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COMPARISON
OF US AND ESTIMATED SOVIET EXPENDITURES
FOR SPACE PROGRAMS



CIA/RR MM 64-2

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CENTRAL INTELLIGENCE AGENCY

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CONTENTS

	<u>Page</u>
Conclusions	1
Discussion	3

Tables

1. Estimated Soviet and Actual US Space Expenditures, by Fiscal Year, 1957-64	4
2. Soviet and US Space Expenditures as a Share of Total Defense and Space R & D Expenditures, by Fiscal Year, 1961-64	5

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COMPARISON OF US AND ESTIMATED SOVIET EXPENDITURES
FOR SPACE PROGRAMS*

Conclusions

Soviet investment in space programs has been expensive but has paid handsome dividends in the form of a number of spectacular space accomplishments that created an image of military strength and technological superiority. Well-publicized Soviet space "firsts" and an official policy of concealing failures have imbued the Soviet space effort with an aura of virtually unblemished success, although well over one-third of all Soviet space attempts have ended in failure. In spite of economies resulting from the use of military boosters and facilities, total Soviet outlays for space are estimated with a relatively high degree of confidence to lie within a range of \$6 billion to \$10 billion through fiscal year 1964. The magnitude of this range results primarily from different assumptions regarding the timing of the Soviet manned lunar landing program. Total US space expenditures, as of the same date, have been substantially greater than those of the USSR -- approximately \$16 billion for all civilian and military space programs.

* The conclusions in this memorandum represent the best judgment of this Office as of 15 August 1964.

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Discussion

There is no direct information available on the actual expenditures of the USSR for its space effort. In the absence of direct information, it has been necessary to divide the Soviet space effort into two main categories for the purpose of estimating costs: (1) those programs for which launches have occurred and (2) those which may be underway but are still in the pre-launch stages. Estimates of costs for programs in the flight phase are made by valuing each observed Soviet program as if it were conducted in the US. This approach entails adjusting US costs to reflect fundamental differences in program philosophy, hardware characteristics, and operational procedures. The estimated Soviet costs are then ranged to account for uncertainties inherent in the estimative process. Still greater uncertainties are involved in estimating the cost of Soviet programs in the second category -- those programs that may be underway but have not been identified through the detection of flights.

Uncertainties as to the cost of individual programs have caused such costs to be estimated in terms of a relatively broad range of values. Because the magnitude of these ranges is believed to encompass the most likely alternatives, there is a relatively high degree of confidence that actual Soviet expenditures fall within the limits of the ranges estimated. Current estimates of annual Soviet expenditures and the actual US expenditures for space programs are given in Table 1.* The magnitude of the range for any given year reflects the level of confidence in the estimates; for the distant past, when Soviet space activities are fairly well established, the magnitude is narrower than for more recent years, when unknowns in the Soviet space program are more numerous. For those programs in the flight test phase, it is estimated that the USSR had spent the equivalent of about \$4 billion and perhaps as much as \$6 billion through fiscal year 1964. Additional expenditures for programs that may be underway, but not identified through the detection of flights, may be on the order of \$2 billion to \$4 billion.

Space outlays have been high for both the US and the USSR and will continue to grow as more advanced programs are undertaken. Although the space race has imposed some strains on the economic and technological resources of both countries, the US, with its substantially higher absolute level of economic activity, its generally more advanced technology, and its considerable unused capacity, probably is better able to support costly space programs without affecting other priority national objectives. In the USSR the space effort, together with advanced weapons programs, probably has preempted a large share of the scarce high-quality materials and skilled manpower that also are needed to increase the efficiency and rates of growth of the Soviet economy. Nevertheless, in spite of economic strains, the USSR has continued to

* P. 4, below.

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allocate substantial resources to its space program, and there seems little doubt that Soviet expenditures for space are destined to grow as a result of new missions and space systems evidently programed for the next few years.

Table 1

Estimated Soviet and Actual US Space Expenditures
by Fiscal Year
1957-64 a/

Billion US \$

<u>Fiscal Year</u>	<u>US</u>	<u>USSR</u>
1957 and before	0.1	0.2 to 0.3
1958	0.2	0.2 to 0.4
1959	0.5	0.3 to 0.4
1960	0.9	0.3 to 0.5
1961	1.5	0.7 to 1.0
1962	2.4	0.8 to 1.2
1963	4.1	1.5 to 2.4
1964	6.2	2.0 to 4.0

a. In later years the upper limit of estimated Soviet expenditures reflects a manned lunar landing program competitive with the US Apollo program; the lower limit reflects a noncompetitive lunar program. The balance of estimated expenditures contained in both limits of the range reflects an allowance for programs other than the manned lunar landing.

A means of gauging the relative importance of the space effort in the two countries is provided by comparing the share of total defense and space R & D expenditures devoted to space activities. The share* of estimated Soviet expenditures for space in the total defense and space R & D account in recent years is less than the share of actual US space expenditures in the corresponding US total (see Table 2). In 1961, when the range of uncertainty about Soviet space activity is relatively narrow, the Soviet space share is about 15 percent, while the US share is 18 percent. In 1964, when the estimates reflect some expenditures for

* Technically the share of space programs in Soviet defense and space R & D should be measured in rubles to reconstruct the situation as the USSR views it rather than in terms of equivalent US costs. At the present time, however, the ruble estimates of Soviet defense and space R & D cannot be disaggregated, and the costs of the Soviet space program are not sufficiently understood to permit a comparison in ruble terms.

a manned lunar landing program, the Soviet share is about 30 to 40 percent compared with 46 percent for the US. Thus, even if the USSR is undertaking a competitive manned lunar landing program, the share of space in current Soviet defense and space R & D expenditures probably is still less than that for the US.

Table 2
Soviet and US Space Expenditures
as a Share of Total Defense and Space R & D Expenditures a/
by Fiscal Year
1961-64

Expenditures	Unit	Fiscal Year			
		1961	1962	1963	1964
USSR					
Total Defense R & D	Billion US \$	4.6 to 7.0	5.3 to 8.0	6.0 to 9.1	6.5 to 10.3
Of which:					
Space	Billion US \$	0.7 to 1.0	0.8 to 1.2	1.5 to 2.4	2.0 to 4.0
Space as a share of total <u>b/</u>	Percent	15	15	25	30 to 40
US					
Total Defense R & D	Billion US \$	8.5	9.4	10.7	13.4
Of which:					
Space	Billion US \$	1.5	2.4	4.1	6.2
Space as a share of total	Percent	18	26	38	46

a. For the US this total is the sum of the research, development, test, and evaluation expenditures of the Department of Defense (DOD), the Atomic Energy Commission (AEC), and the National Aeronautics and Space Administration (NASA). For the USSR this total refers in concept to classified works of national importance, primarily military, nuclear energy, and space RDT & E activities. It is derived from published Soviet financial allocations, the precise scope of which is unknown, and, therefore, the estimates contain a range to reflect this uncertainty. These allocations are expressed in current rubles and converted to dollars.

b. Although the estimates, because they contain a range, result in a corresponding range of percentages, this range is not significant for 1961-63, and, therefore, a single-valued percentage rounded to the nearest 5 has been used for these years.

Clearly the most complex and most costly program that the USSR might be able to accomplish in this decade is a manned lunar landing program. The US Apollo program will cost an estimated \$20 billion,

and peak annual expenditures in 1964-65 will be on the order of \$4 billion to \$4.5 billion. Although no pertinent Soviet cost data are available, it is estimated that it could cost the USSR as much as the US to perform a manned lunar landing mission. On the other hand, if the USSR were able to effect economies in carrying out the program through the use of a different mode* and different hardware, the total cost might be somewhat less -- perhaps the equivalent of about \$15 billion. A Soviet program competitive with the US program thus might cost \$15 billion to \$20 billion and probably would require peak annual expenditures on the order of \$3 billion to \$4.5 billion in 1965-66.

Having used its space program to create an image of strategic capabilities and technological prowess, the USSR can ill afford to ignore the challenge offered by the US manned lunar landing program. Aside from concern about the Soviet image should the US be the first to land a man on the moon, the leadership would have to consider the possible implications -- political, scientific, and military -- of establishment of a US lunar base in the 1970's, even though the consequences of such a project cannot now be fully foreseen. If the USSR chooses not to compete directly, it may try to offset the US program by a less expensive achievement, such as a circumlunar flight or a manned earth orbital space station, and by extensive unmanned exploration of space, the moon, and the nearby planets. In any event, the Soviet space program will be increasingly expensive, not only in aggregate monetary terms but also in terms of the scarce human and material resources that are needed for other high-priority military and civilian programs.

* The USSR appears to favor an earth orbital rendezvous mode rather than the lunar orbital rendezvous mode adopted by the US.