

## SLAVA CLASS CRUISERS FOR THE CHINESE NAVY?

By Dale Hillier

Several weeks ago, among an IRC discussion, the topic came up of Chinese Naval purchases. It was presented to the channel that the PLAN may be purchasing a Slava-class cruiser. After further discussion, a rough idea for the cruiser was formed. This article assumes that the fiscal option doesn't change and that the current political rapport between the PRC and the Russian Republic continues.



### General description

We will start with the vessels themselves. The following data is compiled from the Haze Gray & Underway web site (<http://www.hazegray.org/>) and from A.D. Baker's excellent resource 'Combat Fleets of the World'.

The Slava class Guided Missile Cruiser depicts that term in every aspect. It was designed in the mid- to late-1970's as an apparent counterpart to the Kirov-class BCGN. Soviet doctrine emphasized the use of these ships as a dual-role surface combatant with significant ASuW and AAW capability. The ships of this class are 186 meters long with a beam of 20.8 meters and a draft of 6.25 meters. The standard displacement is 9380 tons.

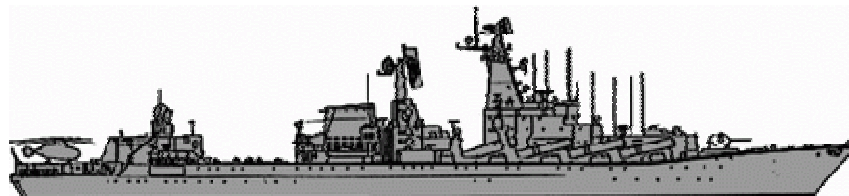
Like all modern Soviet combatants, most of the ship's systems are very diverse and redundant. The main offensive battery consists of 16 P-500/4K80 Bazalt (NATO: SS-N-12 Sandbox) surface-to-surface cruise missiles. This missile is an improved derivative of the SS-N-3 family and carries a 1000-kg HE warhead but can also carry a nuclear warhead. The missile cruises at altitudes between 50 and 5000 meters at a maximum (high-alt) speed of 3000 kph (Mach 2.5, 833 m/sec). This missile, designed in the mid 1960's was accepted into service in 1975. It was also used by Echo II class SSNs and Kiev class carriers.<sup>1</sup>

The primary defensive system consists of 64 S-300F (NATO: SA-N-6 Grumble) surface to air missiles in 8 Rif-type VLS launchers. This missile is the naval variant of the of the SA-10 area defense missile. It was conceived as a family of three systems, strategic air defense, tactical air defense, and fleet air defense. The weapon was designed specifically to counter high-speed threats such as the U.S. SRAM, as well as low-altitude and VLO targets.

Point defense for the Slava-class cruisers is accomplished by two systems. The Osa-M (NATO: SA-N-4 Gecko) point defense missile, roughly equivalent to the U.S. Sea Sparrow system and by the AK-630 CWIS. The AK-630 mounts a 30mm; six barreled gatling gun that has an effective ROF of 1000 rounds per minute with a rated barrel life of 8000 rounds.

ASW systems consist of 2 sets of quintuple launchers for 21 inch torpedoes and 2 Smerch-2 (NATO: RBU-6000) systems each carrying 12 ASW rockets with a range of 6 km.

The class also mounts a twin-barrel 130mm AK-130 Lev gun mounting. This weapon can fire a 34-kg shell to an effective range of about 20-km.



General layout of the Slava class

Active sensor systems consist of one MR-800 Voskhod (NATO: Top Pair) S-Band and one MR-700 Fregat (NATO: Top Steer) L-Band. Both of these are 3-D radar sets. Surface search and navigation accomplished by 3 MR-212/201 Vaygach-U (NATO: Palm Frond) systems. This combination of sensors gives the Slava class a detection capability out to approximately 500 km for air targets and a surface search detection capability out to an estimated 135-km. It

<sup>1</sup> The missile version carried by Slava has been suggested to have an improved guidance seeker, presumably benefiting from the new seeker development programs for the SS-N-19 and SS-N-22 SSMs (Peter Grinning's H4 forms give this missile a Gen-3 radar seeker instead of the standard Gen-2 version).

should be noted that both the Top Pair and Top Steer are usually associated with each other with one accompanying the other on Soviet ships of the time. It was also standard Soviet practice to carry several Palm Frond radars.

Unusually for a Soviet design, there appears to be a lack of redundancy with regards to the fire-control systems. The S-300F SAMs are controlled by the Volna (NATO: Top Dome) radar. This X-Band system uses a 4-m diameter dish that is fixed in elevation. Just below the dish is a smaller dish apparently used for a track-via-missile system with three smaller radomes below that which could also be part of this or another datalink system. Top Dome is credited with being able to track 6 targets but only if they reside in a 60 degree cone. This is the only FCR for the S-300 Fort system and its azimuth restriction is considered a significant tactical drawback in dealing with multi-axis saturation attacks. Furthermore, should the radar be damaged then there would be no other directors for the S-300 system, forcing the ship to rely exclusively on her point defense systems.

The main battery of SS-N-12 missiles is usually targeted by an Argon-1164 (NATO: Front Door-C) radar used to track and pass telemetry information to the SSMs while in flight<sup>2</sup>. This radar is fixed in azimuth on the forward mast of the ship.

The SA-N-4 system uses the MPZ-301 Osa (NATO: Pop Group) radar set. This operates slightly above the X-Band range and is considered similar to the U.S. Mk92 system. It has a reported maximum range of 25 km. There is one radar for each of the Osa-M mounts.

Fire control for the main gun mount is accomplished by a MR-184 (NATO: Kite Screech B) radar while the AK-630 systems share 3 MR-123 Vympel (NATO: Bass Tilt) systems. Apparently, each radar controls two guns. This again would be standard for Soviet warships where the practice is to assign two warheads/weapons to each target. Soviet practice of the era also called for optical backups for the AK-630 systems but no information has been available on whether the ship is equipped with any generation of Soviet optical directors (Kolonka, Squeeze Box, Tee Plinth, or Tin Man). Although it is known that Slava class ships carry the Tee Plinth, it is unknown if these are used for fire control.

The hull-mounted sonar of the ship is the MG-335 Platina (NATO: Bull Horn) with a direct path range of up to 6000 meters and a CZ range of up to 30 km. All vessels of the class also carry the Polinom (NATO: Horse Tail) VDS with an instrumented (best-case theoretical) range of up to 120 km.

Electronic warfare is an area that the Soviets traditionally took very seriously and their several classes of capital warships have very diverse and redundant systems. The integrated EW suite on the Slava class is called Kol'cho and consists of 8 MR-401 Gurzhor-A and -B (NATO: Side Globe) ECM systems, 4 MR-404 Ograda (NATO: Rum Tub) ESM receivers, 2 Bell Crown, 2 Bell Push, and perhaps several other Bell-series systems.



Side-view of the SS-N-12 launchers

Side Globe is a very powerful jammer set, able to deal with 2 radars at once. Reportedly the radiation of these systems, when active, is lethal to humans out to 50 ft. They are associated with the Bell-series systems in this regard. Rum Tub are long range ESM sets that use radar ducting to provide the SS-N-12 missiles with targeting information. The vessel also has two trainable and twelve fixed decoy launchers.

The ship's power plant is of a COGOG arrangement with two M-70 cruise turbines and four M8KF boost turbines for a total of 110,000 SHP. Crew complement consists of 62 officers, 64 non-commissioned officers, and 355 enlisted (although these ships have operated with as few as 38 officers).

## Procurement options

There are two routes that the PRC can go. One is highly restrictive but gives them a ship in the short term. The other gives them what they want but will take significantly longer. We'll start with the first - vessel purchase.

Vessel purchase has several advantages in the short term. Firstly, they gain an already completed ship that has a powerful suite. All they require is a trained crew, which would take considerable time in any case. The second advantage to buying a ship is that it would provide the PLAN with a vessel capable of denying (possibly even controlling) a larger area of water than is currently possible.

The disadvantage of vessel purchase is that the PLAN is acquiring a vessel that is over twenty years old, and is familiar to Western Navies in capability & technical specs. The purchased vessel also has several tactical drawbacks that would cause significant problems in the event that the vessel is attacked. First is the single fire-control radar for the ship's S-300F SAM system. Datalinks and FCR channels aside, if the Volna radar were to be damaged by either an anti-ship missile or anti-radar missile, then the ship would have no method of guidance for her SAMs. A second

<sup>2</sup> Passive ESM-based targeting can also be employed, using the Rum-Tub ESM or external sources.

factor is the opulent officer's accommodations and its accompanying large amount of flammable materials (including solid wood interiors) that would be present. Compounding these problems is an apparent lack of damage control facilities (including fire-fighting) on the vessel. Historically, more ships have been lost through fire than by actual conventional warfare methods<sup>3</sup>.

Finally, given the poor fiscal state of the Russian armed forces, any vessel the PLAN has purchase is possible to have some unresolved maintenance deficiencies that will require attention. These could range from simple touch-up welding to major hull plate replacement to any number of possible defects.

Building a vessel from scratch, by modifying the Slava design, would give the PRC the flexibility of designing the ship their way.

The biggest handicap to the design is its single fire control radar for the S-300F system. Should the radar take an ARM hit or be part of some collateral damage from ASM or bomb hit, then the system would be useless. If there is another S-300F-equipped ship with a functioning radar nearby, then it's possible that the Slava could continue firing SAMs into the basket controlled via datalinks and the FCR on the other ship. The obvious solution here is to install another Top Dome (or Tombstone in the case of SA-N-6C) but the current layout of the ship leaves only two spots for the second FCR. On the forecastle (where there are two AK-630 mounts) or above the bridge, where the MR-184 GFCR is currently.

Still another solution could be the substitution of the Top Steer 3D radar for the Tombstone. How this would degrade the ship's overall search capabilities are unknown. My sources states that the two 3D radars compliment each other but there is no information on how the loss of the shorter range radar (Top Steer) would change this.

Another item is the issue surrounding the P-500 missiles. As mentioned, these are cruise missiles derived from the SS-N-3 family and require OTH targeting and mid-course guidance to fully exploit their considerable range. Currently the PLAN operates Link-W with similar aspects to some French combat direction systems that may or may not be compatible with the P-500 guidance system. While OTH may be possible with the purchase of extra technology, the PLAN is probably better off using another missile system that doesn't require OTH or MCG. One option would be the use of the SS-N-27 Klub family of missiles in either a VLS launcher or an angled launcher. The missiles' ideal position would be the massive angled strut-frameworks where the P-500 mounts are currently placed. If the SS-N-27 family proved unsuitable, another option would be the more conventional SS-N-25 Switchblade (similar in appearance & characteristics to the Harpoon missile). The Klub family would give the ship a greater multi-role flexibility than the Switchblade, but with that capability comes a higher cost in sensors and training (something that the PLAN is traditionally deficient at). Klub also has an ASW variant (much like the cancelled ASWSOW/Sea Lance project) which would require extended training and could delay the IOC of the ship further.



**A view from the bow. The AK-130 gun mount and the foremost SS-N-12 launcher pairs are clearly visible. Notice also the fire-control director on top of the bridge**

The use of Klub or the SS-N-25 would also remove the requirement for the Argon-1164 radar system, providing with an ideal position for the MR-184 radar position. The Tombstone radar can then be placed above the bridge where the MR-184 was formerly placed.

Another issue is the myriad of datalinks that the ship could contain. It is generally presumed that Slava class CGs would act as flagships for any PLAN SAG that would put to sea. Modern combat requires some form of secure data transfer, and the Soviet practice was to use flagships as receivers and the subordinate vessels as collectors of data with the flagship processing the data and issuing orders. The use of datalinks for OTH and MCG is, again, something that the PLAN has never used. I note that long range datalinks is something that the PLAN can do without. Given the current strategic situation, the PLAN will probably NOT be able to retain anything but local air superiority for any specific length of

time. This being due to the preponderance of modern fighters in the SEA area (Malaysia has MiG-29s, Indonesia has a few F-16s, Vietnam has Su-27s AND MiG-29s, while Taiwan has Mirage 2000 and F-16s). Maybe in several more generations can the PLAN can use datalinks as a true blue water navy, but at present it would be doubtful if they could get the necessary forces to bear. Secure tactical datalinks (up to about 100 nm) would probably allow them greater flexibility for the current order of battle.

<sup>3</sup> For instance, the loss of the Royal Navy destroyer HMS Sheffield during the Falklands War was not due to the impact of an Argentine Exocet missile (which may or may not have exploded in any case) but rather the ship was rendered un-inhabitable due to the fires that raged through the ship, despite the best efforts of her crew to save her.

Another Soviet practice was to build warship classes tailored to specific tasks, hence the Udaloy and Sovremenny classes. Only lately have modern Russian designs pushed away from this trend. This is mainly due to the fiscal realities (you can sell more multi-role ships instead single role classes). However even large capital Soviet surface ships had some ASW capability. This being mainly in heavy torpedoes, RBU series launchers, and in some cases, stand off missiles like the SS-N-14 or the newer SS-N-29 (which are similar to ASROC but apparently have an anti-ship role as well). The use of the Klub family of missiles would augment the Slava's twin quintuple torpedo mounts, and her RBU-6000 launchers.

On smaller PRC destroyers, the typical torpedo tubes are conventional triple tube mounts carrying PRC designed Yu-series torpedoes. Italian-made A-244 torpedoes have also been acquired for use. The purchase of two Sovremenny class destroyers, each with two mountings for 21-inch torpedoes gives the PLAN a larger punch for both ASW and ASuW operations.

Finally, it would be a mistake to consider that the PRC would design and build such a ship without having a land attack capability. One needs only to think of the precedent set by the combat effectiveness of the TLAM to realize this. Again, Klub comes into play here with it's 3M-14 land attack variant. The nice thing about the removal of the massive SS-N-12 missile launchers would be all that empty deck space, ready to be used for either VLS or above-decks angled launchers. Klub is significantly smaller and lighter than the monstrous SS-N-12 so there would be a considerable weight saving in replacing the entire system (alternatively, a much larger missile load could be embarked, with a resultant increase in firepower).

As previously noted, the Slava is reported to have very opulent officers' accommodations while at the same time being deficient in damage control. A scratch-build using modified Russian plans would give the PLAN the ability to do away with these deficiencies and possibility give space for a VLS elsewhere.

As for other systems, SA-N-4 can be replaced by SA-N-9, while AK-630 can be replaced by CADS-N-1 mountings. There is a weight gain here but it would be more than compensated by the alteration of interior design, and the removal of the P-500 launchers. ESM and ECM can pretty much remain the same except where it may be more practical to use more modern or home-grown PRC systems. Side Globe ECM systems are supposed to be very powerful while Rum Tub can provide ELINT and OTH targeting if it becomes necessary. Replacement of the PK series decoy launchers would be a minor exercise.

Lastly, the power plant can use Ukraine gas turbines. It will be noted that the PRC is the Ukraine's major trading partner.

This then is a summary review of the possible modifications:

- Replace Top Dome with Tomb Stone, and place a second Tomb Stone above the bridge.
- Delete the Argon-1164 radar and replace it with the MR-184 GFCR.
- Replace P-500 system with the lighter and more flexible SS-N-27 Klub system, in either angled above-deck launchers or in VLS.
- Replace AK-630 with CADS-N-1 and SA-N-4 with SA-N-9.
- Totally redesign interior of this with respect to officer's accommodations and damage control systems and by removal of long range data-links, other OTH and MCG related gear.
- Keep larger ECM and ESM systems while modernizing the tactical systems like Bell Series, etc.
- Replace active decoys if more modern systems available.
- Retain ASW systems and sensors.
- Keep gas turbine powerplant.

Lastly, any space not used can be either used to carry extra fuel, or converted to storage space (for either ammo, stores, or crew quarters).

Taking into account the weights involved (an estimation at best), such a ship could possibly displace less than 11,000 tons full load. Even given the same dimensions as the Russian Slava's.

However, time will tell. It always does.

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