

## SECTION VI - The History of Helicopter Maintenance in Southeast Asia during the Vietnam Era

In keeping with the traditions set by the last few Directories, the Directory Committee presents a few pages to support the theme of this edition - the history of Southeast Asian helicopter maintenance units during the Vietnam War Era. VHPA Member Jerry Mellick was kind enough to loan us his copy "AVIAN 34" which serves as the primary resource for the first part of this section. Unless a paragraph begins by naming another reference, the source is assumed to be "AVIAN 34." All first person accounts are associated with a specific unit and inserted when that unit is mentioned in the "AVIAN 34" flow. We also need to thank VHPA Member Charles Thibodeau for putting us on to the ATAV (Army Transportation Association Vietnam) website.

### 34<sup>th</sup> General Support Group

Until early in 1966, supply and maintenance for the Army's aircraft in the Republic of Vietnam came under the control of the U.S. Army Support Command. This organization was composed of two Transportation Battalions (Aircraft Maintenance and Supply)—the 14<sup>th</sup> with one direct support company and the 765<sup>th</sup> with one general and two direct support companies. Supply support was handled by the Aviation Supply Point at Tan Son Nhut Air Base, which was carrying 8,000 line items in support of 660 aircraft.

MG John Norton, then Commanding General of the US Army Support Command, Vietnam, realized that his organization would be unable to handle the large aircraft buildup projected for 1965 and 1966. To meet this problem, General Norton appointed an ADHOC committee and gave it the project of creating an aviation logistical support organization capable of meeting the demands of the projected aircraft buildup. The committee was given two guidelines. First, the new organization should be structured to provide one-stop maintenance (i.e., support at one location not only for the aircraft, but for its associated avionics and weapons systems as well). Secondly, the new organization should be able to grow with the expected buildup of aircraft.

Based on the recommendations of the committee, the 34<sup>th</sup> General Support Group (Aircraft Maintenance and Supply) was formed provisionally in November 1965. It was activated in January 1966 and given the responsibility of "...providing command and control of assigned and attached units performing the aircraft, avionics and air armament maintenance functions in the Republic of Vietnam". This mission includes aircraft maintenance and supply support for all Free World Forces in Vietnam.

Upon activation, the Group was composed of the 14<sup>th</sup> and 765<sup>th</sup> Transportation Battalions, along with assets drawn from the Army Support Command. During the first year of its existence, two more battalions were brought to Vietnam and placed under the control of 34<sup>th</sup> Group. The 58<sup>th</sup> Transportation Battalion (Aircraft Maintenance and Supply) (General Support) and the Floating Aircraft Maintenance Facility (FAMF), 1<sup>st</sup> Transportation Battalion (Seaborne) raised the Group's strength to four battalions. In March 1967, another General Support Aircraft Maintenance and Supply Battalion—the 520<sup>th</sup>—was added, and in February 1968, the U.S. Army Aviation Materiel Management Center (AMMC) was placed under the operational control of the Group. With the addition of these organizations, the 34<sup>th</sup> Group has been able to render general support to all Army aircraft in Vietnam. It is providing back-up direct support to divisional units in-country, including the 101<sup>st</sup> Airborne, Americal, 4<sup>th</sup> Infantry, 25<sup>th</sup> Infantry, and the 1<sup>st</sup> Cavalry

(Airmobile) as well as the 1<sup>st</sup> Aviation Brigade. Other USARV aviation units receive direct support from the 34<sup>th</sup> Group.

In addition to meeting the needs of U.S. Army aviation, 34<sup>th</sup> Group also provides logistical support to elements of the Royal Australian Air Force, Republic of Korea Air Force, Royal Thai Army, U.S. Navy, U.S. Air Force, and the U.S. Marines.

### Personal recollections of Dennis P. Vasey

*I was assigned to the General Support Group (AM&S) (Provisional) from the 1st Brigade, 101st Airborne Division on 9 December 1965. The Headquarters was located in an attractive suite of office buildings not far from Tan Son Nhut Air Force Base. With the exception of COL Gus Pyer all of us came from units in Vietnam to fill various positions. I was the Group S4 where my initial job was to identify all installed and spare aircraft engines in-country. I had been the 1st Brigade Movements Officer and deployed the 101st from Fort Campbell, Kentucky where we used punch-card's to identify equipment. We had just started using punch-card's to requisition parts and during this tour we began using them to report equipment status using a color code on the top edge of the card. Armed with boxes of blank cards I went to each aircraft maintenance unit and wrote the engine serial number and engine type with a magic marker on a card. If the engine was installed, I wrote the aircraft serial number on the obverse side. Each day I returned to Tan Son Nhut with the completed cards were they were key punched, sorted and transcribed to the National Inventory Control Point in St. Louis, MO. I stopped at refuel sites, maintenance units, aviation units, at field locations where there were aircraft on the ground and to the salvage points for 100 days. You may wonder whether I counted equipment twice and the answer is absolutely. I know one aircraft that had four engines during the survey. Another question might be: Did you inspect each aircraft and engine? I would say if it looked like it might be an aircraft, I checked it! I was also gathering a list of aircraft which was a real eye opener, i.e., some of the aircraft had been reported as destroyed in earlier DA Form 1352 reports. In those days we filed a DA Form 1352 and a DA Form 1890 report that were supposed to list all installed and spare engines. Well, it was apparent that nobody had time to file all of those reports and the practice generally fell by the wayside. Later the material readiness report was revised to include installed and spare engines, along with some additional information on dynamic components. When I got word to stop, we discovered more than three times the number of engines than aircraft. More significant was the discovery that a majority of engines were being used for spare parts and that many containers held piles of parts that were unusable.*

*With the Corpus Christi Bay in operation, we began to collect the pieces and ship them to that facility for test, use, return to the states or disposal. I think the ship stayed awake all day and night building engines, testing them and return within theater. As the 34th Group started taking on new missions it needed vehicles and materials handling equipment. CPT Robert E. Van Dee, the HHC Commander, and I went to units within driving distance of Tan Son Nhut and signed for surplus property identified by USARV that had been reassigned to the group. You can imagine the reception when we got to these units and faced the equipment operators who were required to turn it over immediately. My favorite acquisition was from a pair of colonels who*

*had commandeered a jeep and weren't about to release it no matter who gave the order. They always went to the "Red Ball Inn" after work. I went to the Military Police and asked if they would help me get the equipment. They had better things to do but I was within my rights to take it and no report would be filed. I went to the inn and waited. Sure enough they got there for happy hour and as soon as they locked it up and left, I cut the chain and drove off. At some point I was introduced to a newly assigned LTC who was selected to command the aviation material management center. During the conversation I asked him how things were going. He replied, "Until last night they were just fine." Then I said, "What happened last night?" He replies, "Someone stole my vehicle." My tour started on 9 December 1965 and ended 20 June 1966. I accomplished two tasks: theater aircraft engine inventory and established the group maintenance, operation and inspection of all vehicles and materials handling equipment within group headquarters and the aviation material management center.*

### **Personal recollections of Jerry Turner**

*A CODE 99 is an US Army Captain assigned to a Field Grade Officers slot. That was, most often, my fat, but the trip is always more fascinating than the time there. Getting to Vietnam I spent a day in Bangkok waiting for the weather to clear in Jan 66. The Major that I replaced in the 34th General Support Group presented me with a "Secretarial Notebook" that contained the serial numbers of all the US Army aircraft assigned in Vietnam, there was unit of assignment and location. His parting comment was that now I had been told that 'Big Build-up' is planned. What was once a one-man job turned into a '15-man Project.' When I arrived, the Army had 330 variously assigned aircraft. My expanded section coordinated the arrival, assignment and arranged for crews to ferry all 3,000 incoming aircraft through the various ports, and made certain the correct unit received the assigned aircraft. Documents, etc. for aircraft are much more formal than for any other means of travel. The USARV Commander was the authority for priority of replacement for combat damaged or destroyed aircraft. I received his priority list weekly. Many times I had replaced aircraft for units that lost aircraft by combat losses, before USARV knew of the loss. The other function of evaluating and returning to CONUS all repairables, combat or crash damaged aircraft, was much more time consuming and dangerous, for me and my top-notch inspectors.*

### **US Army Aviation Materiel Management Center**

The history of the U.S. Army Aviation Materiel Management Center (AMMC) dates back to 1963, when approximately 25 supply personnel from the Aircraft Maintenance and Supply Branch, G-4, U.S. Army Support Command, Vietnam began operating what was then called the Aircraft Supply Point (ASP). In July 1965, USARV provided plans and general guidelines for a depot facility complete with an inventory control point. This depot became AMMC and the Aircraft Supply Point was absorbed into it.

The 110<sup>th</sup> Transportation Company (Depot) arrived in-country in November 1965 and added 116 personnel to the growing strength of AMMC. Four months later the 241<sup>st</sup> Transportation Company (Depot) arrived and provided the Center the capacity to operate two depots.

In February 1968, AMMC was made a permanent unit with its own Table of Distribution and Allowances (TDA) and placed under the control of 34<sup>th</sup> General Support Group (Aircraft Maintenance & Supply). The Center, commanded by COL Emil Kluever, is located near Group Headquarters at Tan Son Nhut, Saigon.

Now an integral part of 34<sup>th</sup> Group, AMMC provides supply and selected

maintenance management support to all Army and Free World Forces aircraft in the Republic of Vietnam. As a part of this mission AMMC operates a centralized, single source, automated inventory control center for aircraft, avionics and armament repair parts. AMMC also serves as a statistical data collection and analysis center for aviation logistical information.

The headquarters of AMMC is organized into five directorates, each having a specific area of responsibility. The functions of these directorates are: (A) Directorate of Plans, Operations and Management - This directorate is responsible for planning and developing policies affecting logistical support, performing management studies, and compiling all financial and budgetary reports. It also coordinates all reports leaving the headquarters. (B) Directorate of Supply - Within the Supply Directorate, more than 50,000 lines of stock (valued at more than \$140,000,000) are managed. Management responsibilities include stock account, document control, storage, distribution, and priorities. The annual volume of inventory expenditures approaches \$800 million. (C) Directorate of Materiel Requirements - This directorate controls the buying, issuing, and maintenance of the Authorized Stockage List (ASL). Along with this, it is responsible for determining the parts requirements for the various aircraft systems within the Republic of Vietnam. (D) Data Processing Directorate - Using the latest in data processing equipment, including the IBM 360-50 computer, this directorate processes from 90,000 to 100,000 requisitions a month. These transactions are processed against the master availability balance file containing more than 50,000 lines of supply. (E) Directorate of Maintenance - This directorate manages all USARV aircraft and turbine engine accounts, the Theater Army Repairables Program (TARP), and the configuration control of theater aircraft. In addition, it monitors the retrograde or return of unserviceable items through the Aircraft Collection and Classification Point (see page 16) to CONUS repair facilities.

To gain a broader insight into the mission and operation of AMMC, it would be helpful to examine the processing cycle of the thousands of requisitions processed monthly. When a requisition is sent to AMMC from one of the many Direct Support Supply Activities (DSSA) located throughout Vietnam, it is processed through the Data Processing Center. If the requested item is in stock, a Materiel Release Order (MRO) is forwarded to one of AMMC's two supply depots - the 241<sup>st</sup> Transportation Company (Depot) near Qui Nhon, or the 110<sup>th</sup> Transportation Company (Depot) at Tan Son Nhut, Saigon.

Requisitions for stock that is unavailable are categorized in one of two ways. Items that are on the Center's Authorized Stockage List but are not on hand are put on a backorder list until new stock arrives. Requisitions for items that are not on the ASL are forwarded through the Defense Automatic Addressing System (DAAS) to the proper supply agency for appropriate action. The 110<sup>th</sup> Depot, commanded by MAJ George Catron, stocks more than 47,000 Federal Stock Number items and fills approximately 98 per cent of the 60,000 MROs it receives from AMMC every month. An average of 600 Not Operationally Ready, Supply (NORS) items are processed daily in support of units in all four MRs. The 241<sup>st</sup> Depot, commanded by Captain Bobby Graham, receives, stores, and ships aircraft repair parts for aviation units of MRs I and II. It is now supporting eight DSSAs (responsible for 2,019 aircraft) and provides back-up support to all other DSSAs in its area. The 241<sup>st</sup> stocks 38,000 Federal Stock Number items and fills 93 per cent of the more than 25,000 MROs it processes monthly.

Once an MRO has been filled at one of these depots, the item is either picked up or delivered, depending on the proximity of the requesting unit to the depot. Most pick-ups are made by truck convoy, while deliveries over long distances are usually air-lifted. The newly developed "Red Ball 34" airlift supply program provides customer units with required parts more expeditiously than was ever before possible.

All NORS items receive special treatment. When a NORS requisition is received by AMMC, it is sent directly to the Supply Directorate, where a search for the item is begun. If the item is not on hand either at the 241<sup>st</sup> or 110<sup>th</sup> depots, it is sent through the "Red Ball" system, which is used to expedite the ordering and shipment of NORS items from the United States. Requisitions are transmitted through the DAAS, from where they are sent to the appropriate commodity command and filled. These items are then shipped with top priority to the 110<sup>th</sup> Depot for further movement to the using unit.

It is programs such as "Red Ball" that are helping AMMC continue its fine record of support to Army and Free World Forces aircraft in the Republic of Vietnam.

#### **14<sup>th</sup> Transportation Battalion "Reliables"**

The 14<sup>th</sup> Transportation Battalion (Aircraft Maintenance and Supply), commanded by LTC Tommy Mansfield, provides direct, backup direct, and general support maintenance for aircraft, armament, and avionics to aviation units in MR 2. With headquarters in Nha Trang, the 14<sup>th</sup> is made up of five companies.

The following is an extract from the 1968 14th TC Bn Yearbook provided by Rich Johnson. The HQ & HQ Company has had three different homes since arrival in the Nha Trang area. When it first arrived in Sep 1965, it was initially located on the edge of Nha Trang city. The next month saw the company achieve a measure of permanence when it pitched its tents on Long Van Air Base to the rear of the present Bn HQ. In Oct 1967 when the 339<sup>th</sup> TC CO departed for their short stay at Phu Hiep, their nearby company area was quickly occupied "lock, stock, and barrel" to become the present home away from home for the HHC.

The 1968 Yearbook states: Being the largest aircraft maintenance and supply battalion in the US Army, providing support to half the aircraft in Vietnam, in July 1967, the Battalion had a total of eight company-sized units. At one time supporting as few as 250 aircraft to a high of over 1,800, the Battalion during 1967 had over 2,100 officers and men assigned. Battalion units were spread over I and II Corps, a support area of 40,000 square miles. The Battalion has provided direct, back-up direct and general support to aviation units such as the 1<sup>st</sup> Cavalry Division, 4<sup>th</sup> Infantry Division, 17<sup>th</sup> Combat Aviation Group, Americal Division, Dust-off units in the I and II Corps and numerous other aviation units and detachments. One of the Battalion's most trying times came during the Tet Offensive, when considerable combat damage resulted to many supported unit. Battalion units also received extensive combat damage and while enduring constant alerts, continued its resupply and repair functions under the most adverse conditions.

In March 1968, the 14<sup>th</sup> TC Battalion was reduced in size and mission by relinquishing command and control to the 58<sup>th</sup> TC BN of the 610<sup>th</sup> TC which moved to Red Beach at Da Nang, the 335<sup>th</sup> TC CO at Chu Lai and the 339<sup>th</sup> TC CO which moved to Red Beach. The Battalion's mission area now covers II Corps.

The 79<sup>th</sup> Transportation Company (ADS) at Qui Nhon provides maintenance and technical supply support to 279 aircraft in the northeastern section of the MR 2. With an area of operation extending from the southern border of MR 1 to An Khe, this unit has the most

diversified supply mission within the 14<sup>th</sup> Battalion. It stocks approximately 11,000 Federal Stock Number items. Under the command of MAJ Samuel J. Kowal, the 79<sup>th</sup> is responsible for retrograding and in-processing the majority of aircraft received by the 14<sup>th</sup>. It is also the control Direct Support Unit (DSU) for the Theater Aircraft Repairables Program (TARP).

The 604<sup>th</sup> Transportation Company (ADS) at Camp Holloway in Pleiku provides maintenance and supply support for 293 aircraft and stocks 9,100 lines of aircraft supplies. The unit's area of responsibility is the northwestern sector of MR 2. The Commanding Officer of the 604<sup>th</sup> is MAJ Arthur A. Williams.

The 608<sup>th</sup> Transportation Company (ADS) at Dong Ba Thin provides maintenance and supply support for 380 aircraft and stocks 10,200 lines of aircraft supplies. Commanded by MAJ George H. Fasching, the 608<sup>th</sup> has the largest area of responsibility in the 14<sup>th</sup> Battalion, extending from the sea westward to the Laotian border throughout the southern portion of MR 2.

The 1968 14<sup>th</sup> TC Bn Yearbook provided by Rich Johnson includes: The company was mission operational on 15 Aug 1967, on 23 days after arrival. It provides direct and back-up direct support aircraft maintenance and aircraft technical supply support to U.S. Army units at Cam Ranh Bay, Dong Ba Thin, Nha Trang, Ninh Hoa, Ban Me Thuot, and Phu Hiep. Additional direct maintenance and supply support is provided to the Republic of Korea 100<sup>th</sup> Logistical Command and the 11<sup>th</sup> Aviation Company (ROKA). Aircraft Recovery Support is provided to more than 275 aircraft of various types in a geographical area stretching from Phan Thiet to Phu Hiep along the east coast of Vietnam and extending westward to the Cambodian border. The yearbook shows a Fixed Wing Detachment.

The 540<sup>th</sup> Transportation Company (AGS) is located at Qui Nhon and provides general support maintenance and aircraft recovery throughout the 14<sup>th</sup> Battalion's area of responsibility. It represents the battalion reserve for back-up direct support maintenance as well as providing general support activities for approximately 1038 aircraft. The 540<sup>th</sup> is under the command of CPT Frank R. Muse.

The 1968 14<sup>th</sup> TC Bn Yearbook provided by Rich Johnson includes: The present day mission of the 540<sup>th</sup> TC is to provide GS and back-up DS aircraft maintenance and recovery operations in the I Corps Tactical Zone. To accomplish this mission, the 540<sup>th</sup> utilizes three platoons; a Headquarters Platoon which handles all company administration; a Repair Platoon which is broken down into the Recovery Section and the Repair Section; and a Shop Platoon which contains fourteen sections. In short, the 540<sup>th</sup> retrieves damaged Army aircraft, repairs them and returns them as flyable to the Army inventory. Recovery plays a big part in the operation of this company. The Recovery Section extracts damaged aircraft and transports the majority of them back to the 540<sup>th</sup> where the disposition of the damaged aircraft is determined. After a complete technical inspection, if it is found to be repairable within a certain man-hour range, the Repair Platoon begins the process of getting the aircraft back into the air. However, if the aircraft is found repairable, but requires excessive man-hours, it is readied for evacuation back to the United States. Sometimes, the aircraft is a complete loss and usable parts are retained with the remainder going into local salvage. The Theater Aircraft Repairable Program (TARP) has been in effect more than one year now. In this program, a unit sends unserviceable repairable parts to the 540<sup>th</sup>. In turn, the 540<sup>th</sup> repairs the item and returns it to the supply system rather than the unit. This program is designed to keep

serviceable parts in the supply system and easily accessible to any unit.

### Personal recollections of Paul N. Anderson

*This is a short history of my association with the 540th. I make no claims to the completeness or accuracy of this history, as it is based only on my recollection of events that happened a long time ago and in a place far, far away and are supported by few documents.*

Immediately upon graduating from flight school My classmate, W-1 James S. Allen (65-8W), and I were assigned to the 540th; he as Pilot / Supply Officer and I as Pilot / Motor Officer. We reported to the unit then located at Atlanta Army Depot, Georgia in mid August, 1965. Sometime in September, 1965 the 540th. and its parent unit, 14TH TC BN loaded its equipment and personnel onto a ship docked at the Oakland Army Terminal, Oakland, California. I think the vessel was an old Liberty Ship called the "El Tinge." We sailed in September for some place called Vietnam.

We arrived in Vietnam about twenty days later. Our first port of call was Qui Nhon, however we did not disembark. A couple of days later we anchored in Cam Ranh Bay and did an "Away All boats", (remember that 1950s movie), maneuver. At this time Cam Ranh Bay was undeveloped and did not have a dock so we had to go over the side of the ship, down rope ladders and into Utility Boats which ferried everyone to the beach (ala John Wayne). They even issued one and only one clip of ammo for my .45 cal side arm, made me feel secure! No one was shooting at us and the area really was secure, but it makes for a good story to tell the kids. I was volunteered, along with a captain (I think his name was Raymond D. Magallanes) from the 14th TC BN to remain at Cam Ranh Bay to ensure all of our equipment was off loaded. All other personnel of the 14th and 540th were transported to Nha Trang where they proceeded to set up shop. After a very hot first day on land the Captain and I located the Officers Club or a not so close facsimile of same and had a "cold one" "The Club" was a Command Post tent situated on the waters edge with a fish net full of beer and soda tossed into the water for cooling, manned by one tired Sergeant. Our first night was spent on board a "Mike" Boat anchored in the bay. I think the fact that the skipper of the boat was also a Warrant Officer was instrumental in getting the invite, yea WOPA! A day or two later, our mission complete, we hitched a ride in the back of an open deuce and a half to Nha Trang. What a ride! Two newbies clutching our pistols, with only seven rounds each, expecting to be ambushed at every bend in the road. After what seemed like an eternity we arrived safely in Nha Trang. Apparently the Viet Cong thought twice about attacking such a formidable duo. The stay in Nha Trang was short lived.

After a month or so of living in tents the 540th, moved lock, stock and barrel to Qui Nhon, however the 14th TC BN remained at Nha Trang. The 14th acquired two direct support companies; the 339th in Nha Trang and the 604th in, I think, Pleiku or An Khe. Qui Nhon was another tent city for most of the 540th's personnel, the RLOs and the First Sergeant lived the good life in a wood building with air conditioning while the rest of us called a GP Medium Tent home. Early in 1966 all the tent dwellers took up residence in wood buildings with concrete floors and tin roofs, no air conditioning though, but a definite improvement.

The unit's maintenance personnel were augmented by a few civilian contractors. We also had access to highly trained civilian maintenance techs and specialized equipment / tools on board the ship Corpus Christy Bay, a converted sea plane tender that, at least for awhile, was anchored in Cam Ranh Bay. In addition to the Corpus Christy Bay, the

pilots (mostly the Warrant Officers) of the 540th. flew maintenance / support missions to many regions of Vietnam; from I Corps bases such as Da Nang, Tam Ky, Chu Lai, and Marble Mountain to Pleiku, An Khe, Ban Me Thuot, Nha Trang, Cam Ranh Bay, Dalat, Phan Rang, and Phan Thiet in II Corps. III Corps area included some memorable RONs at Saigon and Vung Tau. I don't recall any missions to IV Corps. I remember two VIP visits, one from General Johnson, I think he was the Chief of Staff of The Army at the time of his visit. The second VIP visit was more enjoyable and useful. It was from a Bell Helicopter Test Pilot, who will remain nameless (because I can't remember it!). He gave us some stick time on the then new UH-1C and showed us how to extend the glide of a Huey, during auto rotation, great fun All in all an interesting year for a young W-1.

### Personal recollections of Rich Johnson

Aircraft recoveries from the field were accomplished as much as possible by utilizing the closest available Chinook to move the aircraft to a secure area. Sometimes the 540th Trans was the quickest available Chinook, but not usually. The aircraft was then repaired by the lowest authorized level permitted. If it was determined that it had to be brought to the 540th, the owning unit or its assigned maintenance unit would call the 540th to schedule a pickup. A call to our headquarters or to our recovery section in the evening would usually result in a pickup the next day. Honestly, we operated very much like a civilian Tow Truck operation, hence our unofficial call sign, "Wicked Wrecker." Before Tet, it was kinda calm, and we didn't get more than one or two calls a day, so we could pretty much handle the load with our 2 assigned Warrant Officers, Steve Collins and myself. If we had more than that, we would use our Maintenance Production Control officer, CPT Fred Ross, and the Co XO, MAJ Eugene Weaver. Two of our CW4s, Jack Mendel and Mr. Saylor, DEROsed in January 68.

Gun escorts were rarely needed, and were difficult to coordinate. We flew up to Quang Tri in Jan 68, waited 4 hours for a couple gunships to take us into Khe Sahn to recover a Bird-Dog, but they never showed. So we went back to Hue Phu Bai, had lunch, and went back to Qui Nhon. The next day, the Tet offensive started. Good thing we got out of Hue instead of hanging around to pick up a busted Bird-Dog. The only other time we needed an escort was to make a recovery out of the triple canopy by Bu Prang, west of Gia Nghia, using 120 feet of sling. Again, it was a Bird-Dog. We slung it back to Gia Nghia, dismantled it and stuffed it inside, and brought it back to Qui Nhon the easy way. On a field recovery, usually the on-site people would rig the aircraft before we got there, and we could just make a hover-approach, grab the doughnut from the guy on the ground, and depart without too much exposure. If we were picking up at a secure location, like an airfield, we would usually land, rig the aircraft, use a ground guy if available, or use the 'shepard hook' if not, to make the hook-up, and fly it back to Qui Nhon. Most everybody had a supply of 20' nylon straps, with connecting links (bike links) to make them longer. We always wound a 20' strap around the rotor head rather than using the lifting eye on top of the Jesus Nut, because we had heard of too many failures using the Jesus Nut eye. Our Chinooks seemed to have a two-hour endurance whether they were loaded or not, so we usually didn't have a problem planning fuel stops.

Although one time, we did just about run out of gas because of a series of things working against us. CPT Fred Ross and I left Qui Nhon to fly up to Red Beach, on the north side of Da Nang Bay, to pick up a Cobra. This was our first Cobra recovery, so we didn't know how much trouble

they were. We topped off at Chu Lai, picked the *Cobra* up at Red Beach, moved through the fast-mover traffic at Da Nang, and stopped at Marble Mountain to top off. To our surprise, the Marble Mountain POL was out of service. Well, we had 2200 pounds left, good for 1+10, and normally Chu Lai was about 40 minutes away with a sling load. So we departed Marble Mountain, and started on down the coast. Guess what? The *Cobra* wouldn't fly for crap! Those big barn doors it had bolted to the rotor head would make that bird start oscillating violently if we tried to go over 40 knots. So that 40 minute trip looked like it was going to use up all our fuel and then some. Fred suggested we set down on the beach, he'd stay there with two gunners and their M-60s, while I went to get gas, but I figured Charley would have plenty of time to get there before I could get back. So we continued on, hoping for the best, and discussing the characteristics of an autorotation from 40 knots with a sling load *Cobra* hanging underneath. We finally dropped our load at Chu Lai and set down at their POL, and took a break while the crew topped off. They put 614 gallons of JP-4 into our tanks, and the maximum capacity was 630 gallons. Talk about cutting it close!

The 614<sup>th</sup> Light Equipment Maintenance Company (GS), commanded by MAJ Bobby R. Harris, provides support for avionics, communications, navigational, and flight control equipment in MR 2. It supports the 14<sup>th</sup> Battalion through three platoons—one each located with the 79<sup>th</sup>, 604<sup>th</sup> and 608<sup>th</sup> companies.

The 1968 14<sup>th</sup> TC BN Yearbook provided by Rich Johnson includes the following material on Aviation Electronics Support Company (AVEL) North (Prov) that must have preceded the 614<sup>th</sup> Maint. The Aviation Electronics Support Company was formed from the combined resources of eight signal detachments to meet the need for avionics general support in the I and II CTZs. With the buildup of US Forces in Vietnam, the simultaneous buildup of aircraft brought the need for avionics maintenance to a level never experienced elsewhere in the world. This brought the need for consolidated general support shops to perform the more complex levels of maintenance which were above and beyond the capabilities of the small direct support detachments normally located with operational units. The only way to accomplish a rapid general support capability was to merge resources. As a result AVEL North today operates as a company but still retains all the elements of eight separate signal detachments plus the avionics resources from each of the 14<sup>th</sup> TC BN's aircraft maintenance companies. The company was formed by USARV GO 1397 on 2 March 1966. During the past nine months this unit, through operational necessity, has developed into the largest Aviation Electronic Support Company of the 34<sup>th</sup> GS Group. In April 1968, the company provided support, both Direct and General, to more than 1,100 aircraft. Among the units supported were the 1<sup>st</sup> Cav Div, the 4<sup>th</sup> Inf Div and the 17<sup>th</sup> CAG. Because of the intensive operations of these units during this period, the amount of work orders received and completed substantially increased. Since the Airmobile concept depends on the constant operational readiness of aircraft and due also to the increase in the number of aircraft in the I and II CTZs, the motto "Never an aircraft down for Avionics" became a necessity rather than a goal. The objective was accomplished. The yearbook lists the 1<sup>st</sup> Platoon with Doppler Repair and ARC-54 work, the 2<sup>nd</sup> Platoon with Tech Supply, TACAN School, the 3<sup>rd</sup> Platoon with Helmet Repair, ARC-51 work, and Control Head work.

### 58<sup>th</sup> Transportation Battalion "Vikings"

The 58<sup>th</sup> Transportation Battalion (Aircraft Maintenance and Supply),

commanded by LTC Glenwood N. (Mikey) Parrish, provides direct, back-up direct, and general support to more than 1,100 Army aircraft in MR 1. Although the majority of aircraft it supports belong to the Army, the 58<sup>th</sup> also gives assistance to U.S. Marine, Vietnamese, and Korean aviation units.

The 58<sup>th</sup> Battalion's headquarters detachment and three companies are all located at Red Beach, Da Nang. Together they possess a network of closely related shops for specialized avionics and aircraft armament repair, in addition to providing command and control for the continually expanding aircraft maintenance and supply requirements in their area. Commanded by MAJ Charles Thibodeau, the 142<sup>nd</sup> Transportation Company (ADS) supports 225 aircraft. Included in this number are 14 different types of helicopters and fixed-wing aircraft. The company's allied shops are staffed by sheet-metal repairmen, engine technicians, prop and rotor specialists, hydraulic mechanics, and technicians. In addition to aircraft maintenance and repair-parts support, a well-equipped armament shop is constantly rewiring, adjusting, and repairing armament systems of the numerous assault helicopters it services. The 142<sup>nd</sup> also has a CONUS retrograde facility which has evacuated more than 65 aircraft during the first six months of 1970.

"Fast and Sure" is the motto of the 610<sup>th</sup> Transportation Company (AGS). Commanded by MAJ John Webster, this unit is responsible for providing general support to more than 1,000 aircraft, as well as reassembling, test flying, and issuing all Army aircraft arriving in Vietnam through DaNang. Most of the aircraft handled by the 610<sup>th</sup> belong to the Americal and 101<sup>st</sup> Airborne Divisions.

Although the 610<sup>th</sup> is classified as a general support unit, it does perform back-up direct support maintenance when necessary and has the capability to perform limited depot-level maintenance (with the exception of main-frame repair). It also provides technical assistance teams to various aviation units in its area for needed on-the-spot assistance.

The 263<sup>rd</sup> Light Equipment Maintenance Company (GS), commanded by MAJ Roy Doubrava, is responsible for maintaining the avionics systems of all Army aircraft in MR 1. Although the unit averages more than 130 work orders a day, it has never had a customer aircraft lose a day out of action due to an avionics problem. The 263<sup>rd</sup> lives up to its motto of "Finest Support".

### 520<sup>th</sup> Transportation Battalion "Sustainers"

The 520<sup>th</sup> Transportation Battalion, commanded by Lieutenant Colonel Robert E. Ainslie, provides direct, back-up direct, and general support maintenance for over 1,100 Army aircraft and associated armament and avionics systems within the northern and western half of MR 3. One direct support company of the battalion is located at Cu Chi, while the battalion headquarters and the remaining units and elements are located at Phu Loi.

The 539<sup>th</sup> Transportation Company (AGS), located at Phu Loi, has been operating in Vietnam since 23 March 1967. Commanded by MAJ Wilbur R. Mixer, the "Hexmates" provide general support and backup direct support for 1,100 aircraft.

Commanded by MAJ Edward D. Collins, the 165<sup>th</sup> Transportation Company has recently moved from Bien Hoa to Phu Loi. Serving customers in the Bien Hoa, Long Binh and Saigon areas, the "Sword Sharpeners" provide supply and maintenance support to more than 275 aircraft. This move to Phu Loi has centralized supply and maintenance operations resulting in quicker and more responsive customer support. Providing direct support maintenance for units from Tay Ninh to Cu Chi,

the 20<sup>th</sup> Transportation Company, commanded by MAJ Larry H. Woodard, is located at Cu Chi and supports over 270 aircraft.

The 605<sup>th</sup> Transportation Company (ADS), commanded by MAJ

Raymond E. Collins, provides direct support and backup direct support to over 500 aircraft belonging to units stretching from Quan Loi to Bear Cat. Assigned to the battalion on 1 April 1967, the "Pacesetters" average more than 35,000 man-hours per month on their supported units' aircraft.

The Aviation Electronics Company, Central (Prov), commanded by MAJ Roger D. Shiley, is the only provisional Avionics Company in the Republic of Vietnam. AVEL Central, with platoons at Phu Loi and Cu Chi, completes an average of over 5,000 avionics work orders monthly. In addition to its line units, the 520<sup>th</sup> Transportation Battalion is responsible for the operation of the Army Aviation Refresher Training School which provides updated training in armament, aircraft, and engine repair for all aviation units in the Republic of Vietnam.

The "Pipesmoke" Recovery Section, which has become synonymous with the term "aircraft recovery" in the Republic of Vietnam, is also a member of the 520<sup>th</sup> Team. The only consolidated recovery section in the United States Army, "Pipesmoke" has recovered more than 3,500 aircraft since it was established in April 1967.

### Personal recollections of Robert L Graves

After R/W flight school in November 1966, I was assigned to the 20<sup>th</sup> TC (ADS) at Fort Campbell, KY. The unit was being readied for shipment to RVN in April 1967. I was assigned as "Rail Movement Officer," with my primary duties as Quality Control Officer, with twelve Quality Control Technicians. The advanced party departed a couple weeks before the main body. They accompanied the shipment by boat from Mobile, AL to Vung Tau, RVN. The remaining approximately 212 personnel flew out of Fort Campbell the night of April 10 to the port at Oakland, CA to board the USS General John J. Pope for the 19 day trip to Vung Tau. We were 'guests' of the 25<sup>th</sup> Inf Div at Cu Chi until we had our hooches completed, and a belated thanks to the 25<sup>th</sup> Engineers for building our mess hall. The first night at Cu Chi was a memorable one. There were about eight of us in the community shower; we had gotten all lathered up and ran out of water. It wasn't a pretty sight! The 20<sup>th</sup> was assigned as direct support to the 187<sup>th</sup> AHC, 188<sup>th</sup> AHC, and back up support to "E" Co. 725<sup>th</sup> Mt. Bn. at Cu Chi, and other maintenance as assigned. Our Battalion, the 520<sup>th</sup> T.C., and sister companies, the 605<sup>th</sup> T.C. (ADS) and 539<sup>th</sup> T.C. (GS) were located at Phu Loi.

My first duties were with PIPESMOKE recovery out of Phu Loi which was quartered with the 605<sup>th</sup>. I flew a Huey that specialized in rigging downed aircraft for recovery by a CH-47. One particular day in June 1967, we had been out since sunup in the areas around Tay Ninh, Phuoc Vinh, and Lai Khe. We had a downed OH-23G, flown by a black CWO (I don't remember his name). After rigging the OH-23 and the recovery by a BLACKCAT CH-47 from Phu Loi, we took the pilot back to his base. As the day progressed, we received another call in an area close by for another downed OH-23. Upon arrival, we discovered it was the same pilot we had recovered earlier in the day. I remember him saying that this was his third OH-23 incident that day and that he was calling it quits. We were also through for the day. On our way back to Phu Loi, we landed at Lai Khe for fuel. As we departed Lai Khe, we received a call from the 520<sup>th</sup> T.C. Bn. at Phu Loi to proceed to some coordinates west of Go Dau Hau, to recover a downed UH-1H that was right on the border of Cambodia and Vietnam that was secured by an American mech infantry unit. I answered the call with, "We don't have

enough fuel on board to complete the mission" (a lie). PIPESMOKE Operations told us we could re-fuel at Lai Khe and proceed, so we did. We had received information that two gun ships were on site awaiting our arrival. They reported to us their fuel limits. We contacted BLACKCAT for the pick-up and relayed all information to them. As we left the Lai Khe area, it was dark; I had the controls, the chart, the three radios, and four of the best EM in the back that the Army had to offer. And I, like them, wanted to get back to Phu Loi. After losing our FM radio and receiving frantic calls from the two gun ships on site because of their fuel situation, we finally arrived at the site. The gun ships set up their escort for us, and as I made our approach, the officer in charge of the APC and his troops told us to turn off our landing light and search light, because the VC had .51 calibers pointed at us. I told him emphatically, "NO!" We released the gun ships and thanked them only seconds before they would have left anyway. Upon landing at the downed UH-1H, we saw that it was surrounded by concertina wire. We completed our rigging and had our timing nearly perfect, because BLACKCAT arrived just as we were ready for him. The CH-47 made his approach, we hooked the sling, and he started his lift. My crew chief on the left side screamed over the intercom, "He's blowing the concertina wire toward our tail rotor." I then screamed to BLACKCAT that he was dragging the concertina wire that had gathered on the stinger of the sling load. By a stroke of good luck, the concertina wire came loose from the sling load and BLACKCAT was cleared back to Phu Loi. We loaded up our crew, said good bye to the folks at the site, and headed to Phu Loi to meet BLACKCAT and unhook the sling. This was the first night flight in Vietnam for our entire crew. I made it with lots of help from a lot of very good, well-trained people. To the two gun ship crews, thanks a bunch; to the CH-47 pilots, a very special "thank you" for the small "brake job" on lift off.

I flew with PIPESMOKE for a couple of months or more, until our maintenance area was somewhat ready. We were made ready one night when the 188<sup>th</sup> AHC at Dau Tieng was mortared, damaging 15 of their 17 Hueys. Only one e was undamaged and another had spent the night at a different location.

In the beginning, our maintenance area at Cu Chi was a dry area, unless it rained and then it was mud. We finally had a load of PSP (Perforated Steel Planking) shipped to us and all company personnel laid it down after the evening meal. Our new hanger was completed early in 1968. One morning in late July or early August of 1967, while on a maintenance test flight of a Medevac Huey, about five miles east of Cu Chi, my two tech inspectors and I spotted a platoon-size group of U.S. Infantry troops on foot east bound on the highway to Phu Loi. It was about mid morning, and as the column was moving east, we saw one of those very large Vietnamese buses approaching the infantry from the East. When the bus got within about 300 yards of the U.S. troops, it hit a land mine and the blast blew the front end of the bus completely off. I immediately told my two TIs to watch for yellow smoke. A few moments later the troops were carrying seven wounded Vietnamese civilians to a landing spot just off the road to the south. We were circling, and I commented to my people that I knew the Infantry on the ground saw our white crosses on the Huey and figured we were a Medevac crew. They "popped" yellow smoke and we made our approach to the landing area. We didn't have a thing in the rear except a bare aluminum floor. One of my T.I.'s was squatting on the floor between the two front seats. The 25<sup>th</sup> Inf. Troops loaded one old man, two old women, and four children on board lying across the floor. We

said good bye and took the injured VN to the 25<sup>th</sup> Division pad adjacent to the hospital. I am sure there were some casualties on the bus but I can't confirm it now. The irony is that if the bus hadn't tripped the mine it is quite possible the troops would have. I was over the road in a 2 1/2-ton a couple days before the incident. Oh yeah, the UH-1 checked good on test flight.

Cu Chi base camp received 1,119 incoming rounds the first 19 days of February, during TET 1968, as reported by the 25<sup>th</sup> Division Command Post. We were very lucky one night when the 122 mm rockets hit our company area around 2300 hours, with two direct hits to our maintenance area, just minutes after our night shift left for chow. I departed RVN in April 1968, only to return for a second tour in January 1970, assigned to the 2<sup>nd</sup> Sig Grp Avn Det at Long Thanh. I was there a couple of months before I managed an assignment back to the 20<sup>th</sup> T.C. at Cu Chi. CWO Carl Midkiff was the Q.C. Officer there until he rotated and I was back in my old job for the remainder of the year 1970. Carl, like myself, was ex-USAF and we were classmates in 66-68. In summation, I would have to admit that my time in U.S. Army Aviation was the most rewarding experience of my military career - a snap? NO! ... busy? YES! The experience in Army Aviation rounded out my maintenance/flying career from the B-29 to the UH-1.

### 765<sup>th</sup> Transportation Battalion "Straight Arrows"

The 765<sup>th</sup> Transportation Battalion (Aircraft Maintenance and Supply) is completing its sixth year of operations in Vietnam. Comprised of three aircraft direct support companies, one aircraft general support company, and an avionics general support maintenance company, the 765<sup>th</sup> provides maintenance and supply support to the southern part of MR 3 and all of MR 4. The battalion has direct support companies in Long Thanh and Vinh Long, while the remaining three subordinate units are located with the headquarters in Vung Tau. LTC Allison Nicholson is the Commanding Officer.

The 330<sup>th</sup> Transportation Company (AGS) is one of the largest and most versatile aircraft maintenance companies in the Army. It has operated in Vung Tau since 22 April 1963, placing it among the oldest support companies in Vietnam. Commanded by Captain Michael R. Kirila, the "Checkmates" support over 1,000 aircraft. Projects included in the 330<sup>th</sup>'s work schedule are the repair of UH-1 "Huey" and AH-1G "Cobra" tailbooms and the fabrication of mounts and controls for the "Nighthawk" weapons system.

The mission of the 388<sup>th</sup> Transportation Company, located in Vung Tau and commanded by Captain James E. Clay, is providing direct support maintenance to Army aircraft, aircraft armaments, and related supply and recovery support (rigging crews) to non-divisional aviation units in the southern half of MR 3 and all of MR 4.

The 611<sup>th</sup> Transportation Company at Vinh Long provides direct maintenance and supply support to aircraft units in MR 4. Commanded by MAJ Leonard J. Spanjers, the company is the southern-most unit in the 34<sup>th</sup> Group.

The 56<sup>th</sup> Transportation Company, located at Long Thanh North airfield, provides direct and back-up direct support maintenance to a total of 42 customers with more than 427 aircraft. This number comprises 273 rotary-wing and 155 fixed-wing aircraft.

The 317<sup>th</sup> Light Equipment Maintenance Company (GS), with four platoons in Vung Tau and one each in Vinh Long and Long Thanh, provides avionics support to all units in the southern half of MR 3 and all of MR 4. In addition, the unit has provided specialized support for aviation units from as far north as Da Nang to as far south as Soc Trang.

Captain John R. Williams is the Commanding Officer of the 317<sup>th</sup>. Many avionics systems, including the repair of airborne weather radar and the Ground Control Approach radar system are supported exclusively by the 317<sup>th</sup>. The unit's accomplishments include the processing of more than 10,000 work orders a month, administration of a Doppler Radar System School, and the return of more than 7,000 items to the supply system during July and August of 1970.

### FAMF

During 1970, the U.S. Army Floating Aircraft Maintenance Facility completed its fourth year of operation off the coast of Vietnam. More commonly referred to as the "FAMF", the ship is the home of the 1<sup>st</sup> Transportation Corps Battalion (Aircraft Maintenance Depot) (Sea-borne), which is under operational control of the 34<sup>th</sup> Group. The history of the FAMF dates back to August 1962, when the Army Materiel Command (AMC) directed the Transportation Materiel Command to explore the possibility of using a ship as a floating maintenance facility to provide helicopter support in the Far East. Results of the study indicated that such a ship would be feasible. Several types of hulls were then considered, ranging from cruisers to LST's, with final approval being given to the conversion of a Navy seaplane tender. The Office of the Project Manager for the FAMF, then code-named Project FLAT-TOP, was established in June 1964. LTC John F. Sullivan was named Project Manager in May 1966 and assumed command of the 1<sup>st</sup> Materiel Group, which was activated to support the ship. In May 1967, Colonel Morgan C. Light assumed the duties of Project FLATTOP Manager and the command of the 1<sup>st</sup> Materiel Group. The Group, later designated as the US Army Materiel Group No. 1 (Logistical Support), is the command element for the 1<sup>st</sup> TC Battalion and the Training Battalion at Corpus Christi, Texas. The FAMF is the former Navy seaplane tender USNS Albermarle. It was loaned to the Army by the Maritime Commission in November 1963 and renamed the USNS Corpus Christi Bay in March 1965. During World War II, the ship saw service in both the European and Pacific theaters. An extensive amount of structural work and refitting was done prior to the FAMF's activation. The most visible change was the construction of the hanger deck covering. Previously, the aft section of the ship consisted of a low, open deck on which seaplanes could be lifted and repaired. A number of internal improvements were also made in order to extend the capabilities of the ship.

Since its arrival in Vietnam, the FAMF has gained increasing recognition for the outstanding support it has provided. From its home base in Vung Tau harbor, the FAMF periodically travels up the coast of Vietnam for stops near Qui Nhon and Da Nang. On these trips, cargo is unloaded and unserviceable components taken aboard.

In its 26 production and 16 support shops, the FAMF can perform virtually every aspect of aircraft component maintenance from investigative analysis to heat treating components. A list of the various production facilities aboard the ship includes a Chemical Lab, Calibration Shop, Avionics Shop, Armament Shop, Engine Test Cell, Transmission Shop, Hydraulic Shop, Sheet Metal Shop, and Machine Shop.

The supply system aboard the FAMF matches the production capabilities in extensiveness. Although supported by ARADMAC in Corpus Christi, the FAMF stocks in excess of 20,000 line items for its internal operations.

The MAJ emphasis of the ship's supply system is in support of theater operations. The 34<sup>th</sup> Group supplies the FAMF with a Not Operationally

Ready, Supply (NORS) parts list from which items that can be manufactured on the ship or filled from internal stockage are extracted. Approximately 100 of these high priority NORS requirements are filled each week.

A great aid to both the supply and production capabilities of the FAMF has been the installation of the new IBM 360-20 computer. Coupled with an extensive technical library, the computer insures an excellent management capability and parts inventory.

The Fabrication and Engineering Shops of the FAMF often get the call for production of special projects. Some of these projects have included the fabrication work done for the "Firefly" Project, manufacture of flash suppressors for machine guns, skid shoes for the OH-6A Light Observation Helicopter, and jettisonable flare racks.

Working aboard the ship is a highly trained and skillful crew, consisting of 361 Army and 130 civilian personnel. The 1<sup>st</sup> TC Battalion is organized into two companies—a Headquarters Company, providing administrative and services support, and Alpha Company, which includes all of the maintenance platoons. The civilians aboard are from the Military Sea Transportation Service and handle the operation of the FAMF.

The ship is a self-sufficient facility, and provides its own health, recreation, and mess facilities.

The most innovative and unique feature of the FAMF concept is its mobility. Having saved the Army millions of dollars in shortened supply lines, the Corpus Christi Bay may well prove itself to be one of the most beneficial legacies of the Army support program in Vietnam.

### **"ACCP"**

Until March 1970, all Army aircraft components that could not be serviced or repaired in Vietnam were retrograded directly back to the United States from direct support units. Theater Aircraft Repairable Program (TARP) items were shipped to an in-country repair facility. On 23 March, the Aviation Collection and Classification Point (ACCP) was established at the Saigon Heliport to save the Army money, time, and equipment in the shipment or retrograde aircraft components or parts. Originally attached to the 166<sup>th</sup> Aircraft Processing Detachment, the ACCP was later reorganized as the Repairables Division of the 110<sup>th</sup> Transportation Company (Depot).

The job of packaging, preserving, and documenting the components for shipment is the responsibility of the individual aviation unit. While most of the items involved are very expensive and require careful preservation, personnel at the various aviation field units are often handicapped by a lack of training, equipment, and time needed to properly package the item for the long trip back to the United States. As a result, expensive items have been damaged due to improper packaging.

The ACCP was created to help eliminate this problem. Its mission is to receive selected aircraft repairable components from the Direct Support Supply Activities in-country and properly preserve, package, and document them for the trip back to CONUS. The fastest service possible for the trip is insured by regularly scheduled repairable flights.

As an aid to field units who send components to the ACCP, detachment technical inspectors in Saigon make careful note of any packaging deficiencies. This information is then forwarded to the sending units to insure that a mistake is not repeated.

Another advantage of the careful checks made by the ACCP is that components are occasionally found that do not require retrograde to the United States. These components are returned directly to the aviation depots.

In July 1970, a High Dollar and/or Critical Supply (HICRIT) program was established to streamline the ACCP operation. Under this program, items are classified for packaging at the field unit according to dollar value, supply need, and necessity for preservation. Those designated HICRIT are shipped to ACCP for inspection and distribution to the proper in-country or CONUS repair facility.

The ACCP gives added efficiency to the TARP program by allowing in-country repair facilities to select components for repair. By stationing a technical inspector at the ACCP, the repair facility is able to select repairable items and maintain positive control over its backlog.

Both the ACCP and HICRIT programs are growing and are expected to be the biggest money savers in terms of repairable aircraft components yet established in Vietnam. During the first five months of its existence, the ACCP detachment shipped more than five million pounds of repairable items, representing over 100 million dollars. It is estimated that the ACCP has already saved the Army \$1,000,000. Annual savings of over \$6,000,000 are expected.

### **"ASOAP"- Forecasting the Unexpected**

It sounds like something out of a science fiction comic book—Atomic Absorption Spectrophotometer. One might guess anything from a future interplanetary space weapon to an advanced model vacuum cleaner. The Atomic Absorption Spectrophotometer does, in fact, exist. While its function and appearance are not as glamorous as the name, the spectrophotometer performs a vital mission in preventative maintenance for Army aircraft in Vietnam.

Most troubles in an engine are related to the frictional wear of moving parts. In a piston engine this usually involves the cylinders. The difficulty in performing routine maintenance is detecting the potential trouble or wear signs. Mechanical failure often occurs without warning—a real danger to the pilot of an aircraft whose very life depends on a well-functioning engine.

For this reason the Army has developed the Army Spectrometric Oil Analysis Program (ASOAP). Using a spectrophotometer, a technician is able to forecast potential problems in an engine by searching for an increase of metal particles in oil samples.

Wear patterns have been studied and limits determined as to the maximum amount of wear-metal particles that can be tolerated by the engine's oil. An evaluator with an oil sample readout from the spectrophotometer determines whether a sample is normal or requires further action. His decision is based on the operational hours of the component from which the oil has been taken, the hours since its last oil change, the metal wear content preceding the sample, and the metal wear criteria established for the component.

The techniques of monitoring the internal condition of oil-wetted components is not new, but only recently has equipment been available that has permitted a rapid and accurate analysis on a volume basis. During 1969, Lear-Siegler, Inc. used four Perkin-Elmer Model 303 Atomic Absorption Spectrophotometers under an Army contract to process more than 392,000 oil samples in Vietnam. During that time, the Lear-Siegler laboratories at Chu Lai, Cam Ranh Bay, and "Hotel Three" Heliport at Tan Son Nhut, Saigon, found sufficient evidence to warrant grounding and re-checking 212 components. Had these defects gone unnoticed they might well have led to in-flight engine failures. Through its constant monitoring of engine components, ASOAP helps to determine design changes for oil inventories; and, because the spectrophotometer is able to gauge so accurately the time necessary between individual component oil changes and overhauls, ASOAP is

making an important contribution toward the high aircraft availability rate that Army aviation in Vietnam now enjoys.

### Mobile Tutors

If you ask any Army Aviation Maintenance Officer what condition his turbine engines are in, he will probably give you strong assurances that they are in excellent shape. He "tops" his engines on periodic test flights as well as performing "hot end" inspections regularly. His crew chiefs keep the engines clean and he has an outstanding foreign object damage prevention program.

Until now the maintenance officer who had accomplished the above tasks had done even more than the Army required. Previously there had been no through Army-wide program that the conscientious maintenance officer could follow to assure good engine performance. To fill this obvious shortcoming in the Republic of Vietnam, MAJ General George Putnam, while serving as the USARV Aviation Officer, was instrumental in establishing the USARV Turbine Engine Conservation Program. The vehicle for this program is a four-man briefing team that visits every company-level-and-above aviation unit in the Republic of Vietnam.

General Putnam selected MAJ Leonard Rodowick, Executive Officer of the 520th Transportation Battalion as team leader because of his knowledge and long experience in aviation maintenance. MAJ Rodowick was also responsible for formulating many of the ideas incorporated into the USARV team, particularly the TEAC and DER programs described below. The other members of the team are Captain Richard Walker, Sergeant First Class Awslon Allen, and Staff Sergeant William Rose. All team training aids are provided from 34th Group resources.

The USARV Turbine Engine Conservation Program consists of concentrated instruction and demonstrations in six primary areas in an effort to provide flight crew and maintenance personnel the ready capability to detect a defective turbine engine before it results in an in-flight failure. The areas covered are:

1. Fuel Handling Operations—This involves an inspection to prevent contaminated fuel from going into the aircraft. Both POL personnel and pilots examine samples of the fuel to check for impurities or foreign matter.
2. Army Spectrometric Oil Analysis Program (ASOAP)—The ASOAP program allows a technician to forecast future engine problems by detecting an increase of metal particles in the engine's oil. (See story on page 16.)
3. Turbine Engine Analysis Check (TEAC)—An engine "topping" procedure devised by MAJ Rodowick and Chief Warrant Officer Michael L. Klinkiel to insure that an engine is developing the proper amount of power. It is one of the most accurate methods known for determining the condition of a turbine engine.
4. Jet-Cal Analyzer and Vibration Meter—The Jet-Cal Analyzer is a special tool used to determine if the gauges in the cockpit are indicating the correct engine temperature. The Vibration Meter insures that the engine is functioning within normal vibration limits.
5. Daily Engine Recording (DER)—Another check devised by MAJ Rodowick to determine if an engine is functioning normally.
6. Go-No-Go Placard—By proper use of this and the aircraft's gauges, the pilot can readily insure that the aircraft has sufficient power for a normal takeoff.

### "Red Ball 34" Delivers the Goods

During the spring of 1970, a significant innovation in aircraft repair parts distribution was begun by 34th Group. A delivery service was developed

which has greatly speeded-up supply support to both 34th Group and divisional Direct Support Units (DSU) in MRs 1 and 2.

General supply support for all Group and divisional DSUs is provided by 34th Group depots in Saigon and Qui Nhon. Both depots are managed by the Aviation Materiel Management Center (AMMC) which is collocated with the Group Headquarters in Saigon. DSUs in the Saigon and Qui Nhon areas make unit pickups of repair parts from the depots in their area. Parts for other DSUs, particularly those in MRs 1 and 2, were being transported by the intra-Vietnam common-user airlift system. This system, already overburdened by high priority tactical and logistical requirements, was unable to provide the response required for aviation repair parts. When one of the approximately 2,200 Army aircraft in MRs 1 and 2 became deadlined for Not Operationally Ready Supply (NORS) parts, it remained in that condition for an excessive length of time. The "Red Ball-34" delivery service was augmented to meet this shortcoming. Working in close cooperation with MACV's Traffic Management Agency and the 834th Air Division, 34th Group established a daily schedule for two C-130 aircraft flights going north from Saigon. The first flight delivers parts to Cam Ranh Bay, Qui Nhon, and Pleiku. The second flight makes deliveries to Chu Lai, Phu Bai, and Da Nang. Both stop at Phu Cat to pick up NORS parts from the Qui Nhon aviation depot.

Each flight circuit takes about ten hours, with the planes returning to Saigon upon the completion of their mission. The sequence of stops on both circuits is designed to meet NORS cargo generation patterns from the two depots and repairable shipments from the DSUs.

A network of contact officers at each DSU and depot was established. These officers report by telephone directly to the AMMC controller who coordinates the daily shipping requirements for the entire system. The contact officers are informed as to how much cargo they can expect to receive and the amount of repairable components that can be loaded on the flight. Additionally, an AMMC courier accompanies each flight to monitor the system and suggest any needed improvements.

NORS and other high priority aircraft parts are unitized (cargo on a pallet is limited to a single DSU) at the depots. The rapid off-loading and back-loading of aircraft minimizes ground time at enroute aerial ports. The C-130 schedules are arranged to provide delivery of two pallets a day to each DSU, one from each depot. The use of unitized loads permits simplified documentation, better control, ease of identification, and inter-modal movement of palletized loads between depot, carrier, and DSU. A "Red Ball-34" label is placed on every piece of NORS cargo to insure that the items are quickly recognized for priority handling.

The "Red Ball-34" system has had an important and beneficial impact on other related aspects of aviation supply and distribution. The feedback information provided by the system helped extend management visibility of supply responsiveness, communications, automatic data processing, and transportation. The supply performance of the combat aviation unit, the DSU, and the depot are now available to detailed examination. Performance "lags" in any segment are readily identifiable and improvements can be made.

The dependable daily departure of the C130 flights proved to be the catalyst for improvements in other functional areas. The 34th Group coordinates aircraft departure times with DSU NORS requisition submission times, AMMC processing, and the depot issue schedule.

The "Red Ball-34" system has reduced to less than 24 hours the elapsed time from DSU submission of a NORS requisition (via AUTODIN, where available) until the part is delivered to the DSU. Additional

benefits were realized when the submission of requisitions from DSU customer units were coordinated with the DSU's schedule for submitting requisitions to AMMC. Synchronizing these operations has minimized the time NORS requisitions are held by the DSU and is providing more nearly optimal service to the customer units.

With "Red Ball-34" as the keystone, the combination of a systems analysis approach with the concept of "inventory in motion" has significantly reduced the down time of Army aircraft in Vietnam. Problem solving such as this is an essential feature of the 34<sup>th</sup> Group and its mission in Vietnam.

### **The 166<sup>th</sup> APD-A Booming Business**

The life cycle of more than 2,500 Army aircraft (or about 60 per cent of the total number now in-country) begins and ends on the Tan Son Nhut flight-line in the hands of the 166<sup>th</sup> Aircraft Processing Detachment. The 166<sup>th</sup>, under the command of Captain Jesse Hamilton, is responsible for processing in and out of country approximately 200 aircraft a month, the vast majority of which are helicopters.

While incoming aircraft are being unloaded, transported to one of the detachment's hangars at Tan Son Nhut, assembled, test flown, and finally issued to various field units, others designated for retrograde are disassembled, preserved, decontaminated, and packaged for loading into transport planes for shipment back to the United States. A large portion of the new or rebuilt aircraft processed in eventually return to the 166<sup>th</sup> for retrograde.

Each month, the United States Army Aviation Material Management Center (USAMMC) supplies the 166<sup>th</sup> with a shipping list of new aircraft arriving from the United States. These arrive in-country aboard an Air Force C133 or C141 transport aircraft.

Once the cargo plane has landed at Tan Son Nhut, a civilian contractor team from Lear-Siegler, Inc. begins the processing cycle by off-loading the helicopters. The new aircraft are then taken to the Detachment's "Hotel Three" hangar or one of the two other small hangers nearby. An inventory is made on all components of the helicopter to insure that every part is present. Because components are either replaced or overhauled after a certain number of hours, it is necessary to ship records on each one giving the number of flight hours on that component and listing any modifications made on it. Two full log books usually accompany every aircraft and eleven technical inspectors work with the 166<sup>th</sup> to keep these books accurate and up to date.

Only after all parts have been thoroughly checked does the assembly of the aircraft begin. Assembly time ranges from approximately 20 man-hours for the OH-58A "Kiowa" and OH-6A "Cayuse" to approximately 250 hours for the CH-47 "Chinook".

Inspections by technicians are conducted throughout the assembly process to insure that the aircraft are fully operational. Maintenance operational checks prior to test flights are conducted and any deficiencies noted are corrected before the ship is released to the gaining unit.

A typical assembly operation by a processing crew working on a newly received UH-1 "Huey" helicopter involves about 20 hours of steady work. If an aircraft were towed into the hangar at 1800 hours by the night shift, it would be ready for delivery to the customer unit by 1400 hours the next day.

When a helicopter is ready for issue, AMMC consults with USARV and then notifies the 166<sup>th</sup> as to which unit will receive the aircraft. Personnel from the unit come to Tan Son Nhut to inspect their new aircraft, pick up its log books, and fly it back to their unit.

The retrograde of a helicopter follows the procedures of assembly in reverse. As an aircraft approaches the maximum flight hours allowed prior to overhaul or is damaged in action, it is recalled by AMMC and returned to the 166<sup>th</sup> for shipment back to the United States. Damaged aircraft are delivered by sling load or transported by truck. "High-time" aircraft are flown in under their own power.

Personnel at the 166<sup>th</sup> begin the aircraft's retrograde at the hangar with a detailed inspection of its records. In compliance with Health Department regulations, the aircraft is inspected for trash, debris, ammunition and any other foreign matter.

The aircraft are then disassembled, packed, and transported to the flight-line and loaded on Air Force cargo planes for return to the United States for overhaul. After overhaul at one of the rebuild facilities, the aircraft are returned to Vietnam. Many will pass again through the 166<sup>th</sup>.

The 166<sup>th</sup> APD has a strength of two officers and 32 enlisted men. In addition, 75 civilian Lear-Siegler employees have been contracted by the Army. These civilians are highly trained and efficient. Many are ex-military men who received their initial aviation training with Army aviation units in Vietnam. A large number of them have served three or more years at the same processing site. This gives the 166<sup>th</sup> a continuity of operation matched by few other Army units.

The 166<sup>th</sup> is a unique organization because of the fact that its sole mission is processing Army aircraft. The dramatic record established by this organization is testimony to a highly trained, highly professional civilian and military team working in close cooperation.

### **"AARTS" - Returning to the Classroom**

The difficulties of operating and maintaining the ever-changing inventory of highly sophisticated aircraft in the Republic of Vietnam have always posed a challenge to everyone associated with Army Aviation. During the early stages of the American military buildup in Vietnam, the demand for highly skilled aircraft repairmen was met through the utilization of the Army Aircraft Mobile Technical Assistance Program (AAMTAP). This program was established by the Army Aviation Systems Command to provide training in the latest technical information to aviation maintenance personnel in Vietnam and was operated through the use of mobile teams staffed by skilled civilians.

It soon became apparent, however, that because of problems encountered during the frequent transfer of training aids and equipment from one location to another, it would be advantageous to establish a training center at a fixed site. As a result, a training base began operations at Vung Tau under the 34<sup>th</sup> Group's 765<sup>th</sup> Transportation Battalion. Technical representatives from Bell Helicopter, Boeing Vertol, and Lycoming served as instructors at the new school. On 1 September 1968, the old AAMTAP program was renamed the Army Aviation Refresher Training School (AARTS).

At Vung Tau, the school's size and scope grew rapidly. The number of graduates rose from 2,100 students in fiscal year 1967 to 3,500 in fiscal year 1970. In April of 1970, because of the general U.S. Army phase-down at Vung Tau, AARTS was moved to Phu Loi where it became an element of the 34<sup>th</sup> Group's 520<sup>th</sup> Transportation Battalion. Within two weeks after arriving at its new location, the school was operational again. Now using only military instructors, the school is rapidly expanding to a capacity of 13 classes.

Enlisted men attending AARTS include crew chiefs, gunners, and maintenance specialists. Officers are given the opportunity to review what they have already learned as pilots and learn more about their aircraft armament equipment. The majority of students are from U.S.

Army aviation units throughout Vietnam, but there have been students from the United States Navy, Marines, and Air Force, as well as from the Australian and Korean Armed Forces.

Approximately 185 students attend classes each week, studying basic courses involved with helicopter airframe, engine, and armament systems. There are also courses offered in technical supply and for aircraft technical inspectors.

The AARTS School Commandant, Captain Ronald L. Axman, reports, "We receive aviation personnel from all areas and MAJ commands in the Republic of Vietnam. Through classroom instruction and practical exercises, we keep our students informed and up-to-date on current maintenance doctrine and technical supply procedures. Our job is made easier by the fact that most of our students are experienced and highly motivated".

There is an atmosphere of seriousness and dedication at the school. No one realizes more than the students and cadre of AARTS that their training may help to save lives, as well as contributing to the overall aviation effort in Vietnam.

### **Pipesmoke Professionalism**

Although the 34<sup>th</sup> Group, as a maintenance and supply organization, performs a vital but rather unglamorous mission, it does include one unit that is involved with a very exciting job day after day. The "Pipesmoke" recovery team of the 520<sup>th</sup> Transportation Battalion is responsible for most of the field and maintenance extractions of downed Army aircraft in MR 3, many of which are performed under the adverse conditions of enemy fire, darkness, and bad weather.

Traditionally, recovery of aircraft in Vietnam has been a coordinated effort between the direct support company, supplying a rigging helicopter with crew to prepare the downed aircraft for recovery, and the general support unit providing the CH-47 "Chinook" for the lift. The "Pipesmoke" recovery team is a unique unit in that both the rigging and extracting elements are under unified operational control. This is made possible due to the close proximity of the 520<sup>th</sup> Battalion units and results in the most efficient, best equipped, and most highly trained recovery unit in Vietnam.

Recoveries are categorized in two ways. Routine Maintenance evacuations involve the aerial transfer of aircraft that are not operational due to mechanical failures, repairable combat damage or accidents. These aircraft require airlifting from one secured area to another for repairs. The second type of recovery is known as a Field Extraction and involves disabled aircraft that have been forced down beyond the safety of base camp perimeters. To keep these aircraft out of the hands of the enemy, immediate extraction is essential.

Averaging approximately 45 maintenance evacuations and 40 field extractions a month, the men of "Pipesmoke" have made more than 3,500 recoveries since April 1967. This figure represents not only recoveries made for maintenance and supply customers of the 520<sup>th</sup> Battalion, but all other aviation units within MR 3 that require assistance. During the recent Cambodian operation, the "Pipesmoke" team followed aviation units across the border and recovered aircraft for both the United States Army and the Vietnamese Air Force.

Late last fall, "Pipesmoke" achieved a notable first when it recovered a fully equipped CH-47 "Chinook" by using a "C" model CH-47 and airlifted it from Phu Loi to Saigon. This recovery marked the first time a "Chinook" had been recovered in Vietnam without having been first stripped of all detachable components, and demonstrated that the valuable helicopter could be moved out of danger much faster than was

ever thought possible.

Requests for recovery missions come to the "Pipesmoke" operations center in Phu Loi by telephone from the owning unit or by air-to-ground communication from an aircraft at the scene. The "Pipesmoke" crew members are then briefed on the mission and prepare the necessary rigging gear and tools. Once on the scene, the recovery is made swiftly and carefully. Each man has a specific job, and in coordination with other members of the team, performs with long-practiced skill.

The personnel of "Pipesmoke" are drawn from the 520<sup>th</sup> Battalions resources. The enlisted personnel are all volunteers and hold highly sought positions. The men of "Pipesmoke" are considered to be the finest and most knowledgeable maintenance personnel in the 520<sup>th</sup> Battalion and hold a prestigious reputation throughout the 34<sup>th</sup> Group.

With all the "AVIAN 34" material presented above, we now begin the second part of this section – more first person accounts.

### **Personal recollections of Walter Gutsche**

*I was a maintenance test pilot with the Shrimp Boat's (179th ASHC) out of Pleiku and this was probably around the end of 69 or early 70 (hopefully the archives have something on this because it resulted in our Tech. Rep. receiving an award). Anyway we had an aircraft that had been shot-up at Firebase Hard Times with the # 2 engine compressor riddled with bullet holes, making it unserviceable, and a bullet hole in the forward transmission sump. I was sent to recover the CH-47C, in one of our old A Models. Besides the flight crew, the Old Girl was carrying a maintenance team, a new forward transmission and our Tech Rep, Al Resse. The plan was to check the transmission for serviceability, replace if necessary and fly it back to Pleiku. We removed the transmission sump so Al could evaluate the battle damage to determine if there was still life in the transmission. He concluded that there was no lead poisoning to the innards so a flight home was possible without changing the transmission. The problem was the forward transmission sump was still improperly vented to the atmosphere (that's maintenance talk for leaking through the bullet hole). Al anticipated the need for a plug and brought some corks with him to seal the bullet hole (he had been through this before and had amassed an extensive collection of used wine corks for just such an occasion as this). The transmission was filled with the appropriate fluid and run-up, but when everything started heating up, the sealing ability of the plug started to wane forcing Al to intervene by physically applying pressure to keep it in place.*

*It should be noted that twilight was approaching as it took most of the day to finally get that Chinook to a somewhat flyable status (still only had one engine). Our situation was becoming more serious with darkness approaching and Chuck was gathering outside the wire. Even though some of the trans fluid was leaking down Al's arm and getting hotter and hotter, Al's motivation, aided by the nearness of our friend Chuck, to keep the plug in place was at an all time high. He was successfully kept the hole plugged for the run-up and for the entire flight back. We were able to get that Chinook off the fire base and out of the Base Commander's hair, thereby greatly reducing Charley's incentive to visit that night. The A model, following us home, kept complaining that we were flying too fast (us with one engine and him with two), but that's what the new L-11 engines had to offer. We wrote up Al's above and beyond the call to duty actions and the Army recognized his efforts with an award. I called Al the other night to find out exactly what the award was but the past 32 years have blurred and*

dimmed the exact information, but it was good to talk to him again even if he didn't remember all the facts. This I can understand as it was a looooong time ago, but at least he remembered me.

### How I became a Maintenance officer by Bob Taylor

I arrived in Vietnam in early December 1966 and was assigned to the 119th Assault Helicopter Company. I was flying with the second platoon, I think, and in late 1966 or very early in 1967, the CO called me in and said he had reviewed my files and that I was a good candidate to go to work for MAJ Don Youngpeter in the 545th TC Det. I had been in the Air Force before joining the Army with the intention of going to flight school. Flight school classes were smaller then so I got to spend a tour in the Infantry as a heavy weapons Davy Crockett gunner before flight school opened up for me in December 1965. After a short holdover waiting for aircraft, I attended flight school with class 66-17 and graduated 8 November 1966. Anyway, I Protested to the CO that my maintenance background had been in fixed wing and I told him "I can hardly fly this flying wing thing." He said, "You can read a volt meter can't you?" When I replied, "Yes", he said, "Son, you are the most experienced man I've got." So off I went to the detachment. The CO and MAJ Youngpeter agreed to let me fly with the platoons a couple of days a week to build time and this I did until the end of the tour. (Does unnecessary "exposure time" ring a bell? I was DUMB!). Between tours I got a standard instrument ticket, became an instructor and added about 8 or 900 hours IP time to my record before going off to AMOC to learn how to be a real maintenance officer. I also served as a crash recovery officer and maintenance member of the crash investigation board at Hunter field between tours. After AMOC I was selected for the maintenance test pilot course. In those days it was a small class, 5 pilots, and they required 1000 hours in type and a bunch of other stuff before you could attend. Anyway I was pretty pleased with myself and I grabbed an assignment to 34th group in Saigon as my in-country assignment. I had visions of a soft luxury second tour. That great feeling lasted until I got to Camp Alpha in October 1969. There, a Major told me that I was going to be assigned to the 101st as a "VIP Pilot." I protested that I had been especially trained for the 34th group assignment and needed to call someone at group. He informed me there would be no phone calls and that I was a candidate to fill a special request. I told him, "No disrespect sir, but I'd rather herd goats." He then got a flint-eyed look that told me I'd lost the argument and said, "You are still going to the 101st, but you will no longer be considered as a VIP pilot." Well I arrived in the 101st and was snagged by the 5th TC Bn Commander and assigned to A company. I reported in and CPT Loyle Ewart (not sure of the spelling), the unit IP and Service Platoon leader, welcomed me aboard and after giving me a check ride, either he or the division standardization folks put me on IP orders. From there, I set up a 3-day test pilot course for new maintenance officers to teach test flight techniques, and did a host of other things including section leader, test pilot, gave check rides, taught instrument flying and served as a recovery officer. The recoveries got real interesting a few times, especially those in the A Shau valley, at Ripcord, and one in the Laos corner of the DMZ. During the tour I started boot-leg flight training the support brigade commander, COL Olin Smith, and he took a liking to me. When he got his star later in the tour he went to Rucker for training and we had some laughs after he got back. He grounded the first two aircraft he preflighted and said "I never had to inspect them after that. They had it running." (Revenge was sweet). He asked me about my stateside

assignment dream sheet and I told him that I had been trying to get to Bell Helicopter since flight school. After commenting that was a bit ambitious for a new pilot, he said he would look in to it. Well, between him and my two battalion commanders I got the assignment to Bell Helicopter. I am not exactly sure who was responsible but I arrived at Bell in October 1970 and stayed 7 years. I went back to Nam for a short TDY from the plant in January 1971 then returned to Bell. I served as an Army acceptance test pilot and 5th Army SIP until I retired in 1977. I then went to work for Bell Helicopter as a design engineer. I retired from Bell Helicopter Avionics Engineering as a Principal Engineer in Dec. 2001.

### Personal recollections of Robert B. Machen

The Directory Committee extends its great appreciation to VHPA Member Jim Parker for going the extra mile to make certain Robert Machen wrote down the following story.

October 15, 1967 started as an unusual maintenance day for the 171<sup>st</sup> Maintenance Detachment assigned to the 147<sup>th</sup> Assault Support Helicopter Company (ASHC) located at Vung Tau. Around 9:30 a.m. MAJ Robert B. Machen, the Detachment Commander, received word that Hillclimber 033, a Chinook assigned to the 147<sup>th</sup>, had made a forced landing deep in the heart of the Delta about seventy miles west of Can Tho. Further checking with the 147<sup>th</sup> OPS, it was learned that 033 was sitting nose down in a canal in about 8 to 10 feet of water. The Unit First Sergeant was called and advised that a ten-man crew would be required to go out for a day or two on a recovery mission. When Machen arrived at the flight line every man in the unit had volunteered. Master Sergeant Earl Foster quickly selected and assembled the ten-man crew along with their tools and equipment. Included in the equipment list were two compressors and two deflated 10,000 gallon fuel bladders requested by Machen. The bladders were to be used as a flotation device when inserted under the aircraft and using air compressors to inflate them. The recovery team and equipment were loaded aboard the CH47 assigned to the 171<sup>st</sup> as a floater aircraft. Machen, CWO James Parker (the Executive Officer), along with the crew of Raymond Todorovich, the flight engineer; Jerome A. Majchrazak, the crew chief; and Douglas G. Burger, the door gunner, and the ten-man maintenance crew made up the recovery team. The 171<sup>st</sup> team arrived at the scene and was barely able to land in a small clearing next to the downed aircraft. Soon after the arrival of the CH47 recovery crew, the 222<sup>nd</sup> Battalion Commander came to the scene of the accident, flew over the crash site a few times, took pictures, and determined that the half-sunken helicopter miles from any hard surface road was not recoverable. The Battalion Commander advised that the aircraft be stripped and burned.

Undaunted by the suggestion of the Battalion Commander, the 171<sup>st</sup> team began the task of recovery. Parker and his volunteer group undertook the task of diving into the canal and working to pull ropes through the canal muck under the downed helicopter. Four pull ropes were required to ensure that the deflated fuel bladders could be inserted under the belly of the helicopter between the wheels. After more than an hour of diving and pushing the rods attached to the ropes which were in turn attached to the fuel bladders, the fuel bladders were inserted and inflated by the compressors brought in by the recovery team. The bladders were marginally effective but did raise the aircraft high enough to give the 171<sup>st</sup> confidence that they could recover the aircraft.

Sergeant Foster gained the service of two small boats which were used

to transport the recovery team from shore to 033 sitting in the canal. The maintenance crew first removed the rotor blades and dragged them ashore. All cowling and fairings were next removed and along with the rotor blades stashed in the recovery CH47. The engines were then rigged to be sling loaded off the downed aircraft. Machen and Parker then took the recovery aircraft and hovered over the downed aircraft. With the precise guidance of Ray Todorovich, each of the engines were removed, loaded into a waiting boat and later, without damage to the engines, loaded aboard the recovery aircraft. Before nightfall, all the equipment above the water level inside of the downed aircraft was removed.

Following the loading of all the removed equipment onto the recovery aircraft, a return trip to Vung Tau was begun as darkness settled over the area. Within a few minutes after taking off, heavy torrential rains and thunderstorms were encountered. Deviations around the thunderstorms were attempted but became impossible due to lack of fuel; penetration of the thunderstorms and a straight line flight to Can Tho became the only option. At about 50 miles out, the Can Tho tower was called for weather, the reply was 300' overcast,  $\frac{1}{4}$  of a mile visibility and numerous thunderstorms to the north and west of the airfield. The tower was advised that we were in the process of penetrating those thunderstorms and wanted an immediate landing upon our crossing over the ADF beacon. Raymond Todorovich, the flight engineer, later said he heard that we were flying at 300 feet with only a quarter of a mile visibility. Armed with that knowledge, he refused to permit the crew chief and the door gunner to remove their machine guns and close the window and door to keep out the rain. Both complained that the water flowing through the aircraft was cold and ankle deep.

Jim Parker had not flown with Machen (an instrument flight examiner) in night weather. Jim had his hands full just trying to maintain heading and altitude as several thunderstorms were penetrated during the last half hour of the flight to Can Tho. His situation was made worse because lightning flashed all around the aircraft. The lightning flashes caused the automatic directional finder (ADF) to home in on the numerous thunderstorms in the area when massive lightning flashes occurred in different cells that were present in the area.

Machen, trying to stay calm and speaking with all the confidence he could muster, would remind Parker to ease the nose up or down and turn easily to the right or left in an attempt to stay on track to Can Tho. Machen not only had to decipher which was the true heading from all the false readings that showed on the ADF, he was worried that the rain was so hard it would cause a flameout. The blinding flashes of lightning and thrashing of the aircraft made the task of developing a teardrop ADF approach into the Can Tho Airport more difficult. Machen knew that a teardrop approach would permit an overflight of the homing beacon which was almost on the airport and miss a tower of several hundred feet less than two miles from the northeast corner of the airfield. The weather, the tower, an unstable ADF, turbulence, water through the aircraft and a fuel warning light all required a positive no error approach. That flight, coupled with the instrument approach down to near zero with very low visibility, caused a number of the men on board the aircraft to kiss the ground after we landed. (That same group of maintenance volunteers who had been scared half to death the night before was waiting by the aircraft ready to go back the next morning.) The Can Tho area commander, curious of what helicopter was flying in such bad weather, paid us a visit while we refueled. When he found we

had not posted a security detail from our maintenance crew at the sight of the downed helicopter, he was livid. Machen made it absolutely clear that he was not about to sacrifice on or any of his men in an attempt to protect a helicopter that was stuck in ten feet of mud and water some seventy miles from any dry land. With that, the refueling was finished and the area commander was left standing beside the aircraft as the recovery crew taxied out and took off.

Once the 222<sup>nd</sup> Battalion Commander learned that it was possible to recover the downed helicopter, a CH54 Flying Crane was dispatched and stood by at Can Tho. During the morning of the second day of the recovery operation, the crane was called in and the downed helicopter was drug by the CH54 to a small sandbar located at the edge of the canal. The successful movement of 033 allowed the remaining internal equipment, such as radios, seats, and armor plating to be removed. The stripping was done with urgency after the 171<sup>st</sup> recovery team was advised by the Special Forces team leader in that area that if we did not recover the aircraft before nightfall, they would be forced to blow it up. The Special Forces team had learned that the Viet Cong were moving south in strength and would arrive before nightfall.

The "flying crane" (CH54) was again called in after 033 had been further stripped and rigged as a sling load to Can Tho. The recovery CH47 was required to leave the small landing area to hover and watch as the CH54 attempted to lift 033 for its trip back to Vung Tau. The attempt by the flying crane to raise 033 was stopped due to the overheating of the CH54's transmission, which was caused by the overload.

Machen, the aircraft commander, always willing to try something new and different, flew the recovery CH47 into a position approximately a hundred feet above and to the front of the flying crane. Careful not to blow the ground cushion out from under the CH54, now overloaded with 033, the CH47 moved toward and down over the loaded CH54. Their rotorwash blew through and over the rotors of the CH54. The rotorwash of approximately 120 miles per hour from the Machen/Parker helicopter gave the aircraft below the extra lift it needed. Just as surely as if they had practiced the maneuver a hundred times, when the CH47 got closer, the crane began to lift 033 out of the canal. When maximum efficiency was realized, 033 was raised completely out of the water. Both the CH47 and CH54 maintained their hover until 033 drained itself. Finally, both the CH47 and the CH54 with the downed helicopter attached, rose above the tree-lined canal. The Machen/Parker CH47 Chinook stayed above and in front of the flying crane by flying backwards. Once the crane picked up speed and gained full translational lift, the CH47 pulled up and away to permit the crane to climb and turn toward the northeast and Vung Tau.

The Viet Cong opened fire just as the break off occurred. Neither the recovery CH47 nor the CH54 was hit but 033 received a few hits. After flying for about a half hour, the crane crew advised Machen and Parker that due to the loss of weight in 033, they would be able to proceed directly to Vung Tau with a fuel stop at Dong Tam, which would save approximately an hour of flight time. The CH54 came under fire for a second time as it began its approach for a refueling stopover. The CH54 was equipped with a device that showed that one of the rotor blades had been penetrated by the ground fire. The 171<sup>st</sup> Maintenance Detachment recovery team flew on to Vung Tau, picked up a proper blade and flew it back to the CH54. A field replacement of the shot blade was made by the 171<sup>st</sup> Maintenance crew.

The CH54, recovered CH47, and Recovery Aircraft from the 171<sup>st</sup> and

crew, along with the ten 171<sup>st</sup> Maintenance volunteers were all back and the aircraft tied down by 5:30 p.m. The impossible took only 32 hours from the time the initial call was made to the 171<sup>st</sup> Commander and the downed helicopter was safely rolled into the maintenance hanger.

The 171<sup>st</sup> maintenance detachment repaired 033 and in a few days it was returned to full flight status for operational missions.

It took the crew standing in front of the CH47 thirty-four years to tell their side of the story. We hope you have enjoyed reading about it as much as we enjoyed reliving that 32-hour mission at the recent 2002 Reunion of the 147<sup>th</sup> Assault Support Helicopter Company.

### **The Great Race (or the Hook that ATE the Huey)**

**by Al Fragola, Black Cats of Phu Loi**

Here's a capsule summary as related to me in 1967 by CW3s Miles Becker, Delfo Ferrante and Omar Kipe, all of whom were participants in the great race. Some might remember these guys from the ORIGINAL 228th. At the time, the Cav was operating A model hooks (posted VNE = 133 kt) and early Hueys (posted VNE about 120 kt). Consequently, according to the dash 10, the Hook was the faster aircraft. Then came the UH-1C with the 540 rotor and a VNE of 140! Now, according to the dash 10, the Huey was theoretically faster.

Now for some technical data. The Huey's VNE is established by a phenomenon known as retreating blade stall. One simply cannot exceed the retreating blade stall speed in level flight to any appreciable extent. The Chinook VNE is primarily a structural issue. Exceed VNE, and the aircraft will continue to fly, but the bending forces on the machine (remember, there are TWO main rotors) begins to do damage to the structure. One can exceed VNE by a significant extent, and the machine will maintain level flight. The Hook can fly faster than the structural safe limits of the bird. Retreating blade stall is a minor issue, in part due to the fact that the rotors counter-rotate, and you have a retreating blade on each side of the aircraft, not just one. If you are willing to risk the damage to the aircraft, you could push an A model Hook to well past 165 Kt, or more than 30Kt over the published red line. An empty A model had more than enough power to do this.

Well, when the Charlie Huey arrived, some of the Huey drivers were quick to point out that they now could fly 7 kts faster than the Hooks. Odds are that none of the Huey drivers in question had any idea of what caused the VNE for the Hook. Just figured that if one helicopter couldn't fly much faster than VNE, the other would be subject to a proportionally similar limitation and thus they were clearly capable of 7 kts more airspeed. Consequently, boasts based on -10 figures turned into challenges for a race.

The Hook folks knew that while the red lines favored the UH-1C, engineering/scientific fact made the Hook a sure winner. Consequently, not only was there a willingness to accept a challenge from the Huey folks, but an eager desire to put money on it. The Hook folks simply agreed amongst themselves to keep their mouths shut about the fact that retreating blade stall is NOT a factor in the Hook VNE, or no one in his right mind would have taken their bets. If memory serves me, copious amounts of money was wagered, including very large bets between the two battalion commanders.

As reported by the three aforementioned CW3s, the Hook was clocked at well above 165 Kts. It suffered significant structural damage, and required a massive amount of work to make it flyable again. The above account was presented as part of our CH-47 transition ground school at Ft Sill in 1967. I have no reason to doubt the truthfulness of the story

as related by Becker, Ferrante and Kipe. Later, Chuck Oram, another of the original Hookers, related the same story to a group of us Black Cats at Phu Loi.

Of course, the B and C model Chinooks had red lines up in the neighborhood of 160+ kts. The Black Cats got their first C (minus) Hooks in III Corps in late 68. I remember more than one occasion when I would be flying a C model with a very stable sling load, and see a fully laden Cobra departing a rearm/refuel point, and make a point of either passing him or flying a circle around him. Since no one was yet aware of the C-Model, that caused great consternation. Also confusing to folks at first was the increase in fuel from 2+15 to 4+30. Our customers couldn't understand why we weren't going for fuel at the normal time. It's been 20 years since I flew a Hook. I was blessed that 14 of my 25 years in the cockpit were in the Fat Lady. No finer machine was ever delivered to the Army on my watch.

### **Maintaining the LOH by SGT Lew Waters C/7/17 CAV**

An Easter egg with a stick, that is how I heard the OH-6A most often described. To me, the shape might have been somewhat unconventional, compared to the more notorious Hueys, Cobras, and multitude of Army helicopters that preceded it, but it was a pure dream to maintain. I still remember it being pretty much the hot rod of Army helicopters.

For those of us who repaired or crewed them, the LOH was the absolute best chopper for the job it had to do. I always thought it designed to hold up to the rigors of combat flight in Vietnam. In fact, I can only remember two men ever being killed as a result of one crashing. The rest of our dead were killed by enemy fire. To this day, I don't think there was a more suitable helicopter in the Army inventory for Vietnam.

Hydraulic systems were always a concern for helicopter mechanics as they were very susceptible to enemy fire and subsequent loss of flight controls. In the LOH, we had a cyclic vibration damper consisting of 6cc of hydraulic fluid. That was the entire hydraulic system. All of the flight controls were mechanical, consisting of tubes and bellcranks. The LOH pilots told me, the LOH flew just as easily, if not easier, than the rest of the helicopters.

Hueys, Cobras and other helicopters were prone to what is known as a 1:1 vertical vibration, meaning one vibration per revolution of the main rotor. In the LOH, we all but completely eliminated that. You see we didn't track the main rotor with a flag, sticking it into the rotor while it was revolving. With the LOH, we could mount four sensors on the swashplate and a pick-up underneath to power a strobe light. Then, we could attach reflectors to the ends of the four main rotors and actually watch what each blade was doing, both on the ground and in flight. Pretty much like using a timing light on your car. With this, LOH jockeys got really used to smooth flights. In fact, I think we spoiled them a bit. For combat flying, you couldn't ask for a safer helicopter. Many didn't know that the 'Egg' shape was used for structural stability, as well as a 'keel beam' construction down the belly and two 'A' frame type supports behind the pilot and crew seats. This construction is much like the roll cage used in Stock Car racing today. Add to that, the engine mounted low and to the rear, at a 43-degree angle, it would actually pull itself and the main rotor transmission away from any occupants in the event of a crash. Many a pilot and observer are walking around today, telling their war stories, as a result of this design.

The LOH was a tough little bird. One incident reminds me of how tough they really were. Our unit was flying in support of a 173<sup>rd</sup> Airborne unit,

sometime in the fall of 1969. As memory serves me, one of their 11Bs took some shrapnel in the throat, severing his jugular vein. His wound was so severe, there wasn't time to call in and wait for a Medevac chopper. One of our LOHs, a wing bird, landed, dropped their mini-gun and took the wounded soldier and the medic aboard. The pilot valiantly tried to fly that LOH as fast as it would go, exceeding its VNE by some 20 knots. Sadly, the man's wounds were so severe that he didn't make it. The LOH was brought back to Lane Army Heliport, at An Son and thoroughly inspected for possible airframe and mechanical damage. We had to clean a lot of blood out of the interior and replace a couple bubbles, but a tear down of the engine showed no significant damage to it and an airframe inspection showed little or no damage to the rivets or fuselage. In a matter of days, it was once again flying missions. I would have to say our sheet metal shop was probably the only ones ever worked on the LOH and then, only because they had so many bullet holes to often patch up. I can remember our Maintenance Officer and Test Pilot, CW2 Al Whaley, shaping the first patch for a newly received LOH that had taken its first round in our unit, in the shape of a heart. Too bad we never came up with any purple paint.

Another minor problem that developed with the little birds was losing some two feet of the horizontal stabilizer at the tail. This was traced back to a harmonic vibration set up in the airframe when firing the mini-gun at a rate of 2,000 rounds a minute. The faster rate of 4,000 rounds a minute did not set up this vibration, so our pilots were stuck with one rate of fire. Good thing the mini-guns were limited to a three second burst, as the LOH could only carry 2,000 rounds of ammo. Due to the conditions they were flown under, we spent many a night working into the wee hours of the morning repairing battle damage and readying LOHs for the next day's mission. In my unit, C Troop 7/17th Air Cav, it was the LOHs that always had the highest flight availability, one time actually achieving a 100% availability. Our reward for our hard work and determination to 'Keep Them Flying' was Mr. Whaley bringing the next scheduled Periodic Inspection in some 130 hours early. But, that was war. What else would we have done - go to Qui Nhon and enjoyed a day or two at the R & R Center?

### Personal recollections of Les Hines

I have memories of several incidents from my tours as a Huey crew chief and in maintenance with the 123rd Aviation Battalion, Americal Division. I can recount an individual named Williams lifting a tracking flag up into the arc of a turning main UH-1 rotor blade. He was standing next to five maintenance team members and a pilot. Lucky the flag was on the downward side of the rotor's movement in relation to the team members. As you will recall, the tracking flag was made from pieces of metal pipe. It was quickly snatched from his grasp. I also remember pilots racing other helicopters after we had turned in our UH-1Ds for remanufactured UH-1Hs. Two well-known pilots (who will remain nameless for this article) blew the seals out of the transmission. As I recall, they were pulling 43 pounds of torque, which was way above anything they could do on the UH-1D. During the races, they pushed the torque up over 50 pounds. It got so bad I think we were losing over 3.5 quarts an hour when we decided to pull over for a fix. The shop quickly put a red "X" on it. Come on guys, this was a 1964 retro-fit nearly five years old! I also remember that pilots would slip during preflights and put their foot through the greenhouse windows. It would take a day of tedious work to remove and replace the window. We had problems obtaining replacement cells for the batteries. If the battery voltage dropped below 11.5 volts while engaged in cranking,

we gave it up. If it had 11.5 to 13 volts, the doorgunner and the crew chief would run the blades around to help crank. I often worried whether the helicopter would start again when we shut down out in the field, but we never had a problem after we got the thing cranked that first time in the morning.

I had several personal incidents where the pilots would land the helicopter to refuel with the nozzle/hose on the wrong side. Then, when they were ready to take off, they would forget me in the back still putting the nozzle away. I made many a jump for the skids as they lifted off without me. However, my experiences pale to those of a doorgunner from our platoon named Selby Callahan. He thought he had it made on his first flying mission after coming out of the field from the 1/52nd Infantry. That was until he was caught on the ground putting the nozzle away as his ship left. He jumped up and got his armpits over the skid to hang on, but the pilots didn't notice his predicament until they were 500 feet up in the air. That made an impression on him! During my last week in country, they wanted to take over for me so I went to my hooch and let them run the shop on their own. A couple days later, I was summoned to the flight line by one of the team. They were trying to rig a fuel control unit and they had the adjustments so out of whack the pilot couldn't shut the helicopter off!

### Personal recollections of Bentley J. Herbert

I had two tours with the 15th TC Battalion, 1st Cavalry Division in Vietnam. Initially I was with the 611th AMS Bn of the 11th Air Assault which was redesignated the 15th TC Bn. I commanded "B" Company. Our aircraft and heavy equipment were transported on the USS Boxer while most of the officers and men went on the SS Upsure. We arrived in Qui Nhon and were airlifted to An Khe to establish the famous tent city on the Golf Course. While our living conditions were primitive, we were blessed with great officers and men who had, in some cases, trained together for up to two years. We adapted to performing maintenance outside in the heat and humidity, as well as during the monsoons. We also learned very quickly how to maintain and test fly helicopters at night. The photo on the cover shows our light sets at work. The battalion had four direct support companies and as the ARA battalion and CAV squadron, assigned one company to support one operational unit. "B" Company was also tasked to retrieve downed aircraft that were not recovered by the owning unit. We did not have any detachments assigned to other units, however, we did send detachments in direct support of units that were operating away from An Khe. During my second tour in 1969 and 1970, I commanded the battalion which was a lot more decentralized. At the beginning of 1969, the 15th TC was deployed as follows: HHC at Bearcat with "A" Company, "B" at Cu Chi, "C" at Long Than North, and "D" at Phu Loi. In late 1969, "C" and "D" were deactivated and their personal used to make up 19 separate TC detachments. Each detachment was then assigned directly to an operation unit. At the time the HQ and HHC relocated to Phu Loi.

### Personal recollections of Lee Brooks (CONDOR 7)

I was the Troop maintenance officer and test pilot in late 1969 and early 1970 for the slicks of C/2/17th Cavalry of the 101st Airborne Division operating out of Camp Sally and later out of Phu Bai. Based out of Phu Bai, C Troop, 2/17th Cavalry was on a mission operating out of Quang Tri, North of Hue and South of the DMZ. On one particular mission our Slick Platoon Leader, CPT Mac Jones (CONDOR 03) and CW2 Glenn Dooley (CONDOR 44) his IP on that flight, took a round in the rotor blade. Our unit CO called me to bring up a replacement

aircraft and to take the damaged one back to Phu Bai. When CPT Jones saw me hovering into Quang Tri he hopped onto my skids begging me to change aircraft with him. For these past thirty some years he always thought he had conned me into switching aircraft when in fact I was instructed to do just that. I often wondered why the CO just didn't have CPT Jones fly the aircraft back to Phu Bai and pick up the replacement helicopter. (Maybe test pilots had some kind of insurance on them that the other pilots didn't have that I was not aware of.) I was not apprised of the damage until I arrived at Quang Tri and inspected the aircraft. The bullet hole on the underside of the blade was the size of a .51 Cal, but the exit on top of the blade was the size of my fist and surrounded by jagged metal. Maintenance Rule #1: For a helicopter to remain out of premature and sudden ground contact rotor blades need to remain intact. After trimming off the excess jagged metal and inspecting the paint surrounding the jagged hole for hairline cracks I covered the hole, and possibly any hairline cracks I did not see, with duct tape. (We just happened to have a roll of that stuff in the helicopter.) Started the helicopter up and brought it to a hover. No noticeable vibration. Sat it down and motioned for the crew to climb on board. They looked at me as if thinking, "Say What??" After a second invitation they climbed on board, figuring they would miss out on a hot meal if they didn't, and we flew it back to Phu Bai. Once at cruising altitude you could count the revolutions by the sound the blade with the duct tape made as it rotated. I let on it was no big deal. (Mostly to convince myself!) Any sane maintenance test pilot would probably have loaded the helicopter onto a flat bed tractor-trailer and hauled it back to Phu Bai. Or at least arranged to have it sling loaded back. But then nobody could ever accuse me of being sane. C Troop had some of the best helicopter maintenance crews (507<sup>th</sup> TC Detachment) within the 101<sup>st</sup>. They worked day and night keeping C-Troop helicopters flying and operational. No easy task in a combat zone when ships would quite often return shot up or with some other type of damage. I don't recall what C-Troop's percentage was on readiness but it must have been pretty darn good, thanks to the maintenance enlisted men and NCO's of the 507<sup>th</sup> TC Detachment who worked on the aircraft day and night to keep them flying. To borrow a quote from AAHS (Army Aviation Historical Society) "Without maintenance crews aviators would just be pedestrians wearing sunglasses."

What follows are extracts from the US Army Aviation System Command, March 1971 manual titled 'Logistical Support of Airmobile Operations, Republic of Vietnam, 1961-1971.' VHPA Member Edward Landry who commanded the 14<sup>th</sup> TC Bn and was the Deputy Commander of the 34<sup>th</sup> Group commissioned VHPA Member George Reese to produce a CD that includes an extensive photo collection of most all the TC units in RVN plus photo copies of the manual mentioned above. Space limitations restrict the extracts to the CH-21C maintenance lessons learned.

### Logistical Support of Airmobile Operations

On 11 December 1961, the USNS Core arrived in Saigon with 32 US Army helicopters and 400 men. This first consignment of H-21 helicopters opened the door for the greatest aviation logistics offensive in the history of the US Army. Two units were the 57<sup>th</sup> TC Company (Light Helicopter) and the 8<sup>th</sup> TC Company (Light Helicopter). Each company had a TOE complement of twenty H-21 light cargo and two H-13 reconnaissance helicopters. Both units were STRAC and had conducted frequent alerts and practice load-outs. The movement orders directed deployment to an unknown destination. The H-21s were preserved by cocooning at the Alameda Naval Air Station to protect the

fuselages from salt water spray; rotor blades were removed and placed in racks inside the aircraft; engines and other components were treated for protection against corrosion and inactivity; rotor heads were covered with protective barrier paper. All 32 of the aircraft were loaded onto the flight deck of the USNS Core in a manner that left little space unoccupied. Equipment needed to make the aircraft flyable at destination was loaded below deck. Rough seas were encountered during the trip, and personnel aboard the USNS Core soon discovered that salt water spray was causing corrosion in the rotor head areas of the deck-loaded helicopters. Consideration was given to diverting to Subic Bay, Philippines, to correct deficiencies in the protective coverings; however, this problem was satisfactorily resolved by use of canvas covers and frequent inspection/servicing of exposed parts and the decision was made to continue on to destination. The other ship was not so fortunate; one of the H-21s broke loose inside the box, and the ship had to be diverted to Hawaii for replacement of the damaged aircraft with one from the 81<sup>st</sup> Transportation Company. This situation delayed considerably the arrival of the remaining aircraft, but they did arrive prior to movement of the 8<sup>th</sup> from Saigon to its permanent location at Qui Nhon.

The two units arrived in Vietnam with 30 days PLL (Prescribed Load List), and there were 30 days ASL (Authorized Stockage List) in the supporting field maintenance detachments. Resupply of aviation parts and supplies was extremely critical during the first few months while a supply system was being established. Initially, supply support was the responsibility of activities located in Okinawa, but the short notice and the distance removed combined to produce a far from adequate supply system. Eventually, an Aviation Supply Point was established at Tan Son Nhut and became minimally effective during the early months; it also provided support to other arriving H-21 companies.

An extremely critical maintenance problem arose when the wooden rotor blades began deteriorating because of extremely high humidity. Leading edge separations and other deficiencies were detected; some blades lasted less than ten hours. The field maintenance detachment supporting the 57<sup>th</sup> established a rotor blade repair shop and performed repairs on blades that would otherwise have been returned to CONUS for overhaul. Considering the ineffective supply system, such a situation would have seriously impaired mission availability rates and aviation support capability. Subsequently, Air America personnel were trained by the detachment, and the commercial company set up its own repair facility and provided back-up support to the H-21 companies.

Various pressures were also experienced because RVN requirements had not been programmed and funded for in the initial phases of the commitment. This initial supply posture of minimum response capability was a result of several previous years of austere programming and funding, necessitating severe limitations on inventories. The initial actions taken in satisfying RVN requirements created a critically depleted stockage situation for certain items.

Crash-and battle-damaged aircraft in the "boneyards" were cannibalized for every usable part and component. The highly experienced and dedicated H-21 pilots performed feats with their aircraft which – with lesser experienced pilots – would have dictated mission aborts to prevent possible damage to aircraft or loss of life; the maintenance personnel and crew chiefs worked long hours, day and night, to keep their aircraft flyable. Dedicated crew chiefs, on many occasions, literally taped and wired and held their aircraft together, permitting them to be flown back to home base rather than have them face possible destruction in hostile areas.