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From: Coordinator, Marine Corps Landing Force Development Activities, Marine Corps Schools, Quantico, Virginia
To: Distribution List

Subj: Marine Corps Operations Analysis Group Study No. 1, forwarding of (U)

Encl: (1) Marine Corps Operations Analysis Group Study No. 1, Characteristics of U.S. Marine Corps Helicopter Operations in the Mekong Delta, 1962 (U) Confidential

(2) Recommended additional distribution list

1. Enclosure (1) prepared by the Marine Corps Operations Analysis Group (MCOAG) is forwarded herewith for your information and retention.

2. The subject study presents data collected during the summer of 1962 while U.S. Marine Corps helicopter operations in the Mekong Delta area of South Vietnam were being conducted by Commander Task Unit 79.3.5. Included is a summary of ground fire damage and helicopter maintenance. The approach of the study is primarily historical rather than inductive.

3. The Coordinator, Marine Corps Landing Force Development Activities forwards this study for the information of the addressees in view of its timely summary of one aspect of counter-insurgency operations.

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MARINE CORPS OPERATIONS ANALYSIS GROUP

STUDY NO. 1

CHARACTERISTICS OF U.S. MARINE CORPS HELICOPTER OPERATIONS IN THE MEKONG DELTA, 1962 (U)

12 March 1963

This study represents the view of the Marine Corps Operations Analysis Group at the time of issue. It does not necessarily reflect the official opinion of the United States Marine Corps except to the extent indicated in the forwarding letter. It includes information of an operational rather than a technical nature, and it should be made available only to those authorized to receive such information.

Enclosure (1) to
MCLFDA ltr Ser 046A7163
Dated 12 March 1963

Prepared by the
MARINE CORPS OPERATIONS ANALYSIS GROUP
Marine Corps Landing Force Development Center

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ABSTRACT

This study presents data collected on U.S. Marine Corps helicopter operations in the Mekong Delta area of South Vietnam in the summer of 1962. The salient characteristics of the operations are discussed, and analyses of ground fire damage and helicopter maintenance are presented.

INTRODUCTION

From 8 July to 3 August 1962, the author, representing the Marine Corps Operations Analysis Group, observed U.S. Marine helicopter operations in counter-insurgency warfare in the Mekong Delta area of South Vietnam. This study presents the data collected by the MCOAG representative during this period, such inferences as may be drawn from it, and discusses those features of this operation which may be of interest from the standpoint of tactical development.

Task Unit 79.3.5, a unit of FMF Seventh Fleet (TF79), was assigned to Commander, Military Assistance Command, Vietnam (COMUSMAC-V) for operational control in early April 1962. Advance elements were flown to the 3280 foot macadam airstrip on the southern outskirts of Soc Thrang on 9 April 1962. Buildup of a base at this site by Sub Unit 2, Marine Air Base Squadron 16 proceeded concurrently with preparations of the headquarters element to begin operations in the III Corps area of the Army of the Republic of Vietnam (ARVN). From 9 to 14 April, the buildup was supported by 50 sorties of GV aircraft of VMGR-152 and VMGR-352, and by 15 April the base was ready for Marine Helicopter Transport Squadron (Medium) 362 (HMM-362). HMM-362, assisted by HMM-261, began moving ashore from the U.S.S. Princeton (LPH-5) at first light on 15 April and ten hours later had completed the lift of 264 personnel and 100 tons of cargo over the 30-mile ship-to-shore distance. The first tactical troop lift mission was on 22 April 1962. During the period covered here the Soc Thrang base retained its expeditionary character; although some structures were rehabilitated and occupied, no permanent improvements were made for the unit. The operation was assigned the code name "Shu-Fly."

Detailed information on the area can be obtained from reference (a). Figure 1 shows the III Corps area and a partial order of battle; a more complete treatment of the current organization of the ARVN is given in reference (b). However, to clarify the degree to which TU 79.3.5 was responsible for the operations in which it participated, further discussion may be helpful. Figure 2, shows this task unit in the III Corps advisory command line. This is to reflect the delegation of operational planning responsibilities to Corps level by COMUSMAC-V as outlined in appendix A. To use U.S. helicopters, the Senior Corps advisor and the helicopter unit commander must concur; however, the requirement for lift may be generated at any of the lower echelons in the U.S. advisory or ARVN hierarchy, or outside it altogether, depending upon the type of forces to be used and the source of intelligence from which the requirement is derived. For example, operations involving the lift of Civil Guard or Self Defense Corps forces would be originated by the province chief with the concurrence of the U.S. advisory personnel assigned these units. In no case, however, would TU 79.3.5 generate its own requirement for operations nor, with the exception of performing limited reconnaissance on its own behalf, would it generate intelligence. Participation in the operational planning process was directed toward the matters cited in appendix A, rather than the broad direction of counter-insurgency warfare or of specific campaigns. Subject to these constraints, however, TU 79.3.5 could and did develop tactics and techniques for the employment of helicopter borne forces.

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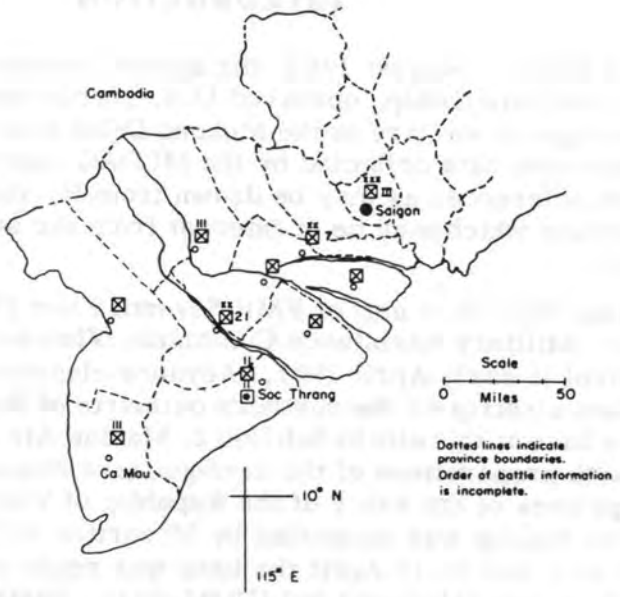

FIG. 1: III CORPS AREA, SOUTH VIETNAM

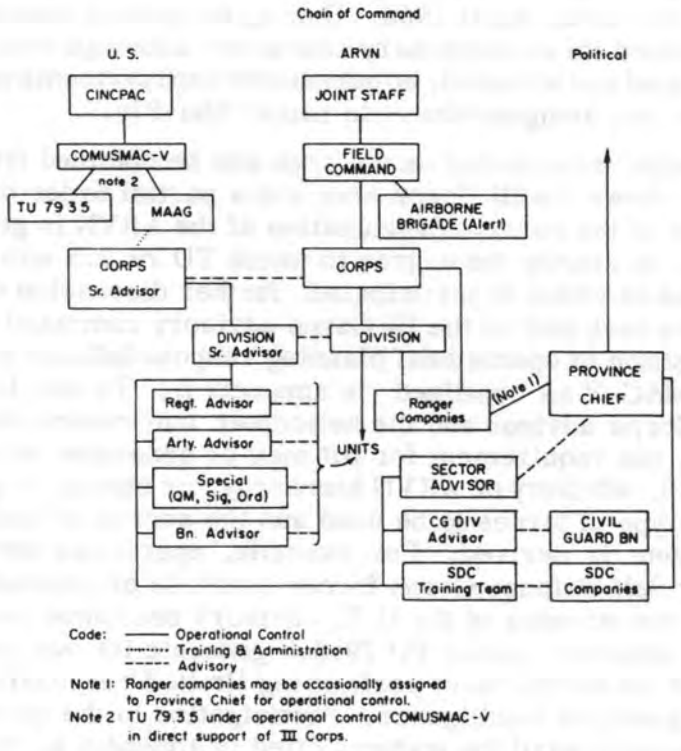

FIG. 2: CHAIN OF COMMAND

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STATISTICAL SUMMARY OF HELICOPTER OPERATIONS

Records maintained by TU 79.3.5 and HMM-362 were examined to determine the pattern (if any) into which helicopter tactical lift operations were falling. Data obtained from these sources has been combined with data obtained from reference (c) in preparing figures 3 through 10, to cover the entire period of operation in the Mekong Delta. On 1 August HMM-362 was relieved by HMM-163; however, this was essentially a personnel relief; organization, aircraft, and operating conditions remained unchanged.

Figure 3 shows the number of helicopters employed per operation. In half of the operations, 16 or more of the 24 helicopters in the squadron were flown. The number of helicopters does not include the spare usually flown to the troop pickup site to replace disabled helicopters. Figure 4 shows the number of troop lifts involved per operation. "Lift", as used here, means the number of cycles between the troop pickup site and landing zone(s) involved in emplacing the assault troops and does not include placement of the reserve or use of airborne reserve. In only about one-third of the cases were three or more lifts involved; however, the 57th Helicopter Transportation Company (Army) or ARVN helicopters contributed to the lift in 17 of the 81 operations. Comparable data on the participation of ARVN and U.S. Army helicopters is unavailable.

Data on emplacement of reserves is provided in table I. In most operations, a reserve force was held at the pickup site, to be called in at the discretion of the operation commander. In addition, an airborne reserve, or "Eagle" flight, was provided in certain operations. Table I shows the number of operations in which either kind of reserve lift was actually made.

TABLE I

USE OF RESERVES

Number of lifts of ground reserves		19
Number of lifts of airborne reserves (Eagle flight)		17
Number of operations airborne reserves landed	12*	
Number of operations airborne reserves not landed	5	
	17	

*Airborne reserves made 36 landings during these 12 operations.

Figures 5, 6 and 7 show total sorties, flying time, troop, passenger and cargo lift by weeks of operation. The excess of sorties over operating hours beginning with the week of 12 August is probably the result of the many short lifts associated with large troop operations around Ca Mau - Bac Lieu during that period; the large number of non-combat passengers in figure 6 for the same week probably represents troop emplacement or back lift not associated with combat. With regard to figure 7, very little of the cargo lifted was associated

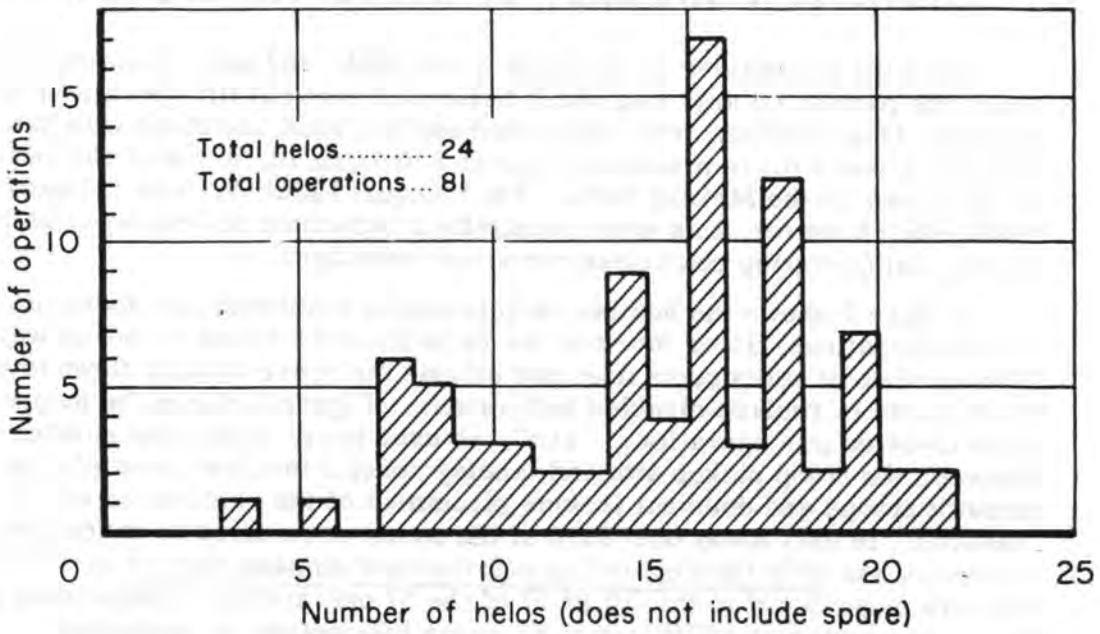

FIG. 3: NUMBER OF HELOS EMPLOYED PER OPERATION

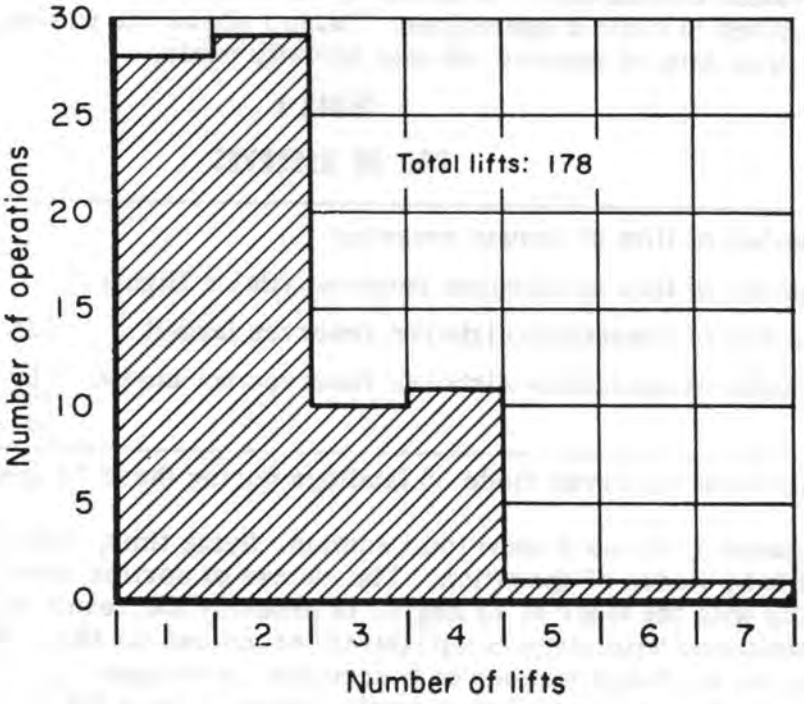

FIG. 4: NUMBER OF LIFTS PER OPERATION

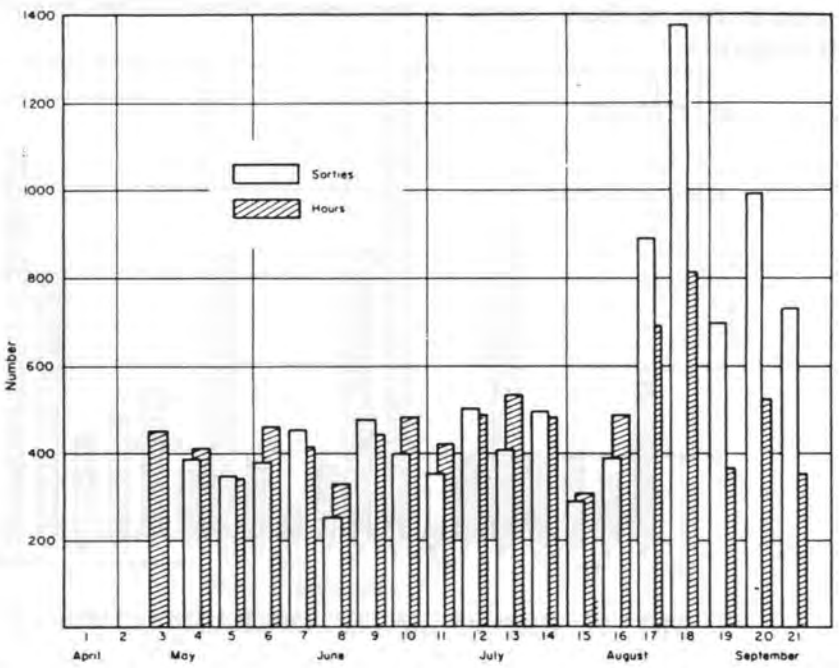

FIG. 5: TOTAL SORTIES AND HOURS FLOWN, OPERATION SHUFLY

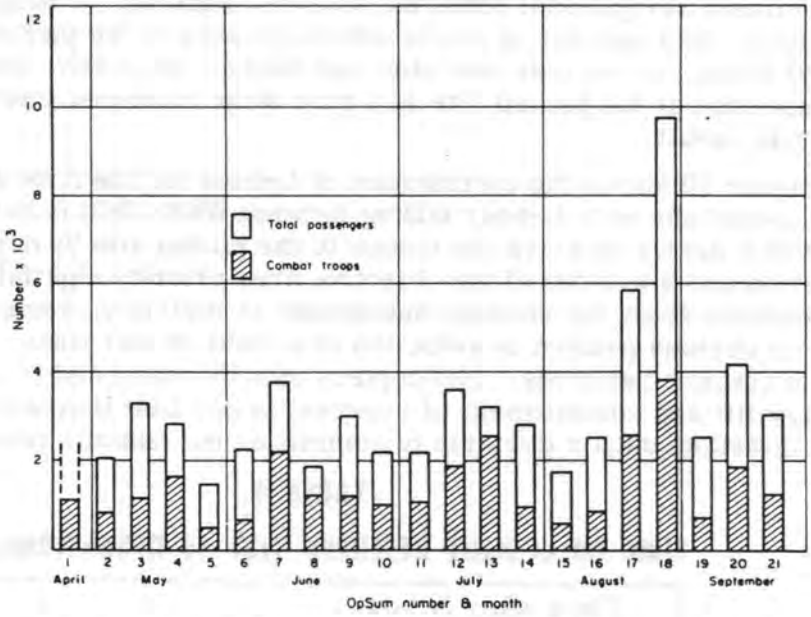

FIG. 6: TROOPS AND PASSENGERS LIFTED OPERATION SHUFLY

directly with assault operations. In only three operations was any cargo lift cited, and in two of these cases it represented back lifted material rather than assault supplies.

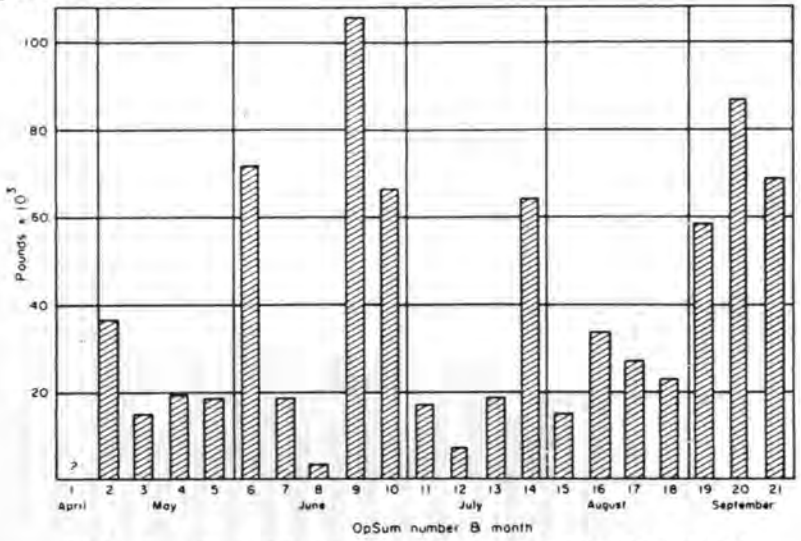

FIG. 7: CARGO LIFTED OPERATION SHUFLY

Figures 8 and 9 show approximate distances involved by number of operations. These distances were obtained by straight-line measurements between Soc Thrang, the pickup location, and the landing zone(s); however, the actual flight path might have differed considerably from a straight line to take advantage of prominent navigational features, to avoid weather, or disguise the landing intentions. In a number of cases where distance to the pickup site was greater than 60 miles, an enroute fuel stop was made. Normally, fueling would be accomplished at the pickup site at a time when minimum interference with the lift would result.

Figure 10 shows the distribution of L-hour for the first 45 operations. The many operations with L-hour falling between 0900-1000 is believed to be the result of a desire to move the troops to the pickup site by day and to terminate the action and move out of the objective area prior to nightfall. While L-hour is not available from the records subsequent to mid-July, some effort was made to avoid an obvious pattern in selection of L-hour at that time. Table II gives the time to commit reserves. Helicopters usually attempted to refuel between primary lift and commitment of reserve; in any cast they were unavailable for other missions until a decision to commit or not commit reserves was made.

TABLE II

TIME TO COMMIT RESERVES (1ST 46 OPERATIONS; 8 CASES)

Time after L-hour	
30 minutes or less	1 case
1 hour or less	1 case
2 hours or less	5 cases
4 hours or less	1 case

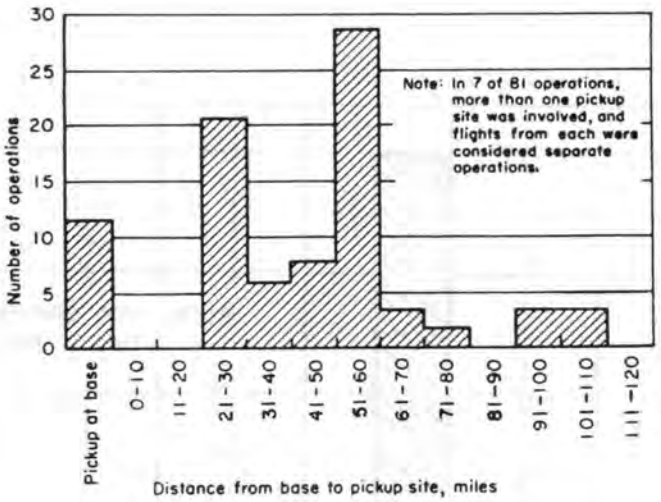

FIG. 8: DISTANCE FROM BASE TO PICKUP SITE

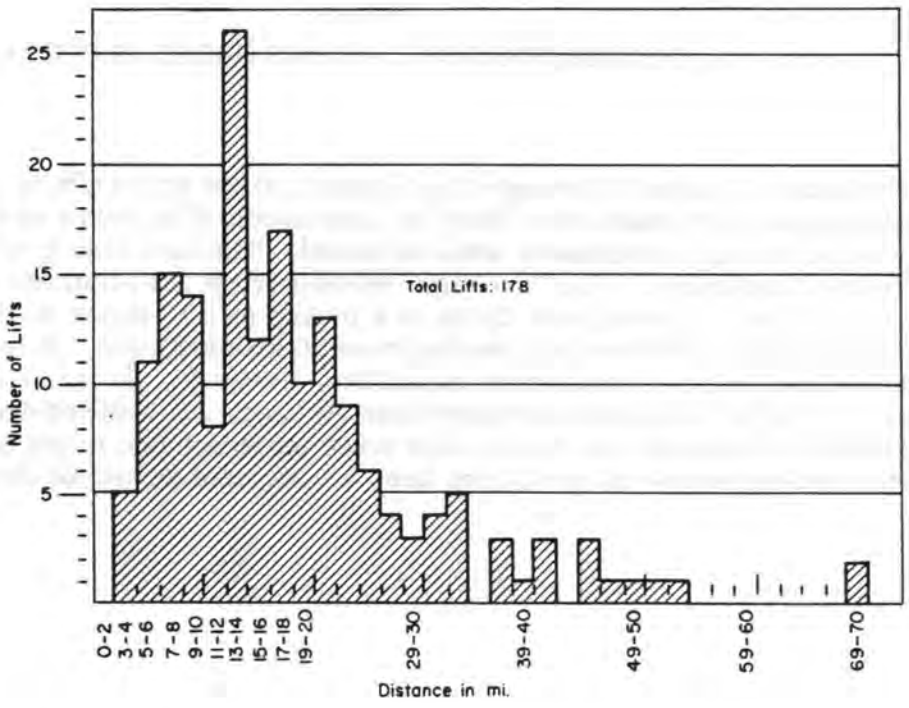

FIG. 9: DISTANCE FROM PICKUP SITE TO LANDING ZONE

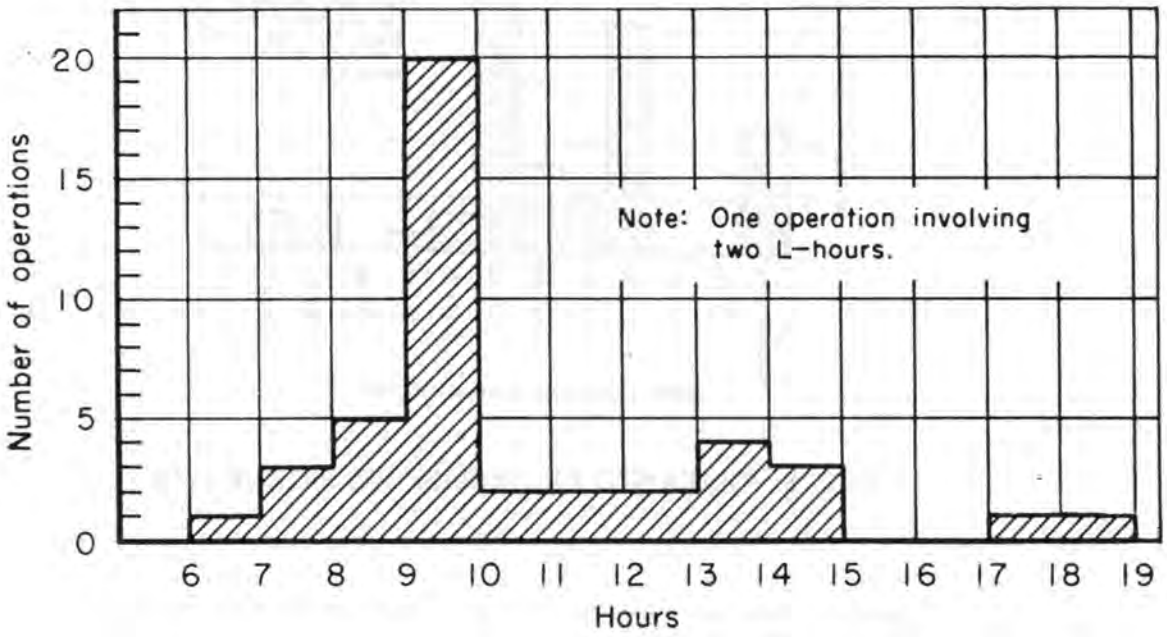

FIG. 10: DISTRIBUTION OF L-HOURS (FIRST 45 OPERATIONS)

The data in figures 3 through 10 are summarized primarily to give some quantitative feel for Operations Shu-Fly; they should also serve as a history in the sense of stating numerically what happened. The data also give some rough indication of capability. The "average" assault troop lift occurred every 1.8 days; it involved 14 helicopters flying to a pickup site 50 miles distant and making two lifts of troops to a landing zone 20 miles distant. It is not possible to relate these values to maximum capability, however. So far as is known, no request for USMC helicopter services from III Corps was unfilled due to non-availability of helicopters or pilots; how much more service might have been provided had the tempo of operations been accelerated cannot be determined.

TACTICS AND RELATED MATTERS

References (d) and (e) provide excellent descriptions of the tactics used by Marine helicopters in the Mekong Delta area. U.S. Army helicopter tactics are discussed in reference (f) and are generally comparable, at least for this area. For the benefit of those not having access to these documents, figure 11 summarizes the en route tactics, and figure 12 shows a typical deployment in the landing zone. In addition, some specific operational matters are discussed below; however, no analysis was attempted in these areas.

Mission Planning

One problem investigated was the length of delay between the development of a situation where a helicopter assault was required and the actual L-hour. These delays appear to stem from three sources: the nature of Viet Cong tactics, the structure of the operational chain of command, and the inherent obstacles to rapid movement in the Mekong Delta. First, a helicopter mission could be generated either as a reaction to some Viet Cong activity or as a result of a planned operation on our initiative. The most frequent type of military VC activity has been a quick strike at a small village or isolated outpost or an ambush followed by a rapid retirement. The usual duration of an ambush engagement is about 2 to 15 minutes; thus even with an extremely rapid reaction, pursuit of the perpetrators would be difficult by day and well-nigh impossible at night. Where missions are carried out on our own initiative, it is difficult to obtain definitive information on the time and location that a worthwhile concentration of VC may exist. A platoon or company of VC may operate over a broad area without concentrating to any extent, and may not often resort to overt military action. They will, in many cases, not actively oppose heliborne forces but will disperse to pre-arranged hideouts or merge into the local population. This forces the use of sweep type operations and the meager results that might appear to be the result of a 48 hour planning process might, in fact, occur just as frequently in a 6 hour planning cycle.

Referring to the chain of command in figure 2, all troop lift missions must be ultimately approved at Corps level by both U.S. advisory personnel and the ARVN corps commander. This requirement for parallel concurrence extends through all levels of the MAG advisor-Vietnamese commander relationship and while there is usually rapid agreement, the process is inherently slower than it would be through a single command line. The situation is further complicated by the existence of a political command line. The province chiefs have operational control of the Civil Guard and Self Defense Corps forces and may control Ranger companies or request assignment of regular army forces for operations undertaken at their behest. This requires additional concurrences and exchanges of information between division and tactical area commanders and the corresponding province chiefs.

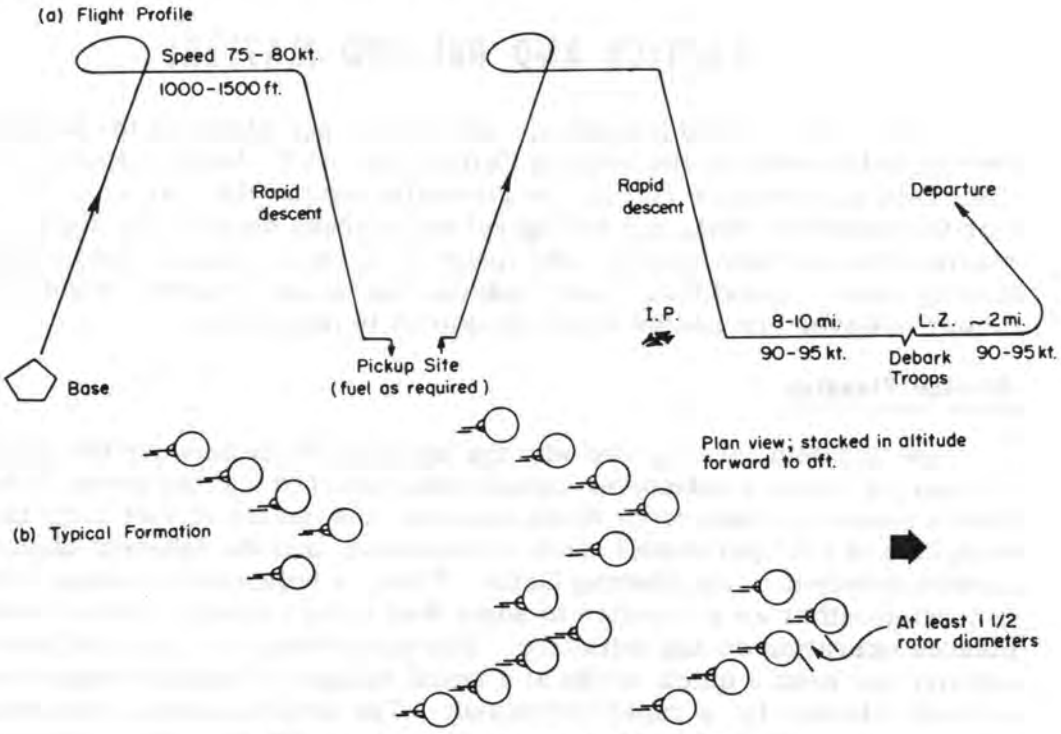

FIG. 11: EN ROUTE TACTICS

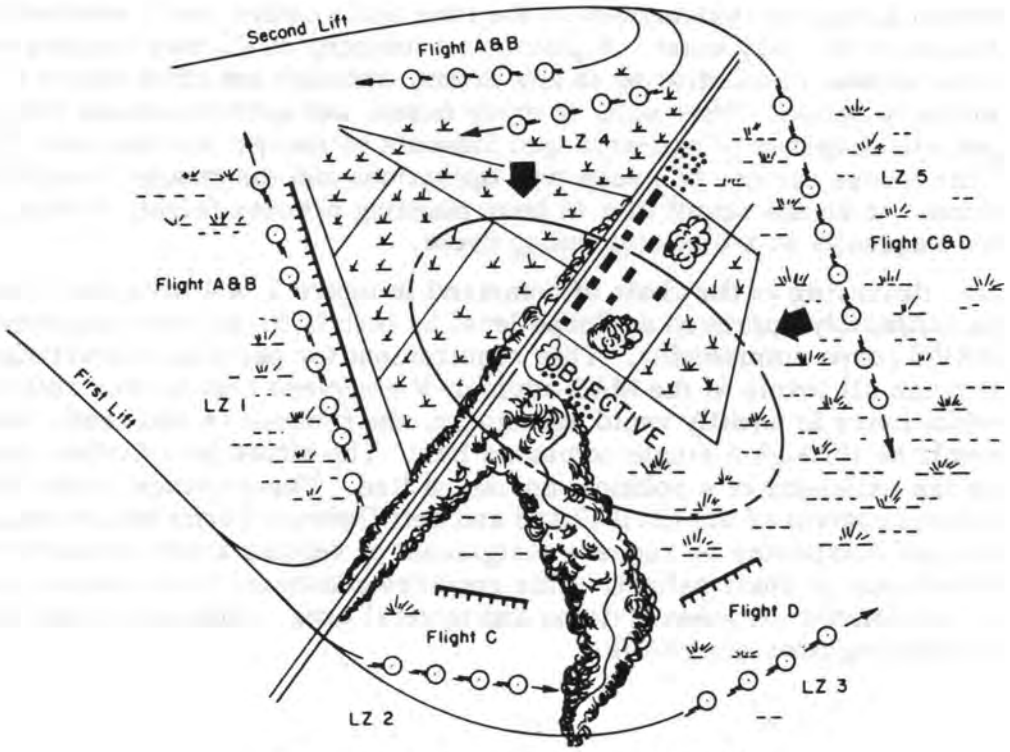

FIG. 12: TYPICAL LZ TACTICS

Finally, were these delays minimized, there is still the problem of assembling the troops at the pickup location, briefing them and arranging for their backlifting or exit from the operating area. Surface lift is limited to a system of navigable canals, not always convenient to the pickup site or objective area, and a sparse road network; both are subject to ambush and dangerous for night movement.

Reaction time might be reduced by certain measures. Routine and methodical reconnaissance of areas known to be subject to Viet Cong operation would help provide positive intelligence. The establishment of additional alert forces or the designation of certain units within a given tactical area (e.g. Ranger companies) to be available for helicopter lift during a given period to the exclusion of other duties, should reduce the planning cycle to the extent that nomination and siting of units consumes time. A reduction in the number of regimental-battalion size operations might release sufficient helicopters and troops to provide such alert forces within the current force structure. Insofar as response by TU 79.3.5 is concerned, a rapid reaction capability has already been demonstrated. On 27 May a request for lift of 152 troops received at 1050 was filled by 13 helicopters airborne and en route to the pickup site by 1130; and again on 2 June, a request for 12 helicopters received at 1050 was filled with 10 helicopters airborne at 1135, and 2 additional diverted from another mission at 1330. On at least five other occasions final briefing of pilots was accomplished at the pickup site.

Command and Control

Appendix A provides a comprehensive outline of those matters which should be considered in the planning and execution of heliborne operations. While many of these considerations are covered by existing doctrine or SOP, and their implementation requires only verbal confirmation between commanders, the list does indicate some of the day-to-day planning burden associated with this type of operation. While a thorough discussion of command and control is beyond the scope of this study, some comment on typical arrangements for communications and reconnaissance may be useful.

Communications netting normally used in heliborne operations is shown on figure 13. Control of supporting fixed-wing aircraft is accomplished from the ARVN L-19, which functions in much the same manner as the TAC(A) in conventional USMC operations except in those cases cited in paragraph 3 b(2) of appendix A wherein the helicopter commander assumes these functions. A Vietnamese observer-interpreter is embarked in the T-28 (assuming the T-28 is provided by the U.S. Air Force Farmgate* operation), and the AD-6 is Vietnamese Air Force manned; thus communications between ground command, L-19 and supporting air are normally in the Vietnamese language. In many cases, a USMC or MAAG advisor will fly with either the ARVN L-19 or OE to provide better coordination between air and ground elements; the use of a helicopter as an airborne CP has also been successfully attempted, but this procedure is not always used.

*See JCS SM 797-62 of 18 July 1962, "Military Accomplishments in the Counter Insurgency Field Since 20 Jan 1961 (as of 15 July 1962)" (U) Secret, Part VA, paragraph 2.a. (4), pg. V-11.

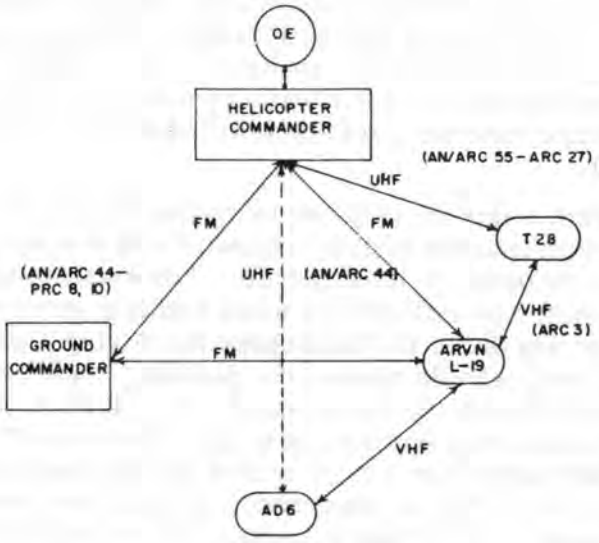

FIG. 13: COMMUNICATIONS NET

Reconnaissance

Except in emergencies, or where the helicopter unit and troops were both quite familiar with the area, a pre-assault reconnaissance was made either by helicopter or OE. In some cases, a limited amount of photo coverage was obtained; in the majority of cases, the pilots had nothing but 1:100,000 map coverage, their recollection of the terrain from previous missions, and the reconnoitering pilot's briefing on the area to aid them in locating the LZ. In spite of this, no serious errors in selection of zone or delay in landing for lack of recognition were noted. Reference (c) indicates that daily OE reconnaissance was instituted during the week of 3 September. Prior to this time, USMC helicopter pilots would report any suspect activity observed in the course of any of their missions. Intelligence logs through July indicate 10 such sightings were transmitted to III Corps, the area commander. However, these sightings were made incident to other missions, from an altitude of about 1500 feet. So far as known, they were not followed up by subsequent reconnaissance.

Supporting Air

Ordinarily, heliborne operations were supported by 2 to 4 T-28 or AD-6 aircraft for cover, strike, and close air support. Both the OE and ARVN L-19 were employed in battlefield reconnaissance, target location, marking objectives on the ground and assisting in the orientation of troops. The OE usually worked closely with the Eagle flight when one was provided; in addition, it assisted the helicopters in the low level portion of their runs into the LZ by monitoring the navigation of their flight from a higher altitude.

Ordnance expenditures for both Farmgate and VNAF supporting air (which include all three Corps areas) are shown on table III. 2.75" rockets, Napalm and aircraft guns were the most frequently used weapons, targets usually being small groups of personnel or light structures. Of the 6 ordnance stations available on the T-28, the 2 inboard can carry items up to 500 pounds; the remainder are limited to 250 pounds with a total weight limitation of 1200 pounds. The heavy stations will usually carry either the 50 caliber machine gun pd, the Mk 75 Mod 1 (75 gallon) Fire Bomb, or the Air Force version of the Aero 7D 2.75" FFAR rocket pod. There is no data on the effectiveness of any of these items; some after-action reports include counts of dead or wounded by air strike, but there is no information on the conditions of engagement, number of passes made, number of targets engaged per pass or similar data.

TABLE III
AIR SUPPORT

	VNAF			Farmgate		
	April	May	June	April	May	June
Sorties						
AD-6	92	176	162	-	-	-
T-28	24	32	174	85	111	98
B-26	-	-	-	48	88	92
SC-47	-	-	-	6	-	-
Totals	116	208	336	139	199	190
Ordnance Expended						
Napalm	115	73	91	96	158	155
2.75"	2,750	5,807	2,980	903	972	544
5"HVAR	189	-	-	-	-	-
100 lb. GP	-	-	-	149	408	92
250 "	-	-	-	-	-	-
500 "	-	66	-	18	22	2
1000 "	-	12	-	-	-	-
120 lb. frag	90	20	162	44	40	142
260 lb. frag	-	-	-	-	-	-
20 mm.	22,365	28,153	16,948	-	-	-
50 cal.	1,650	3,885	29,030	17,000	39,511	34,430

Preparatory strikes in the LZ or objective area were not made regularly, although supporting air would make an exploratory pass over the LZ just prior to helicopter touchdown and deliver suppressive fire, if required. Delivering close air support was complicated by a number of factors. Among these were the indistinguishability of the fleeing VC from frightened civilians; the lack of definition of front lines, and the resultant reluctance of ground commanders to call in, or to permit the TAC(A) to call in, strikes when the location of friendly forces was unknown.

Without accurate data on the performance of ordnance or effectiveness of strikes and with the operational constraints under which supporting air operated, it is difficult to state the extent to which fixed-wing support protected the transport helicopters or contributed to the effect of the operations. It would thus be premature to discuss armament or aircraft requirements based on the experience in Vietnam up to this time.

Helicopter Configuration

The HUS participating in Shu-Fly were stripped of items amounting to about 340 lbs.; these included the hoist and reel, HF radio, IFF/SIF, main door, all seats and the life raft. A step was installed below the main door for ease in loading and debarking troops. Usually 11 - 12 Vietnamese troops were carried; based on an estimated weight of 150 lbs. per trooper (55 lbs. less than the planning value for U.S. troops), a load of about 1700 lbs. exclusive of pilot, co-pilot and crew chief was lifted. A full fuel load was carried on the initial lift; on subsequent lifts, the center and forward tanks would be topped off as practicable. Under these conditions, few over-loading problems were encountered in spite of the unfavorable pressure altitudes prevalent.

All crew members wore body armor. Both co-pilot and crew chief were generally armed with the 0.45 caliber sub-machine gun M3A1, although some preferred the M1 rifle as having better range and accuracy. Although there were several exchanges of fire between crew members and Viet Cong, the results cannot be evaluated; however, it can be stated that neither the presence of fixed wing air cover nor chance of fire from the helicopters appeared to deter the Viet Cong from firing.

Employment of Eagle

Eagle is a designation for a flight of helicopters carrying the airborne reserve. While the idea of an airborne reserve is not new, the concept was tailored to fit operations in the Mekong Delta and was the most significant tactical development during the Shu-Fly operations in that area.

Typically, the Eagle flight would consist of 4 HUS each carrying 12 troops, a total of 48, which would trail the main landing by about 3 - 5 minutes and on arrival orbit the objective area. Targets for Eagle could be designated by the ground commander, the L-19 or OE; or the Eagle flight leader could locate his own targets. Such targets consisted of small groups of VC who had broken out of an encirclement or who were operating outside the objective area. Although actual authority to make an Eagle landing is in theory the prerogative of the ground commander, in many cases the fleeting nature of the target, the separation from the ground CP, and the payoff for aggressive pursuit are such that the Eagle commander acts on his own initiative and reports only when and where he is landing troops.

There is no hard and fast recipe for using Eagle; more than 4 helicopters were used on occasion and different constraints applied to flight pattern, criteria for landing, and communication procedures. The Senior Advisor, 21st Infantry Division makes several interesting comments with respect to Eagle employment:

"1. Eagle should never be assault landed within 200 meters of any brush dense enough to conceal any appreciable VC force. Even during the last moments of a descent the VC can shift their location in an unpredictable manner, and the helicopters should not be exposed to the possibility of a well-planned trap.

"2. Only in the case of a very small VC force, no more than 20 VC confirmed, should an Eagle landing be executed so that the Eagle forces are split by a canal or other impassible object.

"3. In the case of landing a backup Eagle force on a new objective, the best means of orientation are by compass and frequent referals to orbiting L-19's and Eagle aircraft for position checks. Many smoke grenades should be carried by troops to mark their position on the ground as the pursuit continues.

"4. During a pickup, if the Eagle aircraft plan to fire on the way in at targets of opportunity, the ground commander waiting on the LZ should be notified. Otherwise, he may think the helicopters are being fired upon by VC automatic weapons since it is difficult to tell whether automatic weapons fire in a given direction is air-to-ground or ground-to-air.

"5. Adequate prior planning must insure preferably that sufficient gas is available for four relays of Eagle aircraft (although four relays are very seldom required) or alternately that the gas supplies have been computed and the Eagle operations are terminated before the fuel supply at the airfield runs low. This operation consumed 2870 gallons of 115/145 gas in refueling excluding initial topping off before mission.

"6. Concentrations of 50 VC, when identified, should be attacked and dispersed by air attacks if possible with Eagle being commmitted to police up the remnants."

The Eagle tactic is still under development. It is apparent that outside the delta area, where there are fewer landing zones and more ground cover, or where there is a more aggressive or more effective use of anti-air weapons, Eagle tactics would require modification. For example, reference (f) indicates that in the mountainous terrain of the I Corps area of South Vietnam, there were very few landing zones which could accommodate more than 5 helicopters at a time. With fewer and smaller landing zones and heavier cover surrounding them, countermeasures such as covering the LZ with sharpened bamboo stakes and the use of ambush tactics present a problem for attacking forces. Nonetheless, in the delta area, the use of Eagle has provided a means of maintaining contact with the enemy and running him into the ground not available at any prior stage in the war; in several operations, the principal contributions to killed, wounded and captured have been made by Eagle.

VULNERABILITY

Figure 14 shows the experience of HMM-362 in hits from ground fire through 20 July 1962. There is no pattern to the impacts, insofar as density of hits per square foot of helicopter is concerned. Figure 14 shows only the point of impact of the hit and not the path of the projectile; in most cases, fire was from below the helicopter. In only one case did damage result in a "down" in the objective area, and temporary repairs in this case permitted flying the aircraft out. Four hits, involving 3 helicopters, were taken in the oil system early in the tour of HMM-362 and directed attention to the vulnerability of this area. However, whether protection of this area alone is worth an armor penalty of 200 - 300 lbs. or whether rather some lesser degree of protection should be provided to a wider area of the helicopter is an interesting question in view of the hit experience. Actually, a greater man-hour expenditure for repair as a result of hit damage resulted from those cases where fuel cells had to be changed. In only two cases were pilots hit and no fatalities or wounds resulted, although one Vietnamese trooper died as a result of wounds received in the helicopter.

* Location of hit

o Location of hit on opposite side from view

FIG. 14: PATTERN OF HITS ON HELICOPTERS, OPERATIONS THROUGH 20 JULY

It is not possible to determine from the after-action reports prior to 1 July the detailed circumstances under which the aircraft were hit. After that date a revised reporting system required such details to be furnished. Up to 20 July 1962, 13 such reports had been submitted, but it was impossible to determine a any pattern from them. In 6 of those cases the source of fire was unknown, one hit being discovered after landing. Four of 16 hits covered by these reports were taken at about 700 - 800 feet and the remainder below 150 - 200 feet. No effects of position in formation, weather, visibility or speed were apparent. In 4 cases fire was returned by the co-pilot and/or crew chief with undetermined results.

It is difficult to state a meaningful measure of vulnerability from these data. Table IV shows the hit experience through 21 July by date and side number. Of the total of 42 hits, over half were incurred in two operations (17 on 9 May and 10 on 10 July, both in the Ca Mau area). Although not all of these hits were associated with landing or take off, one might be interested in the number of hits incurred per landing. Considering only those landings made in combat troop lifts, and discounting one hit incurred on a reconnaissance mission, the ratio is 41 hits in 1375 landings or 0.03. Figure 15 shows hit experience as reconstructed from reference (c) for the period 22 July to termination. Under the same assumptions, the ratio is 12/1201 or 0.01.

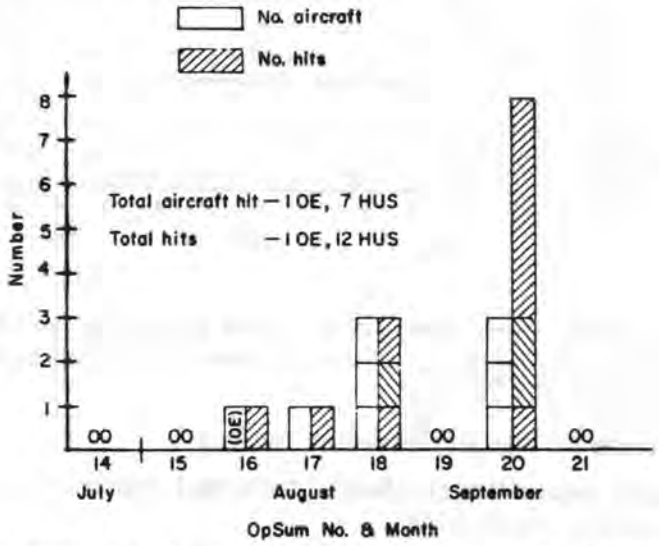

FIG. 15: HIT EXPERIENCE, OPERATION SHUFLY 22 JULY TO 15 SEPTEMBER 1962

It is not surprising that helicopters can be hit, even with home-made weapons. However, in none of these operations were any deliberate preparations of the LZ attempted, nor did troops or helicopter personnel deliver any suppressive fires unless fired on. (One preparation of the objective area by airstrike resulted in the LZ being filled with fleeing VC who inflicted the greatest single day's damage on the landing helicopters.) Supporting air would sweep ahead of the landing helicopters, but again was constrained to fire only on moving or identifiable targets. More vigorous suppressive measures might have prevented some of

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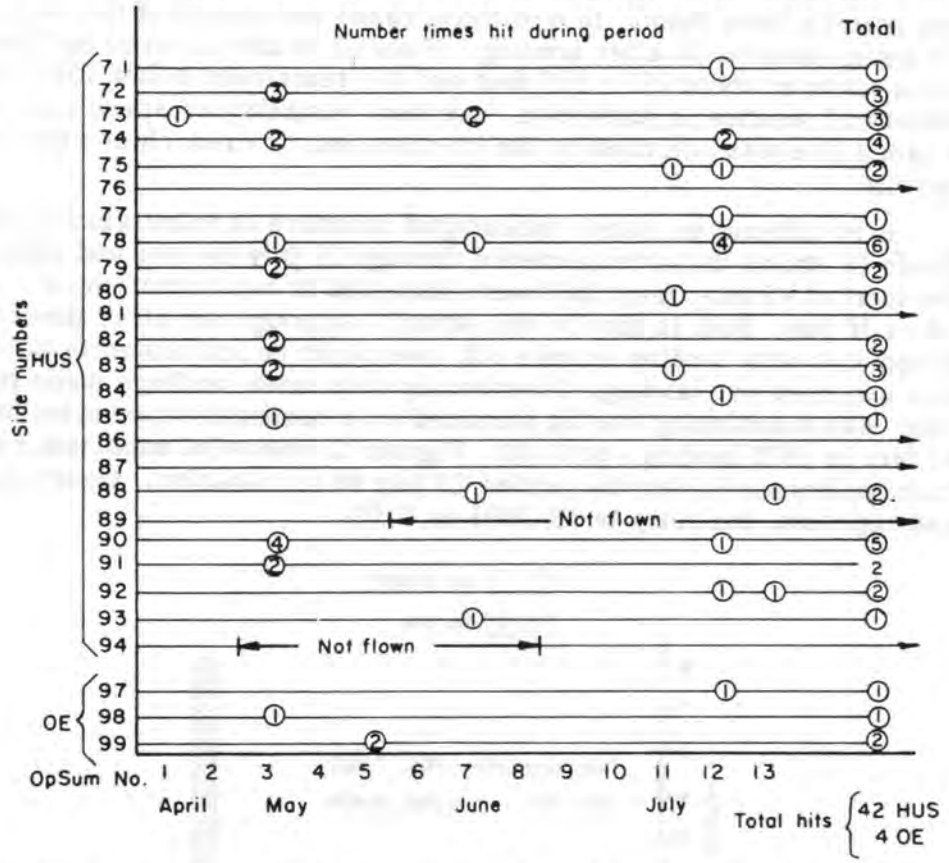
TABLE IV

HIT EXPERIENCE, OPERATIONS THROUGH 21 JULY 1962



the hits; however, these operations drive home the fact that measures must be taken for helicopter safety. Some of these are listed below; most of them were routinely used by TU 79.3.5:

(1) Maximum use of deceptive tactics.

(2) Night capability (including terminal guidance and station keeping aids not now generally available).

(3) Use of escort aircraft capable of operating co-based with helicopters and optimized for visual low-level attack.

(4) Provision of spare helicopter equipped to provide medical assistance and emergency repairs.

(5) Earmarking a portion of the reserve to provide security for downed helicopters.

(6) Provision of a fully qualified co-pilot on all troop lifts.

(7) Use of the helicopter crew and/or embarked troops to deliver suppressive fires when required; implicit in this is the provision of a hand held weapon with adequate range, hitting power, and rate-of-fire characteristics.

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HELICOPTER MAINTENANCE

Maintenance records of HMM-362 for May-June 1962 were analyzed; the findings are summarized in table V below. The basic data were obtained from Part B and Part C of the "yellow sheet", OpNav Form 3760-2. In addition, the work order files for each aircraft were examined, but time out of operation by reason of scheduled checks or overhauls was not analyzed. All required checks were accomplished, however, including a major calendar overhaul which fell due in this period. AOCP aircraft are not mentioned; actually, one aircraft was initially AOCP from 3 May to 11 June. By using this aircraft as "hangar queen", the remainder of the squadron was able to minimize AOCP time. When a second aircraft went down on 26 May and it appeared that it would stay AOCP for some time, it took over the role of hangar queen while the first was restored to working order. There were never more than two AOCP aircraft.

TABLE V
HELICOPTER MAINTENANCE
MAY-JUNE 1962

24 HUS		
Total flights	1212	
Total hours	3261	
Total down	250	
Deck duds	14	
Probability of down, per flight		0.21
Probability of deck dud, per flight		0.012
Probability of down, per hour		0.076
Median time down (94.1% up within 24 hours)	3.9 hours	
Average time down	6.2 hours	
Average hours/helicopter/month		67.9

In addition to down aircraft, the rate at which gripes were accumulated was studied for 4 of the 24 aircraft. A maintenance gripe may not down the aircraft yet may mean just as much (if not more) maintenance effort by repair personnel. At least one such gripe was recorded for the aircraft examined every 2.05 flights or, on the basis of flight time, every 5.8 hours of flight. This is about twice the rate at which "down" gripes occurred.

The raw data are not exact, however. Of the 250 downs, a time to complete repairs was entered on the yellow sheet in only 152 cases. It was assumed that "time to complete repairs" implied an up aircraft (at least for test flight purposes). When more than one discrepancy was recorded for a down aircraft,

the longest repair time determined when the aircraft came up since there was no way of knowing, in most cases, which discrepancy was the downing discrepancy. Also, down times do not necessarily imply a proportionate expenditure of man hours; time limitations precluded a more exhaustive investigation of this and other factors giving additional insight to the problem.

Considering the amount of flying accomplished and the expeditionary character of the base, the number of down aircraft is quite low and repair times are short. A number of factors contributed to this maintenance record which are difficult to weigh quantitatively. First, there was no liberty and few holiday routines. There was some requirement for increased security at Soc Thrang, but no requirements to defend the entire perimeter. There were two GV flights a week on which necessary tools and spares could be flown in from Japan or Okinawa and on which troops could be evacuated for R&R. This is not to minimize HMM-362's performance, but to warn that such performance cannot be expected in all expeditionary squadrons. The maintenance situation was similar in many respects to that existing in aircraft carriers. As a matter of interest, the data was compared to the theoretical curve for maintenance characteristics in the same manner as described in reference (g). The fit is shown in figure 16. Deviations at values of down time between 10 - 17 hours, although consistently negative, are still within the limits for 95 percent confidence of fit with the theoretical curve as shown by the value of "d" on figure 16, with one exception.

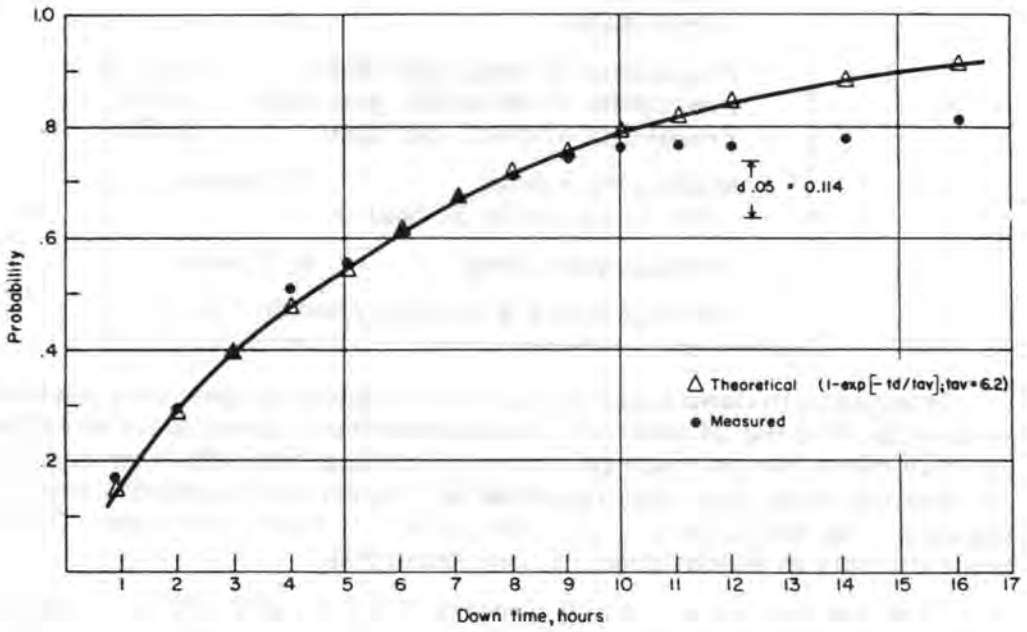

FIG. 16: PROBABILITY THAT DOWN TIME WILL BE LESS THAN A GIVEN NUMBER OF HOURS

EFFECTIVENESS

It has not been possible to use any of the foregoing quantitative material in establishing a measure of effectiveness for the Shu-Fly operation. Viewed in its simplest terms, TU 79.3.5 provided only a means of military mobility to the Vietnamese government forces not otherwise available to them. In that it permitted (in terms of averages) the rapid movement of two companies of infantry over 20 miles of otherwise impassible terrain every other day, it provided a manyfold increase in effectiveness. However, a determination of the degree that Shu-Fly influenced the course of the counter-insurgency campaign for better or worse is difficult to make. Better control of Viet Cong activity might have been accomplished with fewer troops or less flying effort or both. It is likely that a counter-insurgency campaign directed by U.S. forces would have shown an entirely different pattern, but whether it would have been more effective is impossible to say. Values such as number of Viet Cong killed, wounded, or captured show only the scale of the action and have meaning only when one knows to what extent the total Viet Cong capability was committed in an engagement. A comparison with U.S. Army Transportation Company performance might be made from data in reference (f); however, qualitative differences in the organization and equipment of the Army and USMC helicopter units make comparison difficult.

It seems clear that helicopters have provided some military initiative to the government of South Vietnam which it did not previously enjoy. Even if none of the operations were effective in the sense of being military successes, the sheer range and volume of troop activity afforded by use of helicopters appears to have prevented the Viet Cong from consolidating his forces and to have restricted his military activity to company - platoon size operations. Forcing the Viet Cong into either direct military opposition or out of the villages and into hiding has the desirable side effect of cutting to the minimum the time available to them to establish Communist educational or political programs. It permits the government and its allies sufficient breathing space in which support for their own programs can be cultivated by non-military means, which may be far more effective than direct military action.

The commitment of the U.S. Marine Corps helicopters in South Vietnam has also had the desirable side effect of highlighting areas where research and development effort should be expedited. In addition, a number of field expedients in the area of maintenance and support operations appear to be worthy of further development and possibly standardization. These are discussed in detail in reference (h); they are being investigated by the appropriate activities of the Marine Corps Landing Force Development Center.

ADDENDUM

Figure 17 provides Shu-Fly data derived from reference (c) for the period beginning 16 September covering operations in the ARVN I Corps area. It is offered solely for information and no comparison with data elsewhere in this study is warranted or intended.

Submitted by:

M.B. MULLENIX
Marine Corps Operations Analysis Group

Approved by:

R. C. Coile
Director of Research
Marine Corps Operations Analysis Group

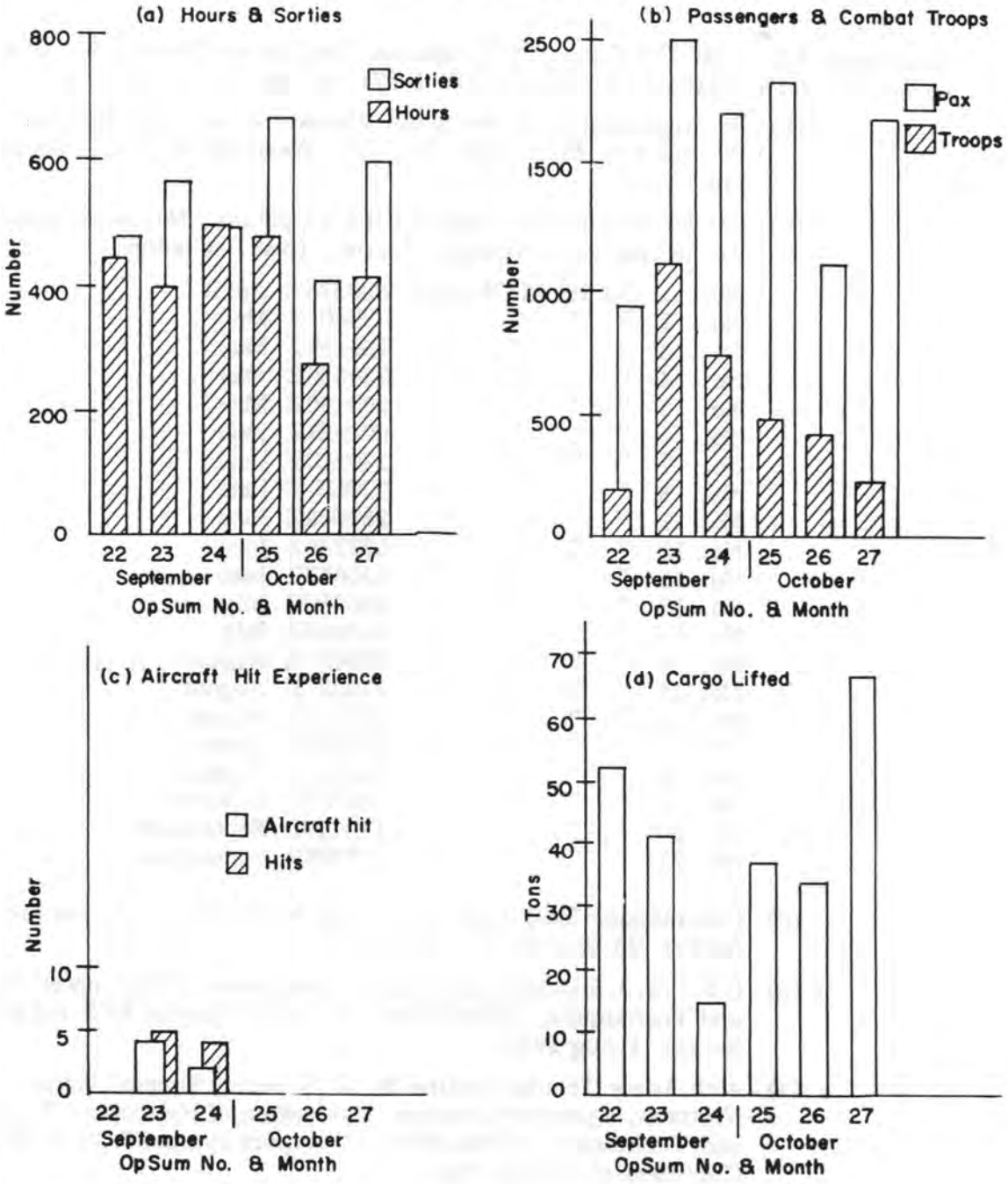

FIG. 17: OPERATION SHUFLY, I CORPS AREA

References: (a) FMF 7th Fleet (TF79) Special Intelligence Study 1-62, South Vietnam; (INTELSTUDY 1-62) Secret

(b) Re-organization of the South Vietnam Army, Intelligence Review No. 252, ACSI, HQ, DA, Washington, D.C. Secret Jan 1962

(c) CG 1st Marine Air Wing SHUFLY OpSums, Numbers 1 through 21, promulgated weekly, Secret. (See list below)

No. 1	CG	1st	MAW	DTG	300325Z	April
No. 2	"	"	"	"	080601Z	May
No. 3	"	"	"	"	150159Z	May
No. 4	"	"	"	"	230830Z	May
No. 5	"	"	"	"	290140Z	May
No. 6	"	"	"	"	090021Z	June
No. 7	"	"	"	"	130750Z	June
No. 8	"	"	"	"	220630Z	June
No. 9	"	"	"	"	280805Z	June
No. 10	"	"	"	"	082230Z	June
No. 11	"	"	"	"	140653Z	June
No. 12	"	"	"	"	230250Z	July
No. 13	"	"	"	"	250438Z	July
No. 14	"	"	"	"	020427Z	August
No. 15	"	"	"	"	110307Z	August
No. 16	"	"	"	"	150110Z	August
No. 17	"	"	"	"	270525Z	August
No. 18	"	"	"	"	310815Z	August
No. 19	"	"	"	"	060737Z	September
No. 20	"	"	"	"	140655Z	September
No. 21	"	"	"	"	212205Z	September

(d) Commander Task Unit 79.3.5 ltr to CMCS via CG 1st MAW, Secret 23 May 1962

(e) CTU 79.3.5 Quarterly Report, Evaluation of Helicopter Tactics and Techniques, COMUSMAC-V Report Symbol RCS-6-J3(T)(C) Secret 1 Aug 1962

(f) 45th Army Transportation Bn, U.S. Army Support Group, Vietnam, Quarterly Report, Evaluation of Helicopter Tactics and Techniques, COMUSMAC-V Report Symbol RCS-6-J3(T)(C) Confidential 1 Aug 1962

(g) OEG Study 585, Maintenance Characteristics of Carrier Aircraft in Korean Operations Confidential

(h) Trip Report of Representative, Air Combat Section, T&T Board, MCLFDC, to SE Asia; Enclosure (1) to CMCLFDCA ltr serial 0046D257-62 Secret 14 Sep 1962

APPENDIX A

HEADQUARTERS
UNITED STATES MILITARY ASSISTANCE COMMAND, VIETNAM
APO 143, San Francisco, California

MACJ3 18 July 1962

CONFIDENTIAL

SUBJECT: Letter of Instruction

TO: See Distribution

1. PURPOSE: To promulgate basic policies for the conduct of heliborne operations involving U.S. Forces.

2. GENERAL:

a. The conduct of heliborne operations and attendant escort by fixed-wing aircraft requires a high degree of coordination of effort and effective direction of the participating forces.

b. The commander of the area of operations determines the force and facilities needed to plan, execute and support required heliborne operations. Within the means available he determines the scope of such operations. Normally, this is the Corps/Division Commander. Employment of U.S. resources requires the coordination and approval of the cognizant Senior Advisor and the helicopter unit commander.

3. PLANNING:

a. Command: Selection of the command structure, or relationships, for the component forces in heliborne operations is the prerogative of the commander of the area of operations, with the advice and consent of the Corps Senior Advisor and helicopter unit commander. A clear understanding of command relationships is essential to all participants to insure the high degree of coordination necessary for orderly and effective conduct of such operations.

b. Control: The designated commander of the helicopter forces involved will normally control assigned helicopter forces and assigned air cover.

(1) All helicopter support operations normally require and will be provided appropriate air escort. When the nature of the helicopter mission indicates an air escort is not required, or cannot be provided due to the urgent nature of the mission and the time element involved, the helicopter unit commander may waive the requirement for air cover, with the concurrence of the Corps Senior Advisor.

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(2) During the conduct of air escort, strikes to suppress fire being received by helicopters, transports and liaison aircraft will be directed and controlled by the Helicopter Flight Commander acting in the capacity of Tactical Air Coordinator (Airborne).

c. Communications:

(1) During the planning and coordination phase of heliborne operation, the helicopter unit commander will be responsible to insure that an exchange of radio frequencies and call signs is effected between the helicopter units and the escort aircraft concerned.

(2) JOC/ASOC assigns the operating frequencies for helicopter forces and fixed-wing unit involved.

(3) In the event of communications failure between the helicopters and assigned air cover:

(a) If such air cover is considered to be essential to the execution of the mission, the commander of the helicopter forces may elect to abort the mission.

(b) Air strikes authorized by paragraph 3b(2) above may be conducted but only with due regard for the safety of the helicopters.

4. EXECUTION: Upon completion of the planning phase and a determination of the fact that a heliborne operation will be conducted, appropriate directives will be issued to participating units. Such directives may be issued as written operation orders, messages or oral orders. In any event, thorough briefing of participating forces is essential. The following will be contained in such directives/ briefings:

a. Mission and general plane.
b. Command relationships.
c. Approximate time and duration of the operation to include type air support required (airborne or ground alert).
d. Necessary intelligence.
e. Plans and instructions to insure secrecy in order to achieve surprise.
f. Tentative listing of forces involved.
g. Fire support plans to include aircraft ordnance available.
h. Landing zones, objectives and/or strike areas.
i. Allocation of airlift and location of loading zones, sequence and phasing of the operation and location of air facilities which will be utilized in support of the operations.
j. Necessary logistical information and instructions.
k. Signal communications instructions.
l. Instructions for postponing or cancelling the operation.

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m. Instructions for juncture or withdrawal.
n. Instructions regarding escape, evasion and survival.
o. Instructions regarding disposition of downed aircraft.

FOR THE COMMANDER:

/s/ R.G. WEEDE

R.G. WEEDE
Major General, U.S. Marine Corps
Chief of Staff

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