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ESTIMATES OF CONSTRUCTION AND VALUE OF NAVAL SHIPS PRODUCED BY THE SINO-SOVIET BLOC

1960

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FOREWORD

This report, the second in a series of annual reports on the construction and value of naval ships produced in the Sino-Soviet Bloc, revises and updates the data on construction and value in the initial report, CIA/RR .

Data on construction are given for the period 1950-60 in terms of the number of ships completed each year and the value expressed in 1960 US dollars. Moreover, the annual expenditure for construction of naval ships in the USSR for the 11-year period is estimated in terms of 1960 US dollars. The estimate does not include expenditures for research and development of new models of ships, propulsion, armament, and electronics.

The detailed nature of the information, which would have involved numerous source references for each of many estimates, makes the inclusion of source references infeasible, but source documentation for estimates is available in the files of this Office.

ESTIMATES OF CONSTRUCTION AND VALUE OF NAVAL SHIPS PRODUCED BY THE SINO-SOVIET BLOC
1960

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1960

Summary and Conclusions

During 1960 the Sino-Soviet Bloc completed more than 286 ships** valued at about $1.2 billion,*** as follows:

	Ships Completed†			Submarines Completed	
Country	Number	Value (Million US $)	Percent	Number	Value (Million US $)
USSR	209	1,020.0	88.0	17	603
Communist China	30††	111.3	9.6	6	75
Poland	38	22.1	1.9	0	0
East Germany	9	5.1	0.5	0	0
Total	286	1,158.5	100.0	23	678

Ships completed by the USSR dropped from 232 in 1959 to 209 in 1960, whereas the value of completions rose from $912 million to $1,020 million, an increase of about 12 percent.

In 1955, Soviet military doctrine concerning future design and employment of naval ships underwent a major change. During 1955-58 the USSR entered a transition period in which emphasis was shifted from construction of conventional ships to more advanced models. This change was influenced by the development of nuclear power and missile weapons systems in the USSR and in the US. Of the 13 different classes of surface ships and submarines that were under construction during 1950-55, construction of

* The estimates and conclusions in this report represent the best judgment of this Office as of 1 July 1961.

** The term completed as used in this report refers to the status of a ship as having been delivered by a shipyard, complete and ready for service, although the ship may not yet have been commissioned by the navy.

*** Dollar values are given in 1960 US dollars throughout this report. Estimated annual construction and value for 1950-60 are given in Appendix A.

† Including submarines.

†† Total of available data, excluding miscellaneous minor naval ships that are included in the value of completed ships and that accounted for $6.5 million.

2 classes ceased before 1955, and construction programs for 10 classes were phased out during 1955-58. The program for only one class, the P-6-class patrol boat, continued through 1960. During 1957-59, ships of 11 new classes of combat vessels had been completed, 3 of the new classes being submarines. Two of these new submarine classes, the F class and the G class, are conventionally powered, snorkel-equipped submarines. The F class is conventionally armed and fitted with improved sonar equipment that provides a better capability for antisubmarine warfare (ASW). The G class is fitted with a large sail* and has been estimated as a ballistic-missile-launching submarine, although the possibility that it may be equipped to launch cruise types of missiles cannot be ruled out. Both the F class and the G class are estimated to have a range capability permitting unsupported operation off the shores of the US, southern Asia, and Africa. The third of the three classes of submarines is unidentified, but is believed to be nuclear powered. Beginning in 1958 and in each year thereafter, submarines of each of these three classes have been produced.

In addition to the three new classes of submarines, there is evidence of eight submarine projects in varying stages of development.

With the exception of the construction program for the Kildin-class missile-launching destroyer, which was an interim program terminated in 1958 and was succeeded in 1959 by the program for construction of the Krupnyy-class missile-launching destroyer, all the new classes of ships that were started since 1955 were still being built in 1960.

Since 1955, considerable research and development has been done in ASW, which resulted in the modernization of weapons systems on existing ships and in the appearance of new ships that have greater capabilities for ASW. Research and development in ASW undoubtedly was accelerated because of the US program for construction of nuclear submarines.

The primary purpose of the submarine force produced during 1950-57 was to defend the water approaches to the USSR and to interdict supply lines to Europe and northern Asia. The subsequent development of nuclear power and of missiles that could be launched from submarines gave the Soviet Navy the instruments with which to develop a more offensive-minded submarine force in addition to extending the defense line around southern Asia and Africa -- areas of indicated Communist expansion.

The trend in construction programs since 1955 indicates a strategic operational concept aimed principally at countering the US nuclear submarine and surface task forces and at destroying certain land-based targets. Submarines currently under construction in the USSR are designed to increase attack capabilities by providing large conventional and

* The term sail is used in this report to designate the structure that houses the conning tower, electronic and optical masts, snort exhaust, and other gear, including probable missile-launching tubes in some submarines.

nuclear-powered submarines of considerably longer operational range than the W-class, the backbone of the present submarine force. In addition, submarines are believed to be equipped to fire ballistic or cruise types of missiles. Although surface ships have shown greater operational capabilities against both surface and subsurface targets, some submarines probably are intended for use in ASW. The fitting of submarines with surface-to-surface missiles together with the installation of improved electronic gear, however, will greatly increase the destructive range above that of earlier models.

Since 1957, with the exception of the construction programs for some minor surface ships, the number of ships produced by the USSR has not been so large as that produced during 1950-57. Continuing technological improvements in propulsion, armament, and electronics undoubtedly have postponed finalization of design for mass production. It is to be expected that only a few ships of a single class will be produced until the rate of technological advancement is slowed or a national emergency arises.

Since World War II, with the exception of the USSR, Communist China has been the only country of the Sino-Soviet Bloc to produce submarines and escort ships. China apparently believed that these types of ships were needed to defend its long coastline, to establish national prestige, to generate political influence in southeast Asia, and to counter foreign naval forces in the Taiwan area. The total value of the naval ships constructed by China during the past 4 years has held relatively steady, ranging between $121 million in 1958 and $111 million in 1960. Of the total value of naval ships constructed by China, submarines accounted for 56 percent during 1957-60 and for 67 percent in 1960. Although it is believed that the program for constructing W-class submarines was phased out in 1960, there are indications that a new class may be under construction in Shanghai.

Construction of naval ships in Poland and East Germany is confined to minesweeping and coastal patrol categories. Construction in other European Satellites is negligible and is confined to craft for harbor and river patrol.

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I. Construction of Naval Ships in the USSR

The USSR completed 209 naval ships (86,500 long tons light ship displacement) valued at $1,020 million during 1960, the first year since 1956 that the value of completed ships rose above $1,000 million. Construction of surface ships decreased from 216 in 1959 to 192 in 1960, but construction of submarines rose from 16 in 1959 to 17 in 1960. The estimated expenditure for construction of naval ships rose from $1,089 million in 1959 to $1,222 million in 1960. Although fewer ships were completed in 1960, the increase in value is attributed largely to increased complexity. *

Soviet military doctrine concerning the design and employment of naval ships underwent a major change in 1955. The program for construction of naval ships that had been underway in the USSR from the end of World War II up to 1955 was one of large-scale construction of conventional ships, including cruisers, destroyers, submarines, mine-warfare ships, and patrol boats. The main driving force behind this unprecedented peacetime buildup of conventional naval forces was believed to be Admiral N. G. Kuznetsov, who, with the exception of a period from 1947 to 1951, was Commander-in-Chief of the Soviet Navy from 1939 to 1955. Admiral Kuznetsov had Stalin's support in the building of a large naval force, although he did not find the same support later from Bulganin or Khrushchev.

Statements by high Soviet military and political officials in criticism of the capability of the Soviet Navy began to appear in 1955 and 1956. Admiral Kuznetsov was retired for "reasons of health," and Admiral S. G. Gorshkov, Commander-in-Chief of the Black Sea Fleet, was appointed Commander-in-Chief of the Soviet Navy in 1955. It was apparent at that time to Soviet leaders that the development of nuclear power and missile weapons systems would greatly change the strategic concept of naval warfare and that the conventional Soviet fleet would soon be obsolescent. The criticism of the Soviet fleet, based on the need to counter the development and construction of nuclear-powered fleet-attack submarines and later construction of nuclear-powered ballistic-missile-launching submarines in the US, spurred action in the USSR on the research and development of new ship models.

During 1955-56 the current Soviet programs for construction of ships were reappraised. As a result of this reappraisal, practically all construction programs underway at that time were phased out, and only such ships as those that already were in construction pipelines were completed in 1956 and 1957. A sharp reduction in the expenditures of funds for construction of naval ships took place in 1956 and 1957. Expenditures for construction of ships dropped from an alltime high of $1,876 million in 1955 to a low of $775 million in 1957 -- a reduction of about 59 percent. **

Of the 13 different classes of surface ships and submarines that were under construction during 1950-55, only two construction programs -- those for the Skoryy-class destroyer and the Kola-class

* See Tables 2, 4, and 5, Appendix A, pp. 19, 24, and 26, respectively, below.
** See Tables 2 and 5, Appendix A, pp. 19 and 26, respectively, below.

escort -- were terminated before 1955.* During 1955-58, 10 different classes were phased out. One program -- that for the P-6-class motor torpedo boats -- was continued through 1960.

The results of the reappraisal, however, were not all negative. There has been a gradual change in the attitude of high Soviet officials toward the Soviet Navy, and support has been mustered to rebuild the Soviet fleet along modern lines.

As a result, ships of new designs began appearing in 1957, and the expenditure of funds swung up sharply. Expenditures for construction of ships rose from $775 million in 1957 to $1,222 million in 1960, an increase of about 58 percent.** These amounts cover only the costs of models under construction and do not include the expenditure of funds for research and development of future naval ships and weapons. If these costs were included, the amount of expenditures since 1955 would be far greater.

During 1957-59, 11 new classes of combat ships appeared, with a heavy emphasis on construction of submarines. Three of these classes are submarines,

Since 1955, considerable research and development has been done on ASW. The effect of this effort has been observed in the modernization of weapons systems on existing ships and in the appearance of new ships having greater ASW capability. Research and development in this field undoubtedly was accelerated by the programs for nuclear submarines in the US.

The USSR has engaged in extensive oceanographic research in the Atlantic, Pacific, and Indian Oceans. One of the benefits of this research has been to provide data both for Soviet engineers engaged in the research and development of new types of underwater detection devices and navigational instruments for submarines and antisubmarine warfare ships and for the planners of ASW.

Soviet leaders, on the occasion of Navy Day on 31 July 1960, began to boast of the potential capability of the Soviet Navy. Deputy Commander-in-Chief Golovko stated, "Submarine forces assume the greatest importance in the Navy; they are capable of dealing powerful blows not only against enemy navies but also against objectives situated on remote enemy territory." On 20 October 1960, Khrushchev announced, "Our country also possesses U-boats with atomic engines and equipped with rockets."

* Because the program for Tallin-class destroyers consisted of only one ship that was completed late in 1953, this program is not included.
** See Tables 2 and 5, Appendix A, pp. 19 and 26, respectively, below.

The trend in construction programs since 1955 indicates a strategic operational concept aimed at countering the US nuclear submarine and surface task forces as well as the destruction of certain land targets. Furthermore, the program is consistent with statements by Admiral L. Vladimirskiy, quoted in Komsomol'skaya Pravda on 23 July 1955, as follows: "The destruction resulting from rockets, which with the help of different devices can be guided perfectly to the target, has decreased the role of heavy ships to an appreciable degree, since comparatively small ships equipped with rocket weapons can successfully defeat the largest battleships and cruisers equipped with normal artillery . . . . The new rocket weapons which can be installed in the submarines undoubtedly increase the striking power of the submarines. Not only can they carry out traditional war activity against communication lines, but also they can attack targets along the coast."*

Since 1957, with the exception of the construction programs for some minor surface ships, rates of construction of ships have not indicated programs of the magnitude (that is, in numbers of ships) of those during 1950-57. Continuing technological improvements in propulsion, armament, and electronics undoubtedly have postponed finalization of designs for mass construction. It is to be expected that only a relatively few ships of a single class will be produced until the rate of technological advancement shows signs of slackening or until a national emergency arises.

A. Submarines

At the end of 1957 the Soviet shipbuilding industry had completed 232 W-class, 26 Z-class, and 30 Q-class submarines, all of which were of post-World War II design.** All these programs had been phased out, and construction was terminated during 1957. All the above submarines are conventionally powered and armed, fleet-attack snorkel-equipped submarines, except for the Q-class submarine, which, in addition to conventional propulsion, is believed to employ a closed-cycle diesel system. Six of the 26 Z-class submarines have enlarged sails, the purpose of which is believed to be to launch ballistic missiles, although there is no evidence to confirm this theory. Of the three classes, only the Z class has the range capability to operate unsupported off the shores of the US, southern Asia, and Africa. The operational range of the medium-size W-class submarine is limited to the North Atlantic and North Pacific areas. The Q-class submarine is confined to coastal patrol. These classes of submarines constitute a force the primary purposes of which are to interdict supply lines to Europe and northern Asia and to defend the homeland from attack from the sea.

The expenditure of funds for construction of submarines dropped from an alltime high of $1,033 million in 1955 to $252 million in 1957, a decrease of 76 percent.

The development of nuclear power and of missiles that could be launched from submarines gave the Soviet Navy the instruments with

* It is clear from the quotation and another by the same author in 1956 that the term rocket can refer to either ballistic or cruise type of missile.

** See Table 2, Appendix A, p. 19, below.

which to develop a more offensive-minded submarine force and to extend a defense line around southern Asia and Africa, areas of indicated Communist expansion.

Analysis of information on construction of ships indicates that probably late in 1954 or early in 1955 Soviet naval architects knew that a nuclear reactor for marine use could be satisfactorily constructed within specified space limitation for use both in the nuclear-powered icebreaker Lenin and in submarines. The Soviet announcement in February 1956 of the proposed construction during the abandoned Sixth Five Year Plan (1956-60) of a nuclear-powered icebreaker probably would not have been made unless there was assurance of a satisfactory nuclear reactor.

Moreover, the completion late in 1958 at Severodvinsk Shipyard No. 402 of a probable nuclear-powered submarine would require plan development as early as late 1954 or early 1955. It is estimated that 9 or possibly 10 nuclear-powered submarines had been completed by the end of 1960.

The G-class submarine, of which 14 have been completed since 1957, is believed to be the successor to the Z-class conversion. The G-class is a conventionally powered, snorkel-equipped submarine. This submarine has a very large sail and is believed to be a ballistic-missile-launching submarine, although the possibility that it may launch a cruise type of missile cannot be ruled out. The G-class submarine is estimated to have a range capability that would permit unsupported operation off the shores of the US, southern Asia, and Africa. ††

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** Table 1 follows on p. 9.

*** Appendix A, p. 19, below.

†† Text continued on p. 13.

Shipyard	Status as of 1 January 1961	Remarks
Severodvinsk No. 402 Komsomol'sk No. 199	Construction believed to be continuing in both shipyards	quated to G-class: ; conventionally propelled; believed to have been designed to launch a ballistic missile or possibly a cruise type of missile, although evidence is lacking to affirm or deny this belief. (For rates of construction, see Table 2, Appendix A, p. 19, below.)
Unknown	Unknown	
Unknown	Unknown	
Probably Leningrad No. 196	Construction continuing	Equated to F-class submarines being constructed at Leningrad Shipyard No. 196. (For rates of construction, see Table 2, Appendix A, p. 19, below.)

Summary of Information on Current Submarine Projects in the USSR
as of 1 January 1961
(Continued)

Shipyard	Status as of 1 January 1961	Remarks
Unknown	Unknown	
Unknown	Unknown	
Komsomol'sk No. 199 (probably also Severodvinsk No. 402)	One or more hulls under construction	
Komsomol'sk No. 199 (probably also Severodvinsk No. 402)	Two hulls (numbers 1640 and 1641) under construction at Shipyard No. 199. Possibly one of these was delivered in 1960.	

Shipyard	Status as of 1 January 1961	Remarks
		Because of the probable early construction at Shipyard No. 199, it is believed that this project was under construction earlier at Shipyard No. 402, and it is considered as a likely candidate for the operational nuclear-powered submarines in the Northern Fleet.
Komsomol'sk No. 199 (probably also Severodvinsk No. 402)	Four hulls (numbers 140, 141, 142, and 143) under construction at Shipyard No. 199. Probably one or more under construction at Shipyard No. 402. Possibly one may have been delivered by shipyard No. 402	Associated with Central Design Bureau No. 18.
		) indicate nuclear-propulsion; quantity of electric cable indicates large submarine comparable in complexity to US SSBN (George Washington-class), therefore, possibly a nuclear-powered ballistic-missile-launching submarine.
Unknown	Unknown	Associated with Central Design Bureau PARUS. Reference refers to the design of shipboard cranes of 12.6-metric-ton and 750-kilogram capacity.

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Summary of Information on Current Submarine Projects in the USSR
as of 1 January 1961
(Continued)

Shipyard	Status as of 1 January 1961	Remarks
Komsomol'sk No. 199 Severodvinsk No. 402	One hull (number 171) and possibly more under construction at Shipyard No. 199. One or more under construction at Shipyard No. 402.	

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The F-class submarine, of which 14 have been completed since 1957, is currently under construction in Leningrad and is a large, snorkel-equipped submarine with a range capability and a propulsion system believed to be similar to that of the G-class. The F-class is a fleet-attack type of submarine and is fitted with improved passive and active sonar installations, providing a better capability for ASW.

Although experimental models of medium-size and small submarines may have been built, there is no known construction program for these types.

The expenditure of funds for construction of submarines rose from $252 million in 1957 to $759 million in 1960, an increase of more than 200 percent.

B. Major Surface Ships

The greatest reduction in construction of naval surface ships since 1955 took place in the category of major surface ships.* The value of completed ships dropped from $558 million in 1955 to $79 million in 1959, a reduction of 86 percent. Construction in 1959 was the lowest in the 1950-60 period. The value of completed ships in 1960, however, rose to $119 million. Construction in 1959 and 1960 was confined to only one type of ship -- the Krupnyy-class missile-launching destroyer. Two ships of this class were delivered in 1959 and three** in 1960.

The phasing out of Sverdlov-class cruisers began as early as 1953-54, but the last cruiser to be completed was delivered in the last half of 1955. Six of the cruisers launched between the first half of 1953 and July 1956 were not completed, and all these uncompleted units probably either were scrapped in 1960 or are now in advanced stages of scrapping.

Construction of the Skoryy-class and Kotlin-class conventional destroyers was terminated in 1952 and 1957, respectively. In 1957 a Kotlin-class hull was completed as a guided-missile destroyer that was fitted with a single surface-to-surface missile launcher. This ship along with three other similar guided-missile destroyers appeared in 1958 and were designated Kildin-class. A newly designed guided-missile destroyer, designated Krupnyy class, larger than the Kildin class and fitted with a surface-to-surface missile launcher both forward and aft, appeared in 1959.

In 1955 the design and development of a surface-to-surface missile launcher, which became part of the main armament on the later Kildin-class and Krupnyy-class guided-missile destroyers, apparently was in a sufficiently advanced developmental stage to assure its feasibility as a weapon on a surface ship. It is believed that construction of a prototype destroyer, which was a Kotlin-class destroyer hull completed as a guided-missile destroyer, was underway late in 1955 or early

* See the chart, Figure 1, following p. 14, and Tables 2, 3, and 4, Appendix A, pp. 19, 23, and 24, respectively, below.

** There is tenuous evidence of the completion of an additional Krupnyy-class destroyer in the Black Sea.

in 1956. In 1957 the last conventional Kotlin-class destroyer was completed, and late in the spring of 1958 there appeared the first of the Kildin-class guided-missile destroyers. These destroyers mounted one missile launcher each. Only four of this class were built, one of which was the prototype mentioned above. It is believed that the last three of this class were ships already in construction as Kotlin-class destroyers when a decision was made to stop this program. The three ships then were completed as guided-missile destroyers and were designated Kildin-class.

The first ship of the Krupnyy class appeared in the fall of 1959, indicating that the plans for these ships were well underway early in 1956 or about the same time that the probable decision was made to complete the last three Kotlin-class destroyers as Kildin-class guided-missile destroyers. At the end of 1960 the program for construction of the Krupnyy-class guided-missile destroyers was continuing, but there is evidence of construction of a probable successor to this class.

Construction of Riga-class escort ships was terminated early in 1958. Although it is expected that a successor to this program will follow shortly, there is no evidence of such plans.

C. Minor Surface and Mine Warfare Ships

Construction of minor surface and mine warfare ships apparently has been on the basis of maintenance of the fleet strength. Therefore, construction has remained farily constant. As in other programs for naval ships, however, a number of types of ships were phased out in 1956 and 1957, and construction of new and improved types was begun immediately. * Two types of patrol boats and two types of minesweeping boats were phased out in 1956-57, and four new types of patrol boats and two new types of minesweeping boats appeared during 1957-59.

The most notable of the new types was a patrol boat for launching short-range surface-to-surface missiles or large free rockets. This boat, designated Osa-class, is about 140 feet long and mounts 4 launchers.

With the exception of 1958, when the value of completed ships was only $161 million, the lowest in the 11-year period, the average value per year of completed ships during 1956-60 was $224 million. Construction in 1960 was valued at $230 million. **

D. Auxiliary and Amphibious Ships

During 1950-56 the principal shipyards in the USSR were occupied with construction of surface combat ships for the Soviet Navy. With the slackening of construction after 1955, space in shipbuilding ways became available. As space became available, it was

* See Table 2, Appendix A, p. 19, below.
** See the chart, Figure 1, following p. 14.

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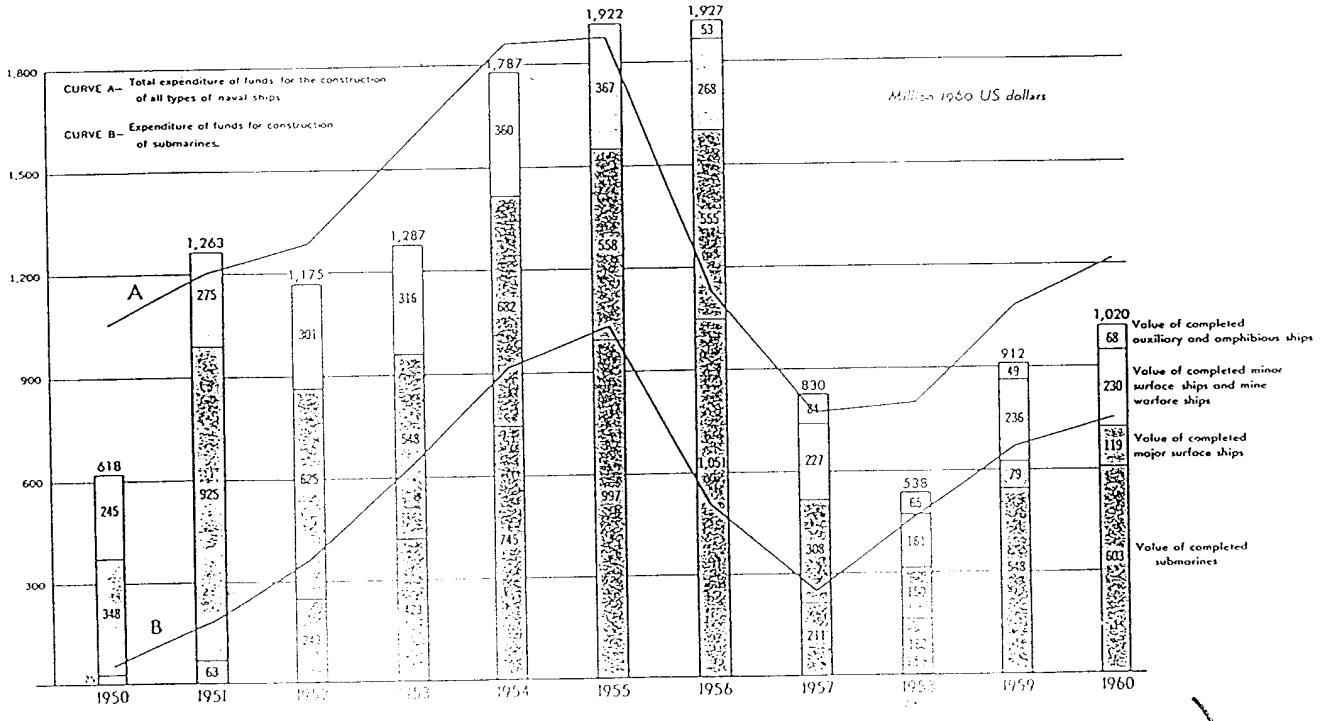
Figure 1

ESTIMATED VALUE OF COMPLETED NAVAL SHIPS AND EXPENDITURE OF FUNDS FOR THE CONSTRUCTION OF NAVAL SHIPS IN THE USSR*, 1950-60



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given to construction of merchant ships and auxiliary and amphibious ships for the navy.* Heretofore, requirements for these categories of ships for the navy were largely filled by converting merchant ships.

The most notable of the new ships constructed was the Don-class submarine tender. This ship is about 450 feet long and displaces about 9,500 long tons. It is the heaviest armed auxiliary observed in the Soviet Navy and probably operates as a submarine squadron command ship as well as a submarine tender.

The level of known construction does not indicate great emphasis on construction of auxiliary and amphibious ships, but the significance of this effort seems to lie in the fact that the USSR now is engaged in constructing new ships for these services rather than in converting merchant ships. The value of construction during 1956-60 averaged $64 million per year, and the value of construction in 1960 was $68 million.

II. Construction of Naval Ships in Communist China

With the exception of the USSR, Communist China has been the only country of the Sino-Soviet Bloc to construct submarines and escort ships since World War II.** China apparently believed that these types of ships were needed to defend its long coastline, to establish national prestige, to generate political influence in southeast Asia, and to counter foreign naval forces in the Taiwan area.

The program for construction of the Soviet-designed W-class submarine probably was phased out, and construction was terminated in 1960.

The total value of naval ships constructed in Communist China during the past 4 years has held relatively steady, ranging between $121 million in 1958 to $111 million in 1960.*** Of the total value of naval ships constructed by China, submarines accounted for 56 percent during 1957-60 and for 67 percent in 1960.

III. Construction of Naval Ships in Poland and East Germany†

Construction of naval ships in Poland and East Germany is confined to the categories of minesweeping and coastal patrol ships.

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* See Table 2, Appendix A, p. 19, below, and Figure 1, following p. 14.

** For construction of naval ships in Communist China, see Table 6, Appendix A, p. 27, below.

*** See Table 7, Appendix A, p. 28, below.

† Construction in the other European Satellites is negligible and is confined to harbor and river patrol vessels.

Poland completed 39 ships in 1959 valued at $38 million and 38 ships in 1960 valued at $22 million.* Although the number of ships completed was about the same for the 2 years, the reduction in value is attributed to a reduction in the number of the relatively high-cost T-43-class minesweeper.

East Germany did not complete any ships in 1959. The last of the types under construction during 1952-58 was phased out in 1958. Shipyards changed over to construction of four new types in 1959, and in 1960 nine ships valued at about $5 million were completed.

IV. Value of Completed Ships and Expenditures for Construction of Ships

A comparison of the estimated value of completed ships with the estimated actual expenditures for construction of ships during 1950-60 is shown in Figure 1.** The vertical bars in this graph show the total value of all ships completed in any one year. For the purposes of the graph, the total value of a ship is credited only to the year of delivery of the ship. The curves show the estimated amounts expended for construction of ships in any one year. Because ships of the size of cruisers, destroyers, escorts, submarines, and some auxiliaries require from 1 to 3 years to build, depending on the size and complexity of the ship, the construction method used, and the urgency of the individual program, funds are budgeted for the entire construction period, generally in accordance with construction schedules. For this reason, the amounts shown in Table 5*** and in the two curves in Figure 1 should be compared with the estimated annual Soviet budget for construction of naval ships rather than with the amounts shown in the vertical bars in Figure 1 or the data in Table 4, which represent the value of completed ships.

The dollar value of ships completed and the dollar value of estimated expenditures for construction of ships, shown in Figure 1 and Tables 4, 5, 7, and 9,† are estimates of the costs to construct comparable models in the US at 1960 prices.

The chart, Figure 2,†† is an index for estimated costs of naval shipbuilding in the US during 1950-60, based on the construction costs for calendar year 1950.

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* See Table 9, Appendix A, p. 30, below.
** Following p. 14, above.
*** Appendix A, p. 26, below.
† Appendix A, pp. 24, 26, 28, and 30, respectively, below.
†† Following p. 16.

APPENDIX A

STATISTICAL TABLES

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Figure 2

INDEX FOR ESTIMATED NAVAL SHIPBUILDING COSTS IN THE US, 1950-60

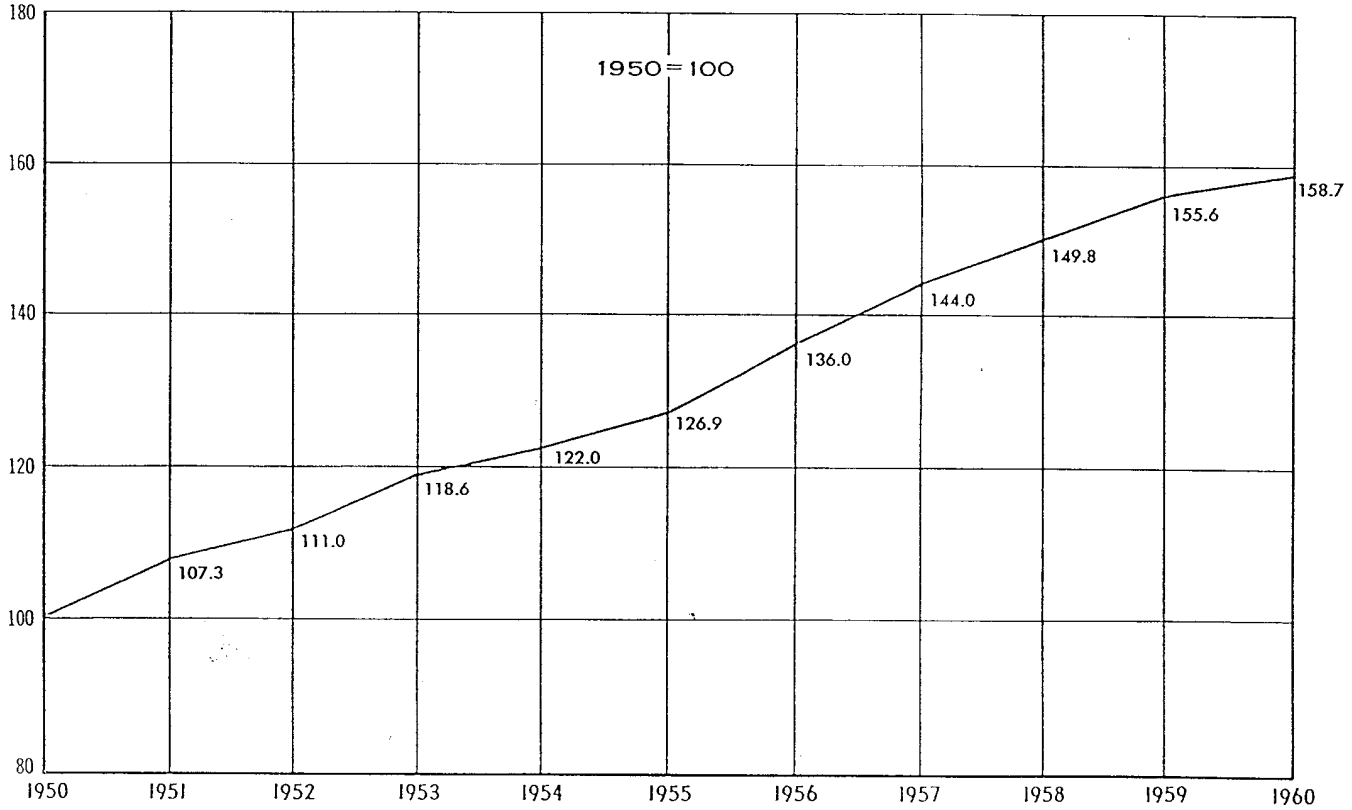

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Table 2

Estimated Construction of Naval Ships in the USSR, by Shipyard and by Number 1950-60 and Status as of 1 January 1961

Units

Type	Class	Shipyard	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	Cumulative Construction Through 1960 a/	Status as of 1 January 1961
Submarines															
SS	W	Gor'kiy No. 112	2	3	10	16	31	41	41	2				146	
		Nikolayev No. 444		2	6	10	14	13	14	2				61	
		Komsomol'sk No. 199					1	4	6					11	
		Leningrad No. 189						4	8	2				14	
		Subtotal W class	2	5	16	26	46	62	69	6				232	Ceased
SS	Z	Leningrad No. 196			2	4	6	6						18	
		Severodvinsk No. 402							4	4				8	
		Subtotal Z class			2	4	6	6	4	4				26	Ceased
SS	Q	Leningrad No. 196					3	10	12	5				30	Ceased
SS	F	Leningrad No. 196									2	6	6	14	Continuing
SSB	G	Severodvinsk No. 402									1	4	4	9	
		Komsomol'sk No. 199									1	2	2	5	
		Subtotal G class									2	6	6	14	Continuing
SSN (probably)	Unidentified	Severodvinsk No. 402									1	4	4	9	
		Komsomol'sk No. 199											1	1	Probably transferred to delivery base in 1960
		Subtotal SSN									1	4	5	10	Continuing, probably including SSBN types
		Total submarines	2	5	18	30	55	78	85	15	5	16	17	326	
Major Surface Ships															
CL	Sverdlov	Nikolayev No. 444		1	1	1								3	Ceased. Six additional cruisers were launched during 1953-56 but were scrapped in 1960.
		Leningrad No. 189		2	1	1	2							6	
		Leningrad No. 194		1	1	1								3	
		Severodvinsk No. 402					1	1						2	
		Subtotal Sverdlov class		4	3	3	3	1						14	

a. The figures in this column include all ships of a class that were produced through 1960 and in some instances include construction for the years before 1950.

Table 2

Estimated Construction of Naval Ships in the USSR, by Shipyard and by Number
1950-60 and Status as of 1 January 1961
(Continued)

Units

Type	Class	Shipyard	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	Cumulative Construction Through 1960	Status as of 1 January 1961
Major Surface Ships (Continued)															
DD	Skoryy	Leningrad No. 190	4	7	3									17	Ceased. Cumulative total includes delivery of three destroyers from each shipyard in 1949.
		Severodvinsk No. 402	4	7	4									18	
		Komsomol'sk No. 199	5	6	4									18	
		Nikolayev No. 445	5	6	5									19	
		Subtotal Skoryy class	18	26	16									72	
DD	Tallinn	Leningrad No. 190				1								1	Ceased; succeeded by Kotlin class
DD	Kotlin	Leningrad No. 190					2	4	4	2				12	Ceased; succeeded by Kildin class
		Nikolayev No. 445						2	3	3				8	
		Komsomol'sk No. 199						2	2	3				7	
		Subtotal Kotlin class					2	8	9	8				27	
DDG	Kildin	Leningrad No. 190									1			1	Ceased; succeeded by Krupnyy class
		Nikolayev No. 445									2			2	
		Komsomol'sk No. 199									1			1	
		Subtotal Kildin class									4			4	
DDG	Krupnyy	Leningrad No. 190										1	1	2	
		Nikolayev No. 445										1	1	2	
		Komsomol'sk No. 199											1	1	
		Subtotal Krupnyy class										2	3	5	Continuing
DE	Riga	Kaliningrad No. 820			2	6	8	8	6	5	2			37	
		Komsomol'sk No. 199				3	4							7	
		Nikolayev No. 445				5	5	5	5					20	
		Subtotal Riga class			2	14	17	13	11	5	2			64	Ceased
DE	Kola	Kaliningrad No. 820	3	3										8	Ceased. Cumulative total includes two ships completed in 1949.
		Total Major Surface Ships	21	33	21	18	22	22	20	13	6	2	3	195	Cumulative total includes 12 destroyers and 2 destroyer escorts completed in 1949.

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Table 2

Estimated Construction of Naval Ships in the USSR, by Shipyard and by Number 1950-60 and Status as of 1 January 1961
(Continued)

Units

Type	Class	Shipyard	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	Cumulative Construction Through 1960	Status as of 1 January 1961
Minor Surface and Mine Warfare Ships															
PC	Kronshtadt	Zelenodol'sk	28	30	33	32	32	32	10					230	Ceased. Cumulative total includes 33 ships built before 1950.
SC	SO-1	Zelenodol'sk No. 340								5	15	24	24	68	
		Khabarovsk										16	16	32	
		Subtotal SO-1 class								5	15	40	40	100	Continuing
PT	P-4	Feodosiya, Yushnaya Tochka		20	20	20	20	20	20	20				140	
		Sosnovka			3	20	25	25	25	25				123	
		Subtotal P-4 class		20	23	40	45	45	45	45				263	Ceased
PT	P-6	Leningrad No. 5		6	20	30	30	35	30	30	10	10		201	
		Vladivostok, Bystryy			4	12	15	20	25	30	30	20	20	176	
		Feodosiya, Yushnaya Tochka									20	20	20	60	
		Subtotal P-6 class		6	24	42	45	55	55	60	60	50	40	437	Continuing
PT	P-10	Leningrad No. 5									10	10	10	30	Continuing
PTC	MO-VI	Leningrad No. 5								5	25	20		50	
		Sosnovka									25	25	30	80	
		Subtotal MO-VI class								5	50	45	30	130	Continuing
PGMG	Osa	Leningrad No. 5										3	8	11	Continuing
MSF	T-43	Leningrad No. 363	16	16	16	16	20	20	16	16				149	Ceased. Cumulative total includes 13 ships built at Leningrad in 1949.
		Kerch No. 532	5	7	8	8	8	8	8	8				60	
		Subtotal T-43 class	21	23	24	24	28	28	24	24				209	
MSF	T-58	Leningrad No. 363									4	10	10	24	Continuing
MSI	T-301	Shcherbakov No. 341	17	18	17	18	30	30	30					225	Ceased. Cumulative total includes 65 ships built before 1950.

Table 2

Estimated Construction of Naval Ships in the USSR, by Shipyard and by Number
1950-60 and Status as of 1 January 1961
(Continued)

Units

Type	Class	Shipyard	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	Cumulative Construction Through 1960	Status as of 1 January 1961
Minor Surface and Mine Warfare Ships (Continued)															
MSI	Sasha	Shcherbakov No. 341								12	16	14	8	50	
		Khabarovsk										1	4	5	
		Kerch No. 532										1	4	5	
		Subtotal Sasha class								12	16	16	16	60	Continuing
		Total Minor Surface and Mine Warfare Ships	66	97	121	156	180	190	164	151	155	174	154	1,719	Cumulative total includes 111 ships completed before 1950.
Auxiliary and Amphibious Ships (Non-combatant)															
ACS	Libau	Zelenodol'sk No. 340							11	12				23	Ceased
AS	Don	Nikolayev No. 445								1	2	1	2	6	Possibly continuing
LSI	MP-2	Vyborg							6	6	6	6		24	Ceased
LSC	MP-4	Leningrad No. 196							5	6	5			16	
		Khabarovsk							5	6	5			16	
		Subtotal MP-4 class							10	12	10			32	Ceased
LSM	MP-8	Vyborg										9	9	18	Continuing
LCU	MP-10	Black Sea Area									12	12	12	36	Continuing
LCU	MP-SMB-1	Tuapse (?)										12	12	24	Continuing
		Total Auxiliary and Amphibious Ships							27	31	30	40	35	163	
		Grand total	89	135	160	204	257	290	296	210	196	232	209	2,403	Cumulative total includes 125 ships completed before 1950.

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Table 3

Estimated Construction of Naval Ships in the USSR, by Weight
1950-60

Category	Thousand Light Ship Displacement Tons (Long) a/										
	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960
Submarines	1.5	3.8	14.9	25.4	44.7	59.8	63.0	12.6	9.3	30.8	33.8
Major surface	41.8	115.4	78.4	57.2	61.9	45.6	32.3	24.7	11.9	5.9	8.9
Minor surface	8.1	9.4	11.3	12.4	12.6	13.2	6.8	5.0	8.3	10.7	10.2
Mine warfare	13.2	14.3	14.7	14.9	18.6	18.6	16.6	14.5	5.7	9.6	9.6
Auxiliaries							3.2	9.5	12.0	6.0	12.0
Amphibious							8.0	9.1	9.5	14.3	12.0
Total	64.6	142.9	119.3	109.9	137.8	137.2	129.9	75.4	56.7	77.3	86.5

a. Tons of 2,240 pounds.

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Estimated Value of Naval Ships Constructed in the USSR a/
1950-60

Million 1960 US $

Type	Class	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960
Submarine												
SS	W	25	63	200	325	575	775	863	75			
SS	Z			49	98	147	147	98	98			
SS	Q					23	75	90	38			
SS	F									48	150	150
SSB	G									58	175	175
SSN (probably)	Unidentified									56	223	278
	Subtotal	25	63	249	423	745	997	1,051	211	162	548	603
Major Surface Ships												
CL	Sverdlov		433	324	409	494	193	170				
DD	Skoryy	322	466	287								
DD	Tallinn				40							
DD	Kotlin					68	273	307	273			
DDG	Kildin									136		
DDG	Krupnyy										79	119
DE	Kola	26	26									
DE	Riga			14	99	120	92	78	35	14		
	Subtotal	348	925	625	548	682	558	555	308	150	79	119
Minor Surface and Mine Warfare Ships												
PC	Kronshtadt	95	102	112	109	109	109	34				
SC	SO-1								7	20	54	54
PT	P-4		5	5	9	10	10	10	10			
PT	P-6		4	16	28	30	37	37	40	40	33	27

a. The total value of a completed ship is credited to the year of completion of that ship.

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Table 4

Estimated Value of Naval Ships Constructed in the USSR a/
1950-60
(Continued)

Million 1960 US $

Type	Class	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960
Minor Surface and Mine Warfare Ships (Continued)												
PT	P-10									7	7	7
PTC	MO-VI								3	33	30	20
PGMG	Osa										4	14
MSF	T-43	126	138	144	144	168	168	144	144			
MSF	T-58									31	78	78
MSI	T-301	24	26	24	26	43	43	43				
MSI	Sasha								23	30	30	30
	Subtotal	245	275	301	316	360	367	268	227	161	236	230
Auxiliary and Amphibious												
ACS	Libau							37	41			
AS	Don								24	48	24	48
LSI	MP-2							5	5	5	5	
LSC	MP-4							11	14	11		
LSM	MP-8										16	16
LCU	MP-10									1	1	1
LCU	MP-SMB-1										3	3
	Subtotal							53	84	65	49	68
	Total	618	1,263	1,175	1,287	1,787	1,922	1,927	830	538	912	1,020

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Estimated Expenditure of Funds for Construction of Naval Ships in the USSR a/
1950-60

Million 1960 US $

Category	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960
Submarines	50	187	366	639	914	1,033	510	252	465	670	759
Surface ships	1,004	1,019	921	937	952	843	630	523	339	419	463
Total	1,054	1,206	1,287	1,576	1,866	1,876	1,140	775	804	1,089	1,222

a. The time required to construct ships of the size of destroyers, escorts, submarines, and some large auxiliaries is from 1 to 3 years, depending on the complexity and size of the ship, the construction method used, and the urgency of the program. The estimated total expenditures for construction during any calendar year should be compared with budgeted funds for the same year. The amount of money expended for construction of ships in any year, therefore, is not comparable with the value of ships completed that year, because the total value (cost of construction) is credited to the year of the completion of the ship. The estimated annual expenditure for construction of ships and the value of ships constructed in the same year are shown graphically in the chart, Figure 1, following p. 14, above.

Table 6

Estimated Construction of Naval Ships in Communist China, by Shipyard and by Number, 1950-60 and Status as of 1 January 1961

Units

Type	Class	Shipyard	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	Cumulative Construction Through 1960	Status as of 1 January 1961
SS	W	Chiang-nan								4	4	3	4	15	Ceased in 1960
		Wu-chang									2	2	2	6	
DE	Riga	Hu-tung							1	3				4	Ceased in 1957
MSF	T-43	Whampoa Naval Dockyard										2	2	4	Continuing
		Wu-chang							2	2	2			6	Ceased in 1958
PC	Kronshtadt	Chiu-hsin							8	4				12	Ceased in 1957
		Whampoa Naval Dockyard							4	2				6	
PTF	Shanghai	International										4	4	8	Continuing
PT	P-6	Various							16	16	16	16	8	72	Continuing
MGB	Swatow	Various									30	30	10	70	Continuing
Miscellaneous minor naval ships		Various	5	6	30	58	54	22	17	N.A.	N.A.	N.A.	N.A.	N.A.	Continuing

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Table 7

Estimated Value of Naval Ships Constructed in Communist China a/
1950-60

Million 1960 US $

Type	Class	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960
SS	W								50.0	75.0	62.5	75.0
DE	Riga							7.1	21.2			
MSF	T-43							11.9	11.9	11.9	11.9	11.9
PC	Kronshtadt							40.7	20.4			
PTF	Shanghai										5.8	5.8
PT	P-6							10.7	10.7	10.7	10.7	5.4
MGB	Swatow									20.1	20.1	6.7
Miscellaneous minor naval ships		0.6	0.8	3.8	7.3	6.8	3.5	2.1	3.3	3.3	6.5	6.5
	Total	0.6	0.8	3.8	7.3	6.8	3.5	72.5	117.5	121.0	117.5	111.3

a. The total value of a completed ship is credited to the year of completion of that ship.

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Table 8

Estimated Construction of Naval Ships in Poland and East Germany, by Shipyard and by Number 1950-60 and Status as of 1 January 1961

Units

Type	Class	Shipyard	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	Cumulative Construction Through 1960	Status as of 1 January 1961
Poland															
MSF	T-43	Paris Commune, Gdansk								3	3	5	2	13	Continuing
MSB	TR-40	Stogi, Gdansk						1	6	12	12	12	10	53	Possibly completed
YP	K-8	North (Polnocna), Gdansk						20	20	20	20	20	20	120	Continuing
WYP	Gdansk	North (Polnocna), Gdansk										2	6	8	Continuing
WYP	Oksywie	North (Polnocna), Gdansk								1	2			3	Ceased
LCU	N.A.	N.A.					3	7						10	Ceased
LCU	N.A.	N.A.		7										7	Ceased
LCM	N.A.	N.A.		5										5	Ceased
LCP(L)	N.A.	N.A.						10	10					20	Ceased
East Germany															
YP	Tuemmler	Schiffswerft, Berlin					6		6					12	Ceased
WYP	Delphin	Schiffswerft, Berlin				12								12	Ceased
SC	KS-II	Peenewerft, Wolgast			10	10	2							22	Ceased
MSI	Schwalbe I	Schiffswerft, Berlin				3	3							6	Ceased
MSI	Schwalbe II	Schiffswerft, Berlin						14	10	18				42	Ceased
MSF	Habicht I	Volkswerft, Stralsund				4	2							6	Ceased
MSF	Habicht II	Peenewerft, Wolgast						6						6	Ceased
MSF	Krake	Peenewerft, Wolgast								3	7			10	Ceased
PT	Iltis	Peenewerft, Wolgast											1	1	One of these four designs will be selected for series construction
		Schiffswerft, Berlin											1	1	
		Schiffswerft, Rosslau											1	1	
		Greifswald											1	1	
LCU	Labo	Peenewerft, Wolgast											1	1	Continuing
PT	Forelle	Schiffswerft, Rosslau											3	3	Continuing
PC	Hai	Peenewerft, Wolgast											1	1	Continuing

Table 9

Estimated Value of Naval Ships Constructed in Poland and East Germany a/
1950-60

Million 1960 US $

Type	Class	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960
						Poland						
MSF	T-43								17.7	17.7	29.5	11.8
MSB	TR-40						0.3	1.8	3.6	3.6	3.6	3.0
YP	K-8						3.5	3.5	3.5	3.5	3.5	3.5
WYP	Gdansk										1.3	3.8
WYP	Oksywie								0.6	1.3		
LCU	N.A.		1.3			0.4	0.9					
LCM	N.A.		0.4									
LCP(L)	N.A.						0.6	0.6				
	Total	0	1.7	0	0	0.4	5.3	5.9	25.4	26.1	37.9	22.1
						East Germany						
MSF	Krake								19.8	46.2		
MSF	Habicht I				21.7	10.9						
MSF	Habicht II						37.5					
MSI	Schwalbe I				1.1	1.1						
MSI	Schwalbe II						6.7	4.8	8.6			
SC	KS-II			4.0	4.0	0.8						
WYP	Delphin				3.6							
YP	Tuemmler					1.8		1.8				
PC	Hai											2.8
PT	Forelle											1.8
PT	Iltis											0.4
LCU	Labo											0.1
	Total	0	0	4.0	30.4	14.6	44.2	6.6	28.4	46.2	0	5.1

a. The total value of a completed ship is credited to the year of completion of that ship.

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APPENDIX B

METHODOLOGY

The figures on volume of construction in Appendix A were derived from a careful analysis of information from all sources,

The dollar value of ships has been estimated in several ways. When similar ships were built in the US, their costs per ton of light ship displacement have been applied to construction in the Sino-Soviet Bloc. When costs of other types of ships are not available, an estimate of cost is made by using known costs of US ships with similar complexity of design and construction.