G. (C) HEAVY LIFT OPERATIONS

1. GENERAL:

a. Purpose - To depict the participation of Medium and Heavy Lift Helicopters in OPERATION LAM SON 719 conducted vicinity of highway 919 from the village of Tchepone, Laos (XD2747) east to staging areas around Khe Sanh, RVN (XD8541), during the period 8 Feb 71 through 27 Mar 71.

b. Scope - This report will address all aspects of the operation involving medium and heavy lift helicopters. It will include enumeration, analysis and discussion of the planning, coordination, conduct and control of all support rendered. Supportive aspects to include intelligence, fire support, maintenance and communications will also be considered. The final section, of the report, will summarize support provided and the results of enemy actions.

c. Organization for Combat:

(1) Organic Units - The 159th Aviation Battalion (ASH) 101st Aviation Group, with three TO&E Assault Support Helicopter Companies and the attached 478th Aviation Company (Heavy Helicopter) formed the nucleus of the Medium and Heavy Lift forces.

(2) Non Organic Units:

(a) The 132nd and 179th Assault Support Helicopter Companies, from First Aviation Brigade assets, were placed under OPCON of the Commanding Officer 159th Aviation Battalion.

(b) The 463rd HMH Squadron, USMC was placed in support of the 159th Aviation Battalion, on a mission basis

(3) Operations Bases:

(a) The organic units operated out of their permanent base camp facilities, with the three letter companies located in the vicinity of Phu Bai airfield and the 478th Aviation Company at Red Beach, Da Nang. To improve response times 2 to 3 478th Aircraft were staged at Phu Bai airfield each night.

(b) The 132nd Assault Support Helicopter Company was based at North Phu Bai adjacent to, and sharing maintenance facilities with Company B, 159th Aviation Battalion.

(c) The 179th Assault Support Helicopter Company occupied a previously abandoned CH-47 revetment area at Camp Eagle.

(d) The 463rd HMH Squadron operated out of their permanent base camp at Marble Mountain Airbase, Da Nang.

2. MISSION: The mission of the medium and heavy lift element was to:

a. Provide medium and heavy lift capability, in support of combat assault operations, for two ARVN Divisions; one Vietnamese Marine Division; and ARVN Ranger Group; Corps Artillery units; elements of the US 101st Airborne, 23rd Infantry, and 5th Infantry (Mech) Divisions; elements of US 7th Air Force and Da Nang Support Command.

b. Conduct normal and emergency resupply of Fire Support Bases and base camps.

c. Perform administrative and tactical troop movement.

d. Accomplish recovery of disabled aircraft.

e. Perform medevac and special missions on call.

3. INTELLIGENCE:

a. Collection, Evaluation and Dissemination - All intelligence from sources outside the 159th Avn Bn and its subordinate units was obtained from either the 101st Avn Group S-2 or the 101st Airborne Division G-2. Raw information from agent reports, visual reconnaissance, radar, sensors, captured documents, POW's and other sources was evaluated by either the 525th MI Group, the 517th MI Detachment of the 5th Infantry (Mech), or the 101st MI Detachment of the 101st Airborne Division (Ambl). From these agencies, the intelligence followed the normal dissemination chain to the 101st Airborne Division G-2 and the 101st Aviation Group S-2. There was, of course, an exchange of intelligence with RVN forces at Division level. Intelligence was also generated by elements of the 101st Aviation Group. Intelligence, mainly concerning anti-aircraft fires, was obtained from air crews organic to, or supporting the 159th Aviation Battalion. Some intelligence was obtained through liaison meetings and direct contact with personnel from other units.

b. Use - Intelligence was collected by the battalion S-2 section and passed on to the aviation companies, staff sections and other interested personnel through formal briefings and informal visits. The S-2 and each subordinate unit maintained an intelligence map showing information of interest to the aircrews and commanders. All pilots were briefed prior to starting a mission. Fresh intelligence was passed by radio as obtained. Air Mission Commanders received detailed briefings during the planning phases.

c. Impact on Operations - Intelligence on enemy fires was a major factor influencing selection of flight routes and altitudes. It also affected tactics employed and timing of operations.

d. Analysis - Although rather limited in scope, in that it concerned mainly anti-aircraft fires, the intelligence used had a major influence on mission accomplishment. The intelligence obtained, and the methods used to obtain it, were adequate for an operationof this scope.

4. OPERATIONS: The conduct of OPERATION LAM SON 719 brought into play all of the functional areas usually associated with a major air-mobile operation. Planning, coordination, command and control were required at all times. Likewise, fire support, communications and maintenance were absoultely necessary to success. Each of these topics, and others will be addressed seperately below. Additionally, each function will be included as appropriate in the discussion of each of the various types of missions flown by the medium and heavy lift elements.

a. Planning

(1) The planning for heavy and medium lift operations during Lam Son 719 was conducted at battalion level by the battalion commander, his staff, and the company commanders.

(2) Pre D - Day planning was initiated on 28 Jan 1971. General areas of consideration during planning were, the organization for operations, command and control, displacement forward of a battalion operations center and defining of its functions, maintenance requirements, and staging for the operation.

(a) A forward battalion operations center (BOC) was planned to be established at Khe Sanh with the mission of planning, controlling and co-ordinating the battalions operations forward. The BOC (forward) would co - locate with the 101st Aviation Group CP (forward) to facilitate operations.

(b) Consideration was then given to the staging of aircraft out of Khe Sanh and the concept was evaluated. It was projected that a company would stage out of Khe Sanh on a rotational basis, maintaining operations forward for 2 weeks at a time. This concept was subsequently discarded because the enemy situation made staging at Khe Sanh overly hazardous, there were no suitable areas available for parking and maintaining the aircraft, and the physical security of the aircraft and equipment would require excessive amounts of man-power. Further consideration was given in support of a contingency plan for moving supplies from the rear to the forward area of operations. This plan would best be supported by staging out of rear areas in the vicinity of Phu Bai. Taking all these factors into consideration, the final decision was made to stage out of the Phu Bai area.

(c) Maintenance in the forward area was of interest during planning and the suggestion for utilizing a maintenance team at Khe Sanh was considered. It was resolved that since the aircraft would be staging from base areas at Phu Bai, the additional support forward would not providethe best utilization of maintenance personnel or their equipment. Further, such a maintenance operation would be so narrow in scope that the assistance provided by such a maintenance team would be negligable.

(3) During the preparation for operations, it was determined that all command and control, co-ordination and mission planning would be conducted by the BOC (forward) through use of LNO's, C & C elements, AMC's and flight leads. It was anticipated that BOC (forward) would plan its missions as received from Group, pass the requirements thru the CP main, located to the rear, to the companies for implementation. Further, the control channels would originate from the BOC through either the AMC, C & C and/or flight lead as required to meet the mission. Co-ordination would be handled by commanders conferences, AMC briefings, and LNO's provided to the BOC.

(4) Analysis of Planning Revealed:

a. Long range planning would be limited at battalion level. This was due primarily to the tactical environment and the very nature of airmobile operations. In order to overcome this disadvantage a great deal of the inherent flexibility was incorporated into each operational plan.

(5) b. Logistical planning on a day to day basis must be as accurate as possible when passed to the unit required to execute the tasks. Unless accurate information concerning sorties and tonnage is available in the planning stages, the commander cannot determine the number of aircraft required to perform the assigned tasks and unnecessary delays in the completion of the tasks may result.

b. Command and Control

(1) The command and control element of the battalion headquarters was broken down into two elements with the battalion commander in charge of the forward CP and the executive officer in charge of operations at the home

station in Phu Bai. The forward CP was manned to perform operations on a 24 hour basis with the following personnel:

(a) Battalion Commander

(b) S-3

(c) Operations Officer

(d) Duty Officer (SD from CH-47 Company)

(e) 3 Radio Telephone operators

(f) 2 Communications Personnel

(g) 1 Generator operator/driver

(2) The shifts were broken down with the bulk of the personnel present during the operating part of the day (0700-1900) and the remainder on duty during the night, planning and consolidating requirements. The commander and S-3 were present and functioning in their respective areas through portions of both shifts. The command and control was effectively extended to the operational area by use of the C&C aircraft by the battalion commander and S-3 in overseeing and coordinating the operations on a daily basis.

(3) The rear CP was also manned on a 24 hour basis using personnel from the letter companies to supplement the remaining staff. The rear CP was utilized to receive and compile mission and aircraft requirements and to allocate the missions to each of the assigned and attached units.

(4) Command and control (C&C) aircraft: The forward command post was furnished a UH-1H to supplement the organic OH-6 helicopters. These aircraft were used to control assault support, resupply and extraction operations. Personnel from the forward CP conducted liaison visits to supported

units, briefed aircrews and monitored flight routes to and from the landing zones and fire support bases. These aircraft were further used to reconnoiter landing zones, make weather checks and otherwise assist the mission leaders in the successful execution and completion of their tasks.

c. Fire Support

(1) Employment: Fire support means employed in support of the heavy lift effort required of a closely coordinated plan to give maximum coverage of the area.

(a) The 2/17 Cav performed a recon role and provided recommended routes of flight into and out of landing zones. Additionally the Cav screened selected areas during the mission to discourage indirect and small arms fire. The Cav AMC and the 159th Avn Bn AMC worked in close coordination before, during, and after the mission to take advantage of the valuable information provided by the 2/17.

(b) Gunship escort was provided by both UH-1C and AH-1G aircraft. The AH-1G was preferred due to the larger fuel capacity resulting in longer station time. The gun ships escorted the heavy lift aircraft into the LZ and provided coverage in the vicinity of the LZ, putting suppressive fire on active enemy locations. The gunships further developed the flight routes into the LZ by drawing enemy fire, enabling the heavy lift aircraft to avoid the active areas.

(c) AH-1G aircraft from the 4/77 ARA battalion provided suppressive fire on suspected enemy locations prior to and during missions. They were not engaged in direct escort of the aircraft and were free to engage suspected targets in their specified area.

(d) Tac air strikes were sometimes used in conjunction with the heavy lift missions, however a forward air controller was always on station in an area around the LZ with TAC air on call. The concept of having a FAC over suspected enemy artillery positions while the resupply mission was in progress seemed to have some effect in reducing attacks by indirect fire, Tac air strikes were coordinated with Cav operations to establish approach routes to the LZ. Air strikes were employed on suspected anemy locations in the flight path. Upon completion of the air strikes, the Cav reconnoitered the area to assess the effectivness of the air strikes. Another Tac air employment was the use of smoke ships. The Air Force had smoke available on call. The smoke was used to help conceal the aircraft enroute and on approach to the LZ.

(e) Artillery fires were available form U.S. and ARVN units. Preplanned artillery was fired on suspected enemy locations before and during heavy lift efforts. The 159th Avn Bn AMC closely coordinated with the supported unit to insure accurate and timely artillery fire on the desired locations. The artillery was fired into areas not being covered by the ARA gunships or Tac Air.

(2) Analysis: The 159th Avn Bn was extremely successful in their mission of medium and heavy lift support to Lam Son 719. Without the proper use of all available fire support, the result may have been different. On numerous occasions aircraft were forced to abort the mission due to heavy anti-aircraft and indirect fire on the LZ's. After applying artillery and Tac Air, renewed attempts were made to accomplish the mission.

On a very few occasions, the enemy was able to prevent the aircraft from getting their cargo to the LZ. The rare times the enemy was successful were due to either effective long range artillery or exceptionally heavy direct fire, both small arms and anti-aircraft fire, all around a fire base. When activity became this intense, even the less vulnerable UH-1 aircraft were unsuccessful in resupply attempts, such as occured at fire base Delta in the last days of the operation. An adequate number of gunships were not always available due to combat damage, maintenance problems, and other combat assault requirements. The large number of fire bases demanded more than one flight of heavy lift aircraft to accomplish all missions. Additionally, to effectively utilize the cargo aircraft, it was desired to keep gunships on station continually. This was not possible at times and resulted in some missions being delayed while the gunships refueled. A strong recommendation for future operations of this nature would be to attach a gun company to the assault support helicopter battalion. This would facilitate command and control, briefing, and coordination, making that unit directly responsive to the needs of CH-47 and CH-54 aircraft for all types of missions.

d. Assault Support Operations

(1) Organization for assault support operations varied depending upon the nature of the operation, the turn-around time and the number of sorties to be moved or the time available for completion. A mission leader, normally one of the assault support company commanders, was appointed for each operation. The number of aircraft used varied from four to twelve. When the number exceeded eight, two flights were used to facilitate control. Aircraft for each operation were drawn from one or more of the assault support helicopter companies. On several occasions, heavy lift support by the CH-54

or CH-53 was used to insert heavy equipment leads such as bulldozers, backhoes and 155mm howitzers.

(2) Planning for assault support operations was done by the battalion forward command post and most often was short range in nature. The mission lead assembled his aircraft at a designated area and the mission lead and aircraft commanders were briefed by personnel from the forward CP. The briefings entailed flight routes, altitudes, aircraft separation and locations of known anti-aircraft weapons and enemy ground units. Detailed planning to include preplanned fires by artillery, close air suppert, and air cavalry and gunships, was accomplished prior to briefing the air crews.

(3) Sound tactics were an absolute necessity to insure that the battalion aircraft took a minimum of significant hits while operating in a mid-intensity conflict.

(a) Tactical considerations called for selection of flight altitudes where possible, out of range of small arms fire and beyond the effective range of most anti-aircraft weapons. It was found that the aircraft took the largest number of hits when operating below 3000' above ground level.

(b) Flight routes were determined after analysing "shot at" and "hit" reports, as well as intelligence reports of enemy locations. "Hot" areas were bypassed when consistent with the accomplishment of the mission.

(c) Approaches and departures from landing zones (LZ's) were determined after reviewing the enemy situation around the LZ. Generally, approaches were steep, spiraling letdowns in close proximity to the LZ. This was done to minimize flying time at low altitudes and to avoid enemy anti-aircraft positions.

(d) A variety of formations were utilized to optimize the

effectiveness of support operations while minimizing vulnerability to enemy actions. Aircraft were frequently separated in both altitude and distance to inhibit the enemy's ability to strike at multi-aircraft formations, however, it was necessary to land the maximum number of leads in the shortest period of time because of the enemy's ability to place mortar fire on the LZ's when they saw aircraft on final approach. Usually, the first two or three aircraft would be able to deliver sorties into the LZ before it came under indirect fire. This situation led to the employment of smaller flights (two to three aircraft) or by separating larger flights into two sections of two or three aircraft each with time/distance separation between the sections.

(e) Another tactic employed to reduce enemy effectiveness was to give a flight the requirement to support several fire support bases. This gave the flight leader the flexibility to have his flight alternate between missions by delivering three sorties to one base, then three to another, and then go on to a third base or back to the first base. This technique permitted efficient operations with a minimum of wasted blade time and tended to confuse the enemy and reduce his responsiveness.

(f) Analysis of Tactics

1. It was found that tight formations, straight line formations and low level operations tended to increase vulnerability of aircraft to enemy action. Tight formations have a primary advantage of enabling door gunners to provide suppressive fire, however, due to the positioning of friendly forces near forward firebases, this advantage was negated. Because of the greater vulnerability of aircraft in tight formations, this tactic was used only when the threat of indirect fire was the primary consideration.

2. Vietnamese (ARVN) pathfinders were often not adequately trained to brief aircrews on the current tactical situation around the fire bases. As a result, escort gunships were sometimes unable to get an assessment of friendly locations and could not engage potential targets. Also, lift aircraft could not plan their approach and departure based on the most current tactical situation.

3. The ARVN pathfinders also were not briefed on the proper use of colored smoke and would frequently mark an area to place a load with red smoke, which, to the pilot, indicated the LZ was under attack.

4. Pick-up Zones (PZ's) were located in South Vietnam and were normally adjacent to major command headquarters. Control and organization of the PZ's was facilitated by having U.S. pathfinders and riggers in the PZ to control the air traffic and to advise in the preparation of loads. Loads were normally well organized in the PZ's to permit multiple aircraft to work in the PZ simultaneously while working the same mission or multiple missions. Police of the PZ's was adequate to prevent damage to aircraft or injury to personnel. In isolated cases, the PZ's could have been rendered more suitable with the removal of several tall trees. Liaison officers from the assault support battalion were placed with the major allied headquarters and proved invaluable in coordinating the PZ times, loads and priorities for delivery.

5. Landing Zones (LZ's) were in South Vietnam and Laos. Sites selected were usually on high ground and were basically unimproved when the first medium and heavy lift loads arrived.

a. The first sorties delivered normally were clearing and earth moving equipment for improvement of the landing zone. Seldom was the time lapse between the delivery of clearing equipment and the first

loads of combat equipment sufficient to allow substantial improvements. In some instances, the ground units were directing loads into areas with tall trees surrounding the desired delivery point. Maneuvering in these areas at altitudes of 2500-3000 feet above sea level and density altitudes of 5000-6000 feet became critical. Variations in the weights of loads which appeared identical contributed to the difficulty of handling the loads in the landing zones. Very few loads were jettisoned or damaged during delivery, however, improvement of the LZ's progressed concurrently with the insertion and in many cases had produced suitable areas by the time the last serties were delivered.

b. Communications with the allied LZ's in South Vietnam was adequate due to the use of American adviser personnel as radio operaters. Communications with LZ's in Laos was normally inadequate due to lack of trained English speaking controllers in the LZ's. On one occasion an assault support operation involving six medium lift helicopters was aborted and delayed more than one hour due to a lack of communication between the aircraft and the ground unit. One exception was the 1st ARVN Division, which had adequately trained English speaking controllers. These personnel greatly enhanced the smoothness of the operation.

6. Fire support for assault support operations was in varying degrees and forms. The most common fire support used was the gunship cap of the landing zone and the escort of each medium or heavy lift helicopter into the LZ. On many occasions the preparatory fires ignited large scale grass or range fires that filled the air with smoke, dust and haze and made location of the LZ's by pilots extremely difficult. On more than one occasion, a command and control ship had to individually escort the medium and heavy lift aircraft through the smoke and haze to the LZ.

(4) Example of an assault support operation

~~I. MEDIUM HEAVY LIFT:~~ The mission in support of the insertion of LZ LOLO was assigned to the 159th Aslt Spt Hel Bn with the assistance of the 132d Aslt Spt Hel Co, OPCON to the 159th, and the III MAF Sqdn HMH 463. The support requirement included seventy sorties of two hundred and sixty-five tons.

The AMC for the troop-life was the S-3, 223d CAB and the heavy lift was under the control of the CO, 159th Aslt Hel Bn.

The planned se-uence of movement included completion of the troop lift prior to the first medium and heavy lift aircraft. This would avoid the mixing of UH-1H aircraft with the medium and heavy lift aircraft. The flight route was north of QL 9 and the Xephon River preceding on a westerly heading until abreast of the LZ at which time a left modified high overhead approach would be initiated ending in an upwind landing.

Gunship cover in the vicinity of the LZ was under the control of the troop lift AMC, giving him as much flexibility as possible with his fire support. Three sets of guns were given the role of Direct Support to the 159th elements under mission control of the C&C for that element. The 159th mission commander planned on utilizing the three sets of guns by maintaining two sets on station over the LZ throughout the heavy and medium lift portion of the insertion. The remaining set of guns would be utilized to relieve, alternately the other sets of guns on staion. The relief set of guns would be on call at the rearm pad at Khe Sanh, and directly responsible to the C&C.

It was decided that one flight would consist of ten aircraft for this operation. The flight of ten aircraft was further broken down into six CH-47's and four CH-53's. Placing the Marines under the control of the Army element facilitated both control and coordination between these units. The use of one flight combining both the heavy and medium lift aircraft further allowed greater flexibility and mission responsiveness than had been experienced by the 159th in previous operations with the Marine aircraft.

Two minute separation between aircraft was considered to be the best separation time. This time was arrived at with due consideration for aircraft separtion in the LZ and PZ while still permitting maximum flight control by the C&C. Heavy emphasis was placed on maintaining proper separation by observing the posted enroute flight airspeed of eight knots and a return air speed of one hundred and ten knots.

The formation most logically chosen for the flight was trail, again maximizing control and coordination while allowing maximum maneuverability and flexibility.

The aircraft were to remain overnight at their home stations and depart not later than 0700 hours on the morning of the 4th to proceed to an assembly area desognated as PZ AIRBORNE (XD8238). This assembly area was chosen for both its size and close proximity to the PZ's. A closing time of 0930 hours was established for the arrival of all the aircraft at assembly area. At the assembly area it was planned that the C&C would give the mission lead and aircraft crews any last minute mission changes and the latest enemy and friendly situation reports. A check of the aircraft would be made by the crews and the flight would be ready for the expected PZ time of 1100 hours, or could respond to an "on call" order to proceed with the insertion. The exact PZ time at this phase was only speculative, and depended on how well the troop insertion progressed. The remainder of the mission would be accomplished as rapidly as possible. With an estimated turn around time of forty-five minutes, the mission would be completed in three lifts and a closing time of 1630 hours was estimated.

On the morning of 4 March 1971, all aircraft were en route to the

assembly area by 0700 hours. While enroute to the assembly area, four direct support missions were complted by aircraft assigned in the LOLO operation. All aircraft closed in the assembly area by 0930 hours and the mission was on schedule. In the assembly area the mission lead and the crews received their up-date mission briefing from the C&C. All aircraft were ready to lanch by 1030 hours.

The C&C then launched to make an aerial reconnaissance of LZ LOLO. While enroute he contacted the AMC and received an air briefing on the latest enemy situation, suggested flight route, approach direction into the LZ, flight altitudes, winds, and artillery advisory and the current mission status.

After receiving the air brief by the AMC, it was evident tha the insertion was not progressing as rapidly as planned. The delay in getting the ground elements inserted made it necessary to begin the heavy and medium lift portion of the insertion prior to the last ground unit closing in the LZ. A warning order was passed to the C&C to prepare the first lift for delivery by 1400 hours. This warning order was followed up by an order to execute the heavy and medium lift phase at 1308 hours. The first flight was launched at 1311 hours and proceeded to the LZ.

The LZ was fairly small and had evidently been prepared by a daisy cutter as there were many stumps and some rather large obstacles left within the perimeter of the LZ. The troop-lift aircraft were making their approach from the north to the south with a short left turn and landing in the LZ from the west to the east. They were departing to the east and

breaking to the left as they were climbing out. It was evident that there would be problems, first getting in and out of the LZ with all the lift aircraft traffic, and once in the LZ, finding a suitable area to release the loads. In addressing the second problem, the only solution was to release the loads. In addressing the second problem, the only solution was to try to keep the loads out of the troop-lift landing area and to avoid blade strikes. As for the first problem, the aircraft commanders had to adjust their approaches to integrate them with the troop-lift traffic. Once in the LZ, the CH-47 with its sixty foot diameter rotor was greatly restricted by obstacles while maneuvering to position their loads and the CH-53 was even more restricted.

The first aircraft arrived and began its descent into the LZ, which was completed successfully with no major incident. The first loads to arrive were the 105mm and 155mm howitzers. The last aircraft on the first lift closed out on the LZ at 1400 hours. This procedure was followed until the last sortie was inserted and the PZ was clean at 1615 hours, finishing the mission at 1675 hours.

Early in the assault phase while enroute on the first lift, a CH-47 tail #820 took two hits at three thousand feet from a 12.7mm antiaircraft weapon. One round entered the cockpit area through the aircraft commander's window, pierced the bulkhead just above and behind the aircraft commander's head and continued on piercing the #2 upper dual boost accuator and eventually lodged in the spar of the green rotor blade. The second

round lodged in the aft red rotor blade spar. The aircraft lost its #2 hydraulics which forced the aircraft commander to drop his load and make an emergency descent landing at ALUOI. The aircraft commander received minor injuries to the left side of his face and left shoulder caused by flying windshield glass. Later in the operation, the aircraft and crew were evacuated to Khe Sanh.

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e. Extraction Operations:

(1) General: The tactical extraction of the fire bases by medium and heavy lift helicopters was completed using the same basic organization, planning and tactics employed during assault support and resupply operations. Medium and heavy lift helicopters were employed during the extraction phase of three of the ARVN fire bases located in Laos and two in South Vietnam. All the fire bases came under some form of ground attack and/or indirect fire at the time of the extractions or just prior to the extractions. Due to enemy contact at the extraction sites, start and completion times were adjusted to meet the tactical situation.

(2) Organization: The organization for each extraction varied based on the amount of equipment to be extracted and the enemy activity around the fire base. The number of aircraft utilized varied from four to six medium lift helicopters (CH-47) and one to two heavy lift helicopters (CH-54/53). One set of AH-1G or UH-1C gunships provided fire support. The aircraft were all under the command of one mission lead until the extraction was completed. A command and control aircraft was used to coordinate the overall extraction from a position over the fire base.

(3) Planning: Detailed planning was accomplished by the personnel of the battalion forward CP and passed to the mission lead on a daily basis, or mission basis. The briefing of flight crews by the S-3 personnel consisted of intelligence, flight routes, fire support (planned and available on call) and the specifics for breaking off the mission in case of heavy enemy activity. The AMC in the command and control aircraft then monitored the operation and was immediately available to coordinate changes and solve problems. The emphasis in extraction planning was on the preparation of the loads and in keeping the exposure time in the PZ to an absolute minimum.

(4) Tactics: Tactics employed were the same during the extraction phase as those employed during the assault support and resupply phase. Departures from the PZ's in Laos were all maximum performance to minimize exposure time below 3000 feet AGL.

(5) Pickup Zones: Due to the enemy situationand the location of extraction PZ's, on forward fire bases, many of the considerations for electing, organizing and operating a good PZ were abandoned. Those considerations most often disregarded were the normal clear area around the PZ (75 X 150 meters), police of the PZ and dust control. Dust was the one problem that most often affected the time spent in the PZ during the hook up of loads. Communication with the PZ was generally inadequate, from the pilots viewpoint, due to the language barrier, however, the preplanning and coordination employed was sufficient to insure that the loads were rigged and ready, and that hook up personnel were on the loads when the aircraft arrived.

(6) LZ: The LZ's for extractions were the same as the PZ's for assault support and resupply operations and required no special preparation or consideration.

(7) Fire Support: The fire support requirements and planning for the extraction phase were generally the same as for the assault support and resupply phase. The assets utilized were all available Tac Air (preplanned and/or on call), artillery and helicopter gunships. The emphasis was placed on the preplanned use of Tac Air and Artillery to hit known and suspected indirect fire sources, and to generally disrupt and disorganize the enemy just prior to commencing the extraction. The on call Tac Air and Artillery was utilized for the same purpose after the operation was interrupted by enemy direct or indirect fire. The coordination of these

fires was accomplished by the AMC from the command and control aircraft overhead.

f. Routine Resupply Operations:

(1) Once the fire bases were established, resupply operations were tailored to meet the individual needs consistent with the tactical situation. Two to six aircraft were placed under the control of a mission leader, usually an assault support helicopter company commander or platoon commander. The aircraft were employed as described in the tactics portions of assault support operations of this paper. Although the Landing Zones (LZ's) were repeatedly placed under indirect fire, through perserverence and a series of valorous attempts, the bases were resupplied. When anti-aircraft fire became intense, especially around forward fire bases near Tchepone, resupply operations had to be suspended until the enemy positions were destroyed or the threat reduced to an acceptable level. Enemy action not withstanding, the battalion moved a record amount of tonnage to re-supply the fire bases.

(2) Although resupply missions were planned a day in advance, it become apparent that often leads would not be rigged until mid-day on the day the mission was to be conducted. This required that the leads be airlifted to the fire bases during the period of the day when the density altitude was the highest. Pathfinders at the pick up zones (PZ's) did an outstanding job of controlling aircraft in high density traffic areas, and in rendering assistance to the logistic personnel. Since most resupply was done through a series of closely knit bases around the perimeter of the Khe Sanh airfield, the high density of aircraft was a persistent problem.

Future plans should include a requirement for greater dispersion of supply bases. Due to the nature of the terrain at Khe Sanh, this could not be accomplished during operation Lam Son 719. (Khe Sanh is situated on a high plateau near the Laotian border) On sorties delivered to landing zones it was planned that loads would be dispersed throughout the site. This prevented indirect fire from destroying complete ammo dumps. This also reduced the vulnerability, of the aircraft had they continually landed on one specific place at each site. As time elapsed the fire support bases and landing zones accumulated a tremendous amount of debris, which proved to be a hazzard to helicopters working the area and endangered the safety of ground personnel. Overall, it can be stated that the majority of resupply operations required the same detailed planning as was necessary for combat assaults.

g. Integration of medium and heavy lift operations with troop lift operations.

(1) In the majority of the moves where UH-1 and CH-47 aircraft were utilized together, planning was accomplished to make each element a separate and distinct part of the move. Normally, the UH-1 portion of the move was completed prior to the start of any medium and/or heavy lift. This facilitated control of lift and gunships, minimized air traffic and airspace problems, and provided elements on the ground time to make necessary preparations for the receipt of supplies and equipment.

(2) On those occasions where time was a critical factor and medium lift had to be initiated prior to the completion of the UH-1 portion, UH-1 aircraft "gave way" to the larger and more cumbersome

aircraft. Although this technique did minimize the problems associated with intermingling two such dissimilar aircraft, control was nevertheless a problem. This was due primarily to the fact that LZ's were either poorly prepared or not prepared at all, compounding the difficulty in maneuvering large aircraft with bulky external loads. Time in the LZ was thus increased, and exact timing and integration became difficult. Compounding obstacles, such as trees and stumps, was the heavy dust blown about by the high winds associated with large helicopters, causing almost IFR conditions for both UH-1 and medium lift aircraft. The fact that throughout the operation there were only several minor blade strikes and no accident damage, is a major tribute to the skill and professionalism of the medium and heavy lift aviators.

h. Aircraft Recovery Operations: During Operation Lam Son 719, the 159th ASHB recovered 57 aircraft from Laos and 185 aircraft from Khe Sanh combat base to other rear areas.

(1) The 101st Aviation Group designated the 158th Aviation Battalion to establish a unit at Khe Sanh combat base to control aircraft recovery operations. This unit had two maintenance recovery UH-1H, carrying T. I. and rigging teams, as well as two UH-1H chase aircraft under their control. The UH-1H aircraft came from the lift battalions on a mission basis. When gunship escort was required for a recovery, the assets were drawn from the General Support Standby Gunships. The 158th control unit had direct communication with the 159th Assault Support Helicopter Battalion and would contact the 159th forward operations when a CH-47 was necessary for extraction.

(2) When notified of a downed aircraft, the following sequence of events took place:

(a) The position and any information available about the downed aircraft was relayed to the maintenance team.

(b) Gunships were launched for operations requiring gun support. Every extraction in Laos had gunship support.

(c) The 159th Aviation Battalion was alerted for the possible extraction.

(d) The maintenance recovery team examined the downed aircraft and determined whether the aircraft could be flown out or would require extraction by CH-47.

(e) When extraction was necessary the rigging team with the maintenance aircraft started preparing the aircraft while the recovery aircraft notified the Control Center that a CH-47 would be required.

(f) The 159th forward operations center immediately dispatched a CH-47 to the recovery operation. The CH-47 would contact the maintenance aircraft and be on station or enroute to the site waiting for the rigging to be completed.

(g) After extracting the aircraft, the CH-47 proceeded to the aircraft's home base if in the Dong Ha, Quang Tri area, or deposited the aircraft at Khe Sanh for back-haul to the rear upon completion of the day's missions.

(3) Analysis of aircraft recovery operations revealed that:

(a) Gunship support was difficult to obtain at times due to the scope of the overall operation. The size of the General Support package varied from day to day and the package was responsible for CH-47 resupply, medevacs, as well as aircraft recovery. The problem was solved several times in Laos by utilizing the same set of guns used to cover CH-47 resupply while a downed aircraft was prepared for extraction from the same fire base.

Recovery operations were delayed in other instances until gunship escort could be provided.

(b) The enemy situation in Laos hindered many recovery operations. Indirect and small arms fire often forced the maintenance recovery team to orbit the downed aircraft for lengthy periods of time before the aircraft could be examined and rigged. The 159th was successful in extracting every aircraft the maintenance recovery team was able to rig. However, on one occasion, the downed aircraft was destroyed due to hostile fire prior to the recovery effort being initiated.

(c) When units other than the 158th controlled maintenance team rigged their aircraft, they occasionally failed to rig them properly, to de-arm, or to de-fuel the aircraft. The 158th maintenance team solved this problem by examining all aircraft prior to a CH-47 being dispatched to extract them to the rear.

(4) Summary: The large number of aircraft damaged by enemy fire and the maintenance problems associated with an operation of this magnitude required an aggressive, responsive aircraft recovery program. This was accomplished by the 159th Aviation Battalion through close coordination with supported units and rapid response to mission requests. Although back haul type evacuations were sometimes delayed by weather and/or darkness, immediate extraction from forward areas was accomplished on an almost daily basis. A system such as that established in Lam Son 719 is mandatory for a successful aircraft recovery program in the environment encountered in Laos.

i. Weather:

(1) Weather in the AO during the operation was characterized by low ceilings, early morning fog and light rain in the eastern portions; with higher ceilings and dryer weather west of the North South Ridgeline bisecting the area. These conditions were a result of the Northeast monsoon which prevailed through the major portion of the operation. Good flying conditions became more prevalent as the monsoon weakened late in the operation.

(2) Weather was an influencing factor on 24 days or 54% of the possible flying periods. During these times, low ceilings and reduced visibility caused delays in flight schedules. On 17 Feb 71 all missions were cancelled due to weather.

(3) Low ceilings compressed the available flying area vertically and laterally, thus causing higher concentrations of aircraft in the useable airspace and, at the same time, bringing the aircraft closer to enemy gunners. Some channelization of flight routes into river valleys also resulted, but it can be concluded that weather prevented mission accomplishment only on rare occasions.

j. Communications:

(1) Communications for the medium and heavy lift elements supporting Lam Son 719 were provided by FM radio, AM radio-teletype and field wire nets that were established, maintained and operated by signal personnel from the 159th Aviation Battalion and the 101st Aviation Group.

(2) Communications Systems

(a) FM Radio: The primary means of voice communications

on this operation was FM radio. Three RT-524 radios were set up at a forward operations tent, providing a Battalion Secure Net, a Battalion Plain Net and a station in the Group Secure Net. The secure capability was achieved by using two KY-8 secure sets. Power for this FM configuration was supplied initially by two 1.5 KW D. C. generater sets and four 12-V D. C. batteries. Later on, because of generater failure and battery problems, a 3 KW D. C. generator set was used in conjunction with an RA-91C rectifier. A net diagram of the FM radio system is shown at fig. 1 . The Battalion (fwd) Plain Net was originally designed to communicate with the rear area by means of an FM re-trans site. Due to equipment shortages, this re-trans site was not installed and bad atmospheric conditions nullified the possibility of communicating to the rear without it. The Battalion (fwd) Plain net was then used, as was the Battalion (fwd) Secure net, primarily for contact with aircraft in the Area of Operations. Aircraft VHF and UHF radios were also employed as required.

(b) AM Radio-Teletype: A long-range radio capability was needed because of the substantial distance separating the forward and rear areas, and because of FM's inherent "line-of-sight" restriction. For this purpose the AN/VSC-2 single-side-band radio was used with a 50 ohm doublet antenna. The equipment was located in a small tent adjacent to the 159th Operations Tent. It was installed, operated and maintained entirely by personnel of the 101st Group Commo Platoon, and existed for the convenience of the 159th and other units of the 101st Aviation Group. The AN/VSC-2 provided us with a plain voice capability and a secure teletype means of communicating with the rear areas and with attached battalions (see fig. 1). This configuration was generally very reliable.

(c) Wire Communications: WD-1 wire and field telephones

were used for local land-line comms between Group and Battalion Operations tents, a line to the area switchboard, and a line between Battalion Operations and the comms tent. (see fig. 2) Equipment was provided by the Battalion Comm Section and personnel from the section were utilized to maintain it. Wire communications, as expected, presented no problems.

(3) Personnel Requirements: In the initial phase of setting up and digging in, seven men from the 159th Avn Bn Comm Section were utilized. This process took the majority of two days, with modifications made during the next ten days. After procedures settled down to normal, two or three people were sufficient to handle the signal requirements, as well as distribute and safeguard SOI material.

(4) Analysis: There were no major problems with signal equipment during this operation. At times, power failures and surges caused minor damage to radios and secure equipment, but enough back-up equipment was always on hand to restore communications promptly. Power problems occurred because the 1.5 KW generator could not supply adequate power to handle the 28 volt lead requirement of the radios with secure sets. Later on, a 3 KW generator was substituted and worked well except for occasional fluctuations in the power level. Finally, a rectifier was obtained whichprovided constant, steady power to the sets. Overheating, especially in the AN/VSC-2 set, became a problem at times. The lack of sufficient ventilation and extremely dusty operating conditions were major causative factors.

(5) Summary: All things considered, the communications system was more than adequate for this operation. Had better sources of power been available, radio equipment problems would probably not have existed. Secure sets held up much better than expected, considering the heat and dust.

Initial installation was fast and efficient. The only major improvement required is in the area of power supplies. Larger, more reliable generators are required to meet the heavy demands of an operation of this type.

k. Maintenance: A major maintenance effort was required to assure continued availability of the large numbers of medium and heavy lift helicopters required to support Lam Son 719. Prior planning, additional support, command emphasis and increased effort were all factors contributing to the achievement of the desired result.

(1) Each of the organic medium and heavy lift companies, (A, B, C, 478th of the 159th Assault Support Helicopter Battalion (ASHB) has a direct support maintenance capability. The three letter companies each have a Transportation Corps (TC) Detachment with direct support capability organic to the company. The 478th Aviation Company acheived this capability through its organic maintenance platoon. The two non-organic medium helicopter companies (132nd and 179th) which were OPCON to the 159th ASHB, also had a direct support capability. Repair parts supply support was provided to each of the units, except the 478th Avn Co, by either A or B Co., 5th Trans Bn. The 478th Avn Co received its support in repair parts supply from the 142nd TC Co, 58th Trans Bn., located at Red Beach, Da Nang.

(2) Impact of operation Lam Son 719: The greatly increased flying hour program had a prenonunced effect on the combined maintenance effort, since it resulted in a corresponding increase in the amount of scheduled and unscheduled maintenance performed. This sharp increase in monthly flying hours was particularly significant since it occurred

immediately after the lull of the monsoon season in northern Military Region One. This had both advantages and disadvantages. It was an advantage in that the units were able to devote more concertrated effort in their maintenance operation during the period immediately preceeding Lam Son 719. The major disadvantage, however, was that it was difficult to quickly adjust to a sudden, sharp increase in the flying hour program, particularly in scheduling the aircraft into Preventive Maintenance-Periodic (PMP) inspections. This problem was anticipated and a warning given to the units of the 159th ASHB to prepare for a highly concentrated flying hour program during the period February 1971 through April 1971. This was of particular concern to the three CH-47 companies of the 159th ASHB, due to the fact that their scheduling program is of vital importance in projecting future scheduled maintenance. The scheduling program is based on a three month projected flying schedule. Using this scheduling program, time change components with required delivery dates (RDD) are requisitioned through close coordination between the quality control sections and tech supply section.

(3) Maintenance Operations: Based on limited information available, each of the letter companies and the 478th Avn Co began preparing for the expected increase in flying hours by adjusting their scheduling program accordingly. In addition, those aircraft which were within 25 hours of their required PMP were flown into the inspection while the high time aircraft were held down, this enabled the units to build a bank of aircraft hours with which to start the operation and sustain themselves without having more aircraft go into scheduled maintenance than they were capable of handling during the initial phase.

As the flying hours per company began increasing at the start of the operation, the amount of scheduled maintenance also increased. During the two (2) month period February through March 71, the three letter companies of the 159th ASHB performed sixty-two PMP inspections, the 132nd and 179th ASHB, twenty eight and the 478th Avn Company nine. This was accomplished by utilizing a twenty-four hour maintenance schedule. This put a severe strain on the manpower available in the maintenance sections of each unit, particularly since assigned strength of the TC Detachments was running at approximately 75% for each of the companies during this period. This problem was compounded because the shortages were mainly in supervisors, 68-series MOS, and other allied shops personnel. There was a distinct shortage of experienced specialists. The following table shows shortages against augherized strength by MOS in the 159th ASHB on 27 Mar 71 which was characteristic of the manpower situation within the companies throughout the operation:

MOS	AUTH	ASG	SHORT	JOB TITLE
671C	13	6	7	Avn Maint Tech
76T	26	14	12	Tech Supply Spec
67Z50	22	13	9	Maint Supervisor
67W	14	9	5	Tech Inspecter
35K	17	14	3	Avionics Mech
35L	6	2	4	Avionics Repairman
35M	6	3	3	Avionics Equip Repairman
35N	5	3	2	Avionics Flt Control Repairman
44E	4	2	2	Machinist
45J	4	2	2	Aircraft Armament Repairman
68B	14	9	5	Engine Repairman
68D	8	6	2	Power Train Repairman
68E	11	8	3	Propeller Repairman
68F	18	11	7	Electrician
68G	25	17	8	Welder
68H	12	8	4	Hydraulic Repairman

The problems caused by these critical shortages were overcome by aggressive cross-training and on-the-job training programs in effect throughout the battalion. In addition, two civilian PMP teams were provided by the 34th

General Support Group to assist the CH-47 units in accomplishing scheduled maintenance. These teams consisted of a total of sixteen personnel, and were available to the units from 7 February 71 through the completion of Lam Son 719. They accomplished a total of twelve PMP inspections on CH-47 aircraft, and contributed 7,515 man hours to the combined maintenance effort. The availability of these teams was of immeasurable help during this period, easing the problems caused by the manpower shortage in the units and providing a reservoir of valuable maintenance experience. Another area in which these teams were invaluable was in coping with the increase in the amount of unscheduled maintenance resulting from the conduct of Lam Son 719. The unscheduled maintenance was of two varieties. One was the normal problems associated with a greatly increased flying hour program. The other was the result of battle damage from enemy ground fire. Almost 1,000 man-hours were required to repair skin and structural damage inflicted on the CH-47's and CH-54's. Without the availability of the civilian PMP teams many of these repairs could not have been effected utilizing organic maintenance capabilities.

(4) Analysis: The three primary parameters for determining the efficiency of the maintenance effort during this period were the operational ready rate (OR), and the NORM/NORS rates. Attached as figure 3 are charts which graphically depict these parameters with relation to the associated flying hour program of the CH-47's and CH-54's. As the flying hour program increased abruptly in February, the NORM rates, and in the case of the CH-47's, the NORS rates, also increased. It is significant to note that the NORS rate, although increasing slightly, remained relatively constant when compared to the previous seven month period. This was due primarily to the great

amount of command interest and emphasis on the aviation repair parts supply system. A forward liaison element of the 34th General Support Group, operating out of Quang Tri, was in a large measure responsible for insuring that the necessary repair parts were made available to the requesting units in an absolute minimum of time. This element also maintained close liaison with the civilian PMP teams, and determined where their assistance was most urgently required. One of the primary reasons for the slight increase in the NORS rates was that some of the repair parts for which there was a sudden demand were items that had acquired little if any demand data in previous operations. Many of the parts damaged by enemy fire were unusual in that these were parts which ordinarily are seldom, if ever, required through repair parts supply channels. It must be emphasized at this point, that a major factor in keeping NORS/NORM rates at a respectable level was the prior planning done by the units of the 159th Assault Support Helicopter Battalion, and the aircraft scheduling program which they utilized. They were able to adequately forecast, in most cases, the repair parts which would be required based on the increased flying hour program. A major area of concern to the maintenance activities during the operation was the conditions under which the aircraft were operating in the forward areas. The dust in which the CH-47s and CH-54As were forced to operate on a continuous basis was a critical factor in increased wear on engines and rotor blades. Due to the battalion policy of flushing each CH-47 engine with water after every flying day, the damage to engines remained negligible. The wear on CH-54 engines was also negligible because of their Engine Air Particle Separators (EAPS).

Most of the damage done by the dust was to the aircraft rotor blades. The abrasive nature of the dust coupled with the extremely high winds generated by the rotor wash, resulted in abnormally rapid deterioration of the leading edge of the aircraft rotor blades. The CH-54s were most affected in this area, in that they were forced to replace seventeen main rotor blades. The impact of this problem on the availability rate, and the NORM/NORS rates was very slight since this problem was expected early in the operation and the necessary parts were prestocked or requisitioned in anticipation.

(5) Summary: Based on performance, operational ready rates, and NORS/NORM rates, the various maintenance activities which provided direct support to the medium and heavy lift helicopter companies continued to operate in an efficient manner during the course of Lam Son 719. Numerous problem areas were encountered, but were solved either through prior planning and preparation, or by making adjustments to alleviate them as they occurred. With reference to the attached charts, it is evident that despite the sharp increase in flying hours, the OR percentage remained fairly constant and in the case of the CH-54s, even increased. The NORS and NORM rates remained well within acceptable limits during the two month period of the operation. This flying hour program could have been continued indefinitely, particularly since the original planning and preparation by the respective maintenance personnel was for a time span which was expected to extend beyond the period covered in this report. One situation which continued to be a significant problem area throughout

the operation was the difficulty the various maintenance activities encountered in servicing and maintaining aircraft in the forward operational area. When an aircraft encountered a maintenance problem which precluded it from returning to its home maintenance facility, the units' maintenance teams had to provide repair capabilities in the forward areas. Due to the distance between the operational area and the units' rear bases, coupled with an occasional breakdown in communications, this situation resulted in many lost hours on the part of the maintenance support. There were some instances where the information which the maintenance officers received was faulty or incomplete regarding parts needed or problems encountered with a particular aircraft. The 478th Avn Co. was most affected by this situation because of the great distance between their maintenance facility (DaNang) and the operational area. The difficulty in maintaining adequate land-line communications compounded the problem for the 478th Avn Company. The advantages which were gained, however, by staging the CH-47's from their home base in the Phu Bai area far outweighed the few problems occasioned by the maintenance difficulties encountered by the aircraft in the forward areas. The other situation which had a detrimental effect on the maintenance effort was, as mentioned earlier, the manpower shortage within the maintenance activities. Had the companies been up to TO&E strength, with experienced, well qualified personnel in technical and supervisory positions, the efficiency and effectiveness of the maintenance operations could have been considerably improved.

5. Results:

a. Tasks accomplished in support of Lam Son 719

(1) Hours flown 5703.6

(2) Sorties carried 13045

(3)	Tons of Cargo Carried	24618.4
(4)	Passengers carried	9990
(5)	Medevacs carried	1110
(6)	Aircraft recovered	
	from Laos	57
	from Khe Sanh area	185

b. Vulnerability

(1) Aircraft damaged: During Operation Lam Son 719, a total of forty-nine medium and heavy lift aircraft were hit, resulting in two CH-47's shot down and destroyed, one CH-47 forced down and later destroyed by ground action, one CH-53 shot down, and one CH-53 crashed while enroute to home base. The cause of this crash was suspected combat damage. A total of fourteen CH-47's, and seven CH-53's, sustained minor damage. Incident damage was sustained by 15 CH-47's, 5 CH-53's and one CH-54.

(2) Aircraft destroyed: The one CH-53 shot down was hit by a mortar round and approximately 20 rounds of small arms fire while hovering over a load in a landing zone. One of the CH-47's shot down was hit going into a landing zone by an unknown number of small arms rounds, which knocked out the hydraulics causing it to crash and burn. The second CH-47 shot down exploded in mid-air; cause undetermined. The CH-53 listed as destroyed had suspected combat damage and was enroute home when the main rotor system failed.

c. Casualties

(1) Nine men killed in action in the crash of a CH-53.

(2) Six men missing in action in a CH-47 crashed in Laos and not recovered.

(3) Six men wounded in action. One medevaced. Five with minor wounds treated and returned to duty.