

**TRISA WEG**

# **Worldwide Equipment Guide**

## **Volume 3: Naval and Littoral Systems**

**December 2011**

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**U.S. ARMY TRADOC G-2**



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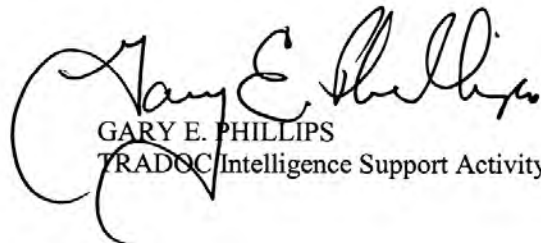
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SUBJECT: Worldwide Equipment Guide (WEG) Update 2011

1. In today's complicated and uncertain world, it is impossible to predict the exact nature of the next conflict that might involve U.S. joint forces. We must be ready to meet the challenges of any type of conflict, in all kinds of places, and against all kinds of threats. That is the nature of the U.S. Army Contemporary Operational Environment (COE), and its operations within the joint operational environment. Training for the joint environment also requires an expanded scope for the Opposing Force (OPFOR). The U.S. joint warfighters must remain flexible, as must the OPFOR designed as a challenging sparring partner in the training environment.
2. The equipment portrayed represents military systems, variants, and upgrades that U.S. forces might encounter now and in the foreseeable future. It is a living document and is updated. The authors analyze real-world developments and trends to assure that the OPFOR remains relevant.
3. The WEG was developed to support OPFOR portrayal in training simulations (constructive, virtual, and live) and other related activities, and is approved for those uses. The WEG is not a product of the U.S. intelligence community. Published in three volumes, it is the approved document for OPFOR equipment data used in U.S. Army training. Annual WEG updates are posted on the Army Knowledge Online (AKO) website. Therefore it is available for downloading and local distribution (see enclosure 1 for reproducible directions). Distribution restriction is unlimited. This issue replaces all previous issues. TRADOC G2, TRISA would like to thank JFCOM for contributing valuable joint systems data used in the document.
4. For comments or questions regarding this document, contact Tom Redman, BAE Systems contractor, at DSN 552-7925, commercial (913) 684-7925, email: [tom.redman@us.army.mil](mailto:tom.redman@us.army.mil). If he is not available (or for specific issues), contact POCs noted in the chapter introductions

2 Encls  
as

  
GARY E. PHILLIPS  
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## AKO PATH TO OPFOR COE PRODUCTS

To access WEG and other COE training products at our site, use either of these two methods.  
The AKO direct link is <https://www.us.army.mil/suite/files/21872221>.

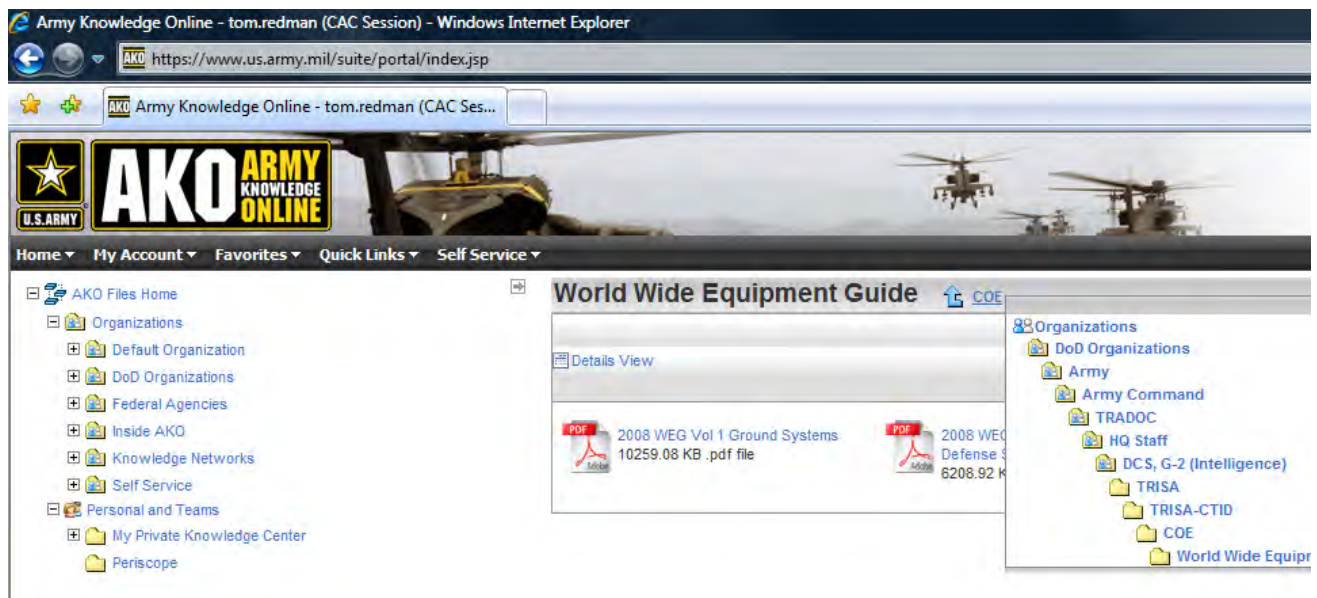
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Volume 1 Ground Forces <https://www.us.army.mil/suite/doc/25963538>  
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### **Errata Changes for 2011 Update**

Chapters 1 and 3 have some changes, which are noted in red in the Red Ink Edition. Please check page numbers, as some have changed. Some illustrations were replaced or added. The following table was added:

<u>System</u>	<u>Page</u>
Littoral Systems: Key Technology Trends.....	3-4

## Preface

This handbook is one of a series that describes a contemporary Opposing Force (OPFOR) for training U.S. Military commanders, staffs, and units. Together, these handbooks outline an OPFOR that can cover the entire spectrum of military and paramilitary capabilities against which the U.S. Military must train to ensure success in any future conflict.

Applications for this series of handbooks include field training, training simulations, and classroom instruction throughout the U.S. Military. All U.S. Military training venues should use an OPFOR based on these handbooks, except when mission rehearsal or contingency training requires maximum fidelity to a specific country-based threat. Even in the latter case, trainers should use appropriate parts of the OPFOR handbooks to fill information gaps in a manner consistent with what they do know about a specific threat.

Unless this publication states otherwise, masculine nouns or pronouns do not refer exclusively to men.



## **Introduction**

This Worldwide Equipment Guide (WEG) describes the spectrum of worldwide systems and system trends in the Contemporary Operational Environment (COE). The updated and approved definition for COE is as follows:

The contemporary operational environment (COE) is the collective set of conditions derived from a composite of actual worldwide conditions that pose realistic challenges for training, leader development and capabilities development for Army forces and their joint, intergovernmental, interagency and multinational partners.

The OPFOR in the COE should also include options for portraying “hybrid threat”. Hybrid threat is defined as:

...the diverse and dynamic combination of regular forces, irregular forces, terrorist forces, and/or criminal elements, all unified to achieve mutually benefitting effects.

The OPFOR force may use conventional weapons; but regular as well as irregular forces may also employ improvised systems, as described in Volume 1 Chapter 14, and in Volume 2 Chapter 7. Upgrade tables are included to capsulize WEG systems changes reflecting contemporary upgrade trends. The authors remind users that the WEG is not a product of the intelligence community. It was developed to support OPFOR portrayal in training simulations (constructive, virtual, and live) and activities, and is approved for that use.

The pages in this WEG are designed use in electronic form or for insertion into loose-leaf notebooks. This guide will be updated as often as necessary, in order to include additional systems, variants, and upgrades that are appropriate for OPFOR use. Please note that a “red ink” edition is available for database developers, noting every change in each edition.

### **WORLDWIDE OPFOR EQUIPMENT**

Due to the proliferation of weapons through sales and resale, wartime seizure, and licensed or unlicensed production of major end items, distinctions between equipment as friendly or OPFOR have blurred. Sales of upgrade equipment and kits for weapon systems have further blurred distinctions between old or obsolete systems and modern ones. This WEG describes base models, or fielded upgrades which reflect current capabilities. Many less common variants and upgrades are also addressed.

## HOW TO USE THIS GUIDE

The WEG is organized by categories of equipment, in chapters. The format of the equipment pages is basically a listing of parametric data. This permits updating on a standardized basis as data becomes available. For meanings of acronyms and terms, see the Glossary. Please note that, although most terms are the same as in U.S. terminology, some reflect non-U.S. concepts and are not comparable or measurable against U.S. standards. For example, if an OPFOR armor penetration figure does not say RHA (rolled homogeneous armor), do not assume that is the standard for the figure. If there are questions, consult the Glossary, or contact us.

System names reflect intelligence community changes in naming methods. Alternative designations include the manufacturer's name, as well as U.S./NATO designators. Note also that the WEG focuses on the complete weapon system (e.g., AT-4/5/5B antitank guided missile launcher complex or 9P148 ATGM launcher vehicle), versus a component or munition (9P135 launcher or AT-4/5 ATGM).

Many common technical notes and parameters are used in chapters with similar weapon and motive technologies. Some chapters, such as Chapter 2 (Undersea Vessels), offer systems with many unique parameters and therefore may not be consistent with those in other chapters.

The authors solicit the assistance of WEG users in finding unclassified information that is not copyright-restricted, and that can be certified for use. Questions and comments should be addressed to the POC below. If he is not available, contact the designated chapter POC.

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## Units of Measure

The following symbols and abbreviations are used in this guide.

<u>Unit of Measure</u>	<u>Parameter</u>
(°)	degrees (of slope/gradient, elevation, traverse, etc.)
GHz	gigahertz—frequency (GHz = 1 billion hertz)
hp	horsepower (kWx1.341 = hp)
Hz	hertz—unit of frequency
kg	kilogram(s) (2.2 lb.)
kg/cm <sup>2</sup>	kg per square centimeter—pressure
km	kilometer(s)
km/h	km per hour
kt	knot—speed. 1 kt = 1 nautical mile (nm) per hr.
kW	kilowatt(s) (1 kW = 1,000 watts)
liters	liters—liquid measurement (1 gal. = 3.785 liters)
m	meter(s)—if over 1 meter use meters; if under use mm
m <sup>3</sup>	cubic meter(s)
m <sup>3</sup> /hr	cubic meters per hour—earth moving capacity
m/hr	meters per hour—operating speed (earth moving)
MHz	megahertz—frequency (MHz = 1 million hertz)
mach	mach + ( <i>factor</i> ) —aircraft velocity (average 1062 km/h)
mil	milliradian, radial measure (360° = 6400 mils, 6000 Russian)
min	minute(s)
mm	millimeter(s)
m/s	meters per second—velocity
mt	metric ton(s) (mt = 1,000 kg)
nm	nautical mile = 6076 ft (1.152 miles or 1.86 km)
rd/min	rounds per minute—rate of fire
RHAe	rolled homogeneous armor (equivalent)
shp	shaft horsepower—helicopter engines (kWx1.341 = shp)
µm	micron/micrometer—wavelength for lasers, etc.

## Chapter 1

### Naval Surface Vessels


This chapter focuses on fast-attack and light naval vessels with anti-ship surface-to-surface missiles. These constitute a reasonable OPFOR threat to U.S. naval operations.

These data sheets were provided by JFCOM, Mr. Charlie Childress. Questions and comments on data listed in this chapter should be addressed to:

**Mr. Tom Redman**

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e-mail address: [thomas.w.redman@ctr.mail.mil](mailto:thomas.w.redman@ctr.mail.mil)

## Russian and Chinese KUZNETSOV Class Aircraft Carrier (CVG)

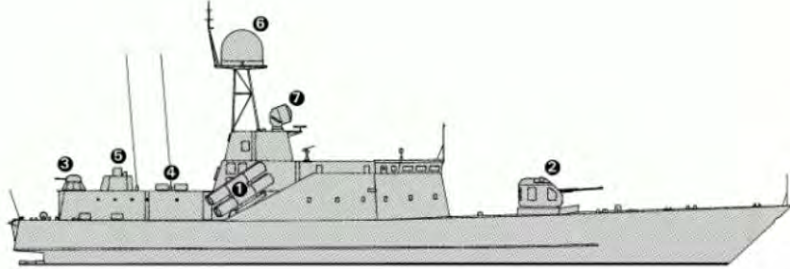
 <p style="text-align: center;">KUZNETSOV-Class carrier</p>	<table border="1"> <thead> <tr> <th>Weapons</th> <th>Load</th> </tr> </thead> <tbody> <tr> <td>SS-N-19/SHIPWRECK</td> <td>12</td> </tr> <tr> <td>SA-N-9/GAUNTLET Lchr</td> <td>4</td> </tr> <tr> <td>SA-N-11/GRISON Gun-Msl</td> <td>8 mts</td> </tr> <tr> <td>AK-630 30-mm Gun</td> <td>16</td> </tr> <tr> <td>Kortik SAM</td> <td>64</td> </tr> <tr> <td>AK-630 30-mm Gatling Gun</td> <td>6</td> </tr> <tr> <td>UDAV-1 Anti-torpedo rockets</td> <td>10</td> </tr> </tbody> </table>	Weapons	Load	SS-N-19/SHIPWRECK	12	SA-N-9/GAUNTLET Lchr	4	SA-N-11/GRISON Gun-Msl	8 mts	AK-630 30-mm Gun	16	Kortik SAM	64	AK-630 30-mm Gatling Gun	6	UDAV-1 Anti-torpedo rockets	10	
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<p><b>SYSTEM</b>  <b>Alternative Designations:</b> Pendant 063,  This CVG class is a larger variant of the KIEV-class.  <b>Date of Introduction:</b> 1985, Sea trials 1989  <b>Proliferation:</b> 2 countries (Varyag to China)</p> <p><b>Description:</b>  Crew: 1,960 (including 518 officers), 626 air group, 40 flag staff  Displacement (tons): 59,100 full load  Length Overall (m): 306.5, 270.0 at waterline  Beam (m): 72.3 overall, 35.4 at waterline  Draft (m): 10.0  Hanger Deck (m): 153.0 length, 26.0 width, 7.2 height</p> <p><b>Performance:</b>  Speed (knots): 29  Range (nautical miles): 3,850 at 29 knots, 12,000 at 10 knots  Propulsion: 4 sets of steam turbines, 4 shafts, 200,000 total shaft hp  Catapult capability: None</p> <p><b>ELECTRONICS</b>  <b>Communications:</b>  Communications Suite: Buran-2  TACAN/Air Control Radar System: CAKE STAND  3 MR-212/201 Vaygach-U (PALM FROND): 3 navigation</p> <p><b>Countermeasures:</b>  Spektr-F (HALF CUP): 4+ laser-warning systems  PK-2 chaff launching system  MG-365 Zvezda M-1 hull-mounted low-frequency sonar  UDAV-1 ASW/Anti-torpedo rocket launcher, 10 tubes, 60 rockets  300-mm rockets with decoys, mines, depth charges, range 3,000 m</p> <p><b>Electronic Warfare:</b>  Sozbezie-BR EW Suite  CROSS LOOP: 3 direction-finder/ESM systems  WINE GLASS: 8 intercept/jammers  FLAT TRACK: 4 intercept/jammers  BELL PUSH: 8 intercept/jammers  BELL NIP: 4 intercept/jammers</p>	<p><b>FIRE CONTROL</b>  <b>Electro-Optics:</b>  1 Bob Tail optronic director  3 Tin Man TV/IR/Laser fire control system</p> <p><b>Radars:</b>  Mars-Passat (SKY WATCH): 1 Fixed array 3-D air surveillance (non-operational)  MR-710 Fregat-MA (TOP PLATE-B): 1 3-D air surveillance  MR-320M Topaz (STRUT PAIR): 2 air surveillance  FLY TRAP: 2 approach radars  MR-360 Podkat (CROSS SWORD): 4 FC radar for SA-N-9  MR-123/3P-87 (HOT FLASH): 8 FC radar for SA-N-11/Kortik</p> <p><b>WEAPONS:</b>  Fixed-wing aircraft onboard capacity: 36 Su-33/FLANKER-D  Helicopter onboard capacity:  16 HELIX-A/Ka-27PL ASW  3 HELIX/Ka-29RLD AEW  2 HELIX-C/Ka-27PS SAR</p> <p>SS-N-19/SHIPWRECK (Granit): 12 launchers, 24 cruise missiles  Range: 550 km/300 nautical miles  Speed: Mach 1.6-2.5  Warhead: 750 kg high explosive or 500 nuclear  Guidance: Inertial, radar/IR/anti-radiation homing</p> <p>SA-N-9/GAUNTLET (9M311/Kinzhal): 8/launcher, 192 missiles  Missile same as SA-15b (radar-guided, 12 km range, 6 km alt)</p> <p>SA-N-11/GRISON (Kashtan) Gun-Msl System 8 mounts:  Kortik SAM, 8 launchers per mount, 256 missiles  Laser beam rider, high velocity missile. Rg 8 km, alt 0-6 km  30-mm AK-630 Gun, 2 per mount, 16 guns, 48,000 rd (see below)</p> <p>AK-630 30-mm Gatling Gun: 6 mounts, 6-barreled, 24,000 rounds  Range 4 km, rate of fire 5,000 rds per min, in bursts</p>																	

### NOTES

This vessel is exceeded in size only by U.S. super-carriers. It is considered a "defensive" aircraft carrier. Lacking a catapult, the FW aircraft cannot launch with full strike loads for offensive missions. The SS-N-19s have no land-attack capability. Russia calls this class of vessel a "heavy aircraft-carrying cruiser", a ludicrous ruse to by-pass aircraft carrier restrictions in the Dardanelles. The above data is all based on the Russian versions of the vessel. Chinese performance, equipment, weapons, and aircraft basing will probably be very different.

The Chinese purchased its carrier Varyag under the guise of converting it into an amusement site. However, refitting is underway for use as a naval vessel, with an assigned pennant number 83. Because extensive repair and upgrade work is required, a commissioning date has been projected for 2015. A postulated but unconfirmed name for the vessel is *Shi Lang*. The Chinese navy will use lessons derived from this work and future operation in its production plans for at least three more aircraft carriers, with construction underway in 2011.


## Russian BPS 500 Guided Missile Corvette

	<table border="1"> <thead> <tr> <th>Weapons</th> <th>Load</th> </tr> </thead> <tbody> <tr> <td>Anti-ship cruise missiles</td> <td>8, possibly 16</td> </tr> <tr> <td>Surface-to-air missiles</td> <td>24</td> </tr> <tr> <td>76 mm gun</td> <td>1</td> </tr> <tr> <td>30 mm gun</td> <td>1</td> </tr> <tr> <td>Machine guns</td> <td>multiple</td> </tr> </tbody> </table>	Weapons	Load	Anti-ship cruise missiles	8, possibly 16	Surface-to-air missiles	24	76 mm gun	1	30 mm gun	1	Machine guns	multiple	
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<p><b>SYSTEM</b>  <b>Alternative Designations:</b> Project 12418  <b>Date of Introduction:</b> 2001  <b>Proliferation:</b> Vietnam (Built by Russia for export)  <b>Description:</b>            Crew: 28-44            Displacement (tons): 517            Length Overall (m): 62            Beam (m): 11            Draft (m): 2.5            Speed (knots): 32-35            Range (nautical miles): 2,200 (at 14 knots)            Endurance: 10 days            Propulsion: 2 MTU diesels. 2 Kamewa waterjets.            Radars: Cross Dome (E/F-band), also known as MR-352 Positive-E, air and surface target acquisition and fire-control radar (range: 69 nautical miles. Unknown I-band radar for navigation. Bass Tilt fire-control radar (range: 30 nautical miles).            Other: fitted with mine rails. Quantity and type of mines that can be carried are unknown.</p>	<p><b>Weapons:</b>            Armed with eight (8), possibly sixteen (16), SS-N-25 (KH-35) Switchblade anti-ship missiles which bear a close resemblance to the U.S. Harpoon missile. It is billed as the export replacement for the widely used SS-N-2 Styx missiles.            Weight: 1388 pounds            Speed: approximately Mach 1            Range: 70 nautical miles            Twenty-four (24) SA-N-10 Gimlet surface-to-air missiles.            Weight: 23.8 pounds            Speed: Mach 2.5            Range: 5,200 m (maximum altitude: 3,500 m)            The 76 mm/60 AK-176M gun is used for air defense, surface engagements and shore bombardment. It has been the principal gun for several corvette and small combatant classes. The AK-176 is part of a weapon control system that is based on the Bass Tilt (H/I-band) fire-control radar (also includes the AK-630).            Rate of fire: 120 rounds/minute            Range: 8 nautical mile (surface); 32,800 feet (anti-air)            Single 30 mm/65 AK-630. Roles include: engaging anti-ship missiles, aircraft, small surface vessels, drifting mines, and defenseless targets ashore.            Rate of fire: 4,000-5000 rounds/minute            Range: 4300-5400 yards            Magazine Capacity: 2,000 rounds</p>													

### NOTES

Vietnam has purchased construction rights from Russia. The first BPS-500 was assembled in Vietnam from modules (kit form) that were fabricated in Russia. It features a streamlined hull and low-profile superstructure (which can be coated with so-called 'stealth materials'). Waterjets and shallow draft make BPS-500 an excellent choice for high-speed, coastal defense missions. Fuel-efficient diesel engines and relatively large fuel tanks provide the craft with good endurance capabilities.

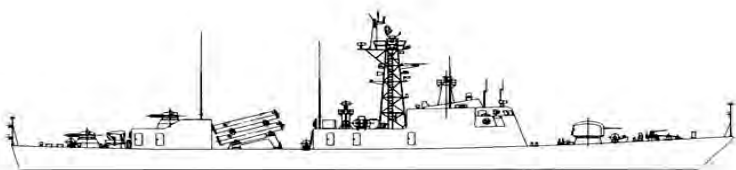
## Chinese HEGU Fast Attack Craft—Missile

	<table border="1"> <thead> <tr> <th data-bbox="1024 254 1265 281">Weapons</th> <th data-bbox="1276 254 1425 281">Load</th> </tr> </thead> <tbody> <tr> <td data-bbox="1024 302 1265 329">Surface-to-surface missiles</td> <td data-bbox="1276 302 1425 329">2 or 4</td> </tr> <tr> <td data-bbox="1024 350 1265 401">Twin 25-mm/80-cal Type 65 anti-aircraft gun</td> <td data-bbox="1276 350 1425 401">1</td> </tr> </tbody> </table>	Weapons	Load	Surface-to-surface missiles	2 or 4	Twin 25-mm/80-cal Type 65 anti-aircraft gun	1
Weapons	Load						
Surface-to-surface missiles	2 or 4						
Twin 25-mm/80-cal Type 65 anti-aircraft gun	1						
<p><b>SYSTEM</b>  <b>Alternative Designations:</b> Houku, Project EM1A  <b>Date of Introduction:</b> not known  <b>Proliferation:</b> China, Pakistan, Bangladesh, Egypt  <b>Description:</b>            Crew: 15 + 2 officers            Displacement (tons): 79.2            Length Overall (m): 27            Beam (m): 6.3            Draft (m): 1.3            Speed (knots): 37.5            Range (nautical miles): 500 (at 24 knots); 400 (at 30 knots)            Propulsion: 4 Chinese type L-12V-180 diesels. 4 shafts.            Radars: Square Tie (H/I-band) for air, surface search and navigation.            Functions include target detection and tracking for anti-ship missile direction. Range against destroyers: 25 nautical miles. Range against medium-sized merchants: 22 nautical miles. Range against combat craft: 10 nautical miles.</p>	<p><b>Weapons:</b>            Armed with either 2 CSS-N-2 Seersucker (C-201) or 4 HY-5 Sardine (C-801) surface-to-surface missiles. Plans to armed all craft with the HY-5 Sardine missile were shelved after only a few conversions were made. The Seersucker is classified as mid-range cruise missile and is based on the CSS-C-2 Silkworm missile. The major difference between the Seersucker and Silkworm is the Seersucker's longer fuselage that provides a larger fuel capacity (and increased range). It is fitted with a large warhead (1,131). The Sardine's flight profile and appearance are similar to those of the Exocet. Reports indicate that it requires little in the way of maintenance.</p> <p><b>CSS-N-2 Seersucker:</b>            Weight: 6,587 pounds            Speed: Mach 0.9            Range: 51 nautical miles</p> <p><b>HY-5 Sardine:</b>            Weight: 2,206 pounds            Speed: Mach 0.8-0.9            Range: 23 nautical miles</p> <p><b>25-mm/80-cal gun:</b>            Rate of fire: 270 rounds/minute            Range: 1.6 nautical miles</p>						

**NOTES**

The Hegu class is the Chinese derivative of the Soviet Komar boats that were transferred to China in the 1960s. Those three or four Komars have since been stricken. The Chinese version has a steel hull instead of the Soviet wood hull. One hydrofoil variant of the Hegu class was built as a prototype for a new class of vessels. Although the prototype may still be in service, plans for the new class were scrapped.

## Chinese HOUJIAN Fast Attack Craft--Missile


	<table border="1"> <thead> <tr> <th>Weapons</th> <th>Load</th> </tr> </thead> <tbody> <tr> <td>Anti-ship missiles</td> <td>5</td> </tr> <tr> <td>Dual 37-mm/63 Type 76A Anti-Air gun</td> <td>1</td> </tr> <tr> <td>Dual 30-mm gun/65 Type 69</td> <td>2</td> </tr> </tbody> </table>	Weapons	Load	Anti-ship missiles	5	Dual 37-mm/63 Type 76A Anti-Air gun	1	Dual 30-mm gun/65 Type 69	2	
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Dual 37-mm/63 Type 76A Anti-Air gun	1									
Dual 30-mm gun/65 Type 69	2									
<p><b>SYSTEM</b>  <b>Alternative Designations:</b> Huang, Shunde  <b>Date of Introduction:</b> 1989  <b>Proliferation:</b> China. Offered for export, but no customers to date  <b>Description:</b>            Crew: 75            Displacement (tons): 520            Length Overall (m): 65.4            Beam (m): 8.4            Draft (m): 2.4            Speed (knots): 32            Range (nautical miles): 1,800 (at 18 knots)            Propulsion: 3 SEMT-Pielstick 12 PA6 280 diesels. 3 shafts.            Radars: Rice Shield (G-band) for surface search; Type 765 (I-band) (derivative of the Russian A-band (Knife Rest) air search radar) for navigation; Type 347G (I-band) for fire control. Some modernized Houjians may be fitted with the MR-36A air-search radar and the MR-35 fire control radar. The MR-36A is a replacement for the Type 352 Square Tie radar. Ranges not known.            Weapons Control: Type 88C Weapons Control System (can control up to three weapons and can accept data from shore-based radars).</p>	<p><b>Weapons:</b>            Armed with 5 C-801/YJ-1 anti-ship missiles that are known as the Strike Eagle (successor to the Styx). After it is launched, the Strike Eagle reaches an altitude of 50 meters and then descends in its approach to the target at an altitude of 20-30 meters. The terminal approach phase (when the radar seeker has acquired the target) is at an altitude of 5-7 meters. The Square Tie search radar is associated with the Strike Eagle missile:</p> <p>Weight: 1,796 pounds            Speed: Mach 0.9            Range: 23 nautical miles (4.5 nautical miles is the minimum range)</p> <p>37-mm/63 Type 76A:            Rate of fire: 180 rounds/minute            Range: 4.6 nautical miles</p> <p>30 mm/65 Type 69:            Rate of fire: 500 rounds/minute            Range: 2.7 nautical miles</p>									

**NOTES**

It was probably built in part for the export market. It also was intended to replace the aging Huangfen and Hegu classes. Reportedly incorporates stealth features as shown in its low profile upper structure.




## Chinese HOUXIN Fast Attack Craft--Missile

	<table border="1"> <thead> <tr> <th data-bbox="1021 256 1269 289">Weapons</th> <th data-bbox="1278 256 1432 289">Load</th> </tr> </thead> <tbody> <tr> <td data-bbox="1021 300 1269 336">Surface-to-Surface missiles</td> <td data-bbox="1278 300 1432 336">4</td> </tr> <tr> <td data-bbox="1021 346 1269 403">2 twin 37-mm/63 Type 76A anti-aircraft guns</td> <td data-bbox="1278 346 1432 403">4</td> </tr> <tr> <td data-bbox="1021 413 1269 470">2 twin 14.5-mm machine guns</td> <td data-bbox="1278 413 1432 470">4</td> </tr> </tbody> </table>	Weapons	Load	Surface-to-Surface missiles	4	2 twin 37-mm/63 Type 76A anti-aircraft guns	4	2 twin 14.5-mm machine guns	4
	Weapons	Load							
Surface-to-Surface missiles	4								
2 twin 37-mm/63 Type 76A anti-aircraft guns	4								
2 twin 14.5-mm machine guns	4								
<p><b>SYSTEM</b>  <b>Alternative Designations:</b>  <b>Date of Introduction:</b> 1991  <b>Proliferation:</b> China, Burma  <b>Description:</b>            Crew: 71            Displacement (tons): 478            Length Overall (m): 62.8            Beam (m): 7.2            Draft (m): 2.4            Speed (knots): 28            Range (nautical miles): 750 (at 18 knots); 1,300 (at 15 knots)            Propulsion: 4 China PR 230ZC diesels. 4 shafts            Radars: Square Tie (I-band) for surface search; Rice Lamp (I-band) for fire control; Anritsu Type 723 (I-band) for navigation. Range against destroyers: 25 nautical miles. Range against medium-sized merchants: 22 nautical miles. Range against combat craft: 10 nautical miles.</p>	<p><b>Weapons:</b>            Armed with 4 YJ-1 (C-801) surface-to-surface missiles which may eventually be replaced by the C-802. The YJ-1 missile is known as the Strike Eagle and is the liquid-fueled replacement to the solid-propellant Styx missile. It is offered as an export as the C-801. The C-802 replaced rocket propulsion with a turbojet engine to achieve longer range:             Weight: 1,796 pounds            Speed: Mach 0.9            Range: 23 nautical miles (minimum range is 4.5 nautical miles)             2 twin 37-mm/63 Type 76A anti-aircraft guns:            Rate of fire: 180 rounds/minute            Range: 4.6 nautical miles             4 14.5-mm Machine Guns:            Rate of fire: 600 rounds/minute            Range: 3.8 nautical miles</p>								

**NOTES**

The Houxin class is another example of a Chinese shipbuilding project designed for both the Chinese navy and for export. It represents the replacement class for the Hegu class of fast attack missile boats. Six have been exported to Burma, or Myanmar.


## Chinese HUANGFENG Fast Attack Craft--Missile

	<table border="1"> <thead> <tr> <th data-bbox="1013 254 1276 296">Weapons</th> <th data-bbox="1276 254 1427 296">Load</th> </tr> </thead> <tbody> <tr> <td data-bbox="1013 296 1276 369">Anti-ship missiles (various)</td> <td data-bbox="1276 296 1427 369">4</td> </tr> <tr> <td data-bbox="1013 369 1276 562">Type 69 or Type 61 gun</td> <td data-bbox="1276 369 1427 562"></td> </tr> </tbody> </table>	Weapons	Load	Anti-ship missiles (various)	4	Type 69 or Type 61 gun	
Weapons	Load						
Anti-ship missiles (various)	4						
Type 69 or Type 61 gun							
<p><b>SYSTEM</b>  <b>Alternative Designations:</b> Type 021  <b>Date of Introduction:</b>  <b>Proliferation:</b> China, North Korea, Pakistan, Yemen, Iran (Huangdong or Hudong), Bangladesh  <b>Description:</b>  Crew: 25 + 3 officers  Displacement (tons): 205  Length Overall (m): 38.6  Beam (m): 7.6  Draft (m): 2.7  Speed (knots): 35-39  Range (nautical miles): 800 (at 30 knots)  Propulsion: Three Type 42-160 diesels. Three shafts.  Radars: Type 331 or Square Tie (I-band) for surface search (range against destroyers: 25 nautical miles; range against medium-sized merchants: 22 nautical miles; range against combat craft: 10 nautical miles). Round-Ball gun fire control or Rice Lamp weapon control radar in ships with YJ-1 anti-ship missiles (ranges: not known).  <b>Weapons:</b>  Armed with four Hai Ying (HY-2) anti-ship missiles. However, Yemeni vessels are armed with the C-801 (YJ-1) and Iranian vessels feature either the C-801 (YJ-1) or C-802 (YJ-2).  HY-2 (CSS-N-3 Seersucker)—developed from the CSS-C-2 Silkworm (longer fuselage to hold more fuel for longer range). It is a mid-range cruise missile with a very low flight altitude and anti-jamming capabilities against electronic countermeasures. Iran is believed to be able to produce its own version of the Seersucker. High explosive warhead.  Weight: 6,587 pounds  Speed: Mach 0.9  Range: 51 nautical miles</p>	<p>YJ-1 (CSS-N-4 Sardine or C-801)—flight profile (sea-skimmer) and appearance resembles those of the Exocet. Likely the product of Chinese reverse engineering of the Exocet. Versions can be launched from aircraft, surface ships, submarines and coastal-defense batteries. Iran claims to be able to produce its own version of the Sardine.  Weight: 2,206 pounds  Speed: Mach 0.9  Range: 23 nautical miles</p> <p>YJ-2 (CSS-N-8 Saccade or C-802)—developed from the Sardine; features a small turbojet engine (instead of the Sardine's solid rocket engine) for a longer range. Flight profile is similar to the Exocet. Some experts suggest that the YJ-2 has a hit estimate of 98 per cent because of its small radar reflectivity and very low attack altitude.  Weight: 1,576 pounds  Speed: Mach 0.9  Range: 65 nautical miles</p> <p>Chinese and Yemeni boats are armed with the Type 61 twin 25 mm gun. The Bangladeshi boat is armed with the Type 69 twin 30 mm gun (forward of the bridge and in the stern). Iranian boats are armed with one Type 69 gun forward of the bridge.</p> <p>Type 61:  Rate of fire: 270 rounds/minute  Range: 1.5 nautical miles</p> <p>Type 69:  Rate of fire: 1,000 rounds/minute (per gun)  Range: 2.2 nautical miles (for anti-surface); 13.120 feet (for anti-air)</p>						

### NOTES

Huangfen design is comparable to the Russian Osa I, four of which were delivered to China in the mid-1960s. Some 100 Huangfen boats were built. Export versions to Pakistan, Bangladesh and North Korea are standard Chinese models. Those boats sold to Yemen feature a longer superstructure and are equipped with four YJ-1 missile launchers and a Rice Lamp fire director. Boats sold to Iran are part of what is known as the Hudong variant. They have the same Huangfen hull, but are armed with four YJ-1 missiles that are set further back on the stern than those on the Yemeni boats. As a result, the Iranian boats do not have the aft twin 30 mm AK-230 mount.

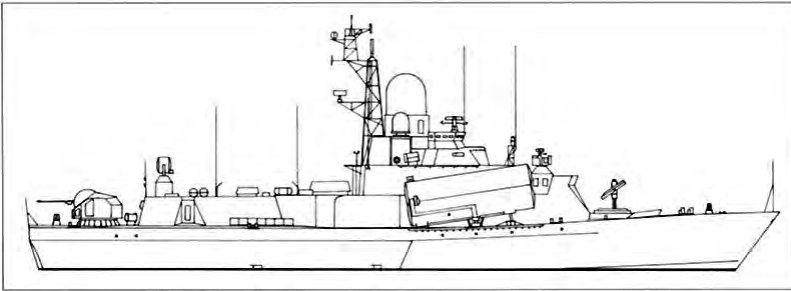
## Russian KAMAN Fast Attack Craft--Missile

	<table border="1"> <thead> <tr> <th>Weapons</th> <th>Load</th> </tr> </thead> <tbody> <tr> <td>Surface-to-Surface Missiles</td> <td>4</td> </tr> <tr> <td>OTO Melara 3-in (76 mm)/62 compact gun</td> <td>1</td> </tr> <tr> <td>Bofors SAK 40 L/70-350 gun</td> <td>1</td> </tr> </tbody> </table>	Weapons	Load	Surface-to-Surface Missiles	4	OTO Melara 3-in (76 mm)/62 compact gun	1	Bofors SAK 40 L/70-350 gun	1	
Weapons	Load									
Surface-to-Surface Missiles	4									
OTO Melara 3-in (76 mm)/62 compact gun	1									
Bofors SAK 40 L/70-350 gun	1									
<p><b>SYSTEM</b>  <b>Alternative Designations:</b> La Combattante II/Tiger (Type 148)  <b>Date of Introduction:</b> 1972-1983  <b>Proliferation:</b> Iran, Libya, Malaysia, Greece, Germany  <b>Description:</b>  Crew: 31 total  Displacement (tons): 275  Length Overall (m): 47  Beam (m): 7.1  Draft (m): 1.9  Speed (knots): 36  Range (nautical miles): 700 (at 33.7 knots)  Propulsion: 4 MTU Type 16V538 TB91 diesels, 4 shafts  Radars: Decca (I-band) 1226 for navigation (maximum access range: 40-45 nautical miles). Signaal WM28 track while scan fire control radar (I/J -band) (also used for surface search).  Electronic Countermeasures: Thomson-CSF Alligator dual mode (noise deception) I-band jammer.</p>	<p><b>Weapons:</b>  Fitted with one or two twin surface-to-surface missile launchers aft of the superstructure—the forward pair trained to starboard and the after pair trained to port. Armed with either four Chinese YJ-1 (C-801) or four Chinese YJ-2 (C-802) anti-ship missiles. Both missiles are sea-skimmers, but the YJ-2 has a significantly longer range.</p> <p>YJ-1 (CSS-N-4 Sardine or C-801) is likely the result of Chinese reverse engineering of the French Exocet anti-ship missile. Iran claims to manufacture its own version of the YJ-1.  Weight: 2,206 pounds  Speed: Mach 0.9  Range: 23 nautical miles</p> <p>YJ-2 (CSS-N-8 Saccade or C-802) features a flight profile similar to that of the Exocet. Because of its small radar reflectivity and very low attack altitude, experts believe the YJ-2 possesses hit estimate of 98 per cent.  Weight: 1,576 pounds  Speed: Mach 0.9  Range: 65 nautical miles</p> <p>1 OTO Melara 3-inch (76 mm)/62 compact gun.  Rate of fire: 10-85 rounds/minute  Range: 8.5 nautical miles</p> <p>1 Bofors SAK 40 L/70-350 gun  Rate of fire: 300 rounds/minute  Range: 6.75 nautical miles</p>									

**NOTES**

It was originally configured to launch Harpoon missiles (which are probably not operational). It is likely that portable SA-7 launchers are onboard some ships of this class. Anti-ship missile boats such as this class and those in the Nanuchka and Tarantul classes may possess half the range of destroyers, but they are ideally suited for littoral actions.


## Russian NANUCHKA III Missile Corvette

	<table border="1"> <thead> <tr> <th>Weapons</th> <th>Load</th> </tr> </thead> <tbody> <tr> <td>Siren Surface-to-Surface Missiles</td> <td>6</td> </tr> <tr> <td>SA-N-4 Surface-to-Air Missiles</td> <td>20</td> </tr> <tr> <td>AK-176M 76 mm Gun</td> <td>1</td> </tr> <tr> <td>30 mm/65 AK-630 close in weapons system</td> <td>1</td> </tr> </tbody> </table>	Weapons	Load	Siren Surface-to-Surface Missiles	6	SA-N-4 Surface-to-Air Missiles	20	AK-176M 76 mm Gun	1	30 mm/65 AK-630 close in weapons system	1
	Weapons	Load									
Siren Surface-to-Surface Missiles	6										
SA-N-4 Surface-to-Air Missiles	20										
AK-176M 76 mm Gun	1										
30 mm/65 AK-630 close in weapons system	1										
<p><b>SYSTEM</b>  <b>Alternative Designations:</b> Veter. Project 1234.1. Type name is Maly Raketny Korabl (meaning small missile ship).  <b>Date of Introduction:</b>  <b>Proliferation:</b> Russia. Nanuchka IIs exported to Algeria, India, and Libya (Note: exported versions are armed with SS-N-2C/Ds).  <b>Description:</b>  Crew: 35 + 7 officers  Displacement (tons): 660  Length Overall (m): 59.3  Beam (m): 11.8  Draft (m): 2.6  Speed (knots): 33  Range (nautical miles): 2,500 (at 12 knots); 900 (at 31 knots)  Propulsion: Six M504 diesels. Three shafts.  Radars: Peel Pair (I-band) for air/surface search (on Nanuchka I and early Nanuchka III); Plank Shave (I-band set) for air/surface search (on later Nanuchka IIIs)(range: 20-25 nautical miles). Bass Tilt (H/I-band) for fire control (range: 35 nautical miles). Pop Group (F/H/I-band) as the weapon control system for the SA-N-4 missile system. Nayada (I-band) for navigation (short-range).  Weapons Control: Band Stand (D/E/F-band) is part of the fire control system for the SS-N-25 missile system. Band Stand also provides datalink for the SS-N-9 missile. Bell Nest and Light Bulb are datalink systems.</p>	<p><b>Weapons:</b>  Armed with six SS-N-9 Siren anti-ship missiles. Two triple launchers are mounted on either side of the superstructure. The Siren, essentially a larger version of the SS-N-7Starbright, is no longer in production and has been replaced by the SS-N-22 Sunburn. Classified as a sea-skimming, anti-ship missile, the SS-N-9 is also known as the Malakhit. Nuclear warheads have been removed per international agreement.  Weight: 7,275 pounds  Speed: Mach 0.9  Range: 60 nautical miles</p> <p>Twenty SA-N-4 Gecko surface-to-air missiles are stored below decks in a magazine. One twin launcher is located on the foredeck. Geckos possess limited anti-surface capabilities (small warhead limits damage it could inflict), but are primarily used as point defense against air threats.  Weight: 287 pounds  Speed: Mach 3.0  Range: 6.6 nautical miles (7.6 nautical miles maximum altitude)</p> <p>The 76 mm/60 AK-176M gun is used for air defense, surface engagements and shore bombardment. It has been the principal gun for several corvette and small combatant classes.  Rate of fire: 120 rounds/minute  Range: 8 nautical mile (surface); 32,800 feet (anti-air)</p> <p>The single 30 mm/65 AK-630 is located at the after end of the superstructure in Nanuchka III and IV. Its five roles are: engaging anti-ship missiles, aircraft, small surface vessels, drifting mines, and defenseless targets ashore.  Rate of fire: 4,000-5000 rounds/minute  Range: 4300-5400 yards  Magazine Capacity: 2,000 rounds-</p>										

**NOTES**

Four versions of the Nanuchka have been built since 1967. They all have the same hull, propulsion system and performance. Differences are found in the weapons and sensors areas. The export version, Nanuchka II, is armed with the SS-N-2C/D anti-ship missile instead of the SS-N-9 missile. Nanuchkas are designed for deployment in coastal waters, although they have deployed in groups of twos or threes in the Mediterranean. One Nanuchka IV was built with sextuple launchers to serve as a test platform for the SS-NX-26 Yakhont anti-ship cruise missile (range of 180 nautical miles and a speed of Mach 2.5). Plans exist for the development of a follow-on class.

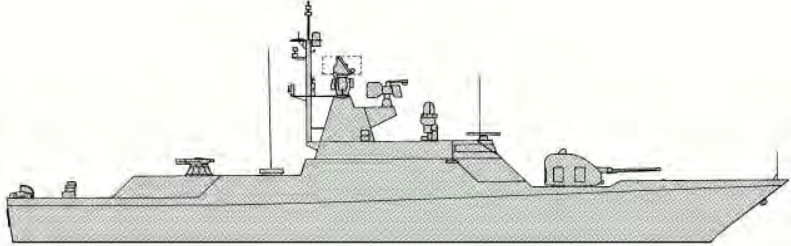
## Russian PROJECT 12421 MOLNIYA Fast Missile Attack Boat

	<table border="1"> <thead> <tr> <th data-bbox="1015 254 1276 289">Weapons</th> <th data-bbox="1276 254 1430 289">Load</th> </tr> </thead> <tbody> <tr> <td data-bbox="1015 300 1276 336">Surface-to-surface missiles</td> <td data-bbox="1276 300 1430 336">4</td> </tr> <tr> <td data-bbox="1015 346 1276 401">Portable anti-aircraft missile system</td> <td data-bbox="1276 346 1430 401">12</td> </tr> <tr> <td data-bbox="1015 411 1276 447">76-mm AK-176M gun</td> <td data-bbox="1276 411 1430 447">1</td> </tr> <tr> <td data-bbox="1015 457 1276 493">30-mm AK-630M gun</td> <td data-bbox="1276 457 1430 493">2</td> </tr> </tbody> </table>	Weapons	Load	Surface-to-surface missiles	4	Portable anti-aircraft missile system	12	76-mm AK-176M gun	1	30-mm AK-630M gun	2
	Weapons	Load									
Surface-to-surface missiles	4										
Portable anti-aircraft missile system	12										
76-mm AK-176M gun	1										
30-mm AK-630M gun	2										
<p><b>SYSTEM</b>  <b>Alternative Designations:</b> not known  <b>Date of Introduction:</b> 1999  <b>Proliferation:</b> not known  <b>Description:</b>            Crew: 44            Displacement (tons): 550            Length Overall (m): 56.1            Beam (m): 10.2            Draft (m): 2.65            Speed (knots): 38-42            Range (nautical miles): 2,400 (at 12-13 knots)            Propulsion: 2 M15E1 gas turbine installations. 2 shafts            Radars: Garpun-Bal multi-role radar system handles early warning surveillance, detection and identification of surface and low-flying air targets, generation of over-the-horizon targeting data, navigation and processing of information from external sources (such as radio links). Reported to be jam-proof, it also can simultaneously track up to 15 targets and provide targeting data on six targets. Range is 70+ nautical miles in the active mode, 310+ nautical miles in the passive mode.</p>	<p><b>Weapons:</b>            Armed with improved 4 SS-N-22 Sunburn supersonic, anti-ship missiles (with almost twice the range of previous Sunburn missiles). The Sunburn features a dual mode active/passive radar terminal seeker. Once launched from its canister, it can make a 60-degree turn towards the target. Cruise altitudes in the terminal phase are between 7-20 meters. Some reports indicate that the Sunburn is capable of evasive maneuvers during its terminal phase to avoid gun and missile defense systems.</p> <p>Weight: 9,900 pounds            Speed: Mach 2.5            Range: 90+ nautical miles</p> <p>IGLA – 1M AD missile system is also known as the SA-16 Gimlet. It is a shoulder-fired surface-to-air missile.            Speed: Mach 1.7            Range: 3 nautical miles (maximum altitude: 3,800 yards)</p> <p>76-mm AK-176M gun mount            Rate of fire: 120-130 rounds/minute            Range: 9+ nautical miles</p> <p>30-mm AK-630M gun (2 X 6)            Rate of fire: 4,000-5,000 rounds/minute            Range: less than 5 nautical miles</p>										

**NOTES**

Third generation missile boat was built by Vypel for export and the Russian navy. Project 12421 boats are significantly updated versions of Tarantul III corvettes. The AK-630 guns are mounted aft and can be used to destroy floating mines.


## Russian SCORPION Guided Missile Corvette

	<table border="1"> <thead> <tr> <th>Weapons</th> <th>Load</th> </tr> </thead> <tbody> <tr> <td>Yakhont surface-to-surface missiles</td> <td>8</td> </tr> <tr> <td>A-190 lightweight gun</td> <td>1</td> </tr> <tr> <td>30 mm Gatling gun</td> <td>Twin</td> </tr> <tr> <td>SA-N-11 surface-to-air missiles</td> <td>8</td> </tr> </tbody> </table>	Weapons	Load	Yakhont surface-to-surface missiles	8	A-190 lightweight gun	1	30 mm Gatling gun	Twin	SA-N-11 surface-to-air missiles	8	
Weapons	Load											
Yakhont surface-to-surface missiles	8											
A-190 lightweight gun	1											
30 mm Gatling gun	Twin											
SA-N-11 surface-to-air missiles	8											
<p><b>SYSTEM</b>  <b>Alternative Designations:</b> Type 12300  <b>Date of Introduction:</b> 2003  <b>Proliferation:</b> All Scorpions in first series will be built for export. Second series will be built for Russian navy.  <b>Description:</b>  Crew: 37-44  Displacement: 470  Length Overall (m): 56.8  Beam (m): 10.8  Draft (m): 5.2  Speed (knots): 38-40  Range (nautical miles): 1500 (at 12 knots)  Propulsion: Combined Diesel and Gas turbine (CODAG) (both types of engines can be engaged at the same time and combined on the same shaft to maximize efficiency and flexibility of the propulsion system). 1 M-70FR gas turbine; 2 MTU 16V4000 M 90 diesels. 3 shafts.  Radars: Cross Dome, or MR-352 Pozitiv-E (E/F-band) for air/surface search, air and target acquisition, firing data for missile and gun systems, and threat assessment (range: 69 nautical miles).</p>	<p><b>Weapons:</b>  Armed with 4 Yakhont (SS-N-26) anti-ship cruise missiles. The Yakhont is the export version of the Oniks anti-ship cruise missile. It can be launched from submarines, ships and mobile or fixed launchers. It is likely a sea-skimmer missile. Constructed with a ramjet engine, it can reach speeds as high as Mach 3.5. Once launched, the homing scanner is briefly turned on at a pre-calculated point and determines target location. The homing system then turns on only when the missile drops its altitude to as low as 16 feet, just a matter of seconds before hitting the target. Russia and India may have entered a partnership to produce a version of the Yakhont called the PJ-10.  Weight: 6,100 pounds  Speed: Mach 2.0-3.5  Range: 180 nautical miles</p> <p>1-A190m lightweight 3.9 in (100-mm) gun is an improved version of the AK-100  Rate of fire: 45 rounds/minute  Range: 10.75 nautical miles</p> <p>Twin 30-mm close-in weapons system:  Rate of fire: 9,000 rounds/minute  Range: 1 nautical mile</p> <p>SA-N-11 Grison surface-to-air missiles are part of the Combined Air Defense System (CADS) which also includes the 30-mm close-in weapons system. CADS is able to engage four incoming missiles simultaneously. SA-N-11s are command-guided.  Speed: reaches maximum velocity of 900m/second  Range: 6 nautical miles (maximum altitude is 11,400 feet)</p>											

### NOTES

It was designed as the successor to the Tarantul class. Its sea-keeping abilities are said to be significantly improved through the addition of a set of automatically controlled 'interceptors' that can reduce rolling motions by a factor of 2 to 3. It is also designed with various stealth features.

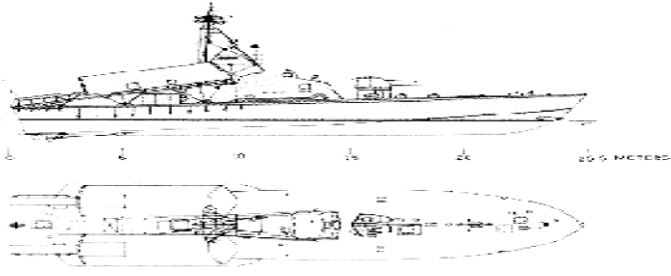
## Russian SIVUCH Guided Missile Patrol Air Cushion Vessel

	<table border="1"> <thead> <tr> <th>Weapons</th> <th>Load</th> </tr> </thead> <tbody> <tr> <td>Anti-ship missiles</td> <td>8</td> </tr> <tr> <td>Surface-to-air missiles</td> <td>20</td> </tr> <tr> <td>76 mm gun</td> <td>1</td> </tr> <tr> <td>30 mm gun</td> <td>2</td> </tr> </tbody> </table>	Weapons	Load	Anti-ship missiles	8	Surface-to-air missiles	20	76 mm gun	1	30 mm gun	2
	Weapons	Load									
Anti-ship missiles	8										
Surface-to-air missiles	20										
76 mm gun	1										
30 mm gun	2										
<p><b>SYSTEM</b>  <b>Alternative Designations:</b> Project 1239. Bora Class Guided Missile Corvette. Dergach Class.  <b>Date of Introduction:</b> 1997  <b>Proliferation:</b> Available for export.  <b>Description:</b>  Crew: 35-68  Displacement: 1,050-1,280 (full load)  Length Overall (m): 64-65.6  Beam (m): 17.2-18  Draft (m): 3.05 (1.1 on cushion)  Speed (knots): 50-55  Range (nautical miles): 2,500 (at 12 knots); 800 (at 40 knots)  Propulsion: 2 gas turbines. 2 auxiliary diesels for slow speed operations. 2 hydroprops. 2 props on retractable pods. The objective of two propulsion systems (gas turbines and diesels) is to ensure reliable propulsion.  Radars: Cross Dome (E/F-band) for air/surface search. Pop Group (F/H/I-band) for surface-to-air missiles. Bass Tilt (H/I-band) for guns. SRN-207 (Cheese Cake) for navigation.  Other:</p>	<p><b>Weapons:</b></p> <p>Sivuch features two quad launchers for the SS-N-22 Sunburn anti-ship missile. The Sunburn is an active radar homing, sea-skimming missile. It can be launched in a 120-degree arc based on the craft's course. Only two minutes are required for the Sunburn to cover its total range. In the event of jamming, its seeker possesses a home-on-jam capability. An extended range Sunburn is available.</p> <p>Weight: 661 pounds  Speed: Mach 2.5 cruising speed  Range: 65 nautical miles for extended range Sunburn; 48 nautical miles for standard missile</p> <p>Sivuch is also equipped with a single, twin-arm launcher for the SA-N-4 Gecko surface-to-air missile.</p> <p>Weight: 287 pounds  Speed: Mach 2  Range: .75-8 nautical miles (height: 25-5,000 m)</p> <p>Single AK-176M 76 mm gun is mounted on the foredeck. It is designed for air defense, surface engagement and shore bombardment.</p> <p>Rate of fire: 120 rounds/minute  Range: 8.5 nautical miles (surface); 10,000 m for anti-air</p> <p>Two 30 mm/65AK 630; one before the bridge, the second on the stern. These close-in weapons systems are designed to engage anti-ship missiles, aircraft, small surface craft, drifting mines, and unprotected targets ashore.</p> <p>Rate of fire: 4,000-5,000 rounds/minute (in 400-round bursts)  Range: 4,000-5,000 m</p>										

**NOTES**

The hull is made of aluminum and magnesium alloys. The Sivuch is considered to be the world's first significant air-cushion missile combatant. It is capable of autonomous operations for a period of 10 days. The heavily armed Sivuch is designed to attack naval ships during heavy counterfire and ECM conditions. An eight-missile salvo will take only 35 seconds to execute.

Russian/Chinese/North Korean SOHUNG Guided Missile Patrol Craft (PTG) \_\_\_\_\_

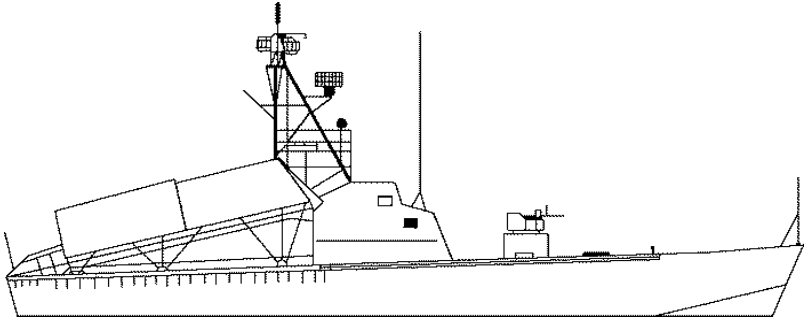
 <p>J) Drawing of a standard KOMAR PTG.</p>	<p><b>Weapons</b></p> <p>Styx or Scrub Brush surface-to-surface missiles</p> <p>25-mm/80 cal (twin) gun</p>	<p><b>Load</b></p> <p>2</p> <p>1</p>
<p><b>SYSTEM</b></p> <p><b>Alternative Designations:</b> Project 183R (Soviet Union)</p> <p><b>Date of Introduction:</b> 1980</p> <p><b>Proliferation:</b> North Korea, Syria</p> <p><b>Description:</b></p> <p>Crew: 20</p> <p>Displacement (tons): 85</p> <p>Length Overall (m): 26.8</p> <p>Beam (m): 6.2</p> <p>Draft (m): 1.5 (maximum)</p> <p>Speed (knots): 40</p> <p>Range (nautical miles):</p> <p>Propulsion: 4 M-50F-4 diesels. 4 shafts</p> <p>Radars: Square Tie (I-band) for surface search/missile target acquisition. Maxium range is approximately 70 nautical miles.</p>	<p><b>Weapons:</b></p> <p>Armed with 2 single SS-N-2A Styx or CSS-N-1 surface-to-surface missiles. Two launchers are located beside the rear area of the superstructure.</p> <p>SS-N-2A Styx: Weight: 5,500 pounds Speed: Mach 0.9 Range: 25-45 nautical miles</p> <p>CSS-N-1 (Scrub Brush) (SY-1) is the Chinese copy of the Styx: Weight: 5,071 pounds Speed: Mach 0.9 Range: 21.5 nautical miles</p> <p>2-M-3 twin 25-mm gun is mounted forward of the bridge: Rate of fire: 450 rounds/minute per barrel Range: 1.5 nautical miles (surface); 9,180 feet (anti-air)</p>	

**NOTES**

The Sohung class is a North Korean design, based on the wooden-hulled Komar Class guided missile patrol craft which were transferred from the Soviet Union in the mid-1960s. The Sohung class is somewhat longer than the Komar boats. Sohungs also have a smaller beam. All North Korean Komars were stricken by 1992. The Soviet Union transferred 77 Komars to China to friendly countries. China built 40 Komars.




## North Korean SOJU Guided Missile Patrol Craft (PTG)

	<table border="1"> <thead> <tr> <th>Weapons</th> <th>Load</th> </tr> </thead> <tbody> <tr> <td>Styx Surface-to-Surface missiles</td> <td>4</td> </tr> <tr> <td>30-mm/65 (2 twin) guns</td> <td>4</td> </tr> </tbody> </table>	Weapons	Load	Styx Surface-to-Surface missiles	4	30-mm/65 (2 twin) guns	4
	Weapons	Load					
Styx Surface-to-Surface missiles	4						
30-mm/65 (2 twin) guns	4						
<p><b>SYSTEM</b>  <b>Alternative Designations:</b>  <b>Date of Introduction:</b> 1981  <b>Proliferation:</b>  <b>Description:</b>  Crew: 28 + 4 officers  Displacement (tons): 265  Length Overall (m): 43  Beam (m): 7.5  Draft (m): 1.8 (maximum)  Speed (knots): 34  Range (nautical miles): 600 (at 30 knots)  Propulsion: 3 Type M-503A diesels. 3 shafts  Radars: Square Tie (I-band) or Chinese equivalent, the Type 352 for surface search (range: 70 nautical miles). Square Tie is a short-range, air and surface search radar that also provides target detection and tracking for anti-ship missile direction. Drum Tilt, or MR-104 Rys gun fire-control radar (H/I-band) for fire control (range: 22 nautical miles). Drum Tilt provides target acquisition and tracking for the twin 30-mm AK-230 gun system.</p>	<p><b>Weapons:</b>  Armed with 4 SS-N-2 Styx anti-ship missiles (the first Soviet anti-ship missiles to enter wide service and the first such missile to sink an enemy ship). Styx is not known for its accuracy against smaller craft (likely because of the smaller radar cross-section). Styx reportedly is vulnerable to chaff.</p> <p>Weight: 5,500 pounds  Speed: Mach 0.9  Range: 27-45 nautical miles</p> <p>4 30-mm/65 (2 twin) AK-230 guns were developed by the Soviet Navy to protect small surface vessels from jet aircraft.  Rate of fire: 500 rounds/minute  Range: 2.7 nautical miles  Magazine Capacity: approximately 2,000 rounds</p>						

**NOTES**

Soju is the North Korean built version of the Russian Osa class. Soju is an enlarged version of the Osa-I. It retains the same propulsion system, missile armament, and 30-mm gun mounts of the Osa-I.


## Russian TARANTUL II Guided Missile Corvette

	<table border="1"> <thead> <tr> <th>Weapons</th> <th>Load</th> </tr> </thead> <tbody> <tr> <td>Styx Surface-to-Surface Missiles</td> <td>4 (no reloads)</td> </tr> <tr> <td>SA-N-5 Surface-to-Air Missiles</td> <td>One, 4 missile launcher</td> </tr> <tr> <td>AK-176M 76 mm Gun</td> <td>1 on foredeck</td> </tr> <tr> <td>30 mm/65 AK-630 close in weapons system</td> <td>2</td> </tr> </tbody> </table>	Weapons	Load	Styx Surface-to-Surface Missiles	4 (no reloads)	SA-N-5 Surface-to-Air Missiles	One, 4 missile launcher	AK-176M 76 mm Gun	1 on foredeck	30 mm/65 AK-630 close in weapons system	2
Weapons	Load										
Styx Surface-to-Surface Missiles	4 (no reloads)										
SA-N-5 Surface-to-Air Missiles	One, 4 missile launcher										
AK-176M 76 mm Gun	1 on foredeck										
30 mm/65 AK-630 close in weapons system	2										
<p><b>SYSTEM</b>  <b>Alternative Designations:</b> Type 1241.1M  <b>Date of Introduction:</b> 1980; production ceased in 1995  <b>Proliferation:</b> Russia, Bulgaria. Tarantul I ships transferred to Poland, India, Yemen, Romania and Vietnam  <b>Description:</b>  Crew: 29 + 5 officers  Displacement (tons): 455  Length Overall (m): 56.1  Beam (m): 10.2  Draft (m): 2.65  Speed (knots): 38-42  Range (nautical miles): 1,650 nautical miles (at 14 knots); 400 nautical miles (at 36 knots)  Propulsion: Combined gas turbine and gas turbine (COCAG). Can use one or two gas turbines per shaft depending on speed. Also can trail one shaft and use one gas turbine on other shaft. Two Nikolayev Type DR 77 gas turbines. Two shafts.  Radars: Plank Shave (I-band set) for surface search and targeting (range: 15-20 nautical miles). Kivach III, or MIUS, (I-band) for navigation (maximum access range: 24 nautical miles). Square Head for IFF  Weapons Control: Band Stand (D/E/F band) radar that is part of the fire-control system for the SS-N-2 missile system; Bass Tilt (H/I band) fire control radar (range: 10-12 nautical miles). Light Bulb serves as data link between ship and missile</p>	<p><b>Weapons:</b>  Armed with four SS-N-2D Styx surface-to-surface missiles (no reloads). Two vertical pairs of launch tubes on either side of the superstructure. Following detection of the target, the ship must close to reach the optimum engagement distance of 15-20 nautical miles. The ship has to face the target when ready to launch. Additionally, the ship must maintain a speed of 15 knots or less and hold its course for 20-30 seconds before launching its first salvo of two Styx. The second pair of Styx may be launched one minute after the first salvo.  SS-N-2D:  Weight: 5,732 pounds  Speed: Mach 0.9  Range: 54 nautical miles</p> <p>The SA-N-5 Grail short- range surface-to-air missile system is the naval version of the SA-7. Four SA-N-5 missiles are mounted on a metal framework. The operator stands inside this framework, with the missiles at shoulder level.  Weight: 22 pounds  Speed: Mach 1.7  Range: 15,000 feet</p> <p>The single AK-176M 76 mm gun is used for air defense, surface engagements and limited shore bombardment. It is part of the Bass Tilt weapon control system (which includes the AK-630 close in weapons system).  Rate of fire: 130 rounds/minute  Range: 3.75 nautical miles (surface); 32,800 feet (air)</p> <p>Two 30 mm AK-630s are mounted side by side to the rear of the ship. They are used to engage anti-ship missiles, aircraft, small surface vessels, drifting mines and land-based targets. Capable of firing bursts of 400 rounds.  Rate of fire: 4,000-5,000 rounds/minute  Range: 13,000-16,400 feet  Magazine Capacity: 2,000 rounds</p>										

### NOTES

It is classified as 'Raketnyy Kater' (Missile Boat or Missile Cutter). Reportedly, attempts to upgrade the SS-N-2 missiles to the SS-N-22 Sunburn largely failed because the newer system (fire control, missiles, and launcher) proved to be too heavy and large and required significant redesign of the Tarantul II's interior hull. Tarantuls are considered to be a better-armed successor to the Osa-class missile boats.


## Russian TARANTUL III Guided Missile Corvette

 <p>Tarantul III</p> <p>Source: U.S. Department of Defense</p>	<table border="1"> <thead> <tr> <th>Weapons</th> <th>Load</th> </tr> </thead> <tbody> <tr> <td>Sunburn Surface-to-Surface Missiles</td> <td>4</td> </tr> <tr> <td>SA-N-5 Surface-to-Air Missiles</td> <td>One, 4 missile launcher</td> </tr> <tr> <td>AK-176M 76 mm Gun</td> <td>1 on foredeck</td> </tr> <tr> <td>30 mm/65 AK-630 close in weapons system</td> <td>2</td> </tr> </tbody> </table>	Weapons	Load	Sunburn Surface-to-Surface Missiles	4	SA-N-5 Surface-to-Air Missiles	One, 4 missile launcher	AK-176M 76 mm Gun	1 on foredeck	30 mm/65 AK-630 close in weapons system	2
Weapons	Load										
Sunburn Surface-to-Surface Missiles	4										
SA-N-5 Surface-to-Air Missiles	One, 4 missile launcher										
AK-176M 76 mm Gun	1 on foredeck										
30 mm/65 AK-630 close in weapons system	2										
<p><b>SYSTEM</b>  Alternative Designations: Project 1241.1RZ, Molnaya-M  Date of Introduction: 1987  Proliferation: Russia, Ukraine  Description:  Crew: 41-44  Displacement (tons): 493  Length Overall (m): 56.1  Beam (m): 10.2  Draft (m): 2.5 to 4.36  Speed (knots): 36  Range (nautical miles): 1,650 (at 14 knots); 400 (at 36 knots)  Propulsion: Combined Diesel Or Gas Turbine (CODOG which means that the propulsion plant is able to run on diesel engines only or gas turbines only). Diesels are more fuel efficient, while gas turbines are good for high speeds, but possess poor efficiency at low speeds. Two Nikolayev Type DR 77 gas turbines. Two CM 504 diesels. Twin shafts.  Radars: Plank Shave (I-band set) for surface search and targeting (range: 15-20 nautical miles). Often found in ships equipped with SS-N-22 missiles; Kivach III, or MIUS, (I-band for navigation (maximum access range: 24 nautical miles). Bass Tilt (H/I-band) for fire control (range: 20-24 nautical miles). Square Head for IFF.  Weapons Control: Vypel fire control system (major component is the Bass Tilt fire-control radar). Band Stand (D/E/F-band) radar is part of the fire-control system for the Sunburn missile. Light Bulb serves as the data link between the Tarantul III and the missile. It is not part of exported Tarantuls.</p>	<p><b>Weapons:</b>  Armed with four SS-N-22 Sunburn surface-to-surface missiles (no reloads). Two vertical pairs of launch tubes mounted on either side of the superstructure. The Sunburn can be launched in a 120-degree arc based upon the Tarantul's course. Once launched, the Sunburn drops to its cruising altitude of 65 feet. It will drop to 23 feet on the final run to the target. It features an active radar seeker with home-on-jam capability. The Sunburn's speed of Mach 2.0 means that only two minutes are needed to cover its full range. The warhead can be either conventional High Explosive (HE), Semi-Armor Piercing (SAP) or nuclear.  Weight: 8,708 pounds  Speed: Mach 2.0  Range: 87 nautical miles</p> <p>The SA-N-5 Grail surface-to-air missile system is the naval version of the SA-7. Four SA-N-5 missiles are mounted on a metal framework. An operator stands inside the framework, with missiles at shoulder level.  Weight: 22 pounds  Speed: Mach 1.7  Range: 15,000 feet</p> <p>The single AK-176N 77 mm gun is used for air defense, surface engagements and shore bombardment. It is part of the Bass Tilt weapon control system (which includes the AK-630 close in weapons system).  Rate of fire: 130 rounds/minute  Range: 3.75 nautical miles (surface); 32,800 feet (air)</p> <p>Two 30 mm AK-630s are mounted side by side to the rear of the boat. They are used to engage anti-ship missiles, aircraft, small surface vessels, drifting mines and land-based targets. Capable of firing bursts of 400 rounds.  Rate of fire: 4,000-5000 rounds/minute  Range: 13,000-16,400 feet  Magazine Capacity: 2,000 rounds</p>										

**NOTES**

Production of the Tarantul III class may resume, according to some reports. Approximately 28 units are believed to be in service. Tarantul III is described as a more capable version of the Tarantul II, with an improved missile system, modified propulsion plant and upgraded electronic warfare. Primary objective of the Tarantul III is to destroy surface vessels in littoral zones and at sea. It is noted for sea-going capabilities, but must return to port to reload surface-to-surface missiles.


## Russian SOVREMENNY Class Guided Missile Destroyer (DDG)

	<table border="1"> <thead> <tr> <th>Weapons</th> <th>Load</th> </tr> </thead> <tbody> <tr> <td>SS-N-22/SUNBURN SSM</td> <td>2</td> </tr> <tr> <td>SA-N-7/GADFLY Lchr</td> <td>2</td> </tr> <tr> <td>Twin 130-mm AK-130 gun</td> <td>2</td> </tr> <tr> <td>AK-630M 30-mm Gatling Gun</td> <td>4</td> </tr> <tr> <td>Twin 45-mm saluting cannon</td> <td>1</td> </tr> <tr> <td>RBU-1000 (6-rd) rocket lchr</td> <td>2</td> </tr> <tr> <td>DTA-53 Twin Torpedo tubes</td> <td>2</td> </tr> <tr> <td>Mine rails</td> <td>2</td> </tr> <tr> <td>PK-10 ASW decoy rocket launcher</td> <td>8</td> </tr> </tbody> </table>	Weapons	Load	SS-N-22/SUNBURN SSM	2	SA-N-7/GADFLY Lchr	2	Twin 130-mm AK-130 gun	2	AK-630M 30-mm Gatling Gun	4	Twin 45-mm saluting cannon	1	RBU-1000 (6-rd) rocket lchr	2	DTA-53 Twin Torpedo tubes	2	Mine rails	2	PK-10 ASW decoy rocket launcher	8
Weapons	Load																				
SS-N-22/SUNBURN SSM	2																				
SA-N-7/GADFLY Lchr	2																				
Twin 130-mm AK-130 gun	2																				
AK-630M 30-mm Gatling Gun	4																				
Twin 45-mm saluting cannon	1																				
RBU-1000 (6-rd) rocket lchr	2																				
DTA-53 Twin Torpedo tubes	2																				
Mine rails	2																				
PK-10 ASW decoy rocket launcher	8																				
<p><b>SYSTEM</b>  <b>Alternative Designations:</b> Project 956, 956A  <b>Date of Introduction:</b> 1986  <b>Proliferation:</b> 2 countries, with 18 vessels in the above projects  <b>Description:</b>  Crew: 296 total  Displacement (tons): 8,480 full load  Length Overall (m): 156 overall  Beam (m): 17.2  Draft (m): 7.9</p> <p><b>Performance:</b>  Speed (knots): 33.4  Range (nautical miles): 1,345 at 32.7 knots, 3,920 at 18 knots  Propulsion: 2 sets steam turbines, 2 controllable pitch propellers, 110,000 total shp</p> <p><b>ELECTRONICS</b>  <b>Communications:</b>  Combat Data System: SAPFIR-U, with shared FC digital data  SATCOM Antennas: Available (2 CHOP DISH per vessel)  3 MR-212/201 Vaygach-U (PALM FROND) navigation</p> <p><b>Countermeasures:</b>  MGK-335MS Platina-2 hull-mounted medium-frequency sonar  Spektr-F (HALF CUP): 2-8 laser-warning systems  2 RPK-5/Liven ASW/Anti-torpedo rocket launchers, each with 6 launch tubes for 300-mm RBU-1000 rockets, and a total supply of 48 rockets. Range 1000 m.</p> <p><b>Electronic Warfare:</b>  1 MP-405M Start-2 or MR-401 intercept system  2 MRP-11M/12M (BELL SHROUD)  2 BELL SQUAT  4 FOOT BALL-B  1 MR-407 Jamming System</p> <p><b>FIRE CONTROL</b>  <b>Electro-Optics:</b>  1 SQUEEZE BOX optronic director with laser rangefinder</p> <p><b>Radars:</b>  1 MG-7 (WHALE TONGUE) high-frequency fire control  1 MR-760MA (TOP PLATE) 3-D air surveillance  1 Mineral (BAND STAND) surface target and designation for SS-N-22  6 OP-3 (FRONT DOME) fire control for SA-N-7 missiles</p>	<p>1MR-184M Lev (KITE SCREECH) FC for 130-mm guns  2 MR-123 Vympel (BASS TILT) FC for 30-mm CIWS</p> <p><b>WEAPONS:</b>  Helicopter onboard capacity:  1 HELIX-A/Ka-27PL ASW, or  1 HELIX-A/Ka-27RT Targeting type</p> <p>Earlier Project 956 vessels have 2 mounts with 8 x launchers for SS-N-22/SUNBURN/Moskit supersonic cruise missiles. The sea-skimming anti-ship SSM (aka P-80/3M82) uses an active radar homing seeker. Once launched from its canister, it can make a 60-degree turn towards the target. Cruise altitude in the terminal phase is between 7-20 meters. Some reports indicate that the Sunburn is capable of evasive maneuvers during its terminal phase to avoid gun and missile defense systems.</p> <p>Warhead: 300 kg semi-armor piercing, or nuclear 200 KT  Speed: Mach 2.5 (25 sec launch-impact time)  Range: 70-90 nautical miles, 120-145 km</p> <p>2 x Twin 533-mm torpedo launchers, with 85R acoustic homing anti-submarine torpedoes, range 55 km.</p> <p>2 mounts with 8 x launchers for SA-N-7/ZR-90/Uragan SAM (same as SA-11/Buk-M1), with 8 ready missiles and 44 total.</p> <p>2 AK-130 130-mm twin gun turrets, with 2,000 rounds</p> <p>4 AK-630 30-mm Gatling guns, with 16,000 rounds</p> <p>1 Type 21-KM twin 45-mm saluting cannon</p> <p>2 mine rails with 40 naval mines</p> <p><b>VARIANTS</b>  Project 965A vessels have 3M-83 Zubr (Moskit-M)/P-270/ SS-N-22 cruise missiles. SUNBURN features a dual mode active/passive radar terminal seeker, with a range of 90-160 nautical miles (170-250 km). Once launched from its canister, it can make a 60-degree turn towards the target. Cruise altitudes in the terminal phase are between 7-20 meters. Some reports indicate that the Sunburn is capable of evasive maneuvers during its terminal phase to avoid gun and missile defense systems.</p>																				

**NOTES**

Some reports indicate that the SOVREMENNY, itself, is no longer seaworthy; but most ships of its class are in operation.

## Chinese JIANGWEI-II Class Fast Frigate (FFG)

	<table border="1"> <thead> <tr> <th>Weapons</th> <th>Load</th> </tr> </thead> <tbody> <tr> <td>C-803/YJ-803 Anti-ship Cruise Missile</td> <td>8</td> </tr> <tr> <td>PJ33A 100-mm twin gun</td> <td>2</td> </tr> <tr> <td>Type 76A 37-mm twin gun</td> <td>4</td> </tr> <tr> <td>Depth charge rack</td> <td>2</td> </tr> <tr> <td>HQ-7 8 x SAM launcher</td> <td>1</td> </tr> <tr> <td>Z-9C multirole helicopter</td> <td>1</td> </tr> </tbody> </table>	Weapons	Load	C-803/YJ-803 Anti-ship Cruise Missile	8	PJ33A 100-mm twin gun	2	Type 76A 37-mm twin gun	4	Depth charge rack	2	HQ-7 8 x SAM launcher	1	Z-9C multirole helicopter	1
Weapons	Load														
C-803/YJ-803 Anti-ship Cruise Missile	8														
PJ33A 100-mm twin gun	2														
Type 76A 37-mm twin gun	4														
Depth charge rack	2														
HQ-7 8 x SAM launcher	1														
Z-9C multirole helicopter	1														
<p><b>SYSTEM</b>  <b>Alternative Designations:</b> Type 053H3  <b>Date of Introduction:</b> 1998  <b>Proliferation:</b> 1 country, with 10 vessels to date  <b>Description:</b>            Crew: 296 total            Displacement (tons): 2,393 full load            Length Overall (m): 115 overall            Height of hull (m): 3.6            Beam (m): 12.4            Draft (m): INA</p> <p><b>Performance:</b>            Speed (knots): 27.2            Range (nautical miles): 4,000 at 18 knots            Propulsion: 2 props                      4 x Type 18E390VA diesel, with 23,674 total shp</p> <p><b>ELECTRONICS</b>  <b>Communications:</b>            Combat Data System: ZKJ-4B/6 (Thompson-CSF TAVITAC)            2 x Racal Decca RM 1290A/D ARPA I-band navigational system            1 x Type 651F IFF system</p> <p><b>Countermeasures:</b>            1 x SR-210 radar warning receiver            2 x Type 946/PJ-46 15-barrel chaff/decoy rocket launchers            1 x Echo Type 5 hull-mounted active search and attack sonar</p> <p>2 Type 3200 ASW/Anti-torpedo rocket launchers, each with 6 launch tubes for rockets, and a total supply of 36 rockets. Range is 1,200 m.</p> <p><b>Electronic Warfare:</b>            1 x Type 352 (SQUARE TIE) I-band surveillance/SSM targeting            1 x RWD-8 (JUG PAIR) intercept            1 x Type 981-3 jammer</p>	<p><b>FIRE CONTROL</b>  <b>Electro-Optics:</b> INA  <b>Sonar:</b> Echo Type noted above is used for protection, as well as for offensive anti-submarine warfare</p> <p><b>Radars:</b>            1 x Type 360 SR-60 E/F -band surface search            1 x 517H-1 (KNIFE REST) A-band 2-D long-range air search            1 x Type 345 MR35 (FOG LAMP) J-band for HQ-7 SAM and 100-mm gun            2 x Type 347G EFR-1 (RICE LAMP) I-band FC for 37-mm AAA</p> <p><b>WEAPONS:</b>            Helicopter onboard capacity:                      1 x Z-9C multirole naval helicopter</p> <p>2 Anti-ship cruise missile launchers (4 x C-803/YJ-83 missiles ea)            Warhead: 165 kg, semi-armor piercing            Speed: Mach 1.7            Range: 134 nautical miles, 250 km            Guidance: Semi-active radar homing, ship or helicopter guided</p> <p>2 PJ33A 100-mm twin gun turrets, with 2,000 rounds (est)</p> <p>4 Type 76A 37-mm twin guns, with 16,000 rounds (est)</p> <p>1 x 8-tube HQ-7 (Crotale-based) SAM launcher</p> <p>2 Depth charge racks</p> <p><b>VARIANTS</b>            JIANGWEI-II is an update to the JIANGWEI FF Class, which was an update to the Jianghu Class. Work on the JIANGWEI-III upgrade class was suspended in favor of the MAANSHAN Class.</p>														

**NOTES**

Weapons, sensors, and countermeasures vary among vessels in the class.

## Chapter 2

### Naval Undersea Vessels


This chapter focuses on undersea vessels, and is currently limited to submarines. In future issues we will include other craft, such as semi-submersible infiltration landing craft (SILC). These data sheets were provided by JFCOM. POC is Mr. Charlie Childress. Questions and comments on data listed in this chapter should be addressed to:

**Mr. Tom Redman**

DSN: 552-7925 Commercial (913) 684-7925  
e-mail address: [thomas.w.redman@ctr.mail.mil](mailto:thomas.w.redman@ctr.mail.mil)



## AGOSTA 90B Attack Submarine, Diesel-Electric Powered (SSK)

	<table border="1"> <thead> <tr> <th>Weapons</th> <th>Load</th> </tr> </thead> <tbody> <tr> <td>Combination of: torpedoes and anti-ship missiles</td> <td>16</td> </tr> <tr> <td>or</td> <td></td> </tr> <tr> <td>Mines only</td> <td>36</td> </tr> </tbody> </table>	Weapons	Load	Combination of: torpedoes and anti-ship missiles	16	or		Mines only	36
Weapons	Load								
Combination of: torpedoes and anti-ship missiles	16								
or									
Mines only	36								
<p><b>SYSTEM</b>  <b>Alternative Designations:</b> None. Follow-on class to French Agosta 70  <b>Date of Introduction:</b> ~1999  <b>Proliferation:</b> Spain and Pakistan (manufacturer with rights to export; reportedly, Asian and Middle Eastern countries have expressed interest in purchasing Agosta 90Bs)</p> <p><b>Description:</b>  Crew: 36-43 enlisted + 5-8 officers  Troop Capacity: Could carry small number of special ops personnel  Length Overall (m): 67.57 (standard version); 76.24 (with MESMA Air-Independent Propulsion System) (AIP)  Displacement (tons): 1,510 (surfaced); 1,760 (submerged)  Beam (m): 6.8  Pressure Hull Diameter (m): 33  Mean Draft (m): 4.97  Maximum Diving Depth (m): 350  Periscope Depth (m): 14.2  Maximum Dived Speed (knots): 20.5  Maximum Surfaced Speed (knots): 12  Maximum Snorkeling Speed (knots): 10.5  Endurance: approx 68 days  Range: 8,500 nautical miles (if snorkeling at 9 knots); 350 nautical miles (if submerged at 3.5 knots)  Propulsion: 2 SEMT-Pielstick 16 PA4 V 185 VG diesels (3,600 hp), 2200kW electric motor—driving a single propeller. NOTE: diesel-electric submarines have to surface to periscope depth to recharge batteries, using diesel engines. AIP module allows submarines to remain submerged 3-6 times longer than conventional diesel-electric submarines. MESMA AIP system consists of a turbine receiving high-pressure steam from a combustion chamber in which a gaseous mixture of ethanol and liquid oxygen is burning. Heat energy is converted into electrical energy by use of a conventional Rankine cycle. This module can be retrofitted because of modular design and construction techniques. At least one Pakistani sub is fitted with the MESMA AIP system, with plans to retrofit the remaining Agosta 90Bs.</p> <p>Other: Double-hull construction. Significantly reduced acoustic signature achieved through installation of new suspension and isolation systems.</p>	<p><b>Sensor Suite:</b>  The SUBTICS (SUBmarine Tactical Integrated Combat Systems) integrates acoustic and non-acoustic sensors, navigation systems, tactical data processing, and weapons controls. SUBTICS also coordinates surface sensors such as the search and attack periscopes, the Kelvin Hughes 1007 search radar, and the electronic support measures systems. Additionally, SUBTICS controls a comprehensive integrated sonar suite (TSM 2233) that includes the cylindrical bow, active, passive flank, intercept and towed arrays. SUBTICS also will engage threats while handling all weapons command and control functions (selection, launching and guidance).</p> <p>Kelvin Hughes 1007 surface search radar (maximum access range: 96 nautical miles). Ideally suited for operations in littoral waters. Will operate at slow speeds to minimize counterdetection. Used in antiship roles in chokepoints or pre-established defensive perimeters for anti-access missions.</p> <p><b>Weapons:</b>  Typically armed with combination of ECAN F17 Mod 2 wire-guided heavyweight torpedoes and MBDA SM 39 Exocet missiles. A total of 16 weapons can be carried onboard (including four ready-to-fire in the four launching tubes and 12 stored on cradles). Instead of torpedoes and/or missiles, the Agosta can carry 36 mines.</p> <p>Torpedoes: Four (4) 21-inch (533 mm) bow tubes for firing ECAN L5 Mod 3 and ECAN F17 Mod 2 torpedoes</p> <p>ECAN L5 Mod 3: older, multi-purpose torpedo. Can be preprogrammed for launching in a passive mode in which case it will follow a set course and depth. At a preset point, the L5 will begin a straight-line active or passive search. It will home on the target by searching in azimuth and depth. The L5's guidance adjusts the three-dimensional shape of the active sonar's transmission lobe according to its preset depth mode, the distance to the target and the torpedo's current depth.  Weight: 2,860 pounds  Speed: 35 knots  Range: 3.8 nautical miles  Operating Depth (m): 555</p>								



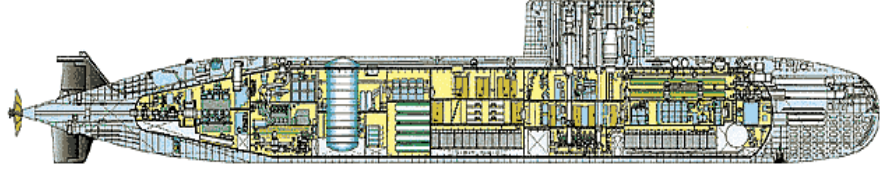
**AGOSTA 90B Attack Submarine, Diesel-Electric Powered (SSK) continued \_\_\_\_\_**

<p>ECAN F17 Mod 2: standard French wire-guided torpedo. Its guidance system operates in active, passive, or active and passive modes (during terminal homing phase). Range and bearing information from transducers is relayed through either the wire to the submarine or used within the torpedo itself to correct course and depth. Also configured for shallow water operations. The F17's sensors are turned on automatically or by specific command over the wire. It is capable of operating independently of sensor updates during a significant portion of its approach. It is also noted for low noise generation.</p> <p>Weight: 2,998 pounds Speed: 40 knots Range: 10.8 nautical miles Operating Depth (m): greater than 600</p>	<p>MBDA SM 39 Exocet Anti-Ship Missiles: Features include a watertight launch capsule. The Exocet is powered to the surface by a solid-propellant booster and is designed to break the surface at a relatively long distance from the Agosta 90. Its 365-pound, Hexolite blast fragmentation warhead is designed to disable the target rather than sink it (which would require a warhead of impractical size). Note-worthy is the fact that the Exocet's fuel is extremely difficult to extinguish. This feature means that the fuel adds to the extent of damage caused by the comparatively small warhead.</p> <p>Weight: 1,468 pounds Speed: 594 knots Range: 27 nautical miles Peak Altitude (m): 50</p> <p>SM 39 Exocet successfully launched from Pakistani Agosta 90B at maximum launching depth and at maximum range from target, using the SUBTICS combat system.</p>
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**NOTES**

Can be used for missions of anti-shipping, anti-submarine warfare, intelligence gathering, mine-laying or special operations and training. The Exocet anti-ship missile, when launched underwater, provides the Agosta 90B with valuable maneuvering time after firing the missile. Pakistan's acquisition of Agosta 90s prompted India to step-up its program for submarine expansion. However, one report has indicated that the Agosta 90B is perhaps one generation behind the Scorpene class.

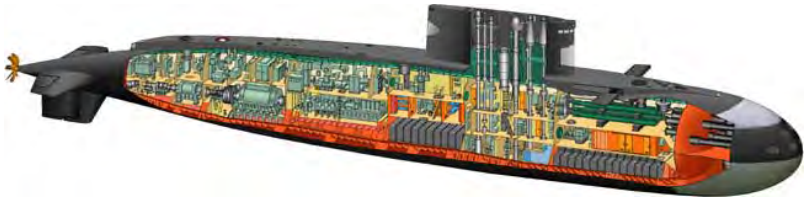
## LADA ATTACK SUBMARINE, DIESEL-ELECTRIC POWERED (SSK)

	<b>Weapons</b>  Torpedoes Missiles or Mines	<b>Load</b>  18 not known  22
<p><b>SYSTEM</b></p> <p><b>Alternative Designations:</b> Project 677, Lada class. Export version is called "Amur" class (Project 1650)</p> <p><b>Date of Introduction:</b> 2003; sea trials in 2004</p> <p><b>Proliferation:</b> India reportedly interested in Amur class</p> <p><b>Description:</b>                      Crew: 37-41                      Troop Capacity: could be used by small number of special operations personnel                      Length Overall (m): 68                      Displacement (tons): 1,765 (surfaced); 2,650 (submerged)                      Beam (m): 7.2                      Pressure Hull Diameter (m): 7.2                      Mean Draft (m): 4.4                      Maximum Diving Depth (m): 250, possibly 300                      Periscope Depth (m): not known                      Maximum Dived Speed (knots): 22                      Maximum Surfaced Speed (knots): 10                      Maximum Snorkeling Speed (knots):                      Endurance: 45-50 days                      Range: 6,700 nautical miles (if snorkeling at 7 knots); 650 nautical miles (if submerged at 3 knots)                      Propulsion: Diesel-electric; 2 diesel generators; 3,400 hp (2.5mW); 1 motor; 5,576 hp (4.1 mW); 1 shaft. Electric motor and diesels can be used simultaneously to obtain maximum propulsion speed. Optional Air-Independent Propulsion system that will increase submerged endurance by 15-45 days.                      Sensor Suite: The Lira integrated sonar system. Considered to have particularly sensitive passive transducer arrays. Active/passive capabilities. Consists of bow-mounted and flank arrays. I-band surface search radar. Details not known.</p> <p>Other: The Lada is a 4<sup>th</sup> generation Russian diesel submarine. Smaller than the previous Kilo-type submarines. Configured for anti-surface and anti-submarine warfare, along with minelaying and the deployment of special forces. Export boats are expected to range in size from 46 to 68 meters in length.</p>	<p><b>Weapons:</b>                      Six 21-inch (533 mm) torpedo tubes.</p> <p>Payload of 18 weapons includes the latest types of Russian torpedoes, anti-submarine rocket torpedoes, cruise missiles and mines. Reloading of torpedo tubes for follow-on firing within less than 20 seconds is made possible by an automatic torpedo loading system.</p> <p>18 SET-80 or Shkval torpedoes</p> <p>VA-111 Shkval submarine-launched anti-submarine torpedo expelled from torpedo tube at roughly 50 knots. Upon reaching safe distance from submarine, rocket is fired and propels weapon to a speed of 200 knots.                      Weight: 2,721 kg                      Range: 3.5 nautical miles</p> <p>SET-80 dual-use torpedo. Acoustic wake following with active/passive homing:                      Weight: 4,410 pounds                      Speed: 40-50 knots                      Range: 12 nautical miles                      Operating Depth (m): greater than 400</p> <p>SS-N-27 Novator Al'fa anti-ship missile: Unknown number.                      Weight: 4,188 pounds                      Speed: Mzch 3.0 attack speed                      Range: 130 nautical miles</p> <p>Yakhont anti-ship cruise missile (export version of ONYX):                      Weight: 6,600 pounds                      Speed: Mach 2.0-3.5                      Range: 150 nautical miles</p>	

### NOTES

Introduced as a gradual replacement for the Kilo. This fourth-generation Russian SSK will offer six different designs ranging from 550 to 2,000 tons surface displacement. Improvements over the Kilo 636 include a marked decrease in noise levels (said to be 8-10 times quieter than the Project 877 Kilo), reduced manning, an integrated multi-array sonar suite, and significantly improved batteries. The export variant (AMUR 1650) is privately funded. This class is distinguished by the ability to hit different targets with missile salvo.


## KILO TYPE 636 Attack Submarine, Diesel-Electric Powered (SSK)

	<table border="1"> <thead> <tr> <th>Weapons</th> <th>Load</th> </tr> </thead> <tbody> <tr> <td>Torpedoes (various)</td> <td>18</td> </tr> <tr> <td style="text-align: center;"><b>or</b></td> <td></td> </tr> <tr> <td>Mines</td> <td>24</td> </tr> </tbody> </table>	Weapons	Load	Torpedoes (various)	18	<b>or</b>		Mines	24	
Weapons	Load									
Torpedoes (various)	18									
<b>or</b>										
Mines	24									
<p><b>SYSTEM</b>  <b>Alternative Designations:</b> Project 636 or Kilo 4B  <b>Date of Introduction:</b> 1997  <b>Proliferation:</b> Russia, China (first customer), India. Actively promoted for world market by Rosvoorouzhnie state-owned company.  <b>Description:</b>  Crew: 52  Troop Capacity: could carry small number of special operations personnel  Length Overall (m): 73.8  Displacement (tons): 2,350 (surfaced); 3,102 (submerged)  Beam (m): 9.9  Pressure Hull Diameter (m): 9.9  Mean Draft (m): 6.4  Maximum Diving Depth (m): 300  Periscope Depth (m): 17.5  Maximum Dived Speed (knots): 20  Maximum Surfaced Speed (knots): 11  Maximum Snorkeling Speed (knots): not known  Endurance: 45 days  Range: 7,500 nautical miles (if snorkeling at 7 knots); 400 nautical miles (if submerged at 3 knots)  Propulsion: 2 storage batteries with 120 cells each, providing 9,700 kW/h. 2 Type 2D-42 diesel generators. Two additional stand-by motors for running in shallow water, at mooring and in emergency situations.</p> <p><b>Sensor Suite:</b>  Fitted with the Morphyspribor MGK-400EM (Rubicon-EM) passive/active sonar that provides: detection of targets in sonar listening mode; echo-ranging in a plus or minus 30-degree sector of target's relative bearing; telephone and telegraph communication in long and short range modes; detection of underwater sound signals and determination of signal bearing. Equipped with an automated combat information system that is capable of providing fire control data on five targets simultaneously. High-speed computer is able to process information from surveillance equipment, display it, determine target data, calculate firing parameters, provide automatic fire control and make recommendations on maneuvering and deployment of weapons.</p> <p>MRK-50E (Snoop Tray-2) general-purpose detection radar. Snoop Tray-2 ranges: 25 nautical miles against aircraft; 12 nautical miles against surface ships. Two periscopes, one of which is for air defense.</p>	<p><b>Weapons:</b></p> <p>Equipped with six 533 mm forward torpedo tubes located in the submarine's nose. Carries 18 torpedoes, with six in the torpedo tubes and 12 stored on racks. The computer-controlled torpedo system is equipped with a quick-loading device. Only 15 seconds are needed to prepare stand-by torpedoes for firing. First salvo is fired within two minutes; the second salvo is fired within five minutes. Project 636 submarines can fire five different types of torpedoes: the 56-65K, SET-53M, SAET-60M, and TEST-71M. Twenty-four mines can be carried instead of torpedoes.</p> <p>Select Project 636 submarines can carry 4 sub-launched cruise missiles with an approximate range of 130 nautical miles.</p> <p>Surface-to-Air missiles:  8 Strela-3 (SA-N-8 Gremlin) or 8 Iгла (SA-N-10 Gimlet)  Range: 6 km Range: 5 km  Speed: Mach 1.65</p> <p>Torpedoes:  18 VA-111 (anti-submarine) torpedoes:  Weight: 5,999 pounds  Speed: 50-200 knots  Range: 3.5 nautical mile</p> <p>TEST-71  Weight: 4,012 pounds  Speed: 40 knots  Range: 10 nautical miles at 20 knots, or 8 nautical miles at 40 knots</p> <p>TEST-96  Weight: 3,968 pounds  Speed: not known  Range: not known</p> <p>53-65KE Wire guided torpedoes  Weight: 4,629 pounds  Speed: not known  Range: not known</p> <p>SS-N-27 SLCM fitted on Kilos purchased by India.  Weight: 4,200 pounds  Speed: M 3.0  Range: 130 nautical miles</p>									

### NOTES

Survivability is increased by Type 636 design, which incorporates six watertight compartments that are separated by transverse bulkheads in a pressurized double-hull. It is considered one of the quietest diesel submarines in the world. Reportedly capable of detecting an enemy submarine at a range three to four times greater than it can be detected itself (counter-detection). Type 636 also represents further development of the Project 877EKM submarines and essentially represents an interim design between the original Kilo and the new Lada project. It is offered with a Russian designed Air-Independent Propulsion system in a lengthened hull. Type 636 features up-rated diesels, higher standards of noise reduction and a propulsion motor that rotates at half the speed of earlier versions. Reduction of the underwater noise level significantly improves opportunities for advance detection of the enemy and attacking ships from a long distance using anti-ship cruise missiles. India reportedly is working on a submarine-launched cruise missile with a range in excess of 300 nautical miles. Diesel-electric propulsion systems ensure quiet operations and are suited for narrow water lanes and shallow sea areas. In underwater modeling competitions, Kilo submarines won against German, French and Dutch submarines.


## Kilo 877EKM Attack Submarine, Diesel-Electric Powered (SSK)

	<table border="1"> <thead> <tr> <th>Weapons</th> <th>Load</th> </tr> </thead> <tbody> <tr> <td>Torpedoes</td> <td>18</td> </tr> <tr> <td>Mines (in lieu of torpedoes)</td> <td>24</td> </tr> </tbody> </table>	Weapons	Load	Torpedoes	18	Mines (in lieu of torpedoes)	24
Weapons	Load						
Torpedoes	18						
Mines (in lieu of torpedoes)	24						
<p><b>SYSTEM</b>  <b>Alternative Designations:</b> Project 877EKM or Paltus class  <b>Date of Introduction:</b>  <b>Proliferation:</b> India (Sindhugosh Class), China, Iran (Tareq Class), Algeria, Poland, Romania  <b>Description:</b>  Crew: 36 + 10-16 officers  Troop Capacity: could be used for small number of special operations personnel  Length Overall (m): 70  Displacement (m): 2,325 tons (surfaced), 3,076 tons (submerged)  Beam (m): 9.9  Pressure Hull Diameter (m): not known  Mean Draft (m): 6.5  Maximum Diving Depth (m): 300  Periscope Depth (m): 17.5  Maximum Dived Speed (knots): 17-25  Maximum Surfaced Speed (knots): 10-12  Maximum Snorkeling Speed (knots): 9  Endurance: 45 days  Range: 6,000 nautical miles (while snorkeling at 7 knots), 400 nautical miles (submerged at 3 knots), 12.7 nautical miles (full run at 21 knots)  Propulsion: Powered by diesel-electric propulsion with two 1000 kW diesel generators and one 5,500 hp propulsion motor. They are produced by Elektrosila and Kolomensky Zavod of Russia. The Type 877 EKM also has a 190-hp motor for economic running and two 102-hp standby propulsion systems. Diesel-electric; Type 4-2DL-42M 2 diesels. Battery capacity: 9,700 kW/h.</p> <p><b>Sensor Suite:</b>  MGK-400 Rubikon (Shark Eye) medium frequency, active/passive sonar array is located in the bow. It provides echo target ranging, detection of active sonar signals and underwater sound communication. Detection performance in the passive mode is 16-20 km against submerged targets and 60-80 km against surface targets. Flank or towed arrays are not fitted. The MGK-400 is supplemented by the MG-519 active mine-avoidance set. The combat system, designated MVU-110EM, can conduct two simultaneous attacks while tracking three other targets manually. One MRK-50 Albatros (Snoop Tray) navigation/search radar (range: 11 nautical miles). Two PZKG periscopes. Countermeasures include electron support measures (ESM), radar warning receiver and direction finder.</p>	<p><b>Weapons:</b></p> <p>Six (6) 21-inch (533 mm) torpedo tubes. Total torpedo load is 18 (six in the tubes and 12 in racks). Two targets can be simultaneously engaged.</p> <p>Six torpedoes can be TEST-71ME wire-guided torpedoes that are launched from tubes 1 and 2 only. Other torpedoes include Types 53-65KE and SET 53M.</p> <p>TEST-71ME: For use against submarines. Wire-guided. Two-speed electric motor. Warhead is equipped with impact and proximity fuses. Reported to be wakeless. Newer versions of this torpedo can be used against both submarines and surface vessels. In service with Algeria, China, India, Iran, Poland, Romania and Russia.  Weight: 4,012 pounds  Speed: 40 knots  Range: 10 nautical miles (at 20 knots); 8 nautical miles (at 40 knots)  Operating Depth (m): 400</p> <p>Launcher and SA-N-5 (Grail, range: 2.7 nautical miles) or SA-N-8 (Gremlin, range: 3.0 nautical miles) surface-to-air missiles are stored in a watertight container at the bottom of the SAM well, located between the snorkel and the radio antenna masts in the sail.</p> <p>Up to 24 AM-1 mines can be carried instead of torpedoes.</p> <p>E53-65K: wake-homing, anti-surface ship. Can attack at ships moving at speeds up to 35 knots.  Weight: 4,269 pounds  Speed: 40 knots and 55 knots  Range: 15 nautical miles (at 40 knots); 12 nautical miles (at 55 knots)  Operating Depth (m): 4 to 14</p> <p>SET-53M: active acoustic antisubmarine torpedo. No longer in use in Russia.  Weight: not known  Speed: 29 knots  Range: 8.5 nautical miles  Operating Depth: not known</p>						


### NOTES

Kilo Class (Project 877) designed for anti-submarine and anti-ship warfare in the protection of naval bases, coastal installations and sea lanes, and for reconnaissance and patrol missions. Five versions of the Type 877 have been produced; the Type EKM is fitted with a much improved command system and noise reduction measures.

## SANG-O Coastal Infiltration Submarine


	<table border="1"> <thead> <tr> <th>Weapons</th> <th>Load</th> </tr> </thead> <tbody> <tr> <td>Torpedoes</td> <td>2 or 4</td> </tr> <tr> <td style="text-align: center;"><b>or</b></td> <td></td> </tr> <tr> <td>Mines</td> <td>16</td> </tr> <tr> <td>Rocket Launchers</td> <td>Unknown</td> </tr> <tr> <td>12.7 mm Machine Guns</td> <td>Unknown</td> </tr> </tbody> </table>	Weapons	Load	Torpedoes	2 or 4	<b>or</b>		Mines	16	Rocket Launchers	Unknown	12.7 mm Machine Guns	Unknown
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Torpedoes	2 or 4												
<b>or</b>													
Mines	16												
Rocket Launchers	Unknown												
12.7 mm Machine Guns	Unknown												
<p><b>SYSTEM</b>  <b>Alternative Designations:</b> Shark  <b>Date of Introduction:</b> 1995  <b>Proliferation:</b> Possibly Iran  <b>Description:</b>            Crew: 19; for short operations, crewmembers may be replaced by special operations personnel.            Troop Capacity: 6 swimmers or 21 soldiers            Length Overall (m): 35.5            Displacement (tons): 256 (surfaced); 277 (submerged)            Beam (m): 3.8            Pressure Hull Diameter (m): 3.8            Mean Draft (m): 3.7            Maximum Diving Depth (m): 180            Periscope Depth (m): Not known            Maximum Dived Speed (knots): 8.8            Maximum Surfaced Speed (knots): 7.6            Maximum Snorkeling Speed (knots): 7.2            Endurance: 3-4 days            Range: 2,700 nautical miles (at 7 knots)            Propulsion: 1 Russian diesel generator; 1 North Korean motor; 1 shaft; shrouded prop            Sensor Suite: Russian manufactured, hull-mounted sonar with passive/active search and attack capabilities. Single periscope. VLF radio receiver in the fin. Short-range Furuno (I-band) for surface search/navigation.</p>	<p><b>Weapons:</b>            Some SANG-O boats are fitted with 2 or 4 21-inch torpedo tubes. These boats can fire either 53-51 or 53-56 torpedoes. No reload capability. In lieu of torpedoes, some SANG-O boats can carry up to 16 mines of an unknown type. Others are configured to carry up to six external, bottom mines of an unknown type.</p> <p>Torpedoes:            53-51:            Weight: 4,100 pounds            Speed: 50 knots            Range: 4 km</p> <p>53-56:            Weight: 4,500 pounds            Speed: 35 knots            Range: 8 km</p>												
<p><b>NOTES</b>            North Korean adaptation of Yugoslavian submarine designs. It is also based on North Korean experiences in constructing Romeo Class submarines. One version of the SANG-O features a diver lockout chamber that has replaced torpedo tubes. Another version is capable of carrying as many as 6 external, bottom mines. SANG-O boats can bottom.</p>													

## SCORPENE Attack Submarine, Diesel-Electric Powered (SSK)

	<table border="1"> <thead> <tr> <th colspan="2">Weapons</th> <th>Load</th> </tr> </thead> <tbody> <tr> <td>Torpedoes</td> <td></td> <td>18</td> </tr> <tr> <td></td> <td>or</td> <td></td> </tr> <tr> <td>Missiles</td> <td></td> <td>18</td> </tr> <tr> <td></td> <td>or</td> <td></td> </tr> <tr> <td>Mines</td> <td></td> <td>30</td> </tr> </tbody> </table>	Weapons		Load	Torpedoes		18		or		Missiles		18		or		Mines		30	
Weapons		Load																		
Torpedoes		18																		
	or																			
Missiles		18																		
	or																			
Mines		30																		
<p><b>SYSTEM</b>  <b>Alternative Designations:</b> None. Jointly developed by France and Spain. Three versions: Standard diesel-electric, Air-Independent Propulsion (AIP) equipped, and Compact (for operations in littoral waters).  <b>Date of Introduction:</b> ~2000  <b>Proliferation:</b> Chile, Malaysia has ordered two, India is gearing up for indigenous construction and has purchased six, and Spain is interested.  <b>Description:</b>  Crew: 35 total  Troop Capacity: Could carry small numbers of special operations personnel  Length Overall (m): 66.4 (standard version); 76.2 (AIP); 59.4 (compact)  Displacement (tons): 1,700 (standard version); 2,000 (AIP); 1,450 (compact)  Beam (m): 6.2  Pressure Hull Diameter (m):  Mean Draft (m): 5.4  Maximum Diving Depth (m): 350 (standard and AIP); greater than 200 (compact)  Periscope Depth (m): not known  Maximum Dived Speed (knots): 20 (standard and AIP-equipped); 14 (compact version)  Maximum Surfaced Speed (knots): 12  Maximum Snorkeling Speed: Not known  Endurance (days): 50, 50, 40  Range: 6,800 nautical miles (if snorkeling at 8 knots); 550 nautical miles (if submerged at 4 knots); 40 nautical miles (at 20 knots)  Propulsion: electric propulsion system consists of an EPM Magtronic 2,800 kW AC permanent magnet synchronous motor, powered by two banks of batteries, which are charged by two or four diesel alternators. Diesel power comes from SEMT-Pielstick turbocharged diesels. Four MTU 16V 396 SE84 diesels, capable of developing 2.2 MW, will be used for the Chilean Scorpene. The AIP system is designed to produce usable power in an air-limited environment and to allow the Scorpene to remain submerged (and less detectable) up to six times longer than a conventional diesel-electric submarine. Danger to the submarine is especially pronounced when snorkeling in coastal waters. Detectability is significantly reduced because the AIP-equipped Scorpene spends less time at snorkel depth to recharge its batteries. The MESMA AIP system consists of a turbine receiving high-pressure steam from a combustion chamber in which a gaseous mixture of ethanol and liquid oxygen is burning. One diesel-generator set is installed specifically for surface propulsion and battery recharging in non-hostile waters, which allows for liquid oxygen to be saved for operations in potentially hostile waters.  <b>Sensor Suite:</b> SUBTICS (Submarine Tactical Information and Control System) Combat Management System. Sonar systems include the THALES TSM 2253 planar flank array, a cylindrical array, an active array, a THALES Safare intercept array; a passive ranging distributed array and two passive LF flank arrays. SUBTICS enables the processing of signals acquired by acoustic and non-acoustic (optical, ESM, radar, communications) sensors for detection, tracking, localization and identification of vessels. System is designed so that the crew is able to remain in constant control of all information, starting from surveillance and threat assessment to the launching of weapons. SUBTICS' set of sensors multiply the detection capacity of the Scorpene against silent targets.</p>	<p><b>Weapons:</b>  18 weapons carried; launched from six torpedo tubes. On the Chilean Scorpene, two tubes are fitted with a pneumatic ram system for launching SM 39 Exocet missiles. 30 mines can be carried if no torpedoes or anti-ship missiles are taken on patrol. Features a positive discharge system that allows any tube-launched weapon to be launched silently at any depth. Typical weapons load would be a combination of various heavyweight torpedoes and MBDA SM 39 Exocets. The Scorpene's weapon-handling and -launching system can accommodate a variety of weapons. Those weapons include: WASS/DCN Black Shark, F17 Mod 2, STN Atlas Elektronik DM2A4, Saab Bofors Underwater Systems Torpedo 2000 and the MK 48 ADCAP.</p> <p>WASS/DCN Black Shark: fourth generation follow-on to the Italian A184. Wire-guided, electrically propelled. Dual speed weapon. For use against submarines and surface vessels. Guidance wires carry commands for course, depth, acoustic mode, speed, enabling range and torpedo stop. Torpedo replies include: course, distance, depth and speed. Capabilities include: wake homing and re-attack procedures. Weight: 2,788 pounds  Speed: 24 or 36 knots  Range: 13.5 nautical miles at 24 knots or 9 nautical miles at 36 knots</p> <p>F17 Mod 2: standard French wire-guided torpedo. Guidance system operates in active, passive or active and passive modes (during terminal homing phase). Configured for shallow and deepwater operations. Weight: 2,998 pounds  Speed: 40 knots  Range: 3.8 nautical miles</p> <p>STN Atlas Elektronik DM2A4: German, wire-guided, acoustic homing torpedo. Features new propulsion system for increased speed and range, and extremely long guidance distance. In service in German, Turkish and Israeli navies. Weight:  Speed: greater than 35 knots  Range: greater than 15 nautical miles</p> <p>Saab Bofors Underwater Systems Torpedo 2000: Swedish, wire-guided, heavyweight torpedo. Essentially, a wake less system with high speed and long-range capabilities. Equipped with an advanced active/passive homing head. Fitted with a computerized proximity fuse and an impact fuse. Can be launched from a submarine lying on the seabed.  Weight: 3,196 pounds  Speed: less than 50 knots  Range: 21.5 nautical miles</p>																			

**NOTES** Indian Navy reportedly interested in installing small nuclear reactor in Scorpene as part of its long-term nuclear ambitions. Design features include very low acoustic, magnetic, electromagnetic and infrared signatures.


**SONG CLASS Attack Submarine, Diesel-Electric Powered (SSG)**

	<table border="1"> <thead> <tr> <th>Weapons</th> <th>Load</th> </tr> </thead> <tbody> <tr> <td>Torpedoes</td> <td>18</td> </tr> <tr> <td>Missiles</td> <td>?</td> </tr> <tr> <td>or</td> <td></td> </tr> <tr> <td>Mines</td> <td>24</td> </tr> </tbody> </table>	Weapons	Load	Torpedoes	18	Missiles	?	or		Mines	24
Weapons	Load										
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or											
Mines	24										
<p><b>SYSTEM</b>  <b>Alternative Designations:</b> Project 039 Wuhan C-class or S20 Song-class. Replacement for Ming Class  <b>Date of Introduction:</b> 1998 (commissioning date). 2001 for dramatically redesigned second sub (Project 039A).  <b>Proliferation:</b> no exports to date  <b>Description:</b>  Crew: 50 + 10 officers  Troop Capacity: could carry small number of special operations personnel  Length Overall (m): 75  Displacement (tons): 2,250 (submerged); 1,700 (surfaced)  Beam (m): 8.4  Pressure Hull Diameter (m): 8.4  Mean Draft (m): 5.3  Maximum Diving Depth (m): approx 300  Periscope Depth (m): not known  Maximum Dived Speed (knots): 17-22 for short periods  Maximum Surfaced Speed (knots): 12-15  Maximum Snorkeling Speed (knots): 8-10  Endurance (days): not known  Range: not known  Propulsion: German MTU 12V 493 diesel engine. Second sub of class and follow-on subs may be fitted with Air-Independent Propulsion (AIP).  Sensor Suite: probably fitted with sonars of French design; however, China likely has access to several foreign sonars, including passive ranging sonars, flank array sonars, and variable-depth sonars. Probably fitted with bow-mounted sonar; passive/active search and attack; medium frequency. Flank array; passive search, low frequency. ESM: Type 921-A (Golf Ball); radar warning (wideband pulse radar direction-finding receiver installed to detect emitters of airborne, shipborne and shore-based radars). Surface search radar: I-band. An unknown number of hydrophones are mounted atop the bow.</p>	<p><b>Weapons:</b>  (6) 21-inch (533 mm) torpedo tubes. Combination of SAET-60 (Yu-4) and Type 53-51 (Yu-1) torpedoes.</p> <p>SAET-60 (Yu-4):  Weight: not known  Speed: 35 knots  Range: 8 nautical miles</p> <p>Type 53-51 (Yu-1):  Weight: not known  Speed: 39 or 51 knots  Range: 2.1 nautical miles (at 51 knots); 5 nautical miles (at 39 knots)</p> <p>YJ-8-2 (C-801): YJ 8-2 (China's first encapsulated anti-ship cruise missile capable of being launched from a submerged submarine).  Weight: 1,796  Speed: 0.9 Mach  Range: 20 nautical miles</p>										

**NOTES**

While the Song S20 is reportedly as quiet as the Los Angeles-class nuclear submarines, its overall performance is hampered by its reliance on 1980s technology. Design problems created excessive noise radiation and difficulties with systems integration. Various upgrades are said to be underdevelopment as part of the Type 039A program. Serial production underway which indicates Type 039 design problems may have been resolved. Design improvements include a modern fin and the removal of the stepped conning tower (making its external appearance resemble the Agosta 90B). The Type 039A boats may be fitted with an Air-Independent Propulsion system. Possibility also exists that the class may be cancelled in favor of additional purchases of Russian diesel-electric submarines.

## Type 209 Attack Submarine, Diesel-Electric Powered (SSK)

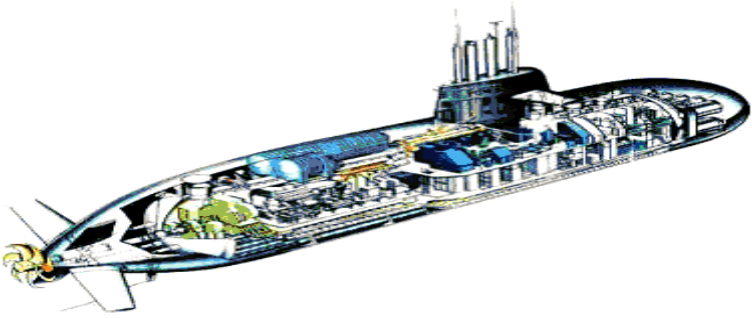
	<table border="1"> <thead> <tr> <th>Weapons</th> <th>Load</th> </tr> </thead> <tbody> <tr> <td>Torpedoes</td> <td>14</td> </tr> <tr> <td>Mines (strap-on container)</td> <td>24</td> </tr> <tr> <td>Anti-ship missiles (on newer 1500 series)</td> <td>4</td> </tr> </tbody> </table>	Weapons	Load	Torpedoes	14	Mines (strap-on container)	24	Anti-ship missiles (on newer 1500 series)	4
Weapons	Load								
Torpedoes	14								
Mines (strap-on container)	24								
Anti-ship missiles (on newer 1500 series)	4								
<p><b>SYSTEM</b></p> <p><b>Alternative Designations:</b></p> <p><b>Date of Introduction:</b> 1967</p> <p><b>Proliferation:</b> Variants in Argentina, Brazil, Chile, Colombia, Ecuador, Greece, India, Indonesia, South Africa, South Korea, Peru, Turkey, and Venezuela</p> <p><b>Description (for 1500 series):</b></p> <p>Crew: 32 + 8 officers</p> <p>Troop Capacity: May carry small number of special operations personnel</p> <p>Length Overall (m): 64.4</p> <p>Displacement (tons): 1,660 (surfaced); 1,850 (submerged)</p> <p>Beam (m): 6.5</p> <p>Pressure Hull Diameter (m):</p> <p>Mean Draft (m): 6.0</p> <p>Maximum Diving Depth (m): 250</p> <p>Periscope Depth (m):</p> <p>Maximum Dived Speed (knots): 22.5</p> <p>Maximum Surfaced Speed (knots): 11-13</p> <p>Maximum Snorkeling Speed (knots):</p> <p>Endurance: 50 days</p> <p>Range (nautical miles): 13,000 (if surfaced at 10 knots); 8,524 (if submerged at 4 knots)</p> <p>Propulsion: (Indian 1500 series) Four diesels driving four alternators--4 MTU 16V493 TY 60 (or AZ diesels) (800 bhp each), 4 430-kw generators, 2 Siemens motors (providing submerged power). May be fitted with Air-Independent Propulsion system.</p> <p>Sensor Suite: (Indian 1500 series) SAM Electronics (formerly, STN Atlas Elektronik) CSU-83 search and attack suite, THALES DUUX-5 passive ranging and intercept. Generally, Type 209 sonars are comprised of a cylindrical, bow-mounted passive array and an active array at the fore edge of the sail, together with three passive ranging arrays mounted along the port and starboard sides of the hull. Flank arrays are under consideration.</p> <p>Other: Generally, passive sonar is the principal undersea warfare mode. Active sonar is used only if warranted by the tactical situation (such as self-defense, or against an alerted submarine). Maintaining a covert status is best accomplished by employing the passive sonar mode. Active and passive sonar operations may be utilized concurrently.</p>	<p><b>Weapons:</b></p> <p>Eight (8) 21-inch (533 mm) torpedo tubes.</p> <p>Twenty-four (24) mines can be carried in a strap-on container.</p> <p>Newer boats in the 1500 series will be capable of firing anti-ship missiles.</p> <p>Torpedoes (India—1500 series):</p> <p>Surface and Underwater Target (SUT) torpedo is an older, German design for use against surface vessels and submarines. No longer in production (approximately 400 were sold world-wide; Indonesia purchased manufacturing rights). Wire-guided. Electric propulsion with variable speeds. After termination of wire guidance, SUT will continue to operate as a homing torpedo.</p> <p>Weight: 3,130 pounds</p> <p>Speed: selectable, maximum of 35 knots</p> <p>Range: 15 nautical miles (at 23 knots); 6.5 nautical miles (at 35 knots)</p> <p>Operating Depth (m): 2-460</p>								

### NOTES

Widely exported, the Type 209 dominates the world market. It is built in a number of versions ranging from 970 tons standard displacement, up to 1,500 tons. Then 1500 series is fitted with an escape sphere that can accommodate 40 crewmembers and withstand pressures equal to the maximum diving depth of the submarine. Some subs in the 1500 series are capable of submerged launching of anti-ship missiles. An Air-Independent Propulsion (AIP) system (which permits the sub to operate underwater significantly longer without the need to snorkel and recharge batteries) can be inserted into existing Type 209s. A strong selling point for Type 209s is the potential for upgrades that can dramatically increase their operational life.



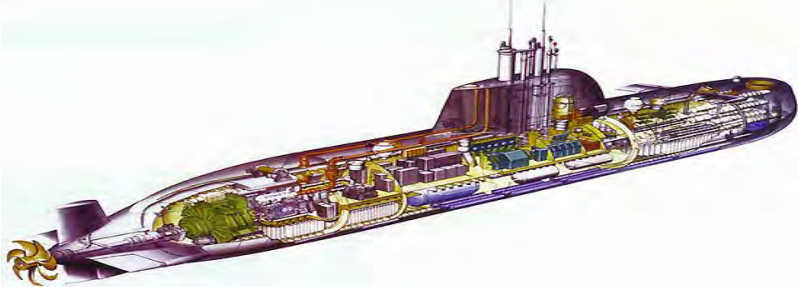
**TYPE 212A Attack Submarine, Diesel-Electric Powered (SSK)**

	<table border="1"> <thead> <tr> <th data-bbox="1021 254 1269 289">Weapons</th> <th data-bbox="1278 254 1427 289">Load</th> </tr> </thead> <tbody> <tr> <td data-bbox="1021 300 1269 394">Torpedoes</td> <td data-bbox="1278 300 1427 394">12</td> </tr> <tr> <td data-bbox="1021 394 1269 468" style="text-align: center;">or</td> <td data-bbox="1278 394 1427 468"></td> </tr> <tr> <td data-bbox="1021 468 1269 615">Mines</td> <td data-bbox="1278 468 1427 615">24</td> </tr> </tbody> </table>	Weapons	Load	Torpedoes	12	or		Mines	24
	Weapons	Load							
Torpedoes	12								
or									
Mines	24								
<p><b>SYSTEM</b>  <b>Alternative Designations</b>  <b>Date of Introduction:</b> 2003 (Sea Trials)  <b>Proliferation:</b> Germany. Orders placed by Italy, Greece, South Korea. Portugal is considering the Type 212A.  <b>Description:</b>  Crew: 19 + 8 officers  Troop Capacity: Could carry small number of special operations personnel  Length Overall (m): 56  Displacement (tons): 1,450 (surfaced); 1,800 (submerged)  Beam (m): 6.9  Pressure Hull Diameter (m): 6.9  Mean Draft (m): 6  Maximum Diving Depth (m): 400  Periscope Depth (m): not known  Maximum Dived Speed (knots): 20  Maximum Surfaced Speed (knots): 12  Maximum Snorkeling Speed (knots): not known  Endurance: 30 days  Range: 8,000 nautical miles (if surfaced at 8 knots); 420 nautical miles (if submerged at 8 knots)  Propulsion: Diesel-electric. 1 MTU 16V 396 diesel engine, 3.12 MW, that powers the generator for charging the lead acid battery. HDW/Siemens Air-Independent Propulsion System, 300 kW, that is used for silent, slow cruising.</p> <p>Sensor Suite: Integrated system designed to cover high, middle and low frequency bands. SAM Electronics (formerly, STN Atlas Elektronik) DBQS-40 sonar suite. DBQS has a cylindrical array for passive medium frequency detection, a low frequency towed array sonar and a flank array sonar for low/medium frequency detection. STN Atlas Elektronik MOA 3070 mine detection sonar. TAU 2000 torpedo countermeasures system that has four launch containers each with approximately 10 discharge tubes equipped with effectors (similar in appearance to a torpedo). Effectors are jammers and decoys designed to counter torpedoes.</p>	<p><b>Weapons:</b></p> <p>Six 21-inch (533 mm) torpedo tubes in the bow.</p> <p>Total of 12 torpedoes. (Whitehead A184 Mod 3 and Black Shark)</p> <p>The Type 212A will be fitted with minelaying belts.</p> <p>Surface-to-Air Missiles are under development.</p> <p>Whitehead A 184 Mod 3: Italian design. Wire-guided, electrically propelled torpedo. Used against submarines and surface vessels. Wake-homing and re-attack procedures are part of the Mod 3 upgrade package. In service with Italian and Peruvian navies.  Weight: 2,788 pounds  Speed: 24 or 36 knots  Range: 13.5 nautical miles (at 24 knots under wire guidance); 9 nautical miles (38 knots)  Operating Depth (m): not known</p> <p>WASS/DCN Black Shark: Follow-on to the Italian A184. Wire-guided, electrically propelled. Dual speed. Can be used against submarines or surface vessels. Capabilities include wake homing and re-attack procedures. Black Shark/iF21 in development: speed to be increased to more than 45 knots.  Weight: 2,788 pounds  Speed: 24 or 36 knots  Range: 13.5 nautical miles at 24 knots or 9 nautical miles at 36 knots  Operating Depth (m): not known</p>								

**NOTES**

A key feature of the AIP system is that it will allow the Type 212A to stay submerged for up to 17 days without having to snorkel to recharge its batteries. The Type 212A incorporates the latest in stealth technology. Its hydrodynamic design results in a deliberately shaped hull and sail with no straight lines which equates to a very low target echo strength. A very low magnetic signature results from the use of magnetic steel. Reductions in heat emission will significantly decrease the infrared wake signature.

## TYPE 214 Attack Submarine, Diesel-Electric Powered (SSK)

	<table border="1"> <thead> <tr> <th>Weapons</th> <th>Load</th> </tr> </thead> <tbody> <tr> <td>Torpedoes</td> <td>16</td> </tr> <tr> <td>Missiles</td> <td>16</td> </tr> </tbody> </table>	Weapons	Load	Torpedoes	16	Missiles	16	
Weapons	Load							
Torpedoes	16							
Missiles	16							
<p><b>SYSTEM</b></p> <p>Alternative Designations</p> <p>Date of Introduction: In development for delivery in 2005</p> <p>Proliferation: Greece, South Korea (objective is to design its own submarines by 2010 by acquiring technology from foreign contractors).</p> <p>Description:</p> <p>Crew: 22 + 5 officers</p> <p>Troop Capacity: could be used for special warfare operations</p> <p>Length Overall (m): 65</p> <p>Displacement (tons): 1,700 (surfaced); 1,900 (submerged)</p> <p>Beam (m): 6.3</p> <p>Pressure Hull Diameter (m):</p> <p>Mean Draft (m): 6</p> <p>Maximum Diving Depth (m): 400</p> <p>Periscope Depth (m):</p> <p>Maximum Dived Speed (knots): 20</p> <p>Maximum Surfaced Speed (knots): 12</p> <p>Maximum Speed on Fuel Cells (knots): 6</p> <p>Endurance: 50 days</p> <p>Range: 12,000 nautical miles (if surfaced at slow speed); 420 nautical miles (if submerged at 8 knots); 1,248 nautical miles (if operating on fuel cells at 4 knots)</p> <p>Propulsion: Fuel cell powered (efficiently converts hydrogen, as fuel, and oxygen into electrical energy. NOTE: submarine using fuel cells instead of a diesel engine to recharge its batteries creates much less sound while doing so. Consequently, the effective detection range of passive acoustic sonobuoys is decreased.</p> <p>Propulsion motor is a Siemens Permasyn low-speed permanently excited electric motor that drives a low-noise, skewback propeller. Equipped with Air-Independent Propulsion (AIP). Performance of the AIP system has been improved by two Siemens PEM (polymer electrolyte membrane) fuel cells which produce 120kW per module and provides the Type 214 with an underwater endurance of two weeks. Two MTU 16 V 396 engines serve a 600-900 V propulsion motor.</p>	<p><b>Sensor Suite:</b></p> <p>Consists of the sonar systems, an attack periscope (equipped with laser rangefinder) and an optronic mast. Type 214's electronic support measures system and Global Positioning System sensors are installed on the optronic mast. Cylindrical array for medium frequency passive detection, flank array to cover transition from medium to low frequency, thin line towed array for low frequencies in a medium self-noise environment, passive ranging sonar determination of target data, and active sonar for target range and bearing. Integrated Sensor Underwater System ISUS 90 serves to integrate all sensors and command and control functions. Search periscope is fitted with optical rangefinder, thermal imager and GPS</p> <p>Type 214 fitted with integrated DBQS sonar system that has a cylindrical array for passive medium-frequency detection, a TAS-3 low frequency towed array sonar, FAS-3 flank array sonar for low/medium frequency detection, passive ranging sonar, and hostile sonar intercept system. Its active high frequency mine detection sonar is the SAM Electronics (formerly, STN Atlas) Elektronik MOA 3070.</p> <p><b>Weapons:</b></p> <p>Eight (8) 21-inch (533 mm) torpedo tubes, four of which will be equipped with a Weapon Expulsion System for launching encapsulated anti-ship missiles. The Type 214 has a torpedo payload of 16.</p> <p>Torpedoes: Possibly the DM2 A-4 export version.</p> <p>Weight: 3,020 pounds</p> <p>Speed: 50 knots maximum; different speed settings</p> <p>Range: 15 nautical miles</p> <p>Operating Depth (m): not known</p> <p>Information of missiles is sketchy. Greece reportedly will arm its Type 214s with Sub Harpoon missiles.</p> <p><b>Sub Harpoon:</b></p> <p>Speed: 0.8 Mach</p> <p>Range: 70 nautical miles</p>							

### NOTES

The hull design and its hydrodynamic form combine for stealth capabilities. Self-generated noise and flow noise are low. The Type 214 is able to remain submerged for almost two weeks (at a speed of 4 knots) while utilizing its AIP system of submerged missions. Submerged sprint speeds of 20 knots also are possible for short periods of time.



## Chapter 3

### Littoral Systems and Equipment

This chapter focuses on vessels, weapons and equipment for use in littoral ("near the shore") operations. Littoral activities include the following:

- "brown water" naval operations in coastal waters (out to as far as 200+ km from shore),
- amphibious landing operations or port entry (opposed and unopposed),
- coastal defense actions (including patrols, engaging enemy, and denying entry)
- operations in inland waterways (rivers, lakes, etc), and
- actions in large marshy or swampy areas.

There is no set distance for "brown water". Littoral range is highly dependent on specific geography at any point along a coast. Littoral operations can be highly risky. Forces moving in water are often challenged by nature and must move at a slow pace while exposed to enemy observation and fires. Thus littoral forces will employ equipment best suited for well-planned operations with speed, coordination, and combined arms support. Littoral forces will employ a mix of conventional forces, specialized (naval, air, and ground) forces and equipment, and civilian equipment which can be acquired or recruited for the effort. Each type of action may require a different mix of equipment to deal with challenges of terrain, vulnerability, and enemy capabilities.

Coastal water operations can utilize naval vessels which can operate in blue water. Naval battle groups for deep water also operate in littoral waters. Submarines and anti-submarine warfare (ASW) systems conduct missions in littoral waters. But challenges of shallow waters and shoreline threats also require use of smaller fast-attack boats, patrol craft, cutters, etc. Other craft include tug and maintenance boats, amphibious aircraft, and submarines (Ch 2). Many of the surface vessels in Chapter 1 are designed for littoral operations. Newer technologies are contributing to vessel designs for littoral waters (see section at pg 3-6). Along coastal areas, naval craft support ground forces by transporting troops and supplies as needed. For patrols in search of enemy and smuggler activities, stealthy high-speed craft are valuable assets. Para-military, police, and security force and other authorized agency craft will also operate in these waters. Most vessels in these waters are civilian commercial watercraft (for shoreline maintenance, fishing, and transport) and private pleasure craft. Insurgent forces and smugglers use these craft and may even "hide in plain sight".

Amphibious landing operations need additional vessels, including landing craft, and shallow water close-in fire support craft to suppress ground targets and provide air defense. Air cushion landing craft (aka landing craft air-cushion – LCAC) offer speed and agility to insert assets early in an operation. Other equipment includes unmanned underwater vessels (UUVs) for vessel inspection, reconnaissance, etc. Assets include special operations forces (SOF), with specialized equipment, such as coastal infiltration submarines (see Sang-O at pg 2-8), midget submarines, scuba gear, semi-submersible infiltration landing craft (pg 3-10 below), and mother ships for surreptitious launch. Aircraft support missions include anti-ship and anti-landing fires, surveillance, and transport. Inflatable boats (modular, rigid, and rigid-hulled) are widely used.

Most vehicles classified as amphibious are not really designed to operate in sea state 3 or greater. Thus they must be used in fairly calm waters or launched close to shore from landing craft.

Many countries, however, have a fairly wide variety of vehicles for use in coastal amphibious operations. Some of the largest amphibious forces are in conventional army units which must operate in littoral zones. Thus they must have many vessels, special vehicles, and support assets noted in this chapter. Combat vehicles for amphibious operations include selected IFVs and APCs (Vol 1 pg 3-40), light tanks and other heavy armored combat vehicles (HACVs, Vol 1 pgs 6-41 through 55). Chinese forces have added several fighting vehicles with buoyant front compartments for use in high sea states. These include the Type 90 APC, ZBD2000 IFV, and Type 63AM (aka Type 99) light amphibious tank. Highly amphibious combat support vehicles (CSVs) include the U.S. DUKW and the Russian PTS-M. Support equipment includes bladders to attach to vehicles and equipment, and amphibious trailers, such as the Russian PKP (for use on land and water).

Coastal defense forces include conventional units and weapons. Many ATGMs can destroy naval vessels (including NLOS systems, Vol 1 pg 6-72). Specialized weapons include anti-ship missile systems (e.g., Chinese HY-2/SILKWORM) and the supersonic cruise missile BrahMos (at Vol 2, pg 5-14). Other specialized systems include aircraft, and anti-ship artillery systems (like the Russian Bereg SP cannon system, pg 3-13). Torpedoes (such as the high-speed Shkval-E) can be launched from ships or underwater launchers to destroy vessels. Air defense missile systems, e.g., Russian SA-11 and Buk-M1-2 (Vol 2, pg 6-73), can be used as anti-ship missiles. Naval aircraft (e.g., the Russian Ka-27/HELIX) and UAVs can be used for coastal defense forces. Engineers and other support units will emplace obstacle systems underwater and ashore at likely landing areas. Surface and subsurface minefields will target surface vessels and submarines, and slow and channelize movement. Anti-landing mines are laid close to shore and at landing sites. Remote mine and rocket launchers deliver fires and strikes at landing craft and vehicles attempting to breach gaps in obstacle systems. Missile, gun and rocket weapons will deliver precision strikes. Unmanned surface vessels with remote operated weapons can patrol and attack enemy targets.

Most large military forces conducting large military offensive operations will use ports to bring in forces or support the forces. The OPFOR will focus great effort to deny waterborne early entry and prevent sustained embarkation operations. They will use all available air, land, and naval forces. They will attack the force at critical nodes, such as restricted waterways, such as straits, channels, canals, harbors, and in port areas, to destroy the force and deny facilities. Mines, torpedoes, submarines, fast-attack craft, SOF, insurgents, and other means will be used.

Crossings in inland waterways are described in Army Field Manual 7-100.2 (Chapter 12). Factors such as gap width, depth, water speed, and threat (whether the crossing is opposed, etc.) affect the choice of equipment used. Coastal patrol, fast-attack, and landing craft can be used in inland waterways. Shallow-draft military riverine craft and commercial boats are widely used. Airboats can move quickly, even in the shallowest waters. Barges can mount weapons and supplement carry capacity of vessels. Amphibious vehicles are widely used. Improvised swim assists such as bladders and barrels enable equipment and vehicles to cross water gaps. Hydro-propulsion water-craft and craft with snag protection are widely used. Jet skis (aka waverunners) can be adapted for military use, even mounting weapons and operating rapidly in shallow waters. Seaplanes and aircraft fitted with pontoons can access areas difficult to reach by land.

Engineer assets are used in gap crossings. Reconnaissance assets, e.g., Russian IRM armored reconnaissance vehicles, frogmen with Scuba gear, re-breathers, mini-sub, and underwater propulsion units, shoreline recon units, and underwater maps help prepare a crossing.

Atmospheric diving suits (ADS) are used in all waters for longer-duration underwater work (deep sea diving, ship and harbor repair, surveillance, and engineer work). Civilian divers will also be used. Bridge vehicles can be used for narrow crossings. Pontoons, amphibious transporters and ferries can be used for wider gaps. Boats and amphibious trailers are used.

Pioneer units and others use improvised assets to aid in crossings. Inflatable rafts and improvised aids, such as wooden rafts constructed from nearby timber and structures, will be used to supplement military assets. Boats can be lashed together to substitute for pontoons as improvised bridges. They may even be planked with boards to support vehicles and equipment.

Mechanized amphibious units will include companies and battalions organized and equipped for use in opposed crossings. These units are carefully coordinated with supporting units to use deception, surprise, supporting fires (direct and indirect), and rapid maneuver to cross, and to seize the other shore. Assets will include armored amphibious vehicles, fire support vehicles, and other support systems with amphibious capabilities. Aircraft and airborne/air assault assets will be used if available. Water-borne assets will attempt to expand the crossing area and bridge the gap (if needed for support assets to cross). Engineer ferries and transporters can be used once the site is secured. Non-swimming vehicles with high-ford designs and snorkels can be used in many crossings. Some tanks with snorkels can ford in waters to 5 m in depth. Winches on fording vehicles aid in navigating narrow water crossings.

Defense of inland waterways is primarily executed with conventional units. Additional equipment can include crossing assets (above, such as commercial watercraft, and anti-landing mines). The Russian KPDM-4 cassette anti-landing mine system offers 50-m ground launch range, for concealed or defilade launch. The VSM-1 helicopter minelayer can also be used.

Marshy and swampy areas require a mix of boats and vehicles which can move in very shallow waters. Airboats and tracked vehicles designed for very low ground pressures can be useful for rapid movement in these areas. The Ukrainian/Russian MT-LB armored transporter, and the Swedish Bv-206 are far-better suited for these terrains. Wheeled vehicles are poorly suited for this terrain. Even many amphibious tracked vehicles cannot be used in these areas, due to excessive ground pressure. In areas with 1 to 3 feet of water with muddy bottoms and banks, and some obstruction (stumps, brush, etc.), vehicles may find the going very slow. Winches, hoists, and saws are critical assets for pulling out vehicles and clearing obstructions. Engineer road clearing and reconnaissance vehicles (Vol 1, pgs 8-39 thru 41) can help. A wide array of other support and combat support assets can be used in littoral missions, including water crossings and actions in nearby land areas (including ports, coasts, and marshy or sandy areas).

Improvised assets are used by civilians in marshy areas, and will be exploited by military forces. Large numbers of flat-bottom boats, amphibious ATVs (such as Supacat, Vol pg 3-72), and dismounted infantry are needed. So-called "swamp buggies" can be fashioned from trucks and tractors with large wide wheels for low ground pressure and high ground clearance. They can transport assets, free mired vehicles, and be fashioned into "technicals" for fire support.

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*Littoral Systems: Key Technology Trends*

Improvements in adversary power projection capabilities and increased worldwide concern over seaborne pirates will emphasize efforts to improve littoral forces. Technology trends include new systems and upgrades for water-borne, amphibious, land, and aerial forces.

System Category	Technology Trend	Reference Vol/Page	System Example	Ref Page
Waterborne Systems	Improved hull designs include catamaran and trimaran for more speed	3-6	C-14	3-8
	Hydrofoil hull offers even more speed increase in sheltered water	3-7	SPARVIERO	3-7
	Fast attack and riverine craft offer modern weapons, high maneuver	3-6	CB90H	3-5
	Rubber inflatable and rigid-hulled inflatable boats assist SPF missions	3-10	Zodiac MIB	3-10
	Ski boats, “cigarette boats” and other fast craft can also be used	3-6	Go-Fast	5-18
	Unmanned surface vessels (USVs) execute patrol and attack missions	3-2	Silver Marlin	NA
	Small submarines can attack targets and deliver SPF	3-1	SANG-O	2-8
	Unmanned underwater vessels (UUVs) assist vessels and land forces	3-1	Remus 600	NA
Amphibious Systems	Landing craft include air cushion landing craft	3-6	ZUBR	3-9
	Semi-submersible infiltration landing craft offer stealth entry	3-1	SILC and I-SILC	3-10
	Armored tracked amphibious vehicles offer high-speed approach	3-2,3	ZBD2000 IFV	5-27
	Waverunners can be used for reconnaissance and attack missions	3-2	Jet Ski	5-43
	Diver propulsion vehicles aid naval SOF and ship-based swimmers	3-1	Protei 5	NA
Land Systems	Coastal defense includes cruise, ballistic, and guided missiles	3-2	Brahmos	5-14
	Coastal artillery guns offer precision fires and rounds	3-2	Bereg	3-13
	Some air defense missiles can be employed against ships and boats	3-2	Buk-M1-2	6-73
	Swamp vehicles, vessels, and transporters can operate in all areas	3-3	PTS-2	3-12
Aerial Systems	Wing-in-ground (WIG) effect craft skim waves and land asea/ashore	3-6	Orlyonok	3-6
	Sea planes and pontooned aircraft operate at sea and in littoral waters	3-1	AN-2V	V2/3-35
	Anti-ship weapons include precision ballistic and cruise missiles	3-2	BrahMos	V2/5-14
	UAVs are used for a wide variety of littoral operations missions	3-2	Camcopter S-100	V2/4-12
Other Systems for Littoral Forces	Multi-role (e.g., AD/AT) missiles, gun, vehicles, for anti-ship use	V1/6-73	Hermes-A	6-75
	Underwater reconnaissance vehicles can aid river crossings	3-2	IRM	V1/8-42
	EW and other Infowar deceive/deny C4ISR	V1/10-1	SPN-2/3/4	V1/10-6
	GNSS jammer can defeat vessel navigation and sea floor clearance	V1/10-1	Optima-3	V1/10-9
	Mines include sensor-fuzed and cassette anti-landing mines	3-3	KPDM-4	NA

## Swedish Fast Assault Craft CB90H



Weapons	Combat Load
.50-cal Twin MG Fixed	1
.50-cal MG Pintle Mount	1
<b>Alternatives for Pintle:</b>	
Mk 19 40mm AGL	1
HELLFIRE ATGM	1
<b>Other Options:</b>	
Naval Mines or Depth Charges	4  6

### SYSTEM

**Alternative Designations:** Combat Boat 90 H (Stridsbat 90, aka Strb 90 - Swedish). For designation, various spacings and forms are used, i.e. CB-90, CB 90 H, CB 90H, etc.

**Date of Introduction:** 1991 commissioned

**Proliferation:** At least 8 countries. Mexico produces CB90HM.

#### Description:

Crew: 4, plus 21-30 troops  
Displacement (tons): 20 full load  
Hull Materials: Aluminum  
Length Overall (m): 14.9  
Height of hull (m): 4.6  
Beam (m): 3.8  
Draft (m): .9

#### Performance:

Speed (knots): 50 (74 k/hr)  
Range (nautical miles): 440  
Propulsion: 2 x water jets and 2 x Scania DS114 diesel engines  
At least 3 other engine arrangements are used.

#### Protection

Armor: See CB90HS variant  
Buoyancy: Sealed compartment in aft area  
NBC: Collective in forward-mid areas  
Auxiliary Power Unit: Yes

#### FIRE CONTROL

**Electro-Optics:** EO sight for remote FCS on main gun  
**Radar:** Naval patrol version

#### ARMAMENT

##### Main Armament:

Caliber, Type, Name: Twin .50 cal (12.7 x 99) MG , M2HB  
Mount: Fixed forward firing, front hull, starboard side  
Rate of Fire (rd/min): 900-1100 cyclic  
Loader Type: Belt feed  
Ready/Stowed Rounds: 750  
Elevation (°): -20/+60  
Fire on Move: Yes

#### Other Weapons:

1 x 12.7-mm MG M2HB on midway pintle mount. The gun can be replaced with a Mk 19 AGL.  
Firing Ports: 6



#### VARIANTS

Variants include naval versions, riverine patrol craft, an ambulance version, and others.

**CB90HS:** Armored version with NBC protection, more engine hp, and protected against 7.62-mm rounds.

**CB90HCG:** Greek Coast Guard version with a raised structure, different engines, additional navigation, radars, and sonar.

**CB90N:** Naval patrol craft with superstructures and other crew accommodations.



CB90 patrol version

### NOTES

Weapons, sensors, and countermeasures vary among vessels in the class. An option for future development is AMOS 120 mm mortar with twin auto-load direct fire. Another consideration is the RBS 17 MANPADS launcher.



### *Modern Technologies in Littoral Craft Design*

There are several modern technologies for vessel design which offer more rapid movement for executing military operations. Some of these are quite costly, or are more suitable for calmer littoral waters, higher mission rates over shorter operating range, or for use in specialized missions.

*Hydrofoils* are increasingly used in commercial ferries, which can be exploited for military use. Some military patrol craft forces, including U.S. and Russian examples, feature hydrofoils. Discussion of this technology can be found at page 3-7.

Another modern technology for modern craft is the *air cavity* hull design. With a scalloped cross-section, catamaran and trimaran designs mean that much of the hull is above the waterline, for reduced drag and shallower draft. These designs are increasingly being used in the commercial sector for sail craft and for racing boats. They also offer wider hulls for better stability over the waves, and more space to carry wide loads. They are popular for ferries and other roles carrying wide loads, such as vehicles. Capabilities for higher speed, dependable operation (with no need for mechanisms which can fail, e.g., hydrofoils), a stable platform, and shallow draft mean that coastal patrol and attack craft can use this design. The Chinese C-14/China Cat catamaran missile boat has proven to be an effective design (pg 3-6). Transport craft include the Russian Linda, at 25 tons, with a passenger load of 70, and speed of 31 knots, successfully operating in shallow waters.

A further development of the air cavity design technology is the Chinese HOUBEI-Class/Type 022 catamaran missile fast attack craft. Derived from Australian ferries, these 220-metric ton vessels feature two wave-piercing sponsons with hyda-jet propulsion. Thus they can be armed with an impressive weapons array while operating at speeds up to 36 knots even in deep water. Despite higher cost, air cavity vessels are likely for use in littoral and some blue water roles.

Air cushion vessels can operate in coastal areas with irregular shore line and shallows. They are noted below for amphibious landing use, but can also be used as patrol craft (Russian Sivuch, pg 1-12 and ZUBR at 3-9), and to provide high speed transport in coastal zones.

Another littoral military technology is *wing-in-ground effect (WIG) craft*, which use lifting thrust for flight 1-2 meters above the waves, and propelling thrust for missions at speeds of up to 700 km/hr. A few Russian WIG craft such as the Caspian Sea Monster were equipped with missiles to attack ships, and with large compartments to deliver troops and equipment. Due to military fielding and operational cost issues, most of the large Russian military “Ekranoplans” are no longer in use. However, successful peacetime conversions include the Orlyonok (with 140 ton displacement, speed 220 knots, range 830 nm). It is now used for passenger and cargo transportation, but could be employed for military roles. Commercial developers in various countries offer smaller WIG craft for passenger and cargo transport, and for personal use.

Inland waterways permit use of new technologies designed for commercial and recreational uses. Military requirements for riverine craft include high speed, rapid maneuver, shallow water capability, space for weapon mounts, and more. Airboats can operate in rivers and creeks and in marshy areas with a few inches of water. Ski boats, “cigar boats” and other high-speed designs offer potential for military applications. These technologies will be described in later updates.

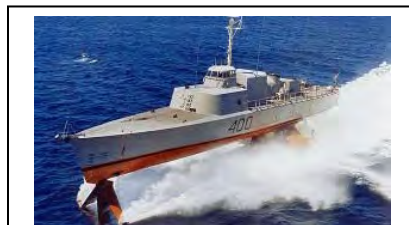
### *Hydrofoil Craft for Littoral Operations*

This technology is increasingly being used for boats and ships in both commercial and military sectors. It is an expensive propulsion upgrade, because of the mechanisms required, but the benefits are in open water speed. For ferries and medium range transport, shorter passage time can mean more passages and missions completed. For military applications, speed also decreases exposure time and permits quicker response time to engage targets. When in harbor areas or shallow water, foils are folded for conventional hull down propulsion. Wave action in high sea state open water will affect craft designed for coastal waters; as is true with any conventional designs.



Russian Kometa Ferry Histarmar

Military craft using foils are currently limited to craft for littoral operations. However, new hydrofoil designs are being considered for larger blue-water vessels. Military craft have been used by the U.S., Russia, Italy, Philippines, Israel, and others. A Canadian test of the Italian FHE-400 Bras'Dor 200-ton hydrofoil boat for anti-submarine warfare found it to be impressive in coastal waters, but unsuitable for long-term deep-water use under severe weather conditions.



Italian Bras'Dor Histarmar

One of the early commercial hydrofoil craft was the Italian Supramar design licensed to the Rodriquez shipyard as the PT-20. This craft is highly successful and used around the world. The 72-passenger ferry displaces 32 tons, for a speed of 35 knots. Military conversions such as the Philippine patrol craft noted at right continue to operate.



PT-20 Conversion Histarmar

The Italian SPARVIERO Class includes seven fast-attack craft, first delivered in 1974. With 62.5 tons of displacement, speed is 50 knots foil-borne, 8 foils folded. Range is 2,225 km. The boat has a 76 mm OTO-Melara cannon and two Otomat anti-ship missile launchers.




Italian SPARVIERO Histarmar

Russian ANTARES-Class patrol boats from the 1970s and 80s are among several designs currently in operation. They displace 220 tons, with a max speed of 65 knots, and can operate in 3-meter waves. Hull-borne, it can operate in sea state 7. Range is 410 nm. Weapons include a 76-mm gun, a 30-mm 6-barrel Gatling-type gun, and two torpedo tubes. Other Russian hydrofoil vessels include SOKOL-Class ships of 465 tons.



Russian ANTARES Histarmar


## Chinese/Iranian Catamaran Missile Boat C-14 Class

	<p><b>Weapons</b></p> <p>C-701 Cruise missile or TL-10 Anti-ship missile</p> <p>or</p> <p>C-704 Anti-ship missile</p>	<p><b>Combat Load</b></p> <p>4-8</p> <p>2-4</p>
<p><b>SYSTEM</b>  <b>Alternative Designations:</b> China Cat  <b>Date of Introduction:</b> 2002  <b>Proliferation:</b> 2 countries. Iran has acquired several China-made vessels. Iranian first licensed production boat is fielded. The boat is marketed for sale in an Iranian catalog.  <b>Description:</b>  Crew: 10, and passengers  Displacement (tons): 20 full load  Length Overall (m): 23  Height of hull (m): 3.6  Beam (m): 4  Draft (m): 1</p> <p><b>Performance:</b>  Speed (knots): 50  Range (nautical miles): 300  Propulsion: 2 x props  2 x diesel engines</p> <p><b>FIRE CONTROL</b>  <b>Electro-Optics:</b> Photoelectric camera in mast substructure  <b>Sonar:</b> INA  <b>Radar:</b>  1 x POT HEAD light surface search</p> <p><b>WEAPONS:</b>  <b>Missile:</b> C-701/YJ-7/TL-10A and B, Kosar in Iran  Type: The C-701 is a multi-role cruise. Primary targets are light craft and patrol boats. It can also be used against land targets. The TL-10 name series is more often referred to as specifically anti-ship.  Launchers: 4 can be seen</p>	<p>Weight (kg): 100  Dimensions (m): 2.5 length x .18 diameter  Warhead: 29 kg semi-armor-piercing  Speed: Mach 0.8  Range (km): .5-20  Guidance: TV guided initial version, as C-701T, TL-10A in Iran  MMW-homing recent option, as C-701R, TL-10B in Iran  Infrared (IR)-homing is an option not currently fielded  P-hit (%): 90</p> <p><b>Missile:</b> C-704/JJ/FL-9/TL-6B in China,  Nasr in Iran  Type: Anti-ship cruise  Launchers: 2  Weight (kg): 350-360  Dimensions (m): 3.5 length x .28 diameter  Warhead: 30 kg SAP  Speed: Mach 0.8-.9  Range (km): 4-35  Guidance: Radar-homing</p> <p><b>Other Weapons:</b>  1 x 12.7-mm MG (Type 89 likely). Guns are optional, and may be removed for stealth operations.</p> <p>A likely addition is a Chinese or Iranian MANPADS missile launcher.</p> <p><b>VARIANTS</b>  Iranian first licensed production boat is initially without missiles. However, Iran now produces Kosar missiles (see above). The Nasr series is expected to be available or currently fielded.</p>	

**NOTES**

Weapons, sensors, and countermeasures vary among vessels in the class.


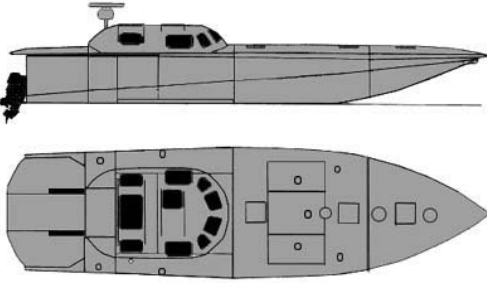
## Russian/Ukrainian Air Cushion landing Craft ZUBR-Class

	<table border="1"> <thead> <tr> <th>Weapons</th> <th>Combat Load</th> </tr> </thead> <tbody> <tr> <td>2 x AK-30M gun mount</td> <td>3,000</td> </tr> <tr> <td>2 x A-22 Rocket Launcher Frag-HE Rockets Incendiary Rockets</td> <td>132</td> </tr> <tr> <td>2 x SA-N-8 SAM Launcher</td> <td>24</td> </tr> </tbody> </table>	Weapons	Combat Load	2 x AK-30M gun mount	3,000	2 x A-22 Rocket Launcher Frag-HE Rockets Incendiary Rockets	132	2 x SA-N-8 SAM Launcher	24	
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<p><b>SYSTEM</b>  <b>Alternative Designations:</b> Project 1232.2, POMORNIK-Class  DONETS'K Class Ukraine  <b>Date of Introduction:</b> 1988  <b>Proliferation:</b> 3 countries. China is considering purchase.  <b>Description:</b>  Crew: 27-31  Displacement (tons): 362, 550 with full load  Length Overall (m): 56.2  Height of hull (m): 21.9  Beam (m): 22.3, 25.6 on inflated air cushion  Draft (m): 1.5 when not in lift mode</p> <p><b>Performance:</b>  Speed (knots): 60, 55 cruise  Range (nautical miles): 300-400  Propulsion: 3 x variable-pitch air propellers (aka: blowers)  50,000 shp from 5 x Ukrainian M-70 gas turbine engines  Lift Engines: 4 x NO-10 engines  Ship Power: 2 x 100kW gas turbine generator APUs  Lift Capacity: 3 x tanks, 8 x BMP-2 IFVs, or 10 x BTR-80 APCs  or up to 140 troops and 130 tons of cargo  Bow and stern ramps assist loading.</p> <p><b>Protection:</b>  The hull and structures have light armor plating.</p> <p><b>FIRE CONTROL</b>  <b>Radar:</b>  Navigation radar  <b>EW station</b>  <b>Other Fire Control:</b> See weapons F/C</p>	<p><b>WEAPONS:</b>  <b>Gun Systems:</b>  Name: AK-630M AD gun mount  Gun: GSSh-6-30K (AO-18)  Type: 6-barreled 30-mm Gatling gun  Fire Control: EO camera and MR-123 fire control radar  Rate of fire: 5,000 rounds/minute, in 400-rd bursts  Range (m): 0-5,000  Ammunition: See above, 2,000 ready and 1,000 stowed  Targets: Boats, other sea and coastal targets, aircraft, UAVs, mines</p> <p><b>Rocket System:</b>  Name: A-22/Ogon Ship-borne Rocket System  Launcher: MS-227  Type: 22 x 140-mm launch tubes  Fire Control: DVU-3-BS rangefinder sight  Rate of fire:  Ammunition: OF-45 140-mm Frag-HE rocket  ZZhS-45 140-mm incendiary rocket</p> <p><b>Missile System:</b> SA-N-8 (aka SA-14 MANPADS)  Launcher: 4-missiles  Warhead: 1.0 kg Frag-HE  Speed: Mach 0.56  Range (km): .6-6.0  Guidance: IR-homing  P-hit (%): 50</p> <p><b>VARIANTS</b>  China is considering using M-70 engines on an indigenously designed air cushion landing craft.</p>									

### NOTES

Air cushion craft offer certain technological challenges. They require more fuel than other vessels. Many designs require more maintenance than most. Noise is significant. Wave action can be hazardous. The air bladder is vulnerable to obstructions and hostile fires. On the other hand, the craft have advantages like no others. These craft can go over deep and shallow water, land, snow, mud, and ice. Their speed is substantial for ship-shore amphibious operations. Air cushion craft are effective for patrolling, especially in areas with varied terrain and on uneven coastlines.

## North Korean Semisubmersible Infiltration landing Craft (SILC)

 <p>Captured Semisubmersible Infiltration Landing Craft (SILC)</p>	 <p>SILC side and top views</p>
<p><b>SYSTEM</b></p> <p><b>Alternative Designations:</b> Sometimes incorrectly referred to as a "mini-sub"</p> <p><b>Date of Introduction:</b> 1980s (est)</p> <p><b>Proliferation:</b> At least 1 country. A ship was intercepted during an attempt to export them to the Middle East. Other countries and private firms have developed similar systems.</p> <p><b>Description:</b>  Crew: 1-4, 6 total with passengers  Length Overall (m): 12.8  Displacement (tons): 5 - 10 depending on configuration  Hull Material: Aluminum  Maximum Diving Depth (m): See I-SILC  Height Exposed Area (m): &lt;.4  Maximum Dived Speed (knots): &lt;10 est  Maximum Surface Speed (knots): 50  Propulsion: 3 marine engines, with 3 propellers  Hatches: 2</p> <p><b>Countermeasures:</b> Counter-radar detection paint</p> <p><b>Navigation Equipment:</b> One captured I-SILC contained a GPS navigation device.</p>	<p><b>Weapons:</b> None are attached on the craft; but many personal and dismount weapons are loaded onboard.</p> <p><b>Associated Systems:</b> Although the craft can operate from far bases in shallow coastal waters, most are carried on "mother ships". These 50-100 ton ships are operated by naval SOF forces and are disguised as fishing vessels, not unlike large fishing vessels or freighters. But they have one or two underwater doors concealed on the stern, to launch semisubmersible craft.</p> <p>Some mother ships are actually intelligence ships, again disguised as large fishing vessels or freighters, with an array of intercept, reconnaissance, and radio systems, as well as semisubmersible craft. A 100-ton trawler was found with SA-16/Igla-1 MANPADS, and RPG-7V ATGLs.</p> <p>Hovercraft can be used to launch SILCs and I-SILCs.</p> <p><b>VARIANTS:</b>  <b>SP-10H Improved SILC (I-SILC):</b> In 1990s this system was introduced. This vessel, when approaching shore, can submerge to 20 ft depth to avoid detection. In December 1998 South Korean forces chased and recovered an I-SILC in their waters.</p>

### NOTES

Primary use for the craft is to insert SOF teams for infiltration missions. The craft races at high speed across open areas with only the cab showing, and reduces speed to approach shore. The I-SILC submerges as it approaches the shore

Similar craft are marketed by a Singapore firm. According to news reports, craft similar to the one above were delivered to Iran. South American drug traffickers have attempted to obtain SILCs for use in transporting drugs into the U.S.

### *Very Lightweight Craft for Use in Littoral Operations*

Inflatable craft can fit in small spaces, with reduced weight for crew carry and transport. They fit stealthy operations with low profile (less visual signature), little metal for minimal radar and thermal signature, and low acoustic signature (low weight for smaller engines, and minimal sound of waves against a hull). They are also very cost effective. Inflation/re-inflation/preparation times are reduced with compressed gas, pneumatic pumps, and cans of quick sealer.

These craft are popular in the sport industry, and are widely used in commercial roles. Thus there are many new technologies and hundreds of producers, most for non-military markets. Although rubber is still used; its use is far outnumbered by the variety of polyethylene watercraft available. Any of these products could have uses for military forces; however, military applications have some requirements which affect choices. Commercial boats often use bright colors for easy detection, versus military craft which are patterned to be concealable. Military craft are usually more rugged, to withstand wear and handle all men and gear needed on a mission. Military craft may need to support weapons mounts, and more powerful engines.

Improved boat technologies have led to confusion in the terms used for the boats. The acronym RIB can mean ***rubber inflatable boat***, ***rigid inflatable boat***, and ***rigid-hulled inflatable boat***. Zodiac and other commercial firms offer boats which can be deflated, easily shipped, then quickly re-inflated and placed into service. Non-rigid boats are well-suited for small teams and for portage off-road between uses. Improvised means for added rigidity include inserted rods, boards, plywood to add decking, and loose seats or packs. Oars are often used for clandestine and short crossings.



Rigid inflatable boats, often favored by military forces, can have rigid seats and decking, for less chance of puncture, better stability in heavier waves, and more carry capacity. There are dozens of designs for sporting, commercial, and military use. Facilities on or near the water will more likely use these craft than the earlier types. Styrofoam fills add rigidity and prevent sinking.

Many military units now use rigid-hulled boats (RHIB), which can be stacked and quickly placed into service, and can handle bigger engines, more troops and supplies, and heavier seas. Inflatable sections extend freeboard, reduce spray and wave effects, and assure flotation in case of capsizing. A fiberglass hull also permits weapon mounts. Some of the boats use armor plate to protect against 7.62-mm rounds. To avoid confusion of terms, the Zodiac Company now refers to its basic rubber inflatable boats as modular inflatable boats (MIB); but it also offers rigid designs.



Rafts and boats can be towed or rowed, and improvised from random wood, cut from trees, or rigged with drums or bladders. Inflatable rafts assist missions and can be life rafts in emergencies. Craft like canoes, kayaks, johnboats and bateaus can be expropriated for military use. Another option is folding commercial or assault boats with polypropylene or plywood panels, also used as pontoons.



## Ukrainian Amphibious Transporter PTS-2



PTS-2

National War College Photo



PTS-M National War College Photo



PTS-M with PKP Amphibious Trailer

### SYSTEM

**Alternative Designations:** INA

**Date of Introduction:** 1982

**Proliferation:** At least 5 countries.

#### Description for PTS-2:

Crew: 2 in cab

Chassis: Chassis (aka: Kharkov, from a T-64) is similar to that of MT-T artillery prime mover, with seven road wheels and four return rollers. Chassis is also used on the PMM-2, MDK-3, BAT-2, etc. – See Vol 1 Engineer Chapter, 7).

Weight (mt): 24.2

Length (m): 12.0

Width (m): 3.3

Height (m): 3.17 in transport configuration

Ground Clearance (m): 0.4 est

Load: 12.0 mt, and up to 70+ soldiers. It can tow the PKP amphibious trailer (above photo).

### AUTOMOTIVE

**Engine:** V-64-4 V-12 710 hp Diesel

**Cruising Range (km):** 500 est

**Water Propulsion:** 2 propellers, and 2 rudders

**Speed (km/h):** 60 on road, 11.7 in water (for up to 10 hours)

### PROTECTION

**Armor (mm):** 6-10 est, cab only

**NBC Protection System:** Cab only

### OTHER CAPABILITES

The PTS-2 has a self-entrenching system on the rear deck. Several scatterable mine systems, including Russian UMZ (Vol 1, pg 8-28) and Bulgarian MAR-MC, can be fitted. A Czech PTS-M AD variant mounts a twin 30-mm AD gun. Weapons (esp MGs) often have been used on cab, top, and side mounted pintles.

### AMPHIBIOUS TRAILER

Name: PKP (see above photo)

Description: Single-axle with 4 wheels (2 each side).

Pontoon can be fitted for heavy loads (photo).

Length (m): 10.3

Width (m): 2.82

Height (m): 1.98

**PKP-2** is an update with ribbing on each side.

### VARIANTS

**PTS:** Original transporter fielded in 1965 on elongated ATS-59 chassis.



**PTS-10:** Czech variant of designation PTS-M. It can carry 10 mt in water (up to 3 km inland), and 5 mt on land, or carry up to 70 soldiers (20 in seats). Road speed is 42 km/h, 20 with 10 mt load. Swim speed is 11 km/h. Cab protection is 6-10 mm. It can tow the PKP amphibious trailer (see above photo).

**PTS-M:** Russian/Ukrainian engine upgrade version from 1969, fielded in 27+ countries. Weighing 36 mt, it can carry up to 10 mt or 20-70 soldiers.

**PTS-MP:** Modernized Polish version.

**PTS-2:** Replacement based on new larger chassis, with higher side walls and larger loading platform. **PTS-3:** Upgrade of PTS-2 with higher sides.

**PLAM:** Chinese variant on indigenous chassis with MG turret on the cab.


**PTS-4:** New system on T-80 chassis with larger props and new armor.

**Volketten Schwimmwagen:** PTS-M with former Easter German Army.

### NOTES

Other amphibious carriers are in use. The K-61 preceded the PTS series. Russian BAZ amphibious chassis are used on transporters, on SA-8, etc.

## Russian 130-mm Coastal Artillery System Bereg

	<p><b>Weapons &amp; Ammunition Types</b></p> <p><b>130-mm gun</b> Frag-HE ERFB-BB APC-T Firm-1 LGP</p>	<p><b>Typical Combat Load</b></p> <p><b>44</b></p>
<p>Bereg vehicles (from left), Combat Support, Command and Control, and SP Gun</p>		
<p><b>SYSTEM</b> <b>Alternative Designations:</b> Bereg-E <b>Date of Introduction:</b> 2003 <b>Proliferation:</b> At least 1 country. Offered for export. <b>Description:</b> The system is designed to link with anti-ship missile systems to supplement strike capability inside of their minimum range, and against quick-reaction targets. A battery set includes a C<sup>2</sup> vehicle (with fire control system), 2 Combat Support Vehicles (CSVs, see Notes), and six SP guns. Chassis All Vehicles: MAZ-543M 8x8 cross-country truck</p> <p><b>Automotive Performance all Vehicles:</b> Engine Type: 525 hp, V-12 diesel engine Cruising Range (km): 850 km Speed (km/h):     Max Road: 60     Max Off-Road: 35     Cross-Country: INA     Max Swim: N/A Fording Depths (m): Unprepared: 1.1</p> <p><b>Protection:</b> Armor (mm): None NBC Protection System: Yes Smoke Equipment: None</p> <p><b>SELF-PROPELLED GUN SYSTEM</b> Designation: A-222, A-222E Crew: 8 Combat Weight (mt): 43.7 Chassis Length Overall (m): 13.01 Height Overall (m): 3.9 Width Overall (m): 3.11 Dispersion during operations (m): up to 1,000 Emplacement/Displacement Time (min): 3 with GPS navigation, electromechanical spade system, and C<sup>2</sup> vehicle remote gun lay</p> <p><b>Radio:</b> R-173</p> <p><b>Main Armament:</b> Caliber, Type, Name: 130-mm, cannon Barrel Length (cal): 54 Rate of Fire (rpm): 12 burst, 4 sustained Loader Type: Manual Fire Mission Time (min): 1-2 destroyer size target, 80% probability of destruction Max Target Speed (km/hr): 200, ships and boats Traverse: (°): 240 left and right Elevation (°) (-/+): -5/+50°</p>	<p><b>Fire Control</b> Sight System: TV sight with digital links to other guns and C<sup>2</sup> vehicle Rangefinder: Laser Fire Control Computer: Yes Gun can operate without C<sup>2</sup> vehicle and link to FOs and OPs.</p> <p><b>VARIANTS</b> <b>Combat Support Vehicle (CSV):</b> See Notes <b>Command and Control Vehicle</b> Crew: 7 Battery Fire Control System: Podacha, with BR 136 FC computer, FC radar, and TV /thermal sights Other Acquisition Links: Helicopter FO, ground OPs, BAL-E missile sys Max Target Acquisition Range (km): 35 Simultaneous Targets: 4 targets tracking, 2 engaged Jamming Resistance: Counter active and passive jamming Digital Links: Transmit targeting data, and fire all guns remotely Emplacement/Displacement Time (min): 5-20 for battery</p> <p><b>MAIN ARMAMENT AMMUNITION</b> <b>Caliber, Type, Name:</b> 130-mm Frag-HE, OF-44     Indirect Fire Range (m): INA-22,500     Complete Projectile Weight (kg): 33.40 (OF33)     Muzzle Velocity: 930 m/s     Fuze Type: V-429 PD</p> <p>130-mm, APC-T     Direct Fire Range (m): 0-1140     Armor Penetration (mm): INA     Complete Projectile Weight (kg): 33.49 (BR-482B)     Muzzle Velocity: INA     Fuze Type: DBR BD</p> <p>130-mm Frag-HE, OF-43     Indirect Fire Range (m): INA-27,500     Complete Projectile Weight (kg): 33.40 (OF-33)     Muzzle Velocity: 930 m/s     Fuze Type: V-429 PD</p> <p>130-mm Frag-HE, ERFB-BB, NORINCO     Indirect Fire Range (m): INA-35,000, limited by FC system range     Complete Projectile Weight (kg): 33.40     Muzzle Velocity: 940 m/s     Fuze Type: ML-5 PD</p> <p><b>Other Ammunition Types:</b> Smoke, Chemical, Illumination <b>Firm-1:</b> Russian Ametech 130-mm laser-guided projectile with Frag-HE warhead. A laser target designator can fit into the SP gun vehicle, or can dismount for lazng ships up to 20 km away (other targets 10 km).</p>	

**NOTES**

The gun system can also engage ground targets. The CSV has a crew of 4 and houses 10 (quarters and kitchen), with a 7.62-mm MG.



## GLOSSARY

**AA** - anti-aircraft

**acquisition range** - sensor range against a category of targets. Targets are usually categorized as infantry, armored vehicles, or aircraft. Acquisition includes four types (or levels of clarity, in ascending order of clarity): detection, classification, recognition, and identification. Where the type of acquisition is not specified, the acquisition range will be regarded as sufficient for accurate targeting. This range is comparable to the former Soviet term *sighting range*.

**AAM** - air-to-air missile

**AD** - anti-handling device (mines)

**ADHPM** - artillery-delivered high-precision munition. This term can be used to describe various artillery precision munitions, including guided, terminally homing, SAL-homing, and course-corrected mortar and cannon rounds and rockets.

**AGL** - automatic grenade launcher

**AIFV** - airborne infantry fighting vehicle

**aka** - also known as

**ALCM** - air-launched cruise missile

**AL/RDX** - aluminized RDX (ammunition) is an enhanced blast filler with aluminum added to the RDX high explosive, often used in Russian Frag-HE munitions with increased lethality.

**AM** - amplitude modulated (communications)

**antitank** - functional area and class of weapons characterized by destruction of tanks. In the modern context used in this guide, the role has expanded to fit the term "anti-armor" (which includes systems and munitions which can be employed against light armored vehicles)

**AP** - antipersonnel

**APAM** - antipersonnel - anti-materiel (ammunition)

**APE** - armor-piercing explosive (ammunition)

**APERS-T** - antipersonnel - tracer (ammunition)

**APC** - armored personnel carrier

**APC-T** - armor-piercing capped tracer (ammunition)

**APHE** - armor-piercing high explosive (ammunition)

**API-T** - armor-piercing incendiary tracer (ammunition)

**APERS-T** - antipersonnel tracer (ammunition)

**APT** - armor-piercing tracer (ammunition)

**APU** - auxiliary power unit; auxiliary propulsion unit

**ARM** - anti-radiation missile. The missile homes in on the radar pulse to kill a radar system.

**ASM** - air-to-surface missile

**AT** - antitank

**ATGL** - antitank grenade launcher

**ATGM** - antitank guided missile

**aux** - auxiliary

**average cross-country (speed)** - vehicle speed (km/hr) on unimproved terrain without a road

**AVLB** - armored vehicle-launched bridge

**burst (rate of fire)** - artillery term: the greatest number of rounds that can be fired in 1 minute  
**BW** - biological warfare, including ammunition type.

**cal** – caliber.

**caliber** - barrel length to gun bore ratio (for all gun systems), and used as a measure of gun barrel size or as a component of ammunition/gun size; in the case of US-made infantry weapons, diameter of ammunition/gun bore only, measured in inches, and used to describe ammunition/gun size

**canister** - close-range direct-fire ammunition which dispenses a fan of flechettes forward

**C - centigrade**

**CC** - cargo-carrying (ammunition)

**CCD** - cover, concealment, and deception. It is also charged-coupled device (an imaging sensor which operates in the visual and near-IR bands, with day and limited night capability).

**CCM** - counter-countermeasure

**CE** - chemical energy: the class of ammunition which employs a shaped charge for the lethal mechanism. Ammunition types which employ CE include HEAT and HESH (see below).

**Chem** - chemical (ammunition type)

**CM** - countermeasure

**coax** - coaxial

**CRV** - combat reconnaissance vehicle

**CW** - continuous wave (communications)

**cyclic (rate of fire)** - maximum rate of fire for an automatic weapon (in rd/min)

**decon** - decontamination

**direct-fire range** - maximum range of a weapon, operated in the direct-fire mode, at which the bullet's trajectory will not rise above the height of the intended point of impact on the target. At this range, the gunner is not required to adjust for range in order to aim the weapon. The comparable Russian term is *point blank range*.

**DPICM** - dual-purpose improved conventional munitions (ammunition)

**DPICM-BB** - dual-purpose improved conventional munitions, base-bleed (ammunition)

**DU** - depleted uranium (ammunition)

**DVO** - direct-view optics

**ECM** - electronic countermeasure

**EFPP** - explosively-formed penetrator (ammunition); kinetic-energy penetrator which is created by a plate, shaped into a slug by an explosive charge, then propelled by it to a target

**EIOC** - estimated IOC

**EMD** - engineering, manufacture and development. Fielding phase between prototype and IOC

**EMP** - electro-magnetic pulse, including ammunition type. The pulse can kill electronic microcircuits in a target area.

**EO** - electro-optic, electro-optical

**ERA** - explosive reactive armor

**ERFB** - extended range full-bore (ammunition)

**ERFB-BB** - extended range full-bore, base-bleed (ammunition)

**est** - estimate

**ET** - electronic timing (ammunition fuze type)

**European** - from a consortium of firms located or headquartered in several European countries

**EW** -electronic warfare

**FCS** - fire control system

**FFAR** - folding-fin aerial rockets

**FAE** - fuel-air explosive (ammunition). This munition technology is employed in aerial bombs and artillery munitions, and uses a dispersing explosive fill to produce intense heat, a long-duration high-pressure wave, and increased HE blast area

**flechette** – small steel darts (much like nails) used to fill artillery rounds (and some bombs). Generally thousands of these darts are fired (similar to a shotgun in an anti-personnel role) dispensing the flechettes forward over a wide area. Unlike **canister rounds**, FSU artillery rounds use a time fuze, permitting close-in direct fire, long-range direct fire, and indirect fire.

**FH** - frequency-hopper (radio, communications)

**FLIR** - forward-looking infrared (thermal sensor)

**FLOT** - forward line of own troops

**FM** - frequency modulated (communications)

**FOV** - field of view

**frag-HE** - fragmentation-high explosive (ammunition)

**FSU** - former Soviet Union

**GCS** - ground control station

**gen** - generation. Equipment such as APS and (thermal and II) night sights are often categorized in terms of 1st, 2nd or 3rd generation of development, with different capabilities for each.

**GNSS** - Global Navigation Satellite System. Any satellite based autonomous geo-spatial positioning system that uses low power signals and small receivers to triangulate the position of users by navigation and timing (PNT) service for military and commercial purpose.

**GP MG** - general-purpose machinegun

**GPS** - global positioning system, a GNSS used in the U.S. and many other countries

**HE** - high explosive (ammunition)

**HEAT** - high-explosive antitank (also referred to as shaped-charge ammunition)

**HEAT-FS** - high-explosive antitank, fin-stabilized (ammunition)

**HEAT-MP** - high-explosive antitank, multi-purpose

**HEFI** - high-explosive fragmentation incendiary (ammunition)

**HEI** - high-explosive incendiary (ammunition)

**HEP-T** - high explosive plastic-tracer (ammunition)

**HESH** - high-explosive squash head (ammunition)

**HF**- high frequency (communications)

**hps** - hops per second (communications)

**HUD** - head-up display

**HVAP-T** - hypervelocity, armor-piercing tracer (ammunition)

**ICM** - improved conventional munition (ammunition, round containing submunitions/grenades)

**IFF** - identification friend-or-foe

**IFV** - infantry fighting vehicle - improved conventional munition; frag-He bomblet submunition

**II** - image intensification (night sighting system)

**ILS** - instrument landing system

**INA** - information not available

**incend** - incendiary

**IOC** - interim operational capability

**IR** - infrared

**IRBM** - intermediate-range ballistic missile (3,001-5,500 km)

**I-SILC**-Improved semi-submersible infiltration landing craft (swims semi- or fully submerged)

**I-T** - incendiary - tracer (ammunition)

**K-kill** - catastrophic kill (simulation lethality data)

**kbits** - kilobytes per second (communications)

**KE** - kinetic energy: class of ammunition which transfers energy to the target for the lethal mechanism. Ammunition types which employ KE include AP, APFSDS-T, and HVAP-T.

**LAFV** - light armored fighting vehicle

**littoral** - near the shore (in reference to military operations and equipment)

**LLLTV** - low-light-level television

**LMG** - light machinegun

**LRF** - laser rangefinder

**mach** - speed of sound, based on atmospheric conditions (1160 km/h at sea level)

**max** - maximum

**maximum aimed range** - maximum range of a weapon (based on firing system, mount, and sights) for a given round of ammunition, while aiming at a ground target or target set with sights in the direct-fire mode. The range is not based on single-shot hit probability on a point target, rather on tactical guidance for firing multiple rounds if necessary to achieve a desired lethality effect. One writer referred to this as *range with the direct laying sight*. Even greater ranges were cited for *salvo fire*, wherein multiple weapons (e.g., tank platoon) will fire a salvo against a point target.

**max effective range** - maximum range at which a weapon may be expected to achieve a high single-shot probability of hit (50%) and a required level of destruction against assigned targets. This figure may vary for each specific munition and by type of target (such as infantry, armored vehicles, or aircraft).

**max off-road (speed)** - vehicle speed (km/hr) on dirt roads

**MCLOS** - manual command-to-line-of-sight

**MG** - machinegun

**Mk** - Mark

**MRBM** - medium-range ballistic missile (1,001-3,000 km)

**MRL** - multiple rocket launcher

**MMW** - millimeter wave (sensor mode, band in the electromagnetic spectrum)

**MVV** - muzzle velocity variation (RF tracker for monitoring round-to-round variations in muzzle velocity variations due to tube wear, or for tracking artillery course-corrected rounds for command course adjustment)

**N/A** - not applicable

**NBC** - nuclear, biological, and chemical

**Nd** - neodymium, type of laser rangefinder

**NFI** - no further information

**normal (rate of fire)** - artillery term: rate (in rd/min) for fires over a 5-minute period

**Nuc** - nuclear (ammunition type )  
**NVG** - night-vision goggle  
**NVS** - night-vision system

**PD** - point-detonating (ammunition fuze type)  
**penaid** - Penetration aid, countermeasure system in the warhead to counter air defense weapons effectiveness.

**Ph** - probability of hit (simulation lethality data)  
**PIBD** - point-initiating base-detonating (ammunition fuze type)  
**pintel** - post attached to a firing point or vehicle, used to replace the base for a weapon mount  
**Pk** - probability of kill (simulation lethality data)

**Poss** - possible

**practical (rate of fire)** - maximum rate of fire for sustained aimed weapon fire against point targets. The rate includes reload time and reduced rate to avoid damage from overuse. Former Soviet writings also refer to this as the **technical rate of fire**.

**RAP** - rocket-assisted projectile (ammunition type)

**ready** - rapid detectability under normal mobility conditions (mines)

**mirecon** - reconnaissance

**rd** - round

**ready rounds** - rounds available for use on a weapon, whether in autoloader or in nearby stowage, which can be loaded within the weapon's stated rate of fire

**RF** - radio frequency

**RHA** - rolled homogeneous armor, often used as a standard armor hardness for measuring penetration of anti-tank munitions

**RHAe** - RHA equivalent, a standard used for measuring penetrations against various type armors

**rpm** - rounds per minute (aircraft)

**RV** - reentry vehicle. That portion of a TBM separating (or multiple separating) warhead which reenters the atmosphere and maneuvers to the target.

**SACLOS** - semiautomatic command-to-line-of-sight

**SAL** - semi-active laser; guidance method used in precision munitions, such as ADHPM, and ATGMs.

**SAM** - surface-to-air missile

**SHF** - super high-frequency (sensors)

**SFM** - sensor-fuzed munition (artillery ammunition)

**shp** - shaft horsepower (aircraft)

**SILC** - semi-submersible infiltration landing craft (swims semi-submerged, and barely shows )

**SLAP** - sabot light armor penetrator (ammunition). Small arms/machinegun round with a sub-caliber penetrator guided down a gun bore by sabots, designed to defeat light armor.

**SP** - self-propelled

**SOF** - special operations forces

**SRBM** - short-range ballistic missile (0-1,000 km)

**SSM** - surface-to-surface missile (can include IRBM, MRBM, or SRBM, or cruise missile)

**stadimetric** - in this guide, a method of range-finding using stadia line intervals in sights and target size within those lines to estimate target range

**stowed rounds** - rounds available for use on a weapon, but stowed and requiring a delay greater than that for ready rounds (and cannot be loaded within the weapon's stated rate of fire)  
**sustained (rate of fire)** - artillery term: rate (in rd/min) for fires over the duration of an hour

**tactical AA range** - maximum targeting range against aerial targets, aka: **slant range**

**TAR** - target acquisition radar

**TBM** - theater ballistic missile

**TEL** - transporter-erector-launcher. Vehicle which carries, raises, and launches TBMs.

**TELAR** - transporter-erector-launcher and radar

**thermobaric** - HEI volumetric (blast effect) explosive technology similar to fuel-air explosive and used in shoulder-fired infantry weapons and ATGMs

**TLAR** - transporter-launcher and radar

**TOF** - time of flight (seconds)

**TTP** - tactics, techniques, and procedures

**TTR** - target tracking radar

**TV** - television (sensor mode)

**UAV** - unmanned aerial vehicle, class of unmanned aerodynamic systems which include remotely piloted vehicles and preprogrammed (drone) aircraft

**UHF** - ultra-high frequency (communications)

**UI** - unidentified

**VEESS** - vehicle engine exhaust smoke system

**VHF** - very high frequency (communications)

**volumetric** - class of explosive ammunition fill which produces high long-duration blast and heat (includes thermobaric and FAE)

**vs** - versus

**w/** - with (followed by associated object)

**WMD** - weapons of mass destruction (ammunition type). These generally consist of nuclear, bacteriological, and chemical munitions.

**WP** - white phosphorus (ammunition)