THE ARMY LOGISTICS STUDY SYSTEM

PRC R-873
30 September 1966

Prepared for
The Board of Inquiry on the
Army Logistics System

PLANNING RESEARCH CORPORATION
LOS ANGELES, CALIFORNIA WASHINGTON, D.C.

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ABSTRACT

~~This~~ report describes the studies, workload, procedures, and organizations of the Army logistics studies system. A master program of study projects is proposed. Alternative organizational changes are examined and an organization to augment DCSLOG's effort is recommended. The types of personnel needed to staff this organization are discussed. Procedures for DCSLOG and Chief of Staff guidance of this effort are described.

FOREWORD

This is the final report on the Army logistics study system completed by Planning Research Corporation for the Board of Inquiry on the Army Logistics System under Contract DA-49-092-ARO-155. This study was conducted from 1 June 1966 through 30 September 1966. The key original guidance for the study may be found in Appendix H. It calls for an examination of the current state of the system and for recommended improvements in the areas of study program content, management procedures, and organizations to carry out the studies.

Section I looks at the study system from the viewpoint of the individual studier and the problems it presents for him. This section also presents several key definitions. Section II reviews the content of the current study program and proposes 30 new projects for initiation. Sections III and IV discuss management procedures and organizational alternatives to improve the current situation. Conclusions and recommendations are contained in Section V. The appendixes provide detail about current study effort, procedures, and study organizations.

The reader who is interested in a summary of the study results should read Sections I and V and glance at Appendixes B and F.

In preparing this report, the authors became indebted to many individuals. Thanks are due first to the many busy people, listed in Appendix D, who gave generously of their time during the interview phase of the study. In this respect the authors particularly appreciate the suggestions and leads provided by Mr. Richard Ross of ALMC and Mr. Charles Davis of OUSA. They also wish to acknowledge the contribution of Mr. Steadman Noble, who pointed out the need for the suggested project on less essential items and units.

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LIST OF EXHIBITS

I. STUDIERS

Four basic terms used throughout this report are defined in the next few pages. This section then turns to the individual studier and his problems. It discusses those important intangibles, such as motivation and study environment, which influence the quality of logistics studies. The achievement of these intangibles becomes the goal of later sections that deal with programs, organizations, and procedures.

DEFINITIONS

Logistics Studies

A "logistics study" has been defined by DOD as follows:

> Logistics studies are objective and analytic inquiries directed toward the improvement of existing or planned for future logistics doctrine and management. Logistics studies include: (1) studies of logistics systems undertaken in response to existing logistics management problems; (2) management surveys in logistics areas; and (3) investigations of new methods, procedures, and techniques in real or simulated logistic environments. (Reference 8)

While the definition used here emphasizes management doctrine, a study dealing with the operation of a particular item of equipment is included in the scope of this report if it has a widespread impact on logistical concepts. This would include, for example, a new mode of transport such as the C5A. Studies dealing with the design and development of hardware were excluded. Because a considerable overlap was found among logistics, operations research, and management studies, all of these were freely included when their content was logistics. The functions of logistics which were included in the selection were procurement, storage, inventory control, maintenance, transportation, construction, consumption, medical, and services. Personnel management, communications, computers, and cost analysis were considered tools, not functions, and a study of these tools was excluded unless it addressed itself as well to one of the nine logistics functions. A list of those active studies that required more than 4 man-years of effort may be found in Appendix B.

Structure Studies

The purpose for which a study was originated provides a useful basis for classification. Some studies aim at long-range objectives, some at particular problems. From this point of view, three types of studies can be identified: "structure," "directed," and "supporting."

A "structure" study in this report is one which is aimed at the systematic, preplanned design of a logistics system. The study is approved and funded by the Chief of Staff and is included in the Army Master Study Program. It will usually be one in a related grouping of studies, all of which aim at a particular problem. The coordinated projects to produce a design for the logistics system for the 1980 objective year would thus consist of structure studies.

A structure study program should begin with a statement of the major objective. This is followed by a succession of analyses with the purpose of subdividing the work systematically to produce study directives for subordinate study agencies. The agency may elect to do part of the work and to assign other parts to subordinates. When the results from the detailed, specialized work are available, the flow reverses, requiring successive synthesis until the final master study is produced. The entire coordinated group of such specialized studies and broader syntheses are referred to as "structure studies."

Directed Studies

This is the type of study that does not fit into a structure study program, but rather is undertaken because someone with power and authority wants it. The originator, who is in OSD or on the Army General Staff, urgently needs an answer to a comparatively specific question. It often has a different set of assumptions from the overall direction of the study program and, as such, provides a way to interject new ideas into the program. "Examine the effect of the C-5A on Army logistics" is an example. The work is often done by a talented ad hoc team drawn from several agencies. The design of a system is usually not an objective, but may be a tool of analysis. There is seldom time to examine any but the first order implications of the recommendations, nor to develop or confirm a

solid data base. Because of this, the conclusions may be suspect. One of the purposes of structure studies, then, is to provide a better foundation for directed studies.

Support Studies

Support studies are those originated by operating agencies from problems as seen from there. They represent the effort of field agencies to study problems on their own initiative. There is usually no support for them at higher echelons, and they are often unrelated to a structure study or a program objective. On the other hand, they offer a way of injecting a fresh idea into a stale system. They are confined to subjects entirely within the responsibility of the proposing agency, and thus seldom examine interfaces with agencies external to the Army. This type of study is important since it offers the agency where the thought is done a way to take the initiative, but this work often lacks priority when either of the other two types makes demands on talent. Most of the studies submitted in response to "dragnet" letters that lead to the ARO-managed and Army Master Study Program are of this type.

PROBLEMS OF THE INDIVIDUAL STUDIER

To understand some of these intangible but important changes, the problems of an individual studier were analyzed in some detail. A typical studier with reasonable technical ability, willingness, and background is working on a nominal 6-month to 1-year study. Before analysis of the overall study system, the question was asked, "What are the problems faced by this individual?" The authors have individually participated in and directed many such studies and have experienced many times the conditions facing this typical studier. Since this studier is the man who must eventually produce the results, it is desirable to make his job as feasible as possible. The immediate objective is maximum quality for a particular study. The long-range objective is training and motivation of Army personnel skilled in large-scale, systematic analysis.

Study Execution

The classical steps in a study are: review of problem statement and assumptions, formulation of questions or "essential elements of

analysis," literature search, hypothesis development, model building, data collection, analysis, synthesis, and production of the report.

Concurrent with this effort, the studier faces the demanding problems stemming from administration and time. As a first consideration, then, he may not realize how to anticipate administrative bottlenecks, nor even know the standard procedures involved. Each administrative step takes time, requiring at least some planning. Though formal planning procedures are available, they are too burdensome for small or short studies. Some tested short form of these methods should be published as an aid, including realistic estimates of lead times for such steps as visit clearances and report publication.

The quality of problem statements is deficient in comparison with problem statements for hardware type studies. In the authors' opinion, the senior Army long-range documents, such as the BASE, the ASP, and the CDC Concept Study, do not provide adequate guidance for study program development. One indicator of the deficiencies in these documents is their scarcity of numbers, formulas, and explicit alternatives. Those who use these documents depend on them in the same manner as troops depend on mission orders. Why not, then, produce explicitly in these documents (and any problem statement) a set of objectives, missions, and uncertainties? These can be used to give perspective by identifying important uncertainties worthy of study and showing major interactions, limits, alternatives, etc. Just as a commander's "concept of the operation" anticipates alternate courses of action from his staff, so an Army concept study might anticipate alternative solutions from the study agencies. As far as feasible, the concept study should say why or how requirements were reached, in the spirit of intellectual inquiry rather than dictum. They should provide leads for deeper inquiry, which will obviously be needed. These documents are valuable only insofar as they guide the subsequent work in building the Army, so it is worth considerable effort to make them useful.

Literature search is comparatively easy for those in the Washington or Fort Lee areas, but even here the investigator needs some help in identifying the several document collections and in learning how to quickly use

them. It would help. at least for contractors, if clearance and need-to-know could be established at one point for ASDIRS, DLSIE, DDC, the Army Master Study Program, and the DCSLOG-AMC Study Program. Since the literature search step is an early one and the establishment of a clearance sometimes takes over a month, administrative delays simply reduce the effective time that can be devoted to study effort.

In the hypothesis and model building areas, the experience and integrity of the individual studier are dominant. The study system here has little control beyond motivating a studier to do his best. Most people work best when they feel they are working for themselves. A studier is motivated to do a better job if he knows that the report with his name on it will be circulating among his coworkers for years to come. One way of obtaining the associated benefits is to require the names of the principal authors on reports and basic documents of a formal nature. It is important to distinguish (a) the individuals who wrote supporting studies, who verbally provided ideas, and who gathered data from (b) those who were responsible for synthesizing these ideas and data as authors of the report. The standard practice is to acknoqledge the first group in the introduction and footnotes; only the second group should have their names on the cover. Placing names on the cover of a report is done to pin down responsibility. The intent is to publicize the names of people who turn out poor work. This kind of publicity is the only way that has ever been discovered for ensuring the quality of intellectual output. Since the purpose of the practice is to motivate quality, those who had no control over the quality of a report, such as consultants and clerical assistants, should not be listed as authors. Their work should be acknowledged in the foreword. When responsibility for a particular report is identified publicly as specifically as possible, the quality of the work may be expected to rise markedly.

The next major step in a study is gathering data. The collection, interpretation, and publication of data is the foundation on which a study program rests. The problem that a studier faces here is that data collection is time-consuming and the temptation is to allow it low priority. The same spurious numbers are deplored, but used in study after study.

In the areas of analysis and synthesis, the authors noticed that at present there is a tendency to use officers as administrators, leaving the substance of the study to civil service or contractor civilians. As a result officers miss an excellent chance to learn analytic techniques and to practice disciplined thinking. From the blurred picture shown by available data, it appears likely that no more than 10 percent of direct study effort is performed by officers. The present system does not often place an officer in a position where his assignment forces him to think carefully about the war he may someday fight. There appears to be a feeling that if a really complicated military problem arises, soldiers are not competent to analyze it. It would seem that rigorous thinking about a future war is better training for an officer than administration, and that officers should be assigned to do a major share of the actual work of analytical investigation in the Army's study program. In particular, they should be assigned as simulation builders instead of merely users.

Study Evaluation

When a study has been completed it faces the process of evaluation. There is great interest in determining how much benefit the Army derives from studies. To do this well requires much work; to do less is unfair. Some benefits will never be recognized when people forget the source of an idea. Therefore, study evaluation was actively investigated throughout the project. The key documents are References 15 and 30, and this subject was investigated in most of the interviews.

The general conclusion is that the current approach to evaluation does not serve the Army well. Study evaluation is treated as a chore and as such is very seldom done realistically. It apparently contributes too little and requires too much effort to encourage more than formal compliance with the regulation. Evaluation is hard work if done well, and, in PRC's opinion, should be primarily aimed at helping a person who needs the study to evaluate quickly its usefulness to him. By analogy to the areas of production and manufacturing, the evaluators should perform the material inspection. This means certifying

that the study meets specifications (i.e., is responsive to the input guidance and data) and is sound in technique, thoroughness, and objectivity. That is, are the conclusions justified in the context of the study? The purpose of inspection is not to give a final grade to the contractor, but to advise a user of the product's reliability. Whether or not the originator of a study uses the evaluation is up to him and need not be considered in the process of evaluation. Usefulness of the results to the Army is also a separate matter from the study's reliability, and it seems inappropriate for evaluators to be asked to comment on the usefulness of a study or on how and when it should be implemented. The same individuals may prepare such a report, but in that case they are performing staff actions, not evaluation.

The Effects of Time

The burden of time and the threat of deadlines place continuous pressure on the key study project. Much of this burden arises from the larger study cycle measured from the original preparation of the study proposal through to final implementation of its recommendations. Other factors influencing study value are quality and stability of the guidance, quality and volume of work, continuing importance of the study subject, and the organizational environment in which the study is conducted. As time passes during a study, changes in one or more of these factors will tend to reduce the value of the final product. If the erosive effects of time are to be controlled, the attraction of short, intensive projects is apparent. However, there is a loss of effectiveness of another kind as the studies are shortened. The development of methodology, collection of data, analysis, and synthesis of results can only be hurried so much, and these steps are the only part of the larger study cycle that are actually productive.

The preliminary administrative steps, as diagrammed in Appendix E, are essentially inhibitory and contribute importantly to lengthening the study cycle. They are intended to minimize the risks of duplication and misdirection and to meet legal requirements such as approval for contracts over $100,000. The risk which is apparently ignored is that the gain from eliminating misdirection may be lost by the passage of events.

The shaded bars of Exhibit 1 illustrate what might happen if existing administrative procedures were followed for a single cycle of master and derivative studies. It should be noted that only a year was allotted for work on each type of study. The process may take more than 6 years to reach the implementation stage, of which only 2 years would be devoted to actual study work. If this seems overstated, consider the COSTAR-TASTA sequence which has the same scale as the contemplated effort. Without counting the germination period. COSTAR was started in 1960, while TASTA was reported out in 1966.

What, then, might be done to shorten the cycle? The master and derivative studies might be performed in tandem to some degree, even though a major function of the master study effort is to direct the derivative work. Study work might also be started before all comments on the master studies are in, and even before all preparatory administration has been completed. One year might be saved by starting the administrative and technical preparation cycle for the derivative work immediately after completion of the master study analysis phase. Other shortcuts are possible. Exhibit 1 shows a representative study cycle incorporating shortcuts, while preserving the same nominal 1-year period for performing the actual study work. The cycle tends towards project management methods at the expense of staff coordination. Whether or not any of these shortcuts are adopted, a strong scheduling and production control system is badly needed.

The next problem related to time is in selecting the scope of the project and its target year. In the 6 years of the COSTAR-TASTA cycle, world events shifted from Europe to Vietnam, but the study itself did not. Useful forecasts of needs 10 years ahead are difficult to develop, yet the development cycle of operational hardware for Army organizations takes at least this long. One solution might be to initiate and develop several operational concepts at the same time up to the point when commitment of major resources can no longer be postponed. Suppose the major commitment process takes 5 years. Even if the condensed schedule of Exhibit 1 is followed, the overall design could not be a reality in the 1975-80 period. Thus the earliest practical objective year for concept development appears to be 1980.

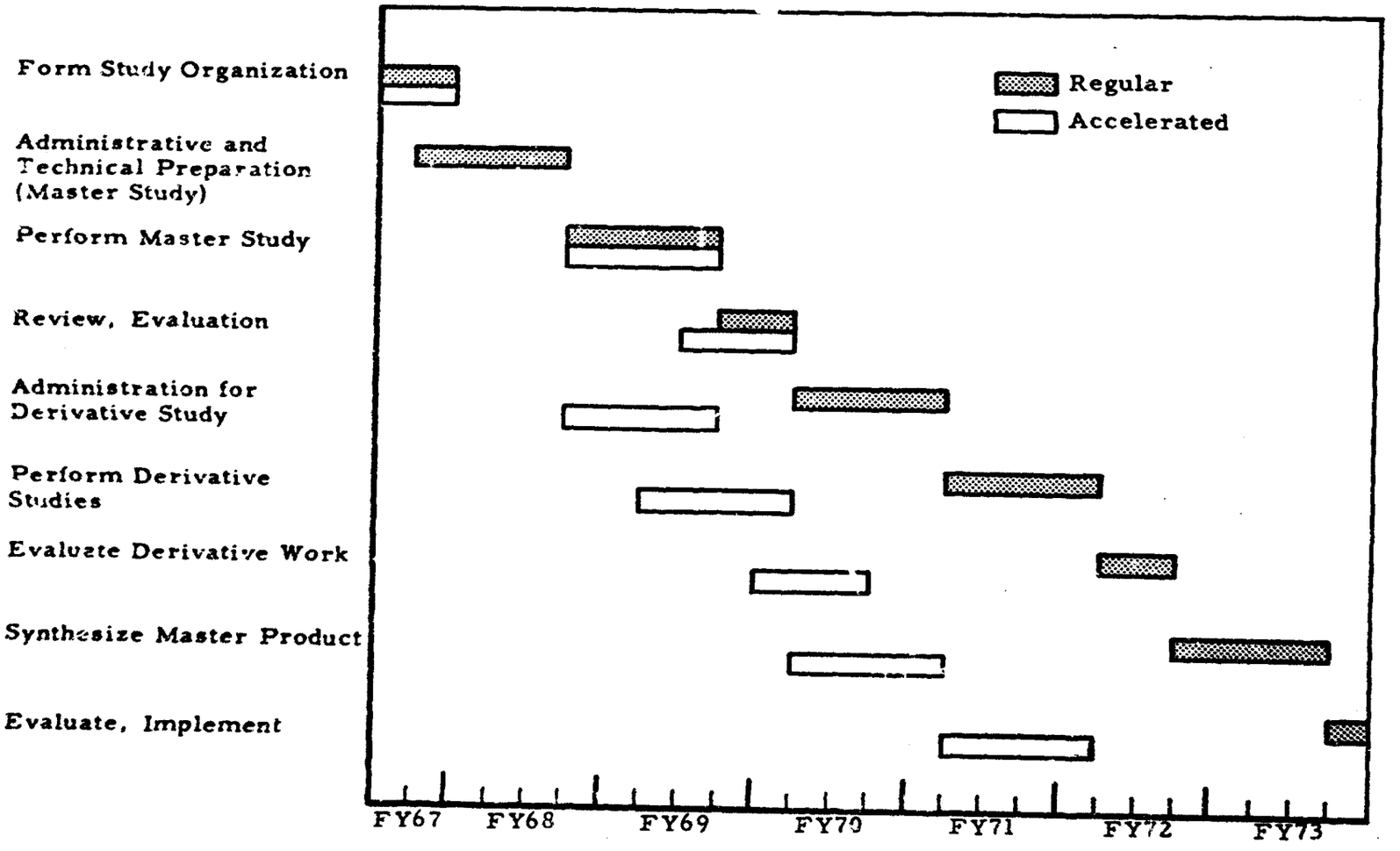


EXHIBIT 1 - OVERALL STUDY CYCLE TIME WITH REGULAR AND ACCELERATED SCHEDULE

The main point of all this is that time is important. A stereotype exists of studies being leisurely and objective, but reality makes a shambles of such a view. Investigators who can make a useful contribution are harried and rushed, while the system does little to alleviate their problem.

Responsiveness to OSD

The people who were interviewed uniformly desire to respond to the aims, plans, and wishes of OSD. Yet somehow, the logistics study system is repeatedly unprepared for questions from this source. Occasionally the difficulty is failure to recognize the value of analytical techniques; more often it is a disparity in breadths of view between OSD and the Army. OSD's interests are long-range and global, while the Army works mostly on near-term problems. There seems to be no method in view to remove this difference. Studiers are swamped, and are falling behind even on near-term questions. The proposed solution is for more people, but this is circular because they will rapidly become absorbed on more of the same type of questions unless some changes are made. Somehow the resources should be found, assigned, and protected to treat three dimensions of logistics studies that are largely unexplored.

One dimension is systematic problem avoidance. This is another name for the selection and design of a logistics system which will not be implemented for several years. CDC's Army Concept Program and AMC's NAPALM work could serve as prototypes.

The second dimension is the study of external agencies, that is, agencies outside the Army on which it depends for its operation. The desired characteristics of these agencies should be anticipated by Army studies so that they will interface with the Army. The word "agency" is used very broadly here. At the top of the list are DOD logistics agencies, Navy, Air Force, and GSA. Other candidates are the U.S. international and foreign transportation systems and other nonmilitary services.

A third dimension relates to technique. OSD asks questions, implicitly, at least, in terms of cost effectiveness, probability, optimization, and quantification. The Army answers not in OSD terms, but in

its traditional language of organization, doctrine, and judgment. OSD asks a question in one language and receives an answer in another. The Army's answer may be right or it may be wrong, but because it is not in the correct terminology it is not given proper credence. To be specific, whether or not FPAO will do a better job of force planning than ACSFOR remains to be seen, but in any event, FPAO's answers will be believed because they will be in a language that OSD understands. For Army logistics studies to carry their due weight, they must speak not only in the traditional language of Army study effort, but also in the language of those who dispense Army funds.

It is anticipated that the added effort of addressing these three dimensions will free many of the currently harassed studiers rather than contribute to their burden. One reason for this is that by providing the framework to the near-term studiers the formative thought processes can be speeded. Some near-term work may even be found unnecessary. Another reason is that the incidence of surprise questions should decrease as the Army better understands OSD's approach and anticipates its problems.

From the viewpoint of the investigator, then, the system does not provide much help. It furnishes him many delays and little leadership. It motivates him poorly, provides little training, and rewards poor work about the same as a quality product. It places great pressure on him to produce quick results, but provides little guidance on how to make those results responsive to the highest levels of the Government. The three sections that follow investigate the program, organization, and procedures that apply these pressures to the individual studier.

II. PROJECTS

This section investigates what is being studied now and what should be studied to achieve a balanced program. The attempt here is to survey the content of the study effort irrespective of where it was performed or how it was originated. These last two areas are investigated in Sections III and IV. Based on a survey of the content of the current study effort, a series of studies are then proposed to provide a more balanced program. While many of these projects can be related to operation of the current Army, they are directed primarily at the type of Army available in 1980.

SOURCES OF DATA ON PRESENT STUDY EFFORT

To determine what is being studied now, the principal sources used by knowledgeable studiers were consulted. These included ASDIRS, CDOG, DLSIE, STINFO, and the published study program of DCSLOG, AMC, and CDC. Leads about other studies were followed up by interviews. While some existing studies were no doubt overlooked, such studies were likely to have been overlooked as well by other studiers seeking insights into a problem and, as such, probably have little influence on the system. The studies considered are in all likelihood those having any impact at the present time.

Exhibit 2 shows the amount of effort in Fiscal Year 1966 devoted to logistics studies by different study programs of the Army. Exhibit 3 shows the same data divided into the amount of effort devoted to various organizational locations and functions. Appendix C contains seven tables showing for each major study program the type of data summarized in Exhibit 3. The figures represent direct man-years of professional study effort. Both in-house and contract personnel are included. Exhibit 2 shows the agency having the best data about a study, not where the study is performed, or who was responsible for monitoring it. This last item was uncertain in the case of most of the

EXHIBIT 2 - SUMMARY OF LOGISTIC STUDY EFFORT IN FISCAL YEAR 1966[1]

Source of Data	Man-Years	Dollars (in Millions)
Chief of Staff		
Brown Board	66	$ 1.8
Force Planning Analysis Office[2]	0	0
Information and Data Retrieval Office	24	.8
Comptroller of the Army	20	.7
Chief of Research and Development	88	3.1
Combat Developments Command	126	3.6
DCSLOG and Army Materiel Command	302	10.6
Strategy and Tactics Analysis Group	10	.3
Engineer Strategic Studies Group	31	.9
Total	668	$21.7

Notes: (1) In-house and contractual.

(2) Potentially 20-25 man-years and $400,000 or $500,000 on logistics.

TOTAL LOGISTIC STUDIES FY66
(MAN-YEARS)

FUNCTION	TYPE	LOCATION OF FUNCTION								
		CONUS				LOC	THEATER			THREE OR MORE LOCATIONS
		DSA	ICP	DEPOT	CAMP		ARMY HQ	COMZ	FIELD ARMY	
Procurement 97	WAR		91		6					
	PEACE									
Storage 12	WAR							5	3	2
	PEACE			2						
Inventory Control 75	WAR								4	23
	PEACE		33		4			11		
Maintenance 86	WAR							12	11	3
	PEACE		22	11	18					9
Transportation 55	WAR					7		20	18	6
	PEACE					1				
Construction 39	WAR					2		30	7	
	PEACE									
Consumption and Data 23	WAR								23	
	PEACE									
Medical Support 8	WAR							1	7	
	PEACE									
Services 11	WAR							2	9	
	PEACE									
Three or More Functions 262	WAR		4			1		73	35	27
	PEACE		58					1	5	58
668			208	13	28	11		155	122	131

COST (000)

In-house	$10,300
Contract	11,400
	$21,700

EFFORT (man-years)

War	329
Peace	339
Contract	324
In-house	344

EXHIBIT 3 - SUMMARY OF LOGISTIC STUDY EFFORT IN FISCAL YEAR 1966, BY FUNCTION AND LOCATION

studies reviewed. In many cases, the same study was reported by two agencies, while the AMC and DCSLOG studies came from a single, combined report. Taken collectively, these tables represent a "snapshot" of the Army and its contractors studying ways to carry out the functions that have been included in the term "logistics."

These snapshots were taken of work being carried on during FY66, and the figures are estimates of the number of professional studiers working on military logistics at that time. In spots, the snapshots are somewhat blurred because available records do not differentiate the FY66 work from that performed in other fiscal years. These figures, moreover, show only study effort, not study quality; and the effort itself appears to fluctuate in level and direction from year to year. Nevertheless, these tables represent the only comprehensive picture of logistics research available, and, cautiously interpreted, they provide a basis for an assessment of study balance.

Studies are categorized in Exhibit 3 in three ways. Reading across the table are seven categories representing location of the organization or operation being studied. Four of these categories represent locations in the continental United States:

DSA	Defense Supply Agency and related non-Army activities
ICP	Army national inventory control points and procurement agencies
Depot	Army depot system
Camp	Logistics to support TOE units at camps in CONUS

Three additional categories represent activities located within a theater of operation:

AF&MC	Army support of Air Force and Marine Corps
ComZ	Army in the communications zone
Field Army	Army in the combat zone

A final category represents the link between CONUS and a theater:

LOC	Air and sea ports in both CONUS and the theater and operations linking the two. Includes operations of Navy and Military Terminal and Transportation Service.

Studies have been categorized in a second way down the tables into nine functions of logistics:

Procurement	Excludes hardware RDT&E.
Storage	Includes loading, packaging, and POL.
Inventory Control	Includes requisitioning and issue.
Maintenance	Includes salvage.
Transportation	Includes evacuation.
Construction	Includes utilities.
Consumption & Data	Includes equipment requirements, resupply factors, unit capabilities, and generally the ultimate consumer's activities.
Medical Support	Excludes surgical matters.
Services	Includes camp operations, bath units, and graves registration; excludes strictly personnel-management type functions.

It will be noted that the first seven of these functions refer to materiel, while the last two refer to personnel.

In addition to categorization by location and by logistics function, an attempt was made to categorize study effort in a third way, by whether it focused on wartime or peacetime operations. This was difficult for many of the studies relating to the CONUS depot and procurement system, since much of the work of redesigning the peacetime supply system may be applicable in time of war as well. What this breakout shows is which studies focused explicitly on wartime operations, whether in the United States or overseas, and which addressed themselves to peacetime operations or peacetime operations with a presumed applicability in wartime. Not more than half of overall Army study effort is devoted to aspects of logistics that have relevance exclusively to wartime operations.

The table also summarizes the distribution of effort between Army study agencies and contractors. References 5, 15, 26, 35, and 37 give the most useful sources. The tabulations show only studies of enough importance or size to be noted by major program documents. Staff studies of minor importance, such as evaluation of forklifts or of methods for packing batteries, are excluded.

The tabulations are very likely incomplete because of deficiencies in reporting. In the CDC program document, the best of all those examined (Reference 35), the total man-months reported as devoted to both studies and related work in logistics agencies accounted for about 55 percent of the total personnel assigned. Whether the remaining 45 percent were absorbed in overhead (a not unreasonable assumption) or whether a large proportion of study effort was unreported cannot be determined. Greater uncertainty is present about data from other commands.

Data from Combat Developments Command, Office of the Chief of Research and Development, and Engineer Strategic Studies Group were obtained primarily in terms of man-years per project. Data about computer contracts from AIDS were obtained in terms of dollars, while data about Army Materiel Command and Office of Chief of Staff studies were obtained in both ways. In those cases where data about both man-years and cost of a particular project were not available, dollars were converted to man-years or vice versa by a standard rate appropriate to the type of organization sponsoring the work. The figures for commercial work, supplied by Army Research Office, were $33,000 per professional man-year for regular studies and $36,000 per man-year for computer, war game, and simulation studies. The equivalent figure for Army study agencies, supplied by Army Logistics Management Center, was $25,000 per professional man-year. While such a conversion involves some lack of accuracy, it eliminates the necessity of investigating proprietary information about the costing rates of particular contractors.

Studies were allocated to a category based on work statement, project titles, personal knowledge of the project, and in a few cases, examination of study reports. With two exceptions, the entire reported effort on a study was allocated to the principal category to which it applied; no attempt was made to pro-rate the effort among general categories. Exceptions to this rule were made for the two largest studies, the Brown Board and NAPALM. It was difficult in a number of cases to make the distinction between studies of the communications zone and of field army.

DEFINITION OF STUDY BALANCE

Exhibit 3 contains an implicit definition of "balance." It says, in effect, that a study program is "balanced" when it has addressed itself to every logistic operation (Function) that must be performed in every organization (Location) that must perform it. The left-hand column of the table represents the operations or functions, and the organizations or locations are listed across its top. As far as the authors can determine, the future Army design is accomplished by asking two questions:

What functions must be done?

What organizations must do them?

This is not an oversimplication; it was found in tracing the conception and generation of a study program through the various echelons of command that these are the only two questions that may be asked in a meaningful way. The definition of a "balanced" logistics study program is one arrived at by asking these two questions systematically at each successively lower echelon of responsibility in formulating the study program. If these two are asked, the program stands a reasonable chance of being "balanced"; if they are omitted, asking any number of clever subsidiary questions will not remedy the defect. The impression of the authors is that these two questions are not asked systematically.

The subsidiary questions cannot be overlooked. Does the Army possess the data to study a particular operation? Is a technique available that can give us a realistic answer concerning such and such a problem? Are the personnel to make such a study available either in-house or through a contractor? If the answer is "no" to enough of these subsidiary questions, an arbitrary set of assumptions based on professional judgment may be appropriate rather than starting a study that will have no meaning. In such a case the logistics study program will of necessity lack "balance," but this does not change the basic definition: a "balanced" study program is one in which every job to be performed has been considered and every organization to perform it has been evaluated.

EVALUATION OF PROGRAM BALANCE

Before discussing the program as reflected in Exhibit 3 and Appendix C, a few comments are relevant about an aspect of the study effort that these tables do not reveal: the guidance of the overall study effort provided by the key Army planning documents. These are the Basic Army Strategic Estimate (BASE), the Army Strategic Plan (ASP), and the Army Force Development Plan (AFDP) and the Army Strategic Capabilities Plan (ASCP). These supposedly key documents appear to be largely ineffective, things to which everyone refers and which no one reads. They are assigned to staff officers as collateral responsibilities and less than a man-year of study effort is to be spent on each. It is probably not overstating our conclusions to say they have little or no meaningful content. They do not contain the alternative requirements that may be laid on the Army in the years ahead, and they certainly do not visualize alternative concepts of operations and support in enough detail to provide a foundation for a program of logistics studies. If these documents were what they were intended to be, the logistics study effort would have a goal and a framework within which to work. Because they are not, the authors propose a set of substitute studies referred to as master studies.

Approximately 700 man-years of effort were identified in FY66 Army logistics research. About 10 percent of this might be considered structure studies, that is, studies giving overall direction to the study program. Determining the amount of effort on "directed" studies was difficult because the audit trail is so difficult to follow. Estimates of amount of effort in this area varied widely; the authors feel that this type of effort is comparatively small, but looms large in people's minds because of its importance.

About 40 percent of the total effort was focused on the CONUS national inventory control points. The communications zone and the combat zone of a theater received an additional 20 percent each of total effort. No studies were found relating to support of the Army by Defense Supply Agency and other agencies in the United States or support by the

Army of Marine and Air Force units in a theater. Although the Army has studied in detail the problems of an air LOC within a theater, it appears to have studied only briefly the logistic operation of linking its CONUS base with the theater; such studies accounted for about 1 percent of the total effort. Transportation and procurement received attention in either CONUS or the theater, but not both. Logistic support of CONUS-based units and of operations of the CONUS depot system, at least in its broader aspects, have also been studied but slightly, accounting for about 2 percent of the total effort. In summary, the effort devoted to studying various locations in which logistics operations are carried out appears to have slighted several important areas.

From the viewpoint of logistic function, rather than organizational location, the snapshots may show a similar lack of balance. Procurement, inventory control, and maintenance have been studied extensively. The comparatively small amount of effort devoted to studies of transportation is surprising, considering the emphasis given to this subject in the last few years. This low figure may reflect the feeling that problems in this field are under control and the fact that attention in this area is focused on hardware rather than on methods to best carry out the function.

A particularly important deficiency is that of data and factors. Not only is the methodology weak, but the data itself is not collected in a systematic way. Note that about 1 percent of the total effort is devoted to this aspect of logistics. In view of the long-recognized deficiency of supply planning factors, the extensive revision of TOE's, and the sensitivity of budget estimates and simulations to such factors, the effort in this area appears much less than desired. A second deficiency is in the area of storage operations, particularly the type addressed to alternate types of depot systems and alternate approaches to the entire question of military and mobilization storage.

In terms of both money and man-years, the logistics study effort is divided about equally between Army in-house agencies and

contractors, with the latter performing almost all logistics gaming and simulation. The gaming effort accounts for approximately $1-1/2 million and 70 man-years of effort, or about 10 percent of all logistics studies.

Because the imbalance of study efforts referred to above might be a temporary condition, the study effort in previous years was also checked, although with lesser detail. The organizational locations and categories tabulated in Exhibit 3 were examined for the period 1962 through 1966 by reviewing the studies catalogued by ASDIRS and counting the number in each category. This count is shown in the last table of Appendix C. It shows an imbalance in the study program similar to that found in the detailed man-year evaluation of FY66.

GUIDELINES FOR AUGMENTED STUDY EFFORT

To outline an augmented study program, something more is required than the snapshots of what is now being done. Rules or guidelines are needed so that studies proposed to augment the present program are more than just random suggestions. To arrive at these guidelines, some questions must be posed to which every study addresses itself: Why? What? When? How? ("Where" and "who" are discussed in other sections of this report.) The answers to these questions about logistics studies may provide a framework upon which to construct an augmented study program.

The first question is "why": Why are studies initiated? The General Staff and the Army study agencies make some studies to answer questions asked by a higher authority for which no answers now exist. A directed study is an example of this type that was brought up constantly during the team's investigation. A second reason for studies is to find a solution to a problem that is becoming urgent. The brushfire study of this type was also referred to frequently during the interviews. A main reason "why" the Army should have a logistics study program, then, is to enable the Army to take the initiative in dealing with problems and with the Department of Defense.

The second question to be answered is "what": What should the Army study in order to anticipate its problems? Exhibit 3 indicates how this question is being answered today. Leaving aside the question of study quality, the table shows that the Army is now studying only those operations for which it has command responsibility. The support that it will receive from DSA and other DOD organizations does not appear to be a subject for systematic investigation. The logistics support that the Army is expected to supply to other services in the theater receives only cursory examination. While the Air Force, through the RAND Corporation, conducts detailed studies of the Army logistics system to determine the amount of support that it may depend upon receiving, the Army neither conducts studies of the support it will receive from Air Force and Navy nor lays requirements for such studies on its sister services. If a purpose of the study program is to get ahead of the brushfire and crash requirement, then the study program should broaden its vision to encompass all agencies and operations that bear on Army operations in a future war. In effect, the answer to the questions "what," then, is to study not only all logistics services the Army will carry out itself, but also those related services provided for or by other Government agencies contributing to the overall military effort.

The third question to ask about the logistics study effort is "when": When will the operations that the Army investigates take place? Brushfire and crash projects cannot be controlled until problems are anticipated far enough in advance to arrive at their solution. This leads to the need for long-range studies, and a promising start has begun in this direction with the CDC effort. The NAPALM effort in AMC is another attempt to push into a new and farsighted mold a system that has existed for decades. As discussed elsewhere, the long-range planning structure required for a meaningful logistics study program is seriously defective. To build such a structure, studies of problems that will arise from 5 to 20 years in the future are required. While no one would claim that a study projected so far into the future will provide

a realistic solution to the problem that eventually arises, a series of such studies will provide a framework in which to effect gradual change more effectively than at present. The answer to the question "when," then, is to study not only short-range problems but the long-range ones as well.

The last question about the logistics study program is "how": How should the studies be carried out? The far-looking, broad-range framework envisaged in the preceding paragraphs requires, in some cases, methodology that the Army does not extensively use at present. It will be difficult, for example, to evaluate the capabilities of the U.S. economy to support different levels of land war without recourse to a large econometric model, perhaps of the input-output type. The Army also appears to require the capability to make demographic projections relating to civilian, military, and industrial manpower, although this is not exclusively a problem of logistics. Failure to develop and to employ such methodologies accounts for many Army problems with DOD. It is as if the Army lived in a 2-dimensional world while DOD asks questions from the third or fourth dimension. The Army should give itself a capability to operate freely in these newly added dimensions.

The present methods of studying military problems will certainly continue to be the basis for most studies, but even here a deficiency is noted: the data bank needs vigorous attention. The available World War II and Korea War data are generally recognized as being outdated, and little are being accumulated to take their place. The authors were ununable to find a systematic program of data accumulation. Spasmodic efforts relating to a type of equipment or unit are occasionally made, but the fact remains that logistics data about the war in Vietnam, on which we may presume the planning for the next few years will be based, are not being systematically assembled.

In summary, the logistics study projects to balance the present effort might well be conceived with the following guidelines in mind:

- Take the initiative.
- Study outside the Army.

- Study into the future.
- Use new methodology and data.

MASTER STUDIES

To ensure purposefulness and direction in Army logistics, the organization responsible for guiding logistics studies should be required to do something constructive with the studies that it has directed others to produce. In other words, the studies office of DCSLOG should be required to take all of the studies of lesser scope that it has directed to be performed and synthesize these into an overall volume or document describing the complete, proposed logistics system of the Army for a particular objective year. The procedures by which this would be carried out and the responsibilities of DCSLOG and the Chief of Staff are outlined in Section IV. Here will be described only the studies that are the foundations and the final products of the overall logistics study cycle.

Inventory of Study Findings

The authors have been unable to discover any person who knows the total logistics research effort in enough detail to say what conclusions have been supported and what questions require further investigation. ASDIRS records almost 1,100 studies completed or in progress since 1962. About 80 of them can be identified as directly related to logistics, while perhaps two or three hundred more contain conclusions that are peripherally relevant. A symptom of this uncertainty is the fact, known to knowledgeable researchers for a long time, that the Army tends to contract for the same study over and over rather than recognizing when a problem has been solved. A necessary condition for a program of systematic research, then, is to know what you've learned before you start to study. An investory of study findings is required.

The academic world solves this difficulty by an occasional book or article in a professional journal summarizing in short paragraphs all relevant conclusions that can be drawn about a particular subject from the present state of research. A book review also serves this

purpose in the world at large, but the problem of security classification prevents the Army from using book reviews for many of its studies. The type of inventory envisaged for the logistics study effort could be based on a systematic study structure of logistics, perhaps similar to that used in Exhibit 3. Under each heading would be a succinct listing of the conclusions that could be drawn based on current research, and each conclusion would be referenced by a superscript to an entry in the bibliography of the inventory. The studies from which no conclusions could be drawn would be of equal interest and might be listed in a separate appendix. Such an inventory should be one of the documents prepared to initiate the study cycle leading to each objective year series of studies. Work on such an inventory of existing studies should be started immediately as a foundation on which to build the reinvigorated logistics study program discussed elsewhere.

In keeping with the guideline, "Study outside the Army," the inventory should include conclusions derived from studies made by the Navy and Air Force, as well as other agencies of the government when appropriate. Particular attention should be devoted to inventorying the inconsistencies and contradictions in studies currently being issued by the various forces. Needless to say, relevant conclusions from work of civilian agencies and universities should be included and the output of the RAND Corporation should not be overlooked. The significant word is "relevant." The difference between an inventory that is a valuable tool and one that is a hodge-podge of irrelevancies is exercise of judgment on the part of its authors. This will take work.

Logistics Alternatives Document

Two types of master studies should be conducted systematically by the DCSLOG and its study agency. The first is a study describing the specific logistics alternatives that must be explicitly considered in a study program. This study sets the boundaries to the overall logistics concepts to be examined. Different General Staff sections would be responsible for conceiving the particular set of alternatives appropriate

to their function. The alternatives needed to initiate the study cycle leading to a particular future year are listed in Exhibit 4. From the entire General Staff some 17 different sets are required. DCSLOG, through its Study Office, is conceived as responsible for three sets of these alternatives: (a) theater support; (b) Army logistics base; and (c) U.S. DOD logistics base.

Objective Year Logistics Studies

The final product resulting from the entire cycle of alternatives and derivative studies is a master study of the entire Army logistics problem for an objective year. On perhaps a 3-year cycle the Logistics Study Office would produce three such studies: Logistics-70, Logistics-80, and Logistics-90, each describing the type of logistics system envisaged at a particular point in time. These studies should cover the entire range of Army interest in logistics from Defense Supply Agency procurement to consumption factors for combat units in alternative theaters. The purpose of these three documents would be to synthesize the current state of research on a logistics system for the particular time frame in question. Writing them would be hard work. The authors would have to read everything on the subject, weigh and reconcile recommendations that conflict because of different viewpoints, and decide which combination of systems best fits the Army's overall needs. Often because of the interaction of different studies, a system or course of action may be recommended for the Army as a whole which none of the specialized derivative studies thought the best solution. This will require a discussion of the derivative studies and why their conclusions in a particular respect are not applicable. In other words, to be of any use, the objective year study should not be an anthology; nor should it be a summary. What it should be is a group of General Staff officers trying as hard as they can to address problems that have been previously addressed in derivative studies by technical specialists. Such a volume should be a constant reference to those making operating decisions. Is, for example, closing of a depot being considered? Army-80 should be the first document referred to in order to see how such an action fits in with overall plans.

EXHIBIT 4 - SETS OF ALTERNATIVES TO BE CONSIDERED BY LOGISTICS STUDY PROGRAM DIRECTED TOWARD A PARTICULAR OBJECTIVE YEAR

Type of Alternatives	Furnished By
1. Personnel	DCSPER
2. Political Climate	ACSI
3. U.S. National Objectives	DCSOPS
4. Foreign Military Technology	ACSI
5. Foreign Military Threat	ACSI
6. State of U.S. Economy	COA
7. Budget Levels in Intervening Years	COA
8. Levels of War	DCSOPS
9. Specific Contingencies	DCSOPS
10. Navy Concept of Operations	DCSOPS
11. Air Force Concept of Operations	DCSOPS
12. Army Force Structure	ACSFOR
13. Army Tactical Concepts	ACSFOR
14. Theater Logistics Support	DCSLOG
15. U.S. Army Logistics Base	DCSLOG
16. U.S. DOD Logistics Base	DCSLOG
17. U.S. Technology Forecast	OCRD

The number of difficulties that the Logistics Study Office encounters in writing these final documents measures how well the study program on which they are based had been planned, and the thought involved will lead to areas for future research as well as reveal mistakes in planning the previous program. The bibliography and footnote to such studies would be a major guide for studiers looking for background information. For these documents to do the most good, they should be, as far as possible, unclassified.

In preparing structure studies, the Army might be guided by the experience of the academic world. It has evolved a system whereby the state of research on a particular subject is summarized from time to time in a definitive work whose function is not to make an original contribution, but to synthesize the results of many particular studies and articles into a coherent picture of the state of research. In Europe such syntheses are referred to as "text" books, with a meaning different from that in the United States. This type of text is not a simple introduction, but rather a fundamental review of all work in a particular area. An essential part of any such "text" is a discussion of what is known as the "state of question." That is, the various conclusions of specific studies are compared and the answers that each provide are either reconciled or the need for additional research is pointed out. Handbook of Organizations (Reference 13) is an example of the type of volume suggested in a field related to Army interests. Better quality volumes are available in more remote fields, as this book is really more of an anthology than a synthesis. Nevertheless, it does represent the type of product the Army could produce.

The authors envisage the complete study cycle to be repeated every 3 years with the short-range and long-range products requiring about 9 months each to write and perhaps 18 months for the midrange study. In other words, writing a structure study is not a small job; it requires more than reading superficially the conclusions to a few studies and jotting them down in a hastily composed narrative. Reconciling the

results of the studies in the present study program with those in preceding study programs and synthesizing the results of studies in the related fields of logistics involve hard work.

STUDIES OF NON-ARMY AGENCIES

The first area in which a series of derivative type studies are required concerns the requirements of the Army's relation to the DOD logistic base in the United States and to the economy at large. The emphasis of the studies in this and in the following subsections is to provide input for the Logistics-80 structure study. Although some work can be done on Logistics-70, studies of the type described below probably could not be completed and implemented by 1970. This would not mean that the derivative study would always be focused exclusively on a single objective year. Some of these foundation studies, such as computer software, might have to address several objective years in the same study. Several examples of the type of study that should be initiated in the area of non-Army logistics agencies follow:

FSN Migration

The Army might investigate over a long period the desirable allocation of federal stock numbers and classes between DSA and the Army. Such a study should include considerations of depot location, mobilization, training requirements of Army units, and future organization of DOD, and of their effects on response and requisition cycle time. The study should provide a basis for the Army to anticipate future DSA assumption of Army supply functions.

ASD (I&L)

Studies are required to investigate the relations of the Assistant Secretary of Defense (Installations and Logistics) to the Army, to isolate his key decisions bearing on Army operations, to anticipate his role in the future, and to investigate changes in Army and DOD so that the two may work together in the most effective manner. The purpose of such studies is to anticipate future shifts in the allocation of power in order to be most responsive to such proposals when they arise.

Econometric Models of U.S.

An econometric model of the U.S. economy should be obtained, and an in-house capability to operate and revise such a model should be developed. The Leontieff input-output model in its latest version seems to be the most likely candidate, although the simultaneous equation type (such as the Brookings or Klein models) should also be investigated. In addition, the Army personnel with a capability in using such a model should develop a familarity with the Office of Emergency Planning economic mobilization model (PARM), and should address some of their study efforts to methods of relating such a model to long-range planning of a CONUS supply base. In redesigning the Army logistics system, the capability of the U.S. is an important as the intentions of potential enemies. Among the alternatives to be investigated will be different levels of economic support for likely wars.

STUDIES OF CONUS LOGISTICS

The scarcity of studies relating to the CONUS depot system may reflect a general satisfaction with its operation as well as the feeling that the important decisions in this area are made at the DOD level. Nevertheless, over an extended period of time a number of alternatives are available in regard to depots. The following subsections discuss some of the investigations that appear to be desirable in this area.

Structure of Depot System

The present CONUS depot system, even if efficient, should not be considered permanent. It might be desirable, for reasons having little to do with cost, to have a series of small, single warehouse depots scattered throughout the country. In other conditions, one or two large ones for the entire world may very well be desirable. These types of alternatives can be studied on a long-range basis via several of the more common mathematical algorithms, taking into consideration such factors as cost, contingency requirements, the future transportation system within the United States, and the various foreign threats. Considering

the large number of factors bearing on such alternatives, simulation and mathematical models will most likely be required. The intent of such investigations is to determine how much influence various types of contingencies and logistics systems might have on the different types of depot systems. Such a study might well be repeated periodically as the main thrust of the most likely Army deployment shifts from one part of the world to the next.

Depot Relations with Camps

Alternative organizations and command relations between the depot system and the camps and stations in CONARC should be investigated in the long-range period. Alternate organizations of camps and depots in the U.S. are easy to envisage, and a number have been tried, at least experimentally, in the past.

The long-range construction effort of the Army in the United States is intimately linked with the particular type of post, camp, and station system envisaged as being most responsive to future demands. This in turn is related to the type of strategic deployment appropriate for different periods in the future, as well as to the type of threat likely from a potential attacker.

The present alignment of responsibility between AMC and CONARC is not final, and the desirability of gradual change toward a different long-range arrangement should be kept under systematic and periodic consideration. Here again, the intent of such studies is not change for change's sake but to keep under consideration whether or not the general structure is sensitive to changing modes of war.

Alternative Construction Systems

A series of studies appears to be required dealing with alternatives and tradeoffs in the overall area of construction. Should planning be for it to be performed entirely by the Army or primarily by civilian contractor? What are the time limits on rapid construction in the event of mobilization? What size construction effort is required to maintain

the training base at different time periods of the future? The purpose of such studies would be to provide a framework in which the troop requirements might be evaluated in terms of the long-range need for facilities. As potential threats shift from one part of the world to another, so presumably does our pattern of stationing troops. Each such shift may generate a requirement for a major construction effort. The magnitudes and alternatives in such effort should be the object of systematic study, since it has an impact on the tradeoffs available in other parts of the logistics system.

Real Estate Requirements

Most considerations mentioned above relative to construction are also relevant to real estate acquisition and disposal. The problem of changing tactics and weapons also bears on this question. If the Army of 1980 will be fighting primarily in urban areas, the present rural orientation of the post, camp, and station system is unrealistic. It would be better to build barracks in slums to give the soldiers a feel for the environment in which they will operate. In fact, putting a barracks of soldiers in the middle of a slum might be an effective way to make the slum disappear, and soldiers with money in their pockets may be as useful in fighting poverty as in fighting Russian tanks. With a growing population, the available real estate is limited and the planning must operate in advance of the real estate developer.

Permanent Medical Support System

The hospital and medical system is another aspect of logistics that should be analyzed for its responsiveness to changing demands on the Army. Considering the likely contingencies, should there be a shift of facilities from one part of the country to another? What types of facilities are required for each eventuality? In such considerations the relation to the particular post, camp, and station system envisaged and the requirements for rapid strategic deployment appear crucial. What should be the relation between major departure airfields and major Army medical facilities? How should the system develop in relation

to DOD-inspired shifts of responsibility? In some circumstances the hospital system might well be abandoned and a shift made to civilian institutions. If the Army were quartered largely in urban areas, no other alternative might be available. Needless to say, changing patterns of in-patient/out-patient care would influence the size and design of the hospital system required. Such studies should also address the likelihood and desirability of Army hospitals being placed under a DOD medical command to enable the General Staff to evaluate such a suggestion if it arises.

STUDIES OF THE LOC

This category refers to studies of the air and sea link between the United States and theater as well as the ports, airfields, and service organizations at each end. While water terminals are no longer an Army responsibility, the Army remains their major customer, and it should systematically review whatever changes in their operating procedures and organization may be required in relation to its changing mission. Although considerable attention has been devoted to strategic deployment in the last few years, several links in this chain still require exploration. The implications of the future types of sea transport on Army operations and organization indicate the need for studies in this area. Examples of such studies are discussed below.

Control Technique for Rapid Deployment

The introduction of rapid strategic deployment via air dictates something more than the conventional mobilization and marshalling techniques. If a unit is not available as planned, another must be rapidly put in its place, and a unit's equipment or men left behind must be controlled, accounted for, and reunited with their parent organization. Each small slippage in a rapid deployment of four or five hundred thousand troops can generate large unforeseen repercussions. Considering the scheduling precision required by this kind of operation, it may be desirable to develop a mechanized system of production or movement control.

Some method is needed to cope rapidly with the inevitable mixups that occur when large bodies of troops and great numbers of equipment are involved. Attention is required particularly in the case of Reserve and National Guard units of the support type, where the discipline and level of training may be less than assumed in doctrinal publications. The design of such control mechanisms requires as a foundation more fundamental studies to determine which links in the deployment system are likely to be bottlenecks, either through enemy action or normal operations.

Deployment by Submarine

Sea transport, at least for military purposes, might shift in the future from air and surface to below the surface. If a submarine the size of an ocean liner should prove feasible, some forethought will be required concerning the activities and morale of troops in confined spaces during such deployments and their capability for combat after an extended period under water. Such a change in deployment dictates changes in R&D objectives. Equipment characteristics may also have to be changed in a manner analagous to those appropriate to airlift, which in turn could dictate changes in methods of operations and even in tactics.

Alternatives to Large Ports and Airports

Depending on the type of war and the type of units being moved, deployment might be carried out more efficiently through a large number of small ports than through a few large ones. Such a shift depends, as in the theater, on the threat, the available ports, and the amount to be moved through each. In studying such a question from the viewpoint of CONUS-based units, the overall structure of posts, camps, and stations, as well as the depot system, should be considered, and the study should be carefully related to the structural analysis of the depot system referred to above. The point to studies such as this is the need for the Army to anticipate changes required in the DOD-controlled portion of the system (MTMTS and MAC) generated by changed concepts of Army tactics and logistics.

STUDIES OF THEATER LOGISTICS

Studies in this location are primarily the responsibility of CDC, although Appendix C shows effort in this area by other study agencies as well. Cumulatively, the field is well covered; any lack of balance stems from considerations relating to study methodology.

Army Support to Other Services

While CDC studies extensively the requirements for units to support the Army in the field, the requirement for Army units to support Marine, Air Force, and Navy units is not examined in depth. In keeping with the principle of study outside the Army, such units should be examined by the logistics study program. In some cases, data about such support is available and the problem is only one of getting it into Army studies. The organization of a Marine division, for example, is well known, but it is different enough from an Army division to require some recognition of this fact in considering a direct support maintenance unit for a theater. Even determining to an acceptable level of detail what size the Air Force or Marine component of a particular theater will be has been difficult, and studies are required on a continuing basis to ensure that the load on the Army-operated supply system by Air Force and Navy units is developed in a manner consistent with similar estimates and assumptions for Army units. In general, it is a council of prudence to watch very carefully the problems one cannot control.

Quantified Base for Combat Service Support-80

Comparatively speaking, the study program conducted by Combat Developments Command of the overseas theater is impressive for both coverage and thoroughness of planning. As a rule, however, these studies are not well grounded in terms of quantitative assumptions. The inputs and assumptions for each study should contain more numbers, and these numbers should be coordinated for all derivative and functional studies. An example of the present attitude occurs in the Army-75

concept study where the Chinese threat does not include even an assumed number of Chinese divisions, much less a series of alternative Chinese force levels. This lack of a quantitative foundation for the subsidiary studies is, perhaps, more important for logistics than for combat or combat support studies. Quantitative inputs for the Transportation-75 program would certainly be the miles of roads and railroads in several real or hypothetical theaters, as well as initial assumptions regarding tonnages moved between key destinations. Similarly, quantitative inputs for Maintenance-75 would be estimates of the number of vehicles and major items of equipment to be supported in several theaters. Such inputs will have an impact not only on maintenance studies, but also on transportation and storage studies. This is not to suggest that all studies, or even a majority of them, require the use of advanced mathematical methodology. The degree to which such methodology can be used depends upon factors such as the education of the studiers and, even more important, the imagination and insight that they may possess. These factors are largely beyond the control of the people who conceive a study program and write the study directives. What is suggested here, however, is that in the process of conceiving studies and assigning them for performance, merely specifying the questions to be answered is not enough. A set of quantitative inputs is also required to focus study effort and to coordinate parallel research across individual study lines.

The combat service supply study for Army-75 is now scheduled for completion in December of 1966. This is probably too late to make a very radical change in its approach, although some increase in the rigor of its approach may be possible. There is not enough lead time to use Army-75 as a test vehicle for the envigorated study approach outlined above. As a start towards this objective, a series of 1-page appendixes should be prepared for the Army-80 concept study. Each of these pages would list the quantified assumptions or inputs to one of the derivative, functional, special, or technical studies listed in Appendix B of the Army-80 concept study. Some items of data, naturally,

will be repeated in more than one appendix. Both the Transportation and the Engineer derivative studies, for example, need as inputs miles of road and railroad in several types of theaters. These appendixes should then be distributed to the study agencies with the requirement that the quantified assumptions and inputs be used in evaluation of the study's recommendations. These inputs might be explicitly listed in an appendix to the study to permit easy checking of their use by study reviewers.

Less Essential Units and Items of Equipment

The present program of studies of operations within the theater aims almost exclusively at ultimately answering a single question: How much equipment, units, personnel, and doctrine are required to fight a war? The study methodology involves, at least implicitly, postulating the threat, estimating the number of divisions required to meed the threat, and constructing a theater-wide combat service support system that will support those divisions. This total system is sooner or later translated into number of units and pieces of equipment to become a foundation for procurement planning, structuring the peacetime support system, and every other activity engaged in by the Army. Because of the basic method by which the questions about force and equipment requirements are answered, the foundation for these follow-on activities is shaky. The answers ignore a consideration painfully obvious in most military operations. That is, in a war there is never enough of everything; something is always short. Even if the Army's estimating methods were precise, changes in the development of events are bound to make the preplanned supply of some units and equipment inadequate. Although the only certain factor in war is inadequate resources, the logistics study system simply overlooks this certainty. It aims at determining what is needed, but does not try to assess the impact of deficiencies. It can determine the exact quantities required of hundreds of items of equipment and units, but cannot tell for which of them a shortage will create the greatest problem. In planning

Logistics-80, for example, it is necessary to know not only the size and type of maintenance support structure required, but also the results of having less than the full requirement. This type of information is useful not only to the peacetime staff planner in making decisions concerning mobilization stocks, but also to the theater commander in wartime who must make instantaneous decisions about the number and location of units and equipment.

With the study system now geared to answer questions about total requirements, it would be impractical at the present time to demand anywhere near a complete answer to questions concerning what is more or less essential. Nevertheless, a start could be made by instituting perhaps two studies examining particular types of units and two studies examining particular types of equipment. In analyzing less essential units, perhaps the study system might look first at the construction battalion and at the medium truck company. In analyzing less essential equipment, the studies might look first at the 2-1/2 ton truck and the 500-gallon, fabric POL container. They should aim at determining the effect of having available perhaps 50 percent to 75 percent of the estimated number of items required on the capability of the field army and theater to carry out its mission.

If the original study of absolute requirements is carried out with a sufficiently explicit quantitative basis, follow-on studies of less essential requirements will be comparatively easy. Nevertheless, a period of transition would be required before the basic Army derivative and special studies are established on a sufficiently quantified basis for the follow-on study to flow as a natural consequence of the basic requirements study. Accordingly, the less essential type studies should be started immediately.

DATA AND METHODOLOGY STUDIES

The most glaring deficiency in the logistics study effort is the absence of the systematic accumulation of operational data. A second deficiency is the failure to develop methodology. Something more

advanced than conventional man-per-day type factors is called for in estimating requirements for both units and equipment. This applies to everything from construction battalions to spare parts. If vehicles rather than soldiers consume gasoline, estimating unit POL requirements on a man-day basis is difficult to rationalize. While the Army seems fairly comfortable with cost estimating relations involving three or more variables, it does not make enough use of this tool in the more important area of estimating operational capabilities and requirements.

A third deficiency relates to the acceptance of quantitative methods in general. In the past 10 years the use of quantitative methods has spread rapidly. Even researchers in such disciplines as education and business administration are today expected to have at least some acquaintance with the use of statistics and simple model building. The recent establishment by the Army of an operations research career field for officers foreshadows a wider and more discriminating use in the future of quantitative methods to analyze military problems. The trend in the Army is likely to be for quantitative methods to be expected in most studies, rather than in relation to a few specific problems. Moreover, it is becoming increasingly the case that anyone making a study must be at least familiar with quantitative methods rather than depending on a corps of specialists. During the study team's interviews, the terms "operations research" and "advanced mathematics" were frequently used in referring to nothing more than straightforward algebra, indicating a need for indoctrination throughout the study system concerning these techniques. The standard method of spreading new doctrine throughout the Army is by means of a field manual, and for this purpose two manuals appear to be required.

Some projects requiring attention in this area are described below.

Data Agency

The late Dr. Lynn Rumbaugh of ORO was one of the founders and leaders of the Army study community. When he died 2 years ago, an

uncompleted address was found on his desk. It began with the words, "The data bank is empty . . . ."

While there is a severe shortage of operational data, pockets of it are available which could be aggressively mined and published. Some of these data come from Vietnam; some come from war games and simulation. Maneuvers are another likely source. A continuing gathering and publishing effort is urgently required to get live data flowing through the veins of the study system. The type of publications needed here might be modeled on the Statistical Yearbook of the United States or some of the Department of Commerce series, such as the "Survey of Current Business."

The people who generate data have little motivation to assemble, systematize, and publish it. They are too busy doing other things like operating ports or running war games. The students who need such data find little incentive to publish it either. The present system tends to reward them more for publishing poorly grounded reports than for publishing data on which reports of others might be better grounded.

For this reason, data gathering studies to be effective must be performed by a separate agency that has no other responsibility. It should establish close liaison with the Office of the Chief of Military History, but an outlook different from that of the political historian is required. The attitudes and thinking patterns of an economic historian, sociologist or census taker appear more appropriate to the problems of this agency. Although this agency could be located in the CDC, it would probably want to build on the basis of the data accumulated by the DCSLOG Data Processing Center at Radford. Its function would be to set data standards, accumulate and systematize data from maneuvers, actual operations, and field tests, and publish the data in perhaps the DA Supply Bulletin Series.

Unit Capabilities Studies

The capabilities statements of logistic type units are the key to force planning, which in turn determines mobilization stock and budget

levels. These statements are on a very unsure foundation. Greater use of numbers in expressing unit capabilities is called for in new TOE's, and those in existence should be reviewed for a more realistic approach where appropriate. The "maintenance equivalent" concept, for example, might be replaced by an estimating formula or a nomograph. Whether or not TOE 29-137F can maintain 6,048 automotive equivalents in all parts of the world and in all types of combat is at least doubtful. This is the very type of information required to do any kind of a force planning job that claims to be realistic. Studies of unit capability should approach the problem from the theoretical, statistical point of view, as well as by means of a systematic review of the performance of particular units in field tests and military operations.

Revised FM 101-10

The recommendation for revision of FM 101-10 has been made many times before by study agencies and contractors; it would appear necessary to make it once more. However, the revision of this manual which appeared last year contains many World War II and Korea data which are now obsolete, and it fails to recognize the results of studies that the Army itself has commissioned. Its figures should be reviewed, and the results of previous studies, war games, and actual operations should probably be amalgamated with whatever operational and historical data that still appear valid. Even more important, a series of footnotes and a systematic bibliography should be included so that an analyst or staff officer using a particular set of figures or factors could determine their source and, if necessary, go back to the source to make necessary adjustments because of peculiarities in his own problems. The footnoting system in Historical Statistics of the United States is a model one in this respect.

The revision should aim at converting a publication that has long outgrown the field manual stage into something approaching an engineer's handbook for staff planners. The tables should, insofar as possible, be converted to graphs and nomographs. Many of the relations expressed

as man-day factors could be expressed as formulas or equations to permit explicit recognition by the planner of the peculiarities of the particular situation he is studying.

Logistics System Measures of Performance

A series of interrelated studies is required, addressing itself to logistics system performance measures. These measures have an even more important use than justifying budgets and making cost effectiveness studies; they are the most promising way for the commandant of the theater to reallocate personnel and units as the tactical situation develops. The traditional overloading of rear areas with units and the scarcity of personnel in forward areas exist primarily because of an inability of theater Army staffs to judge the workload of logistic units in the theater. Some method is required to correct this deficiency, and it appears likely that it should center around the problems of performance measures.

Despite a long felt need, very little of value has been accomplished in this area. An approach that looks promising would be to flow-chart each logistic function from CONUS to the front line, placing unit capabilities figures on each block of the chart. This is also the approach to be used to gather data that the data agency might pursue. A number of techniques involving multivariate statistics also look promising in this area. The logistic system should make a start, even though the problem is a hard one, and aim at producing tools that can be used for cost effectiveness studies and for running a war as well.

Logistics Requirements for Maneuvers

The shortage of data and the deficiencies of FM 101-10 persist, in part, because they are not continually exposed in the process of maneuver evaluation. The members of the Army logistics study effort do not appear to feel very strongly that they should concern themselves with large field tests and maneuvers. Maneuvers seem to be viewed as a concern of the combat side of the house. This is surprising, since a maneuver is the place where the capability of the logistics unit can be

put to the test, though it is a very imperfect measure of a combat unit's effectiveness. In some respects, a maneuver is even superior to combat, since it provides an opportunity for gathering data whereas combat seldom affords this luxury. A number of key personnel have expressed the opinion that the study program with CDC is not realistically related to the needs of the user. The authors find no evidence to support this assertion. CDC appears to make greater effort than any other study program in the Army to be responsive to the needs of the user. Even if the assertion were so, however, the responsibility for making such a program realistic would lie with the General Staff in their scheduling of maneuvers to analyze logistics problems. The General Staff in its logistics functions should have a voice in the number and type of Army-wide maneuvers that is listened to just as attentively as when it speaks in its combat aspect.

To make this voice heard, a series of studies are required on a continuing basis. These studies should probably be conducted by DCSLOG and should specify type of maneuvers and the particular logistic units that must be played in them together with an assessment of the level of realism required in order to evaluate particular characteristics of the logistics units. Since the only field armies that are available for tests via maneuvers are those in Europe and, to a lesser extent, in Korea, studies of this type should address themselves not only to maneuver of units in the continental United States, but those stationed overseas as well. While this is not completely under the control of the Army General Staff, a voice should be heard from the Army when the maneuver schedule for a particular year is arrived at; this voice should consider logistics as well as combat. An additional subject for consideration by such studies would be improved maneuver techniques for logistics units; there is a possibility that the umpires manual, FM-101-5, might be followed by a sequel, a manual directed towards maneuver techniques exclusively for logistic units.

Methodology Field Manuals

The Army might issue a general field manual on conducting studies in a quantitative framework, with examples of studies where these techniques have been applied. A model which might be used for

such a manual is the Combat Operations Research Group publication, Methodology Notebook for Action Officers, now in use by the CDC. Not only would such a manual provide a source of information about how to conduct studies and a standard on what to expect of them, but the process of staffing it and its revisions would provide a medium for educating key Army personnel on study techniques.

A second field manual that appears to be required would survey the principal operations research techniques that are available and give examples of the application of each. These techniques are: linear programming, nonlinear programming, inventory theory, probability, statistical inference, multiple regression, gaming, and simulation. While other techniques are available, these eight are the ones in most general use. Such a manual should not fail to discuss use of these techniques in the general context of cost research as well as operations research. Logistics Selective Management of Secondary Items, FM 38-22, offers a promising basis for the chapter on inventory theory, while the Redstone publication, Alpha and Omega and the Learning Curve, might be the basis for a chapter on cost research. The C&GSC reference book on war gaming is another source. The main point of this discussion is that an invigorated logistics study program should be alert to improvements in methodology and that these improvements can often be founded on work started at the operating level of the Army.

LOGISTICS SIMULATION CENTER

Because larger computer simulation offers one of the few methods of studying complicated relations involving large numbers of people and organizations, an in-house capability in this area is required for the logistics study program. The purpose of simulation is to integrate; therefore, separation of a simulation of the CONUS depot system from an overall simulation of logistics in the theater should be avoided. Studies of these two areas may have to be separated, but simulations of them should be done on the same computer by programmers with offices in the same building. In this way, integration problems that may be missed by studies because they focus on part of the system can be caught by the simulation that bridges these parts.

A major effort of the study program should be to bring together the key logistics simulation into one center. It should start with the theater support system, the U.S. depot system, and the LOC. This does not mean that the smaller, special simulations should not continue to exist at various locations throughout the Army. Such a simulation center would be for logistics what STAG is for operations. Because of the training value of this work, the center should be staffed primarily by military personnel. These personnel would be engaged in the orginal design and revision of simulation and to a lesser intent in the programming and operation of the models. In simulation work, it is easy to slip into a clerical level routine of chucking cards into a computer and trotting away with a pile of printout without understanding or thinking about what went on in between. To prevent this condition from arising, each officer must be made responsible for building a specific portion of a specified simulation. By having to do such work, he will be forced into intimate contact with the details of the war he may someday fight.

This center is envisaged as an operating center whose mission would be to operate and construct a series of simulations of a worldwide logistics system. The parallel jobs of coordinating simulations in general, located both at the center and elsewhere, and of setting Army standards for simulations are functions more appropriate to higher headquarters. Among the projects required to establish such a center are those described below.

Integration of Existing Large Logistic Simulations

The existing simulations relating to lines of communication and theaters should be obtained and made operational at this center. The obvious candidates are the simulations used by the Army at the STAG, RAC, and CORG at Fort Lee. Simulations of theater Army logistics and Army deployment (Reference 33) constructed under Air Force auspices at the RAND Corporation should also be obtained to provide the broadest possible base for this effort. This effort is not intended to assemble in one place every simulation in the logistics system. The large simulations, however, should be grouped into one overall system, and this can be done best if they are located at one place.

Some problems of documentation and reprogramming would be likely to arise in the transferral process, but they should not be overwhelming. The problems themselves would not be without value, since they would provide a good way to force center personnel to become acquainted with the programs they would be integrating and systematizing. Simply getting simulations running on their computer would be one of the best educational experiences the center personnel could receive. Such a move would be an aid to Army contractors as well, since it would enable them to stop making brushfire computer runs and allow them to work full time at extending the state of the simulation art.

Simulation of Depot and ICP System

To complete the simulation system of the overall logistics system, new detailed simulations should be constructed of the CONUS depot and inventory control point systems. A small start towards a depot simulation has been made by the Army Logistics Management Center in its COMPELS simulation. The new simulations should be tied in with the simulations of LOC and theater logistics referred to above. Ultimately it would be possible to observe rather directly the effect of proposed changes in the CONUS logistics system on the front line logistics of the field Army. The overall simulations would also provide a framework in which smaller, more specialized simulations located throughout the Army could fit themselves in studying smaller problems. The simulation center would become a point of reference for these local simulations when faced with a choice of a number of alternative ways of reproducing an operation. By checking with the center, they could select the particular approach to their small-scale problem most consistent with the large simulation of the overall system. While these specialized simulations could never be centralized in one location, having a master simulation for reference would go far towards coordinating their efforts.

Simulation of Total Materiel Inventory

Most simulations are either of organizations and personnel or of the operation of items of equipment such as a missile. It is possible,

however, to simulate other objects. Anything that goes through an operation and has quantitative characteristics is at least susceptible to simulation. The characteristics of an inventory of equipment and spare parts are just as susceptible to a simulation approach as the characteristics of a collection of units and vehicles. An attractive feature of such a simulation is that much of the data for it is readily available. There are less than a thousand major items of interest in the Army inventory and data about the components in each; the organizations in which each is used and the principal spare parts requirements for each are available in Army publications. The basis for such a simulation involves little more than a routine collation of previously published information.

Such a simulation would reflect not only the items in depot and mobilization stocks, but also those in the hands of units stationed both in the United States and overseas. With such a tool, it would be comparatively easy to appraise, for example, the increased maintenance flow generated by stepping-up of the level of maneuvers in Europe or the increased requirement for a particular spare part resulting from a sudden war in some other theater. A difficulty faced by procurement agencies at present is that they are forced to rely on usage data in formulating their reorder policy. This usage data, in general, reflects peacetime conditions: in the event of an emergency or a limited war, we are generally unprepared to respond. With the proposed simulation of the Army inventory, conditions of emergency or limited war could be tested ahead of time and the anticipated load for various major items or parts anticipated. This is the approach toward which work on Army cost models is tending. The authors suggest that it be vastly extended and used not only for budgets but to anticipate operational problems. On a very simple level this involves merely counting the number of each part or component in a peacetime Army of 18 inactive divisions versus a wartime Army much greater than that number. This kind of simple counting of a large number of items is a job that a computer is well equipped to perform. When this data

about our current peacetime usage is extended into the situation simulated by the wartime usage, at least a way is offered toward anticipating the strains on the inventory that different contingencies may impose.

SUMMARY

How the proposed work program is broken into individual projects will depend to a large extent on the studiers available, the location of the effort, and how fast recommendations in other sections of this report can be implemented. Exhibit 5 summarizes the estimated man-years for each proposed study. It should be cautioned that these estimates should not be accorded greater precision than they merit. The numbers are nothing more than the best judgment of the study group. The study program appears to represent from 300 to 400 man-years of effort including overhead, although the scope of individual projects and study pace in general make such an estimate at best an approximation.

The general direction and intent of an augmented study effort is more important than the details, and the particular areas highlighted above are more guidelines to achieving an overall objective than immutable requirements for particular projects. Most important are the principles on which the study of logistics is augmented. What is required in the next 3 years is not so much a variety of new studies of Army logistics problems as a new approach to studying in general. This approach should recognize, in particular, that no optimal system will last; the world of the Army is a world of changing objectives and changing responses. Finally, such an approach to logistics studies has a better chance of success if it follows these four guidelines:

- Take the initiative.
- Study outside the Army.
- Study into the future.
- Develop methodology and data.

EXHIBIT 5 - MAN-YEARS FOR PROPOSED STUDY PROJECTS

Study	Man-Years
MASTER STUDIES	
Inventory of Study Findings	2
Alternatives for Logistics-70	2
Alternatives for Logistics-80	4
Alternatives for Logistics-90	2
Logistics-70	4
Logistics-80	6
Logistics-90	4
STUDIES OF NON-ARMY AGENCIES	
FSN Migration	4
Assistant Secretary of Defense (I&L)	3
Econometric Models of US	6
STUDIES OF CONUS LOGISTICS	
Structure of Depot System	6
Depot Relations with Camps	6
Alternative Systems Construction	6
Real Estate Requirements	5
Structure of Hospital Support System	6
STUDIES OF THE LOC	
Control Technique for Rapid Deployment	12
Deployment by Submarine	5
Alternatives to Large Ports and Airports	6
STUDIES OF THEATER LOGISTICS	
Army Support to Other Services	6
Quantified Base for "Combat Service Support-80"	3
Less Essential Units and Equipment	6
DATA AND METHODOLOGY STUDIES	
Data Agency	25
Unit Capability Studies	15
Revised FM 101-10	6
Logistic System Measures of Performance	8
Logistic Requirements for Maneuvers	3
Methodology Field Manual	4
LOGISTICS SIMULATION CENTER	
Integration of Large Logistics Simulations	12
Simulation of Depot and ICP System	6
Simulation of Total Materiel Inventory	6
TOTAL	188

III. ORGANIZATIONS

GENERAL

This section discusses organizational alternatives which, if adopted, would lead to achievement of objectives previously outlined for the logistics study program. Functions that must be performed to attain these objectives will first be identified. Next, an attempt will be made to locate these functions at an echelon and to associate a staffing requirement at these echelons to perform such functions. Finally, a set of alternative organizations will be proposed to perform these functions, their relative merits will be assessed and a preferred alternative selected.

Functions to be performed can be grouped generally into two categories. The first is the actual conduct of logistics studies. The second category includes all managerial functions associated with initiation, conduct, control, evaluation, and application of studies.

Actual conduct of studies appropriate to the mission of an organization is a function that ideally should be a capability at each echelon of organization. Assuming the case of a single, in-house organization having the responsibility and capability for conducting virtually all logistics studies, there would be still a requirement for a study capability at the next superior echelon to ensure proper analysis of study program development, balance, and results.

In the same manner, study managerial functions are concomitant with the conduct of studies in the primary study organization, but are also the responsibility of each superior echelon, to varying degrees. Should the actual conduct of studies be accomplished in multiple locations and by a variety of organizations, as is more apt to be the case, the need becomes even more evident for a study managerial function at a superior echelon, equipped with a study capability as a management tool.

Exhibit 6 shows an example of a 3-echelon organization with the lowest echelon conducting the majority of Army logistics studies. The next superior echelon is primarily responsible for program development and management, and the top echelon is responsible for planning and coordination necessary to integrate the logistics study effort with the overall Army logistics mission. The assignment of specific functions to various echelons and the estimated staffing requirement to accomplish this assignment of functions will be applied to each of the organizational alternatives to be proposed.

The figure of 400 personnel for the Logistics Study Agency, as is shown in Exhibit 6, is derived by totaling the annual man-years of effort estimated for each individual study in the additional study portion of the 3-year logistics study program and providing two persons for each man-year of effort. This figure allows for normal administrative overhead required in a study organization, such as typists, research aides, library staff, and project managers, but it does not allow for maintenance and housekeeping functions nor for time-sharing with any other assigned functions.

As for the 65 personnel in the Logistics Study Program Managerial Element, Exhibit 7 shows the proposed assignment of personnel within such an organization. As before, it allows for no maintenance or housekeeping functions, but it is sufficiently flexible to provide for some, if not all, management of logistics ADP systems. At this level, the ADP systems management function is not realistically separable from other management functions.

The DA staff supervisory element for logistics study planning and coordination would be required only in the event that the logistics study program management responsibility did not reside in DCSLOG. This figure of 15 personnel provides for a minimum staff to ensure more than mere superficial awareness of the logistics study program content and status.

It should be noted that the number of personnel required for any action is at least a function of the size and complexity of the task to be

EXHIBIT 6 - THREE-ECHELON STUDY SYSTEM

Echelon of Organization	Functions to be Performed	Personnel Required
Logistics Study Agency	1. Conduct structure studies derived from the master logistics study program, at an annual level of approximately 200 man-years	400
	2. Conduct directed studies, as req'd	OK now
	3. Conduct supporting studies, as appropriate & feasible	OK now
Logistics Study Program Managerial Element	1. Prepare & maintain statement of total Army logistics concept, including combat services support for Army-in-field, Theater Army, "wholesale" logistics, & other Army logistics considerations	65
	2. Prepare & maintain logistics master study program consisting of studies derived from & supporting total logistics concept	
	3. Provide for & supervise conduct of structure studies derived from foregoing total Army logistics study program, & for add'l directed and supporting studies as req'd	
	4. Provide for review of completed studies & assessment of their contribution to logistics study program	
	5. Help implement studies by advising staff elements & organizations of study content & conclusions, & ensuring consideration of same in day-to-day & special actions	
	6. Provide limited in-house capability to analyze logistics study requirements & efficiency, & to supplement major in-house study capability for short-term, directed studies	
Logistics Study Planning & Coordination Group (DA Staff)	1. DA staff planning for logistics studies, & review of logistics study program management	15
	2. DA & DOD staff coordination of logistics studies as related to Army logistics staff actions	
	3. Liaison with logistics study groups	

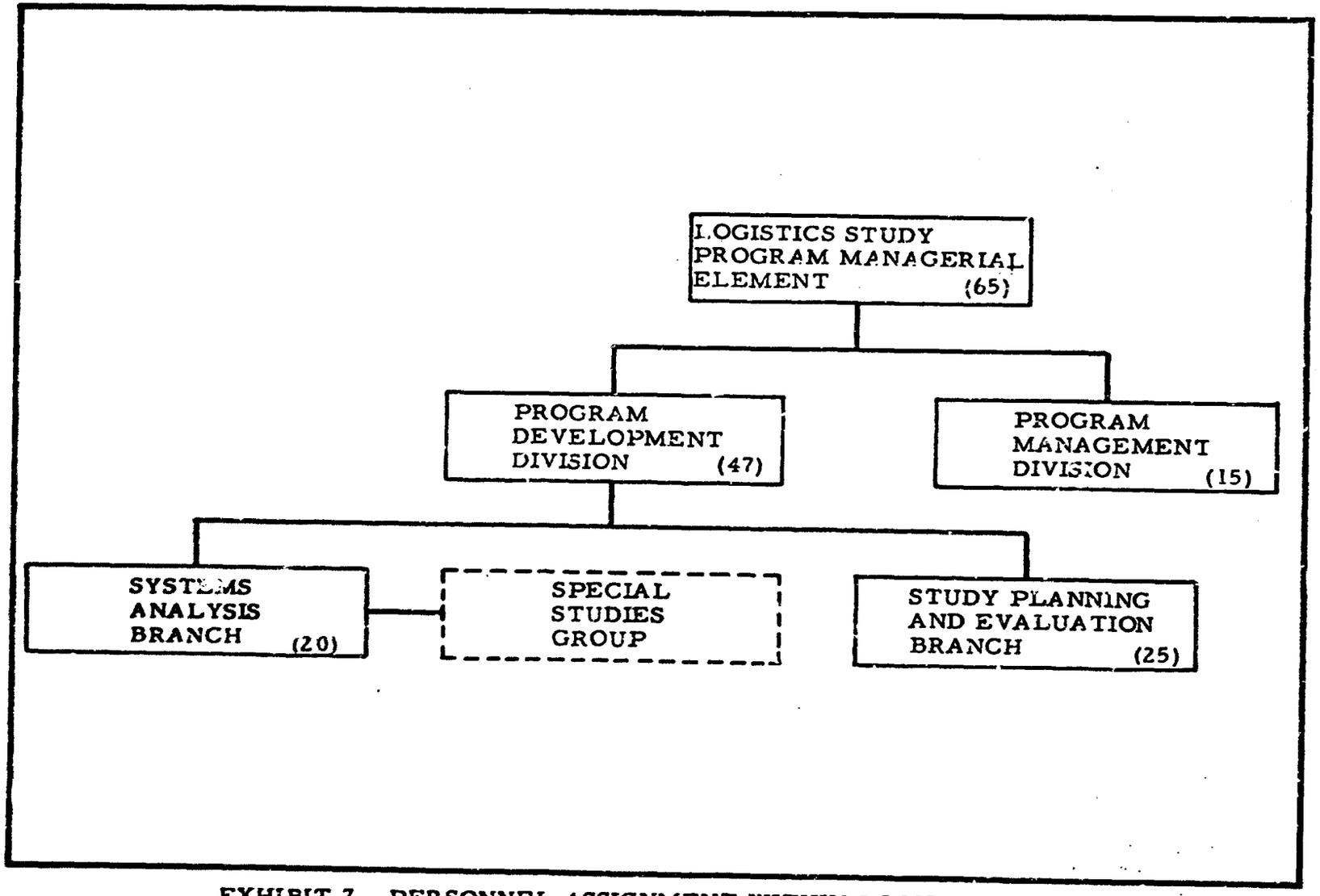


EXHIBIT 7 - PERSONNEL ASSIGNMENT WITHIN LOGISTICS STUDY PROGRAM MANAGERIAL ELEMENT

performed, the length of time allowed, and the depth to which an analysis is directed. Stated conversely, with a given number of personnel and a specified time allowed, the depth and breadth of a study effort or a study managerial effort is established. This, then, is the rationale employed herein. The length of time allowed for conclusive results is taken to be 3 years, with individual study efforts lasting 1 year or less. It was felt that a lesser period might tend to produce superficial results. The number of personnel required is a best estimate of the number considered capable of gainful employment without experiencing mutual interference; the resultant, then, is a study and managerial capability at some fixed level. Neither the number of personnel nor the program period is directly comparable to CDC's staffing requirement and calendar of events for the Army Concept Program, but these data were useful in arriving at the logistics study program estimates. Inability to provide either this number of personnel or to allow the indicated amount of time for constructive study effort would require adjustment of the proposed logistics study program to provide for lesser breadth or depth of studies.

It seems evident that to conduct the number and type of additional logistics studies proposed in Section II of this report, an additional study capability is needed. This may initially be a contract study effort, to be supplanted by an in-house effort as staffing requirements are met. The location of this additional study capability might be at any of several places in the Army organization.

A much more urgent need is for the establishment of an organization for logistics study program development, management, evaluation, and application. This should be an in-house effort, with contractor assistance in areas where the in-house capability is not sufficient. Since this organization will be making use of already existing study capabilities in a wide range of organizations, it is not necessary that it be colocated with or under the same administrative head as the additional study capability. Neither does this supervisory organization have to be in the DCSLOG office, but if it is not, a further requirement would exist for an

office within DCSLOG to provide for Department of Army staff review of this function, Department of Army and DOD staff coordination, and liaison with the managerial and study agencies as indicated in the preceding example.

The following paragraphs will attempt to propose a set of organizational alternatives, each of which will provide for both the additional logistics study capability and for logistics study program development and management. Some of these required personnel are not now available in either the DCSLOG or other Army organizations. The extent to which a requirement exists within each alternative for additional personnel is dependent upon: (1) the number of personnel presently assigned to these functions in either a full- or part-time capacity; and (2) the number of personnel presently assigned to other duties whose responsibilities can be adjusted to accept those of the logistics study program. Such determinations would require a manpower survey of affected organizations and are beyond the scope of PRC's study. It should also be noted that PRC was specifically asked to exclude ADP systems from its considerations. Except as already noted in the case of 65 personnel performing the logistics program development and management functions, therefore, personnel staffing requirements do not reflect the number of personnel unique to ADP systems considerations.

For all the organizational alternatives considered, a uniformly standard capability to function is presumed. Thus, it is assumed in each alternative that sufficient resources are brought together so that effective study coverage will be performed across the entire span of logistics considerations, less ADP. To discriminate among these equally effective alternatives and thus permit selection of a most desirable solution, all will be qualitatively compared in terms of five important characteristics:

Item 1	What additional resources are required?
Item 2	What is the proximity of analysis to the system's problems?
Item 3	What provision is there for interaction with studies arising within other programs?

Item 4 What requirements are there for transfer of roles and missions?

Item 5 What is the lead time for establishing the organization to support this alternative?

ALTERNATIVE I (SEE EXHIBIT 8)

This first alternative proposes an augmented DCSLOG organization for the Army General Staff. Provision is made for a study capability within DCSLOG to adequately analyze the requirements of a logistics system, to develop the elements of the logistics study program, to determine the initial composition of the program, to assess program balance, to measure program progress, and to undertake directed special studies. In addition, the organization would manage the logistics study program and monitor specific logistics studies conducted throughout the Army.

Conduct of structure studies would be performed as at present, within CDC, AMC, and DA Class II installations, and by contractors working for elements of the Department of the Army. The scope and objectives of the next tier of derivative studies would be developed by the DCSLOG Logistics Research, Doctrine, and Systems (LRD&S) Directorate or by another organizational element of the Army with the concurrence of DCSLOG. In any event, the LRD&S Directorate would monitor study progress and, upon conclusion of the study effort, would ensure appropriate review, evaluation, and utilization of the study findings. Existing areas of responsibility, such as CDC for Army-in-the-field logistics, AMC for wholesale logistics, and DCSLOG for areas not the unique responsibility of the former two, would be observed.

Assessment of the system characteristics for this alternative is as follows:

Item 1 Approximately 465 additional personnel would be required, 65 of which would be used to constitute a Logistics Research, Doctrine, and Systems Directorate under an assistant DCSLOG. The

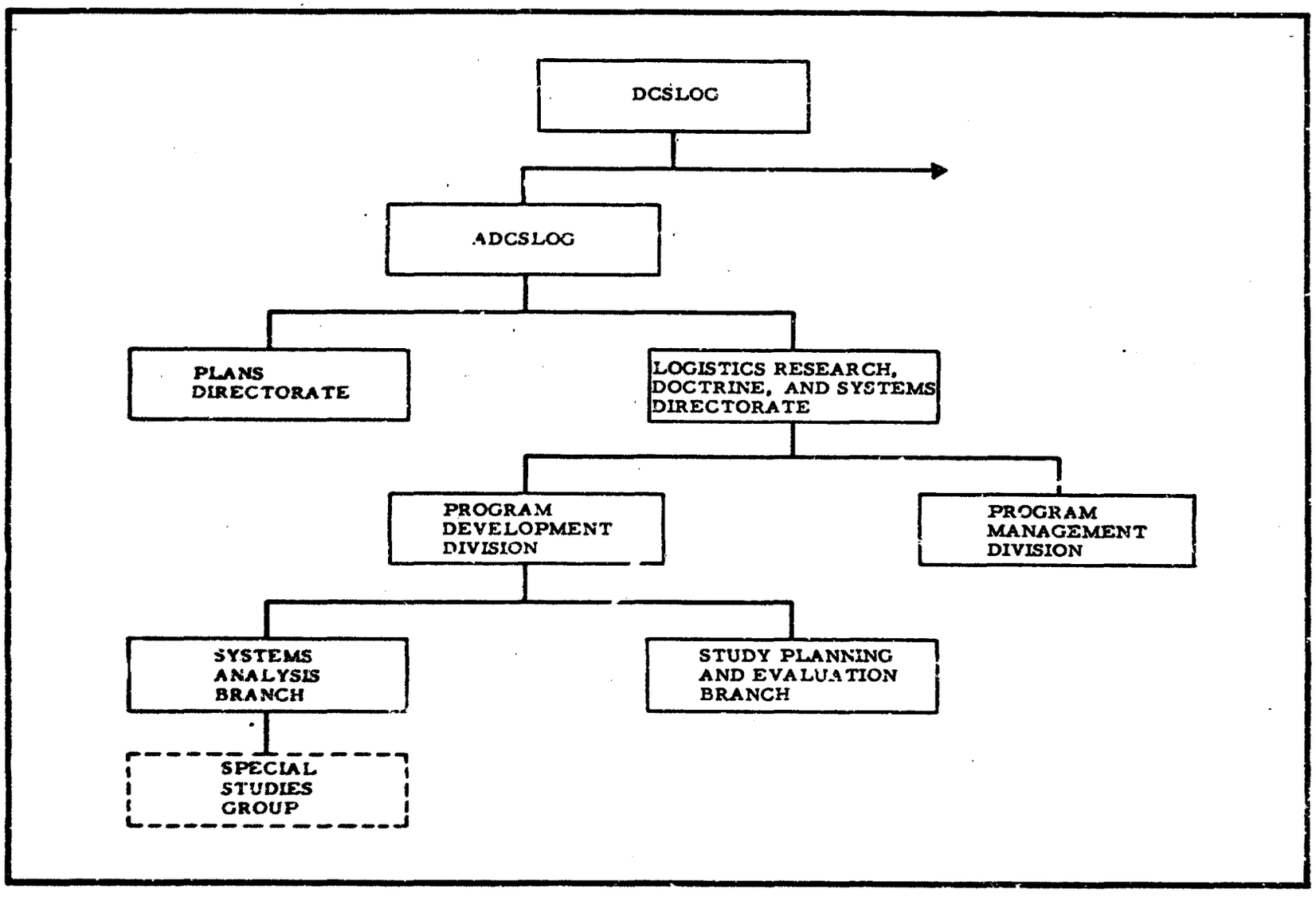


EXHIBIT 8 - ORGANIZATIONAL ALTERNATIVE I

remainder would be required for distribution among existing in-house study agencies in order to accommodate the increased workload.

Item 2 Analyses would be performed at the site of systems problems.

Item 3 Pacing of studies and sharing of study results with other study programs would be carefully managed by this organization because of the high level at which this management organization is situated.

Item 4 No transfer of roles and missions would be required. Organization would function within existing DCSLOG charter.

Item 5 Three to six months would be required to prepare definition of functions and to assemble the required staff.

ALTERNATIVE II (SEE EXHIBIT 9)

This alternative provides for a remotely located (i.e., exterior to the Pentagon) DCSLOG Class II studies organization and a small DCSLOG staff augmentation in an LRD&S office under an assistant DCSLOG. The LRD&S office would exercise operational control over the Class II activity, utilizing this study capability to analyze the requirements of a logistics system, develop the elements of the logistics study program, determine the initial composition of the program, assess program balance, measure program progress, and undertake directed special studies. In addition, the Class II organization would manage the logistics study program and monitor specific logistics studies as conducted throughout the Army.

Conduct of derivative or structure studies would be performed as at present, within CDC, AMC, and DA Class II installations, and by contractors working for elements of Department of the Army. The scope and objectives of the next tier of derivative studies would be developed by the DCSLOG Class II organization or by another organizational element of the Army with the concurrence of DCSLOG. In any

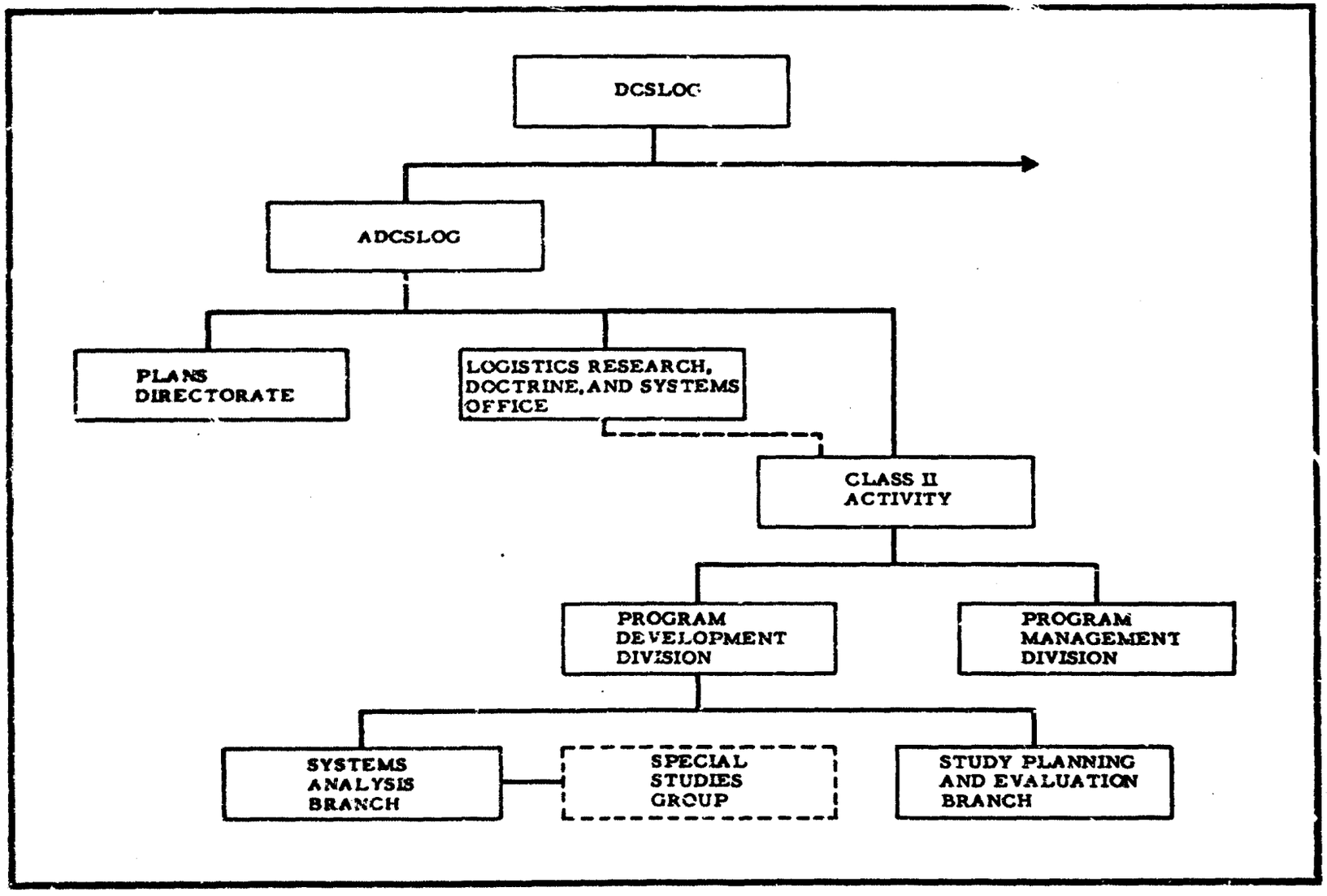


EXHIBIT 9 - ORGANIZATIONAL ALTERNATIVE II

event, the LRD&S Directorate would use the Class II organization to monitor study progress and, upon conclusion of the study effort, would ensure appropriate review, evaluation, and utilization of the study findings. Existing areas of responsibility, such as CDC for Army-in-the-field/logistics, AMC for wholesale logistics, and DCSLOG for areas not the unique responsibility of the former two, would be observed.

Assessment of the system characteristics for this alternative is as follows:

Item 1 — Approximately 480 additional personnel would be required, 465 of which would be used to constitute a Logistics Research, Doctrine, and Systems Organization as a DCSLOG Class II activity, and 15 of which would be used to constitute a Logistics Research, Doctrine, and Systems Office under an assistant DCSLOG. As in Alternative I, if a portion of the increased logistics study workload were to be assigned as an additional workload to already existing in-house study groups, a corresponding portion of the 400 personnel required for conduct of studies should be distributed among the agencies concerned.

Item 2 — As in the case of Alternative I, analyses would be performed at the site of systems problems.

Item 3 — As in the case of Alternative I, pacing of studies and sharing of study results with other study programs would be carefully managed by this organization because of the high level at which this management organization is situated.

Item 4 — As in the case of Alternative I, no transfer of roles and missions would be required. The organization would function within the existing DCSLOG charter.

Item 5 — Six to twelve months would be required to prepare definition of functions and to assemble the required

staff. Depending upon the location selected and the facilities available, additional lead time may be required for site renovation or constructions.

ALTERNATIVE III (SEE EXHIBIT 10)

This alternative provides for an independent Logistics Systems Development Command as a major command of the Army, coequal in echelon with AMC, CDC, and CONARC. As in the case of these other major commands, specific mission and task assignments being prepared by any Hqs DA staff element, such as DSCLOG, for implementation by the lower echelon would become a communication from the Army Chief of Staff to that major command. Such an independent Logistics Systems Development Command could conceivably have total responsibility for the research and development of Army logistics systems, including responsibility for the design of logistics ADP systems. Integral to this command would be elements now located in AMC and CDC and responsible for doctrine developments and derivative studies in the area of wholesale logistics and Army-in-the-field logistics, respectively.

All the logistics study capability, as well as the logistics study program development and program management responsibility, would rest with the independent Logistics Systems Development Command. This would result in an amalgamation, under one headquarters, of subcommand agencies individually responsible for Army-in-the-field logistics, wholesale logistics, and studies in support of overall considerations, such as contingency plans. DCSLOG's unique responsibility in this alternative would be to execute DA level review of funding requirements pertinent to the entire logistics systems study program. DCSLOG would also, under this alternative, assist in intercommand communication within the Army and facilitate direct contact by DOD and other agencies with responsible Army Logistics Systems Development Command elements to ensure that interfaces would be appropriately studied.

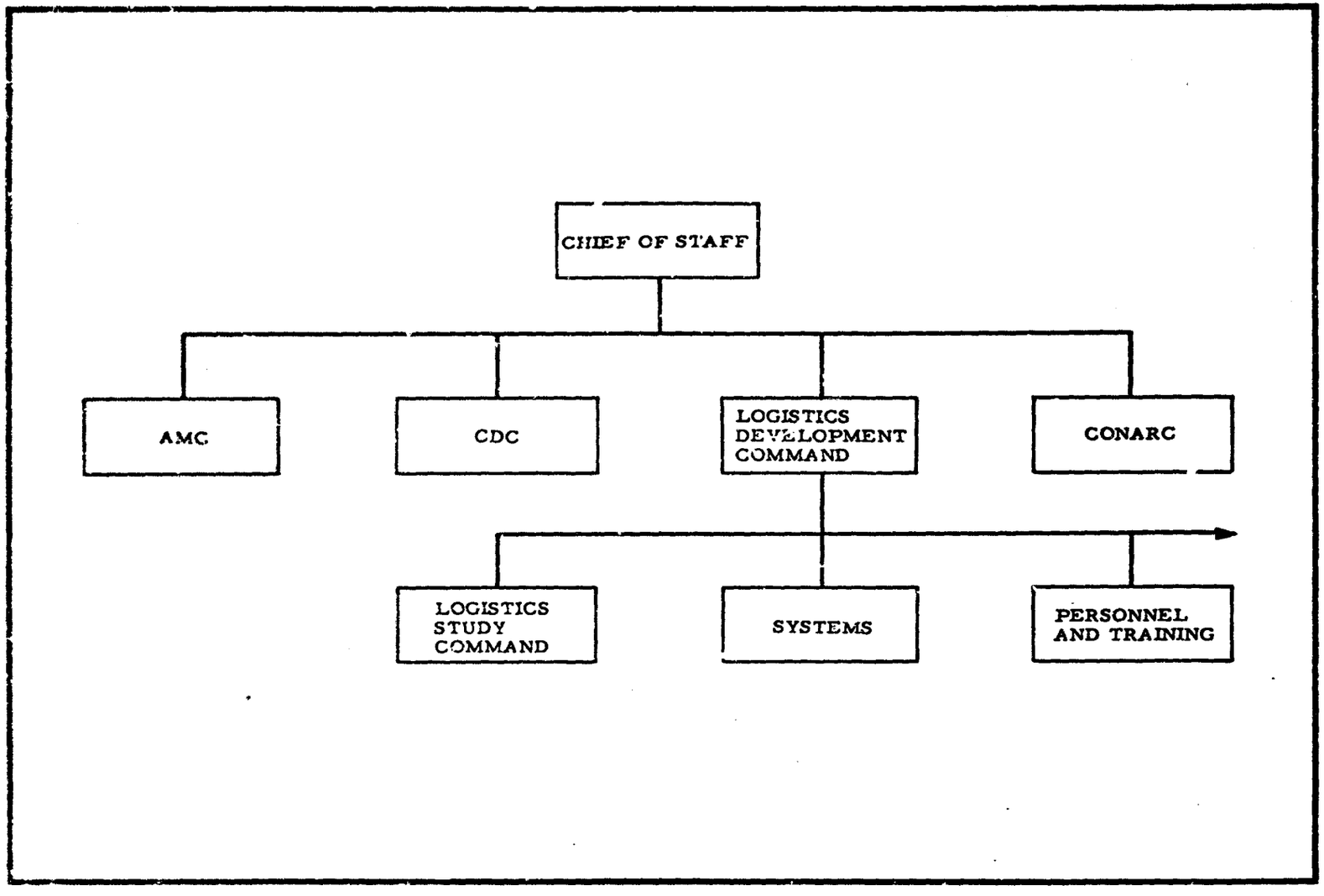


EXHIBIT 10 - ORGANIZATIONAL ALTERNATIVE III

Assessment of characteristics for this alternative is as follows:

Item 1 Approximately 1,500 personnel would be required to constitute the logistics studies portion of this command. This amounts to a requirement for 900 additional personnel not now assigned to any Army organization.

Item 2 Study effort would be removed from the systems and operations in which the problems arise (i.e., the operational environment of AMC and CDC).

Item 3 Study program development and study management would be far removed from the locale for Army staff coordination.

Item 4 Transfer of major study and doctrine development missions would be required from AMC and CDC to the Logistics Systems Development Command.

Item 5 Approximately 1 to 2 years would be required to establish the new organization.

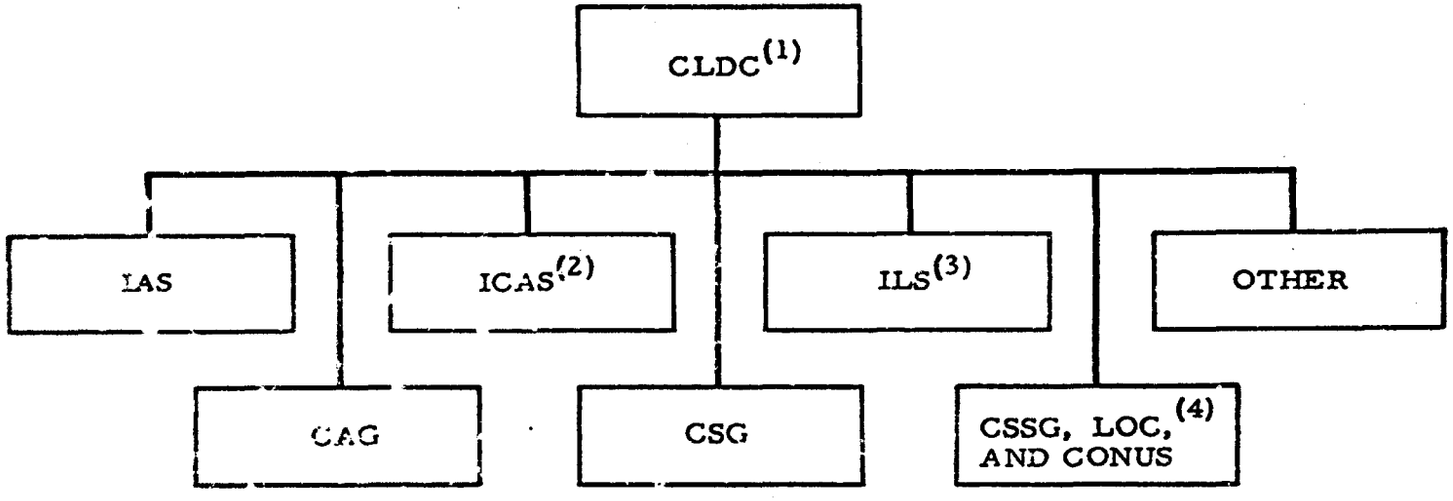
ALTERNATIVE IV (SEE EXHIBIT 11)

This alternative provides for the assignment of responsibility to CDC for the development of overall logistics concepts, doctrine, and master study plan, for the implementation of the logistics master study plan, and for the integration of this effort with the on-going Army Concept Program. Selected logistics study elements presently located in AMC, such as ALMC, AMETA, and a portion of the Ballistic Research Laboratories, would be required to be transferred to CDC under this alternative.

Development, conduct, review, evaluation, and utilization of derivative or structure studies would follow the same pattern of responsibility as specified in Alternative III, except to substitute CDC for the independent Logistics Systems Development Command.

Assessment of characteristics for this alternative is as follows:

Item 1 Approximately 1,500 personnel would be required to constitute the logistics studies portion of CDC.



Notes: (1) Combat Logistics Development Command.

(2) Institute of Combined Arms and Support.

(3) Institute of Logistics Studies (studies echelons commanded by general officer).

(4) Studies lower echelons.

EXHIBIT 11 - ORGANIZATIONAL ALTERNATIVE IV

This amounts to a requirement for 700 additional personnel not now assigned to any Army organization.

Item 2 Analysis of AMC logistics systems problems would be performed by CDC.

Item 3 Study program development and study management would be far removed from the locale for Army staff coordination.

Item 4 Transfer would be required of major AMC missions to CDC.

Item 5 Approximately 1 year would be required to realign missions and functions and to develop an integrated, overall logistics study program.

ALTERNATIVE V (SEE EXHIBIT 12)

This alternative provides for the assignment of responsibility to AMC for the development of overall logistics concepts, doctrine, and master study plan, and for implementation of the logistics master study plan. Selected study elements presently located in CDC, such as the Combat Services Support Group and portions of the Combat Support Group, would be required to be transferred to AMC under this alternative.

Development, conduct, review, evaluation, and utilization of derivative or structure studies would follow the same pattern of responsibility as specified in Alternative III, except to substitute AMC for the independent Logistics Systems Development Command.

Assessment of characteristics for this alternative is as follows:

Item 1 Approximately 1,500 personnel would be required to constitute the logistics studies portion of AMC. This amounts to a requirement for 700 additional personnel not now assigned to any Army organization.

Item 2 Study of combat support systems and combat service support systems would be separated from study of related combat arms problems.

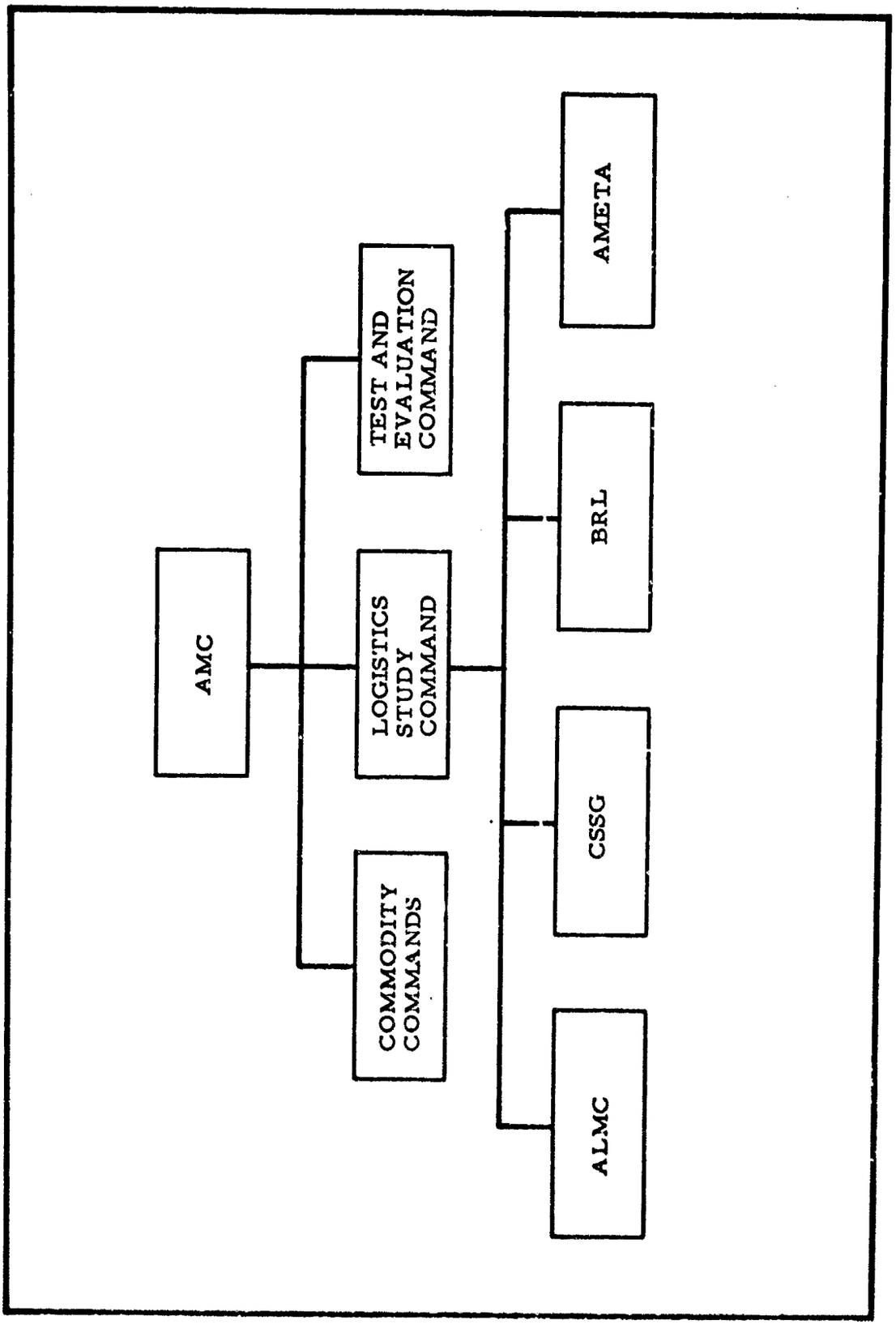


EXHIBIT 12 - ORGANIZATIONAL ALTERNATIVE V

Item 3 Study program development and study management would be far removed from the locale for Army staff coordination.

Item 4 Transfer would be required of major CDC missions to AMC.

Item 5 Approximately 2 years would be required to realign missions and functions, to establish logistics study organizations, and to develop an integrated, overall logistics study program.

ALTERNATIVE VI (SEE EXHIBIT 13)

This alternative is an extension of Alternatives I or II to impose a requirement upon each element of the Headquarters Department of the Army staff for master study program preparation and for management of individual study programs in areas for which that staff element has responsibility. The Office of the Chief of Staff, U. S. Army, would exercise responsibility for ensuring the cohesiveness of the entire Army Master Study Program and its responsiveness to a unifying concept of overall Army operations (as may be expounded in a revised BASE, ASP, or other planning document). Each General Staff section would have a capability to accomplish sufficient analysis to develop an adequate study program to determine assignment of study responsibilities, to monitor the study program, to assess program balance, and to measure program progress. Each staff section would be responsible for its appropriate study programs, utilizing study capabilities afforded by appropriate Class II activities or major commands. In particular, then, this alternative includes either Alternative I or Alternative II for the organization which will be responsible for the Army Logistics Study Program.

The assessment of characteristics for this alternative, insofar as the logistics study program is concerned, is identical to that for Alternative I or II, as appropriate. No estimate has been made of the remainder of the cost associated with the total Army Master Study Program, since this is beyond the scope of the PRC analysis.

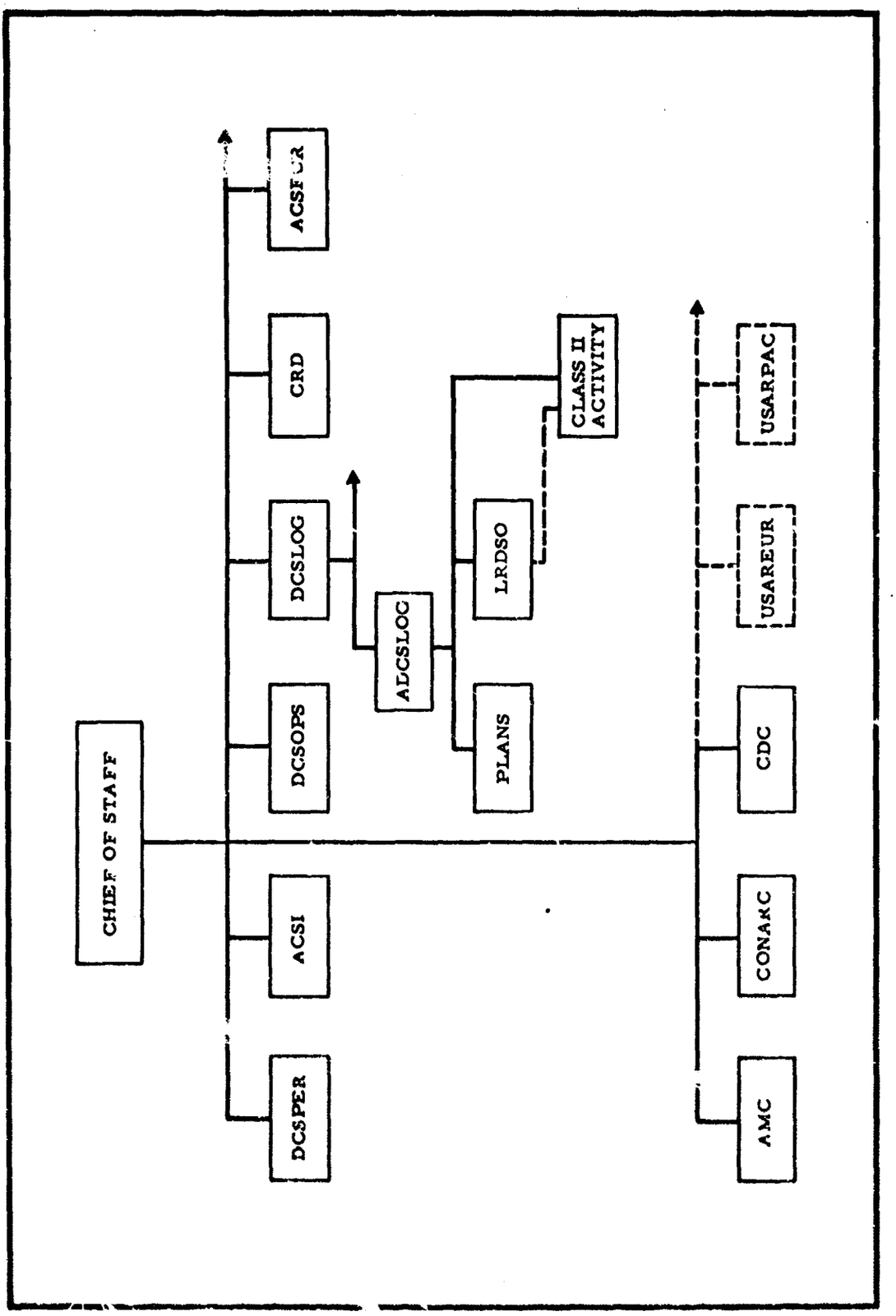


EXHIBIT 13 - ORGANIZATIONAL ALTERNATIVE VI

STAFFING CONSIDERATIONS

In the short time available for this analysis it was not feasible to develop certain detailed information normally associated with organization description, i.e., diagrammatic representation of all component parts, specification of all missions and functions, flow diagrams and work division charts reflecting channels for communication with exterior agencies, and a manpower utilization study summarizing number and qualifications of personnel required. Most of this would have been relatively meaningless for certain of the alternatives, due to the restricted area of PRC's analysis (logistics studies) and the difficulty of disassociating this particular activity from other functional elements of an organization.

Accordingly, PRC's model of a logistics study system is but an initial effort expressed in gross terms. The PRC study team judges that this is adequate for the purpose intended. If it serves to separate the "wheat from the chaff," this will have been a major accomplishment. Later efforts can refine this preliminary model.

The logic for attempting to answer Item 1 ("What additional resources are required?") must begin with the specification of work to be accomplished and an initial estimate of the number of personnel required to perform such tasks. This was done in preceding paragraphs (see page 52) and resulted in figures of 400 personnel for conduct of studies, 65 personnel for essentially managerial functions, and 15 personnel for planning and coordination functions. Where no transfer of functions and/or personnel is involved, but only an increase to already existing levels of effort (e.g., Alternatives I and II), these basic figures may be used directly. Hence, the total additional requirement for personnel to support these two alternatives is 465 and 480, respectively.

Transfer of functions (and personnel performing such functions) to an independent Logistics Systems Development Command, to CDC, or to AMC, as proposed in Alternatives III, IV and V, respectively, will

result in an additional requirement for personnel beyond the basic numbers already stated. This is due to recognition of the following:

- Logistics is but a portion of many individual studies--war games being a good example--and may not be separable from other study efforts of which it is a part and which are performed by agencies not affected in a transfer of missions and functions, e.g., Strategy Tactics and Analysis Group (STAG), Engineer Special Studies Group (ESSG), and the Department of Army Comptroller.
- A residual responsibility to perform some degree of study effort remains with a command after it has lost a specific mission, even though this results in duplication of effort. In the case of AMC, it is estimated that approximately 30 percent of the current on-going logistics study effort would be residual to that command, even though the overall logistics study responsibility were assigned to another command. This can be viewed as the penalty one pays for having a study performed in an environment removed from the origin of the problem being studied. For CDC, an even higher percentage of the current on-going logistics study effort would be residual to that command--perhaps as high as 50 percent--due to the fact that poststudy actions such as development of TOE's, QMR's, and QMDO's would still be the responsibility of CDC. It is visualized that the personnel performing these duties would be required to educate themselves via the study process in order to properly apply the results of completed studies done elsewhere.

Accordingly, though it is estimated that the total logistics study program (approximately 900 man-years, annually) would require a 1,500-person work force in any one of the three Army commands (Alternatives III, IV, and V), there would be an additional requirement of 800, 600, and 600 personnel, respectively, to account for nontransferred, residual functions. The total requirements for personnel for

these three alternatives would then be 2,300, 2,100, and 2,100, respectively. Since 1,400 personnel are presently assigned among the organizations currently performing logistics studies, this results in a net additional personnel requirement of 900, 700 and 700, respectively, for Alternatives III, IV, and V. These figures are summarized in Exhibit 14.

There are indications that the logistics study system may contain personnel who could be utilized more profitably in the augmented study program. First, the existing study agencies may be somewhat overstaffed. Appendix E shows almost 1,300 personnel available performing or supporting logistics studies in Army agencies, while Appendix C shows approximately 350 man-years of in-house direct study efforts. The difference is not likely to be all slack or overhead, since these agencies are carrying out other functions besides their primary mission of producing studies. Clearly, some manpower survey work is required for a better understanding of the relation of total staffing to man-years of direct study effort.

Second, at least 130 man-years of the in-house work in FY 66 was devoted to small studies, that is, those requiring less than 4 man-years each of effort. In some cases, these studies required no more than 2 or 3 man-months of time. Some of these projects appear to represent an understaffed effort that to be effective would require more personnel, and which to some extent dissipate the effort of personnel now assigned to them. Regrouping study personnel into larger projects to increase overall effectiveness appears to be desirable.

Third, a number of the field study agencies appear to be service organization, whose function is to provide studies to whomever requires them. Some of their personnel either could be applied to the augmented study program or could be shifted to the new logistic study organizations while continuing to do the same work.

Fourth, three new study agencies have been established in the immediate past with no noticeable strain on personnel. These were the Force Planning Analysis Office, the Army Materiel Systems Analysis

EXHIBIT 14 - PERSONNEL REQUIREMENT IN SUPPORT OF PROPOSED LOGISTICS STUDY WORKLOAD(1)

Organization	Present Assignment	Organizational Alternatives I	II	III	IV	V
DCSLOG, DA		65	15	-	-	-
DCSLOG Class II Activities	-	-	465(2)	-	-	-
USAMC	600	800	600	200	200	1500
USACDC	400	600	400	200	1500	200
Other	400	400	400	400	400	400
Proposed USALDC	-	-	-	1500	-	-
Total Personnel Required	1400	1865	1880	2300	2100	2100
Total Personnel Available	1400	1400	1400	1400	1400	1400
Additional Personnel Required	-	465	480	900	700	700

Notes: (1) Two personnel are considered required per 1 man-year of study effort. Contractor effort is not separately identified and is computed at the same efficiency ratio.

(2) Some portion of 400 personnel could be alternatively apportioned among AMC, CDC, or other (see pages 59 and 61).

Center, and the Directorate of Cost Analysis. These three agencies are authorized a total of approximately 180 personnel. Since no centralized direction to logistics study effort was in sight when these agencies were established, they had to provide this for themselves. An augmented DCSLOG effort in effect redefines their charters. With DCSLOG direction, personnel in these agencies who generate inputs, scenarios, assumptions, overall logistics guidance, as well as perform some of the logistics studies, would be located more appropriately in either DCSLOG or its Class II activity.

Finally, termination of the Board of Inquiry on the Army Logistics System will make available an additional 100 man-years or more of effort to the Army as a whole.

The above data provides a very rough estimate of the number of personnel now in the system who could be shifted to the proposed study program without undue strain. If 50 percent of the manpower now used by small and generally nonproductive studies; 10 percent of the manpower recently acquired by FPAO, AMSAC, and DCA; 5 percent of the strength of remaining study agencies; and 50 percent of the manpower freed by the Board of Inquiry were made available, an estimated 200 personnel would be available for work on an invigorated logistics study effort. This would reduce by 200 the total additional personnel required, as indicated for each alternative in Exhibit 14.

SELECTION OF ALTERNATIVE

The obvious choice for recommended implementation is Alternative VI. Realizing that the scope of this alternative transcends the limited scope of this study effort, the authors acknowledge that implementation of either Alternative I or II would be a first step toward achieving the purposes of Alternative VI. The PRC recommendation to the Board, then, is for the adoption of either Alternative I or II.

Because of the constraints which limit the increase of Headquarters Department of the Army staff personnel resident in the Pentagon, and because of the advantages which accrue to separation of the study management organization from the pressures and immediacy of day-to-day staff

actions, the authors recommend that Alternative II be implemented for the improved management of the Army Logistics Study Program. This organization will become most effective when it is incorporated into the improved overall Army study program developed and managed under the Director of Special Studies as shown in Alternative VI.

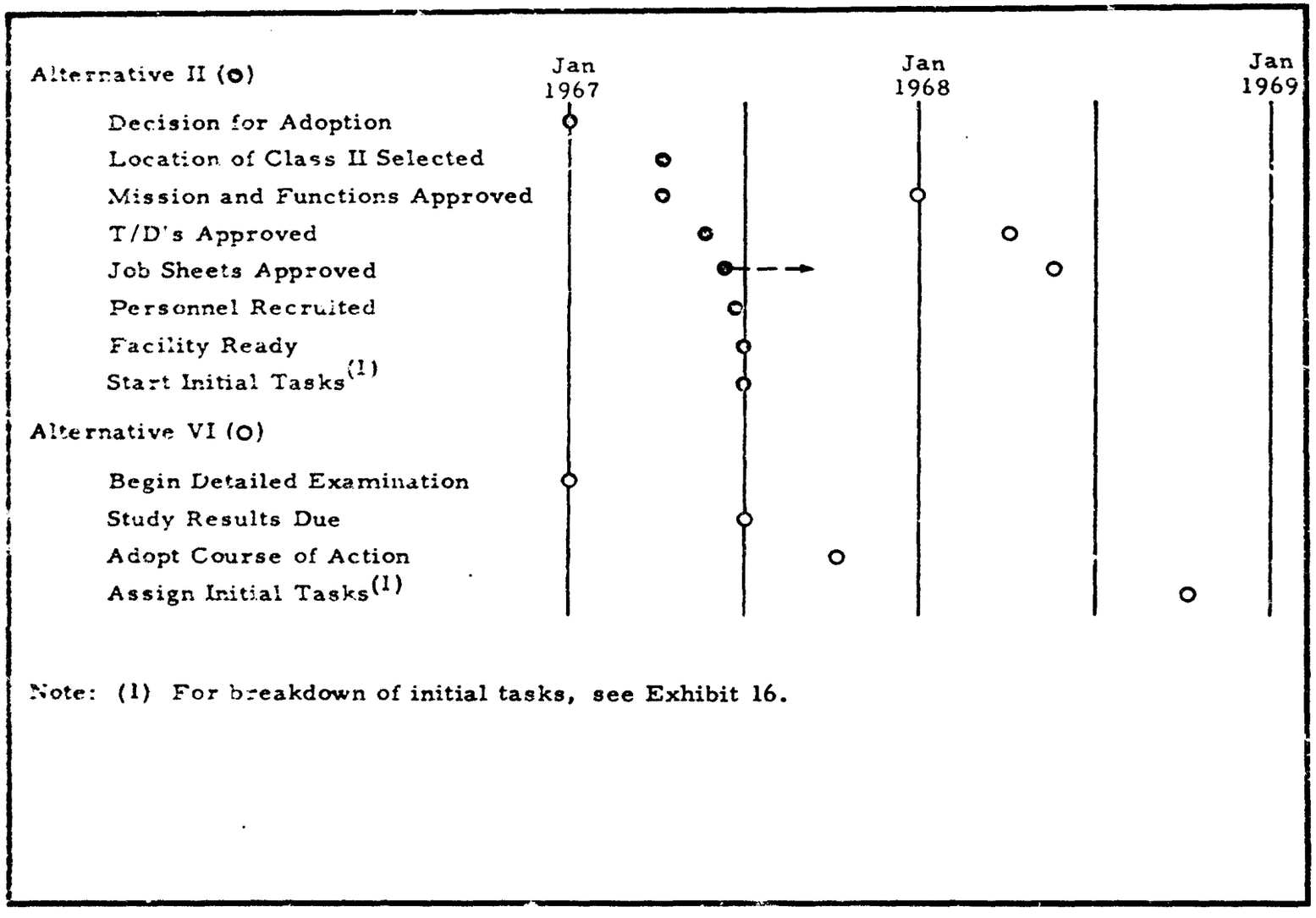
TIME-PHASING OF IMPLEMENTATION

Exhibits 15 and 16 illustrate the time-phasing of implementing actions for either or both of Alternatives II and VI, assuming a Department of the Army decision in January 1967 to adopt the former alternative and to begin detailed study of the latter.

For Alternative II, it is estimated that 3 to 6 months would be required for selecting and preparing a facility for occupancy as a DCSLOG Class II activity. The extent to which an already operational organization is assigned the mission to become the DCSLOG Class II activity will tend to shorten this time requirement, as will the extent to which it has adequate physical facilities already under its control.

An estimated 4 to 6 months of concurrent time are required in formalizing a Table of Distribution and individual job descriptions as a prerequisite to acquiring a permanent staff of military and Civil Service personnel. This period could be shortened somewhat by authorizing personnel acquisitions by means of temporary duty orders. The shortest possible time for assembly and initial organization of a minimum work force is estimated to be 3 months, which would permit assumption of work responsibilities in March 1967 instead of July 1967, as shown. A minimum work force of approximately forty personnel is estimated, but, of course, the capability of such a group to accomplish anything significant depends upon their individual and collective quality as well as their number.

Due to the short supply of personnel with operations analysis skills, not to mention the requirements for additional experience in logistics and study management, it is doubtful that staffing to the level of one hundred personnel could be realized in a year's time. This would seem to imply an initially heavy reliance upon contract study effort with in-house personnel being reserved for study program development, management, and evaluation.



Note: (1) For breakdown of initial tasks, see Exhibit 16.

EXHIBIT 15 - TIME-PHASING OF IMPLEMENTATION OF ALTERNATIVES II AND VI

ALTERNATIVE II

1. Develop Initial Study Program
2. Assign Studies
3. Start Planning Program Modifications
4. Start Monitoring Studies in Progress
5. Evaluate Selected Completed Studies
6. Start Assembling Material for Logistics Concepts and Doctrine Documentation

ALTERNATIVE VI

1. Modify Existing Concept Documents (BASE, ASP)
2. Develop Initial Study Programs for Each Staff Area
3. Assign Studies
4. Modify "Army Master Study Program"
5. Start Monitoring Studies in Progress
6. Evaluate Selected Completed Studies
7. Start Preparation of Logistics Concept and Doctrine Documentation

EXHIBIT 16 - INITIAL TASKS FOR ALTERNATIVES II AND VI

With respect to Alternative VI, the time-phasing indicated is for the "worst case." For the DCSLOG portion of the DA staff, the time for assignment of initial tasks would obviously coincide with the time shown for that same action in Alternative II. For certain other staff sections, also, where recent steps have been taken to organize and use a study analysis effort, the time required would be considerably reduced over that depicted in Exhibit 15. Nevertheless, it is estimated that for all elements of the DA staff to have reached the desired level for coordinated study program development, management, and evaluation, a period of approximately 1 year will have elapsed from date of decision on a course of action.

As the most direct step in implementation of Alternative II, the authors further recommend that maximum use be made of the experience and capabilities represented among the staff of the Board of Inquiry on the Army Logistics System. Specifically, it is believed that the personnel constituting the Board should be used in formation of the new Class II activity, at least to the extent of preparing its terms of reference, but possibly to actual staffing of the new organization.

TYPE OF STUDY PERSONNEL REQUIRED

A requirement exists in LRDSO for maturity in addition to technical competence. The officer should have had a few years to apply what he learned in school, but he must have lost no respect for what he learned. He should have been applying the techniques himself as opposed to directing others. Lieutenant colonels and majors are most likely to meet this requirement with a few bright lieutenants thrown in to provide the insight and enthusiasm of youth.

The following paragraphs offer a few observations to answer the question, "What kind of officer should be sought and how does one recognize him?" These observations provide at best a very rough description of the type of officer the study program requires. In searching for study personnel, the Army should consider three things: interests, personality, and skills. Each of these three characteristics is discussed briefly below.

In terms of interest, the officer with broad interests rather than one who is highly specialized is preferable. Each analyst must have some technical contribution to make, so that the organization can, collectively at least, analyze problems in depth as well as in breadth. On the other hand, the analyst who has only a technical specialty is often difficult to keep fully employed. If his particular specialty is not being studied, he becomes in effect nonproductive. Clues as to whether the officer has the desired broadness may be provided by learning whether he (a) has ever taken courses other than those required to work towards a degree, (b) has ever published an article, (c) will take on any problem that comes along rather than back off from those outside his immediate assignment or, most important, (d) whether or not he has participated as an analyst on a big Army study and, if so, whether or not he enjoyed it.

In terms of personality, two characteristics are desirable: energy and a capability in dealing with ideas. Ten percent of discovery is insight; 90 percent is drudgery. The officer who is unwilling to work hard at the dull routine of accumulating data and making calculations is unlikely to bring any ideas he may have to the point of being useful. Recognizing an officer with energy is easier than determining one who can deal with ideas. Such a man is the type who is motivated to change a system rather than to work within it. He is a person who tends to criticize procedures and organizations rather than people. He is a person preoccupied with solving problems rather than mollifying personalities. The exchange of conflicting ideas among the members of a study organization is important. Unless a man is interested in the ideas of others, he will not be able to listen to them attentively or to respond intelligently enough to gain the respect of his coworkers. To avoid personality conflicts, then, a study organization must select its members from men who are idea-oriented. Perhaps a key characteristic of the desired type of officer is a probabilistic view of the world, or a belief that "almost anything can happen, but some things are more likely than others."

In terms of skills, military training is not an anticipated problem. The things a field grade officer doesn't know about the Army, he has learned how to find out. In addition to this, only one other skill, some facility in using mathematics and statistics, appears to be required. The emphasis in this sentence is on the word "some." It is our impression that the amount of mathematics and statistics required in the ideal studier is grossly overestimated by the Army. His point of view and temperament are far more important than the number of mathematics courses he might show on his transcript. An officer who is willing to work can become acquainted with the basic tools of O.R. and computers in several short courses given in Army schools or in a couple of semesters of night work at a local college. This would introduce him to specialized terminology and basic concepts. Appendix G is a list of short in-house Army courses that will provide the type of orientation required. Any two of them attended during his first 6 months on a study will provide an officer with enough background to begin reading technical publications with some degree of understanding. This is not to overlook the importance of advance methodology in logistics studies. The powerful tools of operations research are based on multivariate statistics, and they should be more widely used, but the fact remains that most study battles are won with simple methodology.

Type of academic training is also an indicator of a desirable officer. The type of degree is not so important as the type of courses and methodological approach favored by the school or department providing the background. Courses in mathematics, probability, statistics, econometrics, forecasting, linear programming, experimental design, and related techniques are favorable indicators. Mathematics and physical science degrees have been traditionally the disciplines that were strongest in model building, but this situation has changed markedly in the last 5 years. Today, complex model building formulations and use of computers may be employed, in the better schools at least, by departments of sociology, psychology, geography, and even education. In less progressive schools, on the other hand, the model building approach in the fields of physics and geology does not compare with

similar work done elsewhere in the soft sciences. In such a situation, the course work, not the degree, is the appropriate indicator to observe. A great deal of advanced graduate work or a Ph.D. is not always desirable either; its possessors often are unhappy studiers of Army systems problems because they do not have the opportunity to apply most of the complicated techniques they learned in school. Obviously, the ability and drive to communicate are required, and indicators of this are published articles and a coherent method of verbally presenting ideas.

The preceding paragraphs are not the only way of looking at the problem of personnel selection. A consulting organization known to the authors analyzes applicants under four categories: growth potential, ability to do the work, management ability, and marketing ability. Other equally valid breakdowns are possible. In any event, the logistics study system has a requirement for an officer with a facility in dealing with ideas, somewhat broader interests than normal, and some capability in the use of mathematics and statistics.

IV. MANAGEMENT

GENERAL

The preceding sections have surveyed the problems besetting logistics studies. These may be summarized as resulting from: (1) lack of strong direction from the top; (2) programming imbalance; (3) complex procedures; and (4) uncertain organizational responsibility. The symptoms are clear. To provide a cure, at least two alternatives are available. One would be to provide a czar, located most likely in the Office of the Chief of Staff, who would in effect "command" the logistics study effort wherever it was carried out. Most likely he would command study efforts in other areas as well. He would be responsible for funds, personnel assignments, study assignments, and study review. While no reorganization of the chain of command to field study agencies would be required, his directives under the Chief of Staff's authority would be aimed directly at the study agencies. Passing through intermediate levels of command would be a mere formality. This is the project manager approach. It has worked well in the Navy, and is widely used in Army hardware development It is an approach well understood by logistics personnel.

In PRC's opinion the above is an approach well-suited to getting things done, but ill-suited to exploring all aspects of a problem. It is an approach that says, in effect: damn the coordination, full speed ahead. In planning an Army of the future, careful consideration of frustrating differences of view are more important than quickly producing a report which may or may not have the meaning. The attractiveness of a czar, however, is understandable, since a well-directed cycle of guidance, alternatives, derivative studies, and master studies can take from 3 to 6 years. The 6-year cycle leading to TASTA is an example.

On the other hand, the Army possesses a sensitive tool for the analysis of complex problems and the reconciliation of different views of complex realities: the General Staff. The Pentagon is littered with the skeletons of ad hoc organizations established outside of regular staff channels in the hope that they could solve a particular problem. In PRC's view,

lasting solutions to Army problems must be established within the General Staff framework. The tradeoffs are clear: use a project manager approach to obtain speedy, shallow results; or use a General Staff approach to obtain less immediate, but thoroughly explored conclusions.

This section will specify and describe the management system and procedures to be employed assuming the adoption of Alternative II, described in the preceding section. It should be borne in mind, however, that this same management system, expanded for application to other Army General Staff sections, would be equally serviceable for Alternative VI.

DESCRIPTION OF THE SYSTEM

The management system for Army logistics studies should consist, essentially, of four components:

- A single point of staff responsibility and authority in development of information, advice, and recommendations on all Army logistics matters, this to reside in the Office of the Deputy Chief of Staff for Logistics, Department of the Army
- A Logistics Studies Steering Committee (LSSC)
- An Army Logistics Study Program (ALSP), as a component of the Army Master Study Program (AMSP)
- A system of Logistics Study Advisory Groups (LSAG's)

DCSLOG Responsibilities

The Deputy Chief of Staff for Logistics is responsible for the design, evaluation, and management of the total Army logistics system. Within this responsibility is the total Army Logistics Study Program utilized as a tool for effective accomplishment of the overall mission.

Specific goals for the total responsibility and for the Army Logistics Study Program are as follows:

- To assure the most effective utilization of logistics means and resources, both now and in the future
- To satisfy requirements for all logistics planning and analysis, both now and in the future

- To provide for unrestricted channels of communication in all matters related to logistics planning and operations
- To maintain objectivity and to provide for flexibility and latitude in performance of the logistics mission

Logistics Studies Steering Committee

The Deputy Chief of Staff for Logistics may convene a Logistics Studies Steering Committee (LSSC) to assist in the accomplishment of his mission and specifically in the development and evaluation of the Army Logistics Study Program.

The LSCC membership should include, as a minimum, the Deputy Chief of Staff for Logistics, who shall serve as chairman; each Assistant Deputy Chief of Staff for Logistics; the Director, Logistics Doctrine and Studies Agency; and representatives from AMC, CDC, and CONARC. As specific needs arise, attendance at any particular LSSC session may be expanded to include representatives from other continental U.S. Army field commands and/or overseas commands.

The LSSC meets, as required, to review the ALSP, to analyze it for completeness to meet the needs of the Army logistics system, and to propose studies for inclusion in the ALSP. It is through the meetings of this committee that the DCSLOG receives from each Army command inputs forecasting logistics problems and identifying logistics studies which should be incorporated into the AMSP. In addition, the committee makes an initial recommendation of the Army activity to which each study should be assigned and of the extent to which contract help should be funded. The committee meeting is the first arena in which the Army planning for a unified, balanced logistics study program takes place. The committee assembles all the diverse specifications from all commands and agencies and moves to shape these into a consistent package of logistics studies which will do the most towards improving the Army logistics system within the resources that are available.

The Army Master Study Program

In the Office of the Chief of Staff the requirements for all Army master studies are received from the staff sections and merged with requirements laid on by OSD and the Joint Staff; these requirements are assembled, integrated, and matched against total resources available to the study program. The Army Master Study Program (AMSP) is molded from these requirements and sized to provide a balanced program for meeting priority requirements with the available resources.

The planning for expenditures of all funds for Army operations research and analysis not directly supporting hardware development should be done in the Office of the Chief of Staff.

It is basic to the system of the Army General Staff that each staff section must have adequate resources for study and analysis. Each General Staff section should plan and manage that portion of the Army Master Study Program which is most directly related to the section's responsibilities, e.g., DCSLOG should be responsible for the Army Logistics Study Program. Thus, DCSLOG should be responsible for budgets, contracting, and personnel ceilings relating to logistic studies and study contracts.

Army Logistics Study Program

The AMSP is composed in the Office of the Chief of Staff, U.S. Army, from the programs proposed by the General Staff sections. The Chief of Staff then issues to DCSLOG the Army Logistics Study Program (ALSP) for which DCSLOG is designated sponsor. This program includes each Army master study which is principally a logistics study, and assigns each study to either DCSLOG or a major command for accomplishment; the program also specifies the funds which are available for contract support to each study (see Exhibit 17).

At the same time at which the ALSP is defined to the DCSLOG, the Chief of Staff, U.S. Army, issues directives to each command to perform those ALSP studies which are assigned to that command. This directive defines DCSLOG as the sponsor of these studies and the advisor for each study. DCSLOG responsibility is defined to include monitoring the completion of each study in the ALSP as a most useful element of the integrated program.

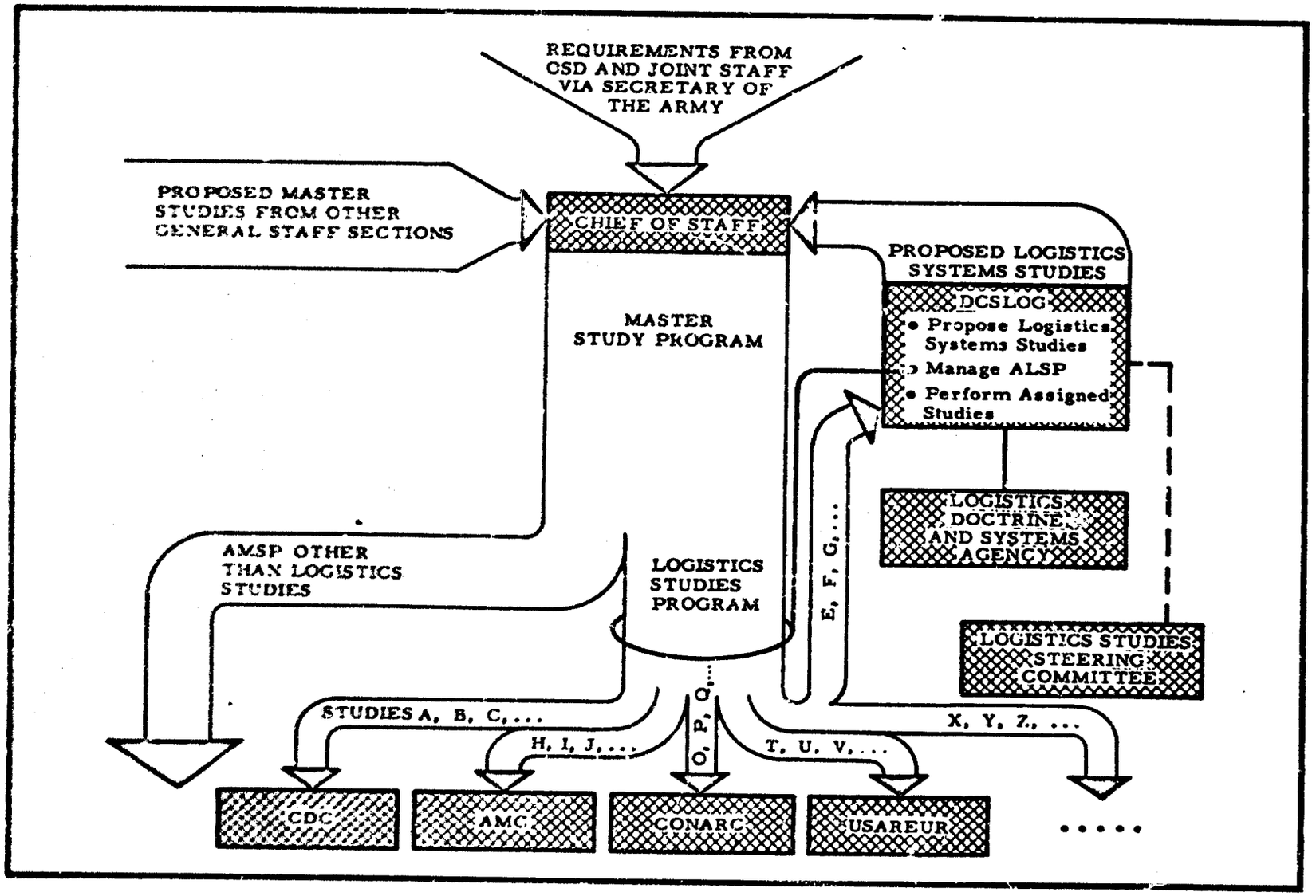


EXHIBIT 17 - DEVELOPMENT OF THE LOGISTICS STUDY PROGRAM

The Logistics Study Advisory Group

The Deputy Chief of Staff for Logistics forms a Logistics Study Advisory Group (LSAG) to assist in the management of each study of the ALSP. The chairman of an LSAG is that Assistant Deputy Chief of Staff for Logistics whose responsibilities are most directly related to the study. The chairman is responsible for carrying out the LSAG mission. The vice-chairman of the LSAG is a member of the staff of the Logistics Doctrine and Systems Activity, the Class II activity supporting ADCSLOG (PDS) in the management of logistics system studies. The vice-chairman is an analyst who is assigned to full time duty in the LDSA for management of the conduct and evaluation of Army logistics studies. He assists the chairman in all LSAG duties and he acts as chairman in the event of the latter's absence from LSAG meetings.

The advisory group for each study is designed carefully by DCSLOG to include representatives from only those commands which meet the following qualifications:

- A command having a primary interest in participating in the development of the data, the concepts, the doctrine, the assumptions, or the guidelines which are to be used in the study
- A command offering to support this interest with a qualified logistics systems analyst who will be assigned to attend the advisory group meetings and to devote time and effort as required to represent the command in preparing constructive guidance for the study

A study in the ALSP such as study H in Exhibit 17 may have an LSAG assigned which is composed of only the chairman and vice-chairman, because no major command other than the study activity has the primary interest or the resources to support the study. Another study (study F in Exhibit 17) may have a large advisory group assigned, because the study is of major interest to many commands each of which is prepared to participate actively in the study advisory group.

The LSAG chairman, or his assistant, shall be uniquely responsible for:

- Initially preparing the work statement and all subsequent modifications thereto, including a statement of appropriate and adequate assumptions
- Providing all formal guidance to the study group, making provision for input from various sources of data, but reserving authorization as to use of such data
- Arranging contacts with other agencies and access to appropriate information to assist the study group in its research and data collection effort
- Conducting periodic formal reviews and maintaining continuous incidental awareness of study progress and the direction or trend of study findings
- Preparing a summary evaluation of each published product of the study group and recommendations to the DCSLOG for application or other appropriate action

The Logistics Study Advisory Group does not manage instead of LDSA, but rather assists LDSA in management. This assistance provides to LDSA appropriate inputs from the major commands for the direction and evaluation of a particular study of the ALSP. Exhibit 18 indicates the relationships among DCSLOG, a study team, and the LSAG appointed for the study.

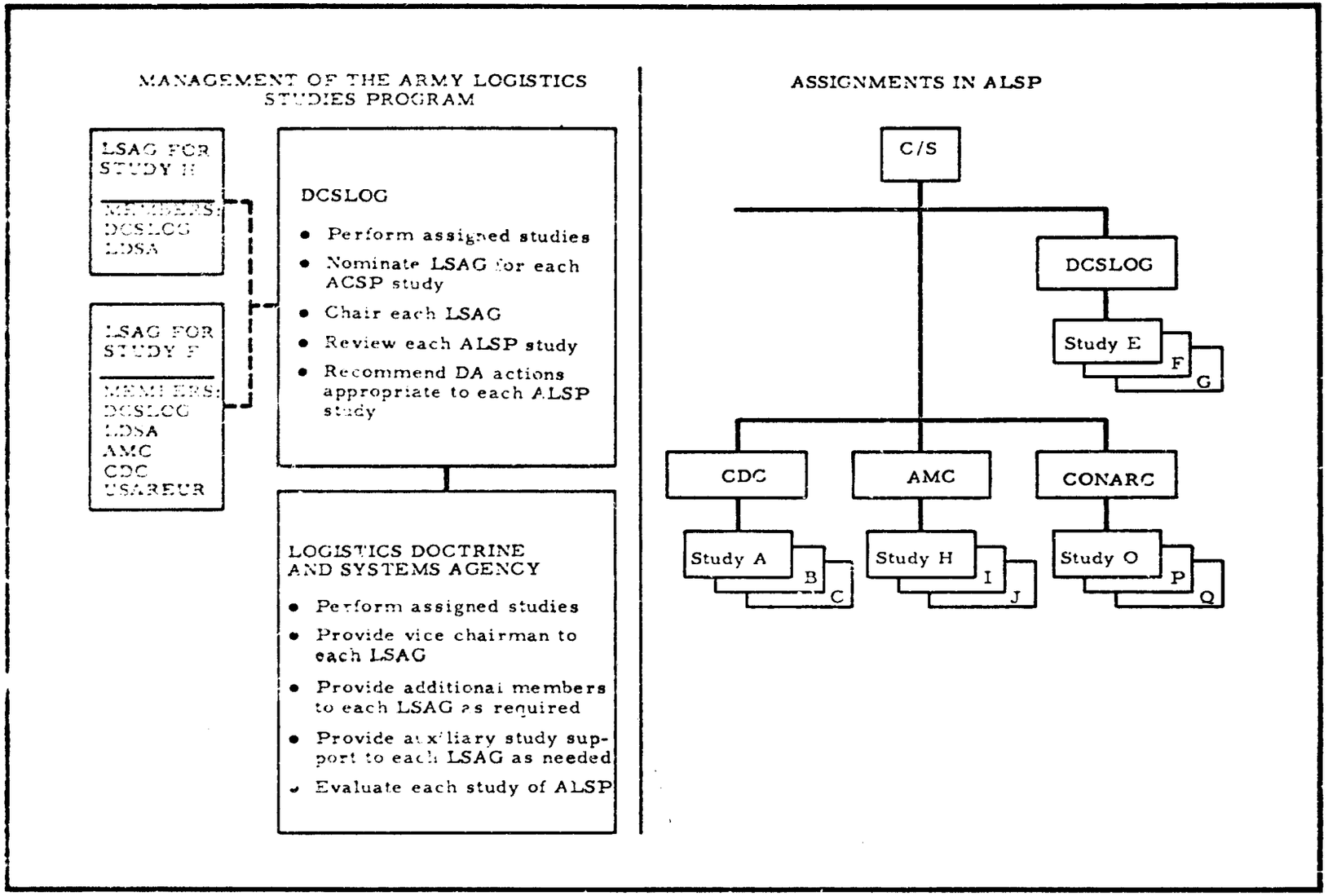


EXHIBIT 18 - LOGISTICS STUDY SYSTEM MANAGEMENT RELATIONSHIPS

V. CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Studiers

The present administrative system presents many obstacles to the individual studier while offering him little assistance or incentive to produce a superior report.

Use of officers in administrative jobs rather than in study work leads to deficiencies both in the realism of studies and in the training of officers.

Study personnel could be more effective by using statistical and mathematical techniques and approaching problems more in terms of the relative probability of several alternatives than in terms of a single, preferable solution.

Projects

Absence of an overall objective or concept to guide the studies carried out by the Army General Staff and by AMC appears to be largely responsible for the fragmentation and lack of direction in their current study effort.

The purposeful design of the Army's future logistics system is extremely weak. The object sought but not found was a set of logistics studies which are clearly related to a master goal and which exhaustively cover the design features of a future Army logistics system.

A central document containing long-range, coordinated Army logistics concepts could not be found. Accordingly, the key Army plans, BASE, ASP, AFDP, and ASCP, were surveyed to see if these documents provide the critical concepts, ideas, numbers, and other material required for follow-on development of logistics concepts. The documents do not appear to have been written for this purpose, and no other possible source of coordinated guidance was discovered.

CDC's structure of studies under the several concept programs is an attractive and effective method for organizing study effort.

The principal areas showing a lack of balance in the Army-wide study effort appear to be the lines of communications between the U.S. and an overseas theater and in the Army's relations with external agencies. Long-range studies other than CDC's program are scarce. A major cause of the Army's difficulty in responding to OSD questions appears to be this lack of long-range studies and lack of examination of the interfaces with other agencies.

Providing a foundation of reliable data receives inadequate attention, and the present system offers little incentive to gather or publish what data is available.

Although beyond the scope of this report, an Army-wide concept study program appears desirable, with the CDC Concept Program serving as a prototype. The study projects proposed in Section II would be an initial step towards such a goal.

Organizations

In analyzing the Army logistics study system, the authors have been brought back repeatedly to a central principle: The DCSLOG, as logistics officer of the Army General Staff, is responsible for conception of an effective logistics study program and for staff supervision of the associated finances, procedures, and organization. To improve Army logistics studies on more than a temporary basis, his capability to guide this process will have to be strengthened.

Since studies are a necessary tool of management, a capability for conduct of studies should exist at each major echelon of organization.

Current compartmentation of logistics responsibilities between CDC for Army-in-the-field logistics and AMC for "wholesale" logistics can be maintained, provided that DCSLOG exercise strong staff supervision over these and other logistics study efforts.

The most acceptable organization improvement to direct and carry out logistics studies would require the formation of a DCSLOG Class II organization with the above as a principal mission. Approximately

280 additional personnel, not now available to DCSLOG, would be required to establish and operate an adequate study and study management effort.

An in-house logistics study capability adequate for the recommended logistics study program is unlikely to be achieved in less than a year.

A vitalization and reorientation of the entire Army study effort is desirable to achieve a definitive structure and to assist in mission accomplishment. Such reorientation, with the proposed logistics study program as a fundamental component, could be achieved with minimal organizational changes in approximately a year.

Management

A workable management system is possible by utilizing currently available personnel and organizations by providing the recommended logistics study and study management organizations and by making minor modifications to existing study management procedures.

The overall cycle for an objective year of administrative preliminary preparation of detailed derivative studies, preparation of the master study, and staffing the results and implementation is likely to be from 5 to 7 years.

The cycle time between study proposal and implementation has a strong effect on a study's eventual value. Organizations, personnel, and problem conditions may change significantly if the overall cycle is delayed too much by administration.

The stimulus for major logistics studies regularly appears to come from outside of DCSLOG. This is not to be expected if DCSLOG is actively planning and managing the program.

There is no apparent difficulty or lack of mechanism to make effective use of support or directed studies.

Study system procedures for initiation, control, and reporting are overly complex, due to inadequate definitions and categorization of studies via AR 1-110, and due to the separation of study requirement approval, study funding approval, and contractor negotiation approval. Existing procedural regulations are not uniformly applicable to all studies.

For DCSLOG to play a proper role in Army logistics studies, budgeting and programming of the entire Army study effort should be a direct responsibility of the Chief of Staff's office. Allocation of resources for conduct of a logistics study should be made on DCSLOG recommendation concurrent with assignment of study sponsor responsibility.

Army Research Office now functions as study contract administrator for all OCRD program studies and for those sponsored by any other Army command or staff agency upon request. While this is an administrative convenience to General Staff sections such as DCSLOG, it tends to make the study agency more responsive to OCRD than to the staff agency principally concerned.

Long delays between approval of a study requirement and initiation of study effort could be shortened by relatively minor administrative changes, such as (1) combining study function authority and study requirement approving authority in the Chief of Staff office; and (2) liberalizing the present $100,000 limitation on contract study procurement officials.

Submission of requests for authority to negotiate a study contract from a General Staff section (e.g., OCRD) to AMC (as the only local designated HPA) is a fundamentally improper staffing action. It contributes to the excessive time between approval of a study and its initiation.

Nominations of projects for new or continuing study efforts that are solicited annually by Army Research Office tend to allocate study resources to less deserving areas and to delay study initiation and completion.

The project advisory group (PAG) system, required only for OCRD-administered studies and AMC-sponsored contract studies, is a control device with many good features, but requires minor modifications to be effective.

Appointment of PAG's after approval of study requirement implies preparation of initial work statement by personnel not necessarily later appointed as PAG members. This may lead to disinterested, ineffective PAG's and to nonresponsive study efforts.

Evaluation of study results is largely a formality to comply with regulations.

DLSIE, ASDIRS, and DDC provide effective methods for dissemination of the discoveries made by logistics studies.

RECOMMENDATIONS

Studiers

1. The Army should rely more on officers and less on contract or civil service personnel in performing logistics studies. At least half of the total man-hours on direct study effort should be furnished by officers. In particular they should be assigned as simulation builders rather than simulation operators.

2. Officers selected for a study assignment should in general be a certain type; that is, concerned predominantly with ideas, having somewhat broader interests than usual, and possessing some knowledge of mathematics and statistics.

3. The names of authors should be placed on study reports, and footnotes showing the origins of data and concepts should be more widely employed.

4. Studiers should receive some training in quantitative methods from short courses in Army schools.

Projects

5. An initial project in the new study program should be the preparation by DCSLOG of specifications for data, contingencies, alternatives for specific consideration, and assumptions to be furnished by each General Staff section for its area of responsibility to provide a master goal for the purposeful design of a logistics system.

6. A program of systematically planned study projects should be initiated which will result in a series of master designs of the Army logistics system at different objective years in the future.

7. The first design should aim at a system which can be implemented approximately by 1980.

8. The studies described in Section II should be initiated and other studies of the same type should be added to the program as the need for them is identified.

9. The Army should devote a sizable block of study effort in the program to anticipating the requirements of the Navy, Air Force, and DOD logistics agencies as well as the services to be furnished to them.

10. The data gathering and publishing effort should be increased substantially.

Organizations

11. A small supervisory study office as described in the main body of this report should be added to the DSCLOG staff.

12. A DCSLOG Class II agency patterned after Alternative II should be established to assist DCSLOG in the overall management of its logistics study program, including exercise of staff supervision over Army-wide logistics study organizations.

13. A logistics simulation center and a data gathering organization should be established, possibly as a part of the field agency recommended above.

Management

14. Exclusive staff responsibility for initiation of study projects, control and justification of budgets, and authorization of contracts related to all logistics studies should be clearly assigned to DCSLOG.

15. The contracts with the Research Analysis Corporation and the Stanford Research Institute should be modified so that financial control and technical supervision of logistics studies under each contract is the responsibility of DCSLOG.

16. DCSLOG should establish a production control system covering the overall cycle of a study project and should schedule financial and administrative actions leading to the study and following its completion as firmly as the study itself.

17. A Logistics Studies Coordinating Committee should be established consisting of members from each major Army command and each theater to advise DCSLOG on program guidance and content.

18. AR 1-110 should be revised and extended to unify procedures for initiating, managing, and reporting final results of all studies. Interests of special staff offices in "management," "research," or other specialized study content should be accommodated by staff coordination between DCSLOG and the appropriate specialized staff office.

19. The current $100,000 limitation on approval of study contracts by major commands and designated procurement officials in Headquarters Department of the Army should be raised to permit local approval of contract studies up to $300,000. Some agency of the Army staff should be designated as HPA, and the JAG should be utilized for legal counsel services to expedite the procedure for obtaining authority to negotiate for a contract study.

20. A study advisory group should be appointed for every logistics study, both in-house and contracted.

21. The chairman of such a group should be an officer assigned to the DCSLOG study office whose full-time assignment is to direct several such groups.

22. The study advisory group should write the detailed study directive, formally approve any special assumptions to be used in the study, and on its completion certify whether the report is sound in methodology and conclusions. This evaluation should become an integral part of the report prior to any distribution to ultimate recipients.

23. Comments on implementation of a logistic's study, as distinguished from its validity, should emanate not from the Advisory Group, but from the DCSLOG staff component that usually deals with the particular operational problem that has been studied.

24. The management system recommended in this report for logistics studies should be considered for extension to other types of Army studies.

APPENDIX A

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APPENDIX B

STUDIES WITH AT LEAST 4 MAN-YEARS OF EFFORT

Administrative Support Theater Army, 1965-1970, TASTA-70
Air Assault Division (11th) Aviation Maintenance and Support Costs
Aircraft Maintenance and Operations Data in Vietnam
Analysis of Army Aircraft Availability
Automatic Data Systems for Army in the Field

Aviation Maintainability and Management Documentation and Specification
Board of Inquiry on Army Logistic System (Brown Board)
Cost-Effectiveness Analysis of Floating Aircraft Maintenance Facility
Electrical Power Requirements for the Army
Electronics Life Cycle Management

Engineer Functional Components System
Fiscal Constraints on Materiel Readiness
Ground Proximity Airdrop System
Impact of C-5A Aircraft on Army Logistics
Logistics Support and Management of Army Missiles

Maintenance Engineering Data System
Maintenance Support Requirements
Materiel Readiness and Maintenance Reports and Policy
Meteorlogy, Army 75
Nuclear Energy Depot

National ADP Program for AMC Logistics Management (NAPALM)
PEMA Reporting System
PEMA Wartime Replacement Requirements
Redesign of Stock Control Applications at Verdun
Repair Parts Supply Requirements

Secondary Item Requirements and Readiness Model
Simulation and Gaming Methods for Analysis of Logistics
Special Weapons Effects

PRC R-873
104

STAG Logistics War Gaming Support
Supply Functionalization for the Army-in-the-Field
Systems Redesign of USARPAC ICP's and Depots
CYNTAC Logistics War Game
Weapons Technical Data Package Storage and Retrieval System

APPENDIX C

CURRENT STUDY DISTRIBUTION

C/S (BROWN BOARD) LOGISTIC STUDIES FY66
(MAN-YEARS)

FUNCTION	TYPE	LOCATION OF FUNCTION								
		CONUS				LOC	THEATER			THREE OR MORE LOCATIONS
		DSA	ICP	DEPOT	CAMP		AF & MC	COMZ	FIELD ARMY	
Procurement 8	WAR									
	PEACE	8								
Storage	WAR									
	PEACE									
Inventory Control 22	WAR									19
	PEACE	3								
Maintenance	WAR									
	PEACE									
Transportation	WAR									
	PEACE									
Construction	WAR									
	PEACE									
Consumption and Data	WAR									
	PEACE									
Medical Support	WAR									
	PEACE									
Services	WAR									
	PEACE									
Three or More Functions 36	WAR									
	PEACE									36
		66	11							55

COST (000)

In-house	$1,280
Contract	472
	$1,752

EFFORT (man-years)

War	19
Peace	47
Contract	13
In-house	53

C/S (AIDS) LOGISTIC STUDIES FY66
(MAN-YEARS)

FUNCTION	TYPE	LOCATION OF FUNCTION								
		CONUS				LOC	THEATER			THREE OR MORE LOCATIONS
		DSA	ICP	DEPOT	CAMP		AF & MC	COMZ	FIELD ARMY	
Procurement	WAR									
	PEACE									
Storage	WAR									
	PEACE									
Inventory Control 16	WAR									
	PEACE		5					11		
Maintenance 7	WAR									
	PEACE		7							
Transportation 1	WAR									
	PEACE					1				
Construction	WAR									
	PEACE									
Consumption and Data	WAR									
	PEACE									
Medical Support	WAR									
	PEACE									
Services	WAR									
	PEACE									
Three or More Functions	WAR									
	PEACE									
		24	12			1		11		

COST (000)

In-house	$ 0
Contract	792
	$792

EFFORT (man-years)

War	0
Peace	24
Contract	24
In-house	0

COMPTROLLER LOGISTIC STUDIES FY66
(MAN-YEARS)

FUNCTION	TYPE	LOCATION OF FUNCTION								
		CONUS				LOC	THEATER			THREE OR MORE LOCATIONS
		DSA	ICP	DEPOT	CAMP		AF & MC	COMZ	FIELD ARMY	
Procurement	WAR									
	PEACE									
Storage	WAR									
	PEACE									
Inventory Control 1	WAR									
	PEACE		1							
Maintenance 19	WAR							1		
	PEACE			6	4					8
Transportation	WAR									
	PEACE									
Construction	WAR									
	PEACE									
Consumption and Data	WAR									
	PEACE									
Medical Support	WAR									
	PEACE									
Services	WAR									
	PEACE									
Three or More Functions	WAR									
	PEACE									
20			1	6	4			1		8

COST (000)

In-house

Contract 670

$670

EFFORT (man-years)

War 1

Peace 19

Contract 20

In-house

PRC R-873
110

OCRD LOGISTIC STUDIES FY66
(MAN-YEARS)

FUNCTION		TYPE	LOCATION OF FUNCTION								
			CONUS				LOC	THEATER			THREE OR MORE LOCATIONS
			DSA	ICP	DEPOT	CAMP		AF & MC	COMZ	FIELD ARMY	
Procurement	6	WAR									
		PEACE				6					
Storage	3	WAR							2		
		PEACE			1						
Inventory Control	0	WAR									
		PEACE									
Maintenance	8	WAR							3		
		PEACE								5	
Transportation	25	WAR					6		1	15	
		PEACE									3
Construction	2	WAR								2	
		PEACE									
Consumption and Data	8	WAR								8	
		PEACE									
Medical Support	6	WAR								6	
		PEACE									
Services	0	WAR									
		PEACE									
Three or More Functions	30	WAR							15		2
		PEACE								5	8
	88				1	6	6		21	41	13

COST (000)

In-house	75
Contract	
Regular	1,553
Simulation	1,490
	$3,118

EFFORT (man-years)

War	60
Peace	28
Contract	85
In-house	3

CDC LOGISTIC STUDIES FY65
(MAN-YEARS)

FUNCTION		TYPE	LOCATION OF FUNCTION								
			CONUS				LOC	THEATER			THREE OR MORE LOCATIONS
			DSA	ICP	DEPOT	CAMP		AF & MC	COMZ	FIELD ARMY	
Procurement		WAR									
		PEACE									
Storage	6	WAR							3	3	
		PEACE									
Inventory Control	8	WAR								4	4
		PEACE									
Maintenance	7	WAR							2	5	
		PEACE									
Transportation	4	WAR					1		1	3	
		PEACE									
Construction	6	WAR							1	5	
		PEACE									
Consumption and Data		WAR									
		PEACE									
Medical Support	2	WAR							1	1	
		PEACE									
Services	11	WAR							2	9	
		PEACE									
Three or More Functions	84	WAR							48	35	
		PEACE									
	125						1		55	56	4

COST (000)

In-house	$2,050
Contract	1,593
	$3,643

EFFORT (man-years)

War	125
Peace	0
Contract	75
In-house	50

DCSLOG-AMC LOGISTIC STUDIES FY66
(MAN-YEARS)

FUNCTION		TYPE	LOCATION OF FUNCTION								
			CONUS				LOC	THEATER			THREE OR MORE LOCATIONS
			DSA	ICP	DEPOT	CAMP		AF & MC	COMZ	FIELD ARMY	
Procurement	83	WAR									
		PEACE		83							
Storage	3	WAR									2
		PE			1						
Inventory Control	28	WAR									
		PEACE		24		4					
Maintenance	46	WAR								9	3
		PEACE		15	5	14					1
Transportation	24	WAR							18		6
		PEACE									
Construction		WAR									
		PEACE									
Consumption and Data	5	WAR								15	
		PEACE									
Medical Support		WAR									
		PEACE									
Services		WAR									
		PEACE									
Three or More Functions	102	WAR		4							25
		PEACE		58					1		14
	302			184	6	18			19	24	51

COST (000)

In-house	$6,900
Contract	
Regular	3,400
Simulation	300
	$10,600

EFFORT (man-years)

War	82
Peace	220
Contract	93
In-house	208

STAG LOGISTIC STUDIES FY66
(MAN-YEARS)

FUNCTION	TYPE	LOCATION OF FUNCTION								
		CONUS				LOC	THEATER			THREE OR MORE LOCATIONS
		DSA	ICP	DEPOT	CAMP		AF & MC	COMZ	FIELD ARMY	
Procurement	WAR									
	PEACE									
Storage	WAR									
	PEACE									
Inventory Control	WAR									
	PEACE									
Maintenance	WAR									
	PEACE									
Transportation	WAR									
	PEACE									
Construction	WAR									
	PEACE									
Consumption and Data	WAR									
	PEACE									
Medical Support	WAR									
	PEACE									
Service	WAR									
	PEACE									
Three or More Functions 10	WAR							10		
	PEACE									

10 10

COST

In-house	$500,000
Contract	0

EFFORT

War	10
Peace	0
Contract	0
In-house	10

PRC R-873
114

ESSG LOGIS STUDIES FY66
(MAN- ARS)

FUNCTION	TYPE	LOCATION OF FUNCTION								
		CONUS				LOC	THEATER			THREE OR MORE LOCATIONS
		DSA	ICP	DEPOT	CAMP		AF & MC	COMZ	FIELD ARMY	
Procurement	WAR									
	PEACE									
Storage	WAR									
	PEACE									
Inventory Control	WAR									
	PEACE									
Maintenance	WAR									
	PEACE									
Transportation	WAR									
	PEACE									
Construction	WAR					2		29		
	PEACE									
Consumption and Data	WAR									
	PEACE									
Medical Support	WAR									
	PEACE									
Services	WAR									
	PEACE									
Three or More Functions	WAR									
	PEACE									
		31				2		29		

31

COST (000)

In-house	$500
Contract	375
	$875

EFFORT (man-years)

War	31
Peace	0
Contract	2
In-house	29

TOTAL LOGISTIC STUDIES FY66
(MAN-YEARS)

FUNCTION		TYPE	LOCATION OF FUNCTION								
			CONUS				LOC	THEATER			THREE OR MORE LOCATIONS
			DSA	ICP	DEPOT	CAMP		AF & MC	COMZ	FIELD ARMY	
Procurement	97	WAR		91		6					
		PEACE									
Storage	12	WAR							5	3	2
		PEACE			2						
Inventory Control	75	WAR								4	23
		PEACE		33		4			11		
Maintenance	86	WAR							12	11	3
		PEACE		22	11	18					9
Transportation	55	WAR					7		20	18	6
		PEACE					1				
Construction	39	WAR					2		30	7	
		PEACE									
Consumption and Data	23	WAR								23	
		PEACE									
Medical Support	8	WAR							1	7	
		PEACE									
Services	11	WAR							2	9	
		PEACE									
Three or More Functions	262	WAR		4			1		73	35	27
		PEACE		58					1	5	58
	668			208	13	28	11		155	122	131

COST (000)

In-house	$10,300
Contract	11,400
	$21,700

EFFORT (man-years)

War	329
Peace	339
Contract	324
In-house	344

NUMBER OF LOGISTIC STUDIES LISTED IN ASDIRS(1)

FUNCTION	TYPE	LOCATION OF FUNCTION								
		CONUS				LOC	THEATER			THREE OR MORE LOCATIONS
		DSA	ICP	DEPOT	CAMP		AF & MC	COMZ	FIELD ARMY	
Procurement 5	WAR		1							
	PEACE		4							
Storage 3	WAR							2		1
	PEACE									
Inventory Control 6	WAR		3						1	
	PEACE		1	1						
Maintenance 5	WAR				1					1
	PEACE		2	1						
Transportation 30	WAR					14		3	5	3
	PEACE			2		3				
Construction 7	WAR							1	2	0
	PEACE				1			1		2
Consumption and Data 11	WAR							1	10	
	PEACE									
Medical Support 3	WAR								3	
	PEACE									
Services 1	WAR								1	
	PEACE									
Three or More Functions 9	WAR		1	1						6
	PEACE				1					

80

Note: (1) As of 30 June 1966

APPENDIX D

VISITS AND INTERVIEWS

Organization	Person
Assistant Secretary of Army (I&L) Directorate of Material and Services	Mr. Joseph C. Zengerle, Jr.
Army Board of Inquiry on the Logistics System	Brig. Gen. Raymond Harvey Col. Fred Trombly Lt. Col. L. R. Sears, Jr. Mr. Darwin Stolzenbach Mr. Rex Brugh Mr. Joseph Jackson
Army Information and Data Systems Office	Mr. Arthur Rosenblum
Army Logistics Management Center	Col. J. P. Alexander, Jr. Col. Raymond J. Wardrop Mr. Richard Ross
Army Research Office ADPS Support Branch	Mr. W. L. Galson Mr. Paul Eiholtzer
Army Research Office Human Factors and OR Division	Col. H. B. Gallinger Lt. Col. J. P. Lydon Major J. Churchill
Ballistics Research Laboratories	Mr. M. Smith
Combat Service Support Group, CDC	Mr. Roland Linker Col. Paul Autrey Lt. Col. Makeech
Force Planning Analysis Office	Mr. William K. Brehm
Hqs, Army Materiel Command Directorate of Management Engineering and Data Systems	Brig. Gen. Jack E. Babcock Col. R. A. Hanson Mr. Al Seitz Mr. William Vogel Mr. Claud C. Conn
Hqs, Army Materiel Command Office of the Chief Scientist	Dr. C. M. Crenshaw

Organization	Person
Hqs, Army Materiel Command Office of the Comptroller	Col. Donald McPheeters Mr. Thomas Desmond
Hqs, Army Materiel Command Office of the General Counsel	Mr. Francis X. McKenna
Hqs, Combat Developments Command, Directorate of Evaluation	Col. B. Harvey Lt. Col. R. W. Trost
Hqs, Combat Developments Command, Directorate of Program Coordination	Col. C. L. Layne Lt. Col. G. F. Hoge
Hqs, Combat Developments Command, Office of Chief Scientific Advisor	Mr. David Hardison
Hqs, Combat Developments Command, Office of Comptroller	Col. W. N. Sloan Lt. Col. LaVere H. Strom Mr. J. P. Coyle
Joint Chiefs of Staff Office of Special Assistant for Strategic Deployment	Col. Finlayson, USA Capt. Patterson, USN Col. Hess, USAF
Office of the Assistant Chief of Staff for Force Development Doctrine and Concepts Division	Col. R. H. Hitchcock
Engineers Strategic Studies Group	Col. William B. Wootten, Jr.
Office of the Chief of Research and Development Directorate of Plans and Programs	Col. J. D. Erickson
Office of Comptroller of Army Cost Analysis Directorate	Mr. R. J. Trainor
Office of Comptroller of Army Management Planning Division	Lt. Col. Eugene Marder Mr. Gene Cardokas
Office of the Deputy Chief of Staff for Logistics Combat Service Support Division	Col. E. A. H. Woodman Lt. Col. J. E. Sterling Maj. W. S. Aiton
Office of the Deputy Chief of Staff for Logistics Organization and Systems Group	Col. Richard M. Stacey Lt. Col. Lillian Harris

Organization	Person
Office of the Deputy Chief of Staff for Logistics Procurement Statistics Office	Miss Marsha Colbert
Office of the Deputy Chief of Staff for Operations Directorate of Strategic Plans and Policy	Maj. Flertzheim
Office of the Director of Special Studies	Gen. C. H. Bonesteel Dr. Fritz Kraemer Lt. Col. W. Wolfe Lt. Col. L. B. Harlan Maj. Ralph Sievers
Office of Undersecretary of Army	Dr. Wilbur Payne Mr. Charles Davis
RAND Corporation	Mr. Andrew Clark Mr. Bud Boosen
Strategy and Tactics Analysis Group	Col. Frederick G. White
Supply Agency, CDC	Maj. A. Desmarais Maj. Vic Hobson
Stanford Research Institute	Mr. Gordon Wiley Mr. Clark Henderson

APPENDIX E

CURRENT STUDY SYSTEM AND PROCEDURES

GENERAL

There is no single, separately identifiable entity known as the Logistics Study System. What will be described in this appendix is the existing Army system within which all studies are conducted as directed, structure, or supporting studies, regardless of their proponent, purpose, content, or categorization.

The three major organizational elements of the U.S. Army identified below are the principal users of studies as an aid in the accomplishment of their respective missions.

- Headquarters, Department of the Army
- U.S. Army Materiel Command
- U.S. Army Combat Developments Command

Because these three organizations have a significant interest in logistics studies, the study system will be described in terms of its use by them.

STUDY SYSTEM COMPONENTS

A study system may be considered as consisting of six components. The first of these is a mission, objective, or concept, out of which grows a requirement for a study. The remaining five components are action-locations and are identified below:

- Initiators - Persons or agencies who recognize the need for a study and recommend that it be undertaken.
- Studiers - A group charged with performing a study.
- Managers - Persons or agencies responsible for supervising all aspects of a study from the original recommendation for initiation, through the conduct of the study effort, to conclusion in a final report and an evaluation thereof.

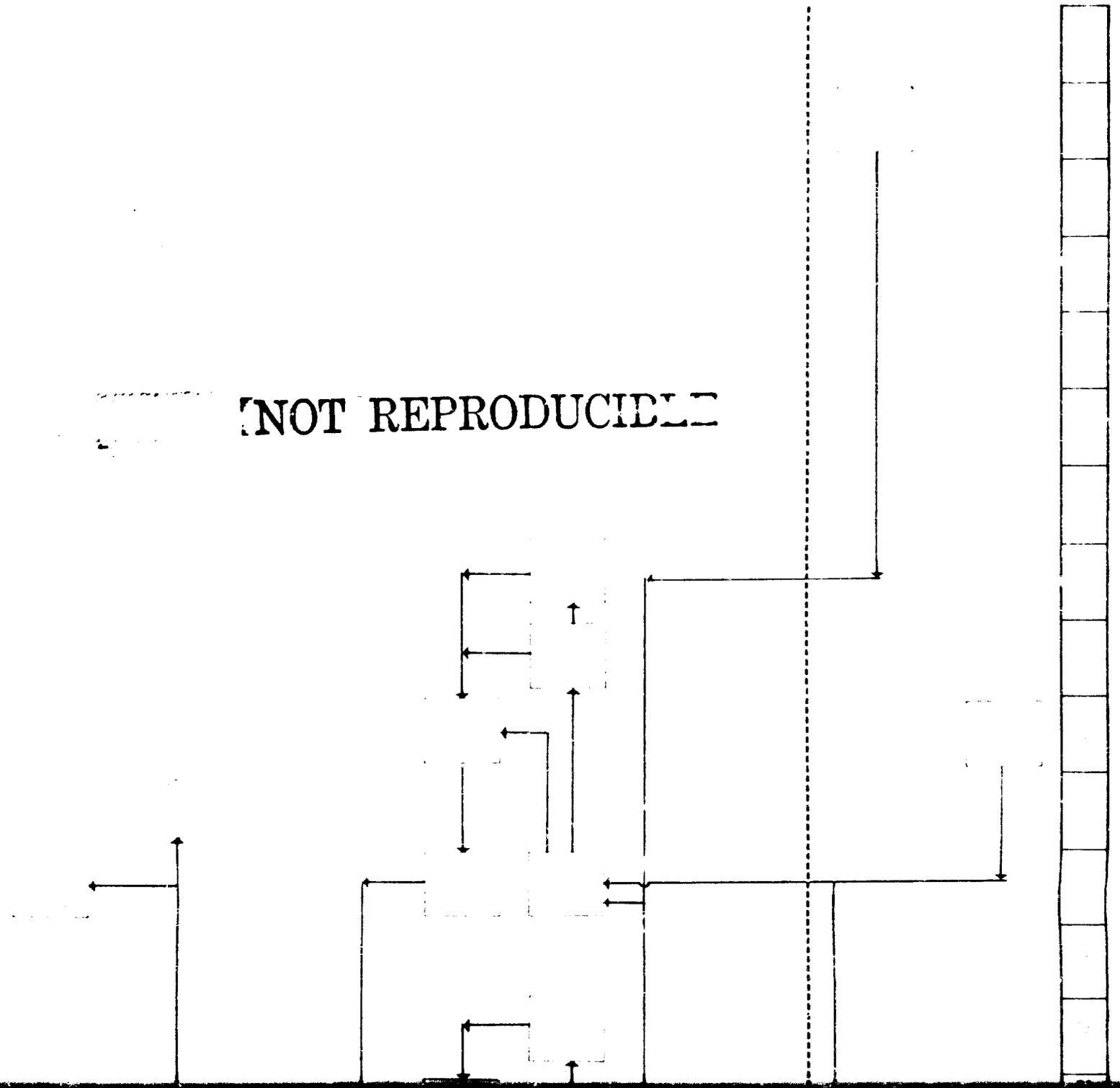
- Reviewers (Users) - Persons or agencies who either voluntarily, or by direction, read and analyze the final results of a study effort and, where appropriate, make appplications of its findings and conclusions.
- Cataloguers - Agencies responsible for obtaining and maintaining, for record and retrieval purposes, either a copy of the published study report or a bibliographic file of information pertaining to it.

Prior to an illustration of the system operation, the identification and location of the components in the system at hand are:

- Mission, Objective, or Concept - The Combat Developments Objectives Guide (CDOG) and the USACDC Army concept programs. Other publications are either too general in nature to be specific sources of study requirements, e.g., the Basic Army Strategic Estimate (BASE) and the Army Strategic Plan (ASP); or they are mere listings of studies, as in the case of the Army master study program and the DCSLOG/AMC logistic study programs.
- Initiators - All echelons of each of the three organizations considered, plus offices of the Department of Defense.
- Studiers - Army in-house organizations (as identified in Appendix F); Army ad hoc study groups; contract study organizations; and combinations of the above.
- Managers - The Army Study Advisory Council (ASAC) with its subcommittee of study coordinators representing each major Army command and each major Headquarters Department of the Army staff agency; the Army Research Office (Human Factors and Operations Research Division), Office of the Chief of Research and Development (OCRD); the Operations Research Advisory Group (resident at the Research Analysis Corporation), OCRD; and designated Project Advisory Groups (PAG's) or project officers, for individual study efforts.

Chart I, above the solid line, depicts several documentary sources from which new ideas for studies, primarily of the directed or structure type, are derived. It shows that the Army's family of plans (BASE, ASP, and AFDP) leading to the development of CDOG and the Army concept program are sources of study ideas. The Army master study program and the DCSLOG/AMC logistics study program likewise establish a base from which new studies may be developed. Unsolicited contractor proposals may also open new areas to study. All of these sources other than the DCSLOG/AMC logistics study program, which is prepared and monitored by the Army Logistics Management Center (ALMC), provide common input, as shown, to all three major study organizations: the Headquarters, Department of the Army, the USAMC, and the USACDC. The DCSLOG/AMC logistics study program is used principally by the agencies for which it is named.

The part of Chart I below the solid line begins to depict the manner in which studies originated and/or controlled by Headquarters, Department of the Army, are processed from proposal to completion. Thus, it identifies sources of specific study requests or study proposals and the Army agencies responsible for acting on such proposals. An example is that group of studies proposed in response to an annual OCRD (ARO) letter for inclusion in the Army's Operations Research Program (monitored by the Human Factors and Operations Research Division, Army Research Office). These studies are assembled by ARO, reviewed for appropriateness of funding from RDT&E resources, arranged in recommended order of priority, and referred to the Army Study Advisory Council (ASAC). This body, chaired by the Director of Special Studies, Office of the Chief of Staff, has representation from every major Department of the Army staff section. It affords two levels of screening, review, and deliberation prior to determining validity of a study requirement. The first of these is by its subcommittee of study coordinators, and the second is by the senior members. Approval of this body involves neither allocation of funds nor authority to negotiate for contract assistance.



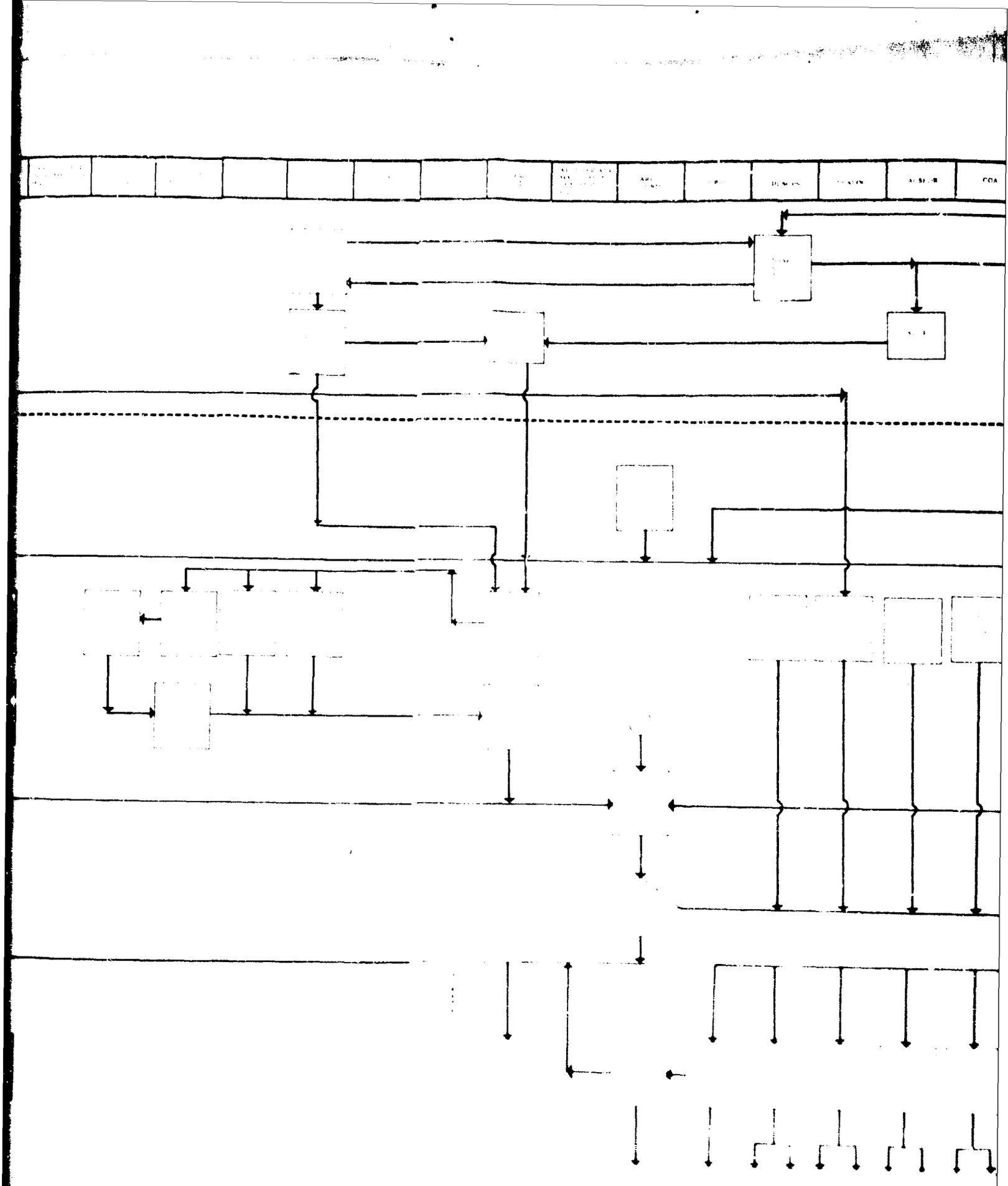
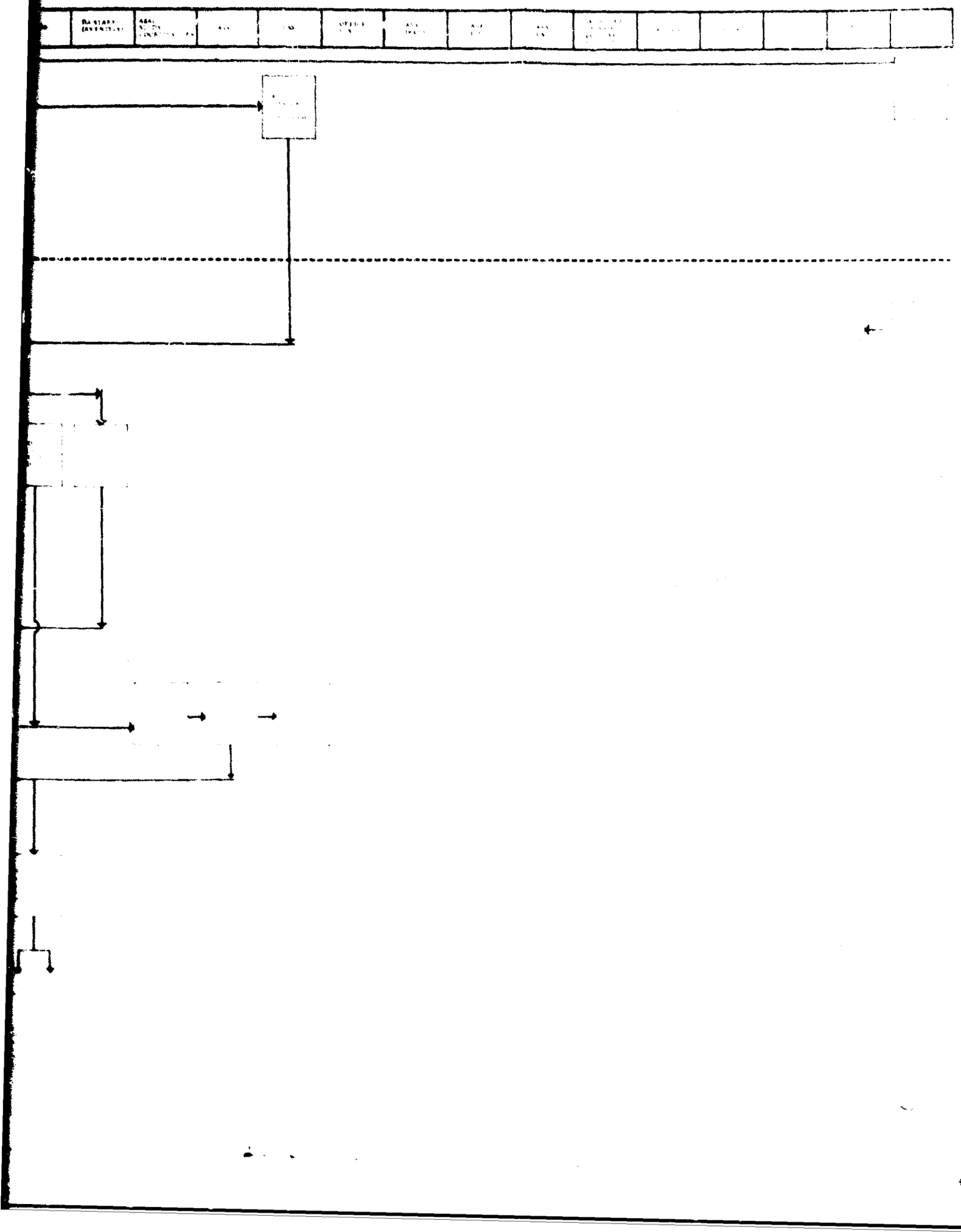
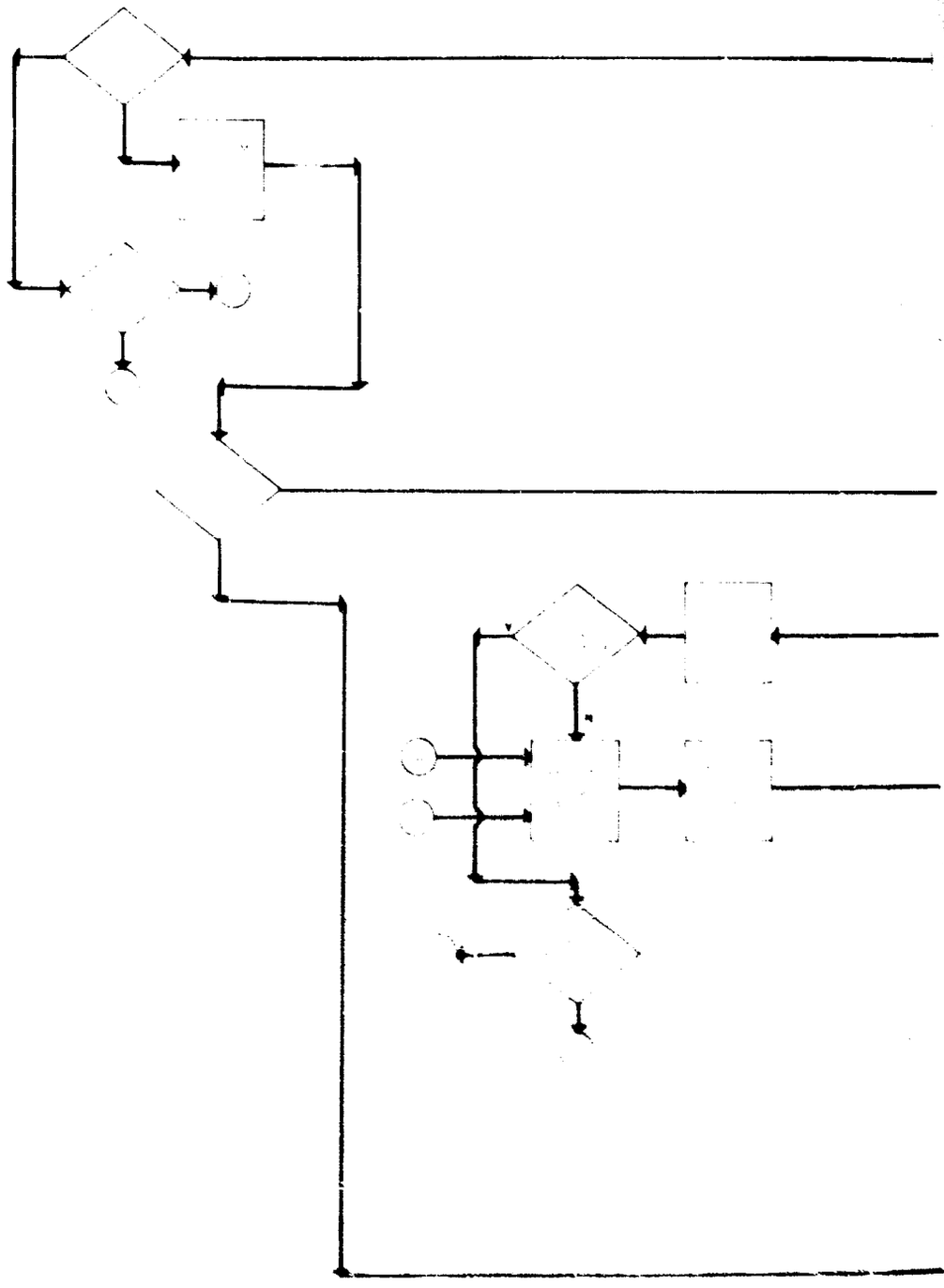
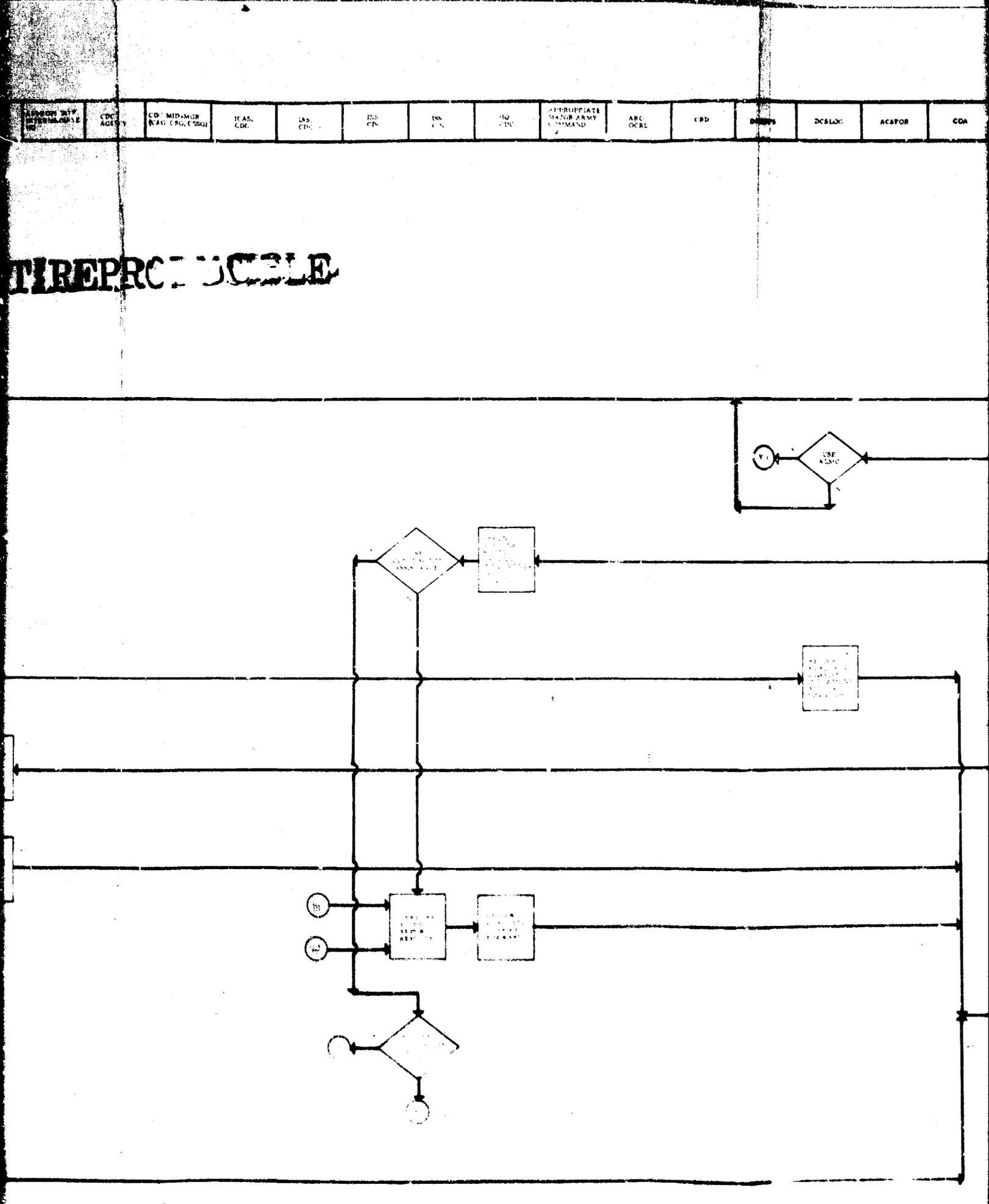


EXHIBIT 1







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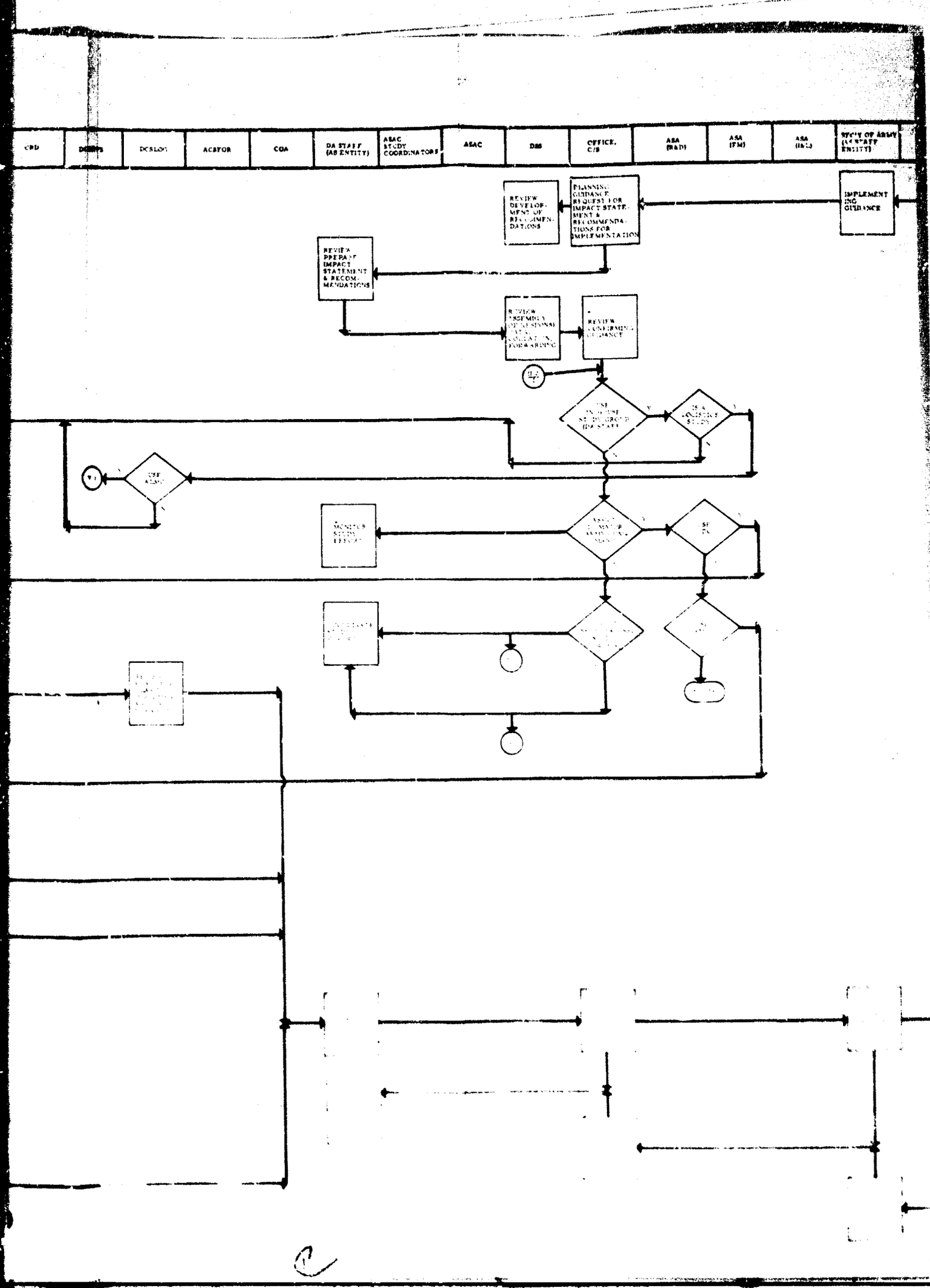
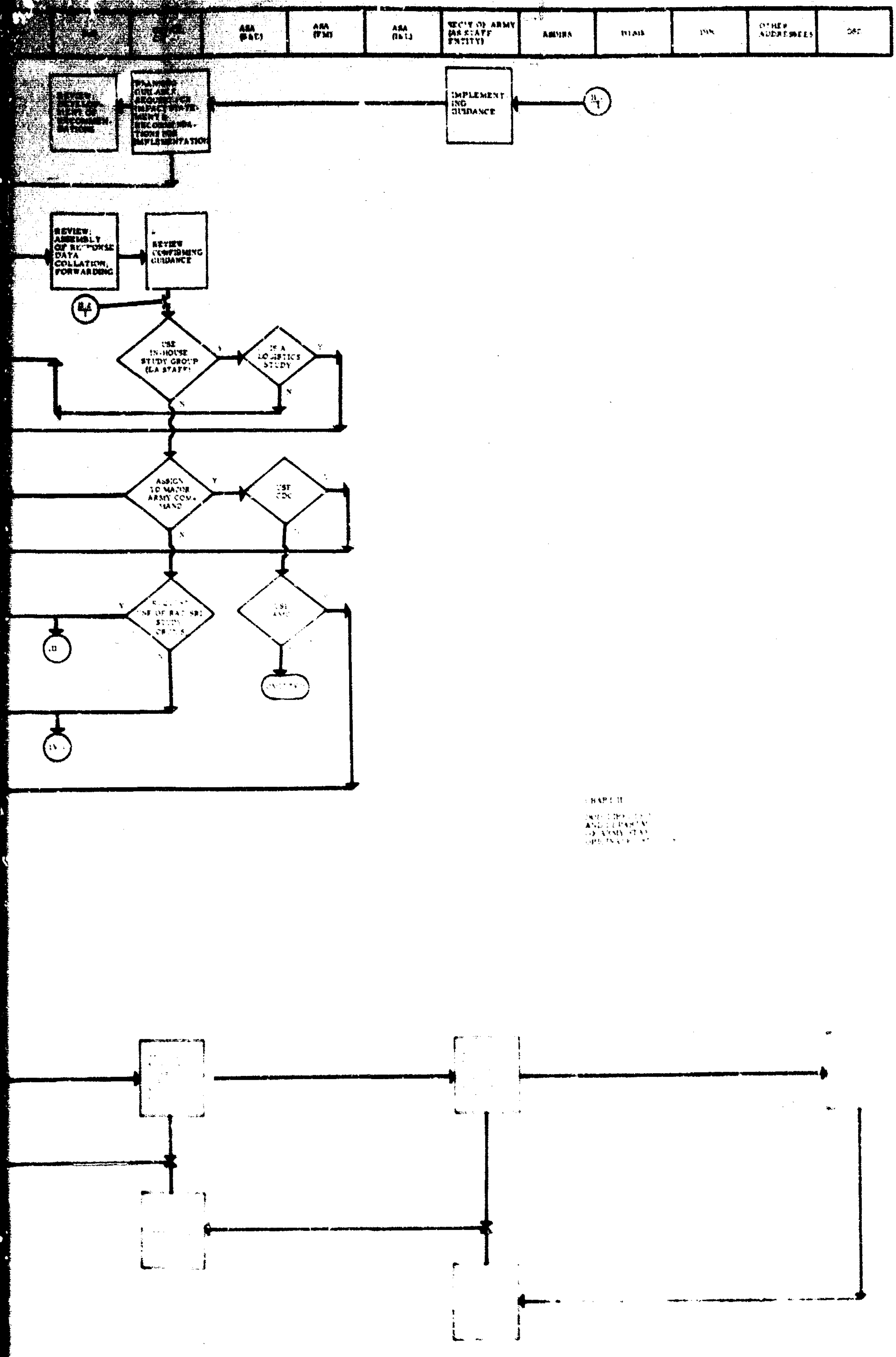
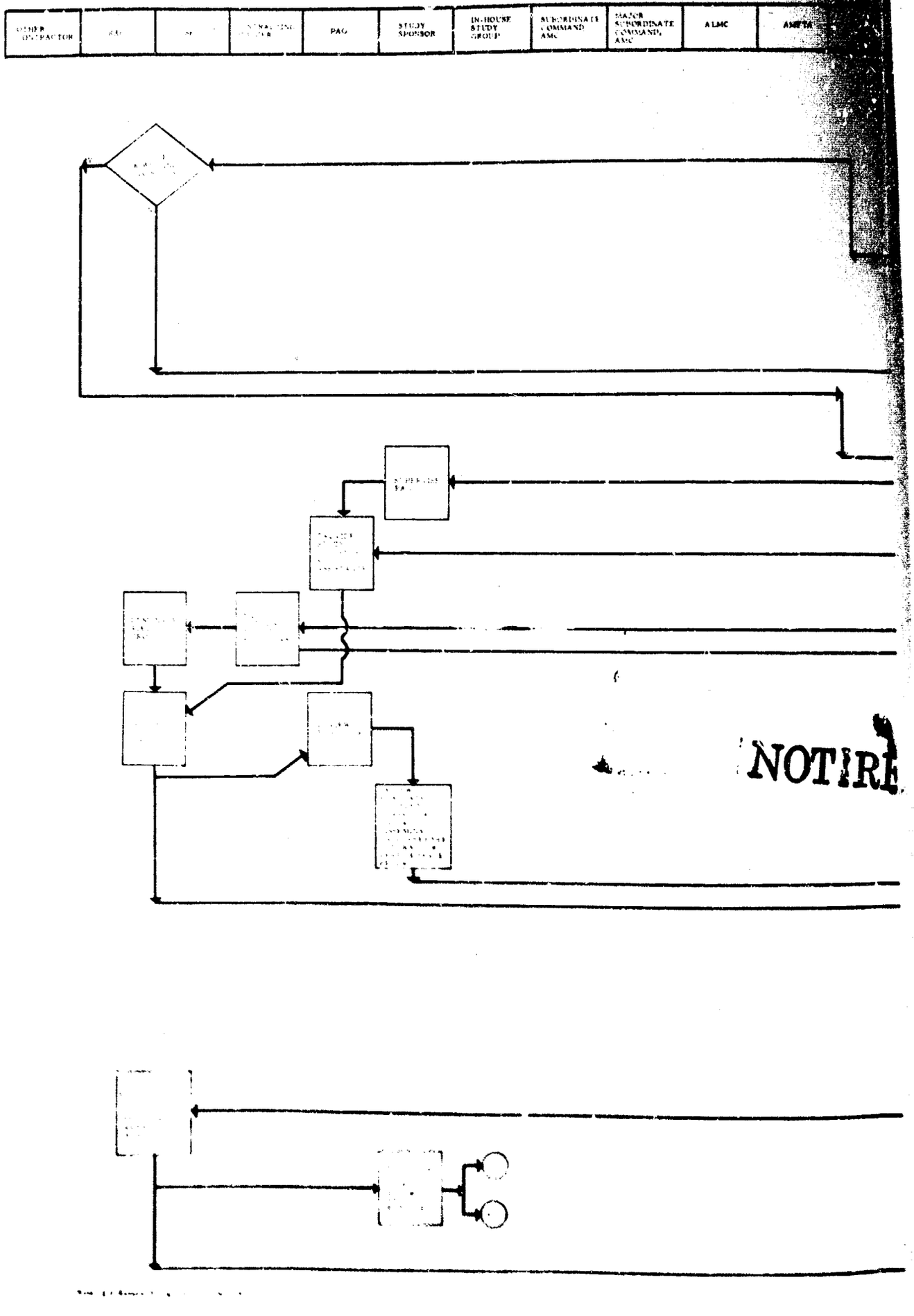

CRD
DCSLOG
ACSFOR
COA
DA STAFF (AS ENTITY)
ASAC STUDY COORDINATORS
ASAC
DBS
OFFICE, C/S
ASA (R&D)
ASA (FM)
ASA (I&L)
STAFF (AS ENTITY)
IMPLEMENTING GUIDANCE
REVIEW DEVELOPMENT OF RECOMMENDATIONS
PLANNING GUIDANCE REQUEST FOR IMPACT STATEMENT & RECOMMENDATIONS FOR IMPLEMENTATION
REVIEW PREPARE IMPACT STATEMENT & RECOMMENDATIONS
REVIEW CONFIRMING GUIDANCE


ASA (R&D)
ASA (FM)
ASA (I&L)
SEC'Y OF ARMY (AS STAFF ENTITY)
OTHER ADDRESSEES
IMPLEMENTING GUIDANCE
REVIEW: ASSEMBLY OF RESPONSE DATA COLLATION, FORWARDING
REVIEW CONFIRMING GUIDANCE
USE IN-HOUSE STUDY GROUP (DA STAFF)
IS A LOGISTICS STUDY
ASSIGN TO MAJOR ARMY COMMAND
USE CDC


STUDY SPONSOR
IN-HOUSE STUDY GROUP
SUBORDINATE COMMAND AMC
MAJOR SUBORDINATE COMMAND, AMC
AFLMC

A

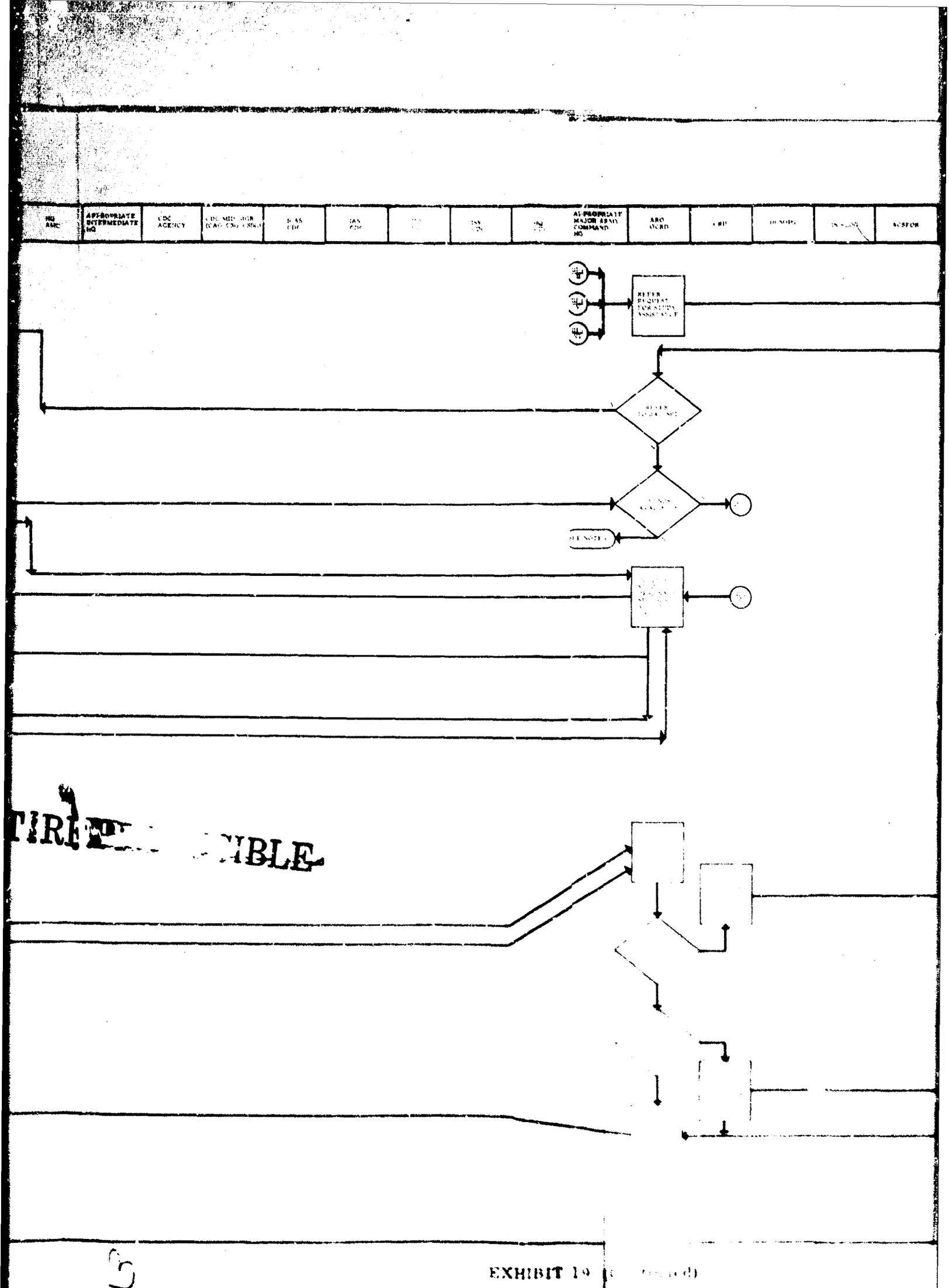


EXHIBIT 19 (Continued)

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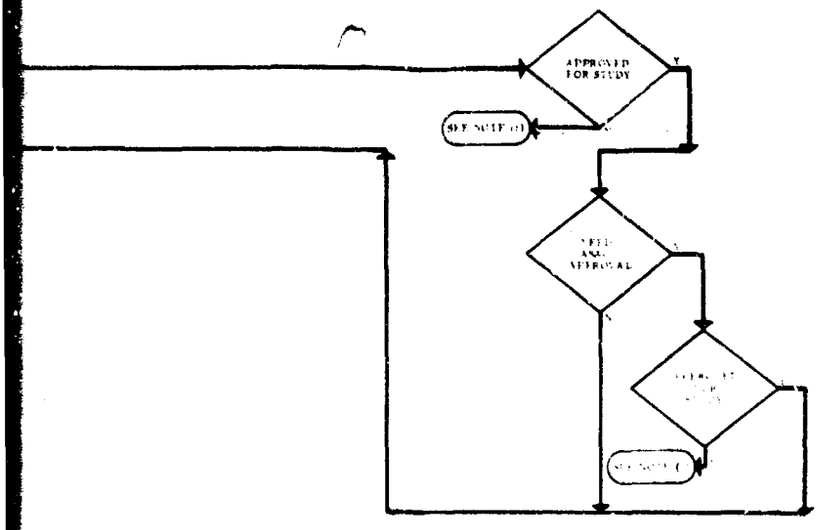
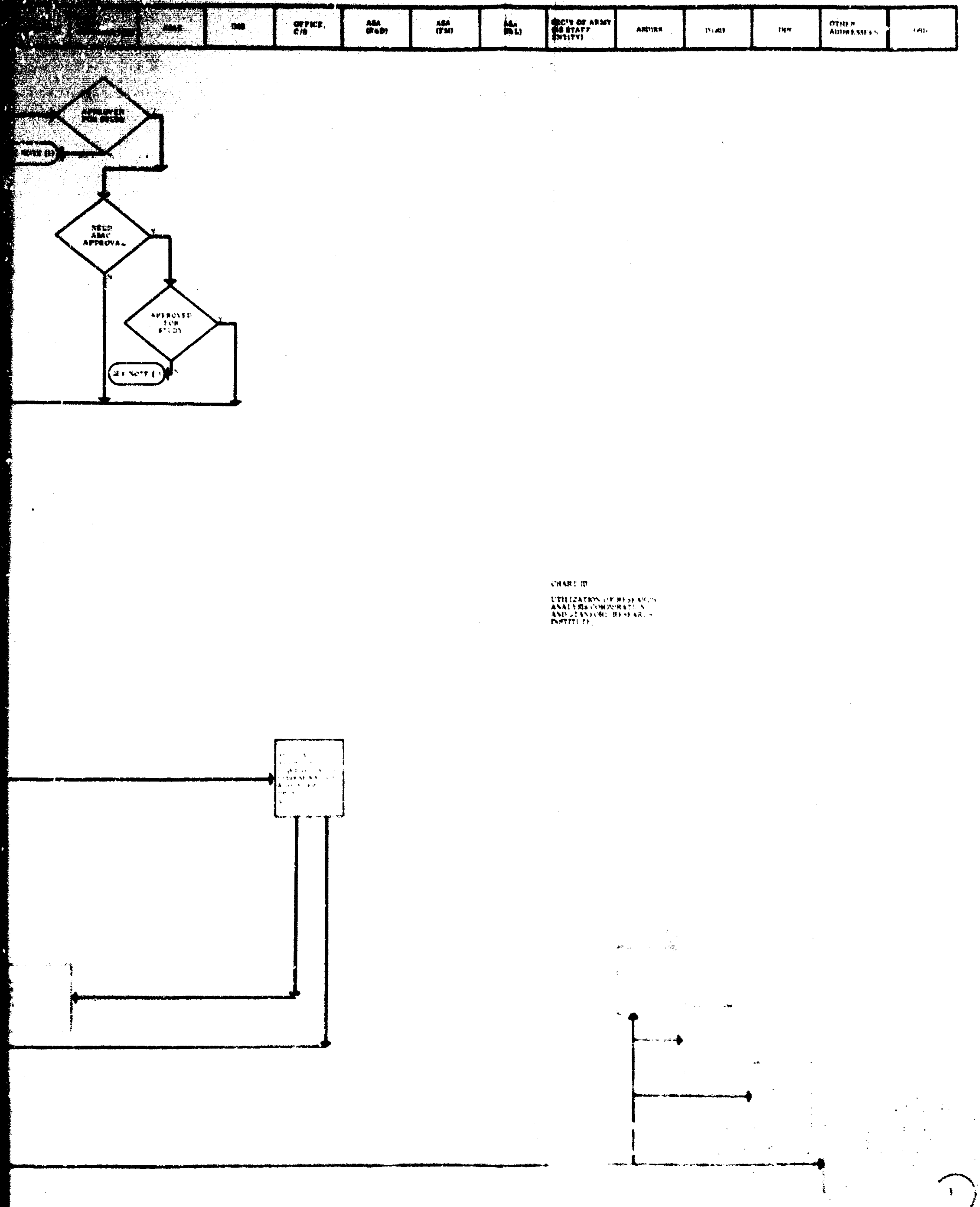
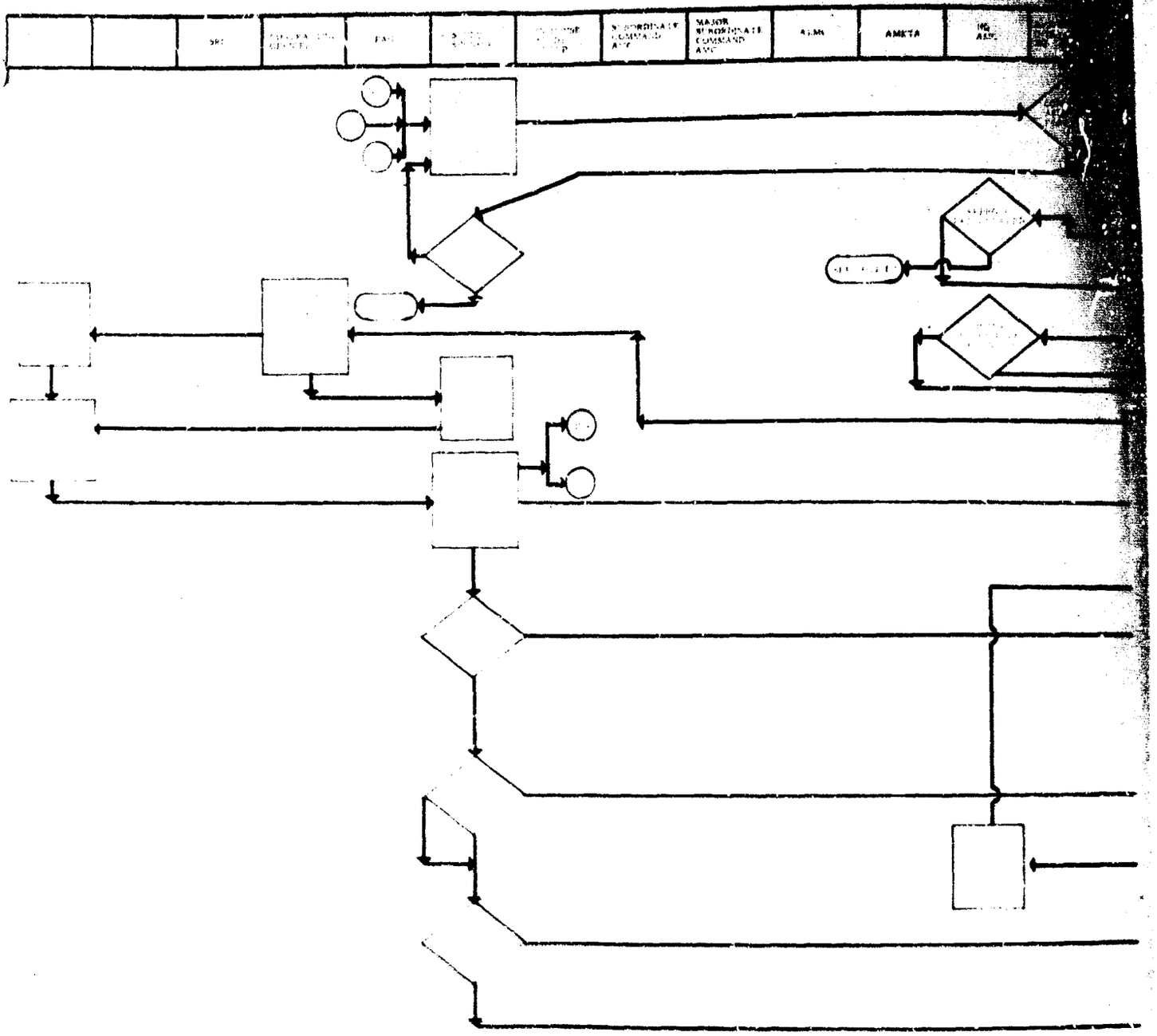


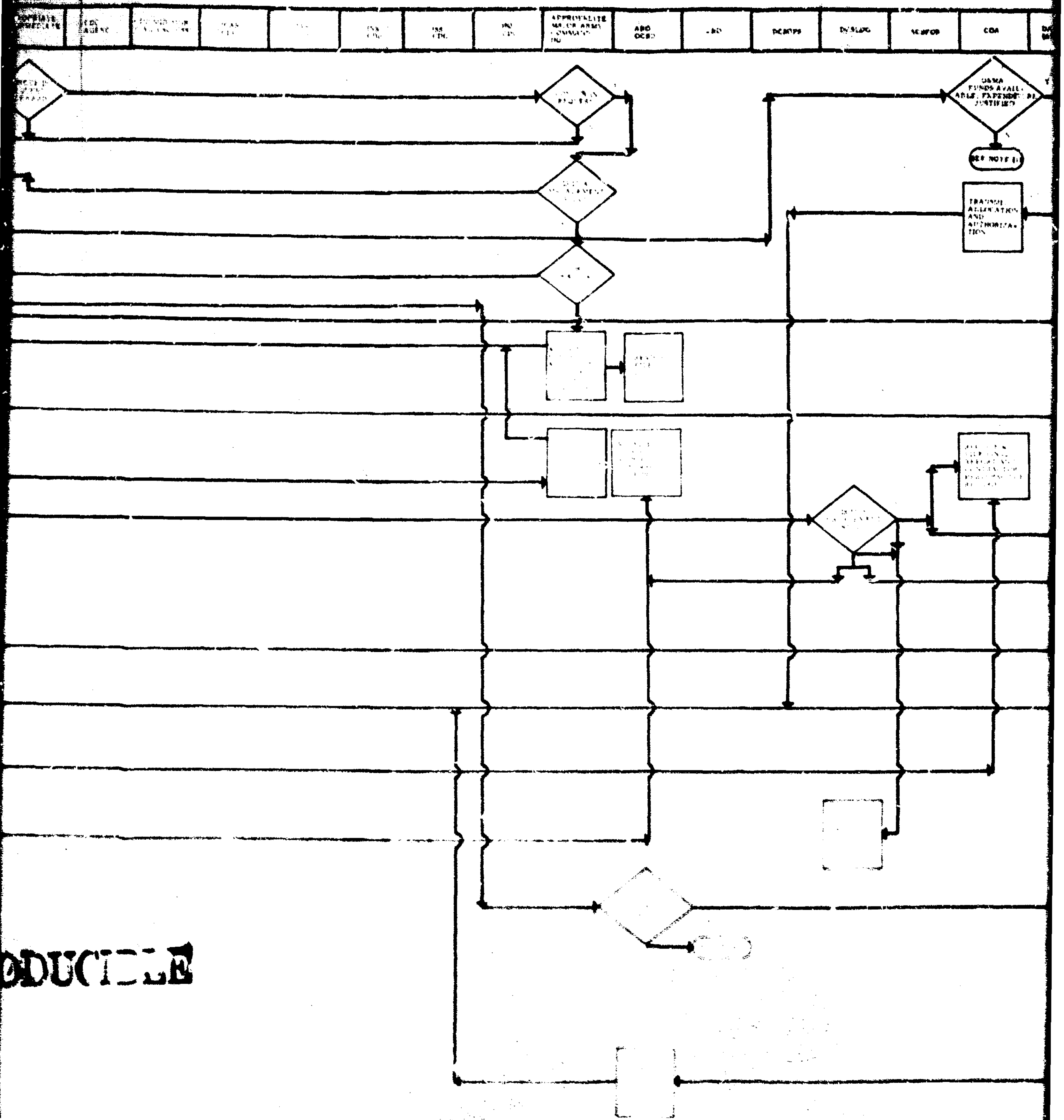
CHART III

UTILIZATION OF RESEARCH ANALYSIS CORPORATION AND STANFORD RESEARCH INSTITUTE


OFFICE, C/S
ASA (R&D)
ASA (FM)
OTHER ADDRESSEES
NEED ASAC APPROVAL
APPROVED FOR STUDY

PRC R-873
128





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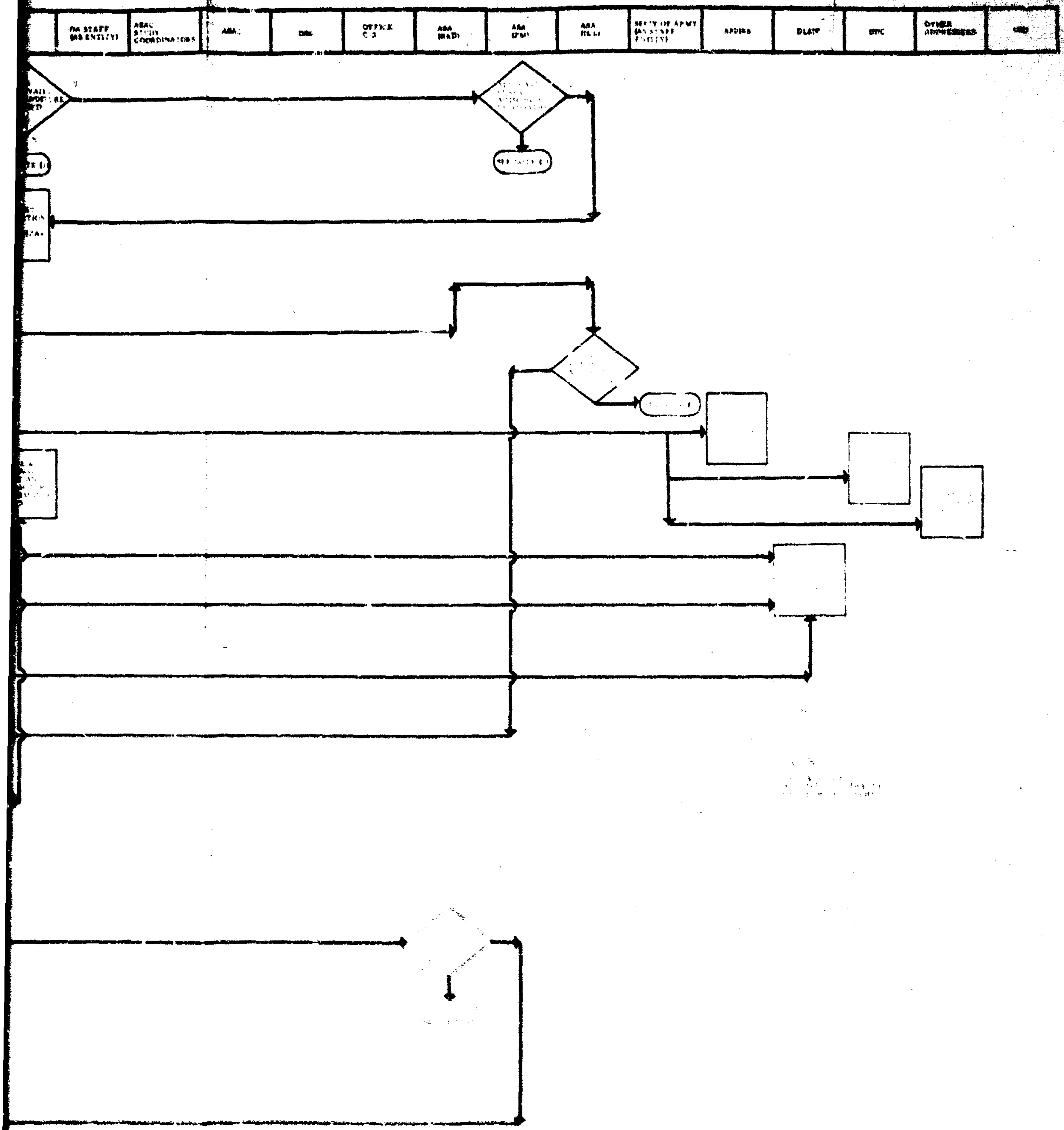
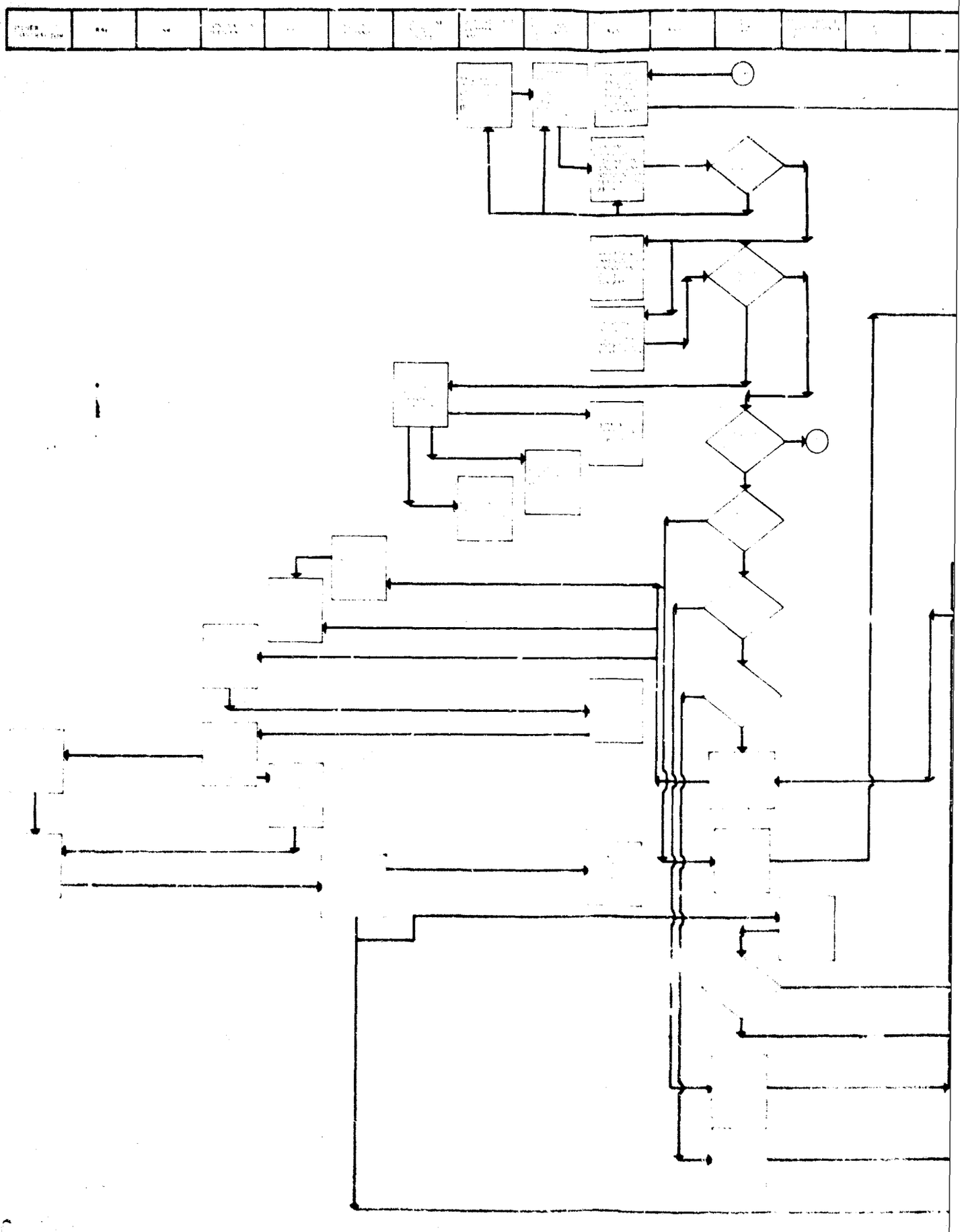
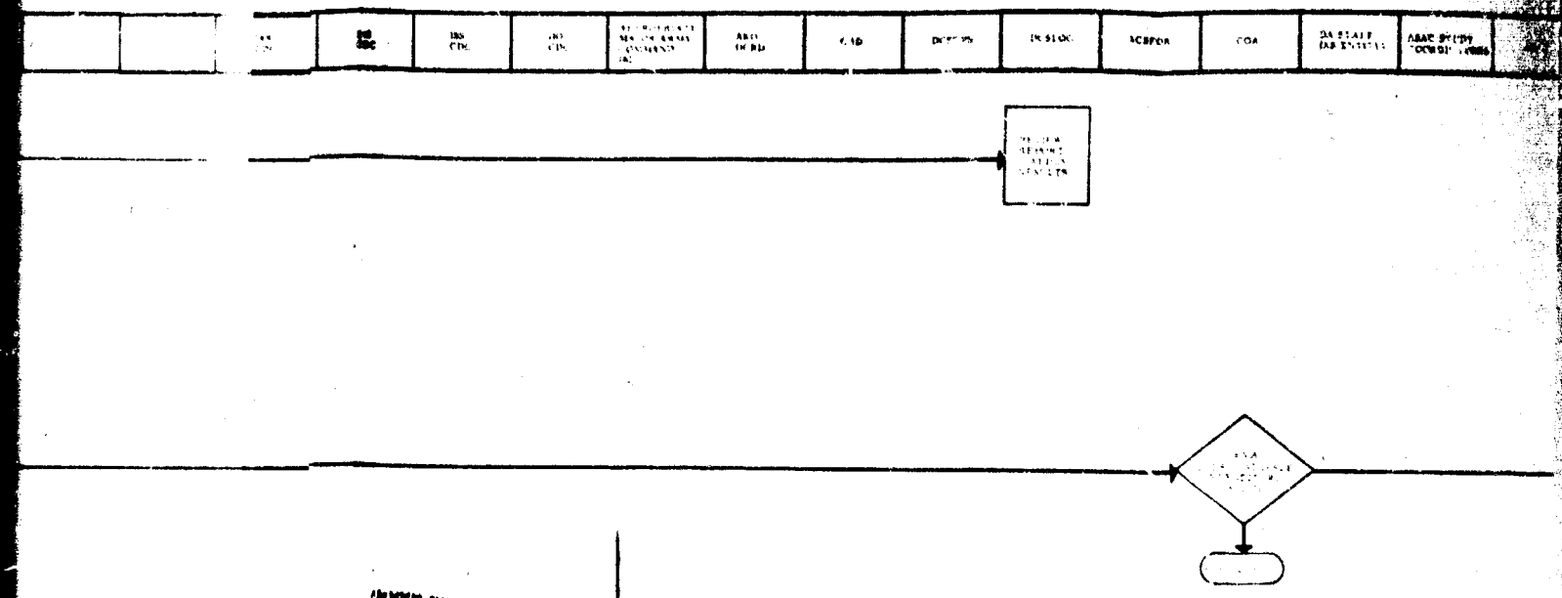
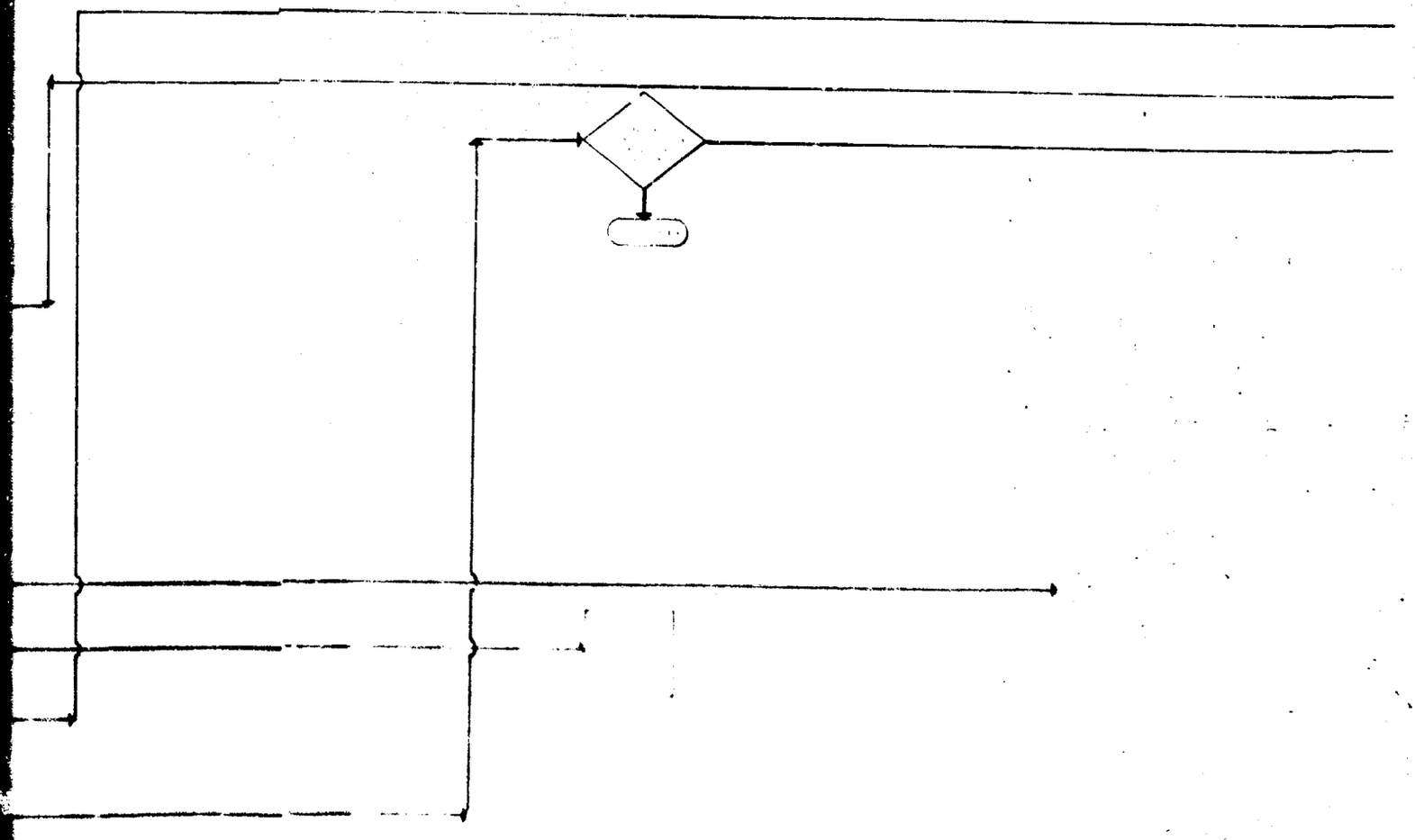

DA STAFF (AS ENTITY)
ASA (R&D)
ASA (FM)
OTHER ADDRESSEES







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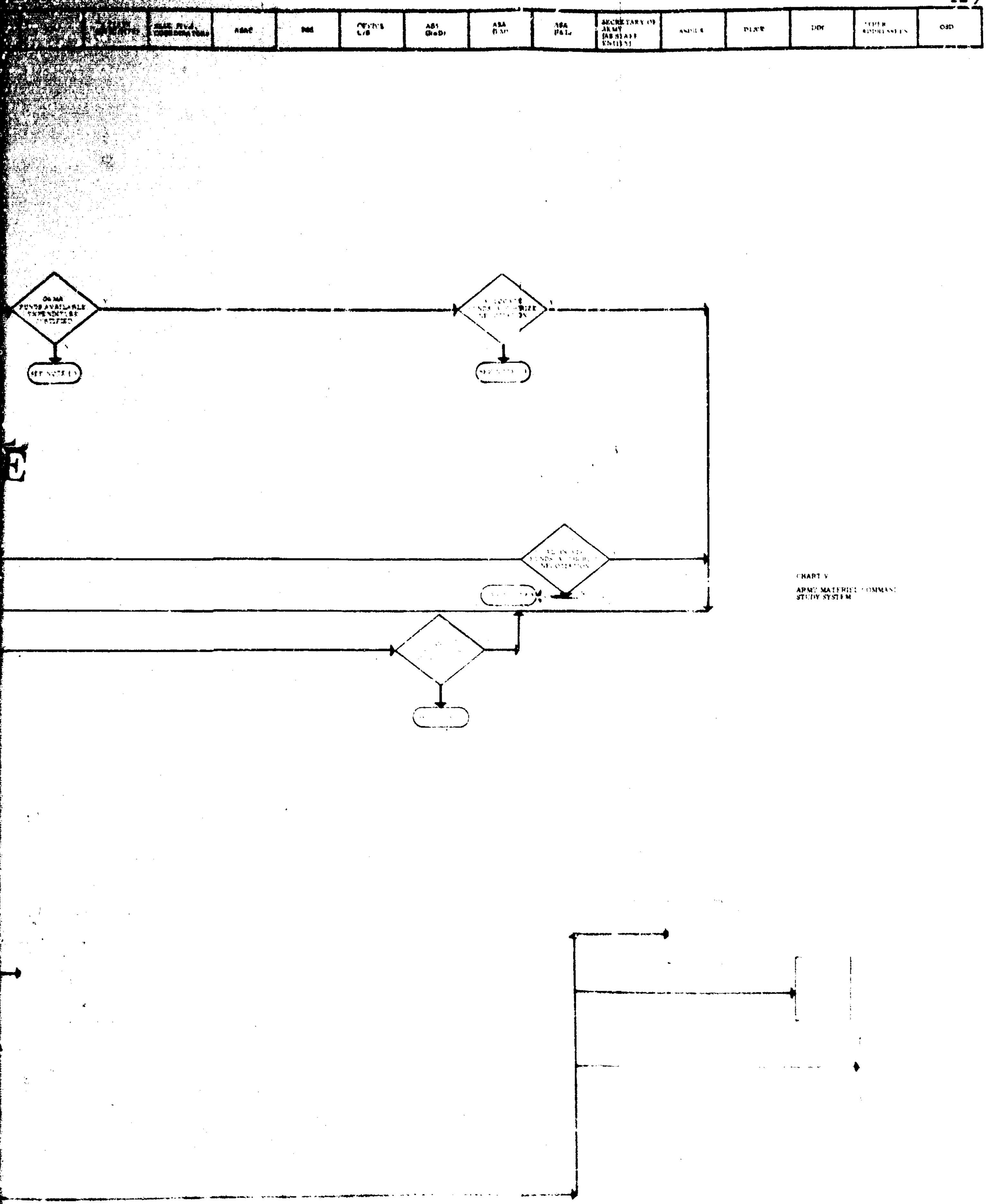

CHART V

ARMY MATERIEL COMMAND STUDY SYSTEM

PRC ?-373
136

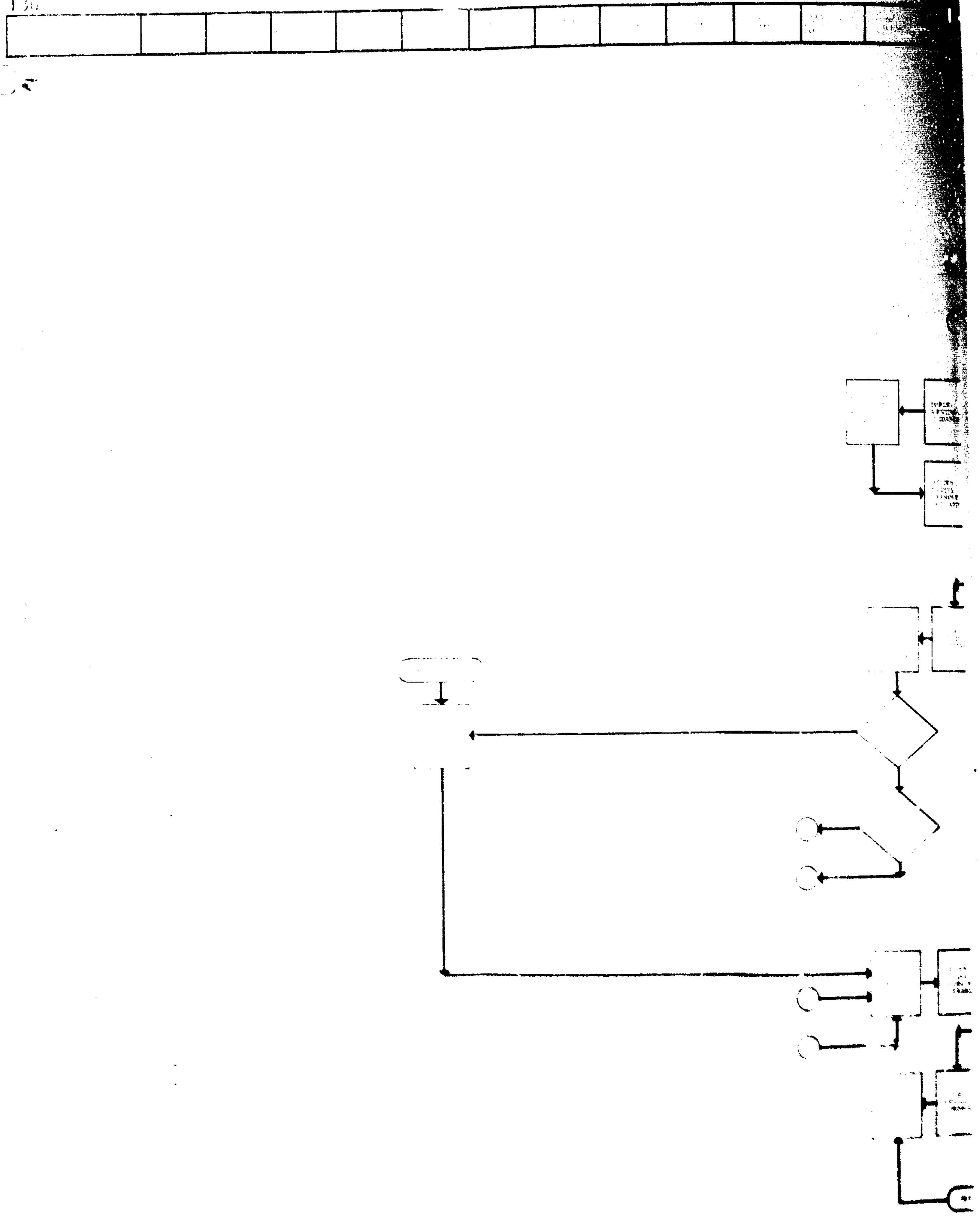

EXHIBIT 19 (Continued)

Study proposals which are not a part of the Human Factors and Operations Research (HF&OR) Program are submitted separately for ASAC consideration, though the facilities of ARO for contract administration can be utilized by arranging for a transfer of funds to that office.

Approved study proposals from all of these sources are initially developed on Chart I; resultant actions are continued on Charts II, III, and IV, as are actions concerning directed studies from the Office of the Secretary of Defense (OSD).

Charts III and IV diagram the actions taken in the event contractor services are required. The significant difference between Chart III, which pertains to utilizing RAC and/or SRI, and Chart IV, which pertains to all other individually negotiated study contracts, is that the former involves a formalized procedure administered exclusively by OCRD, DA, for the Army Operations Research Program. This procedure provides for initial preparation and agreement to the terms of a work statement, designation of a study sponsor, appointment of a PAG, supervision and monitoring of the study while in progress, and ultimate review and approval for publication of a final report of study. All of these actions are the full-time responsibility of designated members of the OCRD, assisted by designated study sponsors and PAG members from other DA staff agencies and U.S. Army organizations.

Chart IV shows the several existing study proposal review channels, depending upon how a study is categorized in accordance with Army Regulation 1-110. The general impact of this regulation is to differentiate between management and operations research studies (it establishes a different request and reporting channel for each) and to authorize major commands of the Army to approve expenditures of up to $100,000 for operations research studies without reference to higher authority. A significant feature to note here is that for all management studies and for those operations research studies costing in excess of $100,000, formal authority to negotiate a contract must first be obtained from an appropriate Assistant Secretary of the Army.

This action must be taken in accordance with the Armed Services Procurement Regulations (ASPR) and the Army Procurement Procedures (APP), regardless of whether the necessity for the study has already been established at OSD or Department of the Army. Determining which Assistant Secretary of the Army is the appropriate office to authorize contract negotiation is a function of the proposed study's content and methodology, and the source of funds to be used. AR 1-110 does not provide for the category of a nonresearch logistics type study, since it distinguishes only between those study proposals which must be acted upon by the Assistant Secretary of the Army for Financial Management (ASA, FM) or by the Assistant Secretary of the Army for Research and Development (ASA, R&D). Nevertheless, there is a direct channel to the Assistant Secretary of the Army for Installations and Logistics (ASA, I&L), as shown, when the proposed study does not involve management or research and is being financed from other than RDT&E appropriations. It is also to be noted that the Office of DCSLOG, Department of the Army, is not in the channel for approval of such study proposals.

Chart V pertains only to studies originating within USAMC or conducted at USALMC under direct supervision of DA, DCSLOG. Most, if not all, of the former are in the category of supporting studies. A significant feature to note on this chart is the vital role performed by USALMC, which is responsible for initial review of any USAMC proposed logistics study, whether it is to be conducted in-house or with contractor assistance. It operates the Defense Logistics Studies Information and Exchange (DLSIE), responsible for maintaining bibliographic records of all completed logistics studies in DOD, and utilizes this facility in determining what studies have already been done, or are being done, in a given area as an aid in deciding whether a new study effort is required.

Chart VI shows only the structured part of USACDC's study program, a large portion of which concerns logistics for the Army-in-the-field or Theater Army. Supporting studies may exist, though none

were identified. Directed studies, however, were previously provided for in Chart II, where it was observed that the Institute of Special Studies and possibly the Institute of Nuclear Studies were the study agencies involved.

APPENDIX F

LOGISTICS STUDY ORGANIZATIONS

ARMY MATERIEL COMMAND

	Agency	Location	Type Log Study	Personnel[1]
1.	Army Materiel Command Board	Aberdeen, Md.	Logistics	37
2.	Army Maintenance Board Special Projects Office	Fort Knox	Unit Maintenance Data	4
3.	Directorate of Development Technical Planning Branch	AMC Headquarters	R&D Planning	7
4.	Directorate of Management Systems Management Research Division	AMC Headquarters	Logistics	16
5.	Electronics Command Logistic Research Agency	Philadelphia	Supply & Maintenance	20
6.	Institute for Research Objectives Analysis Office	Frankford Arsenal	Weapon Systems	19
7.	Logistic Management Center Research & Doctrine Department	Fort Lee	Logistics	61
8.	Logistics Systems Support Center	Letterkenny Depot	Supply & Maintenance	241
9.	Logistics Systems Support Center Inventory Research Office	Philadelphia	Inventory Control	11
10.	Major Items Data Agency Coordination Staff	Letterkenny Depot	Readiness Data	24
11.	Management Engineering Training Agency Department of Management Planning	Rock Island Arsenal	Operations Research	10
12.	Materiel Systems Analysis Center Ballistic Research Laboratory	Aberdeen, Md.	Requirements, Costs	117
13.	Operation Research Group	Edgewood Arsenal	CBR Support	29
14.	R&D Directorate Combat Requirements Branch	Redstone Arsenal	Missile Support	19
15.	Weapons Command Headquarters Operations Research Group	Rock Island Arsenal	Production	7
			TOTAL	622

COMBAT DEVELOPMENT COMMAND

1.	Institute of Combined Arms & Support	Fort Leavenworth	Service Support[2]	89
2.	Engineer Agency	Fort Belvoir	Field Construction	43
3.	Maintenance Agency	Aberdeen, Md.	Field Construction	56
4.	Medical Service Agency	Fort Sam Houston	Medical Support	25
5.	Supply Agency	Fort Lee	Field Storage	34
6.	Transportation Agency	Fort Eustis	Transportation	40
7.	Aviation Agency	Fort Rucker	Transportation	35
			TOTAL	322

SPECIAL

1.	Aviation Accident Board	Fort Rucker	Aircraft Accidents	22
2.	Comptroller of Army Directorate of Cost Analysis	Washington, D.C.	Equipment Costs	31
3.	Comptroller of Army Office of Organization & Management	Washington, D.C.	Management	27
4.	Engineer Strategic Studies Group	Bethesda, Md.	Field Engineering	78
5.	Office of Chief of Staff Force Planning Analysis Office	Washington, D.C.	Force Structure	31
6.	Strategy and Tactics Analysis Group	Bethesda, Md.	War Gaming	162
			TOTAL	351

Notes: (1) Number of military and civilian personnel authorized.

(2) Logistics study personnel only.

Sources: (a) Office of Chief of Staff, "Personnel Authorization Voucher," DA form 1041, 30 April 1966

(b) CDC, "List of USACDC Program Actions by Proponent Organization Including Manpower," June 1966 (Confidential)

(c) Interviews, CG, STAG, CO, ESSG, Director of Cost Analysis, OCA, AMC Manpower Division

APPENDIX G

OPERATIONS RESEARCH COURSES CURRENTLY OFFERED BY THE U.S. ARMY

MANAGEMENT ENGINEERING TRAINING AGENCY

Course Number	Title[1]	Length (Weeks)	Description
7E-F6	Automatic Data Processing for the Systems Analyst	2	Computer systems design; ADP language; costing and installation of computers.
7E-F11	Common Business Oriented Language	2	COBOL programming.
7E-F13	Design and Analysis of Experiments	3	Statistical techniques in research.
7A-F10	*Economic Analysis for Decision Making	2	Techniques of evaluating costs; emphasis on use of decision models.
5A-F2	Elements of Reliability	2	Mathematical, engineering, and managerial aspects of reliability; techniques for reliability prediction.
7E-F15	*Management Statistics	2	Statistical techniques in evaluation of management data.
5A-F1	*Mathematical Programming	3	General and dual linear programming; network flow; parametric, integer, nonlinear, and dynamic programming.
7A-F12	O.R. Appreciation	1	Potentials and limitations of O.R.; emphasis on philosophy.
7A-F15	Probability Controls in Management	1/2	Techniques and models from probability theory; awareness of control devices developed to improve decisions.
5A-F3	*Probabilistic Methods in O.R.	3	Mathematical and probabilistic principles necessary to formulate models.
8A-F7	Product Reliability - Target for Top Management	1	DOD requirements; reliability planning and evaluation.
7E-F16	Sampling Procedures for Reliability	1	Probability, sampling distributions, statistical tests.

LOGISTICS MANAGEMENT CENTER

Course Number	Title[1]	Length (Weeks)	Description
8B-F11	Inventory Management	6	Management of materiel inventories.

ADJUTANT GENERAL SCHOOL

7E-F1	Automatic Data Processing Systems Analysis Officer	4	Capabilities of ADP equipment; problem definition; systems analysis and installation, COBOL.

PERT ORIENTATION AND TRAINING CENTER

	PERT Orientation and Training Workshop	1	PERT and PERT costing.

Note: (1) Preferred courses are denoted by an asterisk.

APPENDIX H

STUDY GUIDANCE

The objective of this study as stated in the original guidance is:

1. To assist the Board of Inquiry on the Army Logistics System in an evaluation of the existing Army Logistics Study Program and in the development of an integrated and balanced Army logistics research program for the future.

2. Purpose and Scope.

a. An examination will be made into the full subject of Army logistics studies, including both in-house and contractual. The examination will include how the Army is organized to carry out the study program, how the study projects are generated, and how they are coordinated, controlled, and evaluated. An analysis will be required of the balance of the study effort between the various logistical functional areas such as supply, maintenance, ADPS, transportation, etc. Sufficient analysis should be provided whereby the board can determine the adequacy of balance in relation to particular problem areas. Specific examples will be cited of the cost effectiveness of particular study programs as far as can be determined.

b. From the above examination:

(1) An outline will be prepared of a proposed 2- or 3-year study effort reflecting an integrated and balanced long-range logistics research program.

(2) An assessment will be made of the capability of existing in-house agencies to participate in control and evaluation of the proposed study program.

c. As a final product, findings will be developed for a spectrum of practical organizational and staffing patterns for an Army logistics research effort which will provide for a system for development of overall logistics doctrine, development of follow-on study programs and methods for controlling, supervising, and carrying out the execution effort and its subsequent evaluation. Systems analysis techniques should be provided as an integral part of the evaluation process. The organization patterns should consider a spectrum varying from a small professionally staffed group which might be positioned as a part of the appropriate General Staff Office to a fairly large centralized research agency (perhaps as a Class II activity of the General Staff Office) which would actually do research as well as provide overall control and direction to the total program. Each should include specific consideration of the role of existing in-house research elements and contractual efforts toward accomplishment of the total program.