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THE EVOLUTION OF SOVIET MILITARY FORCES AND BUDGETS, 1945-1953 (U)

Abraham S. Becker, Edmund D. Brunner

A WORKING NOTE
prepared for the

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PREFACE

(U) This paper is one of a series being prepared as part of a comprehensive analytical history of the U.S.-Soviet strategic arms competition during the years 1945-1972. The effort was requested by the Secretary of Defense, is being coordinated by the OSD Historian, Dr. Alfred Goldberg, and is financed by the Defense Advanced Research Projects Agency. Several DOD components and private research organizations are engaged in various aspects of the history. Rand was assigned the task of examining the military forces and budgets of the superpowers. This Working Note deals with the USSR for the years 1945-1953 and will be followed by two additional documents treating the remainder of the period.

(U) Other Rand studies now in progress for the history will provide the broad historical and strategic conceptual framework for the project and will examine the organizational and decisionmaking aspects affecting the forces and budgets of both the United States and the USSR. The ultimate integrative history is to be written by a Final Study Group headed by Professor Ernest R. May of Harvard University, serving as a consultant to the Historical Office, OSD.

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I. INTRODUCTION

(U) This paper is the first of three presenting a history of Soviet military forces and budgets from the end of World War II to the signing of SALT I. The scheme of periodization is essentially that of major leadership changes: the first period covers the last years of Stalin's reign, until the beginning of 1953, the second extends through 1964, the date of Khrushchev's overthrow, and the third is coextensive with the Brezhnev regime until 1972.

(C) The basic data source for the period from 1951 on is SCAM, CIA's Strategic Cost Analysis Model, in its mid-1974 run. This data base has since undergone some revision and will continue to do so in the future, but such changes are not taken into account in our discussion, here or in the forthcoming installments.

(C) It must be reported, with great regret, that there is no reliable source or set of sources for the middle and late 1940s. There has not been any attempt in recent years to develop a retrospective series before 1951, and there are no contemporary estimates for these years which inspire confidence. The CIA was created in 1947, but our literature search has not uncovered material on military outlays before the early 1950s. Developed in a period where both methodology and information left much to be desired, the documents of the early 1950s provide little detail on Soviet military expenditures and much of the material that is provided is now obsolete. As for data on forces, the picture is broadly similar. Sources differ widely in their estimates of major components and documentation is at a minimum. We will indicate below some of the sharp discrepancies between various sets of force data.

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(S) In the late 1950s, apparently, CIA began to develop an elaborate and more sophisticated framework for analysis of Soviet military costs. The methodology of this system was laid out in a document that has been made available.¹ A published version of the detailed estimates emerging from this system has not been found. However, a set of data brought to Rand in late 1959 and made available for internal use in a limited distribution document, designated SOVOY-39, may be supposed to belong to this CIA system of estimates.² Unfortunately, SOVOY-39 begins with the year 1947, although it runs through 1959. No reliable classified estimates have been found for the years 1945-1947.

(S) As a consequence, our estimates for this first period of the arms competition history are a loosely linked chain, whose links are derived from sharply different estimating procedures. The first link, for 1945-1947, is based to a large extent on official and semi-official Soviet data. The expenditure side takes off from data on wartime outlays, published relatively recently.³ For expenditures, the second link, covering 1947-1951, is SOVOY-39. This is a building-block costing model like SCAM but much less sophisticated and articulated in structure than SCAM, which is the outcome of the rapid development of technical intelligence collection in the past 15 years.

(U) Given the nature of our information for period one, we cannot hope to escape large errors in estimating particular components. This is particularly true for the late 1940s. We can only hope that trends in major aggregates⁹ are not unrecognizably distorted by the crude information available.

¹(S) CIA/RR ER SC 60/6, SC #05938/60, Methodology for Estimating Soviet Military Expenditures, TS Codeword, 26 August 1960.

²(S) SOVOY-39 figures are clearly from the same system as the CIA contribution to NIE 11-4-58 and 11-4-59, minor variants of which are reproduced in CIA RR EM 60-19, The Relationship Between Announced Soviet Military Manpower, Budgetary Allocations for Defense, and Total Military Expenditures 1955-1962, 15 September 1960 (S).

³(U) See the Appendix to this paper.

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II. FORCES

A. Manpower

(U) As suggested in the introduction, detailed and reliable estimates are lacking for much of the early postwar period. Nor is there a consensus among the available estimates. Some of the difficulties for manpower statistics are illustrated in Table 1, which combines a 1948 source with later CIA data along with a few official Soviet totals and estimates that have been developed from the latter and other Soviet sources.

(S) Some two years before the outbreak of World War II, in 1937, the Soviet armed forces numbered about 1 1/2 million men, with the overwhelming bulk, perhaps 1.3 million men, in the ground forces. The air forces, including naval aviation, were estimated to number 140,000 and the navy only 60,000. Internal security forces are indicated as equal to the size of the air and naval forces combined.

(S) By May 1945, the Soviet military had grown to an all time peak strength of some 12 millions, including security forces, with roughly 10 million in the ground forces. Judging from Soviet data on force structure at the German fronts alone (but including GHQ reserves and excluding air defense), naval strength should have been closer to 600 thousand (the NIS figure) than to 300 (the SID figure), while the air force might have been up to a million men. Security forces are put at 700 thousand in both classified estimates.

(U) The Soviets claim to have rapidly demobilized the vast forces they disposed at the end of the war. In January 1960, Khrushchev claimed a reduction in military manpower of 75 percent in 2 1/2 years, from 11,365,00 at the close of the European war, to 2,874,000 at the beginning

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Table 1

ESTIMATES OF SOVIET MILITARY MANPOWER, 1937-1953 (U)
(Thousand Men)

Date	Source	Ground	Naval	Active Regular Service		Total	Security Troops	Total Active Military Personnel
				Air and Naval Air	Command and General Support			
July 1937	SID-48	1,300	60	140	n.a.	1,500	200	1,700
1937	Soviet	..	..	..	..	1,433	..	..
Jan. 1945 ^a	Soviet	(6,313) ^b	(329)	(467)	n.a.	(7,109)	..	..
May 1945	SID-48	10,236	300	1,155	n.a.	11,691	700	12,390
May 1945	NIS-74	10,000	600	1,100	n.a.	11,600	700	12,300
May 1945	Soviet	..	..	..	..	11,365	..	..
Jan. 1946	SID-48	4,600	300	800	n.a.	5,700	700	6,400
Jan. 1946	NIS-74	5,000	695 ^c	705 ^d	n.a.	6,400	600	7,000
Jan. 1946	Estimate	..	..	..	..	5,250	..	..
Jan. 1947	NIS-74	2,800	695 ^c	555 ^d	n.a.	4,050	500	4,550
Jan. 1947	Estimate	..	..	..	..	3,750	..	..
July 1947	SID-48	2,600	300	450	n.a.	3,350	400	3,750
July 1947	SOVOY	2,800	600	600	n.a.	4,000	550	4,550
July 1947	Estimate	..	..	..	..	3,300	..	..
Jan. 1948	NIS-74	2,600	695 ^c	505 ^d	n.a.	3,800	400	4,200
Jan. 1948	Soviet	..	..	..	..	2,874	..	..
July 1948	SOVOY	2,550	600	650	n.a.	3,800	550	4,350
July 1949	SOVOY	3,450	600	650	n.a.	4,700	550	5,250
Jan. 1950	NIS-74	2,650	695 ^c	555 ^d	n.a.	3,900	400	4,300
July 1950	SOVOY	3,737	600	663	n.a.	5,000	550	5,550
Jan. 1951	NIS-74	3,400	695 ^c	605 ^d	n.a.	4,700	400	5,100
July 1951	SOVOY	4,340	675	685	n.a.	5,700	550	6,250
July 1951	SCAM	4,118	586	676	533	5,913	490	6,403
July 1952	SOVOY	4,600	675	725	n.a.	6,000	550	6,550
July 1952	SCAM	4,312	613	759	613	6,297	542	6,839
Jan. 1953	NIS-74	3,400	745 ^c	655 ^d	n.a.	4,800	?	?
July 1953	SOVOY	4,350	675	775	n.a.	5,800	550	6,350
July 1953	SCAM	3,731	625	787	573	5,716	478	6,194

^a.. means not available.

^bn.a. means not applicable.

^cSoviet-German fronts only, excluding air defense personnel, but including High Command reserves. Classification of naval air not indicated.

^dIncluding 24,000 airborne troops

^eIncluding naval air

^fExcluding naval air

SOURCES: SID-48: CIA, Strategic Intelligence Digest, USSR, III, March 1948, (S), p. 1 (The estimates themselves are dated 1 July 1947). NIS-74: National Intelligence Survey, USSR, April 1974, (S). "Armed Forces," p. 8. SOVOY: Sovoy-39, CIA estimates c. 1959 (S), (see text above, p.). Soviet: January 1945 estimate from Institut Marksizma-Leninizma pri TsK KPSS, *Istoriia Velikoi otechestvennoi voyny Sovetskogo Soyuza*, Voennoe izdatel'stvo, V, 1963, p. 27. Others from Khrushchev in Pravda, 15 January 1960. Estimates: Based on Khrushchev figures and description of the postwar demobilization in V.N. Donchenko "Demobilizatsiia Sovetskoi armii i reshenie problemy kadrov v pervye poslevoennye gody," *Istoriia SSSR*, 1970, No. 3, pp. 97-98. (See text, pp.).

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of 1948. A recent Soviet source fills in a very few of the details of this picture:¹

(U) 1. On June 22, 1945, the Supreme Soviet ordered demobilization during the second half of 1945 of the 13 oldest age classes. With the defeat of the Japanese, a September 7 decree extended the language of the June action to troops on the Far Eastern fronts. This first phase of the demobilization was accomplished by the end of September and involved over 3.3 million men.

(U) 2. A second phase was inaugurated with a decree of September 25, ordering the release of the 10 next senior age classes of enlisted men, as well as specialists (in the civilian economy) with middle or higher education, students of second and third courses, teachers and instructors, soldiers who had received three or more wounds or had served seven or more years, and all female enlisted personnel.

(U) 3. A third phase, said to involve considerably fewer people than the first two, took place during the period May-September 1946. In Odessa oblast, the number released in 1946 was less than two-fifths of the total for 1945-1946. In a number of other provinces, the proportion was considerably smaller, between 6-12 percent.

(U) 4. The fourth and final phase was from the end of 1946 through the beginning of 1948.

(U) On the basis of this information, total force levels excluding security troops may be estimated as about 8 million on October 1, 1945,

(U) ¹V. N. Donchenko, "Demobilizatsiia Sovetskoi armii i reshenie problemy kadrov v pervye poslevoennye gody", Istoriia SSSR, 1970, No. 3, pp. 97-98.

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perhaps 5 1/4 million at the beginning of 1946 and 3 3/4 million at the end of the year. These figures take no account of annual intake--or, more accurately, they assume that if intake occurred, the gross number of men released was even higher than the numbers indicated. In any case, these are the bracketing data points of Khrushchev's 1960 announcement (11,365,000 in May 1945 and 2,874,000 at the beginning of 1948), which, if accepted, provide the basis for approximate judgments in intermediate years.

(S) From this point of view, the NIS estimates appear high for 1946 but perhaps not for January 1947, the SOVOY total for mid-1947 also seems high, and the January 1948 NIS total is one million men above Khrushchev's announced figure.

(U) However, Khrushchev's figure for 1948 has aroused some skepticism on account of the doubling of the Soviet armed forces implied by the numbers for 1945, also cited by Khrushchev. Such a rearmament effort seems "of far greater magnitude than suggested either by Soviet policy pronouncements or by Western estimates during the period concerned."¹ It has been suggested that the 1948 figure was deliberately understated "to underscore the Soviet contribution to disarmament immediately after war."²

(S) We have no Soviet benchmarks after 1948 other than Khrushchev's 1955 figure. However, there is no dispute about the fact of a buildup

(U) ¹Thomas W. Wolfe, Soviet Power and Europe: The Evolution of a Political-Military Posture, 1945-1964, RM-5838-PR, The Rand Corporation, November 1968, (U), page 321.

(U) ²Ibid. Also, pages 420 and 421.

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after 1947; it is the pace and magnitude that are still not fully known. Thus, the Sovoy estimates (of 1959 vintage) begin the buildup after mid-1948, the NIS only from 1949 or 1950 (1949 data are lacking). Soviet budgets show an increase in the overt "defense" allocation by 19 percent in 1949, followed by another 5 percent in 1950.¹

(U) There is an additional piece of evidence that points to 1949 as the year in which the buildup began. The following data on planned and actual number of trained apprentices entering employment in industry, construction, and transport (i.e., the main branches of the non-agricultural economy) were compiled by the UN's Economic Commission for Europe (thousands):²

	<u>Annual targets of</u> <u>Fourth Five Year Plan</u>	<u>Actual numbers</u>
1946	380	382
1947	790	790
1948	980	1000
1949	1090	723
1950	1250	494

(U) The indicated shortfall of about one million apprentices may well have been the result largely of stepped-up conscription rates. Presumably, the total call-up was considerably larger, including recruits from the villages (not entering the non-agricultural labor force). By the end of 1950, therefore, active regular service forces could have been as high as 4 1/2-5 million men.

(U) ¹K. N. Plotnikov, Ocherki istorii buidzheta sovetskogo gosudarstva, Gosfinizdat, 1954, p. 433.

(U) ²Economic Survey of Europe in 1950, Geneva, 1951, p. 41.

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(8) With Khrushchev's 1948 figure as base, growth of the armed forces by 1 1/2 - 2 million men means an increase of one-half to two-thirds. In the NIS view, the buildup extends perhaps to 1953 (1952 data are lacking) and amounts to growth by not quite one-quarter in all regular forces. The SOVOY numbers show a larger growth, almost three-fifths, between 1948 and 1952. According to SOVOY, increases take place in all three forces but particularly sharply in the ground forces (80 percent). The NIS-estimated increase is also largest for the ground forces, but amounts to only 30 percent.

(9) The SCAM series, which, because of its continuity and link to the expenditure data, will serve as the basis for estimates of the 2nd and 3rd periods, begins with 1951. At this point, the SOVOY and SCAM figures are not far apart.¹ Moreover, the two series behave comparably between 1951 and 1952. However, for the 1952-1953 change, SCAM shows a sharper decline in ground force personnel, as well as a decrease in command and general support troops and, therefore, a large drop in the overall size of the regular forces.

B. Ground Forces

(8) The following description of changes in Soviet army structure in 1945-1947 (Table 2) is drawn from a 1948 classified source whose estimates for the armed forces as a whole and the three service components were discussed in the previous section. According to this source,

(9) ¹ Possibly the correspondence would be even closer after distribution of SCAM's command and general support personnel among the three main forces. Command and general support includes service schools, headquarters forces, and service central supply and maintenance.

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in July 1945 the ground forces consisted of 590 divisions and 1965 separate brigades (Table 2). There were 510 rifle divisions, 30 cavalry, and 50 artillery, but no tank or mechanized divisions. In addition, there were 150 separate tank regiments. The 195 brigades, however, included 45 mechanized and 125 tank brigades, the remainder being rifle. One year later, the ground force structure had been reduced to 225 divisions and 95 brigades of an altered composition, plus 60 separate tank regiments. For the first time mechanized and tank forces appeared in the divisional structure with 15 of the former and 10 of the latter. The 159 rifle divisions represented 70 percent of the total number compared with over 85 percent a year earlier. Cavalry divisions declined to 21, and artillery to 20. Concerning the separate brigades, tank and mechanized strength rose in proportional terms while declining in absolute numbers, and separate tank regiments were reduced to 60. By July 1947 the emphasis on mechanized and tank forces had further increased to the detriment of rifle forces.

(S) Unfortunately, no information is currently at hand concerning the composition of the Soviet ground forces in the years 1948-1950. However, SCAM data imply a resurgence in the strength of rifle divisions by 1951 which had become increasingly motorized. In addition, the number of mechanized divisions had doubled, while mechanized separate brigades had disappeared, as had separate tank regiments. A new type of force, the airborne division, had entered service by 1951, while cavalry divisions no longer existed. Among the new types of separate brigades were those with artillery and anti-aircraft functions. New types of separate regiments had also entered service by 1951.

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Table 2

SOVIET ARMY STRUCTURE BY ORGANIZATIONAL UNIT,
SELECTED YEARS, 1945-1953 (U)

Unit	1945	1946	1947	1951	1952	1953
<u>DIVISIONS</u>	590	225	173	229	231	211
Rifle	510	159	83	130	132	111
Mechanized		15	25	50	50	50
Tank		10	25	25	25	24
Artillery	50	20	20	19	19	16
Airborne				5	5	6
Cavalry	30	21	20			
<u>BRIGADES</u>	195	95	15	223	229	192
Rifle	25	10	10	13	12	11
Mechanized	45	30				
Tank	125	55	5			
Anti-Aircraft				50	55	59
Artillery				54	54	41
Corps Artillery				106	108	81
<u>REGIMENTS</u>	150	60	40	116	119	101
Tank	150	60	40			
Rocket Artillery				6	7	7
Breakthrough Artillery				24	24	19
Reconnaissance				34	31	30
Engineering				52	57	45

Sources: 1945-1947: CIA, Strategic Intelligence Digest, USSR,
March 1948. 1951-1953: CIA, SCAM.

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(S) It is probable that the growing Soviet ground forces were well equipped, as large scale production of weapons continued throughout the early post-war years. Several thousand tanks and self-propelled guns were turned out each year (compared to zero and near zero in the U.S.), and two new vehicles, an armored personnel carrier and an amphibious carrier, went into production in 1949. Artillery and anti-aircraft artillery output amounted to thousands of pieces annually. Substantial but declining numbers of mortars were produced, while rocket launchers, infantry anti-tank weapons, and small arms were turned out in increasing numbers. Most of the equipment being produced was not of new design. This situation was to change with a process of research and development and subsequent modernization that had its beginnings in the 1946-1953 period.

C. The Navy

(S) During World War II, the Soviet Navy was the waif of the military establishment.¹ In 1946 it possessed only about 100 major surface combatant surface ships, and at least one-fifth of these, including all four battleships, were classed as "old" ships (Table 3).² The Navy did have in service about 240 submarines, 70 of which were of the range ocean patrol type. In the same year, the U.S. Navy had 1,035 major combat surface ships and 80 submarines in the active fleet plus 1,675 surface ships and 106 submarines in the reserve fleet.

(U) ¹ See the Appendix to this paper.

(U) ² Ships over 20 years in age are by definition "old" and those under 15 are "modern." The classification of those between 15 and 20 is a matter of analyst judgement.

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Table 3

SOVIET NAVAL FORCES AT MIDYEAR, 1946-1953 (U)
(Number of Vessels)

Type	1946	1947	1948	1949	1950	1951	1952	1953
<u>MODERN MAJOR SURFACE SHIPS</u>	74	108	127	149	171	167	195	182
Heavy cruiser	1	7	8	9	9	0	0	0
Light cruiser	3	1	1	2	3	7	12	14
Destroyer	20	43	45	50	57	87	110	118
Destroyer escort	24	28	32	37	40	1	4	7
Frigate	25	28	40	50	61	71	68	42
Coastal defense	1	1	1	1	1	1	1	1
<u>OLD MAJOR SURFACE SHIPS</u>	21	20	17	15	25	27	21	35
Battleships	4	3	3	3	3	3	3	3
Heavy cruiser	0	0	0	0	1	7	7	7
Light cruiser	2	2	1	1	1	1	1	1
Destroyer	15	15	13	11	10	5	5	5
Destroyer escort	..	..	..	..	10	0	0	0
Frigate	..	..	..	..	..	5	1	16
Coastal defense	..	..	..	..	..	6	4	3
<u>TOTAL SURFACE SHIPS</u>	95	128	144	164	196	194	216	217
<u>MODERN SUBMARINES</u>	159	176	197	206	222	260	246	235
Long range	70	74	76	77	73	72	68	55
Medium range	39	40	42	41	39	48	55	75
Short range	50	62	79	88	110	140	123	105
<u>OLD SUBMARINES</u>	81	77	71	61	57	54	73	110
Long range	10	10	10	9	8	10	13	30
Medium range	37	33	28	21	19	15	18	20
Short range	34	34	33	31	30	29	42	60
<u>TOTAL SUBMARINES</u>	240	253	268	267	279	314	319	345

Sources: 1946-1950, Office of Naval Intelligence, A Survey of Soviet Naval Construction, May 1953. 1951-1953, CIA, SCAM.

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(8) From 1946 to 1953, the Soviet Navy increased its strength, the fleet of modern major surface ships rising from about 75 to about 182, and the number of submarines going up from 159 to 235. The aggregate of vessels classed as "old" also increased, and the total complement of all vessels rose from around 335 to 562. Ships of new post-war design entered service. These included the "W" and "Z" class long range submarines, which comprised nearly three-fourths of the modern submarine fleet by 1953. Also deployed were two new classes of light cruisers (Chapayev and Sverdlov), the Skoryy class destroyer, and the Kola and Riga classes destroyer escorts.

(8) The naval construction program benefited from a thorough exploitation of German technology and talent, particularly in the case of submarines. This program does not appear to have reflected deep thought about the emerging post-war strategic naval situation, except that no new battleships were constructed. No aircraft carriers were constructed either, as plans for acquiring these vessels were apparently shelved. Ships entering the fleet were largely of limited range capability unable to project the USSR's naval strength any significant distance from Soviet shores. In addition to the introduction of new post-war designs, fleet modernization was aided in that only the most advanced designs of ships under construction during the war were completed. Other uncompleted units, including a battleship, were scrapped. Little adaptation of prizes of war was accomplished except in the case of a few Italian vessels. Emphasis was given to the construction of destroyers and light cruisers and, in the earlier years, of heavy cruisers. Minor surface ships such as subchasers, mine layers, and mine sweepers

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received emphasis as did short range coastal submarines. In general, according to the ONI, the Soviet program reflected a preference for quantity over quality, and a preference for general purpose rather than specialized characteristics. However, R&D activities were in train which were later to affect the configuration of the Soviet Navy in profound ways.

D. Air and Naval Air Forces

(S) At the peak war level, in 1944, Soviet military industry produced 40,000 aircraft and 53,000 aviation engines.¹ By June 1946 there were something less than 15,000 aircraft in operational combat units, (Table 4), plus unknown but large numbers of second line and reserve machines.

(S) The period between the close of World War II and 1953 was one of extensive reshaping of Soviet military aviation. One notable event was the appearance of the TU-4, a rather exact copy of the USB-29, in large numbers. With this plane, the Long Range Air Army, organized in 1946, acquired for the first time the capability to deliver weapons nearly anywhere in Western Europe and the Far East and the theoretical potentiality for one-way missions against the U.S. Whether or not there was any serious danger of such missions, the possession by the USSR of the TU-4 and, beginning in 1949, of the atom bomb, caused genuine concern among the U.S. military. In addition, the large scale conversion from piston to jet engined fighters and light bombers progressed steadily, beginning essentially in 1948 with the advent of the MIG-15.

(U) ¹G. S. Kravchenko, Ekonomika SSSR v gody Velikoi otechestvennoi voyny (1941-1945 gg), 2nd ed., Ekonomika, 1970, p. 297.

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Table 4
SOVIET AIR AND NAVAL AIR COMBAT FORCES AT MIDYEAR, 1946-1953 (U)
(Numbers of Aircraft)

Item	1946	1947	1948	1949	1950	1951	1952	1953
<u>Long Range Aviation</u>	205	195	255	415	600	725	900	1075
TU-4		15	105	290	500	650	850	1050
B-25	205	180	150	125	100	75	50	25
<u>Strategic Defense-Fighters</u>	3675	3690	3455	3220	3305	4130	5555	6945
LA-5/7	700	650	575	400	150	80	65	10
LA-9/11		135	380	460	500	500	400	320
MIG-9		130	180	180	160	150	70	
MIG-15/17			15	270	1185	2775	4300	6050
YAK-3/9	2025	2000	1700	1475	1000	410	250	165
YAK-23					55	115	420	390
P-39	485	390	300	205	110	35	10	
P-40	210	165	125	85	40			
P-63	255	220	180	145	105	65	40	10
<u>Tactical Aviation Fighters</u>	3710	3680	3950	3860	4290	5000	5615	5575
LA-5/7	700	400	200	75				
LA-9/11		410	1140	1380	1500	1450	1200	935
MIG-9		65	90	90	80	75	35	
MIG-15/17			15	180	790	1850	2900	3800
YAK-3/9	2060	2030	1900	1700	1625	1475	1175	840
YAK-23					40	75	280	
P-39	485	390	300	205	110			
P-40	210	165	125	85	40			
P-63	255	220	180	145	105	75	25	
<u>Tactical Aviation-Bombers</u>	6770	6825	7310	7460	6815	6340	6130	5455
IL-2/10	2420	2210	2330	2500	2450	2350	2150	1900
IL-4	300	290	260	220	190	175		
IL-28					70	200	900	1750
PE-2	1840	1715	1660	1510	1360	1250	675	
TU-2	530	1200	1950	2400	2200	2100	2100	1350
TU-14							100	250
BE-6								10
PBY-5/6	200	200	200	195	195	190	180	170
A-20	1280	1030	760	510	250			
B-25	200	180	150	125	100	75	25	25
<u>TOTAL COMBAT AIRCRAFT</u>	14360	14390	14970	14955	15010	16195	18200	19050
<u>SUMMARY BY SERVICE</u>								
<u>Air Force</u>	13225	13060	13435	13280	13155	13915	15395	15605
Long Range Air	205	195	255	415	600	725	900	1075
Defensive Fighters (PVO)	3675	3625	3365	3040	2805	3090	3980	4655
Tactical Aviation	9345	9240	9815	9825	9750	10100	10515	9875
Fighters	3710	3680	3950	3860	4290	5000	5615	5575
Bombers	5635	5560	5865	5965	5460	5100	4900	4300
<u>Navy</u>	1135	1330	1535	1675	1855	2280	2805	3445
Defensive Fighters		65	90	180	500	1040	1575	2290
Bombers	1135	1265	1445	1495	1355	1240	1230	1155
<u>TOTAL COMBAT AIRCRAFT</u>	14360	14390	14970	14955	15010	16195	18200	19050

Sources: Edmund D. Brummer, Jr., Soviet Air Armaments and Their Cost, 1946-61, RM-3508-PR, The Rand Corporation, May 1963 (S); CIA, Strategic Intelligence Digest, USSR, March 1948; JIB, British Intelligence Survey, USSR, 1951; and miscellaneous intelligence sources.

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This program was materially aided by the acquisition from Britain of the Nene jet engine and Nimonic 80 nickel alloy for jet engine turbine blades. Further, the Soviets benefited from the importation of German aeronautical engineers, equipment, and aircraft. A substantial production program was implemented, and the numbers of aircraft in service increased by one-third between 1946 and 1953 from about 14,400 to around 19,000 planes.

(S) In 1946 apparently the only bomber in the newly created Long Range Air Army was the U.S. B-25 supplied under lend-lease, except for a few miscellaneous IL-4's, PE-8's, and possibly others. The B-25, also used in Naval Aviation, was still in service in token numbers in 1953. The mainstay of the LRA was the TU-4, a copy of and externally indistinguishable from the U.S. B-29. During the war Stalin had tried unsuccessfully to obtain the B-29. In 1944 three U.S. B-29's landed in the USSR due to fuel shortage, and the Soviets at once proceeded to copy the design. Three of the largest aircraft plants in the Soviet Union were tooled up for assembly. The first Soviet-produced machines came off the lines in 1947, and it is likely that small numbers entered service in that year. Total production was to reach 2,000 planes, of which 1,200 were in combat units in 1954. The rapidity and scale of the TU-4 effort was remarkable, and represented a major allocation of resources considering the economic burdens which the Soviet Union was carrying in those years.

(S) In terms of sheer numbers, Tactical (or Frontal) Aviation of the Air Force was the favored air arm, as would be expected in terms of the Soviet doctrine, which regarded aviation as an adjunct to the ground

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forces. In 1946 Tactical Aviation apparently possessed over 9,000 planes, 70 percent of the strength of the entire air force, of which about 5,600 were bombers and the remainder were fighters. Nearly 40 percent of the bombers were the Ilyushin Stormoviks, which were effective ground attack machines. Large numbers of these were still in service in 1953 and beyond, and the IL-10 remained in production into the 1960s. Other piston engine bombers of World War II design were the PE-2 and the TU-2; the former continued in deployment status until 1952 and the latter until after 1953. In 1950 the first jet bomber, the IL-28, entered service, and its numbers increased very rapidly as four large assembly plants were in the program. While the Tactical Aviation's bomber force declined in size from 5,600 planes to 4,300 planes between 1946 and 1953, it was a much more modern force in the latter years. Further, the number of Tactical Aviation fighters rose rapidly from about 3,700 in 1946 to around 5,600 in 1953. In 1953 nearly 70 percent of the planes were the excellent MIG 15's and 17's, as many old piston fighters, including the U.S. lend-lease P-39, P-40, and P-63, were phased out of service.

(s) It appears that Naval Aviation tripled in size during the 1946-1953 period, the increase taking place in the fighter force rather than in the bomber force. However, the available data probably overstate the extent of the increase, since in the early years our figures for the Navy do not include piston engine fighters such as the YAK and LA models, some of which were most likely assigned to the Navy. The 1951-1953 figures are relatively reliable and indicate that

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Naval Aviation provided a substantial adjunct to the tactical air element of the general purpose forces.

(U) It also contributed to the strengthening of the air defense program upon which the USSR placed much emphasis. Naval Aviation fighters were essentially a part of the shore based air defense forces, and in fact were later (1959) to be transferred to the Air Defense Forces (PVO). The strength of the combined fighter defense aviation declined somewhat from 1946 to 1949, then rose steadily and rapidly thereafter as the shift to the MIG jets progressed. In spite of its large size, the air defense force in these early years was very deficient in warning and control and in all-weather capability. The fighter force was supplemented by thousands of anti-aircraft guns with inadequate fire control. Surface-to-air missiles had yet to appear.

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III. BUDGETS

A. THE 1945-1947 LINK

(U) Table 5 provides the scanty information that can be set out presently with any confidence for the years 1945-1947. Apart from the official figures for the explicit "defense" appropriation, which is believed to exclude outlays on internal security forces, and the 1945 breakdown, which is obtained from material explained in the Appendix, the data are derived as follows:

(U) Military pay and allowances. These figures are obtained as the product of estimated average annual force levels and remuneration per man. The former are based on an interpretation of the four-phase demobilization, as recounted by Donchenko.¹ Average annual regular-service force levels are estimated as 3.5 million in 1946 and 3.3 million in 1947, compared with an average in 1945 of 9.8 million. Compensation per man averaged about 5000 rubles (49 billion rubles divided by 9.8 million men), but this was significantly affected by demobilization bonuses. . Probably a more reliable base for estimating postwar pay is the 1944 average, although that too is distorted by increases in field allowances for service outside Soviet borders.² The 1944 force level is estimated as 10.75 million, based on the 1945 figures (Table 5) and the indication that there were 9.8 million men in the armed forces in

(U) ¹See above, p. 5, note 1.

(U) ²V. N. Dutov, ed., Finansovaya sluzhba Vooruzhennykh Sil SSSR v period voyny, Voenizdat, 1967, p. 215.

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Table 5

SOVIET "DEFENSE" EXPENDITURES AT CURRENT PRICES
BY MAJOR RESOURCE COMPONENT, 1945-1947
(Billion Rubles)

	1945	1946	1947
Total "Defense"	128	74	66
of which			
Military pay and allowances	49	18	13
Procurement	36	18	(18)
Construction	7	38	35
Operations and maintenance; other outlays	36		
NKO	34		
NKVMF	2		

SOURCES: 1945: Appendix Tables 1 and 8. Military pay and allowances are the sum of 45 billion rubles from NKO (Appendix Table 4) and 4 billion from NKVMF (computed from the index in Appendix Table 7 and the assumption that pay and allowances accounted for half of "maintenance" expenditures in 1940). NKO construction is a rough guess, based on the discussion on p. 54 and the index of Appendix Table 6.

1946-1947. Total "defense." K.N. Plotnikov, Ocherki istorii biudzheta Sovetskogo gosudarstva, Gosfinizdat, 1954, p. 433. Other figures: see text.

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May 1942.¹ Thus, average pay was about 3300-3400 rubles (36 BR + 10.75 million men). In September 1946 civilian wages were increased in connection with an increase of ration prices (a first stage to derationing). It is assumed that military pay scales were raised at the same time. Moreover, it seems likely that the cadre-conscript ratio rose, with a concomitant increase in the average pay and allowance per man. Therefore, the average for 1946 is assumed to be somewhat higher than the 1944 level, or 4000 rubles per man.² This figure is assumed unchanged in 1947. This compares to an average wage and salary rate in the civilian economy in 1946 of 5700 rubles,³ which may have risen to perhaps 6500 in 1947.

(U) Procurement. Soviet sources indicate that civilian industrial output increased 20 percent in 1946, while military production was cut sharply. As a result, total industrial production in that year declined by almost 17 percent relative to 1945.⁴ Military production is said to

(U) ¹ Sovetskoe voennoe iskusstvo v Velikoi otechestvennoi voine 1941-1945 gg., 1962, I, p. 702, cited in Finansovaya sluzhba . . ., p. 176.

(S) ² Estimates of this component differ widely in the literature. SOVOY-39, compiled by service, implies an average for the active regular service of 5540 rubles per man in 1947 at 1955 pay rates. JIB estimated 1650 rubles throughout World War II (JIC, Germany, APPLE PIE Papers, DRS (53) 85, Analysis of Soviet Military Expenditures, 1953, (S), Part 1, p. 7, cited in CIA, SC RR 122--see above p. note). Hans Heymann, Jr. (The Magnitude of Russia's Military Effort, RM-746, 18 December 1951, FOUO, p. 56) estimated 3500 rubles per man for 1951 from sources that probably related to at least a year or two earlier. Without more information on the course of military pay changes, it is not possible to determine the mutual consistency of these estimates.

(U) ³ TsSU SSSR, Trud v SSSR, Statistika, 1968, p. 137.

(U) ⁴ E. Yu. Lokshin, Promyshlennost' SSSR 1940-1963, "Mysl'," 1964, pp. 121-122.

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have accounted for 41 percent of the gross value of all industrial output in 1945.¹ These figures imply a reduction of military production by 70 percent in 1946. Conservatively, the decline in hardware procurement is set at 50 percent in 1946. The 1946 level is assumed unchanged in 1947 on the basis of information previously cited, indicating a significant increase in naval strength, relative stability in the air order of battle, and decline in the number of ground force units.

(U) Construction; operations and maintenance; other outlays.

Calculated as a residual. Major categories of O&M expenditures should have declined tangibly with the end of combat operations and the demobilization of (an estimated) 55 percent of the force in 1946 followed by further cuts in 1947. Thus, the calculated residuals in Table 5 may imply increases in construction or other outlays. Possibly, expenditures on other activities rose sharply (R&D? atomic energy?); possibly too, the declines in pay and allowances or procurement have been overestimated.

(S) There is no question about the fact of a substantial cut in Soviet outlays in 1945-1947. The issue is only of the precise scale and structure. Regrettably, on this issue, the CIA documents of the early and mid-fifties cannot provide much help. Since their basic procedure involved addition of allowances for such elements as internal security forces and nuclear energy to the explicit "defense" allocation, there is no independent check on the magnitude of the predominant element

(U) ¹ Institut Marksizma-Leninizma, Istorii Velikoi otechestvennoi voyny Sovetskogo Soivza, V., p. 425.

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of Soviet military outlays. The manpower figures in these CIA estimates differ from the ones employed here, but they do not appear to have a greater claim to reliability.

B. THE 1947-1951 LINK: SOVOY-39

(8) The expenditure estimates of SOVOY-39 derive from a costing framework that is of the pre-McNamara era. Thus, the blocks are built up in terms of resource costs rather than programs or missions. Moreover, no organizational breakdown was presented either. Therefore, the following exposition begins with the summary data provided by resource component and then proceeds to a crude reworking by organization. A mission distribution can be compiled only for procurement.

(9) The SOVOY data will be presented in two forms, with and without adjustment for different manpower estimates. As indicated in Section IIA, there is considerable variance between the SOVOY military manpower estimates and those which are derived from Soviet figures on the postwar demobilization and subsequent buildup. It has also been noted that there is considerable doubt about the validity of the 1948 and 1955 benchmarks reported by Khrushchev. Therefore, the 1947-1951 link will be presented in two variants, as required: variant A, SOVOY unadjusted; variant B, SOVOY adjusted. Under variant B, forces are set at the following levels (thousands):¹

(8) ¹The 1947 figures are adjustments of the SID-48 numbers in Table 1 for underestimation of the size of the Navy; the presumed decrease in 1948 is deducted largely from the ground forces; 1949-1950 figures are interpolations between 1948 and 1951; the 1951 figures are original SOVOY-39 estimates.

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<u>Middle of</u>	<u>Ground Forces</u>	<u>Navy</u>	<u>Air Force, Including Naval Air</u>	<u>Total Active Regular Service</u>
1947	2400	450	450	3300
1948	2150	450	400	3000
1949	2700	500	500	3700
1950	3500	600	600	4700
1951	4340	675	685	5700

(S) The adjustment is to military personnel costs alone.¹ All other resource elements are estimated independently of manpower in SOVOY-39 and are therefore unaffected by the adjustment. However, because total outlays are changed, the adjustment also changes the resource distribution of these outlays. Since manpower costs are an element of service outlays, the adjustment also affects the growth and structure of expenditures by service.

(S) Tables 6 and 7 in their unadjusted variants are computed directly from a source summary table without any adaptation. According to these data, total Soviet military expenditures, including outlays on militarized internal security forces, increased 55 percent between 1947 and 1951. This aggregate increase is equivalent to an average annual rate of 11.6 percent. Thus, the SOVOY estimates picture a sharp buildup between 1947 and 1951, with a peak increase in 1949. Among the components of the total, the most rapid growth was exhibited

(S) ¹The adjustment for 1947-1950 is effected by service where annual payrates are the implicit average rates of each year in the original SOVOY estimates. For the ground forces these range between 3800 and 5100 rubles per man in 1947-1950, depending on the estimated number of "mobilization troops" (which affects the officer/recruit ratio). The rates are constant in the air force and navy--9600 and 5250 rubles per man--where naval air is included with the air force. When naval air is lumped with navy in calculations to be discussed, personnel costs are computed separately for naval air (pay rate 9600 rubles per man) and other navy (5250 rubles per man).

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Table 6

GROWTH OF SOVIET MILITARY RESOURCE COMPONENTS
AT 1955 RUBLES, 1947-1951 (U)
(Index numbers, 1947 = 100)

	1948	1949	1950	1951
Military personnel				
A. Unadjusted	99.6	111.0	114.3	124.9
B. Adjusted	97.9	108.5	127.0	145.5
O&M	102.5	114.8	124.6	136.9
Procurement	126.4	159.3	205.7	250.0
Construction	100.0	105.0	120.0	145.0
R&D	110.5	122.4	135.5	140.8
Nuclear energy	300.0	400.0	600.0	700.0
All outlays				
A. Unadjusted	107.5	123.3	137.8	154.9
B. Adjusted	107.3	123.1	146.8	168.8

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Table 7

STRUCTURE OF SOVIET MILITARY OUTLAYS AT 1955 RUBLES
BY RESOURCE CATEGORY, 1947-1951 (U)
(Percent of total)

	1947	1948	1949	1950	1951
<u>A. Unadjusted</u>					
Military personnel	58.1	53.8	52.3	48.2	46.8
O&M	13.8	13.2	12.9	12.6	12.3
Procurement	15.9	18.8	20.6	23.8	25.7
Military construction	2.3	2.1	1.9	2.0	2.1
R&D	8.7	8.9	8.6	8.5	7.9
Nuclear energy	1.1	3.2	3.7	5.0	5.1
Total ^a	100.0	100.0	100.0	100.0	100.0
<u>B. With manpower adjusted</u>					
Military personnel	54.3	49.5	47.8	46.9	46.8
O&M	15.2	14.5	14.1	12.9	12.3
Procurement	17.4	20.5	22.5	24.4	25.7
Military construction	2.5	2.3	2.1	2.0	2.1
R&D	9.4	9.7	9.4	8.7	7.9
Nuclear energy	1.2	3.5	4.0	5.1	5.1
Total ^a	100.0	100.0	100.0	100.0	100.0

^aDiscrepancies between totals and sums of components are due to rounding.

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by outlays on nuclear energy, with procurement a distant second. Expenditures on R&D, construction and O&M are pictured as developing at a less hectic pace--8-10 percent per year until 1951, rather than the more than 25 percent per year of procurement or the even more dizzying sevenfold increase of nuclear energy in four years. Personnel outlays rose by only one-quarter until 1951, equivalent to an annual rate of 5.7 percent.

(9) As a consequence, the resource structure of Soviet military outlays was substantially altered in these years (Table 7, part A). The share of personnel expenditures declined by a fifth, and the shares of O&M, construction, and R&D also fell, by varying small margins. However, the relative importance of nuclear energy and procurement outlays shot up, and in 1951, according to these data, procurement accounted for a quarter of the total, against only a sixth in 1947.

(8) How much difference do the manpower adjustments make? Military personnel costs grow more rapidly in 1950-1951 than in the unadjusted variant, substantially raising the average annual rate of growth from 5.7 to 9.8 percent. The adjustment lifts the index of total military outlays by 9 points in 1950 and 14 points in 1951, boosting the implied average rate of growth from 11.6 to 14 percent per year. In the structural calculation, the adjustment reduces the share of military personnel costs in each year of the period 1947-1950, particularly the first three (by 4-5 points), and raises those of all other components. The direction of change in resource element shares is not altered, but the magnitude of change is: the fall in the relative weight of military personnel costs between 1947 and 1951 is

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reduced, as is the increase in procurement's share, but the decline in O&M's relative importance is somewhat enlarged.

(U) The next step is to rearrange the data in an organizational breakdown, by grouping together relevant components of the four major resource categories--personnel, O&M, procurement, and construction. Some special problems are noted in the following listing by resource category:

(S) Personnel. "Ground forces" in the unadjusted variant include outlays on the "mobilization troops." The precise nature of this element is not clear, for the source explanation (with respect to a manpower distribution) is somewhat cryptic: "The mobilization category is taken as the difference between the sum of the strengths for the separate forces [i.e., ground, navy, air--A.S.B.] and the total figure for the Ministry of Defense [i.e., excluding militarized internal security forces--A.S.B.] as the strength of personnel on active regular service." In turn, it is said: "The strength of personnel on active regular service is not official but is an attempt to quantify expressions relating to the possibility of a mobilization of forces in the Soviet Union during the period of the Korean conflict. The quantification reflects, primarily, information on class size and call-up schedule." Internal evidence suggests that the source associates mobilization troops entirely with the ground forces.

(S) O&M. For some reason, maintenance of facilities is not indicated under O&M but is separately identified in a breakdown of military construction. Maintenance of air field and of naval facilities are assigned to the respective services. For the calculation

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including naval air with the navy, a notional 10 percent of air force maintenance is added each year to the navy total to allow for maintenance of naval air facilities. Half of all outlays on maintenance of communications, barracks, hospitals, and administrative-warehouse, are assigned to the ground forces, with the other half divided evenly among the navy and the air force. In the case of POL storage, half the maintenance costs are charged to the navy and the other half shared by air force and ground forces.

(S) Procurement. Naval air procurement is included with that of the air force in the original. The same procedure (as with maintenance costs) is used to estimate naval air procurement for inclusion with other naval procurement.

(S) Construction. Construction of communications, barracks, hospitals, and administrative-warehouse facilities, as well as POL storage, is allocated in the same way as maintenance of these facilities. Naval air construction is estimated in the same way as naval air procurement and maintenance.

(S) Tables 8 and 9 provide the growth and structural calculations for the organizational regrouping just described. There is substantial ground for the belief that the security forces, military R&D, and nuclear energy activities were responsibilities largely outside the defense and navy ministries; therefore, the corresponding outlays are set forth separately. For the most part, the bundle of miscellaneous expenditures--other personnel, O&M, and procurement costs--may also be associated with the Ministry of Defense (or Defense and Navy) budget,

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Table 8

GROWTH OF ORGANIZATIONAL COMPONENTS OF SOVIET MILITARY OUTLAYS
AT 1955 RUBLES, 1947-1951 (U)
(Indexes, 1947 = 100)

	1948	1949	1950	1951
Ground forces				
A. Unadjusted ^a	96.4	113.4	118.4	131.2
B. Adjusted	96.2	107.3	126.8	147.6
Navy, including naval air				
A. Unadjusted	114.7	146.1	175.5	193.1
B. Adjusted	114.8	161.4	206.8	223.9
Air (excluding naval air) force				
A. Unadjusted	121.9	125.2	152.3	187.1
B. Adjusted	120.9	128.4	167.2	216.4
Subtotal, three services				
A. Unadjusted	105.8	121.8	136.4	155.5
B. Adjusted	105.4	121.3	149.9	177.2
Other personnel, O&M, and procurement costs ^b	102.9	120.6	131.4	146.1
Security forces, pay and subsistence	100.0	100.0	100.0	100.0
R&D	110.5	122.4	135.5	140.8
Nuclear energy	300.0	400.0	600.0	700.0
Total				
A. Unadjusted ^c	107.6	123.0	137.8	154.5
B. Adjusted	107.4	122.7	147.2	169.0

^aIncluding "mobilization troops."

^bMilitary pensions, pay and subsistence for reserves, pay and allowances of civilian personnel, miscellaneous O&M (maintenance of fixed communications facilities, maintenance of radar equipment, transportation, medical care, printing and publishing) and nonallocated electronic procurement (electronics for fixed communications facilities; ground radar).

^cThese index numbers are slightly different from those of Table 6 because of rounding errors in the allocation of resource components to particular services.

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Table 9

STRUCTURE OF SOVIET MILITARY OUTLAYS AT 1955 RUBLES
BY ORGANIZATION, 1947-1951 (U)
(Percent of Total)

	1947	1948	1949	1950	1951
A. Unadjusted					
Ground forces ^a	40.8	36.5	37.6	35.0	34.6
Navy, including naval air	11.6	12.4	13.8	14.8	14.5
Air (excluding naval air) force	17.6	20.0	17.9	19.5	21.3
Subtotal, three services ^b	70.0	68.8	69.3	69.2	70.4
Other personnel, O&M, and procurement costs ^c	11.6	11.1	11.4	11.0	11.0
Security forces, pay and subsistence	8.6	8.0	7.0	6.3	5.6
R&D	8.6	8.9	8.6	8.5	7.9
Nuclear energy	1.1	3.2	3.7	4.9	5.1
Total ^b	100.0	100.0	100.0	100.0	100.0
B. Adjusted					
Ground forces	39.5	35.3	34.5	34.0	34.6
Navy, excluding naval air	11.0	11.7	14.4	15.4	14.5
Air (including naval air) force	16.7	18.8	17.4	19.0	21.3
Subtotal, three services ^b	67.1	65.8	66.3	68.4	70.4
Other personnel, O&M, and procurement costs ^c	12.7	12.2	12.5	11.3	11.0
Security forces, pay and subsistence	9.5	8.8	7.7	6.4	5.6
R&D	9.5	9.7	9.4	8.7	7.9
Nuclear energy	1.2	3.5	4.1	5.1	5.1
Total ^b	100.0	100.0	100.0	100.0	100.0

^aIncluding "mobilization troops."

^bDiscrepancies between totals and sums of components are due to rounding.

^cSee note (b), Table 8.

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but are either not integral to the costs of the main forces or not allocable to them with existing information.

(S) Since outlays other than on the three main services account for only a third or less of the total, the trend of growth for the three forces and that of aggregate military outlays is essentially the same. Within the three-force total it is clear (ignoring minor fluctuations) that the navy and air force gained substantially at the expense of the ground forces. This is only slightly magnified by the manpower adjustments. The relative importance in total outlays of the ground forces fell, and that of the other two forces increased, by five or six percentage points between 1947 and 1951 (depending on the variant), reflecting the difference between rates of growth of outlays of 7 percent for the ground forces (10.2 percent in the adjusted variant), on one hand, and 17.9 (22.3) and 17.0 (21.3) percent, respectively, for the navy and air forces, on the other. While growth for the navy and air forces was strong in all years, the naval buildup was particularly rapid in 1949 and 1950 and that of the air force was sharpest in 1950-1951.

(S) The structure of outlays by the three main forces is shown in Table 10 in a resource component breakdown. In the unadjusted variant, it appears that the resource structure of ground force expenditures remained relatively constant over the period shown, in contrast to the pattern of the other two forces, where the share of personnel outlays declined sharply. Among components of naval outlays, procurement's share mushroomed by 1950, at the expense of the shares of all

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Table 10

STRUCTURE OF SOVIET MILITARY OUTLAYS AT 1955 RUBLES
BY SERVICE AND RESOURCE ELEMENT, 1947-1951 (U)
(Percent of total outlays on each service)

	1947	1948	1949	1950	1951
<u>Ground forces</u>					
A. Unadjusted ^a					
Military personnel	69.6	68.5	70.8	70.4	72.0
O&M	8.9	10.1	8.6	8.5	7.4
Procurement	18.1	18.2	17.9	18.6	18.3
Construction	<u>3.3</u>	<u>3.2</u>	<u>2.7</u>	<u>2.6</u>	<u>2.3</u>
Total ^b	100.0	100.0	100.0	100.0	100.0
B. Adjusted					
Military personnel	67.2	65.6	66.5	69.7	72.6
O&M	9.5	10.8	9.7	8.7	7.3
Procurement	20.5	21.0	21.5	19.7	18.4
Construction	<u>2.8</u>	<u>2.6</u>	<u>2.4</u>	<u>2.0</u>	<u>1.7</u>
Total ^b	100.0	100.0	100.0	100.0	100.0
<u>Navy, including naval air</u>					
A. Unadjusted					
Military personnel	61.8	55.6	43.6	37.4	39.1
O&M	14.7	13.7	11.4	11.2	11.7
Procurement	17.6	25.6	40.9	48.0	45.7
Construction	<u>5.9</u>	<u>5.1</u>	<u>4.0</u>	<u>3.4</u>	<u>3.6</u>
Total ^b	100.0	100.0	100.0	100.0	100.0
B. Adjusted					
Military personnel	55.7	48.5	40.8	38.5	39.1
O&M	17.0	15.8	12.0	11.0	11.7
Procurement	20.5	29.7	43.0	47.3	45.7
Construction	<u>6.8</u>	<u>5.9</u>	<u>4.2</u>	<u>3.3</u>	<u>3.6</u>
Total ^b	100.0	100.0	100.0	100.0	100.0
<u>Air, excluding naval air</u>					
A. Unadjusted					
Military personnel	49.0	43.4	41.8	34.3	28.6
O&M	11.6	10.1	11.3	11.0	10.0
Procurement	36.1	43.4	43.3	50.4	56.6
Construction	<u>3.2</u>	<u>3.2</u>	<u>3.6</u>	<u>4.2</u>	<u>4.8</u>
Total ^b	100.0	100.0	100.0	100.0	100.0
B. Adjusted					
Military personnel	41.0	34.0	34.3	30.8	28.6
O&M	13.4	11.7	12.8	11.6	10.0
Procurement	41.8	50.6	48.8	53.1	56.6
Construction	<u>3.7</u>	<u>3.7</u>	<u>4.1</u>	<u>4.5</u>	<u>4.8</u>
Total ^b	100.0	100.0	100.0	100.0	100.0

^aIncluding "mobilization troops."

^bDiscrepancies between totals and sums of components are due to rounding.

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other elements. The relative importance of air force procurement also increased, although somewhat less dramatically.

(5) The manpower adjustment magnifies the increase in relative weight of personnel costs in the ground forces between 1948 and 1951 and reduces the share of procurement in that service's total. On the other hand, with respect to the naval and air force structure, the adjustment damps the reduction in the personnel share and the relative growth of procurement; however, the decline in the relative importance of O&M is heightened, relative to the unadjusted variant.

(8) Given the costing framework of the SOVOY data, a mission distribution for the 1947-1951 period cannot be computed for the entire range of outlays. Table 11 indicates the mission structure of procurement alone. The expected large jump in strategic-offense outlays appears dramatically in Table 11 and is shown as bunched in the years 1948-1950. Naval procurement excluding aircraft and long-range submarines also grew strongly; in absolute terms outlays of this group exceeded those on strategic offense in 1951 by more than 50 percent. Procurement of ground equipment and material was the largest single claimant in 1947 at 46 percent of the total. By 1951, ground force procurement had fallen to less than a quarter of the total, not much larger than the naval share and considerably less than that of air defense, tacair, and navalair.

(8) I noted earlier that SOVOY estimates were derived from building block costing and were therefore independent of Soviet official budget data. Table 12 compares the SOVOY figures net of various outlay

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Table 11

SOVIET MILITARY PROCUREMENT AT 1955 RUBLES BY MISSION, 1947-1951 (U)

	1947	1948	1949	1950	1951
<u>Billion rubles</u>					
1. Strategic offense ^a	.2	1.6	3.1	4.0	4.3
2. Air defense, tacair and navalair	4.5	5.7	5.0	8.9	14.1
3. Ground ^b	6.4	6.2	7.1	7.5	8.1
4. Naval ^c	1.2	2.1	5.2	7.1	6.6
5. Other air	1.6	2.0	1.5	.8	1.0
6. Other procurement ^d	.1	.1	.3	.5	.9
Total procurement ^e	14.0	17.8	22.2	28.9	34.9
<u>Percent distribution (excluding other procurement)^e</u>					
1. Strategic offense ^a	1.5	9.0	14.0	14.2	12.6
2. Air defense, tacair and navalair	32.5	32.3	22.7	31.5	41.4
3. Ground ^b	45.8	35.3	32.4	26.5	23.8
4. Naval ^c	8.4	12.1	23.9	25.1	19.3
5. Other air	11.8	11.3	6.9	2.7	2.8
<u>Indexes of growth, 1947 = 100</u>					
1. Strategic offense ^a	100	762	1462	1914	2038
2. Air defense, tacair and navalair	100	125	109	196	311
3. Ground ^b	100	98	111	118	127
4. Naval ^c	100	182	447	609	562
5. Other air	100	121	92	46	59
6. Other procurement ^d	100	138	363	663	1113
Total procurement ^e	100	127	158	206	249

^aMedium and heavy bombers plus long range submarines.

^bExcluding anti-aircraft artillery (included in air defense).

^cExcluding aircraft and long range submarines.

^dFixed communication and ground radar equipment.

^eCalculated from unrounded data.

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Table 12

COMPARISON OF SOVOY MILITARY OUTLAYS AT 1955 RUBLES
AND SOVIET OFFICIAL "DEFENSE" AT CURRENT RUBLES, 1947-1951 (U)

	1947	1948	1949	1950	1951
<u>Billion rubles</u>					
A. SOVOY, excluding					
1. Security forces and reserve pay	70.3	75.4	90.0	110.4	125.3
2. Security forces, reserve pay, and nuclear energy	69.3	72.4	86.0	104.0	118.3
3. Security forces, reserve pay, nuclear energy, and R&D	61.7	64.0	76.7	93.7	107.6
B. Official "defense"	66.3	66.3	79.2	82.9	93.9
C. Official "defense" plus half of "science" ^a	70.6	70.6	83.7	86.9	98
<u>Indexes, 1947 = 100</u>					
A. SOVOY, excluding					
1. Security forces and reserve pay	100	107	128	157	178
2. Security forces, reserve pay, and nuclear energy	100	104	124	150	171
3. Security forces, reserve pay, nuclear energy, and R&D	100	104	124	152	174
B. Official "defense"	100	100	119	125	142
C. Official "defense" plus half of "science" ^a	100	100	119	123	138

^a"Science": total outlays from all sources ("old series"). See Nancy Nimitz, Soviet Expenditures on Scientific Research, RM-3384-PR, January 1963, pp. 40-41.

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categories--reserve pay, security forces, nuclear energy, and R&D¹--with official "defense", with and without an allowance for the military R&D portion of "science" appropriations, which are charged under a separate budget category. The correspondence between SOVOY and official series is not especially close after 1949, a fact which could be due to price differences (whereas the official figures are in current rubles, the SOVOY data are declared to be at constant 1955 prices) or to accounting transfers of outlays between explicit "defense" and other categories of the state budget, as well as to error in the SOVOY estimates.

C. THE 1951-1953 LINK: SCAM

(S) As indicated, the data source for all years after 1950 is CIA's Strategic Cost Analysis Model, developed by the Office of Strategic Research. This is a building-block model whose 1974 version, utilized in the present series of reports, employs 1970 ruble prices as weights.

(S) Table 13 compares SCAM and SOVOY estimates for the two years of the period of the present paper in which the two sets of estimates overlap. Since there is no independent interest here in comparing the two models, the comparison is not extended beyond 1953. Considering first the resource half of Table 13, it is apparent that there are serious divergences between the two sets of data. To cite but two examples, SOVOY estimates a 3 percent increase in total military outlays in 1953 whereas the SCAM entry shows a 3 percent decline. Construction

(U) ¹On the ground that these outlays are financed outside of the "defense" budget--reserve pay by the reservists' employers, and the other three components from other parts of the state budget.

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Table 13

COMPARISON OF SCAM AND SOVOY-39 ESTIMATES, 1951-1953 (U)

	1951		1952		1953	
	SCAM	SOVOY	SCAM	SOVOY	SCAM	SOVOY
I. RESOURCES^a						
<u>Growth, annual % increases</u>						
Military personnel			7.3	2.2	-7.7	0.3
O&M			8.1	11.4	3.3	5.4
Procurement			-2.9	-1.4	-2.8	4.1
Construction			6.3	34.5	-6.0	-7.7
R&D			3.2	7.5	15.4	7.8
Total outlays			4.1	4.2	-3.3	3.0
<u>Structure, percent of total</u>						
Military personnel	40.8	46.8	42.2	46.0	40.3	44.8
O&M	18.1	12.3	18.9	13.1	20.1	13.4
Procurement	33.9	25.7	31.7	24.4	31.9	24.6
Construction	3.4	2.1	3.5	2.8	3.4	2.5
R&D	3.4	7.9	3.4	8.1	4.1	8.5
Other ^b	.3	5.1	.3	5.6	.3	6.2
Total outlays	100.0	100.0	100.0	100.0	100.0	100.0
II. SERVICE						
<u>Growth,^c annual % increases</u>						
Ground force			6.7	5.1	-11.7	-4.0
Navy, including naval air			16.0	-3.6	-1.9	8.4
Air force, excluding naval air			-8.0	4.5	5.0	1.3
Three services			3.1	3.1	-4.7	1.8
Security forces			10.0	0	-11.4	0
<u>Structure, percent of total</u>						
Ground force	37.9	34.6	38.9	34.9	35.5	33.8
Navy, including naval air	12.6	14.5	14.0	13.4	14.2	14.1
Air force, excluding naval air	27.2	21.3	24.0	21.4	26.1	21.1
Three services	77.7	70.4	76.9	69.7	75.9	69.0
Security forces	4.4	5.6	4.6	5.4	4.2	5.2
R&D	3.4	7.9	3.4	8.1	4.1	8.5
Other ^d	14.6	16.1	15.1	16.9	15.8	17.2
Total	100.0	100.0	100.0	100.0	100.0	100.0

^aCommand and support costs of SCAM are distributed by resource component.

^bSCAM: DOSAAF support. SOVOY: nuclear energy.

^cSCAM: excluding command and support costs.

^dSCAM: command and support, DOSAAF support, reserve pay and subsistence, pensions.
SOVOY: nuclear energy, civilian pay, miscellaneous O&M, nonallocated electronics procurement, DOSAAF, reserve pay and subsistence, pensions.

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is shown as increasing by more than a third in the single year 1952 according to SOVOY but only by 6 percent in the later CIA series. Structural differences are also marked.

(S) The SCAM data appear in the source in a mission-resource breakdown. The following scheme has been used to provide a service distribution:

<u>SCAM Distribution</u>	<u>Service Assignment</u>
Strategic attack (bombers and joint support)	Air force
Strategic defense	
Fighters	Air force
AAA	Ground force
Control and warning	70% to air force; 30% to ground force
Ground	
Ground troops	Ground force
Tacair	Air force
Naval	Navy
Military transport aviation	Air force

(S) Again there are significant divergences between the SCAM and SOVOY data, particularly with respect to the growth of air force outlays.¹ The more recent CIA costing indicates a sharp growth in naval forces in 1952 but a decline in the air force. SOVOY estimates indicate a reverse pattern. SCAM shows a decline in navy expenditures in 1953, SOVOY a significant increase. And so forth.

(S) ¹In SOVOY-39, it should be noted, pay and allowances of the security forces are assumed constant throughout the estimating period.

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(S) The two series differ in the price weights used, 1955 prices for SOVOY and 1970 prices for SCAM. In a letter to the author, CIA has supplied a list of conversion coefficients for a number of elements of the cost model, to enable transformation of 1955 ruble values first to 1968 and then to 1970 prices. The 1968-to-1955 price ratios range from 0.91 to 1.52 but cluster around 1.1-1.2; transition to 1970 prices in most cases seems to involve an additional increase of no more than 8 percent. Thus, the average linked change from 1955 to 1970 prices would seem to be on the order of 20-30 percent. It cannot be determined at this point whether differential price change can help account for the sharp divergences between the SOVOY-39 and SCAM data series.

D. A Note on R&D

(U) In the discussion in Part II, we noted that all the Soviet military services acquired some new weapons of post-war design. For example, the Army deployed the PT-76 amphibious vehicle and the S-60 anti-aircraft gun. The Navy commissioned the "W" and "Z" class long-range submarines, the Chapayev and Sverdlov light cruisers and various other vessels. The Air Force acquired the MIG-9, the MIG-15 A and B, the MIG-17A, and the IL-28. And, of course, the USSR obtained the atom bomb.

(U) Besides having developed the weapons actually deployed in the 1946-1953 period, the Soviet research and development establishment was simultaneously at work on weapons which were to appear in the years beyond 1953. Perhaps most startling to the Western world in terms of immediate threat was the appearance of the large BISON and BEAR inter-continental bombers in 1954 and 1955. R&D activities on these planes,

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deployed in the mid-1950s, must necessarily have begun soon after the end of World War II. Also in progress during the period was work on the diesel powered "G" class ballistic missile submarine, the "H" class nuclear powered ballistic missile submarine, and the missiles with which they were to be equipped. New fighter interceptors, air-to-air missiles, and early warning systems were receiving attention. A substantial R&D effort on space vehicles and launchers was in progress, as evidenced by the appearance of Sputnik in 1957 with effects on the world which are familiar to all. Irrespective of the traditionalist military doctrine proclaimed in the early postwar period, it is obvious that the Soviet leadership was looking to the future.

(U) It is of some interest to note how the USSR was allocating its R&D effort among military missions and organizations. There has been no opportunity to analyze the situation for the years 1946-1949, but some estimates are available for the period 1950-1954. These are based on an examination of the dates at which all identifiable new Soviet weapons were first deployed. R&D dollar costs were assigned to each weapon and the outlays were spread back through the years from the time of first deployment. The mission and organizational subordination of each weapon was established and the individual R&D costs were added for each year to arrive at totals for each mission, organization, and class of weapon. The absolute levels of these totals in dollars or rubles alone would have little meaning, but their distribution, even if based on dollar costs, may be interesting. The distribution is shown in Table 14.

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Table 14

ESTIMATED DISTRIBUTION OF SOVIET R&D EFFORT 1950-1954
(Percentages)

Mission	Organization						Total
	Army	Navy	Air Force	Rocket Forces (a)	Space Organizations (b)	Other	
<u>Strategic Offensive</u>	<u>0.0</u>	<u>15.0</u>	<u>38.3</u>	<u>12.5</u>	<u>0.0</u>	<u>0.0</u>	<u>65.8</u>
A/C and Air-Surface Missiles			<u>38.3</u>				<u>38.3</u>
Land Based Missiles				12.5			12.5
Sea Based Missiles		15.0					15.0
<u>Defensive</u>	<u>0.1</u>	<u>0.0</u>	<u>13.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>13.1</u>
Anti-Aircraft Artillery	0.1						0.1
Surface-Air Missiles			3.0				3.0
Fighters and Air-Air Missiles			10.0				10.0
<u>General Purpose</u>	<u>1.4</u>	<u>10.7</u>	<u>3.9</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>16.0</u>
Army Rockets	0.2						0.2
Army Missiles	0.9						0.9
Army Tanks	0.3						0.3
Navy-Surface Ships		2.2					2.2
Navy-Torpedo Subs		8.5					8.5
Air Force-Attack A/C			3.9				3.9
<u>Support</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>2.3</u>	<u>2.3</u>
Radar						0.7	0.7
Transport A/C						1.0	1.0
Helicopters						0.6	0.6
<u>Space Systems</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>2.8</u>	<u>0.0</u>	<u>2.8</u>
Launch Systems					1.7		1.7
Vehicles					1.0		1.0
TOTALS	1.6	25.7	55.1	12.5	2.8	2.3	100.0

Discrepancies between totals and sums of components are due to rounding.

^aNot organized as a separate entity until 1960.

^bMinistries of Communications and Defense, and Academy of Sciences.

Source: Edmund D. Brunner, Jr., "U.S. and Soviet RDT&E: Economic and Structural Considerations," WN-7870-1, The Rand Corporation, July 1972.

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(U) It can be observed that during these years, the USSR placed considerable emphasis on R&D for the strategic offensive mission, as it apparently absorbed around two-thirds of the total R&D budget, costed in dollars. The Air Force was the largest single beneficiary, as at this time there were large outlays for developing the BADGER medium bomber, the BISON and BEAR intercontinental bombers, and associated air-to-surface missiles. However, the Navy and the precursor organizations of the rocket forces received substantial amounts for work on the first ballistic missile submarines and the ICBM. The effort to strengthen the air defense system was almost entirely an Air Force activity, and 13 percent of total outlays were for this purpose. The strategic and air defense missions, together with smaller expenditures for tactical aviation R&D, combined to give the Air Force about 55 percent of all R&D funding. The Army, with much less complex weapons, apparently spent less than 2 percent of the total. The general purpose forces mission, with 16 percent of all R&D, ranked a poor second to the strategic mission, but somewhat higher than air defense. Navy involvement in both the strategic and general purpose missions combined to give that Service about one-fourth of total R&D outlays. The early R&D efforts on space activities amount to about 3 percent of the total, and these activities were destined to absorb rapidly increasing shares of the overall budget. The Strategic Rocket Forces, already a substantial claimant (12.5 percent), were in later years to assume first place in the R&D hierarchy. To what extent these patterns would be altered by ruble costing cannot be determined.

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IV. SUMMARY AND CONCLUSIONS

(C) Following the end of World War II, a substantial demobilization of Soviet forces took place, lasting through 1947 and perhaps into the first part of 1948. A subsequent buildup, which is likely to have begun seriously in 1949, brought a growth in the size of all the services to 1952. Between 1952 and 1953, the Ground Forces decreased in size, while the Air Force and Navy continued to grow. Overwhelmingly preponderant in the force and budget structure at the end of the war, the Ground Forces declined tangibly in relative weight in favor of the other two services.

(U) With respect to forces in being, the USSR concentrated its strength in the homeland and in Europe, and these forces were not of a nature to apply military might over remote areas of the world. The increasingly mechanized ground troops possessed the bulk of the manpower and established their first airborne divisions. Much attention was given to developing and improving tactical aviation for the support of the ground troops. The air defense system grew rapidly and was given priority in the acquisition of new jet fighter aircraft. The Navy's growing fleet was modernized, but the bulk of it consisted of ships and submarines with limited range capabilities. Europe was indeed held hostage while the Soviet Union took its first steps toward acquiring strategic air power. The Long Range Air Force was established and equipped with the TU-4, and doubtless with some numbers of atomic weapons. This force could have heavily damaged Western Europe, but at best it had only marginal capacity against the U.S.

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(U) While the nature of the forces in being during the 1946-1953 period seemed generally consonant with traditional Soviet military doctrine, the USSR implemented in these years a substantial research and development program with the objective of establishing a truly intercontinental strategic nuclear capability. This R&D effort was to result in a limited long range air force, but very powerful nuclear ICBM and fleet ballistic missile forces comprising the Soviet portion of "the balance of terror."

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Appendix

SOVIET MILITARY OUTLAYS DURING WORLD WAR II

For the purpose of developing estimates of Soviet military expenditures in the early postwar years, as well as for the purpose of serving as a base of comparison with such estimates, it would be useful to develop estimates for World War II. This Appendix is intended to help meet that objective. It is made possible by the appearance in the U.S. of a Soviet work on World War II finance that was previously unobtainable.¹

The first step is to split "defense" expenditures in the Soviet state budget between the two military users--the Commissariats of Defense (NKO) and Navy (NKVMF). Total defense expenditures, 1940-1945, and NKO expenditures, 1941-1945, are given in absolute terms (FS, pp. 29 and 57). NKO outlays in 1940 may be calculated from the 1941 figure and index numbers for 1941-1945 shown on p. 66 of the source. The same page also shows the index numbers for total defense (which are, incidentally, consistent with the absolute figures provided on p. 57). Comparable index numbers for NKVMF outlays are cited on p. 334. The three sets of index numbers are shown below, along with the 1940 base figures for the shares of NKO and NKVMF outlays in total defense which the index numbers imply:²

¹Col. (Reserve) V. N. Dutov, ed., Finansovaia sluzhba Vooruzhennykh Sil SSSR v period voyny, Voenizdat, 1967, hereafter abbreviated to FS. Translated in JPRS 622294-1 and -2, 21 June, 1974, as Finance Service of the Soviet Armed Forces During the War. Page references below are to the Russian text.

²It seems clear that the indexes refer to current-price, not constant-price magnitudes.

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	<u>1941</u>	<u>1942</u>	<u>1943</u>	<u>1944</u>	<u>1945</u>
<u>Indexes, 1940 = 100</u>					
Total defense	146.1	190.8	220.1	242.6	225.7
NKO	155.1	216.5	250.4	274.5	252.8
NKVMF	102.0	80.6	81.8	93.7	109.9
<u>Implied 1940 shares in total defense, percent</u>					
NKO	83.1	81.1	82.0	82.4	81.0
NKVMF	16.9	18.9	18.0	17.6	19.0

The differences in the implied 1940 shares are too large to be attributed solely to rounding of the index numbers. Therefore, it is possible that there is a third component of the total "defense" series other than NKO and NKVMF outlays. It seems useless to speculate on the identity of this component, but it is surely small in size. If NKO outlays in 1940 are subtracted from total defense in that year, the difference is 10.2 billion rubles. Arbitrarily, it is assumed that NKVMF expenditures in 1940 were 10 BR, and the figure is extended in time by the NKVMF index cited above. The resulting estimates are shown in Appendix Table 1.

We can now establish the values of NKO procurement¹ of arms, ammunition, vehicles, and other equipment, by type (Appendix Table 2). The figures in Appendix Table 2 are calculated from annual shares of all NKO procurement in total NKO outlays and from the annual structure of NKO procurement. FS also provides indexes of procurement outlays and annual percentage increases. These may be compared with corresponding figures calculated from Appendix Table 2, as in Appendix Table 3.

¹Procurement may include major hardware repair, in full or in part. It seems likely that minor repair--what the Soviets call "current" repair--is a component of maintenance outlays (see p.54 below).

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Appendix Table 1

SOVIET DEFENSE OUTLAYS, 1940-1945
(Billion rubles, prices of each year)

	Defense	Of which		
		NKO	NKVMF	Unidentified
1940	56.8	46.6	10.0	.2
1941	83.0	72.3	10.2	.5
1942	108.4	100.9	8.1	-.6
1943	125.0	116.7	8.2	.2
1944	137.8	127.8	9.4	.6
1945	128.2	117.8	11.0	-.6

Source:
See text.

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Appendix Table 2

NKO Procurement Outlays by Type, 1940-1945
(Billion rubles)

	1940	1941	1942	1943	1944	1945
Total NKO procurement ^a						
of which	14.6	24.2	34.0	39.6	44.3	31.6
Artillery, infantry weapons, and ammunition	6.1	10.1	15.2	17.0	19.4	13.0
Air force armament	5.5	8.5	9.5	12.6	12.0	9.5
Armored equipment	1.0	3.7 ^c	7.1 ^c	4.6	5.7	5.4
Motor vehicles and tractors	1.1	d	d	3.3	5.5	2.6
Other armament and supplies ^b	.8	1.8	2.2	2.1	1.7	1.1

^aTotals do not necessarily equal sums of components due to rounding.

^bProchie vooruzhenie i imushchestvo. Including "technical and chemical equipment (imushchestvo), communications equipment and many other items of military equipment and supplies" (voennaia tekhnika i imushchestvo), FS, p. 68.

^cIncluding motor vehicles.

^dIncluded with armored equipment.

Source:

Computed from NKO totals in Appendix Table 1 and data in FS giving annual shares of all procurement in the NKO totals and the structure of NKO procurement (pp. 66-68).

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Appendix Table 3

Comparisons of Reported and Calculated Indexes (1940 = 100)
and Annual Percentage Increases of
NKO Procurement, 1941-1945

		1941	1942	1943	1944	1945
<u>All NKO procurement</u>						
Indexes:	Reported	165.7	232.7	270.9	303.2	216.1
	Calculated	165.8	232.9	271.2	303.4	216.4
% increases:	Reported	65.7	40.5	16.4	11.9	-28.7
	Calculated	65.8	40.5	16.5	11.9	-28.7
<u>Artillery, etc.</u>						
Indexes:	Reported	165.0	247.2	276.9	314.8	211.3
	Calculated	165.6	249.2	278.7	318.0	213.1
% increases:	Reported	65.0	49.8	12.0	13.7	-32.9
	Calculated	65.6	50.5	11.8	14.1	-33.0
<u>Air force armament</u>						
Indexes:	Reported	155.5	173.0	228.8	218.7	174.1
	Calculated	154.5	172.7	229.1	218.2	172.7
% increases:	Reported	55.5	11.3	32.3	-4.4	-22.4
	Calculated	54.5	11.8	32.6	-4.8	-20.8
<u>Armored equipment, vehicles and tractors</u>						
Indexes:	Reported	173.3	334.8	373.0	523.9	371.7
	Calculated	176.2	338.1	376.2	533.3	381.0
% increases:	Reported	73.3	93.2	11.4	22.8	-5.9
	Calculated	76.2	91.9	11.1	41.8	-28.6
<u>Other armament and supplies</u>						
Indexes:	Reported	217.1	257.0	242.9	208.9	129.7
	Calculated	225.0	275.0	262.5	212.5	137.5
% increases:	Reported	117.1	18.4	-5.5	-14.0	-37.9
	Calculated	125.0	22.2	-4.5	-19.0	-35.3

Source:

FS, pp. 68-69, and Appendix Table 2.

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Appendix Table 3 indicates that the values of Appendix Table 2, computed from source data on annual shares, are reasonably consistent with source data on indexes and percentage increases, with the possible exception of the series for "other armament and supplies" and the figures for "armored equipment, vehicles and tractors" in 1944-1945. In the latter cases, the difficulty seems easily resolved: reported index numbers and reported percentage increases are inconsistent. Calculated from the reported index numbers, the percentage increases are close to ones I have computed directly from the absolute values:

	<u>Armored equipment, etc.</u>	
	<u>1944</u>	<u>1945</u>
Calculated percentage increase, based on Appendix Table 2	41.8	-28.6
Reported percentage increase	22.8	-5.9
Percentage increase computed from reported index numbers, Appendix Table 3	40.5	-29.1

Apparently, the source computed the percentage increases in 1944 and 1945 from values of armored equipment alone, without motor vehicles and tractors; the values in Appendix Table 2 for armored equipment alone imply changes of 23.9 and -5.3 percent in 1944 and 1945 respectively--i.e., close to the percentage increases reported in the source.

The relative divergences of calculated from reported percentage changes in Appendix Table 3 for "other armament and supplies" are particularly marked in 1942-1944. This series is vulnerable to error, because the 1940 entry contains a single significant digit and because of the small size of the values in other years. However, the absolute error is not likely to be large for any of the members of the series in Appendix Table 2.

Again, it seems evident that the source indexes are computed from current rather than constant-price series.

Pay and money allowances as well as transportation expenditures in the NKO allocation may also be computed for each of the years in this period, as shown in Appendix Tables 4 and 5. For their SNIP accounts,

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Appendix Table 4

Pay and Money Allowances, NKO, 1940-1945
(Billion rubles)

	1940	1941	1942	1943	1944	1945
Servicemen	8.2	13.6	24.6	30.2	32.6	45
Workers and Employees	..	.7	1.1	1.6	2.0	2
Total	..	24.3	25.7	31.8	34.6	47

".." means not available.

Source:

Calculated from percentage shares in total NKO outlays for 1941-1945 reported by FS, p. 214, and absolute NKO totals from Appendix Table 1. FS, p. 215 also provides index numbers on a 1940 base for servicemen pay and allowances. The annual percentage increases implied by the reported index numbers are very close to those calculated from the absolute values of the first row in this table. Therefore, the index numbers are used to calculate a 1940 value of servicemen pay and allowances.

Appendix Table 5

Transportation Outlays, NKO, 1940-1945
(Million rubles)

	1940	1941	1942	1943	1944	1945
Expenditures on military shipments						
Freight	559	793	1039	2763	4143	2907
Troops (<u>Eshelonnie perevozki</u>)	199	270	284	629	459	692
Passengers	486	533	710	938	803	1178
Shipments by water ^a	62	48	133	155	70	129
Unidentified	21	24	27	2	7	14
Total	1327	1667	2193	4488	5482	4920
Maintenance and repair of spur lines and rolling stock	18	14	7	11	13	20

^aIncludes value of passenger and freight shipments completed on waterways.

Source:

FS, pp. 157, 158.

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compiled more than 20 years ago, Bergson and Heymann estimated total military pay as 4.1 billion rubles in 1940 and 14.2 billion in 1944, on the basis of fragmentary indications.¹ Judging from Appendix Table 4, the absolute and relative error of the Bergson-Heymann estimates in either year is substantial, but the implied relative growth between the benchmarks was reasonably accurate.

Finally, we are also told that outlays on (a) baths and laundries came to 196 million rubles in 1940, 258 million in 1941, 333 million in 1942 and 358 million in 1945; (b) "current" repair of military buildings and equipment was over 175 million rubles in 1940 but was cut sharply to 58 million in 1943.²

Further direct breakdown of the NKO totals is not possible. Appendix Table 6 displays available data on relative financing of construction and hardware repair: these data too are at current prices. The source asserts that because of the availability of materials and services requiring no budget outlay and because of decreases in cost, substantial savings were achieved (FS, p. 116). We are also told (FS, p. 117) that after 1 May 1942 the pay of staff military personnel of military construction organizations was paid from funds covering general military pay and allowances (paragraph 1, article 1 of the NKO estimate). Thus, changes in the real volume of construction were different from the pattern indicated by the index in Appendix Table 5. There may be a similar understatement of the real volume of repair in Appendix Table 6 in view of the widespread use of soldiers in repair enterprises (FS, p. 109). This should also be true of the procurement time series in view of Soviet claims of substantial cost and price decreases during the war.

¹Abram Bergson and Hans Heymann, Jr., Soviet National Income and Product 1940 through 1948, R-253, June 1953, Table 3.

²FS, pp. 175-176, 183. In addition to the indicated outlays on baths and laundries financed from article 11 of the NKO "estimate" (smeta), there were expenditures for the same purposes scattered among other articles of the estimate (pp. 176-177).

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Appendix Table 6

Relative Outlays on Construction and Hardware Repair,
NKO, 1940-1945

	1940	1941	1942	1943	1944	1945
<u>Percent distribution of annual</u> <u>NKO outlays on construction</u>						
Defensive (<u>oboronitel'noe</u>)	18.2	54.4	65.5	58.1	52.1	12.9
General military (<u>obshchev</u> <u>voiskovoe</u>)	69.7	36.8	23.5	29.2	40.7	62.3
Airfield	4.4	5.2	5.2	6.2	5.4	4.8
Other	7.7	3.6	5.8	6.5	1.8	20.0
Total	100.0	100.0	100.0	100.0	100.0	100.0
<u>Index, 1940 = 100</u>						
Financing construction	100.0	120.0	90.0	51.0	66.5	75.9
Financing hardware repair	100	228	223	281	317	410

Source:

FS, pp. 105, 114, 116. Outlays are identified as those financed from paragraphs 6 (construction) and 21 (hardware repair) of the NKO estimate.

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NKVMF Outlays

The Navy's expenditures--in total and by component, as available--are compiled in Appendix Table 7. Maintenance accounted for 38 percent of the total in the last prewar year but about three-fifths during the war. Procurement outlays were more than half of the total in 1940 but less than two-fifths during the war. Construction was cut way back.

The source's chapter on Navy outlays provides two different indexes for total construction. However, it seems clear that the second (p. 355) identified as the "volume (ob'em) of capital construction" refers to the physical volume rather than to the financing of naval construction. The first is therefore used in the development of Appendix Table 7.

Summary, NKO and NKVMF

Appendix Table 8 summarizes the estimates of expenditures by NKO and NKVMF, developed on the basis of FS. The NKO residual accounts for almost half of all NKO outlays in 1940 but falls to about 35 percent in 1943-1944 and less than 30 in 1945. Most of this residual is probably O&M outlays--primarily on POL and troop subsistence; construction is probably a relatively minor element.¹ The residual may or may not cover some pensions and family allowances.²

The Structure of Cumulative Defense Outlays

On p. 132, FS states that the aggregate cost of fuel, food, and clothing used by both NKVMF and NKO during the war was 150.3 billion rubles, or 25.8 percent of State Budget outlays on defense. Presumably,

¹See also below, p. 60 of this Appendix.

²Inclusion is implied by chapter 16 of FS. However, Zverev, the long-time Minister of Finance, asserts the contrary. A. Zverev, "Sovetskie finansy v period Velikoi otechestvennoi voyny," Finansy SSSR, 1967, No. 5, p. 24.

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Appendix Table 7

Indexes of NKVMF Outlays, 1941-1945
(Billion rubles, except as indicated)

	1940	1941	1942	1943	1944	1945
Procurement	5.3	..	3.0	3.2	3.5	4.3 ^e
Construction, total	.9	..	.3	.2	.4 ^e	.5
Coastal and base	.5	...	.2 ^c	..	..	..
Barracks and associated personnel construction ^a	.2	..	- ^c	..	..	..
Fuel, arms, ammo and equipment depots	.1	..	..	..	..	..
Aviation ^b	.1	.2	.1	.2	.4	.4
"Maintenance," total	3.8	..	4.8 ^d		5.5	6.2
components: Indexes, 1940 = 100						
Pay (par. 1, art. 1)	100	..	..	..	..	200+
Subsistence	100	..	..	..	..	172
Transportation	100	..	..	..	..	191
Combat and physical training	100	..	c.33 ^d		..	..
Housing and medical service	100	..	c.67 ^d		..	..
Hydrographic service	100	88.3	36.1	30.9	..	..
Floating equipment and harbors	100	..	42.4	..	48.8	..
All NKVMF outlays	10.0	10.2	8.1	8.2	9.4	11.0

"-" means less than 50 million rubles

^aKazarmennoe i kul'turno-bytovoe stroitel'stvo

^bBy the Airfield Construction Administration of the Navy

^cFigures refer to the "volume" (ob'em) rather than to the financing of construction.

^dIn 1942 and in 1943.

^eComputed as a residual, total NKVMF outlays less the other two major components.

Source:

Indexes of procurement, construction and maintenance (which are indicated as comprising all of Navy expenditures) in 1942 and 1943, along with indexes of total Navy outlays, all on a 1940 base (FS, pp. 334-335), imply the following shares in total Navy outlays in 1940: procurement 53 percent, maintenance 38 percent, construction 9 percent. This calculation is crude because the index number for maintenance is stated as approximately 125 in both 1942 and 1943. However, when the index numbers are translated to absolute values on the basis of these computed shares and the absolute totals given in Appendix Table 1, the results are in

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Source: (contd.)

rough conformity with a statement in the source that on the average during the war, maintenance accounted for 60 percent of all Navy allocations (FS, p. 334).

Indexes of maintenance components are taken from pp. 335-337. Values for construction components are the product of 1940 shares and index numbers for other years, from pp. 354. The indicated construction components accounted for 97.6 percent of all construction outlays in 1940.

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Appendix Table 8

Summary of NKO and NKVMF Military Expenditures, 1940-1945
(Billion rubles)

	1940	1941	1942	1943	1944	1945
NKO, total	46.6	72.3	100.9	116.7	127.8	117.8
Pay and allowances	9	24.3	25.7	31.8	34.6	47
Procurement of hardware	14.6	24.2	34.0	39.6	44.3	31.6
Operations and Maintenance						
Transportation outlays	1.3	1.7	2.2	4.5	5.5	4.9
Current repair, buildings and equipment	.2	..	..	.1	..	..
Other: other O&M, construction and unidentified	22	22.1	39.0	40.7	43.4	34
NKVMF, total	10.0	10.2	8.1	8.2	9.4	11.0
Maintenance	3.8	..	4.8 ^a		5.5	6.2
Procurement	5.3	..	3.0	3.2	3.5	4.3
Construction	.9	..	.3	.2	.4	.5

^aIn both 1942 and 1943.

Source:

Appendix Tables 1, 2, 4, 5 and 7, and p. 54 of this Appendix.

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the statement refers to the years 1941-1945. Thus, we may establish the following breakdown:

<u>Total defense, 1941-1945</u>		<u>583 billion rubles</u>
Procurement	NKO	174
	NKVMF	c. 16
Pay and allowances	NKO	163
	NKVMF ¹	c. 16
Fuel, food, clothing	total	150
Construction, NKVMF		2
Remainder: NKO construction, other O&M and miscellaneous for both commissariats		62

The remainder is 11 percent of the aggregate total, which suggests that construction in the NKO accounted for considerably under 10 percent of both the defense and NKO totals.

¹ Assuming that pay accounted for half of navy maintenance in 1940 and grew at a steady rate until 1945.

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