



**We didn't
encounter
them in the
Gulf or in
Kosovo.
Next time,
we will.**

The Double- Digit SAMs

By John A. Tirpak, Senior Editor

SINCE the inception of stealth aircraft such as the B-2 bomber and the F-22 fighter, the Air Force has been warning that advanced surface-to-air missile systems in the early 2000s would begin proliferating among US adversaries, sharply raising the danger to nonstealthy combat aircraft.

As if on cue, Russia in December announced it had struck a multibillion dollar arms deal to equip Iran with the deadly S-300 family of SAMs and its associated radars.

The S-300 grouping features several different types of missiles built to strike at everything from low-flying drones and stealth cruise missiles to high-altitude reconnaissance

airplanes and distant sensor platforms. Arrival of these systems in the arsenals of military foes will greatly complicate US operations, which continue to depend heavily on nonstealthy aircraft and will for years to come.

Gen. Richard E. Hawley, the now-retired former commander of USAF's Air Combat Command, told an AFA symposium in February that these new SAMs, if deployed in numbers large enough to create overlapping zones of engagement, would figuratively present "a brick wall" to nonstealthy fighters,

The S-300 series comprises the SA-10, SA-12, and SA-20 missiles and attendant radars. Each missile-radar combination is geared to operations within a range of altitudes and targets. It is the definitive "double-digit SAM" threat that has spurred the development of US stealth systems over the last 20 years.

The SA-10 "Grumble" weapon is the most common of the S-300 missiles that have been sold abroad, first by the Soviet Union and then by its successor state, Russia. It is optimized for use against fighter-type aircraft, having a range of nearly 50 miles and top speed approaching Mach 6.

The Soviet military designed the SA-12a "Gladiator" primarily for use against incoming tactical ballistic missiles, and its follow-on, the SA-12b "Giant," is considered equiva-

lent to or perhaps more capable than the US Patriot missile.

The SA-20 "Triumph" is an advanced development of the SA-12b. It has a range at least three times greater than that of the earlier version.

All of these missiles vastly outperform the Soviet-Russian systems bearing the single-digit designations SA-2 through SA-9. These older types were encountered in the 1991 Gulf War and 1999 Balkans conflict.

Pulling Out the Stops

The Russians are not shy about pushing their systems to prospective clients. Senior intelligence analysts told *Air Force Magazine* that Moscow's military has "pulled out all the stops" in marketing the very best air defense systems, selling to anyone with the hard currency to buy them.

Earlier model Soviet-Russian SAMs, now in widespread use around the world, were limited to defending against one aircraft or missile target at a time. Now, the SA-20 gives the defender the power to engage six targets simultaneously. Such engagements could take place at a range of 248 miles, three times the effective range of the SA-6 it replaces. The missile is 1.5 times faster than the previous generation and is capable of engaging targets from ground level up to the stratosphere.

"It's automated," one analyst re-

ported. "It's digital; it's easy to re-program." And it is considered highly jam-resistant. The system is also mobile, making it far harder to locate and destroy. "They can pack them up really quick" and move to a new location, the analyst added.

The S-300 system is billed as having capability against low-flying cruise missiles, theater ballistic missiles, and all types of aircraft and as being far easier to operate and maintain than earlier generations of SAMs.

Six battalions of SA-20s, comprising about 48 vehicles and a complement of nearly 200 "ready to fire" missiles, is estimated to be worth about \$1 billion, analysts reported.

Still in development, but already being advertised, is a follow-on system called the S-400, which is an advanced version of the SA-20. However, the S-400 is expected to incorporate a number of new tricks stemming from lessons learned in the Kosovo engagement.

Russia is also marketing upgrades of those older SA-2 through SA-9 missiles, for the Russian customers that can't quite afford an S-300 or S-400, one analyst reported. These new systems feature digital avionics, additional sensors, upgraded guidance packages, and refurbished missile hardware that extends range and reliability. Poland, too, is offering digital upgrades of older SAMs.

"It's the same mentality," explained one analyst. "Take out the

old Commodore 64 and let's put in a Pentium [processor]."

The Bad Guys

US intelligence services anticipate that five or six "traditional adversaries"—Syria, Iraq, Libya, and the like—will purchase SA-12/20 systems over the next five to 10 years. They will need to upgrade because their existing systems suffer from maintainability problems stemming from old technology such as vacuum tubes as well as liquid-fuel motors.

The S-300 system is already in use in China, a nation expected to begin making copies or derivatives of the system for its own use and possibly for export. Most of the former Soviet republics have the system, as do Bulgaria, India, and Cyprus.

Analysts declined to comment on whether the Russian system is truly jam-proof or jam-resistant but did say that the increase in capability represents a fundamental shift in the air defense threat.

"What it comes down to," said one, "is, you want to be able to operate pretty much freely within that area." Jamming will help, but "you can only do that for so long." Jamming buys time, he said, and "might get you in and out, but if you have to loiter inside the threat ring of a 400-kilometer [248-mile] missile, I think your average pilot would want something more than just electrons and an engineer's slide rule to live by." ■

Double-Digit SAMs by the Numbers

	Maximum Range	Guidance	Minimum Altitude	Maximum Altitude	Maximum Speed	Estimated Cost
Air Defense SAMs						
SA-10b "Grumble"	47 mi.	Radar	82 ft.	16.8 mi.	Mach 6	\$60 million (system)
SA-12a "Gladiator"	47 mi.	Inertial Guidance/Radar	820 ft.	15.5 mi.	Mach 5.8	\$100 million (system)
SA-12b "Giant"	62 mi.	Inertial Guidance/Radar	3,280 ft.	18.6 mi.	Mach 8	\$100 million (system)
<i>Next generation</i>						
SA-20 (S-400 "Triumph")	248 mi.	Command/Radar	?	?	?	?
S-300PMU-1 (SA-10d)	93 mi.	Radar	33 ft.	16.9 mi.	?	?
S-300PMU-2 "Favorit"	124 mi.	Radar	?	?	?	?
Point Defense SAMs						
SA-11 "Gadfly"	19 mi.	Inertial Guidance/Radar	50 ft.	13.6 mi.	Mach 2.8	\$250,000 (missile)
SA-13 "Gopher"	3.1 mi.	Infrared	30 ft.	1.8 mi.	Mach 2	\$85,000 (missile)
SA-15 "Gauntlet"	7.4 mi.	Command/Radar	30 ft.	3.7 mi.	Mach 2.5	\$150,000 (missile)
SA-17 "Grizzly"	31 mi.	Radar	33 ft.	15.5 mi.	Mach 4	\$300,000 (missile)
SA-19 "Grison"	5 mi.	Radar	50 ft.	2.2 mi.	Mach 2.7	\$90,000 (missile)

Note: Max altitude and speed are rounded.

Sources: *Air Force Magazine*, "Gallery of Russian Weapons," March 1997; Teal Group; Janes.com.