес стратегического баланса сил на Ближнем Востоке снова стремится к России" (http://army-news.ru/2014/10/pereves-strategicheskogo-balansa-sil-na-blizhnem-vostoke-snova-stremitsya-k-rossii/) *army-news.ru*. Retrieved 27 November 2015.
26. "С- 300В - Многоканальная станция наведения ракет 9С32" (http://pvo.guns.ru/s300v/s300v_4.htm). *guns.ru*. Retrieved 1 April 2015.
27. Василий Н.Я., Гуринович А.Л., Зенитные ракетные комплексы, стр. 271
28. "Универсальная зенитная ракетная система С-300В" (http://topwar.ru/19263-universalnaya-zenitnaya-raketnaya-sistema-s-300v.html). *topwar.ru*. Retrieved 1 April 2015.
29. "S-300V SA-12A GLADIATOR and SA-12B GIANT HQ-18" (https://fas.org/nuke/guide/russia/airdef/s-300vhtm). *FAS.org*. 30 June 2000. Retrieved 2 February 2015.
30. "Russian army to receive advanced weaponry in 2011 | Defense | RIA Novosti" (http://en.rian.ru/mlitary_news/20110228/162790155.html) En.rian.ru. 28 February 2011. Retrieved 14 November 2011.
31. "Зенитно-ракетная система С-300В / С-300ВМ Антей-2500" (http://rbase.new-factoria.ru/missile/wobb/c300v/c300vshtml). Retrieved 14 November 2014.
32. Administrator. "S-300VM Antey-2500 SA-23 Gladiator Giant data pictures video - Russia Russian missile system vehicle UK - Russia Russian army military equipment vehicles UK" (https://www.armyrecognition.com/russia_russian_missile_system_vehicle_uk/s-300vm_antey-2500_sa-23_gladiator_giant_data_pictures_video.html) *www.armyrecognition.com*
33. "Модернизация до уровня ЗРС С-300В4 ПВО сухопутных войск полностью завершится в 2012 году" (http://www.arms-expo.ru/news/archive/modernizaciya-do-urovnya-zrs-s-300v4-pvo-suhoputnyh-voysk-polnost-yu-zavershitsya-v-2012-godu-28-03-2012-14-58-00/) Retrieved 21 July 2017.
34. "С-300 обновили до С-400" (https://rg.ru/2016/05/19/s-300-obnovili-do-s-400.html) *Российская газета*. Retrieved 21 July 2017.
35. Plopsky, Guy (19 January 2017). "Are Russia's Lethal S-400 SAMs Equipped with the Latest Long-Range Missiles?" (http://nationalinterest.org/blog/the-buzz/are-russias-lethal-s-400-sams-equipped-the-latest-long-range-19115)
36. "Задача трудная, но решаемая - Журнал "Воздушно-космическая оборона"" (https://web.archive.org/web/20151213110415/http://www.vko.ru/taktika/zadacha-trudnaya-no-reshaemaya) *vko.ru*. Archived from the original (http://www.vko.ru/taktika/zadacha-trudnaya-no-reshaemaya) on 13 December 2015. Retrieved 27 November 2015.
37. "МО РФ: ЗРС С300В4 подтвердила способность поражать цели до 400 км" (http://ria.ru/defense_safety/20150110/1041996381.html) *РИА Новости*. Retrieved 27 November 2015.
38. "Создана новая зенитная система "Антей-4000"" (https://rg.ru/2016/10/06/sozdana-novaia-zenitnaia-sistema-antej4000.html) *Российская газета*. Retrieved 21 July 2017.
39. Kopp, Dr. Carlo (May 2009). "Almaz-Antey 40R6 / S-400 Triumf Self Propelled Air Defence System / SA-21 Самоходный Зенитный Ракетный Комплекс 40Р6 / С-400 "Триумф"" (http://www.ausairpower.net/APA-S-400-Triumf.html). *AusAirPower*. Carlo Kopp Updated February 2010 Updated May/June 2011 Updated April 2012.
40. "- -" (https://web.archive.org/web/20110926124750/http://www.almaz-antey.ru/catalogue/millitary_catalogue) Archived from the original (http://www.almaz-antey.ru/catalogue/millitary_catalogue/) on 26 September 2011. Retrieved 14 November 2014.
41. "Antiaircraft missile system series S-300П | the History of air and MISSILE defense" (https://www.webcitation.org/6HjbJTzLY?url=http://www.raspletin.ru/zenitnye-raketnye-sistemy-ryada-s-300p) Archived from the original (http://www.raspletin.ru/zenitnye-raketnye-sistemy-ryada-s-300p) on 29 June 2013.
    - THE S-300V – first mobile universal system of missile and anti-aircraft defense.
42. Dr Carlo Kopp, PEng. "76N6 Clam Shell Low Altitude Acquisition Radar / 5N66/5N66M/76N6/76N6E/40V6M/MD Clam Shell" (https://web.archive.org/web/20151208065628/http://www.ausairpower.net/clamshell). *ausairpower.net*. Archived from the original (http://www.ausairpower.net/clamshell) on 8 December 2015. Retrieved 27 November 2015.
43. Not a GRAU index. GRAU indices only apply to land-based versions.
44. "С-400 vs Patriot: в чем американцы уступают нашим ЗРС" (http://svpressa.ru/post/article/120265/). 28 April 2015. Retrieved 21 July 2017.
45. сборник, БАСТИОН: военно-технический. "НЕВСКИЙ БАСТИОН, ВОЕННО-ТЕХНИЧЕСКИЙ СБОРНИК, ВООРУЖЕНИЯ, ВОЕННАЯ ТЕХНИКА, ВОЕННО-ТЕХНИЧЕСКИЙ СБОРНИК, СОВРЕМЕННОЕ СОСТОЯНИЕ, ИСТОРИЯ РАЗВИТИЯ ОПК, БАСТИОН ВТС, НЕВСКИЙ БАСТИОН, ЖУРНАЛ, СБОРНИК, ВПК, АРМИИ, ВЫСТАВКИ, САЛОНЫ, ВОЕННО-ТЕХНИЧЕСКИЕ, НОВОСТИ, ПОСЛЕДНИЕ НОВОСТИ, ВОЕННЫЕ НОВОСТИ, СОБЫТИЯ ФАКТЫ ВПК, НОВОСТИ ОПК, ОБОРОННАЯ ПРОМЫШЛЕННОСТЬ, МИНИСТРЕСТВО ОБОРОНЫ, СИЛОВЫХ СТРУКТУР, КРАСНАЯ АРМИЯ, СОВЕТСКАЯ АРМИЯ, РУССКАЯ АРМИЯ, ЗАРУБЕЖНЫЕ ВОЕННЫЕ НОВОСТИ, ВиВТ, ПВН" (http://nevskii-bastion.ru/s-400-tm-2014/) *nevskii-bastion.ru* Retrieved 21 July 2017.
46. "Гамма-ДЕ - Алмаз-Антей" (https://web.archive.org/web/20170520215836/http://www.almaz-antey.ru/catalogue/millitary_catalogue/53/281/295) *www.almaz-antey.ru*. Archived from the original (http://www.almaz-antey.ru/catalogue/millitary_catalogue/53/281/295) on 20 May 2017. Retrieved 21 July 2017.
47. "Archived copy" (https://web.archive.org/web/20151010094403/http://www.vniirt.ru/sites/default/files/docs/prod/55zh6ume.pdf) (PDF). Archived from the original (http://nniirt.ru/sites/default/files/docs/prod/55zh6ume.pdf) (PDF) on 10 October 2015. Retrieved 27 January 2017.

48. сборник, БАСТИОН: военно-технический. "ВООРУЖЕНИЯ, ВОЕННАЯ ТЕХНИКА, ВОЕННО-ТЕХНИЧЕСКИЙ СБОРНИК, СОВРЕМЕННОЕ СОСТОЯНИЕ, ИСТОРИЯ РАЗВИТИЯ ОПК, БАСТИОН ВТС, НЕВСКИЙ БАСТИОН, ЖУРНАЛ, СБОРНИК, ВПК, АРМИИ, ВЫСТАВКИ, САЛОНЫ, ВОЕННО-ТЕХНИЧЕСКИЕ, НОВОСТИ, ПОСЛЕДНИЕ НОВОСТИ, ВОЕННЫЕ НОВОСТИ, СОБЫТИЯ ФАКТЫ ВПК, НОВОСТИ ОПК, ОБОРОННАЯ ПРОМЫШЛЕННОСТЬ, МИНИСТРЕСТВО ОБОРОНЫ, СИЛОВЫХ СТРУКТУР, КРАСНАЯ АРМИЯ, СОВЕТСКАЯ АРМИЯ, РУССКАЯ АРМИЯ, ЗАРУБЕЖНЫЕ ВОЕННЫЕ НОВОСТИ, ВиВТ, ПВН" (http://bastion-karpenko.ru/55zh6um/) *bastion-karpenko.ru* Retrieved 21 July 2017.
49. "RusArmy.com - Радиолокационная станция "Оборона-14"" (http://www.rusarmy.com/pvo/pvo_vvs/rls_oborona-14.html) *www.rusarmy.com*. Retrieved 21 July 2017.
50. "RusArmy.com - Радиолокационная станция "Небо"" (http://www.rusarmy.com/pvo/pvo_vvs/rls_nebo.html) *www.rusarmy.com*. Retrieved 21 July 2017.
51. "Вестник ПВО :: С-300ПТ" (http://pvo.guns.ru/s300p/index_s300pt.htm) *guns.ru*. Retrieved 1 April 2015.
52. "Вестник ПВО :: ЗРС С-300П" (http://pvo.guns.ru/s300p/#1) *guns.ru*. Retrieved 1 April 2015.
53. "Зенитно-ракетная система С-300ПС (С-300ПМУ)" (http://rbase.new-factoria.ru/missile/wobb/c300ps/c300ps.shtml) *new-factoria.ru*. Retrieved 1 April 2015.
54. "Зенитная ракетная система С-300П" (http://topwar.ru/29485-zenitnaya-raketnaya-sistema-s-300p.html) *topwar.ru*. Retrieved 1 April 2015.
55. "Сильные и слабые стороны самого опасного для противников Асада зенитно-ракетного комплекса" (http://rusplt.ru/world/C-300-v-sirii.html) *rusplt.ru*. Retrieved 1 April 2015.
56. German: *http://www.dtig.org/docs/sa-21.pdf*
57. "Lenta.ru: Наука и техника: Минобороны РФ закупает надувные зенитные комплексы" (http://lenta.ru/news/2008/08/21/rusbal/) Retrieved 14 November 2014.
58. Редактор. "Надувные макеты на службе армии" (http://army-news.ru/2011/05/naduvnye-makety/). *army-news.ru*. Retrieved 27 November 2015.
59. "Военный парад" №34, 1999
60. "Зенитно-ракетная система С-300ПС (С-300ПМУ)" (http://rbase.new-factoria.ru/missile/wobb/c300ps/c300ps.shtml) Retrieved 14 November 2014.
61. "Зенитно-ракетная система С-300 ПМУ-1" (http://rbase.new-factoria.ru/missile/wobb/c300pmu1/c300pmu1.shtml) Retrieved 14 November 2014.
62. "МО РФ: ЗРС С300В4 подтвердила способность поражать цели до 400 км" (http://ria.ru/defense_safety/20150110/1041996381.html) *РИА Новости*. Retrieved 1 April 2015.
63. "Характеристики ракетного комплекса "Пэтриот"" (http://www.inosmi.ru/infographic/20100708/161123864.html) *ИноСМИ*. Retrieved 14 November 2014.
64. "Patriot TMD" (http://www.globalsecurity.org/space/systems/patriot-specs.htm) GlobalSecurity. Retrieved 17 August 2010.
65. "Main defense product range - "Almaz – Antey" Corp" (https://web.archive.org/web/20130424024817/http://www.almaz-antey.ru/en/catalogue/millitary_catalogue) Archived from the original (http://www.almaz-antey.ru/en/catalogue/millitary_catalogue) on 2013-04-24. Retrieved 2018-08-22.
66. "Зенитный ракетный комплекс Patriot PAC-3" (http://rbase.new-factoria.ru/missile/wobb/erint/erint.shtml) Retrieved 14 November 2014.
67. "11.04.12 с -3 -3" (http://www.militaryparitet.com/perevodnie/data/ic_perevodnie/2700/). Retrieved 14 November 2014.
68. John Pike. "Patriot TMD" (http://www.globalsecurity.org/space/systems/patriot-specs.htm). Retrieved 14 November 2014.
69. "Lockheed Martin Patriot PAC-3" (http://www.designation-systems.net/dusrm/app4/pac-3.html). Retrieved 14 November 2014.
70. "-300 -1" (http://www.kap-yar.ru/index.php?pg=244) Retrieved 14 November 2014.
71. "/" (http://www.uhlib.ru/tehnicheskie_nauki/zenitnye_raketnye_kompleksy/p69.php) Retrieved 14 November 2014.
72. ARG. "S-300PMU-2 Favorit Long-Range Air Defense Missiel System Military-Today.com" (http://www.military-today.com/missiles/s300_pmu2.htm) *www.military-today.com*.
73. ARG. "S-300V Long-Range Air Defense Missile System - Military-Today.com" (http://www.military-today.com/missiles/s300vhtm). *www.military-today.com*.
74. "Зенитно-ракетная система С-300 ПМУ-2 'Фаворит'" (http://rbase.new-factoria.ru/missile/wobb/c300pmu2/c300pmu2.shtml) Retrieved 14 November 2014.
75. "С-300 (SA-10, Grumble), зенитная ракетная система и ее модификации" (http://www.arms-expo.ru/news/archive/s-300-sa-10-grumble-zenitnaya-raketnaya-sistema-i-ee-modifikacii27-12-2007-11-11-00/) *arms-expo.ru*. Retrieved 1 April 2015.
76. "20 лет назад Вооруженные силы России потрясли мировое сообщество" (http://www.rg.ru/2013/02/21/armiya-site.html) *Российская газета*. Retrieved 27 November 2015.
77. "Зенитно-ракетная система С-300В / С-300ВМ Антей-2500" (http://rbase.new-factoria.ru/missile/wobb/c300v/c300vshtml). *new-factoria.ru*. Retrieved 1 April 2015.
78. "Зенитная ракетная система С-400 "Триумф" в 3 раза эффективнее аналогов" (http://www.rosbalt.ru/business/2007/08/03/403956.html). *Росбалт*. Retrieved 1 April 2015.
79. Gyürösi, Miroslav (11 March 2005). "Exclusive – NATO Aircraft Will 'Hunt' Russian Missile Systems During Defence-suppression Exercise" (https://web.archive.org/web/20070610012817/http://www.janes.com/press/articles/pc050317_1.shtml) *Jane's Information Group*. The Internet Archive Wayback Machine. Archived from the original (http://www.janes.com/press/articles/pc050317_1.shtml) on 10 June 2007. Retrieved 9 December 2010. "...the participants of Trial Hammer '05, particularly France, Germany, the UK and the US, were keen to have the Slovak Air Force S-300PMU system take part in the exercise.."
80. Miroslav Gyürösi. (11 March 2005). "the Slovak SA-10 radar set to participate in NATO exercise" (http://www.janes.com/press/articles/pc050317_1.shtml). *Jane's Missiles and Rockets*. ISSN 1365-4187 (https://www.worldcat.org/issn/1365-4187) Retrieved 19 July 2006.
81. "Slovak radar missile systems s-300PMU will take part in NATO exercises" (https://www.webcitation.org/64wKPnoYZ?url=http://pvo.guns.ru/other/slovakia/s300_nato.htm) Archived from the original (http://pvo.guns.ru/other/slovakia/s300_nato.htm) on 24 January 2012 Retrieved 12 August 2008.
82. "Israel 'close to deal on F-35'" (http://www.upi.com/Business_News/Security-Industry/2009/06/24/Israel-close-to-deal-on-F-35/UPI-59031245853651/) Upi.com. 24 June 2009. Retrieved 14 November 2011.
83. "Israel orders U.S. stealth planes to counter Iran, Syria threat" (http://en.rian.ru/military_news/20090710/155491203.html) En.rian.ru. Retrieved 14 November 2011.
84. "С-300 способны бить по наземным целям. Но белорусы их этому не учили" (http://naviny.by/rubrics/politic/2011/10/17/ic_articles_112_175478/) *naviny.by*. Retrieved 1 April 2015.
85. "U.S.: 'Russia has had S-300 in Abkhazia for Past 2 Years'" (http://civil.ge/eng/article.php?id=22588&search=) *Civil Georgia*. 12 August 2010. Retrieved 7 October 2017.
86. "Turkey Takes Action Against Russia's Syrian Air War" (http://www.ainonline.com/aviation-news/defense/2015-11-25/turkey-takes-action-against-russias-syrian-air-war) *Aviation International News* 26 November 2015.
87. Barletta, Michael; Jorgensen, Erik; Saracino, Peter (July 1998). "The Russian S-300PMU-1 TMD System" (https://web.archive.org/web/20101110211747/http://cns.miis.edu//cyprus/s300tdms.htm) James Martin Center for Nonproliferation Studies Archived from the original (http://cns.miis.edu/cyprus/s300tdms.htm) on 10 November 2010.
88. http://www.ausairpower.net/APA-S-300-Proliferation.html
89. "missilethreat.com" (https://web.archive.org/web/20111111004257/http://www.missilethreat.com/missiledefensesystems/id.50/system_detail.asp) missilethreat.com. Archived from the original (http://www.missilethreat.com/missiledefensesystems/id.50/system_detail.asp) on 11 November 2011 Retrieved 14 November 2011.
90. "News from Armenia, Events in Armenia, Travel and Entertainment | Armenia Confirms Possession of Sophisticated Missiles" (http://armeniadiaspora.com/news/2025-armenia-confirms-possession-of-sophisticated-missiles.html) ArmeniaDiaspora.com. 20 December 2010 Retrieved 14 November 2011.
91. SIPRI Armstrade Register (http://armstrade.sipri.org/armstrade/page/trade_register.php). Retrieved 27 October 2013.
92. "Russia completes S-300PS deliveries to Belarus" (http://articles.janes.com/articles/Janes-Missiles-And-Rockets-2006/Russia-completes-S-300PS-deliveries-to-Belarus.html). *articles.janes.com*. 14 June 2006. Retrieved 7 August 2011.
93. Russia will deliver four divisions of S-300 ground-to-air defense missile systems to Belarus (http://www.armyrecognition.com/april_2013_news_defence_army_military_industry_uk/russia_will_deliver_four_divisions_of_s-300_ground-to-air_defense_missile_systems_to_belarus_2404135.html). Armyrecognition.com, 24 April 2013
94. "Balkananalysis.com – "Balkan Defence Overview: Developments and Prospects"" (http://www.balkanalysis.com/?p=612) Retrieved 5 September 2008.
95. "Sino Defence Today – "S-300 (SA-10) Surface-to-Air Missile"" (https://web.archive.org/web/20080910213035/http://www.sinodefence.com/army/surfacetoairmissile/s300.asp). Archived from the original (http://www.sinodefence.com/army/surfacetoairmissile/s300.asp) on 10 September 2008 Retrieved 5 September 2008.
96. S-300 (missile)
97. *defensenews* http://www.defensenews.com/story/defense/2015/11/24/egypt-russia-negotiating-missile-sale/76330914/ (http://www.defensenews.com/story/defense/2015/11/24/egypt-russia-negotiating-missile-sale/76330914/) Retrieved 24 November 2015. Missing or empty | `title=` (help)
98. "'Рособоронэкспорт" поставит в Египет зенитные системы С-300ВМ" (http://news.rambler.ru/27071114/). *Рамблер-Новости*. Retrieved 1 April 2015.
99. "ТАСС: Армия и ОПК – Источник: Россия поставит Египту полк систем ПВО "Антей-2500" до конца 2016 года" (http://tass.ru/armiya-i-opk/1812666) *ТАСС*. Retrieved 1 April 2015.
100. "В вооружениях не стесняться" (https://www.kommersant.ru/doc/3566703?query=%D0%90%D0%BD%D1%82%D0%B5%D0%B9) *kommersant*. Retrieved 6 March 2018.
101. "According sources, Russia would start deliveries of Antey-2500 missile systems to Egypt" (http://www.armyrecognition.com/march_2015_global_defense_security_news_uk/according_sources_russia_would_start_deliveries_of_antey-2500_missile_systems_to_egypt.html) 6 March 2015.
102. Kommersant. "Те, кто сегодня критикует Иран, будут бороться за него" (https://www.kommersant.ru/doc/3541181?query=%D0%90%D0%BD%D1%82%D0%B5%D0%B9-2500). Retrieved 7 February 2018.

103. "Russia in talks with Turkey and Egypt for the sale of the S-400" (https://www.newsru.com/finance/20feb2017/idex2017_c400.html) newsru.com. Retrieved 20 February 2017.
104. "Hellenic Air Force Weapons - S-300 PMU1" (http://www.haf.gr/en/mission/weapons/weapon.asp?id=32)
105. "SIPRI Military Expenditure Database - SIPRI" (https://www.sipri.org/databases/milex) *www.sipri.org*.
106. Russian-made S-300 air defence missile system test-fired for the first time by Army of Greece (http://www.armyrecognition.com/december_2013_defense_industry_military_news_uk/russian-made_s-300_air_defense_missile_system_test-fired_for_the_first_time_by_army_greece_1412131.html). Armyrecognition.com, 14 December 2013
107. "Ballistic Missile Defence for India" (http://www.bharat-rakshak.com/IAF/Today/Contemporary/328-BMD.html) *www.bharat-rakshak.com*. BHARAT RAKSHAK. Retrieved 27 July 2016.
108. "India's Missile Defense: Is the Game Worth the Candle?" (http://thediplomat.com/2013/08/indias-missile-defense-is-the-game-worth-the-candle/) *thediplomat.com*. THE DIPLOMAT. 2 August 2013. Retrieved 27 July 2016.
109. Behnam Ben Taleblu. "Understanding Iran's Deployment of the S-300 System" (http://www.defenddemocracy.org/media-hit/behnam-ben-taleblu-understanding-irans-deployment-of-the-s-300-system/) defenddemocracy.org. Retrieved 14 July 2017.
110. "Archived copy" (https://web.archive.org/web/20170831132435/http://www.janes.com/article/72263/iran-deploys-s-300-to-bushehr) Archived from the original (http://www.janes.com/article/72263/iran-deploys-s-300-to-bushehr) on 31 August 2017. Retrieved 31 August 2017.
111. ваше имя. "Политика. Казахстан получит бесплатно до десяти комплексов С-300" (http://vesti.kz/polit/71641/) Vesti.kz. Retrieved 13 August 2012.
112. "Казахстан и РФ подписали контракт на поставку дивизионов С-300" (http://ria.ru/defense_safety/20090304/163779332.html) *РИА Новости*. Retrieved 27 November 2015.
113. "Россия безвозмездно поставит Казахстану пять дивизионов ЗРС С-300" (http://www.interfax.ru/world/355149) *Interfax.ru*. 31 January 2014. Retrieved 27 November 2015.
114. "ТАСС: Армия и ОПК - Минобороны РФ безвозмездно передало Казахстану пять зенитно-ракетных комплексов" (http://tass.ru/armiya-i-opk/2182631) *ТАСС*. Retrieved 27 November 2015.
115. North Korea tests new anti-aircraft system (S-300 copy), ordered its mass production and deployment throughout the country (S-300 copy) (https://already-happened.com/2017/05/28/north-korea-tests-new-anti-aircraft-system-s-300-copy-ordered-its-mass-production-and-deployment-throughout-the-country/) Retrieved 28 May 2017.
116. New-Type Anti-Aircraft Guided Weapon System (https://www.youtube.com/watch?v=Yopfn_vwKWEDPRK)
117. The Military Balance 2010. p.222,223
118. Eugene Yanko, Copyright 1997 – warfare.ru (10 August 1995). "SA-20 GARGOYLE / S300PMU/2/3 | Russian Arms, Military Technology, Analysis of Russia's Military Forces" (http://warfare.be/?lang=&catid=264&linkid=1695) Warfare.ru. Retrieved 23 September 2010.
119. "Новости NEWSru.com :: Россия прекращает выпуск ракетных комплексов С-300 и готовится участвовать в евроПРО с новейшими С-500" (http://www.newsru.com/russia/15aug2011/pvo.html) Newsru.com. Retrieved 13 August 2012.
120. "Модернизированная зенитная ракетная система С-300ПМ2" (https://web.archive.org/web/20160209214444/http://bmpd.livejournal.com/1725424.html) Archived from the original (http://bmpd.livejournal.com/1725424.html) on 9 February 2016.
121. "Модернизация до уровня ЗРС С-300В4 ПВО сухопутных войск полностью завершится в 2012 году — ОРУЖИЕ РОССИИ, Информационное агентство" (https://web.archive.org/web/20120329092904/http://www.arms-expo.ru/049057054048124050055050051048.html) Arms-expo.ru. Archived from the original (http://www.arms-expo.ru/049057054048124050055050051048.html) on 29 March 2012. Retrieved 13 August 2012.
122. "Минобороны РФ подписало трехлетний контракт на поставку ЗРС С-300В4 – Военный Обозреватель" (http://warsonline.info/pvo/minoboroni-rf-podpisal-trechletniy-kontrakt-na-postavku-zrs-s-300v4.html) Warsonline.info. Retrieved 13 August 2012.
123. "Archived copy" (https://web.archive.org/web/20170817092222/http://www.mosr.sk/data/disk/casopis/Obrana_10_2015.pdf) (PDF). Archived from the original (http://www.mosr.sk/data/disk/casopis/Obrana_10_2015.pdf) (PDF) on 17 August 2017. Retrieved 29 July 2017.
124. "В Дамаске будут следить за переговорами Путина и Кэмерона" (https://www.vesti.ru/doc.html?id=1083052) *vesti.ru*. 10 May 2013. Retrieved 13 October 2018.
125. "Russia slams end of EU arms embargo, calls S-300s 'stabilizing factor' in Syria" (http://rt.com/news/eu-arms-syria-embargo-russia-870/) Retrieved 14 November 2014.
126. Walker, Shaun; McDonald-Gibson, Charlotte; Morris, Nigel (29 May 2013). "Russia stokes fears of an arms race with threat to deliver anti-aircraft missiles to Syria's Assad regime" (https://www.independent.co.uk/news/world/middle-east/russia-stokes-fears-of-an-arms-race-with-threat-to-deliver-antiaircraft-missiles-to-syrian-regime-8634578.html). *The Independent*. London.
127. "Russia Does Not Rule Out Backing Military Action in Syria – Putin / Sputnik international" (http://en.ria.ru/russia/20130904/183157113/Russia-Does-Not-Rule-Out-Backing-Military-Action-in-Syria--Putin.html) Retrieved 14 November 2014.
128. "July 11th, 2012 - bmpd" (https://archive.is/20150404123054/http://bmpd.livejournal.com/2012/07/11/). *livejournal.com*. Archived from the original (http://bmpd.livejournal.com/2012/07/11/) on 4 April 2015. Retrieved 27 November 2015.
129. "ЦАМТО: Сирийские ЗРС С-300 достигнут боеготовности не ранее конца 2014 года" (http://vz.ru/news/2013/9/4/648611.html) *vz.ru*. Retrieved 21 July 2017.
130. "Moscow delivers S-300 missile system to Syria for defense of Russian naval base" (https://www.rt.com/news/361586-russia-s300supplied-syria/). Retrieved 21 July 2017.
131. "Russian S-300 Supplies to Syria to Boost Political Stability - Syrian Lawmaker" (https://sputniknews.com/middleeast/201804201063765618-syria-russia-s-300-supplies/) 20 April 2018. Retrieved 13 October 2018.
132. Syria to get Russia's S-300 air-defense missile system within two weeks (http://tass.com/defense/1022844) TASS, 24 September 2018.
133. Гутенев: реакция Израиля на инцидент с Ил-20 вынудила РФ на поставки С-300 в Сирию: Председатель комиссии Госдумы по правовому обеспечению развития ОПК отметил, что теперь израильские летчики не смогут прятаться за российскими самолетами (https://tass.ru/politika/5597868) TASS, 24 September 2018.
134. Россия передаст Сирии С-300 в течение двух недель (https://www.kommersant.ru/doc/3751224) Kommersant, 24 September 2018.
135. Путин обсудил с Асадом поставки российских комплексов С-300 в Сирию: В Кремле отметили, что президент сообщил сирийскому лидеру о дополнительных мерах по обеспечению безопасности военных РФ в республике (https://tass.ru/politika/5597646) TASS, 24 September 2018.
136. Израиль может попытаться помешать поставке С-300 в Сирию, считает эксперт (https://ria.ru/syria/20180924/1529218044.html?relap=1) RIA Novosti, 24 September 2018.
137. Devitt, Polina (2 October 2018). "Russia completes delivery of S-300 system to Syria" (https://www.reuters.com/article/us-mideast-crisis-syria-russia-s300/russia-completes-delivery-of-s-300-system-to-syria-idUSKCN1MC2FT) *Reuters*. Moscow. Archived (http://archive.is/ABNbh) from the original on 6 October 2018. Retrieved 6 October 2018.
138. Binnie, Jeremy; Ripley, Tim (5 October 2018). "Russia announces Syrian S-300 delivery" (https://www.janes.com/article/83576/russia-announces-syrian-s-300-delivery). *IHS Jane's 360*. London. Archived (http://archive.is/VLKtv) from the original on 6 October 2018. Retrieved 6 October 2018.
139. "Three Russian S-300PM battalion sets delivered to Syria free of charge — source" (http://tass.com/defense/1025020) 8 October 2018. Retrieved 13 October 2018.
140. John Pike. "Ukraine – Air Force Equipment" (http://www.globalsecurity.org/military/world/ukraine/vps-equipment.htm) Globalsecurity.org. Retrieved 14 November 2011.
141. "Украинская рулетка: 20-летние С-300 попадают в цель один раз из четырех | Ракетная техника" (http://rbase.new-factoria.ru/news/ukrainskaya-ruletka-20-letnie-s-300-popadayut-v-cel-odin-raz-iz-chetyreh/) Rbase.new-factoria.ru Retrieved 13 August 2012.
142. Ukrainian Air Force received refurbished anti-aircraft S-300PS missile system (http://www.unian.info/economics/1505429-ukrainian-air-force-received-refurbished-anti-aircraft-s-300ps-missile-system.html) UNIAN (6 September 2016)
143. "Путин рассказал про украинские С-300 в Крыму. Что с ними стало?" (http://www.mk.ru/politics/article/2014/04/17/1016068-putin-rasskazal-pro-ukrainskie-s300-v-kryimu-chto-s-nimi-stalo.html)
144. Kroth, Olivia. "Venezuela's partnership with Russia: An emblematic step." (http://english.pravda.ru/russia/economics/23-06-2012/121459-venezuela_russia-0/) *Pravda*, 23 June 2012.
145. Indigo Guevara Venezuela receives ITS First S-300VM / / Jane's Defence Weekly (10 April 2013) C 6
146. "Asia Times – "Russian missiles to guard skyover Vietnam"" (http://www.atimes.com/atimes/Central_Asia/EI05Ag02.html) Retrieved 5 September 2008.
147. "96Л6-1 / 96Л6Е Всевысотный обнаружитель" (http://militaryrussia.ru/blog/topic-805.html). *militaryrussia.ru*. Retrieved 27 November 2015.
148. Diplomat, Franz-Stefan Gady The. "Vietnam Deploys Precision-Guided Rocket Artillery in South China Sea" (http://thediplomat.com/2016/08/vietnam-deploys-precision-guided-rocket-artillery-in-south-china-sea/)
149. "Продажа комплекса С-300: расследование" (https://www.kommersant.ru/doc/103833). 9 March 1995.
150. "Archived copy" (https://web.archive.org/web/20131022154209/http://www15.rian.ru/ruharakter/20060920/54082336.html) Archived from the original (http://www15.rian.ru/ruharakter/20060920/54082336.html) on 22 October 2013. Retrieved 2015-08-18.
151. "ГОЗ по шасси для С-300В4 - новости от Кировского завода" (http://saidpvo.livejournal.com/247634.html) *livejournal.com*. Retrieved 27 November 2015.
152. "Three Iranian long range air defense systems" (http://www.mashreghnews.ir/fa/news/363390). Mashregh News Agency

External links

- S-300 | CSIS Missile Threat
- S-300 and various other system (in English language) in the Russia (official developer site).
- Australian Air Power: Part 1 and Part 2

- www.dtig.org detailed overview of the S-300P & S-300V family
- S-300 PMU2 SA-20B Gargoyle B Surface-to-Air missile(Army recognition)
- Almaz S-300 – China's "Offensive" Air Defence
- Soviet/Russian Missile Designations
- S-300PMU2 FavoritEnemyForces.com
- Almaz S-300P/PT/PS/PMU/PMU-1/PMU-2
- 76N6 Clam Shell Acquisition Radar
- "Antey 9K81 S-300V – SA-12A/B Gladiator/Giant"*ausairpower.net*.
- Matching of the Patriot (1/2/3) against the S-300 (v/ Antey 2500). In English. Used 8 parameters. Admonition. This test is are not officially authenticated but not refuted.
- Aviation Week S-300 Surface-To-Air Missile System

Gallery

S-300V with 9M83 rockets.

5P85-1 launcher for the S-300PT.

S-300 launcher on parade in Sofia.

Croatian S-300 system 1998 in Istria.

S-300PS surface-to-air missile launcher.

A U.S. military photo of the S-300P (SA-10).

S-300 at the 2009 Victory Day parade in Moscow.

S-300 system operated by the Bulgarian military.

KrAZ-260 tractor-trailer of a S-300PMU2 SAM system.

Ukrainian KrAZ-6446 forming part of an S-300 system.

S-300VM during a 2014 display in Caracas, Venezuela.

The 5P85TE2 of an S-300PMU2 SAM on parade in Baku in 2011.

S-300PS displayed in a Ukrainian Air Force museum in Vinnitsa.

Transport-launch container with a 5V55 surface-to-air missile for the S-300P.

A 64N6E2 reconnaissance radar, which forms part of the 83M6E2 command post of this S-300PMU-2 system.

Three S-300PMU missile launchers in firing position. Displayed by the Slovak military in Piešťany.

The 5P85-1 launcher for S-300PT displayed at the Air Defense History Museum in Zarya, Moscow Oblast.

From left to right: the 64N6E2 radar, 54K6E2 command post, 5P85 missile launch vehicle, and the 9M96E2 missiles.

A view of the deck area housing the S-300F vertical missile launchers on the Slava Class Guided Missile Cruiser Marshal Ustinov.

Installing inflatable decoys of the S-300 during a Russian army exercise by the Guards Engineer Brigade and the Engineer Camouflage Regiment.

S-300PMU2 during rehearsal for the 2009 Victory Day parade on April 28 and 30:

The main components of the S-300B in the 2012 *Technologies in Mechanical Engineering* exhibition in Russia:

9A83 TELAR.

S-300V air defense system.

9S19M2 Imbir acquisition radar.

9S15M Obzor-3 round sight acquisition radar.

9S457 self-propelled command post.

9S32 multichannel missile engagement guidance radar.