

TOP SECRET



REPORT R-145

STRATEGIC OFFENSIVE WEAPONS EMPLOYMENT IN THE PRESENCE OF DEFENSES (WEPS) (U)

Phase I: Definition of Study Program (U)

June 1968

This report has been prepared by the Systems Evaluation Division of the Institute for Defense Analyses in response to the Weapons Systems Evaluation Group Task Order SD-DAHC15 67 C 0012-T-140, dated 22 December 1967.

In the work under this Task Order, the Institute has been assisted by military personnel assigned by WSEG.



INSTITUTE FOR DEFENSE ANALYSES
SYSTEMS EVALUATION DIVISION
400 Army-Navy Drive, Arlington, Virginia 22202

~~GROUP 1
EXCLUDED FROM AUTOMATIC
DOWNGRADING AND DECLASSIFICATION~~

TOP SECRET

IDA Log No. TS/HQ 68-176

UNCLASSIFIED

FOREWORD

(U) This report has been prepared by the Systems Evaluation Division of the Institute for Defense Analyses in response to the Weapons Systems Evaluation Group Task Order DAHC15 67 C 0012-T-140. In the work under this Task Order, the Institute has been assisted by military personnel assigned by WSEG.

(U) The current members of the project staff, including the principal contributors during Phase I, are listed below:

A. R. Barbeau, IDA, Project Leader	O. T. Reeves, Col., USAF, WSEG
D. N. Beatty, IDA	J. F. Refo, Capt., USN, WSEG
G. N. Buchanan, IDA	J. A. Ross, IDA
J. H. Daniel, IDA	W. W. Scott, Col., USA, WSEG
J. L. Freeh, IDA	J. A. Seaman, IDA
K. A. Goudreau, IDA	L. G. Starkey, IDA
P. Gould, IDA	T. E. Sterne, IDA
L. W. Hoskins, Col., USA, WSEG	J. R. Transue, IDA
H. A. Knapp, IDA	J. D. Waller, IDA
D. E. McCoy, Capt., USN, WSEG	D. H. Williams, Capt., USN, WSEG
M. E. Miller, IDA	D. J. Zoerb, Col., USAF, WSEG
R. Y. Pei, IDA	

SECRET

ABSTRACT

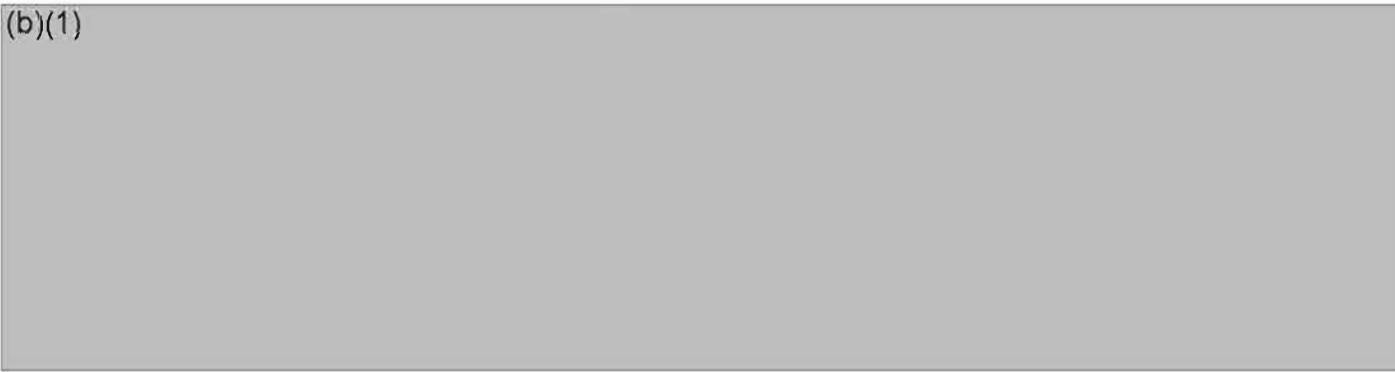
~~(S)~~ The first phase of the WEPS study was mainly devoted to defining approaches and programs to respond to the JCS request to study the employment of strategic offensive weapons in the presence of enemy defenses for the 1971-1978 time period. The Phase I report begins with a preliminary assessment of potentially important (b)(1) of interest. The proposed study program is then presented in the following sequence: a brief discussion of existing studies; a statement of the basic approach to be followed; a description of the studies to be conducted in Phase II (May 1968 - June 1969); and, finally, an indication of the development of the study program and the resources required.

(U) The program proposed for Phase II represents a comprehensive effort to respond to the principal questions raised in the study directive. The program incorporates both practical investigations of certain immediate problems and less predictable research for new insights through logical developments and new methodologies. The program consists of a "context" study and two major "component" studies; the latter studies reflect the more intensive investigation of certain outstanding questions.

SECRET

~~(S)~~ The "context" study is the central feature of the WEPS study. In addition to providing a framework for interrelating all factors relevant to the general problem of nuclear warfare and a mechanism for integrating component studies and supporting tasks, it will develop data bases and methodologies and include research into fundamental considerations. The "context" study will deal with the interactions between opposing systems for cases of U.S. initiation and U.S. retaliation and, therefore, will respond, at least in part, to the questions posed in the JCS directive on the NIKE-X (or the Multi-System Interaction Problem). The end product of the "context" study in Phase II will be a preliminary set of integrated guideline analyses for the employment of programmed strategic forces.

(b)(1)



~~(S)~~ The schedules for the Phase II studies have been developed to provide a presentation of preliminary results in October of 1968, and a formal report for June of 1969. The term of the studies and investigations proposed fall into three categories: (1) the mid-term tasks are to be completed in October of 1968, and are to include surveys and evaluations of

SECRET

SECRET

existing studies, and also a discussion of the applicability of various models and methodologies to the problems encountered in different phases of strategic planning; (2) the continuing "context" studies are planned for at least one iteration in each area of investigation during Phase II; (3) the major component studies are designed for the duration of Phase II, and are expected to make substantial contributions toward the resolution of the problems of MIRV application and missile defense penetration.

(U) The Phase II program is predicated on the full-time support of sixteen (16) analysts and scientists from IDA and six (6) officers from WSEG. In addition, approximately five man-years of consultant services have been estimated. The plan also assumes support from DoD agencies (such as DIA, DCA, DASA), the Services and their contractors, including easy access to studies, data, models, and other analytic tools.

SECRET

CONFIDENTIAL

CONTENTS

INTRODUCTION 1

GENERAL STATEMENT OF THE WEPS TASK 2

 Employment of Strategic Forces (1970-1980) 3

 Quantitative Requirements for Strategic Weapons 3

 Design Implications of Foreseeable Force
 Application Problems 4

 The Phase II Studies 4

AN ASSESSMENT OF THE PROBLEM 5

 Strategic Forces 1970-1975 5

 Strategic Forces: 1975 and Beyond 17

TOPICS RECOMMENDED FOR CONSIDERATION 18

BACKGROUND OF EXISTING STUDIES 20

 Input Uncertainties and Current Methodologies 20

 Assumptions and Controlling Factors 21

 Analyses and Calculations 22

 New Considerations 22

BASIC APPROACH OF WEPS 23

 Problem Definition 23

 Assumptions - Initial Conditions and Rules of
 Engagement 23

 Inputs - Sources of Information 24

 Analytical Development 24

 Models and Calculations 24

 Interpretation of Results - Controlling Factors and
 Presentation of Findings 25

THE PROPOSED PHASE II STUDIES 26

 Emphasis in Phase II 26

CONFIDENTIAL

CONTENTS (Continued)

The "Context" Study	27
Employment of U.S. Offensive Forces	33
Major "Component" Studies	35
THE DEVELOPMENT OF THE STUDY PROGRAM - SCHEDULES AND SUPPORT	39
General Outline	39
Reports and Presentation	41
Support	41
Project Organization	42

All headings in this document are
UNCLASSIFIED

CONFIDENTIAL

I. INTRODUCTION

~~(S)~~ The primary purpose of this Phase I report is to describe the development and organization of a study program designed to respond to the Joint Chiefs of Staff directive on the employment of strategic weapons.¹ Recent and projected weapon developments are considered and the most relevant and pressing questions to be studied are identified. Current methodologies and analyses are assessed and new departures are suggested. The capabilities of strategic defensive systems and the impact of nuclear environments on both offensive and defensive systems are recognized as considerations of major importance in the study program.

¹(U) WSEG Task Order (T-140) to IDA, dated 22 December 1967, ~~(TOP SECRET)~~, referring to Joint Chiefs of Staff Directive to WSEG by SM-351-67, dated 13 May 1967 ~~(TOP SECRET)~~.

~~GROUP 1
EXCLUDED FROM AUTOMATIC
DOWNGRADING AND DECLASSIFICATION~~

CONFIDENTIAL

TOP SECRET

II. GENERAL STATEMENT OF THE WEPS TASK¹

~~(TS)~~ The general purpose of the weapons employment study is to illuminate and explore problems and issues pertinent to future employment plans and defense programs (JSOPs² and DoD 5-Year Programs). The study directive calls for investigations in three related areas:

- The Employment of Strategic Forces;
- The Methodology for Determining Quantitative Requirements for Strategic Weapons;
- The Design Implications of Force Employment Considerations.

~~(S)~~ The scope of the assignment is indicated by the following statement taken from the directive:

"The study should examine force employment considerations in the context both of U.S. initiation and U.S. retaliation, with both sides scheduling missile attacks, combined with bomber attacks where appropriate, against a full range of counterforce and countervalue objectives."

~~(S)~~ The complete statement of the task includes a considerable list of topics to be studied in the context of a broad framework of strategic studies. The following description of the essential features of the study is derived from the JCS directive.³

¹ (U) Strategic Offensive Weapons Employment In The Presence of Defenses (WEPS).

² (U) Joint Strategic Objectives Plan.

³ (U) The detailed considerations indicated in the directive are considered in later sections.

TOP SECRET

TOP SECRET

~~(S)~~ The central theme of the study is force employment. Questions of force size and mix will be considered in the context of the employment studies. Similarly, the system characteristics which most significantly influence employment considerations will be highlighted in the employment analyses, rather than developed in studies focused on defining new weapon systems.

A. EMPLOYMENT OF STRATEGIC FORCES (1970-1980)¹

~~(S)~~ The primary goal of the study is to provide a better understanding of the problems associated with the employment of U.S. strategic offensive weapons with the advent of ballistic missile defenses and offensive missiles equipped with multiple independently targetable reentry vehicles (MIRVs). Employment procedures, force mixes, and system characteristics designed to reduce the impact of uncertainties concerning the capabilities of opposing strategic forces are of major interest as are the implications of those uncertainties.

B. QUANTITATIVE REQUIREMENTS FOR STRATEGIC WEAPONS

~~(S)~~ A second major objective of the WEPS study program is the development of data bases² and methodologies to use in future force structure studies, analyses, and planning. The methodologies should include, in particular, ways to determine the quantitative requirements for MIRV weapons, and should take into account realistic employment problems that will be encountered in strategic nuclear planning.

¹ (U) Although the Task Order indicates the period of interest to be 1971 to 1978, the publication date of the Phase II report suggests an extension to 1980. It is then convenient to consider two intervals; 1970-1975, and 1975-1980.

² ~~(TS)~~ Including data from official sources such as JSOP, Joint Intelligence Estimate for Planning (JIEP), National Intelligence Projections for Planning (NIPP), etc.

TOP SECRET

CONFIDENTIAL

C. DESIGN IMPLICATIONS OF FORESEEABLE FORCE APPLICATION PROBLEMS

~~(S)~~ The periods 1970-1975 and 1975-1980 present rather different problems. For the earlier period, only relatively minor variations from presently known characteristics of the programmed force will be possible. For the latter period, completely new weapons could be introduced. The WEPS effort will point out some of the desirable and undesirable features of programmed or proposed systems and suggest characteristics which it may be desirable to include in new systems. No attempt will be made (at least in the first two phases of the WEPS program), to define in detail and evaluate potential alternatives for new strategic systems.

D. THE PHASE II STUDIES

~~(S)~~ The Phase II program (May 1968 - June 1969), described in this report, is not designed to provide definitive answers to all the questions contained or implied in the referenced directive. The program will, however, treat the central issues in depth and devote substantial efforts to a broad range of relevant considerations. The character and content of the proposed studies are presented following a brief assessment of potentially important (b)(1) in the time period of interest.

III. AN ASSESSMENT OF THE PROBLEM

~~(S)~~ The specific studies, required to comply with the WEPS directive, are discerned in this section by considering the problems which result from the introduction of new weapons in U.S.

(b)(1)

A. STRATEGIC FORCES 1970-1975

New Systems and Design Features

~~(S)~~ The principal changes in the composition of strategic forces in the indicated time period can be reduced to the following essentials:

(b)(1)

SECRET

(b)(1)



- The quantities of missiles (and other system elements) possessed or projected and the technical characteristics of the major system elements.
- The expected deployment of operational units and the employment doctrines which might be used.
- The potential effectiveness of the defensive systems in engaging incoming reentry systems of varying degree

¹(U) And indirectly of the attacking side.

SECRET

of sophistication and in dealing with different attack levels.

- The vulnerability of the major system elements to U.S. missile attacks and the susceptibility of the defenses to suppression.
- The vulnerability of the ABM defense elements to U.S. bomber attacks and the susceptibility of the defenses to suppression by bomber attacks.

(b)(1)

~~(S)~~ The nature of the problems resulting from the inclusion of missile defenses (on either or both sides) underlines the need for analytic methods which can deal with wide-ranging uncertainties as features always and intrinsically present rather than as hypothetical excursions from deterministic assumptions and precise theoretical estimates (which could, at best, be verified only in very gross ways).

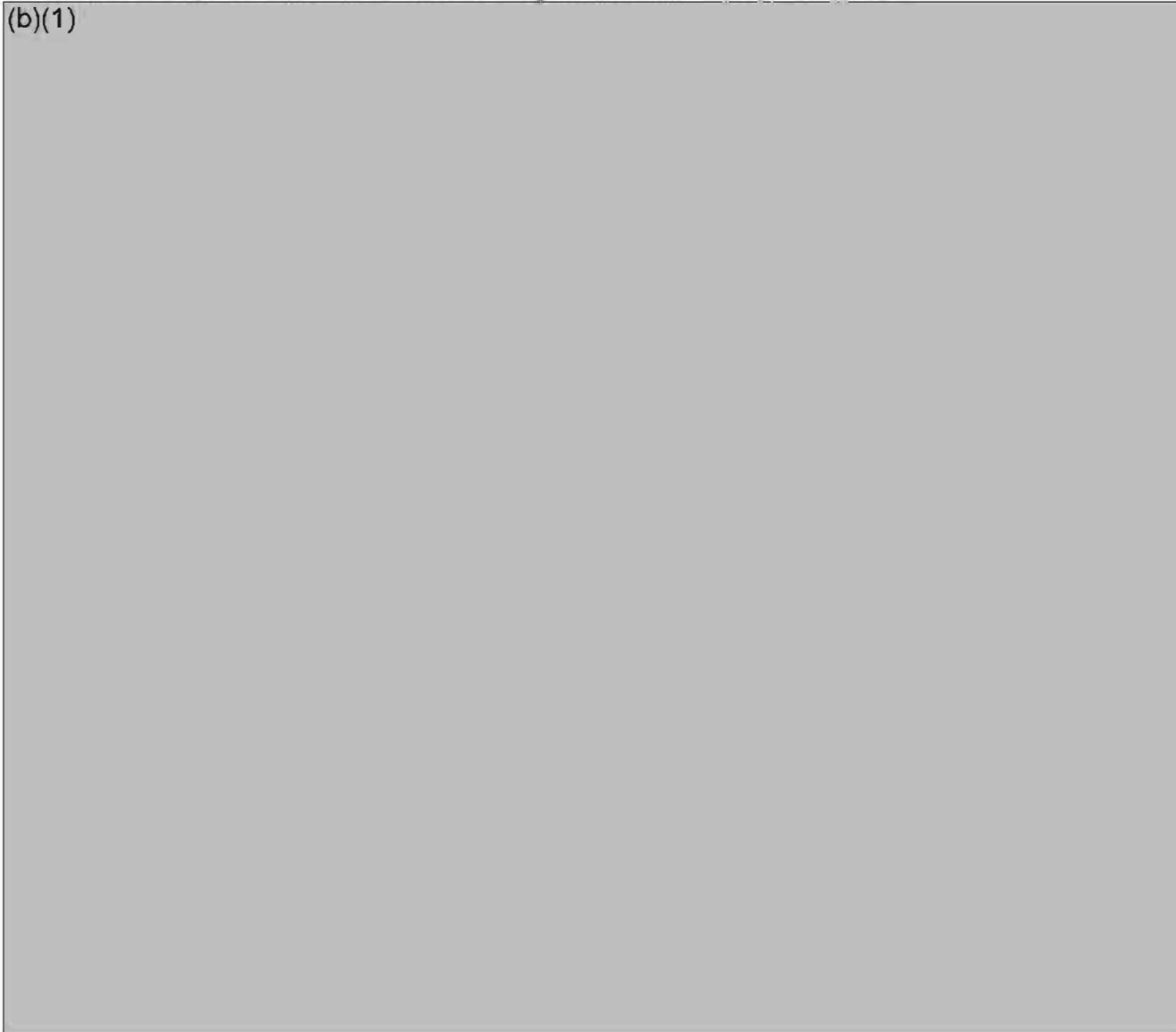
(b)(1)

SECRET

where the vulnerability of the enemy system is uncertain, the level of required damage not precisely specified, and the accuracy of attacking missiles not well established.

~~(S)~~ For the period up to 1975, and from the standpoint of WEPS, problems involving MIRVs are for the most part related to the employment of currently programmed U.S. systems, since more advanced systems would not be operational before 1975.

(b)(1)



¹ (U) The numbers of weapons and pen aids which may be profitably packaged on one missile.

SECRET

(b)(1)

~~(S)~~ The fundamental problem in offensive missile allocation to defended targets involves dealing with wide-ranging uncertainties and the related problem of specifying (or establishing) (b)(1)

(b)(1)

~~(S)~~ The impact of projected MIRV forces on the employment of other U.S. strategic offensive systems and on Soviet strategic plans is considered following brief descriptions of other major

(b)(1)

(b)(1)

~~(S)~~ The U.S. defenses, in this time period (up to 1975), will include the SENTINEL system and some evolutionary changes in air defenses against bombers (notably the Airborne Warning and Control System). Neither development is expected to affect radical

SECRET

(b)(1)

~~(S)~~ With the exception of the FOBS, the changes in the threat indicated above lead to considerations which parallel those introduced by similar U.S. systems. The uncertainties associated with force sizes, specific characteristics, systems capabilities and effectiveness are much greater, however, and the consideration of scenarios, tactics, and objectives must be viewed differently. The FOBS represents an alternate penetration mode against which no effective defense may be available.

Surveillance, Reconnaissance and Information Systems

~~(S)~~ In the 1970 to 1975 period, new sensor data and information processing improvement could provide the U.S. with a (b)(1)

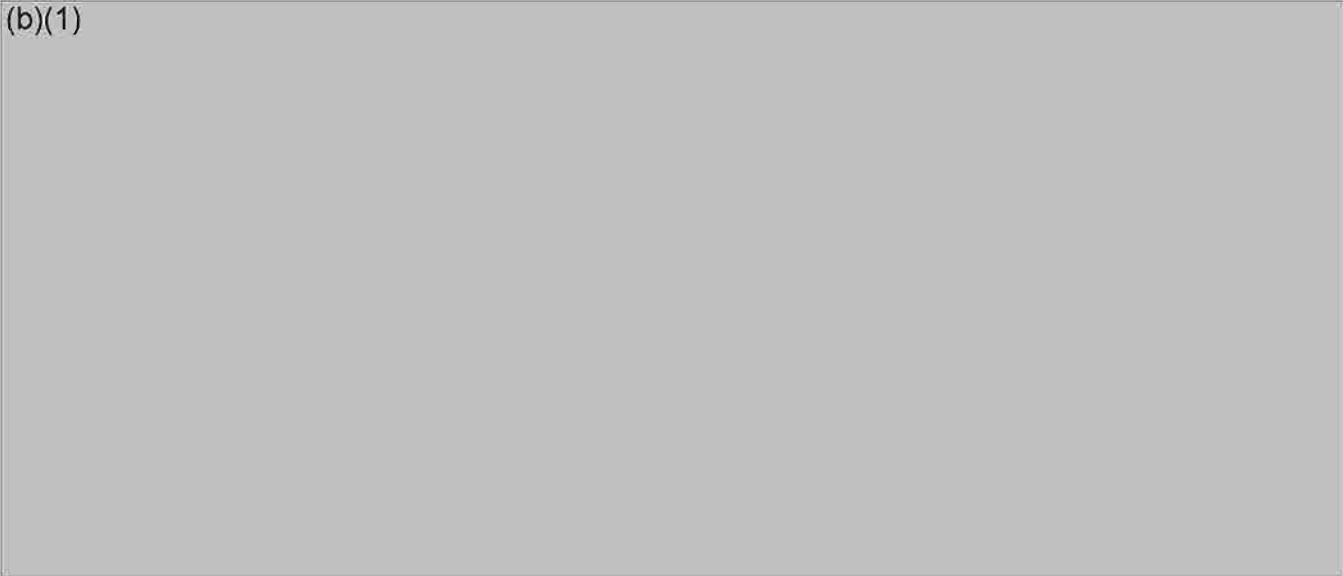
(b)(1)

¹ ~~(S)~~ However, the SENTINEL system or the improved air defenses could (b)(1)

² ~~(S)~~ Command and control capabilities for the period 1970 to 1975 are discussed in detail in WSEG Report 129 (IDA R-141), Command and Control of Offensive Nuclear Weapons in the 1970 to 1975 Period (U), ~~TOP SECRET~~. The study also includes an evaluation of current capabilities.

SECRET

(b)(1)

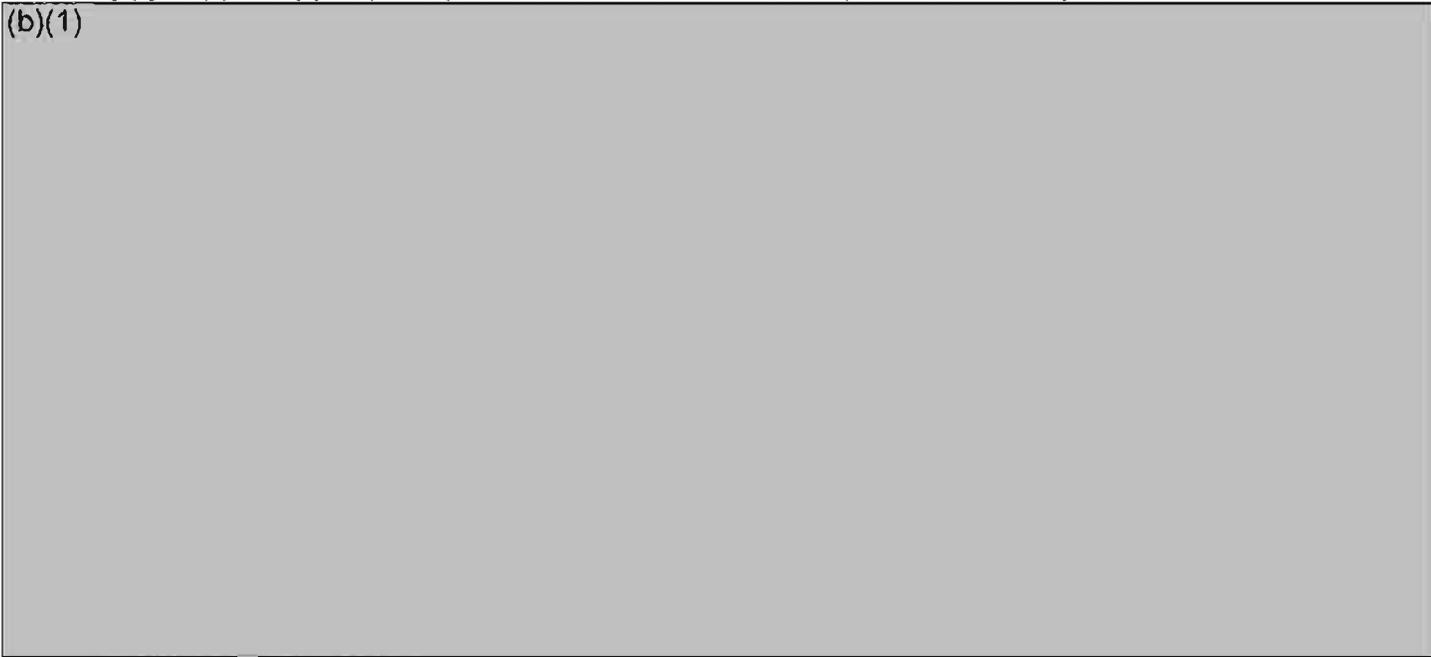


The considerations of most interest can, accordingly, be grouped into two major categories as follows:

- Potential Soviet reaction to U.S. MIRVs, and changes in the application (or targeting) of their strategic offensive forces.
- The impact of MIRV forces on the employment of other U.S. offensive systems in the time period 1970-1975.

Potential Soviet Reaction to U.S. Offensive Missile Forces

(b)(1)



SECRET

(b)(1)

U.S. MIRVs and the Employment of Other U.S. Offensive Systems

(b)(1)

(b)(1)

have major implications on the employment of U.S. strategic forces in general. Although the optimum application of programmed missile forces¹ is still quite unclear, the potential impact of U.S. missile forces

(b)(1)

(b)(1)

² (U) New aircrafts, air-to-surface missiles, decoys, counter-measures, etc.

³ (U) In the form of: (1) mutual support in defense suppression or denial; (2) shared targets; or (3) greater separation and independence than in present plans.

— —

— —

SECRET

B. STRATEGIC FORCES: 1975 AND BEYOND

~~(S)~~ With further extension in time, the emphasis naturally shifts from employment of programmed forces to requirements for new weapons. The design of strategic forces to meet new or existing objectives and to counter a wide range of potential enemy capabilities becomes the principal preoccupation, and evaluations of new concepts and proposed improvements are essential prerequisites in this process.

~~(S)~~ For projections beyond 1975, the forces might include one or more of the following systems:

- U.S. Offense

- Boostglide, cruise, and/or advanced maneuvering reentry systems.

- Reconnaissance and realtime surveillance and information systems.

- New missiles, aircraft, air-to-surface missiles, MIRVs, decoys, pen aids, etc.

- U.S. Defense

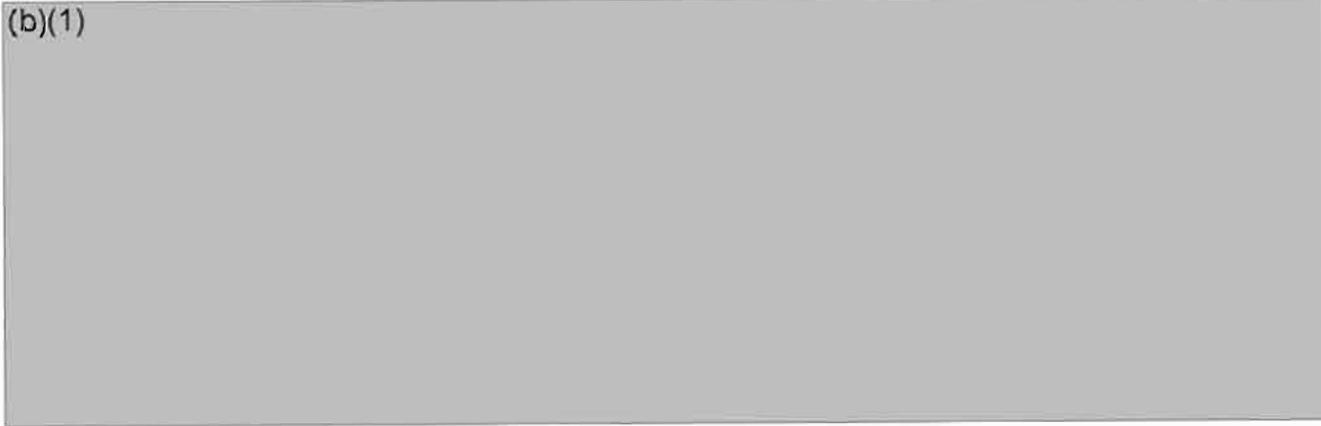
- New warning and surveillance systems (serve both offense and defense).

- Boost and/or mid-course missile defenses.

- New area and terminal defenses for cities for military sites.

- New air defense systems - long range interceptors - improved sensors and control systems.

(b)(1)



TOP SECRET

IV. TOPICS RECOMMENDED FOR CONSIDERATION

~~(TS)~~ In addition to its broader implications relating to matters of employment, requirements, and design features, the study directive calls for consideration of the following more specific topics:

- Target characteristics and MIRV effectiveness,¹
- defense characteristics and MIRV effectiveness (1).

(b)(1)



- Reprogramming, retargeting, and related command and control considerations (6).
- Ballistic missile design features and prospective weapons application³ (8) (9).

~~(S)~~ The above listing includes all items indicated in the directive, and all have already been discussed. The last item, the consideration of new designs, is more appropriate for the

¹ (U) The numbers indicated in brackets at the end of each subparagraph refer to paragraph numbers in the study directive.

² (U) This is the mirror image of the original statement of the Phase III CONAD NIKE-X Operational Impact Study. Since the study was later expanded to consider the effects of incoming offensive weapons, the mirror problem is assumed restated accordingly.

³ ~~(S)~~ Including the influence of the employment of multiple low-yield nuclear warheads on ballistic missile systems design.

SECRET

post-1975 time period. All other weapons-related issues, and the question of flexible response in particular (reprogramming, retargeting, command and control), extend through the post-1975 period.

SECRET

SECRET

V. BACKGROUND OF EXISTING STUDIES

~~(S)~~ An extensive range of studies and analyses exists to provide background for the WEPS task. Those of most interest were prepared to support or comment on major DoD plans and programs including: (1) JSOP, Service recommendations, and (b)(1)

(b)(1)

Studies related to force requirements and selection or evaluation of proposed weapons are particularly applicable to the period starting about 1975. A larger number of studies of a more specialized nature and a narrower scope, involving close scrutiny of potentially critical areas, are also pertinent. This latter group includes a wide range of topics including target characteristics, technical capabilities, operational considerations, and physical phenomenology.

~~(S)~~ The limitations of existing studies, the approaches yet to be developed, and the investigations that remain to be conducted are more closely relevant to the definition of a new study program than are the positive contributions of past efforts. The remarks which follow are not intended, therefore, to represent a balanced evaluation of published studies and current methodologies,² but rather are meant to emphasize the weaknesses of existing analyses in preface to the discussion of the proposed WEPS studies.

A. INPUT UNCERTAINTIES AND CURRENT METHODOLOGIES

~~(S)~~ Although sensitivity analyses and parametric studies are often conducted, uncertainties are generally treated as peripheral

¹(U) Red Integrated Strategic Offensive Plan

²(U) A comprehensive review of the purpose, character, and applicability of pertinent existing (or ongoing) studies, and their relationship to WEPS, is planned for Phase II.

SECRET

issues. The analytical techniques used tend to dictate the form of the inputs and force them to take on qualities (precision) that are inconsistent with realistic assessments of existing information (or knowledge).¹ Frequently, for example, the range of values used in parametric studies is controlled to retain the application of selected mathematical models. To a degree, therefore, the inputs originate in the analyses which use them.

~~(S)~~ The uncritical attitude towards inputs results, in part, from the paucity of objective evaluations² dealing with either the capabilities of existing systems or the prospects offered by the RDTE programs approved for future systems. More generally, the noted weaknesses reflect the distant relationship which exists between the evaluations of system capabilities, as actually carried out, and the inputs used in requirement or employment studies.

B. ASSUMPTIONS AND CONTROLLING FACTORS

~~(S)~~ A major fault in many studies is that the relation between the assumptions (scenarios, postulated capabilities, assumed threats, selected strategies and tactics, etc.) and the results is often quite unclear and is obscured by the analysis rather than exposed by it. The factors most directly affecting the results or conclusions are often insufficiently highlighted; and the merits of the analysis, its dependence on the mathematical models that are used, and the justification of their complexity are rarely seriously discussed. The balance between assumptions and analytic developments and between different parts of the

¹ ~~(S)~~ Neither uncertainty in the performance of systems nor in the knowledge of existing or future capabilities (or performance) is adequately recognized.

² ~~(S)~~ Since few evaluations are carried out by independent agencies (i.e., not responsible for either development, maintenance, or operation) factual information that might provide a basis for questioning or refuting is not often available nor widely distributed when obtained.

SECRET

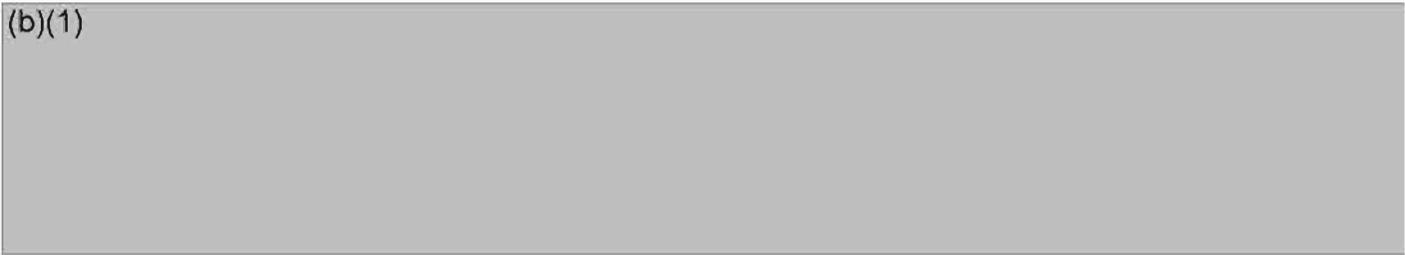
analysis is also frequently questionable, e.g., the detail and precision carried in some areas are inconsistent with the gross assumptions and uncertainties in others.

C. ANALYSES AND CALCULATIONS

~~(S)~~ In one category of studies, the contribution of the analysis to the results obtained can be quite secondary to the conditions setting it up. In these studies the major steps¹ are external to the analytical or mathematical framework employed and the effort is more or less restricted to a set of repetitive calculations. The models and analyses that do include complete logical developments tend, on the other hand, to be highly stylized (or idealized).

D. NEW CONSIDERATIONS

(b)(1)



¹(U) For example, basic allocation decisions, mixes of weapons to use, specific objectives to be met, selected criteria of effectiveness, etc.

TOP SECRET

VI. BASIC APPROACH OF WEPS

~~(TS)~~ The basic approach of WEPS is to be searching and critical with greater emphasis on the discovery and understanding of causes and effects than on calculations or results themselves. The aim is to develop analyses that can establish meaningful relations between the different factors, issues, and objectives involved in the planning process. The general features of the WEPS approach are outlined in the following remarks.

A. PROBLEM DEFINITION

~~(S)~~ The issues need first to be defined or postulated in terms that are meaningful from the standpoint of an analytical development. The essential character of the problems or plans¹ considered must be clearly exposed, and the significance of the issue investigated must be considered in the full context of the broad study program. With proper appreciation for the interactions, the problems can be reduced to manageable dimensions by partitioning, and the isolated areas can then be pursued in greater depth.

B. ASSUMPTIONS - INITIAL CONDITIONS AND RULES OF ENGAGEMENT

~~(S)~~ Assumptions, scenarios, and postulated strategies and tactics must be critically examined and related to other possible or plausible sets. The sensitivity of results to assumptions, rules, and other conditions (including specification

¹(U) The different objectives of the various planning activities dealing with strategic problems must be understood and recognized.

TOP SECRET

CONFIDENTIAL

and interpretation of objectives) must be fully developed in the analyses and emphasized in the presentation of results.

C. INPUTS - SOURCES OF INFORMATION

~~(S)~~ The nature, quality, and content of the information available to describe system capabilities and weapons effects must be reviewed and evaluated before the form and character of the inputs (including uncertainties) are defined. The development of valid inputs is an essential prerequisite to meaningful force (or system) effectiveness analyses.

D. ANALYTICAL DEVELOPMENT

~~(S)~~ The basic purpose of the analyses envisioned is to develop the logical options and arguments which derive from the inputs and assumptions used, and to indicate how the results obtained relate to the inputs. The analyses must be designed to present results (or insights) in the context of the argument (or development) and assumptions which lead to them.

E. MODELS AND CALCULATIONS

~~(S)~~ Models and calculations must be designed and formulated to account for the validity (or plausibility) of the assumptions and the quality of the inputs and to be compatible with the indicated objectives as well as the form (and character) of the most valid inputs. Within the context of a given analytical development, the degree of mathematical sophistication must be consistent with the nature of the assumptions and the reliability (or uncertainty) of the inputs. Complexity must be challenged, and each added degree justified. Finally, the contribution of models to analyses, and in turn the value of the analyses in providing insights and meaningful results, must be critically reviewed and the essential considerations made clear.

CONFIDENTIAL

F. INTERPRETATION OF RESULTS - CONTROLLING FACTORS AND
PRESENTATION OF FINDINGS

~~(S)~~ The investigation of which factors, assumptions, or inputs control the results is an integral feature of the studies to be conducted. Results are not likely to be definitive, unambiguous, and unqualified: understanding their origin will, therefore, often be the greater contribution, and the presentation of findings must be designed to facilitate a full understanding of the relationship between the process examined and the results obtained.

SECRET

VII. THE PROPOSED PHASE II STUDIES

~~(S)~~ The Phase II program represents a comprehensive effort to respond to the principal questions raised in the study directive. The program proposed (for the period terminating in June 1969) is not offered, however, as a definitive and complete fulfillment of the many investigations indicated or of the very broad scope of the complete statement of the task. Significant insights for the development of further studies are expected from the studies of Phase II. The detailed development of the studies described in this report is also expected to evolve in the course of investigation.

~~(S)~~ A basic tenet of the WEPS project is to make use of pertinent studies done in IDA¹ and elsewhere and to refer problems requiring highly specialized skills to those agencies or groups suited to handle them. In this connection, it is anticipated that certain problems will be identified, partially or summarily treated, and recommended for consideration in separate studies.

A. EMPHASIS IN PHASE II

~~(S)~~ The question of how to deal with the uncertainties associated with the capabilities of opposing strategic forces and the conditions of their potential employment is to be a recurring theme in the WEPS study program. The emphasis in Phase II is to be on the employment of programmed forces in the time

¹ (U) Including WSEG Reports 129 (IDA R-141), Command and Control of Offensive Nuclear Weapons in the 1970 to 1975 Period (U), ~~TOP SECRET~~, and WSEG 121 (IDA R-129), Accuracy of Strategic Missile Systems (U), ~~TOP SECRET~~.

SECRET

SECRET

period 1970-1975. The studies are to lead to considerations of:

- Guidance and criteria, and rules and procedures, for the employment of U.S. forces; and

(b)(1)

~~(c)~~ The program proposed for Phase II incorporates both practical investigations of more immediate problems and less predictable research for new insights through logical developments and new methodologies. The program consists of a "context" study and two major "component" studies. The major "component" studies included in Phase II were selected to give emphasis to

(b)(1)

(b)(1)

(Figure 4).

The intent is to extend the initial list of topics selected for investigation in greater depth, as the context study develops and more resources become available, in subsequent phases of the study. Figure 4 illustrates the relationship between the major "component" studies and the "context" study.

B. THE "CONTEXT" STUDY

~~(c)~~ The basic purpose of the context study is to provide:

- A logical arrangement of the considerations pertinent to the general problem of nuclear warfare, from national objectives to specific employment criteria.
- A description of the complete process of planning for strategic war insofar as it can be grasped.
- A basis for reference and a broad background for considering specific issues.
- Guidance for the identification, selection, and development of the more specialized studies (significant problems and controlling factors, interactions and definable boundaries, initial conditions and assumptions, limitations and uncertainties in inputs, etc.).

CONFIDENTIAL

- Guidance concerning the applicability of different models and calculations.
- General methodologies for aggregating or integrating models, simulators, and separate analyses.

~~(S)~~ In addition to providing a framework for interrelating all factors relevant to the general problem of nuclear warfare, the context study will develop data bases¹ and methodologies and include rather unconstrained research into fundamental considerations. The end product of the "context" study in Phase II will be a preliminary set of integrated guideline analyses for the employment of programmed strategic forces. Figure 5 suggests the contents of the proposed context study effort and the following paragraphs elaborate upon it.

Frame of Reference

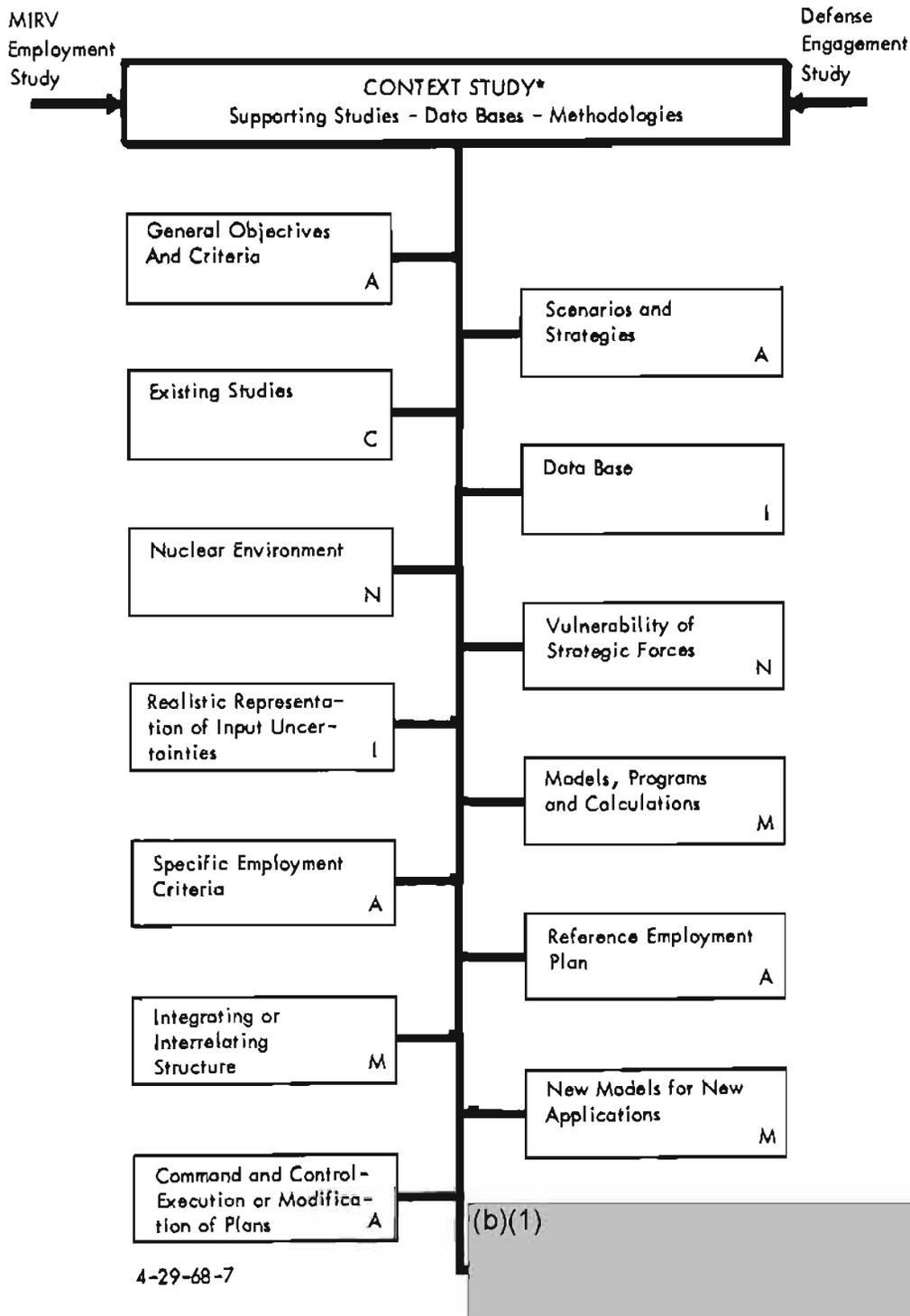
(U) The primary function of the context study is to develop a logical structure (a broad synthesizing framework or model) to relate the essential elements of the total problem including such wide-ranging questions as the employment of programmed forces, future force requirements, and optimum design features. New mathematical models would be expected to evolve as new approaches were explored, interactions identified, and the logical consequences (options and alternatives) of selected assumptions and inputs developed.

Objectives and Scenarios

~~(S)~~ As indicated in the statement of approach, general objectives must be interpreted and transformed into specific postulates before analyses can be developed. Similarly, appropriate forms must be found to represent the range of possible confrontations or engagements. The context study will therefore include:

- The identification and collation of objectives and criteria implied in policy alternatives, development (and procurement) decisions, and current employment plans;

¹(U) Including official intelligence estimates.



*The elements of the "context" study are shown in sequential order. The code letters (A, C, etc.) indicate related subjects.

FIGURE 5 (S) "Context" Study (U)

CONFIDENTIAL

- The definition of scenarios, composition of future forces, conditions of engagement, and general strategies for different types of studies including aggregated analyses, topical studies, and specialized technical or operational investigations;

and provide a spectrum of well-defined possibilities (rather than one or more special sets of conditions).

Applicability of Existing Models and Analyses

~~(S)~~ One of the first tasks to be carried out within the context study will be a survey and critique of current studies¹ including discussions of essential features, major contributions, and relationship to the WEPS program.

~~(S)~~ A compendium of force exchange models, system optimization programs, design trade-off methodologies, damage calculations, and weapons effect models will also be prepared, and the value and applicability of each type (and specifically those used in support of major DoD planning activities) will be critically evaluated.

Specification of Inputs

~~(S)~~ The input studies will include development of data bases including research dealing with input uncertainties (limitations of data sources) and mathematical forms for realistic representation of existing knowledge.

~~(S)~~ The research effort will attempt to develop logical arguments and mathematical procedures that would allow retention of realistic descriptions of capabilities and uncertainties (or statements of inputs) and yet provide meaningful insights and quantitative relationships and results.

~~(S)~~ The development of a comprehensive data base will include intelligence on enemy capabilities and estimates of U.S. capabilities.

¹(U) Either recently completed, under way, or planned for the near future.

CONFIDENTIAL

Nuclear Environment

~~(U)~~ In view of its critical importance, a substantial effort will be devoted to weapons effects including:

- Definition of potential nuclear environments, including uncertainties in basic phenomenology, and effects and estimated effects (and uncertainties) resulting from the application of nuclear weapons to military and civilian installations;
- Consideration of the vulnerability of strategic forces (including command and control systems), and post-attack conditions, capabilities, and uncertainties.

Employment Plan

~~(U)~~ Plans for the employment of current and programmed forces will be developed as part of the context study to provide a frame of reference¹ for the component studies of the WEPS program. The plans will consist of specific criteria for employment covering the most specific to the most general considerations. The approach will involve definitions and developments of plausible sets (of criteria) rather than the selection of specific or unique ones. The original plan would be expected to expand and eventually include criteria for the design of future strategic forces.

Command and Control

~~(U)~~ The command and control of strategic forces will be examined with emphasis on force execution, and on the potential advantages and risks which result from retargeting strategic forces. In this regard, the study will also discuss the difficulties inherent in structuring war plans to correspond to foreseeable confrontations and the problems associated with altering those plans in response to developing crises.

¹(U) The initial plan will be a starting point for the Phase II studies and will then evolve with the development of the WEPS study program.

TOP SECRET

Weapon System Evaluations - Future Forces

(U) A survey will be made, of current U.S. and Soviet development activities, directed toward a comparison of the potential effectiveness and relative costs of new systems and design features.

C. EMPLOYMENT OF U.S. OFFENSIVE FORCES

~~(TS)~~ The central area of interest in the overall study is the employment and effectiveness of the U.S. strategic offensive forces, and MIRVs in particular, and the effect upon them of

(b)(1) In the context study, the examination of this major theme will be developed by consideration of the substantive areas below, many of which, in turn, will be supported and complemented in detail in the component studies.

~~(TS)~~ The investigation of U.S. offensive force employment will be developed around the allocation of weapons (and weapon mixes), as that choice is affected by uncertainties in several major areas: the effectiveness of U.S. weapons; enemy capabilities and tactics; and the manner in which hostilities develop. Also critical to this selection are the implications of conservative vs. higher risk employment plans, the coupling between different missions and objectives, and the overall question of confidence levels for meeting specific objectives. The examination of these factors in the context study is expected to follow a sequence resembling that described in the following illustrative development.

An Illustrative Development

(U) The following sequence is meant as an example, rather than an enumeration of all major areas which will be covered as the study progresses. It is meant to indicate the scope and texture of the examination and to point out specific areas which may be covered in detail in the component studies.

TOP SECRET

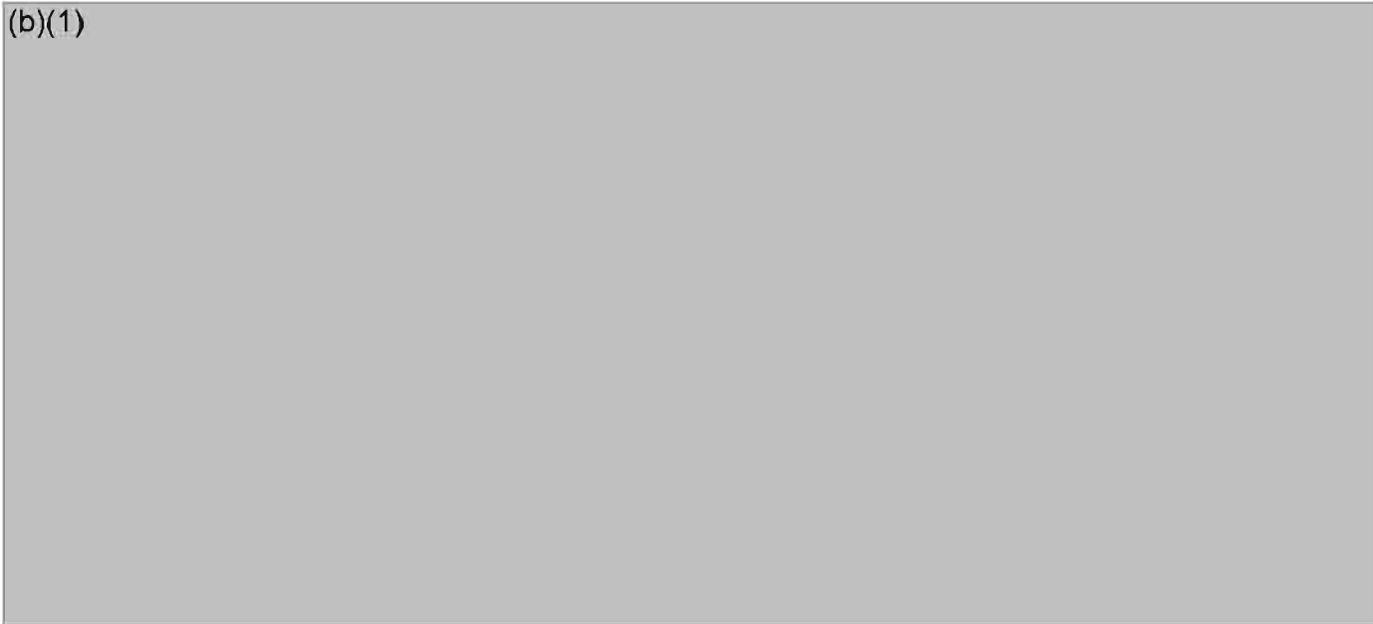
~~(TS)~~ For each target category the preferred missile and bomber type will first be assessed with emphasis on the missions best suited to each system as determined by its unique characteristics. Thus, for example, mission choice and targeting for

(b)(1)



~~(TS)~~ Consideration of alternative tactics will begin with an examination of the relative advantages of attacks by sea-based or land-based systems, and will be followed by a develop-

(b)(1)



SECRET

(b)(1)

~~(S)~~ To complete the examination of the major strategic forces which will affect overall planning during this time frame, consideration will also be given to the application and potential capabilities of U.S. ASW forces against the mounting (b)(1) threat.

D. MAJOR "COMPONENT" STUDIES

~~(S)~~ The problems and issues requiring most immediate attention include the following:

(b)(1)

- The optimum employment of programmed U.S. missile forces equipped with MIRVs;
- (b)(1) and the impact of uncertainties in enemy defense capabilities on the employment of MIRVs;
- The employment of missiles and bombers in the presence of enemy missile and air defenses.

Initially, the first and fourth topic would be considered as elements of the context study² while the second and third would be subject to intensive (concentrated) effort and developed as major "component" studies.

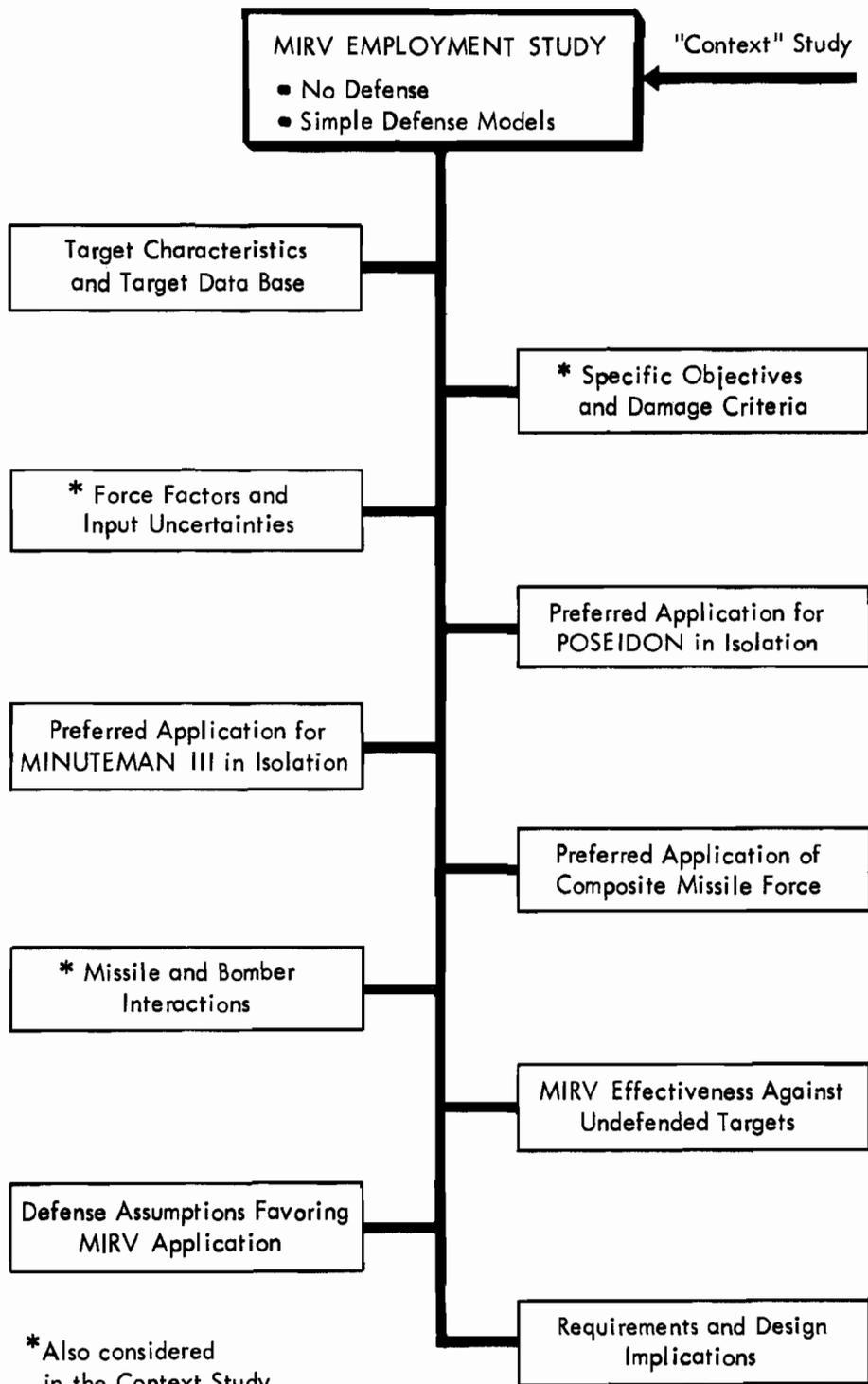
MIRV Employment Study - Defense Engagement Study

~~(S)~~ The two major component studies are referred to as the MIRV Employment Study and the Defense Engagement Study. A brief outline of each is presented in Figures 6 and 7, respectively.

(b)(1)

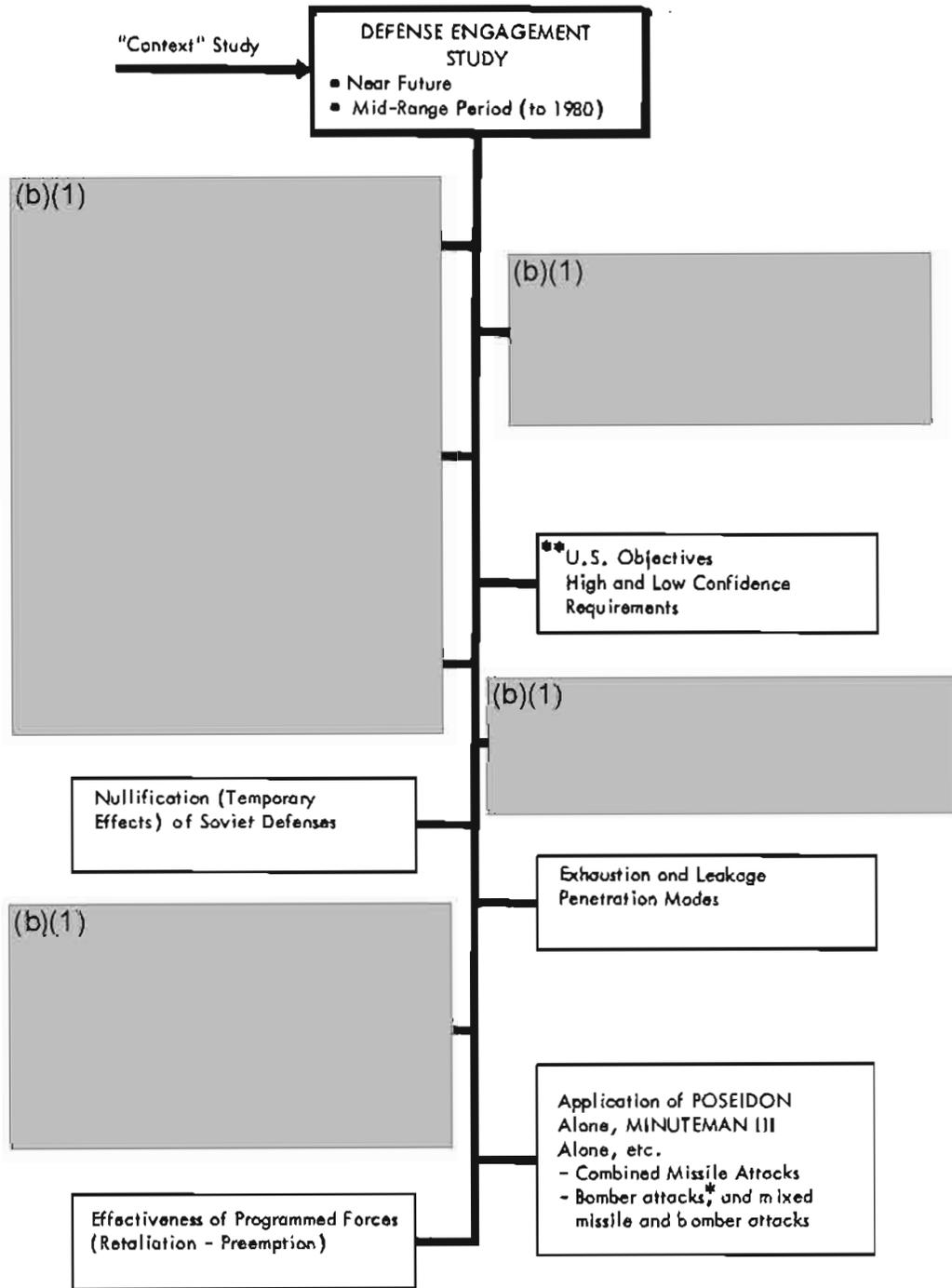
(U) Included in Figure 4 under Other Component Studies.

SECRET



4-29-68-8

FIGURE 6 (U) MIRV Employment Study (U)



4-29-68-9

* Bombers and bomber defenses are considered insofar as they interact with missile forces.

•• Largely developed in the Context Study

FIGURE 7 (C) Defense Engagement Study (U)

~~CONFIDENTIAL~~

Figure 4 indicates that component studies and context studies are to be integrated to provide an overall assessment of the problem of strategic offensive weapons employment in the presence of defenses.

~~CONFIDENTIAL~~

UNCLASSIFIED

VIII. THE DEVELOPMENT OF THE STUDY PROGRAM - SCHEDULES AND SUPPORT

A. GENERAL OUTLINE

(U) The durations of the studies and investigations proposed for Phase II are indicated in Figure 8. The development of the program is indicated below.

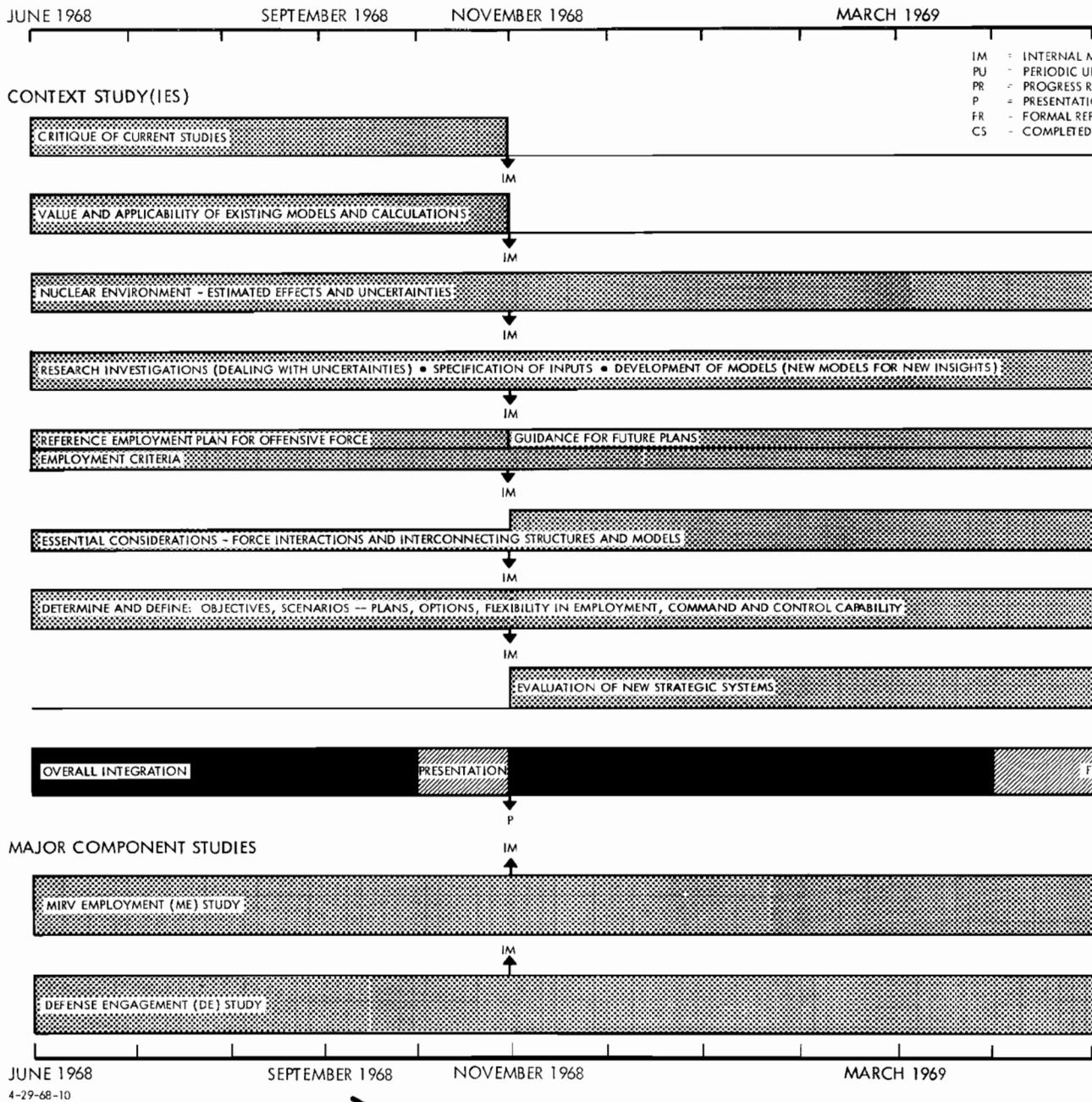
Mid-Term Tasks

(U) The mid-term tasks are to be completed in October of 1968, and are to include surveys and evaluations of existing studies, and discussion of the applicability of various models and methodologies to the problems encountered in different phases of strategic planning.

Continuing Studies Involving Wide-Ranging Considerations

(U) Both iterative and serial approaches will be followed in the "context" study with at least one iteration planned in each area of investigation, starting in November 1968. This portion of the project will be characterized by periodic overviews and numerous short tasks. One group of studies is intended to accomplish the following: provide the context for the major issues and problems considered in the separate component studies; guide the application of resources to the most significant considerations within the ongoing program; and identify the most profitable areas for further study. Other tasks will, in various substantive areas, involve search for potential insights and inferences, and the development of new methodologies, while yet another group will provide bases and support for numerous analyses (for example, the studies of nuclear environments and weapons effects).

UNCLASSIFIED



CONFIDENTIAL

07

FIGURE 8 (C). Development of WEPS Program, Phase II (U)

JUNE 1968
4-29-68-10

UNCLASSIFIED

Major Component Studies for Phase II

(U) The major component studies are designed for the duration of Phase II, and are expected to make substantial contributions toward the resolution of the problems of MIRV application and defense penetration.

B. REPORTS AND PRESENTATION

(U) A comprehensive briefing on the progress of the principal studies will be prepared for presentation in October of 1968. A formal report on the Phase II program will be published in June of 1969.

C. SUPPORT

(U) The Phase II program is predicated on the following support.

Full-time Personnel from WSEG/IDA

(U) Sixteen (16) analysts and scientists will be from IDA and six (6) officers from WSEG. Approximately half of these resources will be assigned to the two component studies and half to the context study.

Consultants

(U) It is estimated that approximately sixty man-months of consultant services will be required. The greatest requirement will be for personnel already engaged in studies for the Services and other DoD agencies. Much of the indicated support is expected to be provided through JCS and the Services.

Access to Studies, Models, and Other Analytic Tools

(U) The plan developed here assumes full cooperation from DoD agencies, the Services and their contractors, and easy access to their data, models, and other analytic tools.

UNCLASSIFIED

Computer Support

(U) Although IDA intends to make extensive use of its own computing facility, it is anticipated that occasions will arise when computations would be more efficiently carried out elsewhere. JCS or Service assistance will be sought to provide the necessary services in such cases.

Specialized Investigations

(U) It is envisioned that the progress of the WEPS program will depend on the accomplishment of certain tasks by outside agencies. The WEPS project intends to identify studies which might be more efficiently and expeditiously conducted by other groups.

D. PROJECT ORGANIZATION

(U) The organization of the project as presented in Figure 9, parallels the study program presented in the previous section. Figure 9, however, depicts the delineation of specific tasks as opposed to the logical development of the substantive study areas indicated in Figures 4, 5, 6, and 7.

(U) The following explanatory notes apply to Figure 9:

- The "context" study is detailed in the center of the diagram and includes those study areas within the broken line. The two major "component" studies are shown on either side.
- The code letter M on the figure refers to mid-term tasks (i.e., to be completed in October 1968).
- C refers to component studies, C-1 and C-2 being the major component studies, while C-3, C-4, C-5, and C-6 are "other" component studies. C-6 (U.S. Defenses) is included although it is to be primarily a monitoring activity in Phase II.
- S refers to supporting studies. S-4 is planned as a modest effort, developing during the second half of the Phase II program.
- P refers to employment plans and command and control considerations.

