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27TH DOCUMENT of Level 1 printed in FULL format.

Public Papers of the Presidents

Address to the German People on the Reunification of Germany

26 Weekly Comp. Pres. Doc. 1513

October 2, 1990

LENGTH: 546 words

It is with great pleasure that I congratulate Chancellor Kohl and the German people at this historic moment. And it is my distinct honor to address the people of the united Germany.

In Berlin and Bonn, from Leipzig in the east to western towns along the Rhine, people are celebrating the day that all of Germany has been waiting for, for 45 long years. For the world, those 45 years were a time of tension and turmoil. For your nation, fate was particularly cruel. For 45 years, at the heart of a divided continent stood a divided Germany, on the fault line of the East-West conflict, one people split between two worlds.

No more. Today begins a new chapter in the history of your nation. Forty-five years of conflict and confrontation between East and West are now behind us. At long last the day has come: Germany is united; Germany is fully free.

The United States is proud to have built with you the foundations of freedom; proud to have been a steady partner in the quest for one Germany, whole and free. America is proud to count itself among the friends and allies of free Germany, now and in the future. Our peoples are united by the common bonds of culture, by a shared heritage in history. Never before have these common bonds been more evident than in this past year as we worked in common cause toward the goal of German unity. Today, together, we share the fruits of our friendship.

In this past year, we've witnessed a world of change for the United States, for the united Germany, for the Atlantic alliance of which we are a part. Even as Germany celebrates this new beginning, there is no doubt that the future holds new challenges, new responsibilities. I'm certain that our two nations will meet these challenges, as we have in the past, united by a common love of freedom. Together, building on the values we share, we will be partners in leadership.

This day, so full of meaning for Germany, is full of meaning for the world. Meters away from the walls of the Reichstadt, scene of the first session of the newly united German Parliament, stood the Berlin Wall, the stark and searing symbol of conflict and cold war. For years, free men and women everywhere dreamed of the day the Berlin Wall would cease to exist, when a world without the Wall would mean a Germany made whole once more -- when Germany, united and sovereign, would contribute in full measure as a force for peace and stability in world affairs.

Today the Wall lies in ruins, and our eyes open on a new world of hope. Now Germany is once more united. Now the Wall no longer divides a nation and a world in two. The last remnants of the Wall remain there at the heart of a free Berlin, a ragged monument in brick and barbed wire, proof that no wall is ever

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strong enough to strangle the human spirit, that no wall can ever crush a nation's soul.

Today the German nation enters a new era; an era, in the words of your national anthem, of "unity and justice and freedom." At this moment of celebration, as we look forward with you to a future of hope and promise, let me say, on behalf of all Americans, may God bless the people of Germany.

Note: The President's remarks were videotaped in the Oval Office at the White House for broadcast by German television.

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7TH DOCUMENT of Level 1 printed in FULL format.

Public Papers of the Presidents

Advance Text of the Thanksgiving Address to the Nation

25 Weekly Comp. Pres. Doc. 1819

November 22, 1989

LENGTH: 2200 words

Like many of you, I'm spending tomorrow with family. We'll say grace, carve the turkey, and thank God for our many blessings and for our great country.

This holiday also marks the adjournment of Congress. And I've worked with Congress, extending my hand across the party aisle, advancing legislation to free our streets of the fear of crime and drugs. We proposed ways to clean the air, the water, and the land around us. We've joined with the Nation's Governors to enter an historic compact to better our schools. And especially touching is that so many Americans have answered the call for community service, the Thousand Points of Light, by rolling up their sleeves and pitching in for the hopeless, the helpless -- each volunteer, a beacon of light for someone who has lost his way.

This will be a very special Thanksgiving. It marks an extraordinary year. But before our families sit down tomorrow, we will give thanks for yet another reason: Around the world tonight, new pilgrims are on a voyage to freedom, and for many, it is not a trip to some faraway place but to a world of their own making.

On other Thanksgivings, the world was haunted by the images of watchtowers, guard dogs, and machineguns. In fact, many of you had not even been born when the Berlin Wall was erected in 1961. But now the world has a new image, reflecting a new reality: that of Germans, East and West, pulling each other to the top of the Wall, a human bridge between nations; entire peoples all across Eastern Europe bravely taking to the streets, demanding liberty, talking democracy. This is not the end of the book of history, but it is a joyful end to one of history's saddest chapters.

Not long after the Wall began to open, West German Chancellor Kohl telephoned and asked me to give you, the American people, a message of thanks. He said that the remarkable change in Eastern Europe would not be taking place without the steadfast support of the United States -- fitting praise from a good friend. For 40 years, we were not wavered in our commitment to freedom. We are grateful to our American men and women in uniform. We should also be grateful to our postwar leaders. You see, we helped rebuild a continent through the Marshall plan; and we built a shield, NATO [North Atlantic Treaty Organization], behind which Europeans and Americans could forge a future in freedom.

For so many of these 40 years, the test of Western resolve, the contest between the free and the unfree, has been symbolized by an island of hope behind the Iron Curtain: Berlin. In the 1940's, West Berlin remained free because Harry Truman said: Hands off. In the 1950's, Ike backed America's words with muscle. In the 1960's, West Berliners took heart, when John F. Kennedy said: "I am a Berliner." In the 1970's, Presidents Nixon, Ford, and Carter stood with Berlin by standing with NATO. And in the 1980's, Ronald Reagan went to Berlin

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to say: "Tear down this wall." Now we are at the threshold of the 1990's. And as we begin the new decade, I am reaching out to President Gorbachev, asking him to work with me to bring down the last barriers to a new world of freedom. Let us move beyond containment and once and for all end Cold War.

We can make such a bold bid because America is strong and 40 years of perserverance and patience are finally paying off. More recently, quiet diplomacy, working behind the scenes, has achieved results. We can now dare to image a new world, with a new Europe, rising on the foundations of democracy. This new world was taking shape when my President began with these words: "The day of the dictator is over." During the spring and summer we told the people of the world what America believes and what America wants for the future. America believes that "liberty is an idea whose time has come in Eastern Europe." America wants President Gorbachev's reforms, known as perestroika, to succeed. And America wants the Soviets to join us in moving beyond containment to a new partnership. Some wondered if all this was realistic. Now, though we are still on the course set last spring, events are moving faster than anyone imagined or predicted.

Look around the world. In the developing nations, the people are demanding freedom. Poland and Hungary are now fledgling democracies -- a non-Communist government in Poland and free elections coming soon in Hungary. And in the Soviet Union itself, the forces of reform under Mikhail Gorbachev are bringing unprecedented openness and change.

But nowhere in the world today, or even in the history of man, have the warm hearts of men and women triumphed so swiftly, so certainly, over cold stone as in Berlin, indeed, in all of East Germany. If I may papaprhase the words of a great poet, Robert Frost: There is certainly something in us that doesn't love a wall.

When I spoke to the German people in Mainz last May, I applauded the removal of the barriers between Hungary and Austria, saying: "Let Berlin be next." And the West German people joined us in a call for a Europe whole and free.

Just yesterday, the West German Foreign Minister gave me a piece of the Berlin Wall. It is on my desk as a reminder of the power of freedom to bring down the walls between people. It brought back memories of 7 years ago, when I went to Modlareuth, a small town in Germany also known as Little Berlin, a divided village, really, its cobbled streets blocked by barbed wire and concrete. On the one side freedom; on the other, despair. I talked with the townspeople, not 150 yards from the specter of armed guards in towers. Someday I'd like to go back to Little Berlin and see families reunited, see neighbors once apart coming together.

Change is coming swiftly, and with this change, the dramatic vindication of free Europe's economic and political institutions. The new Europe that is coming is being built -- must be built -- on the foundation of democratic values. But the faster the pace, the smoother our path must be. After all, this is serious business. The peace we are building must be different than the hard, joyless peace between two armed camps we've known so long. The scars of the conflict that began a half century ago still divide a continent. So, the historic task before us now is to begin the healing of this old wound.

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During our visit to Poland and Hungary last July, I found new encouragement that we were on track: that there was, at long last, the chance for fundamental change. I saw firsthand acts of healing and reconciliation. It was in Warsaw, at my lunch for General Jaruzelski and the leaders of Solidarity, that I met a woman who had worked, at great personal risk, for the release of jailed Solidarity members. She was asked: "How is it possible, after such a short time, to break bread with the men who ordered those imprisonments? Why the absence of bitterness?" And she replied: "Our joy at what is happening now is more powerful than memory." I wish you could have been there, for what we witnessed was extraordinary. The old antagonisms melted away as former adversaries stood up, often with tears in their eyes, and toasted the future. Our guests knew that history would judge them by how well they would cooperate. Well, there is a spirit of cooperation in Eastern Europe. The result: Poland and Hungary are being transformed.

They deserve our support, and they're getting it. We have matched our words with action: new loans and grants, teams of American economic experts working to help them adjust to a free-market society, clearing the way for U.S. investment and trade with Poland and Hungary. Now the peoples of these nations can finally expect their hard work to lead to a better life.

These same winds of change are sweeping our own hemisphere: democracy transforming the Americas with stunning speed. Regrettably, there are some exceptions -- Panama, Nicaragua, and Cuba. And these last two are holding out against their people only because of the massive support of weapons and supplies from their Communist allies. So, when I see President Gorbachev, I'll ask him to join with us to help bring freedom and democracy to all the people of Latin America.

So, as we celebrate the events of Eastern Europe, remember that some walls still remain between East and West. These are the invisible walls of suspicion; the walls of doubt, misunderstanding, and miscalculation.

It was while in Eastern Europe last summer that I decided to make a personal effort to break through these last barriers. Back in May, I set down five steps President Gorbachev should meet if we are to take his new thinking seriously: First, reduce Soviet forces; second, support self-determination in Eastern Europe; third, work with us to end regional disputes; fourth, achieve a lasting pluralism and respect for human rights; and fifth, join with us in addressing global problems, including the international drug menace and dangers to the environment. Serious problems still remain, especially regional conflicts. The Soviet Union has made progress in these five areas. That is undeniable.

With that in mind and the momentous changes in Eastern Europe, I invited President Gorbachev to meet me 10 days from now. This is a first meeting, a time for exploration. It is not a time for detailed arms control negotiations best left for next year's summit. I want President Gorbachev to know exactly where the United States stands. Let me be clear: America stands with freedom and democracy. We are not meeting to determine the future of Europe. After all, the peoples of Europe are determining their own future. Though there will be no surprises sprung on our allies, we will miss no opportunity to expand freedom and enhance the peace. And to those who question our prudent pace, they must understand that a time of historic change is no time for reckelessness. The peace and the confidence and the security of our friends in Europe -- it's just too important.

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We will seek President Gorbachev's assurance that this process of reform in Eastern Europe will continue, and we will give him our assurance that America welcomes reform not as an adversary seeking advantage but as a people offering support. Our goal is to see this historic tide of freedom broadened, deepened, and sustained. We find enormous encouragement in its peaceful advance and its acceptance by the Soviet Union. We can now raise our hopes on other issues: our common environment, our common war against drugs, as well as on human rights and the regional conflicts that remain.

Immediately after my visit with President Gorbachev, I will go to Brussels to consult with our partners in NATO, the very alliance that has kept the West free for 40 years. I will assure them that no matter how dramatic the change in Eastern Europe or in the Soviet Union itself the United States will continue to stand with our allies and our friends. For in a new Europe, the American role made change in form but not in fundamentals. After all, the Soviet Union maintains hundreds of thousands of troops throughout Eastern Europe. Study the map, review history, and you'll see that this presence, with the Soviet Union's natural advantage of geography, cannot be ignored. So, even if forces are significantly reduced on both sides, a noble goal indeed, we will remain in Europe as long as our friends want and need us.

Off the island nation of Malta, Mikhail Gorbachev and I will begin the work of years. We can help the peoples of Europe achieve a new destiny, in a peaceful Europe whole and free. I will tell President Gorbachev, the dynamic architect of Soviet reform, that America wants the people of the Soviet Union to fulfill their destiny. And I will assure him that there is no greater advocate of perestroika than the President of the United States.

When we meet, we will be on ships at anchor in a Mediterranean bay that has served as a sealane of commerce and conflict for more than 2,000 years. This ancient port has been conquered by caesar and sultan, crusader and king. Its forts and watchtowers survey a sea that entombs the scuttled ships of empires lost -- slave galleys, galleons, dreadnoughts, destroyers. These ships, once meant to guard lasting empires, not litter the ocean floor and guard nothing more than reefs of coral. So, if the millennia offer us a lesson, perhaps it is this: True security does not come from empire and domination. True security can only be found in the growing need of free peoples.

It has been said that peace is not the work of a single day not will it be the consequence of a single act. Yet every constructive act contributes to its growth; every omission impedes it. Peace will come, in the end, as a child grows to maturity, slowly, until we realize one day in incredulous surprise that the child is almost grown. It is our hope that Malta will be such a constructive act: guiding brave pilgrims on their journey to a new world of freedom.

Note: The President spoke at 9:01 p.m. in the Laurel Lodge at Camp David, MD. The transcript of the actual address was not available for inclusion in this week's issue.

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OFFICE OF THE COMPTROLLER OF THE DEPARTMENT OF DEFENSE

MARCH 1992

Table 6-8 [Continued]
DEPARTMENT of DEFENSE BA by TITLE
($ in Millions)

	FY 81	FY 82	FY 83	FY 84	FY 85	FY 86	FY 87	FY 88	FY 89	FY 90	FY 91	FY 92	FY 93
CURRENT DOLLARS													
MILITARY PERSONNEL	36,909	42,875	45,688	48,363	67,773	67,794	74,010	76,584	78,477	78,876	84,213	79,217	77,080
RETIRED PAY	13,840	14,986	16,156	16,503									
O&M	65,548	62,466	68,540	70,950	77,803	74,888	79,807	81,829	86,221	88,309	131,930	92,501	86,471
PROCUREMENT	48,025	64,462	80,355	86,161	96,842	92,606	80,234	80,053	79,390	81,376	71,740	60,532	54,416
RDT&E	16,609	20,060	22,798	26,887	31,327	33,609	35,644	36,521	37,530	36,459	36,193	36,999	38,813
MILITARY CONST	3,398	4,916	4,512	4,510	5,517	5,281	5,093	5,349	5,738	5,130	5,188	4,842	6,195
FAMILY HOUSING	2,004	2,203	2,712	2,669	2,890	2,803	3,075	3,199	3,276	3,143	3,296	3,650	4,004
SPEC FOREIGN CURR	3	3	4	3	9	2	4						
DEF WIDE CONTINGENCY													-110
REV & MGMT FUNDS	2,677	2,494	1,075	2,774	5,088	5,235	2,812	1,246	897	566	2,701	4,324	1,552
TRUST & RECEIPTS	-634	-697	-342	-628	-426	-707	-781	-801	-668	-832	-44,329	-5,690	-763
DEDUCT,INTRAGOVT RECPT	-15	-17	-23	-22	-21	-22	-28	-26	-25	-27	-29	-178	-29
TOTAL, CURRENT $	**178,365**	**213,751**	**239,474**	**258,150**	**286,802**	**281,390**	**279,469**	**283,755**	**290,837**	**292,999**	**290,904**	**276,297**	**267,628**
CONSTANT FY 93 DOLLARS													
MILITARY PERSONNEL	66,786	67,789	69,117	69,939	88,066	86,086	90,681	90,179	88,474	88,631	90,633	82,762	77,080
RETIRED PAY	21,469	21,803	22,217	21,950									
O&M	80,629	86,438	90,332	94,991	102,058	97,259	99,977	99,290	100,079	99,033	138,421	95,765	86,471
PROCUREMENT	74,377	94,130	112,444	116,669	127,187	117,886	98,661	94,681	90,515	89,651	76,498	62,511	54,416
RDT&E	25,654	29,220	32,038	36,403	41,177	43,026	44,233	43,888	43,093	40,287	38,578	38,231	38,813
MILITARY CONST	5,176	7,174	6,383	6,157	7,302	6,802	6,333	6,381	6,572	5,661	5,541	5,106	6,195
FAMILY HOUSING	3,046	3,111	3,722	3,558	3,747	3,660	3,790	3,821	3,761	3,477	3,497	3,771	4,004
SPEC FOREIGN CURR	4	4	5	4	11	3	4						
DEF WIDE CONTINGENCY													-110
REV & MGMT FUNDS	4,197	3,634	1,508	3,744	6,641	6,647	3,229	1,495	1,033	626	2,877	4,467	1,552
TRUST & RECEIPTS	-994	-1,015	-479	-848	-556	-898	-986	-961	-769	-921	-47,211	-5,878	-763
DEDUCT,INTRAGOVT RECPT	-23	-25	-32	-30	-27	-27	-35	-31	-29	-30	-31	-184	-29
TOTAL, CONSTANT $	**280,211**	**312,262**	**337,233**	**362,528**	**375,607**	**359,132**	**345,690**	**338,543**	**333,728**	**326,415**	**308,803**	**286,551**	**267,628**
% REAL GROWTH													
MILITARY PERSONNEL	3.6	1.5	2.0	1.2	25.9	-3.4	6.5	-0.5	-0.8	-1.0	2.3	-8.7	-6.9
RETIRED PAY	4.0	1.6	1.9	-1.2									
O&M	9.2	7.2	4.5	5.2	7.4	-4.7	2.8	-0.7	0.8	-1.1	39.8	-30.8	-9.7
PROCUREMENT	26.1	26.6	19.5	3.7	9.0	-7.5	-16.3	-3.9	-4.4	-1.0	-14.7	-18.3	-13.0
RDT&E	12.9	14.3	9.6	13.6	13.1	4.5	2.8	-1.2	-1.4	-6.5	-4.3	-0.9	1.5
MILITARY CONST	38.1	38.6	-11.3	-3.3	18.6	-6.9	-6.9	0.8	3.0	-13.9	-2.1	-7.9	21.3
FAMILY HOUSING	20.0	2.1	19.6	-4.4	5.3	-5.3	6.8	0.8	-1.6	-7.6	0.6	7.8	6.2
TOTAL	13.0	11.4	8.0	4.5	6.5	-4.4	-3.8	-2.1	-1.4	-2.2	-5.4	-7.2	-6.6

Table 6-8 [Continued]
DEPARTMENT of DEFENSE BA by TITLE
($ in Millions)

	FY 68	FY 69	FY 70	FY 71	FY 72	FY 73	FY 74	FY 75	FY 76	FY 77	FY 78	FY 79	FY 80
CURRENT DOLLARS													
MILITARY PERSONNEL	20,023	21,427	22,995	22,643	22,984	23,727	24,167	24,963	25,430	26,118	27,246	28,703	31,014
RETIRED PAY	2,095	2,450	2,858	3,391	3,901	4,442	5,151	6,251	7,326	8,238	9,180	10,283	11,985
O&M	20,950	22,349	21,529	20,434	20,702	21,731	23,955	26,107	26,731	32,108	34,732	38,023	46,365
PROCUREMENT	23,408	20,543	17,867	15,702	17,777	17,473	17,028	16,698	20,991	27,922	29,529	31,428	35,283
RDT&E	7,285	7,629	7,406	7,066	7,519	7,960	8,176	8,572	9,451	10,439	11,371	12,437	13,601
MILITARY CONST	1,543	1,168	980	1,322	1,287	1,356	1,563	1,927	2,360	2,204	1,641	2,319	2,293
FAMILY HOUSING	612	512	604	717	860	987	1,099	1,157	1,229	1,258	1,346	1,563	1,526
SPEC FOREIGN CURR	11			3	12	3	3	2	3	4	2	14	7
REV & MGMT FUNDS	516	961	5					158	135	220	423	728	1,336
TRUST & RECEIPTS	-150	-125	-134	-113	-100	-97	-146	-168	-139	-163	-137	-481	-715
DEDUCT,INTRAGOVT RECPT	-7	-8	-7	-8	-8	-8	-7	-7	-7	-9	-11	-11	-12
TOTAL, CURRENT $	76,286	76,905	74,083	71,159	75,006	77,555	80,981	85,661	95,508	108,338	115,322	125,004	142,621
CONSTANT FY 93 DOLLARS													
MILITARY PERSONNEL	104,329	104,960	100,568	92,482	82,330	76,239	72,735	70,545	68,219	68,400	64,858	64,412	64,473
RETIRED PAY	9,831	10,912	11,841	12,701	13,701	14,703	15,549	16,538	17,454	18,531	19,206	19,873	20,630
O&M	88,313	90,146	80,039	72,559	68,624	67,391	66,916	65,532	67,301	69,228	69,400	70,070	73,852
PROCUREMENT	97,342	81,341	68,725	57,017	60,441	54,492	49,705	44,778	52,181	62,092	59,782	57,737	58,987
RDT&E	28,772	29,016	26,769	24,271	24,551	24,511	23,018	21,874	22,427	22,766	22,903	22,868	22,642
MILITARY CONST	6,007	4,385	3,441	4,493	4,156	4,084	4,203	4,785	5,479	4,691	3,210	4,125	3,747
FAMILY HOUSING	2,429	1,977	2,204	2,478	2,841	3,060	3,268	3,021	2,982	2,818	2,810	2,998	2,530
SPEC FOREIGN CURR	43			9	40	11	8	5	6	8	5	28	12
REV & MGMT FUNDS	1,987	3,588	16					412	327	493	886	1,392	2,316
TRUST & RECEIPTS	-577	-468	-480	-389	-331	-308	-437	-437	-338	-365	-286	-922	-1,240
DEDUCT,INTRAGOVT RECPT	-28	-30	-24	-21	-20	-25	-20	-17	-17	-20	-23	-21	-21
TOTAL, CONSTANT $	338,448	325,826	293,990	265,800	256,332	244,137	234,947	227,038	236,001	246,640	242,751	242,561	247,936
% REAL GROWTH													
MILITARY PERSONNEL	4.0	0.6	-4.2	-8.0	-11.0	-7.4	-4.6	-3.0	-3.3	-2.7	-2.3	-0.7	0.1
RETIRED PAY	10.2	11.0	8.5	7.3	7.9	7.3	5.8	6.4	5.5	6.2	3.6	3.5	3.8
O&M	4.0	2.1	-10.2	-10.4	-5.4	-1.8	-0.7	-2.1	2.7	2.9	0.3	1.0	5.4
PROCUREMENT	-2.1	-16.4	-15.5	-17.0	6.0	-9.9	-8.8	-9.9	16.5	19.0	-3.7	-3.4	2.2
RDT&E	-1.7	0.8	-7.8	-9.3	1.2	-0.2	-6.1	-5.0	2.6	1.5	0.6	-0.2	-1.0
MILITARY CONST	35.2	-27.0	-21.6	30.6	-7.5	-2.2	3.4	13.8	14.5	-14.4	-31.6	28.5	-9.2
FAMILY HOUSING	18.3	-18.6	11.5	12.4	14.6	7.7	6.8	-7.6	-1.3	-5.5	-0.3	6.7	-15.4
TOTAL	1.7	-3.7	-9.8	-9.7	-3.5	-4.8	-3.8	-3.4	3.9	4.5	-1.6	-0.1	2.2

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"The American Adventure," a film and animation presentation depicting a three-century rediscovery of America. The film was presented jointly by the American Express and Coca-Cola Companies and is the centerpiece of World Showcase, that portion of EPCOT which, through pavilion displays, recreates the architecture and culture of nine countries.

After the presentation, the President visited with students participating in the World Showcase Fellowship Program, an educational and cultural exchange program designed to enable outstanding young adults to represent their various countries for 1 year in the pavilions of World Showcase. The fellowship program is part of the President's private sector initiative on international youth exchange.

Remarks at the Annual Convention of the National Association of Evangelicals in Orlando, Florida

March 8, 1983

Reverend clergy all, Senator Hawkins, distinguished members of the Florida congressional delegation, and all of you:

I can't tell you how you have warmed my heart with your welcome. I'm delighted to be here today.

Those of you in the National Association of Evangelicals are known for your spiritual and humanitarian work. And I would be especially remiss if I didn't discharge right now one personal debt of gratitude. Thank you for your prayers. Nancy and I have felt their presence many times in many ways. And believe me, for us they've made all the difference.

The other day in the East Room of the White House at a meeting there, someone asked me whether I was aware of all the people out there who were praying for the President. And I had to say, "Yes, I am. I've felt it. I believe in intercessionary prayer." But I couldn't help but say to that questioner after he'd asked the question that—or at least say to them that if sometimes when he was praying he got a busy signal, it was just me in there ahead of him. [*Laughter*] I think I understand how Abraham Lincoln felt when he said, "I have been driven many times to my knees by the overwhelming conviction that I had nowhere else to go."

From the joy and the good feeling of this conference, I go to a political reception. [*Laughter*] Now, I don't know why, but that bit of scheduling reminds me of a story—[*laughter*]—which I'll share with you.

An evangelical minister and a politician arrived at Heaven's gate one day together. And St. Peter, after doing all the necessary formalities, took them in hand to show them where their quarters would be. And he took them to a small, single room with a bed, a chair, and a table and said this was for the clergyman. And the politician was a little worried about what might be in store for him. And he couldn't believe it then when St. Peter stopped in front of a beautiful mansion with lovely grounds, many servants, and told him that these would be his quarters.

And he couldn't help but ask, he said, "But wait, how—there's something wrong—how do I get this mansion while that good and holy man only gets a single room?" And St. Peter said, "You have to understand how things are up here. We've got thousands and thousands of clergy. You're the first politician who ever made it." [*Laughter*]

But I don't want to contribute to a stereotype. [*Laughter*] So, I tell you there are a great many God-fearing, dedicated, noble men and women in public life, present company included. And, yes, we need your help to keep us ever mindful of the ideas and the principles that brought us into the public arena in the first place. The basis of those ideals and principles is a commitment to freedom and personal liberty that, itself, is grounded in the much deeper realization

tions on publicly financed abortions, it also addresses this whole problem of infanticide. I urge the Congress to begin hearings and to adopt legislation that will protect the right of life to all children, including the disabled or handicapped.

Now, I'm sure that you must get discouraged at times, but you've done better than you know, perhaps. There's a great spiritual awakening in America, a renewal of the traditional values that have been the bedrock of America's goodness and greatness.

One recent survey by a Washington-based research council concluded that Americans were far more religious than the people of other nations; 95 percent of those surveyed expressed a belief in God and a huge majority believed the Ten Commandments had real meaning in their lives. And another study has found that an overwhelming majority of Americans disapprove of adultery, teenage sex, pornography, abortion, and hard drugs. And this same study showed a deep reverence for the importance of family ties and religious belief.

I think the items that we've discussed here today must be a key part of the Nation's political agenda. For the first time the Congress is openly and seriously debating and dealing with the prayer and abortion issues—and that's enormous progress right there. I repeat: America is in the midst of a spiritual awakening and a moral renewal. And with your Biblical keynote, I say today, "Yes, let justice roll on like a river, righteousness like a never-failing stream."

Now, obviously, much of this new political and social consensus I've talked about is based on a positive view of American history, one that takes pride in our country's accomplishments and record. But we must never forget that no government schemes are going to perfect man. We know that living in this world means dealing with what philosophers would call the phenomenology of evil or, as theologians would put it, the doctrine of sin.

There is sin and evil in the world, and we're enjoined by Scripture and the Lord Jesus to oppose it with all our might. Our nation, too, has a legacy of evil with which it must deal. The glory of this land has been its capacity for transcending the moral evils of our past. For example, the long struggle of minority citizens for equal rights, once a source of disunity and civil war, is now a point of pride for all Americans. We must never go back. There is no room for racism, anti-Semitism, or other forms of ethnic and racial hatred in this country.

I know that you've been horrified, as have I, by the resurgence of some hate groups preaching bigotry and prejudice. Use the mighty voice of your pulpits and the powerful standing of your churches to denounce and isolate these hate groups in our midst. The commandment given us is clear and simple: "Thou shalt love thy neighbor as thyself."

But whatever sad episodes exist in our past, any objective observer must hold a positive view of American history, a history that has been the story of hopes fulfilled and dreams made into reality. Especially in this century, America has kept alight the torch of freedom, but not just for ourselves but for millions of others around the world.

And this brings me to my final point today. During my first press conference as President, in answer to a direct question, I pointed out that, as good Marxist-Leninists, the Soviet leaders have openly and publicly declared that the only morality they recognize is that which will further their cause, which is world revolution. I think I should point out I was only quoting Lenin, their guiding spirit, who said in 1920 that they repudiate all morality that proceeds from supernatural ideas—that's their name for religion—or ideas that are outside class conceptions. Morality is entirely subordinate to the interests of class war. And everything is moral that is necessary for the annihilation of the old, exploiting social order and for uniting the proletariat.

Well, I think the refusal of many influential people to accept this elementary fact of Soviet doctrine illustrates an historical reluctance to see totalitarian powers for what they are. We saw this phenomenon in the 1930's. We see it too often today.

This doesn't mean we should isolate ourselves and refuse to seek an understanding with them. I intend to do everything I can to persuade them of our peaceful intent, to remind them that it was the West that refused to use its nuclear monopoly in the

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At the same time, however, they must be made to understand we will never compromise our principles and standards. We will never give away our freedom. We will never abandon our belief in God. And we will never stop searching for a genuine peace. But we can assure none of these things America stands for through the so-called nuclear freeze solutions proposed by some.

The truth is that a freeze now would be a very dangerous fraud, for that is merely the illusion of peace. The reality is that we must find peace through strength.

I would agree to a freeze if only we could freeze the Soviets' global desires. A freeze at current levels of weapons would remove any incentive for the Soviets to negotiate seriously in Geneva and virtually end our chances to achieve the major arms reductions which we have proposed. Instead, they would achieve their objectives through the freeze.

A freeze would reward the Soviet Union for its enormous and unparalleled military buildup. It would prevent the essential and long overdue modernization of United States and allied defenses and would leave our aging forces increasingly vulnerable. And an honest freeze would require extensive prior negotiations on the systems and numbers to be limited and on the measures to ensure effective verification and compliance. And the kind of a freeze that has been suggested would be virtually impossible to verify. Such a major effort would divert us completely from our current negotiations on achieving substantial reductions.

A number of years ago, I heard a young father, a very prominent young man in the entertainment world, addressing a tremendous gathering in California. It was during the time of the cold war, and communism and our own way of life were very much on people's minds. And he was speaking to that subject. And suddenly, though, I heard him saying, "I love my little girls more than anything——" And I said to myself, "Oh, no, don't. You can't—don't say that." But I had underestimated him. He went on: "I would rather see my little girls die now, still believing in God, than have them grow up under communism and one day die no longer believing in God."

There were thousands of young people in that audience. They came to their feet with shouts of joy. They had instantly recognized the profound truth in what he had said, with regard to the physical and the soul and what was truly important.

Yes, let us pray for the salvation of all of those who live in that totalitarian darkness—pray they will discover the joy of knowing God. But until they do, let us be aware that while they preach the supremacy of the state, declare its omnipotence over individual man, and predict its eventual domination of all peoples on the Earth, they are the focus of evil in the modern world.

It was C. S. Lewis who, in his unforgettable "Screwtape Letters," wrote: "The greatest evil is not done now in those sordid 'dens of crime' that Dickens loved to paint. It is not even done in concentration camps and labor camps. In those we see its final result. But it is conceived and ordered (moved, seconded, carried and minuted) in clear, carpeted, warmed, and well-lighted offices, by quiet men with white collars and cut fingernails and smooth-shaven cheeks who do not need to raise their voice."

Well, because these "quiet men" do not "raise their voices," because they sometimes speak in soothing tones of brotherhood and peace, because, like other dictators before them, they're always making "their final territorial demand," some would have us accept them at their word and accommodate ourselves to their aggressive impulses. But if history teaches anything, it teaches that simple-minded appeasement or wishful thinking about our adversaries is folly. It means the betrayal of our past, the squandering of our freedom.

So, I urge you to speak out against those who would place the United States in a position of military and moral inferiority. You know, I've always believed that old Screwtape reserved his best efforts for those of you in the church. So, in your discussions of

the nuclear freeze proposals, I urge you to beware the temptation of pride—the temptation of blithely declaring yourselves above it all and label both sides equally at fault, to ignore the facts of history and the aggressive impulses of an evil empire, to simply call the arms race a giant misunderstanding and thereby remove yourself from the struggle between right and wrong and good and evil.

I ask you to resist the attempts of those who would have you withhold your support for our efforts, this administration's efforts, to keep America strong and free, while we negotiate real and verifiable reductions in the world's nuclear arsenals and one day, with God's help, their total elimination.

While America's military strength is important, let me add here that I've always maintained that the struggle now going on for the world will never be decided by bombs or rockets, by armies or military might. The real crisis we face today is a spiritual one; at root, it is a test of moral will and faith.

Whittaker Chambers, the man whose own religious conversion made him a witness to one of the terrible traumas of our time, the Hiss-Chambers case, wrote that the crisis of the Western World exists to the degree in which the West is indifferent to God, the degree to which it collaborates in communism's attempt to make man stand alone without God. And then he said, for Marxism-Leninism is actually the second oldest faith, first proclaimed in the Garden of Eden with the words of temptation, "Ye shall be as gods."

The Western World can answer this challenge, he wrote, "but only provided that its faith in God and the freedom He enjoins is as great as communism's faith in Man."

I believe we shall rise to the challenge. I believe that communism is another sad, bizarre chapter in human history whose last pages even now are being written. I believe this because the source of our strength in the quest for human freedom is not material, but spiritual. And because it knows no limitation, it must terrify and ultimately triumph over those who would enslave their fellow man. For in the words of Isaiah: "He giveth power to the faint; and to them that have no might He increased strength. . . . But they that wait upon the Lord shall renew their strength; they shall mount up with wings as eagles; they shall run, and not be weary. . . ."

Yes, change your world. One of our Founding Fathers, Thomas Paine, said, "We have it within our power to begin the world over again." We can do it, doing together what no one church could do by itself.

God bless you, and thank you very much.

Note: The President spoke at 3:04 p.m. in the Citrus Crown Ballroom at the Sheraton Twin Towers Hotel.

Following his appearance before the convention, the President attended a Florida Republican fundraising reception at the hotel and then returned to Washington, D.C.

Message to the Congress Transmitting the Proposed Constitutional Amendment on Prayer in Schools

March 8, 1983

To the Congress of the United States:

On May 17, 1982, I transmitted for your consideration a proposed constitutional amendment to restore the simple freedom of our citizens to offer prayer in our public schools and institutions. I know that already this Session there is growing bipartisan support for the amendment and as I forward this package, I am calling on the Congress to act speedily to pass it.

The public expression through prayer of our faith in God is a fundamental part of our American heritage and a privilege which should not be excluded by law from any American school, public or private.

One hundred fifty years ago, Alexis de

ead recently about the Lubbock school case where a judge actually ruled that it was unconstitutional for a school district to give equal treatment to religious and non-religious student groups, even when the group meetings were held during the students' own time.

The First Amendment never intended to require government to discriminate against religious speech. Senators Denton and Hatfield have proposed legislation in the Congress on the whole question of prohibiting discrimination against religious forms of student speech. Such legislation could go far to restore freedom of religious speech for public school students and I hope the Congress considers these bills quickly. And with your help, I think it's possible we can get the constitutional amendment through the Congress this year.

More than a decade ago, a Supreme Court decision literally wiped off the books of 50 states statutes protecting the rights of unborn children. "Abortion on demand" now takes the lives of up to one and a half million unborn children a year.

Human life legislation ending this tragedy will someday pass the Congress—and you and I must never rest until it does. Unless and until it can be proven that the unborn child is not a living entity, then its right to life, liberty and the pursuit of happiness must be protected.

You may remember that when abortion on demand began many, indeed, I'm sure many of you warned, that the practice would lead to a decline in respect for human life, that the philosophical premises used to justify abortion on demand would ultimately be used to justify other attacks on the sacredness of human life, infanticide or mercy killing. Tragically enough, those warnings proved all too true: Only last year a court permitted the death by starvation of a handicapped infant.

I have directed the Health and Human Services Department to make clear to every health care facility in the United States that the Rehabilitation Act of 1973 protects all handicapped persons against discrimination based on handicaps, including infants.

And we have taken the further step of requiring that each and every recipient of federal funds who provides health care services to infants must post and keep posted in a conspicuous place a notice stating that "discriminatory failure to feed and care for handicapped infants in this facility is prohibited by federal law." It also lists a 24-hour, toll-free number so that nurses and others may report violations in time to save the infant's life.

In addition, recent legislation introduced in the Congress by Representative Henry Hyde not only increased restrictions on publicly financed abortions, it also addresses this whole problem of infanticide.

I urge the Congress to begin hearings and to adopt legislation that will protect the right of life to all children, including the disabled or handicapped.

I'm sure you must get discouraged at times, but there is a great spiritual awakening in America, a renewal of the traditional values that have been the bedrock of America's goodness and greatness.

One recent survey by a Washington based research council concluded that Americans were far more religious than the people of other nations; 95 percent of those surveyed expressed a belief in God and a huge majority believed the Ten Commandments had real meaning for their live.

Another study has found that an overwhelming majority of Americans disapprove of adultery, teen-age sex, pornography, abortion and hard drugs. And this same study showed a deep reverence for the importance of family ties and religious belief.

I think the items we have discussed here today must be a key part of the nation's political agenda. For the first time the Congress is openly and seriously debating and dealing with the prayer and abortion issues—that's enormous progress right there.

I repeat: America is in the midst of a spiritual awakening and moral renewal. With your biblical keynote, I say today let "justice roll on like a river, righteousness like a never-failing stream."

Now, obviously, much of this new political and social consensus I have talked about is based on a positive view of American history, one that takes pride in our country's accomplishments and record. But we must never forget that no government schemes are going to perfect man; we know that living in this world means dealing with what philosophers would call the phenomenology of evil or, as theologians would put it, the docrine of sin.

THE EVIL EMPIRE Orlando, FLA 3-8-83

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For example, the long struggle of minority citizens for equal rights, once a source of disunity and civil war, is now a point of pride for all Americans. We must never go back.

There is no room for racism, anti-Semitism or other forms of ethnic and racial hatred in this country. I know you have been horrified, as have I, by the resurgence of some hate groups preaching bigotry and prejudice. Use the mighty voice of your pulpits and the powerful standing of your churches to denounce and isolate these hate groups in our midst. The commandment given us is clear and simple: "Thou shalt love thy neighbor as thyself."

But whatever sad episodes exist in our past, any objective observer must hold a positive view of American history, a history that has been the story of hopes fulfilled and dreams made into reality. Especially in this century, America has kept alight the torch of freedom—not just for ourselves but for millions of others around the world. And this brings me to my final point today.

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I intend to do everything I can to persuade them of our peaceful intent; to remind them that it was the West that refused to use its nuclear monopoly in the '40s and '50s for territoral gain and which now proposes 50 percent cuts in strategic ballistic missiles and the elimination of an entire class of land-based, intermediate range nuclear missiles.

At the same time, however, they must be made to understand we will never compromise our principles and standards. We will never give way our freedom. We will never abandon our belief in God.

And we will never stop searching for a genuine peace. But we can assure none of these things America stands for through the so-called nuclear freeze solutions proposed by some. The truth is that a freeze now would be a very dangerous fraud, for that is merely the illusion of peace. The reality is that we must find peace through strength.

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So I urge you to speak out against those who would place the United States in a position of military and moral inferiority. You know, I have always believed that old Screwtape reserves his best efforts for those of you in the church.

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For, in the words of Isaiah:

"He giveth power to the faint; and to them that have no might He increased strength. But they that wait upon the Lord shall renew their strength; they shall mount up with wings as eagles; they shall run, and not be weary."

STAR WARS

Washington, D.C., March 23, 1983

REAGAN'S announcement, during a nationally televised speech on peace and national security, that the United States would develop a space-based defense against nuclear bal-

waste one more moment to give back to the world all that we can in return for this miracle of life.

Thank you all. God bless you all.

THE ICELAND SUMMIT

Washington, D.C., October 13, 1986

THE PRESIDENT'S two summits with Mikhail Gorbachev in 1984 and 1986 were unproductive. Reagan refused to meet with a Soviet leader until late in his first term, and then, as Garry Wills has noted, he ensured that the press knew that substantial issues were not going to be discussed so that no one's hopes would be raised.

The second summit, held in Reykjavik, Iceland, was a bona-fide failure. The U.S. negotiators, apparently poorly prepared, could not come to grips with radical Soviet proposals for massive arms reductions, or follow through on Reagan's suggestion to eliminate all ballistic missiles over a fixed period. Nor could the Soviets, falling behind in strategic defense technology, accept Reagan's firm intention to test and deploy a Star Wars defense. So disappointing was the whole event that top Reagan aides, especially Secretary of State George Shultz, could not conceal their anger and dismay. (This was attributed by the White House to "fatigue.") In this national address, the president sought ot deflect criticism of the summit, laying most of the blame for the lack of results on the Soviets (in a parallel statement, Gorbachev blamed the United States), and insisting that radical arms reductions were still possible.

Good evening. As most of you know, I have just returned from meetings in Iceland with the leader of the Soviet Union, General Secretary Gorbachev. As I did last year when I returned from the summit conference in Geneva, I want to take a few moments tonight to share with you what took place in these discussions.

The implications of these talks are enormous and only just beginning to be understood.

We proposed the most sweeping and generous arms control proposal in history. We offered the complete elimination of all ballistic missiles—Soviet and American—from the face of the earth by 1996. While we parted company with this American offer still on the table, we're closer than ever before to agreements that could lead to a safer world without nuclear weapons.

But first, let me tell you that, from the start of my meetings with Mr. Gorbachev, I have always regarded you, the American people, as full participants. Believe me, without your support, none of these talks could have been held, nor could the ultimate aims of American foreign policy—world peace and freedom—be pursued. And it's for these aims I went the, went the extra mile to Iceland.

Before I report on our talks though, allow me to set the stage by explaining two things that were very much a part of our talks, one a treaty and the other a defense against nuclear missiles which we're trying to develop. Now you've heard their titles a thousand times—the ABM treaty and S.D.I. Well, those letters stand for ABM, anti-ballistic missile, S.D.I., Strategic Defense Initiative.

Some years ago, the United States and the Soviet Union agreed to limit any defense against nuclear missile attacks to the emplacement in one location in each country of a small number of missiles capable of intercepting and shooting down incoming nuclear missiles. Thus leaving our real defense a policy called Mutual Assured Destruction, meaning if one side launched a nuclear attack, the other side could retaliate. And this mutual threat of destruction was believed to be a deterrent against either side striking first.

So here we sit with thousands of nuclear warheads targeted on each other and capable of wiping out both our countries. The Soviets deployed the few anti-ballistic missiles around

Moscow as the treaty permitted. Our country didn't bother deploying because the threat of nationwide annihiliation made such a limited defense seem useless.

For some years now we'be been aware that the Soviets may be developing a nationwide defense. They have installed a large modern radar at Krashnoyarsk which we believe is a critical part of a radar system designed to provide radar guidance for anti-ballistic missiles protecting the entire nation. Now this is a violation of the ABM treaty.

Believing that a policy of mutual destruction and slaughter of their citizens and ours was uncivilized, I asked our military a few years ago to study and see if there was a practical way to destroy nuclear missles after their launch but before they can reach their targets rather than to just destroy people. Well this is the goal for what we call S.D.I., and our scientists researching such a system are convicned it is practical and that several years down the road we can have such a system ready to deploy. Incidentally we are not violating the ABM treaty, which permits such research. If and when we deploy, the treaty also allows withdrawal from the treaty upon six months' notice. S.D.I., let me make it clear, is a nonnuclear defense.

So here we are at Iceland for our second such meeting. In the first and in the months in between, we have discussed ways to reduce and in fact eliminate nuclear weapons entirely. We and the Soviets have had teams of negotiators in Geneva trying to work out a mutual agreement on how we could reduce or eliminate nuclear weapons. And so far, no success.

On Saturday and Sunday, General Secretary Gorbachev and his Foreign Minister Shevardnadze and Secretary of State George Shultz and I met for nearly ten hours. We didn't limit ourselves to just arms reductions. we discussed what we call violation of human rights on the part of the Soviets, refusal to let people emigrate from Russia so they can practice their religion without being persecuted, letting people go to rejoin their families, husbands and wives separated by national borders being allowed to reunite. In much of this the Soviet Union is violating another agreement—the Helsinki accords they had signed in 1975. Yuri Orlov, whose freedom we just obtained, was imprisoned for pointing out to his government its violations of that pact, its refusal to let citizens leave their country or return.

We also discussed regional matters such as Afghanistan, Angola, Nicaragua, and Cambodia.

But by their choice the main subject was arms control. We discussed the emplacement of intermediate-range missles in Europe and Asia and seemed to be in agreement they could be drastically reduced. Both sides seemed willing to find a way to reduce even to zero the strategic ballistic missiles we have aimed at each other. This then brought up the subject of S.D.I.

I offered a proposal that we continue our present research and if and when we reached the stage of testing we would sign now a treaty that would permit Soviet observation of such tests. And if the program was practical we would both eliminate our offensive missiles, and then we would share the benefits of advanced defenses.

I explained that even though we would have done away with our offensive ballistic missiles, having the defense would protect against cheating or the possibility of a madman sometime decideing to create nuclear missiles. After all, the world now knows how to make them. I likened it to our keeping our gas masks even though the nations of the world had outlawed poison gas after World War I.

We seemed to be making progress on reducing weaponry, although the general secretary was registering opposition to S.D.I. and proposing a pledge to observe ABM for a number of years as the day was ending.

Secretary Shultz suggested we turn over the notes our note-takers had been making of everything we'd said to our respective teams and let them work through the night to put them together and find just where we in agreement and what differences separated us. With respect and gratitude, I can inform you those teams worked through the night till 6:30 A.M.

Yesterday, Sunday morning, Mr. Gorbachev and I, with our foreign ministers, came together again and took up the report of our two teams. It was most promising. The Soviets had asked for a ten-year delay in the deployment of S.D.I. programs. In an effort to see how we could satisfy their concerns while protecting our principles and security, we, pro-

posed a ten-year period in which we began with the reduction of all strategic nuclear arms, bombers, air-launched cruise missiles, intercontinental ballistic missiles, submarine launched ballistic missiles and the weapons they carry.

They would be reduced 50 percent in the first five years. During the next five years, we would continue by eliminating all remaining offensive ballistic missiles, of all ranges. And during that time we would proceed with research development and testing of S.D.I. All done in conformity with ABM provisions. At the ten-year point, with all ballistic missiles eliminated, we could proceed to deploy advanced defenses, at the same time permitting the Soviets to do likewise.

And here the debate began. The general secretary wanted wording that in effect would have kept us from developing the S.D.I. for the entire ten years. In effect, he was killing S.D.I. and unless I agreed, all that work toward eliminating nuclear weapons would go down the drain—canceled.

I told him I had pledged to the American people that I would not trade away S.D.I.—there was no way I could tell our people their government would not protect them against nuclear destruction. I went to Reykjavik determined that everything was negotiable except two things, our freedom and our future.

I'm still optimistic that a way will be found. The door open and the opportunity to begin eliminating the nucelar threat is within reach.

So you can see we made progress in Iceland. And we will continue to make progress if we pursue a prudent, deliberate, and, above all, realistic approach with the Soviets. From the earliest days of our administration, this has been our policy. We made it clear we had no illusions about the Soviets or their ultimate intentions. We were publicly candid about the critical moral distinctions between totalitarianism and democracy. We declared the principal objective of American foreign policy to be not just the prevention of war but the extension of freedom. And, we stressed our commitment to the growth of democratic government and democratic institutions around the world. And that's why we assisted freedom fighters who are resisting the imposition of totalitarian rule in Afghanistan, Nicaragua, Angola, Cambodia, and elsewhere. And, finally, we began work on what I believe most spurred the Soviets to negotiate seriously—rebuilding our military strength, reconstructing our strategic deterrence, and, above all, beginning work on the Strategic Defense Initiative.

And yet at the same time we set out these foreign policy goals and began working toward them, we pursued another of our major objectives: that of seeking means to lessen tensions with the Soviets, and ways to prevent war and keep the peace.

Now, this policy is now paying dividends—one sign of this in Iceland was the progress on the issue of arms control. For the first time in a long while, Soviet-American negotiations in the area of arms reduction are moving, and moving in the right direction: not just toward arms *control*, but toward arms *reduction*.

But for all the progress we made on arms reductions,w e must remember there was other issues on the table in Iceland, issues that are fundamental.

As I mentioned, one such issue is human rights. As President Kennedy once said. "And, is not peace, in the last analysis, basically a matter of human rights . . . ?"

I made it plain that the United States would not seek to exploit improvement in these matters for purposes of propaganda. But I also made it plain, once again, that an improvement of the human condition within the Soviet Union is indispensable for an improvement in bilateral relations with the United States. For a government that will break faith with its own people cannot be trusted to keep faith with foreign powers. So, I told Mr. Gorbachev—again in Reykjavik as I had in Geneva—we Americans place far less weight upon the words that are spoken at meetings such as these, than upon the deeds that follow. When it comes to human rights and judging Soviet intentions, we're all from Missouri: you gotta show us.

Another subject area we took up in Iceland also lies at the heart of the differences between the Soviet Union and America. This is the issue of regional conflicts. Summit meetings cannot make the American people forget what Soviet actions have meant for the peoples of Afghanistan, Central America, Africa, and

Southeast Asia. Until Soviet policies change, we will make sure that our friends in these areas—those who fight for freedom and the inependence—will have the support they need.

Finally, there was a forth item. And this area was that of bilateral relations, people-to-people contacts. In Geneva last year, we welcomed several cultural exchange accords; in Iceland, we saw indications of more movement in these areas. But let me say now the United States remains committed to people-to-people programs that could lead to exchanged between not just a few elite but thousands of everyday citizens from both our countries.

So I think then that you can see that we did make progress in Iceland on a broad range of topics. We reaffirmed our four-point agenda; we discovered major new grounds of agreement; we probed again some old areas of disagreement.

And let me return again to the S.D.I. issue.

I realize some Americans may be asking tonight: Why not accept Mr. Gorbachev's demand? Why not give up S.D.I. for this agreement?

Well, the answer, my friends, is simple. S.D.I. is America's insurance policy that the Soviet Union would keep the commitments made at Reykjavik. S.D.I. is America's security guarantee—if the Soviets should—as they have done too often in the past—fail to comply with their solemn commitments. S.D.I. is what brought the Soviets back to arms control talks at Geneva and Iceland. S.D.I. is the key to a world without nuclear weapons.

The Soviets understand this. They have devoted far more resources for a lot longer time than we, to *their own* S.D.I. The world's only operational missile defense today surrounds Moscow, the capital of the Soviet Union. What Mr. Gorbachev was demanding at Reykjavik was that the United States agree to a new version of a 14-year-old ABM treaty that the Soviet Union has already violated. I told him we don't make those kind of deals in the United States.

And the American people should reflect on these critical questions.

How does a defense of the United States threaten the Soviet Union or anyone else? Why are the Soviets so adamant that America remain forever vulnerable to Soviet rocket attack? As of today, all free nations are utterly defenseless against Soviet missiles—fired by either by accident or design. Why does the Soviet Union insist that we remain so—forever?

So, my fellow Americans, I cannot promise, nor can any president promise, that the talks in Iceland or any future discussions with Mr. Gorbachev will lead inevitably to great breakthroughs or momentous treaty signings.

We will not abandon the guiding principle we took to Reykjavik. We prefer no agreement than to bring home a bad agreement to the United States.

And on this point, I know you're also interested in the question of whether there will be another summit. There was no indication by Mr. Gorbachev as to when or whether he plans to travel to the United States, as we agreed he would last year in Geneva. I repeat tonight at our invitation stands and that we continue to believe additional meetings would be useful. But that's a decision the Soviets must make.

But whatever the immediate prospects, I can tell you that I'm ultimately hopeful about the prospects for progress at the summit and for world peace and freedom. You see, the current summit process is very different from that of previous decades; it's different because the world is different; and the world is different because of the hard work and sacrifice of the American people during the past five and a half years.

Your energy has restored and expanded our economic might; your support has restored our military strength. Your courage and sense of national unity in times of crisis have given pause to our adversaries, heartened our friends, and inspired the world. The Western democracies and the NATO alliance are revitalized and all across the world nations are turning to democratic ideas and the principles of the free market. So because the American people stood guard at the critical hour, freedom has gathered its forces, regained its strength, and is on the march.

So, if there's one impression I carry away with me from these October talks, it is that, unlike the past, we are dealing now from a position of strength, and for that reason we have it within our grasp to move speedily with the Soviets toward even more breakthroughs.

Our ideas are out there on the table. They

won't go away. We're ready to pick up where we left off. Our negotiators are heading back to Geneva, and we're prepared to go forward whenever and wherever the Soviets are ready. So, there's reason—good reason—for hope.

I saw evidence of this in the progress we made in the talks with Mr. Gorbachev. And I saw evidence of it when we left Iceland yesterday, and I spoke to our young men and women at our naval installation at Keflavik—a critically important base far closer to Soviet naval bases than to our own coastline. As always, I was proud to spend a few moments with them and thank them for their sacrifices and devotion to country. They represent America at ther finest: committed to defend not only our own freedom but the freedom of others who would be living in a far more frightening world—were it not for the strength and resolve of the United States.

"Whenever the standard of freedom and independence has been . . . unfurled, there will be America's heart, her benedictions, and her prayers," John Quincy Adams once said. He spoke well of our destiny as a nation. My fellow Americans, we are honored by history, entrusted by destiny with the oldest dream of humanity—the dream of lasting peace and human freedom.

Another president, Harry Truman, noted that our century has seen two of the most frightful wars in history. And that "the supreme need of our time is for man to learn to live together in peace and harmony."

It's in pursuit of that ideal I went to Geneva a year ago and to Iceland last week. And it's in pursuit of that ideal that I thank you now for all the support you've given me, and I again ask for your help and your prayers as we continue our journey toward a world where peace reigns and freedom is enshrined.

Thank you and God bless you.

THE IRAN-CONTRA AFFAIR

Washington, D.C., March 4, 1987

In October 1986 reports began to circulate that the Reagan administration had secretly sold arms to Iran in the hope of securing the release of American hostages held in Beirut by Iranian-backed terrorists—in effect, offering ransom for hostages, in direct contradiction to the president's oft-expressed policy of not negotiating with terrorists. Shortly afterward, the administration revealed that some of the money paid by Iran for the arms had been diverted to the Nicaraguan contras by members of the National Security Council (NSC) at a time when direct funding of contra military activities was banned by Congress. The president, who claimed to have approved the arms sales only after they took place, and who claimed to have no knowledge at all of the diversion of funds, authorized a special commission headed by former Senator John Tower to investigate the affair. The Tower report, released in late February 1987, was a scathing indictment of many Reagan aides, and sharply criticized the "management style" of the president himself.

With public opinion turning against him, Reagan went on nationwide television to demonstrate that he was still in command of himself and of the government, and he brought it off with great skill. The speech was a masterful piece of image-building. Appearing earnest and a touch chastened, Reagan presented the entire affair as a simple matter of poor judgment—a regrettable error that had made him a sadder but wiser president.

My fellow Americans, I've spoken to you from this historic office on many occasions and about many things. The power of the presidency is often thought to reside within this Oval Office. Yet it doesn't rest here; it rests in you, the American people, and in your trust.

[illegible] MILITARY AND SOCIAL INDICATORS

142 Countries, 1987

TABLE III

	MILITARY					GNP		EDUCATION								
	Public Expenditures		Equivalent Years of Income[1]	Military Burden[2]	Economic-Social Standing[3]	per Capita		Public Expenditures per Capita		School-Age Population per Teacher[4]		School-Age Population in School[4]		Literacy Rate[5]		Education[6]
	% of GNP	per Capita	1,000 Years		Average Rank	Rank	US$	Rank	US$	Rank	No.	Rank	%	F Rank	F/M %	Average Rank
WORLD	**5.1**	**189**	**225,374**				**3,655**		**185**		**33**		**70**		**65/79**	
■ Developed	5.1	688	64,644				13,576		703		18		89		98/99	
Developing	5.2	37	160,730				703		27		39		67		52/72	
AMERICA																
North America	**6.1**	**1,122**	**16,338**				**18,301**		**1,003**		**18**		**100**		**99/99**	
■ US	6.5	1,204	15,769		9		18,595		989		18		100		99/99	
■ Canada	2.2	342	569		4		15,540		1,131		16		100		99/99	
Latin America	**1.6**	**29**	**7,263**				**1,764**		**57**		**30**		**79**		**81/85**	
Argentina	1.5	37	464		45		2,468		46		20		79		95/96	
Barbados	0.5	31	1		27		5,586		334		20		100		98/99	
Bolivia	4.7	26	316		96		553		16		33		79		65/84	
Brazil	1.0	21	1,415		58		2,063		70		29		80		76/79	
Chile	3.3	46	415		53		1,386		66		30		87		91/92	
Colombia	0.8	9	241		74		1,131		30		35		76		87/89	
Costa Rica	0.6	9	17		55		1,520		68		40		71		93/94	
Cuba	7.2	129	725		42		1,787		111		15		79		96/96	
Dominican Rep.	1.1	7	72		81		690		10		47		88		77/78	
Ecuador	2.1	21	211		71		984		34		31		85		80/85	
El Salvador	3.9	36	191		88		925		20		65		64		69/75	
Guatemala	1.8	15	152		93		814		18		59		50		47/63	
Guyana	11.8	29	117		92		250		24		43		72		95/97	
Haiti	1.3	5	81		115		349		7		58		58		35/40	
Honduras	5.0	41	234		84		812		40		55		70		58/61	
Jamaica	1.0	10	24		61		1,049		55		34		82		96/96	
Mexico	0.3	6	285		59		1,616		33		32		82		88/92	
Nicaragua	20.0	169	700		77		845		52		45		72		88/88	
Panama	2.0	46	47		50		2,255		121		29		75		88/89	
Paraguay	1.1	12	44		79		1,105		14		30		67		85/91	
Peru	5.0	105	1,036		63		2,108		71		32		91		78/92	
Trinidad & Tobago	1.0	35	12		40		3,518		201		24		93		95/97	
Uruguay	2.1	52	65		47		2,439		74		22		86		94/93	
Venezuela	2.2	57	398		48		2,640		143		27		83		86/88	
EUROPE																
NATO Europe	**3.4**	**394**	**13,229**				**11,748**		**568**		**20**		**80**		**93/97**	
■ Belgium	2.9	420	291		15		14,294		736		12		76		99/99	
■ Denmark	2.2	418	113		3		18,962		1,506		12		84		99/99	
■ France	4.0	627	2,205		10		15,806		885		18		87		99/99	
■ Germany, West	3.0	561	1,847		11		18,483		813		17		79		99/99	
Greece	6.2	290	621		29		4,675		126		21		90		88/97	
■ Iceland	—	—	—		4		21,146		913		20		80		100/100	
■ Italy	2.4	321	1,399		25		13,117		525		17		63		96/98	
■ Luxembourg	0.9	199	3		1		22,076		887		•••		•••		100/100	
■ Netherlands	3.1	448	448		12		14,606		1,096		19		86		99/99	
■ Norway	3.3	659	140		2		19,710		1,320		13		81		100/100	
Portugal	3.2	111	323		36		3,498		153		16		89		80/89	
■ Spain	2.4	177	937		21		7,369		235		25		89		92/97	
Turkey	4.4	55	2,298		78		1,257		21		41		72		62/86	
■ United Kingdom	4.6	555	2,604		16		12,091		618		19		89		99/99	
ALL NATO (incl. US & Canada)	4.8	697	29,567				14,481		749		19		88		96/98	
Warsaw Pact	**9.5**	**754**	**35,277**				**7,931**		**397**		**18**		**87**		**98/99**	
■ Bulgaria	3.8	219	341		32		5,758		288		22		81		93/96	
■ Czechoslovakia	3.5	296	545		28		8,470		306		28		71		99/99	
■ Germany, East	4.5	484	749		20		10,749		413		17		74		99/99	
■ Hungary	2.1	135	223		33		6,430		233		19		71		98/99	
■ Poland	2.8	127	1,057		37		4,543		202		20		76		98/99	
■ Romania	1.2	59	275		46		4,889		76		31		67		95/98	
■ USSR	11.4	976	32,087		19		8,562		462		16		94		98/99	

TABLE I. Military Expenditures, Armed Forces, GNP, Central Government Expenditures, and Population, 1979-1989 — continued

YEAR	MILITARY EXPENDITURES (ME) Million dollars Current	MILITARY EXPENDITURES (ME) Million dollars Constant 1989	ARMED FORCES Thousands	GROSS NATIONAL PRODUCT (GNP) Million dollars Current	GROSS NATIONAL PRODUCT (GNP) Million dollars Constant 1989	CENTRAL GOVERNMENT EXPENDITURES (CGE) Million dollars Constant 1989	PEOPLE Millions	ME/GNP %	ME/CGE %	ME PER CAPITA Constant 1989 dollars	ARMED FORCES PER 1000 PEOPLE Soldiers	GNP PER CAPITA Constant 1989 dollars
Soviet Union	E	E						c	c,e			
1979	176900	284400	3900	1390000	2235000	509600	264.1	12.7	55.8	1077	14.8	8460
1980	198200	292000	3900	1532000	2257000	546600	266.4	12.9	53.4	1096	14.6	8473
1981	219600	295200	3900	1699000	2284000	571300	268.7	12.9	51.7	1099	14.5	8499
1982	237900	300500	3900	1850000	2337000	616400	271.1	12.9	48.8	1108	14.4	8619
1983	250700	304900	3900	1965000	2390000	606800	273.6	12.8	50.2	1114	14.3	8733
1984	263700	309200	3900	2063000	2419000	615500	276.3	12.8	50.2	1119	14.1	8755
1985	277200	315600	3900	2145000	2442000	630700	278.9	12.9	50.0	1132	14.0	8757
1986	287600	319200	3900	2275000	2525000	680300	281.5	12.6	46.9	1134	13.9	8970
1987	303000	325900	3900	2393000	2574000	709900	284.0	12.7	45.9	1147	13.7	9062
1988	317900	330900	3900	2526000	2630000	712500	286.4	12.6	46.4	1155	13.6	9180
1989	311000	311000	3700	2664000	2664000	680000	288.7	11.7	45.7	1077	12.8	9226
Spain												
1979	3822	6145	374	178100	286300	79910	37.2	2.1	7.7	165	10.1	7695
1980	4560	6719	356	196200	289100	82650	37.5	2.3	8.1	179	9.5	7711
1981	5112	6872	366	213400	286900	85800	37.8	2.4	8.0	182	9.7	7599
1982	5541	6998	372	229800	290200	91790	38.0	2.4	7.6	184	9.8	7642
1983	5999	7295	355	242600	295000	98250	38.2	2.5	7.4	191	9.3	7729
1984	6167	7231	342	256200	300400	107500	38.3	2.4	6.7	189	8.9	7835
1985	6639	7558	314	271000	308500	108800	38.5	2.4	6.9	196	8.2	8014
1986	6505	7219	314	287800	319300	110000	38.7	2.3	6.6	187	8.1	8260
1987	7554	8125	314	313800	337500	118500	38.8	2.4	6.9	209	8.1	8692
1988	7244	7541	304	340200	354200	103800 E	39.0	2.1	7.3	193	7.8	9084
1989	7775	7775	277	370700	370700	135500 E	39.1	2.1	5.7	199	7.1	9471
Sri Lanka												
1979	45	72	18	2891	4648	1769	14.6	1.5	4.1	5	1.2	317
1980	49	72	18	3333	4911	2097	14.9	1.5	3.4	5	1.2	330
1981	48	65	18	3801	5110	1722	15.2	1.3	3.8	4	1.2	337
1982	53	67	18	4352	5497	1837	15.4	1.2	3.7	4	1.2	357
1983	68	83	19	4674	5684	1862	15.6	1.5	4.5	5	1.2	364
1984	78	91	21	4975	5832	1868	15.8	1.6	4.9	6	1.3	369
1985	157	179	21	5517	6280	2145	16.0	2.9	8.4	11	1.3	392
1986	144	159	25 E	5903	6551	2170	16.2	2.4	7.4	10	1.5	403
1987	189	203	30 E	6161	6626	2161	16.5	3.1	9.4	12	1.8	402
1988	300	313	47	6519	6786	2345	16.7	4.6	13.3	19	2.8	406
1989	223	223	47	6939	6939	2194	17.0	3.2	10.2	13	2.8	409
Sudan	E	E										
1979	279	449	65	8193	13170	2786	18.2	3.4	16.1	25	3.6	722
1980	302	445	65	9000	13260	2684	18.9	3.4	16.6	24	3.4	702
1981	317	426	87	9896	13300	2883 E	19.5	3.2	14.8	22	4.5	683
1982	442	558	86	11740	14830	2976	20.1	3.8	18.8	28	4.3	737
1983	230	280	86	12390	15060	NA	21.8	1.9	NA	13	4.0	693
1984	236	277	65	12000	14070	NA	22.6	2.0	NA	12	2.9	624
1985	220	250	65	11700	13310	NA	23.5	1.9	NA	11	2.8	567
1986	201	223	59	13270	14720	NA	24.2	1.5	NA	9	2.4	607
1987	313	337	59 E	13950	15000	NA	24.8	2.2	NA	14	2.4	606
1988	286	298	65	13640	14200	2550 E	25.2	2.1	11.7	12	2.6	563
1989	339	339	65	15640	15640	NA	25.7	2.2	NA	13	2.5	608

TABLE I. Military Expenditures, Armed Forces, GNP, Central Government Expenditures, and Population, 1979-1989 — continued

YEAR	MILITARY EXPENDITURES (ME) Million dollars Current	MILITARY EXPENDITURES (ME) Million dollars Constant 1989	ARMED FORCES Thousands	GROSS NATIONAL PRODUCT (GNP) Million dollars Current	GROSS NATIONAL PRODUCT (GNP) Million dollars Constant 1989	CENTRAL GOVERNMENT EXPENDITURES (CGE) Million dollars Constant 1989	PEOPLE Millions	ME/GNP %	ME/CGE %	ME PER CAPITA Constant 1989 dollars	ARMED FORCES PER 1000 PEOPLE Soldiers	GNP PER CAPITA Constant 1989 dollars
United Arab Emirates												
1979	1197	1924	25	23660	38030	3792	0.9	5.1	50.7	2176	28.3	43020
1980	1724	2541	44	31330	46170	6143	1.0	5.5	41.4	2540	44.0	46150
1981	2090	2809	44	34820	46800	7362	1.1	6.0	38.2	2553	40.0	42530
1982	1980	2500	44	32820	41460	6874	1.2	6.0	36.4	2077	36.6	34440
1983	1973	2399	44	29350	35690	5403	1.3	6.7	44.4	1823	33.4	27120
1984	1932	2265	44	28890	33870	5004	1.4	6.7	45.3	1575	30.6	23550
1985	1901 E	2165 E	44	28520	32470	4943	1.6	6.7	43.8	1378	28.0	20680
1986	1580 E	1753 E	44 E	22700	25190	4041	1.7	7.0	43.4	1023	25.7	14700
1987	1590	1710	44 E	24760	26630	3884	1.8	6.4	44.0	926	23.8	14420
1988	1587	1652	43	24590	25590	3739	2.0	6.5	44.2	834	21.7	12910
1989	1471	1471	43	27760	27760	3613	2.1	5.3	40.7	695	20.3	13110
United Kingdom												
1979	18920	30420	324	418300	672400	257500	56.2	4.5	11.8	541	5.8	11960
1980	22080	32530	330	442800	652500	261500	56.3	5.0	12.4	578	5.9	11590
1981	22860	30730	341	479800	645000	265600	56.4	4.8	11.6	545	6.0	11440
1982	25780	32560	335	519500	656200	275800	56.3	5.0	11.8	578	5.9	11650
1983	29270	35600	333	560200	681200	283800	56.4	5.2	12.5	631	5.9	12080
1984	30790	36100	336	593200	695500	281600	56.5	5.2	12.8	639	6.0	12320
1985	32560	37070	334	632700	720200	292500	56.6	5.1	12.7	655	5.9	12720
1986	32780	36380	331	673000	746900	292300	56.8	4.9	12.4	641	5.8	13160
1987	33320	35840	328	724400	779200	289100	56.9	4.6	12.4	630	5.8	13690
1988	32710	34050	324	783300	815400	282400	57.1	4.2	12.1	597	5.7	14290
1989	34630	34630	318	834400	834400	285700	57.2	4.2	12.1	605	5.6	14580
United States												
1979	122300	196600	2033	2508000	4032000	843500	225.1	4.9	23.3	873	9.0	17920
1980	144000	212100	2050	2732000	4025000	916900	227.8	5.3	23.1	931	9.0	17670
1981	169900	228400	2101	3053000	4103000	966000	230.1	5.6	23.6	992	9.1	17830
1982	196400	248000	2168	3166000	3999000	992300	232.5	6.2	25.0	1067	9.3	17200
1983	218000	265100	2201	3406000	4142000	1041000	234.8	6.4	25.5	1129	9.4	17640
1984	237100	277900	2222	3772000	4422000	1051000	237.0	6.3	26.4	1173	9.4	18660
1985	265800	302600	2244	4015000	4571000	1143000	239.3	6.6	26.5	1265	9.4	19100
1986	280900	311700	2269	4232000	4696000	1149000	241.6	6.6	27.1	1290	9.4	19430
1987	288200	309900	2279	4516000	4857000	1137000	243.9	6.4	27.2	1271	9.3	19910
1988	293100	305100	2246	4874000	5073000	1164000	246.3	6.0	26.2	1239	9.1	20600
1989	304100	304100	2241	5201000	5201000	1190000	248.8	5.8	25.5	1222	9.0	20910
Upper Volta (see Burkina Faso)												
Uruguay												
1979	117	188	28	4908	7891	1682	2.9	2.4	11.2	65	9.6	2716
1980	167	246	28	5662	8343	1873	2.9	2.9	13.1	84	9.6	2857
1981	249	334	28	6344	8528	2167	2.9	3.9	15.4	114	9.5	2905
1982	247	312	29	6019	7602	2358	3.0	4.1	13.2	105	9.8	2574
1983	192	233	30	5708	6942	1879	3.0	3.4	12.4	78	10.1	2335
1984	161	189	30	5741	6730	1739	3.0	2.8	10.9	63	10.0	2251
1985	155	176	30	5938	6760	1660	3.0	2.6	10.6	59	10.0	2247
1986	163	181	30 E	6720	7457	1799	3.0	2.4	10.1	60	9.9	2464
1987	138	148	28	7394	7953	1926	3.0	1.9	7.7	49	9.2	2612
1988	162	169	29	7661	7975	2072	3.1	2.1	8.1	55	9.5	2603
1989	NA	NA	27	8066	8066	1500	3.1	NA	NA	NA	8.8	2617

Businesses, by Program: 1980 to 1989

own; see text, section 9. Includes all new prime contracts; ffficial awards, amendments, or other changes in prime con- m contracts and contracts which do not obligate a firm total and delivery orders against such contracts]

	1984	1985	1986	1987	1988	1989
.5	146.0	163.7	158.8	156.5	151.4	139.3
.9	10.1	12.4	9.9	8.8	8.9	9.6
.2	8.3	8.6	9.1	8.9	8.2	6.4
.2	2.7	3.1	3.4	3.5	3.5	3.3
.1	124.9	139.6	136.5	135.3	130.8	120.0
.8	86.3	98.1	92.8	93.0	85.9	79.9
.3	29.2	34.6	32.3	27.7	25.0	24.2
.7	19.7	22.0	19.7	22.6	17.8	18.1
.7	16.7	18.7	19.4	19.8	19.7	18.7
.8	9.4	10.4	9.4	11.5	13.7	9.6
.3	11.4	12.5	12.0	11.6	9.7	9.2
.4	8.5	9.1	10.4	11.0	12.0	11.7

mbursable purchases on behalf of foreign governments. shown separately. Contracts awarded for work in U.S. .; contracts in a classified location; and any intragovern- ual.

rds—Summary: 1989

pecified; expenditures relating to awards may extend over foreign national direct hire civilians and civilian personnel civilians and those direct hire civilians not subject to OMB ed ashore. Excludes personnel temporarily shore-based in s of civilian and active duty military personnel for services xcludes employer's share of employee benefits, accrued sts]

STATE	Contract awards[1] (mil. dol.)	Payroll (mil. dol.)	PERSONNEL (1,000)	
			Civilian	Military
DC	1,236	951	17.9	13.6
VA	5,897	7,634	111.7	96.2
WV	163	58	2.0	0.4
NC	1,104	2,673	15.5	92.3
SC	568	1,912	20.7	41.6
GA	1,864	2,762	39.9	63.3
FL	4,452	3,246	33.8	77.8
S.C.	4,078	3,907	60.6	84.7
KY	333	1,444	14.0	38.8
TN	1,118	393	7.7	9.9
AL	1,392	1,378	25.7	21.2
MS	1,235	692	13.3	14.7
S.C.	11,985	7,527	100.3	189.4
AR	370	336	5.2	9.0
A	1,693	925	8.5	25.3
OK	659	1,358	24.4	28.2
X	9,263	4,908	62.3	127.0
	35,208	**19,923**	**252.2**	**422.9**
	7,835	4,337	62.8	110.9
MT	81	131	1.4	4.6
D	75	147	1.3	5.2
WY	67	114	1.2	3.8
CO	2,928	1,362	14.4	40.0
NM	625	640	9.2	15.0
AZ	2,847	894	11.2	26.2
UT	983	768	22.0	5.8
NV	230	281	2.2	10.3
	27,373	15,586	189.5	312.0
VA	2,951	2,172	29.4	40.5
OR	179	121	3.2	0.7
A	23,125	10,529	131.5	204.2
K	540	761	5.1	22.8
I	579	2,002	20.2	43.8

e of contracts of over $25,000 for work in each State and defense work. Often the State in which a prime contractor See also headnote, table 546. Undistributed civilians and nance in classified locations are excluded.
States and Selected Areas, annual.

No. 548. Worldwide Military Expenditures: 1980 to 1988

[For military expenditures and Armed Forces by country, see section 31. GNP=Gross national product]

COUNTRY GROUP	MILITARY EXPENDITURES (bil. dol.)									PER CAPITA (dol.)	
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1980	1988
CURRENT DOLLARS											
Worldwide, total [1]	**636**	**719**	**804**	**857**	**910**	**963**	**990**	**1,034**	**1,032**	**202**	**202**
United States	144	170	196	217	237	266	281	296	308	894	1,250
Percent of total	22.7	23.6	24.4	25.3	26.1	27.6	28.3	28.6	29.8	(X)	(X)
Developed countries [2]	705	725	759	786	807	842	857	876	865	650	754
Developing countries [2]	195	203	216	215	217	211	198	192	167	58	42
NATO countries [3]	345	363	387	406	421	447	456	466	467	597	763
Warsaw Pact countries	330	333	343	348	353	360	365	372	359	879	898
Soviet Union	280	283	289	293	297	303	306	313	300	1,053	1,047
CONSTANT (1988) DOLLARS											
Worldwide, total [1]	**899**	**928**	**975**	**1,001**	**1,024**	**1,053**	**1,055**	**1,068**	**1,032**	**202**	**202**
United States	204	219	238	254	267	291	299	306	308	894	1,250
Percent of total	22.6	23.6	24.4	25.3	26.0	27.6	28.4	28.6	29.8	(X)	(X)
Developed countries [2]	705	725	759	786	807	842	857	876	865	650	754
Developing countries [2]	195	203	216	215	217	211	198	192	167	58	42
NATO countries [3]	345	363	387	406	421	447	456	466	467	597	763
Warsaw Pact countries	330	333	343	348	353	360	365	372	359	879	898
Soviet Union	280	283	289	293	297	303	306	313	300	1,053	1,047
PERCENT OF GNP											
Worldwide, total	**5.3**	**5.4**	**5.7**	**5.7**	**5.6**	**5.6**	**5.5**	**5.4**	**5.0**	**(X)**	**(X)**
United States	5.3	5.6	6.2	6.4	6.3	6.6	6.6	6.5	6.3	(X)	(X)
Developed countries [2]	5.2	5.2	5.5	5.5	5.4	5.5	5.5	5.4	5.2	(X)	(X)
Developing countries [2]	6.1	6.3	6.7	6.5	6.4	6.0	5.5	5.2	4.3	(X)	(X)
NATO countries [3]	4.3	4.5	4.8	4.9	4.9	5.0	5.0	4.9	4.8	(X)	(X)
Warsaw Pact countries [4]	11.6	11.6	11.7	11.6	11.6	11.8	11.6	11.6	11.0	(X)	(X)
Soviet Union [4]	12.9	12.9	12.9	12.8	12.8	12.9	12.6	12.7	11.9	(X)	(X)

X Not applicable. [1] Includes countries not shown separately. [2] Twenty-eight developed countries; see table 549 for selected countries; for complete list see source. [3] North Atlantic Treaty Organization. [4] The meaning of the ratio of military expenditures to GNP differs somewhat between most Communist countries and non-Communist countries because of different estimating procedures. For details, see source.

No. 549. Arms Trade in Constant (1988) Dollars—Selected Countries: 1986 to 1988

[**In millions of dollars, except percent.** Because some countries exclude arms imports or exports from their trade statistics and their "total" imports and exports are therefore understated and because arms traansfers maybe estimated independently of trade data, the ratio of arms to total imports or exports maybe overstated and may even exceed 100 percent]

COUNTRY	1986	1987	1988		COUNTRY	1986	1987	1988	
			Total	Arms imports as percent of total imports				Total	Arms imports as percent of total imports
World total [1]	**49,110**	**55,950**	**48,610**	**(NA)**	RECIPIENTS				
					Developing [1]	**37,700**	**45,200**	**37,810**	**5.6**
EXPORTERS					Afghanistan	1,385	1,446	2,600	288.9
					Algeria	639	594	825	10.6
					Angola	1,385	1,653	1,600	(NA)
Canada	149	165	180	0.2	Argentina	32	62	20	0.4
China: Mainland	1,279	2,376	3,100	0.5	Cuba	1,705	1,859	1,700	22.4
Czechoslovakia	1,385	1,240	850	0.8	Egypt	1,172	1,549	725	3.1
France	4,582	2,789	1,890	0.1	El Salvador	85	52	60	(NA)
Poland	1,492	1,240	675	3.8	Ethiopia	352	1,033	725	80.6
Soviet Union	22,380	23,040	21,400	1.0	Greece	170	289	575	4.7
United Kingdom	1,598	2,169	725	0.3	India	3,197	3,512	3,200	16.7
United States	9,803	14,770	14,300	0.2	Iran	2,451	1,519	2,000	18.2
West Germany	852	1,890	360	0.4	Iraq	6,074	5,681	4,600	37.1
					Israel	533	1,859	1,900	12.6
					Jordan	277	362	320	11.6
IMPORTERS					Kuwait	139	145	190	3.6
					Libya	1,385	646	575	11.5
Developed [1]	**11,410**	**10,740**	**10,800**	**0.5**	Morocco	96	413	90	1.9
Australia	1,066	749	1,300	3.6	Nicaragua	639	516	525	65.6
Canada	139	176	210	0.2	North Korea	448	434	1,000	32.3
Czechoslovakia	1,172	956	210	0.8	Oman	107	103	30	1.4
East Germany	1,066	320	875	(NA)	Pakistan	320	320	340	5.2
Hungary	192	413	60	0.3	Peru	160	444	30	1.0
Italy	234	207	270	0.2	Saudi Arabia	4,049	5,681	3,000	14.9
Japan	852	981	1,100	0.6	South Korea	586	646	600	1.2
Poland	1,279	852	1,000	3.8	Spain	352	1,007	900	1.5
Romania	533	124	20	(NA)	Syria	1,279	1,963	1,300	58.5
Soviet Union	1,279	1,240	1,100	1.0	Turkey	639	981	775	5.4
United Kingdom	719	568	625	0.3	Venezuela	107	103	60	0.5
United States	440	625	646	0.2	Vietnam	2,238	1,963	1,500	(NA)
West Germany	373	754	900	0.4	Yemen (Sanaa)	298	403	400	28.6

NA Not available. [1] Includes countries not shown separately.
Source of tables 548 and 549: U.S. Arms Control and Disarmament Agency, *World Military Expenditures and Arms Transfers*, annual.

No. 1489. Military Expenditures in Current and Constant (1988) Dollars: 1980 to 1988

[In millions of dollars, except as indicated. See also table 548. For most countries, data for expenditures and for GNP were based on local currencies which were deflated to constant 1988 local currency values before conversion to U.S. dollar equivalents. In general, the rates used for conversion are the 1988 average par/market exchange rates as supplied by the International Bank for Reconstruction and Development]

COUNTRY	CURRENT DOLLARS				CONSTANT (1988) DOLLARS							
	1980	1985	1987	1988	1980	1985	1987	1988	Per capita (dollars)		Percent of GNP [1]	
									1980	1988	1980	1988
United States	**144,000**	**265,800**	**296,200**	**307,700**	**203,700**	**290,500**	**306,000**	**307,700**	**894**	**1,250**	**5.3**	**6.3**
Algeria [2]	1,188	1,248	1,486	1,784	1,681	1,365	1,536	1,784	89	74	3.9	3.4
Argentina	2,712	[2]2,789	[2]1,400	[2]2,972	3,837	[2]3,049	[2]1,447	[2]2,972	136	94	3.6	3.1
Australia	3,006	5,195	5,729	6,170	4,253	5,678	5,918	6,170	291	379	2.3	2.7
Austria	895	[2]1,447	1,441	1,426	1,266	[2]1,581	1,488	1,426	168	188	1.1	1.2
Belgium	3,148	3,837	4,158	4,097	4,454	4,194	4,295	4,097	452	415	3.3	2.7
Brazil	1,559	2,402	3,356	1,209	2,206	2,626	3,467	1,209	18	8	0.7	0.3
Bulgaria [2]	4,088	5,953	6,644	6,842	5,784	6,507	6,863	6,842	654	763	11.7	12.7
Canada	4,993	8,547	9,594	10,020	7,065	9,343	9,911	10,020	293	384	1.9	2.1
Chile	452	622	[2]825	[2]808	639	680	[2]852	[2]808	58	64	3.6	4.0
China:												
Mainland [2]	16,370	19,890	20,510	21,270	23,160	21,740	21,180	21,270	24	20	9.1	3.9
Taiwan	2,982	[2]5,939	[2]5,107	6,156	4,219	[2]6,492	[2]5,276	6,156	237	308	6.5	5.2
Cuba [2]	1,140	1,603	1,306	1,326	1,613	1,752	1,349	1,326	167	128	6.5	3.8
Czechoslovakia [2]	5,687	8,625	9,551	9,818	8,046	9,428	9,866	9,818	527	629	6.5	7.1
Denmark	1,610	2,095	2,205	2,320	2,278	2,290	2,278	2,320	445	453	2.5	2.2
East Germany [2]	7,895	12,150	13,700	14,320	11,170	13,280	14,150	14,320	667	863	6.9	7.7
Egypt [2]	3,402	7,911	8,038	6,086	4,813	8,647	8,303	6,086	114	114	9.5	7.8
El Salvador	117	[2]269	[2]244	212	166	[2]294	[2]252	212	35	39	2.7	3.8
Finland	891	1,326	1,566	[2]1,701	1,260	1,450	1,618	[2]1,701	264	344	1.6	1.7
France	22,700	31,620	34,930	35,950	32,120	34,570	36,090	35,950	596	644	4.0	3.9
Greece	1,894	3,250	3,053	3,378	2,679	3,552	3,153	3,378	278	337	5.5	6.5
Hungary [2]	2,965	3,939	4,217	4,489	4,195	4,306	4,356	4,489	392	424	6.3	6.3
India	3,922	7,373	9,171	9,458	5,549	8,059	9,474	9,458	8	12	3.2	3.5
Indonesia	1,197	1,515	1,480	1,400	1,693	1,655	1,529	1,400	11	8	3.1	1.8
Iran [2]	14,700	24,770	(NA)	(NA)	20,800	27,070	(NA)	(NA)	531	(NA)	6.6	(NA)
Iraq [2]	19,810	18,970	(NA)	(NA)	28,030	20,730	(NA)	(NA)	2,124	(NA)	22.5	(NA)
Israel	7,018	7,425	6,101	6,001	9,929	8,116	6,302	6,001	2,657	1,396	29.2	13.8
Italy	10,060	15,540	18,540	20,430	14,230	16,990	19,150	20,430	252	356	2.1	2.6
Japan	13,660	22,870	26,670	28,870	19,320	25,000	27,550	28,870	165	235	0.9	1.0
Kuwait	939	1,606	1,330	1,340	1,328	1,755	1,373	1,340	970	692	2.9	5.1
Malaysia	708	[2]971	1,307	908	1,002	[2]1,062	1,350	908	73	55	4.4	2.8
Mexico	448	1,032	[2]869	1,016	634	1,128	[2]898	1,016	9	12	0.4	0.6
Morocco	[2]757	(NA)	[2]1,156	1,138	[2]1,071	(NA)	[2]1,194	1,138	52	46	7.6	6.0
Netherlands	4,440	5,990	6,556	6,729	6,282	6,548	6,773	6,729	444	457	3.1	3.0
Nicaragua	[2]49	[2]176	(NA)	(NA)	[2]69	[2]192	(NA)	(NA)	25	(NA)	5.8	(NA)
Nigeria	505	333	202	223	715	363	208	223	8	2	2.4	0.8
North Korea [2]	4,380	5,260	5,640	5,840	6,197	5,750	5,826	5,840	346	266	20.0	20.0
Norway	1,488	2,421	2,930	2,895	2,105	2,646	3,027	2,895	515	691	3.0	3.2
Oman	1,059	1,937	1,518	1,371	1,498	2,118	1,568	1,371	1,522	1,083	22.1	19.1
Pakistan	845	1,905	2,287	2,516	1,196	2,082	2,362	2,516	14	23	5.4	6.9
Peru	1,318	[2]2,108	[2]2,135	(NA)	1,865	[2]2,304	[2]2,205	(NA)	108	(NA)	5.0	(NA)
Philippines	505	408	653	680	715	446	675	680	14	11	1.9	1.7
Poland [2]	9,916	15,080	15,810	15,660	14,030	16,480	16,330	15,660	394	413	8.2	8.7
Portugal	867	1,061	1,196	1,347	1,226	1,160	1,236	1,347	125	130	3.6	3.3
Qatar	604	(NA)	(NA)	(NA)	855	(NA)	(NA)	(NA)	3,707	(NA)	9.3	(NA)
Romania [2]	4,585	6,768	7,431	7,670	6,487	7,398	7,676	7,670	292	333	6.0	6.5
Saudi Arabia	14,990	21,340	[2]16,210	13,560	21,210	23,320	[2]16,740	13,560	2,090	878	14.3	16.5
Singapore	514	1,085	1,105	1,321	727	1,187	1,142	1,321	301	499	5.2	5.3
South Africa	2,594	2,644	[2]3,353	3,607	3,669	2,890	[2]3,463	3,607	126	103	5.2	4.3
South Korea	3,607	5,630	6,427	7,202	5,103	6,154	6,639	7,202	134	168	6.1	4.3
Soviet Union [2]	198,200	277,200	303,000	299,800	280,400	303,000	313,000	299,800	1,053	1,047	12.9	11.9
Spain	4,489	6,528	7,441	7,171	6,351	7,136	7,686	7,171	169	183	2.3	2.2
Sweden	3,324	4,473	4,697	4,975	4,703	4,889	4,852	4,975	566	593	3.1	2.8
Switzerland	2,746	[2]3,885	[2]3,768	[2]3,888	3,885	[2]4,247	[2]3,892	[2]3,888	609	590	2.4	2.1
Syria [3]	1,601	[2]2,959	[2]1,472	[2]1,604	2,265	[2]3,235	[2]1,521	[2]1,604	261	139	17.2	10.9
Thailand	1,004	1,801	1,717	1,718	1,420	1,969	1,774	1,718	30	31	4.1	3.1
Turkey	1,540	2,404	2,807	2,664	2,179	2,628	2,900	2,664	48	49	4.8	3.9
United Arab Emirates	1,724	[2]1,901	1,590	1,587	2,440	[2]2,078	1,642	1,587	2,439	801	5.7	6.8
United Kingdom	22,960	33,890	34,780	34,680	32,490	37,050	35,930	34,680	577	609	5.0	4.3
Venezuela	441	491	[2]1,593	[2]848	624	537	[2]1,646	[2]848	42	45	1.1	1.4
West Germany	24,430	32,710	34,420	35,100	34,570	35,760	35,560	35,100	562	576	3.3	2.9
Yugoslavia	1,809	2,042	2,665	2,080	2,559	2,232	2,753	2,080	115	88	4.3	3.4

NA Not available. [1] Military expenditure as percent of gross national product. For additional information on comparisons between communist and noncommunist countries, see footnote 4, table 548. [2] Estimated. [3] Data probably omit a major share of total military expenditures, probably including most arms acquisitions.

Source: U.S. Arms Control and Disarmament Agency, *World Military Expenditures and Arms Transfers*, annual.

stant (1988) Dollars: 1980 to 1988

countries, data for expenditures and for GNP were values before conversion to U.S. dollar equivalents. change rates as supplied by the International Bank

CONSTANT (1988) DOLLARS						
	1987	1988	Per capita (dollars)		Percent of GNP [1]	
			1980	1988	1980	1988
0	306,000	307,700	894	1,250	5.3	6.3
5	1,536	1,784	89	74	3.9	3.4
9	[2]1,447	[2]2,972	136	94	3.6	3.1
8	5,918	6,170	291	379	2.3	2.7
1	1,488	1,426	168	188	1.1	1.2
4	4,295	4,097	452	415	3.3	2.7
6	3,467	1,209	18	8	0.7	0.3
7	6,863	6,842	654	763	11.7	12.7
3	9,911	10,020	293	384	1.9	2.1
0	[2]852	[2]808	58	64	3.6	4.0
0	[2]1,180	21,270	24	20	9.1	3.9
2	[2]5,276	6,156	237	308	6.5	5.2
2	1,349	1,326	167	128	6.5	3.8
8	9,866	9,818	527	629	6.5	7.1
0	2,278	2,320	445	453	2.5	2.2
0	14,150	14,320	667	863	6.9	7.7
7	8,303	6,086	114	114	9.5	7.8
4	[2]252	212	35	39	2.7	3.8
0	1,618	[2]1,701	264	344	1.6	1.7
0	36,090	35,950	596	644	4.0	3.9
2	3,153	3,378	278	337	5.5	6.5
6	4,356	4,489	392	424	6.3	6.3
9	9,474	9,458	8	12	3.2	3.5
5	1,529	1,400	11	8	3.1	1.8
0	(NA)	(NA)	531	(NA)	6.6	(NA)
0	(NA)	(NA)	2,124	(NA)	22.5	(NA)
6	6,302	6,001	2,657	1,396	29.2	13.8
0	19,150	20,430	252	356	2.1	2.6
0	27,550	28,870	165	235	0.9	1.0
	1,373	1,340	970	692	2.9	5.1
	1,350	908	73	55	4.4	2.8
	[2]898	1,016	9	12	0.4	0.6
	[2]1,194	1,138	52	46	7.6	6.0
	6,773	6,729	444	457	3.1	3.0
	(NA)	(NA)	25	(NA)	5.8	(NA)
	208	223	8	2	2.4	0.8
	5,826	5,840	346	266	20.0	20.0
	3,027	2,895	515	691	3.0	3.2
	1,568	1,371	1,522	1,083	22.1	19.1
	2,362	2,516	14	23	5.4	6.9
	[2]2,205	(NA)	108	(NA)	5.0	(NA)
	675	680	14	11	1.9	1.7
	16,330	15,660	394	413	8.2	8.7
	1,236	1,347	125	130	3.6	3.3
	(NA)	(NA)	3,707	(NA)	9.3	(NA)
	7,676	7,670	292	333	6.0	6.5
	[2]16,740	13,560	2,090	878	14.3	16.5
	1,142	1,321	301	499	5.2	5.3
	[2]3,463	3,607	126	103	5.2	4.3
	6,639	7,202	134	168	6.1	4.3
	313,000	299,800	1,053	1,047	12.9	11.9
	7,686	7,171	169	183	2.3	2.2
	4,852	4,975	566	593	3.1	2.8
	[2]3,892	[2]3,888	609	590	2.4	2.1
	[2]1,521	[2]1,604	261	139	17.2	10.9
	1,774	1,718	30	31	4.1	3.1
	2,900	2,664	48	49	4.8	3.9
	1,642	1,587	2,439	801	5.7	6.8
	35,930	34,680	577	609	5.0	4.3
	[2]1,646	[2]848	42	45	1.1	1.4
	35,560	35,100	562	576	3.3	2.9
	2,753	2,080	115	88	4.3	3.4

uct. For additional information on comparisons Estimated. [3] Data probably omit a major share

itures and Arms Transfers, annual.

No. 1490. Armed Forces Personnel—Number and Rate, by Country: 1980 to 1988

[**Personnel data as of July.** Armed Forces refer to active-duty military personnel, including paramilitary forces where those forces resemble regular units in their organization, equipment, training, or mission. Reserve forces are not included]

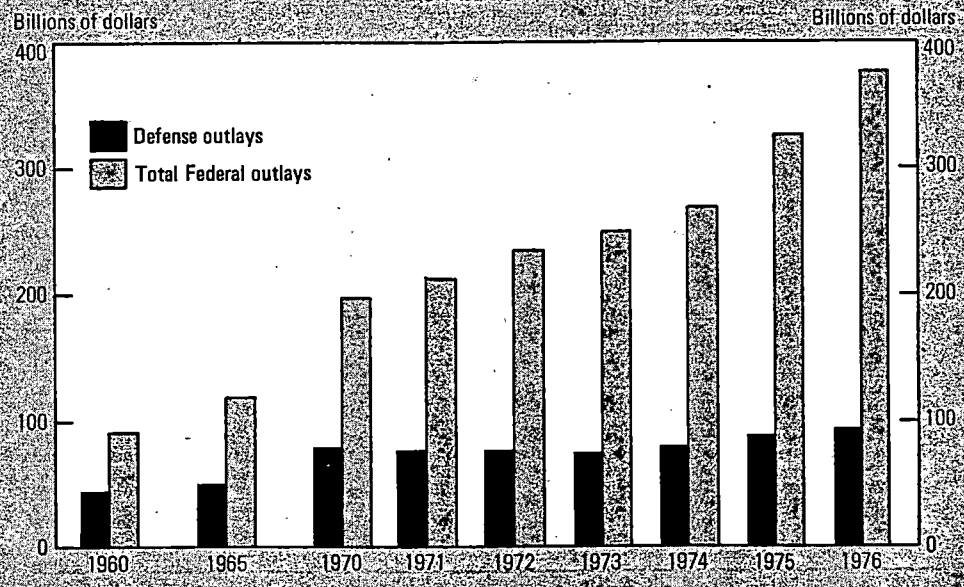
COUNTRY	ARMED FORCES PERSONNEL (1,000)						ARMED FORCES PER 1,000 POPULATION					
	1980	1984	1985	1986	1987	1988	1980	1984	1985	1986	1987	1988
United States	**2,050**	**2,222**	**2,244**	**2,269**	**2,279**	**2,246**	**9.0**	**9.4**	**9.4**	**9.4**	**9.3**	**9.1**
Algeria	101	170	170	180	170	126	5.4	8.0	7.7	7.9	7.2	5.2
Argentina	155	174	129	104	118	95	5.5	5.8	4.3	3.4	3.8	3.0
Australia	71	71	70	71	70	71	4.9	4.6	4.5	4.5	4.4	4.3
Austria	40	40	40	39	70	55	5.3	5.3	5.3	5.2	9.2	7.2
Belgium	108	107	107	107	109	110	11.0	10.9	10.9	10.8	11.0	11.1
Brazil	450	459	496	527	541	319	3.7	3.4	3.5	3.7	3.7	2.1
Bulgaria	188	189	189	190	191	160	21.2	21.2	21.2	21.2	21.3	17.8
Canada	82	82	83	85	86	88	3.4	3.3	3.3	3.3	3.3	3.4
Chile	116	123	124	127	127	96	10.5	10.4	10.3	10.3	10.2	7.6
China: Mainland	4,650	4,100	4,100	4,030	3,530	3,783	4.7	4.0	3.9	3.8	3.3	3.5
Taiwan	465	470	440	390	365	390	26.1	24.7	22.8	20.0	18.5	19.5
Cuba	220	297	297	297	297	297	22.8	29.8	29.5	29.2	28.9	28.7
Czechoslovakia	190	206	210	214	215	211	12.5	13.3	13.5	13.8	13.8	13.5
Denmark	33	31	29	28	28	30	6.4	6.1	5.7	5.5	5.5	5.9
East Germany	228	240	242	242	241	242	13.6	14.4	14.5	14.6	14.5	14.6
Egypt	447	466	466	400	450	452	10.6	9.8	9.5	7.9	8.7	8.5
El Salvador	16	45	48	48	49	45	3.4	9.2	9.6	9.3	9.3	8.4
Finland	36	40	(NA)	37	37	36	7.5	8.2	(NA)	7.4	7.4	7.2
France	575	571	563	558	559	558	10.7	10.4	10.2	10.1	10.1	10.0
Greece	186	197	201	202	199	199	19.3	19.9	20.2	20.3	19.9	19.9
Honduras	14	20	21	22	22	19	3.7	4.6	4.7	4.6	4.5	3.8
Hungary	120	118	117	116	116	117	11.2	11.0	11.0	10.9	10.9	11.0
India	1,104	1,380	1,515	1,492	1,502	1,362	1.6	1.8	2.0	1.9	1.9	1.7
Indonesia	250	281	281	278	281	284	1.6	1.7	1.6	1.6	1.6	1.5
Iran	305	335	345	345	350	654	7.8	7.4	7.3	7.1	7.0	12.6
Iraq	430	788	788	800	900	1,000	32.6	51.7	49.9	48.8	53.0	56.9
Israel	196	205	195	180	180	191	52.4	51.2	47.8	43.4	42.6	44.4
Italy	500	508	531	529	531	446	8.9	8.9	9.3	9.2	9.3	7.8
Japan	242	241	241	245	244	245	2.1	2.0	2.0	2.0	2.0	2.0
Kuwait	12	15	16	18	20	15	8.8	9.2	9.3	10.1	10.7	7.7
Malaysia	83	105	106	106	106	108	6.0	7.0	6.9	6.7	6.6	6.6
Mexico	120	129	140	141	141	154	1.7	1.7	1.8	1.8	1.7	1.8
Morocco	117	149	165	185	200	195	5.7	6.6	7.1	7.8	8.2	7.8
Netherlands	107	103	103	106	106	107	7.6	7.1	7.1	7.3	7.2	7.3
Nicaragua	24	67	74	75	80	74	8.6	21.6	23.4	23.1	24.1	21.7
Nigeria	150	144	134	138	138	107	1.7	1.4	1.3	1.3	1.3	1.0
North Korea	700	784	784	838	838	842	39.1	39.9	38.5	40.1	39.1	38.3
Norway	40	39	36	38	38	40	9.7	9.4	8.7	9.1	9.1	9.5
Oman	15	25	25	26	27	27	15.2	22.4	21.7	21.9	22.0	21.0
Pakistan	467	646	644	573	572	484	5.5	6.7	6.5	5.6	5.5	4.5
Peru	151	135	128	127	127	111	8.7	7.0	6.5	6.3	6.1	5.2
Philippines	155	157	157	161	161	105	3.0	2.8	2.7	2.7	2.6	1.7
Poland	408	434	439	443	441	430	11.5	11.7	11.8	11.8	11.7	11.3
Portugal	88	100	102	101	105	104	9.0	9.9	10.0	9.9	10.2	10.0
Qatar	6	6	7	9	11	7	26.0	21.5	24.0	29.7	34.8	21.3
Romania	211	236	237	238	248	220	9.5	10.4	10.4	10.4	10.8	9.5
Saudi Arabia	79	80	80	80	80	84	7.8	6.3	6.0	5.7	5.4	5.4
Singapore	50	59	59	56	55	56	20.7	23.3	23.1	21.5	21.0	21.0
South Africa	70	97	95	90	102	100	2.4	3.0	2.9	2.7	3.0	2.8
South Korea	600	602	600	604	604	626	15.7	14.9	14.6	14.5	14.3	14.6
Soviet Union	3,900	3,900	3,900	3,900	3,900	3,900	14.6	14.1	14.0	13.9	13.7	13.6
Spain	356	342	314	314	314	304	9.5	8.9	8.1	8.1	8.1	7.8
Sweden	70	69	(NA)	66	66	65	8.4	8.3	(NA)	7.8	7.8	7.7
Switzerland	23	25	(NA)	21	20	23	3.6	3.8	(NA)	3.2	3.0	3.5
Syria	250	402	402	400	400	400	28.8	40.2	38.8	37.2	35.9	34.6
Thailand	234	250	270	275	275	273	5.0	4.9	5.2	5.2	5.1	5.0
Turkey	717	815	814	860	879	847	15.9	16.5	16.1	16.6	16.6	15.6
United Arab Emirates	44	44	44	44	44	43	44.0	30.6	28.0	25.7	23.8	21.7
United Kingdom	330	336	334	331	328	324	5.9	5.9	5.9	5.8	5.8	5.7
Venezuela	55	64	71	66	69	73	3.7	3.8	4.1	3.7	3.8	3.9
Vietnam	900	1,000	1,000	1,300	1,300	1,100	16.8	16.9	16.5	21.0	20.4	16.9
West Germany	490	487	495	495	495	495	8.0	8.0	8.1	8.1	8.1	8.1
Yugoslavia	260	259	258	234	234	229	11.6	11.3	11.2	10.0	10.0	9.7

NA Not available.

Source: U.S. Arms Control and Disarmament Agency, *World Military Expenditures and Arms Transfers*, annual.

Fig. 11-1. NATIONAL DEFENSE AND TOTAL BUDGET OUTLAYS: 1960 TO 1976

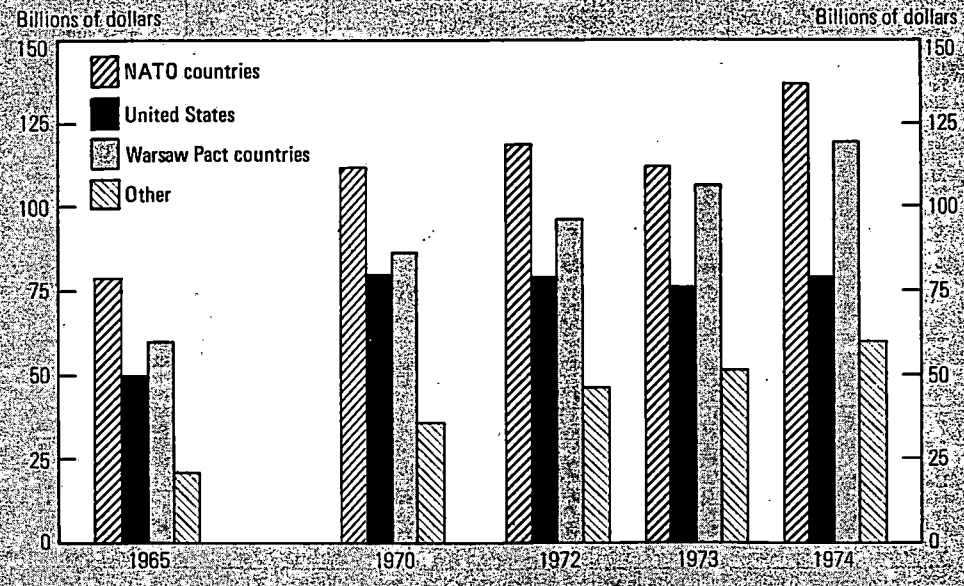
(See table 513)



Source: Chart prepared by U.S. Bureau of the Census. Data from U.S. Office of Management and Budget.

Fig. 11-2. WORLDWIDE MILITARY EXPENDITURES: 1965 TO 1974

(See tables 514 and 517)



Source: Chart prepared by U.S. Bureau of the Census. Data from U.S. Office of Management and Budget and U.S. Arms Control and Disarmament Agency.

No. 517. Worldwide Military Expenditures: 1965 to 1974

[Calendar year data. For estimates of military expenditures and armed forces by country, see section 32]

ITEM	MILITARY EXPENDITURES (bil. dol.)								PER CAPITA (dol.)			
	1965	1968	1969	1970	1971	1972	1973	1974	1965	1970	1973	1974
IN CURRENT DOLLARS												
Worldwide, total	160	212	225	235	250	261	280	315	48	64	71	79
Percent U.S. of total	32	38	36	33	30	30	28	27	(X)	(X)	(X)	(X)
Developed countries [1]	142	189	197	203	208	219	233	260	151	206	230	254
Developing countries [1]	18	23	28	32	42	42	47	55	7	12	16	19
NATO countries [2]	79	111	113	112	112	118	122	136	156	210	223	246
Warsaw Pact countries	60	74	80	87	91	96	106	119	181	251	299	332
Other	21	27	32	36	47	47	52	60	8	13	17	20
IN CONSTANT 1973 DOLLARS												
Worldwide, total	222	268	271	268	273	276	280	285	67	73	71	71
Percent U.S. of total	32.5	38.1	36.2	33.2	30.0	29.7	28.0	27.3	(X)	(X)	(X)	(X)
Developed countries [1]	198	239	237	232	227	231	233	235	210	235	230	233
Developing countries [1]	24	29	34	36	46	45	47	50	10	13	16	17
NATO countries [2]	110	141	136	127	122	124	122	123	217	239	223	223
Warsaw Pact countries	83	93	96	99	100	102	106	107	252	287	299	300
Other	29	34	39	42	51	50	52	55	12	15	17	18
AS PERCENT OF GNP [3]												
Worldwide, total	6.7	7.0	6.7	6.3	6.2	5.9	5.7	5.7	(X)	(X)	(X)	(X)
United States	7.6	9.3	8.8	8.0	7.1	6.7	6.1	6.2	(X)	(X)	(X)	(X)
Developed countries [1]	7.2	7.5	7.1	6.6	6.3	6.1	5.8	5.8	(X)	(X)	(X)	(X)
Developing countries [1]	4.4	4.6	4.8	4.8	5.6	5.2	5.1	5.3	(X)	(X)	(X)	(X)
NATO countries [2]	6.1	6.8	6.3	5.8	5.4	5.2	4.8	4.9	(X)	(X)	(X)	(X)
Warsaw Pact countries [4]	5–9	5–9	5–9	5–9	5–9	5–9	5–9	5–9	(X)	(X)	(X)	(X)

X Not applicable.

[1] 27 developed countries include all those in North America, in Oceania, in European NATO (except Greece, Portugal, and Turkey), in the Warsaw Pact (except Bulgaria), and also Austria, Finland, Ireland, Japan, South Africa, Sweden, and Switzerland; 109 developing countries include all those in Latin America, in the Near East, in South Asia, in East Asia (except Japan), in Africa (except South Africa), and also Albania, Bulgaria, Greece, Malta, Portugal, Spain, Turkey, and Yugoslavia. [2] North Atlantic Treaty Organization.

[3] Gross national product. [4] 5–9 percent range.

No. 518. Arms Exports and Imports, Supplier and Recipient Countries: 1965 to 1974

[In millions of constant 1973 dollars]

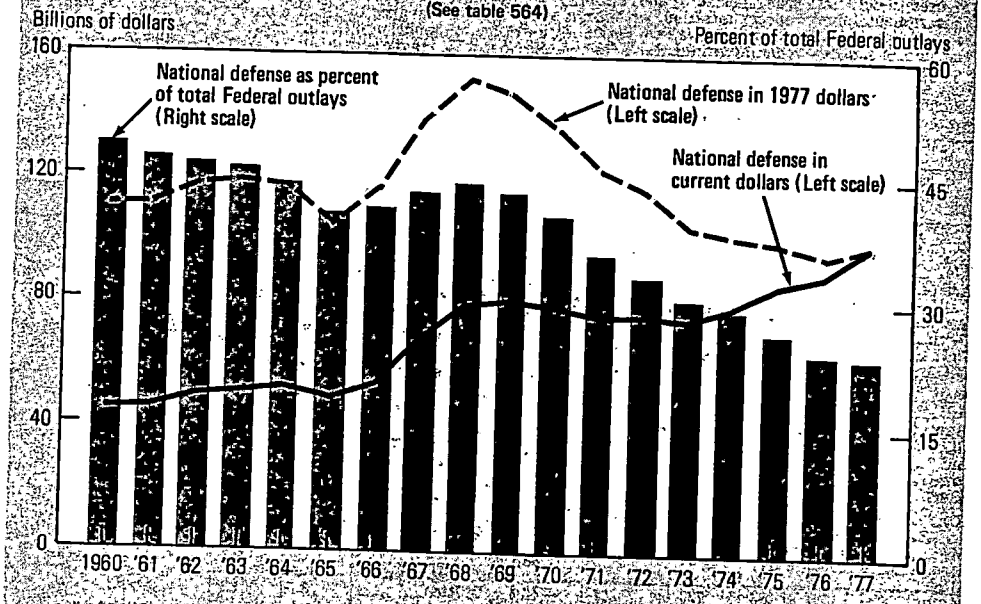
COUNTRY	1965–1970	1971	1972	1973	1974
World, total	38,670	6,940	9,210	9,555	8,365
EXPORTS					
United States	18,730	3,690	4,330	5,020	3,770
U.S.S.R.	11,640	1,770	2,570	2,840	2,550
France	1,261	168	571	571	509
China, People's Republic	1,155	275	421	233	292
Poland	1,124	189	96	61	18
Czechoslovakia	1,071	133	128	106	69
United Kingdom	1,026	194	329	333	420
Canada	821	204	162	74	99
Germany, Federal Republic	772	142	239	26	202
Other	1,070	175	364	291	436
IMPORTS					
Developed countries	12,790	1,800	2,190	1,500	2,355
United States	1,072	166	167	171	105
U.S.S.R.	1,660	213	106	100	36
United Kingdom	1,332	75	40	38	66
Germany, Federal Republic of	1,371	382	283	277	426
German Dem. Republic	1,076	138	338	105	372
Poland	1,036	132	229	100	263
Australia	705	43	58	199	50
Czechoslovakia	729	90	137	75	249
Italy	416	66	204	84	165
Japan	367	90	48	73	83
Romania	327	43	85	40	54

COUNTRY	1965–1970	1971	1972	1973	1974
IMPORTS—Con.					
Developed countries—Con.					
Hungary	327	42	74	20	118
Other	2,372	320	421	218	368
Developing countries	25,880	5,140	7,020	8,055	6,010
Vietnam, South	5,078	877	1,380	1,140	603
Vietnam, North	3,700	338	787	325	363
Korea, Rep. of	1,730	243	539	152	103
Egypt	1,568	393	320	595	107
Turkey	1,456	287	345	265	186
Cambodia	107	59	87	79	274
Libya	131	105	188	209	143
China, Rep. of	1,082	258	235	145	114
India	1,196	257	216	180	117
Iran	879	349	438	482	789
Israel	674	281	226	1,720	577
Syria	288	120	172	724	422
Greece	666	294	219	49	153
Spain	254	98	134	105	75
Pakistan	620	54	101	133	85
Iraq	528	38	90	341	323
Laos	469	121	115	96	62
Korea, North	432	180	143	140	54
Brazil	224	56	62	116	64
Cuba	262	27	26	25	16
Peru	132	58	85	77	67
Indonesia	295	26	37	20	32
Other	4,109	621	1,075	937	1,281

Source of tables 517 and 518: U.S. Arms Control and Disarmament Agency, *World Military Expenditures and Arms Transfers, 1965–1974*, March 1976.

Fig. 12-1. FEDERAL BUDGET OUTLAYS FOR NATIONAL DEFENSE: 1960 TO 1977

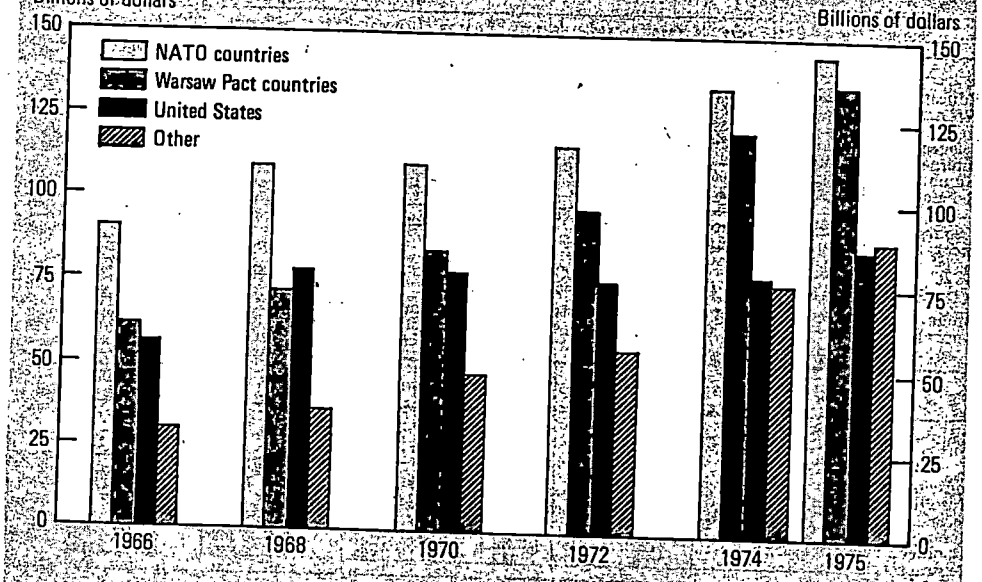
(See table 564)



Source: Chart prepared by U.S. Bureau of the Census. Data from U.S. Office of Management and Budget.

Fig. 12-2. WORLDWIDE MILITARY EXPENDITURES IN CURRENT DOLLARS: 1966 TO 1975

(See tables 565 and 568)



Source: Chart prepared by U.S. Bureau of the Census. Data from U.S. Arms Control and Disarmament Agency.

No. 568. Worldwide Military Expenditures: 1966 to 1975

[For military expenditures and armed forces by country, and for list of NATO and Warsaw Pact countries, see section 33]

Item	Military expenditures (bil. dol.)									Per capita (dol.)		
	1966	1968	1969	1970	1971	1972	1973	1974	1975	1966	1970	1975
In current dollars												
Worldwide, total	184	220	234	245	258	272	294	334	371	53	65	91
Percent U.S. of total	35	37	35	32	29	29	27	26	25	(X)	(X)	(X)
Developed countries [1]	157	187	196	201	209	221	236	264	290	163	202	279
Developing countries [1]	27	33	38	44	49	51	58	70	82	11	16	27
NATO countries [2]	91	110	112	111	111	117	121	135	145	177	208	262
Warsaw Pact countries	62	73	79	85	92	98	108	122	136	185	246	379
Other	31	37	43	49	55	57	65	77	90	12	17	29
In constant 1974 dollars												
Worldwide, total	279	311	314	312	312	317	323	334	340	80	83	84
Percent U.S. of total	34.6	36.7	34.7	31.8	29.1	28.5	26.7	25.7	24.5	(X)	(X)	(X)
Developed countries [1]	237	264	263	256	253	257	260	264	265	247	257	255
Developing countries [1]	42	47	50	56	59	60	63	70	75	17	20	25
NATO countries [2]	138	156	150	141	135	137	133	135	133	268	265	239
Warsaw Pact countries	94	103	106	109	112	114	119	122	125	281	314	347
Other	47	52	58	62	65	66	71	77	82	18	22	26
As percent of GNP [3]												
Worldwide, total	7.0	7.2	6.9	6.5	6.3	6.1	5.8	5.9	6.0	(X)	(X)	(X)
United States	8.4	9.3	8.7	7.9	7.0	6.6	6.0	6.1	6.0	(X)	(X)	(X)
Developed countries [1]	7.3	7.5	7.1	6.6	6.3	6.1	5.8	5.9	6.0	(X)	(X)	(X)
Developing countries [1]	5.8	6.0	6.0	6.1	6.1	5.8	5.7	6.0	6.1	(X)	(X)	(X)
NATO countries [2]	6.5	6.8	6.3	5.8	5.4	5.2	4.8	4.8	4.9	(X)	(X)	(X)
Warsaw Pact countries [4]	5–7	5–7	5–7	5–7	5–7	5–7	5–7	5–7	5–7	(X)	(X)	(X)

X Not applicable.

[1] 28 developed countries include all those in North America, in Oceania, in European NATO (except Greece and Turkey), in the Warsaw Pact (except Bulgaria), and also Austria, Finland, Ireland, Japan, South Africa, Sweden, and Switzerland; 114 developing countries include all those in Latin America, in the Near East, in South Asia, in East Asia (except Japan), in Africa (except South Africa), and also Albania, Bulgaria, Greece, Malta, Spain, Turkey, and Yugoslavia. [2] North Atlantic Treaty Organization.

[3] Gross national product. [4] 5–7 percent range.

No. 569. Value of Arms Exports and Imports, Supplier and Recipient Countries, in Constant Dollars: 1966 to 1975

[In millions of constant 1974 dollars. Countries ranked on basis of totals for 10-year period, 1966–1975]

Country	1966–1970	1971–1972	1973	1974	1975
World, total	37,300	17,830	10,530	9,290	8,890
Suppliers					
United States	18,630	8,870	5,520	4,160	4,440
U.S.S.R.	10,980	4,770	3,150	2,870	2,390
France	1,250	809	621	561	461
United Kingdom	960	579	366	463	346
China, People's Rep.	1,166	765	255	321	175
Germany, Fed. Rep.	703	421	29	223	235
Czechoslovakia	950	289	117	76	108
Canada	825	405	81	109	67
Poland	1,039	316	67	20	38
Other	797	606	324	487	630
Recipients					
Developed countries	11,930	4,450	1,660	2,620	2,380
Germany, Fed. Rep.	1,258	736	305	470	442
Germany, Dem. Rep.	974	526	116	410	338
U.S.S.R.	1,490	352	110	40	27
Poland	925	400	110	290	252
United States	1,060	368	188	116	132
United Kingdom	1,406	128	42	73	101
Czechoslovakia	623	250	83	275	178
Australia	624	111	219	55	28
Italy	387	298	92	182	72
Japan	361	151	80	91	47
Hungary	256	128	22	130	101
Romania	269	140	44	60	111
Other	2,297	862	249	428	551
Recipients—Con.					
Developing countries	25,370	13,380	8,870	6,670	6,510
Vietnam, South	5,291	2,504	1,250	665	829
Vietnam, North	3,570	1,243	358	400	142
Israel	683	553	1,880	636	650
Iran	930	871	530	870	1,020
Egypt	1,612	765	655	118	211
Korea, Rep. of	1,773	864	167	114	166
Turkey	1,498	700	292	205	152
India	1,126	524	198	129	139
Syria	306	323	797	465	202
China, Rep. of	1,090	546	160	126	151
Iraq	529	141	394	416	413
Greece	641	567	54	169	177
Libya	149	326	231	159	330
Pakistan	580	169	145	93	62
Korea, North	416	357	154	60	16
Laos	457	262	106	68	20
Spain	231	257	116	83	112
Cambodia	108	162	87	302	117
Brazil	226	131	128	71	66
Peru	140	157	85	74	99
Cuba	261	59	28	18	35
Indonesia	51	70	22	35	16
Other	3,702	1,829	1,033	1,394	1,385

Source of tables 568 and 569: U.S. Arms Control and Disarmament Agency, *World Military Expenditures and Arms Transfers, 1966–1975*, December 1976.

RANKING OF COUNTRIES, MILITARY AND SOCIAL INDICATORS

141 Countries 1978

TABLE III

	MILITARY						GNP		EDUCATION									
	Public Expenditures per Capita		Public Expenditures per Soldier[1]		Public Expenditures Per Sq. Km.		Economic-Social Standing[2]	per Capita		Public Expenditures per Capita		School-Age Population per Teacher[3]		% School Age Population in School		% Girls in Total Enrollment High School		Literacy Rate[4]	
	Rank	US$	Rank	US$	Rank	US$	Rank	Rank	US$	Rank	US$	Rank	Number	Rank	Number	Rank	%	Rank	%
WORLD		97		17,561		3,207			2,155		110		49		54		43		69
Developed		309		32,632		5,967			6,937		382		27		69		51		99
Developing		30		6,780		1,266			635		24		61		50		40		57
AMERICA																			
North America		468		52,739		5,860			9,634		577		23		83		50		99
United States*		499	[illegible]	52,802	[illegible]	11,668	7	10	9,752	10	565	[illegible]	23	[illegible]	84	[illegible]	50	1	99
Canada*		174	[illegible]	51,112	[illegible]	410	14	17	8,531	8	688	16	26	[illegible]	75	47	49	[illegible]	98
Latin America		22		6,508		367			1,422		53		43		57		45		78
Argentina		55	46	11,000	[illegible]	529	37	47	1,994	65	54	21	28	60	58	[illegible]	53	[illegible]	94
Barbados	[illegible]	4	[illegible]	1,000	[illegible]	2,500	34	49	1,861	31	158	26	30	14	71	21	51	[illegible]	97
Bolivia	[illegible]	18	[illegible]	3,913	[illegible]	82	81	78	770	77	32	47	38	60	58	2	41	[illegible]	63
Brazil	[illegible]	18	[illegible]	7,536	[illegible]	243	54	52	1,608	52	55	47	38	61	52	9	54	[illegible]	75
Chile	[illegible]	73	[illegible]	9,188	[illegible]	1,032	44	59	1,474	37	50	51	40	14	71	2	56	[illegible]	90
Columbia		7	[illegible]	2,211	[illegible]	148	69	73	878	39	20	76	54	73	54	[illegible]	44	[illegible]	82
Costa Rica	[illegible]	11	60	4,600	4	451	50	53	1,606	43	99	66	49	73	54	9	54	[illegible]	90
Cuba	[illegible]	49	[illegible]	2,962	2	4,096	36	60	1,270	47	82	6	22	4	76	[illegible]	51	[illegible]	96
Dominican Republic	[illegible]	17	[illegible]	4,789	[illegible]	1,857	70	75	846	91	18	92	74	85	51	[illegible]	50	[illegible]	68
Ecuador	[illegible]	22	77	6,560	[illegible]	577	64	66	977	75	35	58	46	48	61	[illegible]	44	62	74
El Salvador	[illegible]	13	[illegible]	8,429	[illegible]	2,810	84	82	673	37	23	106	91	96	50	[illegible]	44	[illegible]	63
Guatemala	[illegible]	9	62	4,500	[illegible]	578	85	71	934	100	14	97	78	115	32	[illegible]	43	[illegible]	47
Guyana	[illegible]	10	67	4,000	[illegible]	37	65	90	579	69	46	42	36	43	62	35	50	[illegible]	85
Haiti	[illegible]	2	[illegible]	1,857	[illegible]	464	122	125	183	135	2	120	121	114	33	[illegible]	30	114	23
Honduras		11	[illegible]	2,714	[illegible]	339	91	96	494	31	18	94	77	99	42	[illegible]	51	76	58
Jamaica	[illegible]	9	[illegible]	10,000	[illegible]	1,818	49	64	1,160	49	79	57	44	30	66	[illegible]	53	39	86
Mexico	[illegible]	8	66	4,979	[illegible]	245	59	59	1,418	56	68	62	48	25	67	[illegible]	42	34	80
Nicaragua	[illegible]	28	51	9,714	[illegible]	523	74	74	873	65	24	98	79	90	48	21	51	76	58
Panama	[illegible]	9	[illegible]	1,545	[illegible]	224	48	62	1,237	58	65	53	41	21	69	[illegible]	53	[illegible]	82
Paraguay	[illegible]	13	[illegible]	2,353	[illegible]	98	74	76	817	101	13	60	47	81	52	[illegible]	49	[illegible]	82
Peru	[illegible]	33	[illegible]	6,236	[illegible]	432	77	85	633	93	17	61	58	34	64	[illegible]	46	[illegible]	72
Trinidad & Tobago	[illegible]	11	[illegible]	12,000	[illegible]	2,400	45	40	2,933	35	140	72	52	90	48	21	51	[illegible]	92
Uruguay	[illegible]	40	55	4,259	[illegible]	653	42	51	1,702	77	32	29	32	54	60	[illegible]	54	[illegible]	94
Venezuela	[illegible]	44	37	14,159	[illegible]	683	43	41	2,822	32	149	55	43	60	58	13	53	[illegible]	82
EUROPE																			
NATO Europe		237		28,620		27,501			6,578		348		28		64		48		93
Belgium*	[illegible]	322	[illegible]	36,448	[illegible]	105,700	13	9	9,878	9	589	[illegible]	28	30	58	[illegible]	50	[illegible]	99
Denmark*	[illegible]	259	[illegible]	38,824	[illegible]	30,698	2	6	10,830	3	752	[illegible]	20	[illegible]	70	[illegible]	51		99
France*	[illegible]	350	[illegible]	37,091	[illegible]	34,108	8	16	8,902	12	512	13	24	22	68	13	53	[illegible]	99
Germany, West*	[illegible]	350	9	43,808	[illegible]	86,209	5	7	10,479	14	491	21	28	25	67	21	51	[illegible]	99
Greece	[illegible]	220	47	10,816	[illegible]	15,568	30	35	3,433	51	74	46	37	16	70	47	49	[illegible]	84
Iceland*		—		—		—	4	11	9,536	19	397	6	22	16	70	35	50	1	99
Italy*	[illegible]	112	[illegible]	17,572	[illegible]	21,133	20	27	4,669	28	215	9	23	48	61	[illegible]	48	[illegible]	95
Luxembourg*	[illegible]	103	17	37,000	[illegible]	12,333	15	5	11,408	7	698	15	25	54	60	35	50	[illegible]	98
Netherlands*	[illegible]	304	14	38,500	[illegible]	103,293	9	13	9,396	4	730	37	34	38	63	35	50	1	99
Norway*	[illegible]	322	[illegible]	33,564	[illegible]	4,040	3	12	9,528	5	729	[illegible]	21	16	70	21	51	[illegible]	99
Portugal	[illegible]	64	50	9,828	[illegible]	6,837	41	48	1,968	53	73	41	35	43	62	[illegible]	52	53	72
Turkey	[illegible]	64	32	5,736	[illegible]	3,562	70	61	1,244	71	44	30	57	90	48	106	32	72	60
United Kingdom*	[illegible]	262	[illegible]	46,716	7	59,926	16	25	5,578	23	297	[illegible]	23	2	81	47	49	1	99
ALL NATO (incl. US and Canada)		336		39,358		8,586			7,886		446		26		73		49		95
Warsaw Pact		311		24,303		4,917			3,777		173		31		58		57		99
Burgaria*	[illegible]	77	91	4,527	34	6,117	27	37	3,212	37	120	31	33	69	56	13	53	23	95
Czechoslovakia*	[illegible]	143	43	11,651	20	16,930	20	26	4,733	33	144	37	34	57	59	1	61	1	99
Germany, East*	[illegible]	218	25	23,255	[illegible]	33,806	19	24	5,666	27	226	42	36	38	63	63	47	1	99
Hungary*	[illegible]	79	70	7,368	27	9,032	32	34	3,477	34	142	20	27	69	56	63	47	20	98
Poland*	[illegible]	99	45	11,287	25	11,070	30	33	3,655	41	101	53	41	78	54	7	55	20	98
Romania*	[illegible]	56	75	6,757	37	5,139	29	38	3,088	40	103	31	33	25	67	35	50	20	98
USSR*	[illegible]	394	21	28,312	39	4,588	23	31	3,705	29	189	25	29	60	58	2	56	1	99

Estimating Military Expenditures of the USSR and its Warsaw Pact Allies

In the absence of adequate reporting by the Soviet Union of its annual military expenditures, independent calculations must be made by western authorities (*chart 22*). A review of the estimates made by official US sources indicates that they tend to exaggerate Soviet military expenditures. The result is a stimulus to the arms race.

If the Soviet Union has an interest in curbing the momentum of the arms competition, it could take a relatively simple step: make public its military budget in the detail proposed by the United Nations for all countries. At a small sacrifice of secrecy, it could thereby provide the kind of reassurance on which mutual trust between nations and arms restraint depend.

The usual statistical note on Soviet military expenditures was expanded in *WMSE 1980* to give an overview of the range of western estimates and a more detailed evaluation of the official US estimates. The summary is repeated in this edition, with some revisions based on CIA testimony made available in the past year. Given the limitations of space and time, this is necessarily a cursory examination of a very complex subject. Hopefully it will provide some encouragement to others to explore further.[1]

Soviet military expenditures warrant special attention for several reasons:

1. As a summary of the Soviet military effort and trend, they affect US and all NATO planning, the willingness of public officials to spend more to meet the competition, and of taxpayers to bear the burden.
2. Unlike other major industrial powers, the Soviet Union fails to provide detail on its military budget, or even to describe what expenditures are covered. It announces a single undefined figure each year, which seldom changes. Since 1970 the budget has dropped about 4 percent, from 17.9 to 17.2 billion rubles.
3. The Soviet announced budget is clearly incomplete in view of the advanced military technology and the size of the military force the USSR has produced.
4. The ruble is essentially a domestic currency and official rates of exchange reflect neither the relation between internal prices and foreign prices, nor balance of payments forces.
5. Between the official Soviet military budget, converted to dollars at the official rate, and the official US view of that budget, there was a gap, as *chart 22* indicates, of $129 billion in 1978, a disparity which was larger than the total US military budget that year.
6. Between the official US estimate of Soviet military expenditures, and the estimate in this study, the gap was $51 billion in 1978, although we continue to use the CIA ruble estimate for the calculation.

In the discussion following, the principal focus is on the calculations by US intelligence agencies which establish the official US view of Soviet military expenditures. Since this publication also has dollar estimates for other Warsaw Pact countries lower than the US official estimates, the basis for the alternatives will be described as well.

Soviet expenditures in rubles

Basis of estimates

In the absence of adequate reporting by the Soviet Union, western analysts have generally resorted to one of two basic approaches to an estimate of Soviet military expenditures in rubles.

Add-on—One approach attempts to flesh out the Soviet announced military budget by adding elements such as research and development, which are believed to be missing from the official figures. The missing elements are generally extracted from other parts of the state budget.

Building-block—The other approach is independent of the Soviet announced budgets except in the valuation of research expenditures. This method breaks down military expenditures into physical quantities (manpower, equipment, construction), and operating costs and research. Each major component is composed of many individual elements which are separately assigned monetary values. Considering the thousands of elements which must be identified and also valued, it is evident that this is an extraordinarily complex procedure, feasible only through a vast expenditure of effort on surveillance, data collection, and analysis. So far, only US intelligence agencies have the arsenal of electronic and other resources required for calculations of this detail and scope.

The building-block approach is used by CIA to produce annual estimates of Soviet military expenditures in both ruble values and dollars. The dollar figure is of principal public interest (since it is used for comparison with US expenditures), but it is the CIA ruble estimate which this study uses for its calculation of Soviet military expenditures. Working from the ruble estimate makes it possible to follow the same procedure for conversion to dollars which is used for other countries in this worldwide report and for GNP and other budget expenditures. It also avoids some of the exaggerating effects of the CIA calculation in dollars; these will be discussed below.

In using the CIA ruble estimate for this purpose, however, we do so with reservations. This is not to question either the competence of the analysts, who are highly respected professionals, nor the careful assembly of a massive amount of information. The gaps in knowledge and the need for subjective judgment are still formidable. The numerous uncertainties which invite "worst-case" interpretation and the methodology of the calculations together tend to produce an upward bias in the ruble as well as in the dollar estimate. Even though we cannot remove this bias, or determine precisely how much it may exaggerate the total, identifying some of the factors which appear to produce it may help to indicate the scope of the problem.

Components of CIA estimate

In ruble values, CIA calculates Soviet military expenditures at more than three times the budget of 17.2 billion rubles which the USSR announced for 1978. While the public record does not show how the 1978 figure breaks down into all of the components, averages for the period 1967-1977 will give some clue to the relative importance of the major categories. The estimate of Soviet expenditures in rubles in that period was composed as follows:

- almost one-quarter for research, development, test and evaluation (RDT&E);
- one-half for investment (procurement of equipment and construction);
- a little over one-quarter for operating (60 percent of that for personnel).

What does the record say about some of the measurement problems associated with each of these components?

Research—This category of expenditures is identified by the analysts as the most imprecise element in the estimates. Research outlays cannot be estimated from observable physical quantities. Instead they appear to be derived in large part through an analysis of Soviet information on expenditures for science.

While no direct reference to the basis for the calculations seems to have been made recently, analysts indicated in 1974 testimony that a major share of the Soviet science budget was assumed to be military.

CIA stated in 1978 testimony with "high confidence" that the Soviet military RDT&E effort is "large and growing". The estimated increase in this component in the 1970's has been the predominant factor (along with procurement and maintenance of hardware) pushing the overall expenditure total higher (ref. 6).

An independent study prepared for the National Science Foundation by a specialist in the field reveals some of the practical difficulties in identifying military R&D in Soviet budgets for science (ref. 1). The report provides a careful analysis of definitional and other problems which cannot be adequately summarized here, but two of the general points made seem particularly relevant: a) Soviet reported science budgets appear to be significantly inflated compared with US concepts and b) whether, or how much, Soviet military R&D is included in the science budget is still an unresolved issue.

From this, one could conclude that Soviet budgeting for science is still a largely mysterious area. It may not provide the only basis for the CIA estimate of Soviet expenditures on military R&D, but as a foundation for confident estimates of level or trend it clearly has serious weaknesses.

Investment—The component covering procurement and construction is the part of the estimate in which analysts state they have the greatest confidence. Presumably this is because major equipment can, in large part, be obtained or observed, and at least some of the ruble prices determined from Soviet price lists or sales abroad. In theory at least there is good, "hard" information in this area. Keeping it accurate and up to date is quite another problem, as evidenced by CIA's announcement in 1976 that Soviet military expenditures in rubles were now estimated to be *twice* as high as previously thought, because the ruble prices paid were higher than CIA had calculated.

Even assuming comparatively solid information in some areas, there are others which must depend heavily on judgment or guesswork, for example: the quality and condition of equipment which is not obtainable or visible by satellite or other observation; the range of efficiency and cost within Soviet industry; and the amount of overhaul of old equipment, a practice which some analysts consider fairly common in the Soviet Union.

In addition, a significant source of measurement error arises in valuing equipment for which no ruble prices are available. The estimating process then becomes very shaky indeed. For at least some of the procurement items, CIA must use US analogs. Values in US equivalent prices are established, then converted back to rubles by applying dollar-to-ruble conversion factors. Assessing quality as compared with like US equipment must become a major headache in this case, made more difficult by the fact that Soviet technology as a rule lags behind the US, and the product itself tends to be more simplified.

For example, CIA testimony mentions microminiaturization in computers as one area in which the Soviets are far behind US technology. The question is how accurately analysts can determine the lesser dollar value of a weapon which does not have built into it the accuracy and capability of remote command and control equivalent to its US counterpart.

Although CIA analysts report that they do make the effort to adjust the cost basis of Soviet equipment for physical and performance qualities, they have stated that where their knowledge is incomplete their estimates tend to overstate the costs of producing the Soviet design.

Operating costs—Manpower, although rated at a lower level of reliability than procurement, is considered by CIA to be the most reliable element in the estimates of Soviet operating costs. It is also a relatively small part of the overall estimate of ruble outlays. While Soviet forces are very large, this is a draft army and ruble pay scales are low. (The pay for a private is said to be the ruble equivalent of about $6 per month.)

Estimates of manpower costs presumably depend on the determination of numbers in the total force, the table of organization, and the pay scales used. The record is not clear on all these points. For 1978 CIA estimated manpower at 4.2 million, IISS (the source used in this report) at 3.6 million. The higher CIA figure may result from a definitional difference, possibly from the CIA inclusion of civilians in uniform or of border guards. (ISS has a separate category for paramilitary forces.) It could also result from higher assumptions of the actual complement of Soviet divisions. CIA does state that it takes account of the evidence that a good many Soviet divisions are not at full strength, but certainty in this case may be difficult to establish, and the tendency would be to assume full complement where it is unknown.

In addition to the numbers involved, there are unknowns relating to the operational use of Soviet forces for which adjustments may be especially difficult. The Soviet draft provides a work force at the command of the state. For example, recruits are used for agricultural work during the harvest period. The CIA analysts report that they cannot separate out the portion of time the forces are used in essentially civilian work. In other words, Soviet forces are valued as though fully employed in military functions throughout the year.

Whether adequate cost adjustment can be made for relatively low operational use of equipment and lower levels of readiness than in the US is also a question. Officials have at various times referred to these factors, stating that only one-sixth of Soviet navy ships are deployed at sea (US one-third); Soviet strategic subs operate 11 percent; of the time (US 50 percent); pilots with the Soviet air force in Europe fly roughly one-third as much as American pilots; only part of the Soviet ICBM force is kept at peak readiness.

While CIA reports that they do make allowances for these differences in operating practice, the problems illustrate the complexity of the cost-estimating process even in an area where there is a fair degree of direct knowledge.

1. *Unless specific references are noted, the summary of CIA methodology is drawn from the public record in the annual hearings of the Joint Economic Committee of the US Congress (#5, page 38).*

Soviet expenditures in dollars

Basis of estimates

The dollar equivalent of the Soviet military effort is now usually determined through one of two basic approaches.

Converting aggregates—Military expenditures in rubles are converted to dollars using the total, or broad categories, of expenditures, with appropriate exchange rates. This is the approach now used in this study. It makes possible the comparison of the military "burden" relative to GNP and other national budgets, and also rough comparisons among countries.

Pricing elements—The alternative method, which is used by CIA, constructs the dollar value of Soviet military expenditures through a building-block approach which parallels that described above for the ruble calculation. In this case every element of the Soviet military force is valued at the price that it would have if purchased in the US. The objective is not to establish the basis for international comparison but to produce a summary indicator of the value of the Soviet military effort in US terms.

Implications of CIA methodology

At first glance the product of the CIA approach seems to meet the requirement for a simple binary match-up: the total of the Soviet military effort, expressed in US costs, appears to have been made comparable with total US military expenditures. In fact, as we have tried to show, the method of calculation is not only based on an extremely fragile structure of evidence but also has built into it an upward bias because of the worst-case assumptions applied to the many unknowns in the estimating process.

In the CIA dollar calculation, the problems noted above for the ruble estimate are amplified by the distortion which arises in the dollar pricing. National economies tend to use relatively more of that factor of production in which they have a cost advantage. If, for example, labor is cheap relative to capital, more labor is used. If that labor is valued at prices in effect in an economy where labor costs are high, however, it becomes an extremely expensive item. This is the basis of the distortion which occurs when all elements of the Soviet military effort are given dollar price tags. For a review of the "index number effect", see ref. 4.

In this limited space it is not possible to summarize the problems and results in detail, or the alternative method of valuing expenditures in dollars. Two examples of the distortions implicit in the dollar valuations are given below.

In arriving at the dollar valuation of Soviet manpower, CIA breaks down the Soviet force into ranks and skill components, applying a dollar-cost factor to each skill level. The average pay for the Soviet force in the dollar calculations comes to about $12,500 per man. The very large Soviet army, bought at low cost in rubles, accounts for about $50 billion when priced at US pay scales. Statements about the 1977 estimates indicated that personnel costs then were 14 percent of total spending in rubles, and 36 percent when calculated in dollars.

The CIA method allows for a difference in composition of US and USSR forces, but it is not at all clear that it adequately covers differences in quality, i.e. the technical qualifications of the force and the equipment available to them. Approximately three-fourths of Soviet manpower are short-term conscripts. Many draftees are unacquainted with the operation of even simple motorized equipment. In contrast, the US has a volunteer, career force, subject to intensive on-the-job training during their years of service. Lower readiness standards in the USSR also reduce training effectiveness, eg. the Soviet air force has relatively less flying time, the army less front-of-the-line equipment for training.

The quality differential is also significant in the dollar pricing of Soviet equipment. In the CIA ruble calculation, some ruble values can be established directly. Dollar valuations, however, are based on US industry's estimates of production costs of samples of Soviet equipment, or on US analogs, which overall are more sophisticated than the Soviet inventory. The adjustments made for quality are subjective judgments and, as recognized by CIA, will have a tendency to overstate Soviet costs.

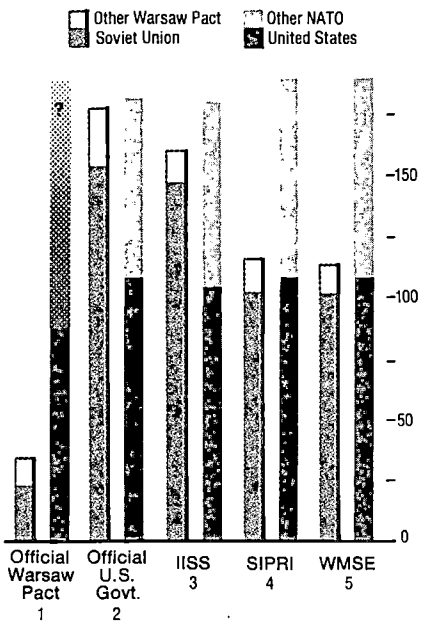
The agencies preparing the estimates are, of course, aware of the methodological bias inherent in the dollar calculations. In their testimony in 1979, for example, they noted that their "dollar comparisons of US and Soviet defense activities do have a potential bias favoring the Soviets, resulting from the index number problem". Despite it, they express a relatively high degree of confidence in the estimates. In the overall cost estimate, they have usually described the possible margin of error as plus or minus 15 percent. In the 1979 testimony they reduced this to plus or minus 10 percent for the current period.

Professor Holzman's review of the method suggests that because of the tendency to worst-case analysis in exercises like this, the range of error in the US-USSR dollar comparisons is likely to be relatively smaller on the low side and much larger on the high side, perhaps of an order of minus 5 to plus 25 percent.

CHART 22

Military Expenditures of the Major Alliances, 1978 — Five Views

billion dollars



1. Defense budgets and official rates of exchange, as reported to UN.
2. US Arms Control and Disarmament Agency, World Military Expenditures and Arms Transfers 1969-78.
3. International Institute for Strategic Studies, The Military Balance, 1979-80. *(IISS has since discontinued publication of an estimate for USSR).*
4. Stockholm International Peace Research Institute, SIPRI Yearbook 1981.
5. This publication, Table II.

WMSE calculations

Soviet Union

The CIA ruble estimate is the basis of the dollar valuation in this publication. For the reasons stated above, it appears to have an upward bias, with the net effect of substantially exaggerating Soviet military expenditures.

The CIA ruble estimate is converted to dollars, in the *WMSE* method, through exchange rates which the World Bank uses for calculations of GNP. A new method of determining GNP in the centrally-planned economies of Europe, tentatively adopted by the Bank in 1979, uses the noncommercial (tourist) rates for the ruble and other Eastern European currencies; values established for 1970, the benchmark year, are moved forward using the US price change in the implicit GNP deflator.

The World Bank method assigns a substantially lower value to the ruble than that implicit in the purchasing power estimate of the intelligence calculations, and somewhat lower than the purchasing power estimate previously used in this publication. In adopting an exchange rate conversion in place of purchasing power, we are following the procedure used for other countries.

In view of the uncertain value of the ruble as compared with normally traded currencies, any estimate of its exchange value at this point must be judgmental. Further observation may suggest that it should be assigned a higher value against the dollar —which of course would raise the dollar estimate.

On the other hand, further review of the CIA calculations, by intelligence or other specialists, are quite likely to yield a lower, and we think, a more realistic value of Soviet military expenditures in rubles:

Other Warsaw Pact

WMSE approach—The estimates of military expenditures in the centrally planned economies of Eastern Europe that are members of the Warsaw Pact (page 6) are based on estimates in national currencies by Dr. Thad Alton and associates (ref. 7). In the Alton estimates, some adjustments are made in the official national figures to conform more closely to US definitions of defense. In converting to dollars, the *WMSE* method again uses the rates implicit in the World Bank's calculation of GNP.

While there appear to be some differences in factors used, this in general is also the approach adopted by IISS and SIPRI. The total dollar figures for these countries are in fairly close agreement.

Official US approach—The method used in the official US report of military expenditures in the "other WP countries" differs from the above in an important respect: the conversion to dollars calculates military forces separately at equivalent US pay scales. The procedure may be summarized briefly as follows: a) the personnel component of military expenditures is separately estimated in national currencies; b) armed forces (regular and paramilitary) in those countries are then priced in dollars at US pay rates (at 100 percent for officers and at 75 percent for enlisted men); c) the remainder of the budget is converted to dollars at the purchasing power equivalent rate implicit in the GNP calculations.

The results of this method appear in the ACDA annual report, where they produce military expenditures for the "other WP countries" roughly double the overall estimates of the other sources. The same report also shows health and education budgets for these countries. No comparable adjustment is made for the manpower component of these social programs, although both have a significant personnel component which is also likely to be "underpriced" compared with US pay rates. This is a curious inconsistency of method which would appear to distort the budget comparisons shown in the ACDA table.

The special personnel adjustment made in the official US estimate of military expenditures for the "other WP countries" also affects comparisons between the WP and other countries. There is no indication on the record that this adjustment is made for any other country in the world. If it were done worldwide, it would sharply increase the US Government estimates of military expenditures in other countries. Testimony in 1978 indicates that pricing of other NATO forces at US pay scales would raise the total dollar equivalents of military expenditures for those countries by 22 percent.

* * *

To attempt alternatives to the elaborate official calculations of WP military expenditures is perhaps even more simplistic and risky than to attempt an abbreviated description of the problems. We recognize that the results shown in this publication are not the final answer. Yet somewhere between the unrealistically low official WP version of their military expenditures, which is perhaps the $35 billion on *chart 22*, and the upwardly biased official US version of $177 billion, there must be a reasonable estimate.

At present our approach suggests that military expenditures of the WP countries in 1978 were in total about $62 billion lower than the US Government estimates. Rather than being equal to the NATO expenditures, this would make them lower by more than one-third. A gap like that could make quite a difference in NATO's planning for a continually rising military effort against the competition—and save taxpayers a whale of a lot of money. □

References—see page 38.

RANKING OF COUNTRIES, MILITARY AND SOCIAL INDICATORS
141 Countries, 1979

TABLE III

	MILITARY							GNP		EDUCATION									
	Public Expenditures per Capita		Public Expenditures per Soldier[1]		Public Expenditures per Sq. Km.		Economic-Social Standing[2]	per Capita		Public Expenditures per Capita		School-Age Population per Teacher[3]		% School-Age Population in School		% Women in Total University Enrollment		Literacy Rate[4]	
	Rank	US$	Rank	US$	Rank	US$	Avg. Rank	Rank	US$	Rank	US$	Rank	Number	Rank	Number	Rank	%	Rank	%
WORLD		108		19,536		3,618			2,395		124		46		54		40		70
Developed		348		38,475		6,777			7,698		435		26		70		44		99
Developing		34		7,510		1,438			730		27		56		51		33		59
AMERICA																			
North America		508		60,133		6,536			10,436		680		23		83		47		99
United States*	9	543	6	60,474	25	13,060	7	14	10,554	9	676	10	23	2	84	17	47	1	99
Canada*	26	174	9	51,500	88	413	8	16	9,319	8	715	15	24	5	75	14	48	22	98
Latin America		23		6,615		386			1,651		63		44		58		36		79
Argentina	63	55	51	11,256	84	541	44	49	2,217	57	75	22	27	67	58	26	43	32	93
Barbados	115	7	123	2,000	42	5,000	35	48	2,322	34	154	28	29	20	69	47	39	22	98
Bolivia	32	18	108	4,174	123	87	91	95	568	90	20	45	36	67	58	77	30	72	63
Brazil	90	14	86	6,004	107	198	59	55	1,792	66	64	59	44	84	54	49	38	62	75
Chile	43	88	52	11,247	68	1,263	47	52	1,904	61	70	54	43	9	72	41	40	36	92
Colombia	109	9	115	3,118	109	186	68	68	1,133	90	20	75	52	74	56	49	38	42	86
Costa Rica		—		—		—	52	58	1,616	50	92	62	46	83	55	54	37	32	93
Cuba	45	79	109	4,116	37	6,795	34	63	1,417	39	122	10	23	17	70	21	46	27	95
Dominican Rep.	92	18	92	5,263	53	2,053	70	76	958	84	24	93	73	60	59	36	41	67	68
Ecuador	77	24	90	5,606	80	652	64	67	1,143	76	43	65	47	51	60	59	35	57	79
El Salvador	102	10	79	6,857	54	2,286	82	82	744	84	24	107	89	94	50	66	32	72	63
Guatemala	96	12	101	4,722	76	780	86	75	1,002	94	19	112	96	115	33	86	27	84	50
Guyana	31	19	113	3,200	126	74	66	93	585	67	58	50	40	31	65	64	33	38	90
Haiti	128	3	121	2,285	51	576	122	127	198	130	4	124	124	118	32	73	31	113	26
Honduras	88	15	103	4,546	86	446	92	96	566	90	20	100	80	101	44	54	37	77	60
Jamaica	109	9	96	5,000	63	1,818	53	73	1,010	60	72	59	44	28	67	24	44	39	89
Mexico	102	10	62	6,330	95	321	58	56	1,779	56	80	62	46	23	68	82	28	55	81
Nicaragua	80	23	81	6,750	67	415	86	89	641	94	19	97	79	85	53	73	31	75	62
Panama	113	8	128	1,364	107	198	49	61	1,500	59	74	47	38	23	68	84	53	51	82
Paraguay	91	13	117	2,800	121	103	71	71	1,085	107	14	59	44	87	51	26	43	51	82
Peru	76	25	100	4,728	94	338	72	78	848	90	20	80	56	31	65	66	32	60	76
Trinidad & Tobago	91	13	39	15,000	49	2,941	43	35	3,868	33	155	75	52	67	58	57	36	36	92
Uruguay	55	59	85	6,179	72	982	45	46	2,386	74	48	36	33	60	59	17	47	30	94
Venezuela	68	42	37	16,595	77	764	47	42	2,952	36	135	54	43	71	57	41	40	51	82
EUROPE																			
NATO Europe		282		32,997		31,745			7,880		399		28		63		39		93
Belgium*	13	368	18	41,724	5	119,016	12	9	11,225	10	668	19	25	46	62	57	36	1	99
Denmark*	19	297	16	43,371	15	35,220	2	7	12,461	6	789	2	19	14	71	41	40	1	99
France*	10	424	13	44,525	12	41,431	3	11	10,749	12	560	10	23	23	68	14	48	1	99
Germany, West*	12	404	11	50,093	6	99,742	9	6	12,464	11	566	22	27	29	66	59	35	1	99
Greece	40	257	43	13,103	21	18,378	30	32	4,215	46	103	42	35	23	68	41	40	42	86
Iceland*		—		—		—	5	13	10,571	20	380	7	22	9	72	59	35	1	99
Italy*	72	136	32	21,266	19	25,770	21	26	5,677	25	259	10	23	51	60	36	41	27	95
Luxembourg*	34	117	17	42,000	23	16,154	13	5	13,746	5	827	15	24	46	62	30	42	22	98
Netherlands*	15	359	15	43,852	4	123,603	13	12	10,660	4	850	32	32	46	62	82	28	1	99
Norway*	16	357	21	37,282	43	4,485	3	10	10,919	3	857	3	20	17	70	49	38	1	99
Portugal	59	70	50	11,450	35	7,459	41	50	1,973	57	75	36	33	31	65	22	45	62	75
Turkey	69	57	104	4,516	48	3,274	75	64	1,387	74	48	87	62	98	46	92	25	75	62
United Kingdom*	17	342	7	59,306	8	78,508	16	23	7,214	21	360	7	22	4	79	59	35	1	99
ALL NATO (incl. US and Canada)		380		44,690		9,813			8,988		523		25		72		44		96
Warsaw Pact		342		26,755		5,449			4,133		191		29		61		49		99
Bulgaria*	39	106	83	6,267	31	8,476	32	39	3,678	37	134	32	32	74	56	6	50	30	94
Czechoslovakia*	23	148	49	11,598	22	17,592	25	29	5,213	32	161	42	35	60	59	36	41	1	99
Germany, East*	12	235	29	24,717	14	36,322	18	25	6,351	26	249	36	33	38	64	17	47	1	99
Hungary*	41	95	60	9,808	27	10,968	28	36	3,789	31	167	22	27	71	57	14	48	1	99
Poland*	35	111	45	12,264	26	12,472	29	37	3,785	41	112	47	38	51	60	6	50	1	99
Romania*	54	64	70	7,845	40	5,979	33	40	3,578	45	106	36	33	51	60	26	43	22	98
USSR*	9	433	25	31,165	41	5,089	23	34	4,052	29	210	27	28	49	61	6	50	1	99

Estimating Military Expenditures of the USSR and its Warsaw Pact Allies

In the absence of adequate reporting by the Soviet Union of its annual military expenditures, independent calculations must be made by western authorities (table opposite). A review of the estimates made by official US sources indicates that they tend to exaggerate Soviet military expenditures. The result is a stimulus to the arms race.

If the Soviet Union has an interest in curbing the momentum of the arms competition, it could take a relatively simple step: make public its military budget in the detail proposed by the United Nations for all countries. At a small sacrifice of secrecy, it could thereby provide the kind of reassurance on which mutual trust between nations and arms restraint depend.

The usual statistical note on Soviet military expenditures was expanded in *WMSE 1980* to give an overview of the range of western estimates and a more detailed evaluation of the official US estimates. The summary is repeated in this edition, with some revisions based on CIA testimony made available in the past year. Given the limitations of space and time, this is necessarily a cursory examination of a very complex subject. Hopefully it will provide some encouragement to others to explore further.[1]

Soviet military expenditures warrant special attention for several reasons:

1. As a summary of the Soviet military effort and trend, they affect US and all NATO planning, the willingness of public officials to spend more to meet the competition, and of taxpayers to bear the burden.
2. Unlike other major industrial powers, the Soviet Union fails to provide detail on its military budget, or even to describe what expenditures are covered. It announces a single undefined figure each year, which seldom changes. Since 1970 the budget has dropped about 4 percent, from 17.9 to 17.2 billion rubles.
3. The Soviet announced budget is clearly incomplete in view of the advanced military technology and the size of the military force the USSR has produced.
4. The ruble is almost exclusively a domestic currency and official rates of exchange reflect neither the relation between internal prices and foreign prices, nor balance of payments forces.
5. Between the official Soviet military budget, converted to dollars at the official rate, and the official US view of that budget, there was a gap of 155 billion dollars in 1979, a disparity which was larger than the total US military budget that year.
6. Between the official US estimate of Soviet military expenditures, and the estimate in this study, the gap was $67 billion in 1979, although we continue to use the CIA ruble estimate for the calculation.

In the discussion following, the principal focus is on the calculations by US intelligence agencies which establish the official US view of Soviet military expenditures. Since this publication also has dollar estimates for other Warsaw Pact countries lower than the US official estimates, the basis for the alternatives will be described as well.

Soviet expenditures in rubles

Basis of estimates

In the absence of adequate reporting by the Soviet Union, western analysts have generally resorted to one of two basic approaches to an estimate of Soviet military expenditures in rubles.

Add-on—One approach attempts to flesh out the Soviet announced military budget by adding elements such as research and development, which are believed to be missing from the official figures. The missing elements are generally extracted from other parts of the state budget.

Building-block—The other approach is independent of the Soviet announced budgets except in the valuation of research expenditures. This method breaks down military expenditures into physical quantities (manpower, equipment, construction), and operating costs and research. Each major component is composed of many individual elements which are separately assigned monetary values. Considering the thousands of elements which must be identified and also valued, it is evident that this is an extraordinarily complex procedure, feasible only through a vast expenditure of effort on surveillance, data collection, and analysis. So far, only US intelligence agencies have the arsenal of electronic and other resources required for calculations of this detail and scope.

The building-block approach is used by CIA to produce annual estimates of Soviet military expenditures in both ruble values and dollars. The dollar figure is of principal public interest (since it is used for comparison with US expenditures), but it is the CIA ruble estimate which this study uses for its calculation of Soviet military expenditures. Working from the ruble estimate makes it possible to follow the same procedure for conversion to dollars which is used for other countries in this worldwide report and for GNP and other budget expenditures. It also avoids some but not all of the exaggerating effects of the CIA calculation in dollars; these will be discussed below.

In using the CIA ruble estimate for this purpose, however, we do so with reservations. This is not to question either the competence of the analysts, who are highly respected professionals, nor the careful assembly of a massive amount of information. The gaps in knowledge and the need for subjective judgment are still formidable. The numerous uncertainties which invite "worst-case" interpretation and the methodology of the calculations together tend to produce an upward bias in the ruble as well as in the dollar estimate. Even though we cannot remove this bias, or determine precisely how much it may exaggerate the total, identifying some of the factors which appear to produce it may help to indicate the scope of the problem.

Components of CIA estimate

In ruble values, CIA calculates Soviet military expenditures (in 1970 prices) at more than three times the budget of 17.2 billion rubles which the USSR announced for 1979. While the public record does not show how the 1979 figure breaks down into all of the components, averages for the period since 1965 will give some clue to the relative importance of the major categories. The estimate of Soviet expenditures in rubles in that period was composed as follows (ref. 8):

—roughly one-fifth for research, development, test and evaluation (RDT&E);
—one-half for investment (procurement of equipment and construction);
—almost one-third for operating (60 percent of that for personnel).

What does the record say about some of the measurement problems associated with each of these components?

Research—This category of expenditures is identified by the analysts as the most imprecise element in the estimates. Research outlays cannot be estimated from observable physical quantities. Instead they appear to be derived in large part through an analysis of Soviet information on expenditures for science.

While no direct reference to the basis for the calculations seems to have been made recently, analysts indicated in 1974 testimony that a major share of the Soviet science budget was assumed to be military.

CIA stated in 1978 testimony with "high confidence" that the Soviet military RDT&E effort is "large and growing". The estimated increase in this component in the 1970's has been the predominant factor (along with procurement and maintenance of hardware) pushing the overall expenditure total higher (ref. 6). It is the fastest growing of the major components (ref. 8).

An independent study prepared for the National Science Foundation by a specialist in the field reveals some of the practical difficulties in identifying military R&D in Soviet budgets for science (ref. 1). The report provides a careful analysis of definitional and other problems which cannot be adequately summarized here, but two of the general points made seem particularly relevant: a) Soviet reported science budgets appear to be significantly inflated compared with US concepts and b) whether, or how much, Soviet military R&D is included in the science budget is still an unresolved issue.

From this, one could conclude that Soviet budgeting for science is still a largely mysterious area. It may not provide the only basis for the CIA estimate of Soviet expenditures on military R&D, but as a foundation for confident estimates of level or trend it clearly has serious weaknesses.

Investment—The component covering procurement and construction is the part of the estimate in which analysts state they have the greatest confidence. Presumably this is because the numbers of major equipment can, in large part, be observed, and at least some of the ruble prices (e.g., civilian products bought by the military) can be determined from Soviet price lists. Others may be obtained clandestinely. In theory at least there is good, "hard" information in this area. Keeping it accurate and up to date is quite another problem, as evidenced by CIA's announcement in 1976 that Soviet military expenditures in rubles were now estimated to be *twice* as high as previously thought, because the ruble prices paid were higher than CIA had calculated.

Even assuming comparatively solid information in some areas, there are others which must depend heavily on judgment or guesswork, for example: the quality of equipment which is not obtainable or visible by satellite or other observation; the range of efficiency and cost within Soviet industry; and the amount of overhaul of old equipment, a practice which some analysts consider fairly common in the Soviet Union.

In addition, a significant source of measurement error arises in valuing equipment for which no ruble prices are available. The estimating process then becomes very shaky indeed. For many of the procurement items, CIA must use US analogs. Values in US equivalent prices are established, then converted to rubles via a small sample of dollar-ruble ratios (about 1 ruble price for every 10 dollar prices). Assessing quality as compared with like US equipment must become a major headache in this case, made more difficult by the fact that Soviet technology as a rule lags behind the US, and the product itself tends to be more simplified.

For example, CIA testimony mentions micro-miniaturization in computers as one area in which the Soviets are far behind US technology. The question is how accurately analysts can determine the lesser dollar value of a weapon which does not have built into it the accuracy and capability of remote command and control equivalent to its US counterpart.

Although CIA analysts report that they do make the effort to adjust the cost basis of Soviet equipment for physical and performance qualities, they have stated that where their knowledge is incomplete their estimates tend to overstate the costs of producing the Soviet design.

Operating costs—Manpower, although rated at a lower level of reliability than procurement, is considered by CIA to be the most reliable element in the estimates of Soviet operating costs. It is also a relatively small part of the overall estimate of ruble outlays. While Soviet forces are very large, this is a draft army and ruble pay scales are low. (The pay for a private is said to be the ruble equivalent of about $6 per month not including upkeep).

Estimates of manpower costs presumably depend on the determination of numbers in the total force, the table of organization, and the pay scales used. The record is not clear on all these points. For 1978 CIA estimated manpower at 4.2 million, IISS (the source used in this report) at 3.6 million. The higher CIA figure may result from a definitional difference, possibly from the CIA inclusion of civilians in uniform or of border guards. (ISS has a separate category for paramilitary forces.) It could also result from higher assumptions of the actual complement of Soviet divisions. CIA does state that it takes account of the evidence that a good many Soviet divisions are not at full strength, but certainty in this case may be difficult to establish, and the tendency would be to assume full complement where it is unknown.

1. *Unless specific references are noted, the summary of CIA methodology is drawn from the public record in the annual hearings of the Joint Economic Committee of the US Congress (#5, page 40).*

MILITARY EXPENDITURES OF THE MAJOR ALLIANCES, 1979-
FOUR WESTERN VIEWS

billion dollars

	Warsaw Pact			NATO		
	USSR	Other	Total	US	Other	Total
US Govt.[1]	181.4	29.3	210.7	122.3	90.2	212.5
IISS[2]	na	13.6	na	114.5	88.6	203.1
SIPRI[3]	115.2	12.0	127.2	122.3	96.3	218.6
WMSE[4]	114.0	13.5	127.5	122.3	95.8	218.1

[1]US Arms Control and Disarmament Agency.
[2]International Institute for Strategic Studies.
[3]Stockholm International Peace Research Institute.
[4]This publication, Table II.

In addition to the numbers involved, there are unknowns relating to the operational use of Soviet forces for which adjustments may be especially difficult. The Soviet draft provides a work force at the command of the state. For example, recruits are used for agricultural work during the harvest period. The CIA analysts report that they cannot separate out the portion of time the forces are used in essentially civilian work. In other words, Soviet forces are valued as though fully employed in military functions throughout the year.

Whether adequate cost adjustment can be made for relatively low operational use of equipment and lower levels of readiness than in the US is also a question. Officials have at various times referred to these factors, stating that only one-sixth of Soviet navy ships are deployed at sea (US one-third); Soviet strategic subs operate 11 percent; of the time (US 50 percent); pilots with the Soviet air force in Europe fly roughly one-third as much as American pilots; only part of the Soviet ICBM force is kept at peak readiness.

While CIA reports that they do make allowances for these differences, in operating practice, the problems illustrate the inadequacy of number comparisons and complexity of the cost-estimating process even in an area where there is a fair degree of direct knowledge.

Soviet expenditures in dollars

Basis of estimates

The dollar equivalent of the Soviet military effort is now usually determined through one of two basic approaches.

Converting aggregates—Military expenditures in rubles are converted to dollars using the total, or broad categories, of expenditures, with appropriate exchange rates. This is the approach now used in this study. It makes possible the comparison of the military "burden" relative to GNP and other national budgets, and also rough comparisons among countries.

Pricing elements—The alternative method, which is used by CIA, constructs the dollar value of Soviet military expenditures through a building-block approach which parallels that described above for the ruble calculation. In this case every element of the Soviet military force is valued at the price that it would have if purchased in the US. The objective is not to establish the basis for international comparison but to produce a summary indicator of the value of the Soviet military effort in US terms.

Implications of CIA methodology

At first glance the product of the CIA approach seems to meet the requirement for a simple binary match-up: the total of the Soviet military effort, expressed in US costs, appears to have been made comparable with total US military expenditures. In fact, as we have tried to show, the method of calculation is not only based on an extremely fragile structure of evidence but also has built into it an upward bias because of the worst-case assumptions applied to unknowns in the estimating process.

In the CIA dollar calculation, the problems noted above for the ruble estimate are amplified because all components are priced in dollars.

National economies tend to use relatively more of that factor of production in which they have a cost advantage. If, for example, labor is cheap relative to capital, more labor is used. If that labor is valued at prices in effect in an economy where labor costs are high, however, it becomes an extremely expensive item. This is the basis of the distortion which occurs when all elements of the Soviet military effort are given dollar price tags. To offset this distortion, the usual procedure would be to calculate expenditures in the prices of both nations and to take a geometric mean of the dollar and ruble estimates. This is not done in the CIA calculations. For a review of the "index number effect", see ref. 4.

In this limited space it is not possible to summarize the problems and results in detail, or the alternative method of valuing expenditures in dollars. Two examples of the distortions implicit in the dollar valuations are given below.

In arriving at the dollar valuation of Soviet manpower, CIA breaks down the Soviet force into ranks and skill components, applying a dollar-cost factor to each skill level. The average pay for the Soviet force in the dollar calculations comes to about $12, 500 per man, according to CIA statements in 1980. The very large Soviet army, bought at low cost in rubles, accounts for about $50 billion when priced at US pay scales. Statements about the 1977 estimates indicated that personnel costs then were 14 percent of total spending in rubles, and 36 percent when calculated in dollars.

The CIA method allows for a difference in composition of US and USSR forces, but it is not at all clear that it adequately covers differences in quality, i.e. the technical qualifications of the force and the equipment available to them. Approximately three-fourths of Soviet manpower are short-term conscripts. Many draftees are unacquainted with the operation of even simple motorized equipment. In contrast, the US has a volunteer, career force, subject to intensive on-the-job training during their years of service. Lower readiness standards in the USSR also reduce training effectiveness, eg. the Soviet air force has relatively less flying time, the army less front-of-the-line equipment for training.

The quality differential is also significant in the dollar pricing of Soviet equipment. In the CIA ruble calculation, some ruble values can be established directly. Dollar valuations, however, are based on US industry's estimates of production costs of samples of Soviet equipment, or on US analogs, which overall are more sophisticated than the Soviet inventory. The adjustments made for quality are subjective judgments and, as recognized by CIA, will have a tendency to overstate Soviet costs.

The agencies preparing the estimates are, of course, aware of the methodological bias inherent in the dollar calculations. In their testimony in 1979, for example, they noted that their "dollar comparisons of US and Soviet defense activities do have a potential bias favoring [i.e., exaggerating] the Soviets, resulting from the index number problem". Despite it, they express a relatively high degree of confidence in the results. In the overall cost estimate, they have usually described the possible margin of error as plus or minus 15 percent. In the 1979 testimony they reduced this to plus or minus 10 percent for the current period.

Professor Holzman's review of the method suggests that because of possible tendencies to worst-case analysis in exercises like this, the range of error in the US-USSR dollar comparisons is likely to be relatively smaller on the low side and much larger on the high side.

WMSE calculations

Soviet Union

The CIA ruble estimate is the basis of the dollar valuation in this publication. For the reasons stated above, it appears to have an upward bias, with the net effect of substantially exaggerating Soviet military expenditures.

The CIA ruble estimate is converted to dollars, in the *WMSE* method, through exchange rates which the World Bank has been using for calculations of GNP. These rates, tentatively adopted by the Bank in 1979, are the noncommercial (tourist) rates for the ruble and other Eastern European currencies; values established for 1970, the benchmark year, were moved forward using the US price change in the implicit GNP deflator. At present, the World Bank has this methodology under review, and may make some revisions in it.

The World Bank method assigns a substantially lower value to the ruble than that implicit in the purchasing power estimate of the intelligence calculations, and somewhat lower than the purchasing power estimate previously used in this publication. In adopting an exchange rate conversion in place of purchasing power, we are following the procedure used for other countries.

In view of the uncertain value of the ruble as compared with normally traded currencies, any estimate of its exchange value at this point must be judgmental. Further observation may suggest that it should be assigned a higher value against the dollar —which of course would raise the dollar estimate.

On the other hand, further review of the CIA calculations, by intelligence or other specialists, are quite likely to yield a lower, and we think, a more realistic value of Soviet military expenditures in rubles.

Other Warsaw Pact

WMSE approach—The estimates of military expenditures in the centrally planned economies of Eastern Europe that are members of the Warsaw Pact are based on estimates in national currencies by Dr. Thad Alton and associates (ref. 7). In the Alton estimates, some adjustments are made in the official national figures to conform more closely to US definitions of defense. In converting to dollars, the *WMSE* method again uses the rates implicit in the World Bank's calculation of GNP.

While there appear to be some differences in factors used, this in general is also the approach adopted by IISS and SIPRI. The total dollar figures for these countries are in fairly close agreement.

Official US approach—The method used in the official US report of military expenditures in the "other WP countries" differs from the above in an important respect: the conversion to dollars calculates military forces separately at equivalent US pay scales. The procedure may be summarized briefly as follows: a) the personnel component of military expenditures is separately estimated in national currencies; b) armed forces (regular and paramilitary) in those countries are then priced in dollars at US pay rates; c) the remainder of the budget is converted to dollars at the purchasing power equivalent rate implicit in the GNP calculations.

The results of this method appear in the ACDA annual report, where they produce military expenditures for the "other WP countries" roughly double the overall estimates of the other sources.

The special personnel adjustment made in the official US estimate of military expenditures for the "other WP countries" affects comparisons between the WP and other countries. There is no indication on the record that this adjustment is made for any other country in the world. If it were done worldwide, it would sharply increase the US Government estimates of military expenditures in other countries. Testimony in 1978 indicates that pricing of other NATO forces at US pay scales would raise the total dollar equivalents of military expenditures for those countries by 22 percent.

* * *

To attempt alternatives to the elaborate official calculations of WP military expenditures is perhaps even more simplistic and risky than to attempt an abbreviated description of the problems. We recognize that the results shown in this publication are not the final answer. Yet somewhere between the upwardly biased official US estimate of $211 billion and the unrealistically low fraction of that which seems to be the official WP version, there must be a reasonable estimate.

At present our approach suggests that military expenditures of the WP countries in 1979 were in total about $83 billion lower than the US Government estimates. Rather than being equal to the NATO expenditures, this would make them lower by 40 percent. A gap like that could make quite a difference in NATO's planning for a continually rising military effort against the competition—and save taxpayers a whale of a lot of money.□

References—see page 40.

RANKING OF COUNTRIES, MILITARY AND SOCIAL INDICATORS

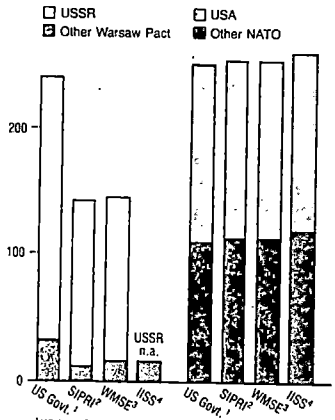
142 Countries, 1980

TABLE III

	MILITARY							GNP		EDUCATION									
	Public Expenditures per Capita		Public Expenditures per Soldier[1]		Public Expenditures per Sq. Km.		Economic-Social Standing[2]	per Capita		Public Expenditures per Capita		School-Age Population per Teacher[3]		% School-Age Population in School		% Women in Total University Enrollment		Literacy Rate[4]	
	Rank	US$	Rank	US$	Rank	US$	Avg. Rank	Rank	US$	Rank	US$	Rank	Number	Rank	Number	Rank	%	Rank	%
WORLD		122		22,032		4,123			2,619		130		45		54		40		70
Developed*		403		44,668		7,897			8,477		448		25		69		44		99
Developing		34		7,737		1,504			794		31		54		51		34		59
AMERICA																			
North America		590		69,834		7,688			11,233		591		22		84		49		99
United States*	8	632	8	70,231	26	15,377	9	16	11,347	16	571	7	22	1	85	12	49	1	99
Canada*	26	195	10	59,519	90	471	11	19	10,159	8	784	17	24	8	72	12	49	22	98
Latin America		25		7,514		451			2,172		75		45		58		37		80
Argentina	61	58	56	11,629	84	588	37	37	4,361	40	157	28	28	48	61	32	42	34	93
Barbados	71	36	70	9,000	19	22,500	33	48	3,301	30	233	21	26	5	76	52	39	22	98
Bolivia	84	19	111	4,417	123	96	84	76	1,071	79	38	45	36	81	55	76	30	78	63
Brazil	97	13	95	5,678	113	182	62	57	2,002	69	63	63	45	87	53	55	38	62	76
Chile	36	132	40	16,545	64	1,923	49	51	2,506	50	113	57	43	8	72	45	40	37	92
Colombia	102	12	109	4,576	104	265	68	70	1,251	91	24	72	49	73	57	55	38	46	86
Costa Rica		—		—		—	52	58	1,923	47	117	67	46	81	55	55	38	34	93
Cuba	40	114	99	5,340	34	9,565	35	60	1,864	39	162	10	23	24	68	20	46	27	95
Dominican Rep.	84	19	94	5,684	60	2,204	69	72	1,175	91	24	96	72	66	58	40	41	64	74
Ecuador	75	26	100	5,333	81	732	63	66	1,358	76	49	69	47	53	60	62	36	57	81
El Salvador	104	11	76	7,714	55	2,571	88	92	725	84	29	113	97	99	47	36	27	74	65
Guatemala	94	14	87	6,313	76	927	86	75	1,096	95	21	112	95	120	33	86	27	90	50
Guyana	78	24	120	2,857	124	93	69	95	680	72	59	54	42	48	61	82	29	39	90
Haiti	126	4	121	2,750	79	786	119	124	266	130	4	118	114	119	34	92	29	118	29
Honduras	102	12	113	4,091	93	402	94	96	633	97	20	101	76	98	48	59	37	31	60
Jamaica	111	9	104	5,000	67	1,818	56	77	1,069	63	76	63	45	31	66	26	44	10	89
Mexico	104	11	81	7,065	95	383	60	50	2,590	60	78	63	45	20	69	76	30	55	83
Nicaragua	73	28	47	14,000	86	538	81	87	837	86	26	95	68	85	54	66	35	71	66
Panama	111	9	128	1,636	106	237	48	61	1,666	59	87	48	38	24	68	5	54	19	85
Paraguay	81	21	112	4,313	116	170	66	67	1,346	102	18	62	44	87	53	28	43	46	86
Peru	75	26	106	4,760	98	356	73	78	1,056	99	19	78	54	31	66	70	32	58	80
Trinidad & Tobago	94	14	42	16,000	50	3,200	44	32	5,268	38	170	76	51	81	55	62	36	27	95
Uruguay	49	90	72	8,667	70	1,477	41	46	3,398	60	78	42	35	60	59	6	53	31	94
Venezuela	66	46	37	18,875	78	828	50	43	3,726	33	188	57	43	73	57	45	40	56	82
EUROPE																			
NATO Europe		330		38,921		37,292			8,939		458		27		63		40		94
Belgium*	16	402	19	44,989	5	127,710	9	13	12,023	9	732	17	24	42	63	59	37	1	99
Denmark*	20	314	16	46,000	14	37,442	3	10	12,504	6	868	3	19	16	70	32	42	1	99
France*	9	492	13	53,467	13	48,384	4	12	12,156	13	599	10	23	24	68	12	49	1	99
Germany, West*	14	434	12	54,018	7	107,382	6	8	13,399	12	616	21	26	34	65	62	36	1	99
Greece	24	236	51	12,522	25	17,265	32	36	4,384	54	101	40	34	24	68	40	41	42	88
Iceland*		—		—		—	5	14	12,009	19	500	7	22	8	72	66	35	1	99
Italy*	28	171	30	26,224	16	31,887	21	27	7,012	27	321	10	23	60	59	32	42	27	95
Luxembourg*	33	143	14	52,000	24	17,333	15	5	14,297	5	920	17	24	66	58	32	42	22	98
Netherlands*	17	373	17	45,887	4	128,707	13	15	11,399	4	947	35	31	43	62	76	30	1	99
Norway*	15	409	13	45,135	44	5,154	2	9	13,357	2	1,197	5	20	16	70	45	40	1	99
Portugal	51	87	44	14,400	35	9,391	39	52	2,393	56	91	31	30	8	72	20	46	58	80
Turkey	62	55	110	4,450	49	3,230	80	68	1,327	81	35	85	56	99	47	86	27	74	65
United Kingdom*	11	478	9	81,386	6	109,738	14	22	9,213	20	494	10	23	4	77	59	37	1	99
ALL NATO (incl. US & Canada)		443		52,355		11,538			9,937		516		25		72		46		96
Warsaw Pact		391		30,793		6,271			4,614		214		28		59		49		99
Bulgaria*	35	133	74	7,919	31	10,631	31	39	4,219	36	176	36	32	73	57	6	53	31	94
Czechoslovakia*	27	180	45	14,103	21	21,484	27	28	5,821	35	182	42	35	60	59	40	41	1	99
Germany, East*	18	360	23	37,160	9	55,741	19	21	7,226	28	304	42	35	43	62	17	47	1	99
Hungary*	44	103	53	11,828	29	11,828	28	40	4,200	32	201	21	26	60	59	17	47	1	99
Poland*	38	121	49	13,522	27	13,738	34	41	3,929	41	135	47	37	81	55	9	50	1	99
Romania*	60	61	77	7,337	42	5,672	35	42	3,851	47	117	37	33	43	62	28	43	22	98
USSR*	10	490	26	35,490	41	5,803	25	34	4,564	31	231	21	26	60	59	9	50	1	99

CHART 21

Military Expenditures of the Major Alliances, 1980 — Four Views
billion dollars



[1] US Arms Control and Disarmament Agency.
[2] Stockholm International Peace Research Institute.
[3] This publication, Table II.
[4] International Institute for Strategic Studies.

which adjustments may be especially difficult. The Soviet draft provides a work force at the command of the state. For example, recruits are used for agricultural work during the harvest period. The CIA analysts report that they cannot separate out the portion of time the forces are used in essentially civilian work. In other words, Soviet forces are valued as though fully employed in military functions throughout the year.

Whether adequate cost adjustment can be made for relatively low operational use of equipment and lower levels of readiness than in the US is also a question. Officials have at various times referred to these factors, stating that only one-sixth of Soviet navy ships are deployed at sea (US one-third); Soviet strategic subs operate 11 percent; of the time (US 50 percent); pilots with the Soviet air force in Europe fly roughly one-third as much as American pilots; only part of the Soviet ICBM force is kept at peak readiness.

While CIA reports that they do make allowances for these differences in operating practices, the problems illustrate the inadequacy of number comparisons and the complexity of the estimating process even in an area where there is a fair degree of direct knowledge.

Soviet expenditures in dollars

Basis of estimates

The dollar equivalent of the Soviet military effort is now usually determined through one of two basic approaches.

Converting aggregates—Military expenditures in rubles are converted to dollars using the total, or broad categories, of expenditures, with appropriate exchange rates. This is the approach now used in this study. It makes possible the comparison of the military "burden" relative to GNP and other national budgets, and also rough comparisons among countries.

Pricing elements—The alternative method, which is used by CIA, constructs the dollar value of Soviet military expenditures through a building-block approach which parallels that described above for the ruble calculation. In this case every element of the Soviet military force is valued at the price that it would have if purchased in the US. The objective is not to establish the basis for international comparison but to produce a summary indicator of the value of the Soviet military effort in US terms.

Implications of CIA methodology

At first glance the product of the CIA approach seems to meet the requirement for a simple binary match-up: the total of the Soviet military effort, expressed in US costs, appears to have been made comparable with total US military expenditures. In fact, as we have tried to show, the method of calculation is not only based on an extremely fragile structure of evidence but also has built into it an upward bias because of the worst-case assumptions applied to unknowns in the estimating process.

In the CIA dollar calculation, the problems noted above for the ruble estimate are amplified because all components are priced in dollars.

National economies tend to use relatively more of that factor of production in which they have a cost advantage. If, for example, labor is cheap relative to capital, more labor is used. If that labor is valued at prices in effect in an economy where labor costs are high, however, it becomes an extremely expensive item. This is the basis of the distortion which occurs when all elements of the Soviet military effort are given dollar price tags. To offset this distortion, the usual procedure would be to calculate expenditures in the prices of both nations and to take a geometric mean of the dollar and ruble estimates. This is not done in the CIA calculations. For a review of the "index number effect," see ref. 4.

In this limited space it is not possible to summarize the problems and results in detail, or the alternative method of valuing expenditures in dollars. Two examples of the distortions implicit in the dollar valuations are given below.

In arriving at the dollar valuation of Soviet manpower, CIA breaks down the Soviet force into ranks and skill components, applying a dollar-cost factor to each skill level. The average pay for the Soviet force in the dollar calculations comes to about $12,500 per man, according to CIA statements in 1980. The very large Soviet army, bought at low cost in rubles, accounts for about $50 billion when priced at US pay scales. Statements about the 1977 estimates indicated that personnel costs then were 14 percent of total spending in rubles, and 36 percent when calculated in dollars.

The CIA method allows for a difference in composition of US and USSR forces, but it is not at all clear that it adequately covers differences in quality, i.e. the technical qualifications of the force and the equipment available to them. Approximately three-fourths of Soviet manpower are short-term conscripts. Many draftees are unaquainted with the operation of even simple motorized equipment. In contrast, the US has a volunteer, career force, subject to intensive on-the-job training during their years of service. Lower readiness standards in the USSR also reduce training effectiveness, e.g. the Soviet air force has relatively less flying time, the army less front-of-the-line equipment for training.

The quality differential is also significant in the dollar pricing of Soviet equipment. In the CIA ruble calculation, some ruble values can be established directly. Dollar valuations, however, are based on US industry's estimates of production costs of samples of Soviet equipment, or on US analogs, which overall are more sophisticated than the Soviet inventory. The adjustments made for quality are subjective judgments and, as recognized by CIA, will have a tendency to overstate Soviet costs.

The agencies preparing the estimates are, of course, aware of the methodological bias inherent in the dollar calculations. In their testimony in 1979, for example, they noted that their "dollar comparisons of US and Soviet defense activities do have a potential bias favoring [i.e., exaggerating] the Soviets, resulting from the index number problem." Despite it, they express a relatively high degree of confidence in the results. For the overall estimate, they have usually described the possible margin of error as plus or minus 15 percent. In 1982 testimony they said "our estimates are unlikely to be in error by more than 10 percent for each year" (ref. 5).

Professor Holzman's review of the method suggests that because of possible tendencies to worst-case analysis in exercises like this, the range of error in the US-USSR dollar comparisons is likly to be relatively smaller on the low side and much larger on the high side.

WMSE calculations

Soviet Union

The CIA ruble estimate is the basis of the dollar valuation in this publication. For the reasons stated above, it appears to have an upward bias, with the net effect of substantially exaggerating Soviet military expenditures.

The CIA ruble estimate is converted to dollars, in the *WMSE* method, through exchange rates which the World Bank has been using for calculations of GNP. These rates, tentatively adopted by the Bank in 1979, are the noncommercial (tourist) rates for the ruble and other Eastern European currencies; values established for 1970, the benchmark year, were moved forward using the US price change in the implicit GNP deflator. At present, the World Bank has this methodology under review, and may make some revisions in it.

The World Bank method assigns a substantially lower value to the ruble than that implicit in the purchasing power estimate of the intelligence calculations, and somewhat lower than the purchasing power estimate previously used in the publication. In adopting an exchange rate conversion in place of purchasing power, we are following the procedure used for other countries.

In view of the uncertain value of the ruble as compared with normally traded currencies, any estimate of its exchange value at this point must be judgemental. Father observation may suggest that it should be assigned a higher value against the dollar—which of course would raise the dollar estimate.

On the other hand, further review of the CIA calculations, by intelligence or other expecialists, are quite likely to yield a lower, and we think, a more realistic value of Soviet military expenditures in rubles.

Other Warsaw Pact

WMSE approach—The estimates of military expenditures in the centrally planned economies of Eastern Europe that are members of the Warsaw Pact (WP) are based on estimates in national currencies by Dr. Thad Alton and associates (ref. 7). In the Alton estimates, some adjustments are made in the official national figures to conform more closely to US definitions of defense. In converting to dollars, the WMSE method again uses the rates implicit in the World Bank's calculation of GNP.

While there appear to be some differences in factors used, this in general is also the approach adopted by IISS and SIPRI. The total dollar figures for these countries are in reasonably close agreement (*chart 21*).

Official US approach—The method used in the official US report of military expenditures in the "other WP countries" differs from the above in an important respect: the conversion to dollars calculates military forces separately at equivalent US pay scales. The procedure may be summarized briefly as follows: a) the personnel component of military expenditures is separately estimated in national currencies; b) armed forces (regular and paramilitary) in those countries are the priced in dollars at US pay rates; c) the remainder of the budget is converted to dollars at the purchasing power equivalent rate implicit in the GNP calculations.

The results of this method appears in the ACDA annual report, where they produce military expenditures for the "other WP countries" roughly double the overall estimates of the other sources.

The special personnel adjustment made in the official US estimate of military expenditures for the "other WP countries" affects comparisons between the WP and other countries. There is no indication on the record that this adjustment is made for any other country in the world. If it were done worldwide, it would sharply increase the US Government estimates of military expenditures in other countries, including its NATO allies. Testimony in 1978 indicates that pricing of other NATO forces at US pay scales would raise the total dollar equivalents of military expenditures for those countries by 22 percent.

* * *

To attempt alternatives to the elaborate official calculations of WIP military expenditures is perhaps even more simplistic and risky than to attempt an abbreviated description of the problems. We recognize that the results shown in the publication are not the final answer. Yet somewhere between the upwardly biased official US estimate of $241 billion and the unrealistically low fraction of that which seems to be the official WP version, there must be a reasonable estimate.

At present our approach suggests that military expenditures of the WP countries in 1980 were in total about $94 billion lower than the US Government estimates. Rather than being equal to the NSTO expenditures, this would make them lower by 40 percent. A gap like that could make quite a difference in NATO's planning for a continually rising military effort against the competition—and save taxpayers a whale of a lot of money. ☐

References—see page 46

Estimating Military Expenditures of the USSR and its Warsaw Pact Allies

In the absence of adequate reporting by the Soviet Union of its annual military expenditures, independent calculations must be made by western authorities (*chart 21*—opposite). A review of the estimates made by official US sources indicates that they tend to exaggerate Soviet military expenditures. The result is a stimulus to the arms race.

If the Soviet Union has an interest in curbing the momentum of the arms competition, it could take a relatively simple step: make public its military budget in the detail proposed by the United Nations for all countries. At a small sacrifice of secrecy, it could thereby provide the kind of reassurance on which mutual trust between nations and arms restraint depend.

The usual statistical note on Soviet military expenditures was expanded in *WMSE 1980* to give an overview of the range of western estimates and a more detailed evaluation of the official US estimates. The summary is repeated in this edition, with some revisions based on CIA testimony made available in the past year. Given the limitations of space and time, this is necessarily a cursory examination of a very complex subject. Hopefully it will provide some encouragement to others to explore further.*

Soviet military expenditures warrant special attention for several reasons:

1. As a summary of the Soviet military effort and trend, they affect US and all NATO planning, the willingness of public officials to spend more to meet the competition, and of taxpayers to bear the burden.

2. Unlike other major industrial powers, the Soviet Union fails to provide detail on its military budget, or even to describe what expenditures are covered. It announces a single undefined figure each year, which seldom changes. Since 1970 the budget has dropped about 4 percent, from 17.9 to 17.1 billion rubles.

3. The Soviet announced budget is clearly incomplete in view of the advanced military technology and the size of the military force the USSR has produced.

4. The ruble is almost exclusively a domestic currency and official rates of exchange reflect neither the relation between internal prices and foreign prices, nor balance of payments forces.

5. Between the official Soviet military budget, converted to dollars at the official rate, and the official US view of that budget, there was a gap of $182 billion in 1980, a disparity which was larger than the total US military budget that year.

6. Between the official US estimate of Soviet military expenditure, and the estimate in this study, the gap was $77 billion in 1980. Although we continue to use the CIA ruble estimate for the calculation.

In the discussion following, the principal focus is on the calculations by US intelligence agencies which establish the official US view of Soviet military expenditures. Since this publication also has dollar estimates for other Warsaw Pact countries lower than the US official estimates, the basis for the alternatives will be described as well.

Soviet expenditures in rubles

Basis of estimates

In the absence of adequate reporting by the Soviet Union, western analysts have generally resorted to one of two basic approaches to an estimate of Soviet military expenditures in rubles.

Add-on or residual—One approach bases estimates on official Soviet statistics, either adding presumably missing elements to the announced defense budget or, by a residual method, deriving implicit military expenditures from the published Soviet statistics.

Building-block—The other approach is independent of the Soviet announced budgets except in the valuation of research expenditures. This method breaks down military expenditures into physical quantities (manpower, equipment, construction), and operating costs and research. Each major component is composed of many individual elements which are separately assigned monetary values. Considering the thousands of elements which must be identified and also valued, it is evident that this is an extraordinarily complex procedure, feasible only through a vast expenditure of effort on surveillance, data collection, and analysis. So far, only US intelligence agencies have the arsenal of electronic and other resources required for calculations of this detail and scope.

The building-block approach is used by CIA to produce annual estimates of Soviet military expenditures in both ruble values and dollars. The dollar figure is of principal public interest (since it is used for comparison with US expenditures), but it is the CIA ruble estimate which this study uses for its calculation of Soviet military expenditures. Working from the ruble estimate makes it possible to follow the same procedure for conversion to dollars which is used for other countries in this worldwide report and for GNP and other budget expenditures. It also avoids some but far from all of the exaggerating effects of the CIA calculation in dollars; these will be discussed below.

In using the CIA ruble estimate for the purpose, however, we do so with reservations. This is not to question either the competence of the analysts, who are highly respected professionals, nor the careful assembly of a massive amount of information. The gaps in knowledge and the need for subjective judgment are still formidable. The numerous uncertainties which invite "worst-case" interpretation and the methodology of the calculations together tend to produce an upward bias in the ruble as well as in the dollar estimate. Even though we cannot remove this bias, or determine precisely how much it may exaggerate the total, identifying some of the factors which appear to produce it may help to indicate the scope of the problem.

Components of CIA estimate

In ruble values, CIA calculates Soviet military expenditures (in 1970 prices) at almost four times the budget of 17.1 billion rubles which the USSR announced for 1980. While the public record does not show how the 1980 figure breaks down into all of the components, averages for the period since 1965 will give some clue to the relative importance of the major categories. The estimate of Soviet expenditures in rubles in that period was composed as follows (ref. 8):

—roughly one-fifth for research, development, test and evaluation (RDT&E);
—one-half for investment (procurement of equipment and construction);
—almost one-third for operating (60 percent of that for personnel).

What does the record say about some of the measurement problems associated with each of these components?

Research—This category of expenditures is identified by the analysts as the most imprecise element in the estimates. Research outlays cannot be estimated from observable physical quantities. Instead they appear to be derived in large part from Soviet aggregate statistical data—and converted from rubles into dollars with a ratio (ref. 9).

While not direct reference to the specific sources for the calculations appears to have been made recently, analysts in 1974 testimony referred to the state budget for science and indicated that space and military R & D took up most of the allocation for science.

CIA stated in 1978 testimony with "high confidence" that the Soviet military RDT&E effort is "large and growing." The estimated increase in this component in the 1970's was the predominant factor (along with procurement and maintenance of hardware) pushing the overall expenditure total higher (ref. 6). It is regarded as the fastest growing of the major components (ref. 8).

An independent study prepared for the National Science Foundation by a specialist in the field reveals some of the practical difficulties in identifying military R&D in the Soviet budgets for science (ref. 1). The report provides a careful analysis of definitional and other problems which cannot be adequately summarized here, but two of the general points made seem particularly relevant: the Soviet reported science budgets appear to be significantly inflated compared with US concepts and whether, or how much, Soviet military R&D is included in the science budget is still an unresolved issue.

From this, one could conclude that Soviet budgeting for science is still a largely mysterious area. It is unlikely to provide the only basis for the CIA estimates of Soviet expenditures of military R&D, but as a foundation for confident estimates of level or trend it clearly has serious weaknesses.

Investment—The component covering procurement and construction is the part of the estimate in which analysts state they have the greatest confidence. Presumably this is because the numbers of major equipment can, in large part, be observed, and at least some of the ruble prices (e.g. civilian products bought by the military) can be determined from Soviet price lists. Others may be obtained clandestinely. In theory at least there is good "hard" information in this area. Keeping it accurate and up-to-date is quite another problem, as evidenced by CIA's announcement in 1976 that Soviet military expenditures in rubles were now estimated to be *twice* as high as previously thought, because the ruble prices paid were higher than CIA had calculated.

Even assuming comparatively solid information in some areas, there are others which must depend heavily on judgment of guesswork, for example: the quality of equipment which is not obtainable or visible by satellite observation; the range of efficiency and cost within Soviet industry; and the amount of overhaul of old equipment, a practice which some analysts consider fairly common in the Soviet Union.

In addition, a significant source of measurement error arise in valuing equipment for which no ruble prices are available. The estimating process then becomes very shaky indeed. For many of the procurement items CIA must use US analogs. Values in US equivalent prices are established, then converted to rubles via a small sample of dollar-ruble ratios (about 1 ruble price for every 10 dollar prices). Assessing quality as compared with like US equipment must become a major headache, in this case made more difficult by the fact that Soviet technology as a rule lags behind the US, and the product itself tends to be more simplified.

For example, CIA testimony mentions microminiaturization in computers as one area in which the Soviets are far behind US technology. The question is how accurately analysts can determine the lesser dollar value of a weapon which does not have built into it the accuracy and capability of remote command and control equivalent to its US counterpart.

Although CIA analysts report that they do make the effort to adjust the cost basis of Soviet equipment for physical and performance qualities, they have stated that where their knowledge is incomplete their estimates tend to overstate the costs of producing the Soviet design.

Operating costs—Manpower, although rated at a lower level of reliability than procurement, is considered by CIA to be the most reliable element in the estimates of Soviet operating costs. It is also a relatively small part of the overall estimate of ruble outlays. While Soviet forces are very large, this is a draft army and ruble pay scales are low. (The pay for a private is said to be the ruble equivalent of about $6 per month not including upkeep.)

Estimates of manpower costs presumably depend on the determination of numbers in the total force, the table of organization, and the pay scales used. The record is not clear on all these points. For 1978 CIA estimated manpower of 4.2 million, IISS (the source used in this report) at 3.6 million. The higher CIA figure may result from a definitional difference, possibly from the CIA inclusion of civilians in uniform or of border guards. The IISS total excludes some 560,000 border guards, internal security, railroad and construction troops. It could also result from higher assumptions of the actual complement of Soviet divisions. CIA does state that it takes account of the evidence that a good many Soviet divisions are not at full strength, but certainty in this case may be difficult to establish, and the tendency would be to assume full complement where it is unknown.

In addition to the numbers involved, there are unknowns relating to the operational use of Soviet forces for

**Unless specific references are noted, the summary of CIA methodology is drawn from the public record in the annual hearings of the Joint Economic Committee of the US Congress (#5, page 46).*

RANKING OF COUNTRIES: MILITARY AND SOCIAL INDICATORS

142 Countries, 1982

TABLE III

	MILITARY							GNP		EDUCATION								
	Public Expenditures per Capita		Public Expenditures per Soldier[1]		Public Expenditures per Sq. Km.		Economic-Social Standing[2]	per Capita		Public Expenditures per Capita		School-Age Population per Teacher[3]		% School-Age Population in School		% Women in Total University Enrollment		Literacy Rate[4]
	Rank	US $	Rank	US $	Rank	US $		Rank	US $	Rank	US $	Rank	Number	Rank	%	Rank	%	Rank %
WORLD		**147**		**26,373**		**5,074**			**2,789**		**140**		**45**		**53**		**41**	**71**
■ Developed		487		52,141		9,665			9,227		495		25		68		46	99
Developing		43		9,808		1,934			827		32		53		50		35	60
AMERICA																		
North America		**788**		**88,742**		**10,476**			**12,980**		**710**		**23**		**77**		**50**	**99**
■ United States		845		89,228		20,975	4		13,160		686		23		77		50	99
■ Canada		252		75,707		622	7		11,330		936		23		79		51	98
Latin America		**31**		**9,054**		**576**			**2,170**		**96**		**42**		**60**		**42**	**81**
Argentina		72		11,783		766	44		3,060		113		27		62		43	94
Barbados		32		8,000		20,000	30		3,840		216		24		81		48	98
Bolivia		18		3,741		92	89		940		34		39		57		30	68
Brazil		20		9,436		303	56		2,140		93		42		57		49	76
Chile		100		11,186		1,433	50		2,210		129		43		71		39	94
Colombia		18		7,441		444	68		1,380		41		53		50		44	86
Costa Rica		...		...		...	64		1,080		63		55		50		38	93
Cuba		111		8,516		9,478	39		1,180		174		22		66		52	95
Dominican Rep.		17		4,417		2,163	80		1,260		26		66		60		41	74
Ecuador		28		5,795		796	61		1,570		78		36		71		36	82
El Salvador		31		5,800		6,905	91		760		28		94		46		27	66
Guatemala		12		4,895		853	93		1,140		22		87		33		23	53
Guyana		28		3,143		102	72		600		56		37		68		32	92
Haiti		5		3,125		893	119		290		3		101		38		32	30
Honduras		15		5,000		536	96		660		28		75		50		39	62
Jamaica		20		15,000		4,091	51		1,300		85		38		74		44	92
Mexico		14		8,317		506	58		2,660		113		42		70		33	84
Nicaragua		72		9,091		1,538	69		950		38		61		59		48	88
Panama		15		2,900		377	45		2,160		108		36		67		57	87
Paraguay		21		4,500		177	74		1,670		24		44		52		43	86
Peru		29		3,882		411	73		1,210		40		48		69		35	82
Trinidad & Tobago		41		23,000		9,200	32		6,840		416		31		73		40	95
Uruguay		140		13,600		2,318	37		3,440		86		26		70		56	95
Venezuela		72		28,342		1,274	48		4,250		276		37		59		40	83
EUROPE																		
NATO Europe		**328**		**33,293**		**37,489**			**8,530**		**448**		**27**		**62**		**42**	**94**
■ Belgium		362		32,427		115,064	12		10,540		653		24		62		39	99
■ Denmark		315		53,800		37,535	2		12,330		851		20		71		43	99
■ France		482		45,458		47,951	8		11,520		462		25		66		49	99
■ Germany, West		414		52,131		102,586	10		12,280		625		25		63		38	99
Greece		280		14,628		20,833	32		4,170		157		31		71		42	90
■ Iceland		—		—		—	6		12,140		532		21		70		35	99
■ Italy		180		19,665		33,777	18		6,750		413		21		60		44	95
■ Luxembourg		140		51,000		17,000	13		14,260		975		23		60		40	100
■ Netherlands		353		47,679		136,595	15		10,780		833		29		60		33	99
■ Norway		447		44,902		5,682	1		14,300		926		20		70		42	100
Portugal		90		10,112		9,783	38		2,480		116		25		65		50	80
Turkey		67		4,216		4,151	82		1,310		38		56		48		30	65
■ United Kingdom		488		81,766		111,469	14		9,580		525		23		76		39	99
ALL NATO (incl. US and Canada)		**529**		**56,164**		**13,986**			**10,480**		**562**		**25**		**69**		**47**	**96**
Warsaw Pact		**492**		**38,809**		**7,995**			**5,480**		**258**		**27**		**60**		**50**	**99**
■ Bulgaria		186		11,216		14,955	27		5,160		246		28		61		51	95
■ Czechoslovakia		225		17,653		27,031	29		5,540		254		35		60		43	99
■ Germany, East		307		30,904		47,500	24		7,010		297		35		58		48	99
■ Hungary		125		12,642		14,565	27		5,180		257		25		62		48	99
■ Poland		121		13,786		13,962	36		4,020		134		36		57		50	98
■ Romania		47		5,856		4,454	45		3,160		87		35		58		43	97
■ USSR		630		45,884		7,589	26		5,790		288		25		60		50	99

Estimating Military Expenditures of the USSR and its Warsaw Pact Allies

In the absence of adequate reporting by the Soviet Union of its annual military expenditures, independent calculations must be made by western authorities (table opposite). A review of the estimates made by official US sources indicates that they tend to exaggerate Soviet military expenditures. The result is a stimulus to the arms race.

If the Soviet Union has an interest in curbing the momentum of the arms competition, it could take a relatively simple step: make public its military budget in the detail proposed by the United Nations for all countries. At a small sacrifice of secrecy, it could thereby provide the kind of reassurance on which mutual trust between nations and arms restraint depend.

The usual statistical note on Soviet military expenditures was expanded in *WMSE 1980* and subsequent editions to give an overview of some western estimates and a more detailed evaluation of the official US estimates. The summary is repeated in this edition, with some revisions based on CIA testimony made available in recent years. Given the limitations of space and time, this is necessarily a cursory examination of a very complex subject. Hopefully it will provide some encouragement to others to explore further.*

Soviet military expenditures warrant special attention for several reasons:

1. As a summary of the Soviet military effort and trend, they affect US and all NATO planning, the willingness of public officials to spend more to meet the competition, and of taxpayers to bear the burden.

2. Unlike other major industrial powers, the Soviet Union fails to provide detail on its military budget, or even to describe what expenditures are covered. It announces a single undefined figure each year, which seldom changes. Between 1970 and 1984 the budget dropped about 4 percent, from 17.9 to 17.1 billion rubles, but in 1985 it rose by 12 percent to 19.1 billion rubles.

3. The Soviet announced budget is clearly incomplete in view of the advanced military technology and the size of the military force the USSR has produced.

4. The ruble is almost exclusively a domestic currency and official rates of exchange reflect neither the relation between internal prices and foreign prices, nor balance of payments forces.

5. Between the official Soviet military budget, converted to dollars at the official rate ($23 billion) and the official US view of that budget ($244 billion), there was a gap in 1982 which was larger than the total US military budget that year.

6. Between the official US estimate of Soviet military expenditure, and the estimate in this study, the gap was $74 billion in 1982, although we continue to use the CIA ruble estimate for the calculation.

In the discussion following, the principal focus is on the calculations by US intelligence agencies which establish the official US view of Soviet military expenditures. Since this publication also has dollar estimates for other Warsaw Pact countries lower than the US official estimates, the basis for the alternatives will be described as well.

Soviet expenditures in rubles

Basis of estimates

In the absence of adequate reporting by the Soviet Union, western analysts have generally resorted to one of two basic approaches to an estimate of Soviet military expenditures in rubles.

Add-on or residual—One approach bases estimates on official Soviet statistics, either adding presumably missing elements to the announced defense budget or, by a residual method, deriving implicit military expenditures from published Soviet statistics for civilian programs.

Building-block—The other approach is independent of the Soviet announced budgets except in the valuation of research expenditures. This method breaks down military expenditures into physical quantities (manpower, equipment, construction), operating costs, and research. Each major component is composed of many individual elements which are separately assigned monetary values. Considering the thousands of elements which must be identified and also valued, it is evident that this is an extraordinarily complex procedure, feasible only through a vast expenditure of effort on surveillance, data collection, and analysis. So far, only US intelligence agencies have the arsenal of electronic and other resources required for calculations of this detail and scope.

The building-block approach is used by CIA to produce annual estimates of Soviet military expenditures in both ruble values and dollars. The dollar figure is of principal public interest (since it is used for comparison with US expenditures), but it is the CIA ruble estimate which this study uses for its calculation of Soviet military expenditures. Working from the ruble estimate makes it possible to follow the same procedure for conversion to dollars which is used for other countries in this worldwide report and for GNP and other budget expenditures. It also avoids some but far from all of the exaggerating effects of the CIA calculation in dollars; these will be discussed below.

In using the CIA ruble estimate for this purpose, however, we do so with reservations. This is not to question either the competence of the analysts, who are highly respected professionals, nor the careful assembly of a massive amount of information. The gaps in knowledge and the need for subjective judgment are still formidable. The numerous uncertainties which invite "worst-case" interpretation and the methodology of the calculations together tend to produce an upward bias in the ruble as well as in the dollar estimate. Even though we cannot remove this bias, or determine precisely how much it may exaggerate the total, identifying some of the factors which appear to produce it may help to indicate the scope of the problem.

Components of CIA estimate

In ruble values, CIA calculates Soviet military expenditures (in 1970 prices) at more than four times the budget of 17.1 billion rubles which the USSR announced for 1982. While the public record does not show how the 1982 figure breaks down into all of the components, averages for the period since 1965 will give some clue to the relative importance of the major categories. The estimate of Soviet expenditures in rubles in that period was composed as follows (ref. 8):

—roughly one-fifth for research, development, test and evaluation (RDT&E);
—one-half for investment (procurement of equipment and construction);
—almost one-third for operating costs (60 percent of that for personnel).

What does the record say about some of the measurement problems associated with each of these components?

Research—This category of expenditures is identified by the analysts as the most imprecise element in the estimates. Research outlays cannot be estimated from observable physical quantities. Instead they appear to be derived in large part from Soviet aggregate statistical data—and converted from rubles into dollars with a ratio (ref. 9).

While no direct reference to the specific sources for the calculations appears to have been made recently, analysts in 1974 testimony referred to the state budget for science and indicated that space and military R & D took up most of the allocation for science.

CIA stated in 1981 that "we are confident that the Soviet military RDT&E effort is large and that the resources devoted to it are growing" (ref. 10). The estimated increase in this component in the 1970's was the predominant factor (along with procurement and maintenance of hardware) pushing the overall expenditure total higher (ref. 6). It is regarded as the fastest growing of the major components (ref. 8).

An independent study prepared for the National Science Foundation by a specialist in the field reveals some of the practical difficulties in identifying military R&D in Soviet budgets for science (ref. 1). The report provides a careful analysis of definitional and other problems which cannot be adequately summarized here, but two of the general points made seem particularly relevant: a) Soviet reported science budgets appear to be significantly inflated compared with US concepts and b) whether, or how much, Soviet military R&D is included in the science budget is still an unresolved issue.

From this, one could conclude that Soviet budgeting for science is still a largely mysterious area. It is unlikely to provide the only basis for the CIA estimate of Soviet expenditures of military R&D, but as a foundation for confident estimates of level or trend it clearly has serious weaknesses.

Investment—The component covering procurement and construction is the part of the estimate in which analysts state they have the greatest confidence. Presumably this is because the numbers of major equipment can, in large part, be observed, and at least some of the ruble prices (e.g. civilian products bought by the military) can be determined from Soviet price lists. Others may be obtained clandestinely. In theory at least there is good, "hard" information in this area. Keeping it accurate and up to date is quite another problem, as evidenced by two major revisions announced by CIA. In 1976 the Agency announced that Soviet military expenditures in rubles were estimated to be *twice* as high as previously thought because the Soviet defense industry was operating less efficiently than had been calculated—i.e. ruble costs were higher. And in 1983 the Agency announced that it had been overestimating the rate of growth of Soviet military expenditures since 1976. The main reason given was that it had made an error in counting the number of new weapons that had been produced and deployed.

Even assuming comparatively solid information in some areas, there are others which must depend heavily on judgment or guesswork, for example: the quality of equipment which is not obtainable or visible by satellite or other observation; the range of efficiency and cost within Soviet industry; and the amount of overhaul of old equipment, a practice which some analysts consider fairly common in the Soviet Union and which may give an impression of new production.

In addition, a significant source of measurement error arises in valuing equipment for which no ruble prices are available. The estimating process then becomes very shaky indeed. For many of the procurement items, CIA must use US analogs. Values in US equivalent prices are established, then converted to rubles via a small sample of dollar-ruble ratios (about 1 ruble price for every 10 dollar prices). Assessing quality as compared with like U.S. equipment must become a major headache in that case, made more difficult by the fact that Soviet technology as a rule lags behind the US, and the product itself tends to be simpler.

For example, CIA testimony mentions microminiaturization in computers as one area in which the Soviets are far behind US technology. The question is how accurately analysts can determine the lesser dollar value of a weapon which does not have built into it the accuracy and capability of remote command and control equivalent to its US counterpart.

Although CIA analysts report that they do make the effort to adjust the cost basis of Soviet equipment for physical and performance qualities, they have stated that where their knowledge is incomplete their estimates tend to overstate the costs of producing the Soviet design.

Operating costs—Manpower, although rated at a lower level of reliability than procurement, is considered by CIA to be the most reliable element in the estimates of Soviet operating costs. It is also a relatively small part of the overall estimate of ruble outlays. While Soviet forces are very large, this is a draft army and ruble pay scales are low. The pay for a private is said to be the ruble equivalent of about $6 per month not including upkeep. (While very low compared with US pay scales, the rate is on a par with pay for conscripts in NATO countries such as Portugal and Greece.)

Estimates of manpower costs presumably depend on the determination of numbers in the total force, the table of organization, and the pay scales used. The record is not clear on all these points. For 1982 the official US estimate of Soviet forces is 4.4 million, which includes all special forces judged to have national security missions, eg. KGB border guards. (In this publication, border guards and internal security forces of countries are not included in regular forces but are included in paramilitary.)

**Unless specific references are noted, the summary of CIA methodology is drawn from the public record in the annual hearings of the joint Economic Committee of the US Congress (#5, page 48).*

Estimated Military Expenditures of the USSR—Three Views
billion 1982 dollars

	ACDA[1]	SIPRI[2]	WMSE[3]
1980	233	154	162
1981	237	157	166
1982	244	159	170
1983	248	162	176

[1] US Arms Control & Disarmament Agency
[2] Stockholm International Peace Research Institute
[3] *World Military and Social Expenditures*

Also affecting the reliability of cost estimates is the difference between the actual number of men in Soviet divisions as compared with the number called for in the table of organization. CIA does state that it takes account of the evidence that a good many Soviet divisions are not at full strength, but certainty in this case may be difficult to establish, and the tendency would be to assume full complement where it is unknown.

In addition to the numbers involved, there are unknowns relating to the operational use of Soviet forces, for which adjustments may be especially difficult. The Soviet draft provides a work force at the command of the state. For example, recruits are used for agricultural work during the harvest period. The CIA analysts report that they cannot separate out the portion of time the forces are used in essentially civilian work. In other words, Soviet active-duty forces are valued as though fully employed in military functions throughout the year; no allowance is made for the Soviet custom of using forces in the harvest. On the other hand, uniformed forces *primarily* performing non-combatant services (construction, railroad, civil defense, and internal security forces) are excluded from the CIA count.

Whether adequate cost adjustment can be made for relatively low operational use of equipment and lower levels of readiness than in the US is also a question. Officials have at various times referred to these factors, stating that only one-sixth of Soviet navy ships are deployed at sea (US one-third); Soviet strategic subs operate 11 percent of the time (US 55 percent); pilots with the Soviet air force in Europe fly roughly one-third as much as American pilots; only part of the Soviet ICBM force is kept at peak readiness.

While CIA reports that they do make allowances for these differences in operating practices, the problems illustrate the inadequacy of number comparisons and the complexity of the estimating process even in an area where there is a fair degree of direct knowledge.

Soviet expenditures in dollars

Basis of estimates

The dollar equivalent of the Soviet military effort is now usually determined through one of two basic approaches.

Converting aggregates—Military expenditures in rubles are converted to dollars using the total, or broad categories, of expenditures, with appropriate exchange rates. This is the approach now used in this study. It makes possible the comparison of the military "burden" relative to GNP and other national budgets, and also rough comparisons among countries.

Pricing elements—The alternative method, which is used by CIA, constructs the dollar value of Soviet military expenditures through a building-block approach which parallels that described above for the ruble calculation. In this case every element of the Soviet military force is valued at the price that it would have if purchased in the US. The objective is not to establish the basis for international comparison but to produce a summary indicator of the value of the Soviet military effort in US terms.

Implications of CIA methodology

At first glance the product of the CIA approach seems to meet the requirement for a simple binary match-up: the total of the Soviet military effort, expressed in US costs, appears to have been made comparable with total US military expenditures. In fact, as we have tried to show, the method of calculation is not only based on an extremely fragile structure of evidence but also has built into it an upward bias because of the worst-case assumptions applied to unknowns in the estimating process.

In the CIA dollar calculation, the problems noted above for the ruble estimate are amplified because all components are priced in dollars as though purchased in the US.

National economies tend to use relatively more of that factor of production in which they have a cost advantage. If, for example, labor is cheap relative to capital, more labor is used. If that labor is valued at prices in effect in an economy where labor costs are high, however, it becomes an extremely expensive item. This is the basis of the distortion which occurs when all elements of the Soviet military effort are given dollar price tags. To offset this distortion, the usual procedure would be to calculate expenditures in the prices of both nations and to take a geometric mean of the dollar and ruble estimates. This is not done in the CIA calculations. For a review of the "index number effect," see ref. 4.

In this limited space it is not possible to summarize the problems and results in detail, or the alternative method of valuing expenditures in dollars. Two examples of the distortions implicit in the dollar valuations are given below.

In arriving at the dollar valuation of Soviet manpower, CIA breaks down the Soviet force into ranks and skill components, applying a dollar-cost factor to each skill level. The average pay for the Soviet force in the dollar calculations comes to about $12,500 per man, according to CIA statements in 1980. The very large Soviet army, bought at low cost in rubles, accounts for about $50 billion when priced at US pay scales and, under this method of calculation, rises every time US forces receive pay raises. Statements about the 1977 estimates indicated that personnel costs then were 14 percent of total spending in rubles, and 36 percent when calculated in dollars.

The CIA method allows for a difference in composition of US and USSR forces, but it is not at all clear that it adequately covers differences in quality, i.e. the technical qualifications of the force and the equipment available to them. Approximately three-fourths of Soviet manpower are short-term conscripts. Many draftees are unaquainted with the operation of even simple motorized equipment. In contrast, the US has a volunteer, career force, subject to intensive on-the-job training during their years of service. Lower readiness standards in the USSR also reduce training effectiveness, e.g., the Soviet air force has relatively less flying time, the army less top-of-the-line equipment for training.

The quality differential is also significant in the dollar pricing of Soviet equipment. In the CIA ruble calculation, some ruble values can be established directly. Dollar valuations, however, are based on US industry's estimates of production costs of samples of Soviet equipment, or on US analogs, which overall are more sophisticated than the Soviet inventory. The adjustments made for quality are subjective judgments and, as recognized by CIA, will have a tendency to overstate Soviet costs.

The agencies preparing the estimates are, of course, aware of the methodological bias inherent in the dollar calculations. In their testimony in 1979, for example, they noted that their "dollar comparisons of US and Soviet defense activities do have a potential bias favoring [i.e., exaggerating] the Soviets, resulting from the index number problem." Despite it, they express a relatively high degree of confidence in the results. For the overall estimate, they have usually described the possible margin of error as plus or minus 15 percent. In 1982 testimony they said "our estimates are unlikely to be in error by more than 10 percent for each year" (ref. 5).

Professor Holzman's review of the method suggests that because of possible tendencies to worst-case analysis in exercises like this, the range of error in the US-USSR dollar comparisons is likely to be relatively smaller on the low side and much larger on the high side.

WMSE calculations

Soviet Union

The CIA ruble estimate is the basis of the dollar valuation in this publication. For the reasons stated above, it appears to have an upward bias, with the net effect of substantially exaggerating Soviet military expenditures.

The CIA ruble estimate is converted to dollars, in the simplified WMSE method, using the adjusted exchange rate implicit in the WMSE calculations of GNP. Soviet GNP is an extension of the series previously calculated by Herbert Block for the US Department of State report on the Planetary Product.

In view of the uncertain value of the ruble as compared with normally traded currencies, any estimate of its exchange value at this point must be judgmental. Further observation may suggest that it should be assigned a higher value against the dollar—which of course would raise the dollar estimate.

On the other hand, further review of the CIA calculations, by intelligence or other expecialists, are quite likely to yield a lower, and we think, a more realistic value of Soviet military expenditures in rubles. Because of the uncertainties involved in both the CIA ruble estimate and the conversion factor used here, the estimate of Soviet military expenditures shown in this report can only be termed a rough approximation or informed guess, as one alternative to inflated US official estimates.

In comparison with Soviet GNP, the WMSE estimates suggest a defense burden of about 11 percent. This is less than the 14 percent shown in official US estimates as published by ACDA but that ratio is based on two values which cannot be compared directly*. In publishing the ratio, ACDA calls attention to the difference in the methods of calculating GNP and military expenditures but does not in its latest edition provide a basis for comparing the two.

Other Warsaw Pact

WMSE approach—The estimates of military expenditures in the centrally planned economies of Eastern Europe that are members of the Warsaw Pact (WP) are based on estimates in national currencies by Dr. Thad Alton and associates (ref. 7). In the Alton estimates, some adjustments are made in the official national figures to conform more closely to US definitions of defense. In converting to dollars, the WMSE method again uses the rates implicit in our calculation of GNP.

Official US approach—The method used in the official US report of military expenditures in the "other WP countries" differs from the above in an important respect: the conversion to dollars calculates military forces separately at equivalent US pay scales. The procedure may be summarized briefly as follows: a) the personnel component of military expenditures is separately estimated in national currencies; b) armed forces (regular and paramilitary) in those countries are then priced in dollars at US pay rates; c) the remainder of the budget is converted to dollars at the purchasing power equivalent rate implicit in the GNP calculations.

The results of this method appear in the ACDA annual report, where it produces military expenditures for the "other WP countries" more than double the overall estimates in this report.

Personnel costs, under the ACDA pricing method, jump from ratios of 12-35 percent of military expenditures in the domestic currencies of these six countries to 42-80 percent of military expenditures in dollars. As ACDA points out, the result is to make the proportion of military expenditures to GNP twice as large when expressed in dollars as it is in domestic currencies.

The special personnel adjustment made in the official US estimate of military expenditures for the "other WP countries" affects comparisons between the WP and non-communist countries. There is no indication on the record that this adjustment is made for any non-communist country in the world. If it were done worldwide, it would sharply increase the US Government estimates of military expenditures in other countries, including its NATO allies. Testimony in 1978 indicates that pricing of other NATO forces at US pay scales would raise the total dollar equivalents of military expenditures for those countries by 22 percent.

* * *

To attempt alternatives to the elaborate official calculations of WP military expenditures is perhaps even more simplistic and risky than to attempt an abbreviated description of the problems. We recognize that the results shown in this publication are not the final answer. Yet somewhere between the upwardly biased official US estimate of $284 billion and the unrealistically low fraction of that which seems to be the official WP version, there must be a reasonable estimate.

At present our approach suggests that military expenditures of the WP countries including the USSR were in total about $97 billion lower than the US Government estimates. Rather than being roughly equal to NATO expenditures, this would make them lower than NATO's in 1982 by more than $100 billion. A gap like that could make quite a difference in NATO's planning for a continually rising military effort against the competition—and save taxpayers a whale of a lot of money. □

References—see page 48

**GNP in dollars is designed to show the average relative size of US and Soviet GNP when both are expressed in both currencies. Military expenditures are converted directly, based on Soviet weights and US price patterns.*

RANKING OF COUNTRIES: MILITARY AND SOCIAL INDICATORS

142 Countries 1983

TABLE III

	MILITARY					GNP		EDUCATION								
	Public Expenditures per Capita		Public Expenditures per Soldier[1]		Public Expenditures per Sq. Km.	Economic Social Standing[2]	per Capita	Public Expenditures per Capita		School-Age Population per Teacher[3]		% School-Age Population in School		% Women in Total University Enrollment		Literacy Rate[4]
	Rank	US $	Rank	US $	Rank US $		Rank US $	Rank	US $	Rank	Number	Rank	%	Rank	%	Rank %
WORLD		158		28,949	5,530		2,839		140		45		52		41	71
■ Developed		524		55,614	10,742		9,417		490		25		68		46	99
Developing		41		9,854	1,836		736		28		54		49		34	60
AMERICA																
North America		862		97,086	11,556		13,991		746		22		77		50	99
■ United States		926		97,749	23,173	3	14,172		725		22		76		50	99
■ Canada		257		78,901	641	2	12,284		951		22		80		51	99
Latin America		28		7,748	522		1,897		67		42		60		43	82
Argentina		39		7,634	422	49	2,030		52		27		63		44	94
Barbados		36		9,000	22,500	28	4,032		228		23		84		54	99
Bolivia		7		1,536	39	93	597		18		39		59		30	70
Brazil		16		7,635	246	57	2,032		59		44		56		50	76
Chile		82		9,854	1,250	50	1,920		96		41		73		40	96
Columbia		17		6,771	416	69	1,378		41		52		51		47	86
Costa Rica		—		—	—	65	1,016		58		55		50		38	93
Cuba		130		8,379	11,550	37	1,852		117		21		65		53	96
Dominican Rep.		15		4,087	1,918	78	1,103		25		64		54		41	75
Ecuador		20		4,513	620	63	1,319		48		39		67		39	82
El Salvador		31		3,571	7,143	89	744		28		93		48		42	66
Guatemala		21		4,200	1,541	90	1,119		20		87		35		23	54
Guyana		28		3,000	98	66	592		52		35		71		38	92
Haiti		5		3,857	964	115	282		3		86		44		32	35
Honduras		16		4,600	616	93	655		28		75		49		40	62
Jamaica		15		8,500	3,091	59	1,350		102		43		66		44	92
Mexico		12		7,347	451	57	2,154		60		41		70		34	88
Nicaragua		90		5,551	2,092	75	868		40		64		54		47	88
Panama		34		7,100	922	43	1,980		105		38		62		56	87
Paraguay		23		5,118	214	76	1,125		20		46		50		43	88
Peru		64		8,824	934	71	1,064		42		48		69		35	84
Trinidad & Tobago		67		77,000	15,400	35	6,833		367		32		69		40	95
Uruguay		83		8,067	1,375	44	2,516		54		36		50		57	96
Venezuela		58		21,523	1,038	48	4,027		325		39		60		40	86
EUROPE																
NATO Europe		285		29,045	32,055		7,629		392		28		63		43	94
■ Belgium		308		27,872	98,000	16	9,120		575		24		63		40	99
■ Denmark		292		49,700	34,674	6	11,538		804		19		71		43	99
■ France		438		41,372	43,717	8	10,481		468		24		66		51	99
■ Germany, West		385		47,726	95,068	10	11,403		582		24		62		38	99
Greece		246		13,655	18,311	33	3,932		146		34		71		43	90
■ Iceland		—		—	—	3	10,245		452		21		70		51	99
■ Italy		168		19,112	31,621	22	6,549		393		21		59		44	96
■ Luxembourg		126		46,000	15,333	15	14,566		779		23		59		36	100
■ Netherlands		319		44,038	123,784	16	9,869		751		30		60		34	99
■ Norway		446		44,854	5,676	1	14,007		977		21		69		44	100
Portugal		80		8,581	8,674	40	2,270		109		24		65		49	82
■ Spain		103		11,343	7,794	28	4,780		120		35		69		46	94
Turkey		59		3,445	3,635	82	1,210		40		55		51		34	67
■ United Kingdom		486		82,204	111,731	12	9,171		482		23		74		40	99
ALL NATO (incl. US and Canada)		523		55,452	14,469		10,252		538		25		68		47	96
Warsaw Pact		601		46,387	9,851		6,273		286		27		60		50	99
■ Bulgaria		188		10,370	15,135	28	5,897		293		27		62		51	95
■ Czechoslovakia		238		17,990	28,672	32	5,847		263		34		61		43	99
■ Germany, East		361		36,108	55,833	25	7,427		336		34		58		47	99
■ Hungary		132		13,429	15,161	24	5,526		309		24		62		49	99
■ Poland		125		13,471	14,633	35	4,252		155		34		59		51	98
■ Romania		48		5,684	4,538	45	3,306		73		35		56		43	97
■ USSR		778		55,790	9,463	23	6,784		319		25		61		50	99

Estimating Military Expenditures of the USSR and its Warsaw Pact Allies

In the absence of adequate reporting by the Soviet Union of its annual military expenditures, independent calculations must be made by western authorities (table, page 9). A review of the estimates made by official US sources indicates that they tend to exaggerate Soviet military expenditures. The result is a stimulus to the arms race.

If the Soviet Union has an interest in curbing the momentum of the arms competition, it could take a relatively simple step: make public its military budget in the detail proposed by the United Nations for all countries. At a small sacrifice of secrecy, it could thereby provide the kind of reassurance on which mutual trust between nations and arms restraint depend.

The usual statistical note on Soviet military expenditures was expanded in *WMSE 1980* and subsequent editions to give an overview of some western estimates and a more detailed evaluation of the official US estimates. The summary is repeated in this edition, with revisions based on CIA testimony and other sources made available more recently. Given the limitations of space and time, this is necessarily a cursory examination of a very complex subject. Hopefully it will provide some encouragement to others to explore further.*

Soviet military expenditures warrant special attention for several reasons:

1. As a summary of the Soviet military effort and trend, they affect US and all NATO planning, the willingness of public officials to spend more to meet the competition, and of taxpayers to bear the burden.

2. Unlike other major industrial powers, the Soviet Union fails to provide detail on its military budget, or even to describe what expenditures are covered. It announces a single undefined figure each year, which seldom changes. Between 1970 and 1984 the announced budget dropped about 4 percent to 17.1 billion rubles, but in 1985 it rose by 12 percent to 19.1 billion rubles.

3. The Soviet announced budget is clearly incomplete in view of the advanced military technology and the size of the military force the USSR has produced.

4. The ruble is almost exclusively a domestic currency and official rates of exchange reflect neither the relation between internal prices and foreign prices, nor balance of payments forces.

5. Between the official Soviet military budget, converted to dollars at the official rate ($22 billion) and the official US view of Soviet military expenditures in 1983, there was a gap of $236 billion.

6. Between the official US estimate of Soviet military expenditure, and the estimate in this study, the gap was $46 billion in 1983, although we continue to use the CIA ruble estimate as the basis for the calculation.

In the discussion following, the principal focus is on the calculations by US intelligence agencies which establish the official US view of Soviet military expenditures. Since this publication also has dollar estimates for other Warsaw Pact countries lower than the US official estimates, the basis for the alternatives will be described as well.

Soviet expenditures in rubles

Basis of estimates

In the absence of adequate reporting by the Soviet Union, western analysts have generally resorted to one of two basic approaches to an estimate of Soviet military expenditures in rubles.

Add-on or residual—One approach bases estimates on official Soviet statistics, either adding presumably missing elements to the announced defense budget or using a residual method which calculates presumed hidden defense expenditures from unspecified budget categories and adds them to the explicit defense budget.

Building-block—The other approach is independent of the Soviet announced budgets except in the valuation of research expenditures. This method breaks down military expenditures into physical quantities (manpower, equipment, construction), operating and maintenance costs, and research and development. Each major component is composed of many individual elements which are separately assigned monetary values. Considering the thousands of elements which must be identified and also valued, it is evident that this is an extraordinarily complex procedure, feasible only through a vast expenditure of effort on surveillance, data collection, and analysis. So far, only US intelligence agencies have the arsenal of electronic and other resources required for calculations of this detail and scope. Given the huge amount of detailed information required, this approach also involves subjective judgments and guess-estimates.

The building-block approach is used by CIA to produce annual estimates of Soviet military expenditures in both ruble values and dollars. (CIA has recently announced that to avoid the politicizing of the figures it will no longer publish a dollar figure, but will continue the ruble estimate.) It is the CIA ruble estimate which this study uses for its calculation of Soviet military expenditures. Working from the ruble estimate makes it possible to follow the same procedure for conversion to dollars which is used for other countries in this worldwide report and for GNP and other budget expenditures. It also avoids some but far from all of the exaggerating effects of the CIA calculation in dollars; these will be discussed below.

In using the CIA ruble estimate for this purpose, however, we do so with reservations. This is not to question either the competence of the analysts, who are highly respected professionals, nor the careful assembly of a massive amount of information. The gaps in knowledge and the need for subjective judgment are still formidable. Relatively few ruble prices are available to the analysts. This means that in many cases ruble estimates are based on calculations first made in dollars and then converted to rubles using broad dollar/ruble ratios.

The numerous uncertainties which invite "worst-case" interpretation and the methodology of the calculations together tend to produce an upward bias in the ruble as well as in the dollar estimate. Even though we cannot remove this bias, or determine precisely how much it may exaggerate the total, identifying some of the factors which appear to produce it may help to indicate the scope of the problem.

Components of CIA estimate

In new estimates announced in 1986, CIA has advanced the price base for its calculations of Soviet military spending from 1970 to 1982. One effect of the change is to produce a higher level of expenditures. In 1982 rubles, the CIA estimate for 1982 is 6-7 times the obviously incomplete budget of 17.1 billion rubles announced by the USSR. Soviet GNP is estimated at 720 billion rubles in 1982, and Soviet defense spending at 15 to 17 percent of it.

Under the new assessments, the shares of major resource categories are also said to have changed. The new breakdowns are not yet available on the public record. Previously, the composition of the estimate was approximately as follows (ref. 8):

—roughly one-fifth for research, development, test and evaluation (RDT&E);
—one-half for investment (procurement of equipment and construction);
—almost one-third for operating costs (60 percent of that for personnel).

* * *

What does the record say about some of the measurement problems associated with each of these components?

Research—This category of expenditures is identified by the analysts as the most imprecise element in the estimates. Research outlays cannot be estimated from observable physical quantities. Instead they appear to be derived in large part from Soviet aggregate statistical data—and converted from rubles into dollars with a ratio (ref. 9).

While no direct reference to the specific sources for the calculations appears to have been made recently, analysts in 1974 testimony referred to the state budget for science and indicated that space and military R & D took up most of the allocation for science.

CIA stated in 1981 that "we are confident that the Soviet military RDT&E effort is large and that the resources devoted to it are growing" (ref. 10). The estimated increase in this component in the 1970's was the predominant factor (along with procurement and maintenance of hardware) pushing the overall expenditure total higher (ref. 6). It has been described as the fastest growing of the major components (ref. 8).

An independent study prepared for the National Science Foundation by a specialist in the field reveals some of the practical difficulties in identifying military R&D in Soviet budgets for science (ref. 1). The report provides a careful analysis of definitional and other problems which cannot be adequately summarized here, but two of the general points made seem particularly relevant: a) Soviet reported science budgets appear to be significantly inflated compared with US concepts and b) whether, or how much, Soviet military R&D is included in the science budget is still an unresolved issue.

From this, one could conclude that Soviet budgeting for science is still a largely mysterious area. The Soviet budget itself is unlikely to provide the only basis for the CIA estimate of Soviet expenditures of military R&D, but as a foundation for confident estimates of level or trend it clearly has serious weaknesses.

A further complicating factor is the substantial lag in Soviet development of such basic research tools as advanced computers and in the general unavailability even of photocopying machines and simple computers. Technological lags which handicap Soviet research add to the difficulty of judging the relative efficiency of Soviet military R&D compared with US programs.

Investment—The component covering procurement and construction is the part of the estimate in which analysts state they have the greatest confidence. Presumably this is because the numbers of major equipment can, in large part, be observed, and at least some of the ruble prices (e.g. civilian products bought by the military) can be determined from Soviet price lists. Others may be obtained clandestinely. In theory at least there is good, "hard" information in this area. Keeping it accurate and up to date is quite another problem, as evidenced by two major revisions announced by CIA. In 1976 the Agency announced that Soviet military expenditures in rubles were estimated to be *twice* as high as previously thought because the Soviet defense industry was operating less efficiently than had been calculated—i.e. ruble costs were higher. And in 1983 the Agency announced that it had been overestimating the rate of growth of Soviet military expenditures since 1976. The main reason given was that it had made errors in counting the number of new weapons that had been produced and deployed.

Even assuming comparatively solid information in some areas, there are others which must depend heavily on judgment or guesswork, for example: the quality of equipment which is not obtainable or visible by satellite or other observation; the range of efficiency and cost within Soviet industry; and the amount of overhaul of old equipment, a practice which some analysts consider fairly common in the Soviet Union and which may give an impression of new production.

In addition, a significant source of measurement error arises in valuing equipment for which no ruble prices are available. The estimating process then becomes very shaky indeed. For many of the procurement items, CIA must use US analogs. Values in US prices are established, then converted to rubles via a small sample of dollar-ruble ratios (about 1 ruble price for every 10 dollar prices). Assessing quality as compared with like US equipment must become a major headache in that case, made more difficult by the fact that Soviet technology as a rule lags behind the US, and the product itself tends to be simpler.

For example, CIA testimony mentions microminiaturization in computers as one area in which the Soviets are far behind US technology. The question is how accurately analysts can determine the lesser dollar value of a weapon which does not have built into it the accuracy and capability of remote control equivalent to its US counterpart.

Although CIA analysts report that they do make the effort to adjust the cost basis of Soviet equipment for physical and performance qualities, they have stated that where their knowledge is incomplete their estimates tend to overstate the costs of producing the Soviet design.

Operating costs—Manpower, although rated at a lower level of reliability than procurement, is considered by CIA to be the most reliable element in the estimates of Soviet operating costs. It is also a relatively small part of the overall estimate of ruble outlays. While Soviet forces are very large, this is a draft army and ruble pay scales are

**For all references, see page 46. Unless specific references are noted, the summary of CIA methodology is drawn from the public record in the annual hearings of the Joint Economic Committee of the US Congress (ref. 5).*

low. The pay for a private is said to be the ruble equivalent of about $6 per month not including upkeep. (While very low compared with US pay, the rate is on a par with pay for conscripts in NATO countries such as Portugal and Greece.)

Estimates of manpower costs presumably depend on the determination of numbers in the total force, the table of organization, and the pay scales used. The record is not clear on all these points. For 1983 the ACDA estimate of Soviet forces is 4.4 million, which includes all special forces judged to have national security missions, e.g. KGB border guards. (In this publication, border guards and internal security forces of countries are not included in regular forces but are included in paramilitary.)

Also affecting the reliability of cost estimates is the difference between the actual number of men in Soviet divisions as compared with the number called for in the table of organization. CIA does state that it takes account of the evidence that a good many Soviet divisions are not at full strength, but certainty in this case may be difficult to establish, and the tendency would be to assume full complement where it is unknown.

In addition to the numbers involved, there are unknowns relating to the operational use of Soviet forces, for which adjustments may be especially difficult. The Soviet draft provides a work force at the command of the state. For example, recruits are used for agricultural work during the harvest period. The CIA analysts report that they cannot separate out the portion of time the forces are used in essentially civilian work. In other words, Soviet active-duty forces are valued as though fully employed in military functions throughout the year; no allowance is made for the Soviet custom of using forces in the harvest. On the other hand, uniformed forces *primarily* performing noncombatant services (construction, railroad, civil defense, and internal security forces) are said to be excluded from the CIA count of forces.

Whether adequate cost adjustment can be made for relatively low operational use of equipment and lower levels of readiness than in the US is also a question. Officials have at various times referred to these factors, stating that only one-sixth of Soviet navy ships are deployed at sea (US one-third); Soviet strategic subs operate 11 percent of the time (US 55 percent); pilots with the Soviet air force in Europe fly roughly one-third as much as American pilots; only part of the Soviet ICBM force is kept at peak readiness.

While CIA reports that they do make allowances for these differences in operating practices, the problems illustrate the inadequacy of number comparisons and the complexity of the estimating process even in an area where there is a fair degree of direct knowledge.

Soviet expenditures in dollars

Basis of estimates

The dollar equivalent of the Soviet military effort is now usually determined through one of two basic approaches.

Converting aggregates—Military expenditures in rubles are converted to dollars using the total, or broad categories, of expenditures, with appropriate exchange rates. This is the approach used in this study.

Pricing elements—The alternative method, which is used by CIA, constructs the dollar value of Soviet military expenditures through a building-block approach which parallels that described above for the ruble calculation. In this case every element of the Soviet military force is valued at the price that it would have if purchased in the US. The objective is not to establish the basis for international comparison but to produce a summary indicator of the value of the Soviet military effort in US terms.

Implications of CIA methodology

At first glance the product of the CIA approach seems to meet the requirement for a simple binary match-up: the total of the Soviet military effort, expressed in US costs, appears to have been made comparable with total US military expenditures. In fact, as we have tried to show, the method of calculation is not only based on an extremely fragile structure of evidence but also has built into it an upward bias because of the worst-case assumptions applied to unknowns in the estimating process.

In the CIA dollar calculation, the problems noted above for the ruble estimate are amplified because *all* components are priced in dollars as though purchased in the US.

National economies tend to use relatively more of that factor of production in which they have a cost advantage. If, for example, labor is cheap relative to capital, more labor is used. If that labor is valued at prices in effect in an economy where labor costs are high, however, it becomes an extremely expensive item. This is the basis of the distortion which occurs when all elements of the Soviet military effort are given dollar price tags. To offset this distortion, the usual procedure would be to calculate expenditures in the prices of both nations and to take a geometric mean of the dollar and ruble estimates. This is done in the CIA calculations of GNP but not in the dollar estimates of military expenditures. For a review of the "index number effect," see ref. 4.

In this limited space it is not possible to summarize the problems and results in detail, or the alternative method of valuing expenditures in dollars. Examples of the distortions implicit in the dollar valuations are given below.

In arriving at the dollar valuation of Soviet manpower, CIA breaks down the Soviet force into ranks and skill components, applying a dollar-cost factor to each skill level. The average pay for the Soviet force in the dollar calculations came to about $15,000, according to a DIA statement in 1983. The very large Soviet army, bought at low cost in rubles, accounts for about $50 billion when priced at US pay scales and, under this method of calculation, rises every time US forces receive pay raises. Statements about the 1977 estimates indicated that personnel costs then were 14 percent of total spending in rubles, and 36 percent when calculated in dollars.

The CIA method allows for a difference in composition of US and USSR forces, but it is not at all clear that it adequately covers differences in quality, i.e. the technical qualifications of the force and the equipment available to them. Approximately three-fourths of Soviet manpower are short-term conscripts. Many draftees are unaquainted with the operation of even simple motorized equipment. In contrast, the US has a volunteer, career force, subject to intensive training during their years of service. Lower readiness standards in the USSR also reduce training effectiveness, e.g., the Soviet air force has relatively less flying time, the army less top-of-the-line equipment for training.

The quality differential is also significant in the dollar pricing of Soviet equipment. In the CIA ruble calculation, some ruble values can be established directly. Dollar valuations, however, are based on US industry's estimates of production costs of samples of Soviet equipment, or on US analogs, which overall are more sophisticated than the Soviet inventory. The adjustments made for quality are subjective judgments and, as recognized by CIA, will have a tendency to overstate Soviet costs.

The agencies preparing the estimates are, of course, aware of the methodological bias inherent in the dollar calculations. In their testimony in 1979, for example, they noted that their "dollar comparisons of US and Soviet defense activities do have a potential bias favoring [i.e., exaggerating] the Soviets, resulting from the index number problem." Despite it, they express a relatively high degree of confidence in the results. For the overall estimate, they have usually described the possible margin of error as plus or minus 15 percent. In 1982 testimony they said "our estimates are unlikely to be in error by more than 10 percent for each year" (ref. 5).

Professor Holzman's review of the method suggests that because of possible tendencies to worst-case analysis in exercises like this, the range of error in the US-USSR dollar comparisons is likely to be relatively smaller on the low side and much larger on the high side.

WMSE calculations

Soviet Union

The dollar valuations of Soviet military expenditures used in this publication continue to be based on the CIA ruble estimate of defense and the implied conversion factor for GNP. Since CIA methodology on the 1982 price base is not yet spelled out in any detail, a provisional method of reflecting these numbers has been adopted for this edition. Briefly stated, the calculations are as follows:

a) The previously published intelligence estimate of 50 billion rubles for 1970 (ref. 9) is roughly adjusted to exclude civilian space, railroad and construction troops, and internal security forces.

b) This estimate is advanced to 1982 using the average annual growth rate stated in the 1986 report by CIA/DIA. (ref. 11).

c) and converted to 1982 dollars using the CIA implied conversion ratio for GNP in 1982 (ref. 12).

Since the CIA ruble estimate of defense expenditures is composed in part of dollar valuations converted to rubles, the method used in WMSE obviously does not wholly remove the index number effect, although it may diminish it. The ruble base therefore continues to have an upward bias.

In comparison with Soviet GNP, the WMSE dollar estimate suggests a defense burden of 11-12 percent. This is appreciably lower than the 15-17 percent of GNP in the CIA/DIA report, and below the 14 percent of GNP in the latest available ACDA report, which was published before the intelligence revisions. The ACDA ratio, however, represents two values which are calculated by different methods and cannot be compared directly.* While ACDA calls attention to the difference in the methods deriving military expenditures and GNP, it does not provide a basis for comparing the two.

Other Warsaw Pact

WMSE approach—The estimates of military expenditures in the centrally planned economies of Eastern Europe that are members of the Warsaw Pact (WP) are based on estimates in national currencies by Dr. Thad Alton and associates (ref. 7). In the Alton estimates, some adjustments are made in the official national figures to conform more closely to US definitions of defense. In converting the Alton estimates from national currencies to dollar equivalents, the WMSE method again uses the rates implicit in the calculations of GNP.

Official US approach—The method used in the official US report of military expenditures in the "other WP countries" differs from the above in an important respect: the conversion to dollars calculates military forces separately at equivalent US pay scales. The procedure may be summarized briefly as follows: a) the personnel component of military expenditures is separately estimated in national currencies; b) armed forces (regular and paramilitary) in those countries are then priced in dollars at US pay rates; c) the remainder of the budget is converted to dollars at the purchasing power equivalent rate implicit in the GNP calculations.

The results of this method appear in the ACDA annual report, where it produces military expenditures for the "other WP countries" more than double the overall estimates in this report.

Personnel costs, under the ACDA pricing method, jump from ratios of 12-35 percent of military expenditures in the domestic currencies of these six countries to 42-80 percent of military expenditures in dollars. As ACDA points out, the result is to make the proportion of military expenditures to GNP twice as large when expressed in dollars as it is in domestic currencies.

The special personnel adjustment made in the official US estimate of military expenditures for the "other WP countries" affects comparisons between the WP and noncommunist countries. There is no indication on the record that this adjustment is made for any non-communist country. If it were done worldwide, it would sharply increase the US Government estimates of military expenditures in other countries, including its NATO allies. Testimony in 1978 indicates that pricing of other NATO forces at US pay scales would raise the total dollar equivalents of military expenditures for those countries by 22 percent.

* * *

To attempt alternatives to the elaborate official calculations of WP military expenditures is perhaps even more simplistic and risky than to attempt an abbreviated description of the problems. We recognize that the results shown in this publication are not the final answer. Yet somewhere between the upwardly biased official US estimate of $300 billion for the Warsaw Pact countries in 1983 and the unrealistically low fraction of that which seems to be the official WP version, there must be a reasonable estimate.

At present our approach suggests that military expenditures of the WP countries including the USSR were $230 billion in total, $70 billion lower than the US Government estimates for these countries. Rather than being roughly equal to NATO expenditures, this would make them lower than NATO's in 1983 by approximately $100 billion. A gap like that could make quite a difference in NATO's planning for a continually rising military effort against the competition—and save taxpayers a whale of a lot of money. □

**GNP in dollars is designed to show the average relative size of US and Soviet GNP when both are expressed in both currencies. Military expenditures are converted directly, based on Soviet weights and US price patterns.*

RANKING OF COUNTRIES, MILITARY AND SOCIAL INDICATORS

142 Countries, 1984

TABLE III

	MILITARY							GNP		EDUCATION								
	Public Expenditures per Capita		Public Expenditures per Soldier[1]		Public Expenditures per Sq. Km.		Economic Social Standing[2]	per Capita		Public Expenditures per Capita		School-Age Population per Teacher[3]		% School-Age Population in School[3]		% Women in Total University Enrollment		Literacy Rate[4]	
	Rank	US $	Rank	US $	Rank	US $	Rank	Rank	US $	Rank	US $	Rank	Number	Rank	%	Rank	%	Rank	%
WORLD		**163**		**28,494**		**5,788**			**2,911**		**140**		**44**		**53**		**41**		**72**
■ Developed		550		58,882		11,364			9,795		497		25		68		46		99
Developing		42		9,105		1,914			752		28		53		50		34		62
AMERICA																			
North America		**935**		**105,259**		**12,653**			**15,321**		**792**		**23**		**77**		**50**		**99**
■ United States		1,002	4	105,638	14	25,291	4	6	15,541	7	771	20	24	6	77	16	50	5	99
■ Canada	12	309	5	94,878	3	780	3	10	13,250	3	983	7	20	3	80	13	51	5	99
Latin America		**31**		**8,925**		**606**			**1,907**		**71**		**41**		**60**		**44**		**84**
Argentina	7	60	13	11,765	11	651	43	52	2,428	55	101	29	26	41	65	35	45	29	96
Barbados	7	37	50	11,000	1	27,500	29	40	3,850	37	235	32	28	11	73	3	55	5	99
Bolivia		11	21	2,393	5	61	95	108	438	97	21	56	38	48	63	88	30	72	74
Brazil	7	11	23	5,693	117	183	63	69	1,449	73	57	57	42	83	54	15	50	65	78
Chile	23	79	22	9,792		1,242	51	53	1,891	58	91	51	40	13	72	54	40	36	94
Colombia	5	23	71	9,357	9	575	63	66	1,582	77	50	80	50	66	53	32	46	48	88
Costa Rica		—		—		—	61	71	1,362	60	82	87	55	93	50	65	38	36	94
Cuba	7	136	2	8,889	14	12,252	37	57	1,911	45	121	11	21	45	64	9	54	29	96
Dominican Rep.	9	12	23	3,435	72	1,612	77	81	1,030	98	20	96	64	41	65	53	41	67	77
Ecuador		24	63	5,615	7	774	61	68	1,455	70	60	84	41	37	66	60	39	64	82
El Salvador		43	3	5,024	7	10,048	83	87	840	96	25	107	81	96	49	51	42	78	72
Guatemala	7	34	7	6,750	14	2,477	89	74	1,157	98	20	112	85	110	37	103	23	98	55
Guyana	7	31	3	4,000	12	112	68	35	647	81	48	71	44	41	65	65	38	29	96
Haiti	9	5	16	4,143		1,036	113	120	308	131	4	109	83	107	45	73	35	119	38
Honduras	7	37	12	9,412	5	1,429	92	94	689	94	28	101	76	93	50	54	40	31	60
Jamaica	7	17	19	10,250	11	3,727	56	72	1,293	59	83	75	45	37	66	42	44	35	94
Mexico	42	20	55	13,167	7	801	55	47	3,027	61	79	87	42	26	69	77	34	46	90
Nicaragua	3	130	11	6,484	3	3,092	71	79	1,044	67	63	97	65	86	53	21	49	48	88
Panama	1	41	3	8,800	7	1,143	47	36	1,965	51	104	53	37	48	63	5	56	48	88
Paraguay	11	12	10	2,706	113	113	76	60	1,038	106	17	64	41	93	50	16	43	48	88
Peru	16	73	14	10,375	7	1,098	68	78	1,066	92	31	71	44	17	71	73	35	57	85
Trinidad & Tobago	3	64	17	37,500	12	15,000	34	31	6,532	23	392	41	32	33	68	28	47	39	96
Uruguay	23	75	13	7,367	77	1,256	38	49	2,636	66	64	30	27	26	69	4	57	26	97
Venezuela	75	60	11	23,045	7	1,112	49	43	3,756	38	233	56	38	62	60	54	40	52	87
EUROPE																			
NATO Europe		**280**		**28,707**		**30,679**			**7,477**		**375**		**27**		**63**		**43**		**94**
■ Belgium	44	274	13	25,224	1	87,065	21	22	8,758	17	514	25	25	75	58	51	40	5	99
■ Denmark	5	275	17	45,355	11	32,698	5	13	11,449	9	750	3	17	21	70	46	43	5	99
■ France	1	421	11	40,466	1	42,241	8	17	10,152	14	537	20	24	37	66	13	51	5	99
■ Germany, West	3	359	18	45,084	7	88,532	10	15	10,985	18	506	20	24	62	60	65	38	5	99
Greece	3	308	6	15,477	25	23,098	33	39	4,273	54	102	34	29	13	72	16	43	42	92
■ Iceland		—		—		—	1	8	14,033	20	498	16	23	17	71	13	51	1	100
■ Italy	3	187	15	20,969	5	35,389	26	23	6,901	24	390	11	21	68	59	35	45	26	97
■ Luxembourg	14	117	7	43,000	2	14,333	10	9	13,784	6	779	5	19	26	69	77	34	1	100
■ Netherlands	17	304	12	42,573		118,514	17	20	9,392	12	652	34	29	68	59	70	36	5	99
■ Norway	1	420	10	44,538	4	5,361	2	7	14,344	4	971	3	17	33	68	35	45	1	100
Portugal	15	81	75	8,200		8,913	40	53	2,340	49	113	20	24	33	68	21	49	40	84
■ Spain	14	117	41	13,612	2	8,895	26	37	4,808	46	120	50	36	17	71	28	47	36	94
Turkey	13	64	120	3,917	42	4,087	81	70	1,420	85	37	90	56	92	51	86	31	83	69
■ United Kingdom	2	470	8	78,943	7	108,265	12	22	8,616	21	447	16	23	9	75	54	40	5	99
ALL NATO (incl. U.S. & Canada)		**551**		**58,628**		**15,342**			**10,719**		**547,**		**25**		**69**		**47**		**96**
Warsaw Pact		**631**		**48,945**		**10,449**			**6,580**		**302**		**26**		**61**		**50**		**99**
■ Bulgaria	31	199	57	12,109	78	16,036	29	36	5,018	33	314	30	27	45	64	11	52	33	95
■ Czechoslovakia	2	252	29	18,841	21	30,469	31	32	6,267	31	327	44	34	57	61	46	43	5	99
■ Germany, East	13	392	26	37,965	10	60,463	20	25	7,995	25	362	7	20	68	59	28	47	5	99
■ Hungary	32	130.	84	13,238	30	14,946	26	33	5,915	34	293	20	24	53	62	21	49	5	99
■ Poland	3	118	33.	13,437	23	13,866	35	38	4,634	39	179	44	34	68	59	16	50	5	99
■ Romania	39	48	39	5,737	31	4,580	45	44	3,571	64	72	53	37	83	54	42	44	26	97
■ U.S.S.R.	11	816	10	58,545	38	10,062	23	25	7,095	29	332	25	25	53	62	16	50	5	99

Estimating Military Expenditures of the USSR and Its Warsaw Pact Allies

In the absence of adequate reporting by the Soviet Union of its annual military expenditures, independent calculations must be made by western authorities. A review of the estimates made by official US sources indicates that they tend to exaggerate Soviet military expenditures. The result is a stimulus to the arms race.

If the Soviet Union has an interest in curbing the momentum of the arms competition, it could take a relatively simple step: make public its military budget in the detail proposed by the United Nations for all countries. At a small sacrifice of secrecy, it could thereby provide the kind of reassurance on which mutual trust between nations and arms restraint depend.

The usual statistical note on Soviet military expenditures was expanded in *WMSE 1980* and subsequent editions to give an overview of some western estimates and a more detailed evaluation of the official US estimates. The summary is repeated in this edition, with revisions based on CIA testimony and other sources made available more recently. Given the limitations of space and time, this is necessarily a cursory examination of a very complex subject. Hopefully it will provide some encouragement to others to explore further.*

Soviet military expenditures warrant special attention for several reasons:

1. As a summary of the Soviet military effort and trend, they affect US and all NATO planning, the willingness of public officials to spend more to meet the competition, and of taxpayers to bear the burden.

2. Unlike other major industrial powers, the Soviet Union fails to provide detail on its military budget, or even to describe what expenditures are covered. It announces a single undefined figure each year, which seldom changes. Between 1970 and 1984 the announced budget dropped about 4 percent to 17.1 billion rubles, but in 1985 it rose to 19.1 billion rubles and in December 1986 it rose again, this time to 20.6 billion rubles for 1987.

3. The Soviet announced budget is clearly incomplete in view of the advanced military technology and the size of the military force the USSR has produced.

4. The ruble is almost exclusively a domestic currency and official rates of exchange reflect neither the relation between internal prices and foreign prices, nor balance of payments forces.

5. Between the official Soviet military budget, converted to dollars at the official rate ($22 billion), and the official US view (ACDA) of Soviet military expenditures in 1984, there was a gap of $238 billion.

6. Between the official US estimate of Soviet military expenditure, and the estimate in this study, the gap was $35 billion in 1984, although we continue to use the CIA ruble estimate as the basis for the calculation.

In the discussion following, the principal focus is on the calculations by US intelligence agencies which establish the official US view of Soviet military expenditures. Since this publication also has dollar estimates for other Warsaw Pact countries lower than the US official estimates, the basis for the alternatives will be described as well.

Soviet expenditures in rubles

Basis of estimates

In the absence of adequate reporting by the Soviet Union, western analysts have generally resorted to one of two basic approaches to an estimate of Soviet military expenditures in rubles.

Add-on or residual—One approach bases estimates on official Soviet statistics, either adding presumably missing elements to the announced defense budget or using a residual method which calculates presumed hidden defense expenditures from unspecified budget categories and adds them to the explicit defense budget.

Building-block—The other approach is independent of the Soviet announced budgets except in the valuation of research expenditures. This method breaks down military expenditures into physical quantities (manpower, equipment, construction), operating and maintenance costs, and research and development. Each major component is composed of many individual elements which are separately assigned monetary values. Considering the thousands of elements which must be identified and also valued, it is evident that this is an extraordinarily complex procedure, feasible only through a vast expenditure of effort on surveillance, data collection, and analysis. So far, only US intelligence agencies have the arsenal of electronic and other resources required for calculations of this detail and scope. Given the huge amount of detailed information required, this approach also involves subjective judgments and guess-estimates.

The building-block approach is used by CIA to produce annual estimates of Soviet military expenditures in both ruble values and dollars. (CIA has recently announced that to avoid the politicizing of the figures it will no longer publish a dollar figure, but will continue the ruble estimate.) It is the CIA ruble estimate which this study uses for its calculation of Soviet military expenditures. Working from the ruble estimate makes it possible to follow the same procedure for conversion to dollars which is used for other countries in this worldwide report and for GNP and other budget expenditures. It also avoids some but far from all of the exaggerating effects of the CIA calculation in dollars; these will be discussed below.

In using the CIA ruble estimate for this purpose, however, we do so with reservations. This is not to question either the competence of the analysts, who are highly respected professionals, nor the careful assembly of a massive amount of information. The gaps in knowledge and the need for subjective judgment are still formidable. According to the *NATO Review* (August 1986), ruble prices and unit costs are available for about half the estimate.

The numerous uncertainties which invite "worst-case" interpretation and the methodology of the calculations together tend to produce an upward bias in the ruble as well as in the dollar estimate. Even though we cannot remove this bias, or determine precisely how much it may exaggerate the total, identifying some of the factors which appear to produce it may help to indicate the scope of the problem.

Components of CIA estimate

In new estimates announced in 1986, CIA has advanced the price base for its calculations of Soviet military spending from 1970 to 1982. One effect of the change is to produce a higher level of expenditures. In 1982 rubles, the CIA estimate for 1982 is 6-7 times the obviously incomplete budget of 17.1 billion rubles announced by the USSR. Soviet GNP is estimated at 720 billion rubles in 1982, and Soviet defense spending at 15 to 17 percent of it.

Under the new assessments, the shares of major resource categories are also said to have changed. Previously, the composition of the estimate was approximately as follows (ref. 8):

—roughly one-fifth for research, development, test and evaluation (RDT&E);
—one-half for investment (procurement of equipment and construction);
—almost one-third for operating costs (60 percent of that for personnel).

According to NATO, the share of the total devoted to Soviet procurement has increased, while that devoted to personnel has decreased.

* * *

What does the record say about some of the measurement problems associated with each of these components?

Research—This category of expenditures is identified by the analysts as the most imprecise element in the estimates. Research outlays cannot be estimated from observable physical quantities. Instead they appear to be derived in large part from Soviet aggregate statistical data—and converted from rubles into dollars with a ratio (ref. 9).

While no direct reference to the specific sources for the calculations appears to have been made recently, analysts in 1974 testimony referred to the state budget for science and indicated that space and military R & D took up most of the allocation for science.

CIA stated in 1981 that "we are confident that the Soviet military RDT&E effort is large and that the resources devoted to it are growing" (ref. 10). The estimated increase in this component in the 1970's was the predominant factor (along with procurement and maintenance of hardware) pushing the overall expenditure total higher (ref. 6). It has been described as the fastest growing of the major components (ref. 8).

An independent study prepared for the National Science Foundation by a specialist in the field reveals some of the practical difficulties in identifying military R&D in Soviet budgets for science (ref. 1). The report provides a careful analysis of definitional and other problems which cannot be adequately summarized here, but two of the general points made seem particularly relevant: a) Soviet reported science budgets appear to be significantly inflated compared with US concepts and b) whether, or how much, Soviet military R&D is included in the science budget is still an unresolved issue.

From this, one could conclude that Soviet budgeting for science is still a largely mysterious area. The Soviet budget itself is unlikely to provide the only basis for the CIA estimate of Soviet expenditures of military R&D, but as a foundation for confident estimates of level or trend it clearly has serious weaknesses.

A further complicating factor is the substantial lag in Soviet development of such basic research tools as advanced computers and in the general unavailability even of photocopying machines and simple computers. Technological lags which handicap Soviet research add to the difficulty of judging the relative efficiency of Soviet military R&D compared with US programs.

Investment—The component covering procurement and construction is the part of the estimate in which analysts state they have the greatest confidence. Presumably this is because the numbers of major equipment can, in large part, be observed, and at least some of the ruble prices (e.g. civilian products bought by the military) can be determined from Soviet price lists. Others may be obtained clandestinely. In theory at least there is good, "hard" information in this area. Keeping it accurate and up to date is quite another problem, as evidenced by two major revisions announced by CIA. In 1976 the Agency announced that Soviet military expenditures in rubles were estimated to be *twice* as high as previously thought because the Soviet defense industry was operating less efficiently than had been calculated—i.e. ruble costs were higher. And in 1983 the Agency announced that it had been overestimating the rate of growth of Soviet military expenditures since 1976. The main reason given was that it had made errors in counting the number of new weapons that had been produced and deployed.

Even assuming comparatively solid information in some areas, there are others which must depend heavily on judgment or guesswork, for example: the quality of equipment which is not obtainable or visible by satellite or other observation; the range of efficiency and cost within Soviet industry; and the amount of overhaul of old equipment, a practice which some analysts consider fairly common in the Soviet Union and which may give an impression of new production.

In addition, a significant source of measurement error arises in valuing equipment for which no ruble prices are available. The estimating process then becomes very shaky indeed. For many of the procurement items, CIA must use US analogs. Values in US prices are established, then converted to rubles via a small sample of dollar-ruble ratios (about 1 ruble price for every 10 dollar prices). Assessing quality as compared with like US equipment must become a major headache in that case, made more difficult by the fact that Soviet technology as a rule lags behind the US, and the product itself tends to be simpler.

For example, CIA testimony mentions microminiaturization in computers as one area in which the Soviets are far behind US technology. The question is how accurately analysts can determine the lesser dollar value of a weapon which does not have built into it the accuracy and capability of remote control equivalent to its US counterpart.

Although CIA analysts report that they do make the effort to adjust the cost basis of Soviet equipment for physical and performance qualities, they have stated that where their knowledge is incomplete their estimates tend to overstate the costs of producing the Soviet design.

Operating costs—Manpower, although rated at a lower level of reliability than procurement, is considered by CIA to be the most reliable element in the estimates of Soviet operating costs. It is also a relatively small part of the overall estimate of ruble outlays. While Soviet forces are very large, this is a draft army and ruble pay scales are

**For all references, see page 42. Unless specific references are noted, the summary of CIA methodology is drawn from the public record in the annual hearings of the Joint Economic Committee of the US Congress (ref. 5).*

low. The pay for a private is said to be the ruble equivalent of about $6 per month not including upkeep. (While very low compared with US pay, the rate is on a par with pay for conscripts in NATO countries such as Portugal and Greece.)

Estimates of manpower costs presumably depend on the determination of numbers in the total force, the table of organization, and the pay scales used. The record is not clear on all these points. For 1984 the ACDA estimate of Soviet forces is 4.5 million, which includes all special forces judged to have national security missions, e.g. KGB border guards. (In this publication, border guards and internal security forces of countries are not included in regular forces but are included in paramilitary.)

Also affecting the reliability of cost estimates is the difference between the actual number of men in Soviet divisions as compared with the number called for in the table of organization. CIA does state that it takes account of the evidence that a good many Soviet divisions are not at full strength, but certainty in this case may be difficult to establish, and the tendency would be to assume full complement where it is unknown.

In addition to the numbers involved, there are unknowns relating to the operational use of Soviet forces, for which adjustments may be especially difficult. The Soviet draft provides a work force at the command of the state. For example, recruits are used for agricultural work during the harvest period. The CIA analysts report that they cannot separate out the portion of time the forces are used in essentially civilian work. In other words, Soviet active-duty forces are valued as though fully employed in military functions throughout the year; no allowance is made for the Soviet custom of using forces in the harvest. On the other hand, uniformed forces *primarily* performing non-combatant services (construction, railroad, civil defense, and internal security forces) are said to be excluded from the CIA count of forces.

Whether adequate cost adjustment can be made for relatively low operational use of equipment and lower levels of readiness than in the US is also a question. Officials have at various times referred to these factors, stating that only one-sixth of Soviet navy ships are deployed at sea (US one-third); Soviet strategic subs operate 15–20 percent of the time (US 55 percent); pilots with the Soviet air force in Europe fly roughly one-third as much as American pilots; only part (estimated 80 percent) of the Soviet ICBM force is kept at peak readiness.

While CIA reports that they do make allowances for these differences in operating practices, the problems illustrate the inadequacy of number comparisons and the complexity of the estimating process even in an area where there is a fair degree of direct knowledge.

Soviet expenditures in dollars

Basis of estimates

The dollar equivalent of the Soviet military effort is now usually determined through one of two basic approaches.

Converting aggregates—Military expenditures in rubles are converted to dollars using the total, or broad categories, of expenditures, with appropriate exchange rates. This is the approach used in this study.

Pricing elements—The alternative method, which is used by CIA, constructs the dollar value of Soviet military expenditures through a building-block approach which parallels that described above for the ruble calculation. In this case every element of the Soviet military force is valued at the price that it would have if purchased in the US. The objective is not to establish the basis for international comparison but to produce a summary indicator of the value of the Soviet military effort in US terms.

Implications of CIA methodology*

At first glance the product of the CIA approach seems to meet the requirement for a simple binary match-up: the total of the Soviet military effort, expressed in US costs, appears to have been made comparable with total US military expenditures. In fact, as we have tried to show, the method of calculation is not only based on an extremely fragile structure of evidence but also has built into it an upward bias because of the worst-case assumptions applied to unknowns in the estimating process.

In the CIA dollar calculation, the problems noted above for the ruble estimate are amplified because *all* components are priced in dollars as though purchased in the US.

**Although CIA no longer reports its dollar estimates, the series for the USSR which ACDA publishes is based on these calculations.*

National economies tend to use relatively more of that factor of production in which they have a cost advantage. If, for example, labor is cheap relative to capital, more labor is used. If that labor is valued at prices in effect in an economy where labor costs are high, however, it becomes an extremely expensive item. This is the basis of the distortion which occurs when all elements of the Soviet military effort are given dollar price tags. To offset this distortion, the usual procedure would be to calculate expenditures in the prices of both nations and to take a geometric mean of the dollar and ruble estimates. This is done in the CIA calculations of GNP but not in the dollar estimates of military expenditures. For a review of the "index number effect," see ref. 4.

In this limited space it is not possible to summarize the problems and results in detail, or the alternative method of valuing expenditures in dollars. Examples of the distortions implicit in the dollar valuations are given below.

In arriving at the dollar valuation of Soviet manpower, CIA breaks down the Soviet force into ranks and skill components, applying a dollar-cost factor to each skill level. The average pay for the Soviet force in the dollar calculations came to about $15,000, according to a DIA statement in 1983. The very large Soviet army, bought at low cost in rubles, accounts for about $50 billion when priced at US pay scales and, under this method of calculation, rises every time US forces receive pay raises. Statements about the 1977 estimates indicated that personnel costs then were 14 percent of total spending in rubles, and 36 percent when calculated in dollars.

The CIA method allows for a difference in composition of US and USSR forces, but it is not at all clear that it adequately covers differences in quality, i.e. the technical qualifications of the force and the equipment available to them. Approximately three-fourths of Soviet manpower are short-term conscripts. Many draftees are unaquainted with the operation of even simple motorized equipment. In contrast, the US has a volunteer, career force, subject to intensive training during their years of service. Lower readiness standards in the USSR also reduce training effectiveness, e.g., the Soviet air force has relatively less flying time, the army less top-of-the-line equipment for training.

The quality differential is also significant in the dollar pricing of Soviet equipment. In the CIA ruble calculation, some ruble values can be established directly. Dollar valuations, however, are based on US industry's estimates of production costs of samples of Soviet equipment, or on US analogs, which overall are more sophisticated than the Soviet inventory. The adjustments made for quality are subjective judgments and, as recognized by CIA, will have a tendency to overstate Soviet costs.

The agencies preparing the estimates are, of course, aware of the methodological bias inherent in the dollar calculations. In their testimony in 1979, for example, they noted that their "dollar comparisons of US and Soviet defense activities do have a potential bias favoring [i.e., exaggerating] the Soviets, resulting from the index number problem." Despite it, they express a relatively high degree of confidence in the results. For the overall estimate, they have usually described the possible margin of error as plus or minus 15 percent. In 1982 testimony they said "our estimates are unlikely to be in error by more than 10 percent for each year" (ref. 5).

Professor Holzman's review of the method suggests that because of possible tendencies to worst-case analysis in exercises like this, the range of error in the US-USSR dollar comparisons is likely to be relatively smaller on the low side and much larger on the high side.

WMSE calculations

Soviet Union

The dollar valuations of Soviet military expenditures used in this publication continue to be based on the CIA ruble estimate of defense and the implied conversion factor for GNP. Since CIA methodology on the 1982 price base is not yet spelled out in any detail, a provisional method of reflecting these numbers has been adopted for this edition. Briefly stated, the calculations are as follows:

a) The previously published intelligence estimate of 50 billion rubles for 1970 (ref. 9) is roughly adjusted to exclude civilian space, railroad and construction troops, and internal security forces.

b) This estimate is advanced to 1982 using the average annual growth rate stated in the 1986 report by CIA/DIA. (ref. 11).

c) and converted to 1982 dollars using the CIA implied conversion ratio for GNP in 1982 (ref. 12).

Since the CIA ruble estimate of defense expenditures is composed in part of dollar valuations converted to rubles, the method used in WMSE obviously does not wholly remove the index number effect, although it may diminish it. The ruble-based estimate therefore continues to have an upward bias.

In comparison with Soviet GNP, the WMSE dollar estimate suggests a defense burden of 11-12 percent. This is appreciably lower than the 15-17 percent of GNP in the CIA/DIA report, and below the 12.6 percent of GNP in the latest available ACDA report. The ACDA ratio, however, represents two values which are calculated by different methods and cannot be compared directly.* While ACDA calls attention to the difference in the methods deriving military expenditures and GNP, it does not provide a basis for comparing the two.

Other Warsaw Pact

WMSE approach—The estimates of military expenditures in the centrally planned economies of Eastern Europe that are members of the Warsaw Pact (WP) are based on estimates in national currencies by Dr. Thad Alton and associates (ref. 7). In the Alton estimates, some adjustments are made in the official national figures to conform more closely to US definitions of defense. In converting the Alton estimates from national currencies to dollar equivalents, the WMSE method again uses the rates implicit in the calculations of GNP.

Official US approach—The method used in the official US report of military expenditures in the "other WP countries" differs from the above in an important respect: the conversion to dollars calculates military forces separately at equivalent US pay scales. The procedure may be summarized briefly as follows: a) the personnel component of military expenditures is separately estimated in national currencies; b) armed forces (regular and paramilitary) in those countries are then priced in dollars at US pay rates; c) the remainder of the budget is converted to dollars at the purchasing power equivalent rate implicit in the GNP calculations.

The results of this method appear in the ACDA annual report, where it produces military expenditures for the "other WP countries" more than double the overall estimates in this report.

Personnel costs, under the ACDA pricing method, jump from ratios of 12-35 percent of military expenditures in the domestic currencies of these six countries to 42-80 percent of military expenditures in dollars. As ACDA points out, the result is to make the proportion of military expenditures to GNP twice as large when expressed in dollars as it is in domestic currencies.

The special personnel adjustment made in the official US estimate of military expenditures for the "other WP countries" affects comparisons between the WP and non-communist countries. There is no indication on the record that this adjustment is made for any non-communist country. If it were done worldwide, it would sharply increase the US Government estimates of military expenditures in other countries, including its NATO allies. Testimony in 1978 indicates that pricing of other NATO forces at US pay scales would raise the total dollar equivalents of military expenditures for those countries by 22 percent.

* * *

To attempt alternatives to the elaborate official calculations of WP military expenditures is perhaps even more simplistic and risky than to attempt an abbreviated description of the problems. We recognize that the results shown in this publication are not the final answer. Yet somewhere between the upwardly biased official US estimate of $305 billion for the Warsaw Pact countries in 1984 and the unrealistically low fraction of that which seems to be the official WP version, there must be a reasonable estimate.

At present our approach suggests that military expenditures of the WP countries including the USSR were $244 billion in total, $61 billion lower than the US Government estimates for these countries. Rather than being roughly equal to NATO expenditures, this would make them lower than NATO's in 1984 by almost $100 billion. A gap like that could make quite a difference in NATO's planning for a continually rising military effort against the competition—and save taxpayers a whale of a lot of money. □

**GNP in dollars is designed to show the average relative size of US and Soviet GNP when both are expressed in both currencies. Military expenditures are converted directly, based on Soviet weights and US price patterns.*

RANKING OF COUNTRIES, MILITARY AND SOCIAL INDICATORS

142 Countries, 1986

TABLE III

	MILITARY					GNP		EDUCATION								WATER AND SANITATION			
	Public Expenditures		Armed Forces		Economic Social Standing[1]	per Capita		Public Expenditures per Capita		% School-Age Population per Teacher[2]		School-Age Population in School[2]		Female Literacy Rate[3]		Population with Safe Water[4]		Population with Sanitation[5]	
	million US $	% of GNP	Rank	1,000	Rank	Rank	US $	Rank	US $	Rank	Number	Rank	%	Rank	%	Rank	%	Rank	%
WORLD	**858,635**	**5.6**		**25,730**			**3,150**		**159**		**43**		**54**		**65**		**66**		**42**
■ Developed	716,098	5.6		10,115			11,195		581		24		69		98		97		77
Developing	142,538	5.3		15,615			719		27		51		51		51		54		28
AMERICA																			
North America	**289,111**	**6.3**		**2,227**			**17,156**		**940**		**22**		**78**		**99**		**100**		**94**
■ US	281,001	6.7		2,144	4		17,478		928		23		78		99		100		98
■ Canada	8,110	2.2		83	1		14,124		1,051		13		80		99		97		60
Latin America	**11,271**	**1.5**		**1,335**			**1,872**		**62**		**40**		**61**		**81**		**71**		**45**
Argentina	1,094	1.5		73	44		2,373		43		25		67		95		64		69
Barbados	8	0.6		—	29		5,124		290		23		86		98		99		100
Bolivia	86	2.4		28	94		541		13		39		61		65		49		21
Brazil	2,330	0.9		283	66		1,809		62		40		55		76		77		24
Chile	583	3.6		101	53		1,309		68		41		72		92		94		84
Colombia	367	1.0		66	71		1,290		36		49		55		87		70		68
Costa Rica	24	0.6		—	55		1,458		69		54		51		93		91		95
Cuba	1,480	7.4		162	40		1,999		124		21		64		93		82		31
Dominican Rep.	74	1.4		21	80		816		13		63		67		77		62		27
Ecuador	174	1.6		42	67		1,097		40		42		65		80		47		65
El Salvador	148	3.7		43	90		821		19		76		50		69		40		62
Guatemala	132	1.3		32	85		1,292		23		70		41		47		52		23
Guyana	50	12.2		6	83		422		34		55		51		95		73		90
Haiti	33	1.5		7	112		369		4		78		47		35		35		21
Honduras	202	5.9		19	86		752		38		73		51		58		69		29
Jamaica	34	1.5		2	55		993		56		43		68		95		86		90
Mexico	1,348	0.6		140	50		2,678		74		39		69		88		75		57
Nicaragua	457	16.0		72	76		845		52		66		51		88		56		27
Panama	95	2.0		12	46		2,150		119		38		62		88		82		80
Paraguay	34	1.0		16	80		921		13		38		53		85		26		85
Peru	1,503	6.5		127	73		1,153		18		41		72		78		55		47
Trinidad & Tobago	64	1.0		2	35		5,095		296		32		69		95		99		98
Uruguay	141	2.5		32	46		1,900		57		28		70		94		80		59
Venezuela	811	1.6		49	49		2,922		194		37		60		86		83		45
EUROPE																			
NATO Europe	**106,258**	**3.4**		**3,270**			**8,295**		**405**		**26**		**64**		**93**		**96**		**80**
■ Belgium	2,811	3.1		91	18		9,298		517		25		57		99		95		99
■ Denmark	1,375	2.1		30	5		12,907		962		14		69		99		100		100
■ France	23,976	3.9		558	10		10,986		648		21		70		99		99		85
■ Germany, West	22,681	3.1		486	13		12,049		542		23		60		99		100		88
Greece	2,604	5.7		209	31		4,617		115		29		73		88		95		•••
■ Iceland	—	—		—	2		16,444		592		23		73		100		100		100
■ Italy	12,060	2.3		385	22		9,330		373		21		58		96		99		99
■ Luxembourg	44	0.8		1	7		15,740		818		19		69		100		100		100
■ Netherlands	4,373	3.1		101	14		9,861		651		29		61		99		100		100
■ Norway	1,989	3.2		37	2		15,109		1,031		18		68		100		99		85
Portugal	895	3.3		68	38		2,628		114		23		68		80		92		41
■ Spain	4,577	2.3		326	25		5,248		167		32		71		92		95		90
Turkey	3,546	4.9		654	78		1,409		29		55		53		62		78		10
■ United Kingdom	25,327	5.0		324	15		9,009		474		22		76		99		100		100
ALL NATO (incl. U.S. & Canada)	395,369	5.1		5,497			11,981		627		24		69		96		97		86
Warsaw Pact	**293,328**	**9.8**		**4,885**			**7,663**		**377**		**25**		**63**		**98**		**94**		**52**
■ Bulgaria	1,610	3.6		148	33		4,955		219		27		64		93		96		•••
■ Czechoslovakia	4,228	4.1		201	29		6,688		241		34		61		99		74		60
■ Germany, East	7,196	4.9		179	16		8,808		335		19		62		99		90		70
■ Hungary	1,551	2.4		105	28		6,212		234		24		62		98		84		60
■ Poland	6,264	3.3		402	37		5,034		228		33		60		98		67		50
■ Romania	1,424	1.6		190	46		4,024		73		38		53		95		77		50
■ U.S.S.R.	271,055	11.5		3,660	25		8,442		442		24		64		98		100		50

Estimating Military Expenditures of the USSR

This section of the report has repeatedly called for Soviet disclosure of the military budget in the detail proposed by the United Nations. This is important for at least two reasons: budget comparisons can be used to fuel an arms race; when they are available only from an opponent, they may exaggerate the facts.

The new policy of glasnost (openness) has begun to unveil the budget. What was assumed to be a closely guarded secret, known only to a very privileged few, may turn out to be a well of ignorance and weak accounting. However, the information is beginning to flow. Whether or how soon it will answer the questions is still unclear.

Since the last edition of **World Military and Social Expenditures,** the policy of glasnost has opened the window a crack on the shrouded and mysterious Soviet military budget. Rather than the usual report in these pages on the procedures followed by western observers in estimating Soviet military expenditures, these notes will review recent disclosures and their effects, if any, on our knowledge of the actual level of military expenditures of the USSR.

☐ The Soviet leadership has on at least two recent occasions referred to plans for specific unilateral reductions in their military expenditures. In January of this year President Gorbachev pledged a unilateral cut of 14.2 percent by 1990–91 and in June there was a further announcement that by the mid-1990's military expenditures would be reduced by one-third.

☐ These announcements followed several other statements that were more in the nature of revelations. At the Party Conference in July 1988, Foreign Minister Shevardnadze had spoken openly of the shortage of statistical information to guide national economic policy, inferring also that the leadership was having some trouble extracting full information from the bureaucracy.

☐ At a meeting in Washington, Gorbachev told President Reagan—as former US Ambassador Arthur Hartman reports—that they really did not know how much they were spending on defense. Since they do not have a national accounts system, Hartman comments, he believes that this is true, and that they are only beginning to understand what an enormous drain on their resources their military burden has been.

☐ The overall Soviet budget deficit, disclosed for the first time, was said in October 1988 to be running at 7 to 8 percent of GNP. This year the Soviet legislative body, the Supreme Soviet, was told that it was soaring toward 14 percent of GNP. (By comparison, the worrisome US deficit is about 3 percent of GNP.)

☐ In May 1989 Gorbachev announced that Soviet military spending this year would be 77.3 billion rubles, or roughly 9 percent of the GNP. Subsequently his economic advisors said that the estimate includes expenses for manpower, weapons procurement, and research, except for some scientific research with possible military applications. Prior to these statements the official Soviet defense budget had been put at 20 billion rubles for the latest years. In 1988 the Soviet Chief of Staff acknowledged that this amount covered only expenses for manpower, supplies, construction and maintenance. In other words, two big cost categories, weapons procurement and research, were not included.

Despite these surprising openings in the information curtain, the detail remains scanty. The ruble figures may be fleshed out further, especially when the newly-established Defense and State Security Committee of the Supreme Soviet, the legislative body, begins to probe. Presumably the Committee has been given carte blanche to get the facts and to approve or disapprove the military budget, although as of summer 1989 it was still without a professional staff or office space. Nevertheless there are encouraging signs of its independence and resolve, and some of its members have exchanged visits and views with the members of the savvy Armed Services Committee of the US House of Representatives.

Meanwhile the revised budget announced by Gorbachev in the spring, although almost four times the size of budgets previously declared, stands well below the estimates that US intelligence has been reporting. CIA/DIA calculate the Soviet defense burden at 15 to 17 percent of GNP, rather than the 9 percent stated in the Soviet announcement. In ruble terms, the CIA/DIA estimate may well be more than 60 percent higher than the recently-disclosed official budget.

Even a complete military budget in ruble terms would be only half of the story. The other part of the problem is how to convert it to dollars to get a sense of how it compares with US military expenditures and what it shows over time in terms of the major reductions that Gorbachev has promised to make in the military budget. The conversion problem is a headache for all international comparisons in value terms, and especially so for economies like the USSR which has a complex system of subsidies and government-administered prices, not only for the military-industrial complex, but throughout the economy, including at the retail level.

Conversion on the basis of the market exchange rate in this case would be hopeless. Officially the value of the ruble is pegged at about $1.59 (or 0.63 rubles to the dollar). At another extreme is the illegal black market rate; there the ruble is said to trade in the range of $0.06 (or about 16 rubles to the dollar).

Conversions used by US intelligence generally use neither of the above and can produce quite different results, depending on the choice made. In converting Soviet foreign trade to dollars, CIA does use the official Soviet exchange rate for the ruble. In expressing Soviet GNP in dollars, however, the agency uses the geometric mean of the ruble and dollar comparisons. And in calculating Soviet military expenditures, it uses a third method: it values Soviet military equipment, forces, etc. in terms of the dollar costs of similar items if bought in the US. Because of the "index number effect," the third method has the effect of overstating Soviet military expenditures in international comparisons.* ACDA, which presents GNP and military expenditures as calculated by CIA, acknowledges the inconsistency but no longer provides alternative estimates which would permit reasonable comparisons between them.

These problems justifiably raise the question whether the Soviet economy can effectively operate in the real world without a freely-traded ruble. The record does show that Soviet economists have discussed this problem among themselves and also with western economists. A conference of US and Soviet officials and business people is scheduled for October 1989 to review convertibility proposals. Meanwhile Agence France-Presse reports that earlier this spring Abel Aganbegyan, Gorbachev's economic advisor, said that Moscow planned to offer a $25,000 prize to the person who devises the best way to convert the ruble into dollars. ☐

***Index number effect**

National economies tend to use relatively more of that factor of production in which they have a cost advantage. If, for example, labor is cheap relative to capital, more labor is used. If that labor is valued at prices in effect in an economy where labor costs are high, however, it becomes an extremely expensive item. This is the basis of the distortion which occurs when all elements of the Soviet military effort are given dollar price tags. To offset this distortion, the usual procedure would be to calculate expenditures in the prices of both nations and to take a geometric mean of the dollar and ruble estimates. This is done in the CIA calculations of GNP but not in the estimates of military expenditures. A geometric mean would require full detail on ruble prices. For the "index number effect," see ref. 4. opposite.