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STUDY REPORT
CAA-SR-76-7

(1)

READINESS SYSTEM STUDY

PHASE II

READINESS INDICATOR MODEL PROTOTYPE DEVELOPMENT

JUNE 1976



PREPARED BY

FORCE CONCEPTS AND DESIGN DIRECTORATE

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1. REPORT NUMBER: CAA-SR-76-7	2. GOVT ACCESSION NO.
3. RECIPIENT'S CATALOG NUMBER	
4. TITLE (and Subtitle): Readiness System Study, Phase II, Readiness Indicator Model Prototype Development	5. TYPE OF REPORT & PERIOD COVERED: Study Report, covers Phase II beginning June 1975, ending May 1976
6. PERFORMING ORG. REPORT NUMBER: CAA-SR-76-7	
7. AUTHOR(s): Mr. F. Gordon Barry	8. CONTRACT OR GRANT NUMBER(s): Study rept. June 75 – May 76.
9. PERFORMING ORGANIZATION NAME AND ADDRESS: US ARMY CONCEPTS ANALYSIS AGENCY, 8120 Woodmont Avenue, Bethesda, Maryland 20014	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS: 74082
11. CONTROLLING OFFICE NAME AND ADDRESS: Office of the Deputy Chief of Staff for Operations and Plans (DAMO-ODR), Washington, D.C. 20310	12. REPORT DATE: June 1976
	13. NUMBER OF PAGES: 121
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office): 112p.	15. SECURITY CLASS. (of this report): Unclassified
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE: Not Applicable

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None

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

None (the Office of the Deputy Chief of Staff for Operations and Plans)

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This study was conducted by CAA to support ODCSOPS in the development of a means to quantify the deployment readiness of Army forces. Present deployment measures do not take into account the reported unit shortfalls in personnel and equipment. These shortfalls have been addressed during the study, and a measuring technique to determine the impact of the shortfalls has been developed. The technique, when fully automated and operational, will assist Army planners in force development and analysis processes.

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READINESS SYSTEM STUDY

PHASE II

READINESS INDICATOR MODEL PROTOTYPE DEVELOPMENT

June 1976

Prepared by

Force Concepts and Design Directorate

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FOREWORD

Phase I of the Readiness System Study began in November of 1974 and was completed with the publication of the study report CAA-SR-75-5 dated 6 June 1975. In the Phase I report a new readiness measurement technique utilizing unit availability time measurement factors was described and subsequently approved by the study sponsor. The Phase II report covered herein describes the development and test of an automated prototype model utilizing the technique and the potential uses of the model in force analysis. A methodology and plan for initial model operation and system implementation is covered under a separate cover being forwarded to the sponsor concurrently with the Phase II report.

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DEPARTMENT OF THE ARMY
US ARMY CONCEPTS ANALYSIS AGENCY
8120 WOODMONT AVENUE
BETHESDA, MARYLAND 20014

IN REPLY REFER TO

MOCA-FDI

1 June 1976

SUBJECT: Readiness System Study, Phase II Report

Deputy Chief of Staff
for Operations and Plans
Department of the Army
Washington, DC 20310

1. Reference is made to memorandum DAMO-ODR dated 1 November 1974, subject: Readiness System Study, which directed the US Army Concepts Analysis Agency to develop a readiness measurement technique that makes realistic assessments of unit deployment capabilities. Memorandum DAMO-ODR dated 9 September 1975, subject: Readiness System Study-Phase II updated guidance previously provided and directed the design and test of an automated prototype of the technique during Phase II of the study.

2. The report describes the development and test of the Readiness Indicator Model prototype and the potential uses of the model in force analysis. A methodology and plan for initial model operation and system implementation are being forwarded under separate cover concurrently with the Phase II report. The plan calls for initial model operation on the CAA computer and for subsequent system implementation at HQDA.

3. The principal result of the Phase II effort is the design and operation of an automated Readiness Indicator Model (RIM) prototype. Sufficient testing of the model has been conducted to provide assurance that it will function when placed under the stress of a full troop list and required to generate readiness indicators in an operational mode.

Ennis C. Whitehead

ENNIS C. WHITEHEAD, JR.
Brigadier General, USA
Commanding

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DEPARTMENT OF THE ARMY
OFFICE OF THE DEPUTY CHIEF OF STAFF FOR OPERATIONS AND PLANS
WASHINGTON, D.C. 20310

REPLY TO
ATTENTION OF:

DAMO-ODR

1 NOV 1974

MEMORANDUM THRU: DEPUTY ~~CHIEF OF STAFF FOR OPERATIONS AND PLANS (DCSOPS)~~ for

TO: COMMANDER, US ARMY CONCEPTS ANALYSIS AGENCY (USACAA)

SUBJECT: Readiness System Study

1. References: AR 220-1, Unit Readiness Reporting, 1 July 1974.

2. DCSOPS has primary responsibility for coordinating Army readiness reporting with force planning and evaluation and will be primarily responsible for the conduct of the study.

3. Unit deployment guidance specified in the current PPGM directs the Army to plan for units to be deployed when required. This guidance emphasizes the need for the Army to make realistic assessments of its unit deployment capabilities. The subject study must address this need. At present, reported unit deployment capabilities do not take into account the unit personnel and equipment shortfalls reported in the Readiness Reporting System. Initially, (Phase I), the study must determine the feasibility of calculating unit availability based on the unit shortfalls presently reported in AR 220-1. The unit availability calculations must be applied to a representative sample of Army units in order to demonstrate feasibility. If the calculations are feasible, the study (Phase II) must apply the calculations to all units of the force and describe a methodology for utilizing availability readiness data in force analysis. This methodology should be developed in light of deployment requirements identified in the Total Force Study (Update). At the completion of Phase II, you should consider a follow-on effort that uses this methodology as a tool in streamlining our mobilization and readiness systems such that unit availability times are more closely aligned with unit readiness requirements.

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DAMO-ODR
SUBJECT: Readiness System Study

4. A schedule of the study tasks and report reviews for CAA are at Inclosure 1.

FOR THE DEPUTY CHIEF OF STAFF FOR OPERATIONS AND PLANS:

Donald E. Rosenblum

1 Incl
as

DONALD E. ROSENBLUM
Colonel, GS
Acting Director of Operations

1. References:

a. CAA Readiness Evaluation Report, Phase 2, CONAF III, October 1973 (SECRET).

b. AR 220-1, Unit Readiness Reporting, May 1973.

2. Purpose: PHASE I - Conduct a study of the feasibility of utilizing existing data in the AR 220-1 Reporting System to estimate unit availability based on reported unit personnel, equipment and training shortfalls as a means of evaluating unit capabilities. PHASE 2 - After approval of feasibility, apply the calculations to all units of the force and describe a methodology for utilizing availability readiness data in force analyses. This methodology should be developed in light of deployment requirements identified in the Total Force Study (Update).

3. Study Sponsor: Office of the Deputy Chief of Staff for Operations and Plans.

4. Study Agency: US Army Concepts Analysis Agency.

5. Terms of References:

a. General:

(1) In order for the Army to plan its force to support changing national defense objectives, it must continuously define its force requirements and evaluate its force capabilities for meeting these defense objectives. The force requirements information is developed in terms of required full strength units by type, quantities, and required availabilities for deployment and employment.

(2) The Army readiness system provides capabilities information in terms of unit personnel and equipment shortfalls below full strength but does not interpret these shortfalls in terms of unit availabilities. Unit commanders do estimate training time required to attain fully trained status but these estimates assume that personnel and equipment shortfalls will be provided in a timely and progressive manner.

(3) Army force planners, in evaluating force capabilities, have no way of relating the reported unit strength shortfalls to unit capability. The impact of these unit shortfalls on unit availability is one way of evaluating capability. However, because the existing availability data in the readiness system does not take into account the actual personnel and equipment shortfalls, force planners assume unit availability. There is a need to correct this deficiency by addressing unit availability based on a realistic consideration of personnel and equipment shortfalls.

(4) The CAA Readiness Evaluation Report (Reference a) developed a concept to estimate unit availability based on personnel, equipment and training shortfalls and partially tested this concept in the CONAF III study. Personnel shortfalls initially were considered in determining unit availability and the test revealed reduced force capability estimates below those that are made by using the unit availability assumptions that are currently made in force capability analyses. This result indicated a possibility of a significant breakthrough in enabling the Army's readiness system to include more realistic unit availability data to improve resource allocation.

(5) The methodology being developed in this study can be a valuable tool in streamlining our mobilization and readiness systems, such that unit availability times are more closely aligned with unit readiness requirements.

b. Objectives:

(1) Phase I - Examine the feasibility of measuring unit availability based on unit personnel and equipment shortfalls and training requirements.

(2) Apply the above measurements to determine the unit availabilities of a representative sample of active and reserve component units.

(3) Phase II - After approval of feasibility, apply the calculations to all units of the force and describe a methodology for utilizing availability readiness data in force analyses. This methodology should be developed in light of deployment requirements identified in the Total Force Study (Update).

c. Tasks:

(1) Analyze the DA readiness force planning and readiness environment; describe the policies, regulations, and information flow; evaluate the effectiveness of these environments in facilitating DA in evaluating force capabilities.

(2) Expand the CAA CONAF III technique for measuring the impact on unit availability of reduced unit personnel strength to define and measure other pertinent factors impacting on unit availability.

(3) Develop a technique for estimating unit capability to deploy which takes into account the combined influences of the measurement made of the above factors.

(4) Apply the technique to estimate the deployment capability of a representative sample of active and reserve component units.

(5) After review and approval of the sample application, apply the unit deployment capability estimating technique to the entire US Army force.

(6) Describe a procedure for utilizing the unit deployment capability estimating technique as part of the existing readiness reporting system (minimizing changes being required in field reporting requirements.)

(7) Monitor the Total Force Study (Update) and utilize the deployment priorities developed in the study as a basis of unit deployment requirements.

(8) Develop a methodology for utilizing Phase I and Phase II information in force planning and for streamlining our mobilization and readiness systems.

(9) Describe a plan for implementing the methodology; showing tasks, required resources, and a task completion schedule.

d. Time Frame: Current range and mid-range force.

e. Essential Elements of Analysis: In order to insure an in-depth treatment of the readiness problems outlined previously, the following questions represent essential elements of analysis (EEA) which should be addressed by the study:

(1) What benefits will result by implementation of the methodology?

(2) What resources will be required and what is the estimated time for implementation of the methodology?

(3) What modifications in DA organizations, reports, procedures, regulations, and data will be required by the methodology?

(4) What automation will be required for the methodology?

(5) What impact will this automation have on existing data bases containing readiness data?

(6) Will management at Headquarters, Department of the Army be made easier, or in other ways improved, by adopting the methodology?

f. Sensitivity Analysis:

(1) The unit availability measurement technique should be tested to insure its validity under variable division force composition and scenarios.

(2) The techniques should also be tested to portray its usefulness as a readiness scale that can be used to measure the impacts of various

levels and combinations of unit personnel, equipment, and training shortfalls and fill requirements.

6. Administration:

a. A 63 man-month effort to be completed in one year is estimated as required.

b. Study Title: Readiness System Study.

c. Study Plan: The study will be performed in two phases: Phase I, from August 1974 through March 1975. Phase II will follow directly after approval of Phase I feasibility. Completion date for Phase II is Sep 75.

d. Study Schedule:

25 March 1975	Feasibility Analysis - Unit availability measurements based on personnel and equipment shortfalls.
29 September 1975	Methodology and implementation plan for utilizing unit readiness/availability in force analyses.

e. This tasking document has been undertaken pursuant to procedures contained in AR 10-38.

7. DCSOPS Point of Contact: LTC Moore, OX 7-1079.

DEPARTMENT OF THE ARMY
OFFICE OF THE DEPUTY CHIEF OF STAFF FOR OPERATIONS AND PLANS
WASHINGTON, D.C. 20310

REPLY TO ATTENTION OF: DAMO-ODR

9 SEP 1975

MEMORANDUM THRU: ~~DEPUTY CHIEF OF STAFF FOR OPERATIONS AND PLANS~~ Gp Exec

FOR: COMMANDER, US ARMY CONCEPTS ANALYSIS AGENCY (USACAA)

SUBJECT: Readiness System Study - Phase II

1. Reference memorandum, DAMO-ODR, Deputy Chief of Staff for Operations and Plans, dated 1 November 1974, subject: Readiness System Study.

2. This memorandum confirms the understandings reached during discussions with your agency on the development of the Readiness System Study to include in Phase II the design and test operation of an automated prototype of the readiness measurement technique developed during Phase I. The Phase II tasks, which have been proceeding on schedule since the completion of Phase I (tasks 1 through 4), are changed to read as follows:

a. Task 5. Design and test an automated prototype model of the readiness measurement technique. The prototype test operation should produce readiness indicators for a sufficient number of force units to demonstrate the feasibility of automation and the potential of the technique as a management tool in force analysis.

b. Task 6. Describe field reporting procedures required for the utilization of the readiness measurement technique, minimizing changes in the existing readiness reporting system.

c. Task 7. After completion of the prototype test, perform sensitivity analyses by varying input parameters to show interactions of these parameters on the model outputs. Reasonable upper and lower limits will be utilized to stress the model.

d. The remaining two tasks (8 and 9) of Phase II are unchanged.

3. In addition, the following modifications or additions are made.

a. Time frame. Current force list will be used in developing prototype design.

DAMO-ODR
SUBJECT: Readiness System Study - Phase II

b. Work Schedule. Completion date for Phase II documentation is 31 May 1976 with the following milestone requirements:

29 February 1976	Prototype test operation.
31 May 1976	Methodology and implementation plan for utilizing readiness measurement technique in force planning.

c. Funds for computer support (where required) will be the responsibility of DCSOPS.

4. DCSOPS point of contact, LTC Moore- OX 71079.

5. CAA Study Director, Mr. F. Gordon Barry- 295-1263.

CHARLES R. SNIFFIN
Major General, GS
Director of Operations

for

FRANK L. GARRISON
Colonel, GS
Deputy Director of Operations

2

LTC Moore/71079
Typed by Joan K. Mudd

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READINESS SYSTEM STUDY
PHASE II
READINESS INDICATOR MODEL PROTOTYPE DEVELOPMENT

SUMMARY

1. Introduction. - The US Army Concepts Analysis Agency has developed, in response to tasking by the Deputy Chief of Staff for Military Operations, a new readiness measurement technique that will enable Army managers to evaluate existing or planned levels of unit personnel and equipment assets in terms of quantifiable readiness indicators. This technique was manually tested during Phase I and determined to be feasible but requiring automation. During Phase II the technique was automated by development of a computer model prototype which demonstrated the feasibility and utility of the technique in force analysis applications at HQDA level. In addition, an implementation plan has been developed (separate cover) to achieve an initial operational capability of the Readiness Indicator Model (RIM) for Headquarters, Department of the Army in January 1977.

2. The Readiness Measurement Technique. - The technique introduces the fundamental elements of time and mission into the readiness equation in a manner which indicates in a quantitative manner the potential of a specified portion of the Army to meet prescribed readiness conditions and deploy overseas. This technique is directly applicable to the force planning environment associated with the Army's most demanding strategic tasks, but it has, as well, considerable potential for use as a readiness management tool in policy and program development. In both regards it overcomes an existing deficiency of HQDA to assess the capability of the Army to accomplish the critical tasks between mobilization day and time when units must deploy to a theater of operations.

a. Approach. - The technique postulates that the difference in time (days) between a unit's required day of deployment and the Army's capability to meet this requirement is an indicator of readiness. When this process is applied in a manner which encompasses a major portion of the Army and the total personnel and equipment assets available, on a time-phased basis, a measure of force readiness is attained. Thus, the technique relies on status reports, resource plans and the associated data bases to meld into a single system a logical representation of the process of filling units to prescribed levels of personnel and equipment, completion of training,

and subsequent movement to ports of embarkation. The common thread is time.

b. Data Base. - All of the input data required by the technique are available from existing reporting systems. The operation of the technique does not impose any additional reporting requirements on unit commanders.

c. Readiness Indicator Model (RIM). - The RIM consists of the computer programs and operations which automate the readiness measurement technique. The major portion of the Phase II effort was devoted to the design and test of a prototype of this model.

3. Prototype Model

a. Description. - The prototype model incorporates all programs and operations required to produce readiness measurements for each unit in the force. The prototype utilizes 31 different preprocessing programs to create the files required by five subroutines of the model. The prototype computes the readiness of units in a given force based on the capability of these units to meet deployment requirements, supplied as inputs to the model. The model then calculates the capabilities of the force units to meet specific time requirements in relation to M-day to be at a specified location, manned, equipped, and trained to prescribed levels. The RIM also computes the difference between a unit's deployment requirement and its deployment capability. The difference is a measure of readiness which is called a Unit Readiness Indicator (URI). A unit with a positive or zero URI can meet its deployment requirement. A unit with a negative URI cannot meet its deployment requirement. The degree that the unit is over-ready or under-ready is indicated by the number of positive or negative days reflected by the URI.

b. Test. - An abbreviated force list was used in the prototype test. The list was extracted from the draft Post Mobilization Deployment List (PMDL) supplied by the sponsor to use in the test. The model successfully produced unit readiness indicators in accordance with the technique specifications for each unit in the force. The output also included a listing of the principal cause of deployment delay for each unit.

c. Evaluation. - The output listings demonstrated that all prototype programs functioned properly and the output listing met the requirements of the technique specifications. All RIM

preprocessor programs and unit readiness calculation subroutines operated within a reasonable and feasible time. No program exceeded 45K of core storage or ran longer than three and one half hours. It is not anticipated that this core size or run time will change appreciably using a full troop list.

4. Readiness Indicator Model Application

a. Management. - The RIM is intended as a flexible management tool to aid force planners in answering both routine questions involving "readiness" and a variety of "what if" force planning questions that confront the Army throughout the planning and programing cycle. The RIM input parameters consist of elements that impact significantly on issues involved in force planning and force evaluation. For example, personnel and equipment levels--both existing and planned--both in and out of units--are key RIM input parameters. Likewise, unit training and deployment requirements are RIM inputs. Changes to any of these inputs will impact on the unit readiness indicator produced by the RIM. Thus, the model can be used as a management tool to assess alternative force plans or policies in terms of the impact of each alternative on readiness.

b. Force Studies. - The RIM also has potential for use in force studies. It can be used to provide a realistic unit deployment capability schedule for use in the Total Force and OMNIBUS Studies. Since the model's output consists of positive (over-ready) and negative (under-ready) unit readiness indicators, the model could be used in studies in which investments in readiness could be comparatively evaluated and maximized.

5. Implementation. - In addition to the development and test of an automated prototype, the Phase II tasking directive required development of an implementation plan for HQDA use and management of the Readiness System. This plan, submitted under separate cover to facilitate consideration by the Army Staff, provides for further development of the prototype in order to increase its utility, and establishes a sequence of tasks to be performed by Army Staff elements and CAA to complete the achievement of an initial operating capability in January 1977. Thereafter, it is planned for HQDA to accomplish additional tasks, jointly with CAA, to field the system, and progressively expand its application to broader Army problems.

READINESS SYSTEM STUDY
PHASE II
READINESS INDICATOR MODEL PROTOTYPE DEVELOPMENT

CHAPTER I
INTRODUCTION

1. Purpose. - The overall purpose of the Readiness System Study is the development of a new Army readiness measurement system. During Phase I the study team developed and manually tested the functional logic of a new technique to measure Army readiness. The current phase, phase II, is a continuation of the effort initiated during Phase I with a modification of the sequencing of tasks originally specified. Specifically the modification required the development and test of an automated prototype model of the new technique, originally to have been developed as a follow-on effort. The study report covers the Phase II effort.

2. Authority for Initiation of Study. - The overall study was authorized by the Office of the Deputy Chief of Staff for Operations and Plans (DAMO-ODR) Memorandum and study tasker addressed to Commander, US Army Concepts Analysis Agency (CAA), dated 1 Nov 74, subject: Readiness System Study. Modifications to the tasker were made by DAMO-ODR Memorandum, dated 9 Sep 75, subject: Readiness System Study - Phase II.

3. Problem. - The Army needs a means of evaluating the status of personnel and equipment in units in terms of readiness. Measurements of existing status levels in units, in themselves, do not reflect the readiness of units. There is a need to know what each unit's desired status level should be, and the time that this level must be reached. There is also a need to measure the time that it takes a unit to reach that desired status level. The Readiness System Study addresses these needs.

4. Objectives. - The Phase II objectives are to demonstrate the feasibility of automation of the CAA readiness measurement technique and the potential of the technique as a management tool in force analysis.

5. Assumptions. - The technique measures unit readiness based on unit personnel and equipment status as reported in the Standard Installation/Division Personnel System (SIDPERS), and the Army Equipment Status Report System (AESRS) on "Status day," which is the SIDPERS and AESRS submission day. The following assumptions were made:

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a. Mobilization day is also SIDPERS and AESRS submission day.

b. The Selective Service draft is reinstituted.

c. All National Guard units are federalized for active duty.

d. All Army Reserve units are activated and individuals in the Individual Ready Reserve are activated.

e. The industrial production base and the training base are expanded in accordance with the rules for total mobilization.

6. Scope. - This study report covers the following Phase II tasks specified in the tasker memorandums:

a. Design and test an automated prototype model of the readiness measurement technique. The prototype test operations should produce readiness indicators for a sufficient number of force units to demonstrate the feasibility of automation and the potential of the technique as a management tool in force analysis.

b. Describe field reporting procedures required for the utilization of the readiness measurement technique, minimizing changes in the existing readiness reporting system.

c. After completion of the prototype test, perform sensitivity analyses by varying input parameters to show interactions of these parameters on the model outputs. Reasonable upper and lower limits will be utilized to stress the model.

d. Develop a methodology for utilizing Phase I and Phase II information in force planning and for streamlining our mobilization and readiness systems.

e. Describe a plan for implementing the methodology; showing tasks, required resources, and a task completion schedule.

7. Background

a. Force Capability Measurement Deficiency. - In order to plan forces to support changing national defense objectives, the Army must continually define force requirements and evaluate force capabilities.

(1) The force requirements information is developed in terms of required full strength units by type, quantities, and deployment/employment time sequence for both overseas deploying units and units employed in Continental United Status (CONUS). The

existing Army unit readiness reporting system (AR 220-1) provides unit status information in terms of unit personnel and equipment shortfalls below required Modification Table of Organization and Equipment (MTOE) levels, but does not interpret these shortfalls in terms of their impact on unit availabilities. Unit commanders do estimate the amount of training required to attain fully trained status, but these estimates are based on the assumption that the units would be provided with sufficient personnel and equipment. The resulting commander estimates, considering the above assumption, range from optimistic to pessimistic values. The usefulness of these values in force analysis is highly questionable.

(2) As a consequence, Army force analysts, when evaluating force capabilities, have had to limit the evaluations to force structure evaluations (that is, evaluations of the unit types, mixes and quantities). Force structure analysis neither required a consideration of unit strength (the quantity of personnel and equipment in a unit), nor consideration of the unit capability to meet availability (deployment or employment) requirements. Therefore, unit strengths and availabilities were assumed in the evaluations of alternative force structures. The result was a series of proposals for improved force structures. But these proposals neither measured the capability of the existing Army units to be available, when required, nor took into account the existing strength of these units. Correction of this force analysis deficiency was the basis for initiating the development of the CAA readiness measurement technique.

b. Conceptual Design for the Army in the Field III (CONAF III) May 74 Study. - A readiness report, provided as part of the CONAF III study, described the development of a concept to estimate unit availability based on personnel, equipment, and training shortfalls. This concept was partially tested using only personnel shortfalls to determine the impact on unit availability of a selected group of units. The results revealed reduced force capability estimates below those that were made by using the unit availability assumptions usually made in force capability analysis. A possible breakthrough enabling the Army readiness measurements to include more realistic unit availability data to improve force capability analysis was indicated. Accordingly, CAA was tasked to begin a readiness system study utilizing the concept developed as a starting point.

c. Phase I Readiness System Study. - In Phase I of the readiness system study, the study team developed the detailed functional logic of a technique for measuring the capability of deploying Army units to be available for deployment, and for measuring the capability of nondeploying support units to be

available for CONUS employment. The logic of the technique was demonstrated to be feasible by manually performing all technique calculations for a small number of Army units. As a result of the Phase I effort, the sponsor directed that the Phase II effort should concentrate on the automation of the technique.

8. Essential Elements of Analysis. - Because of the aforementioned modification in the tasker, an automated prototype was produced in Phase II and the requirement for addressing utilization of the technique as part of the existing readiness reporting system was delayed until Phase III. Consequently coverage of some of the essential elements of analysis (EEA) will be delayed until Phase III. Listed below are the Phase III EEA with references to the report locations where they are covered. Where the EEA will be addressed in Phase III, this fact is also noted.

a. What benefits will result by implementation of the methodology?

Even though the full benefits of this methodology will not be realized until after its implementation, it is envisioned that the ability to analyze unit readiness will be more precise. The potential uses of the technique are discussed in Chapter IV. More comprehensive analysis of the benefits will be made during Phase III, prior to system implementation.

b. What resources will be required and what is the estimated time for implementation of the methodology?

During the period of prototype design expansion and initial model operation on the CAA computer it is anticipated that the existing seven man CAA study team will suffice. No additional resources above those existing in the HQDA Readiness Systems office will be required during system implementation. The HQDA resource requirements for system operation will be addressed during Phase III. The estimated time for implementation is described in the implementation plan presented under separate cover. This plan calls for initial model operation in January 1977 and system implementation in December, ~~1976~~ *1977*.

c. What modifications in DA organizations, reports, procedures, regulations, and data will be required by the methodology?

This question cannot be fully answered until further knowledge and experience is gained during Phase III. The implementation plan, however, does address the ADP and management functions needed for system operation and includes Phase III tasking covering regulations and procedure requirements for the new system.

d. What automation will be required for the methodology?

The RIM requirements on the CAA computer test and operation of the prototype consist of the following: Approximately 50K of memory capacity, two tape drives and one disc pack are required. This automation requirement is essentially quite moderate. Chapter IV analyzes the prototype computer requirements more completely. During Phase III the computer automation requirements for operation of the RIM at HQDA will be addressed.

e. What impact will this automation have on existing data bases containing readiness data?

The impact on existing data bases of the RIM automation is dependent on the degree to which Headquarters DA establishes and updates a readiness data base. This question will be addressed in detail during Phase III. However, one very obvious impact that has already been noted is that there will be a purifying and data management process applied to the existing data bases that has not occurred previously. The reason is that much of the readiness data utilized by RIM have not been used in force planning and therefore have not been subjected to the requirements for accuracy that force planning requires.

f. Will management at HQDA be made easier, or in other ways improved by adopting the methodology?

Chapter IV addresses this question by considering the potential of the prototype as this potential has been discussed with key Army executives. The answer is unequivocally "yes." The extent of improvement will be determined by the effectiveness with which HQDA establishes the RIM as part of its management functions.

9. Phase II Approach

a. The major portion of the Phase II effort was devoted to the design and test of an automated prototype model of the CAA readiness measurement technique, and to the presentation of the test results to HQDA action officers and executives. The approach taken in this report describing this effort is as follows:

(1) The adaptation of the CAA readiness measurement technique for use in an automated Readiness Indicator Model is described in Chapter II. It covers the reexamination of the CAA readiness measurement technique that was made to adapt it for use in an automated Readiness Indicator Model (RIM). The theory of readiness measurement is discussed, a basic readiness formula is postulated and the application of this formula in the RIM to measure readiness is described. The data sources and RIM field

reporting requirements are also described in this chapter.

(2) The detailed operations of the revised CAA readiness measurement technique are described in Chapter III.

(3) Chapter IV contains the test of the RIM prototype. Also included are discussions of the automation feasibility of the RIM prototype and its potential uses in force analysis.

b. In addition to the development and test of an automated prototype, the Phase II tasking directive requires a description of a methodology and presentation of an implementation plan for utilizing the RIM in force analysis. Since these two tasks describe the follow-on effort subsequent to Phase II, they are covered in a separate letter. The sequencing of effort described in the implementation plan has been phased to expedite production of an initial useable model output in response to direction of the Operational Readiness Monitoring System General Officer Steering Committee. This committee was briefed on 18 March 1976 on the Phase II results. They took the position that the study should be continued and expedited to produce an operating model with useable outputs as soon as possible. The quickest route to producing an operating RIM is to bring the required RIM source data into CAA, to update the design of the prototype, as required, and to produce the first output on the CAA computer. Following this initial operation, conversion of the operation to a HQDA computer and functional organization would be accomplished while maintaining useable outputs at CAA.

READINESS SYSTEM STUDY
PHASE II
READINESS INDICATOR MODEL PROTOTYPE DEVELOPMENT

CHAPTER II

THE ADAPTATION OF CAA READINESS MEASUREMENT TECHNIQUE FOR USE IN AN AUTOMATED READINESS INDICATOR MODEL

1. Basic Readiness Formula

a. The first step in the Phase II analysis in response to the revised tasker involved a reexamination of the measurement of Army readiness, particularly as it applies to force analysis. The reexamination resulted in a postulation of a basic readiness formula, and an assessment of the problems and opportunities associated with its use in force analysis. The rationale for the formula is described first.

b. In order for the Army to plan for the forces required to support changing national defense objectives, the Army must continuously determine its force requirements and evaluate its force capabilities, to meet these defense objectives. An understanding of force requirements and force capabilities with a knowledge of the difference between the two, represents the essential ingredients in force analysis and budget determination. In wartime, the difference between force requirements and capabilities is reflected by battlefield losses or gains of personnel, equipment or territory. This difference is obviously of paramount importance, and ultimately is the basis for determining the level of defense dollar expenditures. In peacetime, the nation must also make a dollar investment in defense, but instead of basing the investment on actual battlefield results the defense expenditure levels are based on anticipated or desired battlefield results. As in the case of war, these results are also represented by the difference between requirements and capabilities. This difference between requirements and capabilities is called readiness. The relationship between readiness, requirements, and capabilities is postulated as a basic readiness formula and is shown in Figure II-1. It is the basis of the CAA readiness measurement concept.

READINESS=DIFFERENCE BETWEEN REQUIREMENTS AND CAPABILITIES

Readiness Measurement Accuracy is a Function of:

- o Accuracy of Requirements Statement
- o Accuracy of Capabilities Measurement
- o Ability to Relate Requirements to Capabilities

FIGURE II-1, Basic Readiness Formula

c. The accuracy of the readiness determination by the formula is directly proportional to the accuracy of the determination of the requirements and capabilities. Unless the unit of measure for requirements can be related to the unit of measure for the capabilities readiness measurement becomes a subjective evaluation of the difference between two unlike measurements. Thus, the formula accuracy also depends on the relatability of the requirements measurement to the capabilities measurement.

2. Application of Basic Readiness Formula in Force Analysis

a. War Gaming

(1) Measurement of requirements and capabilities of Army forces in peacetime, presents some difficulties. The first is in the area of basic meanings of terms, and the second is in the use of the measurement techniques. In the larger sense, requirements are expressed in terms of force structure, (addressing Army units containing personnel, weapons systems, and logistics support) and unit availability requirements both intended to meet defense objectives.

(2) In order to tailor the force structure to maximize support of defense objectives, force designers employ various methodologies in peacetime to evaluate the wartime capabilities of alternative force compositions, employment strategies, weapon mixes, and conflict situations. For the most part, these assessments are made with the aid of computer assisted models designed to measure the combat effectiveness of a blue force vs a red force in simulated war games. Factors, such as combat losses, replacement rates for personnel, weapons and supply, unit posture and firepower, Forward Edge of the Battle Area (FEBA) movement, lift, terrain, and red/blue doctrine are used in assessing the overall results. The values given to these factors are heavily dependent on the opinion of Army personnel schooled and experienced in strategy and battlefield tactics, weapons effectiveness, logistics doctrine and organizational concepts.

(3) Two major problems exist when attempting to measure readiness via use of combat and logistics effectiveness factors to determine the difference between requirements and capabilities. First, individual experiences and bias are bound to be reflected into the statements of requirements. These requirements are very often reflected in the rules for success played in making capability assessments. Second, the units of measure for assessing capability are extremely complex. Combat effectiveness is related to many nonquantitative factors as well as to the more readily measureable factors such as unit strength or availability. Morale, leadership and motivation all play a part in combat effectiveness. But units of measure for these factors are difficult to define and sum in any standard way. Firepower values for one type of weapon may or may not be added directly to the firepower of a second type of weapon.

(4) Similarly, logistics effectiveness, which plays a part in combat success, has its own problems related to units of measure. Workload is one unit of logistics measure, but its value range and duration, over which a value is maintained, are highly debatable. Weather and terrain likewise have different impacts on workload, both of which are difficult to assess in advance. These few observations on the complexities associated with force requirements and capabilities evaluation only skim the surface of the considerations involved in force evaluation. These observations are intended to note inherent difficulties presented in using combat and logistics effectiveness factors to determine requirements and capabilities, and to set the stage for explaining the rationale of the CAA readiness measurement concept which uses "time" factors for determining requirements, capabilities and readiness. The rational for using time as the unit of measure in relating requirements, capabilities and readiness is discussed in subparagraph b below.

b. Time measurements. - At the present time, the Army has a dynamic system for establishing time (deployment, employment) requirements for units, but has no system for determining the capabilities of units to meet these time requirements. The Unit Readiness Reporting System, AR 220-1, reports on the existing gross levels of personnel and equipment in units as percentages of the gross level requirements for these units. The existing levels are related to readiness condition (REDCON) C ratings, from best (C-1) to poorest (C-4). Figure II-2 lists the definitions relating to mission capability which are applied to these REDCON levels. Since these definitions do not take into account the time necessary to raise an undesirable C rating to a desirable C rating, the REDCON

do not reflect readiness. Thus, the personnel and equipment REDCON, although of significant use to a division commander concerned with the status levels of personnel and equipment in his units, do not provide HQDA with interpretations of the unit status data in terms of essential time-to-make-ready data. This missing time dimension would enable meaningful comparisons to be made between unit time requirements and unit time capabilities which represent two of the basic readiness formula elements. The measurement of the time-to-make-ready is fundamental to the CAA readiness measurement technique.

REDCON 1 (C-1) ---FULLY READY (C-1). A unit fully capable of performing the mission for which it is organized or designed. Units may be deployed to a combat theater immediately.

REDCON 2 (C-2) ---SUBSTANTIALLY READY (C-2). A unit has minor deficiencies which limit its capability to accomplish the mission for which it is organized or designed. Units may be deployed to a combat theater immediately.

REDCON 3 (C-3) ---MARGINALLY READY (C-3). A unit has major deficiencies of such magnitude as to limit severely its capability to accomplish the mission for which it is organized or designed. Units will require a period of intensive preparation before combat deployment/employment except under conditions of grave emergency.

REDCON 4 (C-4) ---NOT READY (C-4). A unit not capable of performing the mission for which it is organized or designed. Units will require extensive upgrading prior to combat deployment.

FIGURE II-2, AR 220-1 Unit Combat Readiness Codes*

3. A New Application of Basic Readiness Formula to Improve Force Analysis. - The measurement of time is the means by which the basic readiness formula relating requirements and capabilities to readiness is adapted by the CAA readiness measurement technique to improve force analysis. A description of the time measurements of requirements, capabilities, and readiness, as utilized by the technique, is included in the remaining subparagraphs of paragraph 3.

*Extracted from Unit Readiness Reporting AR 220-1 Effective 1 June 1975.

a. Time Measurements Related to Requirements

(1) The major time measurements related to requirements determination needed in the CAA readiness measurement technique are as follows:

(a) A Required Day of Deployment (RDOD) in relation to Mobiliation-day (M-day) at a specific Port of Embarkation (POE) for each deploying unit.

(b) A Required Day of Employment (RDOE) in relation to M-day at a specific employment station for each nondeploying unit.

(c) A prescribed deployment/employment level for each deploying/nondeploying unit in the force by Military Occupational Specialty (MOS) and Line Item Number (LIN).

(d) A prescribed post mobilization deployment/employment unit training level for each deploying/nondeploying unit.

(2) The basis of these requirements, both the time requirements and the level requirements, are determined by force planners. The Required Day of Deployment (RDOD) stems from the theater commander inputs on unit overseas employment time requirements which are submitted to HQDA. Force planners at Headquarters, Department of the Army develop from these inputs a Post M-day Deployment List (PMDL) which lists the Required Day of Delivery (overseas) (RDD) for each deploying unit. Lift factors are applied to the RDD by MTMC to determine the RDOD. The mobilization period for nondeployment support units is also developed at HQDA as part of the mobilization analysis. The prescribed deployment/employment levels of personnel and equipment for units is determined by use of the Table(s) of Organization and Equipment/Modification Table of Organization and Equipment (TOE/MTOE) system as specified by a planner input to the model. Any prescribed level is permissible for use in the model.

b. Time Measurements Related to Capabilities

(1) General. - These time measurements relate to the time in numbers of days that it takes deploying and nondeployment support units to complete the following predeployment/preemployment readiness tasks. These tasks are as follows:

(a) Fill unit personnel and equipment shortfalls to prescribed levels.

(b) Complete unit training.

(c) Pack, load and move from home station to mobilization station. (Where unit is also required to move from the mobilization station to the POE, an additional pack and load time is included in this task.)

(d) Move-to-port of embarkation.

(e) Off-load and load-on lifts.

(2) Filling Unit Shortfalls. - A description of the time measurements associated with the listed readiness tasks follows:

(a) The single most important readiness task which must be measured to determine unit readiness is the time that it takes to fill existing unit personnel and equipment shortfalls to desired levels. As seen in Table II-1, the personnel and equipment REDCON in AR 220-1 reflect gross levels of existing personnel and equipment status rather than specific MOS and LIN levels. Consequently, the time required to raise the existing status level to a desired status level cannot be measured in terms of specific MOS or LIN.

(b) First, the concept requires recognition of needs for unit status data and fill data which relate to specific MOS and LIN, because time-to-fill measurements cannot be made unless applied to the quantity and availability of specific MOS or LIN.

(c) Second, the concept requires recognition of the need for identifying and measuring the quantity and availability of filler assets which can be used for filling units to a desired status level. These filler assets include both existing and planned personnel and equipment assets determined to be available to fill deploying and nondeployment support units.

(d) Third, fill time is not only a function of unit shortfall and filler asset availability, but also of unit fill priority. The fill priority is determined by the M-day deployment/employment requirement of each unit (See paragraph II-5b).

(e) In summary, the unit shortfall, the unit priority, and the quantity and availability of personnel and equipment in the systems containing (or planned to contain) filler assets determine the fill time or the personnel or equipment readiness of a unit. The identification and measurements of the quantities and availabilities of assets in these filler systems is crucial to the credibility of the capability calculation.

(3) Unit Training Time (UTT). - Another important readiness task is the completion of unit training. The Unit Readiness Reporting System (AR 220-1) requires the unit commander to estimate his required unit training (See Table II-1). This estimate must be based on his assumption that sufficient personnel and equipment will be provided to his unit. The commander has no way to control or know when he will have sufficient personnel and equipment to complete unit training. His estimates, understandably vary from optimistic to pessimistic values, and the usefulness of these estimates in force planning is questionable. The need for including an objective standard time measurement for unit training is an essential element of the readiness concept. Consequently, the technique includes a time measurement for post mobilization unit training requirements that takes into account the personnel and equipment shortfalls, and the time that it takes for these shortfalls to be filled.

TABLE II-1, Major Reported Items-AR 220-1 Readiness Reporting System

Personnel Operating Strength	≥ 95% Full MTOE	≥ 85% Full MTOE	≥ 75% Full MTOE	< 75% MTOE
Equipment On Hand Training a/	At Least 90% of RL1 ≥ 90% FILL	At Least 90% of RL1 ≥ 80% FILL	At Least 90% of RL1 ≥ 70% FILL	Greater Than 10% RL1 < 70% FILL
Div. BDE. REQ, BN/SQDN	0 - 2 Weeks Fully Trained	3 - 4 Weeks Fully Trained	5 - 6 Weeks Fully Trained	7 Weeks Plus Fully Trained

a/ Commanders not having sufficient personnel and equipment to become fully trained make training estimates assuming units will be provided sufficient personnel and equipment.

(4) Other Predeployment Tasks. - The original readiness measurement concept presented in the Phase I report covered the major readiness tasks that a unit must perform through its employment in theater. The sponsor requested limiting the Phase II analysis to measurement of the major readiness tasks prior to deployment (or prior to employment for nondeployment units which remain in CONUS in support of the deploying units). These readiness tasks (in addition to filling unit shortfalls and completing unit training covered in paragraphs 3b(2) and (3) above) include pack, load, movement from home station to port of embarkation, offload and load-on lifts. The time measurements related to these tasks are calculated with the aid of the Military Traffic Management Command's (MTMC) Mobility Analysis and Planning System (MAPS). The total lapsed time taken to complete all of the readiness tasks specified constitutes a measurement of unit deployment/employment capability.

c. Time Measurements Related to Readiness Determination. - As specified by the third function in the basic readiness formula in Figure II-1, the measurement of capabilities must be relatable to the measurement of requirements. In the CAA technique, both capabilities and requirements are specified by the same unit of measure, viz, time. Consequently, the readiness calculation can be made by subtracting the capabilities time measurement from the requirements time measurement. This adaptation of the basic readiness formula is made in the automated CAA readiness measurement technique in a computer model called the Readiness Indicator Model (RIM).

4. RIM Readiness Measurement Formula. - The Readiness Indicator Model is the computer model that calculates unit readiness based on the CAA readiness measurement technique. The RIM computes the difference between a unit's deployment/employment requirement and its deployment/employment capability. This difference is a measure of readiness which is called a Unit Readiness Indicator (URI). A unit with a positive or zero URI can meet its deployment/employment requirement. A unit with a negative URI cannot meet its deployment/employment requirement. The degree that the unit is over-ready or under-ready is indicated by the number of positive or negative days reflected by the URI. The RIM formula for calculating unit readiness is shown and defined in Figure II-3. In paragraph 5, the readiness tasks that are measured in the RIM formula are tied together and illustrated in an overall readiness measurement concept for deploying and nondeployment units.

For Deploying Units:

URI = RDOD - UDC

where:

URI = Unit Readiness Indicator
RDOD = Required Day of Deployment
UDC = Unit Deployment Capability
RDOE = Required Day of Employment
UEC == Unit Employment Capability

UDC = UFT + TDT + MSPT + MPT + OLT + LLT

where:

UFT = Unit Fill Time (time to fill unit to prescribed levels of personnel and equipment)
TDT = Training Delay Time (time to complete unit training (in excess of UFT))
MSPT = Mobilization Station Preparation Times (time to pack, load, move from home station to mobilization station)
MPT = Move-to-Port Time (time to move from mobilization station to port of embarkation)
OLT = Off-load Time
LLT = Load-on Lift Time

For Nondeployment Support Units:

URI = RDOE - UEC

UEC = UFT + TDT + MSPT

FIGURE II-3, RIM Readiness Measurement Formula

5. Readiness Time Measurements Used in RIM

a. General. - Figures II-4 and II-5 depict three dimensional pictures of the time measurements used in the RIM for measuring unit readiness. Figure II-4 applies to deploying units. Figure II-5 applies to nondeploying support units. Time measurements of key readiness tasks are used to calculate the capabilities of units to meet specified times in relation to M-day and to be at a specified location, manned, equipped and trained to prescribed levels. The RIM determines readiness by measuring the difference between the specified requirement time for a unit, and the calculated capability time for a unit.

b. Deploying Units. - The diagram in Figure II-4 applies to deploying units, and is drawn on a time scale beginning on M-day and ending on deployment day. Six sets of readiness tasks must be accomplished between M-day and deployment day. These tasks are listed on the top of each of the two time blocks in Figure II-4. The first time block is that between M-day and prescribed level day. In this period, the unit must fill personnel and equipment to prescribed deployment levels, and must complete required unit training. The second time block is between prescribed level day and deployment day. In this period the unit must pack, load, move from mobilization station to POE, off-load and load-on lifts. The measurement of the times required to accomplish all of the tasks shown in the two time blocks represents the deployment capability for each unit. In Figure II-4, the block to the left represents the development of the unit deployment requirements. These must include a Required Day of Deployment (RDOD) in relation to M-day for each deploying unit. In addition, the deployment requirements must include a prescribed deployment level of personnel (by MOS), equipment (by LIN), and prescribed unit training for each of the deploying units. The comparison of the unit deployment capability with the unit deployment requirement provides a measure of unit readiness.

c. Nondeploying Support Units. - Also incorporated in the RIM technique, and shown in the Figure II-5, are the readiness time measurements used for nondeploying support units. In this case, the requirement would be represented by the RDOE for these units to be at their CONUS employment locations at prescribed levels of personnel, equipment and unit training. The employment capability for nondeploying support units then would be measured by the time required for these units to complete the readiness tasks shown in Figure II-5. The sequence of task performance for nondeploying support units is normally reversed from the task performance sequence for deploying units. The nondeploying units would normally pack, load, and move to their mobilization stations

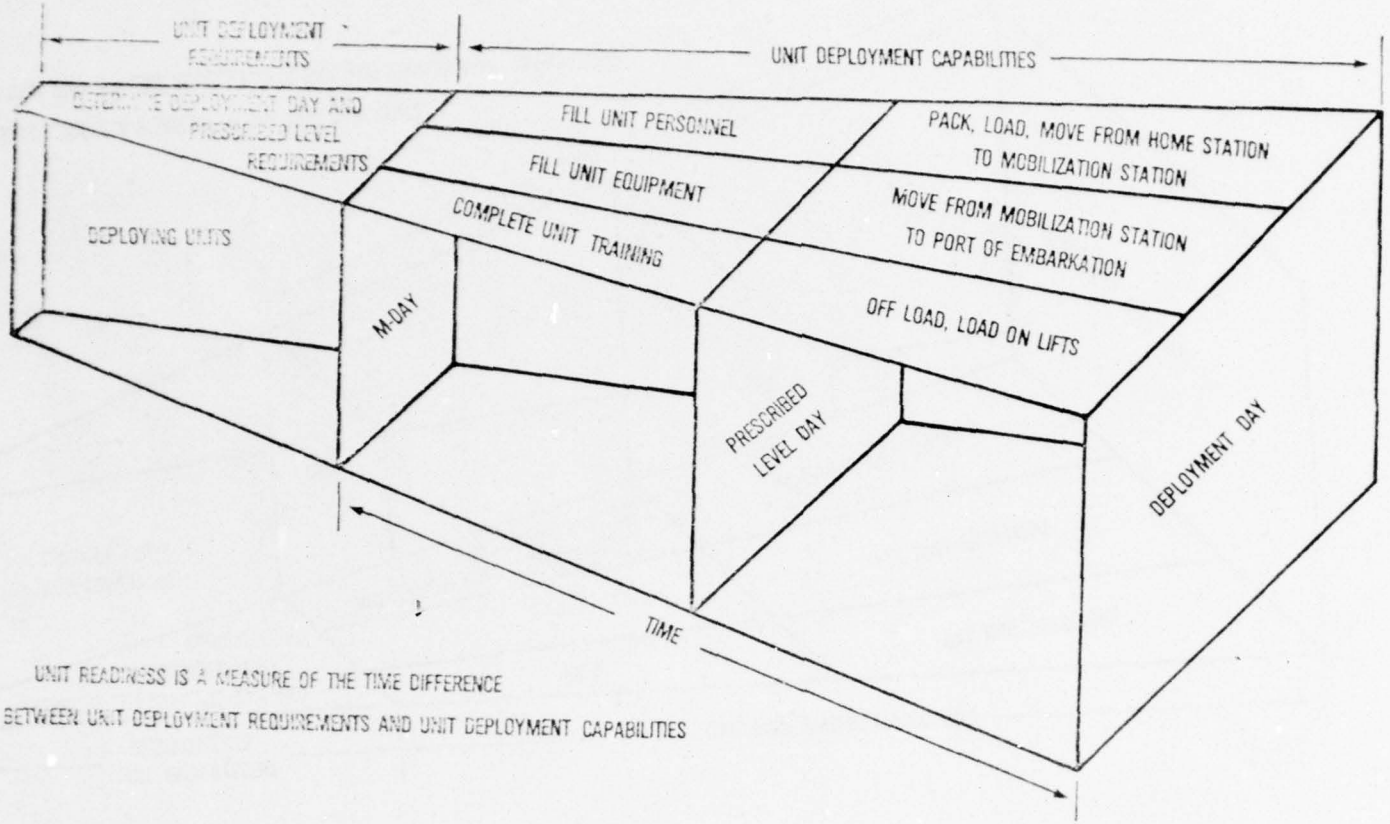


FIGURE II-4 RIM Readiness Time Measurements Used For Deploying Units.

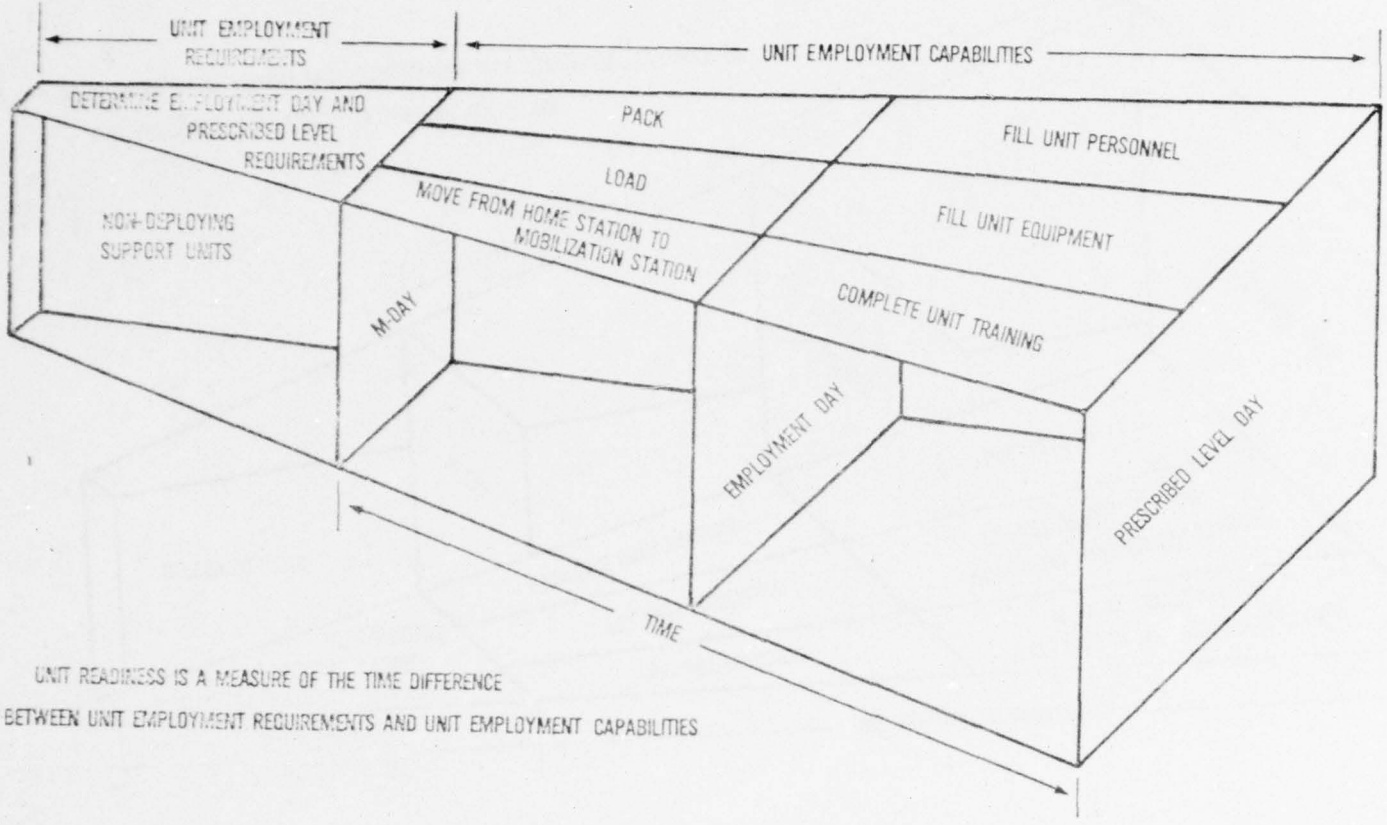


FIGURE II-5 RIM Readiness Time Measurements For Nondeploying Support Units

prior to filling their personnel and equipment shortfalls, and completing their unit training. This sequence is shown in Figure II-5. The comparison of the unit employment capability with the unit employment requirement provides a measure of unit readiness for the nondeploying support units.

6. RIM Field Reporting Requirements. - The RIM uses existing reporting systems for input, therefore, no additional data are required to be generated in the field. With the exception of the Unit/Personnel Training Tables the procedures concerned with obtaining data relate solely to automatic data processing format requirements, and are covered in the system specifications maintained at CAA until the operating RIM is turned over to HQDA. Figure II-6 shows the data files utilized by the RIM. The files require modification in order to be compatible with the UNIVAC computer at CAA, and to meet the requirements of the RIM. In all cases, the required data files were obtained and were successfully used. Referring to Figure II-6, the data required and their sources are:

a. Personnel Files. - Three personnel files are shown in Figure II-6. These files provide status of personnel by military occupational speciality for units in the active Army, US Army Reserve and Army National Guard. MOS for students, trainees, and individuals in the Individual Ready Reserve (IRR) are also obtained from these files. The file data sources are:

(1) The Standard Installation/Division Personnel System (SIDPERS) produced at the United States Army Military Personnel Center (MILPERCEN) for the active Army.

(2) Special tapes prepared by Reserve Component Personnel and Administrative Center (RCPAC) for the IRR and Army Reserve units.

(3) Special tapes from the National Guard Bureau (NGB) for Army National Guard (ARNG) units. RCPAC and NGB have not yet completed chargeover of their personnel data to the Standard Installation/Division Personnel Reporting System (SIDPERS) systems.

b. Post M-day Deployment List (PMDL) File. - This file identifies the deployable units for the scenario used in the prototype development. The file is provided by Office, Deputy Chief of Staff for Operations and Plans (ODCSOPS).

c. Force Accounting System (FAS) File. - This file contains the force troop list for all units in the active Army, Reserve Components, and proposed operational organizations. The file is provided by ODCSOPS.

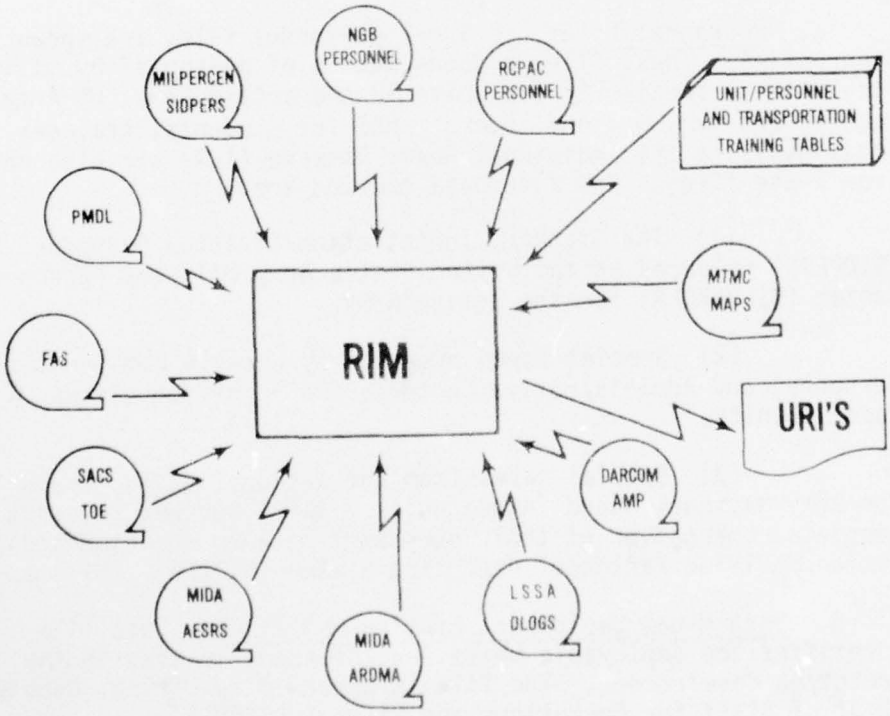


FIGURE II-6 Readiness Indicator Model Field Reporting Requirements

d. Structure and Composition System (SACS) TOE File. - This file contains the requirement levels of personnel and equipment for each unit type Standard Requirements Code (SRC) in the Army. The file is provided by ODCSOPS.

e. Army Equipment Status Reporting System (AESRS) File. - On-hand status of equipment by line item number in all units of the active Army, US Army Reserve, and National Guard are provided by the AESRS file. The Major Item Data Agency (MIDA) furnishes the file. The RIM uses only the Reportable Item Control Code-1 (RICC-1) items in the AESRS file.

f. Assets, Requirements, Depot Maintenance and Acquisition (ARDMA) File. - This file contains information about on-hand quantities of equipment in depot maintenance and depot stocks. MIDA provides the ARDMA file.

g. Division Logistics Systems (DLOGS) File. - This file contains the status of all Prepositioning of Materiel Configured to Unit Sets (POMCUS). It identifies by unit the status of POMCUS equipment. This file is provided by the Logistics Systems Support Agency (LSSA).

h. Army Materiel Plan (AMP) File. - This file contains information on warm base and cold base production schedules for equipment by Standard Study Number (SSN). US Army Materiel Development and Readiness Command (DARCOM) provides the file.

i. Mobility Analysis Planning and System (MAPS) File. - Movement data information for each deploying unit is supplied by this file. The information is provided by the Military Traffic Management Command (MTMC).

j. Unit/Personnel Training and Transportation Tables. - These tables indicate the amount of unit and individual training required, and the time necessary to fully train personnel and units for deployment/employment. The tables were manually produced in conjunction with Deputy Chief of Staff for Personnel (DCSPER), United States Army Forces Command (FORSCOM), and United States Army Training and Doctrine Command (TRADOC). Also included in the file source are manually developed tables of movement times between home and mobilization station locations.

READINESS SYSTEM STUDY

PHASE II
READINESS INDICATOR MODEL PROTOTYPE DEVELOPMENT

CHAPTER III
OPERATIONS OF THE CAA READINESS MEASUREMENT TECHNIQUE

1. Introduction. - The overall logic flow of the operations comprising the CAA Readiness Measurement Technique is depicted on a foldout located in the back of this study report. Each of these operations is described in this chapter and for ease of reference three separate flow charts, derived from the foldout, have been included with the descriptions. The operations descriptions have been keyed to the titles in the blocks of the flow charts. Additional diagrams are also included where the explanations of the operations require added detail. The descriptions of the operations follow.

2. Select Force Lists from FAS, List PMDL units and Categorize Units

a. The purpose of this operation is to develop the time-phased requirements for all CONUS based units in the current force. The two basic data sources used are the FAS and the PMDL. The PMDL is a list of units by Unit Identification Code (UIC) which have been designated by HQDA to fill the requirements of the supported command's specified operations plan.

b. Figure III-1 depicts the functional logic involved in categorizing the force. It is necessary to select a force from the FAS file. For the development of the prototype, the force selected was the M-force (FAS master file force) which had an effective data of 30 June 1976. The force was extracted by UIC along with other unit identifier data elements.

c. The PMDL used for the prototype development was provided by the study sponsor. The "1974 Draft PMDL" for the defense of Europe was used. The FAS and PMDL were overlayed, and by extracting certain data elements from each source, it was possible to place each unit into one of the categories* listed below:

*The first two categories represent the RIM troop list. The readiness of the units in these two categories is measured by the Readiness Indicator Model.

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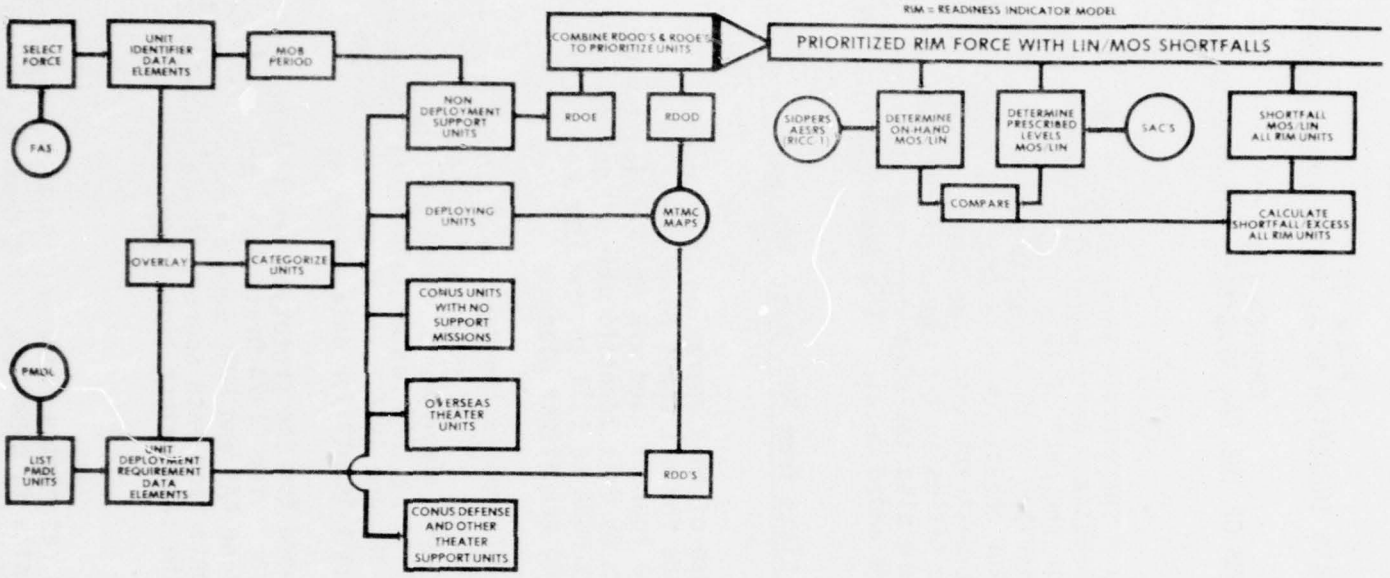


FIGURE III-1, Determination of RIM Troop List Categories, Priorities and MOS/LIN Shortfalls/Excesses

(1) Nondeployment Support Units. - Those units which remain in the United States and are used to support the deploying units.

(2) Deploying Units. - Those units listed in the PMDL.

(3) CONUS Units With No Support Missions. - Those units which have not been assigned a specific mission that would place them in one of the four other categories.

(4) Overseas Theater Units. - Those units which are currently stationed in overseas areas, to include the scenario theater.

(5) CONUS Defense and Other Theater Support Units. - Those units which are designated for the defense of CONUS, and units designated for support of other contingency plans.

3. Determination of Required Day of Deployment (RDOD) and Required Day of Employment (RDOE)

a. The RDOD is the day, in relation to M-day, a deploying unit must be at the POE loaded on strategic lifts and ready for deployment. (An RDOD is calculated for each deploying unit in the RIM force.) During Phase II for the prototype operation purposes the RDOD was calculated by CAA by subtracting a notional ocean transit time (derived from PMDL guidance) from the RDD provided in the PMDL. During Phase III, a means by which MTMC Mobility Analysis and Planning System (MAPS) or other sources can produce an RDOD more realistically will be investigated.

b. The RDOE is the day, in relation to M-day, on which a nondeployment support unit must arrive at its CONUS mobilization station and begin to perform its intended mission. The FAS file contains a data element defined as the mobilization (MOB) period. This element has been extracted for all units which fall into the nondeployment support units category and is designated as their RDOE. (All active units are given an RDOE equal to M-day.)

4. Combine RDOD and RDOE to Prioritize Units. - The two categories of deploying and nondeployment support units are combined together in priority order according to their RDOD or RDOE. In the cases where units have the same RDOE and/or RDOD, then the Troop Program Sequence Number (TPSN) is used to further prioritize. The end result is a priority listing of all units from the two categories which is called the "Prioritized RIM Force" shown in the top bar in Figure III-1.

5. Determination of On-Hand MOS/LIN Status Levels in Units

a. Personnel. - The SIDPERS provides the on-hand quantities of personnel by MOS in CONUS based Active Army units. The National Guard and Army Reserves have not completed their conversion to the SIDPERS system; however, the same unit personnel status information was made available from their respective personnel and administrative centers.

b. Equipment. - The AESRS, which is governed by Army Regulation 710-3, provides information about the on-hand quantities of all major end items in units. Two categories of equipment are reported, viz, property book equipment and operational readiness float equipment. Property book equipment is not coded for serviceability; whereas, operational readiness float equipment is coded in this manner. For utilization by the RIM, the unserviceable operational readiness float equipment is not considered and all property book equipment is assumed to be serviceable. The AESRS on-hand LIN data used in the RIM is limited to the list of Reportable Item Control Code 1 (RICC-1) items.

6. Establish MOS/LIN Prescribed Levels for Units. - Each unit in the RIM force must have an established prescribed deployment/employment level of personnel by MOS and equipment by LIN. The levels are determined by the planner, and are expressed as a percentage of the Modification Table of Organization and Equipment (MTOE), Tables of Organization and Equipment (TOE), or Table of Distribution and Allowances (TDA) required columns. During the development of the prototype, the prescribed level used was 100 percent of personnel, and RICC-1 equipment specified in the TOE. The MTOE, TOE, and TDA reflect various levels of organization for personnel and equipment, i.e., level 1, level 2, etc. As shown in Figure III-1, the SACS file is used to obtain these requirements data. This file contains a listing and all authorization levels for units as given in the MTOE, TOE, and TDA. The planner may elect to use one of these levels for the prescribed level or may select some other level. In all cases, the prescribed level must be provided as an input parameter.

7. Calculation of Personnel and Equipment Shortfall/Excess All RIM Units. - Shortfalls or excesses in units are calculated by comparing the unit's on-hand levels by MOS and LIN to the unit's prescribed levels by MOS and LIN. This is done for each unit in the RIM force. As indicated in Figure III-1, the shortfall determinations are associated with each prioritized RIM unit.

8. Establishment of Personnel Asset Pool. - Figure III-2 indicates the operations which cover the establishment of the quantities and

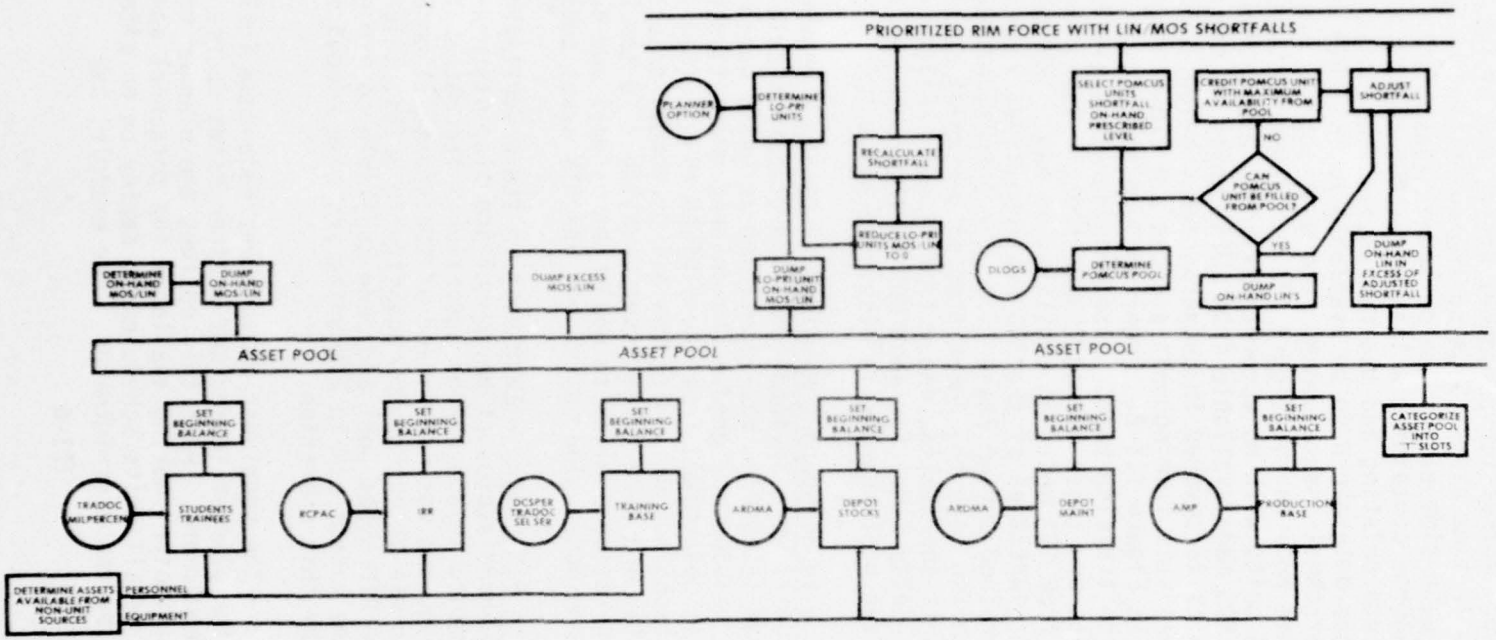


FIGURE III-2, Establishment of RIM Asset Pools Beginning Balances and Availabilities

availabilities of MOS and LIN in the Asset Pool. Table III-1 depicts the asset pool format for personnel assets and divides the asset pool into 12 time slots, listing the quantities of each MOS available, for each time slot. The personnel asset pool (MOS-POOL) is an asset source containing a listing of MOS quantities which are divided into existing and planned assets from units and nonunit asset sources determined to be available to fill RIM unit shortfalls. The personnel assets coming from unit sources are shown above the asset pool bar in Figure III-2. These include on-hand MOS from CONUS units with no support missions, excess MOS from RIM units and MOS made available from LOPRI units. (The discussion of LOPRI units is covered in subparagraph c below.) The personnel assets available from nonunit sources are shown below the asset pool bar in Figure III-2. These include students, trainees, IRR and the training base. Also considered as available MOS assets from units are those termed "CONUS POOL." These represent MOS available from TDA units on mobilization day. (No source for determining the quantities of the MOS availabilities from the CONUS POOL was determined during Phase II.) The purpose of the MOS POOL is to establish both the quantities of personnel assets available to fill unit shortfalls, and a time of availability for filling shortfalls (delay time) for each MOS in the pool. Each of the personnel asset pool sources is discussed below.

a. CONUS Units With No Support Missions. - During a previous RIM operation, the units were divided into five different categories. One of these categories was identified as units which do not have a specific mission assigned. The on-hand quantities of MOS in these units is determined from the SIDPERS file. (See Figure III-2) The technique will withdraw all personnel assets from nonmission units, and make these assets available in the RIM asset pool. This operation applies to equipment as well and dumps the LIN on-hand in the nonmission units into the RIM asset pool.

b. Excess MOS in RIM Units. - Each unit in the prioritized RIM force had its on-hand status of personnel and also its prescribed level determined in a previous operation. The mathematical difference between the two was identified as the shortfall or excess. In cases where there was an excess MOS quantity in units, this excess is put in the RIM asset pool and made available to RIM units with shortfalls. The excess LIN in RIM units are also dumped into the RIM asset pool by this operation.

c. LOPRI Units. - The readiness measurement technique includes an option enabling the planner to include another asset source for both personnel and equipment. With this option, the planner may insert a time discriminator, making available the personnel and equipment resources of all units scheduled to deploy on or after the time designated by the discriminator. For example, the

TABLE III-1, Personnel Asset Pool

TIME SLOT	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12
OPTIMUM TIME	M-3	M-8	M-14	M-21	M-30	M-31	M-45	M-60	M-75	M-90	M-105	M-150
ASSET SOURCES	TRAINEES	STUDENTS	LO-PRI POOL	TRAINEES	IRR	CONUS POOL	TRAINEES	IRR	TRAINEES	IRR	TRAINEES	TRAINING BASE
TIME RANGE	M-0 TO M-3	M-0 TO M-7	M-0 TO M-20	M-4 TO M-29	M-0 TO M-30	M-0 TO M-60	M-31 TO M-60	M-31 TO M-60	M-61 TO M-90	M-61 TO M-90	M-91 TO M-150	M-151 TO TBD
MOS A	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY
MOS B	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY
MOS C	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY
MOS D	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY
MOS E	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY

DEFINITION OF FILL SOURCES

TRAINEES: THOSE INDIVIDUALS PRESENTLY IN THE TRAINING BASE UNDERGOING TRAINING FOR A PRIMARY MOS. INCLUDES OFFICERS, WARRANT OFFICERS AND EM.

STUDENTS: INDIVIDUALS WHO ALREADY HAVE A PMOS BUT ARE ATTENDING A SERVICE SCHOOL FOR ADDITIONAL TRAINING.

LO-PRI POOL: PERSONNEL ASSETS FROM LO-PRI UNITS MADE AVAILABLE BY THE PLANNER.

IRR: INDIVIDUAL READY RESERVE.

CONUS POOL: INDIVIDUALS ASSIGNED TO TDA UNITS IN CONUS WHO WOULD NORMALLY BE MADE AVAILABLE FOR REASSIGNMENT UNDER CONDITIONS OF TOTAL MOBILIZATION.

discriminator could be set at M+120. This would mean that the assets of units scheduled to deploy on M+120 or later could in whole or part, be made available in the RIM asset pool for use by earlier priority RIM units. Once the discriminator is decided upon by the planner, the personnel and equipment assets of the units scheduled on or after that date are placed into the RIM asset pool. The operations related to nonmission units, excess assets in RIM units, and the dumping of LOPRI unit assets into the RIM asset pool are shown in Figure III-2. Note that in the case of LOPRI units, they retain their original priority status, but have their shortfall recalculated. They are filled to their prescribed level from the asset pool when their priority number places them at the top of the queue.

d. CONUS Pool. - Data sources for determining the quantities of MOS available in this pool during Phase II have not been determined. When they are determined, the quantity and the availability values will also be entered into the RIM asset pool.

e. Trainees. - The information on trainees is derived from TRADOC data. The detailed procedures and reports used to develop trainee quantities and availabilities by MOS are described below:

(1) The TRADOC Service School Status Report (886 Report) lists, by service school,and course, the number of individuals who are currently enrolled, the number graduated during the fiscal year, and the number who have been removed from training for various reasons. Since the trainees category is defined as personnel receiving their initial MOS, the service school courses which are coded "3" and "6" are used. A code "3" is for officers and a code "6" course is for enlisted.

(2) For the prototype development, M-day was assumed to be 1 July 1975, and all data on trainee outputs were effective on that date. The first step was to analyze the June 1975 TRADOC 886 Report and determine the number of students in training at the end of the fiscal year. This information was then matched with the TRADOC FY 75 Course Schedule which gave the number of students per class, course start date, and course graduation date. From these data, the number and the graduation date of the remaining students were determined.

(3) A similar procedure was followed to determine what the projected trainee output would be for FY 76. Based on information obtained from the Selective Service System, current planning for reinstitution of the draft specifies that the first draftees will become available at the training centers in 150 days following mobilization. Thus it is necessary to add 150 days to the course lengths before receiving draftees as output from the training base.

For the first 150 days the existing trainees in the training base plus the normal projected inputs from current recruiting efforts were considered to determine the inputs to the training base. (Volunteer enlistees that normally would increase on mobilization were not considered in the prototype operation.) The first source document to determine the quantity of trainees during the first 150 days was the TRADOC FY 76 Program of Inputs and Loads Report. This report lists by service school the courses to be taught in FY 76 and the projected student load. An essential complementary document required for this approach is the TRADOC FY 76 Course Schedule. By comparing these two documents the quantity of classes of a given course which would start and graduate between 1 July 1975 and 27 November 1975 (150 days) was determined.

(4) After the completion of the preceeding operations, it was necessary to determine the time slot (See T-1, T-4, T-7, T-9 or T-11 in Table III-1) in which the scheduled quantities of the trainee MOS should be inserted.

(5) Course attrition rates are provided by the Military Personnel Center and are used as look-up tables. These rates are applied to the gross quantities of MOS prior to putting the quantities into the time slots.

(6) Each of the Army Training Centers conducts Advance Individual Training (AIT), and the output from these courses is reported on the TRADOC Army Training Center Status Report (919 Report). The procedure for determining the output is identical to that used with the 886 Report. These data are also entered in the appropriate time slot, i.e., T-1, T-4, or T-11 (Table III-1).

f. Students. - The input data on students are derived directly from the Active Army Personnel Files which are contained in the MILPERCEN SIDPERS System. This file contains a code "ST" which designates the MOS of the individuals who are students. The file also lists the quantity of personnel in a given MOS. These data are extracted directly from the data tape provided by MILPERCEN and inserted into time slot T-2 (Table III-1).

g. IRR. - The input data for the IRR is provided by RCPAC, St. Louis, Missouri, in the form of a data tape listing all MOS in the IRR and the number of personnel in each MOS. These data are inserted into time slots T-5, T-8, and T-10 (Table III-1). The MOS have been subdivided into three time slots (M+30, M+60, and M+90) based on the availability of the IRR MOS determined by the following rationale:

(1) M+30. - Experience factors of RCPAC were used to specify that 30 days was the earliest time that certain MOS from the IRR could be made available. These factors were based primarily on the reaction time of the IRR notification system to alert the individuals, receive replies, and process data on where and when to report. The time that the individuals take in arriving at their designated mobilization stations is also included. This category represents the quickest availability of the IRR. Individuals with basic combat MOS are included in this category.

(2) M+60. - This time factor allows time for the alert of the individual, as outlined above, plus a maximum of four weeks refresher training. The MOS included in this time group cover intermediate skill level MOS codes such as signal, aviation, or medical.

(3) M+90. - This time factor provides for the alert of the individual plus complete retraining in another MOS or refresher training. This category applies to MOS requiring total retraining caused by system modernization.

h. Training Base. - The input data for the training base are derived from DCSPER (DA), TRADOC, and the Selective Service. Data from these sources were assembled manually, and placed on punch cards for the prototype operation. The training base differs from the other personnel areas by adding a scheduled quantity, by time, associated with the production of an MOS. In the prototype, the training base is assumed inexhaustible. Another difference in the training base source is that it is divided into officer, warrant officer and enlisted sections. The detailed procedures for obtaining the data follow:

(1) Officers. - The first step is to list the service school courses and the length of each course which will be conducted after mobilization. This information is obtained from the TRADOC Mobilization Course Listing and also DA Pamphlet 351-4 (The Army School Catalog). Table III-2 is constructed using these data. Next, a check is made of AR 611-101 (Manual of Commissioned Officer Military Occupational Specialities) to determine the Special Qualification Identifiers (SQI) applicable to officers. Also determined are those SQI requiring formal training. The listing of SQI must then be compared with the mobilization course listing to determine the training time required to obtain the SQI. The SQI data are compiled as shown in Table III-3.

TABLE III-2, Officer's Base MOS Post Mobilization Training Times

Officer's base MOS	Post mobilization training time (weeks)
00020	000
00300	004
02050	009
02130	000
02200	004
02210	005

TABLE III-3, Officer's Special Qualification Identifier

Officer's special qualification identifier	Number of weeks of training required
1	002
2	000
3	013
4	000
5	002

(2) Warrant Officers. - The procedure for determining the availability of warrant officers from the training base is the same as that outlined for officers with one exception--the warrant officer's MOS regulation is AR 611-112. Once the data have been obtained form AR 611-112, DA Pamphlet 351-4 and the TRADOC Mobilization Course Listing, the warrant officer availability is compiled as shown in Tables III-4 and III-5.

TABLE III-4, Warrant Officer's Base MOS Post Mobilization Training Times

Warrant Officer's base MOS	Post mobilization training time (weeks)
100B0	032
100C0	006
100D0	005
100E0	004
101B0	033

TABLE III-5, Warrant Officer's Special Qualification Identifier

Warrant Officer's special qualification identifier	Number of weeks of training required
4	000
5	006
6	005
7	002
8	000

(3) Enlisted. - The procedure for determining the training time associated with enlisted personnel from the training base is similar to that outlined for officers. The only difference is that AR 611-201 is the regulation used for enlisted MOS. Once the data have been obtained from AR 611-201, DA Pamphlet 351-4, and the TRADOC Mobilization Course Listing, the enlisted availability from the training base is compiled as shown in Tables III-6 and III-7.

TABLE III-6, Enlisted Base MOS Post Mobilization Training Time

Enlisted base MOS	Post mobilization training time (weeks)
00B10	019
00B20	019
00B30	023
00B40	008
00C20	007

TABLE III-7, Enlisted Special Qualification Identifier

Enlisted special qualification identifiers	Number of weeks of training required
A	000
B	002
C	003
D	007
E	000

(4) Consolidation of Data for RIM Personnel Asset Pool. - All of the factors covered in Tables III-2 through III-7 are used to make up time slot T-12. The personnel availability data for all other time slots are consolidated into the RIM personnel asset pool. Figure III-3 graphically portrays the development and integration of these input data into this pool.

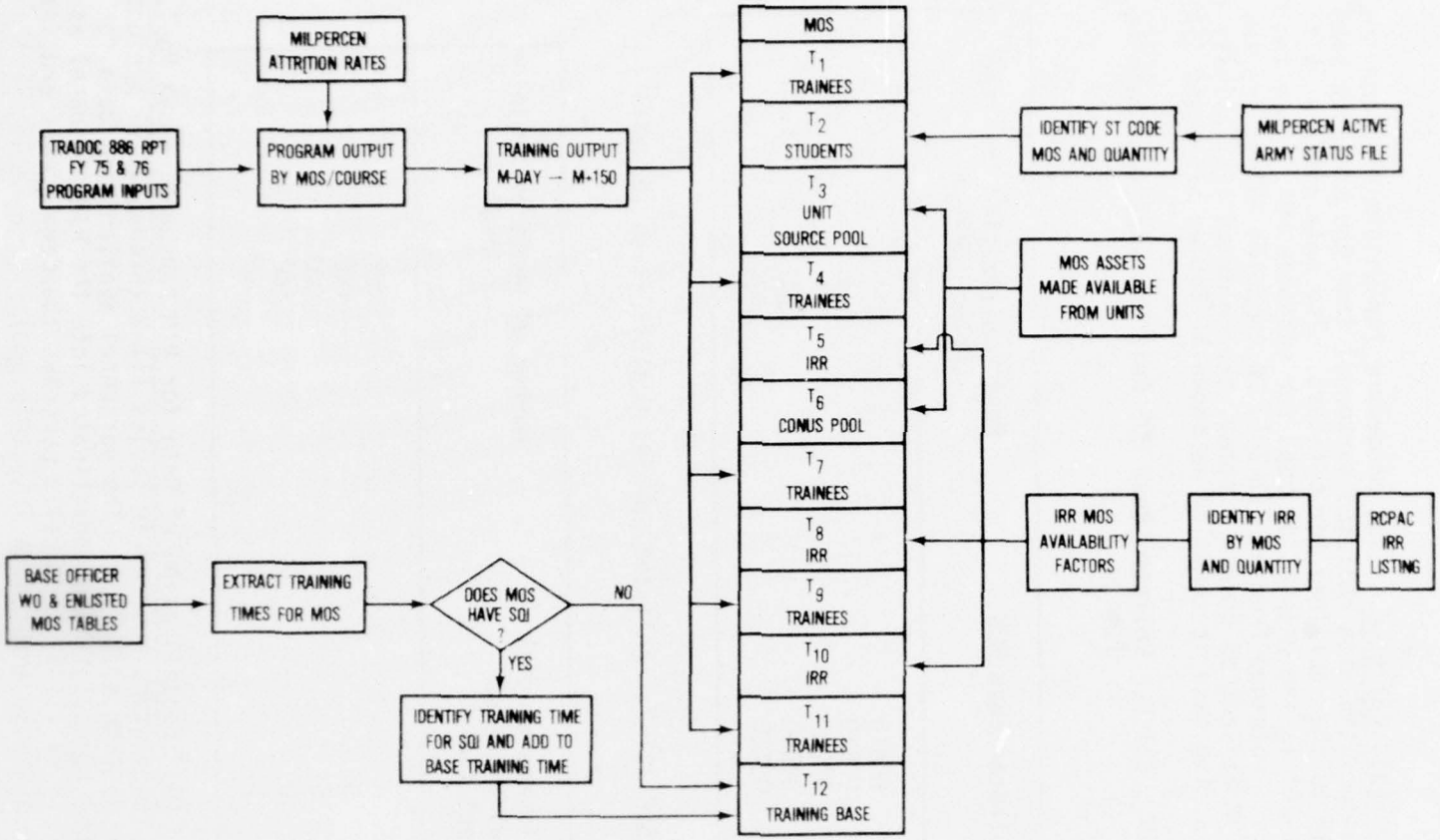


FIGURE III-3, Creation of RIM Personnel Asset Pool

9. Establishment of Equipment Asset Pool. - Figure III-2 identifies seven sources for equipment assets included in the equipment asset pool, i.e., Line Item Pool (LINPOOL). There are three non-unit sources: (1) depot stocks, (2) depot maintenance, and (3) the production base. There are also four unit sources of equipment: (1) items in CONUS units with no support missions, (2) items that are excess in units, (3) items on-hand in LOPRI units, and (4) items that are uncovered by POMCUS units. Table III-8 portrays the equipment asset pool format. Twelve time slots refer to different asset availabilities (delay times) for filling RIM unit shortfalls. The delay time is the elapsed time after M-day that the item could be in the hands of a using unit. Both the equipment asset pool and personnel asset pool are initially established before the model is operated. During operation, the model's program drains the pool's assets to fill unit shortfalls, in priority order, while maintaining the asset pool current balance. Each of the equipment asset sources is discussed below:

a. Depot Stocks. - This source consists of all equipment in CONUS depots which could be issued to RIM force units. It includes contingency support stocks (CONSSTOCS) and operational project stocks. The RIM thus presents a "best case" readiness measurement in the area of depot stocks by making available for fill CONSSTOCS and all operational project stocks, regardless of their peacetime ownership codes. The RIM only considers Reportable Item Control Code (RICC)-1 line items. All quantities of RICC-1 items in codes 01, 02, 04, 05, and 06 of the Assets, Requirements, Depot Maintenance, and Acquisition (ARDMA) file are summed. The ARDMA file is governed by AMC Regulation 700-81. Codes 01, 02, 04, 05, and 06 represent serviceable general issue depot stocks, Prepositioned War Reserve Stocks (PWRS), mobilization reserves, priority mobilization reserves, other serviceable and limited restoration stock, respectively. Appendix E relates ARDMA codes to purpose codes as defined by AR 725-50. Limited restoration, ARDMA code 06, refers to all items in condition code E. It should be noted that RIM will distribute purpose code T equipment (priority mobilization reserve) to all components based on unit priority. A seven day delay time for depot stocks is included in Table III-8. This delay time is the uniform materiel movement and issue priority (AR 725-50) standard for order and ship time in CONUS. Included in order and ship time is requisition submission, inventory control point availability determination, depot/storage site processing, transportation hold and CONUS intransit, and receipt pick-up time. Any order and ship time can be used in the model, since order and ship time is an input parameter.

TABLE III-8 Equipment Asset Pool

TIME SLOT	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12
DELAY TIME	M+7	M+13	M+14	M+23	M+24	M+34	M+53	M+70	M+99	M+135	M+174	M+205
ASSET SOURCES	DEPOT STOCKS	DEPOT MAINT	LO-PRI POOL	DEPOT MAINT	PRODUCTION BASE	DEPOT MAINT	DEPOT MAINT	PRODUCTION BASE	DEPOT MAINT	PRODUCTION BASE	DEPOT MAINT	PRODUCTION BASE
TIME RANGE	M+0 TO M+7	M+8 TO M+18	M+0 TO M+14	M+19 TO M+28	M+9 TO M+39	M+29 TO M+38	M+39 TO M+68	M+40 TO M+99	M+69 TO M+128	M+100 TO M+159	M+129 TO M+218	M+160 TO M+249
LIN A	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY
LIN B	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY
LIN C	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY
LIN D	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY
LIN E	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY	QUANTITY

b. Depot Maintenance

(1) This source consists of all economically repairable items that are located in depot maintenance facilities on mobilization day. The ARDMA file contains the monthly output of all CONUS depot maintenance facilities. The monthly output of all major end items, which are in depot maintenance facilities on the cutoff date of the ARDMA report, is covered by element code 40. Using code 40 will minimize the chances of counting an item in a unit (i.e., the AESRS report), and also counting the same item as a depot maintenance asset. The use of code 40 prevents an item in a unit reported in AESRS, and which may be scheduled in the future to go through depot maintenance, from being counted as an asset in the depot maintenance pool. No acceleration of the ARDMA schedule, under total mobilization, is used to prepare the depot maintenance input for the equipment asset pool.

(2) Time slots T-2, T-4, and T-6 (Table III-8) each receive one-third of the first month's output for depot maintenance. Time slot T-7 contains the depot maintenance output from M+31 to M+60. The next time slot for depot maintenance, T-9, contains the output from M+61 to M+120. The final time slot for depot maintenance, T-11, represents the output from M+121 to M+210. An order and ship time factor of eight days is used for depot maintenance. This is one day more than the standard specified by AR 725-50. Any order and ship time factor for depot maintenance can be used since order and ship time is an input parameter.

c. Production Base. - The last nonunit source for the equipment asset pool in the RIM is the production base. This source in the RIM is made up of all RICC-1 major end items produced within the capabilities of the industrial production base under conditions of total mobilization. The Army Materiel Plan (AMP) contains the necessary total mobilization production data for structuring the production base segment of the equipment asset pool. The production data is listed by Standard Study Number (SSN). For each SSN in the AMP, there exists a cold base and a warm base mobilization production schedule. The appropriate schedule is selected by looking at receipts. If there are receipts, the item is currently in production, and considered as having a warm base, and the warm base production schedule applies. If there are no receipts, the item is assumed to be out or production, and a cold base production schedule applies. These schedules are reported by SSN. Since the RIM only treats line item numbers, the mobilization production schedule must be converted from the standard study number to the

line item number. This conversion is made by dividing the mobilization production schedule of SSN by the number of line item numbers with each SSN. This assumes equal production outputs of each LIN in a SSN. Time slots T-5, T-8, T-10, and T-12 (Table III-8) are used for the production base quantities. Slot T-5 contains the first month's output. Slot T-8 contains the output from M+31 to M+90. Slot T-10 contains the output from M+91 to M+150. Slot T-12 represents the production base output from M+151 to M+240. The production delay times used in the prototype were based on a nine day order and ship time factor. Nine days is two days more than the standard specified in AR 725-50. As with all other sources, the model can accept any order and ship time factor for the production base. Figure III-4 graphically portrays the development and integration of these input data into the equipment asset pool.

d. Equipment Asset Pool Developed from Unit Sources

(1) The logic of determining the equipment assets available from unit sources for the equipment asset pool is the same as that discussed in relation to personnel assets obtained from unit sources. In addition, however, the unoovered POMCUS equipment is also included in the equipment asset pool. A discussion of the POMCUS unit source for obtaining items for the asset pool follows.

(2) POMCUS units require a special preprocessing algorithm for determining their on-hand asset positions. Figure III-2 shows the DLOGS file providing the status of the POMCUS equipment overseas. The equipment is designated for each POMCUS unit in CONUS. The DLOGS data tape, as applied in the RIM, is used to form a pool of POMCUS overseas stocks without regard to the unit designation assigned. The assets of this pool are credited by the RIM to CONUS POMCUS units according to their priority. This means that the unit set assignments are dissolved, and items are credited by priority to the POMCUS units based on the quantity of LIN in the POMCUS pool. All equipment in the POMCUS pool that can be made a available to fill POMCUS units to their prescribed levels is calculated. All on-hand equipment in POMCUS units in CONUS that can be replaced by POMCUS pool stocks in theater is dumped into the RIM equipment asset pool as shown in Figure III-2.

(3) An order and ship time of 14 days is used for these assets because of the unusual requirement to ship equipment from one unit to another. The standard order and ship time of 7 days refers to movement between the supply system and a unit. As with the other sources, any order and ship time factor can be used for this source.

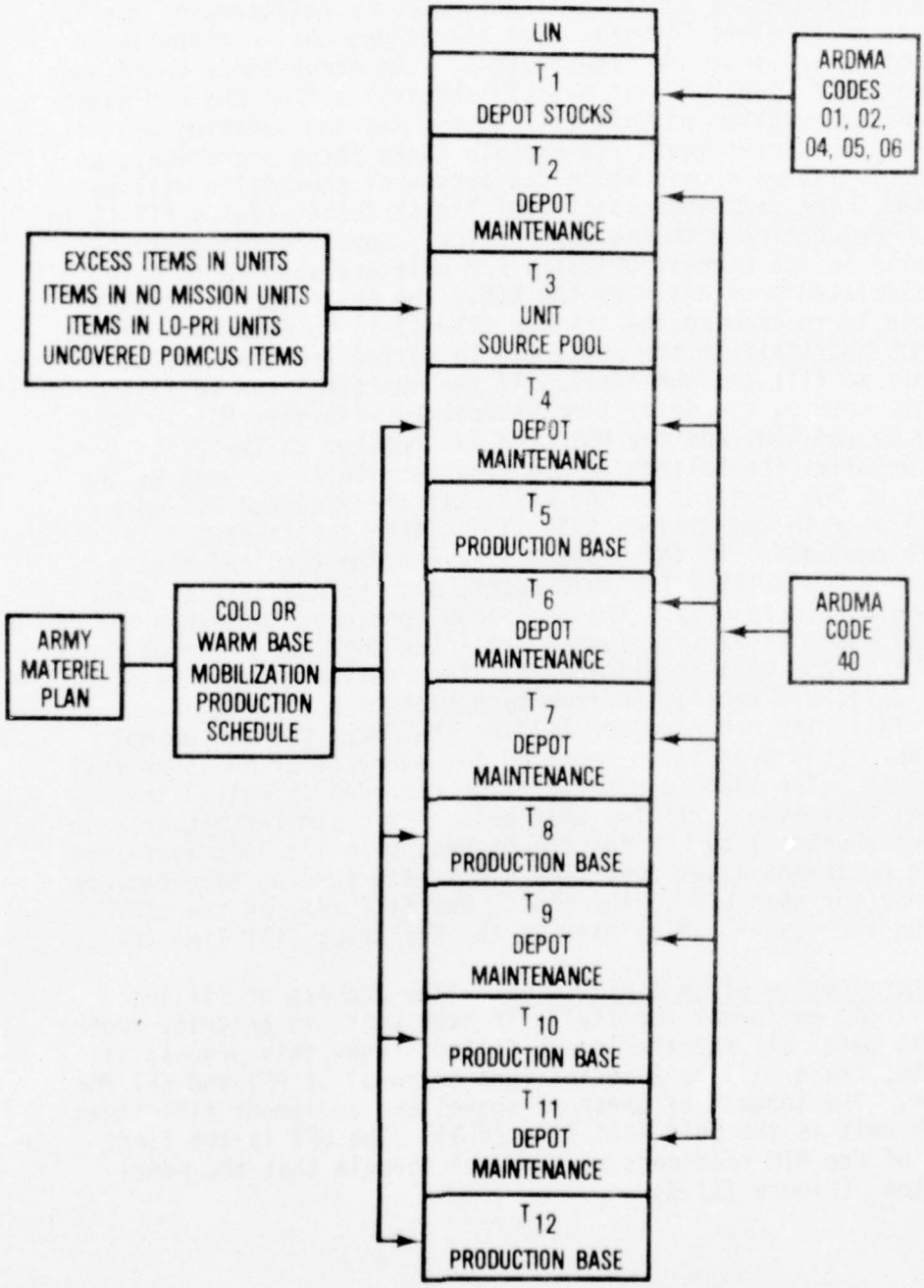


FIGURE III-4, Creation of RIM Equipment Asset Pool

10. Unit Shortfall Fill from Asset Pools, Calculation of Fill Times and Updating Asset Pool Balance. - The remaining operations of the readiness measurement technique involve the calculations of the RIM readiness measurement formula. The operations that perform these calculations are shown in Figure III-5. The first three operations comprise the filling of unit MOS/LIN shortfalls from the RIM asset pool, the calculation of unit fill times, and the updating of the balance in the asset pool. To explain these three operations, an example of filling a unit which has personnel shortfalls will be discussed. The personnel asset pool T-slot format (Table III-1) is used in conjunction with the explanation. Specific MOS personnel shortfalls in the highest priority RIM unit are assumed to have been calculated previously by the RIM. The next step in the RIM technique is to examine the trainee file (T-1) to determine if the first MOS shortfall in the units can be filled from the trainees available to fill the shortfall. If the shortfall can be filled from this source, the delay time associated with this MOS is calculated by the RIM, and the MOS used is credited to the unit. Simultaneously, the balance in the trainee file is reduced by the quantity of MOS credited to the unit. If the required MOS were not available in the trainee file (T-1), then the student file (T-2) is examined. If the student file has the required MOS, a fill time is calculated for this asset, and the quantity in the file reduced accordingly. The technique continues to search the personnel asset files (T columns) until the shortfall for the first MOS in the unit is eliminated. The removed quantities of MOS, as used, are subtracted from each slot of the pool. The longest fill time recorded for filling the first MOS is the MOS fill time. This process is repeated for every other MOS shortfall in the unit. The longest MOS fill time recorded is called the Personnel Fill Time (PFT) for that unit. In a similar manner each equipment shortfall by LIN for the highest priority unit is filled from the equipment asset pool time slots, and running balances are maintained for each LIN in the pool. The fill time of the LIN requiring the longest delay time is the Equipment Fill Time (EFT).

11. Determination of Unit Fill Time. - The process of filling personnel and equipment shortfalls in each unit, in priority order, continues until all shortfalls are filled. When this process is completed, there will be a series (one or more) of PFT and EFT for each UIC. The longest of these personnel and equipment fill times for each unit is the Unit Fill Time (UFT). The UFT is the first element of the RIM readiness measurement formula that the model calculates (Figure III-5).

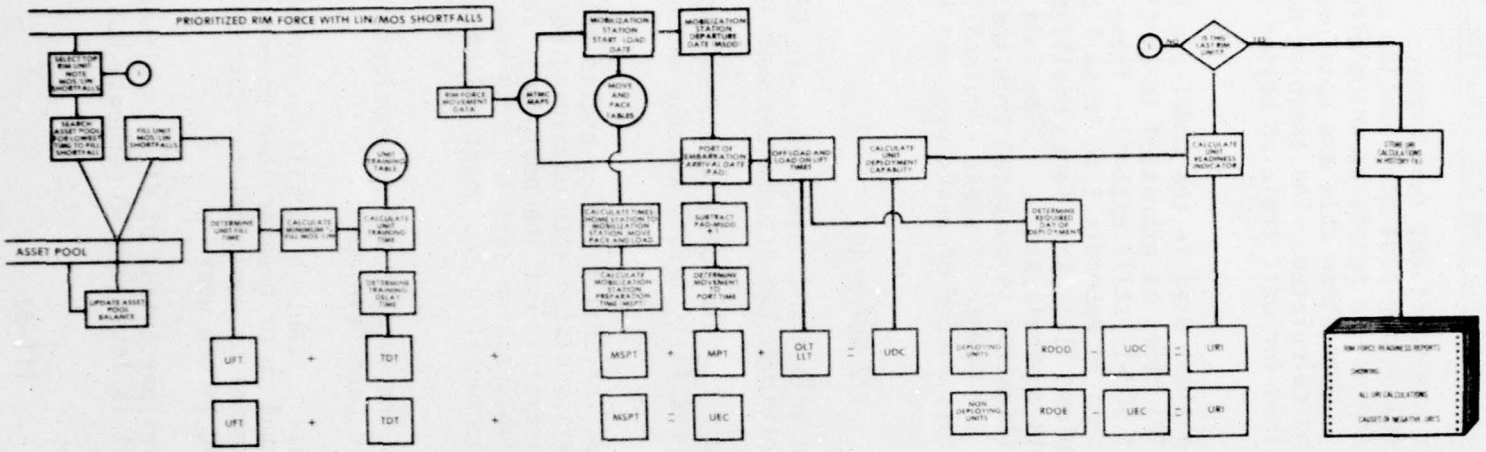


FIGURE III-5, URI Calculations

12. Determination of Unit Training Time and Training Delay Time

a. This operation in the model has two purposes. The first is to determine the time required for post mobilization unit training, and the second is to determine the points at which effective unit training begins and ends. When these data are obtained, training delay time, if any, can be calculated. The training delay time is defined as the time required for unit training beyond the unit fill time.

b. The unit training times used in the model are based on the Army Training Program (ATP) times as expressed in Continental Army Command (CONARC) Pamphlet 500-1 (still extant). These times are applied to the formula found in Appendix I to Annex F of the Army Capabilities Plan (U) (Volume II): Army Force Mobilization Planning Guidance, July 1974. This appendix states: "The Unit Training Time (UTT) required after mobilization is computed from the ATP for each support unit as one-half the number of weeks required for Basic Unit Training (BUT) plus the full number of weeks required for Advance Unit Training (AUT)."

$$UTT = 1/2\ BUT + AUT \qquad \text{III-1}$$

c. In developing the unique and objective logic for calculating post mobilization unit training, two assumptions were made:

(1) There is a direct relationship between the initial unit personnel and equipment fill status, and the amount of unit training required.

(2) Post mobilization unit training begins relative to the maximum days of delay associated with obtaining personnel or equipment, whichever is greater. For the prototype, the assumption was used that post mobilization unit training starts at the midpoint of the longest personnel or equipment fill time experienced by a unit.

d. In order to apply the formula and assumptions, the following decision rules have been developed:

(1) If the initial percentage of fill in personnel and/or equipment in a unit is equal to or greater than 90 percent of the prescribed levels of personnel or equipment for that unit, the post mobilization unit training is one week.

(2) If the initial percentage of fill in either personnel and/or equipment in a unit is less than 90 percent, but greater

than 50 percent of the unit's prescribed levels of personnel or equipment, then the post mobilization unit training is determined by the following formula:

$$UTT = \frac{90 \times UTTmax - (MIN\ \%\ FILL \times UTTmax) + (MIN\ \%\ FILL - 50)}{40} \quad \text{III-2}$$

Where MIN % FILL is the lowest of personnel or equipment fill existing initially in the unit, and the UTTmax is the maximum post mobilization unit training for the unit under consideration.

(3) If the initial percentage of fill in either personnel and/or equipment in a unit is equal to or less than 50 percent of its prescribed levels of personnel or equipment, the post mobilization unit training time is the maximum for that unit, and is determined by the formula:

$$UTTmax = 1/2\ BUT + AUT \quad \text{III-3}$$

e. The maximum values of post mobilization unit training times for all types of units are based on their TPSN. These values were manually assembled, placed on punch cards and entered in the computer as a look-up table. A graphical portrayal of the decision rules for determining unit training time is shown in Figure III-6. It represents the rules as applied to a unit with a UTTmax of 10 weeks.

f. The post mobilization UTT must be converted to Training Delay Time (TDT). As previously mentioned, the unit training start point in the prototype is at the midpoint (or one-half) of the longest fill time (personnel or equipment) experienced by a unit. The Training Delay Time is that training time which extends beyond the UFT. TDT is the second element of the RIM readiness measurement formula calculated by the technique. (See Figure III-5)

13. Preparation of RIM Force Movement Data for MTMC

a. All of the remaining calculations in the RIM result from operations performed by MTMC which was provided movement data for each of the deploying units in the RIM force. In order to interface with their MAPS model for prototype development, it was necessary to reformat the force list into one acceptable to their model. The MAPS model is described in Appendix D. Three MAPS input punched cards per unit containing the pertinent data elements from the RIM force were generated so that the data could pass the MTMC edit process.

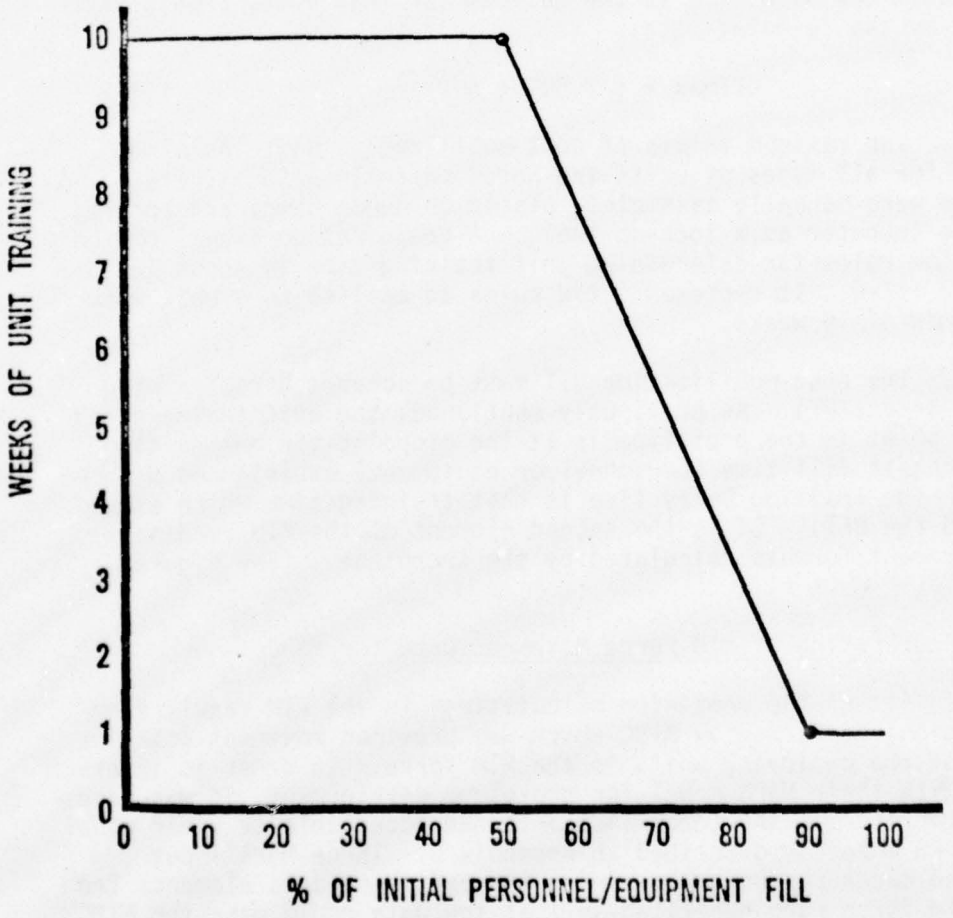


FIGURE III-6, Unit Training Time Graph for Unit with UTTmax Equal to 10 Weeks

b. The deploying force was given to MTMC in prioritized sequence. Only units in CONUS were considered. If the deploying unit was designated as POMCUS, only the personnel movement was considered. For MTMC processing only, it was specified that all unit equipment was available in POMCUS stocks, thus movement data for equipment for POMCUS units was not provided MTMC. During Phase III, data will be provided for equipment that must be transported from CONUS to make up POMCUS shortfalls. For Airborne, Reforger, MRLOGAEUR, 2+10, and Roundout units, all personnel and equipment were assumed to deploy via Military Airlift Command (MAC). The remaining units of the force had their personnel scheduled for air movement and their equipment scheduled for sea movement.

c. The study team identified each unit's mobilization station, ready-to-load date, and Required Delivery Date (RDD) data from the PMDL and restructured it in the format compatible with MAPS processing. The MAPS edited the input through the use of the Joint Chiefs of Staff (JCS) standard software. Since only standard TOE units were involved, MAPS extracted the movement requirements data (weight, cube of equipment and number of personnel for each type unit) for units from the JCS Standard Type Unit Characteristics (TUCHA) file, and recorded these data in a record for subsequent processing. Then the MAPS system addressed the movement portion of the data by examining the sea transit data, seaport berth capability, shiploading criteria, and capabilities of CONUS mobilization stations to receive and outload cargo. From these data MAPS scheduled the CONUS movements which involves the following: (1) computation of commercial transportation requirements, (2) developing CONUS transit times, and (3) analyzing the ready-to-load dates at origin installations to outload unit equipment within specific time periods.

d. The output of the MAPS model provides the following inputs to the RIM:

(1) Mobilization Station Start Load Date

(2) Mobilization Station Departure Date

(3) Port of Embarkation Arrival Date

14. Calculation of Mobilization Station Preparation Time (MSPT). - The calculation of mobilization station preparation time covers a number of tasks which a unit must complete prior to departure from its home station enroute to the port of embarkation. These tasks include:

a. Movement from Home Station to Mobilization Station. - This task is applicable to Reserve Component units. A notional CONUS Movement Table is used to determine the travel time (in days) from home station to mobilization station. This table is a derivative of the MTMC "Notional Mileage Between States Table" given in MTMC Pamphlet 700-1. The mileage distances given in the table have been converted to travel times (in days) using the factors outlined in Appendix G, (Cargo and Passenger Transit Data) of MTMC Pamphlet 700-1. The movement times have been entered into the computer as a look-up table.

b. Pack and Load Time. - Following completion of unit training or other requirements, each deployable unit will spend time in preparing for overseas movement. The amount of time required is dependent on the mode of transportation being used. The following procedure is used in determining the MSPT:

(1) Active Army Units

(a) Pack time is two days if the unit deploys by air.

(b) Pack time is four days if the unit deploys by surface.

(c) Load time is an output of the MTMC MAPS model and is determined by:

Load Time = Mobilization Station Departure Date - Begin Load Date

III-4

(d) Add (a) and (c) above if unit goes by air. Add (b) and (c) above if unit goes by sea. Select the longest time when personnel and equipment are shipped by different mode.

(2) Reserve Component Unit

(a) Pack and load time at home station is one day.

(b) Movement time from home station to mobilization station is derived from the look-up table. See paragraph 14a above.

(c) If the Reserve Component unit is scheduled for overseas deployment, then the factors of pack time and load time for active units must also be added. If the unit does not deploy, but remains at its mobilization station, then the MSPT is comprised of pack and load at home station only. If the unit is a deploying unit, the MSPT includes two pack and load times: (1) at the home

station prior to moving to mobilization station and (2) at the mobilization station prior to moving to POE. Figure III-5 shows the RIM calculation for MSPT.

(d) If the Reserve Component unit is a direct deploying unit from its home station, the factors of paragraph 14b(1) above apply.

15. Calculation of Movement to Port Time. - The Military Traffic Management Command MAPS model provides the Mobilization Station Departure Date (MSDD) and the POE Arrival Date (PAD) for each deploying unit. To determine the movement to port time, the RIM subtracts the PAD from the MSDD and then adds 1 or:

$$MPT - MSDD - PAD + 1 \qquad \text{III-5}$$

The constant of 1 is added in order to account for those moves which are relatively short in distance, and which can be started and finished the same day. This calculation by the RIM is also shown in Figure III-5 as the next element of the deployment/employment capability calculations.

16. Determination of Off-Load and Load-On Lift Time. - These times are required by the unit to off-load from the mode of transportation used in the move from mobilization station to the POE, and then to load-on strategic lifts. These factors have also been determined with the help of MTMC. The factors are:

a. If the unit deploys by air, the off-load and load-on lift time is one day.

b. If the unit deploys by surface, the off-load and load-on lift time is four days.

17. Calculation of Unit Deployment/Employment Capability

a. The RIM calculates a Unit Deployment Capability (UDC) for each deploying unit. The UDC is the sum of UFT, TDT, MSPT, Move-to-Port Time, and Off-Load and Load-On Lift Time. The formula for this calculation is:

$$UDC = UFT + TDT + MSPT + MPT + OLT + LLT \qquad \text{III-6}$$

where: UDC = Unit Deployment Capability
UFT = Unit Fill Time
TDT = Training Delay Time
MSPT= Mobilization Station Preparation Time
MPT = Move-to-Port Time
OLT = Off-Load Time
LLT = Load-On Lift Time

b. A Unit Employment Capability (UEC) is calculated by the RIM for each nondeploying support unit in the RIM force. UEC is the sum of Unit Fill Time, Training Delay Time and Mobilization Station Preparation Time. The formula for this calculation is:

$$UEC = UFT + TDT + MSPT \qquad \text{III-7}$$

where: UEC = Unit Employment Capability
UFT = Unit Fill Time
TDT = Training Delay Time
MSPT= Mobilization Station Preparation Time

Figure III-5 depicts the UDC and UEC calculations by the RIM for the deploying and nondeployment units, respectively.

18. Calculate Unit Readiness Indicator. - The URI is the difference between the deployment/employment requirement and the deployment/employment capability. The RIM readiness measurement formulas for deploying and nondeploying units are as follows:

$$URI = RDOD - UDC \qquad \text{III-8}$$

$$URI = RDOE - UEC \qquad \text{III-9}$$

where: URI = Unit Readiness Indicator
RDOD= Required Day of Deployment (deploying units)
UDC = Unit Deployment Capability
RDOE= Required Day of Employment (nondeploying untis)
UEC = Unit Employment Capability

The URI is the number of days difference between the RDOD/RDOE and the UDC/UEC. A zero or plus number indicates that a unit is capable of meeting its deployment/employment requirement. A negative URI indicates that the unit is not ready, and is not capable of meeting its deployment/employment requirement. The degree that the unit is over ready or under ready is indicated by the number of positive or negative days in the URI. A unit readiness indicator is calculated by the RIM for each unit in the RIM force. In Figure III-5 the URI calculation box is shown leading to a decision loop determining whether or not URI for the entire RIM force list have been calculated. When the URI for the last RIM unit has been determined, the model prints out an initial report which contains a URI for each unit in the RIM force. This initial report also lists (for each UIC) the values of its UDC/UEC formula plus an identification of the line item and MOS that required the largest fill times. An example of a URI report produced by the prototype is shown in Table III-9. The capability of the RIM to pinpoint the principal causes of delay, particularly as applied to a unit

TABLE III-9, Example of a RIM Prototype URI Report

UICC	RIMNR	TPSNA	BR	UNMBER	UNTOS	COMPO	PERS	MOS	EQUIP	LIN	UFT	+	TDT	+	MSPT	=	UEC	+	MPT	+	OLO	=	UDC	RDOD	RDOE	URI
WXXXXX	061	32359	XX	XXXX	XXXXXXXXXX	X	0	71D20	14	M11895	14	+	35	+	6			+	1	+	4	=	60	61		+1
WXXXXX	061	32359	XX	XXXX	XXXXXXXXXX	X	0	71D20	14	M11895	14	+	35	+	6			+	1	+	4	=	60	61		+1
WXXXXX	166	32357	XX	XXXX	XXXXXXXXXX	X	0	71BA0	0	R94977	0	+	1	+	6			+	1	+	4	=	12	166		+154
WXXXXX	023	32370	XX	XXXX	XXXXXXXXXX	X	0	71B30	0	R94977	0	+	1	+	6			+	1	+	4	=	12	23		+11
WXXXXX	166	32359	XX	XXXX	XXXXXXXXXX	X	14	71D20	0	R94977	14	+	35	+	6	=	55								166	+111
WXXXXX	166	32359	XX	XXXX	XXXXXXXXXX	X	0	71D20	23	M11895	23	+	0	+	6	=	29								166	+137
WXXXXX	023	32359	XX	XXXX	XXXXXXXXXX	X	0	71D20	13	M11895	13	+	0	+	6			+	1	+	4	=	24	23		-1
WXXXXX	023	32359	XX	XXXX	XXXXXXXXXX	X	14	71B30	0	R94977	14	+	35	+	6			+	1	+	4	=	60	23		-37
WXXXX	008	32359	XX	XXXX	XXXXXXXXXX	X	4	71D20	0	R94977	4	+	15	+	6	=	25								8	-17
WXXXX	008	32359	XX	XXXX	XXXXXXXXXX	X	0	71D20	0	R94977	0	+	1	+	6			+	1	+	4	=	12	8		-4

with negative URI provides the planner an improved insight into readiness problems and also a means (via the model) of measuring the effectiveness of proposed solutions to the problems.

19. Store URI Calculations in History File

a. The RIM produces three history files as well as the URI report. These files consist of a URI Calculations History File, a Unit MOS History File, and a Unit Line Item History File. In Phase III, the history files will be used as inputs to a report generator (Harlan's report generator) to produce different types of formatted reports used in analyzing the results of the model and also will be used to compare different parameter runs of the model.

b. The history files make possible output reports that can be produced as follows:

(1) A facsimile of the URI report sorted by different data elements.

(2) Reports showing how each MOS was filled, i.e., how many MOS were filled from each asset pool source (T-1 through T-12), for selected units.

(3) Reports showing how each line item was filled from each asset pool source (T-1 through T-12) for selected units.

(4) Reports showing the progression of filling from selected line items or selected MOS for all units.

c. The history file, which contains a recoverable history of each of the transactions calculated to determine a URI, provides the user a wide variety of data configurations that can be extracted for use in force analysis.

READINESS SYSTEM STUDY
PHASE II
READINESS INDICATOR MODEL PROTOTYPE DEVELOPMENT

CHAPTER IV
AUTOMATION FEASIBILITY AND POTENTIAL USES OF READINESS INDICATOR MODEL PROTOTYPE

1. Overview Description of RIM as a Computer Model

a. The RIM is an automated technique that computes the readiness of each unit based on measurements of the quantities and availabilities of existing and planned Army personnel, equipment, and CONUS transportation assets. The RIM utilizes 31 different preprocessing programs to create the files required by the five subroutines of the model. Figure IV-1 illustrates the logic flow of the RIM prototype subroutines utilizing the preprocessor programs. Each preprocessor program functional area is identified with a P prefix and each prototype model subroutine is identified with a M prefix. The preprocessor programs are grouped into five major functional areas which are identified below:

(1) Unit Identification Code/Military Occupational Specialty (UIC/MOS) File (P-1). - A group of preprocessor programs to create the unit MOS records as a UIC/MOS file.

(2) Unit Identification Code/Line Item Number (UIC/LIN) File. - (P-2) Another group of preprocessor programs to create the unit line item records as a UIC/LIN file.

(3) Military Occupational Specialty Pool (MOSPOOL). (P-3) - A group of preprocessor programs used to create the different categories of the nonunit personnel in the RIM asset pool. This pool also incorporates the personnel made available from unit sources in subroutine M-1.

(4) Line Item Pool (LINPOOL). (P-4) - A group of preprocessor programs used to create the different categories of the Equipment Asset Pool. This pool also incorporates the equipment made available from unit sources in subroutine M-3.

(5) Troop List File (P-5). - A preprocessor program used to form the basic trooplist based on a specific date in the FAS file.

b. The RIM prototype (Figure IV-1) consists of five subroutines.

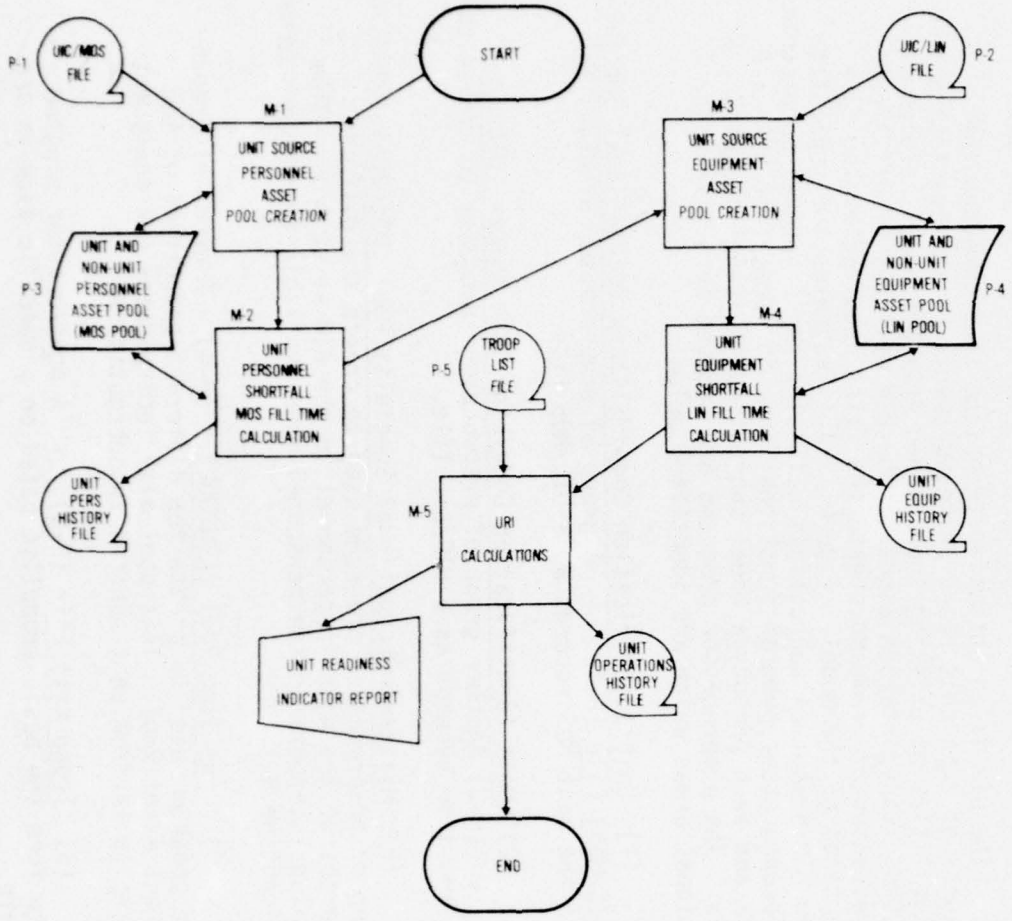


FIGURE IV-1, Readiness Indicator Model Prototype Logic Flow

(1) Unit Source Personnel Asset Pool Creation. (M-1) - This subroutine creates the RIM Personnel Asset Pool (from unit sources). This portion of the pool consists of the personnel assets from Low Priority (LOPRI) units on hand, high priority (HIPRI) unit excess personnel assets, and nonmission unit personnel assets.

(2) Unit Personnel Shortfall and MOS Fill Time Calculations. (M-2) - This subroutine calculates personnel shortfall by MOS for each prioritized RIM unit and calculates each MOS fill time for each unit. An output from this subroutine is the Unit History file which records all personnel fill transactions within units.

(3) Unit Source Equipment Asset Pool Creation. (M-3) - This subroutine creates the RIM equipment asset pool (from unit sources). This portion of the pool consists of LOPRI unit's assets, HIPRI units excess assets, and nonmission unit equipment assets.

(4) Unit Equipment Shortfall and LIN Fill Time Calculations. (M-4) - This subroutine calculates equipment shortfall by line item number in the prioritized RIM units and calculates each LIN fill time for each unit. An output from this subroutine in the Unit Equipment History File which records all equipment fill transaction within units.

(5) Unit Readiness Indicator (URI) Calculations. (M-5) - This subroutine calculates the following items:

(a) The maximum fill times for personnel and equipment for each unit.

(b) Unit training time and training delay time.

(c) Mobilization station preparation time.

(d) Move-to-port time.

(e) Off-load time.

(f) Load-on-lift time.

(g) Unit deployment capability.

(h) The URI.

The principal output of the subroutine (5) is the URI report containing the basic readiness formula calculations by unit, plus selected data from the troop list which identifies the unit. Another output from this subroutine is the Unit Operations History File which records

all transactions that were used to calculate unit readiness. The logic flow of the RIM Prototype is given in Figure IV-1.

2. Test of the Prototype

a. Upon the completion of the programing, an in-house test program was developed which had the following objectives:

(1) To debug the programs and system.

(2) To demonstrate the model feasibility in terms of the effectiveness of each operation, the model output requirements and computer running time.

(3) To determine the computer running time for a full troop list.

b. The first portion of the test involved processing of a 31 unit "minitroop list." When this troop list was chosen, complete information on Reserve units was the only force data available. All of the units except (1) and (2) below are United States Army Reserve Units (USAR). The distribution of units was as follows:

(1) Two POMCUS units.

(2) Two POO Units (Planned Operational Organization) Units (no personnel, no equipment).

(3) Eleven deploying units

(4) Seven nondeploying units.

(5) Four nonscenario units with assets available for filling RIM Units.

(6) Five nonscenario units with assets not available to fill RIM units.

c. The 31 unit troop list proved to be effective in finding errors in the logic of the methodology. The debugging insured that the programing provided a thorough test of the functional logic. The test provided time factors for each of the preprocessor steps as well as each RIM prototype subroutine.

d. After the 31 unit troop list ran satisfactorily, a 1684 unit troop list containing only USAR units was also executed in RIM. Running of the larger troop list revealed additional programing bugs which required the following:

(1) Intermediate source files had to be expanded to accomodate the new data.

(2) Sort programs for some routines required modification.

(3) The SACS TOE File did not contain all SRC for existing units in the troop list.

e. The first two of these problems have been alleviated. The third is still being investigated. Running times were recorded and compared with the 31 unit test in order to use the comparative times to determine a running time projection for a full troop list.

f. Preparation is currently underway for testing (full troop list) including TDA units during Phase III. After the new troop list is acquired detailed analysis will be made of the logic and force data.

3. Quality Assurance Analysis

a. The quality assurance tasks associated with the prototype development consumed over three man months of technical effort. The primary effort centered on the quality of the troop list. It was found that there were many incorrect or non-existing data elements needed for the study. For example, there was a need for correct mobilization station names. Over 50 installations on the troop list were not in the acceptable format to interface with the Army Location Codes (ARLOC) file. Over 100 of the home and mobilization station codes in the PMDL were incorrect when compared to the home and mobilization stations designated in the ARLOC file. These were corrected based on discussions with mobilization planners. It was also necessary to assign a mobilization station to a number of "POO" units designed to be organized and mobilized. These corrections were important since the mobilization station is a critical input factor to the MTMC MAPS model.

b. It was also necessary to examine and correct the lift mode for both personnel and cargo, and also correct the unit type codes so they agreed with the SRC of the unit.

4. Sensitivity Analysis. - Sensitivity analysis was a task to be performed in Phase II. Due to the incomplete PMDL used and limitation of the trooplist to only 1684 units for the test run, it was not considered reasonable to conduct a sensitivity analysis. It was determined that to do a meaningful sensitivity analysis, a group of Report Generator Programs (RGP) needed to be developed. The RGP would show standard groupings of data for comparing alternative outputs produced by variations of RIM input parameters. In

debugging the RIM System a limited sensitivity analysis was done by varying the input times associated with the nonunit equipment asset pool. The time changes were tested in the model, and URI output changes were noted. The test was not adequate to test model sensitivity because filling shortfalls of the limited troop list used did not drain the asset pool sufficiently to reflect the significance of the asset pool time changes. Proper sensitivity analysis requires that a complete troop list be used with an up-to-date complete PMDL. During Phase III, these requirements will be met, and an analysis of the model's output sensitivity to a variety of input changes will be made.

5. Automation Feasibility of RIM Prototype

a. Using the 1684 unit troop list, it was demonstrated that the RIM model did, in fact, produce a URI for each unit. All preprocessor programs had run times from 30 seconds to 22 minutes, except for two. These two programs required 140 minutes and 81 minutes to run. They deal with a sort on unit MOS records and unit line item records. It can be expected on a full troop list run that these two programs will take about twice as long as they did for the 1684 case. The maximum core size used by any of the preprocessor prototype programs is 45K. It is not anticipated that this core size will change appreciably using a full troop list.

b. In looking at the prototype itself, the range of run times for each of the five subroutines was from 11 minutes to 18 minutes. The total time taken for all prototype programs to execute was 79 minutes. An area in which the running time could increase significantly with a full trooplist is subroutine 5, because a sort is performed on many thousands of records with maximum fill time for MOS and LIN. In consideration of the size of the full troop list compared to the 1684 unit troop list, the projected RIM run time for the full troop list is between 160 and 240 minutes. The maximum core size used by any of the prototype subroutines in any of the prototype subroutines is 41K.

c. The preprocessor programs and the RIM prototype can all operate within a reasonable and feasible time. No program exceeds 45K of core of storage or runs longer than two and one-half to three and one-half hours. It is pointed out that the preprocessor programs need only be run once, and then many different runs of only the RIM itself can be made to test alternative input parameters. The resulting variations in URI outputs can then be compared with previous outputs.

6. Potential Uses of the RIM Prototype in Force Analysis

a. The Readiness Indicator Model is intended as a flexible management tool to aid force planners in answering both routine questions involving "readiness" and a variety of "what if" force planning questions that confront Army executives on an unscheduled basis. The initial output produced by the model prototype during Phase II was a unit readiness indicator report listing URI calculated for all units in the force. Units which can be ready for deployment (or employment) prior to their requirements for deployment (or employment) have positive indicators. Units which have a capability matching their requirement date have zero indicators, and units which cannot be ready by their required date have negative readiness indicators. Also included in the prototype output was a listing of the causes for negative readiness indicators. The output listing reflected a profile of overall force readiness, and indicated readiness deficiencies by specific causes. In Chapter VI of the Phase I report a series of potential uses is described. These uses were discussed repeatedly in briefings presented during Phase II. The principal conclusion drawn from these discussions is that the RIM has indeed a potential for effective use in force analysis. The reasons for this conclusion are discussed in subparagraphs 6b and 6c below.

b. Since there are many RIM input parameters which can be varied and the results measured in URI outputs, the RIM prototype is ideal as a force analysis tool. For example, the RDOD discriminator parameter can be varied to vary the quantity of LOPRI assets available to HIPRI units. This in turn will reflect on the URI of each unit. The prescribed level multiplier parameter can be used to vary the TOE or MTOE level to any prescribed level, thus providing the means of measuring readiness at different prescribed levels of personnel and/or equipment in units. The availability times relative to each of the items in the RIM asset pools can also be varied as input parameters and URI output changes noted. The unit training start time relative to unit fill time can also be varied as a planner option. Each one or combination of input parameter changes will affect the URI in some manner. During Phase III, the sensitivity of the RIM to these changes will be measured.

c. Primarily, the RIM usefulness to force planners will be in terms of its capability to be used as a management analysis tool. Its primary URI output will be used to evaluate readiness, but as the prototype model is developed into an operating system and as force planners gain knowledge and experience with the reiterative analytical capabilities of the RIM, its use as a management tool will improve. During Phase III, a prototype design expansion will be directed toward use of the model to produce unit

readiness indicators for a full troop list, to identify readiness deficiencies by MOS and LIN, and to investigate use of the model as a dynamic tool in force analysis.

APPENDIX A

STUDY CONTRIBUTORS

READINESS SYSTEM STUDY
PHASE II
READINESS INDICATOR MODEL PROTOTYPE DEVELOPMENT

APPENDIX A
STUDY CONTRIBUTORS

STUDY TEAM

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APPENDIX B

REFERENCES

READINESS SYSTEM STUDY
PHASE II
READINESS INDICATOR MODEL PROTOTYPE DEVELOPMENT

APPENDIX B
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APPENDIX C

GLOSSARY

READINESS SYSTEM STUDY
PHASE II READINESS INDICATOR MODEL PROTOTYPE DEVELOPMENT

APPENDIX C
GLOSSARY

1. Abbreviations, Acronyms, and Short Terms

AESRS	Army Equipment Status Reporting System
AIT	advanced individual training
ALO	Authorized Level of Organization
AMP	Army Materiel Plan
*ARDMA	Asset, Requirements, Depot Maintenance and Acquisition
*ARLOC	Army Location Code
ATP	Army Training Program
AUT	Advance Unit Training
BUT	Basic Unit Training
bn	battalion
CAA	Concepts Analysis Agency
CINC	commander in chief
*CONARC	United States Continental Army Command
CONSSTOCS	contingency support stocks
CONUS	Continental United States
DA	Department of the Army
DARCOM	US Army Materiel Development and Readiness Command
D-Day	Deployment Day
DCSOPS	Deputy Chief of Staff for Operations and Plans

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DCSPER	Deputy Chief of Staff for Personnel
div	division
DLOGS	division logistics system
DOD	Department of Defense
EDATE	Effective Date
FAS	force accounting system
*FEMBA	Forward Edge of the Main Battle Area
FORSCOM	United States Army Forces Command
FY	Fiscal Year
HQ	Headquarters
*HQDA	Headquarters, Department of the Army
IRR	Individual Ready Reserve
JCS	Joint Chiefs of Staff
*LSSA	Logistic System Support Agency
MAC	Military Airlift Command
M-Day	mobilization day
MIDA	Major Item Data Agency
MILPERCEN	United States Army Military Personnel Center
mob	mobilization
MOS	military occupational speciality
MSC	Military Sealift Command
MTMC	Military Traffic Management Command
MTOE	Modified Table of Organization and Equipment
NGB	National Guard Bureau

*OJCS	Office of Joint Chiefs of Staff
*ODCSOPS	Office, Deputy Chief of Staff for Operations and Plans
PMDL	Post M-Day Deployment List
POD	port of debarkation
POE	port of embarkation
POMCUS	prepositioning of materiel configured to units sets
*POO	Proposed Operational Organization
PWRS	prepositioned war reserve stock
regt	regiment
RCPAC	United States Army Reserve Components Personnel and Administration Center
RDD	Required Delivery Date
REDCON	readiness condition
RICC	Reportable Item Control Code
*RLI	Reportable Line Item
SACS	Structure and Composition System
SIDPERS	Standard Installation/Division Personnel System
SQI	special qualifications identifiers
sqdn	squadron
SRC	standard requirement code
*SSN	Standard Study Number
TDA	tables of distribution and allowances
TOE	table(s) of organization and equipment

TPSN	troop program sequence number
TRADOC	United States Army Training and Doctrine Command
*TUCHA	type unit characteristics
UIC	Unit Identification Code
USAR	United States Army Reserve
WWMCCS	world wide military command and control system
Total Mobilization	Expansion of the active Armed Forces by organizing and/or activating additional units beyond the existing approved troop basis to respond to requirements in excess of that troop basis and the full mobilization of all national resources needed to round out and sustain such forces.

2. Terms Unique to this Study

*EFT	Equipment Fill Time
*HIPRI	High Priority
*LIN	Line Item Number
*LINPOOL	Line Item Pool
*LLT	Load-On Lift Time
*LOPRI	Low Priority
*MOSPOOL	Military Occupational Specialty Pool
*MPT	Move to Port Time
*MSDD	Mobilization Station Departure Date
*MSPT	Mobilization Station Preparation Time
*OLO	Off-Load and Load-On Lift Time
*OLT	Off-Load Time
*POD	POE Arrival Date

*PFT	Personnel Fill Time
*RDOD	Required Day of Deployment
*RDOE	Required Day of Employment
*TDT	Training Delay Time
*UDC	Unit Deployment Capability
*UEC	Unit Employment Capability
*UFT	Unit Fill Time
*URI	Unit Readiness Indicator
*UTT	Unit Training Time

3. Models, Routines, and Simulations

MAPS	Mobility Analysis and Planning System. A computerized system of MTMC which supports mobility planning.
RGP	Harlan's Report Generator Program. Is used to produce formatted reports from COBOL generated data files.
RIM	Readiness Indicator Model. A computer model designed to calculate a unit readiness indicator (URI) for all force units based on the differences between unit deployment/ employment requirements and unit deployment/ employment capabilities.

*Acronyms or abbreviations marked by an asterisk are not authorized by AR 310-50.

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APPENDIX D

MOBILITY ANALYSIS AND PLANNING SYSTEM (MAPS)

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READINESS SYSTEM STUDY
PHASE II
READINESS INDICATOR MODEL PROTOTYPE DEVELOPMENT

APPENDIX D
MOBILITY ANALYSIS AND PLANNING SYSTEM (MAPS)

1. MAPS Overview. - MAPS is a computerized system which supports the Military Traffic Management Command's (MTMC) mobility planning mission as delineated in DOD Directive 5160.53. In compliance with this Directive, MTMC provides transportation planning support to the Joint Chiefs of Staff, the Unified and Specified Commands, the Military Services and the DOD Agencies. The MTMC mission includes preparation of CONUS movement schedules and analyses in support of operation plans, studies and other planning actions.

2. Interface With Strategic Lift Agencies. - In support of deployment planning actions, the MTMC movement scheduling process involves a series of coordinated actions with the Military Airlift Command (MAC) and the Military Sealift Command (MSC). MAC selects the air POE and prepares movement schedules to support the air deployments. Next, MTMC prepares movement schedules from CONUS origins to the air POE provided by MAC. MTMC designates the CONUS sea POE for sea deployments originating within CONUS. MTMC also plans shiploading and schedules the CONUS movements. MSC then schedules the sea movements from the CONUS sea POE provided in the MTMC movement schedules.

2. Subsystems. - MAPS is designed to interface with OJCS standard formats, files and data bases, and MTMC-unique data bases. MAPS consists of several subsystems:

a. The Record Creation Subsystem. - This subsystem deletes all requirements not identifying MTMC as source of transportation then converts requirements involving MTMC support, plus data extracted from the OJCS standard Type Unit Characteristics (TUCHA) file into a master record for processing.

b. The Transportation Equipment Calculator. - This subsystem uses traffic management criteria to determine the numbers and types of commercial transportation equipment to accomodate the personnel and cargo movements.

c. The Scheduler Subsystem. - This subsystem is the foundation of MAPS. It examines sea transit data, seaport berth capabilities and shiploading criteria and selects the CONUS sea POE.

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d. Origin Capabilities Subsystem. - This subsystem analyzes the capabilities of CONUS origins to receive or outload cargo, using commercial motor and rail transportation equipment.

e. Add/Change/Delete Subsystem. - This subsystem is employed subsequent to mainline computer processing, and allows the planner to apply the results of manual analysis and scheduling before submission of the MTMC movement schedules.

f. The Control Subsystem. - This subsystem analyzes initial requirements, in conjunction with the MAPS-produced movement schedules, to insure proper disposition of MTMC responsibilities for a given planning action.

g. The Output Generation Subsystem. - This subsystem consists of a number of programs which produce hard copy movement schedules, movement table (schedule) cards, and management reports.

4. Shortfalls. - MAPS identifies shortfalls or "flags" movements which cannot be scheduled due to insufficient resources and capabilities.

5. Constraints. - It is important to note that MTMC, in developing movement schedules, is constrained by:

a. Ready-to-load, earliest arrival dates and latest arrival dates.

b. Capabilities of the CONUS commercial transportation network and sea POE.

c. The receiving/outloading capabilities of the CONUS origins.

d. Interface with the MAC and MSC movement tables (schedules).

6. Future Developments and System Operation

a. MAPS is being expanded to prepare movement tables which will schedule mobilization or other nondeployment movements requiring commercial transportation from CONUS origins to mobilization stations or other CONUS destinations.

b. MAPS is operated and maintained by MTMC on the WWMCCS (Worldwide Military Command and Control System) computer.

APPENDIX E

ARDMA CODES AND PURPOSE CODES

READINESS SYSTEM STUDY

PHASE II
READINESS INDICATOR MODEL PROTOTYPE DEVELOPMENT

APPENDIX E
ARDMA CODES AND PURPOSE CODES

TABLE E-1, ARDMA Codes and Purpose Codes (continued on next page)

ARDMA Code	Purpose code	Explanation of purpose code
01	A	Includes all operating stocks retained for general issue which are not earmarked, reserved, or restricted for issue to specified requirements. Includes assets reserved for issue priorities 1 through 8 within control levels. Items are available for issue to meet the assigned logistical support responsibilities of the item managers.
02	D	Applies to all assets, CONUS and oversea, reserved to meet prepositioned war reserve materiel objectives. Includes assets administratively earmarked in support of the United States Strategic Army Corps Contingency Plans.
04	T	Applies to all assets reserved for Reserve Component forces designated to be called to Active Army duty upon implementation of Army partial mobilization expansion plans.
05	B	Includes all assets reserved for general mobilization reserve materiel objectives.

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TABLE E-1, ARDMA Codes and Purpose Codes (continued on next page)

ARDMA Code	Purpose code	Explanation of purpose code
05	C	Applies to assets reserved to meet specific mobilization reserve materiel objectives. Includes items reserved for theater reserves programmed and funded to render logistical support to oversea requirements.
05	E	Applies to assets held to support requirements generated by a specific plan, project, or operation other than general, specific or prepositioned war reserve stocks (PWRS) mobilization objectives. Includes assets obligated to support approved operational projects or reserved for deployment or augmentation of units after funding and coordinating approval has been received. Assets will be held at designated storage locations until authorization for release is directed.
05	F	Applies to assets held to support repair, alteration, modification, conversion or assembly programs to be accomplished at an Army or other DOD repair or overhaul facility. Includes components of sets of equipment or assemblages held for assembly/disassembly. Includes stocks that are received and stored to complete sets of equipment, or assemblages. Includes Army stock fund owned accessories, attachments, components, or assemblies which constitute the major end items of

TABLE E-1, ARDMA Codes and Purpose Codes (continued on next page)

ARDMA Code	Purpose code	Explanation of purpose code
		equipment. Does not include organizational maintenance accessories, and repair parts accompanying the major end items of equipment identified in technical manuals as BII.
05	G	Includes stocks reserved to assure delivery of support items with the related end items.
05	H	Applies to assets held for issue Government-furnished materiel (GFM) (referred to as Government-furnished property (GFP) or Government-furnished equipment (GFE)) to support contractually accomplished repair or production programs. Includes items reserved for support of production, manufacturing, or rehabilitation programs or included for planning purposes under the Army Materiel Programs. Includes assets of repair parts and components reserved for support of approved scheduled maintenance and repair programs when such programs are to be accomplished at commercial repair or overhaul facilities.
05	J	Applies to assets allocated and earmarked for Grant Aid.
05	K	Applies to assets held on record for loan, donation, or sale to authorized individuals, clubs, organizations, institutions, or municipalities for purpose of display, exhibition, etc.

TABLE E-1, ARDMA Codes and Purpose Codes (continued on next page)

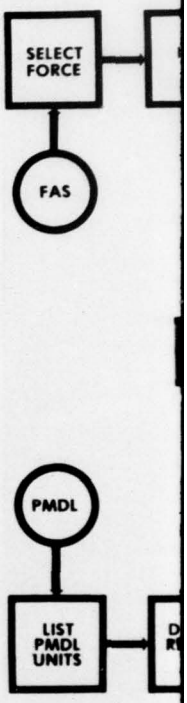
ARDMA Code	Purpose code	Explanation of purpose code
05	L	Includes Army-owned programed inventories that have been approved for issue and are on loan but are subject to recall when required to meet the gross requirements of the Army. All inventory issues on a loan basis will be supported by an agreement specifying the terms of the loan, and the funding responsibilities for maintaining the item in a serviceable condition.
05	M	Includes assets over and above authorized retention limits of the Army that are held pending completion of utilization screening by DOD, governmental, or non-governmental agencies. Applies to Project PLUS criteria for screening of items against DOD requirements. Materiel will be accounted for in this purpose code until receipt of request for withdrawal or until automatic release data has matured, or until appropriate shipment direction will be issued to the storage location for shipment of property to the disposal officer.
05	N	Stocks allocated and earmarked for Foreign Military Sales.
05	P	Stocks allocated and earmarked for issue against US commitments under Cooperative Logistics Support Arrangements.

TABLE E-1, ARDMA Codes and Purpose Codes (concluded)

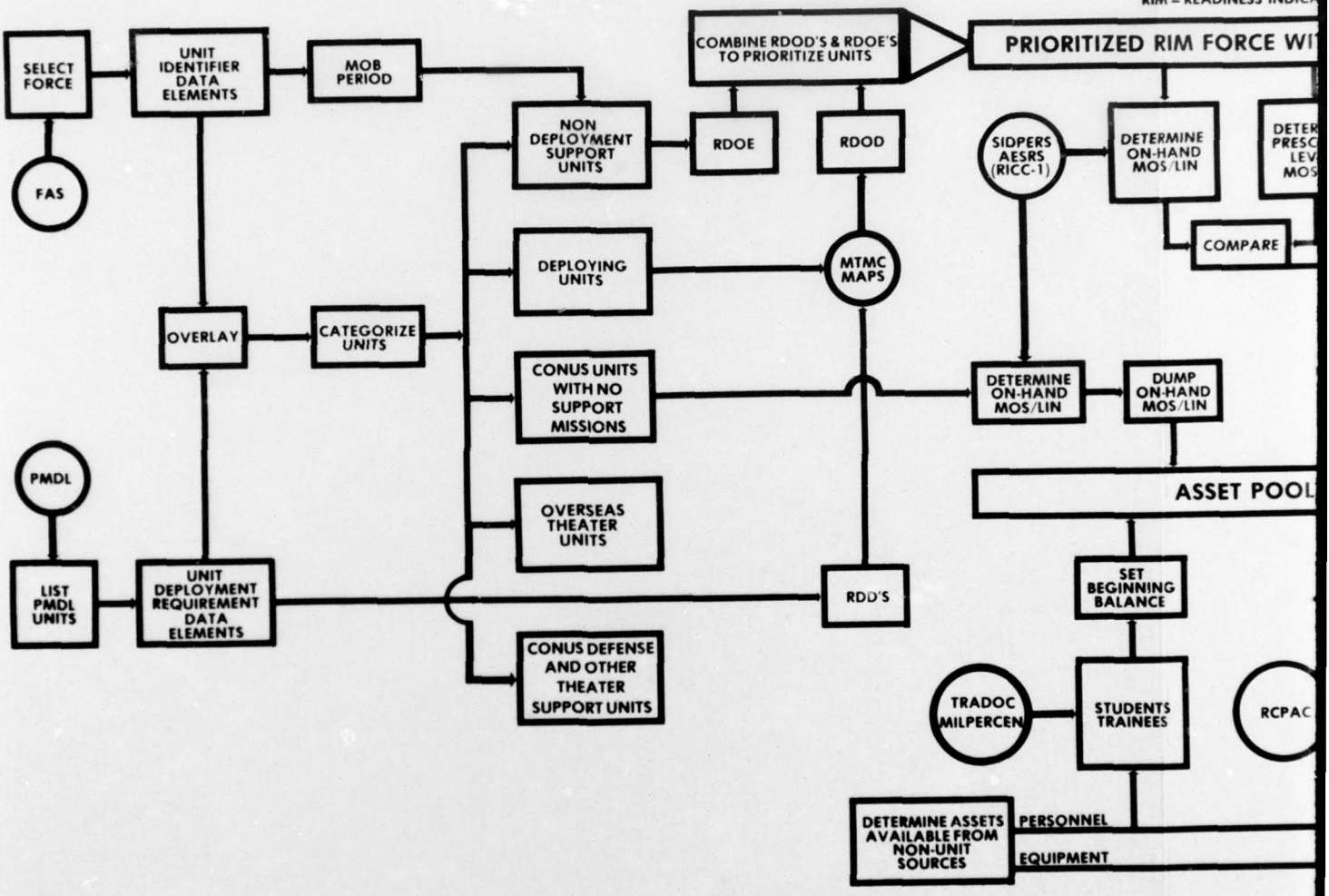
ARDMA Code	Purpose code	Explanation of purpose code
05	W	Includes serviceable and unserviceable, economically repairable BII removed from major end items and/or stocks that are received and held in storage to complete major end items. Applies to all stocks purchased to satisfy BII requirements, including stocks owned by one Army item manager but managed by another Army or non-Army item manager. Materiel in this purpose code will not be physically segregated in storage from other depot stocks.
06	A, B, C, D, E, F, G, H, J, K, L, M, N, P, W	

EXPLANATION OF ACRONYMS AND ABBREVIATIONS

AESRS	Army Equipment Status Reporting System
AMP	Army Material Plan
ARDMA	Assets, Requirements, Depot Maintenance and Acquisition, Date Report
DCSPER	Deputy Chief Staff for Personnel
DLOGS	Division Logistics System
FAS	Force Accounting System
IRR	Individual Ready Reserve
LIN	Line Item Number
LLT	Load on Lift Time
LO-PRI	Low Priority Units
MAPS	Mobility Analysis Planning System
MILPERCEN	Military Personnel Center
MOS	Military Occupational Speciality
MPT	Move to Port Time
MSDD	Mobilization Station Departure Date
MSPT	Mobilization Station Preparation Time
MTMC	Military Traffic Management Command
OLT	Off Load Time
PAD	Port of Embarkation Arrival Date
PMDL	Post Mobilization Deployment List
POMCUS	Prepositioning of Material Configured to Unit Sets
RCPAC	Reserve Components Personnel and Administration Center
RDD	Required Delivery Date
RDOD	Required Day of Deployment
RDOE	Required Day of Employment
RICC	Reportable Item Control Code
RIM	Readiness Indicator Model
SACS	Structure and Composition System
SEL SER	Selective Service
SIDPERS	Standard Installation/Division Personnel System
TRADOC	Training and Doctrine Command
TDT	Training Delay Time
UDC	Unit Deployment Capability
UEC	Unit Employment Capability
UFT	Unit Fill Time
URI	Unit Readiness Indicator

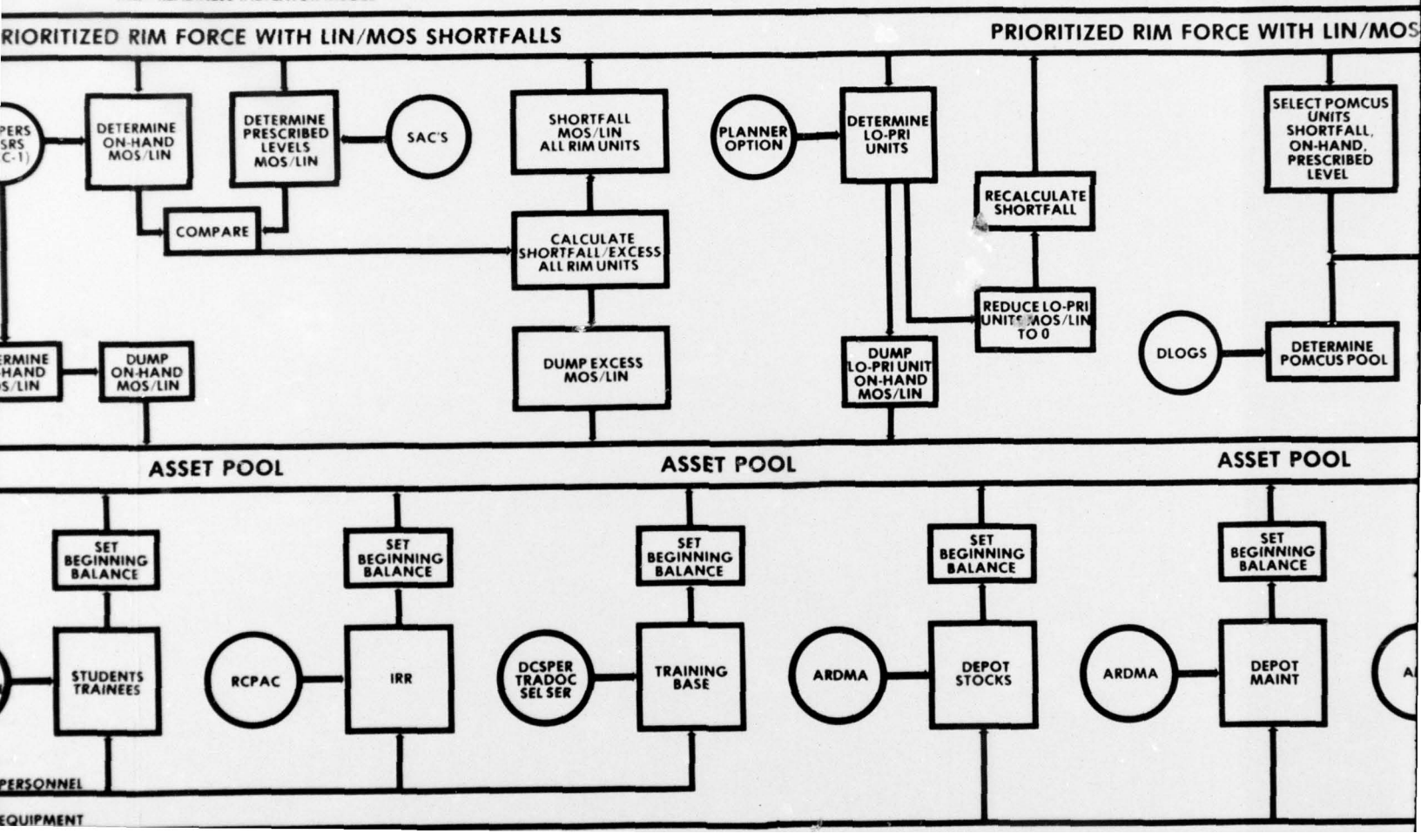


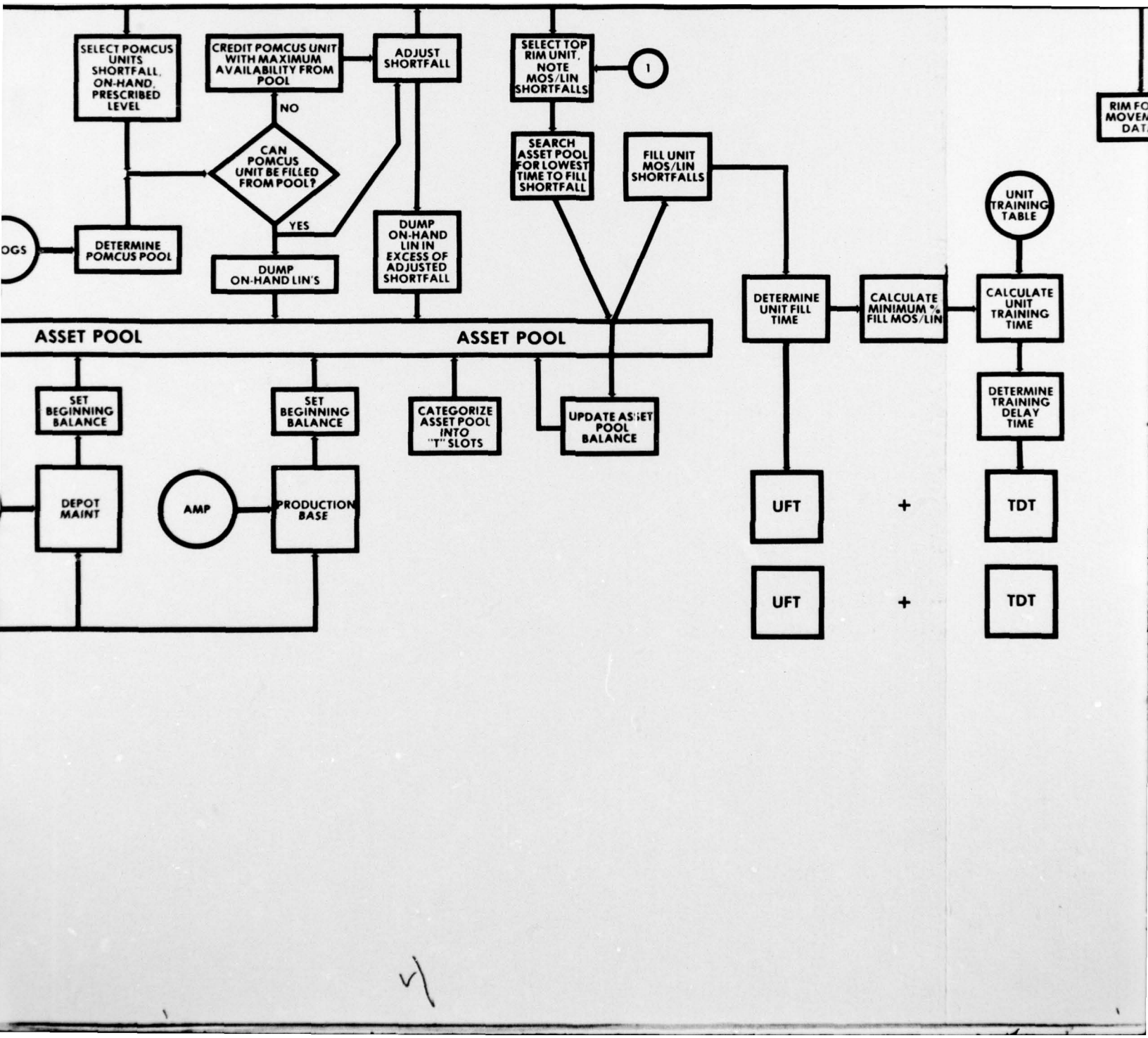
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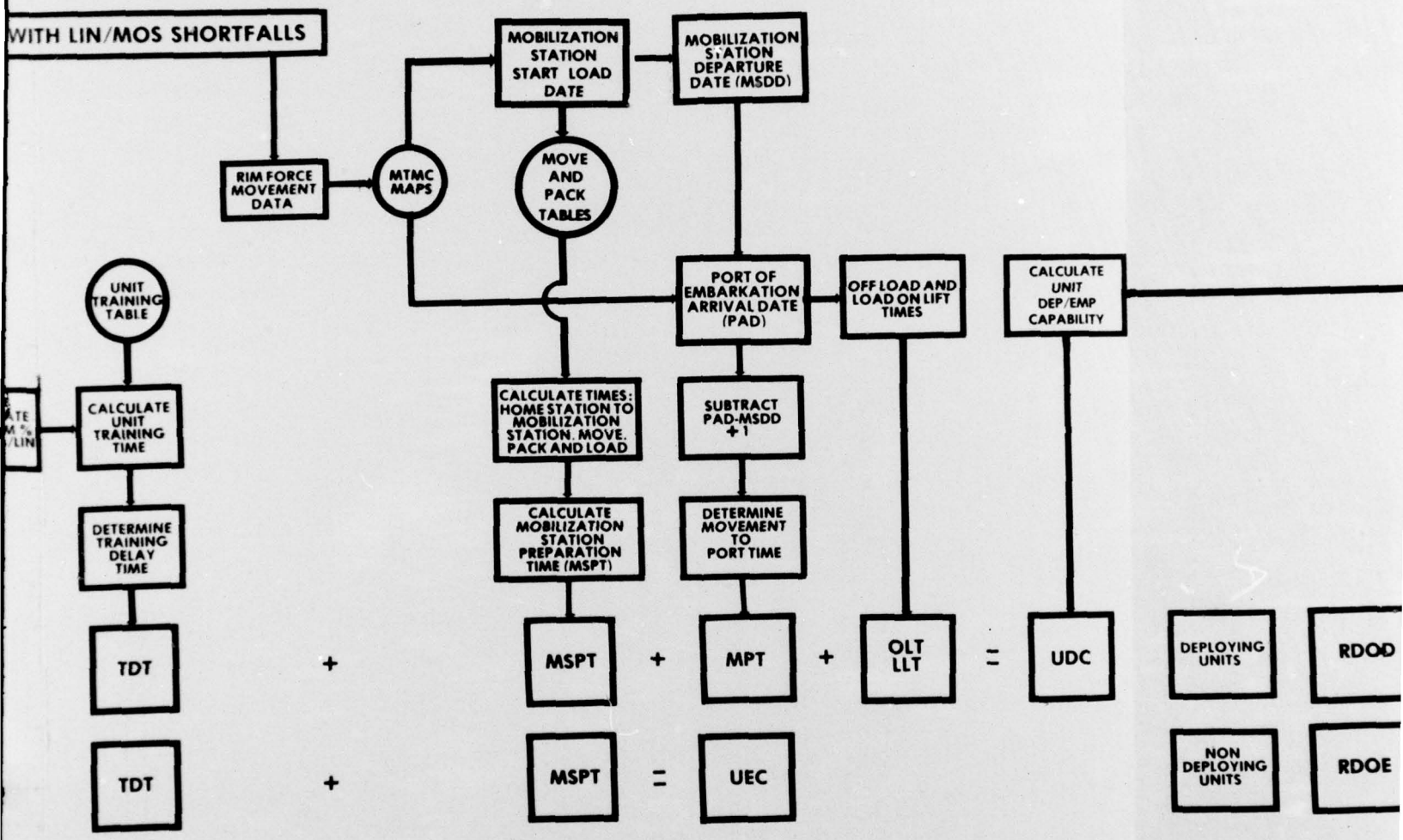

RIM = READINESS INDICA
SELECT FORCE
UNIT IDENTIFIER DATA ELEMENTS
MOB PERIOD
COMBINE RDOD'S & RDOE'S TO PRIORITIZE UNITS
PRIORITIZED RIM FORCE WI
FAS
NON DEPLOYMENT SUPPORT UNITS
RDOE
RDOD
SIDPERS AESRS (RICC-1)
DETERMINE ON-HAND MOS/LIN
COMPARE
DEPLOYING UNITS
MTMC MAPS
OVERLAY
CATEGORIZE UNITS
CONUS UNITS WITH NO SUPPORT MISSIONS
DETERMINE ON-HAND MOS/LIN
DUMP ON-HAND MOS/LIN
PMDL
ASSET POOL
OVERSEAS THEATER UNITS
LIST PMDL UNITS
UNIT DEPLOYMENT REQUIREMENT DATA ELEMENTS
RDD'S
SET BEGINNING BALANCE
CONUS DEFENSE AND OTHER THEATER SUPPORT UNITS
TRADOC MILPERCEN
STUDENTS TRAINEES
RCPAC
DETERMINE ASSETS AVAILABLE FROM NON-UNIT SOURCES
PERSONNEL
EQUIPMENT

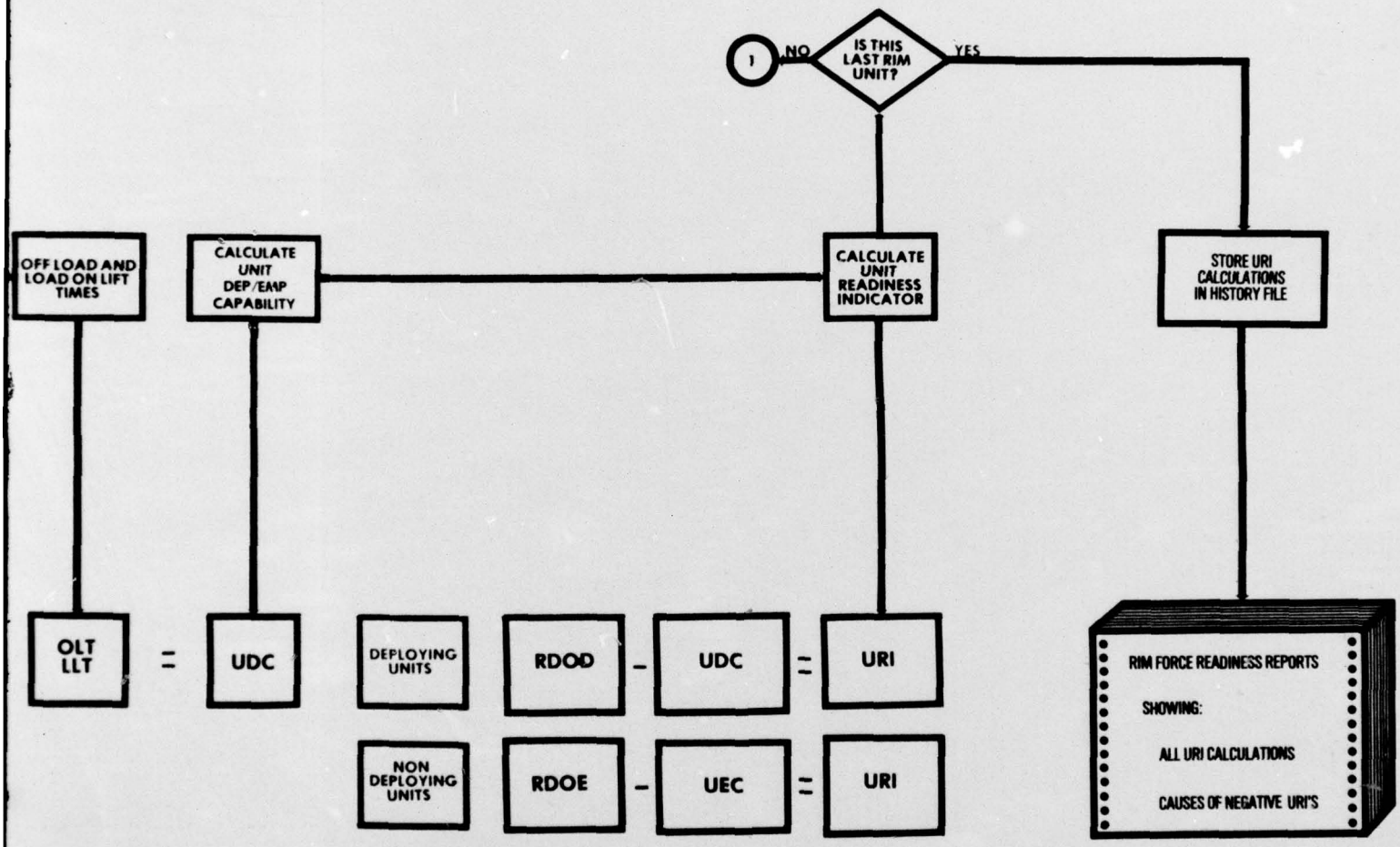
READINES

RIM = READINESS INDICATOR MODEL




SELECT POMCUS UNITS SHORTFALL, ON-HAND, PRESCRIBED LEVEL
CREDIT POMCUS UNIT WITH MAXIMUM AVAILABILITY FROM POOL
ADJUST SHORTFALL
SELECT TOP RIM UNIT, NOTE MOS/LIN SHORTFALLS
1
NO
CAN POMCUS UNIT BE FILLED FROM POOL?
SEARCH ASSET POOL FOR LOWEST TIME TO FILL SHORTFALL
FILL UNIT MOS/LIN SHORTFALLS
UNIT TRAINING TABLE
OGS
DETERMINE POMCUS POOL
YES
DUMP ON-HAND LIN'S
DUMP ON-HAND LIN IN EXCESS OF ADJUSTED SHORTFALL
DETERMINE UNIT FILL TIME
CALCULATE MINIMUM % FILL MOS/LIN
CALCULATE UNIT TRAINING TIME
ASSET POOL
ASSET POOL
SET BEGINNING BALANCE
SET BEGINNING BALANCE
CATEGORIZE ASSET POOL INTO "T" SLOTS
UPDATE ASSET POOL BALANCE
DETERMINE TRAINING DELAY TIME
DEPOT MAINT
AMP
PRODUCTION BASE
UFT
+
TDT
UFT
+
TDT


WITH LIN/MOS SHORTFALLS
RIM FORCE MOVEMENT DATA
MTMC MAPS
MOBILIZATION STATION START LOAD DATE
MOVE AND PACK TABLES
MOBILIZATION STATION DEPARTURE DATE (MSDD)
PORT OF EMBARKATION ARRIVAL DATE (PAD)
OFF LOAD AND LOAD ON LIFT TIMES
CALCULATE UNIT DEP/EMP CAPABILITY
UNIT TRAINING TABLE
CALCULATE UNIT TRAINING TIME
DETERMINE TRAINING DELAY TIME
CALCULATE TIMES: HOME STATION TO MOBILIZATION STATION, MOVE, PACK AND LOAD
CALCULATE MOBILIZATION STATION PREPARATION TIME (MSPT)
SUBTRACT PAD-MSDD +1
DETERMINE MOVEMENT TO PORT TIME
TDT
+
MSPT
+
MPT
+
OLT LLT
=
UDC
DEPLOYING UNITS
RDOD
TDT
+
MSPT
=
UEC
NON DEPLOYING UNITS
RDOE


1
NO
IS THIS LAST RIM UNIT?
YES
OFF LOAD AND LOAD ON LIFT TIMES
CALCULATE UNIT DEP/EMP CAPABILITY
CALCULATE UNIT READINESS INDICATOR
STORE URI CALCULATIONS IN HISTORY FILE
OLT LLT
=
UDC
DEPLOYING UNITS
RDOD
-
UDC
=
URI
NON DEPLOYING UNITS
RDOE
-
UEC
=
URI
RIM FORCE READINESS REPORTS
SHOWING:
ALL URI CALCULATIONS
CAUSES OF NEGATIVE URI'S