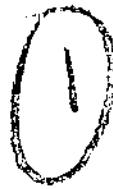


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DIRECTORATE,
FORCE DEVELOPMENT & ANALYSIS
DCS PLANS
TACTICAL AIR COMMAND

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June 1974

SUMMARY OF USAF AIRCRAFT
LOSERS IN SEA (U)

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DIRECTORATE OF FORCE DEVELOPMENT AND ANALYSIS
DCS/PLANS

REPORT 74-9

SUMMARY OF USAF AIRCRAFT LOSSES IN SEA (U)

JOHN M. GRANVILLE

June 1974

United States Air Force
HEADQUARTERS TACTICAL AIR COMMAND
Langley Air Force Base, VA 23665

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SECTION I

INTRODUCTION

A. GENERAL. This study is a presentation of the United States Air Force aircraft losses in the Southeast Asia conflict from January 1962 through January 1973. Its emphasis is on the tactical air forces. This report covers nearly 12 years of SEA conflict and provides in one volume necessary information on tactical aircraft combat and operational losses.

B. LIMITATIONS OF THE AVAILABLE DATA. Combat and operational losses, combat sortie loss rates, and the fate of the crews involved in the airborne losses are given in the detail permitted by the available data. Despite the multitudinous reports on the air war in SEA that were generated both there and in the COMUS, there are many gaps and conflicting information. The numerous reporting systems that survived underwent many revisions. In addition, their terminology was not standardized and this created problems in analyzing and verifying the data from different sources.

C. FORMAT. This study presents the available information in different formats to show combat losses by country and by the different weapon systems employed by the enemy to down our aircraft. In addition, comparisons are made and presented to show how the fate of the crews varied by aircraft type, country where the loss occurred, type of mission, and the enemy weapon system inflicting the combat losses. In the operational losses the fate of the crews is tabulated by aircraft type and cause.

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SECTION II

APPLICATION (U)

A. (U) GENERAL. This analysis of actual aircraft lost, the fate of downed aircrews, and the combat sortie loss rates permits a broad view of significant trends in tactical air warfare in the SEA conflict and provides a basis for realism in future predictive studies on tactical air warfare.

B. (S) COMBAT SORTIE LOSS RATES. Although sortie loss rates have been prepared and portrayed most carefully, their inherent limitations must be clearly impressed on the reader. The loss rates do provide general information for an overall view of aircraft combat losses but one must be cautioned against making comparisons between aircraft types based on this information alone. There are many factors involved in computing aircraft losses that to make a comparative survivability study of two tactical aircraft types with only limited validity would require an effort beyond the scope of this report.

C. (S) AIRCRAFT LOSSES. In this study aircraft losses have been analyzed to show the relationship between the following factors.

1. (U) Type of aircraft. Emphasis has been put on combat losses of USAF fixed wing tactical aircraft.

2. (S) Area where loss occurred. Aircraft losses in RVN comprised the largest portion of our overall combat attrition experience in SEA through March 1968. Since that time the losses in SVN and Laos took on added significance. Tactical air operations in Cambodia were not significant in the overall SEA conflict owing to the comparatively low level of USAF combat air activity there.

3. (U) Type of mission.

4. (U) Time of year.

5. (S) Enemy weapons inflicting lethal hits on aircraft. Losses caused by all types of enemy antiaircraft defenses are presented.

6. (S) Fate of the aircraft crew. The fate of the crews on USAF aircraft lost in combat and the fate of those crews involved in operational losses have received considerable attention in this study. While it was impossible to accurately account for what happened to all aircraft and crew members shot down in combat, information on the fate of the crew was available in many aircraft losses. The fate of

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the crews involved in aircraft losses has been categorized into those recovered, killed, captured, and missing. Prisoners of war who have been returned to this country have not been included in this study.

D. (S) CONSIDERATIONS. Emphasis has been placed on the operational environment affecting the tactical air operations in the SEA conflict. No attempt has been made to consider the political, sociological, or strategical aspects of this conflict which has involved United States' direct participation longer than any war in its history. This operational data could be useful in constructing war games, warfare scenarios, studies on probabilities of aircrews completing combat tours, and in studies covering other phases of combat air operations. In addition, this study should be useful in planning for contingencies and in determining the relative importance of those parameters affecting tactical aircraft losses in combat.

E. (S) OPERATIONAL LOSSES. The causes for operational losses of USAF aircraft in SEA are of interest to the military planners concerned with aircraft maintenance and repairs in the war zone. In general, the operational losses increased as the combat losses increased. The number of combat damaged aircraft that were later involved in operational losses was not available for this study. Detailed information on this relationship should be sought because it could be helpful to personnel responsible for maintenance and repair of tactical aircraft in the combat areas.

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SECTION IV

CHARACTERISTICS OF THE WAR IN SEA

A. GENERAL. The most outstanding characteristic of the conflict in SEA has been judged to be that it was basically an air war. Air power performed the dominant role in the United States' military actions in SEA. The availability of American air power with its flexibility, responsiveness, and numerical strength, strongly influenced the strategy that the United States followed in SEA. The flexibility of air power permitted the United States to exploit this tactical advantage to the greatest degree. Another important characteristic of this conflict was its duration. It was the longest war that the United States has fought. A prolonged war makes a true victory very costly, if not impossible. The quicker the "knockout punches" are delivered, the better are the chances for a "true" victory at an acceptable cost in men and material. However, the restraints imposed by high level decision makers precluded the use of sound combat tactics and sufficient aircraft to assure complete destruction of the most desirable targets.

B. EVOLUTION OF AIR POWER. It was the speed, range, and vastly increased destructive power that the fixed wing aircraft brought to the air war in SEA which most significantly altered the character of warfare in that area. The air war, if not always dominant, was certainly a major factor of the war in SEA. This continuing evolution of air power may significantly affect the conduct of future wars.

C. NATURE OF THE FIGHTING. Any appraisal of US involvement in SEA should consider the special nature of the fighting there. Both sides in the conflict regarded the basic character of the military struggle to be insurgency warfare. The communists waged a ruthless guerrilla type war on the ground in SEA. However, both modern and guerrilla forces, tactics and strategies have been employed by the participants. The nature of the conflict confronted the US with peculiar and unaccustomed problems. In past wars it was often impossible to separate the effects of air warfare from those of the rest of the fighting. In SEA the air war was certainly the major element in that conflict. The basic impact of the air war was quite distinct and its dominant role was proven many times. The air war in SEA was comparatively cheap in terms of American lives. The use of fire power as a substitute for manpower was an outstanding characteristic of US military tactics in the Vietnam war. More than half of the tonnage of aerial munitions dropped on SVN was delivered by B-52 aircraft. However, the purpose of this bombing was not to achieve direct military effectiveness but for its psychological and strategic impact. The purpose of these attacks was to harass the enemy, disrupt his normal activities, and

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to grant him no respite from attack even in his jungle nests, and to wear him down psychologically. It was impossible to factually evaluate the success of this program.

D. INTENSITY OF THE EFFORT. Although North Vietnam was the real enemy in SEA, the naval and ground attacks against that country were on a relatively minor scale. The only real impact of the war on NVN was due to US air action. During the intense phase of the air war against NVN before the bombing halt in 1968, only 100,000 to 200,000 tons of munitions per year were dropped on that country. For some time the number of air strikes was greatest in SVN which was the focus of the ground conflict and where there were large numbers of US troops. During 1968-69, the years of the most intense ground fighting, the US dropped almost 1,000,000 tons of munitions per year on SVN. This is five times the maximum annual tonnage dropped on NVN during the intense periods of air attacks there.

E. DIRECT EFFECTS OF AIR POWER. The accomplishments of air power in SEA must be considered in terms of our national objectives. These were straightforward and limited: to stop aggression against the Republic of Vietnam and to permit self-determination for the people of SVN. Our objectives did not include either the destruction of NVN or dictating its form of government. The most obvious and direct effect of air power in SEA has been the success of repelling enemy troops through our close air support operations and in other strikes against enemy targets in SVN. The high level of tactical air activity made it possible to concentrate force against an enemy in terrain where previously the advantage had almost always been with the guerrilla. Another important accomplishment of tactical air power was its success in making it very costly for NVN to support its combat operations in the south with men and materiel.

F. INNOVATIONS AND DEVELOPMENTS. The counterinsurgency and unconventional warfare environment of SEA resulted in the employment of USAF air power to meet a multitude of requirements. The varied applications of air power involved the full spectrum of USAF aerospace vehicles, support equipment, and manpower. Innovations and developments in air tactics and techniques were characteristic of the tactical air warfare in SEA. Nothing was done in this war which did not affect the air effort in one way or another. Tactical aircraft were involved in all phases of the war. The strides made in search and rescue (SAR) since the beginning of the Vietnam war were outstanding. These included the techniques developed and used to successfully improve the night SAR capability. The air war in SEA has strengthened the existing AF doctrine. However, one must not draw lessons from this war that are out of context. The enemy had no appreciable air capability outside of NVN. That gave the US aircraft freedom to operate and it permitted the Air Force to fly tankers and the aircraft containing the airborne battlefield command

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and control center with relative ease. This may not be the case in another war. With air opposition, war would be far different in many ways. Successful enemy attacks on our air bases in SVN emphasized the insufficient numbers of security police, the lack of heavy weapons such as recoilless rifles, mortars, and 50 calibre machine guns, and the inadequate training of USAF personnel in light infantry tactics throughout SVN. Worldwide deployment of mobile Soviet radar controlled weapons systems could seriously threaten the survivability of USAF tactical aircraft in future combat operations. Experience in SEA shows that an effective means of neutralizing these surface-to-air weapons (SAMs and AAA) and EW/GCI air defense radars is as necessary as an effective air-to-air capability in attaining air superiority. In SEA tactical air forces have demonstrated their capability to perform all types of air operations including close air support, long range interdiction, and the attainment of air superiority. ECM may be the key here and poses an enduring challenge which involves countering a steady crop of new technologies by both sides.

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SECTION V

ENEMY DEFENSES (U)

A. (S) BACKGROUND. Although the sustained bombing of NVN began in February 1965, the United States initiated its bombing against NVN in August 1964. At that time the North Vietnamese air defense system was estimated to be of very low effectiveness. NVN had no jet aircraft, only two modern airfields, no surface-to-air missile (SAM) defenses, poor early warning (EW) coverage and relatively few AAA units. The radar complex consisted of 22 EW sets with very little capability for definitive tracking. The aircraft inventory consisted of transports and light support aircraft and possessed no effective air defense capabilities. The most effective capability existent was the AAA which had little radar tracking capability (four Fire Cans).

B. (S) EARLY DEVELOPMENTS. By 1967 NVN had built an air defense environment of imposing stature. It consisted of good early warning (EW) and ground-controlled intercept (GCI) radars; five jet capable airfields with more under construction; about 60 modern jet aircraft; a significant SAM complex; and an inventory of AAA which had been increased more than tenfold with 115 sets of Fire Can AAA radars.

C. (S) INTEGRATION. It should be noted that in addition to the major buildup of NVN's air defense system, and the extensive combat experience required by the system's personnel, NVN had integrated all facets of the system to insure maximum effectiveness. NVN continued to receive extensive aid in both sophisticated equipment and training for the NVN personnel in its operation from their communist comrades, namely Red China and the Soviet Union. NVN achieved a coordinated area type of defense system that enabled it to raise the sophistication of its antiaircraft defenses to the highest levels. The communist antiaircraft (AA) defense system in NVN has been judged to be more sophisticated than any antiaircraft defense system ever encountered in previous wars.

D. (S) GCI SYSTEM. North Vietnam's AA defense system became a completely integrated complex of radars, guns, and missiles. There were indications that their GCI system became integrated as well. MIGs were observed in close proximity to areas where AAA and SAMs had been fired. The communists in NVN reduced the initiative and maneuver flexibility of the attacking aircraft by employing coordinated defense systems covering the entire altitude spectrum. They developed a "defensive area" which required at least some exposure to attrition over the entire aircraft penetration flight.

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E. (S) EARLY WARNING. Their LW radar equipment was modernized and, with the increase in the number of these radars, extensive coverage was provided. This included overlapping coverage of all NVN and it extended outside the border areas into Laos in the West and overwater to the South and East. Altitude discrimination was enhanced by the deployment of height finders. It was estimated that the radar net was capable of detecting and tracking all aircraft above 1500 to 2000 feet. In addition, the system was judged to be sufficiently sophisticated to maintain continuity of tracking and to coordinate the defense even under the pressure of multiple aircraft penetrations.

F. (U) AIRFIELDS. GCI radars were emplaced in the areas proximate to the key airfields and provided control for jet operations in the Haiphong-Hanoi-Thai Nguyen area. The improvement of existing airfields and construction of new airfields maintained pace with the other improvements. Phuc Yen and Kep were two of the main military airfields where the majority of the communist aircraft were deployed.

G. (S) AIRCRAFT. The communist jet aircraft inventory included MIG-15's, -17's, -19's, -21's and IL-28 bombers. The jet fighters engaged US strike aircraft mainly in Route Packages V, VIA, and VIB. In the early part of the war it appeared that the MIGs concentrated their attacks against F-105 strike aircraft. Later in the war the MIGs dropped this tactic and did attack F-4's that were flying combat air patrol as well as those flying strike missions. As the war continued, the MIG fighter force became more proficient and the communist air-ground coordination became more effective.

H. (S) SURFACE-TO-AIR MISSILES. On 23 July 1965 the first SA-2 missile was fired at a US aircraft over NVN. From then until the end of March 1968 Navy and Air Force pilots reported the firing of between 5366 and 6037 missiles. Of this total, Air Force pilots reported from 2757 to 3153 missiles. During the first 11-month period following the initial firing of an SA-2 missile, SAM firing activity was at a fairly low level and averaged only 30 launches a month. It is likely that the communists used this period to train missile system and associated radar operators, to develop procedures, and to become familiar with the operation of the overall system. A striking increase in the number of SAM firings occurred in July 1966 when about 175 missiles were fired at US aircraft. This increased activity continued during the following months and peaked in October 1967 when between 590 and 740 SAMs were fired at US aircraft. From July 1966 through October 1967 the monthly SAM firings averaged 270. After this period the monthly average through March 1968 was about 220 firings. The 31st of March 1968 marked a halt in US strike activity in the heavily defended Hanoi-Haiphong area and, from that time until shortly before the end of the war, relatively few SAMs were fired at US aircraft operating over NVN. For the 17-month period from November 1966 through March 1968 there was no significant difference in SAM hit ratios for specific aircraft types. The

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I. (S) INDIRECT EFFECTS OF THE SAM SYSTEM. Although the communist SAM system was not significantly successful in shooting down US aircraft, the indirect effects of the SAM system were most important. The presence of SAMs in significant numbers and the communists' proven capability to transport firing elements about the area adversely affected the flexibility of the US attacking aircraft. Their SAM system was one of the antiaircraft elements that enabled North Vietnam to achieve such a high degree of sophistication in its air defenses. The large increase in SAM launchings after June 1966 indicated that their logistic resupply was adequate and the crews were sufficiently proficient to permit firing missiles at this greatly increased rate. It indicated that the communist air defense planners recognized the value of the SAMs in forcing US aircraft to fly at lower altitudes where they would be so vulnerable to the many antiaircraft guns that were so extensively deployed. The SAM threat restricted the envelope of air operations and forced our aircraft into greater exposure to AAA. In addition, this communist air defensive posture greatly hindered our aerial photographic intelligence collection. Manned high altitude platforms could not operate efficiently within the SAM envelope and drones were often shot down by the SAMs. Reconnaissance over key areas could not be obtained on a regular basis.

J. (S) ANTIAIRCRAFT ARTILLERY (AAA). The growth and effectiveness of the AAA forces in NVN were the most imposing factors in the communist air defense system. Deployments of AAA encompassed nearly the entire target system in NVN and approximately 25 percent of all US aircraft sorties in NVN were fired upon by AAA elements. This included all sorties and was probably higher for attack sorties. The majority of US aircraft shot down in NVN was attributed to AAA. The most damaging fire came from the 37mm/57mm (light AAA) and the 12.7mm (automatic weapons) guns. It was apparent from pilot reports that the AAA was integrated into the overall defensive environment. Pilots reported many times that when they descended to lower altitudes to avoid SAMs in flight they encountered heavy, accurate antiaircraft gun fire. On some occasions they were forced to abort their missions.

K. (S) WEATHER. The effects of weather on air operations were significant. During poor or marginal weather the pilot was forced into a low angle approach. He may have been forced to search for the targets while orbiting and thus he was more vulnerable to ground fire. Seventy-three percent of the aircraft lost during one period (February-April 1966) were lost during periods of poor or marginal weather and while in a shallow attack profile.

TABLE 1. USAF AIRCRAFT COMBAT SORTIES AND LOSS COMPARISON
IN WORLD WAR II, KOREA, AND SOUTHEAST ASIA* (U)

<u>WAR</u>	<u>COMBAT SORTIES</u>	<u>AIRCRAFT LOSSES</u>	<u>LOSS RATE (PER 1000 SORTIES)</u>
WW II	2,362,800	22,948	9.7
Korea	710,886	1,466	2.0
SEA (1962-1973)	5,226,701	2,256	0.4

*SOURCE: USAF MS(C5), 5 April 1974, OPR: AF/XOOCOAB.

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TABLE 2. USAF AIRCRAFT COMBAT LOSSES IN SEA
(1 Jan 1962-31 Aug 1973) (U)

<u>AIRCRAFT</u>	<u>NUMBER OF LOSSES</u>	<u>PERCENT OF TOTAL USAF COMBAT LOSSES</u>
A-1	150	8.7
A-7	4	.2
A-26	10	.6
A-37	16	.9
AC-47	17	1.0
AC-119	2	.1
AC-130	6	.3
B/RB-26	9	.5
B-52	17	1.0
B-57	38	2.2
C-7	8	.5
C-47	7	.4
C/UC-123	21	1.2
C-130	34	2.0
C-141	0	0
CH-3	14	.8
CH-53	2	.1
EB-66	4	.2
EC-47	1	.1
EC-121	0	0
EC-130	0	0
F-4	382	22.0
F-5	7	.4
F-100	193	11.5
F/TF-102	7	.4
F-104	8	.5
F-105	334	19.4
F-111	8	.5
HC-130	2	.1
HH-3	10	.6
H-43	10	.6
HH-43	0	0
HH-53	9	.5
HH-16	2	.1

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TABLE 2. USAF AIRCRAFT COMBAT LOSSES IN SEA
(1 Jan 1962-31 Aug 1973) (U) (CONT)

<u>AIRCRAFT</u>	<u>NUMBER OF LOSSES</u>	<u>PERCENT OF TOTAL USAF COMBAT LOSSES</u>
KB-50	0	0
KC-135	0	0
O/T0-1	122	7.0
O-2	82	4.7
OV-10	47	2.6
QU/Y6U-22	0	0
RB-57	2	.1
RB-66	2	.1
RF-4	76	4.4
RF-101	33	1.9
T-28	17	1.0
U-2	0	0
U-3	1	.1
U-6	0	0
U-10	4	.2
UH-1	13	.8
TOTAL COMBAT LOSSES	1736	

TABLE 4 USAF AIRCRAFT COMBAT AND OPERATIONAL LOSSES IN SEA
(1 JAN 1962-31 AUG 1973) (U)

AIRCRAFT	NUMBER OF COMBAT LOSSES*	NUMBER OF OPL LOSSES	COMBINED LOSSES	PERCENT OF TOTAL USAF LOSSES
A-1	150	41	191	8.5
A-7	4	2	6	0.3
A-26	10	2	12	0.5
A-37	16	6	22	1.0
AC-47	17	2	19	0.8
AC-119	2	4	6	0.3
AC-130	6	0	6	0.3
B/RB-26	9	1	10	0.4
B-52	17	8	25	1.1
B-57	38	18	56	2.5
C-7	8	12	20	0.9
C-47	7	13	20	0.9
C/UC-123	21	32	53	2.4
C-130	34	21	55	2.4
C-141	0	2	2	0.1
CH-3	14	3	17	0.8
CH-53	2	0	2	0.1
EB-66	4	9	13	0.6
EC-47	1	0	1	0.1
EC-121	0	2	2	0.1
EC-130	0	0	0	0
F-4	382	62	444	19.7
F-5	7	2	9	0.4
F-100	198	45	243	10.8
F/TF-102	7	8	15	0.7
F-104	8	6	14	0.6
F-105	334	63	397	17.7
F-111	8	3	11	0.5
H-43	10	0	10	0.4
HC-130	2	0	2	0.1
HH-3	10	4	14	0.6
HH-43	0	4	4	0.2
HH-53	9	0	9	0.4
HU-16	2	2	4	0.2

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TABLE 15. FATE OF CREW ON AIRCRAFT LOST IN COMBAT
BY AIRCRAFT TYPE AND COUNTRY
1 Jan 62-31 Dec 72 (U) (CONT)

AIRCRAFT TYPE	NO. ACFT	COUNTRY	FATE OF CREW ⁽¹⁾				TOTAL CREW MEMBERS ⁽²⁾
			RESCUED	MISSING	KILLED	CAPTURED	
HH-3	3	NVN	10	3	0	0	13
	5	LAOS	15	0	5	0	20
	2	SVN	1	0	6	0	7
H-43	1	NVN	0	0	1	3	4
	9	SVN	24	0	3	0	27
HH-53	1	NVN	6	0	0	0	6
	4	LAOS	10	0	11	0	21
	3	SVN	2	1	9	0	12
	1	CAMBODIA	0	0	5	0	5
HU-16	1	NVN	4	0	2	0	6
	1	SVN	0	7	0	0	7
O/T0-1	2	NVN	0	2	0	0	2
	9	LAOS	2	5	4	0	11
	110	SVN	48	8	40	0	96
	1	CAMBODIA	1	0	0	0	1
O-2	3	NVN	2	0	3	0	5
	18	LAOS	10	8	7	0	25
	57	SVN	15	11	33	0	59
	4	CAMBODIA	2	1	3	0	6
OV-10	18	LAOS	13	5	3	1	22
	22	SVN	8	4	18	0	30
	5	CAMBODIA	4	1	2	0	7
RB-57	2	SVN	4	0	0	0	4
RS-66	1	NVN	5	0	1	0	6
	1	SVN	0	0	3	0	3
RF-4	38	NVN	22	30	5	19	76
	22	LAOS	26	13	3	2	44
	14	SVN	6	8	6	0	20
	2	CAMBODIA	4	0	0	0	4
RF-101	27	NVN	5	10	1	10	26
	3	LAOS	2	0	0	1	3
	3	SVN	2	0	0	0	2 ⁽¹⁾
T-28	1	NVN	0	2	0	0	2
	3	LAOS	0	3	1	0	4
	13	SVN	6	0	8	0	14

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TABLE 16. FATE OF CREW IN COMBAT LOSSES BY TYPE OF AIRCRAFT,
COUNTRY AND ENEMY WEAPON SYSTEM
INFLECTING LOSS (U)

ACFT	NO. OF ACFT	COUNTRY	EWS	NO. OF PERSONNEL	FATE OF CREW			
					R %	K %	M %	C %
A-1	16	NVN	GF	19	48	10	32	10
	87	Laos	GF	93	53	31	16	0
	38	SVN	GF	42	45	55	0	0
AC-130	4	Laos	GF	53	51	4	45	0
	1	Laos	SAM	14	0	0	100	0
	1	SVN	SAM	15	20	0	80	0
B-57	5	NVN	GF	10	40	20	30	10
	12	Laos	GF	23	30	17	53	0
	16	SVN	GF	32	47	47	3	3
C-130	2	NVN	GF	19	0	0	100	0
	2	Laos	GF	15	0	0	100	0
	16	SVN	GF	100	35	65	0	0
C/UC-123	3	Laos	GF	16	31	31	38	0
	14	SVN	GF	55	18	75	7	0
F-4	125	NVN	GF	250	38	2	41	19
	104	Laos	GF	212	52	8	39	1
	59	SVN	GF	118	60	34	6	0
	5	Cambodia	GF	10	40	40	20	0
	1	Thailand	GF	2	0	100	0	0
F-4	23	NVN	SAM	46	20	0	26	54
	1	Laos	SAM	2	100	0	0	0
	2	SVN	SAM	4	100	0	0	0
F-4	37	NVN	MIG	74	22	0	24	54
	1	Laos	MIG	2	0	0	0	100
F-100	16	NVN	GF	26	54	8	19	19
	29	Laos	GF	39	70	10	20	0
	140	SVN	GF	147	65	33	2	0
	6	Cambodia	GF	6	66	17	17	0
F-105	227	NVN	GF	239	35	5	28	32
	51	Laos	GF	55	58	16	24	2
	1	SVN	GF	1	100	0	0	0
F-105	31	NVN	SAM	41	20	10	43	27

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