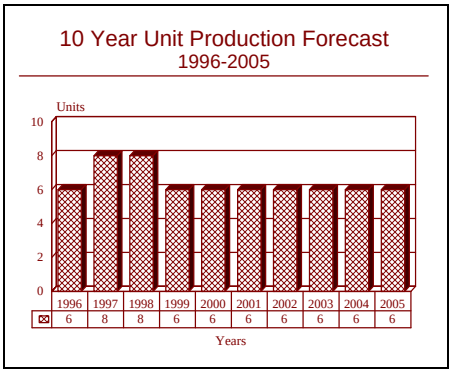
Project 1241 Molniya - Archived 12/97

Outlook

- Only Fast Attack Craft armed with supersonic anti-ship missiles
- Long-established Russian production run
- Latest version has enlarged hull and Kortika CIWS



Orientation

Description. Maly Raketny Kutr (Fast Attack Craft - Missile) to patrol coastal waters and conduct anti-surface strike missions.

Sponsor

Rosvoorouzhenie
18/1 Ovchinnikovskaya Emb
113324 Moscow
Russia
Tel: +7 95 231 0049
Fax: +7 95 233 0272

Contractors

Almaz Central Naval Design Bureau
St Petersburg
Russia
(Design authority)

Severnoe Design Bureau
St Petersburg
Russia
(Export design authority)

Volodarski Shipyard
Rybinsk
Russia

Petrovskiy Shipyard
St Petersburg
Russia

Licensee

Mazagon Dockyard
Bombay & Goa
India

Status. Production and service.

Total Produced. Total production to end of 1992 is 22 Type 1241.1, 21 Type 1241.1M and 27 Type 1241.1MP. Single prototypes of Type 1241.0, Type 1241RE, Type 1241.8 and Type 1242.1 exist; some of these may be converted from existing Type 1241.1M hulls.

Pennant List

Name	Type	Country	Builder	In Service
101 *Mulniya*	1241.1M	Bulgaria	Volodarski	12/1989
K40 *Veer*	1241.1	India	Volodarski	5/1987
K41 *Nirbhik*	1241.1	India	Volodarski	2/1988

Name	Type	Country	Builder	In Service
K42 *Nipat*	1241.1	India	Volodarski	1/1989
K43 *Nishank*	1241.1	India	Volodarski	9/1989
K44 *Nirghat*	1241.1	India	Volodarski	6/1990
K45 *Vibhuti*	1241.1RE	India	Mazagon-Bombay	6/1991
K46 *Vipul*	1241.1RE	India	Mazagon-Bombay	3/1992
K47 *Vinash*	1241.1RE	India	Mazagon-Goa	11/1993
K48 *Vidyut*	1241.1RE	India	Mazagon-Goa	1/1995
K83 *Nashak*	1241.1RE	India	Mazagon-Bombay	12/1994
K98 *Prahar*	1241.1RE	India	Mazagon-Goa	3/1997
K51	1241.1RE	India	Mazagon-Bombay	11/1996
434 *Gornik*	1241.1	Poland	Volodarski	12/1983
435 *Hutnik*	1241.1	Poland	Volodarski	4/1984
436 *Metalowiec*	1241.1	Poland	Volodarski	2/1988
437 *Rolnik*	1241.1	Poland	Volodarski	2/1989
188 *Zborul*	1241.1	Romania	Petrovskiy	12/1990
189 *Lastunul*	1241.1	Romania	Petrovskiy	2/1992
190 *Pescarusul*	1241.1	Romania	Petrovskiy	2/1992
R-2[(b)]	1241.1	Russia	Petrovskiy	1980
R-6[(b)]	1241.1	Russia	Petrovskiy	1980
R-11[(b)]	1241.0	Russia	Volodarski	1979
R-14[(b)]	1241.1M	Russia		1982
R-16[(b)]	1241.1M	Russia		1982
R-18[(b)]	1241.1M	Russia		1982
R-19[(b)]	1241.1M	Russia		1982
R-20[(b)]	1241.1M	Russia		1983
R-24[(b)]	1241.1M	Russia		1983
R-26[(b)]	1241.1M	Russia		1983
R-28[(b)]	1241.1M	Russia		1983
R-33[(b)]	1241.1M	Russia		1984
R-42[(b)]	1241.1M	Russia		1984
R-45[(b)]	1241.1M	Russia		1984
R-46[(b)]	1241.1M	Russia		1984
R-47[(b)]	1241.1M	Russia		1985
R-48[(b)]	1241.1M	Russia		1985
R-49[(b)]	1241.1M	Russia		1985
R-51[(b)]	1241.1M	Russia		1985
R-54[(b)]	1241.1M	Russia		1986
R-56[(b)]	1241.1M	Russia		1986
R-58[(b)]	1241.1M	Russia		1986
R-60[(b)]	1241.1M	Russia		1986
R-63[(b)]	1241.1MP	Russia		1987
R-66[(b)]	1241.1MP	Russia		1987
R-69[(b)]	1241.1MP	Russia		1987
R-71[(b)]	1241.1MP	Russia		1987
R-74[(b)]	1241.1MP	Russia		1988
R-75[(b)]	1241.1MP	Russia		1988
R-76[(b)]	1241.1MP	Russia		1988
R-79[(b)]	1241.1MP	Russia		1988
R-83[(b)]	1241.1MP	Russia		1989
R-85[(b)]	1241.1MP	Russia		1989
R-86[(b)]	1241.1MP	Russia		1989

Name	Type	Country	Builder	In Service
R-88[b]	1241.1MP	Russia		1989
R-98[b]	1241.1MP	Russia		1990
R-99[b]	1241.1MP	Russia		1990
R-100[b]	1241.1MP	Russia		1990
R-101[b]	1241.1MP	Russia		1991
R-103[b]	1241.1MP	Russia		1991
R-104[b]	1241.1MP	Russia		1993
R-109[b]	1241.1MP	Russia		1991
R-113[b]	1241.1MP	Russia		1992
R-115[b]	1241.1MP	Russia		1992
R-129[b]	1241.1MP	Russia		1993
R-142[b]	1241.1MP	Russia		1993
R-143[b]	1241.1MP	Russia		1993
R-144[b]	1241.1MP	Russia		1994
R-145[b]	1241.1MP	Russia		1994
R-158[b]	1241.1MP	Russia		1994
R-160[b]	1241.1MP	Russia		1994
R-162	1241.RE	Russia		1994
R-164	1241.RE	Russia		1994
R-176	1241.RE	Russia		1994
R-177	1241.RE	Russia		1995
R-179	1241.RE	Russia		1995
R-187	1241.RE	Russia		1995
R-229	1241.RE	Russia		1995
R-230	1241.RE	Russia		1996
R-239	1241.RE	Russia		1996
R-240	1241.RE	Russia		1996
R-255	1241.RE	Russia		1996
R-257	1241.RE	Russia		1996
R-261	1241.RE	Russia		1996
R-271	1241.RE	Russia		1996
R-293	1241.RE	Russia		1997
R-297	1241.RE	Russia		1997
R-298	1241.RE	Russia		1997
R-344[c]	12419	Russia		1997
R-442[c]	12419	Russia		1997
185NS9201 *Hiddensee*[a]	1241.1	US	Volodarski	10/1984
971	1241.1	Yemen	Petrovskiy	11/1990
976	1241.1	Yemen	Petrovskiy	1/1991
	1241RE	Vietnam		1996
	1241RE	Vietnam		1997

Four additional ex-German vessels withdrawn from service and now scrapped

[a]To be preserved asa museum ship

[b]Russian pennant numbers change frequently; the list above is approximate only and is subject to change without notice.

[C]The last two may have been designated for exports to the Vietnamese navy.

Application. The Tarantul I/II/III class corvettes are designed for ASuW operations in inshore and territorial waters. They are expressly optimized for launching missile strikes against heavily escorted targets such as convoys and amphibious assault groups. The Type 1241.1MP variant carries a missile armament specifically intended to penetrate the AEGIS defense system.

Price Range. The Severnoe Design Bureau has quoted a price for the Tarantul Class FSG between US$25 million and US$60 million. The former is believed to refer to an ex-Russian Navy Type 1241.1M; the higher cost would be for a new-built Type 1241RE. The 1994 order from Vietnam suggested a unit cost of US$60 million.

Technical Data

Dimensions	**Metric**	**US**
Length:	56.1 m	184.1 ft
Beam:	11.5 m	37.7 ft
Draft:	2.5 m	8.2 ft
Displacement:		
Standard:		385 tons
Full load:		450 tons

Characteristics	
Speed:	43 kts
Endurance:	1600 nm/14 kts; 400 nm at 43 kts
Crew:	5 officers, 29 enlisted

Armament	**Type**	**Quantity**
Missiles:		
Anti-ship:	P-270 Moskit	4
Point defense:	9M-313 Igla	16
Guns:		
Main gun:	AK-176 76 mm L59	1
Point defense:	AK-630 30 mm L65	2

Electronics		
Radar		
Search:	3-Ts-25E Garpun-Bal-E	1
Fire control:	MR-123 Koral-E	1
Navigation:	Kivach-3	1
Electronic warfare		
ESM/ECM:	Half Hat A	2
ESM (OTHT):	Wine Glass	2
Decoy launchers:	RK-16	2
HF/Direction finding:	Cage Stalk	1
MF/Direction finding:	Muff Dive	1
Sonar		
HF mine avoidance:	MG-519	1
Communications		
Command system:	Second Captain	1
Datalinks:	Light Bulb	2
IFF interrogator:	Nikhrom-RM	1 or 2
IFF transponder:	High Pole	1

Propulsion	**Type**	**Quantity**
Gas turbines:	PR-76	2x12,000 shp
Diesels:	M-504	2x5,000
Propellers:	4-bladed	2

Design Features. The Tarantul class hull is basically an enlarged version of that used for the older Osa class (Russian codename Project 205) PCFG. It is of hybrid design with a round-bilge forward section changing to a hard-chine planing hull aft. This configuration provides

the missile craft with significant range and endurance and good seaworthiness, features which have brought them close to the capabilities of corvette-type warships. The hull is built of steel with the superstructure constructed of aluminum alloy. Since the superstructure deck runs most of the length of the ship, sliding joints are provided to accommodate flexing stresses.

Extreme attention is paid to NBC defenses on these ships. The ship's hull and superstructure forms a pressurized citadel accessed via airlocks. The ship's showers are designed to act as emergency decontamination units. Overall construction is extremely solid.

Outfitting of these missile craft with a combination diesel-gas turbine powerplant was a difference, and a rather significant one, from the Osa class craft. With the development of full speed, the powerplant design gears both the diesel and the gas turbines to the propeller shaft. By using this CODAG configuration, the designers succeeded in reducing specific fuel consumption by more than a third at economical speed. This reduction has been translated into reduced fuel stowage and, thus, full displacement. Each gas turbine has full power of 12,000 shp and each diesel 4,000 shp, which gave the missile craft a full speed of 43 knots.

Operational Characteristics. The anti-ship missile system includes two twin container launchers (on each side in the craft's midsection near the superstructure) for P-270 Moskit missiles. The P-270, also known by its industrial nomenclature 3M-80, weighs 3,950 kg with a warhead of 320 kg. Missile length is 9.375 m, body diameter is 1.3 m and wingspan 1.6 m. The missile cruises to its target at a speed of Mach 2.3 then can accelerate to Mach 3.5 for a final high-speed 10 km run to the target. The P-270 can turn by up to 60 degrees immediately after launch. Maximum range is normally 90 km, but this drops to 80 km if the option to use the high-speed final run is utilized. The missile is powered by a ramjet fed by four intakes arranged symmetrically around the missile body. A booster rocket is integrated with the ramjet. Guidance is by active radar with a datalink back to the launch platform. The P-270 has an adaptive radar altimeter which determines the sea state and can vary the cruise altitude of the missile between 7 and 20 m accordingly.

Based on requirements for providing the most favorable horizontal and vertical angles of fire, a single automatic AK-176 76.2 mm gun is mounted in the middle of the forecastle. This weapon is tasked with providing an extended range anti-air capability for self-defense, the destruction of fast airborne targets and unarmored surface targets within range. The AK-176 has a rate of fire of 120 rpm to a range of 14 km against surface targets and 7 km against air targets. The US Navy experience at Pax River suggests that this gun is virtually unjammable, and its great reliability resulted in it being awarded the nickname "Boopamatic."

Close in air defense is provided by two systems. A pair of AK-630 30 mm L65 gatling guns are installed at the rear end of the superstructure. These each have a rate of fire of 3,000 rpm to a maximum range of 2,500 m. They are normally controlled by the MR-123 radar but are provided with an optical back-up system designated Kolonka. This is a crude ring sight similar to that used on Second World War 20 mm Oerlikon guns. The AK-630 guns are supplemented by a SAN-8 launcher quadruple launcher for Igla-M infrared guided anti-aircraft missiles. This has a range of approximately 3.6 km. A total of 16 rounds are carried, four on the mount and 12 in a manually operated reload magazine.

The electronics suite is comprehensive and uses a Garpun-Bal-E (Band Stand) radar as the prime surface search/missile fire control radar. This radar operates in the E/F band and also acts as the datalink receiver for the P-270 missile. The Garpun-Bal-E is the primary sensor for the fire control complex 3Ts-80E and can track 15 targets while designating six for missile attack. As with SSN-22 Sunburn, Band Stand is a NATO generic name for a group of unrelated systems. These include a D-band radar on the Sovremenny class destroyers, the E/F-band system on the Type 1241.1MP and a new high F-band system on the new Type 1241RE. The radar suite also includes a Kivach 3 navigation radar, believed to be a clone of the Racal-Decca 1229.

The masthead position normally used by search radars is occupied by a Light Bulb datalink receiver system. This is a very high-speed, high-capacity datalink comparable to the NATO Link-16 system. It is used to transfer tactical information and data from a central command post (either a shore installation or a flagship) directly into the "Second Captain" command system.

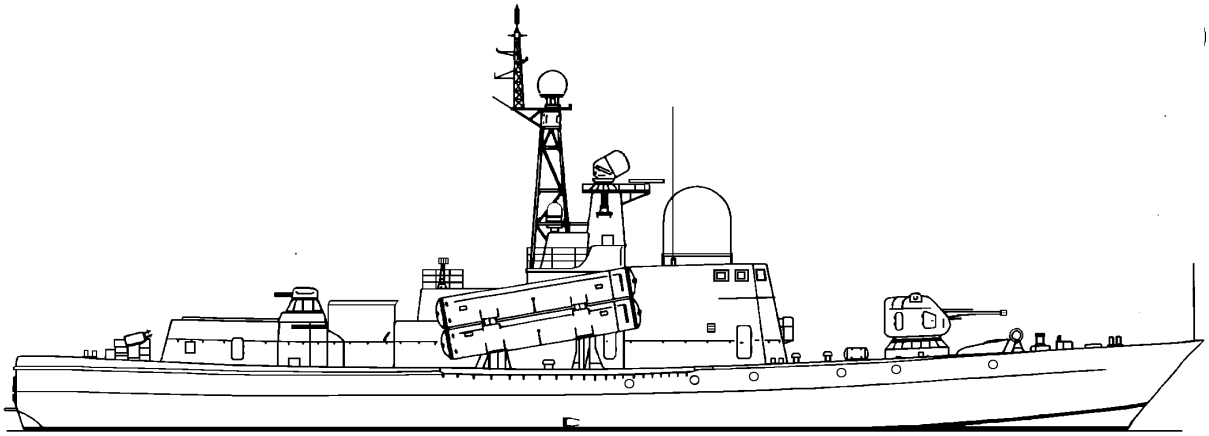
Orders and tactical directives are transferred in a similar manner and the system is capable of firing the ship's offensive weapons without reference to the crew. This is intended to ensure that concentration of effect can be achieved with a coordinated attack from dispersed assets. Note that, in contrast to Western datalinks, the information traffic is one-way only. The Second Captain installation itself is very basic indeed and cannot be equated to a Western-style command system.

The electronic warfare fit reflects the assumption that the Tarantul class craft will be fighting inshore under friendly air power protection. The major system is Half Hat A which combines a directional radar warning system to set off the RK-16 chaff launchers with an integrated deception jammer. This is believed to provide some level of protection against Western anti-ship missiles. The EW suite also includes the Wine Glass

high-precision ESM system which provides over-the-horizon targeting resources for the P-270 missiles.

Communications intelligence equipment is unusually extensive for a craft of this size. High-frequency direction finding (HF/DF or Huff-Duff) is provided by a mast head Cage Stalk installation. There is also a medium-frequency direction finding (MF/DF or Muff-Duff) system designated Muff Dive on the yardarms. One Russian perception explaining the unusually comprehensive provision of communications equipment is that the Tarantul class craft may be assigned to attack and disrupt hostile amphibious operations which include substantial numbers of civilian ships taken up from trade. These would have less secure communications facilities than warships and would thus be more easily targetable by such techniques.

A keel-mounted MG-519 (NATO codename Mouse Roar) high-frequency sonar is installed. This is purely a mine avoidance set and has no ASW function. The Type 1241.1 class (unlike its Type 1241P Pauk class half-brother) has no ASW capability or equipment.



TARANTUL CLASS CORVETTE

Source: Forecast International

Variants/Upgrades

Type 1241. The original prototype design with hydrofoils. This was rebuilt as Type 1241.0.

1241.0. A one-off variant equipped with the P-80 Zubr (SSN-22 Sunburn) missile normally arming the Sovremennyy class (Project 956) destroyers. The Project 1241.0 can be distinguished from the P-270-armed Project 1241.1MP ships by lengthened missile tubes with a modified end-cap. The Project 1241.0 was completed in 1981; no further construction of this variant has occurred. The ship is used for experimental work and to trial new items of equipment (for example the Kortika CIWS).

1241.1 (Tarantul I). Standard non-hydrofoil variant of the Project 1241. This version had a simplified electronics fit, including the replacement of the Band Stand main fire control radar with the Garpun (NATO codename Plank Shave) integrated fire control radar/ESM/datalink system.

The main armament of the Project 1241.1 has been the P-20M radar-guided and P-22 infrared-guided anti-ship missiles (both NATO codenamed SSN-2D Styx). Standard load-out is three P-20M and one P-22 missiles per ship. The ship has an all-gas turbine power plant with two 4,000 shp DMR-76 cruise turbines and two 12,000 shp PR-77 boost turbines. These give a maximum speed of 44 kts and an endurance of 2,400 nm at 14 kts (400 nm at 44 kts).

1241.1E Export derivative of the 1241.1 design before the introduction of types 1241.1RE and 12418. These ships are equipped with the Italian Mini-SADOC command system built under license in India by Bharat Electronics and have a Western-designed electronic warfare system. Reports on the nature of this equipment differ; some sources claim the system is the Racal Cutlass/Cygnus integrated ESM/jammer fit; others the Alenia INS-3 built under license in India while a recent report suggests that the ships may be equipped with the Argo AR-900/ APECS-II system. All of these are credible, but the Italian fit is strongly supported by two other considerations. Firstly, the INS-3 EW system is already installed on large numbers of Indian warships, providing operational commonality.

Secondly, Alenia has recently reported that it is drawing on its experience with the Minerva class corvettes to integrate INS-3 with Mini-SADOC and British-designed (almost certainly Super Barricade) decoy launchers for fast attack craft "of a Far Eastern Navy." The powerplant of Project 1241.1E includes two 12,100 NK-12MV gas

turbines and two SEMT-Pielstick diesels. Later ships may have a three-shaft layout powered by a single LM-2500 gas turbine rated at 27,500 shp and two SEMT-Pielstick diesels.

1241.1M (Tarantul II). A development of the basic Project 1241 family for use by the Russian navy as an interim replacement for the unsatisfactory Project 1241.0. The Project 1241.1 has the same electronics fit as the Project 1241.0, but is armed with the P-27 radar-guided anti-ship missile (NATO codename SSN-2E Styx). The P-27 uses the basic airframe of the older P-20M missile, but has a new L-band seeker and a radar video datalink back to the launch platform The ship has an all-gas turbine powerplant with two 4,000 shp DMR-76 cruise turbines and two 12,000 shp PR-77 boost turbines. These give a maximum speed of 44 kts and an endurance of 2,400 nm at 14 kts (400 nm at 44 kts).

1241.1MP (Tarantul III). Standard Russian navy version of Project 1241. This is the version described in detail in this report.

1241RE. New version of Type 1241.1MP retaining the P-270 armament of the Type 1241.1MP but with the two AK-630 30 mm CIWS gatling guns replaced by a Kashtan (NATO codename CADS-1) combined gun/missile system. This mount is installed at the rear of the superstructure block. The Kashtan system is armed with a pair of 2A38 30 mm L120 multibarrelled cannon and racks for eight 9M-311 (SAN-11) missiles. A total of 48 9M-311 missiles are carried. The two 2A38 guns have an aggregate rate of fire of 10,000 rounds per minute and an effective range of up to 3,000 m.

The 9M-311 missile has command-to-line-of sight guidance and a maximum range of 8,000 m. Two radar antennas are provided, codenamed Hot Flash by NATO. One tracks the target, the other the stream of shells from the 30 mm guns to provide closed-loop tracking. The radar system also provides target tracking at 12,000 m for the 9M-311 missiles. The system operates in the L-band. There is no on-mount target acquisition radar; this function is provided by the Band Stand radar. The Band Stand radar on this variant operates in the high F-band rather than the E/F-band of Project 1241.1MP.

1241.7. Export version of Type 1241RE.

12418. A further development of the basic Type 1241.1MP/1241RE with the weapons and combat systems of those two versions installed in the larger hull of the Project 1242 ASW corvette. This effectively trades five knots maximum speed for 50 percent greater tactical radius, improved living accommodation and more sophisticated electronics. These include improved radars and the provision of a separate Pozitiv-E air search radar.

Export version of Type 1241RE with 16 US Harpoon or Russian AS-20 Kayak anti-ship missiles in place of the four P-270 missiles on the 1241RE.

Program Review

Background. RDT&E aimed at creating the first missile craft in the Russian navy was started in the early 1950s and was completed in 1956. The first such craft were designed through efforts of specialists of the Ministry of the Shipbuilding Industry TsKB-5. This subsequently became the Almaz Central Naval Design Bureau now responsible for what was called the Project 1241. Ye. I. Yukhnin was appointed Chief Designer of the missile craft design project. The designers used the hull and engineering of the Project 183 motor torpedo boat which had proved successful and had been built in quantity for the Russian navy since 1949. The missile boat derivative of this design was designated Project 183R (Komar).

The experience of building and operating Project 183R missile craft permitted shifting to development of a new special-construction missile craft with heavier missile armament, increased seaworthiness and qualitatively improved specifications and performance characteristics. TsKB-5 specialists began work along this direction in 1955 before the lead Project 183R missile craft was commissioned in the Russian navy. Yukhnin continued to act as Chief Designer.

Targets for fulfilling the conceptual and detail designs were set for 1957 and 1958 respectively. Modification of the missile system, which subsequently permitted increasing the P-15 (NATO codename SSN-2A Styx) missile firing range from 40 to 80 km was done in parallel (much earlier than previously believed by Western sources), and creation of the new P-20 (NATO codename SSN-2B Styx) missile system also was under way. The Osa class missile craft's hull and powerplant were designed to allow for the possibility of their use for a new motor torpedo boat and other applications. The craft received a steel hull with special lines: round-bilge in the forebody and hard-chine in the afterbody. Experience showed that this helped increase their seaworthiness and also allowed them to use their missiles in a sea state up to and including four, without a speed restriction and up to Sea State five with a speed of 30 kts.

The Osa class (Type 205) missile craft were built in a large numbers from 1957 through 1970 by shipyards in Leningrad, Vladivostok and Rybinsk. Various design project modifications were undertaken, including Types 205A, 205K, 205E, 205ET, 205ch, 205U, 205M, 205MR and 205ER plus a number of other missile craft based ont

the same Osa class design. Some of these were built only in small numbers or even simply as prototypes used for research or for working out new-design approaches in practice. The USSR built a total of over 400 missile craft under these design projects for the Russian navy as well as for transfer or sale abroad.

The Osa class design was considered a great success and, in 1960, a large group of shipbuilders, TsKB-5 specialists, and contracting parties were awarded the Lenin Prize for their involvement in its creation. In particular, Project Chief Designer Yukhnin, Project Deputy Chief Designer A. P. Gorodyanko, TsKB-5 Department Chief V. P. Gusev, Chief Designers A. Ya Bereznyak (for the missile system), V. A. Kucherov (for the radars), A.A. Mashkov and D. P. Pavlov (for fire control systems), were recognized with the prize. This list is provided in detail since it is virtually a directory of the cream of Russian naval design expertise.

The wide spread of Osa class in Russia and allied countries led the West to hastily begin work on creating similar combat assets. By the early 1970s the design of Western missile FAC-M had overtaken the Osa class – which was, after all the product of early 1950s technology – and Western anti-ship missile defenses had severely limited the efficiency of the P-15 and P-20 missiles. As a result the Russian coastal forces were facing obsolescence and export customers were switching to the new Western designs.

In order to recover design leadership in creating missile craft, a new generation of FAC-M was required. The latest design, the Nanutchka class (Russian codename Project 1234 Burya) had a different tactical rationale and did not fit the requirement. In accordance with a USSR Council of Ministers decree, the Almaz Central Naval Design Bureau began developing a new small craft design project, codenamed Tarantul class Corvettes, in 1973. This was originally conceived as a hydrofoil design but was rebuilt as a conventional displacement hull.

Missile craft of this design were supposed to replace their predecessors in the Russian navy in the 1980s. Development of a new, more advanced anti-ship missile system (the P-80, SSN-22 Sunburn) already had been completed and it was being deployed on the Sovremennyy class destroyers. This missile could not be accommodated on Osa missile craft because of its weight-size characteristics. The P-80 anti-ship missile was characterized by a long flight range and high cruising speed. This called for installing new, more advanced target designation equipment on the launch platform including the onboard processing equipment necessary to display the ISAR imagery sent back by the missile homing head. The increasing effectiveness of Western anti-ship systems required more effective means of collective protection and self-defense than on the Osas.

The Tarantul class was developed by the group of specialists headed by Project Chief Designer Yukhnin. Three versions of the design were developed in parallel. One of these, designated Type 1241.0, was intended for the Russian Navy and carried the highly sophisticated P-80 missile and its associated electronics. The second variant, Type 1241.1, was aimed at the export market and had simplified electronics and was armed with the P-20M (NATO codename SSN-2D Styx) anti-ship missile. The third version was an anti-submarine patrol craft designated Type 1241.2 and differed greatly from the first two designs. After modifications of the original design, the lead ship of "Molniya" Project, became operational with the Russian Navy during 1979-1980, with the prototype export analogue being completed somewhat later.

Trials with the prototype Type 1241.0 were conducted between 1979 and 1981 with mixed results. In terms of ship characteristics, the Tarantul class proved to be highly satisfactory, but problems were detected with the missile armament. Some of these related to the size and bulk of the P-80 missile which placed severe burdens on the hull but the most serious difficulties were electronic. The proximity of the fire control system to the other electronic systems on the ship and extreme difficulty in keeping the datalinks correctly aligned interfered with the sensitive ISAR image link. In spite of many efforts, it proved impossible to get the P-80 system onboard the Type 1241.0 to work consistently.

In contrast, the 1981 trials of the export Type 1241.1 design were wholly and unreservedly successful. As expected, the tried and tested P-20M and P-22 missiles deployed on these ships offered no problems. The complex electronics of the Type 1241.0 (Band Stand radar and Light Bulb high-capacity datalink) were deleted and replaced by a much simpler Garpun (NATO codename Plank Shave) radar which combined radar functions with ESM and a less sophisticated, lower capacity datalink within the same antenna. Deliveries of Type 1241.1 to export customers started in 1984 and continue.

The export version of the Tarantul class was therefore used as a basis for an interim design (Type 1241.1M) which would fill the gap until a new missile for the ships was available. The electronics of Type 1241.1 was upgraded with a number of the systems intended for Type 1241.0 including Band Stand, Light Bulb and a more comprehensive ESM suite. A new version of the P-20M missile was designed which incorporated an L-band seeker to provide enhanced target discrimination and a talk-back datalink to the launch platform (using Band Stand as the receiver). This missile was designated P-27 (NATO codename SSN-2E Styx). Three brigades (21 hulls) of this

type were built between 1982 and 1986 with one ship being sold to Romania in 1991 — this being the first export of the P-27 missile.

The definitive Russian version of the Tarantul class took shape in 1986 when the first prototypes of a new hypersonic anti-ship missile were delivered. This combined the guidance system and datalink of the P-27 with a new airframe powered by an integral rocket/ramjet. The new missile was almost a metric tonne lighter than the P-80 and had less than half the range (90 km as opposed to 250 km). It was, however, substantially faster, making its attack run at mach 3.5. This missile was designated P-270 in Russian service but received the same NATO designation, SSN-22 Sunburn, as the older P-80 missile. The new missile/platform combination was designated Type 1241.1MP. Four brigades of this type were built with the last of the 28 scheduled for delivery in 1995.

India is the largest user outside Russia, with eight boats in service and 12 building. These fall into three groups. The first five are straightforward Type 1241.1 designs built in Russia. The second group of five (three complete, two building) are a modified version, fitted with the Italian Mini-SADOC command system and western EW equipment, and are designated Type 1241.1E. The remaining ten boats are a much more substantially modified design with three shafts in place of two and a radically different powerplant. The central shaft will be driven by an LM-2500 gas turbine while the outer two will be powered by SEMT-Pielstick diesels. Presumably the craft will trail its center screw in cruise configuration. Economic circumstances may force this program to be cut back.

During 1992, the US Navy purchased an ex-German Type 1241.1 boat, the *BMS Hiddensee*, for evaluation. This craft is now based at the Pax River experimental station. It is the only known Russian warship currently being operated by a NATO navy. All other ex-Russian warships in the German navy have been withdrawn from service for sale (mostly to Indonesia) or scrap. Early in 1994 two of the remaining German Tarantul class craft were offered to Poland. This was not accepted and the four ships were subsequently offered (in disarmed condition) to Lithuania. This offer was declined and the four ships are now reported to have been scrapped.

In April 1993, the Severnoe Design Bureau launched two new variants of the Type 1241.1 family at the Abu Dhabi Defense Exhibition. One of these was a simple modification of the Type 1241.1MP design, equipped with a single Kortika integrated gun/missile CIWS in place of the rear AK-630 guns and the SAN-8 missile launcher. This version was designated Type 1241RE. The second variant was a more substantial modification in which the four P-270 missiles were replaced by four quadruple banks of Kh-35 Harpoonski anti-ship missiles. Severnoe officials claimed that the Kh-35 could be replaced by US Harpoon missiles without any modification to ship or missile if the customer desired. This version was designated Type 1241.8 and is also armed with the Kortika CIWS.

Four Type 1241.1MP were delivered during 1994. A final Type 1241.1MP and the first of the Type 1241RE class craft for the Russian navy were reported as being due for completion in 1995. Presumably this is the flagship for the first brigade of Type 1241RE craft. There is no confirmation at time of writing that these deliveries have been made. The Vietnamese navy ordered two Type 1241RE corvettes, the agreement being announced in mid-1994 and the contract formally signed in early 1995. This remains the most recent publicized sale of the Tarantul class.

A further new variant of the basic design was revealed in early 1995. This has been designated Type 1242.1 and fits the electronics equipment of the Type 1241RE into the larger hull of the Type 1242 ASW corvette. The electronics have been upgraded with a 15- to 20-percent increase in radar data processing capability. The anti-air armament can consist of either two AK-630M mounts or a single Kashtan combined gun-missile system.

By mid-1996, most Russian publicity material was concentrating on the Type 1242.1 class with the implication that this was now entering Russian service to replace older Tarantul class boats. There is no supporting evidence for this presumption.

Funding

Original development of the Tarantul class designs was funded by the Soviet government for the Russian navy. Current developments and modifications for the export market are being funded privately by Rosvoorouzhenie.

Recent Contracts

Award

Contractor	($ millions)	Date/Description
Vympel	120.0	*Jan 1995* — Vietnamese order for two Type 1241RE corvettes

Timetable

	1973	Design work on Project 1241 started
	1979	Trials of Type 1241.0 started
	1981	Trials of Type 1241.1 started
	1984	First deliveries of Type 1241.1
	1986	Trials of Type 1241.1MP started
	1987	Type 1241.1MP entered full service
Apr	1993	Type 1241.1RE and Type 1241.8 announced
Jan	1995	Two Type 1241RE ordered by Vietnam

Worldwide Distribution

Bulgaria (1 Type 1241.1M)

India (5 Type 1241.1, 3 Type 1241.1E in service, 12 Type 1241.1E building)

Poland (4 Type 1241.1)

Romania (3 Type 1241.1)

Russia (1 Type 1241.0, 2 Type 1241.1, 20 Type 1241.1M, 27 Type 1241.1MP. 1 Type 1241.1MP and 1 Type 1241.1RE building)

Vietnam (2 Type 1241RE)

Yemen (2 Type 1241.1)

Forecast Rationale

At first sight, the Tarantul class appears to fall into much the same class as other enlarged fast attack craft designs, such as the French Combattante IVNG, the Swedish Goteborg or the British Vita class. However, being designed to operate in conformity with Russian tactical doctrines, a detailed examination of the design shows it to have quite different (though far from inferior) characteristics from those ships.

In common with the rest of Russian coastal forces, the Tarantul class FSG are designed to operate under tight central control from shore-based or floating command elements. Russian sources have described these ships and their Osa class predecessors as "mobile coast defenses." The targets are detected using an extensive shore-based surveillance network, one element of which is the Krug communications surveillance system, then the brigades of FSG are coached in to execute a coordinated attack from numerous points simultaneously. The Okean '70 exercise clearly showed that this technique was flawed and that an at-sea flagship was essential for the final control of the attack. This function is fulfilled by a custom-designed class, the Type 1239 Sivuch corvette, which controls a number (in theory three) of brigades. Only two Type 1239 corvettes have been built.

This doctrine of tight central control makes the Tarantul design unsuited to the requirements of most Western and other navies. These use their fast attack craft in a far more independent manner, still relying on shore-based functions for target acquisition, but conducting their attacks with a much higher level of individual initiative. The introduction of the Type 1242.1 with its increased hull volume may be aimed at providing for the installation of a Western-style command system. Indeed, if Type 1242 was to be made available with (for example) a SEWACO FD or a NAUTIS command system, it would be difficult to justify any other selection.

The Indian navy has shown the way to turning the Tarantul class design into a very attractive asset. By replacing the Russian command system with the proven Italian Mini-SADOC and installing new electronic warfare equipment, the capability of the design to perform Western-style mission profiles has been greatly enhanced. The Indian ships are limited in still carrying the old P-20M missile; the same conversion applied to the Type

1241.1MP or Type 1241.1RE designs would produce a very dangerous opponent.

In short, the Tarantul class is a very well designed, robust and powerful combatant. It shares with all other FSG a very serious vulnerability to helicopter-launched stand-off attacks — neither its AK-630 guns nor the 9M-313 missiles can reach out to the attack ranges preferred by, for example, Royal Navy Lynx/ Sea Skua helicopters. To some extent, this deficiency has been corrected by the modification of the design to carry Kashtan (the installation being a direct result of Russian evaluation of the *Battle of the Bubiyan Channel*), but vulnerability to air attack is still a serious problem.

On the other hand, the offensive capability of these craft provided by the quartet of P-270 missiles cannot be questioned. Trials have shown that CIWS guns such as Phalanx and Goalkeeper are quite incapable of countering these missiles and even the current generation of CIWS missiles are limited in their ability to cope with weapons of this type. When the new generation of laser-guided, hypersonic CIWS missiles, cued by optronic packages capable of detecting the heat plume of the P-270 over the horizon, enter service, a credible defense will be available. At the moment, even the most powerful and sophisticated warships are at risk. The only real defense is to kill the launch platform before the P-270s are airborne; this concept highlights the deficient air defenses of the design.

The comparative values of the hypersonic nonevasive anti-ship missile and its subsonic, low-observable and highly evasive equivalent are enthusiastically debated. Due to the large size of the former group, the choice has narrowed down to four of the hypersonic type or up to 16 of the evasive group. The jury is still out on the debate and the overall result is too close to call. The Severnoe Design Bureau hedged its bets by producing a variant of the Type 1241.1RE (Type 1241.8) armed with 16 of the Kh-35 Harpoonski missile. This is almost an identical twin of the US Harpoon missile and, in a superb example of truly capitalist commercial opportunism, both Severnoe and the Raduga Design Bureau, responsible for the Kh-35, claim that the Type 1241.8 can be fitted to carry the US weapon at no extra cost and with no structural or electronic modifications to either platform or missile.

In conclusion, the Type 1241.1 "Molniya" design appears to offer a very powerful offensive weapon with sufficient flexibility to enable its development into forms suitable for use by a wide variety of clients. In common with all other FSG designs, it is extremely vulnerable to counterattack and its chances of surviving an engagement with, for example, the Royal Navy or US Navy are slight. In a more limited environment, the design comes into its own, and for such circumstances, it is undoubtedly the best design in its class currently available.

Production of the Type 1241.1 family has historically been held at a level of four hulls per year for the Russian navy and an average of two per year for export customers. Type 1241RE is one of the designs forming an essential part of the Russian naval reconstruction plans for the next decade (the others being the Project 956 destroyer, the Project 1154 SKR, the Project 971 SSN and the Project 636 SSK). All other warship design projects have been halted. As the Russian navy reorients toward its traditional role of territorial defense, the Tarantul class will be an essential part of the fleet. We therefore believe that this construction rate will be maintained, although existing versions will be replaced by more advanced developments.

Indian construction is likely to be much slower than planned and is unlikely to exceed one hull per yard per year. We also believe that the more extensive modifications planned will be dropped and construction concentrated on the existing variant (Type 1241.1E). Depending on the terms of their production license, these may form the first significant warship exports by India.

Other export customers may well emerge as existing users of the Osa class, now reaching the end of its viable hull life, look for successors. The Tarantul class, available at low cost and using many of the support facilities set up for the Osa class will probably do well here. However, most of these sales will be of in-service Russian Type 1241.1M variants with the funds so obtained being used to acquire the projected Type 1241RE fleet. Bulgaria has already started to follow this pattern. Our unspecified exports production line is therefore severely restricted. However, refitting these craft along the lines of the Indian variants and providing systems for new-build hulls may well provide a substantial volume of work for command system and electronic warfare companies.

Ten-Year Outlook

None.