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LESSONS LEARNED

I. CIVIL AFFAIRS

1. ITEM: WORKING WITH LOCAL LEADERS

DISSCUSSION: Civic action projects should be undertaken through the local and national government channels to strengthen the individual support of the government. In daily contact with the people, every opportunity to emphasize the government of the country should be pursued. No matter how backward an area may seem, a definite route of communication to the people exists through the village and hamlet officials. Further, each time the local chain of communications is used, the cooperation between the local people and U. S. military is enhanced.

RECOMMENDATION: All civic actions be accomplished through established local officials. In an area where local leadership is weak or non-existent, efforts must first be directed toward the establishment of a viable government.

2. ITEM: EMPHASIZING JOINT WORK PROJECTS

DISCUSSION: Emphasize participation by the local nationals in all local improvement projects. This should include not only the execution of work but also the initiation of ideas. The people are usually more willing to accept changes when they think they instituted them. Local improvement projects should be of the self-help or joint-work type. When projects are done for them, the people have a tendency toward complacency and expect other projects to be accomplished for them, while not really accepting or appreciating the results of the activity.

RECOMMENDATIONS: Units must insist that the local people do their share in all civic action projects on all levels. Whenever possible, the initiative for the conception of ideas and projects should be passed to the local officials.

3. ITEM: DISTRIBUTION OF GIFTS AND SUPPLIES

DISCUSSION: The goal of Civil Affairs/Civic Action in RVN is to support the local government to the end that direct USMC involvement is minimized and the people become accustomed to seeking assistance from their own officials. Direct gifts of CARE, USOM or other materials (other than on appropriate gift-giving occasions, such as children's TET, Christmas, etc.) by Marines to the people tend to defeat the goal. Distribution of gifts during a large public gathering is not desirable, as the position of the local officials is seen as obviously a go-between.

RECOMMENDATION: Distribution of all gifts of farm implements, school supplies and other CARE and USOM - type goods be made only to local officials at their seats of government and without publicity. Prior arrangements should ensure that the ultimate recipients are those intended by the donors.

4. ITEM: MOVEMENT OF VIETNAMESE GRAVES

DISCUSSION: In the CHU LAI Area, GVN has purchased, and is in the process of

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purchasing, privately owned and public land on which are many Vietnamese graves. It is of paramount importance that Vietnamese graves not be defaced or despoiled as the people have a deep religious attachment to the graves of the members of their families. While they do not want to move the graves, they will do so to avoid damage or destruction. Indemnification invariably is involved, and procrastination is nearly always encountered.

RECOMMENDATION:

A. Strictly avoid defacing or damaging Vietnamese graves.

B. When construction of roads or facilities requires movement of graves to avoid destruction, start negotiations for movement of the graves through local officials at the earliest possible time.

C. Assure that definite arrangements for indemnification have been completed before requiring the graves to be moved.

D. Insist that the agreed-upon deadline date for completion of the movement of all graves is adhered to.

5. ITEM: AID TO THE SAMPAN COMMUNITY

DISCUSSION: The Amphibious Tractor Battalion has initiated a program of giving aid to the floating Sampan Communities at vicinity (AT 038754) in and around DA NANG. The program was initiated because these communities had been bypassed by other Civic Action programs due to their inaccessability. Four LVTP-5s, one equipped as a floating dispensary with Red Cross painted on the escape hatches, are utilized to make the trip down river to the Sampan community twice each week. The medical team consists of the Battalion Medical Officer, three corpsmen, and interpreter. The predominate diseases encountered are of the skin and of the respiratory tract. The Battalion Medical Officer has in several cases performed minor surgery on the LVT. A dentist and a dental technician accompany the medical team when available. The dentist performs extractions from a separate LVT. The medical and dental LVTs are positioned together to centralize the medical care in one area for the people requiring treatment. The remaining two LVTs are designated specifically for Civic Action and are positioned approximately 150 yards away from the medical and dental tractors. This minimizes the activity of the MEDCAP tractors, enabling the medical team to make maximum use of time and personnel. The Civic Action tractors, distribute vitamins, food, candy, gum, soap, and clothing to approximately 400 people each trip. Bar soap is cut in half to prevent resale. Contact must be made between the Chief and vice chief of each floating community and needs of the people related through the interpreter. Two fifteen year old Vietnamese girls have been trained by the Battalion medical team to act as medical helpers. They provide medical assistance, and insure emotional stability in difficult cases. The reception of the program by the people of this floating community has been enthusiastic. The Community Chiefs have stated that their people look forward to these trips each week. The more difficult medical cases are always present and waiting for follow up treatment when the LVTs arrive.

RECOMMENDATION: That like units form Civic Action teams trained to implement similar programs of this unique nature.

6. ITEM: LACK OF KNOWLEDGE OF LOCAL CUSTOMS

DISCUSSION: Of prime importance in dealing with people is the knowledge of, and respect for their customs, particularly taboos. The people are much more receptive toward the help offered, and cooperation is gained more readily, when U. S. Forces demonstrated a knowledge of, and respect for their customs, as well as at least a superficial interest in them.

RECOMMENDATION: That all hands receive a complete indoctrination of the customs and habits of the local nationals prior to assignment to an area of operations. The importance of observing and respecting customs should be an integral part of this training.

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LESSONS LEARNED

II. INTELLIGENCE

1. ITEM: DISPOSAL OF ADMINISTRATIVE WASTE PAPER

DISCUSSION: Because of the access Vietnamese Nationals have to our trash dumps, various unclassified papers can be easily obtained by the Viet Cong and must, therefore, be regarded as a potential enemy propaganda source.

RECOMMENDATION: It is recommended that all administrative waste paper be burned.

2. ITEM: TIMELY DISSEMINATION OF PRISONER INTERROGATION REPORTS.

DISCUSSION: Frequently, the prisoner interrogation reports provided by the Division Prisoner Collection Point contains information of a tactical nature. A very low percentage of these reports are usable because the interrogation of prisoners does not produce this information quickly enough to allow exploitation. The passage of one night is usually sufficient time for the Viet Cong to have adjusted its positions or re-deployed so as to destroy the validity of the report. Initial interrogation at the company/battalion level might produce this information prior to the evacuation of the suspects to the Division Prisoner Collection Point. The drawback to this procedure is the shortage of personnel with Vietnamese Language capabilities. Moreover, the ARVN interpreter who may be available has neither the training nor the background to function effectively as an interrogator. The advantages of a Collection Point, is that the ITT has a pool of interpreters (not necessarily Interrogator/Interpreter), and a polygraph which can function as a guide to separate the truths from the untruths. The ITT however, frequently lacks sufficient knowledge of the tactical situation in an immediate area to exploit the presence of a suspect who may possess valuable information. Additionally, the number of suspects that are presently processed serves to delay the production of usable information and, as stated before, late information usually is invalid information.

RECOMMENDATION: Each rifle company, battalion headquarters and regimental headquarters utilize qualified interpreters on a basis of one per company and two per battalion/regimental headquarters for a regimental total of twenty. Interrogation should be accomplished with minimum delay. Subsequently, all suspects would be evacuated to the Division Collection Point for custody and further exploitation. The assignment of ITT subteams to support "on the spot" large operations is also a means of more rapid exploitation of captives and documents.

3. ITEM: PROPER EVALUATION OF INTELLIGENCE REPORTS.

DISCUSSION: Intelligence reports are frequently received without the forwarding headquarters/agency indicating the evaluation placed on the source and/or the report information. As frequently is the case, the organization which reacts to this information is the one most distant removed from the source of the report, and, therefore, the least able to independently provide overall evaluation.

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RECOMMENDATION: It is recommended that all headquarters/agencies in the chain of evaluation be required to indicate their independent evaluation of the source/report, provided within twelve hours time frame.

4. ITEM: ANALYSIS OF INTELLIGENCE INFORMATION.

DISCUSSION: Because of the Viet Cong techniques of individual and unit infiltration over an extended period of time, it is difficult to locate a buildup of Viet Cong personnel and logistics within the TAOR. In addition, many new trail routes and road systems are located, but if not properly recorded can be lost.

RECOMMENDATION: In order to bring meaning to the many and varied sightings made by reconnaissance patrols, a battalion intelligence section should adopt a system of overlays to include the following:

A. Patrol Sightings Overlay maintained on significant sightings by reconnaissance patrols using after action and spot reports. Daily plots are cumulated on the overlay to maintain current and accurate information of the movement and possible buildup of Viet Cong Forces. Color codes could be used to denote different time periods on the same overlay.

B. All new trail networks reported by reconnaissance patrols be plotted on a Trail Sighting Overlay. This overlay is useful for guiding patrols and for operations planning. The Trail Sighting Overlay can also be used in conjunction with the Patrol Sighting Overlay in determining movement patterns within the TAOR. Over an extended period of time, this detailed compilation of information can indicate Viet Cong buildup and movement routes.

5. ITEM: USE OF MINE AND OBSTACLE INTELLIGENCE BY TRANSPORTATION UNITS.

DISCUSSION: Because of the continuing mine threat generated by the Viet Cong, the battalion S-2 should establish a separate map within the S-2 section depicting all known or suspected mined areas. All unit leaders prior to dispatching vehicles from the battalion area, should be thoroughly briefed on any known mined routes. Upon return to the battalion area, individuals should be debriefed and new information be plotted on the same map.

RECOMMENDATION: That all wheeled and tracked vehicle units keep a current, up-to-date mine and obstacle map using the information thereon for thorough briefings of personnel going into areas of known or suspected mine activity.

6. ITEM: MATERIALS USED BY THE VIET CONG IN THE LOCAL MANUFACTURING OF MINES.

DISCUSSION: The Viet Cong have demonstrated the capability of producing effective mines using the simplest of materials discarded or lost by Marines. Care must be taken at all levels to prevent such articles from falling into enemy hands. Most important of these items are, communication wire, batteries, duds of all sizes and type, all types of explosives, blasting caps, plastic waterproofing material and ammo boxes.

RECOMMENDATION:

A. That units carefully screen all waste before disposal, to remove or mutilate beyond further use, all items which might be used by an enemy or civilians.

B. That commensurate with combat operations, all duds and defective explosives be located and disposed of, in accordance with current directives.

C. That prior to discarding batteries, always mutilate them beyond any possible reuse by cutting or breaking open the outer case and removing/destroying the inner element such as the carbon anode of a dry cell.

7. ITEM: THE EFFECTIVENESS OF THE INFORMER NETWORK IN VIETNAM.

DISCUSSION: One of the most effective sources of good intelligence information is the informer network of civilians working for the Vietnamese Government. These civilians report to the District Chiefs, and in turn, the Marine Corps Liaison Officers located at each District Headquarters relay the information to the infantry battalions. Informer reports provide impetus for further research into the enemy situation by such means as aerial reconnaissance, ground reconnaissance, or possibly the employment of counter-intelligence teams.

RECOMMENDATION: It is recommended that units continue to provide Liaison Officers to the various District and Province Headquarters to collect and disseminate the information as it is collected by the District and Province Chiefs. This is considered to be essential in the counterinsurgency climate encountered in Vietnam.

8. ITEM: VC DIRECTIONAL AND FIRING MARKERS.

DISCUSSION: The Viet Cong employ several types of markers for the purposes of providing directions for Viet Cong units to follow, or to mark routes for an attack. Also employed, are markers to aid firing into a pre-determined area or installation. By aligning a weapon with the preposition marker, it is possible to fire fairly accurately in the dark. When such markers have been removed, Viet Cong firing incidents have ceased or decreased.

RECOMMENDATIONS:

A. Maintain a loose-leaf type manual with photos and sketches kept up to date on new Viet Cong techniques.

B. Units conduct frequent patrols around the outside of perimeters to remove and destroy markers, recording the location, direction and estimated range to each possible target, and indicating the nature of each target.

9. ITEM: MINE DETECTION AND CLEARANCE.

DISCUSSION: The large number of mine incidents demonstrates that the Viet Cong

have the capability to interdict roads and trails used by RVN/US personnel and vehicles, almost when and where they choose. Frequently, vehicles must use the same routes for exit and entrance. Deep ruts force vehicles to follow "paths" in the road. Such places should receive special attention by mine detection personnel, drivers, and persons using these routes. Mines detection and clearance should be an all-hands project. Steps taken to prevent Viet Cong from laying mines, and to facilitate detection and removal of mines, are as follows:

A. Night patrolling and ambush of areas likely to be mined.

B. Close inspection, by daylight patrols, of road banks and shoulders.

C. Hand probing of likely mined areas, with more emphasis placed on this method of mine detection. Slow probing of the most likely mined areas by all units could contribute considerably to the engineer efforts.

RECOMMENDATION:

A. Emphasis in training of all units in an "all-hands" responsibility for mine prevention, detection, and clearance.

B. Increased emphasis on mine warfare training, especially among vehicle operators.

10. ITEM: DAILY REAR AREA PATROLS.

DISCUSSION: Due to the very nature of counterinsurgency operations, daily rear area patrols are mandatory, regardless of the proximity of the patrolling to the front lines. Daily patrols determine fluctuations in the sentiment of the local populace, and develop intelligence useful to the patrolling unit, such as signs, markings, directional arrows, etc. Security of supporting units has been greatly enhanced by vigorous rear area patrolling.

RECOMMENDATION: That daily rear area patrols be conducted by all units.

11. ITEM: EXISTING HIDDEN POSITIONS ARE READILY AVAILABLE TO THE VIET CONG WITHIN SECURED AREAS

DISCUSSION: Tunnel and cave type shelters constructed during the French occupation are present and in good condition. These shelters are overgrown with thick vegetation and often are undetected on routine area searches. Such old shelters can be readily occupied by infiltrators or used for caches of arms and ammunition, food stores, or used as protected weapons emplacements. Only with the assistance of the local populace can all such shelters be located.

RECOMMENDATION: Upon entering an area, enlist the aid of local officials to locate all such shelters as soon as possible. All shelters in outlying areas not under constant observation and complete control should be destroyed. All shelters in private homes should be filled, or otherwise rendered useless, or registered, dependent on the exact location and characteristics of the shelters. Shelters affording personnel in friendly villages protection from supporting arms should not be destroyed.

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LESSONS LEARNED

III. OPERATIONS/TRAINING

1. ITEM: INEFFECTIVENESS OF SHORT-DURATION LARGE-UNIT "SWEEPS".

DISCUSSION: A rapid "sweep" conducted by a large unit in VC territory seldom achieves a satisfying result, even when blocking forces are employed. The VC either get prior information of the sweep and evacuate, or they blend indistinguishably with the people, or they manage to exfiltrate. Greater success will be realized if the Marine units "stay awhile" after the initial "sweep" to conduct exhaustive search and patrolling of the entire area. During this period caches can be found, intelligence information and material can be discovered, VC freedom of action and channels of communications will be disrupted, the confidence of the people can be gained and exploited, and VC could be caught filtering back in.

RECOMMENDATION: As the second stage of any large scale (company size or larger) "sweep" outside the TAOR in VC-dominated territory, the operating unit should remain in the area from several days to a week in order to exploit the opportunities presented by a protracted stay in VC territory.

2. ITEM: COMPANY SIZE OR LARGER OPERATIONS.

DISCUSSION: It has been the experience that large-scale operations have generally resulted in far less enemy contact than normal squad patrols and ambushes. Unless the VC feel that they have a superior force, it has been demonstrated repeatedly that they will avoid contact. Most successful contact with the VC has been as a result of squad patrols establishing the initial contact with the deployment of a rapid reaction force when necessary. (This method, using an armored reaction force has been very successful in a battalion TAOR.)

RECOMMENDATION: That large-scale operations be minimized, and conducted on the basis of reliable and timely intelligence. Large-scale actions are most appropriate beyond normal range of small unit operations.

3. ITEM: HILL TOP OP'S WITH OFFENSIVE CAPABILITY.

DISCUSSION: When reconnaissance units established OP's deep inside VC territory, they would almost always have numerous VC sightings. Seldom, however, could offensive capability be brought to bear against the target because of the time lag involved. Occasionally, effective results were obtained from calling artillery fires on the larger targets. An OP concept was adapted by infantry units to include an emphasis on offensive capability. OP's deep in VC territory have been established, usually in conjunction with nearby friendly operations. These OP's are inserted by helicopter, and include a dismounted 106mm RR, a mortar squad, sniper teams, artillery and mortar FO's, and sufficient infantry (usually a platoon (-) (Rein) for security. The mission of the OP unit is to be inserted by helicopter on a dominant hill, establish and secure an OP, and observe for VC targets of opportunity. Any target in range is engaged by an appropriate weapon.

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Large targets may be engaged by artillery. Small fast moving, elusive targets may be immediately engaged by the recoilless rifle or mortar. Individual VC within 800 meters may be shot by the sniper team. This technique is best employed in an area where the VC have had long-standing freedom of action and are not accustomed to having to conceal themselves at all times. It is also best employed in conjunction with a nearby large scale offensive ground operation which tends to "stir up" the VC in the area.

RECOMMENDATION: Explore further the potentialities of this "offensive OP" concept.

4. ITEM: VIET CONG ESCAPE DECEPTION

DISCUSSION: Several instances have been reported when Marines in close pursuit of Viet Cong have been distracted by the enemy dropping his pack on the trail. Most Marines, it has been learned, will stop to inspect the contents of the pack before pursuing the Viet Cong further. In the meantime, the Viet Cong has made his escape with the time gained, while the Marine is inspecting the discarded Viet Cong pack.

RECOMMENDATION: That Marines be trained in this particular aspect of Viet Cong tactics.

5. ITEM: CONDUCTING SEARCHES FOR CAVES AND TUNNELS

DISCUSSION: Experience in locating caves and tunnels in areas occupied by Marines for several months reemphasized the fact that the VC are extremely clever and ingenious in locating and camouflaging their hiding places.

RECOMMENDATION: Searches for caves and tunnels should be very thorough and systematic using every possible means, (probes, mine detectors, dogs, local villagers, etc.). Marines newly arrived in RVN should be given every opportunity to observe caves and tunnels in their original condition to familiarize them with what to look for. Since these hiding places frequently remain undiscovered, the search force should be trailed by another group at approximately 1,000 meters distance. This trailing force is in position to capture/kill any VC emerging from hiding places after the initial search force has passed by. Under certain conditions snipers can be used to accomplish the same mission.

6. ITEM: DESTROYING CAVES AND TUNNELS

DISCUSSION: Engineers have observed secondary explosions when blasting caves and tunnels indicating trapping and/or storage of ammunition or explosives.

RECOMMENDATION: Safety precautions used, when blowing caves and tunnels, should always include the possibility of secondary explosions.

7. ITEM: IMMEDIATE ACTION AGAINST VC PROBES AGAINST THE DEFENSIVE PERIMETER OR MLR

DISCUSSION: VC will frequently infiltrate in small groups to position close to the MLR or perimeter, fire a few rounds or throw a few grenades, then withdraw. Although this action is rarely effective, it does give the VC an element

of surprise and places the Marines at a psychological disadvantage. Seeing no visible target, Marines tend not to fire in return, and the VC usually escapes unscratched. To counteract this problem, it is necessary to have a well understood immediate action plan. For example, if a VC grenade is received, the correct reaction would be for all troops in the general vicinity to immediately throw out several grenades to saturate the area. Such a procedure almost assures that the VC grenade thrower will absorb some fragments. For VC small arms fire, the reaction should be with rifles, M-79's, M-72's, and 3.5" Rockets. In any such reaction plan, due regard must be given to the safety of friendly patrols and listening post to the front.

RECOMMENDATION: Devise and rehearse immediate action plans for VC probes at night.

8. ITEM: NEGOTIATION OF RICE PADDIES BY LVTS

DISCUSSION: One of the major obstacles encountered by rapid cross country mobility in the RVN is the rice paddy. Each one presents a different problem as their consistency varies, both in depth and composition of soil. Many times LVTs will get hopelessly bogged down due to operator inexperience. Careful reconnaissance cannot always be made of the paddies because of the dictates of a fast moving offensive situation. As a result, there are certain general rules that can be applied to crossing paddies by LVT.

A. Run perpendicular to the cultivated rows.

B. Keep the vehicle at a high constant rate of speed in high range.

C. Do not lose forward momentum in any case.

D. Do not apply a steer while crossing the paddies.

E. When more than one vehicle is crossing the same paddy do not track the vehicle in front.

Using these simple rules, the rice paddy is less of an obstacle. There is certainly no assurance however, that the LVT will not get stuck. Certain field expedient materials should be carried by the LVT . The most important of which is a 200 foot long steel cable. With this cable, an LVT on firm ground can usually reach another one mired in a paddy and execute an effective tow. In fast moving situations, in pursuit of the Viet Cong forces, the speed of LVT crewman reaction to this type of problem is essential.

RECOMMENDATION: That training in traversing boggy areas such as rice paddies be included in the basic Amphibious Tractor crewman training course. While conducting training in crossing marshy type areas, intensive drill on rapid vehicle recovery should also be emphasized. Each section of LVTs should be equipped with 200 feet of steel cable for long hookups in extracting LVTs from rice paddies. Discarded SATS arresting cable is a possible source of this cable.

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9. ITEM: RIVER PATROLS

DISCUSSION: The river patrol is a new role for the LVTP-5. The methods of employment on the rivers of RVN have evolved through a trial and error process developed since March, 1965. Since there had been little prior experience with, or training in, operations involving river patrols, there is, at present, no Marine Corps tactical doctrine on this subject. Rapid movement within the Marine TAORs at times has depended on the ability of Marine units to move along and across the river complexes. Control of both sides of river banks is of vital importance to this movement and can most effectively be accomplished by use of river patrols. Further, the movement of enemy forces by boats down rivers can effectively be curtailed by riparian operations that include LVT's. LVT operations in the rivers and waterways have assisted in movement of troops along and across these natural avenues, as well as a patrolling means to control them. Most of the rivers and tidal waterways in both TAORs are effected by tidal influence. LVT operations in the rivers therefore, must be planned to take advantage of, and preferably be executed during the most favorable high tides. The size and composition of riparian patrols varies with the type, size and scope of the specific operation, but should not be composed of less than three LVTP-5s. Careful 360^{0} surveillance is required on each LVT. This necessitates the mounting of infantry personnel topside on the P-5 to cover the blind areas of the vehicle. The following basic rules apply to movement in rivers by LVT's.

A. Formation, if river width and depth permit of a staggered column.

B. A planned coordinated infantry/LVT course of action when fired upon from either bank of the river or both.

C. A planned course of evasive action when taken under fire by direct or indirect fire weapons.

D. Avoid hitting any objects floating in the water.

E. Carry long cables and other necessary equipment for extracting LVTs mired in the tidal mud or slit.

F. During heavy torrential rains, currents in most rivers increase to a speed that hazards LVT operations. Control of the vehicles moving down stream becomes difficult and movement upstream impossible.

G. Do not attempt to navigate a river that appears to have more than three knots current.

RECOMMENDATION: That after sufficient experience in riparian patrols has been gathered by both infantry and LVT units, Amphibious Doctrine should include this type of operation. Also, that based on present experience, training should be continued for LVT personnel in this most vital area.

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10. ITEM: VIET CONG ANTI-TANK MINE WARFARE

DISCUSSION: The Viet Cong Anti-Tank Mine has presented the singularly most effective weapon against the LVTP-5. Exploiting the foremost weakness inherent to the vehicle, that of the soft underbelly, containing the entire fuel supply of the LVTP-5, (456 gals of MOGAS, when full) the Viet Cong have inflicted the majority of the Battalion's vehicular and personnel casualties by the use of mines. To date a total of nine vehicles have struck mines, eight at DA NANG and one at CHU LAI, resulting in a loss of eight of the vehicles and the deaths of two Marine crewmen. Personnel casualties usually resulted from the gasoline fires after the detonation of the mines. These mines have not been encountered in organized fields, but are employed individually in areas of high vehicular usage, and also where the LVT is channelized into a narrow route. The types of mines vary with local ingenuity and availability of simple materials. The locally manufactured AT mine is often positioned so as to detonate directly under the vulnerable centerline of the vehicle. A combination pressure/electrical detonator device is buried in the wheel/track path, and the charge offset to the center of the road or trail. The charges generally have consisted of 20 to 40 lbs of TNT or large artillery shell (155mm). AT mines encountered that exploded directly under the track and suspension systems, caused the least vehicular damage and minimal personnel injuries as fires have not usually resulted. Certain action can be taken to avoid contact with mines and to minimize the effect of mines on the LVTP-5.

A. Sandbag the deck of the cargo compartment.

B. Open cargo hatches of the LVTP-5 to reduce the pressure and diffuse the blast effect as well as to allow quick escape from the vehicle by passengers and crew members.

C. The driver and crew chief of the LVT must continously make visual inspections of the ground ahead for freshly dug areas, unusual debris on the surface, or any unusual change in an area previously traveled. Check all points above the elevation of the surrounding area, frequently chosen by the enemy as mine sites, to avoid the effects of water damage and/or premature activation to the mines.

D. When vehicles are in column, insure that an extended interval is kept between vehicles, and that the vehicles track each other but do not utilize the track trace previously made earlier by other vehicles.

E. Vary the pattern of employment and routes in the same area.

F. Make every effort to avoid areas that confine LVT to a narrow route or defile.

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G. If time and conditions permit, insist on mine clearance in any questionable routes to be traveled. When situation requires repeated use of the same LVT trails, maintain surveillance over them as constantly as means permit. A joint engineer-LVT effort over such trails on a continuing basis may prevent the introduction of mines between scheduled trips and does provide an opportunity to conduct mine detection efforts at a pace more apt to produce positive results than does a hurried effort preceding an unscheduled movement. Certain modifications to the LVTP-5 have been recommended for additional protection. These include a fixed fire extinquisher system for the cargo compartment and additional armor plate for the under-side of the tractor.

RECOMMENDATION: That increased emphasis be placed in the training of vehicular crewmen in the area of mine warfare. Units employing tracked vehicles should thoroughly brief the attached LVT Commander on all known mine intelligence pertinent to the area of operations prior to any operation.

11. ITEM: RIVER BLOCKADES

DISCUSSION: LVTs have been employed on rivers as blocking forces to stop and search boats for contraband and to prevent the movement of the Viet Cong and their supplies by water means. Although the width of the river or body of water at a blocking point and the amount of boat traffic may require more, a minimum of two and preferably three LVTs should be utilized. One LVT is employed to intercept, search and seize and the two other LVTs to provide cover from the front and rear. At least one fire team should be employed on the intercept vehicle. These personnel will actually perform the search. Also desirable is a protective force of infantry personnel on both banks of the river with large caliber direct fire weapon (3.5" Rocket Launcher, 106mm Recoilless Rifle or a tank) to quickly engage and sink hostile boats which threaten the operation or attempt to escape. Because of the relatively light construction of Vietnamese small boats, the LVTP-5 is capable of sinking them by ramming, or by waterline penetration with the .30 caliber Machine Gun. Mounted infantry on the cover vehicles with M-79s can also be effectively employed for this purpose.

RECOMMENDATION: That integrated LVT/infantry training be continued to establish the proper LVT utilization and coordination necessary in blockade operations.

12. ITEM: LVT PROTECTION:

DISCUSSION: The turret mounted .30 caliber Machine Gun of the LVTP-5 has proven inadequate to cover the entire periphery of the tractor. It is evident that a better system of coverage is necessary for effectively engaging an enemy during an ambush or surprise encounters. Firing out of the driver's and crew chief's cupolas, passenger access hatches, and open cargo hatches has proven fatal in several instances. A mediocre enemy marksman has an easy target when lining his sight on the linear top surface of the LVT. Modification to the vehicle that provides for water-tight pistol ports on the escape hatches is presently under development. Several immediate methods of firing out of an LVT can be utilized.

A. Sand bagging around the passenger access hatches leaving slots for firing ports.

B. Sand bagging firing positions in the area around the escape hatches on either side of the vehicle. By attaching a rope or chain to the escape hatch itself, the hatch can be dropped and recovered from inside the vehicle. This method offers good protection for firing low along the belt line on either side of the tractor, and can fully supplement the fire of the .30 cal. Machine Gun.

RECOMMENDATION: As set forth above.

13. ITEM: UNIQUE LVT UTILIZATION IN RVN

DISCUSSION: Besides performing the primary mission of landing and transporting infantry and artillery to inland objectives in an amphibious assault, and providing support logistically, the LVT has been used in several new roles.

A. A mobile, waterborne firing platform for 106mm Recoilless Rifle on river operations.

B. A crash/rescue vehicle at the CHU LAI airfield to rapidly move to downed aircraft in deep sandy areas around edges of landing strip inaccessable to wheeled crash trucks.

C. Causeway anchors. It is noted that deadlined vehicles, if available, can be utilized in this static role, freeing operational vehicles for other missions.

D. Waterborne pumping stations for sea water used in construction of the CHU LAI Airfield.

E. A floating dispensary equipped and staffed to provide medical treatment and assistance to formerly inaccessable sampan communities in and around the rivers of DA NANG.

RECOMMENDATION: As discussed above.

14. ITEM: THAT THE ONTOS CAN BE UTILIZED EFFECTIVELY AS AN ELEMENT IN SEARCH AND DESTROY OPERATIONS

DISCUSSION: The ONTOS is vunerable to hostile (.50 caliber and larger) fire. It requires the protection of infantry. Further, the ONTOS should not be employed to spear-head operations. The cross-country maneuverability of the ONTOS has enabled it to render combat support in many areas impassable to the M48A3 Tank.

RECOMMENDATION: That the ONTOS continue to be used during search and destroy operations as an element of the infantry support team.

15. ITEM: THE ONTOS CAN BE USED EFFECTIVELY AS PART OF A BLOCKING FORCE

DISCUSSION: When the terrain permits tactical movement of the ONTOS into position as part of a blocking force, the ONTOS can provide the necessary fire power and maneuverability to gain the advantage. It must be provided protection by infantry elements of the blocking force.

RECOMMENDATION: The ONTOS, by careful selection of critical terrain and camouflage can be used to its maximum capability in blocking forces.

16. ITEM: INDIRECT FIRING.

DISCUSSION: The ONTOS can be advantageously used for H&I fires, pre-planned concentrations along patrol routes and avenues of approach, and as part of a defensive fire plan for the supported unit. A range of 6,000 meters without "ramping" the vehicle, makes the ONTOS excellent for fire support. Flat terrain is particularly suited to the low trajectory of the 106mm Recoilless Rifle. Indirect fire targets can be masked by vegetation or low ridge lines.

RECOMMENDATION: Indirect fire techniques should be included as a major portion of ONTOS training. Platoon leaders should stress the capability to their supported units. The Platoon Commander must also learn to act as a Forward Observer for indirect fires.

17. ITEM: ONTOS ENGINEER REQUIREMENTS

DISCUSSION: It has been noted that the VC generally mine tracked vehicle routes, particularly after a successful infantry/tracked vehicle operation. Routes into relatively inaccessible areas which are not under constant observation and are not regularly patrolled are continually mined, both after and before use. On avenues of approach, mines are commonly found near culverts, in close passages through hedge rows, turnouts and obstacles, and train junctions.

RECOMMENDATION: If operational necessity dictates that the ONTOS operates in the same area repeatedly, different routes into the area should be used each time. If the terrain channelizes movement into a limited number of routes, an engineer team should precede the ONTOS and sweep an area with detection equipment at least double the width of the ONTOS. Particular attention should be given to the areas mentioned in the discussion. ONTOS should maintain an interval of at least fifty meters, when traveling in column, to minimize damage if a mine is detonated.

18. ITEM: EFFECTIVENESS OF ONTOS IN PROVIDING SECURITY FOR SMALL UNITS AND AS CONVOY ESCORTS.

DISCUSSION: On many occasions the ONTOS has been called upon to provide security for artillery units displacing from one position to another. Further, the ONTOS has been used as a troop (truck) convoy escort and subsequently employed in offensive action. The advantage of the ONTOS as an escort vehicle

rests in its maneuverability and rapid engagement of targets. Much larger vehicles such as tanks or AmTracs are restricted by narrow and limited weight capacity bridges over which the ONTOS is capable of traveling.

RECOMMENDATION: That the ONTOS continue to be employed as security for convoy escorts.

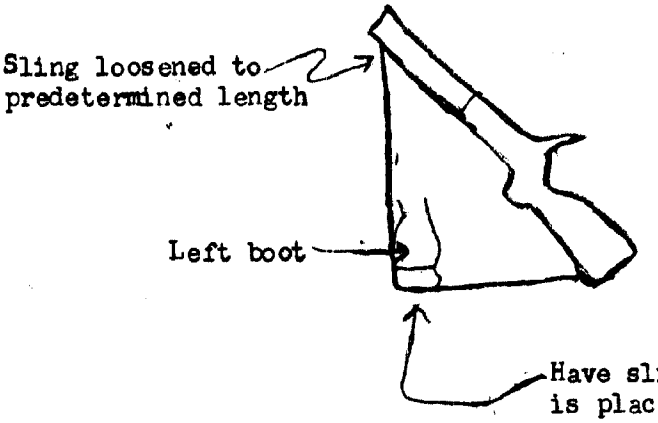
19. ITEM: SECURITY OF VEHICLE CONVOYS

DISCUSSION: Past theory in convoy security has been the use of tanks and other types of armored vehicles. The roads and bridges in RVN severely limit the type of security required to adequately protect convoy formations. Due to the weight and width factors, most armored vehicles cannot be employed, and only the ONTOS has had the capability to provide any sort of vehicle protection. Very seldom are proper turn-around points available in which vehicles can reverse their direction to avoid obstacles, ambushes, etc.

RECOMMENDATION: Artillery, Air Support and when possible Naval Gun Fire, must be provided for all convoys operating out of the TAOR. Engineer personnel should accompany all convoys for the clearing of roads and obstacles. Local civilian traffic must be prohibited from entering any convoy formation.

20. ITEM: THE M-79 GRENADE LAUNCHER AS AN INDIRECT FIRE WEAPON

DISCUSSION: The M-79 grenade launcher has proved to be an extremely effective small anti-sniper and anti-ambush weapon under conditions of reduced visibility. During experiments conducted by one rifle company, it was determined that the M-79 could also be hastily used as an indirect fire weapon. The procedure is to have grenadiers loosen the sling to a predetermined length and then, place the butt of the weapon on the ground, elevating the muzzle and positioning the foot on the sling at the correct position, so that the desired elevation can be obtained and held. Through trial and error, an M-79 round can be "registered" in the desired spot and the sling is then marked so that the grenadier need only replace his foot on the marked position on the sling, judge the correct deflection, and fire, (see diagram).



ENCLOSURE (1)

UNCLASSIFIED

RECOMMENDATION: That grenadiers be instructed on this potential use of the M-79.

21. ITEM: BODY ARMOR.

DISCUSSION: There are many Marines who fail to use body armor in offensive operations. The claim being that it slows troops down and tires them out. This has been proven erroneous. During normal operations, conditioned Marines who have been required to wear the body armor (upper torso only), become accustomed to it and can readily keep up with troops not wearing it. Moreover, it has been found that troops wearing body armor move out with greater confidence and aggressiveness. Normal operations in Viet Nam consist of search and clear missions and patrols, neither of which require extensive running or extreme physical activity. It is recognized, that in mountainous areas during hot weather, it may be necessary to dispense with the body armor due to the extreme physical exertion required. Numerous Marine lives have been saved by the "flak" jacket in this Division. There have been instances of the jacket deflecting direct hits with carbine bullets as well as close range grenade fragmentation. After noting these examples, Marines are easily convinced of the advantages of wearing body armor.

RECOMMENDATION: Publish the advantages of body armor. Dispel the misconception that troops cannot operate effectively in Viet Nam while wearing it. In appropriate cases, require it to be worn.

22. ITEM: THAT A FIELD EXPEDIENT CAMOUFLAGE SUBSTANCE IS USEFUL.

DISCUSSION: It is essential that Marines patrolling and ambushing use camouflage to darken their faces and hands to blend into the background and to prevent easy detection. A combination of mosquito repellent and black carbon paper has proven to be an effective and lasting field expedient to darken and camouflage the face and hands especially for night operations.

RECOMMENDATION: That the necessity to practice camouflage discipline be reiterated in training and the field expedient mentioned above be further promulgated.

23. ITEM: USE OF MINE DETECTORS TO LOCATE VC ARMS AND MUNITIONS CACHES.

DISCUSSION: The VC are extremely clever in hiding their weapons and munitions. Many hours of meticulous physical search more often than not turns up no VC caches. Examples of likely places for caches are cave walls and floors, dung piles, haystacks, firewood piles, hut walls, hut rafters, fresh "graves", baskets of rice or other food, and brush piles. Such places do not lend themselves to easy physical search. A mine detector, however, can readily locate metallic objects in such places with ease.

RECOMMENDATION: Use mine detectors routinely for search operations.

CONFIDENTIAL

24. ITEM: USE OF THE AN/PRS-4 DETECTOR IN THE DELIBERATE SEARCHED OF HAMLETS

DISCUSSION: The AN/PRS-4 (non-metallic mine detector), when used in hamlets, gives many false readings. The detector will pick up any object, regardless of its composition, when the object is within the detector's capability. The AN/PRS-4 will give a very high reading on even a panji pit. Because of the many false readings obtained, little if any time is gained over probing.

RECOMMENDATION: When it becomes necessary to look for mines in congested areas such as hamlets, a team of four men be utilized. They should be employed in shoulder to shoulder probing. This method is slow, but no less so, than using the AN/PRS-4 detector. Results are much more positive and this method also frees the AN/PRS-4 for more suitable employment.

25. ITEM: AP MINES

DISCUSSION: VC employ AP mines on the trails and roads leading to defensible terrain. Patrols moving to high ground positionsare subjected to the danger of mines and booby traps.

RECOMMENDATION: That units stress the requirements for constant vigilance against mines and booby traps. Each company should have adequate personnel trained in disarming mines to employ at least two on each patrol.

26. ITEM: SHAPE CHARGE USED AS BOOBY TRAP

DISCUSSION: The Viet Cong continue to use a 10 pound shape charge, with markings MDH over L207.65 over TNT over 210, as booby traps. These charges are emplaced along roads with the ogive pointing toward the road and prepared for controlled electric detonation. They have usually over 100 meters of communications wire as leads. In every case, they have been discovered by first seeing the communications wire and then tracing it out.

RECOMMENDATIONS: In all instances where there is communication wire in the area, it should be traced out to both ends. This practice has also led to other detonating devices and booby traps.

27. ITEM: PRESSURE DETONATED M-26 GRENADES

DISCUSSION: In several instances the Viet Cong have taken U. S. M-26 fragmentation grenades, removed the firing device and replaced it with one of their own. A nail (6 Penny) is placed in a non-electric blasting cap. This is then inserted in the well of the M-26 grenade and sealed with wax and the grenade is buried with the nail protruding above the earth. When stepped upon, the grenade is detonated.

RECOMMENDATION: In addition to probing and using mine detectors, a diligent visual inspection will often reveal this device. When possible it is better blown in place as it has already become extra sensitive upon removal of the proper firing device. The security and accountability of U. S. explosives e.g., grenades, is obviously important in countering this action.

ENCLOSURE (1)

28. ITEM: DETECTING AND AVOIDING ANTI-TANK MINES

DISCUSSION: The Viet Cong take a primary interest in the destruction of tracked vehicles. They have used pressure sensitive firing devices, controlled electric devices, and even mines placed upon mines. Anti-tank mines have been emplaced a few minutes after an area has been swept and many times in the tracks of another vehicle. Anti-tank mines are, wherever possible, placed at strategic points where terrain conditions or other factors tend to channelize the vehicles.

RECOMMENDATION: Ensure that track vehicles travel on regularly swept routes after they are cleared. Establish a system of dissemination of road information. Maintain a check out system so vehicles are not being used in excess of the needs of the tactical situation. Eliminate unnecessary administrative runs. Caution drivers about deviation from regularly maintained routes. Caution drivers about following tracks made by previous vehicles. Stress timely reporting of incidents.

29. ITEM: EMPLOYMENT OF TRIP-TYPE WARNING DEVICES, VC MINES

DISCUSSION: Three types of effective trip-wire activated warning devices have been found. Two types are made from "C" Ration cans. They have rubber bands twisted across the top of the can and nails or bottle caps inserted in the rubber band. When tripped, the nail or bottle cap bang against the can making a noise clearly audible over a good distance. The other type of device is made of bamboo. It has a windlass with empty shell casings attached. When tripped, a weight causes the windlass to turn and the empty shell casings to bang against a hollow piece of bamboo. This is even more effective than "C" Ration can devices.

RECOMMENDATION: Treat any discovered warning devices as if they were booby traps. Detection of the trip wire is the only way to prevent sounding the alarm.

30. ITEM: DESTRUCTION OF CUT AND COVER TRENCHES

DISCUSSION: Cut and cover trenches consist largely of bamboo placed across trenches and about ten inches of dirt piled on top of the bamboo. This provides good protection and is easily constructed and repaired. Experience has shown that the most effective method for destroying of such trenches is to cut a block of C-4 into thirds; bury each third about six inches in the dirt. Charges should be placed on three foot centers and dug into the roof and side of the trench. This provides for destruction of one wall as well as the overhead.

RECOMMENDATION: As described above.

31. ITEM: VC USE OF COMMUNICATIONS WIRE.

DISCUSSION: Experience has shown that a great many VC mines are controlled detonation electric type. Most often, lead wires to mines are communications wire. Further, for expedience, most land lines are laid along the existing routes of communication. This situation makes it extremely difficult to distinguish VC lead wire from friendly communications lines. When communications wire is moved away from roads and other lines of communication, lead lines to mines and other foreign matter are more easily detected.

RECOMMENDATION: That in all forward tactical areas, all U. S. laid communications wire be at least twenty meters away from utilized roadways. This produces an expeditious method for visual detection of mines electrically detonated from points off the roadway.

32. ITEM: BOOBY TRAPPED ROUNDS/155, 105, AND MORTAR.

DISCUSSION: Extensive use of U. S. artillery duds is characteristic of the Viet Cong. When such rounds are found, the Viet Cong remove the fuse and replace it with one of their own. A replacement fuse consists of a standard base threaded to fit U. S. rounds. In this base is a blasting cap which can be detonated either electrically or by a pull type method. Pressure sensitive devices are also used. In any event, regardless of the type of fuse used, the round is extremely sensitive because it has been fired. If such a booby-trapped round is found it should, if at all possible, be blown in place.

RECOMMENDATION: Upon encountering such devices, blow them in place. If this is not practical, EOD should be utilized to disarm the device. Do not probe around a booby-trapped round.

33. ITEM: U. S. DEVICES ADAPTED TO VC USE.

DISCUSSION: Several types of explosive devices are available to the Viet Cong. Recent developments indicate that the Viet Cong may be using U. S. M1-A1 pressure firing devices. In several areas, a spring like the one in the M1-A1 firing device has been found. Possibly, the new M-60 fuse lighter is being used also. The M-60, which is waterproof, can also be re-cocked. Used in conjunction with other parts it becomes a very effective firing device for booby traps and for single rounds. A .45 caliber round or a 7.62 round will fit very well into the M-60 fuse lighter.

RECOMMENDATION: That all units using any U. S. manufactured firing devices, especially M1-A1 or M-60 devices, be instructed in the potential danger of reuse by Viet Cong. Units should be instructed to retrieve used firing devices whenever possible.

34. ITEM: BA-279 BATTERY-POWER SOURCE FOR NIGHT-LIGHTING DEVICES ON AIMING POSTS.

DISCUSSION: Due to the frequent shortage of BA-30 batteries, a problem arises in keeping night-lighting devices for aiming posts operating. A remedy for this is to wire the night lights to use six-volt BA-279 batteries. This battery

can provide sufficient power for night lighting devices long after it has ceased to be adequate for powering radios. Batteries in this condition are normally usable as a light power source for from four days to two weeks.

RECOMMENDATION: Modify aiming post night lighting devices to use either the BA-30 or BA-279 batteries.

35. ITEM: EMPLACEMENT OF THE 105MM HOWITZER FOR 6400-MIL TRAVERSE.

DISCUSSION:: Rapid trail shifts and accurate relay of the 105mm howitzer can be accomplished by placing a GI can cover beneath the left howitzer wheel. The GI can cover permits the locked left wheel to spin easily through 6400 mils while keeping the axis of the panoramic telescope constant. One circular trail pit will accomodate both trails. The right trail rests against the rear wall of the pit, while the left one is blocked to fill the void between the spade and the rear wall of the trail pit.

RECOMMENDATION: As indicated in discussion.

36. ITEM: COVERING FOR 105MM HOWITZER HIGH ANGLE PITS.

DISCUSSION: When high-angle fire is to be conducted using the 105mm howitzer, a pit must be dug under the breech and of the howitzer to permit clearance during recoil. When the trails of the howitzer are shifted appreciably, there is a danger of one of the wheels slipping into the pit.

RECOMMENDATION: Covers made of pierced steel planking be placed over high-angle pits when the pits are not in use to prevent wheels from slipping into pits during large trailshifts.

37. ITEM: VT FUSE BOXES USED AS MISSION POWDER PITS.

DISCUSSION: The SOP of the Twelfth Marines requires that excess powder increments be placed in a "mission powder pit" after each round is fired. This permits a check of the charge used for each round. At the conclusion of each mission, all excess increments are removed for destruction by burning. It is necessary that excess increments are kept dry; in wet weather this is extremely difficult unless some water-tight container is used.

RECOMMENDATION: Use a VT fuse box, sunk into the ground, as a mission powder pit.

38. ITEM: CLEARING FIELDS OF FIRE IN HEDGEROWS.

DISCUSSION: In many cases, what appears on a map to be a smooth topped hill without trees, turns out to be covered with dense, high hedgerows and terraced ledges which disrupt fields of fire and obstructs view. In many cases there is only one entrance through a thorny complex of hedgerows separating each small field. Clearing passageways and fields of fire through these hedgerows can be major tasks.

RECOMMENDATION: Use bangalore torpedoes and/or C-4 demolitions strung on detonating cord to remove hedgerows and to cut passageways through them quickly. In offensive operations particularly, these supplies can be delivered by helicopter to a unit desiring to establish a night perimeter on a hill in hedgerow country.

39. ITEM: EFFECTIVENESS OF HE TYPE WEAPONS AGAINST VC SNIPERS AND AMBUSHES.

DISCUSSION: The most common type of contact with the VC is a sniping incident. The sniping ranges from a single sniper, who shoots a quick round or two then disappears, up to a squad of snipers firing heavily for several minutes and taking on more of the character of an ambush. Almost always, these incidents take place at long range, 300 yards or more, and the VC fire is rarely effective. Also almost always, the snipers are so well concealed the Marines cannot see a target to engage. A common tendency is for men who cannot see a target to withhold their fire. Another common tendency is to reply on rifle fire alone, which has very limited effectiveness against the well covered and well camouflaged VC. Most effective of all, is an immediate and heavy volume of HE type fires placed on likely sniper positions in the general area from which the sniper fire is coming. Rockets, M-72 LAW's, M-79 Grenades, and rifle grenades will almost invariably establish immediate fire superiority for the Marines and cause the VC to break off and run. It is during the VC withdrawal that the best opportunity to inflict casualties arises, again with emphasis on saturating the VC position with HE fires.

RECOMMENDATION: Have combat patrols carry 3.5" and M-72 rocket launchers, M-79 grenade launchers, and rifle grenades. Train troops to respond immediately with these fires against snipers, whether or not a specific target is identified.

40. ITEM: USE OF TACTICAL SMOKE SCREENS

DISCUSSION: Consideration should always be given to the use of smoke to cover an exposed flank when making an amphibious or helicopter landing when crossing an open area. In amphibious landings, an onshore wind (prevalent in Viet Nam) will usually favor the use of smoke to protect the flanks of the landing force from flanking direct fires. Smoke can be delivered by aircraft, by M4A2 Smoke Pots (amphibious--- they float), by WP artillery or mortar rounds, or by hand smoke grenades, depending upon the size of the force needing protection and duration of smoke required to do the job.

RECOMMENDATION: Always consider uses of smoke for protection of vulnerable flanks.

41. ITEM: FLUSHING VC OUT OF CANE FIELDS (OR OTHER DENSE VEGETATION)

DISCUSSION: VC snipers frequently seek refuge in cane fields, or use them as covered escape routes. It is possible for many VC to hide in a cane field and due to the dense vegetation, its difficult to find them even by physical search.

VC hiding in cane fields are provided no protection from HE airbursts delivered by mortars or artillery. Hence, such fires can be effective in wounding, killing or flushing out VC hiding in cane fields.

RECOMMENDATION: Consider use of mortar or artillery fire with VT or mechanical time fuzes as a means of neutralizing or flushing out VC hiding in dense vegetation. Such action should always be followed by a search.

42. ITEM: LVT BREAKDOWNS IN AMPHIBIOUS LANDINGS.

DISCUSSION: Usually, if a landing plan utilizes all available LVT's, a few of the LVT's will break down before or after crossing the LOD, leaving combat troops stranded and separating men from their units. It is necessary to include pre-planned "back-up" boating for broken down LVT's in the landing plan. Orderly procedures must be set up for rapid response by "back-up" boats when an LVT breaks down. The mission of a "back-up" boat is to pick up troops stranded in disabled LVT's and get them ashore with their parent units (if possible, with their assigned waves). For this reason, the "back-up" boats must be high-speed type (faster than LVT) and should be listed as free-boats.

RECOMMENDATION: In landing plans involving LVT's, always incorporate "back-up" boating and a plan for getting stranded troops ashore with their parent units.

43. ITEM: AERIAL OBSERVATION FOR COMBAT PATROLS.

DISCUSSION: Two tactics that the VC use in different situations are to hide from observation planes and to flee from combat patrols. Providing combat patrols with aerial observation reduces the possibility of VC escaping by forcing them to either hide, which subjects them to possible capture, or move, making them obvious targets for supporting arms.

RECOMMENDATIONS: Use AOs continuously with daylight combat patrols.

44. ITEM: HELICOPTER SUPPORT FOR RECONNAISSANCE ELEMENTS.

DISCUSSION: Experience clearly demonstrates that unless helicopters insert recon elements in one lift, the resulting delay for following lifts alerts the enemy causing sniper fire to be brought on the troops and helicopters making the second insertion.

RECOMMENDATION: That enough helicopters be made available for reconnaissance elements so that all of a patrol can be inserted in one lift. That patrol leaders thoroughly brief pilots prior to takeoff.

45. ITEM: EXTRACTING TROOPS BY HELICOPTER.

DISCUSSION: The VC have used the tactic of following a force of Marines back to a landing zone. After the majority of Marines have been lifted out, the VC either attack the remaining Marines or fire on the helicopters as they return for the last lift.

RECOMMENDATION: FAC's and Artillery FOs should always remain with final element to be extracted to insure rapid air support or artillery fire.

46. ITEM: COMPANY AND BATTALION HST (HELICOPTER SUPPORT TEAM)

DISCUSSION: Due to the frequent use of helicopters for troop movement and re-supply, it is desirable to have a well-trained HST in each company as well as in the battalion headquarters. Use of a trained HST should be required every time helicopters land, no matter for what purpose. Whenever several companies share the same helicopter site, the HST should be provided by the battalion headquarters. Where companies are using separate sites, however, they must provide their own HST. Seldom will a Shore Party HST be made available for battalion operations.

RECOMMENDATION: Create a well trained two-echelon Battalion HST (one for Command OP Group, one for Battalion CP) and a well trained HST in each company.

47. ITEM: TRAINING FOR ALL PATROL LEADERS IN THE ADJUSTMENT OF MORTAR AND ARTILLERY FIRES.

DISCUSSION: It is not possible for all patrols to take mortar or artillery FO's with them. Nevertheless, it is highly desirable for every patrol to be able to call fires on targets of opportunity or for defensive reasons. This can be accomplished effectively, using the Battalion Tactical Net, providing the patrol leader is properly trained.

RECOMMENDATION: Conduct extensive mortar and artillery FO School for patrol leaders, giving each patrol leader substantial practical application.

48. ITEM: USE OF BULLHORNS IN DEALING WITH NATIVE POPULATION.

DISCUSSION: The AN/PIQ-5 "bullhorn" on the T/E of the infantry battalion is most useful in controlling population in search and clear operations. It should be used to inform the people what to do, where to assemble and what the Marines are going to do. It can be used to assure civilians that they will not be harmed, and to summon them for medical aid. It can also be used to coax natives (including VC) out of caves prior to use of more drastic measures.

RECOMMENDATION: Use the AN/PIQ-5 on all search and clear operations, giving one to each interpreter.

49. ITEM: RECORDING OF EVENTS BY UNIT COMMANDERS.

DISCUSSION: Communications limitations do not permit everything that happens in an operation to be reported on the spot. Many events must be reported late. In other cases, only abbreviated information may be transmitted initially, but fuller details must be related later. Because of this and also because of the necessity to compile a chronology of events for a Combat After-Action Report, it

is highly desirable that platoon and company commanders be required to keep a log of events as they occur. Such a log should indicate the unit concerned, the date and time of the incident, the coordinates, a description of the action, and resultant casualties on either side. The log serves as an accurate and complete basis for periodic radio Sit Reps. It also serves as a source-record for reference in compiling the Combat After-Action Report.

RECOMMENDATION: Require unit leaders to keep an informal log of events during offensive operations.

50. ITEM: OVERLAY TECHNIQUES.

DISCUSSION: The following techniques in the production of overlays have been found useful:

A. When making an overlay that encompasses two or more map sheets, show a pair of tick marks for each map sheet. Reason: map sheets are seldom joined perfectly along their margins due to differential shrinkage or differences in printing. Only one pair of tick marks for an overlay covering several map sheets will therefore result in the tick marks not fitting correctly on the various composite maps put together by the various using agencies.

B. Use ditto process for reproducing overlays.

C. Make a practice of choosing a pair of tick marks that are along the same grid line (example: 0600 and 0040). Reason: it is easier to find and align two tick marks that have a common grid line.

RECOMMENDATION: As discussed above.

51. ITEM: USE OF DITTO TO REPRODUCE OVERLAYS.

DISCUSSION: Reproduction of overlays by hand is a tedious process, especially considering the number of copies required in Viet Nam for Operation Orders and Patrol Overlays. These are best reproduced by ditto process, using the machine on the T/E for the Communications Platoon, H&S Company.

RECOMMENDATION: Use ditto for overlay reproduction. Bring plenty of ditto paper and ditto mats to Viet Nam.

52. ITEM: CONVERSATIONAL USE OF TACTICAL NETS IN OFFENSIVE OPERATIONS.

DISCUSSION: During offensive operations, traffic on company, battalion and regimental tactical nets becomes extremely heavy, and it becomes difficult to give the proper priority to backed up message traffic. When the majority of the traffic takes the form of message copy, then transmission time, even for simple messages, is greatly increased as operators laboriously spell, say again, and insert date-time groups, punctuation, and other extraneous matter. It is felt that tactical nets should be reserved primarily for Commanders and principal

staff officers to talk to one another directly and conversationally. If such officers speak from notes, and take notes on the information received, this will provide a very rapid and effective means for communicating orders, requests and ideas. Proper regard for security, including the use of shakles and code words, must be adhered to.

RECOMMENDATION: Reserve tactical nets for rapid conversational traffic between commanders and principal staff officers. Overcome the tendency to always use communicators as intermediaries, since ideas can be exchanged much more rapidly between principals talking directly to one another. Abolish the practice of sending almost all traffic in formal message format, as it consumes too much net time. Have commanders always keep their radios close at hand and their operators alert. Shift necessary formal message traffic to alternate nets (battalion to regiment).

53. ITEM: NIGHT OPERATIONS.

DISCUSSION: When possible, all movement outside of the jungle canopy should be made at night. Positions for daylight CP's should be changed at night using darkness to cover movement. Experience has shown that the last three hours before sunset is a most likely time for VC contact.

RECOMMENDATION: That continued stress be placed on night movement and control to allow maximum effectiveness and prevent casualties to friendly forces.

LESSONS LEARNED

IV LOGISTICS

1. ITEM: LIGHT WEIGHT GRAPPLING HOOK

DISCUSSION: A variety of uses for grappling hooks have become evident in Vietnam. Field-expedient grappling hooks normally carried at the squad level have been used to assist in streams and river crossings, for springing trip wired booby traps, for dislodging suspected mines, scaling steep hills, opening booby trapped gates or pulling down booby trapped walls, fences and underbush. The ideal grappling hook is shaped as a three pronged fishhook without the barbs, is about 10 inches in overall length, weighs about 1½ pounds and should be made of some material such as aluminum which is rustproof, strong and light.

RECOMMENDATION: That grappling hooks, such as described, be made available through the Marine Corps Supply system as a class II, type 2 item.

2. ITEM: CUSHIONED SOLE SOCKS/LOGISTICS

DISCUSSION: The wearing of dyed wool socks contributed to the high incidence of skin diseases of the ankles and feet. The constant dampness of Vietnam and the perspiration of the wearer causes the black dye to liberate from the socks. This dye is an irritant which contributes to the severity of the foot problem.

RECOMMENDATION: That a light shade, color-fast, cushion sole sock be introduced into the supply system.

3. ITEM: DESIGN FOR DRAINAGE STRUCTURES

DISCUSSION: Extensive pioneer road construction was performed during the period, June-October, 1965. During this construction, drainage was a primary consideration. Every effort, with available material and equipment, was made to install adequate ditches, culverts and bridges. Talbot's Formula (FMS-34, p. 213) was utilized in computing the size of structure required. The results were arbitrarily doubled due to the uncertainties of runoff and retardation factors and total lack of experience with the local area. With the advent of the monsoon season it was apparent that the drainage was still inadequate to carry the enormous flow of water. The problem was that of flash floods, i.e., a large volume of water in a short period of time. Annual precipitation charts proved to be a good guide.

RECOMMENDATION: That drainage structures be designed for the capacities which would be required during maximum monsoon phases of the November-December period. When constructed during the dry season, these drainage structures appear to be too large and excessive in construction time and material utilization. However, they may still be inadequate for the severe rains of the monsoon season.

4. ITEM: SECURITY FOR ENGINEER WORKSITES

DISCUSSION: Security for engineer troops, equipment and materials is a continuous problem in the 3d Marine Division TAOR. Engineer activities are spread over the entire area, of which none can be considered secure. Particular security problems are encountered on road reconnaissance, road and bridge projects, and at water points. As an example, an engineer driving a road grader may be exposed to guerrilla activity. A bridge repair crew may be entirely exposed, and several kilometers from friendly troops. Policies have been established to make worksite security a prime factor in job planning. Machine guns are emplaced to protect the site, and alert plans are made for each situation. Personnel are assigned as "shotguns" for equipment operators working away from the main worksite. In some instances, infantry troops have been obtained to provide security on important bridges and on highly exposed worksites.

RECOMMENDATION: That emphasis be placed on training at small unit level, which will contribute to engineer worksite security. Personnel should be trained in planning and preparation, organization of terrain and response procedures.

5. ITEM: ROAD CONSTRUCTION WITH LATERITE SOIL

DISCUSSION: Good base and surfacing material for road construction is not readily available in the 3d Marine Division area of operations in Vietnam. Primary materials are sand, sandy-clay, poorly graded gravel and laterite. Laterite is a leached out residual acid compound of insoluble residues, high in iron or bauxite content. In this area, laterite is a red clay-type soil, and is widely available, easily-loaded and relatively impervious when compacted. However, being poorly-graded, this soil does not hold up when saturated and subjected to heavy traffic. In dry weather the laterite surface pulverizes into a powdery dust, sometimes over 6 inches deep. When surfaced with crushed rock however, laterite has proven to be an acceptable road construction material.

RECOMMENDATION: That personnel concerned with road design and construction be made thoroughly familiar with laterite, its properties and applications. Particular emphasis should be made in compaction techniques. Also, planning for laterite road construction should include the extensive use of crushed rock to stabilize road surfaces.

6. ITEM: ENGINEER EMPLOYMENT DOCTRINE

DISCUSSION: The period July-November 1965, provided a test of current doctrine on employment of the Division Engineer Battalion as outlined in FMFM 4-4. This doctrine states in part that "the widespread scope of Division combat operations will normally require combat engineer companies to be attached, or in direct support of, infantry task groupments. Engineer support requirements to the rear of the forward elements of the Division will be accomplished under centralized battalion control by the Engineer Support Company". Experience has shown that the doctrine is basically valid, and that under an existing relatively stable situation, the battalion can exercise centralized control. This promotes maximum flexibility and productivity of the total engineer effort.

RECOMMENDATION: That the doctrine for employment of Division Engineer Support be applied to the extended operations ashore being conducted in the Republic of Vietnam.

7. ITEM: WATER RESUPPLY TO TROOPS IN OFFENSIVE OPERATIONS

DISCUSSION:

A. During hot weather, water resupply to troops on offensive operations can pose a major problem. The problem stems from various factors, including the high rate of water consumption, coordination required to have helicopters (or other transportation) deliver the water to the right place at the right time, shortage of water cans, the length of time it takes to pour water from the delivery container into canteens, and the tendency for troops to bunch up at a water resupply point.

B. Seldom is it possible to haul water trailers into forward areas due to lack of suitable roads. Reliance must be placed almost soley upon helicopters.

C. An ideal solution to rapid water resupply in offensive operations would be the development of a light weight water tank that can be carried externally on UH-34 helicopters. The tank should have ample spigots to quickly dispense the water into canteens. Such a tank could be quickly landed on a forward LZ, quickly emptied into canteens without spilling, and quickly retracted so as to allow the unit to move on.

D. Some help for the water resupply problem is obtained by having troops carry lyster bags into forward areas. This allows helicopter delivered water cans to be quickly poured into the lyster bags for quick dispensing without spilling over canteens. It also permits rapid retraction of the water cans so that they may be used again elsewhere.

E. For fairly stable installations in forward areas, such as CP's, it pays to set up a rubber water tank such as is used for water purification and storage. Again, the purpose is to store water without tying up many water cans.

F. Since most hamlets have wells, the use of well water treated with iodine pills enables troops to get by when helicopter delivery is not possible.

RECOMMENDATIONS:

A. Units carry lyster bags on offensive operations where resupply by helicopter is anticipated.

B. Always have troops carry iodine pills.

C. Use rubber water tanks to store water in the more stable forward areas.

D. Have at least T/E quantities of water cans on hand, and do not allow them to be abused.

E. Develop a helicopter transportable, multi-spigot, externally carried water tank.

8. ITEM: USAGE DATA FOR MOTOR VEHICLE SUPPLIES

DISCUSSION: The inactivity of vehicles in a static situation such as existed in Okinawa, required an immediate adjustment of usage data necessary before coming into the combat situation in RVN. This reevaluation of parts necessary to keep trucks on the road, never took place and as a result, the lead time necessary to get spare parts has been so great that the deadline rate has been excessively high. Some items of exceptionally high usage are as follows:

A.	Brake shoes and linings	M35
B.	Wheel cylinders	M35
C.	Front hub	M422
D.	Universal joint (CU joint)	M422
E.	CU boots	M35
F.	Starter cable	M422

G.	Batteries (2HN and 6 TN)	
H.	Torque rod bushings	M35
I.	Front spring	M422 and M35
J.	Axle	M35
K.	Tires and tubes	M35 and M422

RECOMMENDATION: That all units before coming to RVN reevaluate their usage data and mount-out stocks for motor transport keeping in mind the poor road conditions and heavy transportation requirements of sustained combat operations.

9. ITEM: USE OF COTTON WEAVE TYPE OIL LINES.

DISCUSSION: Cotton weave type oil lines are being received on new vehicles and are installed on 80% of old vehicles. Currently, our supply system has in stock this type of oil line for use in the hydraulic system. It is completely unreliable and results in premature engine failures.

RECOMMENDATIONS:

A. That all cotton weave type oil lines be removed from stock and destroyed and replaced with rubber coated neoprene that is less than two years old.

B. That all LVT's which have the old type oil lines be refitted with the neoprene lines as soon as possible, and that a program be initiated to obtain bulk type hose from an open purchase source if necessary.

10. ITEM: BRAKE SYSTEM ALL VEHICLES

DISCUSSION: Due to the laterite based soil in this country, consisting of low grade iron ore or bauxite, abrasive particles penetrate into the brake drums and backing plate on all vehicles. This abrasive laterite cuts off the friction surface on M-51 brake shoes in as few as 10 days sustained operations, and does considerable rapid damage to seals, bearings and hydraulic wheel cylinder cups.

RECOMMENDATIONS: That operating stocks be programmed to adequately meet the high demand on the supply system of these general type parts.

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11. ITEM: BRAKE LINING FAILURE

DISCUSSION: Failure and wear can be due to excessive dust, mud and sand.

RECOMMENDATION: That on all quarterly PM's, all wheels be pulled and the brake drum, shoes and lining be cleaned.

12. ITEM: MOTOR VEHICLE BRAKE PROBLEMS

DISCUSSION: It is necessary to make salt water checks on all vehicles after extensive rains. Brake drums have a tendency to fill with mud which must be cleaned out immediately to prevent excessive wear on brake linings and drums.

RECOMMENDATIONS: That salt water PM be held on all vehicles after extensive rains. If possible, units should obtain a 55-gpm pump to wash off vehicle wheels and undercarriage when vehicle returns from a trip.

13. ITEM: PREVENTATIVE MAINTENANCE ON GMC 71 SERIES ENGINE

DISCUSSION: Standard preventative maintenance procedures on the GMC 71 series Engine has proved inadequate, especially during the dry season in the Republic of Vietnam. The temperature at times exceeds 110 F and when dry, the dust conditions are especially harmful to the breather systems of this engine. After numerous tests, it was also noted that 30 weight oil tends to break down rapidly.

RECOMMENDATION:

A. Reduce the standard scheduled maintenance by one-half. For example, perform the 10 hour preventative maintenance check every 5 hours.

B. Change oil and air filters every 50 hours instead of the 100 hour check.

C. Use 50 weight oil instead of 30 weight.

D. Increase operational stock levels of filters proportionally to the volume of equipment on hand to insure adequate stocks on hand.

14. ITEM: LVT REPAIR PARTS

DISCUSSION: Usage data for LVT spare parts based on peacetime LVT operations and monies available, have been found to be inadequate to keep up with the demand in Vietnam. In a training status, the yearly average operating hours per vehicle is around 100. Since the spring of 1965 in the Republic of Vietnam, the vast majority of LVT's have logged between 300 and 400 hours. In 8 months, these vehicles have exceeded by three times the yearly peace time operative figure. With this increased operation in a combat environment, the need for a substantial increase in LVT repair parts allowance has been indicated. This is particularly true of the vehicles track and suspension system. Track kits, road wheel assemblies, and and spring assemblies, road wheel tires and idler arm adapters are the specific items of high usage that are in short supply. Because of the average monthly recurring demand and mount-out blocks that were developed or based on peace time usage, substantial difficulties in maintaining high LVT availability for combat operations were experienced.

RECOMMENDATION: That units anticipating deployment to Vietnam should take a close look at their spare parts adequacy in developing their mount-out blocks and establishing their 30 day operating levels.

15. ITEM: THE LVTE-1 CANNOT BE SHORT TRACKED

DISCUSSION: Due to the weight of the excavator blade and mounting equipment (4800 lbs) it is not possible to install a field fix and expect it to hold. The new type suspension used on the LVTE-1 is not adaptable to reversing the number one torsion arm and road wheel assembly for short tracking and bringing the disabled vehicle back to a rear area maintenance facility.

RECOMMENDATION: That the LVTE-1 have two new stub shafts readily available when dispatched to a disabled LVTE-1 and that these be welded at point of failure. That crewmen of the LVTE-1 be instructed that when driving over high banked dikes and ridges that they be approached slowly and with extreme caution in order not to crack or break the idler adapter (stub shaft).

16. ITEM: PREVENTIVE MAINTENANCE FOR LVT's WHILE DEPLOYED IN RVN

DISCUSSION: The substantially increased utilization of the LVTP-5 in Vietnam, coupled with the difficult terrain and adverse climate encountered here, have placed even greater importance on a timely, thorough and concentrated preventive maintenance program. Staggering the LVT committments by rotating platoon size units to and from the field to a maintenance status, has been effective in maintaining higher LVT availability rates for specific operation. Ideally, for example,

when a platoon is committed in its entirety to the direct support of an infantry unit, 50% of the LVT's should be utilized for operations, while the remaining vehicles be undergoing thorough 1st echelon maintenance in a rear area. To facilitate and expedite this timely maintenance program for LVT units operating in areas distant from the Battalion CP, a subsidiary maintenance facility has been established in the forward area. This facility presently consists of an LVTR-1, supporting equipment, spare parts and personnel. It has proven highly effective.

RECOMMENDATION: That continued emphasis be placed on the instruction of LVT crewmen and AMTRAC leadership personnel on the absolute importance of preventive maintenance. Particular emphasis on methods and materials employed in the type of terrain and climate encountered in S. E. Asia should be stressed.

17. ITEM: FAILURE OF SPIDER AND "U" JOINT ASSEMBLIES OF LVT FAN SHAFTS

DISCUSSION: LVT Bn experienced many failures of the Spider and "U" joint assemblies of short fan shafts and long fan shafts due to the type of grease used in repacking (after 50 hours) at the time of servicing. New vehicles received from the depot on R&E have been found to be dry and have to be repacked prior to issue to Companies. A high temperature aircraft type grease is in use and has increased the life expectancy of these items.

RECOMMENDATION:

a. That all spider and "U" joint assemblies at time of rebuild be checked and repacked.

b. That the use of GAA type III be discontinued for this item and grease aircraft high temperature Mil-G-3545A (FSN 9150-233-4003) be used while in the Republic of Vietnam.

18. ITEM: M-14 RIFLE

DISCUSSION: During the Monsoon season, the wooden stock of the M-14 rifle is repeatedly subjected to wet weather with the result that it expands and hinders field stripping and reassembly of the rifle. Linseed oil, an item difficult to obtain in sufficient quantities, is used with limited success. Repeated swelling and drying out causes the stock to crack.

RECOMMENDATION: That tests previously conducted with the fiberglass stock be reviewed to ascertain the prudence of replacing the wooden stock with the fiberglass stock.

19. ITEM: RESERVE OIL INDEX POSITION, 105MM HOWITZER

DISCUSSION: High temperatures and high rates of fire, which are some times required, cause recoil oil to expand to a degree which endangers the recoil mechanism.

RECOMMENDATION: Keep oil index protruding 3/4 of the allowable distance in the index cavity (or the thickness of a dime below the flush end of the cavity).

20. ITEM: TELESCOPE MOUNT COVERS, 105MM HOWITZER

DISCUSSION: The canvas cover for the telescope mount causes condensation in the sight during periods of continuous rain.

RECOMMENDATION: A #10 can placed over the telescope mount permits circulation of air and prevents condensation.

21. ITEM: SEAL-WITHOUT-MOISTEN ENVELOPES

DISCUSSION: High humidity in Vietnam causes envelope flaps to stick, resulting in a great waste of material and clerical time.

RECOMMENDATION: Supply system acquire seal-without-moisten envelopes in all necessary sizes.

22. ITEM: DETERIORATION OF SUPPLIES AND EQUIPMENT

DISCUSSION: Weather conditions in Vietnam, both during the monsoon season and the high humidity during the remaining months, have caused a significant amount of equipment to deteriorate. Supplies and equipment stored in boxes which have a slow turn-over rate are the greatest source of deterioration, although communications equipment deteriorates readily due to extended field operations.

RECOMMENDATION: That units coming into Vietnam establish a weekly schedule for checking all items for deterioration and that corrective action be initiated to preclude further damage.

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LESSONS LEARNED

V COMMUNICATIONS - ELECTRONICS

1. ITEM: WATER DAMAGE TO RADIO EQUIPMENT

DISCUSSION: During the monsoon season it was noted that many radios of the AN/PRC-6 and AN/PRC-10 series were being turned in for repair due to water damage. Waterproofing bags, issued initially with the equipment, were lost or destroyed and there were no replacement items readily available.

RECOMMENDATION: Use the plastic bags which cover the cases of batteries BA-279/U. Take care when removing this plastic bag from the battery case so that no tears or holes result except those along the seam.

2. ITEM: WATERPROOF BAGS FOR AN/PRC-10 AND AN/PRC-6

DISCUSSION: The waterproof bag for the AN/PRC-10 and the AN/PRC-6 is clear plastic but it shows a white coloring. When the bag is used at night, even under adverse and extreme weather conditions, it is visible at distances of up to 50 yards, which makes it unsatisfactory for use on patrol or in ambush.

RECOMMENDATION: That a waterproof bag of a dark or a camouflage color be developed.

3. ITEM: INADEQUACY OF THE AN/PRC-6 AT PLATOON LEVEL

DISCUSSION: The AN/PRC-6 has proven to be totally inadequate for communications on the Company Tactical Nets because the thick undergrowth and rugged terrain cuts down on its already limited range.

RECOMMENDATION: Use the AN/PRC-10 on the Company Tactical Nets, thus reducing the AN/PRC-6 to squad usage. Communication by the AN/PRC-10 has proved to be reliable over considerable ranges.

4. ITEM: BATTERY TERMINAL FOR BB-451

DISCUSSION: The battery terminal is of a thin plastic that cannot withstand the rigors of field operation. A large percentage of the batteries deadlined are for this reason. As a field expedient, the wooden dowel around which a new coiled cord for the H-33 handset is wrapped, can be cut and drilled out to provide a more than adequate substitute to withstand the rough handling that the terminals must take from the AN/PRC-47 under hurried combat conditions. The contact within the terminal case

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can be spring loaded to guarantee positive contact.

RECOMMENDATION: That a new terminal be developed of hard plastic that will withstand considerable field abuse and that the interior of this terminal be designed to enable the metal contact to be spring loaded to insure positive contact with the terminal posts of the battery adapter. This new terminal should be a second echelon repair item.

5. ITEM: BATTERY BB-451

DISCUSSION: The battery BB-451 has not performed in a satisfactory manner. If this item is allowed to drain to low voltage, it will reverse polarity.

RECOMMENDATION: That a schedule for changing the batteries be adopted. Recharge them as soon as possible. The battery BB-451 should be charged in the repair shop and kept and controlled from a central location.

6. ITEM: RAPID DISCHARGING OF THE BATTERY BB-451

DISCUSSION: The wet cell battery BB-451 is one of the biggest maintenance problems in Vietnam. Since most of our operations consist of small CP groups with only portable equipment, the BB-451 is used to a great extent. From necessity, the charging equipment must be left in the rear, which presents a logistical problem. At times a battery will register full charge at the rear but when placed on the radio will either last only an hour or be completely dead.

RECOMMENDATION: Use only slow charge on the BB-451 and keep accurate records. As a battery becomes discharged on the radio set, do not continue to use the battery until it is completely discharged. When a battery reaches the point where it must be replaced, replace all mono blocks and not merely one or two. For short-term operations, a recharging process can be rigged in the field if a source of power can be provided such as an M422, portable generator or radio vehicle.

7. ITEM: DISCHARGE OF BATTERY BB-451

DISCUSSION: TI-04072A-35/3 recommends the use of 1.5 ohm, 10 watt resistors in order to discharge all cells to an equal voltage level before commencing to charge the battery. Due to a lack of these resistors, a load bank of 40-watt or higher light bulbs turned out to be about 6 ohms and a parallel arrangement of four of these bulbs results in a satisfactory substitute for the required resistor. On cells having an extremely

low residual reverse voltage (.25 volts or less), it is sometimes necessary to use as many as eight light bulbs in parallel in order to reduce the remaining charge. Care should be taken not to short the terminals even at low potentials.

RECOMMENDATION: As a field expedient, follow the above procedure until the required resistor can be procured.

8. ITEM: HIGH MAINTENANCE RATE FOR BATTERIES BB-451 DUE TO DIRT AND CORROSION

DISCUSSION: It has been experienced by this headquarters that the life of a battery BB-451 is significantly lengthened by thoroughly cleaning the battery just prior to every fifth recharge.

RECOMMENDATION: That technical manuals on this subject be changed to require cleaning the BB-451 after every fifth change vice after every tenth charge as currently written.

9. ITEM: BB-451 IN SUNLIGHT

DISCUSSION: It was discovered that when the battery was under the direct rays of the sun in this extreme climate either of two things usually happened. Either, the electrolyte boiled out of the mono blocks or the battery lost its charge, even though not being used, in a matter of hours. The tactical situation at times dictates that the battery be used in the direct sun, on highly reflective sand, without the benefit of shade for extended periods of time. It was found that if a battery was carried in a haversack, out of the direct rays of the sun it was not affected by the heat to any noticeable degree.

RECOMMENDATION: That a heat insulating cover, preferably of a dark or camouflage color be developed for the BB-451.

10. ITEM: DRY CELL RADIO BATTERIES

DISCUSSION: The shelf life of dry cell batteries is considerably shortened when subjected during storage to high temperatures (110-120 degrees fahr.). This problem has been partially solved by storing the batteries in a shaded, dry pit in the ground (3 to 6 ft. deep). This lowered the temperature around the batteries about 10 degrees.

RECOMMENDATION: That units operating in very high temperatures follow the above procedure.

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11. ITEM: BATTERY LIFE OF DRY CELL BATTERIES IN HOT HUMID CLIMATES

DISCUSSION: In Vietnam the battery life of the BA-270, BA-279 and BA-414 used in the AN/PRC-10, AN/PRC-6 radios and remote control unit AN/GRA-6 respectively, may be limited to as little as eight hours of operation. By setting these batteries aside in a cool, dry area for twenty-four hours, it was discovered that another eight hours of service could be achieved. This rotation process was repeated three and four times resulting in obtaining as much as thirty-two hours of battery life in some cases.

RECOMMENDATION: That radio operators be instructed to institute a rotation system described above on all dry cell batteries in use.

12. ITEM: RECEIVER TRANSMITTER RT-66/GRC

DISCUSSION: Age and high temperature is believed to be the cause of improper operation of the Harmonic Generator and 1st or 2d Harmonic Amplifiers causing improper output signal and high voltage output from 2d Harmonic Amplifier. Critical alignment of generator and amplifier stages is necessary to produce a useful output to the transmitter stages and a useful transmitter power output.

RECOMMENDATION: That the effect of extreme heat on communications equipment be made an object of study, with a view toward future communication equipment development.

13. ITEM: RT-176

DISCUSSION: Extreme climatic conditions of the area, coupled with the direct rays of the sun, cause the RT-176 transmitter relays to stick and the set remains in a state of constant keying. It was found that by covering the RT-176 with cloth or burlap, and preventing the direct rays of the sun from hitting the set, even though the cloth or burlap was of a dark color, the problem to a large degree was solved.

RECOMMENDATION: That a heat insulating cover, preferably of a dark or camouflage color, be developed for the RT-176.

14. ITEM: RECEIVER TRANSMITTER, RT-174/PRC, RT-176/PRC

DISCUSSION: Recently quite a few of these units have been experiencing troubles in the Automatic Frequency Control (AFC) modules. Causes and suggested remedies at this time are unknown. "Spaghetti" type insulation

on leads from L-2 of the same modules quite often are too long, and as a result, when the insulation straightens out, it breaks the fine wire leads from L-2 to the other associated components.

RECOMMENDATION: That "Spaghetti" leads be shortened as necessary to prevent "spring" action on coil wires and terminals.

15. ITEM: RADIO SET AN/MRC 83 AND AN/MRC 87

DISCUSSION: Keeping the filters clean and rotated on the TRC-75 is a must. Dirty filters keep air from circulating and thus burn out transistors and fuses on the PP 2352.

RECOMMENDATION: That filters be examined each time the radio vehicle is checked and serviced.

16. ITEM: USE OF RADIO SET, AN/PRC-47, IN FSK MODE.

DISCUSSION: The artillery regiment operates a regimental command net over great distances in RVN, i.e., from the DANANG Enclave to subordinate elements in the HUE PHU BAI and CHU LAI Enclaves. This circuit is covered with T/SEC KW-7 and has proved a useful circuit for the command in logistical and administrative matters. In order to protect the radio equipment it must be operated on low power only in the FSK mode. At the frequencies assigned, this power is about 5 watts. This power level is low for 100% reliability when the propagation mode is sky-wave. The ability to use high power would increase circuit reliability and usefulness.

RECOMMENDATION: That the blower system shown in figure 3-4 page 3-8 (original) of TM-03817A-12/1 be adopted for use by field units. That blowers, if available now, be sent to USMC units in RVN for field testing.

17. ITEM: COUNTERPOISE FOR THE RADIO SET, AN/PRC-9

DISCUSSION: On a small hill consisting entirely of marble rock, it was found even though line-of-sight was maintained to another station, many times communications with the AT-271 antenna on an AN/PRC-9 was inadequate. An RC-292 antenna was erected and even then communications were weak at times. It was assumed that even the modified ground plane RC-292 was not providing a good enough ground due to the marble content of the

mountain. The counterpoise from the radio set AN/GRD 9Z was connected to the AN/PRC-9 and spread out on the mountain top in a 40-60 degree fan pointing in the direction of intended propagation, and the AT-271 antenna again connected. Communications improved immensely. This action tends to prove that the assumption previously made was correct. This is just another example of poorly conducting earth and the improvement in communications that can be achieved by use of a counterpoise.

RECOMMENDATION: That communication personnel be ever alert for innovations or adaptions which will improve the operating range of usefulness of their equipment.

18. ITEM: AMPLIFIER POWER SUPPLY AM-598

DISCUSSION: It was found that when the AM-598 is installed in the back of the vehicle, M-422, and the case is exposed to the direct rays of the sun with ambient temperatures of 110 degrees F. or above, it can be assumed that the temperature inside the case may climb as high as 150 degrees. This causes the fuses to "blow", or the ground strap on back of Power Terminal connector to be burnt, causing an open circuit. In some cases, the fuses may not "blow", but the output voltages of the Power Supply Section may become erratic. This has damaged the accompanying AN/PRC Radio Set. Even if this does not occur, adjustment of the voltage control circuit is necessary. When the AM-598 is installed in M50A1, the above may also happen depending on the inside temperature of the vehicle.

RECOMMENDATION: Placing a canvas top on the vehicle and allowing the power supply to cool off may often bring the voltage back within tolerance.

19. ITEM: HANDSET H-33

DISCUSSION: The cords on the Handset H-33 are constantly breaking. This unit has found that 90% of the handset cords can be repaired by cutting off 4-6 inches of the end.

RECOMMENDATION: That the above procedure be adopted as an authorized field expedient.

20. ITEM: COMMUNICATION WIRE INSTALLATION

DISCUSSION: The tactical deployment of this unit is such that much of its communication wire is extremely vulnerable to cutting or tapping by the enemy. Many miles of wire laid within this unit are, perforce, routed through areas readily accessible to the VC. It has been noted, however, that the wires most frequently distrubed by the VC are those that are on the ground. They seldom tamper with "over headed" wirelines.

RECOMMENDATION: That "over heading" wirelines be employed to the greatest practical extent in operations in Viet Nam.

21. ITEM: TELEPHONE EE-8

DISCUSSION: During inclement weather periods, it has been necessary to conduct a second echelon PM daily on all telephones exposed to the elements. These same telephones may be placed in the sun or in a "hot locker" to dry during the day. When reassembling the telephone, the receiving and transmitting elements should be tapped lightly to ensure that the carbon granules are loose and not caked. Care should be taken so that excessive maintenance does not materially effect the performance of the equipment. This procedure has reduced by 80% the number of telephones deadlined for maintenance.

RECOMMENDATION: That in inclement weather, telephones EE-8 be checked daily using the procedures outlined above.

22. ITEM: WIRE COMMUNICATION-RIFLE COMPANIES.

DISCUSSION: In a static defense situation, wire has become the primary means of communications within the Battalion. Lines to platoons, to outposts and OP's, as well as lines within Battalion create a need for many telephones and cause confusion at the Company CP because of the large number of phones which terminate there.

RECOMMENDATION: Utilize the SB-22 at company level. When there are not enough switchboards, use a TA-125, jumping the terminals so that one phone is on the battalion lines and another on the company local lines. This limits the number of phones within the company CP to two, and allows for an incoming call from Battalion to be dispatched to any platoon outpost or forward observer. Utilization of one EE-8 and one TA-312/PT aids in determining which phone is ringing at the company OP thus eliminating the troublesome chore of answering the wrong phone on an incoming call.

23. ITEM: ABBREVIATED RC-292 ANTENNA

DISCUSSION: There is often a need for the RC-292 antenna on operations; however, the weight and bulk of the complete unit make it impractical to handle in fast moving offensive operations.

RECOMMENDATION: On offensive operations, carry only the antenna base (MP-68), antenna sections, coaxial cable, one mast section (AB-35), and the antenna bag. This abbreviated antenna can be tied in a tree or to a pole without loss of effectiveness. A savings of 30 pounds is realized.

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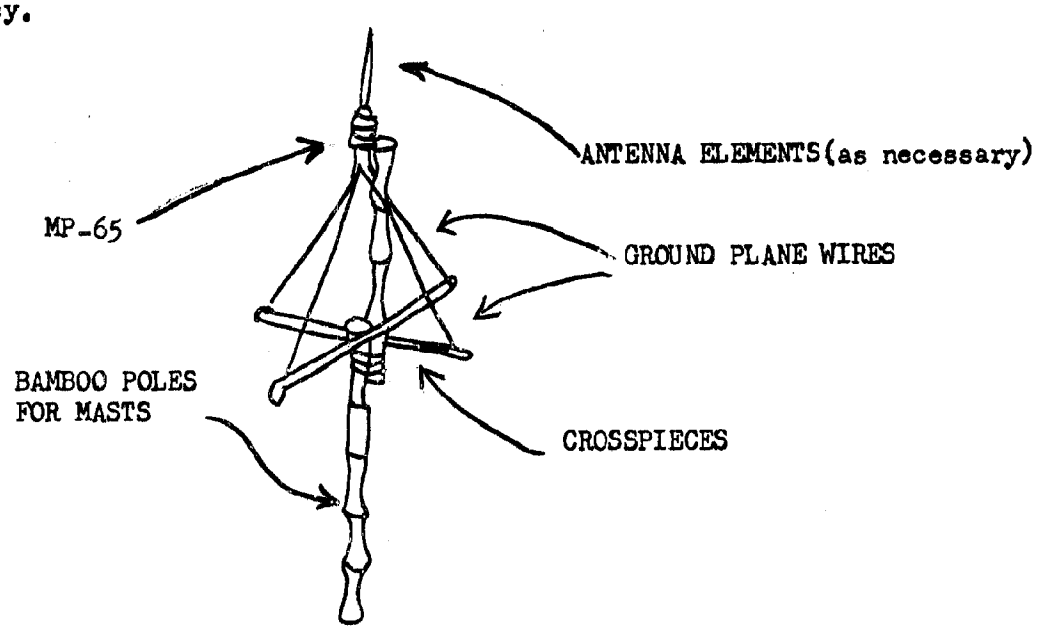
24. ITEM: ANTENNA MASTS

DISCUSSION: Where the location of antenna masts is sometimes not optimum, clearance of local terrain features, such as trees or bamboo groves, is not possible. Therefore, an increase in the height of the antenna is desireable. It has been found that the use of locally available bamboo poles, 25 feet or so in length and fastened together, can be subsitituted for the AB-35 mast sections of the RC-292 antenna assembly. Thus one can raise the antenna height to as much as 60 feet. This has the effect of increasing the operating range of the radio set by as much as 40% which is comparable to increasing the output power by a factor of 2. These bamboo masts also provide a means of constructing additional antennas by using the mast base MP-65 (normally jeep-mounted) atop the poles. In this later case, optimum results are obtained if two cross pieces are erected about 6 to 8 feet from the top, to hold the ground plane wires (see Sketch). Measurements for the length of ground plane wires and angles of drop should be obtained from TM 11-5020 so as to approximate the RC-292 operated at this specified frequency.



RECOMMENDATION: Bamboo poles are an excellent field expedient for replacement of broken masts, can be used to gain increased height, or can be used as an auxiliary antenna, simulating the RC-292.

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25. ITEM: FIELD EXPEDIENT ANTENNA

DISCUSSION: It has been found that in the terrain in Vietnam, field expedient antennas in a reconnaissance unit are a must. Due to age of equipment used, distance involved, and terrain in Vietnam, without the knowledge and use of field expedient antennas, radio communications would have failed many times.

RECOMMENDATION: That all communication schools include an extensive period of instruction in their syllabus for field expedient antennas. All units train in this area whenever possible.

26. ITEM: ANTENNA MOUNTS ON THE ONTOS M-50A1

DISCUSSION: The location of the antenna mounts permit only a maximum 35 degrees of traverse. Any further traverse will place the antenna in the danger area with the high probability that it will be damaged by the back-blast of a 106mm round.

RECOMMENDATION: That emphasis in training be placed upon the full utilization of vehicle maneuver, in conjunction with turret traversing, to obtain target acquisition without placing the antenna in the backblast area.

27. ITEM: HOT LOCKERS

DISCUSSION: During inclement weather periods or when equipment is exposed to the elements, it should be dried out by placing the exposed components in a hot locker. By allowing the items to be dried in the hot locker instead of using the vacuum cleaner HD-44, many man-hours can be saved and utilized for other essential maintenance. The use of a hot locker for storing extra transmitters, and receiving elements for telephones and handsets has proven extremely valuable. These extra elements are placed in the handsets everyday and the old elements are then dried. This rotation of elements further reduces daily PM time and assures maximum equipment readiness. Equipment not in use may be stored in the hot locker until required. This reduces the deleterious effects of fungus and corrosion caused by moisture. One should not allow the temperature to be in excess of 140 degrees Fahrenheit, especially where transistorized equipment is concerned. The uses above, are only meant to be representative, and should in no way restrict the imagination of the user.

RECOMMENDATION: That [redacted] possible, a hot locker be constructed for protection and maintenance of communications equipment. Since continuous electric service is seldom available at company/battery level, development of an non-electric hot locker is desireable.

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28. ITEM: MESSAGE BOOK LEGIBILITY

DISCUSSION: In the high heat and humidity of Vietnam, the new NCR type message books are adversely affected. Legible copies are difficult to make and usually fade out altogether in a short while.

RECOMMENDATION: Have communicators use the carbon paper in the back of the message book for making all copies of messages.

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