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Submarine Launch Procedures at Severodvinsk Shipyard 402 (S)

STRATEGIC WEAPONS INDUSTRIAL FACILITIES

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ABSTRACT

1. This is the third in a series of reports that summarize launch procedures at Soviet shipyards. This report is intended to give the reader a basic understanding of launch procedures at Severodvinsk Shipyard 402. The report describes step-by-step launch procedures, from the first indication that a submarine will be rolled out through the departure of the submarine from the shipyard, and gives examples of launch-related activities. All applicable imagery acquired through [redacted] was used in the preparation of this report. (S/WN)

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2. This report contains a location map, a plan view of Severodvinsk Shipyard 402, drawings depicting the flotation device supports and flotation devices used during the launching of submarines from construction hall 1, 12 annotated photographs depicting the procedures observed before and during the launch of submarines, and a glossary of significant terminology related to submarine launch procedures. (S/WN)

INTRODUCTION

3. Severodvinsk Shipyard 402 (Figures 1 and 2), on the White Sea and approximately 19 nm west of Arkhangelsk, is the principal submarine construction shipyard in the USSR. Construction at the shipyard has included Hotel-I; Yankee-I; Delta-I, -II, -III, and -IV; and Typhoon classes of nuclear-powered ballistic missile submarines (SSBNs); Golf-I-class ballistic missile submarines (SSBs); Oscar, Papa, and Echo-II classes of nuclear-powered cruise missile attack submarines (SSGNs); and Alfa, Mike, and November classes of nuclear-powered attack submarines (SSNs). The shipyard has also been engaged in the conversion program under which the Yankee-class SSUN (a nuclear-powered submarine whose principal military capability is unknown) was reconfigured into the Yankee SSGN. Other conversion programs have included the conversion of the Hotel-I SSBNs to Hotel-II SSBNs and Golf-I SSBs to Golf-II and Golf-V SSBs.



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BASIC DESCRIPTION



FIGURE 1. LOCATION OF THE SEVERODVINSK SHIPYARD COMPLEX, USSR

Overview

4. Severodvinsk Shipyard 402 is one of the four major facilities at the Severodvinsk Shipyard Complex. Other facilities at the complex include Severodvinsk Shipyard Yagry Island [redacted] involved in the overhaul, conversion, and refueling of nuclear-powered submarines; Severodvinsk Nuclear Submarine Special Support Facility [redacted] engaged in the defueling, decontamination, and refueling of nuclear-powered submarines; and Severodvinsk Naval Base West (BE [redacted] the base for ships supporting the sea trials* of newly constructed/overhauled submarines. Severodvinsk Naval Base West contains the only operational missile-loading facility for loading the SS-N-20 submarine-launched ballistic missile (SLBM) aboard the Typhoon SSBN. A similar mis-

sile-loading facility is under construction at Litsa Guba Submarine Base Southwest [redacted] Figure 1). (S/WN)

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5. Severodvinsk Shipyard 402 contains three construction halls (Figure 2) used in the construction of submarines. Construction hall 1 is a four-bay hall containing four building ways, designated A through D (inset, Figure 2). Two building positions, in tandem, on each of the four building ways, provides a total of eight building positions. Construction hall 2 is a two-bay hall with two building ways (not designated). The submarine production in construction hall 2 has not been sufficient to determine the number of building positions on each of the building ways. Construction hall 3 is a three-bay hall containing three building ways, designated 1 through 3 (inset, Figure 2). The building positions in this hall are also in tandem, providing at least six building positions. Submarines are launched throughout the year from all three construction halls. (S/WN)

6. Building ways A and B in construction hall 1 have most recently been used in the conversion of a Y SSUN to the Y SSGN; for refurbishment of the Leningrad Submersible; and for construction of the Stern Horn transporter dock, rectangular support barges, and the Typhoon/Oscar launch dock. Building ways C and D have most recently been used in the construction of Delta-IV SSBNs. Construction hall 2 has most recently been used in the construction of Mike SSNs. Although it has been two years since the first Mike SSN was rolled out and launched, it is likely that a second Mike SSN is under construction. Building ways 1 of construction hall 3 has only been used in the construction of Oscar SSGNs, and building ways 2 and 3 have only been used in the construction of Typhoon SSBNs. Numerous heavy fabrication buildings are nearby and are connected with the construction halls by rail lines. All three construction halls are served by a transverser system and rail line. (S/WN)

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*Italicized terms are defined in the glossary at the end of this report. The glossary provides a definition of significant terminology related to submarine launch procedures and is intended to provide the reader with a consistent set of terminology. (U)



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7. *Roll-out and launch* procedures are different at each of the three construction halls; however, *fitting-out* procedures are similar for all. Submarines constructed in hall 1 are rolled out of the construction hall onto launch rails in the launch basin (Figures 2 and 3). The basin is then completely flooded, and the submarine is launched and

positioned outside the basin for fitting out. (S/WN)

8. Submarines constructed in hall 2 are rolled out of the construction hall onto a side launch ways (Figure 4), launched into the adjacent basin, and then positioned at a fitting-out quay. (S/WN)

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9. Construction hall 3 is the only hall at the facility in which a launch dock is used (Figure 3). The submarine is rolled out of the construction hall into the launch dock. The launch dock, with the submarine in its well, is then removed from the launch basin. The submarine is then launched from the launch dock and positioned at a fitting-out quay. (S/WN)

1. These cables are used to pull the submarine, on *transfer dollies*, out of the construction hall. (S/WN)



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10. After launching, submarines from construction halls 1 and 2 and the Oscar SSGNs from construction hall 3 are positioned at the main fitting-out quay (Figure 2) for initial fitting out. Typhoon SSBNs from construction hall 3 are positioned at the Typhoon fitting-out quay (Figure 2), adjacent to construction hall 3. After initial fitting out, submarines constructed at all three construction halls undergo deperming at the calibration facility prior to departing the shipyard complex on their initial sea trials. (S/WN)

Launch Procedures

13. After the submarine has been rolled out, the launch procedures are as follows:

- The launch basin is partially flooded to allow a floating crane to position the flotation devices (Figure 9) on the flotation device supports. Each flotation device rests on two flotation device supports;
- The flotation devices are secured to the submarine;
- The launch basin is completely flooded, allowing the submarine, partially supported by the flotation devices, to float off the transfer dollies;
- The submarine is maneuvered to the deep-water area of the launch basin and positioned for exiting the basin;
- The water level in the launch basin is lowered and the caisson gate is removed; and
- The submarine, with or without the flotation devices attached, exits the basin and is positioned at the quay for fitting out. (Flotation devices have been removed from the submarine both before and after the submarine has been removed from the basin.) (S/WN)

Construction Hall 1

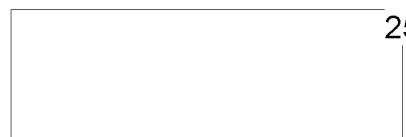
Roll-Out Procedures

11. At construction hall 1, usually the first indication that the rollout of a submarine will occur is the positioning of the *flotation device supports (FDSs)* alongside the launch rails (Figure 5). The number of the flotation device supports and the pattern in which they are arranged have been different for each class of submarine constructed (Figure 6). This difference is because of the greater lifting capacity required for longer and heavier submarines. The number and pattern of flotation device supports are usually key indicators of the class of submarine to be launched (Table 1). Additional indicators of a rollout include:

- The removal of snow from the launch rails during the winter months (Figure 5);
- The removal of the missile bay covers from their usual storage location alongside construction hall 1 (Figure 7). These covers are placed over the missile bay of the submarine inside the construction hall and remain in place during rollout, launch (Figures 8 and 9), and final fitting out; and
- The playing out of cables from the winch houses (Figure 3) opposite construction hall

Fitting-Out Procedures

14. After launch, the submarines are positioned outboard a rectangular support barge at the main fitting-out quay. The sail and missile bay portions of the SSBNs are usually concealed by temporary covers that are removed shortly before the SSBNs undergo deperming at the calibration facility and depart the shipyard on their initial sea trials



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Table 1.
Flotation Devices and Flotation Device Supports for Classes of SSBNs
Constructed in Construction Hall 1 at Severodvinsk Shipyard 402, USSR

SSBN Class	Construction Period	No of FDSs Used	No of Flotation Devices Used	Equivalent to
Y-I	Late 1966– Aug 1972	24	4 large and 8 small	8 large flotation devices
D-I	Jan 1972– Aug 1974	28	4 large and 10 small	9 large flotation devices
D-II	Late 1974– Jul 1975	32	4 large and 12 small	10 large flotation devices
D-III units 1–10	Late 1975– Apr 1979	32	6 large and 10 small	11 large flotation devices
D-III units 11–14	Late 1979– late 1981	24	10 large and 2 small	11 large flotation devices
D-IV units 1 and 2	Feb 1984– present	28	10 large and 4 small (prob)	12 large flotation devices (prob)

This table is classified SECRET/WNINTEL.

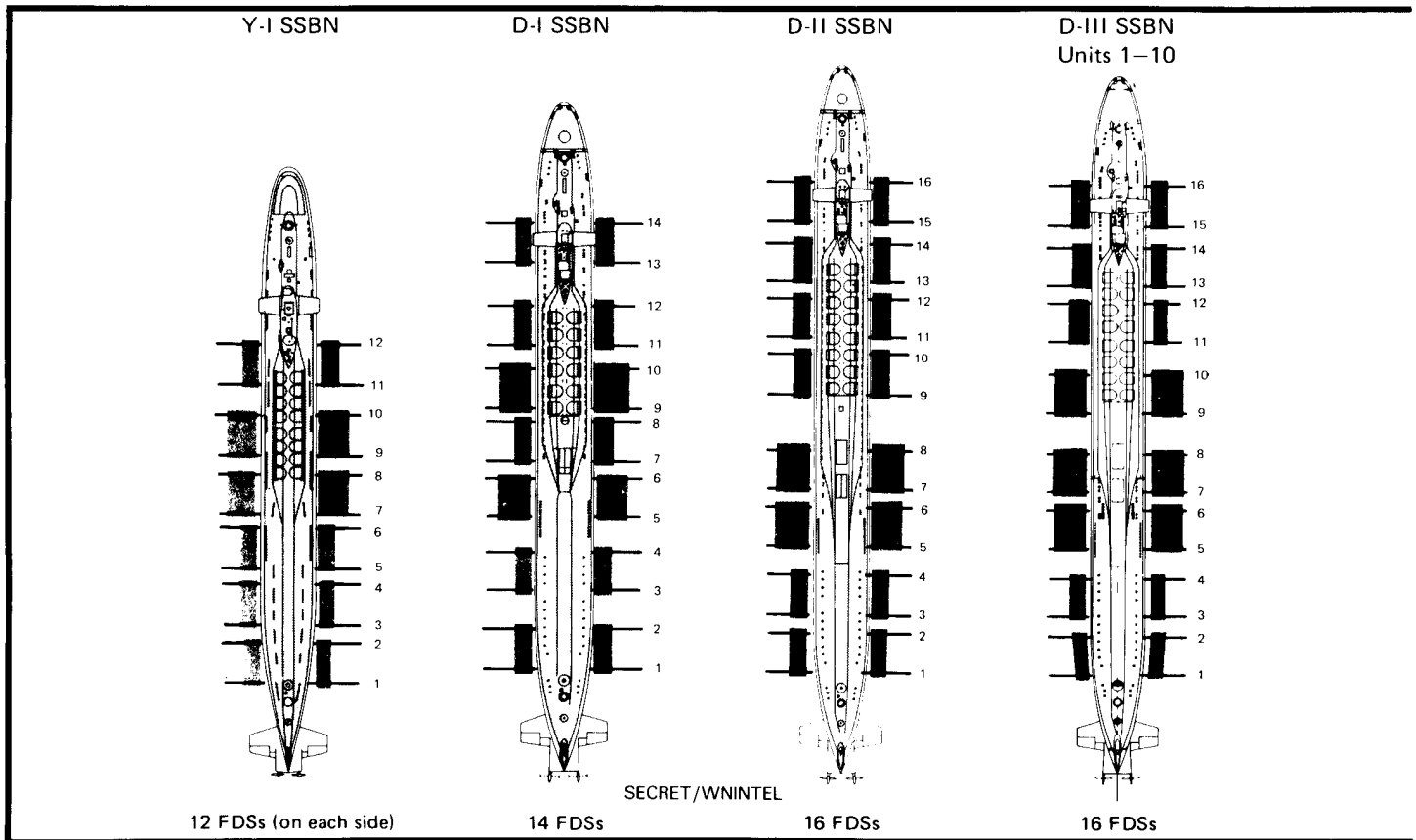


FIGURE 6. FLOTATION DEVICES AND FLOTATION DEVICE SUPPORTS USED FOR THE LAUNCHING OF YANKEE-I-CLASS AND DELTA-SERIES SSBNs CONSTRUCTED IN CONSTRUCTION HALL 1

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in the White Sea. After initial sea trials, submarines are returned to the shipyard for inspection and any necessary maintenance/adjustments prior to being transferred to their Northern Fleet operational base. (S/WN)

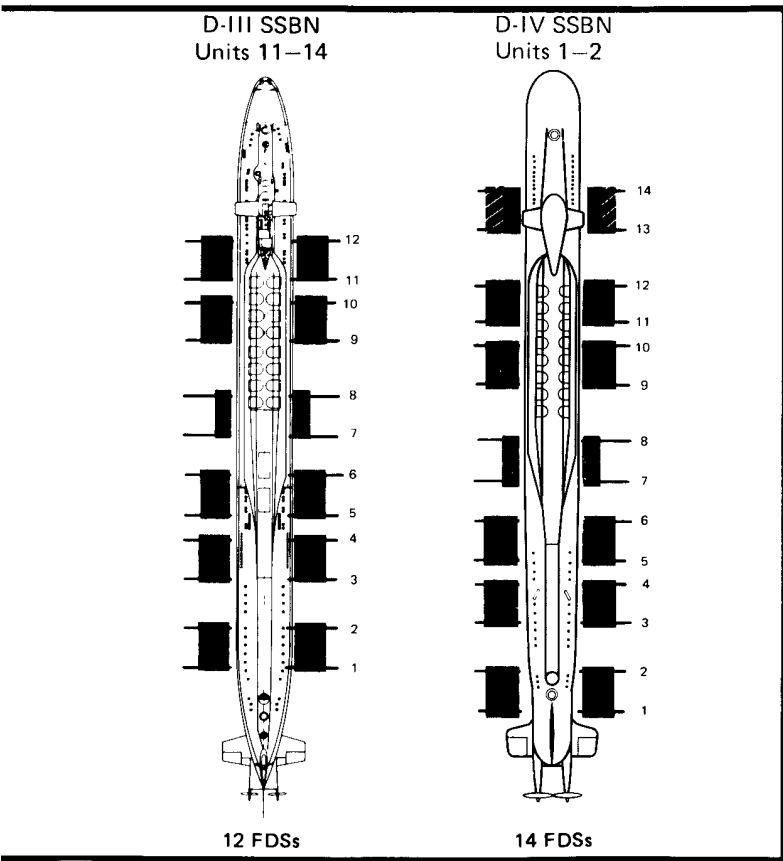
- The positioning of flotation device supports on the upper and lower arms of the cradles upon which the flotation devices will rest (Figure 10); and
- The positioning of flotation devices on the flotation device supports only on the upper arms of the cradles (Figure 10). (S/WN)

Construction Hall 2

Roll-Out Procedures

15. At construction hall 2, the first indication of submarine rollout is the spreading of the upper and lower arms of the *launch cradles* (Figure 10). Additional indicators of a rollout include:

16. The submarine is rolled out of the construction hall and positioned between the arms of the launch cradles (Figures 4 and 11). As at construction hall 1, if the key indicators of rollout are not observed, the presence of transfer dollies and flotation device supports on the side launch ways indicates that rollout and launch have occurred. (S/WN)



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Launch Procedures

17. After the submarine has been rolled out, the launch procedures are as follows:

- The submarine is raised off the transfer dollies and the cradle arms are closed under the bottom of the submarine;
- The flotation devices are positioned on the flotation device supports on the lower arms
- The basin is cleared of ice and the submarine is launched down the side launch ways in a near horizontal position, the cradle arms supporting the submarine keep it in a horizontal position, and the submarine is removed from the basin and positioned at the quay for final fitting out. (S/WN)

of the cradles and secured to the hull of the submarine (Figures 4 and 11); and



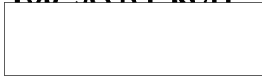
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Fitting-Out Procedures

18. After launch, submarines constructed in construction hall 2 are positioned at the main fitting-out quay next to the construction hall. A rectangular support barge associated only with submarines constructed in hall 2 is used to support

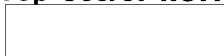
fitting out. After fitting out, the submarine undergoes deperming at the calibration facility, initial sea trials in the White Sea, post-sea-trials inspection/maintenance and adjustments, and is then deployed to its Northern Fleet operational base. (S/WN)

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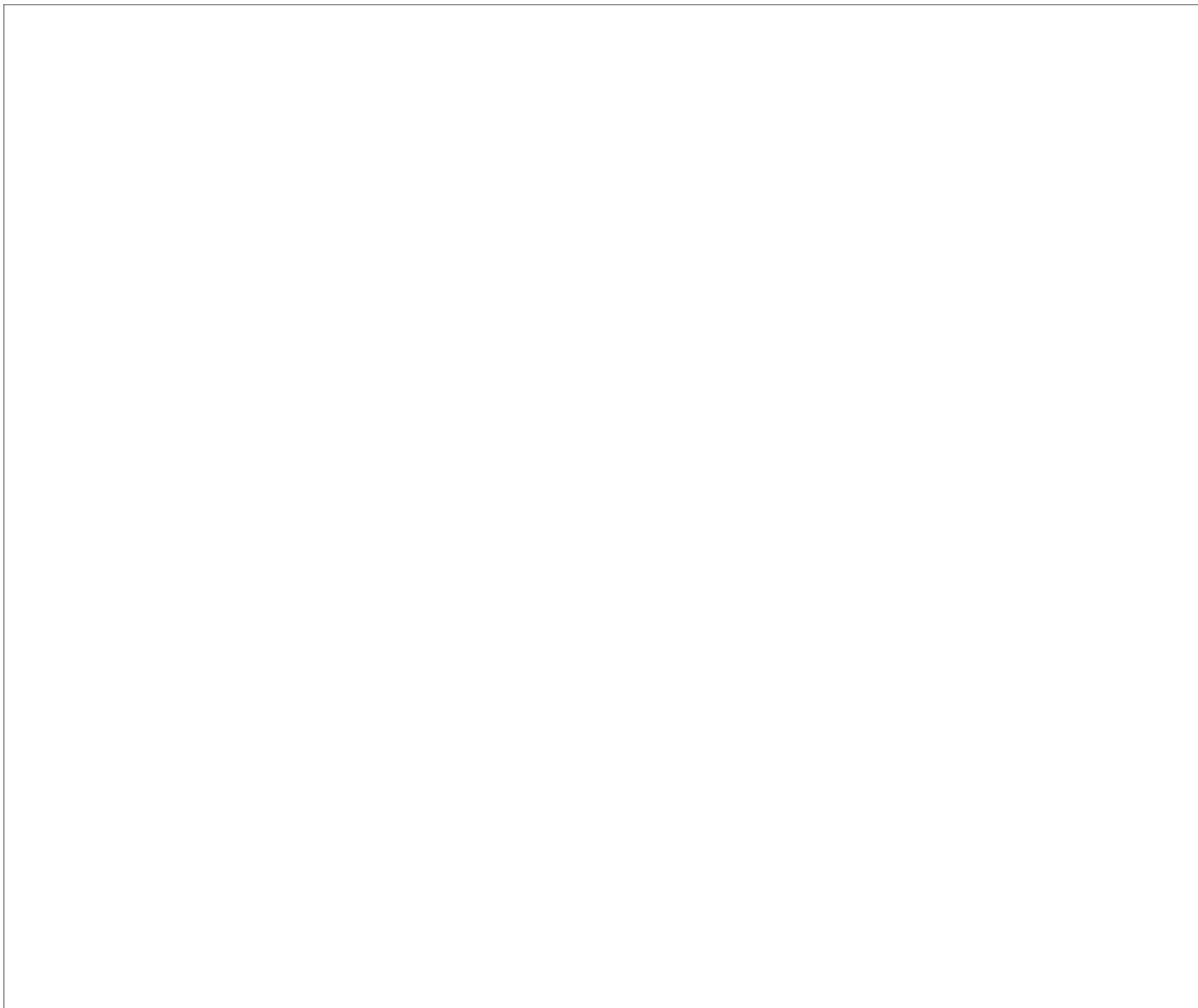


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Construction Hall 3

Roll-Out Procedures

19. At construction hall 3, the first indication that a rollout of a submarine will occur is the removal of any *keel blocks* or other objects from the well of the launch dock. The *bilge dollies* (Figure 12), which are used during the launch of an Oscar SSGN, are retracted to the side walls of the launch dock. Additional indicators of a rollout include:

- The positioning of the *launch dock support cradles* in the cradle trough (Figure 13). These cradles are used to align the launch dock with the building ways on which a submarine will be rolled out. For example, if a Typhoon SSBN rollout is to take place, the launch dock will be moved from its normal stowed position in front of building ways 1 to building ways 2 or 3. If an Oscar SSGN rollout is to take place, the launch dock will not be moved;
- The alignment of the launch dock with the building ways on which a rollout will occur;

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- The positioning of *bridging rails* over the cradle trough to connect the building ways with the launch dock for rollout (Figure 13);
- The attachment of cables from the side winch houses to the launch dock (Figure 3). These cables are used to move the launch dock into the middle of the basin;
- The opening of the door to the construction hall;
- The placement of bridging rails over the door opening;
- The installation of portable caisson sections in the far end of the launch dock (Figure 13); and
- The spreading apart of the arched roof panels of the covered launch dock (Figure 14). (S/WN)



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Launch Procedures

20. After the submarine has been rolled out and placed in the well of the covered launch dock, the launch sequence is as follows:

- The launch dock with the submarine in its well is raised off the launch cradles and pulled by cables to the center of the basin, where it is aligned to exit the basin (Figure 3);

- Once out of the basin, the launch dock is maneuvered alongside the *breasting platforms* (Figure 14) where the dock is flooded, allowing the submarine to float off the transfer dollies and exit the launch dock; and
- The submarine is then positioned at the fitting-out quay. (S/WN)

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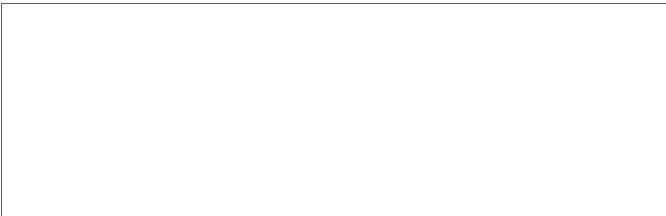
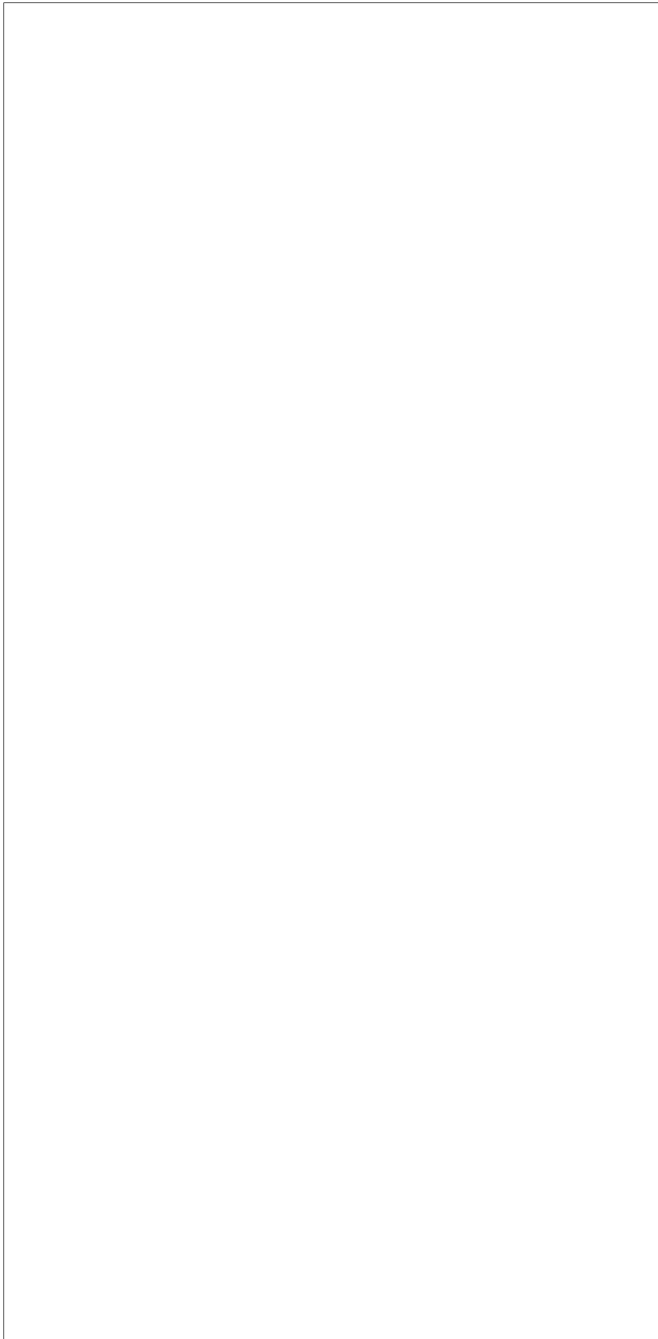


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Fitting-Out Procedures

22. After launch, Oscar SSGNs constructed in hall 3 are positioned at the main fitting-out quay for final fitting out. Typhoon SSBNs constructed in hall 3 are positioned at the Typhoon fitting-out quay for final fitting out. The Typhoon SSBNs are positioned outboard a rectangular support barge that was probably constructed specifically for the support of Typhoon fitting out. In addition to the rectangular support barge, a 975-class radiological repair barge (YRRN) was used to support the fitting out, reactor testing, and start-up during the fitting out of Typhoon units 1 and 2. During the fitting out of Typhoon units 3 and 4, a newly built quay-side reactor purge/test facility, performing the function of the YRRN, was used. The completion of three reactor purge/test facilities along the Typhoon fitting-out quay has increased the number of nuclear-powered submarines that can be fitted out at this quay at one time. After fitting out, Typhoon SSBNs undergo deperming at the calibration facility shortly before initial sea trials. After sea trials and a period of inspection, maintenance, and adjustments, the Typhoon SSBNs are transferred to Litsa Guba Submarine Base Southwest (Figure 1) in the Northern Fleet for additional sea trials and crew training for a period of approximately six months. The submarines are then returned to Severodvinsk for additional inspection, maintenance, adjustments, and loading of missiles at the SS-N-20 missile-loading facility at Severodvinsk Naval Base West prior to becoming fully operational and based at Litsa Guba. (S/WN)

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GLOSSARY

**Significant Terminology Related to Submarine Launch Procedures
at Severodvinsk Shipyard 402**

bilge dollies Large keel-block-like structures used to support the outer area of the submarine hull during rollout and launch for Typhoon SSBNs and during launch only for Oscar SSGNs. They are used in addition to the transfer dollies, which function as the main support for the submarine during construction and rollout (Figure 12).

breasting platform A fixed structure just outside the launch basin that is used to moor the launch dock during a launch (Figure 14).

bridging rails The small section of the launch rail that bridges the gap between the building ways inside the construction hall and the launch rail when the building ways door is open; it also bridges the gap over the cradle trough (Figure 13).

fitting out The period following the launch of a unit when the major production process is completed. The submarine is made habitable and is prepared for the operational testing of all functional components.

flotation device supports Saw-horse-shaped structures that function as platforms to support the flotation devices (Figures 5 and 6).

flotation devices Hollow metal boxes used to add extra buoyancy to the submarine when it is launched from the shallow portion of the launch basin (Figures 3, 4, and 9). Two sizes of flotation devices are used at Severodvinsk. The large flotation devices are approximately 10 by 6 by 7 meters. The small devices are approximately 10 by 3 by 7 meters. The arrangement of the large and small flotation devices used during the launches of various classes of submarines is shown in Figure 6.

keel blocks At Severodvinsk, these large blocks are used to support the submarine during out-of-water periodic maintenance or overhaul. These blocks are used both in the launch dock, which supports construction hall 3, and on the basin ledge in front of construction hall 1. Keel blocks should not be confused with transfer dollies, which are used only during rollout. When rollout from construction hall 3 is imminent, the covered launch dock must be clear of all keel blocks and other items.

launch The process of moving the submarine into the water, either by lifting it off the transfer dollies at construction hall 1, sliding it into the water down the side launch ways at construction hall 2, or by floating it out of the launch dock after rollout from construction hall 3. This activity should not be confused with rollout, which is the process of transferring the submarine from the construction hall to either the shallow ledge of the basin, as at construction hall 1 (Figure 9); between the arms of the launch cradles, as at construction hall 2 (Figure 11); or into the launch dock, as at construction hall 3 (Figure 14).

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launch cradles These devices support the submarine during side launch from construction hall 2. The wedge-shaped arms of the cradles are positioned under the hull of the submarine and keep it horizontal during the side launching (Figure 10).

launch dock support cradles The four cradles positioned in a trough in front of construction hall 3; the cradles are used to align the launch dock with the building ways of construction hall 3 (Figure 13)

rollout The transfer of a submarine by rail from the construction hall. This process should not be confused with launching, which is the process of moving the submarine into the water.

sea trials The checkout period conducted at sea when all systems and subsystems of the submarine are exercised to their design limits. For intelligence reporting purposes, sea trials are considered to have commenced when the unit has first departed the complex where fitting out occurred.

transfer dollies Structural crossmembers, contoured to the hull of the submarine, with two sets of wheels (referred to as trucks). Transfer dollies are used to roll a submarine from the building ways to either the launch rail or the launch dock (Figures 12 and 13).

This glossary is classified SECRET/WNINTEL.

REFERENCES

IMAGERY

All applicable satellite imagery acquired through [redacted] was used in the preparation of this report. (S/W

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MAPS OR CHARTS

SAC. USATC, Series 200, Sheet 0092-22, scale 1:200,000 (U)

REQUIREMENT

COMIREX J09
Project 545024J

RELATED DOCUMENTS

NPIC. Z-12112/83, IAR-0077/83, *Modified Flotation Device Support Pattern at Severodvinsk Shipyard 402, US* (S), Nov 83 (SECRET [redacted])

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NPIC. Z-14085/84, RCA-09/0018/84, *Submarine Launch Procedures at Komsomolsk Shipyard Amur 199 (S)*, N 84 (SECRET [redacted])

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NPIC. [redacted] RCA-09/0005/85, *Submarine Launch Procedures at Leningrad Shipyards Sudomekh 1 and Admiralty 194 (S)*, Jun 85 (TOP SECRET [redacted])

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Comments and queries regarding this report are welcome. They may be directed to [redacted] Soviet Navy, Nuclear Division; Imagery Exploitation Group, NPIC; [redacted]

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