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APPENDIX A
PARAMETERS AND DEFINITIONS

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INTRODUCTION

This appendix defines the more common parameters appearing in the tables of this volume. Parameters not discussed here, e.g., several from volume I, are discussed in the text accompanying the tables in which they appear.

Table A-1 lists definitions for certain of the parameters of the sortie summary tables: Aircraft possessed, Flying hours, Sortie, etc.

Table A-2 lists the major mission types and the OPREA function codes they include. These definitions are related to matter presented throughout the study report.

Table A-3 lists the territories included under the "Country" codes C-1, C-2, and C-3 of the sortie and attrition summary tables.

Table A-4 lists the definitions of the C-code in the Marine helicopter loss index, appendix B. This code is primarily designed to sort combat losses into the categories of: Shot down, Intentionally destroyed, Landing zone hit, Combat associated, Ground losses, Other, Undetermined.

TABLE A-1
PARAMETERS LISTED IN SORTIE SUMMARY TABLES

Poss A/C	(Possessed aircraft) Aircraft assets: Average number of aircraft on hand and in operating status. Those months during which a type of aircraft was not possessed are not included in the yearly and overall averages. For instance, 30 aircraft reported possessed during the months of July through December will be listed as 30 aircraft possessed for that year, as opposed to an average of 15 aircraft possessed.
Flying hours	Aircraft utilization: Total number of hours aircraft have spent airborne.
Sortie	Helicopter takeoff and landing.
Total sorties	Aircraft utilization: Sum of all sorties reported.
Combat sorties	Aircraft employment on combat missions: Total sorties minus non-combat sorties (Mission type M-8).

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TABLE A-2
JCS OPREA FUNCTION CODES GROUPED BY MISSION TYPE

<u>Function</u>	<u>Code</u>
Mission type M-1: Armed helicopter, escort, etc.	
Strike	1*
Flak suppression	2*
Air interdiction	3
Armed reconnaissance	4
Close air support (CAS)	5*
Direct air support (DAS)	6*
Ship combat air patrol (CAP)	8
Search and rescue CAP	9*
Air defense CAP	10
Rescue CAP	11*
Target CAP	13*
Escort (general)	34*
Armed helo	43*
CAP (other)	63*
CAS - Helo support	74*
DAS - Helo support	75
Escort - Helo support	76*
Mission type M-2: Aerial surveillance	
Infra red reconnaissance (RECON)	16*
SLAR RECON	17
Visual RECON	18*
Photo RECON	20*
Hydro acoustic RECON	23*
Optical RECON	24*
Radiometer RECON	26
Spectrometer RECON	27*
Ultra violet RECON	31*
RECON (other)	60*
Tactical air RECON	66*
Pathfinder	67
Mission type M-3: Combat troop and cargo	
Combat troop carrying	45*
Combat cargo carrying	46*
Mission type M-4: Medical evacuation	
Air evacuation	57*

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TABLE A-2 (continued)

<u>Function</u>	<u>Code</u>
Mission type M-5: Combat support	
Forward air control	35*
Psychological warfare	37*
Airborne electronic warfare	40*
Search and rescue	41*
Air refueling	42*
Command and control	44*
Special forces	50
Radio relay	54*
Defoliation	55
Artillery adjust	56
Active air defense	58*
Radio direction finding	59*
Combat support (other)	61*
Tactical air recovery	64*
Tactical air control	65*
Air abort	71
Mission type M-6: Logistic troop and cargo	
Logistic troop carrying	47*
Logistic cargo carrying	48*
Mission type M-7: Administrative/liaison	
Administrative/liaison	49*
(Also: function data not available)	-*
Mission type M-8: Non-combat	
Training	51*
Maintenance	52*
Non-combat (other)	62*
Mission type M-9: Non-airborne	
Non-airborne	70*

Note: Codes marked with * are functions reported by USMC units.

TABLE A-3

COUNTRY-OF-OPERATION CODES

C-1	Republic of Vietnam (South Vietnam)(SV) and Cambodia (CB)
C-2	Thailand (TH) and "at sea" (ZZ)
C-3	North Vietnam (NV) and Laos (LA)

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TABLE A-4 COMBAT LOSS CAUSE CODE (C-CODE)

1. S - Shot down:

Aircraft hit by enemy fire airborne and either destroyed airborne or upon impact with ground.

2. I - Intentionally or otherwise destroyed:

Aircraft damaged by enemy fire or otherwise disabled while airborne; aircraft landed safely, then intentionally or otherwise destroyed by enemy or friendly forces.

3. L - Landing zone hit:

Aircraft hit by enemy fire while in, hovering over, departing from, or entering landing zone. To have qualified for this code, an aircraft must have been within 300 feet of the landing zone when the damage was inflicted.

4. C - Combat associated:

Aircraft destroyed while taking evasive action, such as attempting to land in inappropriate landing zone, and contacting hidden obstacles, trees, etc.; while operating in a combat environment.

5. G - Ground losses:

Non-airborne losses due to enemy attack in areas such as revetments.

6. O - Other:

Aircraft losses that seem to be non-combat related, such as pilot errors in landing, weather and environmental hazards, etc.; category also includes some missing aircraft.

7. U - Undetermined:

Category comprised of those losses referenced only by JCS and/or OPREA sources; that is, no Safety Center or Marine Corps information is indicated or, if indicated, the item cannot be found in the corresponding file of combat losses.

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APPENDIX B

**USMC HELICOPTER LOSSES IN SOUTHEAST ASIA,
JANUARY 1965 THROUGH MAY 1971**

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This appendix lists the incidents of Marine Corps helicopter losses in Southeast Asia between January 1965 and May 1971, 280 designated combat loss and 143 operational (275 and 133, respectively, since October 1965).

It is a new list in the sense that it is different from the set of losses in any other existing file. It is primarily designed to be complete in the set of losses it contains, rather than comprehensive in the available data on these losses. This file lists only one "measurable" parameter for each loss, i.e., Combat-operational, along with a number of typical indexing parameters. It is itself, therefore, not directly useful as a data base, but rather as an index to often voluminous information contained in other files.

This index consolidates information from many sources. The four primary sources, and the symbols (in parentheses) by which they are represented in the listing, are:

- The JCS OPREA file, based on OpRep-5 messages (J)
- The Naval Safety Center file of aircraft accidents (S)
- The file of aircraft separations and reinstatements of the Office of the Chief of Naval Operations, Op-511 (O)
- The in-house file of hard-copy messages on aircraft accidents and incidents (M).

Of these, the Op-511 file is considered most authoritative concerning the fact of the loss, although it is usually somewhat uncertain in the date and place of the loss. Additionally, an informal list of helicopter losses was available from Headquarters, Marine Corps (HQMC), which proved useful in the final resolution of a few disagreements between the other sources.

The parameters provided in this index include:

- Date, usually as held in the OPREA file
- Aircraft type and model
- Loss type designation: combat (C) or operational (O)
- Loss (L) or damage (D) indicator
- Safety Center damage category, if source claims only damage (B, C, D, or E)
- OPREA function code (OF), defined in appendix A
- Mission type code (M-), defined in appendix A
- Loss cause code (C), defined in appendix A
- Aircraft bureau number
- Squadron
- Country of loss, defined in appendix A
- Sources or files known to carry the loss (J, S, O, or M)
- Additional remarks

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Each entry representing a bona fide loss is marked with the symbol (STRK) along the left margin. Where files are known to contain variant information particularly regarding the indexing parameters, such information is usually indicated either under remarks or as an additional line item marked with the symbol (+) along the left margin. A line marked (+) shows only the variant information, parameters in agreement have been left blank. If the variant information itself constitutes blanks, e.g., OPREA showing a blank bureau number, it is indicated by a string of letters B, e.g., BBB.

Thus, for example, the loss on 11 March 1966 appears in the Safety Center, JCS OPREA, and Op-511 files; however, OPREA shows it without bureau number or squadron and the Safety Center lists it as combat damage category B. Furthermore, OPREA lists an additional entry on that date, also without bureau number or squadron, but with a different function code (47 as opposed to 45). The remarks indicate that the informal listing obtained from HQMC shows "unk" (in place of bureau number and squadron).

Because the primary usefulness of this newly-assembled list is seen to lie in its indexing power, information is included on entries identified as losses in one or more of the sources, but presently known or believed to be mere damage incidents or outright errors. In this listing such items will be found marked with the symbol (X) along the left margin. Users of the loss data contained in the "sources" or other files may find it convenient to mark these items in their data files as to be avoided or viewed with suspicion.

Under the "remarks" heading, certain other information may require some interpretation. A few more common examples will be discussed to illustrate the meaning of the entries.

- a) If the loss is shown to have occurred at sea (country coded as ZZ), the remarks column shows the ship involved. Thus, the loss on 24 January 1966 occurred in connection with operations from LPH-8.
- b) The additional line of information for the 9 March 1966 loss shows that the OPREA file contains a bureau number corresponding to an aircraft which is still operational, according to the remarks entry. (When the first 3 digits are shown elsewhere in the data bureau numbers may be listed as the last 3 digits only, which are also known as the aircraft "side number".)
- c) The apparent loss on 21 July 1966, shown as 20 July in the Safety Center file, actually was reinstated during or prior to January 1967.
- d) The operational loss on 4 September 1966 occurred during salvage operations of a previous combat damage incident. It is listed with erroneous bureau number as combat damage in OPREA and with the same erroneous bureau number as operational loss, on the HQMC list.
- e) The loss of aircraft bureau number 149322 on 14 November 1966 was not actually acknowledged by Op-511 until June 1969, when Op-511 presumably first became aware of it.
- f) The UH-1 aircraft lost on 2 March 1967 was originally reported as bureau number 152408, then via change message corrected to 152423.
- g) Losses on 22 and 26 March 1967 appear in OPREA as Navy-owned, without bureau number or squadron. One of these was actually reinstated during or prior to June 1967.

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h) The apparent loss on 24 April 1967 appears in OPREA with the bureau number of an F-4A aircraft, 148258. The HQMC list shows a legitimate UH-34D bureau number together with remarks indicating the severity of the damage: transmission shaft broke, aircraft crashed and burned. Op-511 carries the aircraft of the Headquarters list (-758) as going into storage in May 1972.

Incidentally, regarding the incident discussed under (h) above, the Safety Center listing shows a UH-34 combat damage (B) on 27 April 1967 with bureau number 150258. This is an example of the nature of "additional information" that was omitted from our loss listing. In this case, aircraft type and side number agree, date is off by 3 days, damage category is different, other parameters are not available for checking.

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- - - - - LISTING OF MARINE CORPS HELICOPTER LOSSES IN SOUTHEAST ASIA - - - - -

--DATE-- YR MO DA	A/C TYPE	LOSS TYPE	-LOSSES-			A/C NO.	SQUADRON	CY	SOURCE	REMARKS
			OF	4-	C					
STRK 65 03 11	UH-34 D	C L	47	6	A	148798	HMM-163	SV	S J D	
STRK 65 03 16	UH-34 D	D L D D B	47	6		150569	HMM-163	SV	S J D	
								S	INTENTIONALLY DESTROYED	
STRK 65 03 28	UH-34 D	C L	47	6	A	148812	HMM-163	SV	S J D	
STRK 65 03 31	UH-34 D	C L	47	6	I	150572	HMM-163	SV	S J D	
STRK 65 04 13	UH-34 D	D L	47	6		150564	HMM-162	ZZ	S J D	NOT ON HQ LIST
						R477777		J	LPH05	
STRK 65 06 06	UH-34 D	D L	47	6		148791	HMM-161	ZZ	S J D	
STRK 65 06 06	UH-34 D	D L	47	6		148820	HMM-161	ZZ	S J D	LPH02
STRK 65 07 02	UH-34 D	D L	47	6		150565	HMM-261	SV	S J D	
STRK 65 07 14	UH-34 D	D L	47	6		149184	HMM-163	ZZ	S J D	LPH02
STRK 65 07 15	UH-34 D	C L	47	6	I	148795	HMM-261	SV	S J D	
STRK 65 07 19	UH-34 D	D L	47	6		149324	HMM-161	SV	S J D	
STRK 65 07 25	UH-34 D	D L	47	6		147159	HMM-261	SV	S J D	
STRK 65 08 15	UH-34 D	C L	47	6	I	148750	HMM-161	SV	S J D	
STRK 65 08 26	UH-34 D	D L	47	6		147163	HMM-163	ZZ	S J D	LPH02
STRK 65 08 31	UH-34 D	D L	47	6		145771	HMM-163	ZZ	S J D	LPH02
STRK 65 09 18	UH-34 D	D L	47	6		145774	HMM-352	SV	S J D	
		C L	47	6				J		
X 65 09 25	UH-34 D	D L	47	6				SV	J	NOT ON HQ LIST
STRK 65 10 17	UH-34 D	D L	46	3		148740	HMM-161	SV	S J D	
STRK 65 10 26	UH-34 D	D L	47	6		148817	HMM-263	SV	S J D	
STRK 65 10 27	UH-34 D	C L C D B	70	9	U	150197	HMM-263	SV	S J D	
							S			
STRK 65 10 27	UH-34 D	C L	70	9	U	150726	HMM-263	SV	J D	
X 65 10 27	UH-34 D	C L	70	9	U		HMM-263	SV	J	ON HQ LIST, NO RU.NO.
STRK 65 10 27	UH-34 D	C L	70	9	U	148779	HMM-361	SV	J D	
STRK 65 10 27	UH-34 D	C L	70	9	U	150196	HMM-361	SV	J D	

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- - - - - LISTING OF MARINE CORPS HELICOPTER LOSSES IN SOUTHEAST ASIA (CONT'D) - - - - -

--DATE-- YR MO DA	A/C TYPE	LOSS TYPE	-C INFS-- D 4- C			A/C NO. & ID	SQUADRON	CY	SOURCE	REMARKS
			0	1	2					
STRK 65 10 27	UH-34 D	C L	70	9	U	150231	HMH-361	SV	J O	
STRK 65 10 27	UH-34 D	C L	70	9	U	150251	HMH-361	SV	J O	
STRK 65 10 28	UH-1 E	C L	70	9	U	151273	VMO-2	SV	J O	
STRK 65 10 28	JH-1 E	C L	70	9	U	151850	VMO-2	SV	J O	
STRK 65 10 29	JH-1 E	C L	70	9	U	151855	VMO-2	SV	J O	
STRK 65 10 28	JH-1 E	C L	70	9	U	151274	VMO-2	SV	J O	
STRK 65 10 28	JH-1 E	C L	70	9	U	151276	VMO-2	SV	J O	
STRK 65 10 28	JH-1 E	C L	70	9	U	151862	VMO-2	SV	J O	
STRK 65 10 28	JH-1 E	C L	70	9	U	151287	VMO-2	SV	J O	
STRK 65 10 28	JH-1 E	C L	70	9	U	151266	VMO-2	SV	J O	
STRK 65 10 28	JH-1 E	C L	70	9	U	151293	VMO-2	SV	J O	
STRK 65 10 28	JH-1 E	C L	70	9	U	151296	VMO-2	SV	J O	
STRK 65 10 28	JH-1 E	C L	70	9	U	151298	VMO-2	SV	J O	
STRK 65 10 28	JH-1 E	C L	70	9	U	151843	VMO-2	SV	J O	
STRK 65 10 28	JH-1 E	C L	70	9	U	151844	VMO-2	SV	J O	
STRK + 65 11 01	UH-34 D	C L D L	48	6	U	150205	HMH-361	SV	S J O J	
STRK + 65 11 02	CH-37 C 01	C L	49	7	I	165874	HMS-16	SV	S J O S	
STRK 65 11 13	UH-34 D	C L	41	5	I	150575	HMH-263	SV	S J O	
STRK + 65 11 14	UH-1 E	C L	47	6	A	151285 1285	VMO-6 6UK	SV	S J O J	
X + 65 11 18	UH-34 D	C L C D C	47	6	U	150552	HMH-361	SV	J S	STRICKEN 7-68. ON HQ LIST
STRK 65 11 22	UH-34 D	C L	47	6	U	147100	HMH-362	SV	S J O	
STRK + 65 12 03	UH-34 D	C L	45	3	S	148762 14872	HMH-364	SV	S J O J	
STRK 65 12 06	UH-1 E	C L	43	1	I	151272	VMO-6	SV	S J O	
STRK + 65 12 08	UH-34 D	D L	48	6		145768	HMH-364	SV	S J O J	

----- LISTING OF MARINE CORPS HELICOPTER LOSSES IN SOUTHEAST ASIA (CONT'D) -----

--DATE-- YR MO DA	A/C TYPE	LOSS TYPE	-LOSSES-			A/C NO.	SQUADRON	CY	SOURCE	REMARKS
			OF	4-	C					
STRK 65 12 09	UH-1 E	C L	57	4	S	151047	VMO-2	SV	S J O	
STRK 65 12 12	UH-34 D	C L	45	3	I	145742	HMH-362	SV	S J O	
STRK 66 01 24 + 22	UH-34 D	D L	48	6		148793	HMH-362	ZZ	S J O	LPH08
STRK 66 02 04	UH-34 D	D L	48	6		148065	HMH-363	SV	S J O	
STRK 66 02 17	UH-34 D	D L	49	7		149380	HMM-163	SV	S J O M	
STRK 66 02 21	UH-34 D	C L	43	1	O	149381	HMH-362	SV	S J O	
STRK 66 03 02 + 09	UH-34 D	C L	46	3	I	145762	HMH-363	SV	S J O	
STRK 66 03 09 + 10	UH-34 D	C L	45	3	I	149387	HMH-262	SV	S J O	-297 STILL UP
						149297				
STRK 66 03 10 + 10	UH-34 D	C L C D F	45	3	O	149370	HMM-163	SV	S J O	
						149340				
STRK 66 03 11 + 11	UH-34 D	C L	57	4	L	149370	HMM-163	SV	S J O M	
			45	3	L	149340				
						147152	HMM-163	SV	S J O	SUNK ON HQ LIST
						480368	PAB		J	
						480388	PAB		J	ADDITIONAL ENTRY, SUSPECT GHOST
									S	
STRK 66 03 20	UH-34 D	D L	57	4		149351	HMM-163	SV	S J O M	
STRK 66 03 21	UH-34 D	C L	45	3	L	145802	HMH-363	SV	S J O M	
STRK 66 03 25	UH-34 D	D L	45	3		148772	HMH-362	ZZ	S J O	LPH05
STRK 66 04 03 + 02	UH-34 D	C L	57	4	L	145781	HMM-263	SV	S J O	
STRK 66 04 16 + 15	UH-34 D	C L	57	4	O	149165	HMM-263	SV	S J O	
STRK 66 04 27	UH-34 D	C L	46	3	I	149401	HMM-364	SV	S J O M	
			45	3	I				J	
STRK 66 05 14	UH-34 D	C L	45	3	I	150233	HMM-161	SV	S J O	
STRK 66 05 28	CH-46 A	D L	48	6		151946	HMM-161	SV	S J O	
STRK 66 06 06	UH-34 D	D L	49	7		147193	HMH-362	SV	S J O	
STRK 66 06 11	CH-46 A	C L	57	4	U	151935	HMM-164	SV	J O	

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LISTING OF MISSING CHINESE MILITARY AIRCRAFT IN SOUTHEAST ASIA (CONT'D)										
DATE YR MDY	S/C TYPE	L/T/S TYPE	AC ID#S OF M- C	A/C REG#	SHOOTDOWN TIME	CY	SOURCE	REMARKS		
STRK 66 06 16	UH-34 C	C L	65 5 1	151871	HMM-161	SV	S J D			
STRK 66 06 18	UH-34 D	C L	65 5 57 6	147195	HMM-161	22	S J D			14005
STRK 66 06 25	UH-34 D	C L	57 6 C	148023	HMM-161	SV	S J D			
STRK 66 07 01	UH-34 D	C L	67 2 0	148111	HMM-161	SV	S J D			
STRK 66 07 08	CH-46 A	C L	45 3	151947	HMM-161	SV	S J D			
STRK 66 07 10	UH-34 D	C L	45 3 S	148362	HMM-161	SV	S J D			
STRK 66 07 15	CH-46 A	C L	45 3 L	151930	HMM-161	SV	S J D			
STRK 66 07 15	CH-46 A	C L	45 3 1	151936	HMM-161	SV	S J D			
STRK 66 07 15	CH-46 A	C L	45 3 0	151961	HMM-161	SV	S J D			
STRK 66 07 15	CH-46 A	C L	7 5	152003	HMM-161	SV	S J D	HQ LISTS -151900, AN F-4B		
STRK 66 07 18	UH-34 D	C L	57 6	149379	HMM-161	SV	S J D			
X 66 07 21	CH-46 A	C L	46 3	151958	HMM-161	SV	S J D	REINSTATED 1-67, ON HQ LIST		
20							S			
STRK 66 07 23	UH-34 D	C L	57 6	150564	HMM-161	SV	S J D			
STRK 66 07 23	UH-34 D	C L	37 5	149343	HMM-161	SV	S J D			
STRK 66 07 25	UH-34 D	C L	46 3	149363	HMM-161	SV	S J D			
STRK 66 08 06	UH-34 D	C L	45 3	150252	HMM-161	SV	S J D			
STRK 66 09 02	CH-46 A	C L	45 3 S	151928	HMM-161	SV	S J D			
STRK 66 09 04	UH-34 D	C L	52 8	145300		SV	J D	HQ LISTS -804, DROPPED FROM CH46		
				145304			J			
STRK 66 09 14	CH-46 A	C L	47 6	152506	HMM-161	SV	S J D			
STRK 66 09 25	UH-34 D	C L	45 3 S	148776	HMM-161	SV	S J D			
STRK 66 09 29	UH-34 D	C L	60 2	150578	HMM-161	SV	S J D			
STRK 66 10 07	CH-46 A	C L	47 6 0	151960	HMM-161	SV	S J D			
76				49 7			S			
							J			

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- - - - - LISTING OF MARINE CORPS HELICOPTER LOSSES IN SOUTHEAST ASIA (CONT'D) - - - - -

--DATE-- YR MT DA	A/C TYPE	LOSS TYPE	- C 105 -			A/C BU. NO.	SQUADRON	CY	SOURCE	REMARKS
			OF	4-	C					
STRK + 66 10 24	UH-1 E	CL	41	5	0	151840	VMO-2	SV	S J O M	
			34	1					J	
STRK + 66 10 24	UH-1 E	CL	34	1	0	152416	VMO-2	SV	S J O M	
			41	5		152950			J	BU NO GARbled, -856 IS TA-6F
STRK 66 11 04	UH-34 D	CL	64	5		145792		SV	J O	DROPPED FROM CH-46
STRK 66 11 14	UH-1 E	CL	34	1	S	151873	VMO-6	SV	S J O M	
STRK 66 11 14	UH-34 D	CL	57	4	L	149367	HMM-263	SV	S J O M	HO LISTS -149369
STRK + 66 11 14	UH-34 D	CL	45	3		149322	HMM-163	SV	J O M	NOTED 6-69. NOT ON HO LIST
			60	2					J	
STRK 66 11 16	UH-34 D	CL	57	4	L	147153	HMM-163	SV	J O M	
STRK + 66 12 06	UH-34 D	CL	45	3		143974	HMM-363	SV	S J O M	
			47	6					J	
STRK 66 12 07	UH-34 D	CL	64	5	L	150576	HMM-263	SV	S J O M	
STRK + 66 12 28	UH-34	CL	64	5	0			SV	J	NOT ON HO LIST
STRK + 66 12 25	UH-34 D	CL	52	8		143966	HMM-263	SV	S J O M	
			RRRRRR	RRR					J	
STRK 66 12 30	UH-34 D	CL	46	3	L	150723	HMM-163	SV	S J O M	
STRK 67 01 07	UH-34 D	CL	46	3	I	148813	HMM-263	SV	S J O	
STRK + 67 01 12	UH-34 D	CL	49	7		148735	HMM-363	SV	S J O M	
			11						S	
STRK + 67 01 14	UH-1 E	CL	34	1	S	151282	VMO-6	SV	S J O M	
			60	2					J	
STRK + 67 01 25	CH-46 A	CL	45	3	L	152559	HMM-262	SV	S J O M	
			60	2					J	
STRK 67 01 27	UH-34 D	CL	47	6	I	148114	HMM-263	SV	S J O M	
STRK + 67 01 28	CH-46 A	CL	46	3		150272	HMM-265	SV	S J O M	
			60	2					J	
STRK + 67 01 29	CH-46 A	CL	45	3	A	150959	HMM-265	SV	S J O M	
			60	2					S	
STRK + 67 01 26	CH-46 A	CL	45	3	L	152514	HMM-265	SV	S J O M	
			60	2					J	

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- - - - - LISTING OF MARINE CORPS HELICOPTER LOSSES IN SOUTHEAST ASIA (CONT'D) - - - - -

STRK	67	01	28	CH-46	A	C L	LOSS TYPE	-CODES--		A/C BU-NR.	SQUADR	CY	S/URCE	REMARKS		
								YR	MO						DA	TYPE
STRK	67	01	28	CH-46	A	C L		45	3	A	150953	HMM-364	SV	S J O M		
											151953			M		
														S	M	
											399994			J		
STRK	67	01	28	UH-34	D	O L			7		149400	HMM-362	SV	S O		
STRK	67	01	30	UH-1	E	O L		34	1		151884	VMO-2	SV	S J O M		
								65	5					M		
														S		
STRK	67	02	21	CH-46	A	O L		45	3		150945	HMM-364	SV	S J O		
						O O B							S			
						O L							J			
STRK	67	02	24	UH-34	D	C L		57	4	S	150563	HMM-363	SV	J O M		
								45	3		RRRRRB	RRR		J		
STRK	67	02	26	UH-34	D	O L		62	8		143968	HMM-363	SV	S J O		
X	67	03	02	CH-46	A	O L		46	3		151943		SV	J	STRICKEN 3-68. ON HQ LIST	
STRK	67	03	02	UH-1	E	C L		65	5	S	152423	VMO-2	SV	S J O M		
								152408					J	CHG MSG FOUND		
STRK	67	03	03	CH-46	D	C L		46	3	U	152526	HMM-365	SV	S J O		
						C O D					RRRRRR	RRR	S			
						O L							J			
STRK	67	03	03	UH-34	A	O L		46	3		150244	HMM-265	SV	S J O M	CHG MSG HAS BU NO ONLY	
STRK	67	03	12	CH-46	A	C L		45	3	S	152516	HMM-265	SV	S J O M		
								015251			RRR		J			
STRK	67	03	13	CH-46	A	C L		46	3	L	152509	HMM-164	SV	S J O		
								RRRRRR			RRR		J			
STRK	67	03	13	UH-34		C L		45	3	S	150574	HMM-163	SV	S J O M		
								46	3		RRRRRB	RRR	J			
X	67	03	22	UH-34	D	O L		57	4		147198	HMM-363	SV	S J O M	REINSTATED 6-67. ON HQ LIST	
								47	6		RRRRRR	RRR	J	WRONG SERVICE		
X	67	03	22	UH-34	D	C L		57	4	O	149331	HMM-363	SV	S O M	REINSTATED 7-67. ON HQ LIST	
STRK	67	03	26	UH-34	D	C L		57	4	L	145796	HMM-363	SV	S J O M		
								47	6		RRRRRB	RRR	J	WRONG SERVICE		
X	67	03	28	UH-1	E	O L		34	1		151747		SV	J	-747 STILL UP, NOT ON HQ LIST	
STRK	67	03	28	UH-1	E	C L		60	2	S	152419	VMO-2	SV	S J O M		

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----- LISTING OF MARINE CORPS HELICOPTER LOSSES IN SOUTHEAST ASIA (CONT'D) -----

--DATE-- YR MT DA	A/C TYPE	L7SS TYPE	-C130FS--			A/C TYPE	SQUADRN	CY	SOURCE	REMARKS
			OF	M	C					
STRK + 67 04 25	UH-1 E	C L	57	4	L	151852	V40-6	SV	S J D M J	
STRK + 67 04 09	UH-1 E	D L	34	1		153741	V40-3	SV	S J D M J	
STRK + 67 04 16	UH-1 E	C L	34	1	A	153740	V40-2	SV	S J D M J	
X + 67 04 24	UH-34 D	D L	46	3		148258		SV	J	-258 E-4A, -758(HO) STRK 5-72 ON HQ LIST, TX SHFT B2K, FPSH, RDN
STRK + 67 04 27	CH-46 A	C L	45	3	L	152541	HMM-265	SV	S J D M J	
STRK + 67 04 27	CH-46 A	C L	45	3	S	152551	HMM-262	SV	S J D M	
STRK + 67 04 27	UH-34 D	D L	46	3		148771	HMM-263	22	S J D	LSN31
STRK + 67 05 01	CH-46 A	D L	57	4		150268	HMM-165	SV	S J D M	
STRK + 67 05 21	UH-1 E	C L	45	3	S	153748	V40-3	SV	J D M J	
STRK + 67 05 02	UH-1 E	D L	49	7	U	154751	V40-2	SV	S J D M J	
X 67 05 02	UH-1 E	C L	49	7	U	154751		SV	J	-951 STILL UP, NOT ON HQ LIST
STRK 67 05 06	UH-34 D	C L	57	4	U	149336	HMM-361	SV	J D	
STRK + 67 05 08	UH-34 D	D L	46	3		148771	HMM-263	SV	S J D	
STRK + 67 05 10	UH-1 E	C L	62	8	U	151266	V40-6	LA	J D	
STRK + 67 05 11	UH-34 D	D L	57	4		148769	HMM-363	SV	S J D M	
X + 67 05 11 10	UH-34 D	C L	45	3	I	149395	HMM-263	SV	S J D M S J M	CD ONLY, STRICKEN 8-67, ON HQ LIST
STRK + 67 05 12	CH-46 A	D L	43	6		152550	HMM-262	SV	S J D M J	
STRK + 67 05 12	UH-34 D	C L	46	3	S	147190	HMM-363	SV	J D M J	
STRK + 67 05 14	UH-34 D	C L	57	4	L	148763	HMM-363	SV	S J D M J	
STRK + 67 05 14	UH-34 D	C L	45	3		148613		J M	-613 IS AN A-4F	
STRK 67 05 22	CH-46 A	C L	46	3	U	152527	HMM-165	SV	J D	

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----- LISTING OF MARINE CORPS HELICOPTER LOSSES IN SOUTHEAST ASIA (CONT'D) -----

STRK	YR	MO	D	A/C	TYPE	LOSS	-COPERS-		A/C	RU. NO.	SQUADRON	CY	SOURCE	REMARKS	
							OF	4-							C
STRK	67	05	26	UH-1	F	C L	46	3	U	152439		SV	J D	NOT ON HQ LIST	
STRK	67	05	30	UH-1	E	O L	76	1		153746	VMO-3	SV	J D	DROPPED FROM CH-53	
STRK	67	05	31	CH-46	A	O L	70	9		152549	HMM-262	SV	S J O M	HOT POINT REFUEL, RESUPPLY MIS	
							46	3				J			
STRK	67	06	02	UH-34	D	C L	57	4	L	147166	HMM-362	SV	S J O M		
STRK	67	06	02	UH-1	E	C L	34	1	S	154758	VMO-3	SV	S O M		
STRK	67	06	03	CH-46	A	C L	45	3	L	150955	HMM-165	SV	S O M		
STRK	67	06	08	UH-1	F	C L	18	2	S	154763	VMO-3	SV	S J O M		
STRK	67	06	11	CH-46	A	C L	45	3	S	150270	HMM-265	SV	S J O M		
							60	2				J			
STRK	67	06	16	CH-46	A	C L	45	3	O	150939	HMM-262	SV	S J O M	HQ LISTS 151730	
										161730		J	151730 IS SH-34J, STRICKEN 4-63		
												M	POSSIBLE		
STRK	67	06	23	CH-46	A	O L	7			150936	HMM-164	ZZ	S O	COLL WITH WATER	LPH10
STRK	67	06	25	UH-34	D	O L	57	4		148077	HMM-363	SV	S J O M		
X	67	06	30	CH-46	A	C L	45	3	S	152501	HMM-265	SV	S J M	-501 STORAGE 7-71. ON HQ LIST	
							35	5				J			
STRK	67	06	00	CH-46	A	C L			U	152515	HMM-265	SV	O	PHU BAI	
STRK	67	06	00	CH-46	A	C L			U	152534	HMS-16	SV	O	DANANG	
STRK	67	07	00	CH-46	A	C L			U	150273	HMM-262	SV	O	MARBLE MOUNTAIN	
STRK	67	07	03	CH-46	A	O L	60	2		152532	HMM-165	SV	S J O M		
							46	3		153532		J			
X	67	07	20	CH-46	A	C L	57	4	L	151944	HMM-265	SV	S J M	-944 STORAGE 12-71. ON HQ LIST	
STRK	67	07	24	UH-34	D	C L	57	4	S	149395	HMM-263	SV	S J O M		
												S			
X	67	07	25	UH-34	D	C L	46	3	O	150728	HMM-362	SV	S J M	STRICKEN 3-71. ON HQ LIST	
							57	4				J			
STRK	67	07	28	CH-46	A	O L	49	8		151929	HMM-164	SV	S J O M		
							57	4		BB88888		J			
STRK	67	07	30	CH-46	A	C L	57	4	O	151945	HMM-164	SV	S J O M		
							61	5				J			

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----- LISTING OF MARINE CORPS HELICOPTER LOSSES IN SOUTHEAST ASIA (CONT'D) -----

--DATE-- YR MO DA	A/C TYPE	LOSS TYPE	-CODES-- OF M- C			A/C HU.N. #	SQUADRON	CY	SOURCE	REMARKS
			57	4	A					
STRK 67 07 30	UH-34 D	FL	57	4	A	148300	HMM-363	SV	S J O M	NOT ON HQ LIST
+		CNC	61	5				S		
STRK 67 09 01	UH-34 D	FL	52	8		147154	HMM-362	ZZ	S J O M	LPH03
+	12	CL	61	5				J		
STRK 67 08 03	CH-46 A	CL	60	2	L	151923	HMM-164	SV	S J O	
+	28	CL	46	3	I	152561	HMM-262	SV	S J O M	HQ LISTS 7L -151561, CHGD TO CL
+	28	CL	60	2		151561		J		ACTUALLY CODED 0151561
STRK 67 08 12	UH-34 D	CL	45	3	A	147138	HMM-263	SV	S J O M	
+	28	CL	61	5				J		
STRK 67 08 10	UH-1 E	CL	57	4	O	151842	VMS-6	SV	S J O M	
STRK 67 08 23	UH-34 D	CL	70	9	G	145735	HMM-361	SV	S J O	A DMG FM DIRCT HT. NOT ON HQ LST
STRK 67 08 29	CH-46 A	FL	70	9	G	150948	HMM-164	SV	S J O M	
+	28	FL	70	9	G	153763	HMS-16	SV	S J O	
STRK 67 08 29	UH-1 E	CL	70	9	G	154776	HMS-16	SV	S J O	
+	28	CL	70	9	G	148033	HMM-363	SV	S J O M	
STRK 67 08 31	CH-46 A	CL	57	4		152569	HMM-262	SV	S J O M	
+	28	CL	61	5				J		
STRK 67 09 02	UH-34 D	FL	65	5		148056	HMM-363	SV	S J O M	
+	28	FL	60	2				J		
STRK 67 09 09	UH-34 D	CL	57	4	I	149366	HMM-363	SV	S J O M	
+	28	CL	45	3				J		
STRK 67 09 16	UH-34 D	FL	45	3	A	147149	HMM-163	ZZ	S J O	LPH03
STRK 67 09 23	UH-1 E	FL	34	1	A	154753	VMS-3	SV	S J O M	
STRK 67 09 23	UH-34 D	CL	46	3	S	149342	HMM-263	SV	S J O M	
+	28	CL	61	5				J		
X 67 10 05	UH-34 D	CL	57	4	S	148783	HMM-362	SV	S J O M	-733 STRICKEN 7-71. ON HQ LIST
+	28	CL	45	3				J		
STRK 67 10 09	UH-34 D	CL	45	3		150561	HMM-361	SV	S J O	

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----- LISTING OF MARINE CORPS HELICOPTER LOSSES IN SOUTHEAST ASIA (CONT'D) -----

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----- LISTING OF MARINE CORPS HELICOPTER LOSSES IN SOUTHEAST ASIA (CONT'D) -----

--DSTF-- YR MO DA	A/C TYPE	LOSS TYPE	-CODES-- OF M- C		A/C HNR/NT.	SQUADR	CY	SOURCE	REMARKS
			---	---					
STRK 68 01 18	UH-1 E	C L	76	1 A	153742	VMO-3	SV	S J D	ALSO LISTED 7L 10-67
STRK 68 01 20	CH-46 A	C L	57	4 L	152544	HMM-262	SV	S J D	
STRK 68 01 23	CH-46 A	C L	46	3 D	151954	HMM-262	SV	S J D M	
STRK 68 01 24	CH-46 A	C L	45	3 D	150943	HMM-265	SV	S J D M	*RECOND WITH SIX PASSENGERS
			60	2				J	
STRK 68 02 01	CH-46 A	C L	45	3 L	150944	HMM-265	SV	S J D M	
			46	3	150444			J	
STRK 68 02 05	CH-46 D	C L	57	4 S	153986	HMM-364	SV	S J D M	
STRK 68 02 07	UH-1 E	D L O D C	62	8	151281	VMO-6	SV	S J D M	DO, DROPPED FROM CH-53 ON 02-13
X 68 02 08	UH-34 D	C L	70	9 G	148069	HMM-362	SV	S J D	REINSTATED 3-68. ON HQ LIST
				158069			J		
STRK 68 02 16	UH-1 E	C L	45	3 L	151261	VMO-6	SV	S J D M	
			61	5				J	
STRK 68 02 19	CH-53 A	C L	48	6 D	153278	HMM-463	SV	S J D M	
				153270			J		
STRK 68 02 21	CH-46 D	C L	46	3 T	153934	HMM-364	SV	S J D M	HQ LISTS -985
STRK 68 02 22	CH-53 A	C L	46	3 L	153283	HMM-463	SV	S J D M	
STRK 68 02 25	UH-34 D	C L	7	1	148059	HMM-163	SV	S D	
STRK 68 02 25	UH-1 E	C L	70	9 G	151289	VMO-6	SV	S J D M	
STRK 68 02 27	CH-46 D	C L	70	9 G	153396	HMM-262	SV	S J D M	STRICKEN 6-68
			25					S	
STRK 68 02 28	CH-46 D	C L	45	3 S	153360	HMM-262	SV	S J D M	
STRK 68 03 04	CH-53 A	C L	70	9 G	153276	HMM-463	SV	S J D M	
STRK 68 03 06	CH-46 A	C L	45	3 S	151909	HMM-165	SV	S J D M	
			61	5				J	
STRK 68 03 06	CH-46 A	D L	45	3	151943	HMM-154	ZZ	S J D	DL 3-67, STRICKEN 3-68 LPH08
STRK 68 03 14	CH-46 D	C L	46	3 S	153998	HMM-262	SV	S J D M	
STRK 68 03 14	UH-1 E	C L	34	1 S	154771	VMO-3	SV	S J D	
STRK 68 03 15	UH-34 D	C L	57	4 T	148072	HMM-361	SV	S J D M	
			46	3				J	

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----- LISTING OF MAINE CARGO HELICOPTER LOSSES IN SOUTHEAST ASIA (CONT'D) -----

STRK	DATE YR MN DA	A/C TYPE	LOSS TYPE	CODES			A/C BUIL. NO.	SQUADRN	CY	SOURCE	REMARKS
				OF	4-	C					
STRK	68 03 17	CH-46 A	C L	57	4	S	150274	HMM-265	SV	S J D M	
STRK	68 03 21	UH-1 A	C L	44	5	L	152429	VMO-2	SV	S J D M	
STRK	68 03 22	UH-34 D	D L	44	5		147168	HMM-163	SV	S J D M	
STRK	68 03 24	UH-1 E	C L	43	1	S	153761	VMO-6	SV	S J D M	
				61	5					J	
STRK	68 03 26	UH-34 D	D L	57	4		144654	HMM-363	SV	S J D M	
				C L						J	
STRK	68 03 28	CH-46 D	C L	46	3	I	152571	HMM-262	SV	S J D M	
STRK	68 03 29	CH-46 A	C L	45	3	I	151906	HMM-165	SV	S J D M	DFSTR 2 DS AFTER FWD CO LNDNG
				31			131906			J	
STRK	68 03 29	CH-46 A	C L	45	3	I	152524	HMM-165	SV	S J D M	DFSTR 2 DS AFTER FWD CO LNDNG
				31						S	
STRK	68 03 29	CH-46 A	C L	45	3	S	151922	HMM-165	SV	S J D	NOT ON HQ LIST
STRK	68 03 29	UH-1 E	C L	34	1	S	154954	HML-367	SV	S J P M	
				61	5					J	
STRK	68 03 30	UH-1 E	C L	34	1	I	153749	HML-367	SV	S J D M	
				29						S	
STRK	68 03 31	UH-34 D	C L	57	4	S	148792	HMM-362	SV	S J D M	
				46	3					J	
STRK	68 04 11	UH-1 E	D L	34	1		154968	VMO-6	SV	S J D M	
STRK	68 04 11	UH-34 D	D L	57	4		145804	HMM-163	SV	S J D M	-154804 ON HQ LIST
STRK	68 04 15	CH-46 A	C L	46	3	L	150456	HMM-164	SV	S J D M	
				61	5					J	
STRK	68 04 18	CH-46 A	D L	70	9		152507	HMM-265	SV	S J D M	
				61	5					J	
STRK	68 04 24	UH-1 E	C L	34	1	S	152436	HML-167	SV	S J P M	
				20						S	
STRK	68 04 25	CH-53 A	D L	48	6		151697	HMM-463	SV	S J D M	
				46	3					J	
				24						S	
STRK	68 04 25	UH-1 E	C L	49	7	S	154761	VMO-6	SV	S J D M	
				51	8					J	

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- - - - - LISTING OF MARINE CORPS HELICOPTER LOSSES IN SOUTHEAST ASIA (CONT'D) - - - - -

--DATE-- YR MO DA	A/C TYPE	LOSS TYPE	-COPES-			A/C NUMBER	SQUADRON	CY	SOURCE	REMARKS
			OF	M-	C					
STRK + 68 04 25	UH-34 D	C L	57	4	0	147150	HMM-163	SV	S J D M	
	24									
STRK + 68 05 01	CH-53 A	D L	49	7		153281	HMM-463	ZZ	S J D M	LPH08
			46	3						
STRK + 68 05 01	UH-34 D	C L	57	4	L	145785	HMM-163	SV	J D M	
STRK + 68 05 04	UH-1 E	C L	46	3	S	154767	VMO-2	SV	S J D M	
			34	1						
STRK + 68 05 05	CH-46 A	C L	57	4	L	152531	HMM-165	SV	S J D M	
STRK + 68 05 05	CH-46 D	C L	70	9	G	154024	HMM-262	SV	S J D M	
	24									
STRK + 68 05 05	UH-34 D	C L	70	9	G	148318	HMM-361	SV	S D	
STRK + 68 05 06	CH-46 A	C L	45	3	I	152497	HMM-265	SV	S J D M	
			46	3						
STRK + 68 05 10	CH-46 A	C L	45	3	L	151907	HMM-265	SV	S J D M	
STRK + 68 05 13	CH-46 A	C L	47	6	I	151919	HMM-164	SV	S J D M	DESTROYED 68-05-17
			17	0	E					
STRK + 68 05 13	UH-34 D	D L	57	4		150254	HMM-362	ZZ	S J D M	M4017
		C L	49	7						
STRK + 68 05 13	UH-34 D	C L	70	9	L	143961	HMM-362	SV	S J D	
STRK + 68 05 14	CH-46 A	C L	57	4	0	153399	HMM-364	SV	S J D M	NOT ON HQ LIST
			12							
X 68 05 18	CH-46 D	D L	46	3		154798		SV	J	NOT ON HQ LIST. STILL UP
STRK + 68 05 18	UH-1 E	D L	62	9		151354	VMO-6	SV	S D	CD, DROPPED FROM CH-53
STRK + 68 05 19	CH-53 A	D L	45	3		152413	HMM-463	SV	S J D M	
STRK + 68 05 24	CH-46 A	C L	57	4	L	150952	HMM-265	SV	S J D M	
			45	3						
STRK + 68 05 25	CH-46 A	D L	47	6		150933	HMM-164	ZZ	S J D	LPH08
STRK + 68 05 29	CH-46 D	C L	46	3	0	154025	HMM-364	SV	S J D M	
			45	3						
STRK + 68 06 02	CH-46 A	D L	49	7		152545	HMM-265	ZZ	S J D M	LPH08
			46	3						

LISTING OF MARINE CORPS HELICOPTER LOSSES IN SOUTHEAST ASIA (CONT'D)

--DATE-- YR MT DA	A/C TYPE	L7SS TYPE	-C77FS-- OF 4- C			A/C R/II, N/T.	SQUADRON	CY	SOURCE	REMARKS
			---	---	---					
STRK + 68 06 05	UH-34 D	O L	49	7		150256	HMH-362	SV	S J O M J	
			57	4						
STRK + 68 06 06	CH-46 A	O L	45	3	S	151940	HMH-165	SV	S J O	
					S	152533	HMH-165	SV	S O	
						152537			S	-537 ON HQ LIST, TINKED IN -537 STRICKEN 3-69
STRK + 68 06 06	UH-1 E	O L	60	2	S	153743	HMH-361	SV	S J O	
STRK + 68 06 07	UH-34 D	O L O O C	7	A		150230	HMH-363	SV	S O M S	NOT ON HQ LIST
STRK + 68 06 07	UH-1 E	O L	13	2	A	151294	VMO-6	SV	S J O M	
STRK + 68 06 08	UH-34 D	O L O L	57	4	L	144645	HMH-363	SV	S J O M S	
STRK + 68 06 11	CH-46 A	O L O L	47	6	S	150960	HMH-164	SV	S J O S	SHOT DOWN BY FRIENDLIES
STRK + 68 06 16	UH-34 D	O L	52	8		150567	HMH-363	SV	S O	
STRK + 68 06 19	CH-46	O L O O C	46	3	U	153381	HMH-161	SV	S J O S	
STRK + 68 06 19	CH-46 A	O L	70	9		151925	HMH-164	SV	S J O	
STRK + 68 07 01	UH-34 D	O L O L	46	5	O	148070	HMH-362	SV	S J O M J	
STRK + 68 07 01	CH-46 A	O L	45	3	S	150937	HMH-164	SV	S J O S	-151911 ON HQ LIST STILL UP
STRK + 68 07 03 30	UH-1 E	O L	34	1	I	153759	VMO-6	SV	S J O S	ACTUALLY DESTROYED 68-07-30
STRK + 68 07 11	CH-46 D	O L	46	3	L	154019	HMH-262	SV	S J O	
X + 68 07 15	UH-1 E	O L O O C				152420	VMO-2	SV	S O M S	STRICKEN 7-69, MARKED OOC ON HQ
STRK + 68 07 16	UH-34 D	O L	57	4	I	150258	HMH-363	SV	S J O M	
STRK + 68 07 21	UH-1 E	O L	45	3	S	154962	VMO-2	SV	S J O M J	
			60	2						
STRK + 68 07 25	CH-46 D	O L	7	S		154008	HMH-161	SV	S O	
STRK + 68 07 27	UH-34 D	O L O L	57	4	O	150552	HMH-363	SV	S J O	ALSO CL 11-65

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- - - - - LISTING OF MARINE CORPS HELICOPTER LOSSES IN SOUTHEAST ASIA (CONT'D) - - - - -

--DATE-- YR MT DA	A/C TYPE	LOSS TYPE	-C JOBS-- OF M- C		A/C BLN/NT.	SQUADRN	CY	SOURCE	REMARKS
			OF	M					
STRK 68 07 28	CH-53 A	DL	46	3	153234	HMM-463	SV	S J D M	-152384 ON HQ LIST
STRK 68 08 06	CH-46 D	CL	45	3 1	154017	HMM-262	SV	S J D M	
STRK 68 08 15	CH-46 A	DL	62	8	150278	HMM-265	SV	S J D M	DD, DROPPED FROM CH-53
			45	3				J	
STRK 68 08 16	UH-1 E	DL	57	4	154966	HML-367	SV	S D	
STRK 68 08 19	CH-46 D	CL	45	3 L	152566	HMM-262	SV	S J D M	
					152563			J	CHG ON FMAR 220900Z AUG TO -566
STRK 68 08 23	UH-1 E	DL	51	8	154955	HMM-361	SV	S D	
STRK 68 08 24	CH-46 D	CL	45	3 4	154022	HMM-262	SV	S J D M	
STRK 68 08 24	CH-46 A	CL	46	3 L	152502	HMM-265	SV	S J D M	
STRK 68 08 25	UH-1 E	CL	61	5 S	153767	VMO-6	SV	S J D M	
			62	2				J	
STRK 68 08 27	UH-1 F	CL	34	1 S	151880	HML-167	SV	S J D M	
STRK 68 08 28	UH-34 D	CL	57	4 S	149382	HMM-363	SV	S D	
STRK 68 09 02	CH-46 D	CL	45	3 L	153966	HMM-161	SV	S J D M	
STRK 68 09 17	CH-46 D	CL	7	1	153976	HMM-161	SV	S J D M	CD, UNRECOVERED
STRK 68 09 17	UH-1 E	DL	61	5	154963	HML-367	SV	S J D M	
			21					J	MSG DTG 170345Z SEP
STRK 68 09 18	UH-34 D	CL	57	4 S	150226	HMM-362	SV	S J D M	
STRK 68 09 21	CH-46 D	CL	46	3 L	152557	HMM-262	SV	S J D M	
STRK 68 09 27	UH-34 D	DL	57	4	145793	HMM-362	SV	S J D M	
			CL					J	
			DD C					S	
STRK 68 09 29	UH-1 E	CL	61	5 S	155343	HML-167	SV	S J D M	
					55343			J	
STRK 68 10 01	UH-34 D	CL	57	4 S	150222	HMM-362	SV	S J D M	
STRK 68 10 02	UH-1 E	DL	34	1	151863	HMM-163	SV	S J D	
STRK 68 10 09	CH-46 A	CL	46	3 D	150275	HMM-165	SV	S J D M	
			45	3				J	
STRK 68 10 09	CH-46 A	DL	46	3	150934	HMM-165	SV	S J D M	

- - - - - LISTING OF 46-140 CARDS IN (COPPER-10000) IN SOUTHEAST ASIA (CONT'D) - - - - -

--DATE-- YR M D H H M S	A/C TYPE	LISS TYPE	A/C TYPE			REMARKS
			OF	HR	MIN	
STRK 68 10 10 CH-46 A	C L	45 3 0	152517	HMM-165	SV	S J D M
X 68 10 10 UH-1 E	C L C D C	S	151881	VMM-2	SV	S J D M
STRK 68 10 11 CH-46 A	C L	45 3	151917	HMM-265	SV	S J D M
X 68 10 11 UH-34 D	C L	45 3	148802	HMM-362	SV	S J D M
X 68 10 17 CH-46	C L C O F	46 3	154794	HMM-364	SV	S J D M
X 68 10 17 CH-46	C O F	46 3	S	S	S	DL 10-60. NOT ON HQ LIST
STRK 69 10 17 CH-46 D	C L	57 4	153095	HMM-101	SV	S J D M
STRK 68 10 25 CH-46 A	C L	45 3	152547	HMM-265	SV	S J D M
STRK 68 10 30 CH-46 D	C L D	45 3 1	153320	HMM-164	SV	S J D M
X 68 10 30 UH-34 D	C L C D C	57 4 S	147158	HMM-262	SV	S J D M
STRK 68 11 07 CH-46 D	C L	45 3 L	152569	HMM-262	SV	S J D M
STRK 68 11 07 UH-1 E	C L	34 1 A	151295	VMM-6	SV	S J D M
STRK 68 11 17 UH-34 D	C L	57 4 L	149329	HMM-162	SV	S J D M
STRK 68 11 20 CH-46 A	C L	45 3 L	151935	HMM-265	SV	S J D M
STRK 68 11 27 UH-1 E	C L	18 2	154766	HMM-361	SV	S J D M
STRK 69 12 02 UH-1 E	C L	61 5	154752	HMM-361	SV	S J D M
STRK 68 12 22 UH-34 D	C L	45 3	150232	HMM-361	SV	S J D M
X 68 12 22 UH-34 D	C L	57 4	J	J	J	SEPARATE ENTRY, IN ADD TO CLA
STRK 68 12 09 CH-46 D	C L	45 3 1	152570	HMM-161	SV	S J D M
STRK 69 01 07 CH-46 A	C L	61 5	152552	HMM-165	SV	S J D M
STRK 69 01 10 CH-46 A	C L	61 5	150935	HMM-164	SV	S J D M
STRK 69 01 12 CH-46 A	C L	46 3 A	150961	HMM-265	SV	S J D M
X 69 01 12 CH-46 A	C L	45 3	S	S	S	NOT ON HQ LIST
STRK 69 01 15 UH-1 E	C L	34 1 S	154762	HML-367	EA	S J D M

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- - - - - LISTING OF MARINE CORPS HELICOPTER LOSSES IN SOUTHEAST ASIA (CONTINUED) - - - - -

STRK #	DATE YR MO DA	A/C TYPE	L/ISS TYPE	CODES		A/C BU. NO.	SQUADR	CV	SOURCE	REMARKS		
				DE	M-							
				C	C							
STRK +	69 01 16	UH-1	S	0	L	34 61	1	154750	VMM-2	SV	S J O 4 J	
STRK +	69 01 18	CH-46	D	0	L	45 61	3	154706	HMM-161	SV	S J O 4 J	
STRK +				0	DC						S	
STRK	69 01 25	CH-46	D	0	L	46	3	L	153346	HMM-165	SV	S J O 4
STRK	69 01 26	CH-46	D	0	L	57	4	S	153977	HMM-364	SV	S J O 4
STRK +	69 01 26	UH-1	E	0	L	34 61	1	151892	HML-167	SV	S J O 4 J	
STRK	69 01 27	UH-1	S	0	L	45	3	1	155338	HML-367	LA	S J O 4
STRK +	69 01 30	UH-34	D	0	L	44 45	5	1	148822	HMS-36	SV	S J O 4 J
STRK	69 02 04	UH-34	D	0	L	44	5	1	150212	HMM-362	SV	S J O 4
STRK	69 02 04	UH-34	D	0	L	44	5	1	143965	HMM-362	SV	S J O 4
STRK	69 02 07	CH-46	D	0	L	57	4	S	153334	HMM-364	SV	S J O 4
STRK +	69 02 07	CH-46	A	0	L	43 57	6	0	150269	HMM-265	SV	S J O 4 J
STRK +	69 02 23	UH-1	E	0	L	34 45	1 3	S	152424	VMM-6	LA	S J O 4 J
STRK +	69 03 02	CH-46	A	0	L	52	6	1	152537	HMM-164	SV	S J O 4 S
STRK	69 03 05	CH-46	D	0	L	46	3	L	152556	HMM-262	SV	S J O 4
STRK	69 03 07	CH-46	D	0	L	45	3	L	154041	HMM-262	SV	S J O 4
STRK	69 03 14	CH-46	D	0	L	57	4	L	154341	HMM-161	SV	S J O 4
STRK	69 03 26	CH-46	D	0	L	57	4	0	154813	HMM-263	SV	S J O 4
STRK +	69 03 29	UH-1	E	0	L	34 28	1	1	153750	HML-367	SV	S J O 4 S
STRK	69 04 01	CH-46	D	0	L	45	3	S	154814	HMM-263	SV	S J O 4
STRK +	69 04 09	CH-53	A	0	L	46 48	3 6	1	153738	462	SV	S J O 4 J
STRK +	69 04 11	CH-46	D	0	L	46	3	1	153332	HMM-364	SV	S J O 4
						45	3					

----- LISTING OF MARINE CORPS HELICOPTER LOSSES IN SOUTHEAST ASIA (CONT'D) -----

--DATE-- YR MO DA	A/C TYPE	LOSS TYPE	COPES-- OF X- C		A/C NO.	SQUADRON	CY	SURFACE	REMARKS
			OF	C					
STRK 69 04 14	CH-46 D	C L	57	4 L	153361	HMM-364	SV	S J O M	
STRK 69 04 19	CH-46 D	C L	57	4 L	154835	HMM-263	SV	S J O M	
STRK 69 04 22	CH-46 D	C L	45	3 L	154840	HMM-161	SV	S J O M	
STRK 69 04 23	CH-46 D	C L	45	3 L	153336	HMM-161	SV	S J O M	
STRK 69 04 24	CH-46 D	C L	45	3 L	154021	HMM-262	SV	S J O M	
STRK 69 05 02	CH-46 D	7 L	46	3	152559	HMM-262	SV	S J O M	
			13	2				J	
STRK 69 05 02	CH-46 D	C L	45	3 7	154795	HMM-263	SV	S J O M	
STRK 69 05 03	UH-1 E	0 L	43	1	153755	HML-367	SV	S J O M	STRICKEN 9-67
	15						S		
STRK 69 05 03	UH-1 E	C L	43	1 0	153337	HML-367	SV	S J O M	
	12	0 L					S		DROPPED IN SALVAGE TDS
STRK 69 05 05	CH-53 A	0 L		7	153730	462	SV	S J O M	NOT IN HQ LIST
STRK 69 05 10	CH-46 D	C L	45	3 L	152540	HMM-262	SV	S J O M	
					152580		J		
STRK 69 05 12	CH-46 A	0 L	47	7	152523	HMM-265	SV	S J O M	
STRK 69 05 19	UH-1 E	0 L	46	1	152425	VMO-6	SV	S J O M	
STRK 69 06 02	CH-46 D	C L	57	4 L	153970	HMM-161	SV	S J O M	
STRK 69 06 03	CH-46 D	C L	57	4 0	153384	HMM-262	SV	S J O M	
			45	3			J		
STRK 69 06 05	CH-46 D	C L	57	4 L	153315	HMM-262	SV	S J O M	
STRK 69 06 07	CH-46 D	C L	45	3 L	153451	HMM-161	SV	S J O M	
STRK 69 06 07	CH-46 D	C L	45	3 L	153963	HMM-262	SV	S J O M	
			46	3			J		
STRK 69 06 07	CH-46 D	0 L	46	3	153397	HMM-364	SV	S J O M	
STRK 69 06 07	CH-46 A	0 L	43	6	152525	HMM-265	ZZ	S J O M	LPH02
K 69 06 10	CH-46	C L		0	152580	HMM-262	SV	S J O M	ON HQ LIST
STRK 69 06 14	CH-46 A	C L	52	8 S	152529	HMM-165	SV	S J O M	ENROUTE FLIGHT, PERHAPS 47 6
	11						S		
STRK 69 06 17	UH-1 E	0 L	43	1	154756	HML-367	SV	S J O M	

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- - - - - LISTING OF MARINE CORPS HELICOPTER LOSSES IN SOUTHEAST ASIA (CONT'D) - - - - -

--DATE-- YR MO DA	A/C TYPE	LOSS TYPE	-CONDNS-			A/C M/N, NO.	SQUADRON	CT	SOURCE	REMARKS
			OF	M	C					
STRK 69 06 21	CH-46 D	C L	45	3	L	154811	HMM-165	SV	S J D M	
STRK 69 07 04	CH-53 A	T L	45	3		153290	HMH-463	SV	S J D M	
+			46	3					J	
STRK 69 07 08	UH-1 F	C L	43	1	S	152420	HML-167	SV	S J D M	
STRK 69 07 15	UH-1 F	C L	45	3	S	154780	HML-367	LA	S J D	
STRK 69 07 16	CH-46 A	D L	52	8		150949	HMM-265	ZZ	S J D M	-150941 ON HQ LIST
+						150941				LPH02
STRK 69 07 20	CH-46 A	D L	45	3		152540	HMM-165	SV	S J D M	-548 CL 11-67, BOTH ON HQ LIST
+									S	
STRK 69 07 27	CH-46 D	C L	57	4	L	154018	HMM-364	SV	S J D M	
STRK 69 07 29	UH-1 F	T L	34	1		152418	HML-167	SV	S J D M	
+			43	1					J	
STRK 69 07 31	CH-46 D	C L	57	4	L	153791	HMM-262	SV	S J D M	
STRK 69 08 03	CH-46 D	C L	45	3	F	154643	HMM-263	SV	S J D M	
STRK 69 08 04	UH-1 F	C L	61	5	D	155339	HML-367	LA	S J D	
STRK 69 08 11	CH-46 A	T L	45	3		152530	HMM-164	ZZ	S J D	LPH08
STRK 69 08 26	CH-46 D	C L	57	4	S	153392	HMM-364	SV	S J D	
STRK 69 08 28	CH-46 A	C L	44	5	A	151916	HMM-164	SV	S J D	
STRK 69 09 01	CH-53 A	D L	47	6		153232	HMH-361	SV	S J D	
+						155282			J	
STRK 69 09 19	UH-1 G	C L	43	1	S	015170	VH7-2	SV	S J D M	
STRK 69 10 09	CH-46 D	D L	47	6		154794	HMM-364	SV	S J D	DEPPED IN DANANG RAY
+	08					153319			S	
+									J	-153319 ON HQ LIST, STILL UP
STRK 69 10 10	UH-1 F	C L	34	1	S	152430	HML-367	SV	S J D	
STRK 69 11 01	CH-53 A	D L	35	5		152394	HMH-361	SV	S J D M	
+						152339			J	
STRK 69 11 12	UH-1 G	C L	43	1	S	015080	VH7-2	SV	S J D M	
+			57	4					J	
STRK 69 11 13	CH-46 D	C L	57	4	A	154791	HMM-263	SV	S J D M	
STRK 69 11 30	CH-46 D	C L	57	4	D	153996	HMM-364	SV	S J D	
+	29								C	

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- - - - - LISTING OF MARINE CORPS HELICOPTER LOSSES IN SOUTHEAST ASIA (CONT'D) - - - - -

--DATE-- YR MO DA	P/C TYPE	LOSS TYPE	ACADES			A/C BU. N. #	SQUADRON	CY	SOURCE	REMARKS
			OF	4+	F					
STRK 69 12 02	UH-1 E	C L	45	3	S	154765	HML-367	LA	S J 0	
STRK 69 12 07	CH-46 D	C L	57	4	O	153954	HMM-263	SV	S J 0	
STRK 69 12 22 + 21	UH-1 E	C L	13	1		153758	HML-167	SV	S J 0	D, DROPPED BY ARMY CH-47
STRK 69 12 22	UH-1 E	C L	7			152417	HML-167	SV	S J 0	
STRK 69 12 28	CH-46 D	C L	49	7		153379	HMM-364	SV	S J 0	
STRK 70 01 11	CH-46 D	C L	44	5		153401	HMM-263	SV	S J 0	
STRK 70 02 12	CH-46 D	C L	45	3	O	154007	HMM-267	SV	S J 0	
STRK 70 02 16	CH-46 D	C L	46	3		153954	HMM-161	SV	S J 0	
STRK 70 02 18	AH-1 G	C L	13	2	I	815072	HML-367	SV	S J 0	
STRK 70 02 26 + 27	AH-1 G	C L	18	2		815198	HML-367	SV	S J 0	
STRK 70 03 06	AH-1 G	C L	43	1	S	817027	HML-367	SV	S J 0	
STRK 70 03 06	CH-46 D	C L	18	2	L	153390	HMM-262	SV	S J 0	
STRK 70 03 07	CH-46 D	C L	61	5		154043	HMM-263	SV	S J 0	
STRK 70 03 10	CH-46 D	C L	46	3		153957	HMM-161	SV	S J 0	
STRK 70 03 11	AH-1 G	C L	13	2	S	815190	HML-367	SV	S J 0	STRICKEN 6-70
STRK 70 03 13	UH-1 E	C L	44	5		151279	HML-167	SV	S J 0	
STRK 70 03 21	UH-1 E	C L	61	5	S	152427	HML-167	LA	S J 0	
STRK 70 03 25 + 26	AH-1 G	C L	45	3		815213	HMM-361	SV	S J 0	STRICKEN 6-70
STRK 70 03 25	AH-1 G	C L	46	3		817045	HMM-361	SV	S J 0	STRICKEN 6-70
STRK 70 04 05	CH-46 D	C L	61	5	O	154830	HMM-161	SV	S J 0	
STRK 70 04 10	UH-1 E	C L	61	5	O	151297	HML-167	SV	S J 0	
STRK 70 04 28 + 29	UH-1 E	C L	16	2	A	151280	HML-167	SV	S J 0	
STRK 70 05 07 + 08	UH-1 E	C L	52	8		151845	HML-167	SV	S J 0	SEPARATE ENTRY
STRK 70 05 13	UH-1 E	C L	44	5		154450	HML-167	SV	S J 0	

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----- LISTING OF MARINE CORPS HELICOPTER LOSSES IN SOUTHEAST ASIA (CONT'D) -----

--DATE-- YR MD DA	A/C TYPE	LOSS TYPE	-CODES--			A/C HIN/NO.	SQUADRN	CY	SOURCE	REMARKS
			OF M-	C	---					
STRK 70 06 01	CH-46 D	C L	45	3	4	154797	HMM-262	SV	S J 0	
STRK 70 06 04	CH-46 D	C L	60	2	L	153403	HML-167	LA	S J 0	
STRK 70 06 25	UH-1 E	O L	35	1		151264	HML-167	Z7	S J 0	AH017
STRK 70 07 19	UH-1 E	O L	60	2	0	154773	HML-167	SV	S J 0	
STRK 70 08 07 + 25	CH-46 D	O L	60	2	0	152576	HMM-364	SV	S J 0	J
X 70 08 07 + 25	CH-46 D	O L	57	4	L	154809		SV	J	SFF 70-08-25
						263			S	
						364			S	
STRK 70 08 18	UH-1 E	O L	45	3	S	154969	HML-167	SV	S J 0	
STRK 70 08 25 + 07	CH-46 D	O L	45	3		154809	HMM-263	SV	S J 0	
			57	4		154009		J	J	-029 STILL JP
STRK 70 08 25 + 07	CH-46 D	O L	49	7	0	153955	HMM-364	SV	S J 0	
X 70 08 25	CH-46 D	O L	60	2		152576		SV	J	SFF 70-08-07
STRK 70 09 07	CH-46 D	O L	45	3	0	154793	HMM-262	SV	S J 0	
STRK 70 09 13	CH-53 D	O L	60	2	0	156661	HMH-463	LA	S J 0	
STRK 70 09 14	CH-53 D	O L	45	3	S	156665	HMH-463	LA	S J 0	
STRK 70 09 17 + 00	CH-46 D	O L	49	7	0	154044	HMM-262	SV	S J 0	J
STRK 70 09 21 + 22	CH-46 D	O L	57	4	0	152577	HMM-262	SV	S J 0	S
STRK 70 10 01 + 01	AH-1 G	O L	57	4	0	815074	HML-367	SV	S J 0	
						915071		J		
STRK 70 10 12 + 11	UH-1 E	O L	60	2	0	152421	HML-167	SV	S J 0	S
STRK 70 10 26	CH-53 D	O L	52	8		156670	HMH-463	SV	S J 0	
STRK 70 10 27	CH-46 D	O L	57	4	0	154639	HMM-364	SV	S J 0	
STRK 70 11 19	CH-46 D	O L	60	2	0	154837	HMM-263	SV	S J 0	
STRK 70 11 24	UH-1 E	O L	44	5		154952	HML-167	SV	S J 0	

- - - - - LISTING OF MAJOR CIRRUS HELICOPTER LOSSES IN SOUTHEAST ASIA (CONT'D) - - - - -

--DATE-- YR MO DA	A/C TYPE	LOSS TYPE	-LOSSES-			A/C REG. NO.	SQUADRN	CY	STOIC	REMARKS
			DE	MO	YR					
STRK 70 12 04	AH-1 G	C L	76	1	0	815073	HML-167	SV	S J 0	
STRK 70 12 19	CH-46 D	C L	45	3	S	153351	HMM-364	SV	S J 0	
STRK 71 01 11	CH-46 D	C L	7			153356	HMM-165	ZZ	S 0	LPH02
STRK 71 01 21	CH-46 D	C L	46	3	0	153354	HMM-364	SV	S J 0	
STRK 71 02 01	UH-1 F	C L	61	5	S	151881	HML-167	SV	S J 0	
STRK 71 02 05	CH-46 D	C L	57	4	L	153376	HMM-364	SV	S J 0	
STRK 71 02 18	CH-53 D	C L	48	6		156667	HMM-463	SV	S J 0	
STRK 71 02 23	CH-53 D	C L			U	156660	HMM-463	SV	S 0	
STRK 71 03 30	CH-46 D	C L			U	154842	HMM-262	SV	S 0	
STRK 71 03 31 * 30	CH-46 D	C L	57	4	L	154802	HMM-262	SV	S J 0	S
STRK 71 04 19	CH-46 D	C L	57	4		154830	HMM-262	SV	S J 0	

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APPENDIX C

DATA QUALITY ASSESSMENT AND CORRECTIONS

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INTRODUCTION

A considerable amount of systematic quality assessment was conducted in the preparation of the Marine Corps data summaries. For the sortie data, only a few minor discrepancies of any consequence have been found and corrected. With the attrition data, on the other hand, a major effort was undertaken to purify the set of Marine Corps helicopter losses, both operational and combat. Nothing was checked or corrected for the Army data summaries.

SORTIE SUMMARIES

Quality Assessment

Through recourse to the original OpRep-5 messages, reported sorties were obtained for 3 one-month periods: March of 1966, 1968, and 1970; and this data was compared against the corresponding entries in the OPREA file. Initially, considerable disagreement was observed in comparing the data in monthly summary form. OPREA counts were found to be high for 1966 and 1968, but in perfect agreement for 1970. When the data for 1966 and 1968 was scrutinized entry by entry, a number of discrepancies were isolated, which will be discussed next.

OPREA Completeness

Almost the entire observed difference in the summaries resulted from the fact that a certain type of data, representing the activities of Marine units stationed at sea off the coast of South Vietnam, was absent from the hard-copy file of messages scrutinized. The OPREA file included these reports. Once this discrepancy was isolated, the sample summaries agreed extremely well with the remainder of the data. Residual disagreements have all been identified and are discussed in the following sections.

Skewed Tabulations

Relatively minor discrepancies in 1968 were attributed to poor data tabulation techniques on the transmitting message form. Data columns would occasionally become badly misaligned, ascribing sorties to the wrong mission type. For the 3 one-month periods of altogether approximately 15 weekly reports checked, data was badly misaligned on several messages. However, the OPREA file coders were able to decipher the data from all but one of these messages correctly.

An example of poor tabulation is shown in figure C-1, which depicts that portion of the OpRep-5 message in which most of the helicopter sorties are reported. (We purposely refrain from assisting the reader in the reading of figure C-1.) When compared with the original typed message form shown in figure C-2, it is easy to understand how sorties can get ascribed to wrong mission categories. It is pointed out that for this example the OPREA file entries appear exactly as intended, as shown in figure C-3, demonstrating the enormous care in data encoding on the part of the JCS data processors.

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PAGE SIX RUMSAV 075W C O N F I D E N T I A L

F-4B	27	27
A-4E	2	2
EF-10B	35	35

SECTION IV - FIXED WING AIRLIFT/SPECIAL MISSION

N1. NUMBER OF SORTIES

TYPE	COMBAT	LOGISTICS	AIR	FLARE	REF	TOTAL	PAX/CARGO
ACFT	TC/CARGO	TC/CARGO					
C-117D		28		24		52	94R-2
US-28							4-NA

KC-130F	20R	1	13	16	238	6643-1011
---------	-----	---	----	----	-----	-----------

SECTION V - HELICOPTERS

N1. NUMBER OF SORTIES/TASKS

TYPE	ARMED	COMBAT	COMBAT	LOC	LOG	CAS	
ACFT	HELO	TC	CARGO	TC	CARGO	EVAC	SAR
UH-34D	16-2	059-19U	206-64	325-131	148-71	886-348	4-1
UH-1E	1606-694					7-2	
CH-46A/D		329-83	634-256	143-64	692-351	221-91	12-6
CH-53A				103-34	587-62		5-4
	VIS				NO.		TONS
	RECON	RECON	TAC(A)	TAR	TOTAL	APX	CARGO

BT

OO RUC1HOA RUHHBBA RUHHBRA
DE RUMSAV 119W 0690735/

9 090735Z MAR 68 -
FM CG FIRST MAW
TO AIG NINE ONE EIGHT
INFO RUC1HOA/CMC -
RUHKM/CG FFPAC
ZEN/CG III MAF
RUMSAR/SEVENTH AF TACC
RUMSAL/SEVENTH AF CC
BT

070
1154230
AA
A02

C O N F I D E N T I A L

FINAL SECTION OF TWO SECTIONS

UH-34D	105-15	75-29	2424-851	2644	73
UH-1E	109-37	13-8	1755-760	319	NA
CH-46A/D	17-4	5-3	2053-858	4799	840
CH-53A		21-8	X716-108	1618	950

X21. ORDNANCE EXPENDED

TYPE ACFT	7.62//	2.75FFAR	.50 CAL.
-----------	--------	----------	----------

UH-34D	200
--------	-----

UH-1E	324,130	4359
-------	---------	------

CH-46A/D	2725	2370
----------	------	------

22. NUMBER OF BATTLEFIELD CASUALTIES/EVACUATED

FIG. C-1: PORTION OF OPREP-5 MESSAGE

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IMMEDIATE

CONFIDENTIAL

9 MARCH 1968

SECTION III - RECONNAISSANCE

11. NUMBER OF SORTIES

TYPE ACFT	RECON TAC(A)	PHOTO IR	ECM	TOTAL
RF-4C		23	9	32
TA-4C	9	14		23
O-1C/D	36	8		44
F-4B	27			27
A-6A	2			2
MF-10B				35
				35

SECTION IV - FIXED WING AIRLIFT/SPECIAL MISSION

11. NUMBER OF SORTIES

TYPE	COMBAT	LOGISTICS	AIR	
ACFT	TC/CARGO	TC/CARGO	FLARE	REF TOTAL
C-117D	28	24	52	846-2
UH-3B				NA
HC-13OF	208	1	13	16 238 6643-1011

SECTION V - HELICOPTERS

11. NUMBER OF SORTIES/TASKS

TYPE	ARMED	COMBAT	LOG	LOG	GAS	
ACFT	HELC	TC	CARGO	CARGO	EW/C	SAR
UH-1H	164	654-130	106-4	325-131	148-71	886-314 4-1
UH-1E	1606-697					7-2
CH-46A/D		329-83	634-256	143-64	692-351	221-91 12-6
CH-53A				103-34	587-62	5-4
	VIS				NO.	TONS
UH-3B	205-25	75-22		2124-271	2644	73
UH-1E	109-37	13-8	20-16	1755-760	319	NA
CH-46A/D	17-4	5-3		2053-858	4799	840
CH-53A			21-8	716-108	1618	950

21. ORDNANCE EXPENDED

TYPE ACFT	7.62MM	2.75MM	.50 CAL.
UH-3B	200		
UH-1E	324,130	1359	
CH-46A/D	2725		2370

22. NUMBER OF BATTLEFIELD CASUALTIES EVACUATED

UH-3B	805
UH-1E	3
CH-46A/D	394

SECTION VI - RECAP

11. OTHER SORTIES (SORTIES/TASKS FOR HELICOPTERS)

TYPE	TC/TC	ADMT	ADMIN/AVIATION	OTHER	TOTAL
F-4B			2	6	8
F-4C		2		2	4
A-6A	6		7	32	45
A-6A	3		7		10
TA-4C	1		2		3

FIG. C-2: REPRODUCTION OF TYPED MESSAGE FORM (DITTOED ORIGINAL)
FOR THE MESSAGE REPRODUCED IN FIG. C-1

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Message data heading		Armed helo	Combat TC	Combat cargo	Log TC	Log cargo	Cas evac	SAR
OPREA code		43	45	46	47	48	57	41
UH-34D	Message	16	659	206	328	143	886	4
	OPREA	16	659	206	143	328	886	4
UH-1E	Message	1606					7 b	
	OPREA	1606					10	
CH-46	Message		329	634	143	692	221	12
	OPREA		329	634	143	692	221	12
CH-53A	Message				103	587	5	
	OPREA				103	587	5	
Message data heading		Vis recon	Recon	TAC (A)	TAR	Trng	Maint	Admin/L
OPREA code		18	60	65	64	51	52	49
UH-34D	Message	105	75			4	16	823
	OPREA	105	75			4	16	823
UH-1E	Message	109	13	20			56	344
	OPREA	109	13	20			56	344
CH-46	Message	17	5					338
	OPREA	17	5					338
CH-53A	Message				21 a&b		44	
	OPREA				13 (13)		44	

**FIG. C-3: EXAMPLES OF DIFFERENCES BETWEEN
ORIGINAL DATA AND OPREA ENTRIES**

7 MARCH 1968

a - Code error

b - Erroneous entry

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Figure C-4 clearly demonstrates actual discrepancies in the OPREA file sortie data directly attributable to poor tabulation. In this figure, as also in figures C-3 and C-5, the order of the columns is the same as on the original message. Thus, for the CH-46 aircraft, the 372 sorties accumulated in the Combat troop carrying category appear indexed as Armed Helo, the category of the next column over, etc. Altogether for this one weekly report, three of the entries for the CH-46, three for the UH-1, and two for the UH-34 are encoded with the mission category of the adjacent column.

It should be noted, however, that this miscoding due to data skewing does not lead to errors in the Total sorties category for any time period, and that the potential effect in summaries by mission type is somewhat reduced when several missions are combined into new larger categories, as was done with the summaries produced in this study.

Miscellaneous Errors

Figures C-3 and C-4 also demonstrate all the other types of error discovered in the OPREA sortie data. These errors are labeled (a) through (d) in the figures, as follows:

Mission Code Reversal (a)

Figure C-3 shows an accidental reversal of mission codes 47 and 48. This type of mistake may be expected to occur occasionally for pairs of similar missions. For the present summary such similar missions are usually combined; for example, these OPREA codes 47 (Logistic troop carry) and 48 (Logistic cargo carry) are combined into M-6 (Logistic troop and cargo). Therefore, this kind of error in OPREA is not likely to affect the present summary.

Erroneous Entry (b)

Figure C-3 shows one or, possibly, two cases of the wrong number of sorties entered. As both figures C-1 and C-2, which display data from the same report as shown in figure C-3, indicate, the entry under "Cas Evac" for the UH-1E aircraft should be 7 sorties, whereas OPREA contains 10. In the other case in question, OPREA shows no sorties for code 64 (Tactical aircraft recovery), while 21 such sorties are actually reported on the source message. On the other hand, OPREA shows 13 sorties under category 13 (Target combat air patrol) which does not correspond to any datum on the source document.

Mission Miscoded Due to Skewing (c)

This phenomenon, shown in figure C-4, has been discussed above.

Omitted Datum (d)

Figure C-4 shows that OPREA has failed to register the 17 sorties reported as mission 18 (Visual reconnaissance) for the CH-46.

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C-6

Message data heading		Armed helo	Combat TC	Combat cargo	Log TC	Log cargo	C/C	SAR	Cas evac
OPREA code		43	45	46	47	48	44	41	57
UH-34D	Message	24	323	224	363	206	60	20	869
	OPREA	24	323	224	363	206	60	20	869
UH-1E	Message	1283						4	5
	OPREA	1283						4	5
CH-46	Message	c	372	314	174	257		5	75
	OPREA	372	314	174	257		5		75
CH-53A	Message				100	476			
	OPREA				100	476			
Message data heading		Vis recon	Recon	TAC (A)	TAR				
OPREA code		18	60	65	64				
UH-34D	Message	62	57	c		5			
	OPREA		62	57		5			
UH-1E	Message	63	59	c					
	OPREA		63	59					
CH-46	Message	17	68	36	83				
	OPREA	d							
CH-53A	Message				9				
	OPREA				9				

FIG. C-4: EXAMPLES OF DIFFERENCES BETWEEN
ORIGINAL DATA AND OPREA ENTRIES

14 MARCH 1968

c - Skewed tabulation

d - Omitted data

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Discrepancies, But Not Errors

Figure C-5 shows a discrepancy much like the discrepancies initially discovered due to the inclusion, within OPREA, of statistics from off-shore operations, demonstrating OPREA's completeness.

In the example of figure C-5, OPREA includes data customarily reported in the OpRep-5 messages but absent from this particular weekly report; i. e., the message tabulation is missing two columns of data. It may be assumed that these sorties have later been supplied on a change message; but such a change message has not been found in the hard-copy files consulted.

Findings

Qualitative Assessment

The limited quality determination undertaken has led to the following conclusions for the sortie data:

1. The OPREA file is probably more complete than data that can be derived from any similar file of hard-copy messages in existence.
2. The relatively infrequent sortie entry ascribed to the wrong mission does not affect the total sortie count for the month. While it is likely to affect summaries by mission type, the magnitude of this effect is reduced by combining missions into new categories (especially those reported in adjacent columns).
3. The occasional error in the sortie count entered in OPREA is random in nature and tends to cancel out in summary statistics.
4. Error types seem to be localized in time. March 1966 shows only the random entry error. March 1968 shows predominately coding errors due to skewing and code reversal. March 1970 shows no errors at all.

Quantitative Assessment

The assessment conducted on the sample of three one-month periods involved a total of 595 OPREA sortie entries representing a total of 106,501 sorties. Of these, 89 entries reporting 7305 sorties by off-shore units, and 4 entries reporting 966 sorties mistakenly omitted from the original reporting message (figure C-5), could not be checked further.

The remaining 502 entries of 98,230 sorties were checked, with the following statistical findings. Eight entries were miscoded due to skewing, all from the same message. Four of these produced errors in the summaries by mission type; but none affected reported totals (subtract 8 or 4 from 502 to obtain appropriate totals). Three entries were miscoded for other reasons, none of which produced errors in any of the summaries (subtract 3 or 0).

Additionally, there were six minor entry errors, none greater than 20 sorties, which together produced an overall discrepancy of only 2 sorties, as follows (subtract 6):

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Message data heading		Armed helo	Combat TC	Combat cargo	Log TC	Log cargo	C/C	SAR	Cas evac
	OPREA code	43	45	46	47	48	44	41	57
UH-34D	Message	24	73		342	146		16	645
	OPREA	24	73	456	342	146		16	645
UH-1E	Message	1364			2				4
	OPREA	1364			2				4
CH-46	Message		623		107	316		20	124
	OPREA		623	309	107	316		20	124
CH-53A	Message		59		77	312			2
	OPREA		59	120	77	312	1		2
Message data heading		Via recon	Recon	TAC (A)	TAR				
	OPREA code	18	60	65	64				
UH-34D	Message	66	88						
	OPREA	66	88						
UH-1E	Message	36	19	16					
	OPREA	36	19	16					
CH-46	Message	19	34						
	OPREA	19	34						
CH-53A	Message				42				
	OPREA				42				

FIG. C-5: EXAMPLES OF DIFFERENCES BETWEEN
ORIGINAL DATA AND OPREA ENTRIES

29 MARCH 1968

e – Omitted on original message

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	Sorties	
	Reported (message)	Entered (OPREA)
March 1966	113	133
March 1968	131	113
March 1968	968	986
March 1968	7	10
March 1968	17	0
March 1968	21	13
Total	1257	1255

Thus, 485 out of 502 entries (96.6 percent) were correct, and only 10 out of 502 entries (2.0 percent) introduced any error in the summaries. Most of these errors were too small to require correction on the monthly scale, and would tend to cancel in the yearly or overall summaries. The overall sum of sorties was off by only 2 out of 98,230 (0.002 percent).

Even though, for the 3 months tested, the original errors produced only insignificant perturbations in the more-highly aggregated summary data format, the effects evident on separation by mission category were of a more severe nature, as discussed in the next section. It is perhaps of interest to note that of the 3 months discussed sofar, one is among a total of 6 months of sortie summary data that ultimately required correcting. However, the fact that this month required correcting was established by an independent criterion as described below, (i.e., not simply because a lot of detailed information had been researched for this month).

SORTIE SUMMARIES: CORRECTIONS

Locating Possible Errors

While some of the effects of the skewed data tabulations cancel when adjacent columns of data are combined, others persist; and sometimes they lead to fantastic results. Thus, from the file entries shown in figure C-4, one may deduce erroneously that the CH-46 flew 372 sorties in the Armed Helo mission category, a category in which the CH-46 usually does not log any sorties. Such a datum is easy to spot as extremely unlikely and therefore suspect.

The rest of the errors produced by skewing of the data shown in figure C-4 would appear to be more difficult to spot among monthly summary data as shown below:

- For the CH-46, the Combat troop and cargo category lost 372 out of 686 sorties and gained 174 sorties, a net effect of 29 percent for the week reported. This represents approximately a 7 percent loss in the monthly accumulations. The Logistic troop and cargo category lost 174 sorties out of 431, or 30 percent, which again corresponds to a 7 percent effect for the month as a whole.

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- For the UH-34, 57 out of 119 sorties were lost from the Surveillance mission category (OPREA codes 18 and 60), a 48 percent effect, which reduces to perhaps 11 percent for the monthly data. The Combat support category, which combines data from OPREA code columns 41, 44, 64, and 65, gained 57 sorties in addition to the 85 correctly assigned, producing a 15 percent effect in the monthly data.
- Similarly, for the UH-1, the Surveillance category lost 8 percent of the monthly data; and the Combat support missions gained 39 for a monthly expected value of perhaps 54, representing a 70 percent increase.

With the exception of the first example (CH-46 on Armed Heli mission), none of these effects in the monthly accumulations would be discernible among the legitimate fluctuations present in the data.

Checking Possible Errors

A systematic scan of an earlier version of the monthly Marine Corps sorties summaries produced 8 separate combinations of aircraft type and month, and one period of 3 months, during which one or more entries appeared suspect, indicating the desirability of further checking. Recourse to the source messages has led to corrections in 6 of these cases.

Suspect Data - Verified Correct

Two of the suspect one-month periods and the 3-month period have been verified to be correct as derived from OPREA. For the record, they represent the following sortie data:

June 1966	CH-46	M-6 high
July 1966	CH-37	M-3 and M-6 high
Sep-Nov 1967	CH-46	All too low

During the period September through November 1967, all the CH-46 aircraft were grounded, except for emergency operations.

Suspect Data - Requiring Correction

Six of the one-month periods contained errors as follows, which have been rectified:

Period	Aircraft	Suspect item	Summaries corrected
Nov 1966	CH-37	M-2 high	M-2
Dec 1966	UH-34	M-2 high	M-2, 3, 4, 6
Jun 1967	UH-1	M-1 very high	M-1
Jun 1967	UH-34	M-1 & M-2 high	M-1, 2, 5, 6
Mar 1968	CH-46	M-1 high	M-1, 2, 3, 4, 5, 6
Aug 1968	CH-46	M-5 high	M-5, 6

These errors involve almost exclusively the type previously discussed as erroneous entry. Four of the five errors in December 1966, coming from one message, appear as follows: 461 entered as 61, 344 entered as 34, 596 entered as 556, and 133 entered as 2314. (This last entry represents a datum so far from the norm that it signifies the

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existence of problem data clearly - it produced the suspect summary item and led to the discovery of the error.) The error of June 1967 for the UH-1 involves a datum of 1405 entered as 7405 sorties. For the UH-34 during the same month, an 8 is stored as 844 and 150 shows up as 1506, along with some skewing problems and other minor errors. The March 1968 case has been discussed with figures C-3, C-4, and C-5. The August 1968 error represents miscoding, probably due to skewing, as 1778 Logistic cargo carrying sorties were listed under the heading of Command and control.

ATTRITION SUMMARIES: QUALITY ASSESSMENT

Losses

General

Sortie accumulating and reporting is a matter of routine; an aircraft loss is quite a different matter. Each loss incident generates a considerable volume of reports; much information is required, yet it is often unknown or poorly understood. Thus, it is quite easy to see how conflicting information can be found in various attrition data bases.

For helicopters there appear to be further complications; when a high-performance fixed-wing aircraft is lost, there is usually little doubt about its chances for recovery. The severity of the high-speed impact almost certainly precludes ever returning the aircraft to flying status. A helicopter, on the other hand, may suffer severe damage and be considered a loss; often, however, as was the case in Southeast Asia, it is possible to salvage the wreckage and rebuild the aircraft. Thus, a helicopter reported lost may actually be found flying six months later; only files which are continually updated will carry such an item with its correct status.

Army Losses

It has been learned that until recently the Army has spent considerable effort keeping the OPREA entries of Army helicopter losses in a high state of purity.

Marine Losses

When a comparison was made of the list of Marine Corps helicopter losses from OPREA and from the Naval Safety Center file, a considerable number of discrepancies was noted. Because the Naval Safety Center does not demand a report for each incident, (merely the incidents be reported whenever the tempo of operations permits the submission of such a report), OPREA was expected to contain some incidents not listed with the Safety Center. However, in addition to a number of such events (about 15 percent), almost as many were also found held by the Safety Center but not by OPREA. (Note that, while individually considerable in magnitude, these two discrepancies tend to cancel each other in yearly summaries.)

It was, therefore, considered essential to generate an improved list of Marine Corps helicopter losses.

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Other Attrition Parameters

In addition to aircraft losses, attrition involves the occurrence of equipment damage and loss or wounding of personnel. When Marine Corps listings of these parameters from OPREA were compared with corresponding Safety Center statistics, the disagreement between the summaries proved even greater than for the aircraft losses, as shown in table C-1. However, beyond trying to understand the origins of these differences, no attempt has been made to modify the data.

Combat Damage

The discrepancy of approximately 15 percent appears to be due in large part to "holes missed" in the initial damage incident data reported to OPREA. The relatively more leisurely report schedule tolerated for the reports reaching the Safety Center may be expected to lead to somewhat more accurate accounting in this and the other categories of the Safety Center file.

Operational Damage

Partly for reasons offered in the previous paragraph, and partly because of the very purposes for which the files are created, the Safety Center would be more likely to receive word on minor operational damage through its reporting system than the OPREA file would via the daily OpRep-5.

Personnel Lost

One major problem with this parameter appears to be that, at the time of the report, the number of passengers on board an aircraft when it is lost is quite uncertain (e.g., the aircraft might be carrying passengers previously picked up for evacuation).

Personnel Wounded

Here again the OpRep-5 is simply the report for summarizing only the more traumatic cases.

ATTRITION SUMMARIES: CORRECTIONS

Losses

New Marine Corps List

Attempts to resolve the discrepancies in loss entries of various files have led to a new list of Marine helicopter losses in Southeast Asia, published as appendix B of this volume; data from this list is included in the attrition summaries. This new list represents a superposition of the best information contained on these incidents in the OPREA file, the Naval Safety Center file, the file of aircraft separations and reinstatements maintained by Op-511, and the set of various aircraft accident messages held by the Marine Corps Operations Analysis Group (MCOAG). Furthermore, an annotated listing resembling the set of incidents held by OPREA was obtained from Headquarters Marine Corps, and proved useful in the final solution of a few discrepancies.

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TABLE C-1

COMPARISON OF YEARLY MARINE CORPS HELICOPTER ATTRITION SUMMARIES IN SOUTHEAST ASIA
 FROM THE NAVAL SAFETY CENTER (SAFCEN) FILE, FROM THE JCS OPREA FILE,
 AND FROM THE NEW LOSS LIST

Year	Combat losses*			Combat damage		Operational losses*			Operational damage		Personnel losses		Personnel wounded	
	SAFCEN file	OPREA file	New loss list	SAFCEN file	OPREA file	SAFCEN file	OPREA file	New loss list	SAFCEN file	OPREA file	SAFCEN file	OPREA file	SAFCEN file	OPREA file
1965	14	29	28	227	188	12	4	3	39	7	38	11	128	8
1966	26	31	31	1193	1117	18	19	20	201	69	63	26	371	30
1967	50	57	58	1519	1174	28	34	30	222	9	147	74	559	35
1968	81	77	84	1436	1488	33	32	32	197	27	226	162	527	90
1969	43	42	42	921	760	30	30	31	358	134	173	116	409	99
1970	26	24	26	352	253	14	17	14	189	191	77	39	236	24
1971	6	4	6	85	31	3	2	3	32	23	20	6	40	17
Total	246	264	275	5735	5011	141	138	133	1239	460	746	434	2275	303

* Include ground losses

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Particular Data Problems

Among the many problems encountered in trying to match up incidents in the different files, the following appear relatively typical.

(a) Various files show the incident with different dates. Usually these dates could be identified as several of the following: the date the aircraft went down, when it was abandoned, when the report was issued, when the aircraft was declared destroyed during salvage operations, etc.

(b) Files show different aircraft bureau numbers. Especially OPREA would occasionally list a disfigured number (e.g., one or more digits may be missing, the number shifted within its field, etc.) or omit it altogether.

(c) Files disagree on the nature of the incident. Whether an incident represents a loss or a damage can usually be decided by its disposition in the Op-511 file, where it may be traced by its bureau number. However, that file is occasionally uncertain about the month of the loss or the location of the aircraft at the time of the incident. Whether an incident is of a combat or operational nature is usually left up to the reporting authority.

Perhaps the most troublesome parameter to resolve has been the mission (or function) performed at the time of the loss. OPREA carries such a function code; and the only file of data against which this entry can be checked is the incomplete collection of messages held by MCOAG. Almost half of the OPREA function codes checked against the messages have been found to be in error. Recurring miscoding has been attributed to the use of the word Recon, which to persons outside the Marine Corps seems to mean surveillance (with a connotation of searching) rather than troop insertion (with a connotation of hunting behind enemy lines). Another problem code appears to be the evacuation of wounded, which quite often becomes a simple combat troop carrying operation. Occasional reversals of functions such as troop and cargo were noted, but not considered serious. (It is likely that the JCS scheme for reporting mission functions should be reviewed.)

Other Attrition Parameters

No corrections were made for the summaries of Marine Corps (nor Army) aircraft damage and personnel lost or wounded parameters. It should be noted that Army analysts who devoted considerable effort to maintaining an accurate account of Army helicopter losses and kept OPREA loss data purged, rarely altered the OPREA file entries of these other attrition parameters. Thus, they remain preserved in their original configuration, as reported, according to unified-command directives for the OpRep-5 message content.

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Arlington, Virginia 22209**

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