MEMORANDUM
RM-5423-1-ISA/ARPA
JUNE 1968

VIET CONG LOGISTICS

L. P. Holliday and R. M. Gurfield

PREPARED FOR:
THE OFFICE OF THE ASSISTANT SECRETARY
OF DEFENSE/INTERNATIONAL SECURITY AFFAIRS
AND THE
ADVANCED RESEARCH PROJECTS AGENCY

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FOREWORD

This report is one of a series of Rand studies that examine the organization, operations, motivation, and morale of the Viet Cong and North Vietnamese forces that fought in South Vietnam.

Between August 1964 and December 1968 The Rand Corporation conducted approximately 2400 interviews with Vietnamese who were familiar with the activities of the Viet Cong and North Vietnamese army. Reports of those interviews, totaling some 62,000 pages, were reviewed and released to the public in June 1972. They can be obtained from the National Technical Information Service of the Department of Commerce.

The release of the interviews has made possible the declassification and release of some of the classified Rand reports derived from them. To remain consistent with the policy followed in reviewing the interviews, information that could lead to the identification of individual interviewees was deleted, along with a few specific references to sources that remain classified. In most cases, it was necessary to drop or to change only a word or two, and in some cases, a footnote. The meaning of a sentence or the intent of the author was not altered.

The reports contain information and interpretations relating to issues that are still being debated. It should be pointed out that there was substantive disagreement among the Rand researchers involved in Vietnam research at the time, and contrary points of view with totally different implications for U.S. operations can be found in the reports. This internal debate mirrored the debate that was then current throughout the nation.

A complete list of the Rand reports that have been released to the public is contained in the bibliography that follows.

(CRC, BJ: May 1975)

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PREFACE

This Memorandum attempts to show how the Viet Cong are supported logistically, the extent to which they depend on non-military resources, and how their operations might be impeded by counterlogistics tactics. The study underlying it was sponsored jointly by the Advanced Research Projects Agency and the Office of the Assistant Secretary of Defense (International Security Affairs). The study is related by purpose and subject matter to M. E. Anderson, M. E. Arnsten, and H. Averch, Insurgent Organization and Operations: A Case Study of the Viet Cong in the Delta, 1964-1966, The RAND Corporation, RM-5239-ISA/ARPA, August 1967. Both RM-5239-ISA/ARPA and the present document -- the latter in incomplete draft form -- were used for reference by the American Embassy, Saigon, and by the Military Assistance Command, Vietnam, in 1967, particularly during a period of service of the primary author in Saigon.

This Memorandum should be of interest to intelligence analysts in the respect that it provides a method of filling in the unknown parts of a logistics picture. Operations planners may find it useful in comparing tactics.

The authors are particularly indebted to RAND colleague J. W. Higgins for advice and comment; also to Harvey Averch, Richard B. Rainey, Jr., and William A. Johnson. Appreciation is also due to Steven Enke, formerly Deputy Assistant Secretary of Defense (Systems Analysis) for his suggestions, and to the officers of the Military Assistance Command, Vietnam, and the Combined Intelligence Center, Vietnam, who read an early draft in Saigon. The cooperation of the Combined Document Exploitation Center and FMA, Inc. (Saigon) personnel in making data available is also acknowledged. Valentina Laffin and Lois Littleton of RAND assisted substantially in the research and documentation.

SUMMARY

This study assembles a composite but incomplete picture of the Viet Cong logistics system in being in early 1967, based on interviews, translated documents, intelligence bulletins, and other sources. Insurgent logistics organization and manpower are examined at both the Main Forces divisional level and the guerrilla level. Details are given of nonfood, food, and ordnance supply, of transportation, and of other critical logistics support functions. The support of a Dinh Tuong province Main Force battalion is then analyzed in detail as a case study, and support factors relating civilian manpower required to support one Viet Cong soldier are derived. Tables of support factors are presented as a function of resupply rate and the distance over which supplies must be carried. The population under Viet Cong control is considered to be a limiting factor. Finally, implications of the study are discussed, particularly as they relate to possible counter-logistics measures.

The problem addressed can be stated as follows: It is known that the Viet Cong rely on the civilian population for various types of support, ranging from taxes paid in money or goods to corvée labor for such tasks as carrying supplies and digging fortifications; also, that the Viet Cong provide some of their own support (about 15 percent of the strength in a battalion is devoted to support activities). How, then, is support allocated, and what factors affect its magnitude? What are the strengths and weaknesses of the Viet Cong logistics system and what measures would be most effective against the system? What are the effects of transportation facilities, agricultural productivity, and the availability of civilian manpower?

The Viet Cong logistics system in the Delta can be characterized as follows:

1. The Viet Cong rely on civilian support for transportation, construction, food production, evacuation of wounded, ordnance work, and purchase of supplies.

2. Logistics facilities are numerous and well-dispersed.

3. There are numerous supply routes using every possible mode of transportation.

4. There appears to be a high ratio of available civilian laborers to Viet Cong troops, except during the peak labor periods of rice production.

Logistics countermeasures should take these factors into account. They might include combinations of attacks against logistics facilities, crop destruction, evacuation of civilians, blockade, and resources control. All of these tactics have been used, but not necessarily in the optimum combination. In particular, the present GVN program of resources control has been rated as ineffective.

Analysis of logistics support factors was used to clarify the relative effectiveness of countermeasures. In general, it was found that Viet Cong support requirements are increased most effectively by forcing the following: the use of porters over long distances under difficult conditions; the importing of rice for troops, and the carrying of rice for porters; and the need for ammunition.

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I. INTRODUCTION

This Memorandum reports on part of a study of ways in which the United States can apply its resources to prevent or to handle low-level conflicts of various types. Military force is but one of a variety of ways to apply resources; economic and military aid are others; and, in an active arena such as South Vietnam, U.S. activities can range from civic action, resources control, and pacification programs to full-scale combat engagements. The question is, what is the best combination for a given situation?

One interesting aspect of this question is the matter of Viet Cong logistics operations. The authors examined relevant data available through mid-1967, including intelligence bulletins, interviews with prisoners and ralliers, and translations of captured documents, in an effort to fill in an outline of the logistics picture of the Viet Cong. Further, they modeled this picture so that interactions could be simulated or analyzed and the effect of changing assumptions and numerical values could be studied.

This study of Viet Cong logistics is thematically related to a RAND report, published in August 1967, dealing with Viet Cong organization and operations in the Delta.[1]

With a better understanding of how the Viet Cong logistics system works, it should be possible to draw better guidelines for U.S. and allied actions against the system. This Memorandum gives some clues as to what these guidelines might be. The flexibility and survivability of the Viet Cong logistics system is impressive. More than three-fourths of the logistic support appears to come from the civilian population; and the ratio of Viet Cong troops to civilians is so small, at least in the Delta, that there are immense reserves of support.

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[1] M. E. Anderson, M. E. Arnsten, and H. Averch, Insurgent Organization and Operations: A Case Study of the Viet Cong in the Delta, 1964-1966, The RAND Corporation, RM-5239-ISA/ARPA, August 1967.

Sections II and III, following, are a compilation of research data on organization and support functions, serving as a basis for defining specific logistics support factors.[1] Some of the topics, such as payment of taxes, which are related to Viet Cong support do not yet show up explicitly in the model and are treated only briefly. Logistics information is assembled from various areas of South Vietnam; exact geographical locations are noted when known. Because the data were insufficient to support a complete logistics analysis by area, chief emphasis is placed on the Delta in the south. (Data are included from other areas, because some activities -- such as those of ordnance machine shops -- are likely to be similar throughout the country.) Ways are suggested for modifying support factors for areas other than the Delta. Not all of the information in Sects. II and III was used in developing support factors or in drawing conclusions. It was felt best to retain this material as general background for the reader.

Section IV focuses on an area covering about half of Dinh Tuong province. It assumes that the province battalion is operating in that area and shows how the support of the battalion is estimated. Section V summarizes the characteristics of the Viet Cong logistics system, and indicates how support factors can be used as an aid in comparing countermeasures.

Appendix A provides details or ordnance production and supply. It includes a glossary of weapons cited in the source literature. Appendix B draws together some of the quantifiable data to develop tables of support factors for classes of supply situations.

When secondary sources were used, no attempt was made to verify the original sources. Some sources give conflicting estimates of the effect of rice-denial, for example. This may be due to observer bias; more probably, it indicates how the effectiveness of a strategy can vary with the local situation.

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[1] Support factor: civilians required to support one Viet Cong soldier.

Additional field work would be required to answer some of the questions implied by this Memorandum. Important among these are the questions of how the Viet Cong logistics system varies between geographical areas, and what specific measures and tactics would be most "cost-effective" in a given area.

II. LOGISTICS ORGANIZATION AND MANPOWER

The Viet Cong have a well-developed logistics management organization, as exemplified by the use of Forward Supply Councils at various levels. Unpaid or partly-paid civilian (corvée) labor is essential, as we shall see, to the support of Viet Cong operations. These ways of organizing manpower resources form the principal subject of discussion below. At the end of the section, the logistics of two quite different kinds of combat units -- the divisional unit and the guerrilla unit -- is also discussed.

INSURGENT LOGISTICS ORGANIZATION

The Central Office for South Vietnam (COSVN, Viet Cong) is responsible for overall direction of the communist insurgency in South Viegnam. Functioning with, and subordinate to COSVN are the People's Revolutionary Party and the National Front for the Liberation of South Vietnam.[1]

The Worker's Party (NVN) organized its apparatus in SVN in March 1962 by creating the Central Office for South Vietnam and gave to it overall responsibility for action in the Republic. The 1962 reorganization was apparently intended to improve the coordination of insurgent activities.

Three agencies operate the Viet Cong logistics system: the Finance and Economic Section, the Rear Services Organizations, and the Forward (Front-line) Supply Council.

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[1] Sometimes referred to as the "Front." Generally we have used the term "Viet Cong" when referring to troops or military units.

The Finance and Economic Section acts as the "chief revenue-earner, producer, purchaser, storer, and issuer for the insurgency." This agency occupies a key position within the Viet Cong political infrastructure at all levels from COSVN to the village committee. It primarily serves the political and civilian portion of the Viet Cong logistics system.

Rear Services organizations are concerned with the support of Viet Cong military units. They are of three types: a staff agency, which is a section of the Military Affairs Committee at each political echelon; an operational section or unit, which is organic to military units; and a large military support unit with area responsibilities. The last is called a Rear Services Group and is directly subordinate to the Rear Services Department of COSVN. These groups range in size from 300 to 3000 men and support Viet Cong and North Vietnamese Main Force units operating within their area of responsibility. They purchase, produce, transport, store, and distribute large quantities of food and supplies; also, they operate various types of workshops and provide medical facilities for the units within their operational areas.

The Forward Supply Council, formed in mid-1965 in reaction to increased U.S. aid, operates at four levels below COSVN: region, province, district, and village. At each of these levels the Council is organized by the Party Committee, and key positions on the Council are held by Committee members. Also at each level, the Council consists of two elements: (1) a Standing Section, with subsections for organization and control, civilian labor, recruits, and provisions; and (2) an amalgam of Section chiefs concerned with military affairs, security, public health, information, and economy; Secretaries of such organizations as labor youth groups and women's groups; and Chiefs of the Liberation Farmers' Association, the Women and Aged People's Association, the Soldiers' Foster Mothers' Association, and the like. These groups and associations are called "members of the Council."

The central mission of the Forward Supply Council is to marshall resources for the battlefield. (Finance and Economic organizations continue to be responsible for the general flow of daily supplies.) In a captured enemy document, the mission of the Forward Supply Council is described as follows:

> Through the direct leadership of the Party Headquarters, all echelons take charge of supplying recruits, civilian laborers, food, money and necessary facilities for main force troops in the battlefield -- inspire the people -- organize and send all the human and material resources contributed by the people to the units and the battlefield -- strengthen the people by urging them to increase agricultural production, practice economy to the limit.

Since the Council consists entirely of backbone cadres from local areas, and since all persons must join a Viet Cong group or organization, the requisition of resources is closely controlled and results are ensured.

The province and village Forward Supply Councils are each divided into four subsections: Recruiting, Civilian Laborers, Food Supply, and Burial Services.[1]

Recruiting. This subsection has the job of recruiting new fighters for the Main Force units by motivating youths to join Viet Cong forces, including indoctrinating youths in the 16-35 age group and drafting them if they are healthy and have a clean background. (In addition, this subsection organizes "Youth Volunteer" groups.) At the village level, the Recruiting subsection sends each month some 30 to 50 youths to the Viet Cong Main Force units; a third of these must be either Party members or Labor Youth members serving as nong cot (activist) elements. A number of District cadres are sent down to the villages to help in the execution of policies and to ensure a continuous flow of new recruits.

Civilian Laborers. This subsection organizes farmers in the 36-45 age group into platoons and squads of civilian laborers,

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[1] DT-140.

indoctrinates them, and sends them away to perform specific tasks for a period of three to six months each year. Such are the Civilian Laborers proper, serving the Front Line and sent to provinces other than their own. Laborers who operate near their native villages are organized into squads, each with its equipment ready -- four hammocks, four carrying poles, and four sampans, two of them motorized -- so that when the time comes they can leave at once. Each village has one or two platoons of these laborers. The platoons include Party and Labor Youth members, who serve as nong cot elements, and a medic from the village.

Food Supply. This subsection specializes in providing the units with food supplies. There is a Food Supply subsection in each village, and a Food Supply cell in each hamlet. Each family must keep in reserve one to three gia[1] of rice to supply the troops when they come. In addition, they have to grow more vegetables in order to supply the troops when necessary. This subsection is composed mostly of women and farmers, and is assisted by the Soldiers' Foster Mothers' Association.

Burial Services. This subsection is responsible for burying the dead carried back from the battlefield. It is composed of people with a certain prestige, such as the families of fighters and cadres, and theirs is the task of indoctrinating the families of the dead. Members of the Soldiers' Foster Mothers' Association, and Viet Cong representatives, are also members of the subsection. Each Burial Services subsection has three to five people who know carpentry and have the necessary tools.

These three agencies -- the Finance and Economic Section, Rear Services, and the Forward Supply Council -- have interrelated and overlapping functions, and the effectiveness of the logistics system depends on their coordination. Such duplication benefits the Viet Cong by producing numerous supply stocks and exploiting many alternative sources, thus increasing the probability that unit supply needs will be met in the face of allied interdiction efforts.

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[1]A gia is a bushel containing 40 liters, equivalent to 19 kilograms of paddy (unmilled rice).

THE USE OF CIVILIAN LABOR[1]

Villagers are often forced to work for the Viet Cong, sometimes for small wages and sometimes for nothing. If wages are paid, the money may come from a special tax on local villages, which may require villagers not on a labor assignment to take extra jobs in order to pay the tax. Corvée labor is of two principal kinds: construction of fortifications and porterage of supplies, arms, and munitions from rear areas to battlefronts. In addition, laborers may be impressed for a variety of special assignments.

A forced-labor assignment may last as long as six months, part of which might be spent in carrying supplies and part in clearing campsites and performing other work. In Binh Ba Village, Phuoc Tuy Province, the policy stated by cadres was as follows:

> Everyone in the village had to do three months' labor a year. All young men had to do labor in battlefields, carrying wounded and ammunition; 7-20 day missions. Men under 45 and single females transported rice and goods, but not in battle. Men over 45 worked on the destruction of roads.[2]

In another village, forced labor averaged 3-5 days per month, presumably for the entire able-bodied population, although in some months there was no labor assignment.

A district in Binh Thuan Province was ordered to impress 200 civilian laborers and concentrate them at a specified village. These laborers were to prepare food and salt for two months and were to be trained in techniques to counter sweeps by U.S. forces.

The size of a labor group varies. In one case, a group of 40 persons apparently carried all the supplies required by a province; in another case, there were 300-400 people in a labor group. Accounts of an entire village of several thousand people being impressed for emergency construction of fortifications have been found. When there

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[1] PIE-25, AG-451, H-6, AG-440, AG-433.

[2] AG-451.

is more time, a year might be allocated for digging a tunnel network, and each family in a village might have to devote five or more days to this task. It was claimed in one case that this delayed farm work and decreased the production of rice and corn.

The work day for construction workers might last from 0700 to 1800 hours, and for porters from 0400 to 1900. One ex-porter said that his group covered 50 km if they marched in daylight, but only 30-40 km at night. Another group of porters made one trip per day carrying rice from a base to a storage place, and rested one day in ten. There is evidence of escort and supervision. In one case, the escorts were described as hard-core cadres; in another, a company of laborers (probably about 100) was followed by 20 "fighters."

Porters carry 20-30 kg, including their food supply. One typical load consisted of three artillery shells plus 10 liters of rice; another included 9-13 liters of rice. Rice consumption would average about one liter per day per porter.

The availability of labor resources differs greatly between areas, depending on population density (which normally varies by a factor of 3 or 4), distribution by sex and age group, and such factors as the degree of Viet Cong control and previous evacuation of civilians. Table 1 presents data on population distribution by sex and age group. Here, we are comparing the distribution for a village in Long An Province in 1957 with that of refugee populations in three other provinces in early 1966. If we assume that refugees generally take the form of family units, then refugee populations may also represent non-refugee populations, with perhaps two exceptions: (1) some families may have left young men behind, working as laborers or as village guerrillas for the Viet Cong; (2) Chieu Hoi ralliers, who are almost all young men, are counted separately from refugees, although they may belong to refugee families. Both of these exceptions tend to increase our estimate of the population of young males in villages under Viet Cong control.

Table 1

SOME DATA ON THE DISTRIBUTION OF POPULATION BY AGE GROUP

A. KHANH HAU VILLAGE, LONG AN PROVINCE, 1957[a]

Age Group (years)	Males	Females	Total	%
1-10	621	548	1,169	35
11-14[b]	142	141	283	9
15-44	551[c]	675	1,226	38
45-60	191	186	377	12
Over-60	81	105	186	6
Total	1,586	1,655	3,241	100

B. PHU-YEN PROVINCE REFUGEES, SPRING 1966[d]

Age Group (years)	Males	Females	Total	%
0- 9	1,085	995	2,080	34
10-14	501	457	958	16
15-44	786	1,216	2,002	32
45-59	348	344	692	11
Over 60	207	235	442	7
Total	2,927	3,247	6,174	100

C. DINH TUONG PROVINCE REFUGEES, SPRING 1966[e]

Category	%
Adult females	30
Adult males	15
Under 15	40
Over 40	15
	100

Table 1 (Cont'd)

D. DARLAC PROVINCE REFUGEES, SPRING 1966[f]

Age Group (years)	%
0-14	27
15-39	57
Over 40	16
	100

(37% male, 63% female)

Notes:

[a]James B. Hendry, The Study of a Vietnamese Rural Community -- Economic Activity, Michigan State University Viet Nam Advisory Group, December 1959. Also published as The Small World of Khanh Hau (Chicago: Aldine, 1964).

[b]This age group is small because of the low birth rate in an insecure period 11-14 years previously.

[c]Reflects departure of young males in significant numbers.

[d]A. T. Rambo, et al., The Refugee Situation in Phu-Yen Province, Viet-Nam, HSR-RR-67/6-Aa, Human Sciences Research, Inc., July 1967.

[e]J. M. Tinker, The Refugee Situation in Dinh Tuong Province, FRM #6, Human Sciences Research, Inc., 1966.

[f]J. D. Le Noir, Notes on the Refugee Situation in Darlac Province, Republic of Viet-Nam, HSR-TN-66/2-Aa, Human Sciences Research, Inc., June 1966.

In computing labor resources, one has to decide whether both sexes can be used as laborers and whether young adolescents (say, 10-14 years) can be used. This applies both to corvée labor and to normal civilian work such as rice production. It is the authors' impression that young adolescents and women can be used for all but the heaviest or most dangerous jobs such as plowing ricefields or carrying ammunition into battle.

The following age-group comparison can be made, based on Table 1:

Khanh Hau village (1957)	47% ages 11-44 38% ages 15-44
Phu-Yen refugees (1966).	48% ages 10-44 32% ages 15-44
Dinh Tuong refugees (1966)	45% ages 15-40
Darlac refugees (1966)	57% ages 15-39

Obviously, the age groups do not match exactly; but the point is that, under fairly liberal assumptions as to who can be used for labor, from 45 to 57 percent of the population would be available. In later calculations, we settle on 38 percent -- based on ages 15-44 in the Khanh Hau data -- since this figure already reflects the departure of young males in significant numbers and is more conservative than figures under the assumptions above.

DIVISIONAL LOGISTICS

The Division Rear Services Staff has four functional sections: a Quartermaster Section for procurement, storage, maintenance, and distribution of weapons and ammunition; a Medical Section for medical support and evacuation; and a Finance Section.[1]

Since motor transportation is not "available or desirable" at present, the Rear Services Staff must rely heavily on foot transportation. The Division Transportation Battalion has 391 men; a regimental

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[1] Much of this description is based on a study of the Sao Vang Division.

transportation company, 68 men. Plans call for drafting 1200 laborers from local manpower resources, indicating the dependence on laborers.

Depots are generally small and scarce. There are exceptions where rice is found in large quantities on large Viet Cong bases, but these deposits are located in relatively safe areas and used to support troops in training or refitting phases. Depots are not scattered over the Division's area of activity; instead, they tend to be located in one central area in rugged terrain, yet close to populated areas because of transportation requirements.

The local population constitutes the main source of food supply, procurement, and transportation. These items are obtained through agricultural taxes, contribution drives, and labor drafts. The Forward Supply Councils regulate these resources.

Regiments are given an initial 30-day issue of rice, to be replenished when half consumed. In addition, regional staffs maintain a one-month stock of supplies for all forces operating in their area. According to one document, one-third of the prescribed stock is stored in depots while the remaining two-thirds is dispersed among the civilians for custody; thus, each village and hamlet could be considered a Viet Cong depot. As a regiment moves, it draws rice from depots or villages located along its axis of movement, thus making it possible for soldiers to keep the prescribed 7-day supply of rice in their individual packs as emergency reserves.

Each regiment is assigned an area in which food is purchased. The regiment's Rear Services Staff sends out purchasing teams to this area to contact local Viet Cong authorities and arrange purchases.

Cloth is purchased by Division teams, then transported to the Division depot for issue to the clothing manufacture section. One such section had 31 sewing machines, dispersed in two villages, with local women doing the sewing. The output was 2.5 uniforms per day per machine (the goal was 4).

In the ordnance area, the Division is capable of producing bangalore torpedoes and concussion grenades for its own use. Weapons maintenance in one case was said to be poor, owing to troop neglect and a lack of rags and grease. Ammunition supply was "fair."

The Division has two principal medical units: a medical battalion and a field hospital. As of November 1965 the medical battalion could accommodate 40 serious or "moderate" patients and 40 "light" patients. It is organized in four companies and has the apparent mission of providing first-aid and medical-evacuation support to the combat units. The field hospital is organized into two field dispensaries; the larger of these had a strength of 42 men, 60 beds for moderate and serious cases, 70 beds for light cases, and medical supplies for 150 patients. Each regiment had from one to three surgical teams. Health preservation was said to be good, resulting in a combat strength of 95-97 percent.

Another captured document describes various Rear Services Organizations below Division level. The regimental Rear Services organization comprises the following: a financial affairs chief; a quartermaster chief, with assistants for food supply and clothing equipment, warehousemen, and tailors; a medical chief, with dispensary and drug storage, and assistants for preventive medicine; an ordnance chief, with ordnance repair station, warehousemen, and assistants for maintenance and statistics/registration; and a transportation company.

The battalion Rear Services organization has a clothing supply section, a medical officer, an ordnance section, and a transportation platoon. The company Rear Services organization has a clothing supply cadre, a medic, and an armorer.

The organization of the Sao Vang Division is compared with that of a Region Independent Battalion in Table 2.

Table 2

COMPOSITION OF TWO VIET CONG UNITS

Unit	Strength	Percentage
Sao Vang Division		
Three regiments	8,134	65.8
Three artillery battalions	1,582	12.8
Transportation battalion	391	3.2
Medical units[a]	546	4.4
Telephone company	126	1.0
Military staff	350	2.8
Political-military school	171	1.4
Recruit training	378	3.1
Numbered units, no function given	623	5.0
Total	12,360	100.0
A Region Independent Battalion		
Battalion headquarters	19	
Signal platoon	46	
Recon sapper platoon	39	
Engineer platoon	21	
Transportation and medical evacuation platoon	30	
Combat support company	87	
Three infantry companies	405	
Total	647	

Note:

[a]The medical support factor derived in the text includes medical personnel in lower echelon units.

GUERRILLA LOGISTICS

> During the day I worked in the field watching buffalo and farming. At night I guarded the village and spread propaganda.[1]

Before discussing guerrilla logistics, it is appropriate to define some of the types of paramilitary forces active in South Vietnam. At the bottom of the scale are the militia, or self-defense forces. The militia functions as local police and are usually found in the "combat hamlets." In addition to exercising police functions, such as arresting strangers, they supervise the construction of fortifications. Sometimes they have only sticks as weapons, although they may be issued grenades (seldom rifles).

The hamlet or village guerrillas are somewhat better organized and equipped. There are two types: (1) the part-time guerrilla, who lives at home and has occasional guard duty or participates in sweeps; (2) the full-time or "concentrated" guerrilla, who may or may not live at home and is organized into squads (at hamlet level) or platoons (at village level). The full-time guerrilla circulates in his general area, protecting villages, harassing GVN forces, arresting strangers and defectors, and acting as part of an intelligence and warning screen. His equipment varies -- sometimes only one in five guerrillas has a rifle.

At district and province levels, we find independent platoons, and sometimes companies of full-time guerrillas. These are sometimes referred to as district or province units, or local forces, or as Local Forces as distinguished from (regional) Main Forces.

There is at least one more category -- secret guerrillas. These operate in cities or in contested villages.

The guerrilla is often on his own, logistically speaking, after he receives his initial issue of a rifle and a small quantity of ammunition (perhaps 50 rounds). After that it may be up to him to capture weapons, ammunition, and equipment for his own use.[2] There are not

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[1] AG-164, a village guerrilla.

[2] On the other hand, he may be resupplied in about the same way as a Main Force unit (see below).

always enough rifles to go around, and those without weapons, if they go into the field, act as supply carriers, cooks, aidmen, and so on.

One of the main functions of guerrilla forces is to provide security for lines of communication. In one district, for example, the Viet Cong planned to establish guerrilla bases in three of the 16 villages, thus providing security to the commo-liaison corridor through which strategic goods were moved, or along which they were hidden awaiting a favorable occasion for movement. Also, it was estimated that each village had one platoon and a blacksmith producing weapons and traps for antisweep operations.

In the same district, each village had 25 to 36 guerrillas. In another, there were 298 guerrillas and 750 hamlet self-defense members at the end of 1964. On the average, a rifle was issued to one out of five guerrillas, and three grenades were issued to each self-defense member.

From another source, the grand total for eight districts was: 894 concentrated guerrillas, 453 secret guerrillas, 1,841 hamlet guerrillas, and 6,985 self-defense militia.

The resupply of ammunition to guerrilla units has been described as follows:

> A district unit was resupplied from ammunition in a different way from the regional main force unit. A Russian rifle was only equipped with 150 rounds and the fighter had to shift for himself when he had finished off his ammo. Only when the district unit approved it would the fighters receive what they needed. Their main source of resupply was their military proselytizing operations, meaning their penetration agents were in charge of providing them with ammunition. From their main ammunition storage point they delivered it to the work camp, also called the rear service of the district. Then the district distributed it to the unit. The regional main forces had a transportation group which had to get in touch with the rear service at the same place and carry the ammunition to the fight.[1]

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[1] AG-192.

> Ammunition was distributed to each unit up front at a determined ratio: 100 cartridges for each gun used by a province combat unit, 80 for district, 50 for village, 25 for hamlet units. Following each battle those who wanted to get a supply of ammunition were to bring in empty cases of cartridges they had fired. Empty cartridge cases were sent to the Front machine shop which transformed them into new and useful cartridges.[1]

> There was no direct supply of ammunition to the guerrillas. Each guerrilla was given 35 to 50 rounds of ammunition for use according to fighting capacity. If he had used all his ammunition it took about one week to resupply him. A request was then sent to the district military affairs committee through the commo-liaison agents. In general a request was made when the quantity of ammunition was reduced to one-half or one-third.[2]

> Ammunition was stored in a small depot inside the district office. It was permanently supplied by commo-liaison agents and had about 500-600 rifles and grenades in wooden crates.[3]

A weapons worksite at Chau Hoa village, Kien Hoa province, provided arms and ammunition to the local guerrillas and hamlet self-defense units. This worksite produced rifles and booby traps; repaired damaged rifles and dud mines and grenades, and supplied spikes. Each cadre in the military affairs sections of various hamlets had to contribute two days of work per month at the worksite (2100 to 0200 hours).

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[1] AG-50.

[2] AG-245.

[3] AG-73.

III. LOGISTICS SUPPORT FUNCTIONS

This section is a collection of data, from many sources, on the broad subject of Viet Cong logistics. In some cases, the data are used to estimate the support requirement for a specific function, such as food production; in other cases, they are only summarized for background purposes. For an explanation of the scheme for referencing sources and a glossary of ordnance terminology, the reader is referred to page vii and Appendix A. Applications of the support factors developed in this section are discussed in Sects. IV and V.

The important logistics functions are discussed first: Nonfood supply, food supply, ordnance supply and transportation.

NONFOOD SUPPLY

As of April 1967, U.S. intelligence personnel were of the opinion that the Viet Cong could purchase almost anything they wanted in Saigon by using various fronts and agents. One of the major COSVN logistical units (Rear Services Group 83) was believed to be responsible mainly for buying nonfood goods, particularly in the Saigon-Cholon area, to support Viet Cong units. The Group had many "purchasing agencies" in Saigon, employing agents to buy materials. The purchased goods were probably transferred to relay points for pickup by the Group's transportation element, then moved primarily by pack bicycle (in Saigon) and motorboat (leaving Saigon). Supply items varied. In addition to critical items for the medical, quartermaster, ordnance, and engineer branches, there were office supplies, radios, cameras, kerosene, and typewriters. During the period from October 1965 to April 1966 the following quantities of main supply items were reported to have been purchased and transported to Viet Cong bases:

Gasoline	33,200 liters
Lubrication oil	3,040 liters
Kerosene	232 cans (20 liters each)

Asphalt	123	cans
Cloth	46,802	meters
Canvas	800	meters
Diesel Oil	20,760	liters
Grease	150	kilos
Parachute cord	37,572	meters
Recording tape	20	
Plastic material	44,444	meters
Dry battery, PRC 10	2,443	
Dry battery, PRC 6	70	
Dry battery, regular size	3,910	
Flashlight	112	
Electric wire	35,880	(meters)
Tin	31,267	sheets
Pickmattock	860	
Machete	1,181	
Refrigerator	1	
Typewriter	2	

A counterfeit identification-card-production cell was uncovered in a market area of Saigon. Cards were produced for Viet Cong cadres as well as for South Vietnamese draft-dodgers. Biographical data on Viet Cong cadres coming into Saigon from Cambodia and needing false identification cards were obtained through liaison contacts.

In Tay Ninh province, near the Cambodian border, an illegal market was set up for selling goods to the Viet Cong. The exact location was changed each day, and Viet Cong commo-liaison agents led merchants to the area. Each day more than 300 people came to sell goods, including salt, cloth, tobacco, fat, kerosene, typewriters, batteries, electric wire, and rubber. Because of the danger and difficulty involved in traveling to the area, the Viet Cong paid a high price for the goods.

FOOD SUPPLY

This section discusses the general administrative characteristics of the Viet Cong food supply system, applicable to all of South Vietnam, and indicates regional differences among provinces of the Mekong Delta, the Central Lowlands, and the Central Highlands.

Management and Organization

Getting food to the Viet Cong fighting units is one of the main functions in the administration of liberated areas. The general procedure is as follows. The Finance and Economic Section first estimates Viet Cong needs for more than a year in advance, for all of the regions of South Vietnam. It assigns general quotas based on these estimates to each military region headquarters, which in turn assigns quotas to provinces. Province headquarters assigns quotas to districts, and district headquarters assigns quotas to villages. All of the participating headquarters review quotas at quarterly or semiannual intervals to make sure that food supplies are consistent with anticipated needs. These reviews permit adjustments in the quotas, and allow the Viet Cong to transship food into areas where deficits arise.

At each headquarters the agency responsible for food collection, storage, and distribution is the Party Finance and Economic Section, managed by a civilian cadre. The Village Finance and Economic Section is subordinate to the District Section, which is subordinate to the Province Section, and so on. Once the quotas are set, each Finance and Economic Section plans how to get the food. The usual methods are:

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[1]H-18, education cadre, rallier, Long An and Hau Nghia.

[2]One document, captured in southwest Kontum, implies that all Military Region Headquarters must make quarterly and semiannual reports on food stocks on hand to the National Liberation Front Headquarters. A second document states that "once every fortnight the warehouse area submits report on actual status of storage quantity on hand to district, and once a month submits report on receipts and issues made with balance on hand. The central warehouse should submit final monthly reports to province at the end of the current month." A third document reports that inspections are conducted throughout the region to ascertain that records agree with actual quantities on hand, that each cache is secure from the elements, and that food is sufficiently dispersed.

Taxation (payable in food or cash).
Fund drives (payable in food or cash).
Purchase in markets of the liberated areas.
Farming.

The Village and District Finance and Economic Sections determine where the food is to be stored and how to get it to the storage places. Food is usually stored in villagers' houses and in caches hidden outside the villages. As noted, food is sometimes shipped to other areas by order of the district, province, or region. Since storage points are dispersed throughout a region, food is never far from Viet Cong operating there; should one cache be destroyed by the enemy or the weather, the food supply will not be wiped out. In Kontum, the Front recommends that caches contain two to three tons of rice, and that villagers who stock Viet Cong rice in their homes maintain about 30 bushels.

The food-supply system is described by the former Assistant Chief of Staff, Operations, National Liberation Front 5th Division, Long Khanh Province:

> All supply for the military was from money or supplies received by the rear services from the Front Finance and Economic Section. For this reason, storage facilities were not normally maintained in excess of that required for 30-60 days.
>
> The individual's rice ration was normally brought up to the seven-day individual supply every few days.
>
> Source stated that there are two types of depots: those depots which are maintained by Front Finance and Economic Sections for normal use and those which are reserve depots for use in support of campaigns. An average district would have approximately 20 tons depending on whether or not the district produced an average or large amount of rice. In addition . . . the district would maintain 30-40 tons as a strategic reserve for campaigns.
>
> For military units the Rear Services Headquarters serving a particular area also maintains temporary and strategic depots [reserves]. Source believes that there are thousands of tons of reserve rice supplies in scattered strategic depots.
>
> Normally, regiments and divisions did not maintain reserves for the entire regiment or division, but strictly maintained temporary reserve rice depots for their

headquarters. Normally, temporary reserve depots contained anything from a few days' to a sixty-day supply of rice. A battalion usually kept the same amount for the entire battalion.

When a unit of the District, Province, or Main Forces moves into an area and requires food, it is told by the Rear Services Committee or District Headquarters which villages will feed it. Food may be obtained by purchase from villagers or from special stocks maintained by local Viet Cong agencies; or it may be had free from caches upon presentation of the required papers. Interviews with former Viet Cong members indicate that some units in the Mekong Delta area purchased most of their rice from villagers or caches. Others in Quang Ngai report that they purchased none of their rice;[1] and still others in Binh Dinh report that they bought fish, fruit and meat[2] but not rice.

The method of obtaining food through the villagers is clarified by the following excerpts from an interview with a civilian rallier from Dinh Tuong Province:

Q: Did the big units -- such as the 514th, the 261st, and 263rd Battalions -- buy food from the people? How did they do it? How did the people manage to have enough rice to sell to them?

A: Usually, each family gave to these units a few liters of rice or a few anabas.[3] These units had to buy the rest. The people had enough rice to sell to them because each family had to keep from 15 to 20 gia of paddy in reserve in order to feed the troops. Each family bred a few hundred anabas for use on the occasion of the anniversaries of the deaths of their ancestors, and not for selling. But they had to sell these fish to the troops, because they had been indoctrinated on this.

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[1] H-19 Quang Ngai, H-33 Binh Dinh, H-31 Phu Yen.

[2] H-28 Binh Dinh.

[3] Anabas: small perch-like fresh-water fish.

> Whenever a unit came to stay in a village, the Party Chapter there had to take care of food supply for the troops. The chapter sent women to the market. Each time they sent many women to the market -- sometimes a few dozen -- to buy food, because if only a few went they would each have to carry too much food back and this would arouse the suspicion of the GVN. Each woman bought a little food, and if anyone asked them they said that they were buying food to commemorate the death anniversary of their ancestors. Each village had a troop support fund. When I was in My Luong Village, we always put aside over 20,000 piasters to buy food for the troops when they passed through. The battalions repaid us later on. In addition, before a battalion arrived in a village, a rear services cadre was sent down to the village in advance to take care of the supply problem. The Party Chapter therefore knew about the impending arrival of the troops and arranged everything in advance.[1]

The purpose of the food-supply system is to raise food and money for the Viet Cong. The civilian organization that administers the system in liberated areas does not travel with the fighting units, nor is it an integrated part of the military. Units of company and battalion size, therefore, have to spend some part of their time going to special locations to obtain food; in this process, they ignore commercial markets, which might be more convenient. The unit must make sure it does not operate where it will be cut off from the source of supply. (This is not a major problem in heavily populated rural areas, because a Viet Cong food supply is available in nearby villages.)

The Forward Supply Councils, as discussed in the previous section, have the responsibility of keeping food supplies flowing to destination points among combat troops, particularly Main Force units. They also provide tight management of food supplies as indicated in the following directive:

> Close control will be exercised on inventories and transportation and coordination with the local forward supply council will be required in order to regulate the flow of supply. Units must store one-third of their prescribed stock in their depots and the remaining two-thirds

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[1] DT-140.

among the civilians for custody. Exception to this rule is made for the storage of rice in mountainous areas where rice depots can be constituted according to tactical requirements providing that caution against air strikes is taken.

Production

Quantitative data on the effort required to grow crops are scarce, even for rice production in South Vietnam. Table 3 is based on the most detailed descriptions found, which was for a village in the delta growing "single-transplant" rice.[1] It shows an annual total production effort of 77 man-days per hectare of riceland. The U.S. Overseas Mission Statistical Bulletin (1964) shows a productivity of 2.23 metric tons per hectare in Dinh Tuong province, which would amount to 35 man-days per metric ton of paddy. This would be on the high side according to MACV estimates in 1966:[3]

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[1] Four types of rice, differentiated by growing technique, are common in Vietnam:

Single-transplant rice. This is the most common type, grown on 69 percent of the cultivated area. The seed is cast on relatively dry ground at the beginning of the rainy season. In a month, when the water level has risen to 10-20 cm, the rice is transplanted to a prepared paddy. Single-transplant rice falls into three subcategories according to the time required to bring it to harvest: the early crop, the middle or mid-season crop, and the peak or late-season crop. Some 25-50 days are required for the seedlings to develop, and 75-150 days for the crop to mature after the seedlings are transplanted.

Double-transplant rice. This type of rice is transplanted twice, as required, to avoid destruction by a rising water table, generally where the terrain is gently sloping. This method is used on only 4 percent of the cultivated area.

Floating rice. This type of rice covers 22 percent of the cultivated area. It does not really float, but grows tall to keep above rising waters. It may survive in water as deep as 4-5 meters, provided that the rate of rise does not exceed 5 cm per day. This is sometimes called brown rice and is considered to be of inferior quality.

Upland rice. This type of rice -- also called slash-and-burn or highland rice -- covers only 5 percent of the cultivated area. It is grown on the plateaus and sloping hillsides of central South Vietnam and is considered of inferior quality. No paddies are required to grow it, and its only source of moisture is rainfall.

Table 3

RICE PRODUCTION CALENDAR FOR A DELTA PROVINCE

Activity	Density (Men/Hectare)[a]	Typical Period[a]	Man-days/ Hectare[b]
Plow and harrow for planting	1	25 April-10 May	15
Plant	1	11 May	1
Tend seedlings	0.2	12 May-3 June	4
Plow and harrow for transplanting	1	27 May-3 June	7
Transplant[c]	1.1	4-15 June	12
Tend growing crop	0.1	16 June-16 December	18
Harvest:[d]			
Early	1	15-20 September	5
Middle	1	5-10 December	5
Peak	1	20-30 January	10
			77

Notes:

[a]Although some periods overlap, the activities occur on different sections of riceland and the labor density is not additive.

[b]Conservative (high) estimates combining data from Hickey and Hendry. One hectare is 10,000 square meters.

[c]Usually done by women.

[d]Using a yield of 120 gia/hectare and harvest manpower of 1/6 man-day/gia, a total of 20 man-days/hectare is obtained for harvesting. This is arbitrarily broken down by harvest period. One gia = 40 liters = 19 kg of paddy (unmilled rice) = one bushel. On the average, 19 kg of paddy yields 11 kg of milled rice and 1.4 kg of broken rice.

Sources:

Gerald C. Hickey, Village in Vietnam (New Haven: Yale University Press, 1964).

James B. Hendry, The Study of a Vietnamese Rural Community -- Economic Activity, Michigan State University Viet Nam Advisory Group, December 1959. Also published as The Small World of Khanh Hau (Chicago: Aldine, 1964).

Type of rice	Man-days per metric ton (Paddy)
Single-transplant	24
Double-transplant	41
Floating	9
Upland	35

As shown below, the annual per capita consumption of paddy is around 400 kg. Using the 35 man-days per metric ton for Dinh Tuong, a person would have to spend about 4 percent of his time on rice production if he grew rice for his own subsistence.

Some notion of the geographical variation of rice production, population, and area under cultivation can be gained from the following comparison:[1]

Province	Region	Paddy Production (Metric Tons)	Population	Riceland (Hectares)	Production per Hectare (Metric Tons)	Persons per Hectare
Dinh Tuong	Delta	211,000	608,100	100,000	2.11	6.08
Quang Ngai	Central Lowlands	137,000	673,400	84,000	1.63	8.02
Kontum	Central Highlands	8,000	117,100	10,000	0.80	11.70

We can measure the potential labor force per metric ton produced by ratioing the last two columns, which gives a low of 2.9 persons per ton for Dinh Tuong and a high of 14.6 for Kontum. But according to the previous text table the labor required per metric ton of upland rice (35 man-days) is only 50 percent more than that required for Delta (single-transplant) rice (24 man-days); therefore, the labor force available to the Viet Cong in rice-poor areas may not be affected by the fact that rice is harder to grow in such areas. Other types of food have to be grown, such as manioc; however, it is likely that these

[1]The data are for 1965-1966.

other products are less sensitive than rice to labor shortages during critical periods of the growing cycle.

The Viet Cong have imposed a self-sufficiency requirement on all military units and cadres. In addition to his regular job, each man must spend some days each year in agricultural work or other labor to help villagers who supply the bulk of Viet Cong food. The basic requirement for 1966-1967 as outlined in one captured document is that "each unit member will be self-sufficient for two months in the year." Other documents translate this into 20 days of labor per year working harvests, digging wells and dikes, caring for crops, or preparing village defense. Higher self-sufficiency requirements for individual units are also reported.[1]

A regional production site in Phu Yên province is reported to have produced rice, bananas, manioc, squash, and corn in quantities estimated to be sufficient to support a Viet Cong battalion permanently. Oxen and breeding cattle were seen at the site. Out of approximately 150

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[1]For example, interview H-21 Q13 says that a Main Force unit, Company 5, 2nd Regiment, Binh Dinh, had a 50-percent self-sufficiency quota. A comparison of self-sufficiency requirements in food-rich and food-poor sections of Vietnam is illustrated by the following: In the case of the 5th Division in Long Khanh Province, self-sufficiency amounted to much less than one-sixth. The same source says that agricultural production is not normally carried out in a Main Force base area; or if it is, it is conducted away from the unit location within the base area. This production is normally in a liberated area. According to the source, approximately one squad from each regiment was engaged in production under the direction of a Rear Services cadre. The majority of personnel involved in agricultural production were persons in poor health or in need of a rest. The policy was that agricultural production be done to supplement items not available on the local economy.

At the other extreme, units in Quang Tri Province (the northernmost in South Vietnam) had to be largely self-sufficient. Main Force units were fed for four months and had to live on their own for eight months. Operating in local areas, each soldier should support himself for 12 months. If soldiers had to go on missions, a number of them had to stay home to perform production work.

people at the site, most were soldiers or cadremen who had violated Viet Cong rules and were being punished; others were volunteers. During the day the laborers divided into many small groups to farm and clear areas in several Montagnard villages.

The rationale for the farming program is partly explained in a 1965 document captured in Long An. "With adequate farm production we will not be forced to buy food from the cities at high prices--200$/bu rice, or 45$/kg meat or chicken, etc. Good rice, fresh cane, fertile ricefields aren't enough. We should raise water buffalo, cows, pigs, chickens, ducks to furnish people, units and agencies with daily food and the surplus can be sold for a large sum of money. Requirements of farm production for self-sufficiency aim at increasing the food supply for the people's use, enriching party funds, and reducing people's contribution."

In the Central Highlands and the mountains bordering on the Central Lowlands, the Viet Cong do not have easy access to the food supplies accumulated by the villagers, owing to the distances between villages. The farmlands where rice is grown lie along the narrow coastal strip, which may be a three-or four-day walk from where the units are operating. Montagnards populate the inland regions but the density of their settlements is low. In Kontum, for example, villages can be five days' walk apart. Because the steep terrain cannot be flooded, the Highlands are not generally suitable for rice production. Manioc, sweet potatoes, and corn are the Montagnard staples, a diet the ethnic Vietnamese find less desirable than rice.

In their own production units, the Viet Cong are forced to grow principally manioc, corn, sweet potatoes, and, where possible, rice. The food eaten by units living in the mountains comes

from both the people and the production areas. There is a system of rice caches in these provinces which are filled by bearers from villages and local guerrilla units. Combat units are permitted to take food from the caches, but other units have to go directly to the villages where the food is stored. Some of the documents indicate that food produced by the Viet Cong is stored for emergencies, and the ordinary needs are met by the villagers' stocks.

In the south, where food is more plentiful, the documents and interviews present a different picture. Raising food for sale is mentioned frequently: "The function of the food production areas was to raise money. At least 600$/man was considered the minimum, and it was obtained by selling the food produced on the commercial market. The money thus obtained was turned over to higher authorities" (for example, District and Province Headquarters).[1]

The Viet Cong guidelines for self sufficiency claim that, in the Mekong Delta provinces, contributing money to the self-sufficiency fund is not enough, because the money is obtained by individual Viet Cong troops hiring themselves out to landowners at harvest time and surrendering the wages. The troops prefer that the money come from the sale of their own produce so that they directly control the food supply.

The Viet Cong discourage the sale of produce and animals in the GVN markets by confiscating the profits of such a transaction. In some villages these sales must be to the Viet Cong, who are alleged to resell the goods at higher prices -- the profits going to themselves and to the system. A rallier in Vinh Binh said, "People are forbidden to take rice out of the liberated villages. If anybody had more rice than he needed he could sell it only to the Front. The Front set up control stations on the village roads to check on

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[1] H-7 rallier from the Economic and Finance Committee of Chau Than District, Dinh Tuong. Interviewed 22 February 1966.

activities of the villagers. Potatoes, manioc, oranges, and coconuts could be sold on the GVN market if money taxes were paid to the Front on the receipts."[1]

In the Rural Administrative Procedures Guide, a manual for the control of the liberated areas, dated July 1965, the Viet Cong prohibit the people "from transporting foodstuffs, livestock from our zone to the enemy zone, with the following exception: Farmers actually need to buy buffaloes and cows for farm work and exchange goods (except rice and paddy) of equivalent value."

There are reports of illegal transport of rice into Cambodia, usually by boat, for both processing and storage.[3]

Several reasons can be found for the Viet Cong's controlling food production in the villages and trying to increase the cultivated acreage. We will venture two:

1. The buildup of regular Viet Cong forces in 1965 and 1966 increased the demand on the food-supply system. This tended to aggravate inefficiencies in the food distribution system, pointing up the need for greater control.

2. Food production in some of the liberated areas declined after 1962 because of insecurity, Viet Cong land reform, GVN operations and population resettlement, and high taxes on both sides. Several interviews discuss the disincentive of high Viet Cong taxes,[2]

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[1] AG-421, rallier, Party member, Battalion staff office head clerk, interviewed June 1966, vinh Binh.

[2] PIE-30, Dinh-an Village, Chuong Thien Province: "Last year I harvested 960 gia and paid 450 gia in agricultural tax. This year I have not farmed any land.... From time to time operations were conducted by the GVN last year which resulted in large destruction of property and cattle."

PIE-31, Dinh-an Village, Chuong Thien. Since taxes levied on production have been too high, the farmers have been discouraged in increasing production in spite of efforts made by cadres to induce farmers to increase production.

the disturbing effect of Communist land reform, and the gaps caused by refugee programs that send middle-class farmers to live in the cities.[1]

Diet Analysis

A Viet Cong soldier's diet is compared with that of a "growing boy" in Table 4, both amounting to around 4,000 calories per day. Some substitutability is indicated: The Viet Cong diet is heavier on vegetables and much lighter on meat and fish. A porter's diet may consist mostly of rice, but his ration is higher (1,200 instead of 750 grams). Also, a bare subsistence diet might be substantially less. Over a hundred years ago, a captured seaman traveled by foot across Cochin China and observed that prisoners were given 15 pounds of rice per month, which was "hardly enough to keep from starving."[2] This converts to one-half pound per day, or only 225 grams (790 calories). According to a League of Nations publication in 1937, a patient's diet in a Cochin China hospital amounted to 2,600 calories per day.[3]

Judging by the data in Table 4, rice accounts for 40-50 percent of the weight and around 70 percent of the caloric value of a Viet Cong soldier's diet -- hence the importance of rice production.

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[1] AG-395, civilian worker, rallier, Phu Tho Hamlet, Phu Sung Village, Ham Thuan District, Binh Thuan Province. Interviewed May 1966: "A 132: Land reform has decreased productivity because: (1) Middle-class farmers (10-20 hectares) left the village. (2) Poor farmers didn't have enough buffalo to till ricefields. (3) The Front recognized the decrease of output and assessed the 1964 harvest at 4300 carriages, but the 1965 harvest at only 3000 carriages of paddy."

[2] Edward Brown, A Seaman's Narrative of His Adventures ... 1857-58, (London: Charles Westerton, 1961).

[3] League of Nations, Health Organization, Intergovernmental Conference of Far-Eastern Countries on Rural Hygiene. Preparatory Papers: Report of French Indochina, League of Nations Publications, III: 1937.

Table 4

COMPARATIVE DAILY DIETS: VIET CONG SOLDIER AND GROWING BOYS

Food	Grams/Day	Calories/Gram	Calories/Day
Viet Cong Soldier's Diet, Based on Self-sufficiency Requirements			
Rice	750[a]	3.50	2,630
Manioc	904	1.20	1,090
Meat and fish	55[b]	2.00	110
Potatoes	164	1.20	200
Fruit	110	0.75	80
Total	1,983		4,110
Ration for Growing Boys[c]			
Rice	800	3.50	2,800
Meat and fish	275	2.00	550
Fruit	100	0.75	75
Vegetables	440	1.20	530
Total	1,615		3,955

Notes:

[a]Rice ration is based on general survey of source materials.

[b]Various sources differ as to the exact amount. A compromise value of 55g/day is used here. Note the tendency on the part of the Viet Cong to substitute vegetables for meat and fish (comparing the two diets).

[c]League of Nations, Health Organization, Intergovernmental Conference of Far-Eastern Countries on Rural Hygiene. Preparatory Papers: Report of French Indochina, League of Nations Publications, III: 1937.

Food Consumption, Stocks, Rations, and Sources

The following guidance is given by a Viet Cong document on the subject of food stocks and rations:

Prescribed Stocks:

> Soldiers should have at all times in their individual packs seven days of rice supply (two days of roasted rice, five days of normal rice). Regiments must have from 10 to 13 days supply, to be replenished when nearly consumed.[1] Upon movement the regiment should return its depot with the remaining rice to the division or region sub-rear service. The division or region sub-rear service must have 30 days of supply for all forces operating in their areas of jurisdiction (excluding the regimental and individual rice packs) with emphasis on the area where mobile forces are likely to operate. Dispensaries and hospitals must have 60 days of supply. Salt is collected in the [weight] ratio of 22/1 in the lowland and 20/1 in the mountainous area. Wastage factors should be kept below three percent for a duration of six months.

Allowed Daily Consumption Rate:

> In mountainous areas: infantry troops in bivouac, 500 grams of rice plus 500 grams of seasonings; infantry troops in movement and combat, 750 grams of rice; artillery troops in bivouac, 750 grams; in movement and combat, 875 grams. In the low land, infantry and bivouac, 700 grams; in movement and combat, 750 grams; artillery troops, same as above. As for foodstuffs, one man is allocated two kilograms of meat per month and 300 grams of vegetables per day.

Another document gives the following instructions on food storage by a Division Rear Services staff:

> (1) Each battalion should maintain a prestock of rice for a seven-day supply and of dry food for a 30-day supply at all times; (2) each regiment should at all times maintain a prestock of rice for a 20- to 30-day supply and of salt for a two-month supply; (3) company-size and smaller units attached to the regiment will receive their rice and salt supplies from the regiment; (4) the permanent civilian

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[1] Another source states 30 days, to be replenished when half consumed.

> laborers will receive rice and food supply from the units in which they serve after the prescribed period of self-supporting. The individual daily ration is three cans of rice and two piasters of food allowance; (5) for the procurement and storage of meat, salted fish, sugar, milk, etc., the forward supply sections of the concerned regiments are to coordinate with the local finance economy elements.

Toward the end of 1965, the Sao Vang Division's rice was stored in numerous "depots," some of them undoubtedly villages with rice dispersed among the households. A captured document shows the plan for rice supply of the Division, which had 12,360 men in December 1965.[3] Deliveries were to be phased over a period of 50 days and amounted to a total of 1,077 metric tons. Division consumption in a 50-day period would have been approximately 460 metric tons (at 650 grams per man per day), so it appears that a supply buildup was planned. At the end of October, 650 metric tons of rice were stored in various depots. The largest separate cache was 400 tons.

Much smaller caches are sometimes reported. For example, 10,000 kilograms of rice were reported stored in civilian homes, and a cache of 200 bags was reported stored along a river bank.

There is evidence of individuals' drawing a one-month supply of rice from a "liaison protection house." (This would be about as much as one man could carry, since it would weigh 50 pounds.) Only part of this would be carried by soldiers on the march; the rest would be moved on boats, if possible, or left in storage at villages in the area.

An interrogation report on a Viet Cong rice depot near the Cambodian border gives the following information:

> While source was receiving military training he was instructed to go with 25 men from his company to pick up rice. The rice depot was installed in a dense wood difficult to discover by air observation. The warehouse was a thatched roof building approximately 7 x 10 meters. The rice stock was estimated at 40,000 liters. The depot was located six km from the base of the 5th Battalion. The leader of the team (the company adjutant) should appear to the guard prior to entering the rice depot where every soldier got 40 liters of rice.

A liter of rice weighs about 750 grams, so this was a very heavy load for every man (around 66 pounds). However, the distance was short.

In Kien Tuong Province the daily individual ration for Viet Cong cadres and troops in 1965 was fixed at one liter of rice (valued at four to eight piasters) plus two piasters for other foodstuffs. The Viet Cong did not supply food systematically, but allocated money for purchase from the populace. (This was a relatively well-to-do province, so food was available for purchase.) Usually, the food allowance was not sufficient, so the local people would give additional food. After completing their duties, Viet Cong troops would participate in food production such as growing vegetables and catching fish. If they caught more fish than they needed, they would sell the surplus to the people. In the rainy season the fields would be flooded and would abound in small fish. During the dry season the water level would fall, leaving the fish in hollow places where they would grow. Occasionally the catch in such a place would be worth as much as 4,000 piasters.

Under these relatively good living conditions, the Viet Cong were expected to shift for themselves economically for a portion of the year, as follows:

Combat cadres and troops -- self-supporting for two months.

Cadres and troops employed in military organizations -- self-supporting for four months.

Cadres employed in civilian organizations -- self-supporting for six months.

These standards were easily met in this province.

Actual consumption data for the 3rd Regiment, 1st Division, Military Region V, are indicated below.

Month	Cans of Rice[1]	Piasters for Food
September 1965	201,022	201,919
October 1965	213,042	218,398
November 1965	201,396	169,199
January 1966	175,352	183,856

Assuming a regimental strength of 2,700 men (as in the Sao Vang Division), these figures indicate a consumption of two to three cans of rice per man per day.

One company of 77 men reported a rice allowance of 6,752 cans (85 cans per man, or about a one-month supply), a salt allowance of 152 cans, and a cash allowance of 4,848 piasters. This rice allowance meets the regimental standard of 30 days, but the company seems to have been short on salt and cash.

A battalion moving about in a rice-rich province, such as the 261st in Dinh Tuong province, would usually buy its rice instead of carrying it:

> Rice was always purchased from the inhabitants of villages where the battalion settled. We stayed in a village only from one to four days each time, but when we left a village it was to move to another. We settled in a forest only when we prepared to attack a GVN post near it. In this case we brought along rice bought from the inhabitants of the village we had left the day before.[2]

A captured document gives quartermaster guidelines and missions for 1965:

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[1] One can holds one-third liter. The ration per man varies from two to five cans per day, depending on availability and type of activity.

[2] AG-195.

> Each person is issued 750-900 grams (of rice) every day. In the base, 300-375 grams are issued; in combat units, 750 grams; in the delta, during the operations and TDY mission, 500 grams.
>
> Strive to keep a six-month reserve stock. Distribution: province, two months; company, two months of rice and two months of paddy.

Another directive, apparently from the Sao Vang Division, gives the following instructions:

> Permanent Reserves: A Battalion-size unit must have from seven days to one month of dry provisions; a regiment-size unit must have from 20 days to one month of rice and two months of salt (for both battalion and regiment).
>
> Food administration: After a fixed period of self-sufficiency, the full-time laborers receive the same rations as those of the troops: three cans of rice and two piasters per day. In the attack on strongholds as well as during an ambush, each soldier must have a two-day rice ration on his back.

The same document reports on the reasons for food deficiencies:

> The entire quantity of rice fixed in the plan would be collected from the people but the people had not as yet gathered crops from the field. We dare not confiscate all rice in stock by the people. In addition, the selection of civilian laborers is difficult because most of them are engaged in the harvest.
>
> A large number of troops arrived at the depot area and cooked everywhere. This frightened the people and caused difficulties at the rice depot.

The allowance of foodstuffs other than rice is reported, in grams per man per day:

Meat and fish	8
Salted fish	.18
Coconut oil	6
Bean and sesame	9
Vegetables	.80
Salt	.25

Agricultural Taxation

The agricultural tax levied by the Viet Cong is 80-90 percent of the revenue of the COSVN budget. Collections are made at the time of the harvest to insure the greatest yield. Cadres are responsible for collecting the tax under the direction of province and district Finance and Economic Sections.

In the Mekong Delta region, the main collection item for the Army Support Tax is paddy. Secondary items are sugar cane, bean, and other types of cereal, all collected during the appropriate harvest seasons. The tax rate on farm output is progressive, ranging from 5 percent on farms producing 10 bushels to 25 percent on farms producing more than 146 bushels per season. The poorest farmers are not taxed, but are asked to give as much as they can. Persons, such as rubber workers, who cannot contribute food contribute money according to a graduated scale.

Additional tax burdens are also reported. Families are asked to contribute one handful of rice per meal to a troop support pot. This pot is collected once or twice a month by the village women or village guerrillas under the direction of the village cadres. The food is used to feed local cadres and the village guerrillas.

Food Shortages and Viet Cong Operations

Ralliers and defectors report that they went hungry only infrequently, and then for only one or two days. The cause of food shortages is usually accidental. For example, in one case, a squad on patrol was cut off from camp by GVN soldiers blocking the route. They were forced to wait a day or so until the force moved on, permitting them to return to camp.

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[1] H-22 Binh Dinh.

[2] PIE-102 Chuong Thien.

[3] H-18 Long An and Hau Nghi.

[4] Ag-421, Q147, Vinh Binh, Battalion Staff, office head clerk, military rallier. AG-440, Q58, Tay Ninh, Long Khanh, civilian worker rallier.

A more serious situation occurred in Military Region VI (Binh Thuan, Lam Dong, Phuoc Long, Quang Duc, Tuyen Duc, and Ninh Thuan provinces) during February-April 1966. Rice was not locally available in the region. Except for Binh Thuan, the provinces had barely enough rice to feed their local forces for the coming months. The reasons given for the scarcity were the rarity of game and the GVN toxic spray program. Food to support the region's campaign would have to be brought in from Cambodia through Phuoc Long. Furthermore, the supply of laborers to bring the rice to the campaign-objective area was insufficient for the needs. In February 1966, soldiers spent seven days prepositioning rice, and through the February-March period, at least one-third of the combat strength was diverted to rice transportation.

Viet Cong reaction to the GVN food-denial programs depends on local factors. The former Assistant Chief of Staff of Operations, Front 5th Division, operating in Long Khanh and Phuoc Tuy provinces, said that rice stocks could be replenished within 10 days following their seizure, depending on the availability of transportation and the quantity seized. For example, in May-June 1966 a GVN/U.S. force seized a 30-day rice supply for the 5th Division near the Tuc Trung rubber plantation in Long Khanh. The rice was replaced in five days with no apparent degradation of combat effectiveness.

ORDNANCE: MANUFACTURE AND RESUPPLY

Manufacture

One captured document gives details of the proposed organization and manning of a number of Viet Cong ordnance worksites[1] as shown in Table 5. The monthly production quotas do not seem to be consistent with the breakdown of manning by specialty, although this is hard to

[1]Translations vary: these are also called "shops," "engineer repair shops," or "munitions workshops."

Table 5

PROPOSED MANNING AND PRODUCTION QUOTAS FOR VIET CONG ORDNANCE WORKSITES

(Gia Dinh and Hau Nghia Provinces)

Location	Production Manning[a]							
	Grenades	Mines	Mold	Ammo Reload	Chemical	Lather-Fitter	Forge	Total
"Y" ord. sect.[b]	10	2	10	3	13	8	-	46
Nha Bi	(c)	(c)	10	(c)	7	12	-	29
Di Anh	-	-	6	-	3	5	-	14
Go-Mon	-	-	15	-	5	-	-	20
Cu Chi	-	3	8	3	8	4	3	29
Thu Duc	5	-	7	(d)	6	-	4	22
Binh Tan	-	-	10	(c)	8	6	-	24
Total	15	5	66	6	50	35	7	184

Location	Monthly Production Quota					
	Grenades[e]	Bazoo-Mines	Explosive Charges[f]	Reload Cartridges	Rifle Grenades	Mines
"Y" ord. sect.[b]	1,500	20	500	3,000	500	85
Nha Bi	1,000	15	100	2,000	200	-
Di Anh	500	5	100	1,000	-	5
Go-Mon	800	-	200	1,000	200	-
Cu Chi	1,000-1,500	-	100	-	300	20
Thu Duc	500	5	100	1,000	100	5
Binh Tan	1,000	10	1,200[g]	2,000	300	10
Total	6,300-6,800	55	2,300	10,000	1,600	125

Notes:

[a] Excluding support manning.

[b] Possibly a province workship; others are district worksites.

[c] Included in fitters.

[d] Included in forgers.

[e] Hand and trap grenades.

[f] 500g charge.

[g] Includes 1,000 shaped charges.

judge because of overlaps and variations in the way the production functions are described. For example, the chemical specialists, lathers, and fitters may work on several types of weapons, and the molders may take part in ammunition reloading.

The discussion of ordnance expenditure and resupply, below, includes sample data on Viet Cong weapon and ammunition stocks. When these data (and further details in Appendix A) are combined with the ordnance-worksite data of Table 5, some tentative ordnance support factors can be derived. It appears that ammunition reloading can be a substantial support requirement. If a Viet Cong unit is in almost daily combat -- requiring 10 basic ammunition loads per month, as in part C of Table 6 -- 0.88 ordnance worker per soldier would be needed to reload ammunition of 50-caliber size or smaller, and to make grenades, assuming that ordnance manning must match ammunition expenditure. The hypothesized intensity of combat is highly unlikely, however.[1]

Unexploded bombs and shells retrieved from the GVN provide a source of explosives for the ordnance shops. Napalm filler is used for small hand bombs.[2]

Some sample data on ordnance production may be of interest. One ordnance shop produced, each month -- in addition to repairing weapons and reloading 1,500 cartridges -- 1,230 grenades of various types, 175 hand grenades, and 80 mines. It also manufactured delay mechanisms for time bombs and mines. The 27 personnel of the shop were organized into 4 cells: molding, finishing, foundry, and administration and security. A lathe was included among the regular shop tools.

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[1] In Sect. V an ordnance support factor is derived based on the estimated production in Dinh Tuong Province. As indicated here, a much higher factor is obtained if ordnance manning is required to match ammunition expenditure.

[2] AG-129.

Table 6

SOME VIET CONG ORDNANCE SUPPORT FACTORS

A. Production Manpower

8000 grenades/month ÷ 184 men = 43 grenades/man-month[a]
3000 ammo reloads/month ÷ 3 men = 1000 reloads/man-month

B. Ammunition Loads[b]

Military Unit	Strength	Small Ammo Carried (Rounds)	Ammo (Rounds/ Man)	Grenades Carried	Grenades/ Man
502nd Battalion, 271 Company	148	9,000	61	-	-
Recon. Squad	14	1,750	125	12	0.86
Signal Platoon	43	-	-	40	0.93
334th Battalion, 1st Company	117	20,700	177	-	-
Platoon	31	6,000	194	52	1.68
Regiment	2,372	176,944	75	3,593	1.51
Guerrilla Squad	9	-	-	30	3.33
Regiment	2,955	136,342	46	2,170	0.73
	Average Load		113		1.5

C. Ordnance Manpower per Combat Troop

Requirements	Basic Loads Expended per Month		
	10	5	1
(1) Ammo reloaders required	0.62	0.31	0.062
(2) Grenade makers required	0.26	0.13	0.026
Total	0.88	0.44	0.088

Notes:

[a]Probably below minimum production; other data show as high as 200 grenades per man-month, but the contribution by other specialties (molders, fitters, etc.) is not known.

[b]Based on Appendix A. These are actual quantities rather than authorized basic loads.

One very small shop was located in a villager's house. Its job was to fabricate antipersonnel mines and muskets, without machines and using only three workers. About 30 mines and 3 muskets were produced every month from gunpowder and sheet iron supplied by the village committee. Another workshop had about 40 workers and each month produced some 200 mines and bangalore torpedoes, the latter weighing about 1.5 kg each. A province workshop with 80 workers and 20 guards had a foundry with a monthly output of about 500 mortar shells.[1]

One captured document included a table of estimated production times for weapons and ordnance spare parts, given below in Appendix A. One worksite was a region-level facility charged with the maintenance of weapons and the production of antitank mines, Claymore mines, antipersonnel mines, and ammunition for all types of weapons, including mortars. This site had about 20 workers and a 30-man protective force. A worksite in Long An province employing 20 men manufactured 2000 rifle rounds per day, as well as unknown quantities of grenades and mines. A large worksite in Quang Tin province supported three districts, employed 250 workers, and manufactured or repaired about 50 weapons in a 24-hour period. Explosive devices were also manufactured. This site operated only at night, from 2100 to 0400 hours. Every day a 40-man labor group went to a nearby village to purchase iron for the worksite. Tools and equipment were brought from a district town and transported part of the way by a 30-man pedicab group.

Although there is some information in captured sources on "basic loads" (amounts of ordnance allocated to a unit, some of which may be carried along and some kept in storage), there is very little on

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[1]DT-123.

actual combat expenditures. These expenditures could possibly be deduced by comparing data on current stocks and stocks received; however, these data are only fragmentary. Another approach, which may have merit for smaller units, might be to assume that one-half to two-thirds of the basic load is expended in any one engagement, since it is an established Viet Cong tactic to break off before expending too much ammunition.

Details on the manning and equipping of specific Viet Cong military units are provided in Appendix A. Included is a glossary of weapon names and descriptions.

Resupply[1]

The source material gives the impression that a Viet Cong soldier rarely runs out of ammunition while fighting; the duration of the battle is probably predetermined by his ammunition supply. When attacking, he saves enough ammunition to cover his withdrawal, if necessary.[2] A unit might run out of ammunition if attacked by surprise by a superior GVN unit, in which case, if hand-to-hand fighting were impossible, rifles might be buried or destroyed before withdrawing.[3] One regional force unit allocated 20 shells for each 81mm mortar. When half of this was used, a one-month trip through forest and mountains was required for resupply.[4]

Local resupply of ammunition was carefully planned before an attack. After fighting, an entire battalion might go to the local storage site to obtain fresh munitions.[5] Usually it took the 514th

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[1] See also Transportion, below.

[2] Soldiers in the 309th Battalion, Regional Main Force, were "allowed to expend all their ammunitions in the attack except for 50 rounds for each type of weapon to protect their withdrawal in a raiding operation. Ammo was not resupplied after the attack had once begun."

[3] AG-195.

[4] AG-136.

[5] AG-195.

Battalion (Dinh Tuong Province) only one day to be resupplied with ammunition after an attack, because the Rear Services unit had everything ready. Only in cases of surprise attack by the GVN was the supply of ammunition delayed; in this case it might take 2-6 days for resupply.[1]

One directive divided reserve ammunition supplies into two categories: (1) Ammunition for small arms, and grenades. Units were to carry enough supplies to fight for the day, and replacements were to be made during the night. (2) Mortar and 50 caliber recoilless rifle ammunition, and antitank rifle grenades. Units were to carry at least one-third of their basic load during movement. Rear Services was to replace expenditures within the same day.

One novel way of storing weapons and ammunition was to cover the cases with grease and sink them in a river or drainage ditch.

The reception of arms and ammunition is described in another source as follows: The Province Military Affairs Committee would send a liaison man to inform Rear Services that a shipment of a certain size would be delivered at a specified time and place. The shipments often came by water (in this case) and were received at a point about one-half hour's walk from the underground depot where they were to be stored. A receipt was given to the delivery party. Such shipments arrived irregularly; sometimes once every ten days, sometimes once every two or three months. A combat unit needing arms or ammunition would file a request with the Province Military Affairs Committee, which would then furnish the unit with delivery orders against which Rear Services would issue corresponding quantities from the depot. All receptions and deliveries took place at night. The largest single shipment received consisted of 800 Russian-made rifles.

Empty cartridge cases had to be turned in to Rear Services in order to get new ammunition. These cartridge cases were then forwarded to ordnance worksites to be reloaded.

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[1] DT-125.

TRANSPORTATION

This section does not attempt to describe the Viet Cong transportation system in detail but rather to sketch general features of the methods and procedures. The outstanding feature of the system is its flexibility. This is attributable in great part to the endless possible combinations of boats, pack animals, bicycles, carts, trucks, and porters. Small boats and porters seem to be the most common transportion methods within South Vietnam, as typified by the following description:

> The weapons battalion had 4 sampans, 2 very large and 2 smaller, which operated 6 times a month. The sampans came into the mooring site at night. The men from the battalion left their mountain camp at 3:00 PM and arrived at the road at about 6:00 PM. My reconnaissance-intelligence platoon had to make the road secure for the carrying party by taking positions at both ends of that portion of the road. The carrying party crossed the road at 6:00 PM and arrived at the mooring site by 7:00 PM, a distance of about 2.5 km. The distance from the road to the camp was about 10 km. The unloading operation was carried out in 2 hours and at 9:00 PM the carrying party would start back with the weapons, due to arrive in camp at 2:00 AM. The size of the party depended on how many sampans were at the mooring site: if there were 2 large sampans, the entire battalion would come; if there were 2 small sampans, then only 1 or 2 companies would come.[1]

An example follows of the sequential use of trucks, bicycles, and porters described in a captured document:

> Source stated that the logistical methods used by the 304th Division in RVN were as follows: supplies were taken from NVN, through Laos and Cambodia by truck.... From the Cambodian-Vietnamese Border the supplies were taken to Station 4 by bicycle and from there the K19 battalion started its operations. He stated the K19 battalion supplied all units of the 304th Division of battalion size or larger on an average of once a month; not on a regularly scheduled date but upon request by each individual unit. He stated that the K19 Transportation Battalion delivered all types of supplies such as medicine, foodstuffs, and ammunition in addition to evacuating wounded soldiers to the hospital.

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[1] AG-55.

The MACV Rice Situation report estimates Viet Cong primary transportation modes to be the following (by Corps Tactical Zone):

I	Porters, some sampan and elephant
II	Porters, some oxcart and sampan
III	More than half by sampan and oxcart, porters also of importance
IV	Watercraft, some porters and oxcarts

As the example above indicates, there is some use of trucks despite U.S. interdiction and the limited road net. Truck movements are at night and on relatively short segments of roads under Viet Cong control. In the words of an interviewee:

> The Front had trucks, fuel, and even an M113 they had captured. They used it for rice transportation. In the jungle there were real roads, but people would not believe it.[1]

The weather and U.S. actions combine to increase the importance of using laborers to move goods. During the rainy season, for example, the trails may be passable only to animals and porters, since even pack bicycles may be mired.

The use of porters requires organization, planning, control, and protection:

> District authorities will see to it that rice and other foodstuffs are available at the assembly areas. Laborers will have to bring their personal effects such as hammocks, nylon sheets, mosquito nets, blankets, sandals, clothes, medicine, lantern, rice pouches, mess kits and dry rations. Each squad must have 3 bill hooks, 5 pickaxes and 2 cooking pots.
>
> The Corridor Section is in charge of the corridors going in from the north to the south and also from one region to another. This is a very important section because, without it, all units would get lost in the immense forest.[2]

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[1] AG-55.

[2] G-45, a civilian worker.

> When we went to get ammunition we needed at most 8 civilian porters and 10 guerrillas to protect them. Each porter could carry two rifles or 1000 [sic][1] rifle cartridges. It took us 2 days and one night to cover on foot a distance of over 50 km. We had to pass by 2 staging points.[2]

In another case, a civilian labor group in Bien Hoa province consisted of around 70 men ranging from 20 to 40 years of age, carrying mortar rounds, rice, and machinegun ammunition. This group was escorted by 80 armed Viet Cong.

According to one interviewee, there were two and possibly three transportation regiments moving equipment and food, from station to station, from North Vietnam.[3] Each transportation company had 100-150 men, divided into four platoons. Apparently, each company manned one station and there may have been 18 stations. Each had to transport an average load of 3 metric tons per day, of which 40 percent was weapons and ammunition and 60 percent was rice, foodstuffs, and medicine. The regimental standard was 50 kilograms per man.

The interviewee's company made the 12-kilometer march between Stations 12 and 13 once a day, taking 4 hours through rugged terrain. Company standards were on the average higher (32-33 kilograms) than those of the regiment; the men in this unit often carried up to 45 kg.

> There was a very high competitive spirit to break the record and some comrades went so far as to carry up to 75 kg in order to get sick afterward because they hoped to be allowed to return to the north. (Their hope was not realized.)

> Each station had many storehouses. Station 12 had rice storehouses, each containing 8 tons of rice. Weapons and ammunition were placed under racks of branches and leaves. About 1-1.5 tons of weapons and ammunition were stored in Station 12. Station 13 was organized in the same way.

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[1] A questionable figure; two rifles would be a very light load, but 1,000 cartridges would be more than a man could carry.

[2] AG-68, a village guerrilla.

[3] AG-78

A prisoner captured in 1965 described the transport of ammunition by forced labor:

> On 27 February 1964...while subject and three other inhabitants of Phuoc Thien village were harvesting the rice, a group of armed Front personnel came and told them to follow them to attend a meeting.... Only when they were out of the village did they know that they were captured by the Front and afterwards they were forced to transport ammunition....
>
> After being captured, they were led to Phuoc Chi.... They stayed there for 3 days. Subject noted the presence of approximately 60 male youths from 20 to 30 years old (subject was only 14), natives of different districts in Bien Hoa Province. The following day these youths were formed by the Front into 6 ten-man squads. Squad leaders and assistant squad leaders were Front cadres. In addition to the 60 male youths there were 9 female youths who did the cooking and a 50-man Front platoon equipped with 1 MG, 3 AR's and a number of rifles and SMG's.
>
> After one day of movement through the forest the group arrived in Ba Ria and halted...for 2 days. Subject's squad was ordered to transport three 0.80 x 0.50 x 0.50 meter boxes of ammunition of between 24 and 26 kg each.... Subject was told that other squads transported the same type boxes and they were of a total of 30. Trip to Gioc Moi lasted approximately 12 days since the boxes were heavy and the group only moved at night to avoid airstrike.

It is interesting to note from the above that only 12 out of 17 days were spent in movement, and then only at night. Also, the 60 porters were escorted by 12 Viet Cong cadres and 50 troops (as well as by 9 female cooks). Judging by the squad strength (10 men) and the weight of the boxes, the average load per porter must have been light by comparison with other data. It can be presumed that food for 12 days for 131 people was carried along (12 x 131 x 0.75 = 1,180 kilograms). This actually would have weighed more than 30 boxes of ammunition at 26 kg (780 kg).

Another interviewee describes the occasional transport of ammunition by village laborers:

> Some 30-50 people had been recruited as coolies to transport ammunition boxes to my village. Then the same number of coolies were recruited in my village for transport to the next village, and so on. These ammunition boxes were made of tin and weighed 15-40 kg each. Each coolie carried one box according to his physical strength. This corvée was carried on at irregular periods of time, usually every 5-7 days. The village guerrilla unit was responsible for recruitment of coolies. As a rule he was informed 2 hours in advance of each arrival of ammunition. The guerrilla squad leader sent his man to call on the people's houses to recruit coolies, who are assembled at a selected place at night, prior to the arrival of the ammunition. The coolies were generally escorted by a platoon.[1]

Porters may also operate in direct support of a combat unit:

> A 50-man transportation unit detached from the battalion was responsible for the resupply of ammunition. Fifteen men of this unit were detached to each company. Although unarmed, they always stood close to the battlefront, carrying all types of ammunition with them. The requisition forms had to be sent to the company and the resupply of ammunition was made within one hour.[2]

A formula for computing the number of porters required for a given transportation job is derived in Sect. IV.

Animals

Oxcarts and pack animals are used whenever available. In one case, a group of about 100 Viet Cong troops moved their base of operations with the help of five oxcarts containing ammunition and weapons, including 81mm mortars and automatic rifles. Elephants have been observed moving arms and ammunition from southern Laos to storage sites in Quang Tin province.

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[1] AG-245, a village guerrilla.

[2] AG-40.

Coastal Shipping

One method of delivery by coastal shipping is described as follows. In this case, boats had to operate on dark nights only. On these nights, the Viet Cong sent a man with a lantern to the shore to signal by striking a match three times. If the boats could not make contact with the coast, they anchored and waited in the sea for one or two nights.

Another coastal delivery system is described as follows:

> This ship was met by a company called the Company for the Protection of the Base Camp, which had 3 platoons and 99 men. This company fights only when the GVN attacks the base camp, which is very seldom because it stays in the deep jungle. The camp is established near a large village covered with a dense jungle which extends to the coast. The ship was 30 meters in length. It looked exactly like ships of the GVN navy and flew the GVN flag. It was unloaded by 2 motorized boats during the night.[1]

Another source was sure that submarines were being used to transport weapons and important cadres from the north. He also stated that large quantities of weapons and ammunition were brought by boat from China, especially in 1964. They were disguised as fishing boats.

> The Chinese boats had to manage to get there at night and when they arrived the Front stood off to sea in two lines formed about 500 meters apart. This was to cover the Chinese boats which ran ashore between these two lines of boats. On the sand hundreds of men were ready to unload the boat and they carried out this operation at the most in 30 minutes. All of the weapons were dismantled and cased. If the Front were not there in due time, the Chinese boat did not run ashore but proceeded on its way.[2]

Waterways

Some units had many small boats for movement and resupply. One battalion, for example, had 200 sampans for its 600 men, probably enough to move the entire battalion.[3]

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[1] AG-198.

[2] AG-192.

[3] AG-60, member of local unit.

> The VC personnel carried ammunition by sampans with a maximum load of 500 cartridges each. In transporting ammunition from the work camp of the rear service, the VC used camouflaged, light wooden boats.[1]

A Viet Cong transportation group in Ba Xuyen province was equipped with 17 boats, 2 loaded sampans, and 6 support sampans carrying 4-5 armed men each. The boats and sampans were diesel-powered and had a capacity of about 2 metric tons.

River Crossings

Regulations were published governing the ferrying of passengers across rivers:

> The ferry will not accommodate more than 5 passengers. When proceeding to the ferry site, passengers must be well-camouflaged and 3-5 meters apart to avoid being spotted by enemy aircraft. Waiting time at the ferry site will not exceed one hour. No noise will be made while waiting for or boarding the ferry. Before the ferry leaves the river bank all individuals must watch out for aircraft. Light-reflecting materials will be well concealed. If spotted by aircraft while in the middle of the river, all passengers must remain calm to avoid capsizing the ferry.

Crossings are also made without ferries:

> In the dry season the water is just above knee level. In the rainy season one has to swim across, guided by a rattan line as big as 3 fingers. Goods are placed in nylon bags and carried across the river.[2]

OTHER SUPPORT FUNCTIONS

Construction

Construction labor is provided by some combination of Viet Cong troops, village laborers, and village militia. Requirements in terms of time and manpower are difficult to predict, and little is known about them. They can vary from a few hours and a few people repairing

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[1] AG-192.

[2] AG-202, a village guerrilla.

trenches, to a thousand or more people working for perhaps a month to build a fortified camp or a combat village, to perhaps hundreds of people working for a year or more to construct a network of tunnels.

One camp at a district headquarters required about three weeks to build. Most of the work went into fortifications, since the structures required only two or three days of work. This camp was surrounded at a radius of 500 meters by defensive trenches and camouflaged pits armed with bamboo spikes, with spikes and booby traps on the surface. There were also secret trenches for hiding and retreat.[1]

Sometimes a construction gang is called an "assault labor group." One such group, with approximately 400 men, set out to clear a one-meter trail about 10 kilometers long, "in the shadows of large trees." According to the source, this job was completed in one day, a considerable accomplishment.

Underground bunkers are built to protect villagers from artillery and air strikes. In Binh Thuan province a unit of 80 Viet Cong soldiers was dispatched to assist and direct the building of bunker housing for 32 families during an 18-day period. The underground bunkers were 2.5 meters high, 3 meters wide, and 3 meters long. The ceilings were made of tree logs, reinforced vertically, under a sand clay cover 2 meters thick. Bamboo pipes provided ventilation and light.

In Thua Thien province, local inhabitants were forced by the Viet Cong to develop a road for transporting heavy weapons. The road was 3 meters wide and about 10 km long. The civilians had to cut down trees, flatten the road surface, and dig trenches and foxholes along both sides of the road. Armed Viet Cong troops have been observed doing the same type of work in a nearby area.

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[1] AG-73.

Manual labor is not always used. A group of porters was reported carrying a small electric generator and an earth boring machine (Soviet), ostensibly to dig a secret tunnel to Bien Hoa Air Base.

When an ARVN outpost moved near a canal in Hau Nghia province, the Viet Cong could no longer use the canal as a waterway; hence they began dredging an abandoned canal as an alternative route. A district company recruited about 200 civilian laborers from three villages and divided them into groups of 12, each group supervised by a Viet Cong cadre. Each civilian was told to bring along 500$VN, 5 liters of rice, a hoe, an ax, and a bamboo basket.

The construction of a 6 km road was completed in nearly 3 months with the following expenditures of materials and labor: 540 kilograms of explosive charges; 1200 blasting caps; 250 laborers for 90 days (22,500 man-days).

District and village supply councils are responsible for maintaining the bridges and roads in their area. When manpower is short, laborers are moved about in the area to perform such work. Sometimes roads have to be improved so that they can be used by pack bicycles. Civilians are called upon to work on destruction tasks such as cutting bridges and digging up roads. According to one interviewee, everyone from 15 to 45 has to work as civilian laborers unless they are disabled.[1]

In some areas (such as An Xuyen Province), and for unspecified periods of time, all able-bodied villagers have had to spend 10-20 days per month doing forced labor, digging trenches, mining roads, digging canals and traps, and constructing combat villages. Such a village has its own defense works in the form of concrete mounds surrounding a gun position, a headquarters, a hospital, and protection for gunners. "There are many works to be done all year long."[2]

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[1] AG-483

[2] PIE 38, 39, 40.

Communications

Battalions have a field-telephone system with wires laid to each company area, and companies are authorized one radio each;[1] but much of the Viet Cong communications is by courier along commo-liaison routes. A Postal Transportation and Liaison Service has been organized to handle courier traffic, with sections, units and cells at province, district, and village levels, respectively. The Unit has charge of the main transportation and liaison route of the district; at the same time, it supervises the operation of various Viet Cong intervillage relay stations, which are organized by the villages and hamlets for their own local mail service.

Some external support is required:

> At those...relay stations where bridges or sections of the highway have to be crossed a number of weapons will be emplaced to provide protection for cadre and documents. These will be furnished by the local forces concerned and local cadres will be used to mount guard around these stations.

There are some special problems relating to communications security:

> The main factor in the communication problem was the need for security. The higher levels are afraid to let the lower levels know too much because they might return to the national cause and this would endanger the higher level committees. Secret lines are set up which go through village and district to province level. If a message goes any other way, it is suspect. Radios are never used.[3]

In 1966, the 507th Signal Battalion had a strength of 500 men and six companies: wireless telegraph, messenger, supply, telephone, transportation, and security.[4] When this battalion was moved to Pleiku, it was broken down into many elements to support other Viet

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[1] During operations, the Viet Cong uses word-of-mouth rather than signal communications.

[2] AG-172, a civilian worker.

Cong units. The Sao Vang Division had a telephone company of 126 men. The Viet Cong 7th Infantry Battalion had the following communications:

(1) The communications platoon in battalion headquarters had 6 telephones.

(2) Battalion headquarters had a liaison squad to transmit orders and documents to subordinate units.

(3) Each company had 3 liaison agents to carry communications and escort command cadres.

This is approximately 3 percent of battalion strength. If we include the entire strength of a Divisional telephone company, we can arrive at a Division-level factor of 4 percent for communications, including commo-liaison personnel. This is very rough, because there may be independent commo-liaison units as well as independent signal units.

One note on supply communications:

> Source stated that for a unit to be supplied by the K19 Battalion it notified the Rear Service Officer at the 304th Division Headquarters by messenger except in case of an emergency when the telephone was used. The Rear Service Office would notify the K19 [transportation] battalion which would deliver the necessary supplies.

Medical Support

The following medical support factors were gleaned from various source material:

Division	546 men (medical battalion plus field hospital)
Regiment	1 medical company (assume 50 men)
Battalion	no separate medical support mentioned, probably dispatched from Division

Company	1 medical corpsman
Platoon	1 first-aid man

Combining these requirements and assuming a triangular structure, we arrive at an estimate for the Division medical-support strength:

Division		546
Regiments	(3 x 50)	150
Companies	(27 x 1)	27
Platoons	(81 x 1)	81
		804 men

If the Sao Vang Division strength of 12,360 men is considered to be representative, then medical support amounts to 7 percent.

The B Area Military Hospital in Kien Giang Province was built in January 1963 to provide medical treatment for Provincial Main Force Battalion 207, concentrated units, and village guerrilla units in Kien Ginh, Kien Tan, Kien Hung, and Chau Thanh Districts. The hospital also organized and supervised the 207th Battalion Dispensary, as well as dispensaries in each of the four districts.

In October 1965 the hospital received three sets of surgical equipment and began an expansion program. By April 1966, it consisted of 91 personnel and could receive about 150 patients. The facilities consisted of wooden and thatched houses and contained an internal disease ward, a "seriously wounded" ward, a surgery ward, medicine and food storage, and an administrative office. Each ward had a kitchen and quarters for personnel. Medicines, materials, and documents -- except for a one-day supply of medicine -- were hidden in concrete jars in a secret tunnel or in a camouflaged motorboat ready for immediate evacuation. The entire hospital was moved once because it had been detected, but it stayed in the Vinh Hoa Hung Village area.

Medical support in the field is described in one source document in some detail. During a battle, the medical corpsman assigned

to each Viet Cong infantry company and the evacuation team, composed of local guerrilla forces, were stationed about 1 kilometer from the battlefield. In addition, each platoon had a first-aid man. In the event of a battalion-size or larger engagement, the Viet Cong dispatched a surgical team with four cells: pre-surgical to receive, prepare, and classify the wounded; surgical; post-surgical for nursing care; and a food-handling cell for the staff and patients.

In Kien Tuong Province, boats were most frequently used for evacuation because of the numerous canals. Stretchers were not often used because they were cumbersome and exposed the carriers.

According to another document, a combat unit is responsible for evacuating its own wounded soldiers back to the preliminary surgery station, from which they are moved to the final surgery area by civilian laborers. Because of the possibility that these laborers might abandon the wounded in the event enemy planes appeared for a search, the unit is also directed to provide substitute carriers. Owing to the shortage of commo-liaison personnel, evacuation of the wounded is to be carried out in one stage if the battle develops quickly and favorably, and in two stages if it becomes a "see-saw and sustained battle." In addition, all stages of evacuation require escort by a guard force.

Diseases contribute substantially to medical support requirements. Diseases common to the Viet Cong are malaria, diarrhea, rheumatism, dysentery, and skin diseases. They are caused by poor hygiene, lack of preventive measures, and the hard life that Viet Cong personnel have to lead. Treatment consists of a combination of Western and Eastern medical practices, such as drugs, shots, acupuncture, and plant derivatives.

As in the case of food supply, medical care sometimes appears to be on a pay-as-you-go basis. Thus, one source states that there

was a 10-piaster monthly allowance per man for medicine. A second source however, claims that each man was given 25 piasters a month as a drug allowance. The latter source also mentions "drug imprest[1] funds," with which unit medical sections purchase drugs directly from selected pharmacies, as follows:

	Piasters Monthly
A unit of 120 men	2,000
A unit of 200 men	4,000
Independent companies	7,000
Regiments and subordinate units	30,000

Clothing

In Kien Tuong province, we learn that Viet Cong cadres and troops were not provided with clothing. Instead, each man was given 30 piasters per month to buy clothes. As a result, the clothes worn varied -- many who received additional support from their families would wear nonstandard fabrics or colors.

One source mentions a clothing allowance of 480 piasters per year, broken down as follows:

	Piasters
2 suits of clothes (including sewing expenses)	230
2 shorts	40
1 mat	25
2 meters of nylon	40
1 pack (made of flour bag)	30
2 towels	30
1 blanket	45
1/2 mosquito net (1 net lasts 2 years)	40
Total	480

This source adds "Those who receive clothing and material from homes will not be issued uniforms (or clothing) and these uniforms will be

[1] Imprest: an advance from government funds.

issued to those who really need them."

Apparently, in many cases only the materials are issued and the soldier has to pay his own tailoring expenses, which range from 3 piasters for a blanket to 25 piasters for a suit.

One directive states that clothing factories must be set up, each consisting of 20-30 sewing machines dispersed among civilians who are also charged with the clothing manufacture.[1] Output is fixed at 4 sets of uniforms per machine per day (present output is 2.5).

Handling of Dead

Burial areas are generally designated in advance of an engagement and graves are sometimes dug in advance. Evacuation and burial are accomplished by civilian laborers under the direction of cadres. Bodies are simply wrapped in white cloth and covered with earth. Graves are supposed to be marked (probably secretly) and recorded so that they can be located later by the deceased's families; however, for security reasons they are probably not marked, and families are frequently not notified until much later, if at all.

It is Viet Cong doctrine to remove and bury the dead as soon as possible, both as matter of respect and for morale and security reasons. Combat troops are organized into cells of three men; in the event that aidmen or laborers are not available, the cell members take care of each other:

> In the event a soldier was killed in action, his comrades made every effort to bring his body out of the battlefield. The method most frequently used was to tie a rope or cord around the neck of the body and the other end around the waist of the carrier, who will crawl and drag the body with him. (Every Front member was provided with a four-meter length of rope which was used to fasten his hammock.)

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[1] The Sao Vang Division had 31 machines. Allowing one person per machine, this is only 0.3 percent of Division strength.

In each combat there were two groups taking part, one fighting group and one special group in charge of the rescue of the dead and wounded. Its size depended on the particular size of the operation; on the average a company would have a 50-man group, a battalion a 100-man group.[1]

There were 10 civilians accompanying a company during an operation. Their assignment was to carry off dead and wounded.[2]

The battalion was very concerned about the question of removing the dead from the battlefield and burying them. It would be better for the battalion to lose fifty weapons than to leave two bodies on the battlefield, because if this happened the people would protest strongly against it. The battalion was very afraid of losing the support of the people, and after an attack the unit had to retrieve the bodies of the dead fighters by all means, carry them to the nearest village, and hand them over to the Village Party Chapter for burial and commemoration ceremonies. But there were times when we were unable to retrieve the dead. When this happened the unit had to explain to the people all the difficulties which had prevented it from retrieving the dead -- such as bombings, shellings and so on -- to make the people and the families of the dead sympathize with us.[3]

War Booty

There is a Viet Cong directive on the subject of war booty. War Booty Councils are established at three levels. All types of war booty, military as well as civilian, are gathered, inventoried, and reported to higher headquarters.

Perishable civilian goods, such as foods, can be administered and used by the Current Affairs Section. This kind of war booty can be given to various branches and issued in lieu of cash for expenditures or sold for money for the fund. Other civilian booty such as engines, radios, sewing machines, grinding machines, bicycles, gold and silver, rice, medicines, and office supplies are inventoried and reported to higher echelons.

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[1] G-10.

[2] AG-59.

[3] DT-125.

Captured weapons, ranging from submachine guns to smaller arms, are issued in priority to local forces. While awaiting the decision of the Viet Cong Party Committee, the War Booty Council may temporarily lend out weapons and ammunition (submachine guns and smaller arms), upon request of the interested military agencies, to meet combat requirements.

Weapons captured in action by guerrillas are issued to the guerrillas. The distribution of these weapons is reviewed later by the district unit.

Exchange of war booty is strictly forbidden.

IV. A CASE STUDY: DINH TUONG PROVINCE

This section presents a composite picture of Viet Cong logistics in Dinh Tuong province in the Delta, based partly on data extracted from the source documents and partly on the analysis of support requirements. The support of the 514th Province Battalion is emphasized because of the availability of the data. The 514th's camp network was selected for logistical analysis.[1] Our discussion begins with the local support (support of a campsite), starting with the overall province picture, then focussing on the western portion. Then we consider commo-liaison support (lines of communication into and across the province) and examine a representative commo-liaison corridor.

LOCAL SUPPORT

Local support will be quantified by function later in this section. First, however, it is of interest to summarize what is known, from prisoner interrogations at Provincial Interrogation Centers, of the support of the 514th Battalion. These interrogation reports by the National Police were found to contain more detail than any other source studied.

A former member of the 514th said that village guerrillas were responsible for security and "held the way" at 500-1000 meters from his company's locations. The battalion reconnaissance squad also surveyed the situation, checked on strangers, and sounded alarms. Platoons and squads were ordered to dig "public trenches" and "war ditches" according to the conditions of the ground. The Viet Cong District Rear Section ordered villagers to provide food until the 514th's mission was finished. The rear labor section of the 514th supplied munitions continually until the "cleaning of the battlefield." The Province or District Military Section ordered munitions transported in advance. The local Village Military Section was responsible for

[1] See M. E. Anderson, et al., Insurgent Organization and Operations; A Case Study of the Viet Cong in the Delta, 1964-1966

hiding supplies and maintaining emergency reserves. With regard to health care, internal and external diseases were spot-classified. Viet Cong nurses dressed and gave injections and drugs to "light" patients; other patients were carried to the Viet Cong Province Military Hospital. Nurses gave first aid for wounds. The families of the more seriously wounded or ill patients were urged to transport them to a national area for treatment. The Viet Cong could heal only about 10 percent of chronic malaria and other hard-to-cure cases; some troops took 3-6 months of leave for home treatment.

As of January 1966 the My Tho (now Dinh Tuong) province worksite was "a professional organization specializing in grenade, petard, and mine production for the 514th Battalion...," operating under the Province Military Section. This worksite was manned by the 518th Company with 120 persons dispersed into 4 platoons with separate locations. The daily output was about 100 items. The worksite was resupplied by canal twice monthly. Powder from dud bombs was used when available. The Cai Lay district worksite, directed by the District Rear Services Section, alternated its location between My Thanh and Thanh Phu villages, spending three months at each place. The supply section bought acid, solder, and tin monthly.

The map in Fig. 1 shows the campsites and logistics facilities in Dinh Tuong and Go Cong provinces. Figure 2 enlarges a portion of the map of Dinh Tuong province to show village boundaries and the population estimated to be available for Viet Cong support, based on the MACV J33 Hamlet Evaluation Survey of 28 February 1967.

Since food in this area is available locally, ammunition storage sites and ordnance shops are of primary interest in Fig. 2. The straight-line distance from each campsite to the nearest ammo site or ordnance shop is entered above the campsite location. The longest

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[1] DT-563/66.

[2] DT-564/66.

distance shown is only 10 kilometers, or about 14 kilometers by trail (based on a study of 1:50,000 maps of the area). There are some food-storage sites, but these are probably for emergency reserves and would not normally be used.

The controlled population was estimated as follows. The latest MACV security categories for each hamlet range from "A" (GVN control) to "E" (Viet Cong control), as defined in the Hamlet Evaluation Systems. Based on these definitions, a population in category E was assumed to be 100 percent available to the Viet Cong; in category D, 50 percent; in category C, 25 percent. Categories B and A were rated at zero availability. Population and control data were abstracted from a MACV survey. In cases where earlier GVN categories were still being used, "VC" was rated at 100 percent and "Contested" at 50 percent, based on the definitions of these earlier categories.

The sample area (Fig. 2) has 33 campsites and a controlled population of 99,793. Assuming that the ratio of controlled riceland to total riceland is the same as the ratio of controlled population to total population, a total of 317 square kilometers or 31,700 hectares would be under Viet Cong control. These numbers are developed in Table 7.

Several calculations can now be made:

1. Annual rice production, at 2.23 metric tons[1] of paddy per hectare, would be 70,690 metric tons on the controlled riceland. Annual rice consumption of the civilian population, at 401 kilograms of paddy per capita,[2] would be 40,020 metric tons, indicating a substantial surplus for the controlled area.

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[1] USOM Statistical Bulletin, 1964, for Dinh Tuong Province.

[2] James B. Hendry, The Study of a Vietnamese Rural Community. Hendry estimates a per capita rice consumption of 0.8-0.9 liter per day. Using 0.85 liter per day, 750 grams per liter, and a milling factor of 0.58, we compute the annual per capita consumption of paddy as 0.85 x 750 x 365/(0.58) = 401 kilograms. 1966 figures from USAID indicate that this may be on the high side: 5,043,000 metric tons consumed by 16,727,000 people would be 302 kilograms per capita per year.

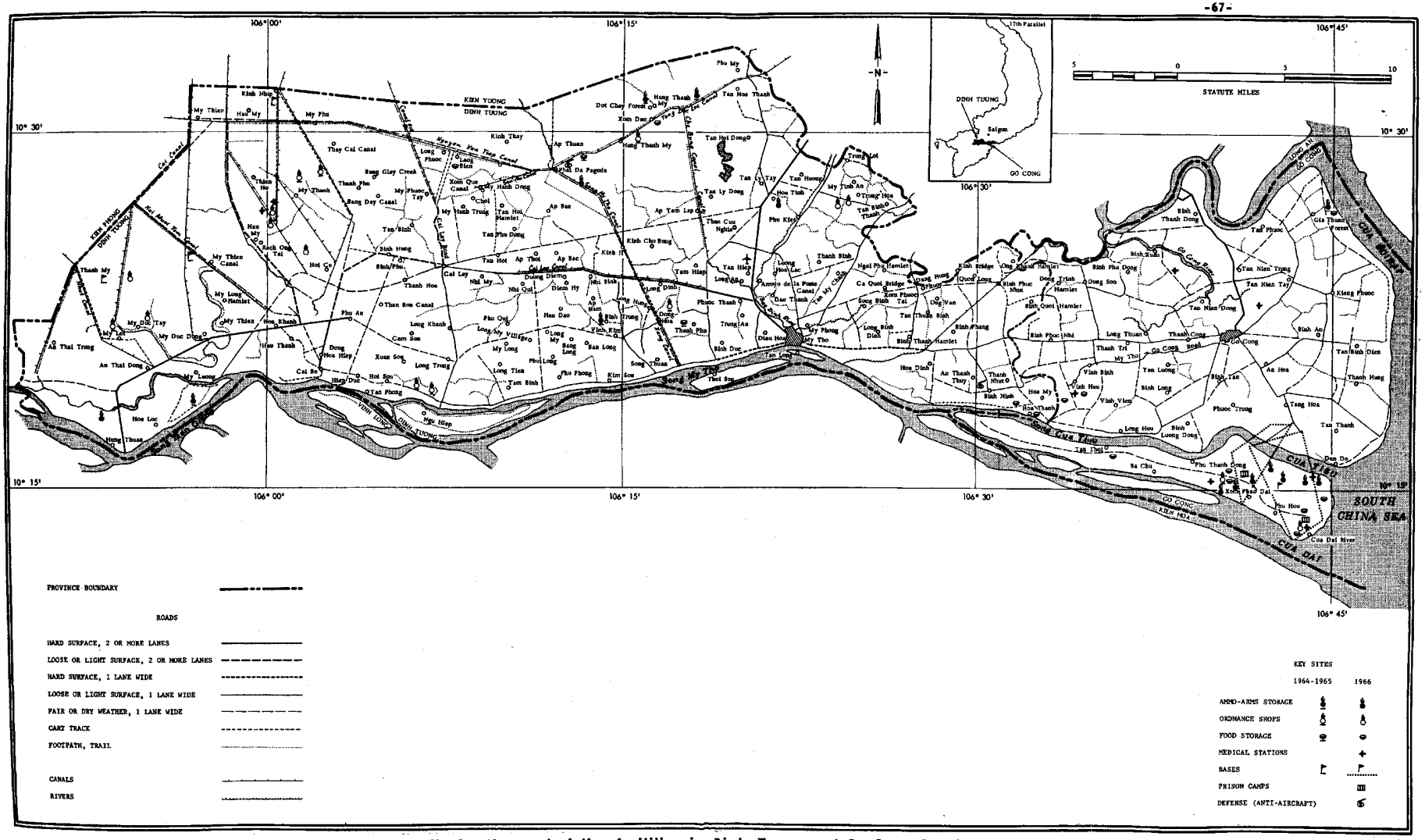

Fig. 1—Known logistics facilities in Dinh Tuong and Go Cong Provinces

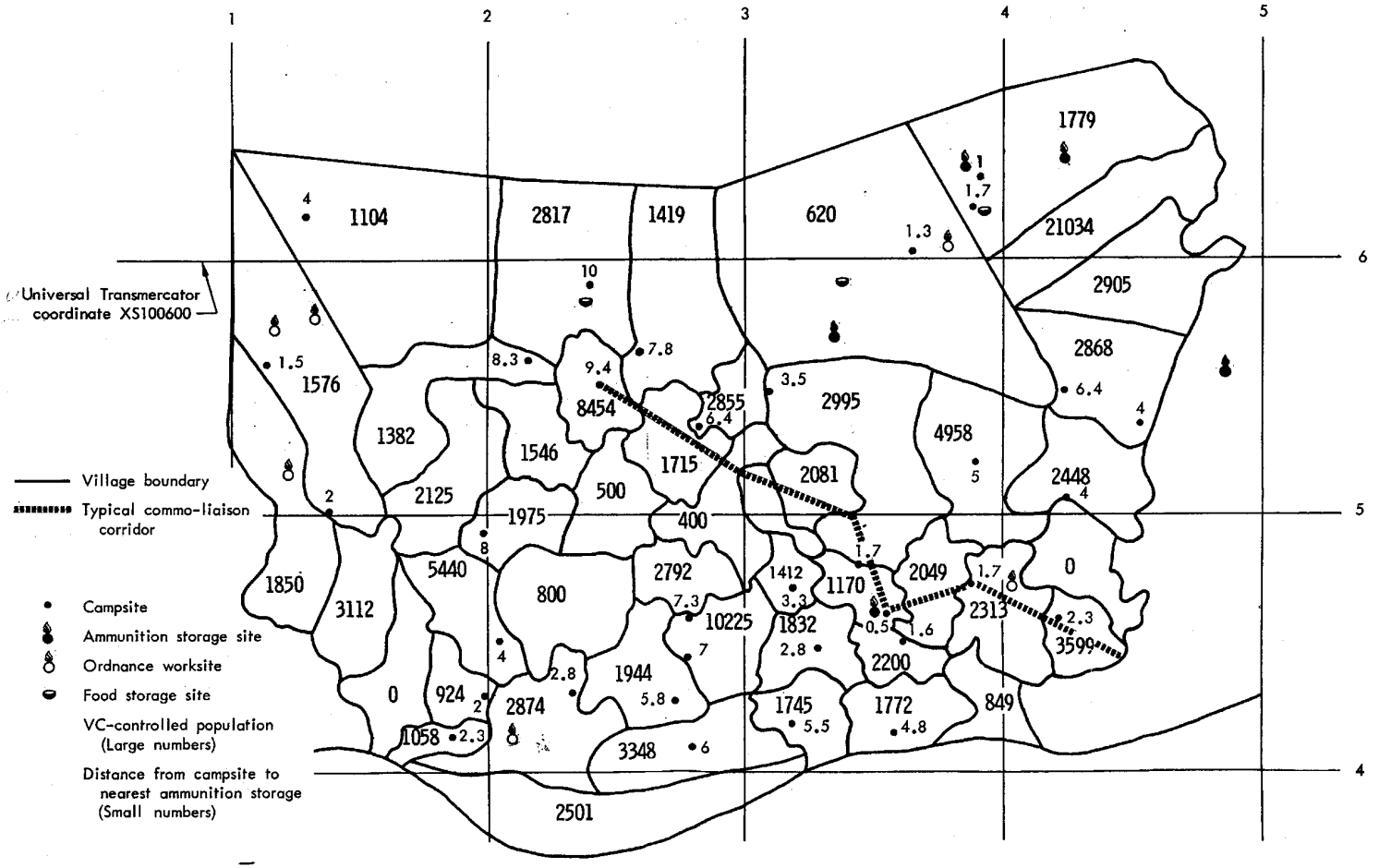

Fig. 2—Campsites of the 514th Battalion, logistics sites, and village population under VC control for a portion of Dinh Tuong Province

MACRDS

NAME OF EVALUATOR _____

DISTRICT _____ VILLAGE _____ HAMLET NAME _____ HAMLET NO. _____ TYPE OF HAMLET _____

UNCONTESTED ☐ UNDERGOING CLEARING ☐ UNDERGOING SECURING ☐ SECURED ☐ NPA ☐ CONFIDENCE ESTIMATE 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

	E	D	C	B	A
1. VC Military Activities a. Village Guerrilla Unit	VII Gs combat effective tho some indentified or eliminated; VC VII defenses largely intact.	VII Gs reduced somewhat in men & defenses; can attack in plat strength from within village or nearby area (10-15 km).	Military [illegible] division, most Gs identified, 50% loss [illegible] disrupted, activity below plat level; [illegible] still not prevent GVN activities in [illegible]	VII G control reduced to 1-2 hamlets or VII periphery; could make desperation raid. Activities of Gs from adjacent VIIs limited by no havens or friendly defenses.	VII G remnants driven out. No threat of harassment or intimidation from Gs in adjacent VIIs.
b. External Forces (EF) (Prov. Main Force, unit in district)	EF intact; may have base & can make company-sized attacks within 15 km of hamlet. Hamlet or VII may have been fired on and/or assaulted during month.	Unit in district reduced up to 25%; EF otherwise as in E.	Unit in district [illegible] up to 50% in men & arms, or base [illegible] in district destroyed. No VC operations [illegible] company-size or larger, no mortar or RR fire [illegible] hamlet during moth.	Bases in district or near hamlet destroyed; unit in district only marginally effective. Not capable of company-size operations.	Unit in district eliminated or ineffective; no attacks by plat or larger & no mortar or RR fire in district or near hamlet. Attack possible only from outside district.
c. Military Incidents Effecting Hamlet	Armed VC units in hamlet at night, sometimes in day. Little GVN authority at night. Routes to hamlet interdicted by day; may be ambush near hamlet.	GVN activity under harassment. Frequent sniping on routes to hamlet; VC night activity in hamlet.	Long range [illegible] night, VC activity in adjacent hamlets [illegible] sniping on routes to hamlet.	No incidents in hamlet during month; infrequent harrassments within village or nearby.	No incidents, including harrassments, in VII or near hamlet or on routes to VII during month.
2. VC Political & Subversive Activities a. Hamlet Infrastructure	Party cadre underground by day but free to intimidate populace at night. No assurance party structure or leaders uncovered.	Members and most leaders of VC hamlet organizations uncovered & neutralized but undercover agents still operative.	Intel indicates [illegible] of Party apparatus identified; some agents under VII or Dist control still operative.	All normal Party apparatus identified & dealt with; agents under VII or Dist control eliminated.	No reason to doubt whole Party apparatus eliminated or neutralized.
b. Village Infrastructure	Despite some individual identification, VII apparatus intact, functioning.	Some VII cadre eliminated but apparatus fairly effective.	Most key members of VII apparatus identified, up to half neutralized; effectiveness curtailed.	Most of VII apparatus leaders eliminated; almost all members identified. Little coordinated VC activity in VII.	VII. organization wiped out. Few covert agents directed from outside but stymied by friendly security organizations.
c. Activities Affecting Hamlet	VC apparatus can undermine GVN in hamlet by incidents ranging from propaganda thru terrorism & sabotage, at least at night.	No overt propaganda but terrorism or sabotage during past month.	No overt VC [illegible] in hamlet, few signs of covert subversion.	No subversion in hamlet & no incidents in adjacent hamlets during month.	No subversive activity in VII during month.
3. Security (Friendly Capabilities) a. Hamlet Defense Plan & Organization	No night defense except by external forces although required.	Day & night defense by external forces. Local recruiting & training underway	Local warning [illegible] communication systems operative, [illegible] trained local defenders but main reliance on [illegible] external defense.	Defense force organized; adequate plan and communications for its use.	Adequate defense force & adequate defense plan following Prov RD plan.
b. Friendly External Force (FEF) Assistance	FEF do not meet needs for arty, air support, reaction ground forces, etc.	FEF meets needs but only effective marginally, e.g., delayed response, no night response, not aggressive, etc.	Availability [illegible] responsiveness of FEF generally meet needs	Need for FEF less than C; can be met adequately.	Need for FEF very slight; can be met adequately.
c. Internal Security Activities	No agents, no intelligence from public except possibly sporadic police informants.	No complete intelligence system; a few trained or voluntary informants & some data from FD census grievance work.	Hamlet [illegible] general info from informants, census [illegible] and/or some volunteers.	Effective informant system; considerable useful info from public.	Hamlet Chief directs effective internal security apparatus; security deputy, police, informant system, willing public participation.
4. Administrative & Political Activities a. GVN Governmental Management	Temporary or external GVN officials; effective, marginally, usually present only in daytime.	Some local participation in hamlet management; officials present usually only in daytime.	Many [illegible] present; mostly local appointees [illegible] usually present at night.	Complete managerial group is fully resident; includes elected hamlet chief & deputy; fully functioning but with some external support.	Elected, autonomous governing body, under autonomous VII; all officials in hamlet & VII resident.
b. Census Grievance Program	Only limited census activity; no grievance program.	Census grievance program started systematically	[illegible] very complete; some [illegible] solved.	More GVN actions being taken to meet people's grievances & aspirations.	Permanent GVN grievance [illegible] in place. Substantial evidence of GVN efforts to meet aspirations.
c. Information/PSYOP Activities	Little or none	Minimal activity; public indifference.	Rudimentary [illegible] activity given if makeshift; [illegible] associations being developed.	Systematic coverage; increased awareness of govt programs & personnel. Increased numbers of ralliers; people participating freely in civic associations.	Resident official executing [illegible] active & regular program. Active public awareness of GVN personnel, impending elections, district programs, etc.; civic associations active and effective.
5. Health, Education & Welfare a. Medical Services & Sanitation	Only infrequent visits by MEDCAP or cadre team.	Only periodic, scheduled MEDCAP or cadre team visits.	Full-time [illegible] sanitation teams; includes sanitation [illegible]	Resident trained medic who supervises sanitation & public health programs with some public participation. Trained midwife in hamlet or nearby.	Resident trained medic continues effective medical & sanitation programs with general public participation. Resupply of medicines regular & adequate.
b. Education	No GVN-sponsored educational facilities; may be informal instruction by VII elders, monks, Cath. priest.	Some formal instruction, not full-time; no permanent classrooms.	[illegible] primary education [illegible] classrooms but over-crowded; [illegible] 25% of children not enrolled.	Virtually all children receive primary education in permanent classrooms; may be some adult classes.	All children receive primary education in permanent classrooms; secondary school accessible; adult education program.
c. Welfare	No social welfare activity.	Some welfare activity to assist needy families, but basic needs not determined.	Basic needs [illegible] some being met.	Basic needs being met; some special benefits being paid by GVN.	Basic needs satisfied; special benefits clarified & being paid; Benefit channels continue to function.
6. Economic Development a. Self Help Activity	None	People assist in selecting projects but outsiders do most of work.	Projects [illegible] chosen with local consent & some [illegible] in house started.	All programmed projects underway, chosen to satisfy aspirations; popular participation with outside aid.	Some projects completed; local pride general; continuing external interest and support for new projects.
b. Public Works (require outside expertise; affect at least village)	None planned or undertaken.	Some detailed planning for RD plan projects.	[illegible] projects [illegible] & meet public needs; [illegible] work [illegible]	Priority projects underway; resources at hand; people appreciative.	Projects well along or completed; public enthusiastic.
c. Economic Improvement Programs (Farming, Fishing, Land Reform, etc.)	None.	Some planning; a few basic programs started.	[illegible] people interested.	More advanced programs started; increased popular support and participation.	Most programs well advanced in response to popular demand and continuing participation.

Fig. 3—Hamlet evaluation worksheet

Table 7

DATA FOR VILLAGES IN LOCAL-SUPPORT EXAMPLE

(As in Fig. 2)

District	Village	Population[a]	Controlled Population[b]	Fraction Controlled	Riceland (sq. km)	Controlled Riceland[c]
Sung Hieu	Hoi Cu	4,391[d]	1,850	0.421	24	10.1
	Phu An	5,319[d]	3,112	0.585	13	7.6
	Thanh Hiep Duc	1,117	0	0	11	0
	Hoi Son	2,115	1,058	0.500	5	2.5
	Xuan Son	924	924	1.000	7	7.0
	My Thanh	2,965	1,576	0.532	37	19.7
Khiem Ich	Thanh Phu	2,208	1,104	0.500	47	23.5
	My Phuoc Tay	5,933	2,817	0.500	26	13.0
	My Hanh Dong	2,833	1,419	0.500	18	9.0
	Cam Son	5,440	5,440	1.000	13	13.0
	Tan Phu Dong	2,855[e]	2,855	1.000	5	5.0
	Thanh Hoa	14,789	1,975	0.133	10	1.3
	Tan Hoi	3,429	1,715	0.500	10	5.0
	Nhi My	5,915	500	0.085	11	0.9
	My Hanh Trung	1,690	845	0.500	9	4.5
	Phu Nhuan Dong	1,682	1,382	0.822	15	12.3
	Tan Binh	4,595	1,546	0.336	16	5.4
	Binh Phu	7,070	2,125	0.301	17	5.1
	Long Trung	6,493	2,874	0.443	18	8.0
	My Hiep	5,002	2,501	0.500	23	11.5
	Long Khanh	2,146	800	0.373	18	6.7
	Tam Binh	6,696	3,348	0.500	19	9.5
	Long Tien	5,129	1,944	0.379	14	5.3
	My Long	10,225	10,225	1.000	13	13.0
	Phu Qui	5,583	2,792	0.500	8	4.0
	Nhi Qui	3,005	400	0.133	12	1.6
Long Dinh	Hung Thanh My	826	620	0.750	4	3.0
	Long Dinh	9,359	4,958	0.530	22	11.7
	Nhi Binh	5,191	2,995	0.577	34	19.6
	Binh Kim	3,748	2,200	0.587	4	2.3
	Ban Long	2,442	1,832	0.750	9	6.8
	Phu Phong	2,326	1,745	0.750	10	7.5
	Kim Song	2,272	1,772	0.780	12	9.4
	Song Thuan	1,698	849	0.500	8	4.0
	Long Hung	4,626	2,313	0.500	15	7.5
	Dong Hoa	4,096	2,049	0.500	8	4.0
	Binh Trung	2,340	1,170	0.500	6	3.0
	Huu Dao	1,883	1,412	0.750	4	3.0
	Diem Hy	1,936	968	0.500	4	2.0
	Duong Diem	2,662	2,081	0.782	8	6.3
	Thanh Phu	7,507	3,599	0.479	8	3.8
	Phuoc Thanh	4,555	0	0	10	0
Ben Tranh	Phu My	3,557	1,779	0.500	17	8.5
	Tan Hoa Thanh	3,275	2,103	0.642	12	7.7
	Tan Ly Dong	5,021	2,905	0.579	8	4.6
	Tan Ly Tay	4,805	2,868	0.597	4	2.4
	Tan Hiep	7,286	2,448	0.336	2	0.7
	Total	200,965	99,793	0.497	628	317.2

Notes:

[a] From MACV Hamlet Survey, except as noted.

[b] See text for method of estimating controlled population.

[c] Assumed same ratio as controlled population. Used village areas from Wilson and Penzo, modified by map study. See Sources, below.

[d] No population given for some hamlets.

[e] Not in hamlet survey; used Wilson and Penzo for population, and other sources for control data.

Sources:

Hq. MACV Hamlet Survey as of 28 February 1967

2. The able-bodied labor force, at 38 percent[1] of the controlled population, is 37,920. This should be enough labor for the riceland, since the maximum density required is estimated to be 1.1 laborers per hectare (Table 3).

3. The 514th Battalion, with 693 men, amounts to less than one percent of the controlled population. On the average, each campsite could count on 1,150 laborers, a support ratio of about 1.7. Also, while at any given campsite, the 514th could draw on the labor force near other campsites.

4. The sample area contains about 800 square kilometers, with 48 laborers per square kilometer. This is approximately one-half of the province and could be expected to contain around 2,400 Viet Cong troops, or 3 troops per square kilometer. On this basis a support ratio of 48:3 or 16:1 is obtained.

Next, two pictures of local support in Dinh Tuong province are developed. Labor drawn from the villages is the common index of support in both cases.

The first picture is dynamic in that it shows how the number of laborers needed might vary from week to week. Figure 4, based on Table 7, illustrates this for an average village. Note that most of the labor force is required for rice production at certain times (see Table 3). The labor utilization pattern shown is hypothetical in that it assumes a two-day camp every six weeks and the planning of major labor-consuming operations, such as battles and construction work, so as not to interfere with the major events in rice production (also shown). In the Delta, a good month for major construction, at least from the labor standpoint, is March, because it is in the slack season between the last harvest and the first plowing. Construction of a fortified battalion campsite might well occupy the entire labor force of a village for a period of weeks. On the other hand, existing fortifications might require only minimal repair before each occupancy.

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[1] Ages 15-44 (see Table 1, part A).

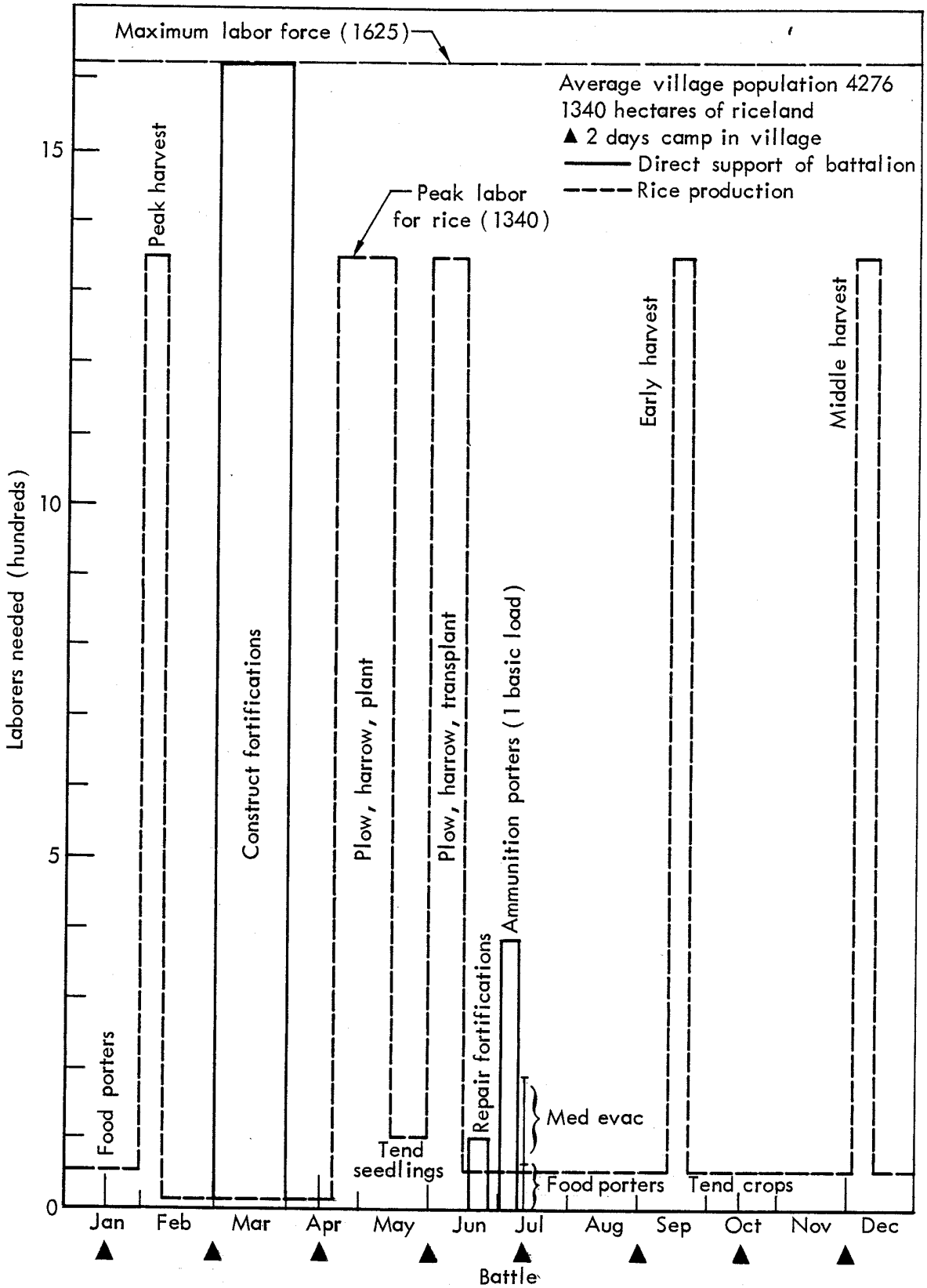

Fig. 4—Possible labor utilization for average village in local support example

The 514th's basic load of ammunition and its distribution are shown in Table 8. To carry one basic load in one lift without assistance from the battalion requires 377 ammunition porters (7,539 kg/basic load ÷ 20 kg/porter). To carry an entire 2-day supply of rice in one lift requires 52 porters.[1]

Setting aside the construction problem, we see that if the battalion draws only on this "average" village, it can almost always find enough porters to carry food and ammunition (429). If a battle is fought, 138 villagers would be scheduled to aid in evacuating dead and wounded. The total local-support requirement would then rise to 567, which would be no problem except during peak rice-growing activities. Ill-timed demands for support could ruin the rice crop, especially during planting, which is carefully timed with respect to water level.

This first picture is incomplete in several respects when compared with the factors developed below; but it does show how insensitive the support of the battalion is to cycles of the village economy. Also, porter requirements can be much lower if more time is allowed to preposition food and ammunition.

Actually, it has been the practice of the 514th to send many women to the market, each to buy a small quantity of rice, so as not to indicate the battalion's presence (or imminent presence) in the area. Thus, although the total effort in carrying food might be as illustrated, it would be spread out in terms of both people and time. This illustrates the difficulty in drawing a dynamic picture of support requirements and tends to move our analysis toward averages, as discussed next.

Our second picture of local support is a set of average support factors -- that is, the average number of civilians to support one Viet Cong soldier -- developed for a range of assumptions, ignoring fluctuations with time. The 514th Battalion's average support requirement is a function of (1) the average distance to logistics sites and (2) the average consumption of supplies. Support may be drawn from

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[1] Computed as follows: $\frac{693 \text{ men} \times 0.750 \text{ kg/day} \times 2 \text{ days}}{20 \text{ kg/porter}}$

Table 8

WEAPONS AND BASIC AMMUNITION LOADS, 514TH PROVINCE MAIN FORCE BATTALION

Weapon	Basic Load (Rounds)	Number of Weapons			Weight of Basic Load (kg)		
		Recon-Intel Sq. + B'n Hq.	3 Cos.	Total	Per Round[a]	Per Weapon	Battalion Total
Machinegun	500[b]	-	6	6	0.100	50.0	300
57mm recoilless rifle	4[b]	-	6	6	6.0	24.0	144
60mm mortar	24[b]	-	6	6	6.0	144.0	864
Automatic rifle	800	-	27	27	0.0039	3.1	84
Submachinegun	200	3	27	30	0.0039	0.8	24
M1 rifle	250	-	27	27	0.0039	1.0	27
MAS 36 rifle	100[c]	-	27	27	0.0039	8.4	227
Redstock rifle	100[c]	-	162	162	0.0039	8.4	1,361
Carbine	300[c]	9	78	87	0.0020	9.2	800
Pistol	(d)	3	6	9	-	-	(d)
Grenades	500/Co	-	1,500	1,500	1.0	1.0	1,500
Rifle grenades	-	-	-	2,208	1.0	1.0	2,208
Total							7,539

Notes:

[a]Based on Department of the Army Field Manual FM 9-2, Ordnance Corps Logistical Data, August 1959.

[b]Assumed, based on other data.

[c]Plus eight rifle grenades per weapon (2,208 total), included in weight of basic load (row above total).

[d]Assumed negligible.

20 different villages in a 40-day period, but, assuming adequate coordination, the total resources needed would be almost the same as if the battalion had remained in one place.

The local-support factors summarized in Table 9 are derived below, based on the discussion in Sect. III. Commo-liaison support, which extends beyond a local area, is discussed later in this section.

Cooking. The battalion generally does its own cooking. We assume that one man spends one hour per day cooking for his three-man cell. For a productive day of 16 hours, this amounts to 2 percent of the battalion effort, or 14 men.

Food production. In the Delta, the overall effort for producing rice consumes 4.4 percent of a person's time if that person is self-sufficient. This would imply a production force of 31 people to support the battalion. The effort to produce food other than rice could not be quantified, but manioc and corn are grown mostly during the off-season for rice (February to April). Based on this, we assume that other food requires about one-third as much effort as rice, or 10 people to support the battalion. Typically, the battalion would be one-sixth self-sufficient in food production; hence, the total of 41 people for food production divides into 7 from the battalion and 34 civilians. These are average requirements and do not allow for peak loads.

Medical treatment. A factor of 0.07 was developed earlier, giving a total of 49 men, all military.

Medical evacuation. Each combat engagement is assumed to last one day and use one-half a basic load of ammunition. Civilian support for evacuation of dead and wounded is assumed to be 20 percent of the battalion strength, on days of combat only.

Ordnance worksites. The worksites are assumed to be able to reload all ammunition of 50 caliber or less and to manufacture all grenades.[1] According to Table 8, worksites can produce 2,823 kilograms

[1]There is evidence that some worksites can also produce mortar shells.

Table 9

AN ESTIMATE OF LOCAL VIET CONG SUPPORT REQUIREMENTS[a]

(B = basic load of ammunition exploded monthly)

Activity	Manpower Contribution				Support Factors (Civilian Only)[b]
	Battalion	Other Military	Civilian	Total	
Cooking	14	-	-	14	-
Food production	7	-	34	41	0.049
Medical treatment	9	40	-	49	-
Medical evacuation	-	-	9B	9B	0.013B
Ordnance worksites	-	-	49	49	0.07
Construction	-	-	35 to 350[c]	35 to 350	0.05 to 0.50
Communications	21	7	-	28	-
Food porterage	-	-	22	22	0.032
Ammunition porterage	-	-	13B	13B	0.019B
Total	51	47	140 + 22B to 455 + 22B	238 + 22B to 553 + 22B	0.201 + 0.032B to 0.651 + 0.032B

Notes:

[a]Based on the 514th Battalion in Dinh Tuong province.

[b]Ratio of civilian support to battalion strength (693 men).

[c]Range from "low" to "high" construction requirement.

of ammunition and 3,708 kilograms of grenades out of each total battalion basic load of 7,539 kilograms. The question is, should the support factor be expressed as a function of ammunition expenditure rate or should a constant production capacity be assumed for the province? We have chosen the latter alternative on the ground that the personnel are trained and require some equipment; new ordnance worksites could not appear on the scene quickly in the manner of freshly recruited porters. We must also take into account that the worksites support all ordnance users in the province, not just the 514th.

There are 14 worksites in Dinh Tuong province, according to Fig. 1, and these support approximately 5,000 men.[1] We start with requirements for the 514th, based on Tables 6 and 8:

Ammunition reloading:

82,350 cartridges ÷ 1,000 cartridges/man-month per basic load per month = 82 men

Grenade manufacture:

3,708 grenades ÷ 82 grenades/man-month (avg) = 45 men

Total 127 men

From this total, 127 men (or women) can produce 6,531 kilograms per month, supporting 693 men in the battalion. But the average worksite has 26 men (Table 5), so the 14 sites in the province would have 14 x 26 = 364 men. This would support 1,990 troops, or less than half of those in the province if all units fired one basic load per month and had the same basic load as the 514th. This is not the case: average expenditure is much less and other units are not so well-equipped; hence, the 14 sites are adequate. In any event, we use here a support factor of 364 ÷ 5,000 = 0.07.

The total ordnance production in the province would be 6,531 x 364/127 = 18,720 kilograms per month. For 5,000 troops this amounts to 3.7 kilograms per month per troop.

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[1] See M. E. Anderson, et al., Insurgent Organization and Operations: A Case Study of the Viet Cong in the Delta.

Construction. Owing to the extreme variation in manpower required for construction work, this factor is arbitrarily varied through a range of 0.05 to 0.50, designated in Table 9 as "low" and "high" construction requirements. This would require from 35 to 350 civilians.

Communications. A factor of 0.04 was developed earlier, or 28 military men to support the battalion.

Local porterage. The distances involved turn out to be relatively short because of the distribution of logistics sites; those given here were developed by detailed map studies of the trails and waterways near one campsite. Only the trail distances are used, because support factors assume porter transportation. The following distances were calculated: 10.2 kilometers to the nearest food-storage site, and 12.8 kilometers to the nearest ammunition site. We assume that porters carry 20 kilograms and walk 24 kilometers per day (somewhat less than porters on longer lines of communication, because local villagers are required to do the job, on an occasional basis, in this case). The required number of porters is given by the formula

$$N = 2\,SD/pV$$

where N is the number of porters required, S the supply rate in kilograms per day, D the one-way distance to a storage site, p the porter payload, and V the average distance traveled daily. For rice, the total daily requirements of the 514th Battalion, at 750 grams per man, are 693 x 0.750, or 518 kilograms. The value of N is (2 x 518 x 10.2)/(20 x 24), or 22 porters. As for ordnance, we recall from Table 8 that each basic load of ammunition weighs 7,539 kilograms. At one basic load per month (B = 1), S is 7,539/30, or 2,513 kilograms/day; and N is 13 porters per basic load per month.

The use of averages for support assumes good scheduling. Ordnance workers, for example, might have to leave their shops at times to work in the ricefields. To balance this, extra people would be available for ordnance work during the dry season, when there is little or nothing to do in the fields. A battle during the planting time could

seriously damage the ensuing crop.[1] On the other hand, as pointed out earlier, most support activities can be spread out over time to avoid peak loads and interference with rice production.

Support is expressed here in terms of civilians required per Viet Cong soldier. If a Viet Cong unit is forced to provide its own support, its average combat potential is presumably reduced, but its ability to fight intensively for short periods may not be hampered.

Although the case study leading to the support factors in Table 9 was based on a battalion in the Delta, these factors are fairly general for all of South Vietnam. The effort to produce rice varies with geographical area by less than a factor of two; therefore, the support factor for food production would probably not exceed 0.1. There is no apparent reason why medical evacuation or ordnance work would change with area, and construction has already been left as a variable. Local porterage of food and ammunition would be the only other factor subject to geographical change. The case study used distances of 10-13 kilometers for local porterage; this support factor would vary in direct proportion with the average distances to food and ammunition storage sites. If, for example, these distances were doubled and the food production effort were likewise doubled, the formula for local support in Table 9 would become 0.232 + 0.051B for the low-construction case and 0.682 + 0.051B for the high-construction case.

COMMO-LIAISON SUPPORT

The long-distance movement of supplies, as distinguished from what we have thus far called local support, is accomplished along commo-liaison routes or corridors. Many of these corridors are manned by porters operating in stages; therefore, this support factor is measured in terms of porters as an upper limit on labor requirements. Adjustment factors can be derived for converting to lower manpower requirements for sampans, bicycles, oxcarts, and pack animals.[2]

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[1] U.S./GVN tactics might be most effective if they could disrupt the schedule at critical times.

[2] Official estimates indicate an emphasis on watercraft in the Delta, but no data were found on the number or type of watercraft available to the Viet Cong.

Several examples of specific commo-liaison support of the 514th Battalion were found in Provincial Interrogation Reports. For example, a 17-man "Engineer Platoon" transferred weapons and ammunition for the 514th two to four times per month from June-October 1965, operating out of Dang Hung village.[1]

Binh Ninh village had a Transportation Escort Civilian Laborer squad directed by the Binh Phu hamlet Liberation Youth Civil Affairs Committee. This squad was organized to transport ammunition and evacuate wounded soldiers through Binh Ninh village, Cho Gao district. The squad, which consisted of two leaders and eight members, operated along a designated route guarded by two guerrilla squads. The squad personnel often began work at 1900 hours and made three or four moves per month. A platoon of 50 people could carry 30-40 boxes (the larger boxes required two people).[2] In one case, all members of a transport squad carried GVN identification cards and otherwise behaved as villagers friendly to the GVN.[3]

Commo-liaison support is described in three parts: (1) an actual example is given from an interview with an ex-Viet Cong porter; (2) equations are derived for computing porter requirements; and (3) the potential capacity of an actual route is analyzed, based on the estimated labor pool.

An Example: Movement of Ammunition

Figure 5 shows a section of a corridor with rather closely spaced transfer points, as described by the ex-porter. Three different villages supplied porters for the section shown. The narrative is included on the figure for ease of reference.

Porter Equations

The most complicated case is where porters operate in stages and carry rice for succeeding stages. Under this concept, porters are

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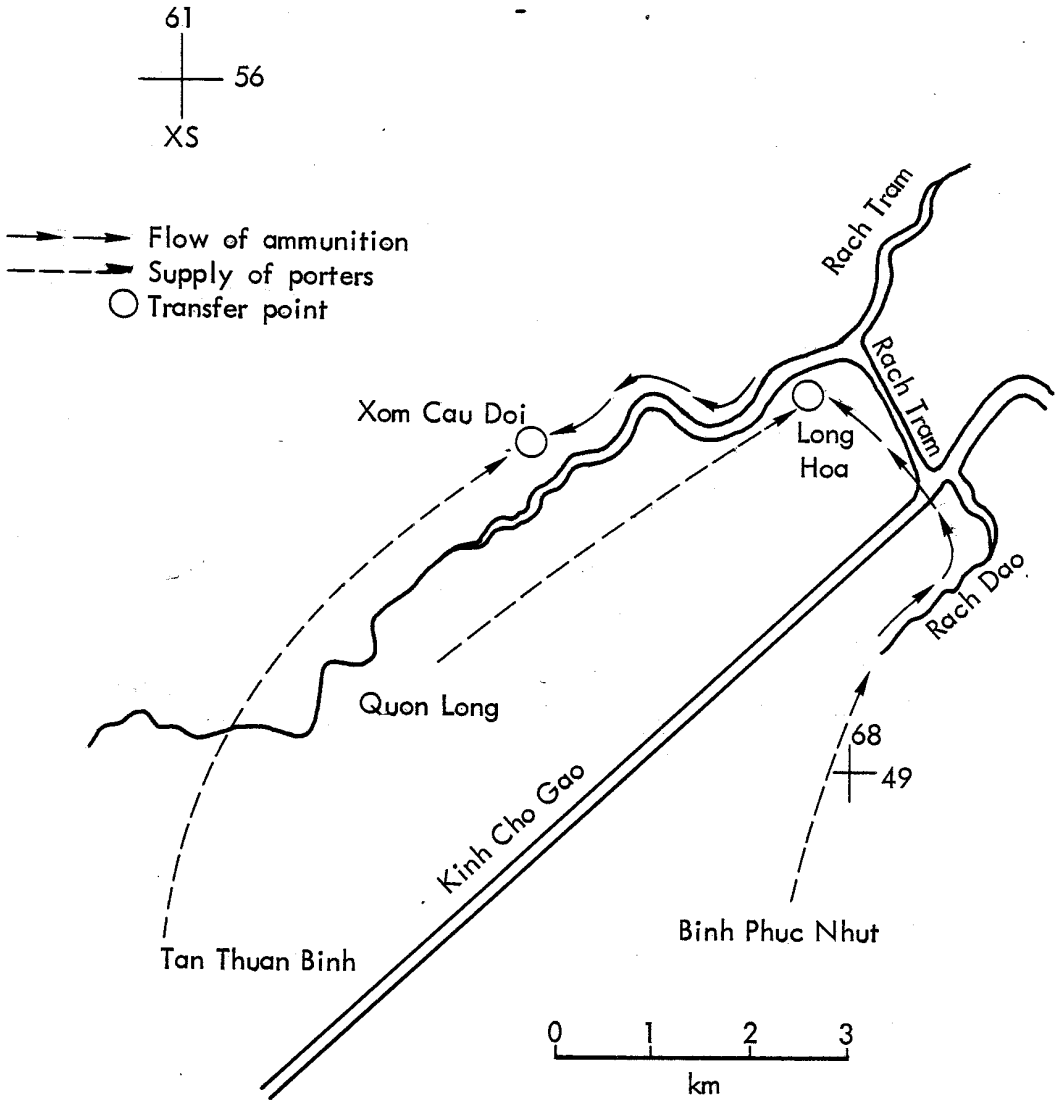
[1] DT-65/66.

[2] DT-348/66.

[3] DT-493/66.



"The porters had to gather in Long Hoa hamlet. There is a liaison station in Long Hoa which is manned with about twenty armed youths. These liaison agents received the ammunition from the porters coming from Binh Phuc Nhut and handed it over to the Quon Long porters. I was told that the Binh Phuc Nhut people carried the ammunition along the Rach Dao creek, crossed the Kinh Cho Gao canal and paddled alongside the Rach Tram creek before arriving at Long Hoa hamlet. Then it was the turn of the Quon Long people who had to carry that ammunition along the next segment of the same creek to Xom Cau Doi. After that, the ammunition was turned over to the Tan Thuan Binh villagers who had to carry it to another destination which I don't know." (DT-124, a civilian rallier)

Fig. 5—Example of the use of ammunition transportation teams in Dinh Tuong province

drafted from a nearby village and assembled at a commo-liaison station. They receive their loads from the team operating on the stage behind them, then make a one-day round trip on their assigned stage, delivering to the next station. They carry rice for three meals, plus rice for all succeeding stages, plus enough cargo to bring their load up to their prescribed payload. Obviously this becomes inefficient if there are too many stages.

If R represents the pounds of cargo to be delivered per day and p the porter payload, then R/p porters are carrying payload (not counting food for themselves and later stages). On the last stage, if each man needs r pounds of food for the one-day round trip of d kilometers, the number of porters carrying food is $\frac{nr}{p}$, where n is the total of cargo-carriers plus food carriers on the last stage. Therefore,

(1) $$n = \frac{R}{p} + \frac{nr}{p} = \frac{R + nr}{p}$$

(2) $$n = \frac{\frac{R}{p}}{1 - \frac{r}{p}} = \frac{R}{p - r}$$

Now the food for the last stage is actually part of the cargo for the next-to-last stage. Let n' be the number of porters on the next-to-last stage. There are $\frac{R + nr}{p}$ cargo-carriers and $\frac{n'r}{p}$ food carriers, so

(3) $$n' = \frac{R + nr + n'r}{p}$$

(4) $$n'(1 - \frac{r}{p}) = \frac{R + nr}{p} = \frac{R}{p} + \frac{nr}{p}$$

But, from Eq. (1),

(5) $$\frac{nr}{p} = n - \frac{R}{p}$$

so

(6) $$n'(1 - \frac{r}{p}) = n$$

For simplicity, we define a variable $\bar{c}$:

$$\bar{c} = \frac{1}{(1 - \frac{r}{p})} \tag{7}$$

Then, from Eq. (6),

$$n' = n\bar{c} = \frac{R}{p}\bar{c}^2 \tag{8}$$

This extends to a geometric progression:

$$\bar{P} = \frac{R}{p}\sum_{i=1}^{s}\bar{c}^s \tag{9}$$[1]

where $\bar{P}$ is the number of porters (not counting some factors added below). Then the sum of the progression is $\left[\frac{R}{p}\right]\frac{\bar{c}(\bar{c}^s - 1)}{\bar{c} - 1}$ and

$$\bar{P} = \frac{R\bar{c}(\bar{c}^s - 1)}{p(\bar{c} - 1)} \tag{10}$$[2]

Next we add some factors to account for time lost in assembling porter teams and for escort and supervision. The discussion of porterage in Sect. III, under "Transportation," mentions a team that was out for 17 days, of which 12 were spent in actually carrying supplies. The ratio of total time to productive time is 17/12, or 1.42 in this case, which we adopt for our porterage equation. If we introduce 10 percent additional manpower for escort and supervision, two adjustments are necessary:

1. The number of food-carrying porters on the last stage becomes 1.1nr/p, and the common ratio becomes:

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[1]Actually, $\bar{c}$ is the common ratio of the progression; that is, the ith term multiplied by $\bar{c}$ gives the $(i + 1)$th term.

[2]These equations are equivalent to those in J. W. Higgins, Porterage Parameters and Tables, RM-5292-ISA/AGILE, August 1967, which deals with porterage in more detail. The algebraic form is different, but the results are the same when consistent assumptions are made as to how much food is carried.

(11) $$c = \frac{1}{(1 - \frac{1.1r}{p})}$$

2. The right-hand side of Eq. (10) is multiplied by 1.1. The adjusted porterage equation then becomes

(12) $$P = \frac{1.56Rc(c^s - 1)}{p(c - 1)}$$

where c is defined by Eq. (11) and the coefficient 1.56 is the product 1.42 x 1.1. Equation (12) was used in calculating support factors given in Appendix B.

Analysis of an Actual Route

One of several commo-liaison corridors discovered in Dinh Tuong province is shown on Fig. 2. This corridor crosses the 10 villages listed in Table 10, and would probably draw porters from these villages up to a maximum equal to the population under Viet Cong control. As shown in Table 10, the corridor capacity would vary considerably from village to village, but even the lowest capacity (4,860 pounds/day) would support around 8,000 troops expending one basic load of ammunition per month.[1]

Although this example is in the setting of Dinh Tuong province, the porterage equation should be applicable anywhere in South Vietnam, because payload, distance, and number of stages are left as variables. Further, this represents the worst case from the transportation standpoint, since porters are used instead of sampans or other vehicles requiring less labor per unit of supply capacity.

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[1]Calculated as 4,860/0.61, where 0.61 is the value of coefficient "a" computed in Appendix B, p. 107.

Table 10

VILLAGES ALONG A COMMO-LIAISON CORRIDOR IN DINH TUONG PROVINCE

Village[a]	Controlled Population[b]	Controlled Labor Force[c]	Corridor Capacity[d] (lb/day)
My Hanh Trung	845	321	10,300
Tan Hoi	1,715	652	20,900
Nhi Qui	400	152	4,860
Diem Hy	968	368	11,800
Duong Diem	2,081	791	25,300
Nhi Binh	2,995	1,138	36,400
Binh Trung	1,170	445	14,200
Dong Hoa	2,049	779	24,900
Long Hung	2,313	879	28,100
Thanh Phu	3,599	1,368	43,800

Notes:

[a]See corridor shown on Fig. 2.

[b]From Table 7.

[c]Based on Table 1, age group 15-44 (38 percent).

[d]Using Table B-2, program B, step 1.04 and average porterage conditions as defined in Appendix B: capacity $R = p\frac{P}{1.56}$ for one stage per village ($s = 1$). Some of the stage lengths are short enough to permit more than one round-trip per day, with correspondingly increased capacity; however, one trip per day was assumed for the porters from each village.

V. IMPLICATIONS OF THE STUDY

This section shows how the foregoing analysis of the Viet Cong logistics system might be used as an aid in selecting preferred strategies, and gives examples of the calculations that a planner could make in comparing and combining countermeasures in any given area of South Vietnam.

The Viet Cong logistics system in the Delta can be characterized as follows, based on the preceding analysis:

- The Viet Cong rely on civilian support for transportation, construction, food production, evacuation of wounded, ordnance work, and the purchase of miscellaneous supplies.
- Logistics facilities are numerous and well-dispersed.
- There are numerous supply routes, using every possible mode of transportation.
- There appears to be a high ratio of available civilian laborers to Viet Cong troops, except during the peak labor periods of rice production.

Logistics countermeasures might include combinations of attacks against logistics facilities, crop destruction, evacuation of civilians, resources control, and blockades. All of these operations are already in effect in various degrees with the ultimate objective of GVN control of an area. This section discusses the relative effects of such countermeasures.

USE OF SUPPORT FACTORS

Figure 6 illustrates the use of support factors to evaluate countermeasures, using data from Table B-3, Appendix B. In this case, the support factors are shown as a function of the distance over which supplies must be carried. Unless otherwise coded, all curves are for ammunition expenditure of one basic load per month.

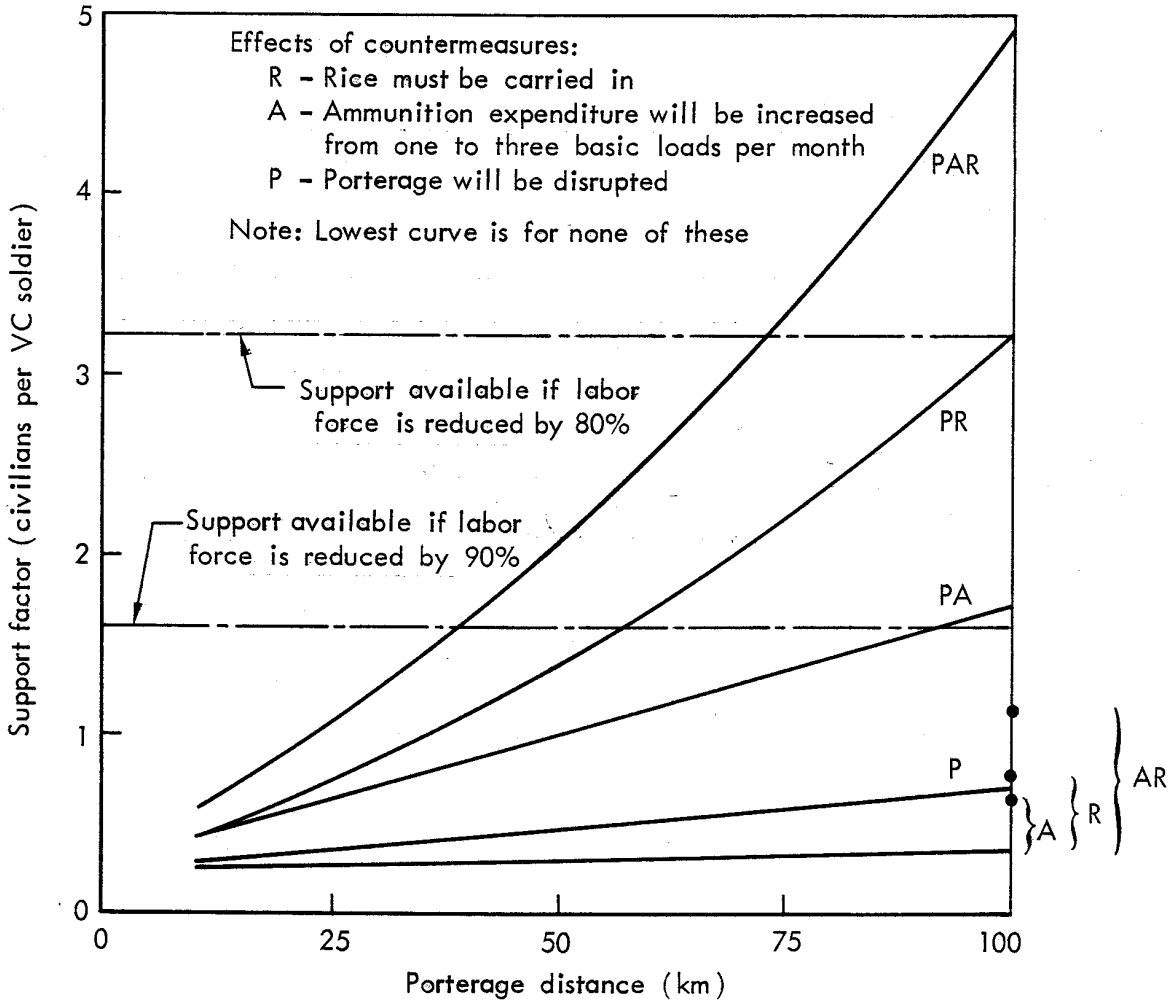

Fig. 6—Effect of various countermeasures on VC support capabilities in the Delta

Source: Table B-3

Starting at the bottom of Fig. 6, we see that the lowest curve is for no countermeasures; even at a porterage distance of 100 kilometers, the support factor is only 0.35 (the separate effects of increasing ammunition and carrying rice are shown by brackets "A" and "R"; the combined effect, by bracket "AR"). Curve "P" shows the effect of making porterage more difficult (payload decreased from 50 to 40 pounds; daily walking distance, from 30 to 10 kilometers).[1] Curve "PA" compounds the effect of difficult porterage with that of increasing the ammunition requirement to three basic loads per month. Curve "PR" combines difficult porterage with a requirement for carrying rice: porters must carry all the rice they consume, including rice for subsequent stages, plus rice for the troops they are supporting[2] (ammunition expenditure is back to one basic load per month for curve "PR"). The highest curve, "PAR," combines all three effects: difficult porterage, increased ammunition, and rice carried in.

It appears from Fig. 6 that the combined use of countermeasures is much more effective than their separate use. Increased porterage distance is a powerful multiplier; this implies some combination of resources control, area control, and stockpile removal to force resupply at longer distances. The present existence of commo-liaison routes shows that, at least for specialized items such as weapons and certain ammunitions, it is already necessary to move supplies in from a distance. For a given porterage distance it is much more effective to increase porterage, rice, and ammunition requirements simultaneously than to increase them one at a time.

The required support varies by a factor of 20 in Fig. 6, ranging from 0.25 to 4.9 civilians per soldier. However, in the case study of Sect. IV it was calculated that the Delta could provide around 16 laborers per Viet Cong soldier, or more than three times the highest value shown in Fig. 6. This indicates that a substantial reduction

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[1] Increased GVN control along the supply route would generate delays, detours, and restricted hours of operation for Viet Cong porters, approximating this effect.

[2] This implies a successful rice-control program or some combination of destruction and removal of rice stocks.

of the labor force[1] would be required before other countermeasures would be felt -- that is, before support required would exceed support available. An 80-percent reduction (dashed line on Fig. 6) would bring available support down to 0.2 x 16 or 3.2 laborers per soldier, but this would be limiting only in the worst case (PAR) for distances up to 100 kilometers. Even a 90-percent reduction is limiting only for porterage distances of 40 kilometers or more. Longer supply lines, if they could be forced, would further amplify the effect of labor-force reduction (see Table B-3).

POSSIBLE COUNTERMEASURES

Depletion of Food Stocks

In the Delta, normal supplies of food would be stored in the villages, possibly set aside for Viet Cong purchase as required. The food storage sites shown in Fig. 1 are probably for emergency reserves only. If villagers kept a six-month food supply on hand,[2] the military portion would be small because it would be dispersed among the camp areas; the troop population is relatively small, in any event. Therefore, food destruction or removal would have to be complete and spread over a large area to defeat Viet Cong unit mobility.[3] This, in turn, implies complete evacuation of civilians, because the relatively small amounts of food required by the Viet Cong can probably be smuggled out of GVN-controlled areas.[4]

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[1] By evacuation or by increased GVN control.

[2] They might store much less in cases where a prime-quality rice crop was sold out and cheaper rice was purchased for consumption as needed.

[3] Each soldier carries a week's supply of rice, and a unit can move as far as 100 kilometers in a week.

[4] According to official sources, approximately 10,000 metric tons of Viet Cong foodstuffs were captured or destroyed by allied forces during the four-month period November 1966 through February 1967. From the same study, this would be about a three-month supply for Viet Cong/NVA Main Force and Local Force units in South Vietnam. However, 10,000 metric tons amounts to only 0.2 percent of the total 1966 production of rice.

The former Assistant Chief of Staff, Operations, Viet Cong 5th Division, was asked about the effect of capturing rice stocks:

> Source felt that rice stocks can be replenished within ten days following their seizure. This would depend on the availability of transportation and the quantity seized.
>
> Source stated that RVN/U.S. forces seizure of the rice near the Tuc Trung Rubber Plantation in Long Khanh Province in late May and early June 1966 deprived the 5th Division of approximately 30 days' supply of rice. Source stated he heard that this was replaced in five days. Source heard of no effect on the unit's combat effectiveness.

On the other hand, there are reports of effective harassment:

> The enemy is concentrating on harassing our economic activities, particularly burning, destroying and seizing rice. At present in Tuy-Hoa, they are concentrating on sweep operations and trying to destroy the rice harvest. They have confiscated and burned much rice. This has caused a critical shortage of food for us as well as for the masses. This activity must be immediately stopped or it will cause much trouble to our resistance.

Destruction of Ammunition Stockpiles

Even if all ammunition sites in an area could be found and destroyed, which is unlikely, the troops would have a one- to three-month supply with them. Loss of the storage sites would temporarily reduce the combat potential of supported units, but there would be fresh ammunition in the pipeline (the commo-liaison routes) which would become available unless interdicted. Also, ordnance worksites would continue to produce mines, grenades, and ammunition unless their supply of materials was also cut off.

Destruction of Ordnance Worksites

In Dinh Tuong province the ordnance worksites shown on Fig. 1 could provide an estimated 25 percent of a basic load per month for

all of the province troops. Destruction of these sites would force the resupply of complete rounds and explosive devices, at the above rate. This would continue for perhaps several months while new technicians and tools were infiltrated from the north, assuming that no replacements were available locally. The substitute resupply would be required, of course, only if province ammunition expenditures were as high as the worksites' output.

Blockades

The difficulty in cutting off supplies by means of blockades is that the main routes constitute only a small portion of the transportation net. In the sample area (Fig. 2) the trails shown on a 1:50,000 map are roughly one kilometer apart over most of the area. Waterways are much more variable in density; in places, they are more frequently found than trails. To blockade the sample area, then, would require control of the entire perimeter. This could possibly be done by controlling sections of roads, rivers, and canals which would have to be crossed to enter the area. Maintaining sufficient strength at all crossing points to block transport (porters, carts, sampans, and so on) escorted by armed troops would be extremely costly; some type of patrol-and-reinforce system would probably be more feasible.

Reduction of the Available Labor Force

The discussion of Fig. 6 indicated the importance of the civilian labor force and showed that combined countermeasures would probably be needed to make any substantial reduction of the labor force effective. Even in the Delta, however, examples may be found of the effects of reducing the civilian population. An interviewee, an assistant squad leader in the 514th Battalion, is quoted as follows:[1]

> It was very easy for us to get food supplies in 1962 and 1963. But starting in 1964, it became more and more difficult for us to get food supplies, because many villagers left their villages due to bombings and shellings.

[1] DT-125.

In many areas there were no people left, and if some of them still stayed there, they built huts in the middle of the ricefields and lived there to avoid bombings and shellings. This was the situation in Tan Phu, Long Tien, Long Trong, Cam Son and Xuan Son villages. A number of the villagers went to live in GVN areas. In Tan Phu village, for example, a number of the people have moved to the GVN areas. From the end of 1965 to the present, it has become even more difficult for us to get rice and other food items. Before, each fighter received 6 piasters per day for food, but at the end of 1965 it was raised to 10 piasters at the request of the fighters. Even though we had the money we couldn't buy rice and other food items such as soy bean sauce, dry mushroom and chao (salted bean curd) because there were no people left for us to buy these items from. If people still lived in the area, they went away when we came to stay in their village because they were afraid that the GVN would bomb it. They were afraid of getting killed in bombings. One time the people said: "There must be many GVN infiltrators in this unit, otherwise how could it be that wherever it goes it gets shelled and bombed?"

The squad cadres proposed to the higher ranking cadres that the quartermaster buy rice, dry fish, soy sauce and chao and distribute them to the various squads. So starting in 1966 the quartermaster bought rice for the troops, and each of the fighters was given two piasters per day to buy other food items. There were ten men in each squad, so each day the squad received 20 piasters which it spent on soy sauce, chao, and so on. These food items were also bought by the quartermaster, and the squads paid the quartermaster when they got their rations. The food was bought at the market by the people for the quartermaster.

It was very easy for the 2nd Company to move around in 1962 and 1963, because the people supported and helped us by providing sampans to transport our heavy weapons. The people also repaired roads and bridges regularly and so it was easy for us to move on foot. What's more, we were neither bombed nor shelled. In the following years, especially in 1965 and 1966, we met a lot of difficulties in our moves. The people no longer provided us with sampans as before, and no one repaired bridges and roads because most of the people had moved elsewhere. This was why the troops tripped and fell very often, especially during the rainy season.

The foregoing illustrates the Viet Cong reliance on civilian support and how the lack of such support, even in a few villages, can hamper operations and perhaps affect morale. In this specific case,

reduction of the labor force had more effect than our analysis would indicate.

Resources Control

South Vietnam has had a legal basis for resources control since 1952; however, GVN responsibility for denying the Viet Cong goods with a system of check points and controls was not officially defined until October 1964. A report made by USAID Special Projects in 1966 agreed closely with a 1963 survey by USAID Public Safety Division, which concluded:

> The checkpoints in most instances are established at fixed locations, usually near town and on main highways. The present type of operation appears to be only harassing the Viet Cong and preventing them from the wholesale use of the highways.

The 1963 survey rated 27 provinces poor, seven fair, and six not evaluated (probably because of Viet Cong control) with respect to resources control. The 1966 report estimated that enemy capability at circumvention had actually increased and that the resources control program was a failure. This general feeling was personally verified on several occasions when one of the authors observed police checkpoints along canals in Saigon. Very few cargo boats were checked, and many of those not checked could have been carrying goods to the Viet Cong. A U.S. customs advisor reported a similar situation on waterways at the Cambodian border. One excuse given in Saigon was that the police operated on tips and only checked boats suspected of carrying contraband. There have, in fact, been some recoveries of machine tools, medicines, gold bars, and other goods, as a result of intelligence information.

Apparently resources control has been unsuccessful on both sides of the conflict. For example, here is what happened when the Viet Cong tried rice control in Dinh Tuong province:

Each month each family was allowed to mill just enough paddy for its members. The Front determined that each person was entitled to a ration of 1 bushel of paddy per month. Whenever the people went to have their paddy milled, they had to have an introduction letter from the hamlet cadres or from the Village Finance Section. Anyone who was caught carrying their paddy away without this letter of introduction would have their paddy seized by the Front. This is in theory, but in practice the villagers have been bringing all their paddy out to the GVN-controlled areas secretly.[1]

[1]DT-120, a civilian rallier.

Appendix A

SOME ORDNANCE DETAILS

1. GLOSSARY OF WEAPONS MENTIONED IN REFERENCED DOCUMENTS. (Except as noted, "Chinese" means "Communist Chinese." See end of Glossary for general source of information in this tabulation.)

Weapon	Description and Remarks
Assault rifle (AR)	See Submachinegun AK.
Automatic rifle, BAR	U.S. Browning automatic rifle, cal. 30.
Automatic rifle, Czech	Probably 7.92mm machinegun model 26; also manufactured in China as type 26.
Automatic rifle, French F.M. 24 x 29	French M1924/M29, 7.5mm.
Automatic rifle, RPD	Soviet 7.62mm light machinegun RPD; same as Chinese light machinegun type 56.
Bazooka	B40 rocket launcher.
Carbine	Probably Chinese type 53 or 56, which is same as Soviet SKS 7.62mm semiautomatic carbine.
Carbine, semiautomatic	See Carbine; also Rifle, CKC.
Grenade launcher	Probably U.S. M79.
Machinegun, company	Also called RP46, a Soviet 7.62mm machinegun; same as Chinese light machinegun type 58. Has also been called a heavy machinegun.
Machinegun, heavy	Insufficient information. Could be 7.62mm or 12.7mm, if Chinese.
Machinegun, heavy, K53	Soviet 7.62mm heavy machinegun SG-43, SGM; same as Chinese type 53, 57.
Machinegun, heavy, 12.7mm	Chinese type 54.
Machinegun, heavy, 12.8mm	Not in source.
Macninegun, light, RPD	See Automatic rifle, RPD.
Machinegun, light, Russian	Goryunov M43 (not in source).
Machinegun, light, type 53	7.52mm, same as Soviet light machinegun DP, DPM.
Machinegun, light, U.S.	Browning cal. 30.
Machinegun, MAS 31	French, 7.5mm, M1931A.
Machinegun (MG), German	May be 7.92mm machinegun, M34; good for antiaircraft use because of high cyclic rate.

Weapon	Description and Remarks
Mortar, 60mm	Probably Chinese Nationalist type 31; same as French M1935; same as U.S. M2.
Mortar, 81mm	Could be U.S. M1, French M44, or UK L16A1.
Mortar, 82mm	Soviet M1937; same as Chinese type 53.
Pistol, K45	Believed to be Chinese; bore size not given.
Pistol, 12mm	Probably U.S. Cold 45.
Pistol, K51	Believed to be Chinese; bore size not given.
Recoilless rifle (RR), 57mm	Chinese type 36, usually designated DKZ (no Soviet equivalent found in source).
Recoilless rifle, 75mm	Chinese type 52 or U.S. M20.
Revolver, Smith & Wesson	U.S., need more information.
Rifle, Canadian Browning	Not in source.
Rifle, CKC	Frequently mentioned; but not in source. May be Chinese Nationalist "Chiang Kai-shek" model. Sometimes called automatic carbine. May be Soviet SKS carbine.
Rifle, K44, Russian	Looks like Soviet SKS semiautomatic carbine. Not mentioned in source. Might also be Soviet M1944 carbine.
Rifle, MAS-36	French, 7.5mm M1936.
Rifle, red stock	K44 Russian rifle (as mentioned in MACVJ2 Interrogation Report, Log #11-280, 8 January 1965, Confidential).
Rifle, M1	U.S., Garand.
Rocket launcher, B40	Bazooka.
Submachinegun (SMG), AK	Also called assault rifle. Probably Soviet 7.62mm assault rifle, AK-47; same as Chinese type 56.
Submachinegun, K50	Chinese type 50 and North Vietnam type 50 are same as Soviet 7.62mm submachine-gun M1941.
Submachinegun, MAT49	French 9mm M1949. Some have been converted to use Soviet 7.62mm pistol cartridge.
Submachinegun, Tulle	Believed to be French, but not mentioned in source.

Source:
Weapons and Equipment Recognition Guide, Southeast Asia, Department of the Army Pamphlet 381-10, January 1966.

2. ESTIMATED PRODUCTION TIMES FOR WEAPONS AND ORDNANCE SPARE PARTS

Weapon	(1) Nomenclature	Time Hr	Time Min	Weapon	(2) Nomenclature	Time Hr	Time Min
MAS rifle	Spring shackle M	2		Machinegun	Barrel spring shackle	4	
K.44	Extractor	8			Taper pin	10	
	Sear	8		Machinegun	Recoil spring	4	
	Safety pin	1	30	MAS	Safety pin	4	
Garand rifle	Extractor	10			Connecting pin	7	
CKC rifle	Firing pin	10			Tripod lock	12	
	Extractor	10			Front lock	12	
	Front sight	2		Machinegun	Leaf spring V	8	
	Firing pin	2		Maxim gun	Firing pin	13	
	Recoil spring	1	30		Recoil spring	7	
	Extractor pin	1		Machinegun	Safety pin	11	
	Safety lever	11		?	Extractor	10	
Carbine	Sight	16		RPD Sub-machinegun	Bolt latch release lock	12	
	Wooden stock	24			Extractor	10	
	Follower	3			Extractor pin	11	
Tulle sub-machinegun	Knob	11			Taper	10	
	Cover	8		57mm re-coilless rifle	Firing pin	3	
	Cover spring		30		Trigger housing screw		30
K.50 sub-machinegun	Follower	2					
	Leaf spring	4					
AK sub-machinegun	Extractor	10			Trigger spring	1	
	Extractor pin	1			Trigger cord		30
	Extractor spring		30		Trigger housing		30
	Knob	2			Connecting pin		50
	Safety sear	1			Safety shield	2	
	Trigger	2		81mm mortar	Firing pin	8	
	Recoil spring	1	30		Elevation crank spring	2	
	Firing pin	10		12.7mm	Firing pin	10	
U.S. auto-matic rifle	Rear sight	1			Barrel spring shackle	4	
	Sear	3			Taper	12	
	Firing pin	11			Pin to release lock lever	10	
	Recoil spring	3			Firing pin lever	16	
AR 24-29	Extractor	8			Pin retaining lock spring	16	
	Ejector	6			Trigger release pin	8	
	Tripod	7					
	Bipod spring	2					

[cont'd]

Weapon	(1) Nomenclature	Time Hr	Time Min	Weapon	(2) Nomenclature	Time Hr	Time Min
AR 24-29 [cont'd]	Connecting pin	2		B.40mm	Firing pin	15	
	Pin	12			Trigger	10	
	Recoil spring	4			Trigger pin	2	
	Shoulder pad	14					

Note

Estimated expenditures for production of weapons and ordnance spare parts and repair of weapons based on capability, facilities, technical skills, raw material available, past experiences gained by blacksmiths, metal workers and turning lathe units, so as to facilitate the establishment of the quarterly and yearly plan.

3. SAMPLE VIET CONG ORDNANCE INFORMATION

Table A-3-1

ARMAMENT OF A VIET CONG INDEPENDENT BATTALION (502nd)

	Organic Military Units				Companies		Elements of 273rd Co.			
	Command Sec.	Signal Plt	Combat Spt Plt	Recon Squad	271st	272nd	1st Plt	2nd Plt	3rd Plt	Recon Squad
Strength:	159	43	42	14	148	146	32	32	42	12
57mm RR[a]			3/45[b]							
60mm mortar					3	2			2	
MG, lt.					4/6000					
-Cal.30					(1)					
-Chicom					(3)	3/4500			3	
SMG, K50				3/400						
Auto. rifles					6/3000	9/4500				
-U.S.					(2)	(1)				
-Czech					(4)	(8)		1		
-Chicom								2		
Rifle-K44									8	8
Carbine		8/800		9/1350			3		4	2
Grenade		40		12						

Notes:

[a] See preceding weapons glossary.

[b] Number of weapons/rounds of ammunition.

Table A-3-2

ARMAMENT OF SAMPLE VIET CONG UNITS

	334th Battalion[a]				
	1st Co.	3rd Co., 1st Plt	22nd Reg[b]	District Plt[c]	Village Guerrilla Squad[c]
Strength:	117	31	2372	24	9
82mm mortar			14/187[d]		
81mm mortar			3/10		
60mm mortar	3/60[c]		15/237		
75mm RR			10/67		
57mm RR			3/46		
Bazooka	3/12	1/4	18/123		
MG, heavy	2/1500		6 } 12,600		
MG, light			17 }		
SMG	30/9000	3/2700	401	2	
Auto. rifle	9/4500	3/1500	50	2	
Rifle	38/5700	12/1800	?/164,344	12	9
Carbine	1		33	2	1
Pistol	4			1	
Grenade		52	3593		30

Notes:

[a] A Main Force battalion of the 32nd regiment.

[b] Of the Yellow Star (Sao Vang) Division.

[c] Number of weapons/rounds of ammunition.

Table A-3-3

AMMUNITION LOAD OF THE 320TH VIET CONG REGIMENT

Weapon	No. of Weapons	Ammunition (rounds)	Rounds/ Weapon
Pistol[a]	56	2,439	44
AA gun[a]	5	3,550	710
12.7mm MG	3	16,160	5,387[b]
12.8mm MG	2	2,000	1,000
57mm RR	3	45	15
75mm RR	6	45	8
82mm mortar	5	133	27
81mm mortar	6	84	14
60mm mortar	15	330	22
B40 rkt launcher	24	76	3
Carbine	42	2,332	56
Other 7.62mm weapons[c]	768	113,411	148
Grenades	2,170	-	-

Notes:

[a]Bore size not given.

[b]K54 ammunition believed to be 12.7mm; only three 12.7mm weapons were listed.

[c]Includes 339 CKC rifles, 282 AK submachineguns, 63 RPD light machineguns, 16 company machineguns, 8 K53 machineguns.

Table A-3-4

VIET CONG BASIC AMMUNITION LOADS AND EXPENDITURES

(from various captured documents)

Ammunition	Basic Load (Rounds)
Rifle	70
Carbine	120
LMG/assault rifle	390
12.7mm heavy MG	500-600
57mm recoilless rifle	4
40mm grenade launcher	5
60mm mortar	24
81/82mm mortar	15

	Basic Loads (rounds)		
Weapon	Province Unit	District Unit	Village/ Hamlet Unit
57mm RR	20	-	-
81mm mortar	20	-	-
69mm mortar	20	15	-
U.S. heavy MG	1,000	600	-
British heavy MG	600	400	-
Maxim heavy MG	1,000	600	-
German company MG	1,000	600	-
U.S. AR	1,000	300	250
MAS AR	400	200	-
German AR	300	300	-
K44 AR	400	300	-
U.S. assault rifle	400	60	40
MAS rifle	100	50	30
K44 rifle	80	50	30
German rifle	100	50	30
French rifle	100	40	25
British rifle		30	25
SMG	80	50	40
Thompson SMG	100	70	50
K50 SMG	300	150	100
Carbine	100	60	30
Semi-automatic rifle	100	80	35

Table A-3-4 (continued)

When the 60th Battalion attacked Ba Gia Post, the basic load of ammunition for each weapon was as follows:

Automatic rifle	500 rounds
Submachinegun, K50	90
Carbine	60
Rifle, K44	50
Rifle, Garand M1	55

Quang Ngai Province, 38th Battalion (Main Force unit), ammunition issued for each weapon:

Rifle	40-50 rounds
Automatic rifle	500-600
Carbine	from 100
Submachinegun	200-250

In an attack on two New Revolutionary Life Hamlets, soldiers in units of the 80th Battalion carried with them:

Machinegun	600 rounds
Automatic rifle	300-400
Submachinegun	200
Rifle	100

97th Battalion, Binh Dinh Province, basic loads:

Machinegun	600 rounds
Automatic rifle	450
Submachinegun	150
Rifle, K44	80
Carbine	5 magazines

This is a partial list of ammunition expended by a battalion of the Quyet Thang Group during the Van An raid, 17 January 1966:

1st Company	2200 K.56 rounds
	300 K.53 rounds
	10 60mm mortar rounds
	47 grenades

Table A-3-4 (continued)

2nd Company	1036 K.56 rounds
	200 K.53 rounds
	10 60mm mortar rounds
	10 carbine rounds
	10 grenades
4th Company	107 K.56 rounds
	150 K.53 rounds
	17 82mm mortar rounds
	5 57mm RR rounds

Table A-3-5

WEAPONS DATA FOR TWO VIET CONG UNITS

A. Weapons and Ammunitions of Company

Weapon	Ammunition
2-12.7mm Russian heavy MGs	1,530 rounds (1st Platoon has 13 boxes, 2nd Platoon 5 boxes)
2-12.7mm U.S. heavy MGs	945 rounds
3-K53 MGs	1,500 rounds
18-CKC rifles	1,800 rounds
8 Carbines	350 rounds
2-K50 SMGs	400 rounds

B. Basic Ammunition Load for an Antiaircraft Company.

Weapon	Basic Load (Rounds)	Ammunition To Be Used in Each Contact (Rounds)
Rifle, CKC	80	20
SMG, AK	120	50
ERPD [sic]	300	100
RP [sic]	500	100
Mortar	20	-
RR	5	2/target
B40 RKT launcher	5	-
12.7mm heavy MG	400	300
MG, K53	750	200

Table A-3-6

SAMPLE DATA ON VIET CONG REGIMENTAL AMMUNITION SUPPLY

(Average On-hand per Regiment)

Weapon Type	Rounds	Additional Ammunition
B40 RKT launcher	8	34-1.2mm bangalore torpedoes
57mm RR	32	6.15 bangalore torpedoes
75mm RR	11	276 kilograms of TNT
60mm mortar	13	218 concussion grenades
81mm mortar	13	
82mm mortar	19	
12.7mm MG	700	
Rifle	50	
SMG	200	
AR	300	
MG or Co.	900	
MG, U.S.	500	

Appendix B

SUPPORT FACTORS

This Appendix uses data given previously in the text to make estimates of support factors in two categories: (1) local support, as summarized in Table 9, and (2) commo-liaison support, expressed in terms of porters per man supported. The total support per man is the sum of these two categories.

RAND's JOSS II on-line computing system[1] was used to generate tables of support factors (Table B-3). The equations explained below correspond to steps in the JOSS program (Table B-2), using the notation from Table B-1. (The use of support factors is illustrated in Sect. IV.)

The JOSS program (Table B-2) is broken down as follows:

1.01 This first step in the program computes the number of porter stages.

1.02 JOSS equivalent of Eq. (11)(the asterisk indicates an exponential).

1.03 Supplies carried (R, lb/man/day) are assumed to consist of food (r) plus ammunition (aB). The coefficient "a" was obtained from

$$a = \frac{(10.88 - 2.50)2.2}{30} = 0.61$$

where the basic load of 10.88 kg per troop supported is reduced by the local ordnance production of 2.50 kg/man, and converted to lb (2.2 lb per kg). Coefficient "a" is a multiplier of B, which is on a monthly basis; the divisor 30 converts the product to a daily basis.

1.04 JOSS version of Eq. (12). Note that P is now porters per man, because R is resupply per man supported.

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[1] JOSS is a trade-mark and service mark of The RAND Corporation for its computer program and services using that program.

1.05 The equation for local support is $\chi + yB$, where $y = 0.032$ and $\chi = 0.201$ (low construction requirement) (Table 9). Adding P gives total support per troop (f). Other values of χ and y can be used for other localities, since these values were derived from a study of a Delta province.

Note also that daily round-trip distance d and porter payload p are left variable as measures of porterage difficulty. The remainder of the program is for sequencing the computations and printing the outputs in a readable format.[1]

Program B is for the case where no food is carried. This requires two changes from Program A:

(1) No food is carried for porters or troops (r = 0).

(2) The number of porters required is simply the number of stages multiplied by R/p porters on each stage and the factor 1.56 as in Eq. (12), to allow for assembly time and escorts.

Table B-3 shows support factors for corridor distances of 10-200 km, for 1-3 basic loads per month, and for the following cases:

Case 1: No rice carried, average porterage
Case 2: No rice carried, difficult porterage
Case 3: All rice carried, average porterage
Case 4: All rice carried, difficult porterage.

The rice carried is intended for both troops and porters. A consumption of 1.65 lb/day (750 g) was used. "Average" porterage involves a payload of 50 lb and a daily round-trip distance of 30 km. "Difficult" porterage involves reduced values: 40 lb and 10 km. This would be for some combination of difficult terrain, poor visibility, and delays due to GVN control or harassment. "Low" construction requirements are assumed for all cases (see p. 78).

Note that the four cases represent an ascending scale of difficulty of support: case 1 gives the lowest values, case 4 the highest.

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[1] In step 1.07, "fp" means "fractional part" in JOSS notation.

Table B-1

NOTATION USED IN SUPPORT EQUATIONS

a	Pounds of ammunition carried per day per man supported (for each basic load expended per month)
B	Basic loads of ammunition expended per month
c	Ratio, defined as $\frac{1}{1 - 1.1\frac{r}{p}}$
d	Daily walking distance for porters (km)
D	Resupply distance (km)
f	Support factor for combat troops
p	Porter payload (lb)
P	Porters per man required for line of communications
r	Food consumption (lb/man/day)
R	Resupply rate for combat troops (lb/man/day)
s	Number of porterage stages
x	Fixed coefficient in local-support equation
y	Coefficient of variable term in local-support equation

Table B-2

JOSS PROGRAM FOR VIET CONG SUPPORT FACTORS

JOSS Program A: Rice Carried for Both Troops and Porters

```
1.01  Set s=2•D/d.
1.02  Set c=1/(1-1.1•r/p).
1.03  Set R=r+a•B.
1.04  Set P=[1.56•c•R•(c*s-1)]/[p•(c-1)].
1.05  Set f=x+y•B+P.
1.06  Type D,P,f in form 1.
1.07  Line if fp(D/25)=0.

2.01  Line.
2.02  Line.
2.03  Type B in form 2.
2.04  Line.
2.05  Type a,r,x,y,p,d in form 3.
2.06  Line.
2.07  Type form 4.
2.08  Line.

3.01  Do part 2.
3.02  Do part 1 for D=10(10)200.
3.03  Page.

4.01  Set a=.61.
4.02  Set r=1.65.
4.03  Demand x.
4.04  Set y=.032.
4.05  Demand d.
4.06  Demand p.
4.07  Do part 3 for B=1(1)3.

Form 1:
      ___          __.___       __.___

Form 2:
     For __._ basic loads of ammunition expended per month.

Form 3:
     a = .__  r = _.__  x = .___  y = .___  p = __  d = __

Form 4:
     Distance (km)     Porters/man     Total support/man
```

Table B-2 (Continued)

JOSS Program B: No Rice Carried

```
1.01  Set s=2•D/d.
1.03  Set R=r+a•B.
1.04  Set P=(1.56•s•R)/p.
1.05  Set f=x+y•B+P.
1.06  Type D,P,f in form 1.
1.07  Line if fp(D/25)=0.

2.01  Line.
2.02  Line.
2.03  Type B in form 2.
2.04  Line.
2.05  Type a,r,x,y,p,d in form 3.
2.06  Line.
2.07  Type form 4.
2.08  Line.

3.01  Do part 2.
3.02  Do part 1 for D=10(10)200.
3.03  Page.

4.01  Set a=.61.
4.02  Set r=0.
4.03  Demand x.
4.04  Set y=.032.
4.05  Demand d.
4.06  Demand p.
4.07  Do part 3 for B=1(1)3.

Form 1:
      ___          __.___        __.___

Form 2:
     For __._ basic loads of ammunition expended per month.

Form 3:
     a = .__  r = _.__  x = .___  y = .___  p = __  d = __

Form 4:
     Distance (km)     Porters/man     Total support/man
```

Table B-3

VIET CONG SUPPORT FACTORS

Case 1: No Rice Carried, Average Porterage

For 1.0 basic loads of ammunition expended per month.

a = .61 r = .00 x = .201 y = .032 p = 50 d = 30

Distance (km)	Porters/man	Total support/man
10	.013	.246
20	.025	.258
30	.038	.271
40	.051	.284
50	.063	.296
60	.076	.309
70	.089	.322
80	.102	.335
90	.114	.347
100	.127	.360
110	.140	.373
120	.152	.385
130	.165	.398
140	.178	.411
150	.190	.423
160	.203	.436
170	.216	.449
180	.228	.461
190	.241	.474
200	.254	.487

Table B-3 (Continued)

For 2.0 basic loads of ammunition expended per month.

a = .61 r = .00 x = .201 y = .032 p = 50 d = 30

Distance (km)	Porters/man	Total support/man
10	.025	.290
20	.051	.316
30	.076	.341
40	.102	.367
50	.127	.392
60	.152	.417
70	.178	.443
80	.203	.468
90	.228	.493
100	.254	.519
110	.279	.544
120	.305	.570
130	.330	.595
140	.355	.620
150	.381	.646
160	.406	.671
170	.431	.696
180	.457	.722
190	.482	.747
200	.508	.773

Table B-3 (Continued)

For 3.0 basic loads of ammunition expended per month.

a = .61 r = .00 x = .201 y = .032 p = 50 d = 30

Distance (km)	Porters/man	Total support/man
10	.038	.335
20	.076	.373
30	.114	.411
40	.152	.449
50	.190	.487
60	.228	.525
70	.266	.563
80	.305	.602
90	.343	.640
100	.381	.678
110	.419	.716
120	.457	.754
130	.495	.792
140	.533	.830
150	.571	.868
160	.609	.906
170	.647	.944
180	.685	.982
190	.723	1.020
200	.761	1.058

Table B-3 (Continued)

Case 2: No Rice Carried, Difficult Porterage

For 1.0 basic loads of ammunition expended per month.

a = .61 r = .00 x = .201 y = .032 p = 40 d = 10

Distance (km)	Porters/man	Total support/man
10	.048	.281
20	.095	.328
30	.143	.376
40	.190	.423
50	.238	.471
60	.285	.518
70	.333	.566
80	.381	.614
90	.428	.661
100	.476	.709
110	.523	.756
120	.571	.804
130	.619	.852
140	.666	.899
150	.714	.947
160	.761	.994
170	.809	1.042
180	.856	1.089
190	.904	1.137
200	.952	1.185

Table B-3 (Continued)

For 2.0 basic loads of ammunition expended per month.

a = .61 r = .00 x = .201 y = .032 p = 40 d = 10

Distance (km)	Porters/man	Total support/man
10	.095	.360
20	.190	.455
30	.285	.550
40	.381	.646
50	.476	.741
60	.571	.836
70	.666	.931
80	.761	1.026
90	.856	1.121
100	.952	1.217
110	1.047	1.312
120	1.142	1.407
130	1.237	1.502
140	1.332	1.597
150	1.427	1.692
160	1.523	1.788
170	1.618	1.883
180	1.713	1.978
190	1.808	2.073
200	1.903	2.168

Table B-3 (Continued)

For 3.0 basic loads of ammunition expended per month.

a = .61 r = .00 x = .201 y = .032 p = 40 d = 10

Distance (km)	Porters/man	Total support/man
10	.143	.440
20	.285	.582
30	.428	.725
40	.571	.868
50	.714	1.011
60	.856	1.153
70	.999	1.296
80	1.142	1.439
90	1.285	1.582
100	1.427	1.724
110	1.570	1.867
120	1.713	2.010
130	1.856	2.153
140	1.998	2.295
150	2.141	2.438
160	2.284	2.581
170	2.427	2.724
180	2.569	2.866
190	2.712	3.009
200	2.855	3.152

Table B-3 (Continued)

Case 3: All Rice Carried, Average Porterage

For 1.0 basic loads of ammunition expended per month.

a = .61 r = 1.65 x = .201 y = .032 p = 50 d = 30

Distance (km)	Porters/man	Total support/man
10	.048	.281
20	.098	.331
30	.149	.382
40	.201	.434
50	.255	.488
60	.310	.543
70	.366	.599
80	.423	.656
90	.482	.715
100	.543	.776
110	.605	.838
120	.669	.902
130	.734	.967
140	.801	1.034
150	.869	1.102
160	.939	1.172
170	1.011	1.244
180	1.085	1.318
190	1.160	1.393
200	1.238	1.471

Table B-3 (Continued)

For 2.0 basic loads of ammunition expended per month.

a = .61 r = 1.65 x = .201 y = .032 p = 50 d = 30

Distance (km)	Porters/man	Total support/man
10	.062	.327
20	.125	.390
30	.189	.454
40	.256	.521
50	.324	.589
60	.393	.658
70	.465	.730
80	.538	.803
90	.613	.878
100	.690	.955
110	.768	1.033
120	.849	1.114
130	.932	1.197
140	1.017	1.282
150	1.104	1.369
160	1.193	1.458
170	1.284	1.549
180	1.378	1.643
190	1.474	1.739
200	1.572	1.837

Table B-3 (Continued)

For 3.0 basic loads of ammunition expended per month.

a = .61 r = 1.65 x = .201 y = .032 p = 50 d = 30

Distance (km)	Porters/man	Total support/man
10	.075	.372
20	.151	.448
30	.230	.527
40	.310	.607
50	.392	.689
60	.477	.774
70	.563	.860
80	.652	.949
90	.743	1.040
100	.836	1.133
110	.932	1.229
120	1.030	1.327
130	1.130	1.427
140	1.233	1.530
150	1.338	1.635
160	1.446	1.743
170	1.557	1.854
180	1.670	1.967
190	1.787	2.084
200	1.906	2.203

Table B-3 (Continued)

Case 4: All Rice Carried, Difficult Porterage

For 1.0 basic loads of ammunition expended per month.

a = .61 r = 1.65 x = .201 y = .032 p = 40 d = 10

Distance (km)	Porters/man	Total support/man
10	.189	.422
20	.396	.629
30	.624	.857
40	.874	1.107
50	1.148	1.381
60	1.449	1.682
70	1.779	2.012
80	2.141	2.374
90	2.538	2.771
100	2.975	3.208
110	3.453	3.686
120	3.978	4.211
130	4.554	4.787
140	5.187	5.420
150	5.881	6.114
160	6.642	6.875
170	7.477	7.710
180	8.394	8.627
190	9.400	9.633
200	10.504	10.737

Table B-3 (Continued)

For 2.0 basic loads of ammunition expended per month.

a = .61 r = 1.65 x = .201 y = .032 p = 40 d = 10

Distance (km)	Porters/man	Total support/man
10	.240	.505
20	.504	.769
30	.793	1.058
40	1.110	1.375
50	1.458	1.723
60	1.840	2.105
70	2.259	2.524
80	2.719	2.984
90	3.224	3.489
100	3.777	4.042
110	4.385	4.650
120	5.052	5.317
130	5.784	6.049
140	6.587	6.852
150	7.468	7.733
160	8.435	8.700
170	9.496	9.761
180	10.660	10.925
190	11.937	12.202
200	13.339	13.604

Table B-3 (Continued)

For 3.0 basic loads of ammunition expended per month.

a = .61 r = 1.65 x = .201 y = .032 p = 40 d = 10

Distance (km)	Porters/man	Total support/man
10	.291	.588
20	.611	.908
30	.961	1.258
40	1.346	1.643
50	1.768	2.065
60	2.231	2.528
70	2.739	3.036
80	3.297	3.594
90	3.909	4.206
100	4.580	4.877
110	5.317	5.614
120	6.126	6.423
130	7.013	7.310
140	7.987	8.284
150	9.055	9.352
160	10.227	10.524
170	11.514	11.811
180	12.925	13.222
190	14.474	14.771
200	16.174	16.471