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Report to Rep. Melvin Price, Chairman, House Committee on Armed Services; Sen. John C. Stennis, Chairman, Senate Committee on Armed Services; by Elmer B. Staats, Comptroller General.

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GAO reports and Army studies during the past 14 years have shown widespread, serious weaknesses in the Army's system for determining personnel requirements for combat units. The Army's Manpower Authorization Criteria provides criteria for determining the staff needed for combat functions which have measurable workloads. Errors in estimating either workload or soldiers' available worktime can have a major impact of the number of soldiers available. Findings/Conclusions: In the 15 years since the inception of Manpower Authorization Criteria, the Army has not solved its problem of determining and justifying manpower requirements. Shortcomings in methods for estimating both workload and available worktime used in the formula make the results unreliable. A March 1978 proposal suggested new methods to model personnel requirements under varying wartime and peacetime conditions. This proposal provides an organized approach for improving the determination of maintenance personnel requirements and recognizes the need for an orderly, concerted, and long-range improvement effort. When complete, it should provide a basis to account for the differences between wartime and peacetime requirements and should result in more efficient resource allocation, large scale economies, and improved readiness. Recommendations: The Armed Services Committees should direct the Secretary of the Army to establish a comprehensive program for developing, implementing, and operating a reliable system to determine personnel requirements for combat units. The program should identify the system's objectives and include Army funding, organizations, personnel, and other resources needed to achieve the objectives. The Committees should direct the Secretary of Defense to see that the improvement program is complete, credible, and supported by viable funding and staffing and that the Army's budget contains funds specifically set aside to support the

improvement effort. (RES)

7524

REPORT BY THE

Comptroller General

OF THE UNITED STATES

Continuous Management Attention Needed For Army To Improve Combat Unit Personnel Requirements

The Army's determination of personnel requirements for combat units is not reliable because of weaknesses in basic planning factors called Manpower Authorization Criteria. On the basis of these criteria, the Army spends about $2.8 billion annually for 188,000 active duty soldiers and 248,000 reservists and National Guardsmen.

The Office of the Secretary of Defense and the Army are developing a long-range program to establish a reliable system. Considerable potential exists for delaying, diverting, or diminishing program support due to changes in leadership and management priorities. Also, Army improvement plans need to be expanded to correct weaknesses not addressed during early planning.

This report contains recommendations to congressional committees on Armed Services and to the Secretary of Defense.

FPCD-78-61

SEPTEMBER 5, 1978

COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

B-133370

To the Chairmen, House and Senate
Committees on Armed Services

Prior GAO reports 1/ and Army studies during the past 14 years have shown widespread, serious weaknesses in the Army's system for determining personnel requirements for combat units. 2/ The criteria for this system are published in an Army regulation entitled "Manpower Authorization Criteria." On the basis of these criteria, the Army will spend about $2.8 billion in fiscal year 1978 for 188,000 people assigned to combat units in the Active Army and 248,000 people in the National Guard and Reserves. The accuracy of criteria used to determine personnel requirements for combat units is vital to the readiness of these forces and the Army's capability to perform its mission. Moreover, the size of the combat forces influences the Army's requirements for noncombat personnel--military and civilian.

The Office of the Secretary of Defense and the Army are developing a long-range program to establish a reliable system. But our discussions with Office and Army officials, review of available reports and studies, and examination of records at six installations showed that the program planning omitted some essential actions.

THE CRITERIA

"Manpower Authorization Criteria" provides criteria for determining the staff needed for combat functions which have

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1/"Developing Equipment Needs for Army Missions Requires Constant Attention" (LCD-75-442, May 10, 1976, pp. 10 to 13 and 15 to 18) and "Determining Requirements for Aircraft Maintenance Personnel Could be Improved--Peacetime and Wartime" (LCD-77-421, May 20, 1977, pp. 36 to 38).

2/Includes Table of Organization and Equipment units designated as combat, combat support, and combat service support.

measurable workloads. 1/ Workload for a maintenance function, for example, is an estimate of annual hours required to maintain equipment. Workload estimates are divided by estimated available worktime--the time that soldiers are available to perform their primary duties after deducting the time they are not available because of nonwork related activities. Thus, as the following formula shows, reliable personnel requirements cannot be determined without equally reliable and accurate data for both workload and available worktime.

$$\frac{\text{Equipment quantity} \times \text{annual maintenance manhours}}{\text{Available hours per soldier}} = \text{Number of soldiers needed}$$

Errors in estimating either workload or soldiers' available worktime can have a major impact on the number of soldiers needed. For example, an error of only 1 workday per month in the available worktime of active duty soldiers represents about 6,200 positions, costing $77 million annually.

THE PROBLEM

Major shortcomings indicate that in the 15 years since the inception of Manpower Authorization Criteria, the Army has not solved its problem of determining and justifying requirements. Shortcomings in methods for estimating both workload and available worktime used in the formula make the results unreliable. Considerable resources are being expended to manage a system which produces unacceptable results.

The Army developed the Manpower Authorization Criteria system because it was unable to justify personnel authorizations under a previous system which it had experienced significant problems in implementing.

Early workload data would have resulted in significant reductions in maintenance personnel. To prevent the reductions, the Army applied factors to increase personnel requirements; that is, the Army modified workload data several times, and added an indirect productive time factor which increased maintenance workload estimates up to 40 percent.

Since then, many studies have addressed problems with the patchwork system that resulted. Army requirements

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1/Another type of Manpower Authorization Criteria, called standard position criteria, applies to positions having no measurable workload, such as supervisory positions.

developers who use Manpower Authorization Criteria have generally questioned the validity of workload estimates that equipment managers provide them. Conversely, equipment managers have questioned the validity of factors that developers use to determine available worktime.

DEVELOPING A SOLUTION

The Army has recognized that a major long term effort will be needed to develop a reliable system. Following Army Inspector General reports of recurring deficiencies in automotive maintenance criteria for 3 consecutive years, the Army established a General Officer Steering Committee headed by the Deputy Chief of Staff For Personnel and a joint working group to review system problems and develop an improvement program. This resulted in a March 1978 draft program which proposed restructuring the criteria for maintenance functions. The proposal suggested new methods to model personnel requirements under varying wartime and peacetime conditions.

Although the proposal will not solve all system problems, it offers the potential for solving many of them. It provides an organized approach for improving the determination of maintenance personnel requirements and recognizes the need for an orderly, concerted, and long-range improvement effort. Moreover, when complete, it should provide a basis to account for the differences between wartime and peacetime requirements.

But the proposal should be expanded. It is limited to maintenance and does not include criteria for other functions which make up more than half the various criteria included in Manpower Authorization Criteria. In addition, the Army's draft proposal has not provided for correction of several important problems that must be overcome to obtain adequate estimates of available time and workload. These estimates have a major impact on the number of soldiers needed. For example, determining available time requires deducting from total time the time soldiers are not available because of nonwork-related activities, which amounts to an estimated 59,000 soldiers costing $727 million annually. (See app. I., p. 8.)

The importance of the role of the Office of the Secretary of Defense in guiding the services' personnel requirements determination was highlighted in one of our prior reports. 1/ The Defense Manpower Commission also has stated that the

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1/"Development and Use of Military Services Staffing Standards: More Direction, Emphasis, and Consistency Needed" (FPCD-77-72, Oct. 18, 1977).

Office should provide such guidance to achieve commonality in service methods. The Office and the Army currently have underway a number of studies that should contribute to the Army's improvement program. (See app. I., p. 18.)

CONCLUSIONS

The Manpower Authorization Criteria system produces unacceptable results. Office and Army officials we contacted expressed serious concern about the need for a reliable system to determine combat support and service support personnel needs. The March 1978 draft proposal now being considered to improve the current system is a step toward meeting that need. However, any improvement effort should include functions other than maintenance having a measurable workload, and should address problems of workload and worktime computation and currency, system documentation, and system staffing. More specific conclusions on Manpower Authorization Criteria problems and on the Army's draft improvement proposal are discussed in appendix I.

A long-term commitment of personnel and other resources will be required to develop, test, and implement all needed changes. As in any long-term effort, considerable potential exists for delaying, diverting, or diminishing program support due to changes in leadership and management priorities. In our judgment, these efforts are worthy of high management attention and protection from resource constraints that might result in delay or diminished support. The benefits from sustained visibility and priority of effort will far outweigh the expenditures. When completed and implemented, the Army's program should result in more efficient resource allocation, large scale economies, and improved readiness. Accordingly, we believe that the Congress and the Office of the Secretary of Defense should make sure that any Army effort to develop and implement a reliable system is adequately funded and staffed, and periodically reviewed.

RECOMMENDATIONS

To promote successful development and implementation of a reliable system, we recommend that the Armed Services Committees:

--Direct the Secretary of the Army to establish a comprehensive program for developing, implementing, and operating a reliable system to determine personnel requirements for combat units. The program should identify the system's objectives and include Army funding, organizations, personnel, and other resources

needed to achieve the objectives. It should also include milestones for accomplishing various program phases from design to a fully operative system. To keep the Congress informed, the Army should report progress on the program to the Armed Services Committees initially 6 months from the date of this report and annually thereafter as part of the normal budget process of justifying its end strength. In addition, progress in using the new system, when operational, to justify personnel requirements should be reported in the Defense Manpower Requirements Report.

--Direct the Secretary of Defense to see that the improvement program is complete, credible, and supported by viable funding and staffing, and that the Army's budget contains funds specifically set aside to support the improvement effort.

Specific recommendations to the Army are in appendix I, page 13.

We made our review pursuant to the Budget and Accounting Act, 1921 (31 U.S.C. 53), and the Accounting and Auditing Act of 1950 (31 U.S.C. 67). We discussed the results of the review with officials from the Office of the Assistant Secretary of Defense (Manpower, Reserve Affairs, and Logistics) and the Office of the Army Deputy Chief of Staff for Personnel, and we considered their comments in preparing the report. We did not, however, receive written comments.

We are sending copies of this report to the Chairmen, House and Senate Committees on Appropriations; the Director, Office of Management and Budget; the Secretary of Defense; and the Secretary of the Army.

Comptroller General
of the United States

APPENDIX I

CHANGES NEEDED IN THE ARMY'S PLAN TO IMPROVE MANPOWER AUTHORIZATION CRITERIA

APPENDIX I

Contents

ABBREVIATIONS

AMSAA	Army Materiel Systems Analysis Activity
DCSLOG	Army Deputy Chief of Staff for Logistics
GAO	General Accounting Office
LMI	Defense Logistics Management Institute
MACRIT	Manpower Authorization Criteria
MOS	Military Occupational Specialty
OSD	Office of the Secretary of Defense
TOE	Tables of Organization and Equipment

PROPOSED IMPROVEMENTS

DIRECTED ONLY TO MAINTENANCE

The Army directed its March 1978 improvement proposal to maintenance which is an important part, but not the only part of the Manpower Authorization Criteria (MACRIT). More than half the published criteria are for functions other than maintenance. 1/ A Department of the Army official said the proposal was limited to maintenance because most problems had occurred in maintenance and that the Army believed experience gained in maintenance could later be applied to other functions.

Workload estimates for other functions, as well as maintenance, need to be improved. One of the basic deficiencies addressed in the March 1978 proposal is that maintenance workload data does not reflect wartime conditions. This is also true for some estimates of workload for other functions.

CONCLUSIONS

We believe that the Army should develop reliable criteria (both workload and time available for work) for other functions as well as for maintenance.

We realize that a high priority for improving maintenance criteria may be appropriate; but the March 1978 draft proposal to improve the system does not address other functions. We believe planning improvements for these functions, along with maintenance, would help to assure that the assumptions, judgments, and data used in a new system are consistent and complete.

In May 1978, we discussed our views with Army officials who stated that the final improvement plan would address other functions as well as maintenance.

1/Information is not available to show, by function, the number of MACRIT-supported positions.

ESTIMATED AVAILABLE WORKTIME SHOULD BE MORE RELIABLE

The MACRIT requirements formula provides for dividing workload by available worktime to determine personnel requirements. Therefore, requirements estimates are only as reliable as estimates of workload and available worktime because both are used in the formula. Because they are highly significant in terms of personnel and related costs, available worktime estimates warrant close attention.

Available worktime estimates are unreliable because they

--have received little attention,

--are supported by little or no documentation,

--may be substantially overstated as indicated by an Army study which recommended doubling the estimates of time not available for work (see p. 10), and

--are not based on appropriate use of available data.

Consequently, requirements estimates are unreliable.

LOST TIME CONSIDERED IN DETERMINING AVAILABLE WORKTIME IS SUBSTANTIAL

In estimating the annual time a soldier is available for work during wartime, the Army recognizes that some soldiers will lose time only during nonproductive activities, while others will lose additional time during movement of their units.

Nonproductive activities such as security duty, kitchen police work, work details, eating, casualties, and personal needs amount to 24 percent of total time available, as shown in the following table.

Time Lost for Nonproductive Activities

	Hours	Percent
Total time: 365 days at 12 hours a day	4,380	100
Less nonproductive time	1,050	24
Time available for work	3,330	76

Additional time lost for some soldiers due to movement of their units ranges from 5 to 19 percent depending on the type of unit. This loss, when added to nonproductive time, amounts to total lost time of 29 to 43 percent, as shown below.

Time Lost for Nonproductive Activities and Unit Movement

	Category of unit (note a)					
	I		II		III	
	Hours	Percent	Hours	Percent	Hours	Percent
Time available for work	3,330	76	3,330	76	3,330	76
Less, movement time	830	19	630	14	230	5
Net available time for work	2,500	57	2,700	62	3,100	71
Nonproductive and unit movement time		43		38		29

a/Categories are for combat, combat support, and combat service support units with varying degrees of unit mobility.

Further analysis shows the relative importance of the nonproductive and movement time estimates in terms of the number of active duty soldiers and costs. Army officials did not know how many soldiers supported by MACRIT lose productive time because of unit movement, but believed that the portion would exceed 50 percent. Assuming that such soldiers are distributed to the three unit categories in accordance with Army force stratification documents, and in the aggregate equal about 60 percent of MACRIT-supported positions, we estimated the effects of the Army's determination of time lost to nonproductive activities and unit movement. As shown on the following page, we estimate the effects to be 59,000 soldier positions costing $727 million annually.

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	MACRIT-supported positions	Cost (millions)	Percent	Nonproductive and unit movement time (note a)	Cost (millions)
People losing time for nonproductive activities only	75,200	$ 933	24	18,048	$224
People losing time for nonproductive activities and unit movement:					
Category I	33,840	420	43	14,551	181
Category II	33,840	420	38	12,859	160
Category III	45,120	559	29	13,085	162
Total	188,000	$2,332	31	58,543	$727

a/Equivalent positions.

MORE ATTENTION NEEDED TO AVAILABLE WORKTIME

The Army has paid relatively little attention to determining available worktime. As a result, the Army is basing requirements on data which is between 14 and 18 years old.

Nonproductive and unit movement factors used to determine available worktime were developed in the early 1960s. Although regulations require MACRIT studies every 3 years, the Army has updated nonproductive factors only once, based on a 1964 study, and has never updated unit movement factors. No permanent personnel are assigned, and no periodic review cycle has been established for determining available worktime, although it is used--together with workload data--to determine personnel requirements for combat personnel in Tables of Organization and Equipment (TOE) units. 1/

Army officials said that few permanent personnel have been available to support the system. However, they had not identified the number of personnel needed to determine and update available time estimates. Permanent personnel develop and review annually about 50 MACRIT studies for various jobs. These studies are required by regulations

1/Information is not available to show, by function, the number of MACRIT-supported positions.

every 3 years and include a review and updating of workload data, but not available worktimes. The basis for the 3-year cycle is that TOEs are required to be updated every 3 years.

The March 1978 MACRIT improvement proposal recognizes the need to reevaluate the whole concept of updating.

Conclusion

Requirement determinations are only as current as the older of either workload data or available worktime data used in the formula. Since the available worktime data has not been updated, the requirements are based on data between 14 and 18 years old rather than on data not more than 3 years old as required for MACRIT studies. We believe available time should be determined periodically as required for workload.

LACK OF DOCUMENTED SUPPORT

Little documentation is available to support the nonproductive factors, and none is available to support the unit movement factors now published in Army regulations. Requirements for an estimated 59,000 positions, costing $727 million annually, are based on these factors. (See p. 8 of this appendix.)

Sufficient information was not available to support the nonproductive factors. They were established in 1968 as a compromise between previous factors totaling 18 percent of total time available and factors totaling 34 percent proposed in a 1964 study.

We were unable to find any documentation to show and Army officials were unable to explain how unit movement factors were established. They said the factors were developed many years ago for a different theater of combat operations based on different scenarios than those currently used.

Army testimony before the Senate Committee on Appropriations following our report entitled "Developing Equipment Needs for Army Missions Requires Constant Attention" (LCD-77-421, May 20, 1977) included the following comments on unit movement factors:

> "* * *the considered opinion of the DA staff agencies has been that in the absence of a wartime environment to truly test their validity they should be considered valid. Of note is the fact that none

of today's field units have challenged the validity of unit movement factors."

Army officials we talked with said no one knows how often or how far a given unit currently is expected to move in a tactical situation or how much time will be required. But there is evidence that units in Vietnam were relatively stable and that the unit movement factors were excessive. This would tend to overstate personnel requirements and offer no incentive for field units to challenge the factors.

The March 1978 draft proposal to improve the system includes unit movement as one of the variables to be measured, and it provides for modeling, field exercising, and testing to validate such variables.

Conclusions

New nonproductive time and unit movement factors to be established should be fully supported by documentation to provide a basis for review, validation, and updating.

STUDY RECOMMENDS FACTORS DOUBLE THOSE AUTHORIZED

A 1975 Army Logistics Center draft study recommended an increase of more than 100 percent in nonproductive time factors. The study, which recommended new factors for leave and training, pointed out that current nonproductive time and unit movement factors were not reliable. If adopted, the study's recommendations would have resulted in a 35-percent decrease in available worktime and a corresponding increase in personnel requirements. The study, which was not approved, states:

"* * * It is not inconceivable that a change in a factor indicates that more is known about the function it represents than before, and that the previously used factor was probably less than accurate * * * there is some evidence that in the past, other factors were inflated to compensate for this * * * The net result of this type of inflation is that it increases the manpower allocations which the low published nonproductive factors would otherwise reduce."

According to Army officials, one of the reasons the study was not accepted was because it was limited by a questionnaire

data base. However, Army Logistics Center officials told us that the proposed improvements will need to provide highly reliable factors based on objective facts and figures. They will consider better ways of developing factors by using new technology, including the development of a sample field data collection system.

NEED FOR BETTER METHODS

The credibility of new factors for determining available worktime will require that they be based on reliable data and sound methods of analysis and interpretation. Due to lack of documentation, the methods used to establish the current nonproductive and unit movement factors are not clear. Based on our review, several shortcomings are apparent that should be considered in the Army's improvement plans.

Variances between units not considered

The Army provides for variances among units in the time allowed for unit movement, but not in the time allowed for nonproductive factors. A single set of nonproductive factors are applied to all units, although nonproductive time varies significantly among units depending on their category. 1/ Variances in time above or below the published nonproductive factors would tend to result in too few or too many soldiers in a unit.

The 1975 Logistics Center study shows that for some nonproductive time factors, there were significant differences among military units. For example, the study shows that nonproductive time for security duty ranged from 7 to 15 percent of total time available compared to the 5 percent now authorized for all units. The study did not attempt to measure differences in time for casualties, although they probably would be greater in forward units.

Need to account for unit movement for full day

In a 1964 study of nonproductive factors, the Army apparently assumed that units do not move in the 12-hour "off-duty" shift, but only during the duty shift. We found no supporting documentation to show how the unit movement factors were developed. If they are based on this assumption, they--and therefore personnel requirements--may be

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1/Combat, combat support, or combat service support.

overstated because some unit movement time occurs on the off-duty shift.

The 1975 Logistics Center study recognized the need to account for unit movement in both shifts, but the Army has not revised its procedures.

Overlapping allowances

The nonproductive and unit movement factors now used to determine available worktime and the indirect productive time factor added to maintenance workload hours (see p. 16 of this appendix) were each developed at different intervals, each apparently independent of the other. Failure to consider any overlap in the allowances would tend to result in overstated requirements.

Unit movement factors were established about 1960, before the inception of MACRIT. The 1964 study used in establishing MACRIT nonproductive factors does not show whether time allowances for nonproductive time and unit movement are mutually exclusive. It also does not address the potential overlap with some elements of indirect productive time, such as time awaiting parts.

The limited data available does not show the consideration given to the potential overlap between the allowances applicable to these factors. For example, a soldier engaged in unit movement or security does not also lose additional time for eating or personal needs as indicated by current methods. Similarly, a mechanic awaiting parts might use that time to attend to personal needs, but current methods do not recognize this.

The 1975 Army Logistics Center study recognized the need to take into account the overlap of some of these factors, but the Army has not revised its procedures.

Unit movement factors based improperly on nonproductive factors

Available worktime should be determined in a way that minimizes the possibility of compounding errors or inaccuracies that may exist among various factors. Since unit movement factors are applied to the time available after deducting the nonproductive factors, errors in the nonproductive factors may be compounded. As a result, unit movement factors may be understated or overstated.

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The determination of available worktime initially involves determining six separate nonproductive time factors which are deducted from total time available. Unit movement factors are then computed based on varying percents of the remaining time available. 1/ Unit movement allowances are, therefore, based in part on the cumulative error, imprecision, and judgment associated with the six nonproductive factors. An Army official said one solution might be to base the unit movement factors on total time available, instead of on the time remaining after deducting nonproductive time factors.

Differences in wartime and peacetime work schedules not accounted for

The MACRIT system does not account for differences between requirements based on an assumed wartime work schedule and requirements in peacetime. The March 1978 draft proposal for improvement recognizes the need to account for these differences and indicates that the relative differences between several scenarios, including wartime and peacetime, will be examined.

RECOMMENDATIONS

In developing its plans to establish more reliable factors to determine available worktime, we recommend that the Army

--allocate sufficient staffing to establish and update available worktime as needed to provide current and reliable estimates;

--develop methods and procedures that recognize variances among units, unit movement during the full day, overlapping allowances, a proper base for unit movement, and differences between wartime and peacetime; and

--fully document and support factors used.

1/Both the 1964 and 1975 studies utilized these percents in conjunction with revised nonproductive factors proposed.

WORKLOAD ESTIMATES SHOULD BE MORE RELIABLE

The MACRIT system, a vital element in establishing Army personnel requirements, is unreliable due in part to inadequate workload estimates. Since 1967, the Army has issued several reports dealing with this problem. Among the principal weaknesses are:

--Workload data does not reflect a wartime environment as intended or actual worker skill levels.

--Indirect productive time factors applied to workload data are based on questionable assumptions.

The Army's March 1978 MACRIT improvement proposal addresses these problems and suggests approaches for developing methods to improve workload estimate reliability.

WORKLOAD DATA NOT BASED ON WARTIME ENVIRONMENT

The time soldiers are available for work is presently based on an assumed wartime work environment but workload estimates are not. Thus, computed manpower requirements have not been accurate and could either be understated or overstated. The Army, in its MACRIT instructions, intended that workload be estimated assuming a combat environment. But no methodology has been provided to assess the effect of combat on task time. As a result, workload estimates, except for aircraft maintenance, are based on a peacetime environment.

The Army has known of this problem for at least 11 years. In a June 1967 report, the Army Combat Developments Command Maintenance Agency stated that the realities of combat and combat support do not find their way into the development of workload hours.

In July 1976, some 9 years later, the Army Materiel Systems Analysis Activity (AMSAA) concluded from a study that MACRIT does not reflect wartime requirements.

The March 1978 MACRIT improvement proposal, prepared by AMSAA, suggests methods for assessing the effects of combat on maintenance workload estimates, including battle damage, cannibalization, task frequencies, equipment failures, changes in human behavior, supply and transportation, and climatic conditions. The proposal provides a basis to account for differences between wartime and peacetime requirements. It indicates that the Army will examine relative differences

between several scenarios, including wartime and peacetime. We believe this is an important step in improving the reliability and accuracy of the Army's personnel requirements determination process and will greatly assist decisionmakers at all levels to understand wartime and peacetime combat personnel requirements.

WORKLOAD DATA DOES NOT REFLECT ACTUAL WORKER SKILLS

Under the current MACRIT system, all personnel are assumed to be trained to minimum skill-level standards; but they are not. As a result, workload hours may be understated.

Army instructions dated September 1975 require that annual maintenance workload hours be based on the assumption that all repairmen are trained to the minimum skill level required by a Military Occupational Specialty (MOS). Previously, this meant a journeyman skill level. Based on changes in personnel procedures between 1975 and 1977, the required number of personnel for each MOS are distributed to various grades and skill levels based on a predetermined ratio. This has resulted in a major increase in the number of lower skilled repairmen in positions requiring more training and skill. To meet required skill levels, MOS standards for the lower skill level were rewritten to incorporate many skills previously ascribed to the next higher skill level.

Under current methods, it appears that all personnel are assumed to be trained to the new minimum standards; but they are not. According to a March 1978 Logistics Management Institute study, the Army Training and Doctrine Command should have upgraded its advanced training program to produce mechanics capable of performing the tasks calling for greater skill. Instead, the formal instruction programs were downgraded, thus placing greater reliance on fewer higher skilled mechanics to train a larger number of lesser skilled mechanics on the job.

The March 1978 MACRIT improvement proposal provides a method of developing maintenance task times based on a combination of

--time required by the equipment developer's skilled personnel,

--time of soldiers as they finish their school training,

--time of soldiers in a proper field environment, and

--time of soldiers performing under stress of combat.

Task times of soldiers, as they finish their school training, will measure their actual skills rather than assume higher skill levels. Since a less trained soldier probably takes longer to perform some tasks, required workload hours may be understated and units' efficiency impaired. This may tend to increase requirements unless training is upgraded to a higher skill level.

INDIRECT PRODUCTIVE TIME FACTOR
BASED ON QUESTIONABLE ASSUMPTIONS

Workload estimates may be further understated or overstated because indirect productive time, 1/ for the most part, has been applied as 40 percent of direct productive time regardless of the actual needs of individual units.

Army instructions provide that indirect productive time will be applied as a factor of up to 40 percent of direct productive time. This assumes a direct linear relationship between the two. For the most part, 2/ 40 percent has been applied.

Several Army studies have pointed out problems in the indirect productive time factor. In June 1967, the Army Combat Developments Command Maintenance Agency concluded that the indirect productive time factor has not been validated for all categories of maintenance and under all types of conditions encountered in the field. A more recent study by the Army Maintenance Management Center in September 1974 reported that the indirect productive time factor is either incorrect or suspect for use in development of manpower authorization of maintenance personnel in combat units.

1/Direct productive time is defined as "wrench turning" or "hands on" time, whereas indirect productive time is for maintenance-related tasks such as inspection, maintenance administration, maintenance of the work site, and delays awaiting parts.

2/Recently, MACRIT, for some general support units, have included a 22 percent factor based on a 1975 Army Ordnance School study.

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A 1975 Army Logistics Center study concluded that indirect productive time is more closely related to unit type, environment, and administrative procedures than to direct productive time.

In a July 1976 report, AMSAA also concluded that indirect productive time was not a function of direct productive time and that more realistic methods should be used to account for the time for these overhead tasks. We agree.

The March 1978 MACRIT improvement proposal makes no mention of continued use of the indirect productive time factor. It does cite the need to identify and define the different types of overhead tasks that contribute indirectly to reduced maintenance time.

APPENDIX I

ARMY AND OFFICE OF THE SECRETARY OF DEFENSE STUDIES THAT SHOULD CONTRIBUTE TO IMPROVEMENT

The Army and the Office of the Secretary of Defense have initiated several studies that can contribute to the development of a reliable system. The following is a brief description of those studies.

1. A "Phase II Study of Logistics Operations in the Communications Zone," dated August 1977, was sponsored by the Army's Deputy Chief of Staff for Logistics (DCSLOG). It is directed to deficiencies in supply, maintenance, and logistic support of the Army in Europe.

2. DCSLOG has requested the Army Forces Command to evaluate the utilization of maintenance personnel. Scheduled to start July 1, 1978, it will require about 15 months. Worktime statistics will be gathered from selected units and analyzed to identify the amount of productive time.

3. The Defense Logistics Management Institute (LMI) Task 77-9, "Productivity of Organizational and Intermediate Maintenance," is sponsored by OSD. The first phases, completed in late 1977, focused on manpower utilization, and verified GAO and Army Audit Agency findings of low peacetime utilization of military mechanics.

4. LMI Task ML804, "Effectiveness of Army and General Support Maintenance Units," was initiated by OSD in lieu of the second phase of Task 77-9. Objectives are to evaluate

   --the capability of direct and general support maintenance units to satisfy wartime requirements,

   --the effectiveness of peacetime maintenance performed by these units, and

   --modifications to the Army maintenance structure presently under development or in use on a limited basis.

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5. A third LMI study of Army ground vehicle maintenance activities sponsored by OSD is directed to the capability of both reserve and active units to perform their missions.

6. Rand Corporation studies sponsored by OSD are directed to (1) the effect of wartime planning assumptions on maintenance manpower requirements at below-depot-level maintenance activities and (2) the time military personnel are not available for work because of nonwork-related activities.

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