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AUTOMATION AND GENERATION OF THE ARMY'S LOGISTIC RESOURCE ANNEX--ETC(U)
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Automation and Generation of the Army's Logistic Resource Annex (LRA) to the FYDP

FINAL REPORT

LEVEL II

By:

Jerry L. Buffay (Project Manager)
Jeanne W. Campbell
George R. Fitzpatrick
Edward F. Larrivee
Charles D. Runge
Erwin H. Schiff

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January 1979

OPERATIONS ANALYSIS GROUP

GENERAL RESEARCH CORPORATION

A SUBSIDIARY OF FLOW GENERAL INC.

7655 Old Springhouse Road, McLean, Virginia 22102

Submitted To:

U.S. Army
Office, Deputy Chief of Staff for Logistics
(Resources and Management Directorate)
The Pentagon
Washington, D.C. 20310

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643-02-79-CR Functional Requirements for the LRA
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The Logistic Resource Annex (LRA), a document to supplement periodic updates of the Five Year Defense Plan (FYDP), relates logistic resources (manpower and TOA dollars) to a comprehensive set of logistic functions defined by the Office of the Assistant Secretary of Defense for Manpower, Reserve Affairs and Logistics (OASD-MRA&L). The LRA described in the report is intended to

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serve internal needs of the Army and to satisfy the requirements of OASD (MRA&L) for a logistic annex to the FYDP.

The report describes the preparation, manually, of an LRA for the POM FY80-84 FYDP update; presents a generalized description of the design, development, and implementation of a computerized system--installed on an Army computer--to produce subsequent LRAs automatically; and summarizes the effort to improve the quality of input data and to refine the allocation methodology.

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SECTION 1

INTRODUCTION

BACKGROUND

For a number of years, the Army has been asked repeatedly to respond to varied, and often duplicative, queries from within the Department of Defense (DoD), from the Office of Management and Budget (OMB), and from the Congress concerning its use of logistic resources (dollars and manpower). This persistent interest in logistic and logistic-support resources stems from the fact that these resources are a significant portion of the Army's annual budget. For example, the Army portion of Program 7, "Central Supply and Maintenance," of the DoD Five Year Defense Program (FYDP) for FY79 amounted to approximately $2.8 billion. Other, less clearly identified logistic resources are to be found elsewhere in the FYDP and in the Army's financial and organizational structures. Program 2, "General Purpose Forces," the Army's portion of which amounted to $14 billion in FY79, includes funding for Army divisions which, by definition, encompass organic logistic functions and resources. The supply and transportation (S&T) battalion, maintenance battalions, and the division support command (DISCOM) are specifically logistic support units organic to the division. Virtually all battalion-size units of the division and a variety of non-divisional combat and combat-support units have, as an integral part of their organizations, elements whose functions are supply, maintenance, and transportation in support of their primary mission.

Recognizing the need for better identification and reporting of logistic resource data, the Office of the Chief of Staff, Army, Program Analysis and Evaluation Directorate (OCSA-PAED), in November 1975, tasked the General Research Corporation (GRC) to develop a structure for a comprehensive logistic resource data base. Phase I of the study, completed in April 1976, resulted in a proposed structure for the data base, an initial correlation of logistic resources data with logistic functions performed by the Army, and a preliminary evaluation

of the availability of the required data. Phase II, completed in January 1977, resulted in the conceptual design of a logistic subsystem of the FYDP--the forerunner of a FYDP Logistic Resource Annex (LRA). Results of the Phase I and Phase II efforts were published in a report specifying the data elements required, discussing their relative availability, and describing the manner in which the data should be aggregated and displayed.[1] The subsystem described in the report required submission by field installations and activities of data elements selected from existing and developing systems, both automated and manual.

Meanwhile, the Office, Secretary of Defense (OSD) had directed that all services proceed with the development of a logistic resource annex to supplement FYDP updates, and this work was undertaken by the Logistics Management Institute (LMI) for the Air Force and by the Institute for Defense Analyses (IDA) for the Navy. Faced with this urgent requirement, the Army retained GRC to provide a near-term, interim operational capability to produce an LRA that would not involve a massive effort to collect data from the field. That project involved three major tasks: (1) design of an LRA structure and format, (2) development of the methodology necessary to construct it, and (3) a demonstration of the feasibility of creating an LRA using analytical techniques and data readily available at the departmental level. Those objectives were accomplished, and a manually prepared LRA, based on the May 1977 update of the FYDP, was delivered to OCSA-PAED in November 1977.[2]

In February 1978, the Office, Deputy Chief of Staff for Logistics (ODCSLOG) contracted with GRC to prepare, again manually, an LRA to be completed as rapidly as possible following the May 1978 FYDP update

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[1] O. J. Harrison et al., Logistic Resource Data Base Structure, General Research Corporation, OAD-CR-177, January 1977.

[2] J. L. Buffay et al., An Initial Feasibility Demonstration of the Army's Logistic Resource Annex (LRA) to the Five Year Defense Program (FYDP), General Research Corporation, CR-105, January 1978.

and to create and install on an Army computer the programs required to generate automated output for subsequent editions of the LRA.

OBJECTIVE

The LRA is intended to provide Army and OSD planners and program analysts with a capability to determine, and to display in a meaningful manner, resources related to the accomplishment of logistic functions. Logistic resources so displayed will support preparation and defense of programs and budgets of the logistics community, and will meet the requirement of OSD for an Army LRA. Automation of the LRA provides an effective and efficient method for collecting, updating, and managing the large volume of data required to produce in a timely manner an LRA after each of the annual FYDP updates in January, May, and October.

APPROACH

The effort reported in this document required the accomplishment of three major tasks:

- Manual preparation of an LRA based on the Army's FY80-84 Program Objective Memorandum (POM) to meet OSD's requirement that the Army submit an LRA to accompany the May 1978 update of the FYDP.
- Design, development, and implementation of a computerized system for the automatic generation of LRAs for subsequent periodic updates of the FYDP.
- Refinement and modification of the automated LRA system, primarily by addressing the development of a methodology for attributing, by category of equipment, logistic resources related to maintenance performed at the installation level and at the below-installation level.

CONTENT OF THE REPORT

Following this introduction, Section 2 discusses the work accomplished in the preparation of the manual POM FY80-84 LRA. Section 3

describes in general terms the computer system developed for the automatic generation, as required, of subsequent LRAs, and Section 4 reports the results of an analysis of field data undertaken to determine the utility of these and similar data for use in supporting various LRA requirements.

GRC has prepared the following additional documents under this contract, supplementing the material reported herein, all dated January 1979.

643-02-79-CR	Function Requirements for the LRA
643-03-79-CR	Data Requirements for the LRA
643-04-79-CR	Design Concepts for the LRA

SECTION 2

THE MANUAL LOGISTIC RESOURCE ANNEX (LRA)

INTRODUCTION

In 1977, GRC analyzed data used to update the Army portion of the FYDP and demonstrated that dollar resources in the FYDP could be divided into those funding specified logistic functions and those funding non-logistic functions.[1] In that study total obligational authority (TOA) dollars were entered into cells of a matrix that had logistic functions as the row dimension and mission categories of the Army as the columnar dimension. The study demonstrated the feasibility of constructing a Logistic Resource Annex to the FYDP that would display in a useful way the allocation to specified logistic functions of resources contained in periodic updates of the FYDP.

The Budget-Constrained Approach

A "budget-constrained" approach was used to compute the allocation of logistic resources and derive control totals in the LRA. This methodology involves identification and/or computation of logistic resources contained in the FYDP and "spreading" these resources to the appropriate logistic function identified in the LRA structure. The LRA is budget constrained in that the sum of logistic and nonlogistic resources must equal the total of all Army appropriations for the fiscal year being addressed. FYDP resources not allocated to LRA functions are summed under a nonlogistic category that, together with the logistic-related resources, comprise the total Army budget for that fiscal year.

The Program Element - Logistic Function Relationship

Figure 2.1 is a matrix illustrating, schematically, the relationship between TOA dollars contained in program elements (PEs) of the FYDP and the related major logistic function(s). The matrix was

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[1] Buffay, op. cit.

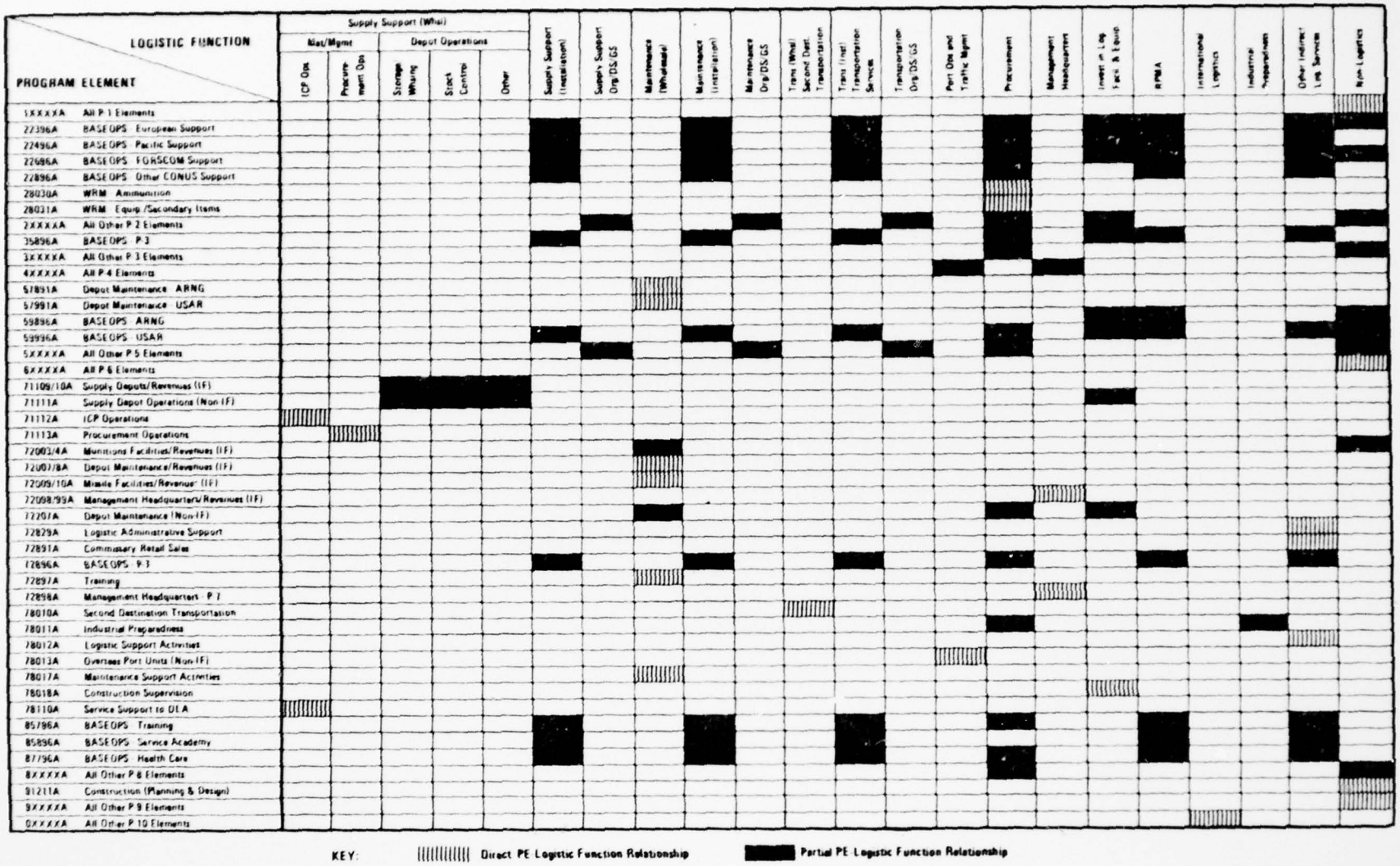


Figure 2.1. Illustrative FYDP Logistic Function Matrix

constructed through analysis of PE content as described in the FYDP handbook,[1] interviews with knowledgeable Department of Army personnel, and the exercise of professional judgment by the study team. The initial determination of the relationship was made without regard to the amount of FYDP resources that might be devoted to related functions, except that, for some PEs, it was immediately apparent that total resources could be related to a single function. These cells are indicated in Figure 2.1 by vertical lines. The shaded cells indicate those situations in which PE resources are related to more than one function and, in some cases, to nonlogistic functions.

The matrix illustrates that a majority of the PEs contain resources related to more than one function, and that almost all logistic functions are funded by resources imbedded in more than one program element. The portion of multifunctional PE resources attributable to particular functions can be determined only by an analysis of data supplementing the FYDP, as described subsequently in the subsection titled "Data Sources."

As a result of this earlier work, GRC was tasked to produce, manually, an LRA based on the POM FY80-84 update of the FYDP, consisting of the budget year (FY79) and the five program years (FY80-84). Following is a discussion of the structure of the LRA and of the data sources and methodology employed to complete the LRA matrices.

STRUCTURE OF THE LRA

The structure for the POM FY80-84 LRA was developed in consultation with representatives of ODCSLOG and Office, Assistant Secretary of Defense, Manpower, Reserve Affairs and Logistics OASD (MRA&L), so that both the interests of ODCSLOG and the requirements of OASD (MRA&L) could be mutually satisfied. The principal change from earlier LRA prototypes was that the resources allocated to logistic functions be displayed by appropriations, which became the columnar headings of the matrix. Several,

[1] Department of Defense, FYDP Program Structure, Codes and Definitions, DoD 7045.7-H, May 1977.

but comparatively minor, changes in the logistic functions, the row identifiers, were made specifically to satisfy the requirements of OASD (MRA&L).

LRA Columns

Table 2.1 lists the appropriations (column headings) used to develop the LRA; the organization of the columns of the LRA display is discussed in the following paragraphs.

In accordance with study guidance, Reserve and National Guard logistic resources are consolidated, requiring only a single column each for the Operations and Maintenance, Military Personnel, and Military Construction appropriations of these two Defense components.

Industrial Fund resources are provided separate columns for expense, revenue, and--of interest only in FY79--operating gain or loss data. Because the sums of the row entries in these columns net to zero, inclusion of the entries in the matrix does not inflate total Army TOA, yet industrially funded activities are made visible.

Only one column is provided for data from the three family housing appropriations. Resources from the "Family Housing-Defense" (Investment), "Family Housing-Defense" (Operations), and "Family Housing-Defense-Debt Service" appropriations are reported in the applicable rows of the "Family Housing-Defense" column.

All resources in certain appropriations are treated in the LRA as nonlogistic related by agreement with the sponsor. Accordingly, space is provided in the last two rows of the "Nonlogistic (Residuals)" column for the sum of TOA dollars from the "Research, Development, Test and Evaluation (RDT&E)," "Homeowners Assistance Fund-Defense," and "National Board for the Promotion of Rifle Practice" appropriations.

Table 2.1

APPROPRIATIONS DISPLAYED IN THE LRA
(Columnar Headings and Subheadings)

Operations and Maintenance
- Army
- Reserves and National Guard

Military Personnel
- Army
- Reserves and National Guard

Procurement
- Aircraft
- Missile
- Weapons and Tracked Combat Vehicles
- Ammunition
- Other

Military Construction
- Army
- Reserves and National Guard

Industrial Fund
- AIF (Expenses)
- Revenues
- Operating Gain or Loss

Stock Fund

Family Housing Defense

Nonlogistic (Residuals)

Total

LRA Rows

Logistic functions and subfunctions to be displayed in the LRA were selected by the study team in collaboration with representatives of ODCSLOG and OASD (MRA&L). These functions define most of the rows in the LRA; additional rows provide for the display of summary data.

The logistic function rows are arranged in a hierarchical structure so that data entered at the lowest level of aggregation can be summed successively to each next higher level.

The Base Operations (BASEOPS) function consists of a variety of logistic functions separately identified throughout the LRA rows, e.g., in supply, maintenance, and transportation operations at installation level. To provide visibility for this important function, a separate row, labeled "Total of All BASEOPS (Non-add)" is provided on the final page of the LRA.

Three special rows on the final page of the matrix complete the LRA structure. The "Total Logistic Resources" row provides for the entry of the sum of the four major logistic function aggregations of the LRA; the "Total Nonlogistic (Residual) Resources" row identifies the remaining TOA dollars; and the final row identifies total TOA dollars, entries into the appropriate columns of which will correspond to the appropriation totals of the FYDP. The LRA row identifiers are listed in Table 2.2.

DATA SOURCES

The following paragraphs discuss supplemental data sources that, together with the FYDP, were used to arrive at the data entries for certain LRA logistic functions and describe the manner in which the supplementary data were used.

TABLE 2.2

LOGISTIC FUNCTIONS DISPLAYED IN THE LRA
(Row Designators)

I. LOGISTIC SUPPORT OF PEACETIME MATERIAL READINESS
  A. Maintenance, Modification, and Technical Support of Equipment
    1. Depot-Level Maintenance and Modification Alteration Installation
      (The following sub-headings of 1. are repeated for Organic, Inter-Service, and Contract maintenance.)
      a. Aircraft
        (1) Basic Aircraft Reworks
        (2) Engine Overhaul
        (3) Component Repair
        (4) Modification Installation
        (5) Other Aircraft Maintenance
      b. Missiles
        (1) Equipment Overhaul/Repair
        (2) Component Repair
        (3) Modfication Installation
      c. Combat Vehicles
        (1) Equipment Overhaul/Repair
        (2) Component Repair
        (3) Modification Installation
      d. Weapons Armament
      e. Communications-Electronics
      f. Other Equipment
    2. Sustaining Engineering & Technical Support
      a. Aircraft
      b. Missiles
      c. Combat Vehicles
      d. Weapons Armament
      e. Communications-Electronics
      f. Other Equipment
    3. Installation Level Maintenance (TDA Organizations)
      a. Aircraft
      b. Missiles
      c. Combat Vehicles
      d. Weapons Armament
      e. Communications-Electronics
      f. Other Equipment
    4. Below-Installation Level Maintenance (TOE Organizations)
      a. Organizational
      b. Direct Support
      c. General Support
    5. Initial Spares and Repair Parts
    6. Replenishment Spares and Repair Parts

(Continued)

TABLE 2.2 (Cont.)

LOGISTIC FUNCTIONS DISPLAYED IN THE LRA
(Row Designators)

7. Modification Kits and Alteration Materiel
(Headings 5, 6, and 7 have the following subheads)
a. Aircraft
(1) Reliability/Maintainability (Heading 7, only)
b. Missiles
c. Tracked Combat Vehicles
d. Weapons and Other Combat Vehicles
e. Ammunition
f. Communications-Electronics
g. Other Equipment

B. Supply System Operations
1. Depot Level Storage and Distribution Activities
2. Inventory Management Activities
3. Procurement Operations
4. Contract Administration Services
5. Supply Operations - Installation Level
6. Supply Operations - Below Installation Level
a. Organizational
b. Direct Support
c. General Support

C. Transportation
1. Second Destination Transportation
a. Surface (Land and Sea)
b. Air
c. Other Transportation Activities
2. Traffic Management and Terminals (MTMC)
3. Transportation Services - Installation Level
4. Transportation Services - Below Installation Level
a. Organizational
b. Direct Support
c. General Support

D. Logistic Support of Force Operations and Training
1. Aircraft and Vehicle Fuel
2. Personnel Support Materiel
a. Subsistence
b. Clothing and Medical Supplies
3. Other Consumable Supplies and Materiels
4. Munitions - Peacetime Operations and Training (Procurement)
a. Ammunition
b. Tactical Missiles
c. Other munitions

(Continued)

TABLE 2.2 (Cont.)

LOGISTIC FUNCTIONS DISPLAYED IN THE LRA
(Row Designators)

II. LOGISTIC SUPPORT OF POST-D-DAY COMBAT SUSTAINABILITY
- A. War Reserve Stockage
  - 1. Munitions (Procurement)
    - a. Ammunition
    - b. Tactical Missiles
      - (1) Surface-Surface
      - (2) Surface-Air
      - (3) Air-Surface
  - 2. Aircraft War Reserve Spares and Repair Parts (Procurement)
  - 3. All Other War Reserve Spares and Repair Parts (Procurement)
  - 4. Stock Fund Materiel
    - a. Repair Parts
    - b. Clothing (Chemical/Protective)
    - c. Other Supplies (Medical/Dental)
- B. Industrial Preparedness
  - 1. Ammunition Production Base Investment (Procurement)
  - 2. Other Industrial Facilities Investment (Procurement)
  - 3. Manufacturing Technology (Procurement)
  - 4. Industrial Preparedness Operations (OMA)
    - a. Layaway/Maintenance of Reserve Plants
    - b. Layaway/Maintenance of Reserve IPE
    - c. Industrial Preparedness Planning
    - d. IPE Management and Control
    - e. Manufacturing Technology

III. LOGISTICS MANAGEMENT AND SUPPORT ACTIVITIES
- A. Logistics Management Headquarters
- B. Logistic Support Equipment (Procurement)
  - 1. Aircraft Ground Support Equipment
  - 2. Maintenance-Related Equipment
  - 3. Storage and Materiels Handling Equipment
  - 4. Construction Equipment
  - 5. Commercial Vehicles
  - 6. Logistic ADP Equipment
  - 7. Productivity Enhancing Equipment
- C. Other Logistic Support
  - 1. Property Disposal
  - 2. Other Logistic Activities

IV. INSTALLATION AND FACILITIES SUPPORT
- A. Facilities and Construction (Less Housing)
  - 1. Logistic Facilities Construction
    - a. Supply and Storage Facilities
      - (1) Ammunitdion
      - (2) POL
      - (3) POMCUS
      - (4) Other
    - b. Maintenance Facilities

(Continued)

TABLE 2.2 (Cont.)

LOGISTIC FUNCTIONS DISPLAYED IN THE LRA
(Row Designators)

2. Other Facilities Construction
    a. Support Facilities
        (1) Administrative Facilities
        (2) Community Facilities
        (3) Medical Facilities
        (4) R&D Facilities
        (5) Operations & Training Facilities
        (6) Telecommunications Facilities
        (7) NATO Infrastructure
    b. Environmental/Conservation/Security Facilities
        (1) Air Pollution Control
        (2) Water Pollution Control
        (3) Energy Conservation Investment
        (4) Nuclear Security
    c. Miscellaneous Facilities Construction Support
        (1) Utilities, Real Estate Acquisition, etc.
        (2) Minor Construction
        (3) Planning and Design
        (4) Contingency
    d. Reserve and National Guard Facilities (Total of MCAR and MCARNG Appropriations)

B. Housing
    1. Family Housing
        a. Construction
        b. Leasing
        c. Operations
        d. Maintenance
        e. Debt Service
        f. Improvement
    2. Troop Housing Construction

C. Real Property Maintenance Activities
    1. Maintenance and Repair of Real Property
    2. Utilities Operation
    3. Minor Construction
    4. Other Engineering Support

D. Base Operations - Other Services and Support
    1. Base Command, Administration and ADP Support
    2. Personnel Support and Other Base Services

TOTAL OF ALL BASEOPS (Non-add)

TOTAL LOGISTIC RESOURCES

TOTAL NONLOGISTIC (Residual) RESOURCES

GRAND TOTAL - LOGISTIC RESOURCE ANNEX

Depot Maintenance

The Operations and Maintenance, Army (OMA) appropriation dollars funding depot maintenance resources are accounted for in a set of 72XXXA PEs in the FYDP. However, neither the definitions of these PEs nor the description of the subaccounts of the corresponding Army Management Structure Code (AMSCO) accounts provides sufficiently detailed information to permit these resources to be allocated to the Depot Maintenance logistic functions of the LRA.[1] In principle, data for the FYDP PEs are derived from a set of OPS-25 series reports produced by the Depot Systems Command (DESCOM), and these reports display the division of OMA dollars by PE among depot maintenance activities that generally correspond to the depot maintenance logistic functions of the LRA. A set of OPS-25 reports related to the period of the POM FY80-84 update of the FYDP was obtained, but analysis of these reports revealed that PE OMA dollars in the reports disagreed slightly with the OMA dollars reported in the FYDP PEs. To assure correspondence between the LRA and the FYDP, the FYDP PE dollars were allocated to the LRA Depot Maintenance functions in proportion to the division of the PE dollars in the OPS-25 reports.

Procurement

The resources of the five procurement appropriations are also reported in a number of FYDP PEs and, again, the PE definitions do not permit identification of the resources to logistic functions of the LRA. However, the Office of the Deputy Chief of Staff, Research, Development and Acquisition (ODCSRDA) publishes a Procurement Annex for each update of the FYDP that displays the allocation of resources by procurement item and function. By selection of appropriate items from the Procurement Annex to the POM FY80-84 FYDP, data were aggregated for entry into corresponding cells of the LRA. In some cases, a direct correspondence exists between line items of the Procurement Annex and an LRA logistic

[1] There is a one-to-one correspondence between PEs containing OMA dollars and the Army Management Structure Codes (AMSCOS) of AR 37-100-XX used to identify accounts of the OMA appropriation. AMSCOS commonly have subaccount suffixes.

function; e.g., "Initial Spares and Repair Parts." In others, individual line items had to be selected from a larger grouping to aggregate those related to a specific logistic function or subfunction. For example, from those line items grouped as automatic data processing equipment (ADPE) systems, it was necessary to determine from their titles which line items should be included in the "Logistic ADP Equipment" function of the LRA.

Facilities Construction

Data obtained from the Office, Chief of Engineers (OCOE), were used to support the Facilities Construction category. The two data sources were the "Military Construction, Army (MCA) Program FY80-84" and the "Proposed FY79 MCA Appropriation Summary." Data from these sources were aggregated to derive the subfunctional display shown in the LRA. When summed, the total Facilities Construction resources displayed in the LRA agree with the total of the MCA appropriation. The total Reserves and National Guard Facilities Construction resources are the sum of appropriate Program 5, "Guard and Reserve Forces" PEs.

Base Operations (BASEOPS)

Identification of resources attributable to BASEOPS functions in the LRA was made from data produced by an automated system maintained by the Comptroller of the Army (COA) and by reference to relevant AMSCOs. The printout displays, by major Army Command, the distribution of OMA resources of the FYDP BASEOPS PEs to the lettered subaccounts of the BASEOPS AMSCOs. Based on the AMSCO definitions, the subaccounts were matched, either singly or in groups, to LRA BASEOPS functions. For example, the "C" subaccount, "Maintenance of Materiel," was matched to the LRA function, "Installation Level Maintenance"; and the "N" subaccount, "Administration," plus the "P" subaccount, "Data Processing Activities," were matched to the LRA function, "Base Command, Administration and ADP Support." For each BASEOPS function the sum of the major Army Command totals for the AMSCO subaccounts were entered in the appropriate cells of the LRA.

The sum of the MPA dollars in the FYDP BASEOPS PEs was distributed to the LRA functions in proportion to the distribution of the OMA dollars.

Below-Installation Level Maintenance, Supply Operations and Transportation

The methodology used to produce the below-installation level maintenance, i.e., organizational, direct support, and general support (Org/DS/GS), logistic resources was based on the GRC-developed factors and techniques described in the January 1978 final report.[1] These factors are used to derive labor costs for Supply Operations and Transportation and to derive labor and repair parts costs for maintenance. The procedures described pertain to the Active Army; however, the Reserve and National Guard data were computed in a like manner because similar distributions for their logistic functions and support echelons were assumed for factoring purposes.

Prior to assembly of the POM FY80-84 LRA, the GRC study team obtained a copy of the Force Accounting System (FAS) listing of "Organizational Units within PEs" dated 14 March 1978. This listing was reviewed to confirm the factors contained in the GRC report and to update, where necessary, the basic data used to derive the logistic personnel ratios. An analysis of the March 1978 FAS data indicated only a very slight revision to the factors was required, amounting in most cases to only a small fraction of one percent. Table 2.3 lists the revised personnel factors by echelon and function. These factors are applied to the Military Personnel

TABLE 2.3

PERCENT OF TOTAL MILITARY PERSONNEL ATTRIBUTED TO LOGISTIC FUNCTIONS BY SUPPORT LEVEL

	Logistic Function		
Support Level	Supply Operations	Maintenance	Transportation
Organizational	.0443	.1693	.0313
Direct Support	.0388	.0582	.0205
General Support	.0118	.0114	.0104

[1] Buffay, op. cit.

appropriation to derive a labor cost attributable to each of the indicated logistic functions. The labor cost methodology is described in the following paragraph.

Labor

The methodology used to drrive labor resources for the below-installation functions is relatively straightforward, given the personnel factors of Table 2.3. For Active Army forces (and the procedure is similar for Reserve forces), the total dollars in the appropriation for Military Personnel, Army (MPA) contained in Program 2, "General Purpose Forces," were adjusted by subtracting MPA dollars in Program 2 supporting the BASEOPS program. These dollars were subtracted to determine a "pure" Org/DS/GS base figure for Program 2 MPA dollars. The appropriate logistic personnel factors were then applied to the adjusted total and the results entered in the corresponding LRA cells.

Repair Parts

The technique used to attribute repair parts dollar resources to below-installation maintenance is also described in the January 1978 final report.[1]

A factored "parts cost" had to be computed because of the absence of actual data, or even of rough estimates, pertaining to repair parts usage at the Org/DS/GS echelons. Lacking any directly relatable parts cost data or estimates, the GRC study team computed the necessary factors based on average annual maintenance man-hours requirements found in AR 570-2.[2] The rationale for using man-hours as a basis for attribution was predicated on the assumption that repair parts are "consumed" in proportion to the number of man-hours expended at each support echelon. The validity of this assumption requires verification by analysis of empirical data. The results of a preliminary analysis of such data are presented in Section 4 of this report.

[1] Buffay, op. cit.

[2] Department of the Army, Organization and Equipment Authorization Table - Personnel, AR 570-2, January 1977, Chapter 7.

Repair parts used in support of Org/DS/GS maintenance are generally Stock-Funded items; i.e., low cost, non-depot-reparable parts. To derive an unbiased baseline figure for the computation of the Org/DS/GS repair parts "costs," it was necessary to subtract those Stock Fund dollars supporting Installation Maintenance; i.e., BASEOPS. The BASEOPS portion was determined to be .06 for the Active Army and .032 for the Reserves and National Guard. These factors were arrived at by consulting with BASEOPS analysts in ODCSLOG familiar with the BASEOPS "C" account, "Maintenance of Materiel."

Miscellaneous Other Functions

Data to support those LRA functions not discussed in the preceding subsections were extracted from AMSCOs and their related subaccounts. For example, the subfunctions "Surface (Land and Sea)," "Air," and "Other Transportation Activities" of the "Second Destination Transportation" function were taken from the subaccounts of the AMSCO corresponding to PE 78010A, "Second Destination Transportation." These miscellaneous data elements were obtained in hard copy form from the responsible offices of ODCSLOG.

Section 3 discusses the development of a computerized system to create subsequent versions of the LRA automatically.

SECTION 3

THE AUTOMATED LRA SYSTEM

INTRODUCTION

Because of the recurring requirement to produce the LRA concurrent with the FYDP updates, and the complex, time-consuming nature of the manual process, GRC was tasked to develop, design, and program an automated LRA system. The automated system is intended to provide a display similar to that developed for the POM FY80-84 LRA; i.e., logistic functions by appropriation, plus the added capability to present manpower resources related to certain functions.

The automated system uses the same basic "budget-constrained" approach and allocation methodology developed and demonstrated in the manually-constructed LRA described in the preceding section. Computer support for the automation effort was provided by the US Army Management Systems Support Agency (USAMSSA).

The discussion of the automated system in this report is intended to provide the reader with a general overview of the system. Technical details are contained in the documentation prepared for USAMSSA and included detailed system functional requirements, design concepts, data requirements and descriptions, and all system programs, complete with explanatory comments.

The automated LRA system as it presently exists is a first-generation model. Refinement, modification, and increased sophistication of the system is being accomplished as part of a follow-on effort.

SYSTEM DESCRIPTION

The automated LRA system was designed in a modular configuration with the programs written in ANSI COBOL. A modular approach was used because it provided better management control due to the smaller, discrete

entities involved, and permitted tailoring of the individual modules to meet specific needs. It will also make changes to the system much easier to accomplish.

LRA System Flow

The system involves three major processing phases, as depicted in the system flowchart presented in Figure 3.1. The initial step occurs in the FYDP Preprocessor where new and/or changed PEs are identified for determination of logistic-related resources. The PE master file is updated with these new data, and a FYDP extract is created for use in the LRA modules.

The second stage of system operation involves processing the data in the modules to identify resources by logistic function and to create the LRA Data Base. Logistic resource data are output from the processing modules and merged with the title file to form the LRA Data Base. To facilitate output processing by logistic function and subfunction, the file is structured in a hierarchical order through use of a Logistic Resource Element (LRE) code. Within each LRA function and subfunction; i.e., within each LRE, dollar and manpower resources are identified by appropriation Resource Identification Codes (RICs) consistent with the FYDP structure. The data base design permits display of all resources for each function and the aggregation of TOA and manpower resource totals.

The final processing step is the production of the LRA report. The system has an optional call-up capability that provides a display of selected LREs on a cathode ray tube (CRT).

The FYDP Preprocessor

The initial step in development of the LRA is identification of PEs containing logistic resources. Figure 3.2 portrays the programs and files constituting the FYDP Preprocessor that accomplishes this task.

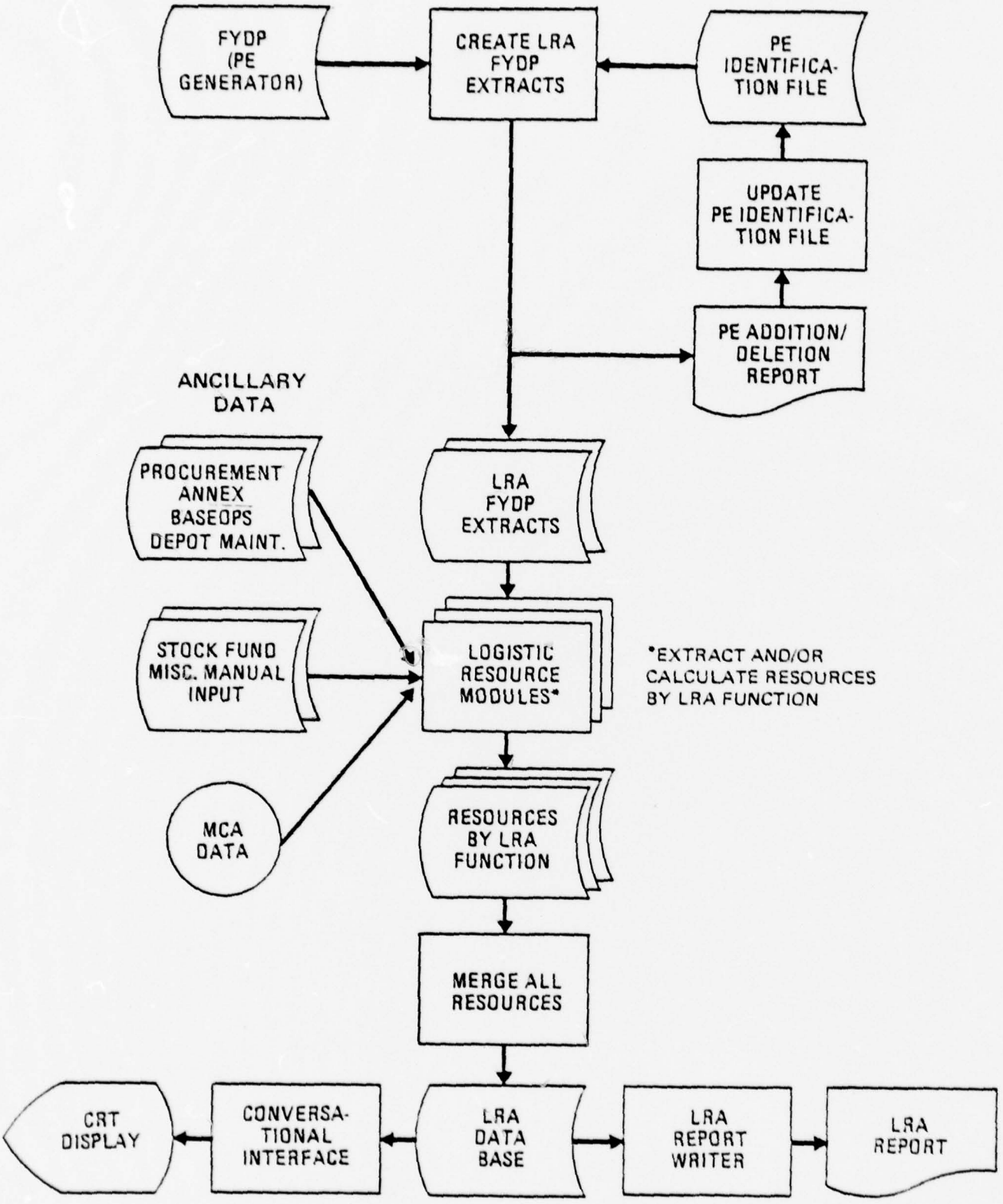


Figure 3.1. LRA System Flow

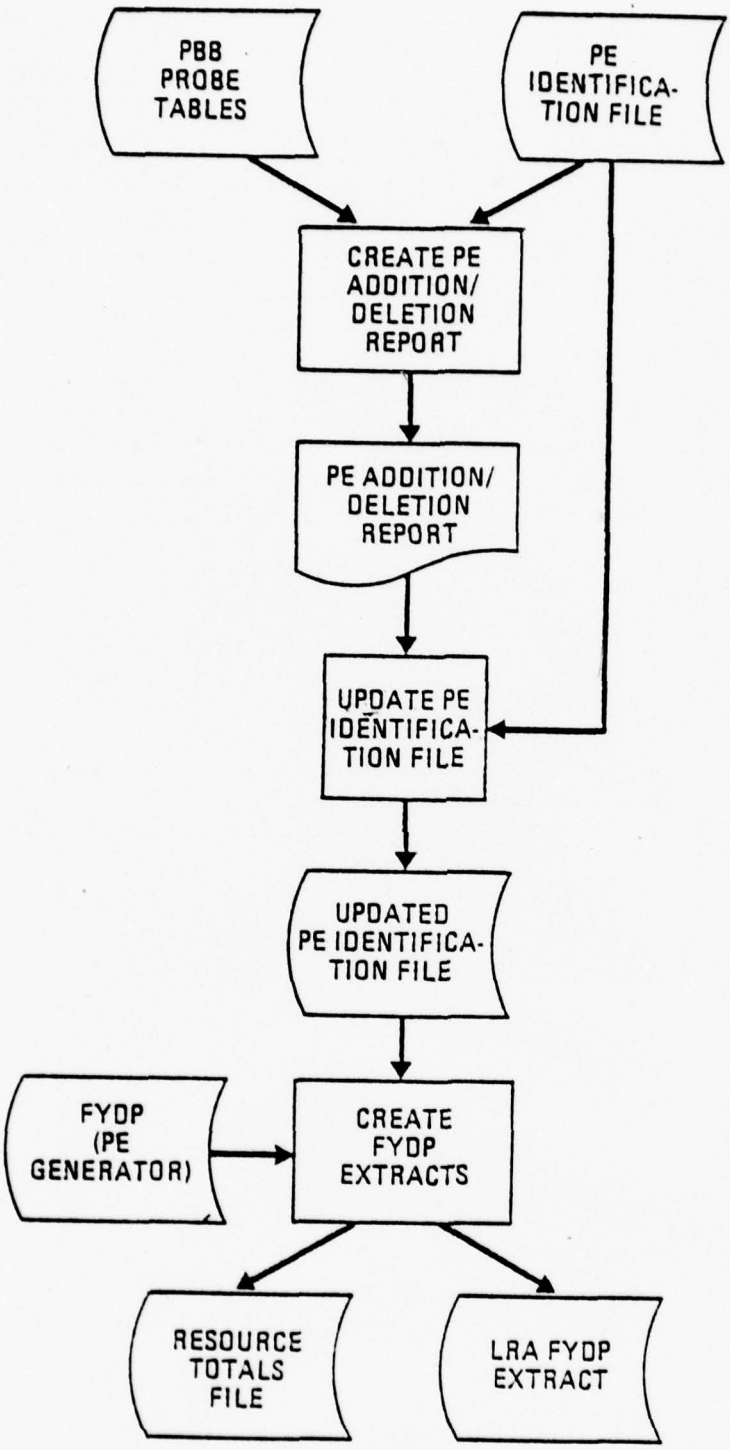


Figure 3.2. FYDP Preprocessor

The PE Identification file contains all of the PEs in the FYDP during the last system run and also identifies those PEs that contain logistic resources. This file is compared to the ancillary PROBE Data Base Tables (containing all current PEs) in order to list new and deleted PE changes created since the last LRA update.

Changes to the FYDP structure, documented in program change decisions (PCDs), are reviewed manually and the PCDs researched to determine whether: (1) new PEs entering the FYDP contain logistic-related resources, (2) deleted PEs contained logistic resources, and if so, have these resources been dropped from the file or transferred to another PE, and (3) the new/changed PEs are directly relatable to one or more logistic functions in the LRA. The PE Identification file is then manually updated with this information for processing of the FYDP.

The LRA FYDP Extract is created by matching the PEs in the updated PE Identification file to the PEs in the FYDP for selection of PEs containing logistic TOA dollars and manpower. During processing of the FYDP file, resource totals are also calculated and written on the Resource Totals file for control purposes during module operation and Final Report Generation.

The LRA Modules

There are six processing modules utilized to manipulate the data contained in the FYDP extract and supporting Army budget data. The processing flow of the LRA Modules is illustrated in Figure 3.3.

The modules operate on unique identification codes in each ancillary data source to allocate TOA dollars and end strengths. Output records produced by all of the modules are in the same format and contain: LRE, RIC, fiscal year, update cycle number, resources, and memo entry indicator for the budget year and five program years.

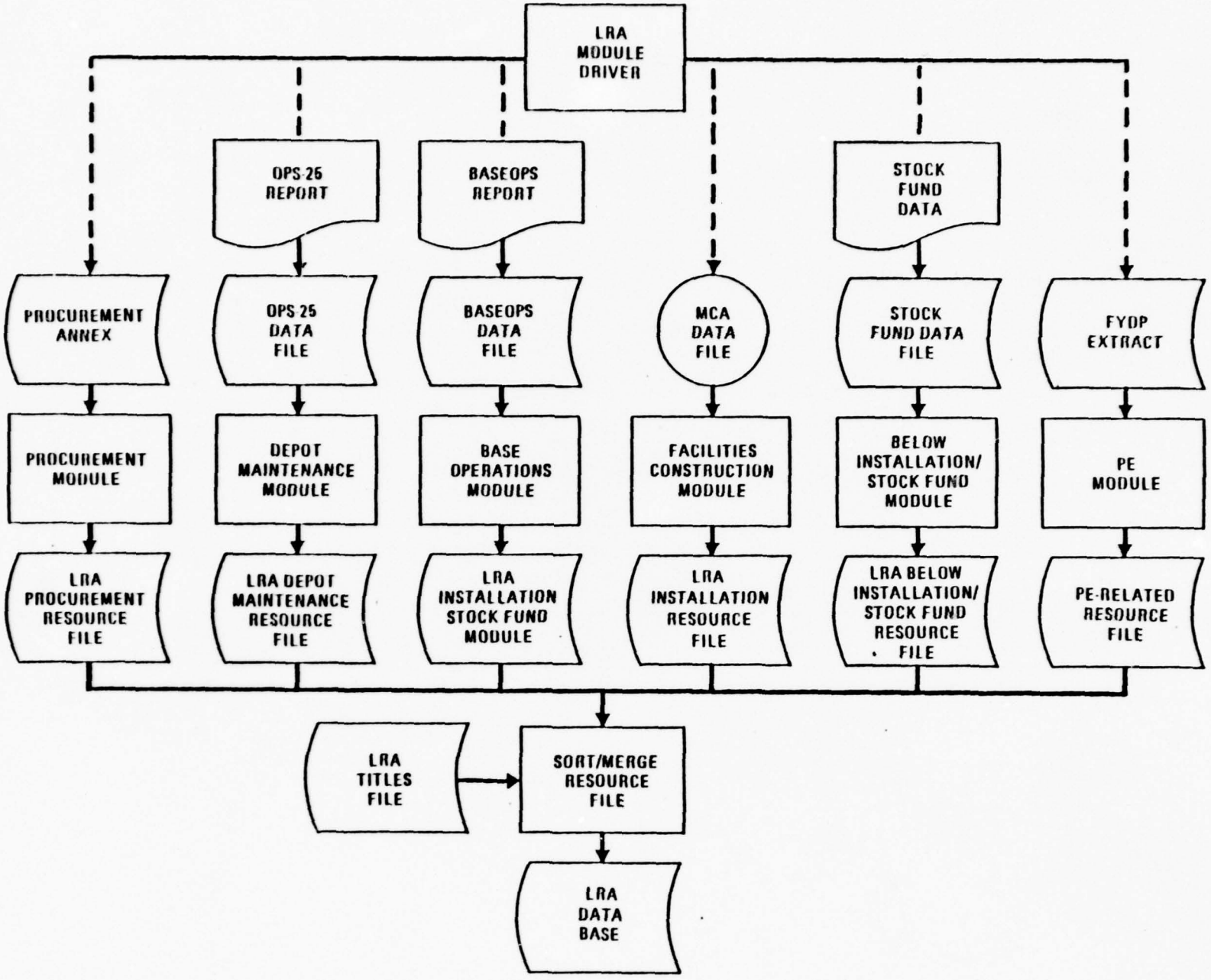


Figure 3.3. LRA Module Processing

The LRA Driver program controls all module processing with call statements issued to the modules in order of execution. Any of the modules may be "skipped" when data are incomplete or only partial output is desired. The module may be executed later and the Output Resource file merged with the data base for generation of the final report.

MODEL OUTPUT

The final report consists of a series of tables, one for each logistic function. The general form of these tables is illustrated in Figure 3.4. By specifying the LRE, which identifies a logistic function or subfunction, and the RIC, which identifies the appropriation or the type of manpower, the user of the model can call up on a CRT data corresponding to a line of the output tables.

Fiscal Year	79	80	81	82	83	84
REAL PROPERTY MAINTENANCE ACTIVITIES						
Maintenance and Repair of Real Property						
TOA (Dollars in Thousands):						
Operation and Maintenance (Army)	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
Operation and Maintenance (Reserve/Nat'l Guard)	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
Military Personnel (Army)	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
Total TOA	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx
Manpower (End Strength):						
Enlisted (Army)	xxx	xxx	xxx	xxx	xxx	xxx
Officer (Army)	xxx	xxx	xxx	xxx	xxx	xxx
Enlisted (Reserve/Nat'l Guard)	xxx	xxx	xxx	xxx	xxx	xxx
Officer (Reserve/Nat'l Guard)	xxx	xxx	xxx	xxx	xxx	xxx
Total Military	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
Civilian	xxx	xxx	xxx	xxx	xxx	xxx
Utilities Operation						
TOA (Dollars in Thousands)						
Operation and Maintenance (Army)	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
REAL PROPERTY MAINTENANCE ACTIVITIES (TOTAL)	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx

Figure 3.4. Sample LRA Report Format

SECTION 4

ANALYSIS OF EMPIRICAL MAINTENANCE DATA

INTRODUCTION

This section discusses the experimental data collection effort conducted at Fort Lewis, Washington, in the latter stages of the just-concluded project. The field visit was undertaken to explore the type and quality of empirical data available to support certain LRA installation and below-installation maintenance data requirements. The requirement to display logistic resources by equipment categories at these levels cannot currently be supported by data available at Headquarters, Department of the Army (HQDA). There is also a long-standing requirement by the Army and OSD to identify and display selected logistic support resources allocated to, consumed by, and/or projected for weapon systems. The purpose of the data collection effort was threefold:

- To determine the validity of the equipment category attribution methodology employed to allocate installation level maintenance resources to equipment categories in the LRA.
- To determine the feasibility of using field data to allocate logistic resources to equipment categories at the below-installation level.
- To determine the data requirements to permit attribution of logistic support resources to specific weapon systems.

DATA SOURCES

The LRA team requested permission to visit an installation supporting at least a division-size unit to acquire the necessary detailed empirical data to develop the analyses described in this section. U.S. Army Forces Command (FORSCOM) selected Fort Lewis, Washington, home station of the 9th Infantry Division, from among several posts proposed by the team and members of the project team

visited there during the week of 4 December 1978. At Fort Lewis data were collected at the Maintenance Division activity (installation level), the 709th Maintenance Battalion (DS), and the G-4 Office of the 9th Infantry Division. No TOE General Support Unit (GSU) data were available at Fort Lewis as the TDA Maintenance Division activity provides the necessary GS level support. A portable microfilmer was used to photograph the data documents which were later developed, enlarged, and printed to produce a facsimile hard copy.

INSTALLATION LEVEL MAINTENANCE

The installation level maintenance data consisted of reports produced by the Support Maintenance Management System (SMMS). SMMS provides, on a monthly basis, military and civilian labor and parts costs by weapon system code. Data were collected for the twelve month period, December 1977 through November 1978. There were 48 weapon system and commodity codes which were aggregated by the study team to conform to the six equipment categories displayed in the LRA, i.e., aircraft, missiles, combat vehicles, weapons/armament, communication-electronics, and other equipment.

Appendix A presents the SMMS labor and parts cost data arrayed by weapon system code, by month for the 12 month period collected. Appendix B consists of a series of tables relating labor and parts costs to the LRA equipment categories for the 12 month period.

Because of the lack of data at HQDA to support an LRA equipment category display at installation level, the GRC study team used an attribution technique based on data derived from a series of runs of the "Battalion Slice Model." A detailed discussion of the model and the methodology is contained in the GRC final report of January 1978.[1] A comparison of the distribution of logistic resources to equipment categories developed for the LRA through use of the model with the distribution

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[1] Buffay, op. cit.

derived by an analysis of the Fort Lewis data indicates a close correspondence of the maintenance costs (labor and parts) for the categories missiles and other equipment. This was not the case for the remaining categories. While the size of the sample neither proves nor disproves the results of the model, it is evident that SMMS data are useful and applicable and that a more extensive data collection is warranted, and that an attribution methodology supported by the SMMS data is feasible.

BELOW-INSTALLATION LEVEL MAINTENANCE

Currently, the LRA does not display logistic resources attributable to equipment categories at the below-installation level, i.e., Org/DS/GS. The O&M and military pay resources displayed in the LRA are produced using a factoring technique that provides a gross estimate of the maintenance function TOA attributable to these levels. A detailed description of the methodology employed is contained in the GRC final report of January 1978.[1] The data collected at Fort Lewis in the form of Maintenance Request Registers (DA Form 2405) and output from the Commitment and Account Management of Unit Supplies (CAMUS) reporting system were analyzed to determine the feasibility of using these sources to validate the relative distribution of resources among the Org/DS/GS levels and to develop an equipment category attribution methodology for these levels. The Maintenance Request Registers consisted of one year's worth of data from each company of the 709th Maintenance Battalion (DS). The CAMUS data were provided by the G-4 Office of the 9th Infantry Division.

Maintenance Request Register Data

Significant data extracted from the Maintenance Request Registers included quantity and identification of the items repaired and direct-labor manhours expended on each job. The data were arrayed to conform to the LRA equipment categories. Table 4.1 presents the results of an analysis of estimated cost of military direct-labor, by equipment

[1] Buffay, op. cit.

TABLE 4.1

ESTIMATED MILITARY DIRECT-LABOR COST, DIRECT SUPPORT MAINTENANCE BY EQUIPMENT CATEGORY*

Period	Equipment Category					
	Aircraft	Missiles	Combat Vehicles	Weapons/ Armament	Commo-Electronics	Other
	Dollars					
July, 1978[a]	11,755	5,253	804	4,240	4,244	10,428
August, 1978[a]	8,988	6,648	1,463	4,426	3,140	15,136
September, 1978[a]	10,474	11,401	1,345	3,921	3,076	13,378
Annual[δ]	124,869	93,208	14,448	50,348	45,440	155,768

*Based on an analysis of manhours recorded in the Maintenance Request Registers (DA Form 2405) of the individual companies of the 709th Maintenance Battalion (DS).

[a]Estimate derived by multiplying recorded manhours by an average pay factor of $4.344 per manhour.

[δ]Estimate based on an extrapolation of July-September data.

category, as computed using the Maintenance Request Registers. The labor costs were estimated by applying the average enlisted hourly rate (pay and allowances) to the recorded direct-labor manhours. The average military pay grade was developed from analysis of a representation maintenance battalion table of organization and equipment (TOE). The TOE data were reviewed and only maintenance military occupational specialty (MOS) spaces for direct-labor mechanics, technicians, etc., and first-line supervisors were included in the calculation. The average grade was computed to be between E-4 and E-5. The average hourly pay and allowances per military space for these grades was computed from information contained in a TRADOC letter, subject: "Command Analysis of OMA Funding," dated 15 December 1977. These costs were weighted proportionately to the relative number of E-4s and E-5s in the sample maintenance battalion TOE. The data displayed in Table 4.1 are presented primarily as a demonstration of the kind of information that can be obtained from field maintenance sources; they indicate that empirical data could be used to support, as a minimum, the DS labor-related portion of the equipment category attribution algorithm.

The data available from the Maintenance Request Registers does not appear sufficient to develop weapon system related costs. These data may be useful, however, when used in conjunction with other data sources, e.g., job orders and supply data such as the Division Logistics System (DLOGS).

CAMUS Data

Among the CAMUS output was a report entitled "Fund Accounting Summary" which displays by individual battalion accounts the FY78 funds committed to date (as of 31 August 1978) for Class IX materiel and for other supplies.[1] Table 4.2 was prepared to show the commitment

[1] The study team was informed by Fort Lewis personnel that on 1 January 1979 CAMUS was to become a standard Army system under the new designation "Tactical Unit Financial Management Information System" (TUFMIS).

TABLE 4.2

ILLUSTRATIVE COST OF CLASS IX SUPPLIES (REPAIR PARTS)
DIRECT SUPPORT LEVEL*

Accounting Entity	Cost, $000
709th Maintenance Bn. (Less A Co.)	596.9
A Co., 709th Maintenance Bn.	167.0
ASL replenishment	447.4
Quick-service supply	291.4
Direct-exchange, aircraft	90.1
Direct-exchange, common	80.5
Direct-exchange, missile	10.5
Total	1,683.8

*Abstracted from 9th Infantry Division Commitment and Account Management of Unit Supplies (CAMUS) report, "Fund Accounting Summary," for FY78 as of 31 August 1978.

of dollars for Class IX items attributable to the direct support level. Separate accounts are maintained for individual accounting entities within the battalion such as ASL replenishment, quick-service supply, and various commodity direct-exchange operations. Although these data are not definitive enough to permit development of an equipment category distribution, they could be used in summary form to develop the repair parts portion of the overall direct support maintenance algorithm.

Data consisting of the total commitment of funds by individual battalions and accounting entities for repair parts extracted from the cited CAMUS report are depicted in Table 4.3. The primary value of these data, insofar as LRA requirements are concerned, is the ability to use them in the computation of relative differences among the Org/DS/GS levels. These data are not adequate for the development of equipment category distributions nor weapon system related costs.

SUMMARY

Because of the limited time and resources available for data collection, reduction, and analysis of the Fort Lewis data the study team concentrated on those data sources that were either already partially aggregated or could be readily summarized for rapid analysis. For example, it was not feasible to attempt to work with individual job orders (Maintenance Request DA 2407) or detailed repair parts supply data. Historically, maintenance data available at the below-installation level has been extremely difficult to aggregate into the level of detail required as described in this section.

Based on past experience gained from numerous studies involving supply and maintenance data, the study team is satisfied that use of detailed records available at the below-installation level will, with the proper manipulation, provide the basis for development of an equipment category and weapon system attribution methodology.

TABLE 4.3

ILLUSTRATIVE COST OF CLASS IX SUPPLIES (REPAIR PARTS) ORGANIZATIONAL LEVEL*

Organizational Unit Type	No. Units	Cost, $000
Armored Units	2	1,251.7
Infantry Units	8	761.1
Artillery Units	7	695.6
Engineer Battalion	1	225.9
Aviation Battalion	1	176.8
Signal Battalion	1	132.0
Administrative & Other	14	307.9
Total		3,441.0

*Abstracted from 9th Infantry Division Commitment and Account Management of Unit Supplies (CAMUS) report, "Fund Accounting Summary," for FY78 as of 31 August 1978.

The analysis of the data collected at Fort Lewis served to confirm that the level of detail provided by SMMS is adequate to support LRA requirements for development of equipment category and weapon system logistic resource distributions for the installation level. The validity of the LRA installation level equipment category attribution technique can neither be confirmed nor refuted based on the limited data sample available at this time.

The data collection exercise does indicate the necessity to use more detailed data sources such as individual maintenance job orders and supply records to develop the data base needed to provide below-installation equipment category and weapon system related cost attribution factors.

APPENDIX A

INSTALLATION LEVEL MAINTENANCE COSTS

This appendix consists of 12 tables displaying installation level parts and labor costs by weapon system code, by month, for one year beginning December 1977. These data were extracted from Support Maintenance Management System (SMMS) reports microfilmed by the study team at the Fort Lewis Maintenance Division activity (installation level).

TABLE A.1

FORT LEWIS MAINTENANCE DIVISION PARTS AND LABOR COSTS, DECEMBER 1977

Equipment & Materiel Category		Costs, dollars		
Code	Title	Parts	Labor	Total
	Aircraft			
8A	Aircraft, fixed wing	5,407	18,134	23,541
1A	TH-1G	-	-	-
4A	UH-1	2,536	17,283	19,819
5A	AH-1G	10,645	24,631	35,276
6A	OH-58	875	1,646	2,521
9A	CH-47	760	4,848	5,608
2A	All other aircraft equipment	-	36	36
3A	Tools and test equipment	10	1,025	1,035
	Total	(20,233)	(67,603)	(87,836)
	Automotive			
2B	Commercial Vehicles	335	1,605	1,940
5B	Trucks under 1 ton	1,605	8,066	9,671
6B	Trucks 1-1/4 ton	10,494	9,365	19,859
7B	Trucks 2-1/2 ton	7,118	23,205	30,323
8B	Trucks 4 ton and over	25,187	26,073	51,260
9B	Trailers and semitrailers	267	5,584	5,851
4B	Tools and test equipment	-	52	52
	Total	(45,006)	(73,950)	(118,956)
	Combat Vehicles			
4C	Tools and test equipment	-	-	-
5C	Recovery vehicle	197	9,558	9,755
7C	Carriers	2,874	7,259	10,133
8C	Self-propelled artillery	212	6,425	6,637
9C	Tank, combat, full track	4,856	9,084	13,940
	Total	(8,139)	(32,326)	(40,465)
	Construction Equipment			
1D	Construction equipment	1,507	12,763	14,270
	Total	(1,507)	(12,763)	(14,270)
	Communications & Electronics Equipment			
1E	Wire communication & teletype	2,208	7,946	10,154
2E	Radar, radio, TV & SV	5,559	21,226	26,785
3E	All other elec-commo equipment	420	2,925	3,345
4E	Tool and test equipment	178	2,417	2,595
9E	TOE unit day rooms	-	375	375
	Total	(8,365)	(34,889)	(43,254)

TABLE A.1 (cont.)

FORT LEWIS MAINTENANCE DIVISION PARTS AND LABOR COSTS, DECEMBER 1977

Equipment & Materiel Category		Costs, dollars		
Code	Title	Parts	Labor	Total
	Missile Systems			
4F	REDEYE	-	-	-
5F	CHAPARRAL	961	3,262	4,223
7F	Tools and test equipment	-	-	-
	Total	(961)	(3,262)	(4,223)
	Armament			
1I	Small arms	3,879	8,033	11,912
2I	Artillery	1,673	10,411	12,084
4I	Gun mounts	-	-	-
5I	Fire control	1,517	2,660	4,177
6I	Tools and test equipment	-	-	-
7I	Chemical weapons	-	1,202	1,202
	Total	(7,069)	(22,306)	(29,375)
	General Equipment			
1K	Materiel handling equipment	1,326	12,314	13,640
2K	Electric power generating equipment	3,681	10,029	13,710
5K	Chemical protective equipment	33	111	144
9K	All other general equipment	-	1,202	1,202
	Total	(5,040)	(22,459)	(27,499)
	Commodity Groups			
1L	Shop tools and test equipment	88	4,389	4,477
2L	Calibration, other than missiles	-	7,355	7,355
3L	Day room furniture	-	4,047	4,047
4L	Air-delivery equipment	-	56,730	56,730
5L	All other equipment	1,437	12,559	13,996
6L	Marine equipment	-	-	-
8L	Metal and wood furniture	38	2,978	3,016
9L	Office machines	295	4,176	4,471
7L		-	1,560	1,560
	Total	(1,858)	(93,794)	(95,652)
	GRAND TOTAL	98,178	363,352	461,530

TABLE A.2

FORT LEWIS MAINTENANCE DIVISION PARTS AND LABOR COSTS, JANUARY 1978

Equipment & Materiel Category		Costs, dollars		
Code	Title	Parts	Labor	Total
	Aircraft			
8A	Aircraft, fixed wing	2	770	772
1A	TH-1G	-	-	-
4A	UH-1	4,414	12,075	16,489
5A	AH-1G	6,230	22,289	28,519
6A	OH-58	8,084	8,459	16,543
9A	CH-47	3,095	8,508	11,603
2A	All other aircraft equipment	-	39	39
3A	Tools and test equipment	70	1,386	1,456
	Total	(21,895)	(53,526)	(75,421)
	Automotive			
2B	Commercial Vehicles	144	2,941	3,085
5B	Trucks under 1 ton	3,267	11,644	14,911
6B	Trucks 1-1/4 ton	2,589	17,219	19,808
7B	Trucks 2-1/2 ton	12,235	26,462	38,697
8B	Trucks 4 ton and over	24,007	25,336	49,343
9B	Trailers and semitrailers	717	4,377	5,094
4B	Tools and test equipment	3	318	321
	Total	(42,962)	(88,297)	(131,259)
	Combat Vehicles			
4C	Tools and test equipment	-	-	-
5C	Recovery vehicle	3,055	6,222	9,277
7C	Carriers	4,608	7,965	12,573
8C	Self-propelled artillery	296	9,518	9,814
9C	Tank, combat, full track	2,716	11,891	14,607
	Total	(10,675)	(35,596)	(46,271)
	Construction Equipment			
1D	Construction equipment	1,556	6,780	8,336
	Total	(1,556)	(6,780)	(8,336)
	Communications & Electronics Equipment			
1E	Wire communication & teletype	1,703	8,532	10,235
2E	Radar, radio, TV & SV	3,765	19,488	23,253
3E	All other elec-commo equipment	2,586	4,007	6,593
4E	Tool and test equipment	364	3,539	3,903
9E	TOE unit day rooms	-	1,102	1,102
	Total	(8,418)	(36,668)	(45,086)

TABLE A.2 (cont.)

FORT LEWIS MAINTENANCE DIVISION PARTS AND LABOR COSTS, JANUARY 1978

Equipment & Materiel Category		Costs, dollars		
Code	Title	Parts	Labor	Total
	Missile Systems			
4F	REDEYE	66	446	512
5F	CHAPARRAL	267	2,356	2,623
7F	Tools and test equipment	-	-	-
	Total	(333)	(2,802)	(3,135)
	Armament			
1I	Small arms	48,672	11,312	59,984
2I	Artillery	1,703	18,706	20,409
4I	Gun mounts	-	-	-
5I	Fire control	154	2,549	2,703
6I	Tools and test equipment	-	-	-
7I	Chemical weapons	-	776	776
	Total	(50,529)	(33,343)	(83,872)
	General Equipment			
1K	Materiel handling equipment	938	12,494	13,432
2K	Electric power generating equipment	4,280	15,618	19,898
5K	Chemical protective equipment	22	843	865
9K	All other general equipment	-	-	-
	Total	(5,240)	(28,955)	(34,195)
	Commodity Groups			
1L	Shop tools and test equipment	93	3,694	3,787
2L	Calibration, other than missiles	-	7,750	7,750
3L	Day room furniture	-	4,566	4,566
4L	Air-delivery equipment	1	16,382	16,383
5L	All other equipment	437	10,995	11,432
6L	Marine equipment	426	1,011	1,437
8L	Metal and wood furniture	12	4,510	4,522
9L	Office machines	152	3,512	3,664
7L		-	1,337	1,337
	Total	(1,121)	(53,757)	(54,878)
	GRAND TOTAL	142,729	339,724	482,453

TABLE A.3

FORT LEWIS MAINTENANCE DIVISION PARTS AND LABOR COSTS, FEBRUARY 1978

Equipment & Materiel Category		Costs, dollars		
Code	Title	Parts	Labor	Total
	Aircraft			
8A	Aircraft, fixed wing	5,520	17,360	22,880
1A	TH-1G	-	-	-
4A	UH-1	5,124	17,082	22,206
5A	AH-1G	1,643	11,153	12,796
6A	OH-58	632	3,667	4,299
9A	CH-47	1,512	6,878	8,390
2A	All other aircraft equipment	-	-	-
3A	Tools and test equipment	-	862	862
	Total	(14,431)	(57,002)	(71,433)
	Automotive			
2B	Commercial Vehicles	72	4,226	4,298
5B	Trucks under 1 ton	6,410	18,427	24,837
6B	Trucks 1-1/4 ton	3,664	15,267	18,931
7B	Trucks 2-1/2 ton	8,270	24,094	32,364
8B	Trucks 4 ton and over	12,375	17,071	29,446
9B	Trailers and semitrailers	255	5,659	5,914
4B	Tools and test equipment	-	80	80
	Total	(31,046)	(84,824)	(115,870)
	Combat Vehicles			
4C	Tools and test equipment	-	-	-
5C	Recovery vehicle	-	8	8
7C	Carriers	486	5,173	5,659
8C	Self-propelled artillery	3,770	22,803	26,573
9C	Tank, combat, full track	5,792	9,016	14,808
	Total	(10,048)	(37,000)	(47,048)
	Construction Equipment			
1D	Construction equipment	1,870	8,203	10,073
	Total	(1,870)	(8,203)	(10,073)
	Communications & Electronics Equipment			
1E	Wire communication & teletype	2,257	8,845	11,102
2E	Radar, radio, TV & SV	4,740	19,761	24,501
3E	All other elec-commo equipment	713	3,564	4,277
4E	Tool and test equipment	156	3,182	3,338
9E	TOE unit day rooms	-	1,029	1,029
	Total	(7,866)	(36,381)	(44,247)

TABLE A.3 (cont.)

FORT LEWIS MAINTENANCE DIVISION PARTS AND LABOR COSTS, FEBRUARY 1978

Equipment & Materiel Category		Costs, dollars		
Code	Title	Parts	Labor	Total
	Missile Systems			
4F	REDEYE	1,496	309	1,805
5F	CHAPARRAL	62	4,536	4,598
7F	Tools and test equipment	-	-	-
	Total	(1,558)	(4,845)	(6,403)
	Armament			
1I	Small arms	7,547	6,484	14,031
2I	Artillery	1,183	21,126	22,309
4I	Gun mounts	-	-	-
5I	Fire control	73	1,860	1,933
6I	Tools and test equipment	-	-	-
7I	Chemical weapons	-	1,757	1,757
	Total	(8,803)	(31,227)	(40,030)
	General Equipment			
1K	Materiel handling equipment	3,163	11,612	14,775
2K	Electric power generating equipment	3,936	14,143	18,079
5K	Chemical protective equipment	1,422	2,417	3,839
9K	All other general equipment	249	368	617
	Total	(8,770)	(28,540)	(37,310)
	Commodity Groups			
1L	Shop tools and test equipment	222	2,489	2,711
2L	Calibration, other than missiles	-	8,750	8,750
3L	Day room furniture	-	4,546	4,546
4L	Air-delivery equipment	-	31,468	31,468
5L	All other equipment	321	8,761	9,082
6L	Marine equipment	-	-	-
8L	Metal and wood furniture	220	5,164	5,384
9L	Office machines	230	4,668	4,898
7L		-	636	636
	Total	(993)	(66,482)	(67,475)
	GRAND TOTAL	85,385	354,504	439,889

TABLE A.4

FORT LEWIS MAINTENANCE DIVISION PARTS AND LABOR COSTS, MARCH 1978

Equipment & Materiel Category		Costs, dollars		
Code	Title	Parts	Labor	Total
	Aircraft			
8A	Aircraft, fixed wing	32	904	936
1A	TH-1G	-	-	-
4A	UH-1	3,732	20,518	24,250
5A	AH-1G	2,904	22,196	25,100
6A	OH-58	22,869	10,259	33,128
9A	CH-47	1,752	4,040	5,792
2A	All other aircraft equipment	-	-	-
3A	Tools and test equipment	16	438	454
	Total	(31,305)	(58,355)	(89,660)
	Automotive			
2B	Commercial Vehicles	778	5,308	6,086
5B	Trucks under 1 ton	3,476	14,055	17,531
6B	Trucks 1-1/4 ton	2,642	15,147	17,789
7B	Trucks 2-1/2 ton	8,029	33,472	41,501
8B	Trucks 4 ton and over	144,788	30,139	174,927
9B	Trailers and semitrailers	449	4,931	5,380
4B	Tools and test equipment	-	278	278
	Total	(160,162)	(103,330)	(263,492)
	Combat Vehicles			
4C	Tools and test equipment	-	-	-
5C	Recovery vehicle	1,327	1,572	2,899
7C	Carriers	4,131	19,933	24,064
8C	Self-propelled artillery	1,090	8,268	9,358
9C	Tank, combat, full track	18,517	49,273	67,790
	Total	(25,065)	(79,046)	(104,111)
	Construction Equipment			
1D	Construction equipment	2,003	14,760	16,763
	Total	(2,003)	(14,760)	(16,763)
	Communications & Electronics Equipment			
1E	Wire communication & teletype	9,076	9,971	19,047
2E	Radar, radio, TV & SV	15,306	21,043	36,349
3E	All other elec-commo equipment	303	3,402	3,705
4E	Tool and test equipment	80	1,571	1,651
9E	TOE unit day rooms	-	1,134	1,134
	Total	(24,765)	(37,121)	(61,886)

TABLE A.4 (cont.)

FORT LEWIS MAINTENANCE DIVISION PARTS AND LABOR COSTS, MARCH 1978

Equipment & Materiel Category		Costs, dollars		
Code	Title	Parts	Labor	Total
	Missile Systems			
4F	REDEYE	-	-	-
5F	CHAPARRAL	87	3,083	3,170
7F	Tools and test equipment	-	-	-
	Total	(87)	(3,083)	(3,170)
	Armament			
1I	Small arms	2,979	11,365	14,344
2I	Artillery	380	15,961	16,341
4I	Gun mounts	-	-	-
5I	Fire control	-	2,106	2,106
6I	Tools and test equipment	-	-	-
7I	Chemical weapons	-	579	579
	Total	(3,359)	(30,011)	(33,370)
	General Equipment			
1K	Materiel handling equipment	2,206	23,073	25,279
2K	Electric power generating equipment	2,203	11,830	14,033
5K	Chemical protective equipment	60	974	1,034
9K	All other general equipment	-	192	192
	Total	(4,469)	(36,069)	(40,538)
	Commodity Groups			
1L	Shop tools and test equipment	275	6,301	6,576
2L	Calibration, other than missiles	-	8,390	8,390
3L	Day room furniture	-	2,778	2,778
4L	Air-delivery equipment	-	34,346	34,346
5L	All other equipment	1,685	20,942	22,627
6L	Marine equipment	-	-	-
8L	Metal and wood furniture	34	2,114	2,148
9L	Office machines	90	3,585	3,675
7L		-	2,127	2,127
	Total	(2,084)	(80,583)	(82,667)
	GRAND TOTAL	253,299	442,358	695,657

TABLE A.5

FORT LEWIS MAINTENANCE DIVISION PARTS AND LABOR COSTS, APRIL 1978

Equipment & Materiel Category		Costs, dollars		
Code	Title	Parts	Labor	Total
	Aircraft			
8A	Aircraft, fixed wing	33,168	8,693	41,861
1A	TH-1G	-	-	-
4A	UH-1	5,894	26,738	32,632
5A	AH-1G	2,478	11,377	13,855
6A	OH-58	2,693	6,672	9,365
9A	CH-47	1,122	3,350	4,472
2A	All other aircraft equipment	-	-	-
3A	Tools and test equipment	9	390	399
	Total	(45,364)	(57,220)	(102,584)
	Automotive			
2B	Commercial Vehicles	165	3,141	3,306
5B	Trucks under 1 ton	2,258	11,967	14,225
6B	Trucks 1-1/4 ton	1,748	11,573	13,321
7B	Trucks 2-1/2 ton	16,635	30,521	47,156
8B	Trucks 4 ton and over	9,504	23,210	32,714
9B	Trailers and semitrailers	577	9,816	10,393
4B	Tools and test equipment	-	322	322
	Total	(30,887)	(90,550)	(121,437)
	Combat Vehicles			
4C	Tools and test equipment	-	-	-
5C	Recovery vehicle	1,041	9,739	10,780
7C	Carriers	2,858	11,238	14,096
8C	Self-propelled artillery	1,789	19,987	21,776
9C	Tank, combat, full track	26,207	21,292	47,499
	Total	(31,895)	(62,256)	(94,151)
	Construction Equipment			
1D	Construction equipment	1,065	12,457	13,522
	Total	(1,065)	(12,457)	(13,522)
	Communications & Electronics Equipment			
1E	Wire communication & teletype	6,230	6,828	13,058
2E	Radar, radio, TV & SV	6,875	17,190	24,065
3E	All other elec-commo equipment	447	3,802	4,249
4E	Tool and test equipment	73	2,000	2,073
9E	TOE unit day rooms	54	615	669
	Total	(13,679)	(30,435)	(44,114)

TABLE A.3 (cont.)

FORT LEWIS MAINTENANCE DIVISION PARTS AND LABOR COSTS, APRIL 1978

Equipment & Materiel Category		Costs, dollars		
Code	Title	Parts	Labor	Total
	Missile Systems			
4F	REDEYE	-	147	147
5F	CHAPARRAL	126	3,779	3,905
7F	Tools and test equipment	47	782	829
	Total	(173)	(4,708)	(4,881)
	Armament			
1I	Small arms	6,182	7,357	13,539
2I	Artillery	2,159	16,175	18,334
4I	Gun mounts	-	-	-
5I	Fire control	133	2,679	2,812
6I	Tools and test equipment	12	2,920	2,932
7I	Chemical weapons	-	3,507	3,507
	Total	(8,486)	(32,638)	(41,124)
	General Equipment			
1K	Materiel handling equipment	1,164	13,084	14,248
2K	Electric power generating equipment	3,579	16,765	20,344
5K	Chemical protective equipment	5	856	861
9K	All other general equipment	-	233	233
	Total	(4,748)	(30,938)	(35,686)
	Commodity Groups			
1L	Shop tools and test equipment	362	3,978	4,340
2L	Calibration, other than missiles	-	12,671	12,671
3L	Day room furniture	-	8,038	8,038
4L	Air-delivery equipment	34	29,865	29,899
5L	All other equipment	235	13,552	13,787
6L	Marine equipment	-	-	-
8L	Metal and wood furniture	88	5,523	5,611
9L	Office machines	185	3,982	4,167
7L		-	1,992	1,992
	Total	(904)	(79,601)	(80,505)
	GRAND TOTAL	137,201	400,803	538,004

TABLE A.6

FORT LEWIS MAINTENANCE DIVISION PARTS AND LABOR COSTS, MAY 1978

Equipment & Materiel Category		Costs, dollars		
Code	Title	Parts	Labor	Total
	Aircraft			
8A	Aircraft, fixed wing	982	1,371	2,353
LA	TH-1G	-	-	-
4A	UH-1	14,321	27,078	41,399
5A	AH-1G	1,475	7,391	8,866
6A	OH-58	17,379	5,090	22,469
9A	CH-47	3,517	9,250	12,767
2A	All other aircraft equipment	-	-	-
3A	Tools and test equipment	222	684	906
	Total	(37,896)	(50,864)	(88,760)
	Automotive			
2B	Commercial Vehicles	352	6,974	7,326
5B	Trucks under 1 ton	1,584	7,037	8,621
6B	Trucks 1-1/4 ton	2,719	17,218	19,937
7B	Trucks 2-1/2 ton	11,107	24,378	35,485
8B	Trucks 4 ton and over	25,000	28,546	53,546
9B	Trailers and semitrailers	377	7,083	7,460
4B	Tools and test equipment	-	223	223
	Total	(41,139)	(91,459)	(132,598)
	Combat Vehicles			
4C	Tools and test equipment	-	-	-
5C	Recovery vehicle	1,223	10,964	12,187
7C	Carriers	759	6,596	7,355
8C	Self-propelled artillery	2,338	23,275	25,614
9C	Tank, combat, full track	3,629	15,681	19,309
	Total	(7,949)	(56,516)	(64,465)
	Construction Equipment			
1D	Construction equipment	14,067	21,386	35,453
	Total	(14,067)	(21,386)	(35,453)
	Communications & Electronics Equipment			
1E	Wire communication & teletype	1,928	6,242	8,170
2E	Radar, radio, TV & SV	5,665	21,341	27,006
3E	All other elec-commo equipment	463	3,343	3,806
4E	Tool and test equipment	115	1,501	1,616
9E	TOE unit day rooms	5	706	711
	Total	(8,176)	(33,133)	(41,309)

TABLE A.6 (cont.)

FORT LEWIS MAINTENANCE DIVISION PARTS AND LABOR COSTS, MAY 1978

Equipment & Materiel Category		Costs, dollars		
Code	Title	Parts	Labor	Total
	Missile Systems			
4F	REDEYE	-	-	-
5F	CHAPARRAL	-	1,713	1,713
7F	Tools and test equipment	97	1,241	1,338
	Total	(97)	(2,954)	(3,051)
	Armament			
1I	Small arms	3,727	13,598	17,325
2I	Artillery	697	14,038	14,735
4I	Gun mounts	-	-	-
5I	Fire control	181	3,196	3,377
6I	Tools and test equipment	-	345	345
7I	Chemical weapons	-	52	52
	Total	(4,605)	(31,229)	(35,834)
	General Equipment			
1K	Materiel handling equipment	2,720	14,111	16,831
2K	Electric power generating equipment	5,353	14,633	19,986
5K	Chemical protective equipment	740	1,201	1,941
9K	All other general equipment	-	-	-
	Total	(8,813)	(29,945)	(38,758)
	Commodity Groups			
1L	Shop tools and test equipment	181	2,478	2,659
2L	Calibration, other than missiles	-	5,088	5,088
3L	Day room furniture	-	9,595	9,595
4L	Air-delivery equipment	29	17,063	17,092
5L	All other equipment	162	6,855	7,017
6L	Marine equipment	-	-	-
8L	Metal and wood furniture	166	4,366	4,532
9L	Office machines	208	3,394	3,602
7L		-	1,565	1,565
	Total	(746)	(50,404)	(51,150)
	GRAND TOTAL	123,488	367,890	491,378

TABLE A.7

FORT LEWIS MAINTENANCE DIVISION PARTS AND LABOR COSTS, JUNE 1978

Equipment & Materiel Category		Costs, dollars		
Code	Title	Parts	Labor	Total
	Aircraft			
8A	Aircraft, fixed wing	3,196	1,495	4,691
LA	TH-1G	-	-	-
4A	UH-1	30,880	35,895	66,775
5A	AH-1G	5,109	18,057	23,166
6A	OH-58	3,197	5,236	8,433
9A	CH-47	1,598	4,810	6,408
2A	All other aircraft equipment	-	-	-
3A	Tools and test equipment	283	855	1,138
	Total	(44,263)	(66,348)	(110,611)
	Automotive			
2B	Commercial Vehicles	19	2,064	2,083
5B	Trucks under 1 ton	3,083	7,069	10,152
6B	Trucks 1-1/4 ton	1,798	10,419	12,217
7B	Trucks 2-1/2 ton	8,385	30,047	38,432
8B	Trucks 4 ton and over	18,831	31,360	50,191
9B	Trailers and semitrailers	1,079	11,887	12,966
4B	Tools and test equipment	-	247	247
	Total	(33,195)	(93,093)	(126,288)
	Combat Vehicles			
4C	Tools and test equipment	-	-	-
5C	Recovery vehicle	1,552	6,898	8,450
7C	Carriers	4,123	13,306	17,429
8C	Self-propelled artillery	881	13,599	14,480
9C	Tank, combat, full track	7,395	16,738	24,133
	Total	(13,951)	(50,541)	(64,492)
	Construction Equipment			
1D	Construction equipment	529	9,209	9,738
	Total	(529)	(9,209)	(9,738)
	Communications & Electronics Equipment			
1E	Wire communication & teletype	1,694	9,134	10,828
2E	Radar, radio, TV & SV	4,778	18,103	22,881
3E	All other elec-commo equipment	869	3,035	3,904
4E	Tool and test equipment	202	4,554	4,756
9E	TOE unit day rooms	10	544	554
	Total	(7,553)	(35,370)	(42,923)

TABLE A.7 (cont.)

FORT LEWIS MAINTENANCE DIVISION PARTS AND LABOR COSTS, JUNE 1978

Equipment & Materiel Category		Costs, dollars		
Code	Title	Parts	Labor	Total
	Missile Systems			
4F	REDEYE	-	15	15
5F	CHAPARRAL	925	3,936	4,861
7F	Tools and test equipment	-	-	-
	Total	(925)	(3,951)	(4,876)
	Armament			
1I	Small arms	8,712	7,404	16,116
2I	Artillery	368	12,044	12,412
4I	Gun mounts	-	-	-
5I	Fire control	431	2,616	3,047
6I	Tools and test equipment	-	-	-
7I	Chemical weapons	-	5,188	5,188
	Total	(9,511)	(27,252)	(36,763)
	General Equipment			
1K	Materiel handling equipment	768	22,382	23,150
2K	Electric power generating equipment	1,596	9,484	11,080
5K	Chemical protective equipment	100	708	808
9K	All other general equipment	-	-	-
	Total	(2,464)	(32,574)	(35,038)
	Commodity Groups			
1L	Shop tools and test equipment	1,306	5,994	7,300
2L	Calibration, other than missiles	-	5,733	5,733
3L	Day room furniture	-	4,912	4,912
4L	Air-delivery equipment	43	27,179	27,222
5L	All other equipment	520	12,853	13,373
6L	Marine equipment	-	-	-
8L	Metal and wood furniture	105	10,812	10,917
9L	Office machines	303	3,515	3,818
7L		-	1,308	1,308
	Total	(2,277)	(72,306)	(74,583)
	GRAND TOTAL	114,668	390,644	505,312

TABLE A.8

FORT LEWIS MAINTENANCE DIVISION PARTS AND LABOR COSTS, JULY 1978

Equipment & Materiel Category		Costs, dollars		
Code	Title	Parts	Labor	Total
	Aircraft			
8A	Aircraft, fixed wing	19,692	12,780	32,472
1A	TH-1G	-	-	-
4A	UH-1	93,118	29,458	122,576
5A	AH-1G	293	1,583	1,876
6A	OH-58	5,093	8,653	13,746
9A	CH-47	4,517	5,605	10,122
2A	All other aircraft equipment	-	-	-
3A	Tools and test equipment	345	1,271	1,616
	Total	(123,058)	(59,350)	(182,408)
	Automotive			
2B	Commercial Vehicles	-	417	417
5B	Trucks under 1 ton	1,812	7,349	9,161
6B	Trucks 1-1/4 ton	3,634	14,998	18,632
7B	Trucks 2-1/2 ton	7,422	17,688	25,110
8B	Trucks 4 ton and over	11,777	23,816	35,593
9B	Trailers and semitrailers	555	7,301	7,856
4B	Tools and test equipment	95	180	275
	Total	(25,295)	(71,749)	(97,044)
	Combat Vehicles			
4C	Tools and test equipment	-	-	-
5C	Recovery vehicle	335	3,274	3,609
7C	Carriers	4,920	14,711	19,631
8C	Self-propelled artillery	332	2,454	2,786
9C	Tank, combat, full track	2,664	6,919	9,583
	Total	(8,251)	(27,358)	(35,609)
	Construction Equipment			
1D	Construction equipment	7,521	22,300	29,821
	Total	(7,521)	(22,300)	(29,821)
	Communications & Electronics Equipment			
1E	Wire communication & teletype	2,738	6,057	8,795
2E	Radar, radio, TV & SV	2,937	13,880	16,817
3E	All other elec-commo equipment	495	2,319	2,814
4E	Tool and test equipment	132	2,936	3,068
9E	TOE unit day rooms	-	272	272
	Total	(6,302)	(25,464)	(31,766)

TABLE A.8 (cont.)

FORT LEWIS MAINTENANCE DIVISION PARTS AND LABOR COSTS, JULY 1978

Equipment & Materiel Category		Costs, dollars		
Code	Title	Parts	Labor	Total
	Missile Systems			
4F	REDEYE	-	-	-
5F	CHAPARRAL	188	2,470	2,658
7F	Tools and test equipment	-	48	48
	Total	(188)	(2,518)	(2,706)
	Armament			
1I	Small arms	10,401	7,166	17,567
2I	Artillery	3,455	15,417	18,872
4I	Gun mounts	-	-	-
5I	Fire control	18	2,118	2,136
6I	Tools and test equipment	-	-	-
7I	Chemical weapons	-	2,322	2,322
	Total	(13,874)	(27,023)	(40,897)
	General Equipment			
1K	Materiel handling equipment	427	11,383	11,810
2K	Electric power generating equipment	922	5,082	6,004
5K	Chemical protective equipment	202	822	1,024
9K	All other general equipment	-	124	124
	Total	(1,551)	(17,411)	(18,962)
	Commodity Groups			
1L	Shop tools and test equipment	432	3,587	4,019
2L	Calibration, other than missiles	-	10,520	10,520
3L	Day room furniture	-	5,221	5,221
4L	Air-delivery equipment	46	28,931	28,977
5L	All other equipment	32,670	18,451	51,121
6L	Marine equipment	-	-	-
8L	Metal and wood furniture	306	3,592	3,898
9L	Office machines	283	4,163	4,446
7L		-	1,830	1,830
	Total	(33,737)	(76,295)	(110,032)
	GRAND TOTAL	219,777	329,468	549,245

TABLE A.9

FORT LEWIS MAINTENANCE DIVISION PARTS AND LABOR COSTS, AUGUST 1978

Equipment & Materiel Category		Costs, dollars		
Code	Title	Parts	Labor	Total
	Aircraft			
8A	Aircraft, fixed wing	317	453	770
1A	TH-1G	-	-	-
4A	UH-1	4,754	15,828	20,582
5A	AH-1G	16,913	16,517	33,430
6A	OH-58	500	4,304	4,804
9A	CH-47	2,005	2,955	4,960
2A	All other aircraft equipment	-	-	-
3A	Tools and test equipment	82	670	752
	Total	(24,571)	(40,727)	(65,298)
	Automotive			
2B	Commercial Vehicles	134	1,560	1,694
5B	Trucks under 1 ton	2,855	10,109	12,964
6B	Trucks 1-1/4 ton	447	7,813	8,260
7B	Trucks 2-1/2 ton	2,372	10,118	12,490
8B	Trucks 4 ton and over	13,095	18,611	31,706
9B	Trailers and semitrailers	440	3,497	3,937
4B	Tools and test equipment	1	180	181
	Total	(19,344)	(51,888)	(71,232)
	Combat Vehicles			
4C	Tools and test equipment	-	-	-
5C	Recovery vehicle	72	642	714
7C	Carriers	10,778	30,031	40,809
8C	Self-propelled artillery	2	1,661	1,663
9C	Tank, combat, full track	5,078	13,417	18,495
	Total	(15,930)	(45,751)	(61,681)
	Construction Equipment			
1D	Construction equipment	5,029	12,450	17,479
	Total	(5,029)	(12,450)	(17,479)
	Communications & Electronics Equipment			
1E	Wire communication & teletype	285	5,706	5,991
2E	Radar, radio, TV & SV	6,439	16,431	22,870
3E	All other elec-commo equipment	126	1,541	1,667
4E	Tool and test equipment	152	3,139	3,291
9E	TOE unit day rooms	-	760	760
	Total	(7,002)	(27,577)	(34,579)

TABLE A.9 (cont.)

FORT LEWIS MAINTENANCE DIVISION PARTS AND LABOR COSTS, AUGUST 1978

Equipment & Materiel Category		Costs, dollars		
Code	Title	Parts	Labor	Total
	Missile Systems			
4F	REDEYE	-	-	-
5F	CHAPARRAL	52	1,592	1,644
7F	Tools and test equipment	-	-	-
	Total	(52)	(1,592)	(1,644)
	Armament			
1I	Small arms	-	4,347	4,347
2I	Artillery	-	14,322	14,322
4I	Gun mounts	-	-	-
5I	Fire control	-	2,816	2,816
6I	Tools and test equipment	-	-	-
7I	Chemical weapons	-	3,564	3,564
	Total	(-)	(25,049)	(25,049)
	General Equipment			
1K	Materiel handling equipment	1,743	9,944	11,687
2K	Electric power generating equipment	2,343	7,124	9,467
5K	Chemical protective equipment	18	643	661
9K	All other general equipment	-	115	115
	Total	(4,104)	(17,826)	(21,930)
	Commodity Groups			
1L	Shop tools and test equipment	-	1,273	1,273
2L	Calibration, other than missiles	26	9,348	9,374
3L	Day room furniture	-	3,601	3,601
4L	Air-delivery equipment	-	25,132	25,132
5L	All other equipment	37	7,795	7,832
6L	Marine equipment	-	-	-
8L	Metal and wood furniture	-	3,745	3,745
9L	Office machines	135	2,789	2,924
7L		-	789	789
	Total	(198)	(54,472)	(54,670)
	GRAND TOTAL	76,230	277,332	353,562

TABLE A.10

FORT LEWIS MAINTENANCE DIVISION PARTS AND LABOR COSTS, SEPTEMBER 1978

Equipment & Materiel Category		Costs, dollars		
Code	Title	Parts	Labor	Total
	Aircraft			
8A	Aircraft, fixed wing	65,414	16,872	82,286
1A	TH-1G	-	-	-
4A	UH-1	8,962	42,263	51,225
5A	AH-1G	286	2,885	3,171
6A	OH-58	25,485	9,844	35,329
9A	CH-47	-	1,902	1,902
2A	All other aircraft equipment	-	-	-
3A	Tools and test equipment	-	594	594
	Total	(100,147)	(74,360)	(174,507)
	Automotive			
2B	Commercial Vehicles	21	4,285	4,306
5B	Trucks under 1 ton	2,335	11,924	14,259
6B	Trucks 1-1/4 ton	979	8,450	9,429
7B	Trucks 2-1/2 ton	4,793	17,659	22,452
8B	Trucks 4 ton and over	12,764	24,370	37,134
9B	Trailers and semitrailers	-	10,490	10,490
4B	Tools and test equipment	17	227	244
	Total	(20,909)	(77,405)	(98,314)
	Combat Vehicles			
4C	Tools and test equipment	-	-	-
5C	Recovery vehicle	98	1,629	1,727
7C	Carriers	4,623	21,341	25,964
8C	Self-propelled artillery	10	3,469	3,479
9C	Tank, combat, full track	1,872	12,072	13,944
	Total	(6,603)	(38,511)	(45,114)
	Construction Equipment			
1D	Construction equipment	2,027	5,793	7,820
	Total	(2,027)	(5,793)	(7,820)
	Communications & Electronics Equipment			
1E	Wire communication & teletype	251	7,918	8,169
2E	Radar, radio, TV & SV	2,521	15,247	17,768
3E	All other elec-commo equipment	60	1,958	2,018
4E	Tool and test equipment	167	1,903	2,070
9E	TOE unit day rooms	8	1,852	1,860
	Total	(3,007)	(28,878)	(31,885)

TABLE A.10(cont.)

FORT LEWIS MAINTENANCE DIVISION PARTS AND LABOR COSTS, SEPTEMBER 1978

Equipment & Materiel Category		Costs, dollars		
Code	Title	Parts	Labor	Total
	Missile Systems			
4F	REDEYE	73	700	773
5F	CHAPARRAL	-	641	641
7F	Tools and test equipment	-	-	-
	Total	(73)	(1,341)	(1,414)
	Armament			
1I	Small arms	399	8,810	9,209
2I	Artillery	612	13,996	14,608
4I	Gun mounts	-	-	-
5I	Fire control	249	1,850	2,099
6I	Tools and test equipment	-	-	-
7I	Chemical weapons	-	3,742	3,742
	Total	(1,260)	(28,398)	(29,658)
	General Equipment			
1K	Materiel handling equipment	982	24,985	25,967
2K	Electric power generating equipment	2,196	17,507	19,703
5K	Chemical protective equipment	53	1,809	1,862
9K	All other general equipment	-	455	455
	Total	(3,231)	(44,756)	(47,987)
	Commodity Groups			
1L	Shop tools and test equipment	2	7,580	7,582
2L	Calibration, other than missiles	2	10,116	10,118
3L	Day room furniture	-	7,187	7,187
4L	Air-delivery equipment	88	27,243	27,331
5L	All other equipment	75	15,515	15,590
6L	Marine equipment	-	-	-
8L	Metal and wood furniture	30	3,193	3,223
9L	Office machines	51	2,936	2,987
7L		-	914	914
	Total	(248)	(74,684)	(74,932)
	GRAND TOTAL	137,505	374,126	511,631

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TABLE A.11

FORT LEWIS MAINTENANCE DIVISION PARTS AND LABOR COSTS, OCTOBER 1978

Equipment & Materiel Category		Costs, dollars		
Code	Title	Parts	Labor	Total
	Aircraft			
8A	Aircraft, fixed wing	-	830	830
1A	TH-1G	-	-	-
4A	UH-1	115,887	66,336	182,223
5A	AH-1G	4	3,189	3,193
6A	OH-58	347	4,803	5,150
9A	CH-47	542	2,315	2,857
2A	All other aircraft equipment	-	-	-
3A	Tools and test equipment	-	80	80
	Total	(116,780)	(77,553)	(194,333)
	Automotive			
2B	Commercial Vehicles	2	4,500	4,502
5B	Trucks under 1 ton	700	12,316	13,016
6B	Trucks 1-1/4 ton	57,189	13,265	70,454
7B	Trucks 2-1/2 ton	306	12,893	13,199
8B	Trucks 4 ton and over	11,890	26,612	38,502
9B	Trailers and semitrailers	24	6,972	6,996
4B	Tools and test equipment	-	185	185
	Total	(70,111)	(76,743)	(146,854)
	Combat Vehicles			
4C	Tools and test equipment	-	-	-
5C	Recovery vehicle	15	3,581	3,596
7C	Carriers	130	19,423	19,553
8C	Self-propelled artillery	105	2,034	2,139
9C	Tank, combat, full track	4,872	9,683	14,555
	Total	(5,122)	(34,721)	(39,843)
	Construction Equipment			
1D	Construction equipment	1	5,114	5,115
	Total	(1)	(5,114)	(5,115)
	Communications & Electronics Equipment			
1E	Wire communication & teletype	39	7,129	7,168
2E	Radar, radio, TV & SV	1,187	18,466	19,653
3E	All other elec-commo equipment	94	1,441	1,535
4E	Tool and test equipment	53	1,346	1,399
9E	TOE unit day rooms	-	352	352
	Total	(1,373)	(28,734)	(30,107)

TABLE A.11 (cont.)

FORT LEWIS MAINTENANCE DIVISION PARTS AND LABOR COSTS, OCTOBER 1978

Equipment & Materiel Category		Costs, dollars		
Code	Title	Parts	Labor	Total
	Missile Systems			
4F	REDEYE	22	533	555
5F	CHAPARRAL	-	5,167	5,167
7F	Tools and test equipment	-	-	-
	Total	(22)	(5,700)	(5,722)
	Armament			
1I	Small arms	124	8,013	8,137
2I	Artillery	14	12,232	12,246
4I	Gun mounts	-	-	-
5I	Fire control	106	2,242	2,348
6I	Tools and test equipment	-	15	15
7I	Chemical weapons	-	-	-
	Total	(244)	(22,502)	(22,746)
	General Equipment			
1K	Materiel handling equipment	118	9,858	9,976
2K	Electric power generating equipment	269	6,798	7,067
5K	Chemical protective equipment	-	1,926	1,926
9K	All other general equipment	-	40	40
	Total	(387)	(18,622)	(19,009)
	Commodity Groups			
1L	Shop tools and test equipment	18	1,447	1,465
2L	Calibration, other than missiles	1	6,981	6,982
3L	Day room furniture	-	4,548	4,548
4L	Air-delivery equipment	-	20,963	20,963
5L	All other equipment	13	6,446	6,459
6L	Marine equipment	-	-	-
8L	Metal and wood furniture	54	3,887	3,941
9L	Office machines	7	4,281	4,288
7L		-	1,766	1,766
	Total	(93)	(50,319)	(50,412)
	GRAND TOTAL	194,133	320,008	514,141

TABLE A.12

FORT LEWIS MAINTENANCE DIVISION PARTS AND LABOR COSTS, NOVEMBER 1978

Equipment & Materiel Category		Costs, dollars		
Code	Title	Parts	Labor	Total
	Aircraft			
8A	Aircraft, fixed wing	-	675	675
1A	TH-1G	-	-	-
4A	UH-1	13,946	39,353	53,299
5A	AH-1G	454	13,985	14,439
6A	OH-58	5	5,833	5,838
9A	CH-47	151	2,333	2,484
2A	All other aircraft equipment	-	-	-
3A	Tools and test equipment	-	476	476
	Total	(14,556)	(62,655)	(77,211)
	Automotive			
2B	Commercial Vehicles	477	5,979	6,456
5B	Trucks under 1 ton	66	13,383	13,449
6B	Trucks 1-1/4 ton	985	9,350	10,335
7B	Trucks 2-1/2 ton	405	16,925	17,330
8B	Trucks 4 ton and over	15,075	53,032	68,107
9B	Trailers and semitrailers	7,870	26,086	33,956
4B	Tools and test equipment	-	70	70
	Total	(24,878)	(124,825)	(149,703)
	Combat Vehicles			
4C	Tools and test equipment	-	-	-
5C	Recovery vehicle	13	13,756	13,769
7C	Carriers	2,121	10,692	12,813
8C	Self-propelled artillery	39	6,613	6,652
9C	Tank, combat, full track	130	12,563	12,693
	Total	(2,303)	(43,624)	(45,927)
	Construction Equipment			
1D	Construction equipment	32	17,069	17,101
	Total	(32)	(17,069)	(17,101)
	Communications & Electronics Equipment			
1E	Wire communication & teletype	159	7,425	7,584
2E	Radar, radio, TV & SV	59	20,971	21,030
3E	All other elec-commo equipment	36	2,972	3,008
4E	Tool and test equipment	11	2,873	2,884
9E	TOE unit day rooms	-	176	176
	Total	(265)	(34,417)	(34,682)

TABLE A.12(cont.)

FORT LEWIS MAINTENANCE DIVISION PARTS AND LABOR COSTS, NOVEMBER 1978

Equipment & Materiel Category		Costs, dollars		
Code	Title	Parts	Labor	Total
	Missile Systems			
4F	REDEYE	-	-	-
5F	CHAPARRAL	1	637	638
7F	Tools and test equipment	-	-	-
	Total	(1)	(637)	(638)
	Armament			
1I	Small arms	1,385	20,451	21,836
2I	Artillery	15	10,139	10,154
4I	Gun mounts	-	-	-
5I	Fire control	77	3,067	3,144
6I	Tools and test equipment	-	-	-
7I	Chemical weapons	-	1,414	1,414
	Total	(1,477)	(35,071)	(36,548)
	General Equipment			
1K	Materiel handling equipment	63	16,268	16,331
2K	Electric power generating equipment	622	10,856	11,478
5K	Chemical protective equipment	-	2,167	2,167
9K	All other general equipment	-	82	82
	Total	(685)	(29,373)	(30,058)
	Commodity Groups			
1L	Shop tools and test equipment	4	9,231	9,235
2L	Calibration, other than missiles	1	9,658	9.659
3L	Day room furniture	-	8,177	8,177
4L	Air-delivery equipment	-	29,577	29,577
5L	All other equipment	16	18,562	18,578
6L	Marine equipment	-	18	18
8L	Metal and wood furniture	-	2,432	2,432
9L	Office machines	1	3,961	3,962
7L		-	638	638
	Total	(22)	(82,254)	(82,276)
	GRAND TOTAL	44,219	429,925	474,144

APPENDIX B

INSTALLATION LEVEL MAINTENANCE COSTS BY EQUIPMENT CATEGORY

Appendix B consists of six tables displaying installation level parts and labor costs by equipment category, i.e., aircraft, missiles, etc., by month, for one year beginning December 1977. These data are the result of an independent analysis of Support Maintenance Management System (SMMS) reports obtained from the Fort Lewis Maintenance Division activity referred to in Appendix A. They present an alternative aggregation of the basic data, and permit the data to be viewed from another perspective.

Table B.1

INSTALLATION LEVEL MAINTENANCE COSTS, AIRCRAFT

Month	Cost, dollars		
	Parts	Labor	Total
December, 1977	20,233	67,604	87,837
January, 1978	21,895	53,526	75,421
February	14,432	57,002	71,434
March	31,305	58,355	89,660
April	45,363	57,220	102,583
May	37,896	50,864	88,760
June	44,262	66,348	110,610
July	123,058	59,350	182,408
August	24,562	40,727	65,299
September	100,147	74,359	174,506
October	116,779	77,553	194,332
November	14,566	62,655	77,211
Total	594,498	725,563	1,320,061

Table B.2

INSTALLATION LEVEL MAINTENANCE COSTS, MISSILES

Month	Cost, dollars		
	Parts	Labor	Total
December, 1977	961	3,262	4,223
January, 1978	333	2,802	3,135
February	1,558	4,845	6,403
March	87	3,083	3,170
April	173	4,708	4,881
May	97	2,954	3,051
June	925	3,951	4,876
July	188	2,518	2,706
August	52	1,592	1,644
September	73	1,341	1,414
October	22	5,700	5,722
November	1	636	637
Total	4,470	37,392	41,862

Table B.3

INSTALLATION LEVEL MAINTENANCE COSTS, COMBAT VEHICLES

Month	Cost, dollars		
	Parts	Labor	Total
December, 1977	8,139	32,326	40,465
January, 1978	10,675	35,596	46,271
February	10,048	37,000	47,048
March	25,064	79,046	104,110
April	31,895	62,256	94,151
May	7,949	56,516	64,465
June	13,951	50,541	64,492
July	8,251	27,358	35,609
August	15,930	45,751	61,681
September	6,603	38,511	45,114
October	5,122	34,721	39,843
November	2,303	43,624	45,927
Total	145,930	543,246	689,176

Table B.4

INSTALLATION LEVEL MAINTENANCE COSTS, WEAPONS/ARMAMENT

Month	Cost, dollars		
	Parts	Labor	Total
December, 1977	7,069	22,306	29,375
January, 1978	50,529	33,343	83,872
February	8,803	31,227	40,030
March	3,359	30,011	33,370
April	8,486	32,638	41,124
May	4,605	31,229	35,834
June	9,511	27,252	36,763
July	13,874	27,023	40,897
August	-	25,049	25,049
September	1,260	28,398	29,658
October	244	22,502	22,746
November	1,476	35,071	36,547
Total	109,216	346,049	455,265

Table B.5

INSTALLATION LEVEL MAINTENANCE COSTS, COMMUNICATION-ELECTRONICS

Month	Cost, dollars		
	Parts	Labor	Total
December, 1977	8,365	34,889	43,254
January, 1978	8,418	36,668	45,086
February	7,866	36,381	44,247
March	24,765	37,121	61,886
April	13,679	30,435	44,114
May	8,176	33,133	41,309
June	7,553	35,370	42,923
July	6,302	25,463	31,765
August	7,001	27,577	34,578
September	3,007	28,878	31,885
October	1,373	28,734	30,107
November	265	34,417	34,682
Total	96,770	389,066	485,836

Table B.6

INSTALLATION LEVEL MAINTENANCE COSTS, OTHER

Month	Cost, dollars		
	Parts	Labor	Total
December, 1977	53,411	202,965	256,376
January, 1978	50,879	177,789	228,668
February	42,678	188,049	230,727
March	168,719	234,742	403,461
April	37,605	213,546	251,151
May	64,765	193,194	257,959
June	38,466	207,182	245,648
July	68,104	187,756	255,860
August	28,675	136,636	165,311
September	26,415	202,639	229,054
October	70,593	150,798	221,391
November	25,618	253,522	279,140
Total	675,928	2,348,818	3,024,746

ABBREVIATIONS AND ACRONYNS

AIF	Army Industrial Fund
AMSCO	Army Management Structure Code
AR	Army regulation
BASEOPS	Base Operations
CAMUS	Commitment and Account of Unit Supplies
COA	Comptroller of the Army
CRT	cathode-ray tube
DOD	Department of Defense
DS	direct support
DESCOM	Depot System Command
FAS	Force Accounting System
FYDP	Five Year Defense Program
GRC	General Research Corporation
GS	general support
HQDA	Headquarters, Department of the Army
LRA	Logistic Resource Annex
LRE	Logistic Resource Element
MCA	Military Construction, Army
MCAR	Military Construction, Army Reserves
MCARNG	Military Construction, Army National Guard
MTMC	Military Traffic Management Command
OASD-MRA&L	Office, Assistant Secretary of Defense - Manpower, Reserve Affairs, and Logistics
O&M	operation and maintenance
OCOE	Office, Chief of Engineers
ODCSLOG	Office, Deputy Chief of Staff for Logistics
OCSA-PAED	Office, Chief of Staff, Army - Program Analysis and Evaluation Directorate
ODCSRDA	Office of the Deputy Chief of Staff, Research, Development and Acquisition
OMA	Operation and Maintenance, Army
OMB	Office of Management and Budget
Org/DS/GS	organizational, direct support, and general support
OSD	Office of Secretary of Defense
PBB PROBE TABLES	Ancillary data set to the USAMSSA FYDP data base
PCD	program change decision
PE	program element
POM	program objective memorandum
POMCUS	prepositioning of materiel configured to unit sets
PROBE	Program Optimization and Budget Evaluation
RDTE	Research, Development, Test and Evaluation
RIC	Resource Identification Code
SMMS	Support Maintenance Management System
S&T	supply and transportation
TDA	table of distribution and allowances
TOA	total obligational authority
TOE	table of organization and equipment
USAMSSA	US Army Management Systems Support Agency

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