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Suitability and Effectiveness of Weapons and Equipment Used in US-Supported Operations with the Royal Laos Army (U)

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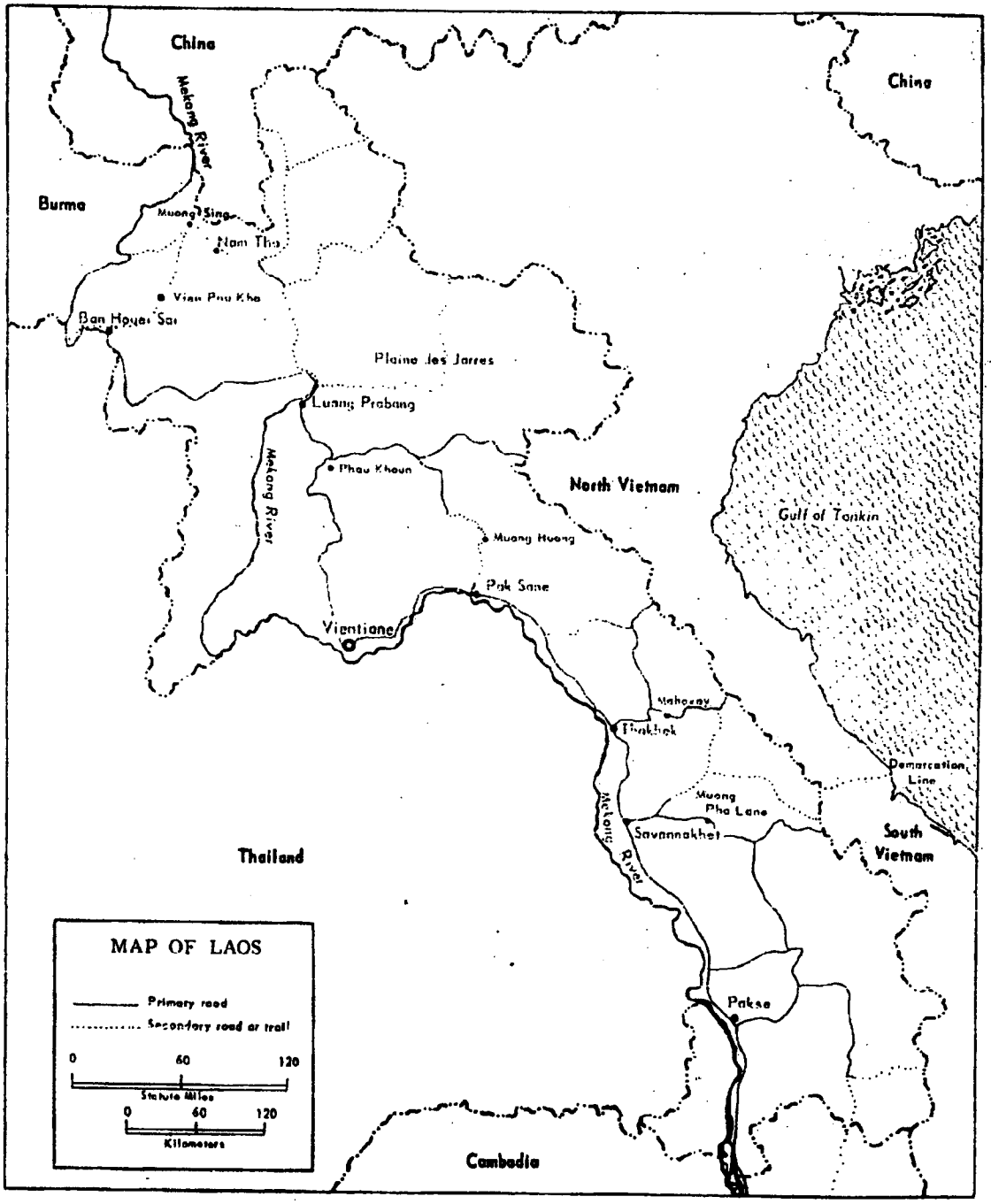

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SOUTHEAST ASIA FIELD OFFICE
STAFF PAPER RAC-SP-1(SEA)
Published September 1962

Suitability and Effectiveness of Weapons and Equipment Used in US-Supported Operations with the Royal Laos Army (U)

by
Richard E. Tiller

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PREFACE

This study was undertaken pursuant to proposals made early in 1962 and agreed on by Office, Chief of Research and Development (OCRD) and Advanced Research Projects Agency (ARPA) in April–May. Arrangements to accomplish the actual field investigations were made with Maj Gen Reuben H. Tucker, III, Chief, Military Assistance Advisory Group (CHMAAG), Laos, who assured the full cooperation of his staff and those under his command.

The original conception was that a study of ground-combat operations in Laos might provide information and insight that could be applied elsewhere. Initially it was believed that the emphasis should be on individual and light crew-served weapons and equipment. It became apparent quickly that there are important collateral problems. Logistic support is one and effective training procedures is another. The study of the air logistical support problem went by the board at the direction of Washington. The training problem has been acknowledged in Dr. Tiller's paper and some observations offered.

There are two fundamental and difficult problems in obtaining profitable answers in a "lessons learned" exercise. First, there are few "data" in the quantitative sense. Second, subjective information is generally strongly biased, and the bias increases in proportion to the time and distance the observer is removed from the scene of the action.

Thus it seemed that the summer of 1962 was an optimum time to work on the problems in Laos while some of the participants were still available, on the scene. This paper is the result. It stems from personal interviews and information derived from after-action reports.

The paper has been read by Gen Tucker and by members of his staff. Their comments and suggestions have been taken into account in the final draft in which, Dr. Tiller reports, they have concurred, generally and specifically. The conclusions and recommendations should be considered for action by appropriate US authorities.

T. W. Brundage
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ACKNOWLEDGMENTS

The author expresses his sincere thanks to Maj Gen Reuben H. Tucker, III, CHMAAG, Laos, and the members of his staff in Vientiane and the regional MAAG headquarters for their enthusiastic cooperation and support of the study.

Special thanks are due Lt Col Aito Keravuori, Commanding Officer, White Star Mobile Training Team, Laos, and the many excellent officers and noncommissioned officers of his command who served as the principal sources of information. Lt Col John D. Hale, USA, Inf, assigned to the Combat Development Test Center, Bangkok, assisted during the course of the field survey and has given valuable advice and comment on the study.

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SUMMARY

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PROBLEM

To assemble and evaluate data from the United States Military Assistance Advisory Group (USMAAG) operations in Laos as a possible source of guidance to R&D in weapons and equipment and to conduct a preliminary examination of factors affecting weapon effectiveness in these operations.

FACTS

Materiel supplied to the Laos forces has been that which could be provided at minimum cost to the US military inventory. Infantry weapons have, in large measure, been obsolescent.

The physical size, condition, and educational level of the indigenous troops may impose serious limitations on the acceptability of the materiel provided to them. In addition the indigenous soldier may be the source of a complex pattern of factors that limit effective utilization of weapons, equipment, or even a training program.

The physical and tactical environment in Laos introduces requirements for special equipment and characteristics. Terrain features, meteorological patterns, and the nature of the operation impose restrictions on the type and effectiveness of military materiel.

DISCUSSION

The results of interviews with US training and advisory personnel and the examination of after-action reports of field training teams indicate that a number of light infantry weapons and items of equipment used in the Laos program were not well suited to the indigenous forces, the mission, or the environment. A need was apparent for the development of specialized equipment, designed to meet the demands of future US or US-supported counter-guerrilla and guerrilla warfare. Several recently adopted (but not yet available) and proposed items appear to meet these demands.

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SUMMARY

CONCLUSIONS

Weapons and Equipment

1. US troops and US-supported indigenous forces in highly mobile tropical operations require specialized military materiel, in which light weight and minimum bulk are of primary importance.

2. R&D effort in weapons and equipment should emphasize the prompt development of suitable materiel for mobile, tropical warfare.

3. The development of "universal" weapons and equipment suitable for use in all combat environments is desirable but should be of secondary importance to the early availability of materiel urgently needed for specialized tasks.

Factors Contributing to Weapon Effectiveness

4. US-supported indigenous troops can introduce a complex set of factors that may equal or exceed in importance the characteristics of the materiel provided to them.

5. Anthropological, sociological, and political studies by qualified personnel are urgently needed to evaluate the significance of these factors.

RECOMMENDATIONS

1. R&D in specialized materiel for highly mobile jungle operations should be accelerated immediately.

2. Research should be initiated with the following objectives:

a. To identify and evaluate the significant human factors that may influence the effectiveness of US military assistance programs.

b. To develop techniques for evaluating the combat potential of indigenous forces.

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SUITABILITY AND EFFECTIVENESS OF WEAPONS AND EQUIPMENT USED IN US-SUPPORTED OPERATIONS WITH THE ROYAL LAOS ARMY

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ABBREVIATIONS

ADC	Auto-défense de Choc
ARPA	Advanced Research Projects Agency
BI	battalion, infantry
BP	battalion, parachute
BR	battalion, regional
BS	battalion, special
BV	battalion, volunteer
CDTC	Combat Development Test Center
CHMAAG	Chief, Military Assistance Advisory Group
CINCPAC	Commander in Chief, Pacific
FABN	battalion, field artillery
FAR	Forces Armées Royales
FTT	field training team
GM	Groupement Mobile
HEPD	high-explosive point-detonating
KIA	killed in action
LTAG	Laos Training Assistance Group
MAAG	Military Assistance Advisory Group
OCRD	Office, Chief of Research and Development
PEO	Program Evaluation Office
SF	Special Forces
SFG	Special Forces Group
USASWC	United States Army Special Warfare Center
USMAAG	United States Military Assistance Advisory Group
WIA	wounded in action
WSFTT	White Star Field Training Team
WSMTT	White Star Mobile Training Team

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INTRODUCTION

MISSION

To assemble and evaluate data from USMAAG operations in Laos as a possible source of guidance to R&D in the fields of weapons and equipment, to delineate profitable areas for R&D in weapons and certain items of equipment suitable for use in similar operational situations, and to conduct a preliminary examination of the factors affecting weapon effectiveness in the MAAG, Laos, operations.

GENERAL FACTS

US military assistance and advisory programs in Southeast Asia have been conducted in various forms since the early 1950's. Materiel has been that which could be provided at minimum cost to the US military inventory. The demands for equipping US troops in CONUS and throughout the world with the best materiel currently available, plus security restrictions on new items, have made it necessary to provide materiel not representative of the best US capability to meet operational and environmental demands. Consequently, the infantry weapons supplied have, in large measure, been obsolescent.

Weapons and equipment well suited or acceptable for use by US personnel may be poorly suited or unacceptable for use by indigenous troops. Physical size, educational level, and aptitude, plus the extent and type of training that can be given, impose very real limitations on the items suitable for US-supported activities. For example, the average Laotian soldier is 5 ft 5 in. tall, weighs 114 lb, is 20 years old, and has 2 years of schooling. Opinions are mixed regarding the adequacy of his diet, but, on the basis of generally accepted standards, it appears to lack the nutritional quality required for sustained physical effort. He is heavily parasitized and highly vulnerable to gastrointestinal and respiratory disorders. It is readily apparent that a solider with these handicaps cannot realize the capabilities of equipment designed for a healthy, physically larger and stronger, and better-educated US trooper.

In addition to the readily identified physical and educational limitations, the indigenous soldier may be the source of a much more complex pattern of factors, all capable of exerting strong influence on the effective utilization of weapons, equipment, or even a training program. In this category are the problem areas derived from the quality of leadership, the level of discipline,

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the extent of military and/or political organization, the degree of national unity, and the magnitude of ethnic and religious influences. These factors have a direct bearing on the ability of the supported forces to respond to US assistance and guidance, and to utilize materiel supplied to them. The extent and orientation of support (the echelons at which training will be required) will be to a considerable degree a function of these factors.

Finally, the combat environment introduces requirements for special equipment characteristics. Terrain features (vegetative cover, slope), meteorological patterns, type and amount of resupply (air and/or ground) anticipated, and the nature of the operation (mobile or static, large or small unit) impose restrictions on the type and effectiveness of combat materiel. In Laos, terrain ranges from flood plain to plateau to rugged mountains, including virtually impenetrable jungle and limestone escarpments broken by a few deep, narrow passes. The basic pattern is a series of plateaus that slope downward from the Annamite Mountain Chain to the Mekong River.

There is no highway net by Western standards, and few roads. A single road, currently not passable over its entire length, extends from Luang Prabang to Pakse, intersecting less than a dozen roads leading eastward along the entire length of the country (see frontispiece). Although jungle trails are numerous, they provide no opportunity for vehicular transport.

There are two zones of climate. Northern Laos has hot summers and cold winters; central and southern Laos have tropical climates. Monsoonal rains occur during July through October. The amount of rainfall decreases from north to south. A dry season extends from late winter through spring.

The stated characteristics of terrain, weather, and road net tend to limit the rate, route, and type of resupply. In many areas aerial resupply is the only practicable method and must be limited to minimum operational essentials, i.e., food, ammunition, clothing, medical supplies, and those items necessary for maintenance of unit materiel. Although present in defensive situations, these limitations are most sharply evident in offensive operations and in reconnaissance and/or combat patrols. The latter demand maximum capability for highly mobile independent unit action with minimum requirements for logistical support. Weapons and equipment must therefore impose the least possible burden in terms of maintenance and resupply and must deliver the highest possible level of performance.

ORGANIZATION AND TRAINING

US Forces

US-supported training and advisory operations in Laos were initiated in July 1959 under the organizational designation Program Evaluation Office (PEO). This was a classified mission, and the assigned military personnel were given civilian status. The first training contingent was supplied by the 7th Special Forces Group (SFG), Ft Bragg, N. C., and was designated Laos Training Assistance Group (LTAG). Twelve eight-man field training teams (FTT), each composed of two officers and six enlisted men, were assigned the mission of conducting infantry (including parachute) training for officers and

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the first three grades of NCOs in the Laos Army. Training was conducted in Luang Prabang, Vientiane, Savannakhet, and Pakse. Three FTTs were assigned to each town, with a control detachment for the entire operation located in Vientiane.

In mid-April 1961 administrative and operational control for the Laos Army program became the responsibility of the Chief, Military Assistance and Advisory Group (CHMAAG), Laos, under the supervision of CINCPAC. Training personnel returned to military status, and, for the first time, advisory personnel joined Laos units in forward areas. During May 1961 the transition to the present FTT organization was begun. The eight-man training teams employed in the LTAG operation were phased out and replaced with SF A detachments split to form two six-man teams (Fig. 1). Originally, 12 A detachments were assigned; additional units were gradually added to reach a total of 24. A B detachment was assigned to each military region (see Fig. 2). The control

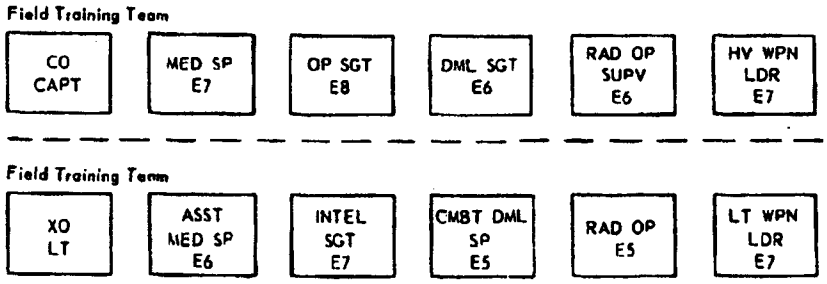

Fig. 1—Special Forces Operational Detachment A

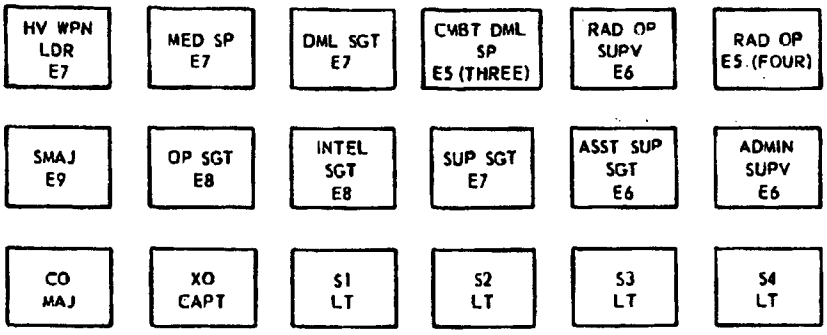

Fig. 2—Special Forces Operational Detachment B

detachment was assigned and then augmented, primarily by S4 and communications personnel, as the operation expanded. During this period the training element was designated the White Star Mobile Training Team (WSMTT). Figure

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3 indicates the organizational relation between CHMAAG and WSMTT. Although all operational aspects of the White Star mission were under the G3 section of MAAG, a direct two-way channel of information exists between CHMAAG and CO, WSMTT. The training effort has been conducted by personnel of the 7th SFG, Ft Bragg, and the 1st SFG, Okinawa. Six of the 24 A detachments were assigned from 1st SFG; 18 men from 7th SFG. Two of the B detachments, which served as regional White Star headquarters, were from 1st SFG, and two were from 7th SFG. Forty-three FTTs were placed under the operational control of CHMAAG; five were assigned special missions.

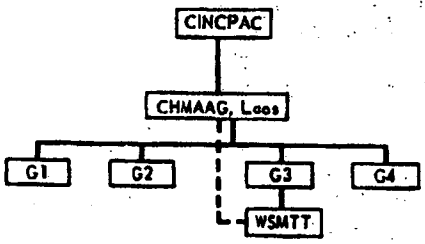

Fig. 3—Organizational Relation of WSMTT and MAAG, Laos

—— Command line — — Coordination line

Forces Armées Royales (Laos)

During the period under consideration the Forces Armées Royales (FAR) were organized under five regional commands, in which the largest unit was the Groupement Mobile (GM) most nearly comparable to a task force, roughly the size of a regiment in the US Army. The GM, composed of battalions, included armor and artillery augmentations. Organizational status of battalions on 1 Jul 62 was as follows:

Battalion, infantry (BI)	21
Battalion, volunteer (BV)	23
Battalion, regional (BR)	12
Battalion, parachute (BP)	3
Battalion, special (BS)	3
Battalion, field artillery (FABN)	9

The BV and BR were comparable to National Guard or Home Guard units.

In addition, there were 310 company-sized local militia units designated Auto-défense de Choc (ADC).

A WSFTT was attached to each GM headquarters. Additional teams were assigned training missions at battalion level, and six two-man teams (one officer and one enlisted man) not from Special Forces, were detailed to the regional adviser (MAAG) to provide assistance in artillery training.

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SCOPE

This survey was originally designed to determine the suitability of light infantry weapons and certain items of equipment supplied by the US to FAR and to report operational limitations and suggested modifications or replacements.

In the initial stages of the survey, however, it became apparent that the effects of a complex set of nonmateriel factors (noted in the introductory paragraphs) must be recognized. A full investigation of these factors exceeded the limitations imposed by time and personnel, but the study was expanded to indicate their presence and relative importance.

The following presentation is therefore divided into two sections: the first is a report on weapons and equipment; the second deals with the problems that influenced weapon effectiveness in training and combat.

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PROCEDURE

SOURCES OF INFORMATION

No previous compilations of data specifically pertaining to the suitability or desired characteristics of weapons and equipment for the Laos military-assistance program were available. It was therefore necessary to explore available sources of pertinent information of quality suitable for analysis.

The primary source was found in interviews with officers and enlisted personnel from the White Star Field Training Teams (WSFTT). These interviews were conducted at the regional White Star team headquarters at Luang Prabang and Savannakhet and at field training sites in the surrounding areas. Nineteen field teams were covered in this survey. These data were supplemented by discussions and interviews with twelve White Star personnel in the control team at Vientiane and the two regional B team headquarters previously mentioned. A wide range of personnel, missions, and experience was covered. Some units had solely a training mission; others had operational missions, including static defense, patrols, and offensive operations. In a few instances some of the team members were able to report on earlier tours of duty in Laos as well as on their present assignment. No set pattern was employed in conducting the interviews, although the same points were covered in all. The basic approach was to discuss the unit mission and the problems encountered in its performance. In this way the relative importance of weapons, equipment, and the training or operational situation was determined, and the interviewees were not led to place unrealistic emphasis on problem areas of minor significance. Duration of the discussion was governed by the flow of information. Some were concluded in about 1 hr; others, in which operational experiences were described, lasted 3 to 3½ hr. Interviews were not conducted with teams so recently assigned that the validity of their opinions might be questionable. Additional discussions were conducted with CHMAAG, Laos, and officers from the G2, G3, and G4 sections of MAAG headquarters, Vientiane, and in MAAG regional headquarters at Luang Prabang, Savannakhet, and Pak Sane. This group included individuals who had participated in operations or had substantive information on operational and equipment problems. All interviews were conducted during the period 22 Jun–15 Jul 62.

A second source of information was found in the after-action reports from 36 of the 48 WSFTTs. These reports, covering the period October 1961–July 1962, described the progress and problems in the assigned team mission but did not include an organized survey of the specific problems associated with

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weapons and equipment. Although numerous comments regarding certain items were included, the principal value of these reports was in the identification of factors affecting weapon effectiveness in training and in combat operations. These factors are discussed in the final pages of the section presenting results of the survey.

Data from all sources were examined and where possible were assembled for further analysis in a modified tabular form. Symbols were used to indicate the degree of acceptability of the particular item, and brief explanatory notes were entered opposite each symbol. As an example, if the M2 carbine was judged highly desirable on the basis of light weight and high volume of fire, the tabular entry was "AA, light wt, high vol fire." The information pertaining to factors influencing weapons effectiveness was somewhat less amenable to tabulation. If a problem or unsatisfactory situation existed, the symbol N (negative) was employed; a satisfactory or productive situation was indicated by P (positive). Explanatory notes were used as in the case of items of equipment. Fuller description and documentation of supporting data were required to develop acceptable results from this information.

LIMITATIONS OF THE DATA

The procedures employed in this study are characterized by limitations inherent in any survey of individual opinions. It was obviously necessary to eliminate data that were suspect on the basis of an obvious bias or individual prejudice. In some instances, teams or individuals were unable or unqualified to provide comments due to nonavailability of an item for training or combat missions. Thus a full complement of answers was not available from all sources. An attempt was made simply to present in semiquantitative form a mass of related qualitative information. Data were compiled from the most reliable sources in the theater and represent the fullest justifiable interpretation.

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RESULTS

WEAPONS CHARACTERISTICS

Individual Weapons, Currently Issued

Ranges of Engagement. All the interviews and reports indicated a minimum range of less than 100 yd for small-arms fire under virtually all conditions. Sixty-one percent reported ranges of less than 10 yd for patrol actions and ambushes, and 92 percent agreed on less than 50 yd. These data are in consonance with the results of British studies during antiterrorist operations in Malaya, in which mean ranges for ambushes were found to be 40 yd, and for patrol engagements, 60 yd.[1] Maximum range for jungle fighting was universally stated to be less than 100 yd in 90 percent of all instances, 62 percent stating this range to be less than 50 yd. In open terrain, 75 percent agreed that maximum range is less than 300 yd, and in no instance did the estimate exceed 500 yd.

Rifle, Cal .30, M1. This weapon was judged unsuitable by 80 percent of the sources, was acceptable for limited use (one per platoon, as a sniping weapon) by 12.5 percent, and desirable by only 7.5 percent. Unsuitability was on the basis of weight and size, particularly for the Lao soldier. The volume of fire was judged inadequate, and there was no need for the range and accuracy offered by the M1 in the short-range, brief, intensive fire fights most frequently encountered. Some of the sources favoring the M1 felt that the heavy bullet offered desirable stopping power; others felt that training of the Lao soldier would enable him to handle the weapon effectively. The personnel providing these last comments had only training experience and had not used the M1 in combat.

Carbine, Cal .30, M1. The carbine was universally desired. Seventy-one percent of the sources considered it excellent, and 29 percent judged it acceptable. Light weight and small size, with adequate range and lighter ammunition, were the bases for acceptability for use by US or Lao soldiers.

Carbine, Cal .30, M2. Again universally desired, this weapon was considered excellent by 80 percent, and desirable by 20 percent. The folding stock and an optional semi- and full-automatic fire capability were wanted by many individuals. Those individuals who considered this weapon desirable rather than excellent expressed concern over the possibility of excessive ammunition expenditure by the Lao soldier using a full-automatic weapon. Even in training, it was reported difficult to maintain good fire discipline. British data from the Malayan Campaign ranked the M1 and M2 carbines first, in order of preference for killing effectiveness in jungle patrol actions, followed by the Bren LMG, the Sten/Owen carbines, and the rifle.[2,3]

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Sub-Machine Gun, Cal .45, M3. Opinions were more mixed on this weapon than on those previously discussed. Forty-three percent judged it unacceptable, 28 percent found it acceptable, and 28 percent found it desirable. The compact, lightweight design and high volume of fire were considered ideal for the short ranges usually encountered, but the ammunition was judged to be excessively heavy. The M3 was not considered suitable for as wide a spectrum of situations as the M1 or M2 carbines and would require backup weapons in the squad or patrol.

Sub-Machine Gun, Cal .45, Thompson. This weapon was not widely employed in the units from which data were compiled. It was considered acceptable, but not highly desirable, owing to heavy weight of both the weapon and ammunition.

Automatic Rifle, Cal .30, Browning, M1918A2. Seventy-five percent of the comments on this weapon indicated that it is unacceptable (on the basis of weight and size) for offensive or patrol actions by either US or Lao soldiers. It was considered acceptable as a crew-served weapon by 12.5 percent and as a defensive weapon only, by 12.5 percent.

Pistol, Automatic, Cal .45, M1911A1. Although a side arm was considered desirable for jungle fighting by all US personnel, particularly for radio operators and medics or on guerrilla missions when demolition equipment would be carried, the .45-cal automatic pistol was judged acceptable by only 40 percent. Sixty percent favored its replacement by a lighter weapon. The .38-cal Special and .357-cal Magnum were cited as having desirable cartridge characteristics, and a short-barreled revolver seemed to be generally preferred.

Grenades. Extensive use of hand and rifle grenades was reported. The former were generally preferred, owing to the short ranges of engagements in which grenades would be most effective. The M26 hand grenade was preferred. Lao troops reportedly required more training than is required by US soldiers to develop acceptable accuracy. The use of grenades, particularly rifle launched, was sometimes difficult owing to deflection by heavy vegetative cover with consequent hazard to the launcher. Interest was expressed by one team in a point-detonating grenade to eliminate the requirement for estimating fuze time in close combat where the enemy could avoid or return the grenade.

Mines, Antipersonnel, M14 and M16. Although the value of mines in perimeter defense, ambushes, and delaying actions was universally recognized, the consensus was that they were not desirable for use by the Lao soldier. Mine discipline was virtually nonexistent. Fields were repeatedly laid with no, or at best inadequate, record of the location. In one area near Kiou Cha Cham, several thousand antipersonnel mines were laid around a defensive position and not properly recorded. Twenty casualties to friendly troops, five of them fatal have occurred since March 1962. In another area, near Thakhek, a similar situation resulted in seven casualties during a 3½-month period.

Individual Weapons, Proposed

Rifle, Automatic, Cal .223, AR15, Colt-Armalite. First introduced in 1957 in .222 Remington Special caliber, this weapon possesses characteristics that make it ideally suited for use in highly mobile warfare in difficult terrain. With a full 20-round magazine, it weighs less than 6½ lb, and all possible parts

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are of corrosion-resistant materials. The action is gas operated and air cooled, and has selective semi- or full-automatic fire option.[4] The low recoil and straight-line stock make it suitable for accurate burst fire. Unpublished data from combat tests in South Vietnam indicate that the high-velocity flat-trajectory .223-cal cartridge is accurate and lethal for all ranges encountered. Most of the individuals interviewed knew of the AR15, and a surprisingly large number had handled and/or fired it during a demonstration at Ft Bragg. All, including those to whom the characteristics were described during the interview, agreed that it appeared to be an excellent weapon for use by US and indigenous forces in guerrilla or counterinsurgency operations.

40-mm Grenade Launcher, M79. Extensive use of hand and rifle grenades has been previously cited. The M79 could replace both, in all except minimum-range engagements in which the distance could conceivably be less than the arming range of the projectile, and would give greatly improved accuracy to a longer range. It is a single-shot break-action shoulder-fired weapon weighing 6.45 lb (loaded) and is equipped with a folding rear sight, graduated in meters, and a blade front sight. It fires an 8-oz HE wire-wrapped round (M406) 3.9 in. in length, with a velocity of 76 m/sec. Effective range is approximately 375 m. Field tests in South Vietnam reveal that the M406 round compares favorably with the M26 grenade.[5] Only a few of the personnel interviewed were familiar with the M79, but all felt that it possesses characteristics ideally suited for training and combat operations of the type conducted in Laos.

Shotgun, 12 Gauge, Slide or Automatic Action. Opinions regarding the desirability of a shotgun were mixed. Some individuals withheld comment, some felt that a light automatic weapon would be better in the same role, and in the six instances where the shotgun was considered desirable, it was made clear that one at the point of a patrol would be adequate. All favoring the shotgun expressed the need for a fast-handling weapon, capable of large area coverage at short range. Previously cited data on estimated ranges of engagement are supported by British data reporting 12-gauge-shotgun trials in Malaya. Jungle and undergrowth was found to have little retarding effect to the depth from which an enemy could fire. An effective range of 50 yd for an all-purpose 12-gauge cartridge, and a "fully effective" range of 50 yd, with considerably greater unspecified actual range, was reported for a long-range round.[6]

Multiple Flechette Cartridge, Cal .45 for Pistol, M1911A1. Although none of the individuals interviewed was familiar with the proposed round, there was considerable interest in the potential for increasing area effectiveness of the pistol. This improved performance over ball ammunition would undoubtedly make the undesirably heavy weight of the M1911A1 more acceptable.

Directional Antipersonnel Mine (Claymore). Although only a few of those interviewed were familiar with this mine, its characteristics appealed to all. It would undoubtedly be a highly effective defensive and ambush weapon and would materially reduce the mine-discipline problem previously described.

Crew-Served Weapons

Data were scanty on this group of weapons, particularly relating to operational effectiveness. Improper employment or failure to employ the weapon at all were repeatedly reported by individuals and units who had accompanied

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FAR troops in combat situations. In the training situation, weapon and/or ammunition shortage limited the comments to a very few teams.

60-mm Mortar. Although this weapon was widely available and reportedly was well liked by FAR, only one team was able to state a specific instance in which it was employed effectively. During defensive operations in the Mahaxay area in early 1962, 60- and 81-mm mortars were used in the indirect role to cover enemy avenues of approach. All units offering comments on the 60-mm mortar felt that it is a desirable weapon. With respect to desirable modifications, 88 percent agreed that a simpler sight would reduce training problems and that reduced weight and a spade base plate would be desirable. Twenty-five percent wanted an optional trigger-firing mechanism. One individual felt that the training problem for indigenous troops would be lessened if the weapon were used hand-held, without the bipod.

81-mm and 4.2-in. Mortars. As in the case of the 60-mm mortar, data are too scanty for valid analyses. Improper employment, at or beyond extreme range, or failure to fire were reported. These failures, plus the additional problems imposed by logistical and communication breakdowns will be discussed in a later section. A single report of proper utilization of 81's was reported in defensive operations near Mahaxay. Forward observers were employed, and FAR were provided with good fire support. There was no doubt expressed as to the desirability of heavy mortars, and their value was repeatedly indicated by FAR reaction to enemy mortar fire. An example was cited from the Nam Tha-Ban Houei Sai actions during the spring of 1962 when approximately 10 mortar rounds, only one of which was effective, caused an entire FAR battalion to fall back 5000 to 8000 m. The effects of Pathet Lao mortar fire were cited in a report of night attack near Muong Huong in April 1962. Preparatory mortar (60- or 81-mm) fire fell on the FAR position and was closely followed by intensive automatic weapons fire. The FAR position was completely overrun. In May 1962, extremely accurate enemy mortar fire on an outpost near Ban Phuong preceded a successful attack by the enemy forces.

57- and 75-mm Recoilless Rifles. Although there were several reports of improper employment, particularly in reference to the 75-mm recoilless rifle (used in an indirect role, improper siting, firing at extreme ranges), these were regarded as good weapons. The 57-mm recoilless rifle was reported by one team to be the most effective area weapon available but that excessive ammunition expenditure frequently occurred. With HEPD or canister the 57-mm rifle was considered excellent for the area-defense role. Here again, data are insufficient to indicate a required change in anything except the troops employing the weapons.

Machine Gun, Light, Cal .30, M1919A4 and A6; and Heavy, Cal .50, M2. Data on the effectiveness of these weapons were virtually nonexistent, but the light machine gun was considered a desirable weapon, particularly for defensive situations. There were many reports that FAR did not site either of these weapons effectively and repeatedly failed to establish adequate fields of fire. Difficulty was encountered in training FAR soldiers to fire short bursts, and excessive ammunition expenditures resulted. One team reported that FAR found the light machine gun too heavy, and, unless closely supervised, would discard the tripod and attempt to fire using sandbags to support the weapon.

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EQUIPMENT

Although a number of specific suggestions were offered during the interviews, the keynote for making equipment suitable for highly mobile operations involving relatively small units was lightness. The desirable combat load was considered about 25 lb for the Lao soldier and 30 to 45 lb for US troops. Although seldom available or carried the present load for FAR totals approximately 52 lb, 35 lb of uniform and equipment and 17 lb of weapon and ammunition. This, of course, will vary with the weapon or specific equipment.

Uniform

Footgear. Footgear was universally a major problem. The combat boot is unsatisfactory for jungle operations, and the present jungle boot needs improvement. Nearly all interviews indicated a need for improving the sole and heel. Many team members reported or exhibited boots on which the heel had come loose after relatively little usage. The most popular suggestion was for a one-piece molded rubber sole and heel provided with heavy cleats for traction on wet or rocky slopes. In addition a number of comments indicated that leather was highly vulnerable to mildew and rot and should be eliminated if possible.

Headgear. Another item presently unsatisfactory is headgear. The Special Forces beret is acceptable in some situations, but for tropical areas should be made of lighter material. The Australian "bush hat" in camouflaged fabric has been almost universally adopted by the White Star personnel. Purchased from local sources, this wide-brimmed hat provides protection from sun and rain and prevents insects dislodged from jungle vegetation from falling down the back of the neck.

Fatigue Uniform. The present fatigue uniform was the source of widespread dissatisfaction. A lighter, quick-drying, more durable fabric is needed. More pocket space and a loose-fitting bush jacket were favored. A tab and buttons to permit the trousers to be bloused over the boots or worn with open cuff was desired by several individuals.

Poncho. The present poncho was most often used as a roof or shelter lining, or to cover equipment. For personal protection a much lighter item is needed.

Personal and Miscellaneous Equipment

Sleeping Bag. The present sleeping bag is entirely too bulky and heavy for tropical use. The sleeping-bag cover with a light removable liner is a frequently used improvisation. Several individuals suggested a lightweight combination jungle hammock and one-man shelter provided with insect netting. A pilot model weighing 16 lb designed by an officer from the 7th SFG was reported to be under test in Florida by the United States Army Special Warfare Center (USASWC).

Rucksack. Opinions regarding the rucksack were mixed, but it was generally agreed that it should be lightened and provided with a detachable container for patrol operations. An improvisation for this purpose uses the canvas demolition bag as a carrier for essential items. Some interviews included

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recommendations that all-leather fittings be replaced by fabric to minimize deterioration from mildew. A few individuals felt that the rucksack was satisfactory when fully loaded but poorly balanced and uncomfortable with a partial load.

Individual Compass, M2. During several of the interviews and in some of the reports, comments were made regarding minor pieces of individual equipment not included in the survey. In most instances these comments were too few in number to justify inclusion in the report but in one case comments were supported by limited experimental data. The individual compass, M2, was reported to impose training difficulties and was judged hard to read quickly. These objectionable characteristics appear to be overcome in a rugged, weatherproof individual compass adopted in the mid-1930's by the Finnish Army. A small experiment was conducted in August 1962 by CO, WSMTT, Vientiane, to demonstrate this instrument to the author. Eight US soldiers were chosen at random, only three of whom had received any compass or map training. All were given a 3-min briefing and demonstration of the Finnish compass, after which each was asked to obtain the reading for a map course and to take bearings on nearby points. All were able to complete each exercise in a few seconds, and those familiar with the M2 judged the test item to be greatly superior. The advantages of the Finnish instrument are a liquid-damped needle and a unique indexing system superimposed on the face.

Communication Equipment

A number of technical modifications were indicated to be desirable; these have been forwarded to a qualified member of the CDTC, Bangkok, for evaluation. As in all other materiel, a reduction in weight is of primary interest. WSFTTs are currently provided with the AN/GRC 109 transmitter, and all comments regarding this item indicated a need for decreasing its weight and the weight of the generator from which it operates.

Improved air-ground and ground-air communication capability is urgently needed. Currently two units are used: the obsolete URC-4 provides contact with uhf or vhf units in nonarmy aircraft, and the PRC-10 provides contact with the ARC-44 in army aircraft. Performance is limited in both, and the goals for future equipment should be longer range and lighter weight. In addition to improvements in the range and weight characteristics, effort could be profitably directed toward the development of a single small compatible unit to use between aircraft, between aircraft and ground stations, and between ground stations.

Rations

The interviews included questions regarding the suitability of newly developed freeze-dehydrated or irradiated rations to US personnel assigned to the Laos operations. Generally, it was felt that meals requiring reconstitution would have little application except in static situations, but the need for an improved assault ration was indicated. Although Special Forces personnel are trained to live "as and with" the troops they support, the morale value of "like-fresh" US-type food was recognized. A high-calorie meat sandwich, for example, would be an excellent item for patrol or assault missions. The most

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important factors were minimum bulk, flat and/or flexible packaging, and no requirement for preparation. The development of food additives that would render indigenous foods more palatable and nutritionally adequate was suggested and appears to be a desirable item for US troops subsisting on the local economy.

FACTORS CONTRIBUTING TO WEAPONS EFFECTIVENESS

As indicated in the introductory paragraphs an analysis of these factors was not originally a part of this study. A full investigation of their origin and interrelations exceeds the limitation of time and personnel. However, their significance warrants consideration, if only to indicate the nature of problems that may be encountered in future operations of a similar nature.

A number of problems of common origin arose in both training and combat missions. These will be discussed separately to achieve clearer definition.

Training

Leadership and Discipline. In 59 percent of the interviews and reports on training missions, the quality of leadership and discipline and interest of FAR officers was reported to be unsatisfactory. There were repeated instances in which unit commanders and/or senior NCOs did not attend training sessions and showed no interest in the advisory program. Thus, instead of producing a cadre of well-qualified FAR officers and NCOs who could later conduct effective training programs, the US advisory teams were forced to direct training efforts largely to enlisted men. Although these troops were well trained, their combat potential could never be realized under the command of poor officers totally unfamiliar with US tactical doctrine.

Thirty-two percent indicated satisfactory officer attitudes with aggressive leadership, good discipline, and active participation in the training. The remaining 9 percent expressed a neutral position in which the officers were partly satisfactory or mildly interested, or in which attitudes were improving.

Military Education and Competence. Seventy-nine percent of the sources commenting on this problem indicated military incompetence in the officers and senior NCOs. This was attributed in most instances to the residual effects of French training that stresses tactics for static defense of "strong points," with no emphasis on or recognition of the need for, reconnaissance and security-patrol missions.

Logistical Support. Organized channels of supply and maintenance materiel were found to be virtually nonexistent in 97 percent of the interviews and reports. Only 3 percent of the training teams felt that adequate support was provided to the units to which they were assigned. In these instances, geographical proximity to a supply depot and/or an aggressive unit commander was credited, rather than an effective supply system.

Intelligence and Aptitude of Enlisted FAR Personnel. Eighty-nine percent of the comments relating to this training factor indicated that the FAR soldier is willing and eager to learn. Although slower to learn than the US trooper, particularly when dealing with theories or principles, he has good mechanical

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aptitude and with patience can be taught all necessary skills. Eleven percent found training problems difficult, particularly with complex equipment, e.g., sighting equipment on mortars and recoilless rifles.

Language Barrier. This was universally found to be an obstacle, and the difficulty of working through an interpreter, particularly when differences of opinion between the training team and FAR officers were involved, was repeatedly cited. Nearly all teams felt that even very elementary language training would have been extremely valuable to their mission. An additional though less serious language problem was encountered in technical nomenclature. The Laos language has only about 3000 words, and descriptive phrases for items or parts had to be developed as needed.

Operations

Leadership and Discipline. In 74 percent of the reports and interviews covering combat operations, the lack of aggressive leadership and poor discipline by FAR officers were cited as major sources of failure. In the rout of 6700 FAR troops at Nam Tha during the spring of 1962, a primary cause of the collapse was cited to be a lack of strong, competent leaders. Officers were repeatedly observed preceding their troops, not in organized withdrawal, but in disorderly flight. During the air evacuation of wounded, an unhurt FAR officer tried to board the aircraft by force and was restrained by US personnel at the point of a gun. The retreat continued to Ban Houei Sai, where a totally disorganized crossing to Thailand took place. The extent of chaos is indicated by the fact that only about 10 of 80 tons of ammunition was saved; the remainder was destroyed to prevent its use by the enemy. Only 30 FAR soldiers and no officers could be recruited by US personnel for reconnaissance of the Nam Tha road to determine the location and strength of enemy units. Of the 30, only 9 accompanied the patrol to the point of contact. In defensive and patrol operations in the Thakhek area from February–May 1962, poor discipline and weak leadership contributed to the success of enemy attacks.

Although 26 percent of the comments on the subject cited good aggressive officers, their effectiveness was largely offset by weak or incompetent men in higher commands or in supporting units. An example is found in the report on a BV engaged in combat from the Plaine des Jarres southward during the spring of 1961. Poorly equipped with uniforms, with minimum weaponry, and despite the lack of artillery support and inadequate resupply, this unit fought well though consistently overmatched. This was a well-led unit. The battalion CO was a stern disciplinarian and reportedly executed five men in his command who were suspected to be Communist sympathizers. Further evidence of the effect of discipline and leadership was seen in action near Mahaxay early in 1962. A company of infantry composed of the youngest soldiers in the battalion were pushed from a defensive position. They were reassembled without difficulty and immediately returned to retake the position. Although this required no fighting since the enemy did not exploit their advantage, this prompt return is indicative of strong leadership and excellent discipline.

Communication and Coordination, Intelligence, and Tactical Competence. Although examined separately these three factors are so closely related and comments were so consistently similar that they can be more effectively

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discussed as a group. In a total of 59 interviews and after-action reports, all three were considered serious obstacles to effective combat performance. Again, the actions in the Nam Tha and Ban Houei Sai areas provide substantive evidence of these inadequacies. In the early stages of the operation a new "Nam Tha Command" was arbitrarily established, and the tactical commander of the military region was placed under the command of a totally inexperienced superior officer with completely independent authority. Although several of the participating units were reportedly well trained and willing to fight, their effectiveness was virtually destroyed by a complete lack of information flow from command headquarters and between adjacent units with which coordinated action was anticipated. Units attempted assault actions expecting flank and/or artillery support, neither of which materialized. A battalion CO mounted a frontal attack with complete disregard for an enemy flanking force against which he was warned and was completely routed. Again and again it was indicated that no chain of command existed and that decisions could, or would, be made only by the senior commander, who in many cases had no knowledge of the overall tactical situation.

There was no indication that FAR officers recognized the value of intelligence, and there was no systematic effort made to collect and disseminate it. Reports were scanty, usually obtained from the local population, and no attempt was made to determine their validity. These were usually inaccurate or incomplete, in some instances owing to fear of enemy reprisal. A striking example was cited in the Nam Tha retreat, when FAR intelligence reported Pathet Lao forces within 4 km of Ban Houei Sai. A patrol led by US advisory personnel, moved 50 to 55 km up the Nam Tha road without establishing contact with the enemy. Further evidence that FAR have little cognizance of the need for intelligence was provided by a White Star team leader who produced a copy of the map employed by FAR in the Nam Tha operation. This was an ozalid reproduction of a 1:100,000-scale map of questionable accuracy and was inadequate for the tactical mission.

Dissatisfaction was not limited to the Nam Tha-Ban Houei Sai situation. Exactly similar problems were cited for offensive and defensive action in areas near Pak Sane and Mahaxay. Intelligence was stated to be incomplete, unreliable, and exaggerated; orders were vague and incomplete; and no chain of command was established. A situation was cited in which a FAR battalion occupying defensive positions near Thakhek was probed by an enemy patrol of 10 to 15 men. This action was reported as an attack of two enemy companies. A US adviser accompanying an airborne attack on the Plaine des Jarres during January 1962 discovered that the company commander had no knowledge of the mission or its location.

The residual influence of French training was reflected in defensive operations by a mobile group near Muong Pha Lane. The area of responsibility was too large; the units occupied "strong points" which were so widely scattered that enemy infiltration was possible. This tactical incompetence was compounded by lack of communication and inadequate security. Only 13 percent of the comments reported proper weapons employment; 87 percent cited instances in which weapons were improperly sited, fields of fire were not established, support to advancing units was not provided, and weapons were fired at extreme ranges or

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without forward observers or were not fired owing to fear of vulnerability to counterbattery fire.

Ethnic Background. Only a few comments were compiled on this problem, but these are significant as indicators of the type of problem that may be encountered in advisory and assistance programs in underdeveloped areas. First, the Lao are Buddhists and as such are religiously indoctrinated to oppose killing. It was reported several times that FAR soldiers would not fire small arms directly at an individual and were often observed to deliberately fire over the heads of the enemy. Indirect-fire weapons in which they could not observe the effects of the round were more acceptable. Geographical barriers have retarded the development of national unity. Strongest loyalties are to the village tribal group, in many instances owing to ignorance of the existence of any governmental structure. Some reports indicated that units might be organized to fight effectively in defense of their homes but would be reluctant to enter combat in other areas. In the opinion of the advisory personnel the greatest military potential was believed to lie in the Meo tribes. This group was said to have more unity, recognizes a king whom they respect, and has a more nearly nationalistic attitude than other tribal components of the population.

Logistical Support. In 85 percent of the comments on combat operations, the FAR logistical procedures were cited as inadequate or nonexistent. Here again the situation at Nam Tha was cited as an example. Nam Tha was saturated with troops, for whom logistical support was maintained only by maximum utilization of the aerial resupply capability. The tactical commander reported this problem, but a higher FAR command sent in three additional battalions with the result that adequate support was impossible. A failure to deliver crew-served weapons contributed materially to the failure of a parachute battalion to perform its assigned mission. Field maintenance and spare parts were not available, and the units entered combat with only 60 percent of its automatic weapons operable. Grenades were issued at the position from which the attack was launched, and were found to be without fuzes. There were repeated reports of slow, disorganized, and inadequate logistical procedures. Fifteen percent of the comments on combat actions reported no logistical handicaps. A report describing an unsuccessful defensive action near Phou Khoun in early 1961 stated that logistical support was adequate and attributed the defeat to a support-command failure and tactical incompetence. In an assault action near Mahaxay in January 1962, no problem was encountered in logistical support, but lack of coordination and poor tactics resulted in defeat.

Unwillingness to Fight, Hysteria, and Superstition. These three factors were cited by 89 percent of the sources to be significant causes of poor combat performance by the FAR soldier. Exaggerated fear of the Viet Minh components of enemy forces was repeatedly cited. One set of comments offered in explanation is the fact that for many years the French were a symbol of power; their defeat identified the Viet Minh as virtually invincible and inspired unrealistic estimates of their capability. The fear of injury or death is apparently very great, and heavy casualties are not required to precipitate disorderly retreat. Repeated instances were cited from the Nam Tha operations when units withdrew without casualties at the sound of enemy fire or early in the engagement after suffering only a very few casualties. It was estimated that less than 20 were killed in action (KIA) in the operation, and, including wounded in action

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(WIA), total casualties were believed to be less than 100—a very small number to precipitate the rout of 6700 troops. Although the FAR retreating to Ban Houei Sai following the fall of Vien Pou Kha reported heavy losses and Pathet Lao in close pursuit, a patrol up the Nam Tha road 1 week later made contact and suffered one casualty at a distance of 36 km. The greatest requirement for medical aid was reported by the White Star medical specialist at Ban Houei Sai, who recorded treating about 200 "footsore and exhausted" FAR troops. In an action approximately 75 km north and west of Thakhek, a battalion was surprised and overrun by a Pathet Lao force of less than two companies. No small-arms casualties were reported from the attack. Losses were one KIA and five WIA from mortar fire as the unit withdrew. A single exception was reported in the performance of an artillery battery at Nam Tha. This unit moved as far forward as terrain would permit and continued to fire after the city had fallen into enemy hands. The battery was cut off and took heavy casualties during its withdrawal.

Evidence of the importance of superstition was found in a report of physically uninjured casualties who suffered the loss of "friendly spirits" from the close passage of a bullet or nearby explosion of a mortar round. These were considered priority evacuation cases by FAR, to be taken as quickly as possible to a temple where a Buddhist priest could restore the "spirit" to its protecting position.

Loss of Face. Although this factor may be peculiar to Oriental populations, it was not infrequently encountered and is worthy of discussion. In both training and operational situations it was difficult for an NCO or junior officer from US training teams to achieve acceptance or recognition from FAR personnel senior to him in military rank. Two sets of comments suggested brevet rank appropriate to the mission be given the team members. However, this problem may have stemmed to a greater extent from the Laos' recognition of social "caste" that made it inappropriate for an officer to accept guidance from a man of subordinate rank. Another source proposed no insignia identifying rank but a distinctive emblem designating the individual as a military adviser. Two operational examples of the problem were reported. In one phase of the Nam Tha operations, artillery fire was called for on an enemy heavy-machine-gun position. The FAR artillery officer was unable to adjust his fire and finally ordered fire for effect off the desired target. He explained to the US adviser present that he had just received word that a Pathet Lao company had entered the area in which he was directing fire. In operations near Mahaxay, an adviser observed a 75-mm recoilless rifle positioned with insufficient back-blast clearance. When this was called to the unit commander's attention he walked off without replying. Two days later, however, he ordered the gun relocated; in this manner the improved siting appeared to be his idea.

Command and Control Authority for US Training Teams

Although mentioned in only five interviews, the importance of this factor was inferred by the writer in many of the discussions. This is too broad and complex a problem to receive adequate analysis in this survey, but merits brief mention because it bears on the overall subject of weapons effectiveness.

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The problem of logistics was cited as an example of the importance of assigning a control function to the US training personnel. Several individuals felt that a fully effective training program could not be established, or successful combat missions conducted, unless the US training/advisory personnel had some control authority over storage and issue of materiel. Once into the FAR logistical channels, supplies could in most cases be extricated only with great difficulty. Weapons employment provided another illustration of the need for control authority. One individual felt that effective weapon use could be achieved only by taking the weapon away from the unit and denying its use unless it was employed properly. It is not necessary to cite additional comments; the desirability of control authority may be readily identified with nearly all of the previously discussed nonmateriel factors. These problems might well have been corrected had the training personnel been given authority comparable to that which they would be given in training US forces.

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DISCUSSION

Basic requirements for survival on the modern battlefield include mobility and the capability for independent small-unit action. US-supported counter-insurgency, counterguerrilla, and guerrilla operations of the type conducted in Laos introduce special problems that reinforce these demands. Complexity of the problem is increased by the climate, terrain, and vegetation, and probably most significantly by the indigenous forces to whom support is provided. Obviously the findings from this study are not applicable in toto to all areas of the world in which the US might conduct military assistance programs, but the survey has identified two areas for research from which results can be profitably transferred. These are the required emphasis of R&D in certain weapons and items of equipment, and the research needed on the nonmateriel factors which limit effective utilization of the materiel provided in US-supported operations.

WEAPONS AND EQUIPMENT

It is apparent from the survey that much of the equipment is not well suited for the geographical area or the mission. Lightness (maximum functional payload), environmental resistance, reliability, ease of maintenance, and simplicity of training are standard requirements for military materiel. The need for these is simply emphasized in tropical operations and is doubly emphasized when the materiel is to be used by indigenous personnel. Opportunity for adequate training may be reduced by lack of time and training facilities and the presence of language barriers. The educational level and aptitude of the troops will probably be lower than the US soldiers' and their physical condition and conformation may degrade their ability to use the equipment effectively.

It was pointed out in the introductory paragraphs that materiel provided to the Laos forces was generally that which would be least costly to the US military inventory. For the reasons stated in the same paragraphs the US will undoubtedly continue to supply supported forces with obsolescent equipment. However, the requirements of indigenous forces are not the primary problem. The important fact revealed by the data is that US forces themselves need improved equipment for highly mobile warfare in tropical areas. Despite the fact that nearly 20 years have elapsed since the South Pacific operations of World War II, few improvements specifically applicable to jungle warfare have been achieved. The .30-cal M1 rifle has been replaced with the 7.62-mm M14. Increased firepower is provided but only a few ounces reduction in weight has been achieved. It is a precision instrument, capable of accurate fire in the

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hands of a trained rifleman to a distance of 500 m. Studies of the distribution of combat targets not in jungle warfare indicated that very few were engaged beyond 300 m and the greatest density occurred at about 150 m.[7] The ranges of engagement cited for the Laos operations reveal that long-range accuracy is totally unnecessary. A lightweight weapon capable of delivering a high volume of area fire without imposing an excessive ammunition load is needed. The experimental .223-cal automatic rifle AR15 appears to have the desired characteristics. The results provide other examples that need not be repeated. They simply reinforce the need of the jungle soldier for specialized equipment. There is no question regarding the necessity for specialized rounds of ammunition for the tank gun: HE is available for soft targets; HEAT or kinetic-energy rounds are at hand for hard targets. It appears, however, that similar needs have not been recognized for jungle operations. A need is apparent to deemphasize R&D effort directed toward "universal" materiel. In long-term research the goal may justifiably be utility in all situations. The immediate aim should be to achieve as wide a spectrum of usefulness as is practical; the specific task the item is to perform should be the primary consideration.

NONMATERIEL FACTORS

As stated previously, the original mission of the study was to determine the suitability of certain weapons and items of equipment. It was quickly apparent that shortcomings in materiel were in a large measure overshadowed by shortcomings in the forces employing that materiel. The results of this survey are, at best, only indicative of the general nature of the nonmateriel factors. The RAC team presently in Southeast Asia was not qualified and time was not available to conduct the type of study required to delineate all facets of the problem.

Many questions remain unanswered, and undoubtedly many more would have arisen had the research effort been more thorough. Why, for example, have the Pathet Lao with similar cultural and ethnic backgrounds been more successful and consistently more aggressive than FAR? The answer most frequently encountered was that the Pathet Lao units contain a cadre of Viet Minh troops or are reinforced by Viet Minh units to their rear. This cadre or reinforcement was believed successful simply because fear and force were employed to obtain the desired tactical discipline. Limited statements from captured Pathet Lao support this belief. A full answer to this question and the many others regarding training, motivation, and combat effectiveness can be developed only from detailed study.

It is apparent from the operations in Laos that successful US-supported operations require more than a supply of weapons, equipment, and training teams. The comments regarding control authority of advisory personnel indicate that consideration must be given to the development of more effective patterns of administration and supply for such operations. There is urgent need for reasearch directed toward the recognition and evaluation of the significant factors to be considered in training an indigenous population. Human-factors research conducted by qualified personnel is required to determine the qualities of the troops to be trained and the techniques of training and to evaluate their combat potential.

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