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RESOURCES MANAGEMENT
LOGISTICS SUPPORT OF
RESEARCH & DEVELOPMENT LABORATORIES
by
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SCHOOL OF SYSTEMS AND LOGISTICS
AIR FORCE INSTITUTE OF TECHNOLOGY
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13. ABSTRACT The research and development laboratories within the United States Air Force perform an important role in exploring the most promising approaches in science and technology to develop military systems that can counter any threat to our national security. The effectiveness of these laboratories' R & D efforts depends upon the adequacy of the logistics support provided to the laboratories which, in turn, depends upon the system or type of resources management employed in providing the required support. This study was conducted to analyze the adequacy of logistics support provided to the laboratories by the host base support organizations and to analyze the procedures employed in managing the material resources within these USAF R & D laboratories. Areas of investigation focused on the Standard Supply System Support, Base Procurement System Support, and the Interface of Supply Procedures. The study resulted in specific recommendations regarding the type of resources management system which would provide the best possible support to the laboratories and assist them in accomplishing their vital research and development missions which so significantly contribute to the security of our nation.		

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Abstract

The research and development laboratories within the United States Air Force perform an important role in exploring the most promising approaches in science and technology to develop military systems that can counter any threat to our national security. The effectiveness of these laboratories' R & D efforts depends upon the adequacy of the logistics support provided to the laboratories which, in turn, depends upon the system or type of resources management employed in providing the required support.

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The research study reported in this document was originally conducted by Captains John S. Ason and Robert D. Libbert II under the direction of Lt Colonel James L. Quinn in partial fulfillment of the requirements for award of a Master of Science degree in Logistics Management at the Air Force Institute of Technology's School of Systems and Logistics.

The original thesis has been substantially revised and edited by Lt Colonel Quinn in cooperation with Captains Ason and Libbert for publication as a technical report by the School of Systems and Logistics. Should the reader of this report desire more detailed information as to the techniques of analysis and the specific findings from the questionnaires and structured interviews, reference should be made to the more comprehensive thesis report which will soon be available for purchase from the Defense Documentation Center or available for interlibrary loan from the Air Force Institute of Technology Library. Inquiries relating to the Document Control Number assigned by DDC or the library call number assigned by AFIT should be directed to the Department of Research and Communicative Studies of the School of Systems and Logistics (AFIT/SLGR, WPAFB, OH 45433).

January 1972
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R E S O U R C E S M A N A G E M E N T
LOGISTICS SUPPORT
OF RESEARCH AND DEVELOPMENT LABORATORIES

INTRODUCTION

The security of our nation depends, to a great degree, on how effective may be the research and development (R & D) efforts devoted to maintaining our scientific and technological superiority over other nations. Toward this end, an important role is played by the United States Air Force (USAF) research and development laboratories, whose mission is to explore the most promising approaches in science and technology to maintain a superior technological base facilitating the development of military systems that can counter any threat to our national security. (4:1)

Therefore, this study addresses the degree of effectiveness of the resources management within these USAF R & D laboratories, which are under the overall supervision of the Director of Laboratories, Air Force Systems Command (AFSC). In particular, this study focuses upon the logistics support provided by the host base support organization to the laboratories.

Problem Statement

The formal document which governs the support agreements between the host base and tenant organizations is Air Force Regulation 11-4, Host-Tenant Support Responsibilities of USAF Organizations. The purpose of

the host-tenant agreement is to specify the support functions which are to be performed by the host base and by the tenant organizations. (5:9) This agreement is primarily intended for the support of operational units whose requirements can be satisfied by the procedures established in AFR 11-4. Unfortunately, the support provided to the R&D laboratories under this regulation has been less than adequate to meet the needs of these organizations. Indeed, current trends indicate a gradual erosion in the level of support being rendered by the host bases. (2:10)

Air Force Regulation 80-3, Management of Air Force In-House Research and Development Laboratories, encourages each Air Force support element to follow a flexible policy in interpreting Air Force directives, as necessary to foster a creative laboratory environment. (6:3) The problem has been what is the interpretation of "a flexible policy"? Headquarters USAF has made a very narrow interpretation in maintaining that laboratories can be supported by standard support procedures. (7) On the other hand, Headquarters AFSC has broadly interpreted the meaning of "a flexible policy" and has established a Laboratory Materiel Control Activity (LMCA) to remedy the deficiencies found in logistics support services by the host base. (9)

Although both Hq USAF and Hq AFSC recognize that logistics support of R&D laboratories is of paramount importance, no agreement has been reached on the type of system that will best provide this support. Therefore, the advantages and disadvantages of competing systems must be closely examined to determine appropriate trade-offs between standardized logistics support vis-a-vis complete laboratory autonomy.

Background

In 1949, the Scientific Advisory Board of the Air Force was directed by General Hoyt S. Vandenberg, Chief of Staff, USAF, to perform an overall study of the Air Force's research and development activities. Louis N. Ridenour headed a subcommittee composed of prominent scientists who made an intensive investigation of USAF scientific activities. The report of this subcommittee pointed out the need for timely and responsive availability of the many "bits and pieces" that are so essential to the efficient operation of the scientific laboratories engaged in the advancement of technology. (12) As a result of the findings of the Ridenour Report, the Air Force authorized deviation for R&D laboratories from the "standard" logistics support system, but required that the laboratories rely on established supply activities for common item support.

The subject of adequate laboratory support has been the basis for Congressional hearings. The Congressional Record of the Eighty-Third Congress contains a detailed transcript of one such investigation. In testimony before the committee, Dr. A. G. Hill, Director of the Lincoln Laboratories, Lexington, Massachusetts, stated that the problem of making government laboratories more efficient could be accomplished by improving the logistics support procedures. (13:390)

In 1960, E. M. Glass, Assistant Director of Laboratory Management in the Office of the Director of Defense Research and Engineering, published a report, DOD Laboratories in the Future, which was critical of the procedures being used by the Air Force and the Department of

Defense in supporting their in-house R&D efforts. This report flatly stated that the Air Force Supply System did not provide the timely logistics support needed for the laboratories, that is was cumbersome and required too much time and paperwork to get the requisitioned items, yet it was better than other DOD agencies' systems.

In 1966, the Defense Science Board Subcommittee, in their report to the Chairman of the Defense Science Board, identified logistics support as a major problem area in the management of in-house laboratories. The subcommittee felt that in many cases the laboratory managers were restricted from exercising the necessary authority because the laboratory managers did not have direct control over support services. The subcommittee made the following recommendation:

Managers of R&D organization units now provided with administrative and support services from another organizational unit should have the option, when these services are considered inadequate, of establishing their own service groups or contracting for services elsewhere. (3:5)

Some of the recommendations of these committees have been implemented. Section D, Part Two, Volume II, AFM 67-1, "RDT&E Laboratory Supply Support Procedures," has given these laboratories greater flexibility in supply support procedures. More flexible local purchase procedures have been developed, responsive contract negotiation techniques have been implemented, and simplified requisitioning procedures have been developed and tested. In spite of these improvements, there is still the question: "Do all Laboratory Directors have sufficient authority over their logistic support commensurate with their responsibility?" As David Hertz has pointed

out in his book, The Theory and Practice of Industrial Research, it is not proper to partition responsibility and authority. If the research director is given the responsibility to solve a particular problem, he should be given the requisite authority over the resources necessary to accomplish the job. (1:180)

INVESTIGATION

This study specifically investigated the adequacy of the supply and procurement support services for the Air Force in-house R & D laboratories.

Scope of Study

All AFSC Research, Development, Test and Evaluation (RDT & E) facilities support systems were examined to determine the different types of R & D logistics support systems in existence. All these facilities have an R & D mission; therefore, an analysis of the support systems revealed the range of support problems in existence.

The areas of supply and procurement of the logistics system were studied in detail. Even though the areas of transportation, funding, maintenance, and communications are important facets of logistics, they were not within the scope of this study.

The present R & D logistics support systems are generally divided into three categories: Standard Base Supply Support System, Laboratory Supply Support Activity (LSSA), and Laboratory Materiel Control Activity

(LMCA). All of the R&D facilities are supported by one of these systems with but small variations. An analysis and comparison of the three systems was made in this study.

Objectives and Research Questions

The specific objectives of this investigation were as follows:

1. Describe the Standard Base Supply Support provided by the host Base Supply and Procurement to a tenant organization under United States Air Force (USAF) procedures.
2. Describe the supply and procurement support provided by Base Supply and Procurement to Research and Development (R&D) laboratories under Air Force Systems Command Laboratory Support Procedures.
3. Describe the difficulties in supporting R&D laboratories under the present USAF Standard Base Supply and AFSC Systems.
4. Determine the areas for improvement in the supply and procurement systems required to support R&D laboratories.

The research questions formulated to guide this investigation were as follows:

1. Does the United States Air Force (USAF) Standard Supply System provide adequate supply support to Research and Development (R&D) laboratories?
2. Does the USAF Base Procurement System have the capability to provide adequate support to R&D laboratories?
3. Do the Air Force Systems Command Laboratory Support procedures interface with the USAF Standard Supply System?

Methodology of Investigation

Collection of the data contained in this study was accomplished by use of a questionnaire, a structured interview, and personal observations. The questionnaire,

which was sent to all R&D laboratories within the Air Force Systems Command (AFSC), employed both open-ended and ranking type questions to gather information on the type of support that R&D laboratories are receiving from host base supply and procurement organizations. The structured interviews were used to collect information which required more than just a rating scale and to cross-check information received on the questionnaire. The final data gathering technique employed was personal observation of the operation of a sample of the R&D laboratories located at Wright-Patterson AFB, Ohio.

The sources of data included Headquarters AFSC and the R&D laboratories, as well as reports, studies, and library reference material. The R&D laboratory commanders were chosen as the primary source of information, because of their authority and responsibility for establishing the present support activities within each of the laboratories. Hq AFSC provided all available data concerning the support of R&D laboratories. Government reports and surveys were used to determine past accomplishments in support of R&D laboratories. And, extensive library research provided background information in the areas of economics, management, and industrial research.

Since quantitative data were employed in this investigation, it is important to recognize that the statistical approach has certain limitations relating to: (a) representativeness of the data sample, and (b) the accuracy and reliability of the data. In recognizing and taking into account these limitations, an attempt was made to offset their possible effects by handling the data with caution and restraint.

Since it was essential to establish a common basis of understanding for certain terms used in this study, two primary means were used to achieve that objective: (a) certain terms that had been previously identified in Department of Defense publications were defined in accordance with established usage, and (b) a glossary was prepared to accompany the questionnaire in order to clarify those terms that were inadequately defined in certain reference publications.

RESULTS

In investigating the research questions, the following results were obtained.

Standard Supply System Support

Based on the data collected from the questionnaires, structured interviews, and personal observations, the study found that more adequate support of R&D laboratories could be provided by the Standard Supply System. Each of the laboratories normally negotiates the Host/Tenant support Agreement for the support services needed. Most of the supply support required by laboratories is the type of support required by any Air Force tenant organization -- pick-up and delivery, distribution, stock control, and base service store. Although such common support was found to be adequate, problems were noted in satisfying laboratory requirements of a unique nature such as the specialized engineering supplies needed by the thousands of engineers at the R&D labs.

Since Base Supply is structured to provide a level of support geared to operational and support units, most host base supply organizations can provide common tenant support to R&D laboratories. However, because of manning limitations, funds restrictions, and a highly structured organization, the supply system cannot provide the specialized, flexible support that is sometimes needed by the laboratories.

Base Procurement System Support

Based upon the data collected from the questionnaires, structured interviews, personal observations, and review of the literature, the conclusion is drawn that the USAF Base Procurement System does have the capability to provide adequate support to R&D laboratories. However, the procedures (Laboratory Materiel Control Point) currently being proposed to replace the existing procedures (Laboratory Supply Support Activity and Laboratory Materiel Control Activity) would place severe restrictions on R&D laboratories. These restrictions require that all item purchase requests be submitted through base supply, and they revoke the authority of laboratories to submit purchase requests for non-standard items directly to the base procurement activity.

Therefore, although the host procurement organization has the ability to meet the needs of the laboratories, restrictive procedures may limit the ability of laboratories to use the range of procurement services that are available.

Interface of Supply Procedures

Based upon the data analysis of the questionnaires, structured interviews, personal observations, and related documentary material, it was found that AFSC Laboratory Support Procedures do interface with the USAF Standard Supply Procedures. (8, 10, 11) Four different types of procedures are currently used by the laboratories -- the Laboratory Supply Support Activity (LSSA), Laboratory Materiel Control Activity (LMCA), and special stock record account procedures, and satellite procedures.

Each of these procedures has been adopted by at least one of the laboratories -- depending on Hq USAF approval, Hq AFSC approval, and the environment within which the laboratory is operating. The special stock record account procedures and satellite procedures are extensions of the Standard Base Supply System and, therefore, completely interface with the standard supply procedures. The LSSA procedures are also an extension of the standard supply system and are intended to provide the laboratory with the means to utilize the Standard Base Supply System or to submit purchase requests directly through procurement channels. The LMCA procedures nearly parallel the LSSA procedures and are intended to extend to all AFSC R & D laboratories the basic LSSA concepts.

The proposed Laboratory Materiel Control Point (LMCP) procedures are an extension of the standard supply system and are intended to make the laboratories completely dependent on the Standard Base Supply System for all supply and equipment support.

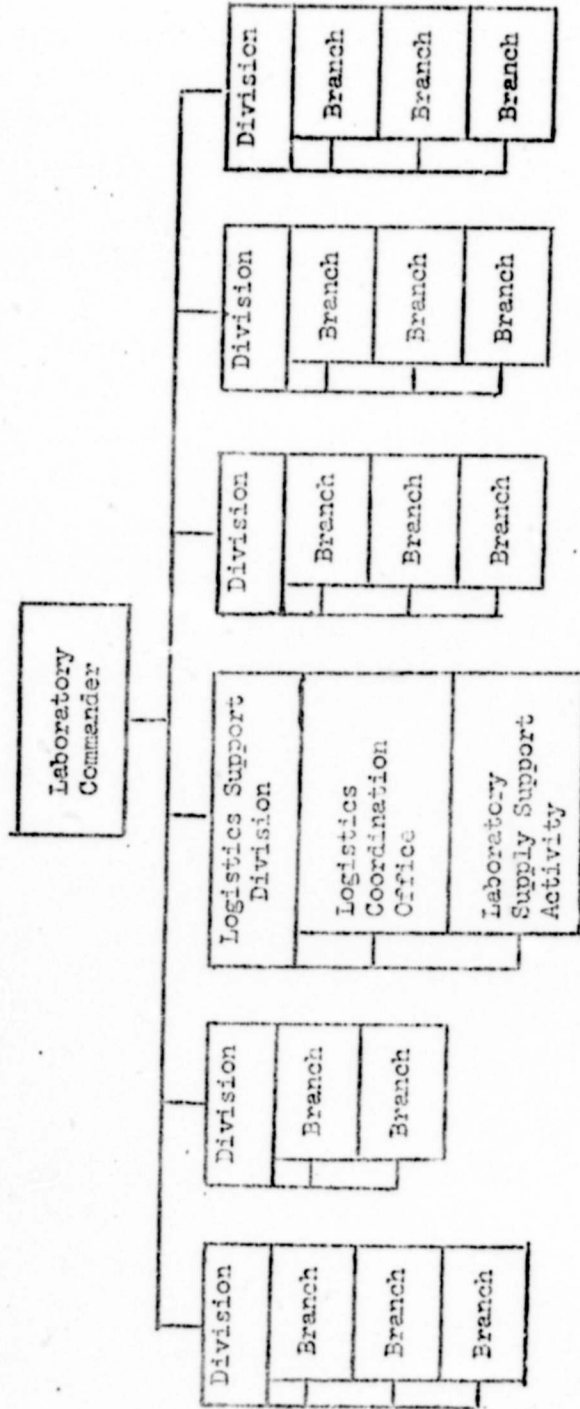
ANALYSIS

This study focused on providing pertinent information and suggestions of value concerning resources management for in-house research and development laboratories. Various systems of resources management were evaluated -- the Satellite Supply Support, Laboratory Supply Support Activity, Laboratory Materiel Control Activity, and Laboratory Materiel Control Point -- to determine which might provide the best means of managing the resources of these laboratories. In analyzing the systems, it was found that the Laboratory Supply Support Activity, with certain modifications, would come nearest to satisfying the needs of management.

Logistics Support Division

The LSSA, organized as a branch of a division such as the Logistics Support Division shown in the accompanying illustration (Figure 1), is the system most likely to provide the best possible support to the laboratories. The establishment of the division-level support organization is considered essential if the laboratories are to be adequately supported. Without the responsibility and commensurate authority and role/status being located at the division level of the organization, logistics requirements would likely be neglected and supply discipline would become ineffectual if not non-existent. As has been said by some, "The logistician wants to be traded off, not traded away." (15:32).

LABORATORY ORGANIZATIONAL CHART



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Figure 1.
Laboratory Organizational Chart

The accompanying diagram (Figure 2) charts the elements of a proposed resources management system which could best support the missions of the research and development laboratories. At the head of the support division would be a Logistics Support Office responsible for the overall materiel resources management in each laboratory. The division would consist of two branches -- one, the Logistics Coordinating Office (LCO) serving a staff function; the other, the Laboratory Supply Support Activity (LSSA) branch serving a line function.

Laboratory Supply Support Activity

The line branch, the LSSA, would be responsible for the materiel services of the entire laboratory. The branch chief would be the individual responsible for the procurement, acquisition, inspection, storage, inventory, utilization, and documentation of equipment and supplies. To assist the branch chief would be three sections concerned with equipment control, supplies management, and operational support.

Equipment Control Section. --As its name indicates, this section would be responsible for the proper management procedures to control all equipment items within the laboratory. Operating under the Equipment Control Section would be three units concerned with temporary storage, equipment inventory and utilization, and equipment documentation, allowance and authorization.

The Temporary Storage Unit would provide storage for equipment items that were waiting for disposition or were going to be utilized in the near future.

ORGANIZATION FOR LOGISTICS SUPPORT OF R&D LABORATORIES (PROPOSED)

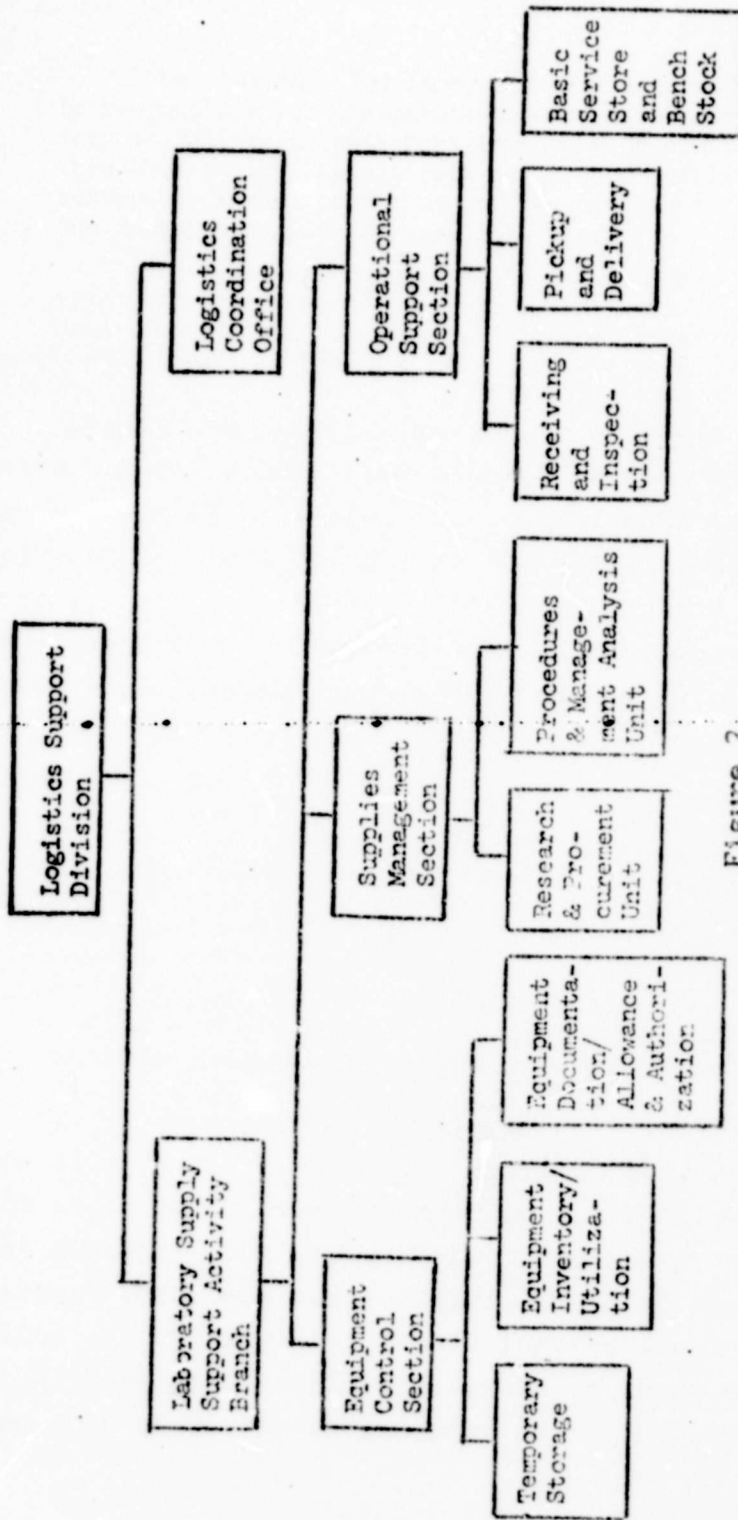


Figure 2.
Organization for Logistics Support
of R&D Laboratories: (Proposed)

The Equipment Inventory and Utilization Unit would be responsible for the maintenance of a periodic inventory as well as a continuous inventory of equipment items. This unit would also maintain and conduct utilization surveys to insure proper use of the equipment located in the research and development laboratory.

The Equipment Documentation and Allowance/Utilization Unit would document all equipment status changes, maintain allowance records, and insure authorization of the equipment in the laboratory.

Supplies Management Section.--The second section located under the LSSA Branch would be the Supplies Management Section, responsible to the LSSA chief for proper acquisition, documentation, storage, procurement, inventory, and justification for all supplies used within the research and development laboratories. This section would contain two units concerned with the research and procurement of supplies and with the analysis of management procedures.

The Research and Procurement Unit would be responsible for the researching of stock lists for supplies, the location of sources of supply for local purchases, the documentation of all transactions, and the procurement of Blanket Purchase Order items.

The Procedures and Management Analysis Unit would have the job of insuring that proper standards were established and maintained throughout the LSSA Branch operation.

Operational Support Section.--The final section responsible to the Laboratory Supply Support Activity Branch would be the Operational Support Section. The actual storage, receiving, inspection, and movement of all items, equipment and supplies, would be the responsibility of this section. Assisting the section in meeting these responsibilities would be three units concerned with receiving and inspection, with pickup and

delivery, and with the basic service store and bench stocks.

The Receiving and Inspection Unit would be responsible for insuring that all items were as ordered and that all items were properly received with the laboratories.

The Pickup and Delivery Unit would be concerned with the authorized movement of items from one point to another. This unit would also maintain all rolling stock located within the research and development laboratory.

The Basic Service Store/Bench Stocks Unit would stock and maintain records on all types of office and janitorial supplies and bench stocks located within the laboratory.

Functional Relationships.--The functions of each of the sections and units within the LSSA Branch must be performed. However, each section or unit need not be separately manned. For example, the Receiving and Inspection Unit personnel could also handle the jobs required of the Pickup and Delivery Unit. This would allow the small laboratory to maintain an organization similar to that of a large laboratory without the requirement for additional manning beyond the resources of the small R&D organization.

Logistics Coordination Office

The second branch responsible to the Logistics Support Office would be known as the Logistics Coordination Office. This branch would act as a staff agency for the division chief and would be responsible for the following activities and functions.

1. Reviewing all approved projects and then advising the division chief of all logistics considerations involved in the review of the projects.
2. Training all laboratory personnel in the aspects of logistics deemed necessary by the laboratory director.
3. Maintaining liaison with the Integrated Logistics Offices of the Systems Program Office for which the laboratory is doing research.
4. Insuring that the engineers/scientists place their logistics requirements for projects in written form and submit these requirements in advance so that equipment can be obtained on schedule for the projects.
5. Developing and maintaining logistics plans for the research and development laboratory.
6. Providing any other staff assistance deemed necessary by the division chief.

RECOMMENDATIONS

Anyone familiar with the present Laboratory Supply Support Activity will recognize several changes recommended in this study to improve the operation of a support system for a research and development laboratory.

Changes Recommended

The first change recommended is the placing of the LSSA under a Logistics Support Division. This action would establish the support function as a major division within the laboratory and would, thereby, place greater emphasis on the importance of the logistics function. Consequently, better support would be provided to the laboratory since logistics requirements would face less likelihood of being "traded away." Finally, as better

support is provided, supply discipline should correspondingly improve and costs of supporting the laboratory should decrease since the hoarding of supplies and equipment would no longer be necessary.

The second basic change recommended is the establishment of a staff branch under the Logistics Support Division. This branch would be able to improve the support provided by the division because it would constantly review the status of projects within the laboratory. Consequently, rush orders would be less prevalent and a smoother flow of supplies could be maintained. Thus, the division chief would be able to manage by exception rather than by crisis. Training provided by this staff branch would enable the personnel in the laboratory to understand the logistics support requirements and to assist in achieving adequate support of the laboratory. Such education would help open up communication channels and facilitate cooperation between the engineer/scientist and the support personnel -- thereby resulting in better support for the entire laboratory.


The third change recommended is the location of a procurement office within the formal organization of each laboratory. The procurement office would be authorized to execute a blanket purchase order for procurement of items up to \$2500 in value. Such an arrangement would facilitate rapid response to the special procurement needs of the research and development laboratory and would likely reduce the order-to-contract time many-fold. (14) The arrangement would also help insure the procurement of the "right" item, since the procurement office would have direct communication with the person who placed the order.

Other Recommendations

Several other actions are recommended which should provide better support to the research and development laboratories. Based upon the review of many varied management techniques and applications, the following recommendations are made:

1. A training program should be established to educate the laboratory commanders and other high ranking personnel in the importance of the function of logistics in support of the research and development laboratories.
2. A flow chart of activities that must be accomplished to quickly obtain an item with the least possible delay and confusion should be established. An example of such a flow chart is presented in Figure 3.
3. Supply discipline should be stressed throughout the entire organization to reduce the amount of inventory costs and associated waste involved in the hoarding of supplies and equipment.
4. Authority commensurate with responsibilities must be given the logistician in order for him to adequately support the needs of the laboratory.

CONCLUSION

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The research and development laboratories within the United States Air Force perform an important role in helping maintain the superior scientific and technological position which strengthens our nation's security and supports our national objectives. The effectiveness of these laboratories' R&D efforts depends upon the adequacy of the logistics support provided to the laboratories which, in turn, depends upon the system or type

of resources management employed in providing the required support.

This study was conducted to analyze the adequacy of logistics support provided to the laboratories by the host base support organizations and to analyze the procedures employed in managing the materiel resources within these USAF R&D laboratories. The study resulted in specific recommendations regarding the type of resources management system which would provide the best possible support to the laboratories and assist them in accomplishing their vital research and development missions which so significantly contribute to the security of our nation.

FLOW OF ACQUISITION

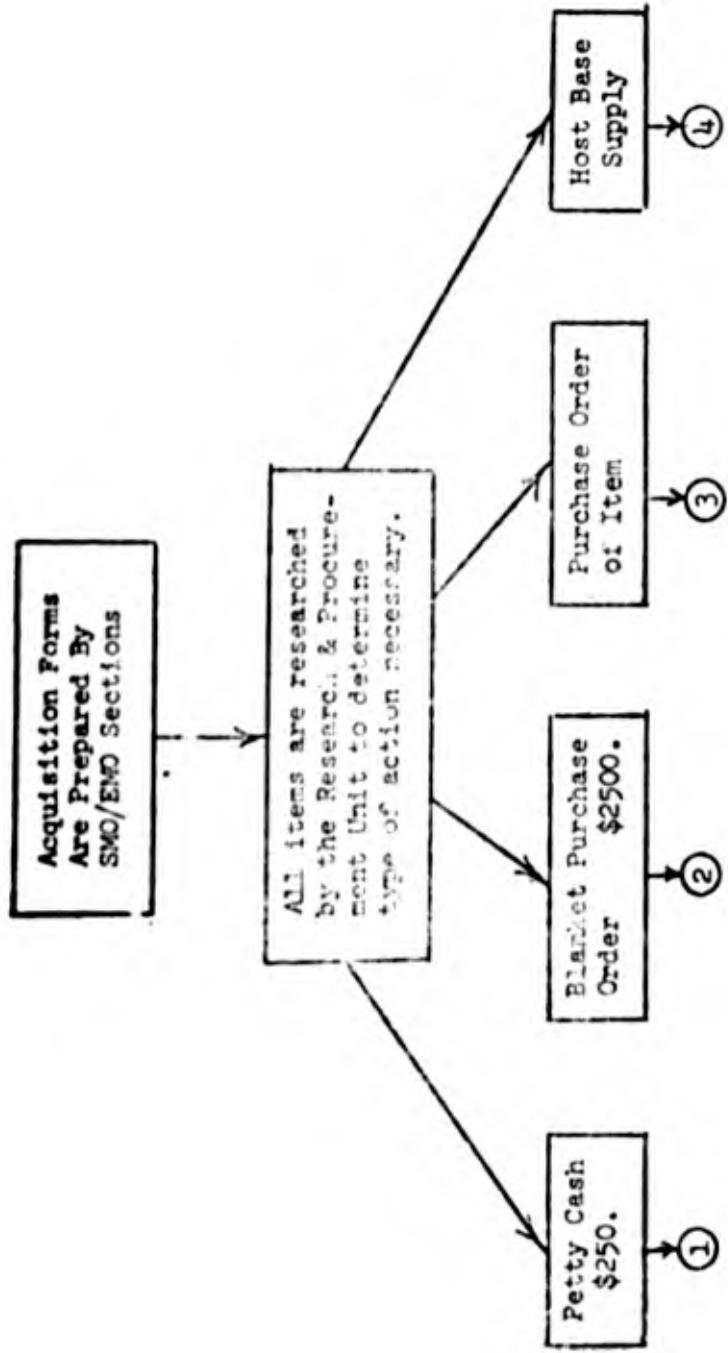


Figure 3.
Flow of Acquisition

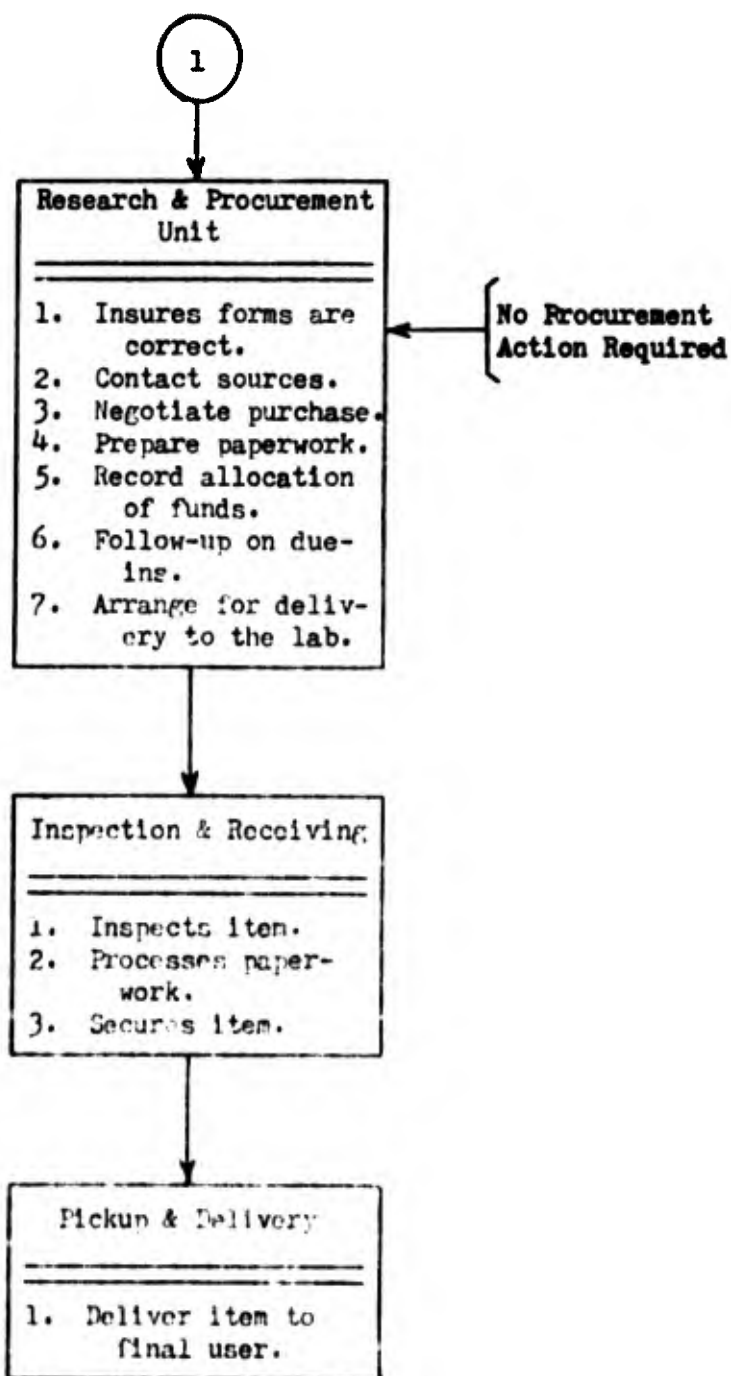


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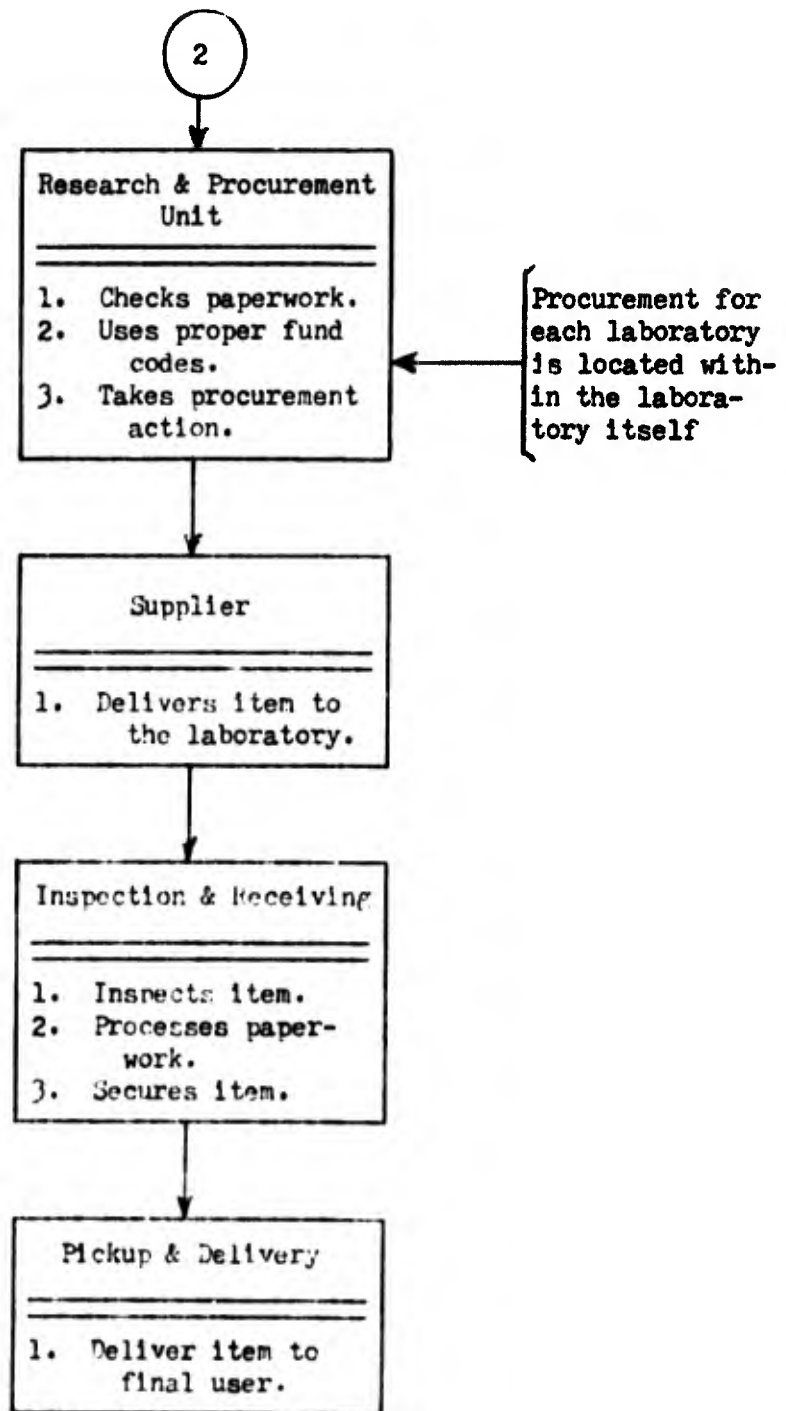


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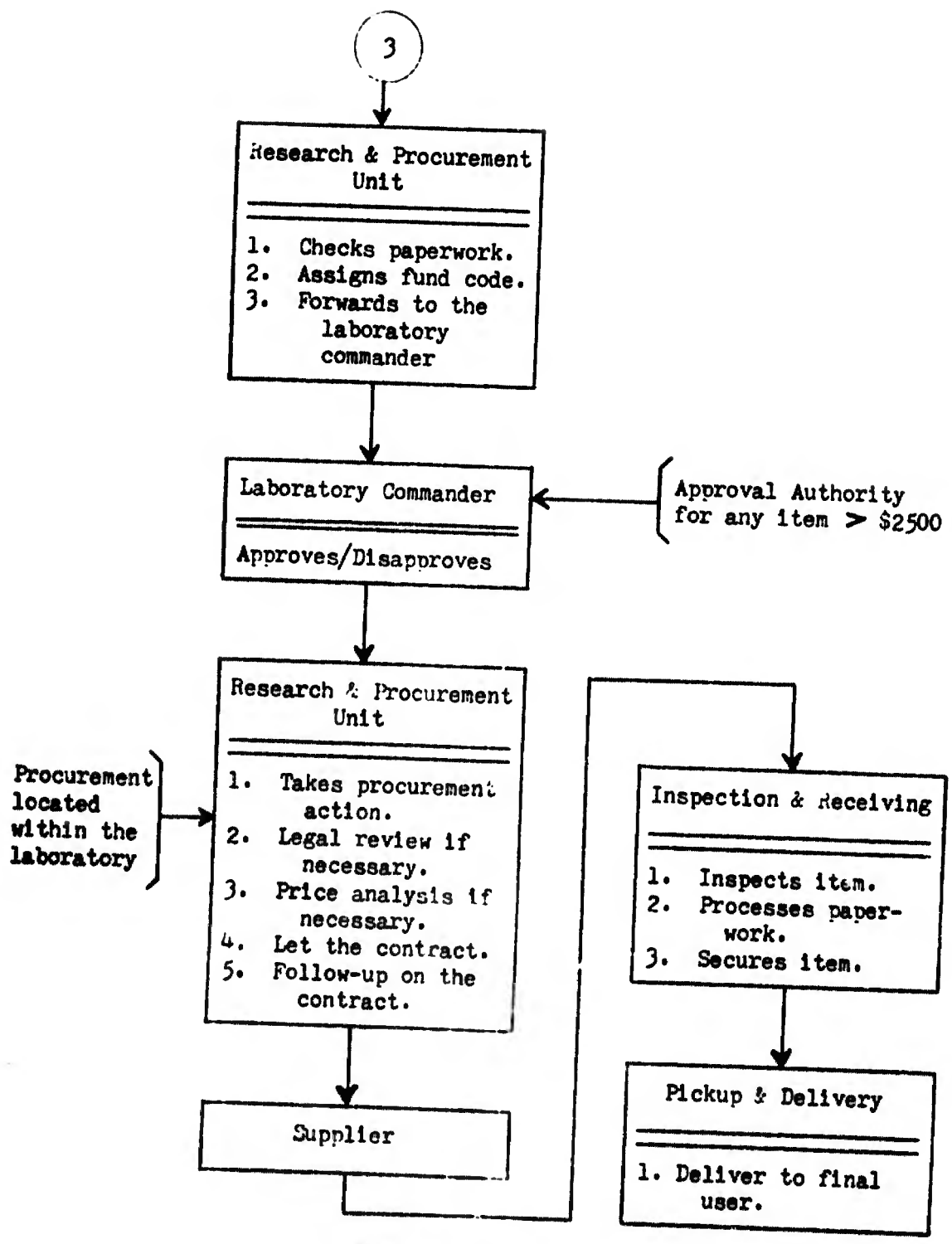


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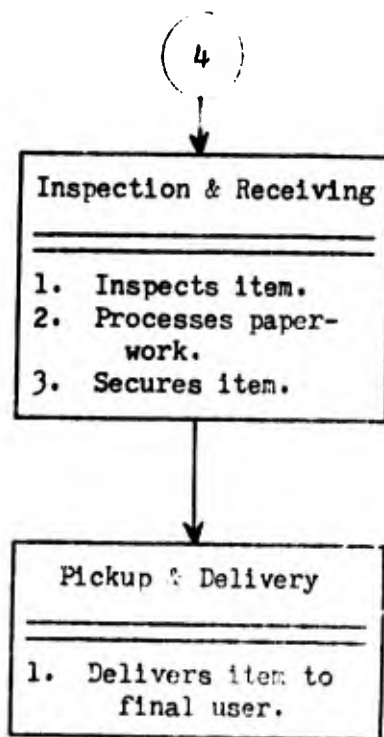


Figure 3.
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Biographical Data

Lt Colonel James L. Quinn, Captain John S. Ason, and Captain Robert D. Libbert II, are all assigned to the Air Force Institute of Technology's School of Systems and Logistics (Wright-Patterson AFB, Ohio), and they are all members of the Society of Logistics Engineers (professional association) and the Sigma Iota Epsilon (national honorary management fraternity). LtCol Quinn is Chief of the School's Graduate Education Division, and Captains Ason and Libbert are graduating from the School's Graduate Logistics Management Program.

Captain Ason holds his Bachelor of Arts degree in Economics from the University of Pittsburgh and has earned his Master of Science degree (With Distinction) in Logistics Management from the Air Force Institute of Technology. Captain Ason's previous assignment was with the Air Force Aeropropulsion Laboratory (Wright-Patterson AFB, Ohio) as a Materiel Control Officer, and his next assignment is with the 388th Supply Support Squadron (Korat RTAFB, Thailand) as a Supply Officer. He has been honored by the Air Force designation as an Outstanding Supply Officer (1969).

Captain Libbert holds his Bachelor of Science degree in Business Administration from Ball State University and has earned his Master of Science degree in Logistics Management from the Air Force Institute of Technology. Captain Libbert's previous assignment was with the Officer Training School (Lackland AFB, Texas) as an Instructor, and his next assignment is with Headquarters, USAF Security Service (Kelly AFB, Texas) as the Chief of Supply, Satellite Supply Operation.

Lt Colonel Quinn holds his Bachelor of Science degree (With Honors) in Engineering from the University of Texas, his Master of Business Administration degree (With Distinction) in Engineering Management from the Air University Institute of Technology, and his Doctor of Business Administration degree (With Special Recognition) in Management and Behavioral Science from Indiana University. He holds the academic rank of Associate Professor of Logistics Management and has been honored with the Professional Designation in Logistics Management (Advanced) by the Society of Logistics Engineers. He has served with the Office of the Secretary of the Air Force as a project engineer and program management officer, with the Space Systems Division as a configuration management officer, and with the School of Systems and Logistics as Head of the Department of Research Studies.