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APR 78 R H MONAHAN, W SCHUBERT

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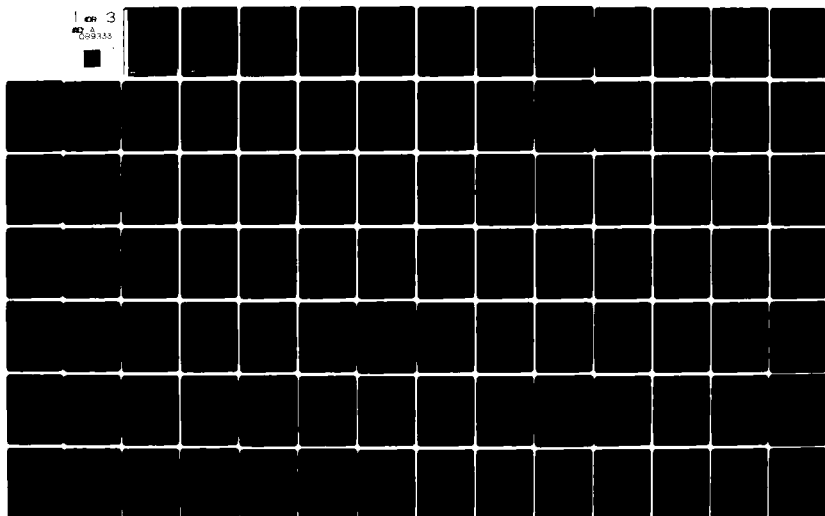
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AD-A089333



Final Report

April 1980

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By: R. H. MONAHAN W. SCHUBERT

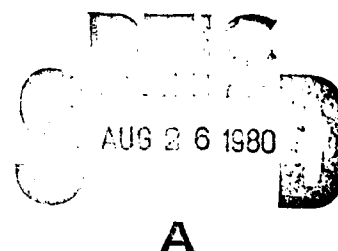
Prepared for:

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SRI Project 7158

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sample problem for illustrative purposes. A complete listing of the program is included as an appendix to the report.

PREFACE

This report documents the analysis and findings of a research project conducted for the David W. Taylor Naval Ship Research and Development Center (DTNSRDC), Bethesda, Maryland. The sponsor and technical monitor was M. J. Zubkoff, Code 187, of DTNSRDC. The work was performed under Contract N00014-78-C-0138, administered by the Office of Naval Research.

The research was performed in the Center for Defense Analysis (CDA) of the Systems Research and Analysis Division (SRAD) of SRI International. J. Naar is Director of CDA; D. D. Elliott is Executive Director of SRAD.

R. H. Monahan was project leader and principal investigator. He was assisted by W. Schubert, who performed most of the cost and supply base configuration analyses associated with this project. G. T. Smith provided the majority of the computer programming. D. L. Harvey also provided technical assistance in the conduct of this research.

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Zubkoff, NSRDC/Code 187

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I MODEL OVERVIEW

A. Introduction

The objective of the research described in this report was the development of a computerized model that provides estimates of the resources required to construct and operate an advanced permanent naval supply base to support Navy and Marine forces in overseas areas of operations over prolonged periods of time. In today's global environment of continual political turmoil within and among various nations of the world, the requirement of positioning U.S. operational forces in widely dispersed and sometimes remote locations throughout the world becomes increasingly more important for the security of U.S. interests at home and abroad. Providing adequate supplies for these forces is a monumental task, and reliance on existing overseas bases and ports of call in areas of political upheaval compound the problem. Thus, it will be beneficial to Navy supply planners to have analytical tools available to determine future requirements for the establishment of overseas bases in the more settled areas around the globe. The Advanced Base Cost Model (ABCOMO) described in this report represents one such tool.

The ABCOMO model represents a major revision of the ABLE model (see Item 1 of the Bibliography) developed several years ago by DTNSRDC. The basic structure of ABCOMO is similar to the ABLE model, but most of the subroutines have been significantly modified and expanded to accommodate the requirements imposed on the present model. Nevertheless, much of the basic concepts underlying the ABLE model, such as the use of drivers, pacing facilities, ripple factors, and so on, have been retained in ABCOMO.

The ABLE model was designed to predict the amount of facilities and personnel required for an expeditionary-type advanced supply base

to support Navy and Marine forces in contingency operations. The ABCOMO model, on the other hand, is designed to determine the necessary facilities, personnel, and equipment required for an advanced permanent supply base to support Navy and Marine forces over prolonged periods of operations, including estimates of the initial investment and recurring annual costs to construct and operate such a base. Some of the significant revisions required to construct ABCOMO included the following:

- The temporary facilities in the ABLE model were supplanted by permanent major facilities with attendant minor facilities, including initial outfitting of major equipments and supplies.
- Additional base functions, such as long-range radio communications facilities, were added to support and sustain the supply base over an extended time period.
- Family support facilities, such as family housing, commissary, Navy exchange, and so on, were added to the base.
- Provisions for estimating the initial investment and recurring annual costs for the base were added, as well as for estimating the costs of transporting supplies to the base for the supported operational forces.

In the remainder of this chapter, a brief overview of the model concept, structure, and usage is presented. Chapter II describes the mechanics of setting up a model run, using a realistic sample problem, and portrays the various outputs of the model. A detailed mathematical description of the model is presented in Chapter III. In Chapter IV, several limitations of the model are discussed and possible improvement options are identified. Appendix A provides a description of the criteria used to establish an input data base for representing the various functional components of the hypothetical supply base, including a component-by-component delineation of the associated model inputs and requirement equations. A complete listing of the ABCOMO computer program, as programmed for the CDC 6400 computer, is then presented as Appendix B to this report.

B. Supply Base Composition

The supply base represented by the ABCOMO model is a permanent advanced supply base that is designed to provide prolonged support to Navy and Marine forces deployed in an overseas area of operations. This

hypothetical supply base is structured as an autonomous entity, providing support to the operating forces as well as its own self-support. It is assumed that the base stocks are replenished on a periodic basis through MAC, MSC, and commercial shipments from major CONUS supply points. Base operations are conducted by Naval personnel on three year tours of duty, with the exception that many of the family support operations (commissary, dependent school, bank, etc.) utilize on-base military dependents. The supply base is assumed to be composed of 49 functional components, each of which includes the facilities, personnel, and equipment to perform a distinct function necessary to the operation of the base. These components are listed in Table I-1. The amount of facilities, personnel, and equipment required by each component is a direct function of the size and configuration of the peak forces to be supported by the base. Associated with each component is a facing facility--i.e., a facility whose size can be directly related to the supported force composition, and from which can be scaled the amount and associated costs of facilities, personnel, and equipment required by the total component. These relationships include consideration of the so-called "ripple effect" for personnel requirements where, as support personnel are assigned to the base, additional personnel are required to provide base support for these personnel and hence increase the requirements imposed on the base components which, in turn, impose additional personnel requirements for base support, and so on. The supply base is assumed to normally operate under peacetime conditions. However, provisions are made for storage of wartime reserves of supplies, fuel and ammunition, and components associated with the receiving, handling and shipping of fuel and ammunition are sized utilizing projected wartime consumption rates.

C. Model Structure

The general structure of the model is presented in Figure I-1. The model inputs are delineated in detail in Section B of Chapter III. These inputs include various operating characteristics of possible elements of the supported operational forces, logistic planning data, functional component requirements data, operational planning numbers, supported force composition definitions, and costing inputs, some of which are geographically dependent.

Table I-1

SUPPLY BASE COMPONENTS

Component ID	Component Description	Component ID	Component Description
A3	Administration Office, Post Office	F1	Cargo Handling Battalion
A4	Data Processing Facility	G2	Hospital
A5	Electronic Maintenance	G9	Dispensary
A7	Shore Patrol Headquarters	G28	Dental Clinic
BB	Waterfront Safety Facilities	HA	Airfield Operations Support
B5A	Boat Pool	H9J	Aircraft Maintenance Facilities
B13C	Port Services Office	J3A	Ammunition Depot
C3A	Naval Station Communications	J3D	Ordnance Support Facilities
C7	Visual Station, Operating Base	J4	Explosive Ordnance Disposal
C13	Internal Communications	NA	Family Support
C27J	Direction Finder Station	NB	Enlisted Personnel Support
C32A	Air Traffic Control Component	OC	Officer Personnel Support
DA	Container Operations (non-ammunition)	SD	Personal Services (all personnel)
D3A1	Tank Farm, Ship Fuel	SE	Recreational Facilities (all personnel)
D3A2	Tank Farm, Jet Engine Fuel	S10B	Military Training and Education
D4C1	Tank Farm, Base Supply 200GAS	S14	Chapel
D4C2	Tank Farm, Base Supply, Diesel	S16	Officers' Recreation
D4C3	Tank Farm, Base Heating Fuel	S17	Enlisted Recreation
D26	Disbursing Office	P5	Public Works Unit
D24A	Ships Store Facility	P5A	Automotive Maintenance
D29A	Air Cargo Terminal	F12A	Fire Protection
D31A	Supply Storage and Administration	P15	Base Power Plant
D31E	Supply Support Facilities	P16	Waste Management
D32A	Refrigerated Storage	P18	Water System
D33A	Materials Handling Facilities		

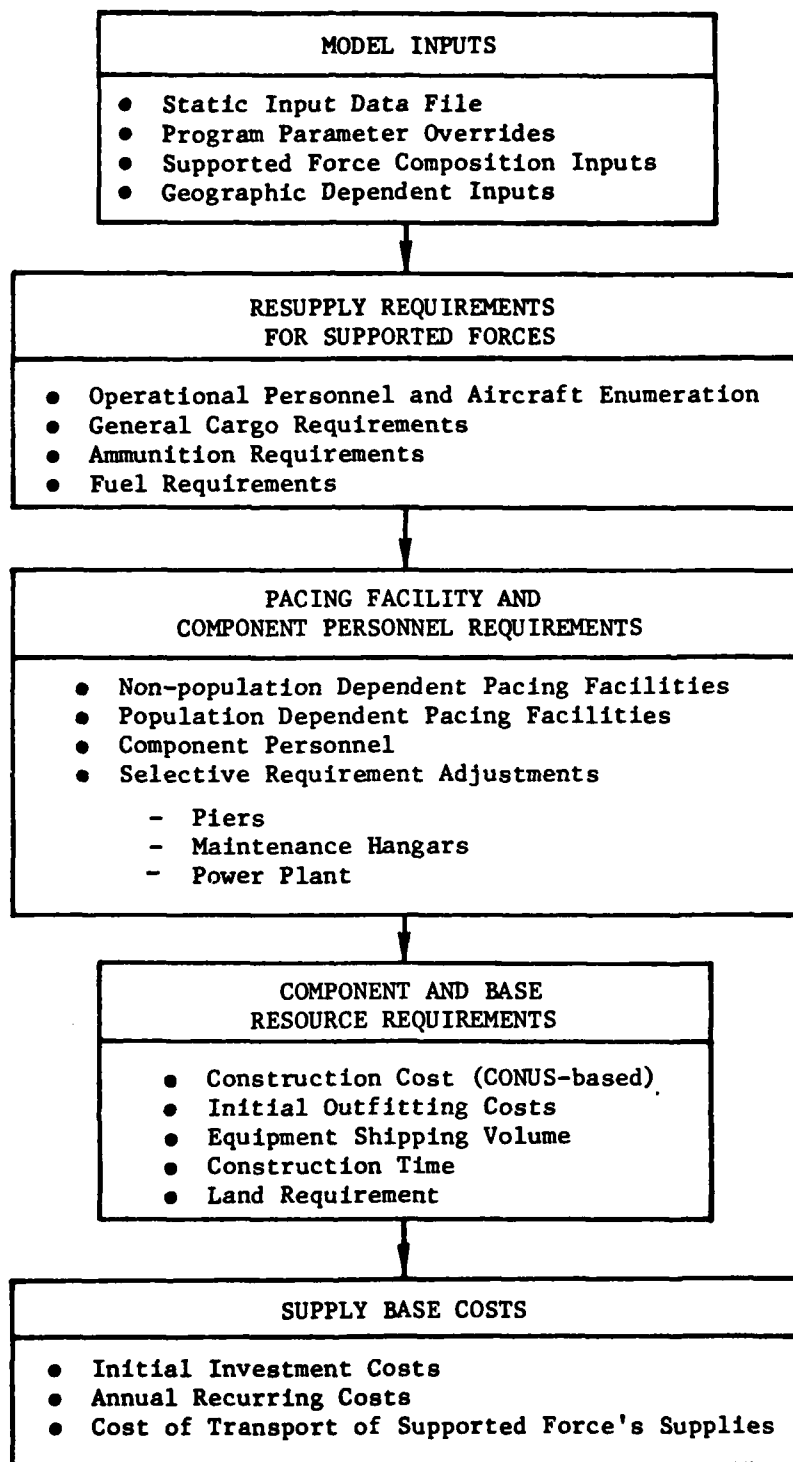


FIGURE I-1 GENERAL STRUCTURE OF ABCOMO MODEL

The first function of the model is to determine the resupply requirements for the peak force that the supply base is designed to support. These requirements include an enumeration of the numbers of personnel, aircraft, and ships in the force, as well as the daily consumption rates that they will generate for the various classes of supply. The model separates the supply classes into three major categories: bulk fuel, ammunition, and general cargo, where the latter consists of all supply items except bulk fuel and ammunition.

These resupply requirements provide the basis for establishing the required sizes of the various functional components comprising the base. For each functional component of the supply base, one of its facilities has been selected as the pacing facility for that component--i.e., a facility whose size can be directly related to the supported force composition and from which can be scaled the amount and associated costs of facilities, personnel, and equipment required by the entire component. These pacing facilities are divided into two categories, depending on whether or not the pacing facility size, and hence that of the entire component, is dependent upon the as yet unknown population of the base. For the non-population-dependent pacing facilities, the pacing facility requirements are computed directly from the pacing facility requirement equations that have been developed for the various functional components. For the population dependent pacing facilities, the computations must include consideration of the population "ripple effect." This terminology is adopted from the earlier ABLE model documentation and refers to the damping process where, as support personnel are assigned to the base, additional personnel are required to provide base support for these personnel and hence increase the requirements imposed on the population-dependent components, which, in turn, impose additional personnel requirements for base support, and so on. This rippling of personnel requirements eventually converges to a fixed set of personnel requirements for the various base functional components. The manner by which these pacing facility requirements are determined is adopted, in principle, from the ABLE model and involves the solution of a set of simultaneous equations relating personnel requirements to

pacing facility requirements. Once the pacing facility requirements are established, the model then determines the number of personnel required by each functional component and performs selective facility requirement adjustments such as requiring pier lengths to be specified in multiples of cargo ship lengths as opposed to the required raw feet of berthing determined by the solution procedure.

The model next establishes the component resource requirements which include construction costs (CONUS-based), initial outfitting costs, shipping volume of equipment and supplies, construction times, and land requirements. These computations are based on component estimating relationship equations, developed for this model, that linearly relate component resource requirements to pacing facility requirements. These component resource requirements are then accumulated to establish the associated resource requirements for the entire base.

The final function of the model is to compute the costs related to the construction and operation of the overseas supply base, which represent the primary model outputs. These costs are dependent on the specific geographical area under consideration and the model is structured so that any number of different geographical areas can be considered without having to recompute any of the previous computations. The supply base costs are divided into three groups: Initial Investment Costs, Annual Recurring Costs, and Cost of Transport of supported forces supplies. The initial investment costs are those incurred in the construction and setting-up of the base for sustained operations. Specifically, these are the base construction cost; the base initial outfitting cost; the costs to transport from CONUS the initial base equipment and supplies, personnel and dependents, and their personal belongings; and the land acquisition cost, if applicable. The actual construction of the supply base is assumed to be performed by private contractors and the construction costs generated by the model include consideration of all construction factors such as building materials, construction workers, shipment of materials, and so on.

The annual recurring costs are those incurred in the annual operation and maintenance of the supply base. The associated costs generated by the model are the annual personnel billet cost; annual cost to the Navy of general supplies and equipment, including base fuel; the annual costs incurred in transporting from CONUS the base supplies and fuel, rotational personnel (both ways), and their personal belongings; and the annual land lease cost, if applicable.

Although not directly related to the cost of construction and operation of the supply base itself, the cost of transporting (from CONUS to the base) the supplies, equipment, fuel and ammunition required by the supported forces will be useful in application of the model. The computation of these transport costs represent the final function of the model.

D. Sample Case

As an illustration of the use of the model, a sample case was set up and run. In this sample case, two different supported force compositions are postulated and two different geographic locations are considered. The first force composition (FC1) includes two carrier task groups, an ASW group, and an amphibious group, all assumed stationed at sea. The specific composition of these operational groups is as follows:

Task Group 1: 1 attack aircraft carrier (CV)
 4 guided missile frigates (FFG)
 1 fast combat support ship (AOE)
 1 carrier air wing (CAW)
 (24 F-14, 24 A-7, 10 A-6, 10 S-3, 4 E-2)

Task Group 2: 1 attack aircraft carrier (CV)
 4 guided missile frigates (FFG)
 1 fast combat support ship (AOE)
 1 carrier air wing (CAW)
 (same composition as in Task Group 1)

ASW Group: 4 frigates (FF)

Amphibious Group: 4 amphibious transport docks (LPD)
1 amphibious assault ship (helicopter) (LPH)
1 amphibious assault ship (general purpose) (LHA)
2 dock landing ships (LSD)
1 tank landing ship (LST)
8 guided missile frigates (FFG)
1 frigate (FF)
1 oiler (AO)
1 combat store ship (AFS)
1 ammunition ship (AE)
1 air complement (16 CH-46, 6 CH-53, 4 UH-1)

The second force composition (FC2) maintains the two carrier task groups and ASW group, stationed at sea, but does not include the amphibious group. In place of the amphibious group, FC2 assumes that an amphibious air complement of 16 CH-46, 6 CH-53, and 4 UH-1 is stationed at the supply base, together with a marine detachment consisting of 100 officers and 1000 enlisted men.

The two geographical areas of consideration are the Indian Ocean Area and the South Atlantic Area. The choice of the geographical area can affect the base construction costs, land acquisition and lease costs, and all transport costs. A complete listing of the sample case inputs and outputs are presented in Chapter II. A summary of the primary outputs are listed in Table I-2.

The dollar cost differentials, for both force compositions, between the Indian Ocean Area and South Atlantic Area are roughly 300 million for the Initial Investment Costs and 5 million for Annual Recurring Costs, the lower costs being associated with the base located in the South Atlantic Area. These cost differentials are attributable to a 2.2 construction cost multiplier for the Indian Ocean Area versus a 1.6 construction cost multiplier for the South Atlantic Area (construction costs are initially computed for a CONUS-based base) and to lower transport costs because the South Atlantic Area is closer to CONUS than the Indian Ocean Area.

In comparing the supply bases that support the two different force compositions, the base supporting Force Composition 2 turns out to be larger and more costly to operate even though the number of operational

Table I-2
SAMPLE CASE PRIMARY OUTPUTS

Output Factor	Force Composition 1		Force Composition 2	
	Indian Ocean Area	South Atlantic Area	Indian Ocean Area	South Atlantic Area
<u>Personnel</u>				
Operational Personnel	24,350	24,350	17,298	17,298
Base Support Personnel	3,544	3,544	3,552	3,552
Base Dependents	3,255	3,255	3,251	3,251
Total	31,149	31,149	24,101	24,101
<u>Initial Investment Costs (thousands of dollars)</u>				
Facility Construction	1,102,386	801,735	1,128,062	820,409
Initial Outfitting	45,924	45,924	45,084	45,084
Transport of Equipment	5,455	3,731	5,357	3,664
Transport of Personnel	3,379	1,672	3,380	1,673
Transport of Personal Belongings	6,753	4,619	6,753	4,619
Land Acquisition	0	0	0	0
Total	1,163,897	857,682	1,188,637	875,449
<u>Annual Recurring Costs (thousands of dollars)</u>				
Personnel Billets	94,178	94,178	93,800	93,800
Supplies and Equipment	26,182	26,182	26,240	26,240
Transport of Supplies and Equipment	3,938	2,693	3,940	2,694
Base Fuel	33,474	33,474	39,739	39,739
Transport of Base Fuel	3,339	1,725	3,965	2,049
Transport of Rotational Personnel	2,253	1,115	2,254	1,115
Transport of Personal Belongings	4,502	3,079	4,502	3,079
Land Lease	7,746	7,746	7,252	7,252
Total	175,611	170,193	181,690	175,968
<u>Supported Forces Annual Transport Costs (thousands of dollars)</u>				
Supplies and Equipment	14,104	9,646	10,019	6,853
Ship Fuel (peacetime)	18,429	9,522	9,579	4,940
Aircraft Fuel (peacetime)	5,967	3,083	5,967	3,083
Ship Ammunition (peacetime)	36	25	19	13
Aircraft Ammunition (peacetime)	138	95	138	95

personnel supported by this base is about 20% less than the number supported by the base supporting Force Composition 1. This is due to the requirement for base facilities to accommodate some 1500 operational personnel stationed at the base for the second force composition as compared with none for the first force composition. However, the Supported Force Annual Transport Costs are higher in all cases for Force Composition 1 than for Force Composition 2.

These results have been presented to illustrate the model outputs and should not be construed to be true representations of actual expected costs. Many of the inputs that would be supplied by the user were arbitrarily assigned values by project team personnel and would require a more precise definition for the model results to be truly representative of expected supply base costs.

II MODEL USAGE

A. Introduction

The purpose of this chapter is to provide the necessary instructions that will allow a user to set up and run the computer program that implements the ABCOMO model. Although a knowledge of the mathematical details underlying the model is not necessary for the capability of using the model, it is assumed that the user is familiar with the model concept and logic. If he is not, he can obtain this familiarity through a reading of Chapter III of this report. Section B of this chapter presents the input requirements, including data file formats and the order in which the data is read in to the program. The program output report numbering description is discussed in Section C. Section D then provides a copy of the output generated for the sample problem discussed at the end of the previous chapter.

B. Input Specifications *

The program inputs are segregated into four input groupings: Static Input Data File, Program Parameter Overrides, Supported Force Composition Inputs, and Geographic-Dependent inputs. The Static Input Data File consists of those data that will remain constant, for the most part, in routine applications of the model. The Program Parameter Overrides refer to two sets of numerical parameters that are built into the model, but that can be altered at the user's discretion. The Supported Force Composition Inputs refer to those inputs required to describe the composition of the peak force to be supported by the supply base. In a given program run, a number of different such force compositions can be processed in turn. The Geographic-Dependent Inputs refer to those specific inputs that are dependent on the geographical location of the postulated supply base. For each supported force composition,

* Much of the program input for the ABCOMO model coincides with that required by the ABLE model. Thus, some of the input description discussed in this section is taken directly from Item 1 of the Bibliography.

any number of geographical locations can be considered by specifying a set of these inputs for each such geographical location. Within each input grouping, there are subsets of data inputs that, in general, can contain a variable number of inputs. For these data sets, in ABCOMO end-of-file (EOF) mark, which is a card with six asterisks punched in the first six columns, is required to terminate the reading of inputs in that particular data set. In a couple of cases, the EOF card also contains additional data. The exceptions to the EOF card requirement are the data sets contained in a single card such as base fuel unit costs, fuel and ammunition specific volumes, and base personnel input parameters. For those data sets that may be empty (e.g., operational planning factor overrides), the EOF card must still be inserted to indicate to ABCOMO that that data set contains no information. Figure II-1 shows a sample data deck setup.

1. Static Input Data File

This data file is broken down into seven distinct data sets: Aircraft Static Parameters, Ship Static Parameters, Ripple Factors, Component Estimating Relationship Parameters, General Cargo Parameters, Fuel Specific Volume Factors, and Base Personnel Input Parameters.

a. Aircraft Static Parameters

This data set defines the operational characteristics of all relevant aircraft types. Entries in this set consist of an aircraft type and its associated physical characteristics. Only aircraft types that appear in this file are valid for inclusion in a supported force composition.

The first card of the set is a header card. This card contains the data in Columns 1-12 and user comments in Columns 14-72. The second card of the set is an output option card with a 0 or 1 in the first column. If 0 is entered, all of the input data is listed in the program output. If 1 is entered, then all of the Static Input Data is suppressed in the output, except the Base Personnel Input Parameters. All other cards in the file are aircraft static data cards. Any aircraft may be entered in the file by punching a card following the format given in Table II-1 and specifying the aircraft model, aircraft mission type code (1 = TACTICAL, 2 = PATROL, 3 = CARGO, 4 = ROTARY WING), wingspan, length, fuel wartime consumption rate, etc.

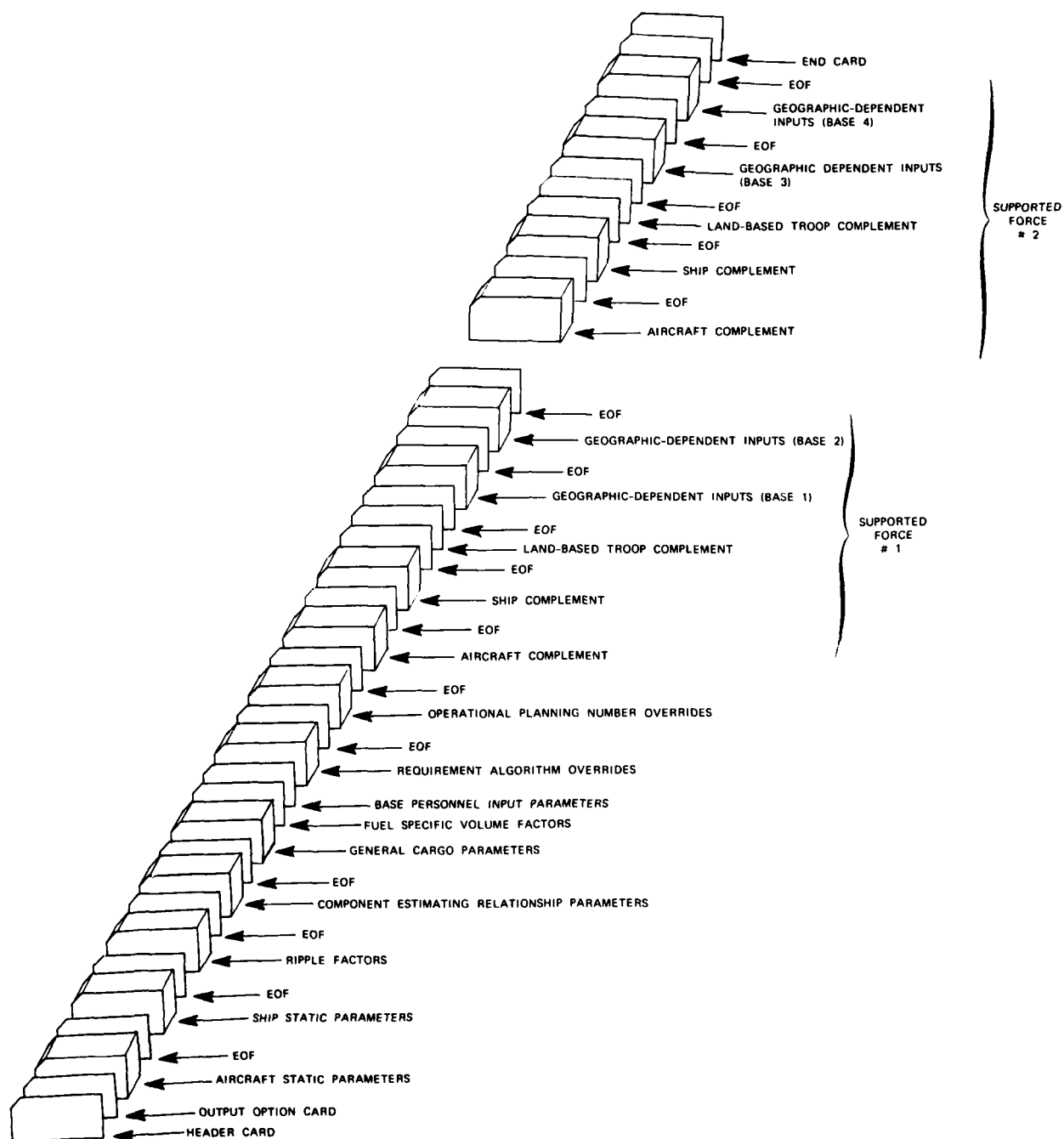


FIGURE II-1 SAMPLE DECK SETUP

Table II-1

AIRCRAFT STATIC PARAMETER CARD FORMAT

Card Columns	Description	FORTRAN Format
1-8	Aircraft Type	A8
10	Mission Type Code	I1
12-14	Wingspan (feet)	F3.0
16-18	Length (feet)	F3.0
20-23	Fuel Consumption Rate (gallons/day)	F4.0
25-26	Number per squadron	I2
28-29	Crew--Officers	I2
31-32	Crew--Enlisted	I2
34-38	Maintenance Personnel--Officers	F5.2
40-44	Maintenance Personnel--Enlisted	F5.2
46	Fuel Code	I1
48-53	Ammunition Consumption Rate (lb/day)	F6.0

number of aircraft per squadron, crew and maintenance complements, fuel code (0 = AVGAS, 1 = JET), and ammunition wartime consumption rate. It should be noted that the ammunition wartime consumption rate is clearly a function of the type of action that could be expected and should be entered accordingly. Two operational planning factor inputs identify peacetime-to-wartime ratios for fuel and ammunition consumption that are used by the model to determine consumption rates for peacetime operations. An EOF card is required at the end of this data set.

b. Ship Static Parameters

This data set contains the operational characteristics of all relevant ship types. The information necessary for entering a ship in this set is the ship type, officer complement, fuel wartime consumption rate, and ammunition wartime consumption rate. Fuel wartime consumption rates and

ammunition wartime consumption rates must take into account the type of operation in which the ship is engaged. Two operational planning factor inputs identify peacetime-to-wartime ratios for fuel and ammunition consumption that are used by the model to determine consumption rates for peacetime operations. The format for these cards is given in Table II-2. An EOF card is required at the end of this data set.

Table II-2

SHIP STATIC PARAMETER CARD FORMAT

Card Columns	Description	FORTRAN Format
1-8	Ship Class	A8
10-13	Crew--Officers	I4
15-18	Crew--Enlisted	I4
20-25	Fuel Wartime Consumption Rate (barrels/day)	F6.0
27-32	Ammunition Wartime Consumption Rate (lb/day)	F5.0

c. Ripple Factors

A complete list of component ID designators for all valid components is maintained internally in ABCOMO. However, the user must supply certain information associated with each component. This data set contains some of this information. Each component card in this data set contains a component ID designator; a description of the pacing facility associated with that component; a unit of measure for the requirements imposed on the pacing facility; and the officer, enlisted, and electric power ripple factors for that component. The manner in which these ripple factors were developed is described in Appendix A. The format for the component ripple factor cards is given in Table II-3. An EOF card is required at this end of this data set.

Table II-3

COMPONENT RIPPLE FACTOR CARD FORMAT

Card Columns	Description	FORTRAN Format
1-6	Component ID	A6
8-31	Name of Associated Pacing Facility	4A6
33-36	Units of Measure of Pacing Facility Requirement	A4
38-47	Officer Ripple Factor	F10.9
49-58	Enlisted Ripple Factor	F10.9
60-69	Power Ripple Factor	F10.9

d. Component Estimating Relationship Parameters

This data set provides the remaining information required for each supply base component. Two cards must be supplied for each supply base component. These two cards contain the parameters required for the component estimating relationships that determine CONUS-based construction cost, initial outfitting equipment cost, shipping volume of this equipment, construction time, and land requirement for that component. The estimating relationship equations used by the model are all of the following format:

$$Y = b + mX$$

where Y is the applicable component resource factor, X is the pacing facility requirement, b is the relationship constant parameter and m is the relationship coefficient. The manner by which these component estimating relationship parameters were developed is described in Appendix A. The format for the required data cards is given in Table II-4. An EOF card is required at the end of this data set.

Table II-4

COMPONENT ESTIMATING RELATIONSHIP PARAMETER
CARD FORMAT

Card Columns	Description	FORTRAN Format
First Card		
1-4	Component ID	A4
5-36	Component Description	4A8
38-45	Construction Cost Constant Factor	E8.1
47-54	Construction Cost Coefficient	E8.1
56-63	Equipment Cost Constant Factor	E8.1
65-72	Equipment Cost Coefficient	E8.1
Second Card		
20-27	Equipment Shipping Volume Constant Factor	E8.1
29-36	Equipment Shipping Volume Coefficient	E8.1
38-45	Construction Time Constant Factor	E8.1
47-54	Construction Time Coefficient	E8.1
56-63	Required Land Constant Factor	E8.1
65-72	Required Land Coefficient	E8.1

e. General Cargo Parameters

This data set provides daily consumption estimates, specific volumes, and unit costs for the various classes of supply. Ten cards are required for this data set. The first eight cards provide the above data for the following eight supply classes, specified in the proper sequence: I--Subsistence, II--Clothing, Tools, Etc., III--Packaged POL, IV--Construction Material, VI--Personal Demand Items, VII--Major End Items, VIII--Medical Material, and IX--Repair Parts. Included on these cards is a Navy-funded consumption input that refers to daily consumption of items that are not normally included in personnel billet costs--i.e., such items as subsistence, clothing, and personal

demand items are assumed to be included in the billet costs, and their consumption rates are therefore not included in this category. Also, the unit cost input for subsistence refers to nonrefrigerated subsistence items. Applicable data for refrigerated subsistence items are specified on the ninth card of this set. The tenth card provides unit costs for base fuel items. The format for these cards is presented in Table II-5. An EOF card is not required at the end of this data set, although an EOF mark is required on Card 9.

Table II-5
GENERAL CARGO PARAMETER CARD FORMAT

Card Columns	Description	FORTTRAN Format
Cards 1-8 One for each supply class listed in the text		
1-8	(Blank)	A8
9-18	Daily Consumption Rate (lb/man/day)	F10.6
19-28	Average Specific Volume (cu. ft./lb)	F10.6
29-38	Average Unit Cost (\$/lb)	F10.6
39-48	Navy-Funded Daily Consumption Rate (lb/man/day)	F10.6
Card 9		
1-6	EOF mark (six asterisks)	A6
9-18	Proportion of Subsistence That is Refrigerated	F10.6
19-28	(Not used--enter .0)	F10.6
29-38	Refrigerated Subsistence Average Unit Cost (\$/lb)	F10.6
39-48	(Not used--enter .0)	F10.6
Card 10		
1-10	Motor Gasoline Unit Cost (\$/bb1)	F10.6
11-20	Diesel Fuel Unit Cost (\$/bb1)	F10.6
21-30	Heating Fuel Unit Cost (\$/bb1)	F10.6

f. Fuel Specific Volume Factors

This data set consists of one card that provides the specific volume factors for motor gasoline, diesel fuel, heating fuel, ship fuel (DFM), and aircraft fuel (JET). The card format is given in Table II-6. An EOF card is not required after this card.

Table II-6

FUEL SPECIFIC VOLUME FACTORS CARD FORMAT

Card Columns	Description	FORTRAN Format
1-10	Motor Gasoline Specific Volume (bbl/LT)	F10.6
12-21	Diesel Fuel Specific Volume (bbl/LT)	F10.6
23-32	Heating Fuel Specific Volume (bbl/LT)	F10.6
34-43	Ship Fuel (DFM) Specific Volume (bbl/LT)	F10.6
45-54	Aircraft Fuel (JP-5) Specific Volume (bbl/LT)	F10.6

g. Base Personnel Input Parameters

This data set consists of one card that provides required inputs associated with base support personnel. These inputs, separated by officer and enlisted categories, cover billet costs, fraction of personnel that will bring families overseas, number of dependents per married person, and personal belongings allowances. The format for this card is given in Table II-7. An EOF card is not required after this card.

Table II-7

BASE PERSONNEL INPUT PARAMETERS CARD FORMAT

Card Columns	Description	FORTRAN Format
1-7	Officer Billet Cost (Thousands of dollars)	F7.3
9-15	Enlisted Man Billet Cost (Thousands of dollars)	F7.3
17-21	Fraction Officers with Families Overseas	F5.3
23-27	Fraction Enlisted Men with Families Overseas	F5.3
29-33	Number of Dependents per Married Officer	F5.2
35-39	Number of Dependents per Married Enlisted Man	F5.2
41-48	Personal Belongings Allowance - Unmarried Officers (cu. ft.)	F8.1
50-57	Personal Belongings Allowance - Married Officers (cu.ft.)	F8.1
59-66	Personal Belongings Allowance - Unmarried EM (cu. ft.)	F8.1
68-75	Personal Belongings Allowance - Married EM (cu. ft.)	F8.1

2. Program Parameter Overrides

Built into the program are two sets of numerical parameters: Pacing Facility Requirements Algorithm Parameters and Operational Planning Numbers. Although these sets of parameters have specified default values (the value used if no override is requested) within the program, the user has the option of overriding the default values of any subset of these parameter sets.

a. Requirement Algorithm Overrides

Because the criteria for pacing facility requirements are subject to constant review and change, a mechanism has been provided for limited modification of the pacing facility planning factors in the requirement algorithms through the use of override cards. Each override card contains an identification (Component ID) field, an index field, and a new-value field in the format shown in Table II-8. The index field (which is actually an array subscript) is used to indicate the particular value it is desired to override. Table III-3 of Chapter III contains a list of the components, the requirements factors associated with those components, and their indices. The manner in which these values are used to calculate pacing facility and personnel requirements in the ABCOMO Model is fully described in Chapter III. An EOF card is required at the end of this data set, even if there are no override cards.

Table II-8

REQUIREMENT ALGORITHM OVERRIDE CARD FORMAT

Card Columns	Description	FORTTRAN Format
1-8	Identification	A8
10-12	Index Field	I3
14-23	New Value	F10.3

b. Operational Planning Number Overrides

Because the criteria for base operations may vary from time to time, the override mechanism is available to the user to alter the program default values for these data. The specific operational planning factors, their default values, and their indices are listed in Table III-4 of Chapter III. These planning factors cover requirements for days of supply (both for wartime reserves and operating stocks) for storage purposes and these may be different for general cargo, aircraft fuel, ship fuel, base fuel, and ammunition. Since the fuel and ammunition consumption inputs for the ships and aircraft of the supported forces are specified in terms of wartime consumption, other planning numbers include peacetime-to-wartime consumption ratios for ship and aircraft fuel and ammunition consumption. The remaining planning factors designate the fractions of general cargo and ammunition that will be containerized, the fraction of at-sea men that will require facilities ashore, and the fraction of break-bulk cargo to be delivered by air. The override card format is the same as indicated in Table II-8. Again, an EOF card is required at the end of this data set, even if there are no override cards.

3. Supported Force Composition Inputs

The program allows for a number of different supported force compositions to be processed, in turn, during a given execution run. The supported force is defined by specifying the aircraft complement, ship complement, and land-based troop complement. Each of these represent a specific data set.

a. Aircraft Complement

The cards in this data set specify the numbers and types of aircraft that will be loaded onto or supported by a base. Each card contains three items of information. The first eight columns of the card contain the aircraft type. The only aircraft types that may be loaded onto a base are those for which a static data card has been entered. The manner in which the aircraft type is punched on an aircraft complement card must correspond exactly to the manner in which it was entered on the corresponding static data card. The second item on this card represents the number of aircraft of this type

that will be loaded on the base. This number is an integer that is right-adjusted in Columns 10-12. The third field on the card indicates, if blank, that the aircraft are land-based and, if non-blank, that they are carrier-based. (Any alphanumeric character(s) may be used.) Table II-9 shows the card format.

Table II-9
AIRCRAFT COMPLEMENT CARD FORMAT

Columns	Description	FORTRAN Format
1-8	Aircraft Type	A8
10-12	Number of Aircraft of that Type	F3.0
14-21	Carrier Flag	A8

There is no limit to the number of complement cards that may specify any particular aircraft type. If more than one card is input for a particular type, the sum of the numbers on each card is used in calculations. For example, it is possible to load 20 F-4s on a base, 10 land-based and 10 carrier-based, by punching two cards. One card would specify 10 land-based F4s and the other would specify 10 carrier-based F4s. The total of 20 would be used. The distinction between carrier-based and land-based aircraft is important because carrier-based aircraft are assumed to have no impact on land airfield requirements. However, they contribute to total requirements for such items as fuel storage, ammunition storage, etc. An EOF card is required at the end of this data set, even if there are no aircraft complement cards.

b. Ship Complement

This data set contains cards specifying the numbers and types (given by ship class designations) of ships supported by the base. The format for these cards is shown by Table II-10. The ship name must be punched on the complement card in the identical manner in which the corresponding static data card was punched, and only ship types with an entry in the ship static file are valid inputs.

Table II-10

SHIP COMPLEMENT CARD FORMAT

Card Columns	Description	FORTRAN Format
1-8	Ship/Class Designation	A8
10-12	Number of ships of this Class	F3.0

This file is terminated by a case ID and supported force ID end-of-file card. In addition to the asterisks in Columns 1-6 required in the EOF cards, this EOF card contains a case ID descriptor (8 alphanumeric characters in Columns 14-21) and a supported force ID descriptor for this supported force (4 alphanumeric characters in Columns 22-25). These two items may appear anywhere in their respective fields and either field may be left blank if desired. Table II-11 shows the format of these EOF cards.

Table II-11

CASE ID AND SUPPORTED FORCE ID EOF CARD FORMAT

Card Columns	Description	FORTRAN Format
1-6	EOF Mark (six asterisks)	A6
14-21	Case ID Descriptor	A8
22-25	Supported Force ID Descriptor	A4

c. Land-Based Troop Complement

It is possible to preload a base with operational personnel. This may be desired when other force elements such as Marine or Army units will be stationed at the base. These personnel must always be in excess of those

required to operate and maintain the ships, aircraft, and physical plant associated with the base. They are entered by punching a card with the number of additional officers as an integer right justified in Columns 1-5, and the number of enlisted men as an integer right justified in Columns 7-11. This card follows the ship complement file and must always contain only one card punched as shown in Table II-12. This card must be followed by an EOF card.

Table II-12

LAND BASED TROOP COMPLEMENT CARD FORMAT

Card Columns	Description	FORTRAN Format
1-5	Additional Officer Personnel	F5.0
7-11	Additional Enlisted Personnel	F5.0

4. Geographic-Dependent Inputs

For each supported force composition, the model allows for bases located in any number of different geographical areas as specified by a different set of geographic-dependent inputs to be processed. These inputs provide for a descriptor of the geographical area, a construction cost multiplier for that geographical area (construction costs are computed initially in the model in terms of a CONUS-based supply base), various transport costs for personnel, equipment, supplies, fuel and ammunition, and land-related inputs designating the proportion of required land that may be purchased outright, with the remainder leased, and the costs associated with land purchase and lease. The card format for each set of geographic-dependent inputs is given in Table II-13. An EOF card is required at the end of this data set.

Table 11-15
GEOGRAPHIC-DEPENDENT INPUTS

Card Columns	Description	FORTRAN Format
Card 1		
1-32	Geographic Area Descriptor	4A8
Card 2		
1-6	Construction Cost Multiplier	F6.3
8-14	Transport Cost--Nonrefrigerated Cargo (\$/MT)	F7.2
16-22	Transport Cost--Refrigerated Cargo (\$/MT)	F7.2
24-30	Transport Cost--Personnel (\$/man)	F7.2
32-38	Transport Cost--Bulk POL (\$/LT)	F7.2
40-46	Transport Cost--Ammunition (\$/MT)	F7.2
48-52	Proportion of Land Requirement Purchased	F5.3
54-60	Land Purchase Cost (\$/acre)	F7.1
62-68	Annual Land Lease Cost (\$/acre)	F7.1

5. Run Termination and Recycle Option

As mentioned previously, more than one base can be processed in a single computer run by stacking different sets of supported force composition cards and geographic-dependent cards. A deck setup may thus consist of any number of these card sets. For a given run, values in the static data files, including the requirement algorithm and operational planning numbers, remain constant for a given run. Figure 11-2 illustrates the logic of program operating sequence. At the end of the input data deck, a termination card is required with the word END punched in Columns 1-3. This causes the program to terminate execution.

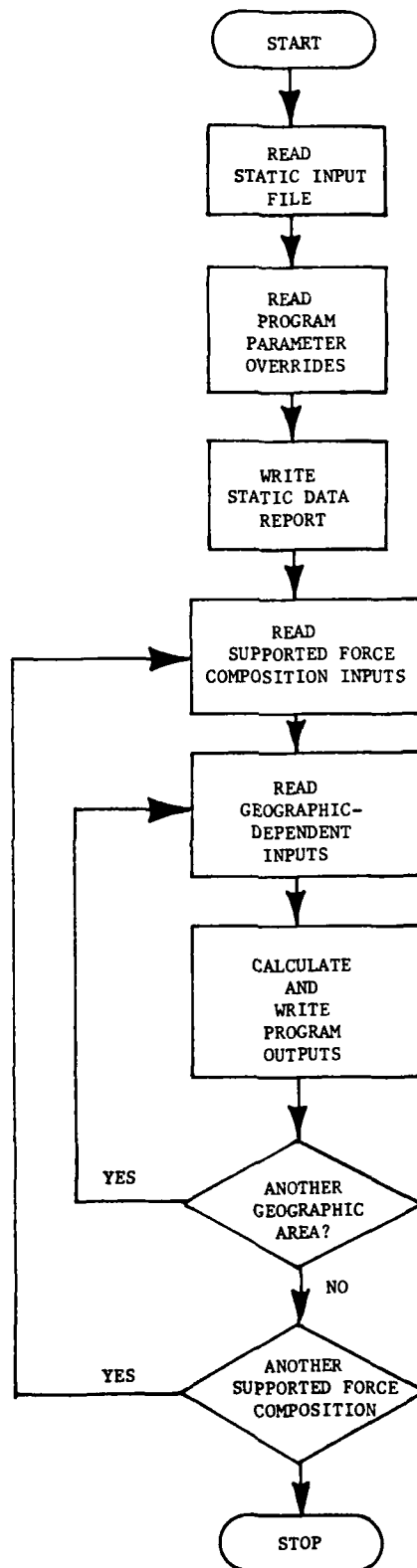


FIGURE II-2 PROGRAM OPERATING SEQUENCE

C. Output Description and Report Numbering

The output from ABCOMO consists of a static data input report followed by a series of output reports for the different bases. Each report is given a unique number.

The static data report, number 1-1-1, summarizes all the static data inputs, specifies the base operational planning factors in effect, and lists any algorithm overrides that may have been input. The user has the option of suppressing much of the printout included in the static data report if he so desires.

The output reports follow the static data report, and give the base loading, the base component requirements and resource factors, and the cost factors associated with each base processed. These reports are numbered sequentially by case ID, supported force composition ID, and geographical area for that base. The report number consists of four numbers. The first number is "2", which signifies that this is an output report. The second number is a case ID counter. If the case ID designator for the supported force being processed is different than the previous one processed, then this second number is incremented ahead by one. The third number is a counter for the number of supported forces included in a single case ID sequence. The fourth number is a counter for the number of different geographical areas processed for the given supported force. For example, the report number 2-3-1-4 means that this is an output report (2) for the third (3) case considered, that this is the first (1) supported force considered in that case, and that this is the fourth (4) different geographical area considered for this supported force. For coherent report numbering, successive supported force card sets should be properly ordered and grouped together.

A complete listing of a sample output is presented in the next section.

D. Sample Program Output Listing

A complete listing of the inputs and outputs obtained from the sample problem discussed at the end of the previous chapter is presented on the remaining pages of this chapter. The output report addresses only one case ID, two different supported forces, and two different geographical areas for each

supported force. The majority of inputs were obtained from numerous source documents, listed in the Bibliography of this report. The component ripple factors and estimating relationship parameters were derived by project team members, as described in Appendix A. Some of the input data that would be provided by the user were postulated by the project team members.

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AIRCRAFT STATIC DATA FILE

AIRCRAFT	TYPE	WINGSPAN (FT)	LENGTH (FT)	FUEL CONSUMPTION (GAL/DAY)	NO./ SQUAD	CREW COMPLEMENT OFF ENL	MAINTENANCE COMPLEMENT OFF ENL	FUEL CODE	AMMO CONSUMPTION (LBS/DAY)
A-6	1	53.	56.	1596.	12	2	1.00	1	4000.
A-7	1	39.	47.	1470.	12	1	.75	1	4000.
AH-1	4	44.	54.	210.	18	1	2.75	1	3000.
AV-8B	1	26.	47.	1092.	20	1	.75	1	2000.
CH-46	4	51.	85.	336.	18	2	1.50	1	100.
CH-53	4	73.	89.	546.	21	2	1.50	1	100.
COD	3	81.	57.	1050.	8	2	1.50	1	100.
E-2	2	81.	58.	1008.	4	3	4.00	1	100.
EA-3	1	60.	76.	2562.	13	2	2.67	1	100.
EA-68	1	53.	60.	2184.	4	2	4.00	1	100.
F-4	1	39.	59.	2100.	12	2	.92	1	5000.
F-14	1	65.	63.	2394.	12	2	.92	1	5000.
F-18	1	41.	56.	1428.	12	1	.58	1	5000.
HH-2	4	44.	53.	336.	10	2	2.00	1	100.
MS(X)-L	4	54.	65.	336.	10	2	1.33	1	100.
KA-6	3	53.	56.	2016.	4	2	1.00	1	100.
UV-10	1	40.	40.	294.	12	1	2.00	1	1000.
HA-5	1	53.	76.	2774.	7	2	3.00	1	100.
HH-53	4	73.	89.	630.	17	2	1.48	1	100.
S-3	2	69.	54.	1050.	10	3	2.00	1	100.
SH-2	4	44.	53.	210.	10	2	1.54	1	100.
SH-3	4	62.	73.	336.	8	2	1.33	1	100.
UH-1	4	48.	58.	210.	21	2	1.00	1	1000.

FUEL CODE
0 = AVGAS
1 = JET

TYPE CODE
1 = TACTICAL
2 = PATROL
3 = CARGO
4 = ROTARY WING

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SHIP STATIC DATA FILE

SHIP	COMPLEMENT		CONSUMPTION RATES	
	OFF	ENL	FUEL (HBL/DAY)	AMMO (LRS/DAY)
AD	39	848	246.	500.
AE	17	283	177.	500.
AFS	27	227	191.	500.
AGF	14	180	229.	500.
AO	15	285	280.	500.
AOE	23	553	680.	500.
AR	35	840	297.	500.
CG	64	957	629.	1500.
CGN	71	964	500.	1500.
CVA/CV	140	2903	1771.	5000.
CVN	144	3250	0.	5000.
DD	18	270	486.	5000.
DDG	19	320	560.	5000.
FF	30	350	349.	5000.
FFG	24	380	400.	5000.
LCC	50	505	486.	500.
LHA	30	300	411.	6000.
LKA	30	330	411.	100.
LPD	28	435	629.	100.
LPH	47	641	343.	3000.
LSD	18	300	497.	3000.
LST	10	170	314.	3000.
MCS	28	465	400.	800.
MSO	6	67	40.	200.
PG	4	26	40.	200.
PHM	5	30	40.	200.

KIPPLE FACTOR TABLE

COMPONENT ID	PACING FACILITY	UNITS	OFFICER RIPPLE	ENLISTED RIPPLE	POWER RIPPLE
A3	ADMINISTRATIVE OFFICE	SF	.002600000	.016900000	.008600000
A4	DATA PROCESSING CENTER	SF	.002080000	.011800000	.006250000
A5	OFFICE EQUIP-APPLNCE RP.	SF	.013300000	.091700000	.208000000
A7	CORRECTIONAL FACILITY	SF	.000600000	.008900000	.009000000
B8	DREDGING	CY	0.000000000	0.000000000	0.000000000
B5A	WATERFRONT OPS. BLDG.	SF	.001390000	.084700000	.015300000
B13C	PORT CONTROL OFFICE	SF	.001460000	.005420000	.005000000
C3A	COMMUNICATION CENTER	SF	.001970000	.024600000	.065800000
C7	VISUAL STATION	SF	0.000000000	.044600000	.067000000
C13	CENTRAL TELEPHONE OFF.	SF	0.000000000	.036600000	.013900000
C27J	RECEIVER BUILDING	SF	.001040000	.012500000	.062500000
C32A	AIRCRAFT OPS. BUILDING	SF	.011400000	.108000000	.009850000
JA	SUPPLY CONTAINER HOLG PR	FB	0.000000000	0.000000000	.550000000
U3A1	SHIP FUEL STORAGE	BL	.000006250	.000081300	.000225000
U3A2	JET ENGINE FUEL STORAGE	BL	.000006250	.000081300	.000225000
U4C1	MOGAS STORAGE	BL	.000033000	.000370000	.000700000
U4C2	DIESEL FUEL STORAGE	BL	.000033000	.000370000	.000700000
U4C3	ACT. HTNG. FUEL STORAGE	BL	.000033000	.000370000	.000700000
U20	DISBURSING OFFICE	SF	.000750000	.006250000	.006250000
U24A	EXCHANGE LAUNDRY PLANT	SF	.000375000	.007750000	.034400000
U29A	AIR CARGO TERMINAL	SF	.000714000	.010900000	.000214000
U31A	GENERAL PURPOSE WAREHSE	SF	.000115000	.000800000	.001250000
U31E	SUPPLY PIER	FB	0.000000000	0.000000000	.549000000
U32A	COLD STORAGE WAREHOUSE	SF	0.000000000	.000862000	.030800000
U33A	AUTOMOTIVE MAINT. SHOP	SF	.000500000	.017500000	.010800000
P1	ADMINISTRATION (MIN.)	SF	.006410000	.144000000	.010700000
U2	HOSPITAL	SF	.000289000	.001070000	.002080000
G9	OUTPATIENT CLINIC	SF	.000208000	.002080000	.003130000
U28	DENTAL CLINIC	SF	.002600000	.005470000	.011700000
MA	AIRCRAFT RUNWAY	SY	0.000000000	.000108000	.001320000
H9J	MAINT. HANGER (HI-BAY)	SF	.000135000	.001760000	.015200000
J3A	HIGH EXPLOSIVE MAGAZINE	SF	.000047000	.000747000	.001410000
J3D	AMMUNITION PIER	FB	0.000000000	0.000000000	.637000000
J4	EXPLO. ORD. DISPOSAL BLDG	SF	.001040000	.003130000	.011500000
MA	FAMILY HOUSING	SF	.000001350	.000011300	.005070000
NA	BACHELOR ENLIST. QTRS.	SF	0.000000000	.000667000	.005860000
NC	BACHELOR OFFICERS QTRS.	SF	0.000000000	.000135000	.005500000
ND	EXCHANGE SERVICE STATION	SF	0.000000000	.001844000	.031600000
NE	SPECIAL SERVICES OFFICE	SF	.000190000	.001330000	.144000000
M10B	APPLIED INSTRUCTION BLDG	SF	.000124000	.000365000	.009160000
M14	CHAPEL	SF	.000750000	.000750000	.001500000
M16	COMM. OFF. MESS (OPEN)	SF	.000125000	.001250000	.005250000

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RIPPLE FACTOR TABLE

COMPONENT ID	PACING FACILITY	UNITS	OFFICER RIPPLE	ENLISTED RIPPLE	POWER RIPPLE
M17	EM CLUB, PO MESS (OPEN)	SF	.000179000	.002210000	.004900000
P5	PUBLIC WORKS SHOP	SF	.000875000	.033800000	.058300000
P5A	AUTOMOTIVE MAINT. SHOP	SF	.000062500	.002500000	.014000000
P12A	FIRE STATION	SF	0.000000000	.008700000	.006960000
P15	ELECTRIC POWER STATION	KW	0.000000000	9.000000000	0.000000000
P16	SEWAGE TREATMENT PLANT	KG	0.000000000	.027500000	.200000000
P18	WATER TREATMENT FACILITY	KG	0.000000000	.005730000	.200000000

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COMPONENT ESTIMATING RELATIONSHIP(E.R.) PARAMETERS

COMP. ID	CONSTRUCTION COST E.R.		EQUIPMENT COST E.R.		EQUIPMENT VOLUME E.R.		CONSTRUCTION TIME E.R.		REQUIRED LAND E.R.	
	CONSTANT	COEFF.	CONSTANT	COEFF.	CONSTANT	COEFF.	CONSTANT	COEFF.	CONSTANT	COEFF.
A3	0.	.183E+03	0.	.146E+02	0.	.611E+00	0.	.295E+00	0.	.391E-03
A4	0.	.155E+03	0.	.311E+02	0.	.565E+00	0.	.208E+00	0.	.278E-03
A5	0.	.788E+03	0.	.162E+03	0.	.331E+01	0.	.920E+00	0.	.217E-02
A7	0.	.127E+03	0.	.564E+01	0.	.200E+00	0.	.181E+00	0.	.350E-03
B8	0.	.995E+01	0.	0.	0.	0.	0.	.223E-02	0.	0.
B5A	0.	.370E+03	0.	.505E+04	0.	.370E+03	0.	.353E+00	0.	.556E-03
B13C	0.	.725E+02	0.	.240E+02	0.	.157E+01	0.	.103E+00	0.	.833E-04
C3A	0.	.144E+03	0.	.315E+03	0.	.640E+01	0.	.208E+00	0.	.219E-01
C7	0.	.436E+03	0.	.135E+03	0.	.297E+01	0.	.487E+00	0.	.112E-02
C13	0.	.211E+04	0.	.148E+02	0.	.430E+00	0.	.207E+00	0.	.174E-02
C27J	0.	.616E+03	0.	.175E+03	0.	.538E+01	0.	.348E+00	0.	.781E-01
C32A	0.	.806E+03	0.	.210E+04	0.	.175E+02	0.	.400E+00	0.	.114E-01
DA	0.	.105E+05	0.	.120E+03	0.	.502E+01	0.	.746E+00	0.	.206E-01
D3A1	0.	.218E+02	0.	.165E+01	0.	.169E+00	0.	.487E-01	0.	.108E-03
D3A2	0.	.325E+02	0.	.165E+01	0.	.169E+00	0.	.487E-01	0.	.110E-03
D4C1	0.	.478E+02	0.	.642E+01	0.	.420E+00	0.	.169E+00	0.	.230E-03
D4C2	0.	.484E+02	0.	.651E+01	0.	.427E+00	0.	.172E+00	0.	.240E-03
D4C3	0.	.830E+02	0.	.642E+01	0.	.420E+00	0.	.169E+00	0.	.230E-03
D20	0.	.731E+02	0.	.973E+01	0.	.627E+00	0.	.120E+00	0.	.225E-03
D24A	0.	.156E+03	0.	.212E+02	0.	.117E+01	0.	.197E+00	0.	.350E-03
D29A	0.	.418E+02	0.	.150E+02	0.	.714E+00	0.	.500E-01	0.	.700E-04
D31A	0.	.377E+02	0.	.151E+01	0.	.441E+00	0.	.483E-01	0.	.120E-03
D31E	0.	.696E+04	0.	.120E+03	0.	.501E+01	0.	.745E+00	0.	.426E-02
D32A	0.	.107E+03	0.	.650E+00	0.	.122E+00	0.	.634E-01	0.	.157E-04
D33A	0.	.756E+02	0.	.559E+03	0.	.274E+02	0.	.144E+00	0.	.100E-03
F1	0.	.257E+03	0.	.292E+04	0.	.840E+02	0.	.276E+00	0.	.267E-02
G2	0.	.125E+03	0.	.283E+01	0.	.312E+00	0.	.125E+00	0.	.726E-04
G9	0.	.116E+03	0.	.872E+01	0.	.905E+00	0.	.118E+00	0.	.208E-03
G28	0.	.127E+03	0.	.252E+02	0.	.148E+01	0.	.703E-01	0.	.234E-03
HA	0.	.752E+02	0.	.103E+01	0.	.592E-01	0.	.151E-01	0.	.413E-03
H9J	0.	.239E+03	0.	.442E+01	0.	.950E+00	0.	.978E-01	0.	.243E-03
J3A	0.	.126E+03	0.	.107E+02	0.	.584E+00	0.	.136E+00	0.	.117E-01
J3D	0.	.147E+05	0.	.120E+03	0.	.502E+01	0.	.744E+00	0.	.422E-02
J4	0.	.492E+03	0.	.204E+03	0.	.788E+01	0.	.345E+00	0.	.333E+00
NA	0.	.725E+02	0.	.155E+00	0.	.775E-01	0.	.129E+00	0.	.482E-04
NB	0.	.114E+03	0.	.352E+01	0.	.625E+00	0.	.128E+00	0.	.474E-04
NC	0.	.109E+03	0.	.929E+00	0.	.126E+00	0.	.120E+00	0.	.440E-04
ND	0.	.900E+03	0.	.160E+02	0.	.195E+01	0.	.641E+00	0.	.369E-02
NE	0.	.275E+04	0.	.430E+02	0.	.891E+01	0.	.248E+01	0.	.642E-02
N10B	0.	.160E+03	0.	.290E+01	0.	.373E+00	0.	.147E+00	0.	.130E-02

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COMPONENT ESTIMATING RELATIONSHIP(E.R.) PARAMETERS

COMP. ID	CONSTRUCTION		EQUIPMENT COST E.R.		EQUIPMENT VOLUME E.R.		CONSTRUCTION TIME E.R.		REQUIRE LAND E.R.	
	CONSTANT	COEFF.	CONSTANT	COEFF.	CONSTANT	COEFF.	CONSTANT	COEFF.	CONSTANT	COEFF.
N14	0.	.180E+03	0.	.585E+01	0.	.709E+00	0.	.120E+00	0.	.225E+03
N16	0.	.171E+03	0.	.592E+01	0.	.124E+01	0.	.120E+00	0.	.150E+03
N17	0.	.942E+02	0.	.276E+01	0.	.788E+00	0.	.858E+01	0.	.621E+02
P5	0.	.213E+03	0.	.637E+03	0.	.249E+02	0.	.371E+00	0.	.163E+02
P5A	0.	.933E+02	0.	.374E+02	0.	.136E+01	0.	.162E+00	0.	.388E+03
P12A	0.	.634E+02	0.	.476E+02	0.	.213E+01	0.	.111E+00	0.	.870E+04
P15	0.	.575E+03	0.	.185E+02	0.	.305E+01	0.	.144E+00	0.	.333E+03
P16	0.	.547E+04	0.	.289E+03	0.	.290E+02	0.	.204E+01	0.	.420E+01
P18	0.	.195E+04	0.	0.	0.	0.	0.	.869E+00	0.	.287E+01

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GENERAL CARGO PARAMETERS

CLASS OF SUPPLY AND DESCRIPTION	CONSUMPTION (LBS/MAN/DAY)	SPECIFIC VOLUME (CU.FT/LB)	UNIT COST (DOLLARS/LB)	NAVY FUNDED CONSUMPTION (LBS/MAN/DAY)
I SUBSISTENCE	6.223000	.036600	.930000	0.000000
II CLOTHING, TOOLS, ETC	4.100500	.041600	4.570000	3.706700
III PACKAGED POL	.451800	.025400	.530000	.451800
IV CONSTRUCT. MATERIAL	.657000	.051000	.416000	.657000
VI PERSONAL DEMAND	4.799000	.042600	2.260000	0.000000
VII MAJOR END ITEMS	.432000	.067200	2.290000	.432000
VIII MEDICAL MATERIAL	.134200	.065000	1.150000	.134200
IX REPAIR PARTS	.718900	.061800	2.290000	.718900
REEFER PROPORTION OF SUBSISTENCE =	.660			
REEFER UNIT COST =	1.42 DOLLARS PER POUND			
MOGAS UNIT COST =	52.92 DOLLARS PER BARREL			
DIESEL UNIT COST =	54.18 DOLLARS PER BARREL			
HEATING FUEL UNIT COST =	54.18 DOLLARS PER BARREL			

FUEL AND AMMUNITION SPECIFIC VOLUME FACTORS

MOGAS =	8.599000 BARRELS PER LONG TON
DIESEL =	7.582000 BARRELS PER LONG TON
HEATING FUEL =	6.495000 BARRELS PER LONG TON
SHIP FUEL (DFM) =	7.582000 BARRELS PER LONG TON
AIRCRAFT FUEL (JET) =	7.809000 BARRELS PER LONG TON
AMMUNITION =	1.070000 MEASUREMENT TONS PER SHORT TON

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SUMMARY OF ALGORITHM OVERRIDES

CATEGORY CODE	INDEX	OLD VALUE	NEW VALUE
A7	5	2500.00	2000.00
D31E	27	685.00	700.00
J3D	49	1.07	1.01

SUMMARY OF PARAMETER OVERRIDES

ITEM	INDEX	OLD VALUE	NEW VALUE
FC	15	.30	.20
FA	16	.20	.30

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	DAYS OF SUPPLY	OPERATING STOCKS	RESERVES
CARGO		30	90
AIRCRAFT FUEL		30	90
SHIP FUEL		30	90
BASE FUEL		30	90
AMMUNITION		30	90

PEACETIME-TO-WARTIME RATIOS

AIRCRAFT FUEL	.5000
SHIP FUEL	.5000
AIRCRAFT AMMUNITION	.0100
SHIP AMMUNITION	.0100

OTHER PLANNING FACTORS

FRACTION CARGO CONTAINERIZED	= .2000
FRACTION AMMO CONTAINERIZED	= .3000
FRACTION AT-SEA MEN WITH IMPACT ASHORE	= .0300
FRACTION BREAK-BULK CARGO DELIVERED BY AIR	= .1000

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BASE PERSONNEL INPUT PARAMETERS

OFFICER BILLET COST -	64.789	THOUSANDS OF DOLLARS
ENLISTED MAN BILLET COST -	23.569	THOUSANDS OF DOLLARS
FRACTION OFFICERS WITH FAMILIES OVERSEAS -	.620	
FRACTION ENLISTED MEN WITH FAMILIES OVERSEAS -	.320	
NUMBER OF DEPENDENTS PER MARRIED OFFICER -	2.73	
NUMBER OF DEPENDENTS PER MARRIED ENLISTED MAN -	2.68	
PERSONAL BELONGINGS ALLOWANCES		
UNMARRIED OFFICERS -	1573.0	CUBIC FEET
MARRIED OFFICERS -	1573.0	CUBIC FEET
UNMARRIED ENLISTED MEN -	1001.0	CUBIC FEET
MARRIED ENLISTED MEN -	1001.0	CUBIC FEET

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SUMMARY OF BASE LOADING
CASE 1D-TEST 1 FORCE 1D-1

TYPE	AIRCRAFT COMPLEMENT		
	LAND BASED	CARRIER BASED	TOTAL
A-6	0	20	20
A-7	0	48	48
CH-46	0	16	16
CH-53	0	6	6
E-2	0	8	8
F-14	0	48	48
S-3	0	20	20
UH-1	0	4	4

SHIP COMPLEMENT	
TYPE	TOTAL
AE	1
AFS	1
AD	1
AOE	2
CVA/CV	2
FF	5
FFG	16
LHA	1
LPD	4
LPH	1
LSD	2
LST	1

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SUPPLY CONSUMPTION RATES
CASE ID-TEST 1 FORCE 10-1

GENERAL CARGO PER DAY		
CLASS OF SUPPLY AND DESCRIPTION	SHORT TONS	MEASUREMENT TONS
I SUBSISTENCE		
REFRIGERATED	50	92
NON-REFRIGERATED	26	47
II CLOTHING, TOOLS, ETC	50	104
III PACKAGED POL	6	7
IV CONSTRUCT. MATERIAL	8	20
VI PERSONAL DEMAND	58	124
VII MAJOR END ITEMS	5	18
VIII MEDICAL MATERIAL	2	5
IX REPAIR PARTS	9	27

TOTAL GENERAL CARGO		
REFRIGERATED	50	92
NON-REFRIGERATED	164	352

TOTAL FUEL AND AMMUNITION		
SHIP FUEL (DIESEL FUEL, MARINE)	18	THOUSANDS OF BARRELS PER DAY
AIRCRAFT FUEL (JET)	6	THOUSANDS OF BARRELS PER DAY
AMMUNITION	328	SHORT TONS PER DAY

DAILY CONSUMPTION RATES

TOTAL GENERAL CARGO	17.516400	LBS/MAN/DAY
REFRIGERATED GENERAL CARGO	4.107180	LBS/MAN/DAY

MANPOWER					
LAND-BASED AIRCRAFT PERSONNEL	SEA-BASED AIRCRAFT PERSONNEL	SHIP PERSONNEL	OTHER FORCE ELEMENTS	HASE OPS PERSONNEL	HASE DEPENDENTS
OFFICERS	0	529	0	259	438
ENLISTED	0	3679	0	3285	2817
TOTAL	0	4208	0	3544	3255
		1154			2380
		18948			28769
		20142			31149

SUMMARY OF PROJECTED REQUIREMENT
CASE IU-TEST 1 FORCE IU-1

COMPONENT ID	PACING FACILITY	COMPONENT BASE OPS PERSONNEL OFFICERS	ENLISTED	PACING FACILITY REQUIREMENT
A3	ADMINISTRATIVE OFFICE	10.0	65.0	3846.8 SF
A4	DATA PROCESSING CENTER	3.0	17.0	1440.0 SF
A5	OFFICE EQUIP-APPLNCE RP.	7.2	49.7	541.9 SF
A7	CORRECTIONAL FACILITY	5.3	77.9	8757.5 SF
BB	DREDGING	0.0	0.0	133333.0 CY
B5A	WATERFRONT OPS. BLDG.	2.0	122.0	1440.0 SF
B13C	PORT CONTROL OFFICE	17.4	64.7	11942.5 SF
C3A	COMMUNICATION CENTER	9.0	112.2	4560.0 SF
C7	VISUAL STATION	0.0	19.9	446.2 SF
C13	CENTRAL TELEPHONE OFF.	0.0	35.4	968.1 SF
C27J	RECEIVER BUILDING	1.0	12.0	960.0 SF
C32A	AIRCRAFT OPS. BUILDING	15.0	142.6	1320.0 SF
DA	SUPPLY CONTAINER HDLG PR	0.0	0.0	2050.0 FB
D3A1	SHIP FUEL STORAGE	12.0	156.0	1918665.0 BL
D3A2	JET ENGINE FUEL STORAGE	4.0	52.0	639870.0 BL
D4C1	MOGAS STORAGE	4.5	50.1	135523.9 BL
D4C2	DIESEL FUEL STORAGE	.7	7.6	20516.0 BL
D4C3	ACT. HTNG. FUEL STORAGE	1.7	18.6	50234.2 BL
D20	DISBURSING OFFICE	1.3	10.7	1709.7 SF
D24A	EXCHANGE LAUNDRY PLANT	2.8	58.3	7521.8 SF
D29A	AIR CARGO TERMINAL	.9	13.9	12709.2 SF
D31A	GENERAL PURPOSE WAREHSE	46.1	320.8	401059.4 SF
D31E	SUPPLY PIER	0.0	0.0	1400.0 FB
D32A	COLD STORAGE WAREHOUSE	0.0	95.1	110339.3 SF
O33A	AUTOMOTIVE MAINT. SHOP	5.3	186.6	10663.7 SF
F1	ADMINISTRATION (MIN.)	8.3	186.3	1293.8 SF
G2	HOSPITAL	32.5	120.5	112577.2 SF
G9	OUTPATIENT CLINIC	1.6	16.3	7839.8 SF
G28	DENTAL CLINIC	7.5	15.8	2891.2 SF
HA	AIRCRAFT RUNWAY	0.0	24.0	222222.0 SY
H9J	MAINT. MANGER (HI-BAY)	.1	1.9	1056.4 SF
J3A	HIGH EXPLOSIVE MAGAZINE	25.0	398.0	532842.2 SF
J3D	AMMUNITION PIER	0.0	0.0	2050.0 FB
J4	EXPLO. ORD. DISPOSAL BLDG	1.0	3.0	960.0 SF
NA	FAMILY HOUSING	2.2	18.2	1614978.2 SF
NB	BACHELOR ENLIST. QTRS.	0.0	229.3	343838.9 SF
NC	BACHELOR OFFICERS QTRS.	0.0	11.8	87164.5 SF
ND	EXCHANGE SERVICE STATION	0.0	5.8	3131.1 SF

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SUMMARY OF PROJECTED REQUIREMENT
CASE ID-TEST 1 FORCE ID-1

COMPONENT ID	PACING FACILITY	COMPONENT BASE OPS PERSONNEL OFFICERS	ENLISTED	PACING FACILITY REQUIREMENT
NE	SPECIAL SERVICES OFFICE	.7	5.2	3902.4 SF
N108	APPLIED INSTRUCTION BLOG	3.6	10.9	29738.4 SF
N14	CHAPEL	9.9	9.9	13186.5 SF
N16	COMM. OFF. MESS (OPEN)	1.4	13.8	11048.2 SF
N17	EM CLUB, PC MESS (OPEN)	5.4	67.1	30382.3 SF
P5	PUBLIC WORKS SHOP	9.3	361.2	10685.4 SF
P5A	AUTOMOTIVE MAINT. SHOP	.6	23.8	9530.2 SF
P12A	FIRE STATION	0.0	40.2	4615.3 SF
P15	ELECTRIC POWER STATION	0.0	9.0	23251.1 KW
P16	SEWAGE TREATMENT PLANT	0.0	20.7	752.9 KG
P18	WATER TREATMENT FACILITY	0.0	4.3	752.9 KG

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SUMMARY OF COMPONENT REQUIREMENT
CASE 10-TEST 1 FORCE 10-1

COMP. ID	COMPONENT DESCRIPTION	CONSTRUCTION COST (THOUSANDS OF DOLLARS)	EQUIPMENT COST (THOUSANDS OF DOLLARS)	EQUIPMENT CUBE (MEASUREMENT TONS)	CONSTRUCTION TIME (MAN-DAYS)	LAND REQMT (ACRES)
A3	ADMIN. OFFICE, POST OFFICE	703	56	59	1135	2
A4	DATA PROCESSING FACILITY	223	45	20	300	0
A5	ELECTRONIC MAINTENANCE	427	88	45	499	1
A7	SHORE PATROL HEADQUARTERS	1111	49	44	1582	3
B8	WATERFRONT SAFETY FACILITIES	13267	0	0	2973	0
B5A	BOAT POOL	533	7278	13328	508	1
B13C	PORT SERVICES OFFICE	866	286	468	1230	1
C3A	NAVAL STATION COMMUNICATIONS	655	1435	729	948	100
C7	VISUAL STATION OPERATING BASE	194	60	33	217	0
C13	INTERNAL COMMUNICATIONS	2047	14	10	200	2
C27J	DIRECTION FINDER STATION	591	168	129	334	75
C32A	AIR TRAFFIC CONTROL COMPONENT	1064	2767	577	528	15
UA	CONTAINER OPERATIONS (NON-AMMO)	21581	257	257	1529	42
D3A1	TANK FARM, SHIP FUEL	41827	3166	8106	93439	207
D3A2	TANK FARM, JET ENGINE FUEL	20783	1056	2703	31162	70
U4C1	TANK FARM, BASE SUPPLY MOGAS	6481	870	1423	22904	31
U4C2	TANK FARM, BASE SUPPLY DIESEL	993	134	219	3529	5
D4C3	TANK FARM, BASE HEATING FUEL	4170	323	527	8490	12
U20	DISBURSING OFFICE	125	17	27	205	0
D24A	SHIPS STORE FACILITY	1175	159	220	1482	3
D29A	AIR CARGO TERMINAL	531	191	227	635	1
U31A	SUPPLY STORAGE AND ADMINISTRATION	15140	606	4422	19371	48
U31E	SUPPLY SUPPORT FACILITIES	9744	184	175	1043	6
D32A	REFRIGERATED STORAGE	11860	72	337	6995	2
D33A	MATERIALS HANDLING FACILITIES	807	5966	7294	1536	1
F1	CARGO HANDLING BATTALION	333	3782	2717	357	3
G2	HOSPITAL	14058	318	878	14072	8
G9	DISPENSARY	909	68	177	925	2
G28	DENTAL CLINIC	368	73	107	203	1
HA	AIRFIELD OPERATIONS SUPPORT	16716	229	329	3356	92
H9J	AIRCRAFT MAINTENANCE FACILITIES	253	5	25	103	0
J3A	AMMUNITION DEPOT	67167	5682	7779	72467	6234
J3D	ORDNANCE SUPPORT FACILITIES	30169	246	257	1525	9
J4	EXPLOSIVE ORDNANCE DISPOSAL	473	196	189	335	320
NA	FAMILY SUPPORT	117118	250	3129	208332	78
N8	ENLISTED PERSONNEL SUPPORT	39297	1210	5372	44011	16
NC	OFFICER PERSONNEL SUPPORT	9490	81	275	10460	4
ND	PERSONAL SRVCS (ALL PERSONNEL)	2818	50	153	2007	12

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SUMMARY OF COMPONENT REQUIREMENT
CASE 10-TEST 1 FORCE 10-1

COMP. ID	COMPONENT DESCRIPTION	CONSTRUCTION COST (THOUSANDS OF DOLLARS)	EQUIPMENT COST (THOUSANDS OF DOLLARS)	EQUIPMENT CUBE (MEASUREMENT TONS)	CONSTRUCTION TIME (MAN-DAYS)	LAND REQMT (ACRES)
NE	RECREATIONAL FAC. (ALL PERS.)	10716	168	869	9689	25
N10B	MILITARY TRAINING AND EDUCATION	4763	86	277	4371	39
N14	CHAPEL	2377	77	234	1582	3
N16	OFFICERS RECREATION	1893	65	344	1326	2
N17	ENLISTED RECREATION	2861	84	599	2607	189
P5	PUBLIC WORKS UNIT	2273	6811	6642	3964	17
P5A	AUTOMOTIVE MAINTENANCE	889	357	325	1544	4
P12A	FIRE PROTECTION	292	220	246	512	0
P15	BASE POWER PLANT	13369	430	1772	3348	8
P16	WASTE MANAGEMENT	4117	218	546	1539	32
P18	WATER SYSTEM	1465	0	0	654	22
TOTAL FOR BASE		50185	45924	74622	592046	7746

FOOTNOTE - CONSTRUCTION COSTS NOT MODIFIED TO REFLECT GEOGRAPHIC COST MULTIPLIERS

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INDIAN OCEAN AREA
CASE ID-TEST 1 FORCE ID-1

GEOGRAPHIC DEPENDENT INPUTS

CONSTRUCTION COST MULTIPLIER -	2.200	
TRANSPORT COSTS		
GENERAL CARGO -	73.10	DOLLARS PER MEASUREMENT TON
REEFER CARGO -	140.40	DOLLARS PER MEASUREMENT TON
PERSONNEL -	497.00	DOLLARS PER PERSON
BULK POL -	41.90	DOLLARS PER LONG TON
AMMUNITION -	144.10	DOLLARS PER MEASUREMENT TON
PROPORTION LAND REQUIREMENT PURCHASED -	0.000	
LAND PURCHASE COST -	0.0	DOLLARS PER ACRE
LAND LEASE COST -	1000.0	DOLLARS PER ACRE

BASE INITIAL INVESTMENT COSTS

(COSTS IN THOUSANDS OF DOLLARS)

BASE FACILITY CONSTRUCTION	-1102386
INITIAL OUTFITTING (EQUIPMENT AND SUPPLIES)	- 45924
TRANSPORT OF EQUIPMENT AND SUPPLIES	- 5455
TRANSPORT OF BASE PERSONNEL AND DEPENDENTS	- 3379
TRANSPORT OF PERSONAL BELONGINGS	- 6753
LAND ACQUISITION	- 0

TOTAL BASE INITIAL INVESTMENT COST	-1163897

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INDIAN OCEAN AREA
CASE 10-TEST 1 FORCE 10-1

BASE ANNUAL RECURRING COSTS

(COSTS IN THOUSANDS OF DOLLARS)

PERSONNEL BILLETS -	94178
SUPPLIES AND EQUIPMENT -	26182
TRANSPORT OF SUPPLIES AND EQUIPMENT -	3938
BASE FUEL -	33474
TRANSPORT OF BASE FUEL -	3339
TRANSPORT OF ROTATIONAL PERSONNEL AND DEPENDENTS -	2253
TRANSPORT OF PERSONAL BELONGINGS -	4502
LAND LEASE -	7746

TOTAL BASE ANNUAL RECURRING COST -	175611

SUPPORTED FORCES ANNUAL TRANSPORT COSTS - CONUS TO FORWARD BASE

(COSTS IN THOUSANDS OF DOLLARS)

SUPPLIES AND EQUIPMENT -	14104
SHIP FUEL -	18429
AIRCRAFT FUEL -	5967
SHIP AMMUNITION -	36
AIRCRAFT AMMUNITION -	138

ABCOMO TEST CASE

SOUTH ATLANTIC AREA
CASE ID-TEST 1 FORCE ID-1

GEOGRAPHIC DEPENDENT INPUTS

CONSTRUCTION COST MULTIPLIER -	1.600		
TRANSPORT COSTS			
GENERAL CARGO -	50.00	DOLLARS PER MEASUREMENT TON	
REEFER CARGO -	96.00	DOLLARS PER MEASUREMENT TON	
PERSONNEL -	246.00	DOLLARS PER PERSON	
BULK POL -	21.65	DOLLARS PER LONG TON	
AMMUNITION -	98.60	DOLLARS PER MEASUREMENT TON	
PROPORTION LAND REQUIREMENT PURCHASED -	0.000		
LAND PURCHASE COST -	0.0	DOLLARS PER ACRE	
LAND LEASE COST -	1000.0	DOLLARS PER ACRE	

BASE INITIAL INVESTMENT COSTS

(COSTS IN THOUSANDS OF DOLLARS)

BASE FACILITY CONSTRUCTION -	801735
INITIAL OUTFITTING (EQUIPMENT AND SUPPLIES) -	45924
TRANSPORT OF EQUIPMENT AND SUPPLIES -	3731
TRANSPORT OF BASE PERSONNEL AND DEPENDENTS -	1672
TRANSPORT OF PERSONAL BELONGINGS -	4619
LAND ACQUISITION -	0

TOTAL BASE INITIAL INVESTMENT COST -	857682

SOUTH ATLANTIC AREA
CASE ID-TEST 1 FORCE ID-1

BASE ANNUAL RECURRING COSTS

(COSTS IN THOUSANDS OF DOLLARS)

PERSONNEL BILLETS -	94178
SUPPLIES AND EQUIPMENT -	26182
TRANSPORT OF SUPPLIES AND EQUIPMENT -	2693
BASE FUEL -	33474
TRANSPORT OF BASE FUEL -	1725
TRANSPORT OF ROTATIONAL PERSONNEL AND DEPENDENTS -	1115
TRANSPORT OF PERSONAL BELONGINGS -	3079
LAND LEASE -	7746

TOTAL BASE ANNUAL RECURRING COST -	170193

SUPPORTED FORCES ANNUAL TRANSPORT COSTS - CONUS TO FORWARD BASE

(COSTS IN THOUSANDS OF DOLLARS)

SUPPLIES AND EQUIPMENT -	9646
SHIP FUEL -	9522
AIRCRAFT FUEL -	3083
SHIP AMMUNITION -	25
AIRCRAFT AMMUNITION -	95

SUMMARY OF BASE LOADING
CASE ID-TEST 1 FORCE ID-2

AIRCRAFT COMPLEMENT			
TYPE	LAND BASED	CARRIER BASED	TOTAL
A-6	0	20	20
A-7	0	48	48
CH-46	16	0	16
CH-53	6	0	6
E-2	0	8	8
F-14	0	48	48
S-3	0	20	20
UH-1	4	0	4

SHIP COMPLEMENT	
TYPE	TOTAL
AOE	2
CVA/CV	2
FF	4
FFG	8

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SUPPLY CONSUMPTION RATES
CASE ID-TEST 1 FORCE ID-2

GENERAL CARGO PER DAY		SHORT TONS	MEASUREMENT TONS				
CLASS OF SUPPLY AND DESCRIPTION							
I SUBSISTENCE							
REFRIGERATED		36	65				
NON-REFRIGERATED		18	33				
II CLOTHING, TOOLS, ETC		35	74				
III PACKAGED POL		4	5				
IV CONSTRUCT. MATERIAL		6	14				
VI PERSONAL DEMAND		42	88				
VII MAJOR END ITEMS		4	13				
VIII MEDICAL MATERIAL		1	4				
IX REPAIR PARTS		6	19				
TOTAL GENERAL CARGO		36	65				
REFRIGERATED		116	250				
NON-REFRIGERATED							
TOTAL FUEL AND AMMUNITION							
SHIP FUEL (DIESEL FUEL, MARINE)				9	THOUSANDS OF BARRELS PER DAY		
AIRCRAFT FUEL (JET)				6	THOUSANDS OF BARRELS PER DAY		
AMMUNITION				296	SHORT TONS PER DAY		
TOTAL GENERAL CARGO		17,516,400	LBS/MAN/DAY				
REFRIGERATED GENERAL CARGO		4,107,180	LBS/MAN/DAY				
MANPOWER							
LAND-BASED AIRCRAFT PERSONNEL							
SEA-BASED AIRCRAFT PERSONNEL							
SHIP PERSONNEL							
OTHER FORCE ELEMENTS							
BASE OPS PERSONNEL							
BASE DEPENDENTS							
TOTAL PERSONNEL							
OFFICERS	89					415	1927
ENLISTED	374					2,836	22,174
TOTAL	463					3,251	24,101

SUMMARY OF PROJECTED REQUIREMENT
CASE ID-TEST 1 FORCE 10-2

COMPONENT ID	PACING FACILITY	COMPONENT BASE OPS PERSONNEL OFFICERS	ENLISTED	PACING FACILITY REQUIREMENT
A3	ADMINISTRATIVE OFFICE	13.1	85.0	5027.9 SF
A4	DATA PROCESSING CENTER	3.0	17.0	1440.0 SF
A5	OFFICE EQUIP-APPLNCE RP.	8.6	59.3	646.9 SF
A7	CORRECTIONAL FACILITY	6.5	96.4	10832.3 SF
BB	DREDGING	0.0	0.0	1333333.0 CY
BSA	WATERFRONT OPS. BLDG.	2.0	122.0	1440.0 SF
B13C	PORT CONTROL OFFICE	13.8	51.1	9426.6 SF
C3A	COMMUNICATION CENTER	9.0	112.2	4560.0 SF
C7	VISUAL STATION	0.0	15.7	352.2 SF
C13	CENTRAL TELEPHONE OFF.	0.0	43.5	1144.5 SF
C27J	RECEIVER BUILDING	1.0	12.0	960.0 SF
C32A	AIRCRAFT OPS. BUILDING	15.0	142.6	1320.0 SF
DA	SUPPLY CONTAINER HDLG PP	0.0	0.0	2050.0 FM
D3A1	SHIP FUEL STORAGE	6.2	81.1	947290.0 BL
D3A2	JET ENGINE FUEL STORAGE	4.0	52.0	639470.0 BL
D4C1	MORGAS STORAGE	5.2	54.9	159061.4 HL
D4C2	DIESEL FUEL STORAGE	.9	9.9	24415.3 BL
D4C3	ACT. HING. FUEL STORAGE	1.9	21.4	54944.8 HL
D20	DISBURSING OFFICE	1.7	14.0	2234.6 SF
D24A	EXCHANGE LAUNDRY PLANT	3.1	64.3	8244.0 SF
D29A	AIR CARGO TERMINAL	.4	12.7	11634.3 SF
D31A	GENERAL PURPOSE WAREHOUSE	35.7	248.2	310277.8 SF
D31E	SUPPLY PIER	0.0	0.0	1400.0 FM
D32A	COLD STORAGE WAREHOUSE	0.0	73.2	44918.1 SF
D33A	AUTOMOTIVE MAINT. SHOP	4.2	147.3	4417.1 SF
F1	ADMINISTRATION (MIN.)	6.5	147.1	1621.7 SF
G2	HOSPITAL	27.4	102.9	94151.2 SF
G9	OUTPATIENT CLINIC	1.4	17.7	4504.7 SF
G28	DENTAL CLINIC	4.8	14.4	3343.3 SF
HA	AIRCRAFT RUNWAY	0.0	24.0	22222.0 SF
H9J	MAINT. HANGAR (HI-RAY)	.1	1.4	35422.4 SF
J1A	HIGH EXPLOSIVE MAGAZINE	23.1	367.4	491418.4 SF
J3U	AMMUNITION PIER	0.0	0.0	2050.0 FM
J4	EXPLC. ORU. DISPOS. BLDG	1.0	3.0	940.0 SF
MA	FAMILY HOUSING	2.2	14.2	161244.0 SF
NH	BACHELOR ENLIST. QTRS.	0.0	319.7	47435.5 SF
NC	BACHELOR OFFICERS QTRS.	0.0	24.9	14445.3 SF
ND	EXCHANGE SERVICE STATION	0.0	7.0	3416.7 SF

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SUMMARY OF PROJECTED REQUIREMENT
CASE ID-TEST 1 FORCE ID-2

COMPONENT ID	PACING FACILITY	COMPONENT BASE OPS PERSONNEL OFFICERS\$ ENLISTED	PACING FACILITY REQUIREMENT
NE	SPECIAL SERVICES OFFICE	.9	4730.2 SF
N108	APPLIED INSTRUCTION BLDG	4.7	38401.9 SF
N14	CHAPEL	11.3	15051.2 SF
N16	COMM. OFF. MESS (OPEN)	1.5	12246.4 SF
N17	EM CLUB, PO MESS (OPEN)	6.4	35737.5 SF
P5	PUBLIC WORKS SHOP	12.2	13966.3 SF
P5A	AUTOMOTIVE MAINT. SHOP	.8	12469.1 SF
P12A	FIRE STATION	31.2	5416.9 SF
P15	ELECTRIC POWER STATION	0.0	24513.2 KW
P16	SEWAGE TREATMENT PLANT	0.0	883.7 KG
P18	WATER TREATMENT FACILITY	0.0	883.7 KG

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SUMMARY OF COMPONENT REQUIREMENT
CASE ID-TEST 1 FORCE ID-2

COMP. ID	COMPONENT DESCRIPTION	CONSTRUCTION COST (THOUSANDS OF DOLLARS)	EQUIPMENT COST (THOUSANDS OF DOLLARS)	EQUIPMENT CUBE (MEASUREMENT TONS)	CONSTRUCTION TIME (MAN-DAYS)	LAND REQMT (ACRES)
A3	ADMIN. OFFICE, POST OFFICE	919	73	77	1483	2
A4	DATA PROCESSING FACILITY	223	45	20	300	0
A5	ELECTRONIC MAINTENANCE	510	105	54	595	1
A7	SHORE PATROL HEADQUARTERS	1375	61	54	1957	4
B8	WATERFRONT SAFETY FACILITIES	13267	0	0	2973	0
B5A	BOAT POOL	533	7278	13328	508	1
B13C	PORT SERVICES OFFICE	683	226	370	971	1
C3A	NAVAL STATION COMMUNICATIONS	655	1435	729	948	100
C7	VISUAL STATION OPERATIONS BASE	153	47	26	171	0
C13	INTERNAL COMMUNICATIONS	2515	18	13	246	2
C27J	DIRECTION FINDER STATION	591	168	129	334	75
C32A	AIR TRAFFIC CONTROL COMPONENT	1064	2767	577	528	15
DA	CONTAINER OPERATIONS (NON-AMMO)	21581	246	257	1529	42
D3A1	TANK FARM, SHIP FUEL	21741	1646	4214	48568	108
D3A2	TANK FARM, JET ENGINE FUEL	20783	1056	2703	31162	70
U4C1	TANK FARM, BASE SUPPLY MOGAS	7606	1021	1670	26881	37
U4C2	TANK FARM, BASE SUPPLY DIESEL	1298	175	286	4612	6
U4C3	TANK FARM, BASE HEATING FUEL	4895	379	619	9964	14
U20	DISBURSING OFFICE	163	22	35	268	1
D24A	SHIPS STORE FACILITY	1296	176	243	1634	3
U29A	AIR CARGO TERMINAL	486	175	208	582	1
D31A	SUPPLY STORAGE AND ADMINISTRATION	11713	469	3421	14986	37
D31E	SUPPLY SUPPORT FACILITIES	9744	168	175	1043	6
U32A	REFRIGERATED STORAGE	9128	55	259	5364	1
D33A	MATERIALS HANDLING FACILITIES	637	4709	5757	1212	1
F1	CARGO HANDLING BATTALION	263	2984	2144	282	3
G2	HOSPITAL	12007	272	750	12019	7
G9	DISPENSARY	986	74	192	1004	2
G28	DENTAL CLINIC	432	85	126	239	1
HA	AIRFIELD OPERATIONS SUPPORT	16716	229	329	3356	92
H9J	AIRCRAFT MAINTENANCE FACILITIES	8471	157	841	3464	9
J3A	AMMUNITION DEPOT	61996	5244	7181	66887	5754
J3D	ORDNANCE SUPPORT FACILITIES	30169	246	257	1525	9
J4	EXPLOSIVE ORDNANCE DISPOSAL	473	196	189	335	320
NA	FAMILY SUPPORT	116964	250	3125	208058	78
N8	ENLISTED PERSONNEL SUPPORT	54783	1687	7490	61355	23
NC	OFFICER PERSONNEL SUPPORT	20059	171	580	22109	8
ND	PERSONAL SVCS (ALL PERSONNEL)	3435	61	186	2446	14

SUMMARY OF COMPONENT REQUIREMENT
CASE ID-TEST 1 FORCE ID-2

COMP. ID	COMPONENT DESCRIPTION	CONSTRUCTION COST (THOUSANDS OF DOLLARS)	EQUIPMENT COST (THOUSANDS OF DOLLARS)	EQUIPMENT CUBE (MEASUREMENT TONS)	CONSTRUCTION TIME (MAN-DAYS)	LAND REQMT (ACRES)
NE	RECREATIONAL FAC. (ALL PERS.)	12990	203	1053	11721	30
N10B	MILITARY TRAINING AND EDUCATION	6150	111	358	5645	50
N14	CHAPEL	2713	88	267	1806	3
N16	OFFICERS RECREATION	2099	72	381	1470	2
N17	ENLISTED RECREATION	3366	99	704	3066	222
P5	PUBLIC WORKS UNIT	2971	8903	8682	5181	23
P5A	AUTOMOTIVE MAINTENANCE	1163	466	425	2020	5
P12A	FIRE PROTECTION	343	258	289	601	0
P15	BASE POWER PLANT	14095	453	1869	3530	8
P16	WASTE MANAGEMENT	4834	255	641	1807	37
P18	WATER SYSTEM	1720	0	0	768	25
TOTAL FOR BASE		512756	45084	73282	579537	7252

FOOTNOTE - CONSTRUCTION COSTS NOT MODIFIED TO REFLECT GEOGRAPHIC COST MULTIPLIERS

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INDIAN OCEAN AREA
CASE ID-TEST 1 FORCE ID-2

GEOGRAPHIC DEPENDENT INPUTS

CONSTRUCTION COST MULTIPLIER -	2.200	
TRANSPORT COSTS		
GENERAL CARGO -	73.10	DOLLARS PER MEASUREMENT TON
REEFER CARGO -	140.40	DOLLARS PER MEASUREMENT TON
PERSONNEL -	497.00	DOLLARS PER PERSON
BULK POL -	41.90	DOLLARS PER LONG TON
AMMUNITION -	144.10	DOLLARS PER MEASUREMENT TON
PROPORTION LAND REQUIREMENT PURCHASED -	0.000	
LAND PURCHASE COST -	0.0	DOLLARS PER ACRE
LAND LEASE COST -	1000.0	DOLLARS PER ACRE

BASE INITIAL INVESTMENT COSTS

(COSTS IN THOUSANDS OF DOLLARS)

BASE FACILITY CONSTRUCTION	-1128062
INITIAL OUTFITTING (EQUIPMENT AND SUPPLIES) -	45084
TRANSPORT OF EQUIPMENT AND SUPPLIES -	5357
TRANSPORT OF BASE PERSONNEL AND DEPENDENTS -	3380
TRANSPORT OF PERSONAL BELONGINGS -	6753
LAND ACQUISITION -	0

TOTAL BASE INITIAL INVESTMENT COST	-1188637

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INDIAN OCEAN AREA
CASE ID-TEST 1 FORCE ID-2

BASE ANNUAL RECURRING COSTS

(COSTS IN THOUSANDS OF DOLLARS)

PERSONNEL BILLETS -	93800
SUPPLIES AND EQUIPMENT -	26240
TRANSPORT OF SUPPLIES AND EQUIPMENT -	3940
BASE FUEL -	39739
TRANSPORT OF ROTATIONAL PERSONNEL -	3965
TRANSPORT OF PERSONNEL AND DEPENDENTS -	2254
TRANSPORT OF PERSONAL BELONGINGS -	4502
LAND LEASE -	7252

TOTAL BASE ANNUAL RECURRING COST -	181690

SUPPORTED FORCES ANNUAL TRANSPORT COSTS - CONUS TO FORWARD BASE

(COSTS IN THOUSANDS OF DOLLARS)

SUPPLIES AND EQUIPMENT -	10019
SHIP FUEL -	9579
AIRCRAFT FUEL -	5967
SHIP AMMUNITION -	19
AIRCRAFT AMMUNITION -	138

SOUTH ATLANTIC AREA
CASE ID-TEST 1 FORCE ID-2

GEOGRAPHIC DEPENDENT INPUTS

CONSTRUCTION COST MULTIPLIER -	1.600	
TRANSPORT COSTS		
GENERAL CARGO -	50.00	DOLLARS PER MEASUREMENT TON
REEFER CARGO -	96.00	DOLLARS PER MEASUREMENT TON
PERSONNEL -	246.00	DOLLARS PER PERSON
BULK POL -	21.65	DOLLARS PER LONG TON
AMMUNITION -	98.60	DOLLARS PER MEASUREMENT TON
PROPORTION LAND REQUIREMENT PURCHASED -	0.000	
LAND PURCHASE COST -	0.0	DOLLARS PER ACRE
LAND LEASE COST -	1000.0	DOLLARS PER ACRE

BASE INITIAL INVESTMENT COSTS

(COSTS IN THOUSANDS OF DOLLARS)

BASE FACILITY CONSTRUCTION -	820409
INITIAL OUTFITTING (EQUIPMENT AND SUPPLIES) -	45084
TRANSPORT OF EQUIPMENT AND SUPPLIES -	3664
TRANSPORT OF BASE PERSONNEL AND DEPENDENTS -	1673
TRANSPORT OF PERSONAL BELONGINGS -	4619
LAND ACQUISITION -	0

TOTAL BASE INITIAL INVESTMENT COST -	875449

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SOUTH ATLANTIC AREA
CASE ID-TEST 1 FORCE 10-2

BASE ANNUAL RECURRING COSTS

(COSTS IN THOUSANDS OF DOLLARS)

TRANSPORT OF PERSONNEL	93401
SUPPLIES AND EQUIPMENT	26240
TRANSPORT OF SUPPLIES AND EQUIPMENT	2694
TRANSPORT OF ROTATIONAL PERSONNEL AND DEPENDENTS	39739
TRANSPORT OF PERSONAL BELONGINGS	2049
LAND LEASE	1115
	3074
	7252
TOTAL BASE ANNUAL RECURRING COST	175968

SUPPORTED FORCES ANNUAL TRANSPORT COSTS - CONUS TO FORWARD BASE

(COSTS IN THOUSANDS OF DOLLARS)

SUPPLIES AND EQUIPMENT	6854
SHIP FUEL	4950
AIRCRAFT FUEL	3083
SHIP AMMUNITION	13
AIRCRAFT AMMUNITION	95

III MODEL DESCRIPTION

A. Introduction

This chapter presents a detailed description of the logic and mathematics that form the basis of the ABCOMO model. As indicated previously, the model is designed to determine the necessary facilities, personnel, and equipment required for an advanced permanent supply base to support Navy and Marine forces over prolonged periods of operation, and to provide estimates of the initial investment and recurring annual costs to construct and operate such a base within different geographical regions of the world.

The supply base represented by the model is assumed composed of 49 functional components, each of which includes the facilities, personnel, and equipment to perform a distinct function necessary to the operation of the base. These components are listed in Table III-1. The amount of facilities, personnel, and equipment required by each component is a direct function of the size and configuration of the peak forces to be supported by the base. Associated with each component is a facing facility--i.e., a facility whose size can be directly related to the supported force composition, and from which can be scaled the amount and associated costs of facilities, personnel, and equipment required by the total component. These relationships include consideration of the ripple effect for personnel requirements where, as supported personnel are assigned to the base, additional personnel are required to provide base support for these personnel and hence increase the requirements imposed on the base components, which in turn impose additional personnel requirements for base support, and so on. The supply base is assumed to normally operate under peacetime conditions. However, provisions are made for storage of wartime reserves of supplies, fuel and ammunition; and components associated with the receiving, handling, and shipping of fuel and ammunition are sized utilizing projected wartime consumption rates.

Table III-1

SUPPLY BASE COMPONENTS

Component ID	Component Description	Component ID	Component Description
A3	Administration Office, Post Office	F1	Cargo Handling Battalion
A4	Data Processing Facility	G2	Hospital
A5	Electronic Maintenance	G9	Dispensary
A7	Shore Patrol Headquarters	G28	Dental Clinic
BB	Waterfront Safety Facilities	HA	Airfield Operations Support
B5A	Boat Pool	H9J	Aircraft Maintenance Facilities
B13C	Port Services Office	J3A	Ammunition Depot
C3A	Naval Station Communications	J3D	Ordnance Support Facilities
C7	Visual Station, Operating Base	J4	Explosive Ordnance Disposal
C13	Internal Communications	NA	Family Support
C27J	Direction Finder Station	NR	Enlisted Personnel Support
C32A	Air Traffic Control Component	NC	Officer Personnel Support
DA	Container Operations (non-ammunition)	ND	Personal Services (all personnel)
D3A1	Tank Farm, Ship Fuel	NE	Recreational Facilities (all personnel)
D3A2	Tank Farm, Jet Engine Fuel	N10B	Military Training and Education
D4C1	Tank Farm, Base Supply NOGAS	N14	Chapel
D4C2	Tank Farm, Base Supply, Diesel	N16	Officers' Recreation
D4C3	Tank Farm, Base Heating Fuel	N17	Enlisted Recreation
D20	Disbursing Office	P5	Public Works Unit
D24A	Ships Store Facility	P5A	Automotive Maintenance
D29A	Air Cargo Terminal	PL2A	Fire Protection
D31A	Supply Storage and Administration	PL5	Base Power Plant
D31E	Supply Support Facilities	PL6	Waste Management
D32A	Refrigerated Storage	PL8	Water System
D33A	Materials Handling Facilities		

The general structure of the model is presented in Figure III-1. In the sections that follow, each box in the figure is sequentially addressed in detail.

B. Model Inputs

The model inputs are segregated into four groupings: Static Input Data File, Program Parameter Overrides, Supported Force Composition Inputs, and Geographic-Dependent Inputs.

1. Static Input Data File

The input data file consists of data that will remain constant, for the most part, in routine applications of the model. This data file itself can be broken down into seven input groupings: Aircraft Static Parameters, Ship Static Parameters, Ripple Factors, Component Estimating Relationship Parameters, General Cargo Parameters, Fuel Specific Volume Factors, and Base Personnel Input Parameters. Table III-2 lists and defines the generic inputs that are included in each of these groupings.

2. Program Parameter Overrides

Built into the program are two sets of numerical parameters: Pacing Facility Requirement Algorithm Parameters and Operational Planning Numbers. Although these sets of parameters have specific default values within the program, the user has the option of overriding the default values of any subset of either of these parameter sets for a given model run. The Pacing Facility Requirement Algorithm Parameters are defined in Table III-3, together with their associated default values which are used by the model if no override value is specified. (The algorithms themselves are listed in Tables III-7 and III-8 which appear, respectively, in Sections D-1 and D-2 later in this chapter.) The Operational Planning Number definitions and associated default values are as indicated in Table III-4.

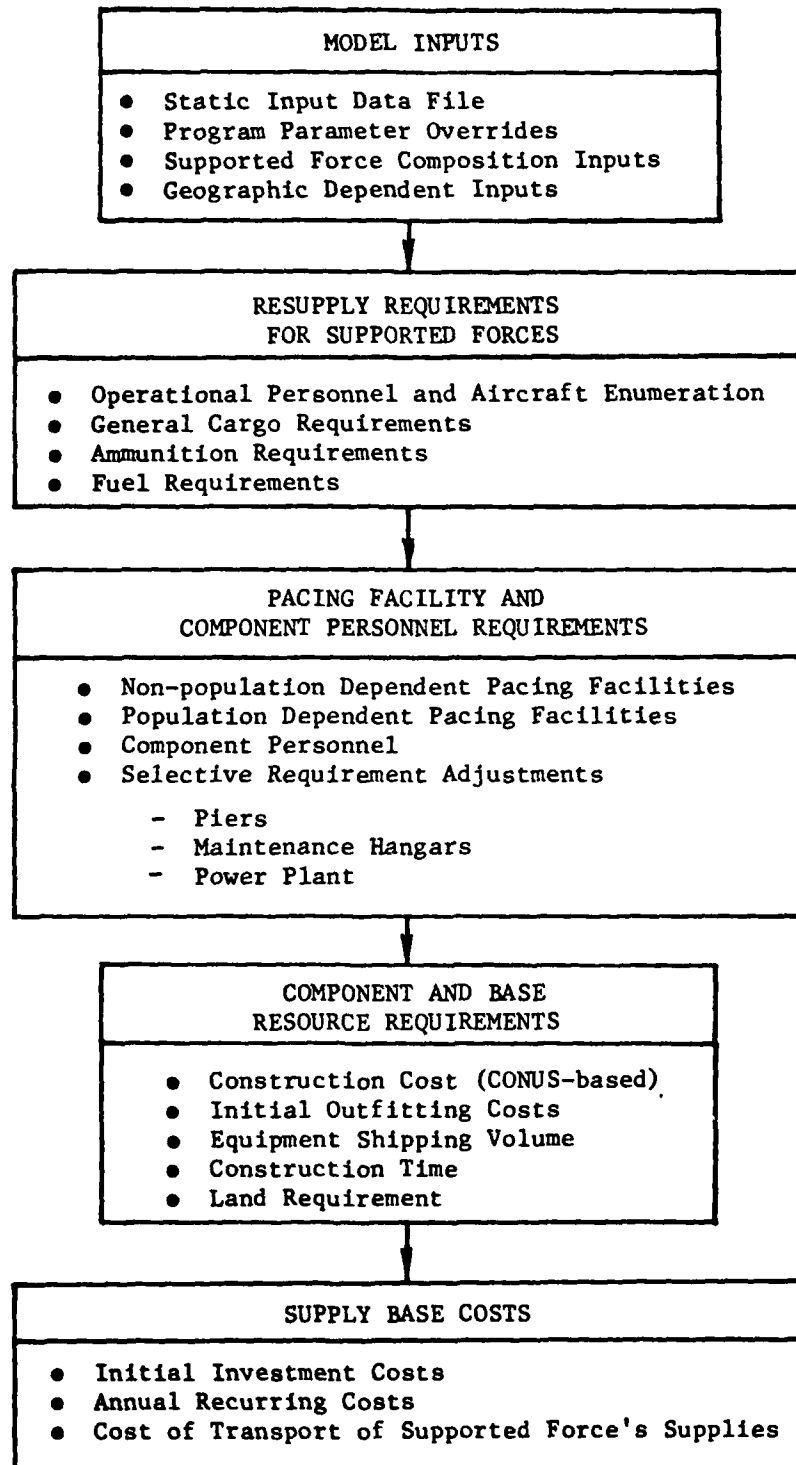


FIGURE III-1 GENERAL STRUCTURE OF ABCOMO MODEL

Table III-2

STATIC INPUT DATA FILE

Aircraft Static Parameters (One Set for Each Aircraft Type Included in the File)	
i	Aircraft type designator (alphanumeric)
TC_i	Mission type code for aircraft type i (1 - Tactical 3 - Cargo 2 - Patrol 4 - Rotary wing)
WS_i	Wingspan of aircraft type i (ft)*
L_i	Length of aircraft type i (ft)
FP_i	Daily wartime fuel consumption for aircraft type i (gal/day)
SQ_i	Number of aircraft per squadron for aircraft type i *
O_{pi}	Officer crew complement per aircraft of type i
E_{pi}	Enlisted crew complement per aircraft of type i
O_{mi}	Officer maintenance complement per aircraft of type i
E_{mi}	Enlisted maintenance complement per aircraft of type i
FC_i	Fuel code for aircraft type i (0 - AVGAS, 1 - JP-5)*
AP_i	Daily wartime ammunition consumption for aircraft type i (lb/day)
Ship Static Parameters (One Set for Each Ship Type Included in the File)	
i	Ship type designator (alphanumeric)
O_{si}	Officer crew complement per ship of type i
E_{si}	Enlisted crew complement per ship of type i
FS_i	Daily wartime fuel consumption for ship type i (bbl/day)
AS_i	Daily wartime ammunition consumption for ship type i (lb/day)

Table III-2 (Continued)

Ripple Factors (One Set for Each Base Functional Component)	
i	Functional component designator (alphanumeric)
R_{oi}	Officer ripple factor for component i (officers/PFRU†)
R_{ei}	Enlisted ripple factor for component i (enlisted men/PFRU†)
R_{pi}	Power ripple factor for component i (kW/PFRU†)
Component Estimating Relationship (ER) Parameters (One Set for Each Base Functional Component)	
i	Functional component designator (alphanumeric)
b_{ci}	Construction cost constant factor for component i (dollars)
m_{ci}	Construction cost coefficient for component i (dollars/PFRU†)
b_{ei}	Equipment cost constant factor for component i (dollars)
m_{ei}	Equipment cost coefficient for component i (dollars/PFRU†)
b_{vi}	Equipment shipping volume constant factor for component i (cu ft)
m_{vi}	Equipment shipping volume coefficient for component i (cu ft/PFRU†)
b_{ti}	Construction time constant factor for component i (man-days)
m_{ti}	Construction time coefficient for component i (man-days/PFRU†)
b_{li}	Required land constant factor for component i (acres)
m_{li}	Required land coefficient for component i (acres/PFRU†)

Table III-2 (Continued)

General Cargo Parameters (One Set for Each Supply Class Except Bulk POL and Ammunition)	
i	Supply class designator
C_i	Daily consumption factor for supply class i (lb/man/day)
SV_i	Specific volume for supply class i (cu ft/lb)
UC_i	Unit cost for supply class i (dollars/lb) $\mp$
NC_i	Navy-funded daily consumption for supply class i (lb/man/day)
Additional General Cargo Parameters	
P_r	Percent of daily subsistence that is refrigerated
UC_r	Unit cost of refrigerated subsistence (dollars/lb)
UC_m	Unit cost of motor gasoline (dollars/bbl)
UC_d	Unit cost of diesel fuel (dollars/bbl)
UC_h	Unit cost of heating fuel (dollars/bbl)
Fuel Specific Volume Factors	
SV_m	Specific volume of motor gasoline (bbl/LT)
SV_d	Specific volume of diesel fuel (bbl/LT)
SV_h	Specific volume of heating fuel (bbl/LT)
SV_s	Specific volume of ship fuel (DFM) (bbl/LT)
SV_p	Specific volume of aircraft fuel (JP-5) (bbl/LT)

Table III-2 (Concluded)

Base Personnel Input Parameters	
BC_O	Officer average annual billet cost (thousands of dollars)
BC_E	Enlisted man average annual billet cost (thousands of dollars)
P_{mo}	Fraction of officers accompanied by their families
P_{me}	Fraction of enlisted men accompanied by their families
D_{mo}	Number of dependents per married officer
D_{me}	Number of dependents per married enlisted man
PBL_{uo}	Personal belongings allowance--unmarried officers (cu ft)
PBL_{mo}	Personal belongings allowance--married officers (cu ft)
PBL_{ue}	Personal belongings allowance--unmarried enlisted men (cu ft)
PBL_{me}	Personal belongings allowance--married enlisted men (cu ft)

* These aircraft static parameters are carryovers from the ABLE model, but are not used in the present ABCOMO model. However, they are maintained in case future revisions warrant their use.

† PFRU = Pacing facility requirement unit.

‡ For supply class I, unit cost refers to nonrefrigerated subsistence (subsistence unit costs normally will not be required, since these are assumed included in annual billet costs).

Table III-3

ALGORITHM PARAMETER
DEFAULT VALUES AND INDICES

Component	Index	Default Value	Description
A3	1	0.9	Administration Office (SF/man)
A4	2	1,440.	Data Processing Center Requirement (SF)
A5	3	200.	Repair Shop--Constant Requirement (SF)
	4	0.08	Repair Shop--Variable Requirement (SF/man)
A7	5	2,500.	Correctional Facility--Constant Requirement (SF)
	6	1.581	Correctional Facility--Variable Requirement (SF/man)
BB	7	1,333,333.	Dredging Requirement (CY)
B5A	8	1,440.	Waterfront Operations Building Requirement (SF)
B13C	9	7.2	Port Control Office (SF/MT/day)
C3A	10	4,560.	Communications Center Requirement (SF)
C7	11	0.269	Visual Station (SF/MT/day)
C13	12	250.	Telephone Office--Constant Requirement (SF)
	13	0.168	Telephone Office--Variable Requirement (SF/man)
C27J	14	960.	Receiver Building Requirement (SF)
C32A	15	1,320.	Aircraft Operations Building Requirement (SF)
DA	16	1,025.	Minimum Supply Container Berth (FB)
	17	.084	Supply Container Berth Length Factor (FB/MT)
D4C1	18	0.15	MOGAS Storage (BL/man/day)
D4C2	19	0.04	Diesel Fuel Storage (BL/man/day)
D4C3	20	0.0556	Heating Fuel Storage (BL/man/day)
D20	21	0.4	Disbursing Office Requirement (SF/man)
D24A	22	5,000.	Exchange Laundry Plant--Constant Requirement (SF)
	23	0.59	Exchange Laundry Plant--Variable Requirement (SF/man)
D29A	24	8,000.	Air Cargo Terminal--Constant Requirement (SF)
	25	104.	Air Cargo Terminal--Variable Requirement (SF/MT/day)
D31A	26	7.448	General Purpose Warehouse Storage (SF/MT)
D31E	27	685.	Minimum Supply Berth (FB)
	28	.274	Supply Berth Length Factor (FB/MT)
D32A	29	7.84	Reefer Storage (SF/MT)
D33A	30	6.429	Automotive Maintenance Shop Requirement (SF/MT/day)
F1	31	0.78	Cargo Handling Administration Office Requirement (SF/MT/day)
G2	32	40,000.	Hospital--Constant Requirement (SF)
	33	2.33	Hospital--Variable Requirement (SF/man)
G9	34	4,000.	Outpatient Clinic--Constant Requirement (SF)
	35	0.51	Outpatient Clinic--Variable Requirement (SF/man)
G28	36	0.0	Dental Clinic--Constant Requirement (SF)
	37	0.384	Dental Clinic--Variable Requirement (SF/man)
HA	38	222,222.	Runway Requirement (SY)
H9J	39	23.33	Hangar Requirement--Transient Cargo Aircraft (SF/MT/day)
	40	1,331.	Hangar Requirement--(SF/Type 1 Aircraft)
	41	3,173.	Hangar Requirement--(SF/Type 2 Aircraft)
	42	1,997.	Hangar Requirement--(SF/Type 3 Aircraft)

CONTENTS

Component	Index	Default Value	Description
10A	43	1.0	Administrative Services
	44	1.0	Administrative Services
10B	45	1,000.0	Administrative Services
	46	1,000.0	Administrative Services
	47	1,000.0	Administrative Services
	48	1,000.0	Administrative Services
	49	1,000.0	Administrative Services
	50	1,000.0	Administrative Services
10C	51	1,000.0	Administrative Services
10D	52	1,000.0	Administrative Services
10E	53	1,000.0	Administrative Services
10F	54	1,000.0	Administrative Services
10G	55	1,000.0	Administrative Services
10H	56	1,000.0	Administrative Services
10I	57	1,000.0	Administrative Services
10J	58	1,000.0	Administrative Services
10K	59	1,000.0	Administrative Services
10L	60	1,000.0	Administrative Services
10M	61	1,000.0	Administrative Services
10N	62	1,000.0	Administrative Services
10O	63	1,000.0	Administrative Services
10P	64	1,000.0	Administrative Services
10Q	65	1,000.0	Administrative Services
10R	66	1,000.0	Administrative Services
10S	67	1,000.0	Administrative Services
10T	68	1,000.0	Administrative Services
10U	69	1,000.0	Administrative Services
10V	70	1,000.0	Administrative Services
10W	71	1,000.0	Administrative Services
10X	72	1,000.0	Administrative Services
10Y	73	1,000.0	Administrative Services
10Z	74	1,000.0	Administrative Services
11A	75	1,000.0	Administrative Services
11B	76	1,000.0	Administrative Services
11C	77	1,000.0	Administrative Services
11D	78	1,000.0	Administrative Services
11E	79	1,000.0	Administrative Services
11F	80	1,000.0	Administrative Services
11G	81	1,000.0	Administrative Services
11H	82	1,000.0	Administrative Services
11I	83	1,000.0	Administrative Services
11J	84	1,000.0	Administrative Services
11K	85	1,000.0	Administrative Services
11L	86	1,000.0	Administrative Services
11M	87	1,000.0	Administrative Services
11N	88	1,000.0	Administrative Services
11O	89	1,000.0	Administrative Services
11P	90	1,000.0	Administrative Services
11Q	91	1,000.0	Administrative Services
11R	92	1,000.0	Administrative Services
11S	93	1,000.0	Administrative Services
11T	94	1,000.0	Administrative Services
11U	95	1,000.0	Administrative Services
11V	96	1,000.0	Administrative Services
11W	97	1,000.0	Administrative Services
11X	98	1,000.0	Administrative Services
11Y	99	1,000.0	Administrative Services
11Z	100	1,000.0	Administrative Services

Table III-4

OPERATIONAL PLANNING NUMBERS,
DEFAULT VALUES, AND INDICES

Identifier	Index	Default Value	Description
DOS _c	1	30.	Days of Supply--Cargo (Operating Stocks)
DOS _{cr}	2	90.	Days of Supply--Cargo (Reserves)
DOS _p	3	30.	Days of Supply--Aircraft Fuel (Operating Stocks)
DOS _{pr}	4	90.	Days of Supply--Aircraft Fuel (Reserves)
DOS _s	5	30.	Days of Supply--Ship Fuel (Operating Stocks)
DOS _{sr}	6	90.	Days of Supply--Ship Fuel (Reserves)
DOS _b	7	30.	Days of Supply--Base Fuel (Operating Stocks)
DOS _{br}	8	90.	Days of Supply--Base Fuel (Reserves)
DOS _a	9	30.	Days of Supply--Ammunition (Operating Stocks)
DOS _{ar}	10	90.	Days of Supply--Ammunition (Reserves)
PC _{af}	11	.5	Ratio of Peacetime-to-Wartime Aircraft Fuel Consumption
PC _{sf}	12	.5	Ratio of Peacetime-to-Wartime Ship Fuel Consumption
PC _{aa}	13	.01	Ratio of Peacetime-to-Wartime Aircraft Ammunition Consumption
PC _{sa}	14	.01	Ratio of Peacetime-to-Wartime Ship Ammunition Consumption
F _c	15	.3	Fraction Cargo Containerized
F _a	16	.2	Fraction Ammunition Containerized
g	17	.03	Fraction at-Sea Men with Impact Ashore
F _{ac}	18	.1	Fraction Break-Bulk Cargo Delivered by Air

3. Supported Force Composition Inputs

The model allows for a number of different supported force compositions to be processed in turn during a given model run. For each force composition, as indicated in Table III-5, aircraft must be identified by type, number per type, and carrier-based indicator; ships must be identified by type and number per type; and land-based* troops must be identified by total numbers of officers and enlisted men.

4. Geographic-Dependent Inputs

For each supported force composition, the model allows for bases located in any number of different geographical areas as specified by a different set of geographic-dependent inputs to be processed. As will be described later in this chapter, the model determines all the requirements of the supply base without considering geography (the bulk of the computations for a given supported force composition), and then applies the geographic-dependent inputs to those results to obtain the ultimate base costs considering the geographical location. Table III-6 identifies the specific geographic-dependent inputs required for the model.

C. Resupply Requirements for Supported Forces

The first computational function of the model is to establish the resupply requirements for the operational forces supported by the supply base. In the performance of these computations, several auxiliary computations are also performed to determine values of some of the associated variables that will be required in subsequent model computations. The computations discussed in this section fall under the following four broad headings: Operational Personnel and Aircraft Enumeration, General Cargo Requirements, Ammunition Requirements, and Fuel Requirements.

*"Land-based," as used in the model, refers to operational personnel and aircraft located at the supply base and not at some other land location.

Table III-5

SUPPORTED FORCE COMPOSITION INPUTS

For Each Supported Force Composition to be Processed, One Set of the Following Input Specifications	
Aircraft Complement (One or More Sets for Each Aircraft Type Included in the Force)	
i	Aircraft type designator*
NP_i	Number of type i aircraft in this group
IC_i	Carrier-based indicator $\begin{pmatrix} 0 - \text{land-based} \\ 1 - \text{carrier-based} \end{pmatrix}$
Ship Complement (One or More Sets for Each Ship Type Included in the Force)	
i	Ship type designator*
NS_i	Number of type i ships in this group
Land-Based Troop Complement	
O_T	Number of officers in the land-based troop complement
E_T	Number of enlisted men in the land-based troop complement

* Aircraft and ship type designators must agree with one of the respective designators appearing in the static input data file.

Table 1.1.1.1

For Each Department, the following information is provided:	
$CF_{j,t}$	Construction cost of building j
$TS_{j,t}$	Transport cost of building j from the construction site to the site of the building
$TR_{j,t}$	Transport cost of building j from the construction site to the site of the building
$CTF_{j,t}$	Transport cost of building j from the construction site to the site of the building
$CTA_{j,t}$	Transport cost of building j from the construction site to the site of the building
$PCF_{j,t}$	Property tax on building j
$CPA_{j,t}$	Land purchase cost of building j
$CLA_{j,t}$	Land lease cost of building j

1. Operational Personnel and Aircraft Enumeration

The most dominant force in determining the size of the supply base is the numbers of personnel to be supported. Most of the components that are allowed to vary in size are, in one way or another, related to the personnel, both operational and base support, served by the base. The operational personnel served by the base are strictly a function of the support force composition and thus the model accumulates the numbers of these personnel, segregating them by commission status and location for subsequent model use. The principal personnel variables enumerated are the following:

- O_L = Number of officers in the land-based operational forces
- O_S = Number of officers in the sea-based operational forces
- E_L = Number of enlisted men in the land-based operational forces
- E_S = Number of enlisted men in the sea-based operational forces
- M_L = Number of military personnel in the land-based operational forces
- M_S = Number of military personnel in the sea-based operational forces

The manner by which these variables are computed is given by the following six equations, where the first four are derived from input values and the latter two are then functions of the first four:

$$O_L = O_T + \sum_{i=1}^{N_P} (NP_i \cdot (1 - IC_i) (O_{pi} + O_{mi})) \quad (III-1)$$

$$O_S = \sum_{i=1}^{N_S} (NS_i \cdot O_{si}) + \sum_{i=1}^{N_P} (NP_i \cdot IC_i \cdot (O_{pi} + O_{mi})) \quad (III-2)$$

$$E_L = E_T + \sum_{i=1}^{N_P} (NP_i \cdot (1 - IC_i) (E_{pi} + E_{mi})) \quad (III-3)$$

$$E_S = \sum_{i=1}^{N_S} (NS_i \cdot E_{si}) + \sum_{i=1}^{N_P} (NP_i \cdot IC_i \cdot (E_{pi} + E_{mi})) \quad (III-4)$$

$$M_L = O_L + E_L \quad (III-5)$$

$$M_S = O_S + E_S \quad (III-6)$$

In the above equations, N_p and N_s denote, respectively, the number of aircraft and ship types in the Static Input Data File, and for aircraft and ship types not included in the force composition, NP_i and NS_i are assumed equal to zero, respectively.

In addition to these personnel enumerations, the model also enumerates the numbers of land-based aircraft in accordance with their maintenance hangar requirements. For maintenance hangar requirements, as derived in this model, fixed wing aircraft of lengths equal to or less than 85 ft and rotary wing aircraft are considered as Type 1 aircraft and the remaining aircraft are considered as Type 2 aircraft, where the latter require more hangar space per aircraft than the former. (In NAVFAC planning documents, the number of aircraft per squadron is also considered in determining hangar requirements, but for the purposes of this model, the above criterion is assumed sufficient). In equation form, then,

$$NA_{L1} = \sum_{i=1}^{N_p} (NP_i \cdot (1 - IC_i)) \text{ for all } i \text{ such that } TC_i = 4 \text{ or } L_i \leq 85 \text{ ft} \quad (III-7)$$

$$NA_{L2} = \sum_{i=1}^p (NP_i \cdot (1 - IC_i)) \text{ for all } i \text{ such that } TC_i \neq 4 \text{ and } L_i > 85 \text{ ft} \quad (III-8)$$

2. General Cargo Requirements

The term "general cargo," in the context of this model, refers to the combined nine classes of supply excepting bulk POL and ammunition. Thus the following supply classes are included in the definition of general cargo: I--Subsistence; II--Clothing, Tools, etc.; III--Packaged POL; IV--Construction Material; VI--Personnel Demand Items; VII--Major End Items; VIII--Medical Material; and IX--Repair Parts. For each general cargo supply class, the model computes the total daily consumption for the supported forces in terms of both weight and cube. These computations are performed in accordance with the following two equations:

$$W_i = C_i \cdot (M_L + M_S) / 2000 \quad (\text{III-9})$$

$$V_i = SV_i \cdot W_i / 40 \quad (\text{III-10})$$

where

W_i = Total supported force daily consumption by weight (ST) of Supply Class i items

V_i = Total supported force daily consumption by cube (MT) of Supply Class i items.

The total daily consumption of all general cargo in terms of weight (W_T) and cube (V_T) is then obtained as follows:

$$W_T = \sum_{i=1}^{IX} W_i \quad (\text{III-11})$$

$$V_T = \sum_{i=1}^{IX} V_i \quad (\text{III-12})$$

For subsistence items (Supply Class I), the model also computes the total supported force daily consumption of refrigerated items in terms of both weight (W_r) and cube (V_r) as follows:

$$W_r = p_r W_I \quad (\text{III-13})$$

$$V_r = SV_I \cdot W_r \quad (\text{III-14})$$

For subsequent model use, certain general cargo specific volumes are required. These are:

SV_c = Average specific volume (MT/ST) of all general cargo items

SV_r = Average specific volume (MT/ST) of refrigerated general cargo items

SV_{nr} = Average specific volume of nonrefrigerated general cargo items.

These factors are computed as follows:

$$SV_c = V_T/W_T \quad (111-14)$$

$$SV_r = V_r/W_r \quad (111-15)$$

$$SV_{nr} = (V_T - V_r)/(W_T - W_r). \quad (111-16)$$

Two additional parameters required later in the model are the following:

C_{gc} = Daily consumption rate per man (lb/man/day) of all general cargo items

P_r = Proportion (by weight) of daily general cargo consumption that requires refrigeration.

These are computed as follows:

$$C_{gc} = 2000 W_T/(M_L + M_S) \quad (111-17)$$

$$P_r = W_r/W_T. \quad (111-18)$$

3. Ammunition Requirements

The total daily wartime ammunition requirements for the supported forces are directly derivable from the aircraft and ship input data. For subsequent model use, it is convenient to first compute the total daily ammunition requirements of the land-based aircraft and that of combined sea-based aircraft and ships. Let

A_L = Total daily wartime ammunition requirement (lb/day) for land based aircraft

A_{Sp} = Total daily wartime ammunition requirement (lb/day) for sea-based aircraft

A_{Ss} = Total daily wartime ammunition requirement (lb/day) for ships.

Then,

$$A_L = \sum_{i=1}^N (NP_i \cdot (I - IC_i) \cdot AP_i) \quad (III-20)$$

$$A_{Sp} = \sum_{i=1}^N (NP_i \cdot IC_i \cdot AP_i) \quad (III-21)$$

$$A_{Ss} = \sum_{i=1}^N (NS_i \cdot AS_i) \quad (III-22)$$

Since the supply base is to be configured to handle ammunition shipments and transshipments during wartime periods, the daily average ammunition throughput for the base to be used for sizing the ammunition piers and handling components must be based on expected wartime throughput. Daily throughput refers to the average amount of supplies coming in and leaving the supply base each day. If we let X_A denote the daily average poundage of ammunition arriving at the base, and Q_A denote the daily average poundage of ammunition leaving the base, both under wartime conditions, then

$$X_A = A_L + A_{Sp} + A_{Ss} \quad (III-23)$$

$$Q_A = A_{Sp} + A_{Ss} \quad (III-24)$$

The total daily average ammunition throughput is then the sum of X_A and Q_A .

4. Fuel Requirements

The total daily fuel consumption for the forces under wartime condition is also directly derivable from the aircraft and ship input data. Let F_s and F_p denote the total daily wartime fuel consumption (BBbl/day) for ships and aircraft respectively; then

$$F_s = \sum_{i=1}^{N_s} (NS_i \cdot FS_i) \quad (III-25)$$

$$F_p = \sum_{i=1}^{N_p} (NP_i \cdot FP_i) / 42 \quad (III-26)$$

where the division by 42 in the second equation converts gallons per day to barrels per day.

D. Pacing Facility and Component Personnel Requirements

For each functional component of the supply base, one of its facilities has been selected as the pacing facility for that component--i.e., a facility whose size can be directly related to the supported force composition and from which can be scaled the amount and associated costs of facilities, personnel, and equipment required by the total component. The next step in the model process is to determine the size of these pacing facilities.

The pacing facilities can be divided into two categories, depending on whether or not the pacing facility size, and hence that of the total component, is population-dependent. For example, the requirement for ship fuel storage is strictly a function of the fuel consumption characteristics of the ships in the supported forces, and does not depend on the number or personnel in the supply base population. On the other hand, the requirement for bachelor enlisted quarters depends on both the number of land-based operational enlisted men and the number of enlisted men in the base support force. Thus, the former pacing facility (ship fuel storage) is non-population dependent, while the latter pacing facility (bachelor enlisted quarters) is population-dependent.

The manner by which the model calculates the pacing facility requirements differs, depending on the population dependency of the pacing facilities.

These computations are thus discussed separately in the next two subsections. Following this, the procedure for computing the component personnel requirements is described. Also, there are several adjustments that have to be made to the pacing facility requirements after the component personnel requirements are determined. These are discussed at the end of this section.

1. Non-Population-Dependent Pacing Facilities

There are twelve pacing facilities (components) whose size is independent of the supply base population. These are listed in Table III-7, together with the equations used by the model to compute their size requirements. All variables listed in the table have been identified previously in this chapter, either as an input parameter or as one of the factors computed earlier in the model. The numerical values occurring in the equation, with the exception of unit conversion factors such as 2000 pounds per short ton, are pacing facility requirement algorithm parameters whose values are built into the model but that can be changed by user option through specifying a parameter override as input (see Section B-2 of this chapter). After these equations are used to compute the required sizes of the non-population-dependent pacing facilities, the model then computes the numbers of officers and enlisted men that will be required by each associated component to perform that component's function within the operation of the supply base. These computations make use of the input-specified officer and enlisted men ripple factors (R_{oi} and R_{ei} respectively) for the various supply base components. If R_i denotes the size requirement for the pacing facility associated with the i^{th} component, then the numbers of officers (O_i) and enlisted men (E_i) required by that component are determined as follows:

$$O_i = R_{oi} \cdot R_i \quad (\text{III-27})$$

$$E_i = R_{ei} \cdot R_i \quad (\text{III-28})$$

Table III-7
NON-POPULATION-DEPENDENT COMPONENTS REQUIREMENT EQUATIONS

Component ID	Pacing Facility		Req. Units	Requirement Equation
	Category Code	Description		
A4	610-20	Data Processing Center	SF	One 1440 SF Facility per Base
BB	165-10	Dredging	CY	Average of 1,333,333 CY per Base
B5A	159-64	Waterfront Operations Building	SF	One 1440 SF Facility per Base
C3A	131-15	Communications Center	SF	One 4560 SF Facility per Base
C27J	131-35	Receiver Building	SF	One 960 SF Facility per Base
C32A	141-40	Aircraft Operations Building	SF	One 1320 SF Facility per Base
D3A1	411-10	Ship Fuel Storage	BL	$(DOS_{sr} + PC_{sf} \cdot DOS_{sf}) \cdot \sum_{i=1}^{N_s} (FS_i \cdot NS_i)$
D3A2	411-50	Jet Engine Fuel Storage	BL	$(DOS_{pr} + PC_{af} \cdot DOS_{p'}) \cdot \sum_{i=1}^{N_p} (FP_i \cdot NP_i) / 42$
HA	111-10	Aircraft Runway	SY	One 222,222 SY Runway per Base
J3A	421-22	High Explosive Magazine	SF	$(19 \text{ SF/ST}) \cdot (DOS_{ar} + PC_{aa} \cdot DOS_a) \cdot \sum_{i=1}^P (AP_i \cdot NP_i) / 2000$ $+ (14 \text{ SF/ST}) \cdot (DOS_{ar} + PC_{sa} \cdot DOS_a) \cdot \sum_{i=1}^{N_s} (AS_i \cdot NS_i) / 2000$
J3D	151-10	Ammunition Pier	FB	$[(.090 \text{ FB/ST}) \cdot X_a \cdot F_a + (.243 \text{ FB/ST}) \cdot ((1-F_a) \cdot X_a + Q_a)] / 2000$
J4	143-20	Explosive Ordnance Disposal Building	SF	One 960 SF Facility per Base

One component (P15--Base Power Plant) is assumed to have a fixed basic cadre of officers and enlisted men, given by its associated ripple factors $R_{o,P15}$ and $R_{e,P15}$, although the size of the component is population-dependent. It is assumed that additional personnel required are provided by other base functional components. The model next accumulates the numbers of officers and enlisted men required by these pacing facilities as follows:

$$R_o = \sum_i O_i + R_{o,P15} \quad (\text{III-29})$$

$$R_e = \sum_i E_i + R_{e,P15} \quad (\text{III-30})$$

where R_o and R_e denote, respectively, the total number of officers and enlisted men required by the non-population-dependent components, and the sums in the above equation are taken over these components only.

2. Population-Dependent Pacing Facilities

The computations for the pacing facility requirements for the population-dependent components must include consideration of the so-called "ripple effect". This terminology is adopted from the earlier ABLE model documentation and refers to the damping process where, as support personnel are assigned to the base, additional personnel are required to provide base support for these personnel and hence increase the requirements imposed on the population-dependent components which, in turn, impose additional personnel requirements for base support, and so on. This rippling of personnel requirements eventually converges to a fixed set of personnel requirements for the various base components. The manner in which the pacing facility requirements for the population-dependent components is determined is adopted, in principle, from the ABLE model, and this involves the solution of a set of simultaneous equations relating personnel requirements and pacing facility requirements.

The basic equations for the pacing facility requirements for the population-dependent components are presented in Table III-8. In these equations, the variables whose principal designator is C, M, O, or E refer, respectively, to civilians, military personnel, officers, and enlisted men. The associated subscripts B, L, and S refer to base support personnel, land-based operational personnel, and sea-based operational personnel, respectively. Civilians refer to dependents of base support personnel, and this variable can be expressed in terms of the variables O_B and E_B as follows:

$$C = P_{mo} \cdot D_{mo} \cdot O_B + P_{me} \cdot D_{me} \cdot E_B \quad (III-31)$$

With this representation of C, all the equations in Table III-8 can be written as follows:

$$R_i = C_{oi} \cdot O_B + C_{ei} \cdot E_B + K_i \quad (III-32)$$

where i refers to each of the 36 population-dependent components,* C_{oi} and C_{ei} are the respective coefficients for the base officer and enlisted man variables derived from the equation in Table III-8 for the component i, and K_i represents the summation of the constant terms appearing in component i's equation. For example, consider Component G2, Hospital. The associated equation in Table III-8 for this component can be expressed as above with

$$C_{oi} = (2.33 \text{ SF/man}) \cdot (1 + P_{mo} \cdot D_{mo}) \quad (III-33)$$

$$C_{ei} = (2.33 \text{ SF/man}) \cdot (1 + P_{me} \cdot D_{me}) \quad (III-34)$$

and

$$K_i = 40000 \text{ SF} + (2.33 \text{ SF/man}) \cdot (M_L + M_S) \quad (III-35)$$

*The requirement for the one remaining component, P15-Base Power Plant, is computed subsequently in the model as described in the next subsection.

Table III-8

POPULATION-DEPENDENT COMPONENTS REQUIREMENT EQUATIONS

Component ID	Pacing Facility		Req. Units	Requirement Equation
	Category Code	Description		
A3	610-10	Administrative Office	SF	$(0.9 \text{ SF/man}) \cdot (M_B + M_L + gM_S)$
A5	218-70	Office Equipment/Appliance Repair Shop	SF	$200 \text{ SF} + (0.08 \text{ SF/man}) \cdot (M_B + M_L + gM_S)$
A7	730-15	Correctional Facility	SF	$2500 \text{ SF} + (1.581 \text{ SF/man}) \cdot (M_B + M_L + gM_S)$
B13C	137-40	Port Control Office	SF	$(7.2 \text{ SF/MT/day}) \cdot [SV_c \cdot C_c \cdot (C+M_B + M_L + M_S + (1-g)M_S) + (1.07 \text{ MT/ST}) \cdot (X_a + Q_a)] / 2000$
C7	137-40	Visual Station	SF	$(0.269 \text{ SF/MT/day}) \cdot [SV_c \cdot C_c \cdot (C+M_B + M_L + M_S + (1-g)M_S) + (1.07 \text{ MT/ST}) \cdot (X_a + Q_a)] / 2000$
C13	135-20	Central Telephone Office	SF	$250 \text{ SF} + (0.168 \text{ SF/man}) \cdot (M_B + M_L + gM_S)$
DA	151-61	Supply Container Handling Pier	FB	$(0.084 \text{ FB/MT}) \cdot SV_c \cdot F_c \cdot C_c \cdot (C+M_B + M_L + M_S) / 2000$
D4C1	411-40	Motor Gasoline Storage	BL	$(0.15 \text{ BL/man/day}) \cdot (C+M_B + M_L + gM_S) \cdot (DOS_b + DOS_{br})$
D4C2	411-30	Diesel Fuel Storage	BL	$(0.04 \text{ BL/man/day}) \cdot (M_B + M_L + gM_S) \cdot (DOS_b + DOS_{br})$
D4C3	124-65	Activity Heating Fuel Storage	BL	$(0.0556 \text{ BL/man/day}) \cdot (C+M_B + M_L + gM_S) \cdot (DOS_b + DOS_{br})$
D20	610-10	Disbursing Office	SF	$(0.4 \text{ SF/man}) \cdot (M_B + M_L + gM_S)$
D24A	740-13	Exchange Laundry Plant	SF	$5000 \text{ SF} + (0.59 \text{ SF/man}) \cdot (M_B + M_L + gM_S)$
D29A	141-12	Air Cargo Terminal	SF	$8000 \text{ SF} + (104 \text{ SF/MT/day}) \cdot F_{ac} \cdot SV_c \cdot (1-F_c) \cdot C_c \cdot (C+M_B + M_L + M_S) / 2000$
D31A	441-10	General Purpose Warehouse	SF	$(7.448 \text{ SF/MT}) \cdot SV_{nr} \cdot (1-P_r) \cdot C_c \cdot (C+M_B + M_L + M_S) \cdot (DOS_c + DOS_{cr}) / 2000$
D31E	151-60	Supply Pier	FB	$(0.274 \text{ FB/MT}) \cdot SV_c \cdot C_c \cdot [(1-F_c) \cdot (C+M_B + M_L + M_S) + (1-g)M_S] / 2000$

Table III-8 (Continued)

Component ID	Pacing Facility		Req. Units	Requirement Equation
	Category Code	Description		
D32A	431-10	Cold Storage Warehouse	SF	$(7.84 \text{ SF/MT}) \cdot \text{SV} \cdot \text{P} \cdot \text{C} \cdot (\text{CH}_B + \text{M}_L + \text{M}_S) \cdot (\text{DOS}_C + \text{DOS}_{Cr}) / 2000$
D33A	214-20	Automotive Maintenance Shop	SF	$(6.429 \text{ SF/MT/day}) \cdot [\text{SV} \cdot \text{C} \cdot (\text{CH}_B + \text{M}_L + \text{M}_S) + (1-g) \text{M}_S] + (1.07 \text{ MT/ST}) \cdot (X_a + Q_a) / 2000$
F1	610-10	Administration Office (minimum)	SF	$(0.78 \text{ SF/MT/day}) \cdot [\text{SV} \cdot \text{C} \cdot (\text{CH}_B + \text{M}_L + \text{M}_S) + (1-g) \text{M}_S] + (1.07 \text{ MT/ST}) \cdot (X_a + Q_a) / 2000$
G2	510-10	Hospital	SF	$40000 \text{ SF} + (2.33 \text{ SF/man}) \cdot (\text{CH}_B + \text{M}_L + \text{M}_S)$
G9	530-10	Outpatient Clinic	SF	$4000 \text{ SF} + (0.51 \text{ SF/man}) \cdot (\text{CH}_B + \text{M}_L + \text{M}_S)$
G28	540-10	Dental Clinic	SF	$(0.384 \text{ SF/man}) \cdot (\text{CH}_B + \text{M}_L + \text{M}_S)$
H9J	211-05	Maintenance Hangar (Hi-Bay)	SF	$(23.33 \text{ SF/MT/day}) \cdot \text{F}_{ac} \cdot \text{SV} \cdot (1-F_c) \cdot \text{C} \cdot (\text{CH}_B + \text{M}_L + \text{M}_S) / 2000 + \{ (1331 \text{ SF/AC}) \cdot \text{NA}_{L1} + (3173 \text{ SF/AC}) \cdot \text{NA}_{L2} \}^\dagger$
NA	711-20	Family Housing	SF	$(1333 \text{ SF/man}) \cdot (\text{P} \cdot \text{O} + \text{P}_{me} \cdot \text{E}_B)$
NB	721-11	Bachelor Enlisted Quarters	SF	$(118 \text{ SF/man}) \cdot [(1-P_{me}) \cdot \text{E}_B + \text{E}_L + \text{E}_S]$
NC	724-00	Bachelor Officers' Quarters	SF	$(586 \text{ SF/man}) \cdot [(1-P_{mo}) \cdot \text{O}_B + \text{O}_L + \text{O}_S]$
ND	740-30	Exchange Service Station	SF	$900 \text{ SF} + (0.522 \text{ SF/man}) \cdot (\text{M}_B + \text{M}_L + \text{M}_S)$
NE	740-37	Special Services Office	SF	$1000 \text{ SF} + (0.631 \text{ SF/man}) \cdot (\text{IC} + \text{M}_B + \text{M}_L + \text{M}_S)$

Table III-8 (Concluded)

Component ID	Paving Facility		Req. Units	Requirement Equation
	Category Code	Description		
N108	171-20	Applied Instruction Building	SF	$(7.5 \text{ SF/man}) \cdot (E_B + E_L + gE_S)$
N14	740-10	Chapel	SF	$2450 \text{ SF} + (1.426 \text{ SF/man}) \cdot (C + M_B + M_L + gM_S)$
N16	740-60	Commissioned Officers' Mess (open)	SF	$8000 \text{ SF} + (7.832 \text{ SF/man}) \cdot [(1 + .5P_{mo}) \cdot O + O_B + gO_S]$
N17	740-66	EM Club, PO Mess (open)	SF	$12000 \text{ SF} + (4.636 \text{ SF/man}) \cdot (E_B + E_L + gE_S)$
P5	219-10	Public Works Shop	SF	$(2.5 \text{ SF/man}) \cdot (M_B + M_L + gM_S)$
P5A	214-20	Automotive Maintenance Shop	SF	$2900 \text{ SF} + (1.871 \text{ SF/man}) \cdot (M_B + M_L)$
P12A	730-10	Fire Station	SF	$(0.613 \text{ SF/man}) \cdot (C + M_B + M_L + gM_S)$
P16	831-10	Sewage Treatment Plant	KG	$(0.1 \text{ KG/man}) \cdot (C + M_B + M_L + gM_S)$
P18	841-09	Water Treatment Facility	KG	$(0.1 \text{ KG/man}) \cdot (C + M_B + M_L + gM_S)$

* The amount of hangar space requirement for maintenance activities for land-based operational aircraft [bracketed term in equation] is not used to establish personnel requirements since the aircraft squadrons have proscribed organic maintenance complements.

In addition to the 36 independent equations of the form of Eq. (III-32), two additional and independent equations expressing, respectively the total numbers of officers (O_B) and enlisted men (E_B) in the base support force can be written as follows, using the input-specified officer and enlisted men ripple factors (R_{oi} and R_{ei}) and pacing facility requirement variables (R_i):

$$O_B = \sum_i (R_{oi} \cdot R_i) + R_o \quad (\text{III-36})$$

$$E_B = \sum_i (R_{ei} \cdot R_i) + R_e \quad (\text{III-37})$$

where R_o and R_e are the total numbers of officers and enlisted men, respectively, required by the non-population-dependent components.

The set of equations given by Eqs. (III-32), (III-36), and (III-37) then represent a set of 38 simultaneous equations in 38 unknown variables (O_B , E_B , and R_i , where i ranges over the 36 population-dependent components). These equations can be represented in matrix form as follows:

$$\tilde{A} \tilde{A} \cdot \tilde{X} = \tilde{B} \quad (\text{III-38})$$

The structure of $\tilde{A} \tilde{A}$ matrix and the vectors $\tilde{X}$ and $\tilde{B}$ are indicated in Figure III-2, where the population-dependent components are assumed numbered sequentially from 1 to 36. This set of equations is solved within the model by the same Gauss-Jordan solution procedure that was used in the original ABLE model.

The solution vector $\tilde{X}$ provides the values for the pacing facility requirements of the 36 components and the total complement of officers and enlisted men for the base support force.

3. Component Personnel

Once the pacing facility requirements have been established, the model next computes the numbers of officers and enlisted men associated with each of the population-dependent functional components. These

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ADVANCED NAVAL SUPPLY BASE COST MODEL (ABCOMO). (U)
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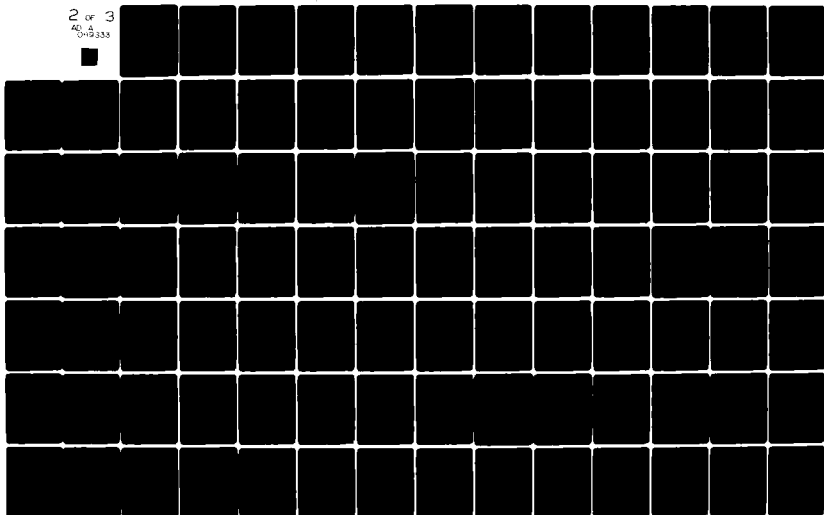
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$$\tilde{A}\tilde{Y} = \begin{bmatrix} C_{o1} & C_{e1} & -1 & 0 & \cdot & \cdot & \cdot & 0 \\ C_{o2} & C_{e2} & 0 & -1 & \cdot & \cdot & \cdot & 0 \\ C_{o3} & C_{e3} & 0 & 0 & \cdot & \cdot & \cdot & 0 \\ \cdot & \cdot & \cdot & \cdot & & & & \cdot \\ \cdot & \cdot & \cdot & \cdot & & & & \cdot \\ \cdot & \cdot & \cdot & \cdot & & & & \cdot \\ C_{o36} & C_{e36} & 0 & 0 & \cdot & \cdot & \cdot & -1 \\ 1 & 0 & R_{o1} & R_{e1} & \cdot & \cdot & \cdot & R_{o36} \\ 0 & 1 & R_{e1} & R_{e2} & \cdot & \cdot & \cdot & R_{e36} \end{bmatrix}$$

$$\tilde{X} = \begin{bmatrix} O_B \\ E_B \\ R_1 \\ R_2 \\ R_3 \\ \cdot \\ \cdot \\ \cdot \\ R_{36} \end{bmatrix}$$

$$\tilde{B} = \begin{bmatrix} K_1 \\ K_2 \\ K_3 \\ \cdot \\ \cdot \\ \cdot \\ K_{36} \\ R_0 \\ R_E \end{bmatrix}$$

FIGURE III-2 ELEMENTS OF MATRIX EQUATION

computations are simply the individual terms in the summations in Eqs. (III-36) and (III-37). That is,

$$O_i = R_{oi} \cdot R_i \quad (\text{III-39})$$

$$E_i = R_{ei} \cdot R_i \quad (\text{III-40})$$

The personnel requirements for the other components were computed prior to the simultaneous equation solution and were discussed in Section D-1 of this chapter.

4. Selective Requirement Adjustments

Components DA--Container Operations, D31E--Support Facilities, and J3D--Ordnance Support Facilities, have piers as their pacing facilities and the requirements generated by the described solution procedure are in terms of raw feet of berthing. These have to be adjusted because piers must be constructed in sufficient lengths to accomodate the largest cargo ship anticipated to dock alongside the pier. In addition, maintenance hangar space (Component H9J) must be provided for land-based operational aircraft (this was not included in the solution procedure because these aircraft have already been assigned maintenance complements and inclusion would have resulted in duplication of the aircraft maintenance personnel requirements). Finally, the requirement on the size of the base power plant (Component P15) can now be derived as a function of the other component size requirements. The means by which the model performs these adjustments are described in the following subsections.

a. Piers

In the ABCOMO model for non-ammunition supplies, container operations and non-container supply operations are represented by separate components, each having a pier as its pacing facility. Thus, unlike the ABLE model where a container pier can serve dually as a supply pier, this model assumes separate pier space for each of these operations. As mentioned above, the requirements generated for each type of pier are in terms of raw feet of berthing. The procedure for adjusting these requirements to

establish pier lengths in multiples of cargo ship lengths is given as follows:

$$R'_i = R_i - \text{AMOD}(R_i, 2P_{i-\min}) + 2P_{i-\min} \cdot m'_i \quad (\text{III-41})$$

where

R'_i = Adjusted feet of berthing requirement for component i ($i = \text{DA or D31E}$)

$P_{i-\min}$ = Minimum berth length for component i ($i = \text{DA or D31E}$)

$\text{AMOD}(R_i, 2P_{i-\min})$ = Modulus of R_i relative to $2P_{i-\min}$ --that is, the difference between R_i and the largest multiple of $2P_{i-\min}$ that is equal to or less than R_i

and

$$m'_i = \begin{cases} 0 & \text{if } \text{AMOD}(R_i, 2P_{i-\min}) = 0 \\ 1 & \text{otherwise.} \end{cases} \quad (\text{III-42})$$

For ammunition supply operations, Component J3D includes both the container supply piers and non-container supply piers. In this case, the model allows dual use of the container supply piers. The model first computes the requirement for the ammunition container supply pier feet of berthing as in Eq. (III-41), with ℓ'_c and ℓ_c replacing R'_i and R_i , respectively, and $P_{i-\min}$ being the minimum container supply berth length (as in Component DA), where

ℓ'_c = Adjusted ammunition container supply pier feet of berthing requirement (III-43)

$$\ell_c = (.090 \text{ FB/ST}) X_a \cdot F_a / 2000 \cdot$$

For the ammunition non-container supply pier, the requirement is computed as in Eq. (III-41), this time with ℓ'_s and ℓ_s replacing R'_i and R_i , respectively, $P_{i-\min}$ being the minimum supply berth length (as in Component D31E), and $m_i = 0$ if $\text{AMOD}(\ell_s, 2P_{i-\min}) \leq \ell'_c - \ell_c$ and unity otherwise, where

ℓ'_s = Adjusted ammunition supply pier
feet of berthing requirement

and

$$\ell_s = (.243\text{FB/ST}) \cdot (X_s \cdot (1 - F_a) + Q_a) / 2000 \quad (\text{III-44})$$

The change in the value of m'_i infers that there is a possibility that an ammunition container pier can be used in a dual role for both container operations and non-container operations. The total feet of berthing requirement for the ammunition pier, which is the pacing facility for Component J3D is then computed as follows:

$$R'_{J3D} = \ell'_c + \ell'_s \quad (\text{III-45})$$

b. Maintenance Hangars

An indicated in Table III-8, the term in brackets in the equation for Component H9J is not included in the pacing facility requirements solution procedure since this term covers the requirement for maintenance hangar space for land-based operational aircraft whose maintenance personnel are already included in the land-based operational forces. After determining the base support personnel requirements, this portion of the maintenance hangar requirement equation is added to the base maintenance hangar requirement (which supports the air cargo function) to establish the total base and operational force maintenance hangar requirement.

c. Power Plant

As indicated previously in Section D-1 of this chapter, the Base Power Plant (Component P15) is assumed to have a basic cadre and draws any remaining personnel requirements from other base components. As such, its pacing facility size requirement was not included in the solution process although its requirement is dependent on the sizes of the other components. After making the above described pacing facility requirement adjustments, the model next computes the Electric Power Source size require-

ment using the input-specified power ripple factors (R_{pi}) and the pacing facility requirements for the other components. The applicable equation is as follows:

$$R_{P15} = \sum_{i=1}^{N_{comp}} (R_i \cdot R_{pi}) \cdot \quad (III-46)$$

E. Component and Base Resource Requirements

Having determined the pacing facility requirements for each of the functional components of the base, the model next determines the component resource requirements. In addition to personnel and power requirements already discussed in the previous sections, these resource requirements include construction cost, initial outfitting cost (supplies and equipment), equipment shipping volume, construction time, and land requirement. These resource requirements are computed in accordance with component estimating relationship equations which are linear scalings on the pacing facility requirements. The constant factors and coefficients of these estimating relationship equations are model inputs (see Table III-2). The manner in which they were derived, together with the previous used ripple factors, is described in detail in Appendix A to this report. The resulting equations are indicated below. It should be noted that the component construction costs determined by Eq. (III-47) below represent a CONUS-based construction cost. Subsequent model computations apply a geographic-dependent construction cost multiplier factor to determine estimates of overseas construction costs. The equations are as follows:

$$C_{ci} = (b_{ci} + m_{ci} \cdot R_i) / 1000 \quad (III-47)$$

$$C_{ei} = (b_{ei} + m_{ei} \cdot R_i) / 1000 \quad (III-48)$$

$$V_{ei} = (b_{vi} + m_{vi} \cdot R_i) / 40 \quad (III-49)$$

$$T_{ci} = b_{ti} + m_{ti} \cdot R_i \quad (\text{III-50})$$

$$L_{ri} = b_{li} + m_{li} \cdot R_i \quad (\text{III-51})$$

where

C_{ci} = Construction cost (CONUS-based) of component i
(thousands of dollars)

C_{ei} = Initial outfitting cost for component i (thousands
of dollars)

V_{ei} = Shipping volume for initial supplies and equipment for
component i (measurement tons)

T_{ci} = Construction time for component i (man-days)

L_{ri} = Land requirement for component i (acres).

The model next computes the total resource requirements for the base by
summing over all the components for each resource requirement. That is,

$$C_c = \sum_{i=1}^{N_{\text{comp}}} C_{ci} \quad (\text{III-52})$$

$$C_e = \sum_{i=1}^{N_{\text{comp}}} C_{ei} \quad (\text{III-53})$$

$$V_e = \sum_{i=1}^{N_{\text{comp}}} V_{ei} \quad (\text{III-54})$$

$$T_c = \sum_{i=1}^{N_{\text{comp}}} T_{ci} \quad (\text{III-55})$$

$$L_r = \sum_{i=1}^{N_{\text{comp}}} L_{ri} \quad (\text{III-56})$$

where

C_c = Base construction cost (CONUS-based) (thousands of dollars)

C_e = Base initial outfitting cost (thousands of dollars)

V_e = Total shipping volume for initial base supplies and equipment (measurement tons)

T_c = Base construction time (man-days)

L_r = Base land requirement (acres)

F. Overseas Supply Base Costs

The final model computations which represent the primary model outputs are concerned with determining the costs related to the construction and operation of the overseas supply base. These costs are dependent upon the specific geographic area under consideration and the model is structured so that any number of different geographical areas can be considered at this point, for a given supported force composition without having to re-compute any of the previously described computations. The supply base costs are divided into three groups: Initial Investment Costs, Annual Recurring Costs, and Cost of Transport of Supported Force's Supplies. The associated computations are described separately in the following three subsections.

1. Initial Investment Costs

The initial investment costs are those incurred in the construction and setting up of the base for sustained operations. The specific costs included in this category are the following, where the costs are all expressed in thousands of dollars:

C_B = Base facility construction cost

C_O = Base initial outfitting (equipment and supplies) cost

C_{TE} = Cost to transport initial equipment and supplies (CONUS to base)

C_{TP} = Base personnel and dependents transport cost (CONUS to base)

C_{BL} = Cost to transport personal belongings of base personnel
(CONUS to base)

C_{LA} = Land acquisition cost

C_{II} = Base initial investment cost.

These cost estimates are computed in accordance with the following equations, where the parameters (here and in the following subsections) subscripted with "geo" or "land" are geographic-dependent inputs and the remaining factors are either model inputs or results of prior computations:

$$C_B = CF_{geo} \cdot C_c \quad (III-57)$$

$$C_O = C_e \quad (III-58)$$

$$C_{TE} = CTS_{geo} \cdot V_e / 1000 \quad (III-59)$$

$$C_{TP} = CTP_{geo} \cdot \left[(1 + P_{mo} \cdot D_{mo}) \cdot O_B + (1 + P_{me} \cdot D_{me}) \cdot E_B \right] / 1000 \quad (III-60)$$

$$C_{BL} = CTS_{geo} \cdot \left[(PBL_{uo} \cdot (1 - P_{mo}) + PBL_{mo} \cdot P_{mo}) \cdot O_B + (PBL_{ue} \cdot (1 - P_{me}) + PBL_{me}) \cdot E_B \right] / 40000 \quad (III-61)$$

$$C_{LA} = CPA_{land} \cdot PCP_{land} \cdot L_r / 1000 \quad (III-62)$$

$$C_{II} = C_B + C_O + C_{TE} + C_{TP} + C_{BL} + C_{LA} \quad (III-63)$$

2. Annual Recurring Costs

The annual recurring costs are those incurred in the annual operations and maintenance of the base. The specific costs included in this category are the following, where the costs are all expressed in thousands of dollars:

- A_P = Annual personnel billet cost
 A_S = Annual cost of general supplies and equipment (Navy funded items only)
 A_{TS} = Annual cost of transporting supplies and equipment (CONUS to base)
 A_F = Annual cost of base fuel
 A_{TF} = Annual cost of transporting base fuel (CONUS to base)
 A_{RP} = Annual cost of transporting rotational personnel and their dependents (between CONUS and base)
 A_{BL} = Annual cost of transporting rotational personnel's personal belongings (between CONUS and base)
 A_{LL} = Annual lease cost of non-purchased land
 A_R = Base annual recurring cost.

These cost estimates are computed in accordance with Eqs. (III-64) through (III-72) below. In these equations it is assumed that one-third of the base support personnel are rotated each year. In the computation of the annual cost of general supplies and equipment, supplies included in personnel billet costs such as subsistence, clothing, and personal demand items are not normally included; that is, the input values of the Navy-funded consumption inputs (NC) are normally either equal to zero or reduced accordingly to account for these non-funded items.

$$A_P = (BC_O \cdot O_B + BC_E \cdot E_B) / 1000 \quad (\text{III-64})$$

$$A_S = 365 \cdot \left[UC_I \cdot NC_I \cdot (1 - p_r) + UC_r \cdot NC_I \cdot p_r + \sum_{i=II}^{IX} (UC_i \cdot NC_i) \right] \cdot M_B / 1000 \quad (\text{III-65})$$

$$A_{TS} = 365 \cdot \left[CTR_{geo} \cdot C_I \cdot SV_I \cdot p_r + CTS_{geo} \cdot (C_I \cdot SV_I \cdot (1 - p_r) + \sum_{i=II}^{IX} (C_i \cdot SV_i)) \right] \cdot M_B / 4000 \quad (\text{III-66})$$

$$A_F = 365 \cdot (UC_m \cdot R_{D4C1} + UC_d \cdot R_{D4C2} + UC_h \cdot R_{D4C3}) / [1000 \cdot (DOS_b + DOS_{br})] \quad (III-67)$$

$$A_{TF} = 365 \cdot CTF_{geo} \cdot (R_{D4C1}/SV_m + R_{D4C2}/SV_d + R_{D4C3}/SV_h) / [1000 \cdot (DOS_b + DOS_{br})] \quad (III-68)$$

$$A_{RP} = 2 \cdot CTP_{geo} \cdot M_B / 3000 \quad (III-69)$$

$$A_{BL} = 2 \cdot CTS_{geo} \cdot \left[(PBL_{uo} \cdot (1 - P_{mo}) + PBL_{mo} \cdot P_{mo}) \cdot O_B + (PBL_{ue} \cdot (1 - P_{me}) + PBL_{me} \cdot E_B) \right] / 120000 \quad (III-70)$$

$$A_{LL} = CLA_{land} \cdot (1 - PCP_{land}) \cdot L_r / 1000 \quad (III-71)$$

$$A_R = A_P + A_S + A_{TS} + A_F + A_{TF} + A_{RP} + A_{BL} + A_{LL} \quad (III-72)$$

3. Cost of Transport of Supported Force's Supplies

Although not directly related to the cost of the construction and operation of the supply base itself, the cost of transporting from CONUS to the base the supplies and equipment, fuel, and ammunition required by the supported forces will be useful in applications of the model results. Thus, these computations are performed by the model. The specific cost estimates provided are the following, where the transport costs are expressed in thousands of dollars and the fuel and ammunition transport costs are based on peacetime consumption rates only:

T_{SE} = Annual transport cost (CONUS to base) of general supplies and equipment for the supported forces

T_{SF} = Annual transport cost (CONUS to base) of ship fuel for the supported forces

T_{PF} = Annual transport cost (CONUS to base) of aircraft fuel for the supported forces

T_{SA} = Annual transport cost (CONUS to base) of ship ammunition for the supported forces

T_{PA} = Annual transport cost (CONUS to base) of aircraft ammunition for the supported forces.

These transport costs are computed in accordance with the following equations:

$$T_{SE} = 365 \cdot \left[CTR_{geo} \cdot C_I \cdot SV_I \cdot p_r + CTS_{geo} \cdot (C_I \cdot SV_I \cdot (1 - p_r) + \sum_{i=1}^{IX} (C_i \cdot SV_i)) \right] \cdot (M_L + M_S) / 40000 \quad (III-73)$$

$$T_{SF} = 365 \cdot CTF_{geo} \cdot PC_{sf} \cdot F_s / (1000 \cdot SV_s) \quad (III-74)$$

$$T_{PF} = 365 \cdot CTF_{geo} \cdot PC_{af} \cdot F_p / (1000 \cdot SV_p) \quad (III-75)$$

$$T_{SA} = 365 \cdot (1.07 \text{ MT/ST}) \cdot CTA_{geo} \cdot PC_{sa} \cdot (A_{Ss} / 2000) / 1000 \quad (III-76)$$

$$T_{PA} = 365 \cdot (1.07 \text{ MT/ST}) \cdot CTA_{geo} \cdot PC_{aa} \cdot \left[(A_L + A_{Sp}) / 2000 \right] / 1000 \cdot \quad (III-77)$$

IV MODEL LIMITATIONS AND IMPROVEMENT OPTIONS

A number of basic limitations are presently built into the ABCOMO model design that could be eliminated, at least in part, through future improvements to the model. In addition, the input data base and pacing facility requirement equations are, in many cases, based on the engineering judgment of the SRI project team and should be reviewed in detail by cognizant Navy Department personnel. It is recommended that this data base review be performed before any significant use of the model is made. In this chapter, a number of the more significant model limitations are identified and possible improvement options are discussed.

A. Land Use

In the present model, the land required by the base is estimated and the cost of the land (either through purchase or lease or both) is based on this land requirement. This assumes that the land use efficiency is 100%. In some cases, this may be nearly so, but in others such as in hilly or rugged terrain, a considerably lower efficiency factor could well be the case. Thus, it is recommended that a land use efficiency factor be included in the geographic-dependent model inputs and applied appropriately to the base's basic land requirement to arrive at a more appropriate requirement on the amount of land to be purchased or leased.

B. Use of Existing Facilities

The ABCOMO model presently assumes that all facilities must be constructed in toto and thus does not allow for the use of any existing facilities at the intended base location. Although there is sufficient model output to allow a user to perform the necessary computations to account for these existing facilities, this could become a rather tedious

exercise. It would be possible to specify another set of model inputs that identify the amount of existing facilities (in terms of pacing facility requirements) for each functional component, and the component construction cost could then be reduced accordingly. Since it is quite likely that some renovation of the existing facilities will be required, a renovation cost factor could be specified as input and applied to the existing facility requirements to account for this added cost of renovation.

C. Use of Military Construction Groups

The present ABCOMO assumes that all construction is performed by private contractors. In some instances, it may be beneficial for some of the construction to be performed by military construction groups such as Naval Construction Battalions (SeaBees) or the Corps of Engineers. To allow for this in the model would require, first, the specification of those components, or portions thereof, that would be constructed by the military. In addition, additional inputs and model computations would be required for estimating military construction costs, including personnel costs, construction materials cost, costs to transport construction materials to the base, and so on.

D. Use of Civilian Personnel

In the present model, all personnel employed at the supply base are either military personnel or civilian dependents of military personnel. No allowance is made for employing non-dependent civilians, either U.S. or host country. Since many foreign land use agreements stipulate the use of some host country inhabitants, it may be desired to include this option in the model. One way to address this problem is to specify as input the proportion of the base support personnel to be supplied by the host nation. This would reduce the requirements for base support facilities such as housing, commissary, etc. Thus, many of the pacing facility algorithms would require modification to account for the use of these local inhabitants. The allowance for use

of non-dependent U.S. civilians as base support personnel could also be accomplished in the same manner.

E. Use of Variable Consumption Data

The present ABCOMO model assumes that the daily consumption rates for operational and base support personnel are the same. Since consumption ashore differs significantly from consumption afloat, this should be accounted for in some future model revision. This would require additional consumption input data and also some significant computational changes within the model itself.

F. Other Limitations

Some of the other significant model limitations include the following:

- (1) the supply base is constructed with no consideration for base defense,
- (2) pier requirements are based on an average daily throughput rate and do not consider peak joint arrivals of cargo ships, (3) berthing for transient ships, other than cargo ships, has not been considered, and
- (4) time phasing of the actual base construction, which would allow for partial base use during construction, is not included. These limitations are significant and could be addressed through future model revisions.

However, the manner by which they would be addressed would require additional analysis beyond the scope of this present effort.

Appendix A

SUPPLY BASE COMPONENT REQUIREMENTS CRITERIA

Appendix A

SUPPLY BASE COMPONENT REQUIREMENTS CRITERIA

1. Supply Base Composition

The supply base represented by the ABCOMO model is a permanent advanced supply base that is designed to provide prolonged support to Navy and Marine forces deployed in an overseas area of operations. This hypothetical supply base is structured as an autonomous entity, providing support to the operating forces as well as its own self-support. It is assumed that the base stocks are replenished on a periodic basis through MAC, MSC, and commercial shipments from major CONUS supply points. Base operations are conducted by Naval personnel on three-year tours of duty, with the exception that many of the family support operations (commissary, dependent school, bank, etc.) utilize on-base military dependents.

The supply base assumed is composed of 49 functional components, each including one or more individual facilities serving that function. These components are summarily identified in Table A-1 and described in greater detail in Section III of this appendix. These components, with their associated facilities, were chosen on the bases of project team experience, the Master Plan for Adak,^{12*} and the Navy's Real Property Inventory for the Marine Supply Base at Barstow, California.¹³ The components chosen comprised those considered applicable from OPNAV's Table of Advanced Base Functional Components² (which are further detailed in NAVFAC's Facilities Planning Guide³), plus additional ones formulated by SRI to complete the functional structure of a hypothetical permanent base. The Table of Advanced Base Functional Components is set up primarily for planning of expeditionary advanced bases and thus does include functional components for such functions as family support,

* Superscripts refer to data sources listed at the end of this appendix.

Table A-1

SUPPLY BASE COMPONENTS

Component ID	Component Description	Component ID	Component Description
A3	Administration Office, Post Office	F1	Cargo Handling Battalion
A4	Data Processing Facility	G2	Hospital
A5	Electronic Maintenance	G9	Dispensary
A7	Shore Patrol Headquarters	G28	Dental Clinic
BB	Waterfront Safety Facilities	HA	Airfield Operations Support
B5A	Boat Pool	H9J	Aircraft Maintenance Facilities
B13C	Port Services Office	J3A	Ammunition Depot
C3A	Naval Station Communications	J3D	Ordnance Support Facilities
C7	Visual Station, Operating Base	J4	Explosive Ordnance Disposal
C13	Internal Communications	NA	Family Support
C27J	Direction Finder Station	NB	Enlisted Personnel Support
C32A	Air Traffic Control Component	NC	Officer Personnel Support
DA	Container Operations (non-ammunition)	ND	Personal Services (all personnel)
D3A1	Tank Farm, Ship Fuel	NE	Recreational Facilities (all personnel)
D3A2	Tank Farm, Jet Engine Fuel	N10B	Military Training and Education
D4C1	Tank Farm, Base Supply MORGAS	N14	Chapel
D4C2	Tank Farm, Base Supply, Diesel	N16	Officers' Recreation
D4C3	Tank Farm, Base Heating Fuel	N17	Enlisted Recreation
D20	Disbursing Office	P5	Public Works Unit
D24A	Ships Store Facility	P5A	Automotive Maintenance
D29A	Air Cargo Terminal	P12A	Fire Protection
D31A	Supply Storage and Administration	P15	Base Power Plant
D31E	Supply Support Facilities	P16	Waste Management
D32A	Refrigerated Storage	P18	Water System
D33A	Materials Handling Facilities		

personal services, recreation, and so on. Furthermore, the facilities listed in those tables are temporary in nature and hence had to be permanentized for the purposes of this work.

2. Requirements Determination Procedure

For each of the components, one of its subsidiary facilities was chosen as the "pacing facility" for that component--i.e., the most important facility in terms of size or cost, and one whose size could be expected to vary in some predictable way with the tonnage throughput of the supply base or some other appropriate factor. Each pacing facility was then given a "basic size" (in units of barrels, square feet, cubic yards, kilowatts, or kilogallons per day) appropriate to its particular function. Where a basic size was indicated for a pacing facility in the Table of Advanced Base Functional Components, that figure was adopted. Otherwise, the SRI project team assumed a basic size using engineering judgment. In those instances where the pacing facility was considered population-dependent (such as a chapel), the basic size was taken to be that required to support a military population arbitrarily set at a level of 500 officers and 4380 enlisted men, using the ratio of 8.76 enlisted men per officer that was employed in the Advanced Base Logistic Envelope (ABLE) model.¹ The calculations of basic size of facilities were governed also by the provisions of NAVFAC's Facility Planning Factors,⁴ which sets standards--for example, the square feet of chapel building that are allowed for various levels of population served.

Once the basic size of all necessary facilities (and thus of their parent components) had been established, the resource requirements for each component were calculated. The resources of interest included: numbers of officers and enlisted men required to operate the component, number of vehicles required, acres of land required, kilowatts of electrical power required, construction time in man-days, shipping volume of supplies and equipment for initial startup of the facilities in cubic feet (the assumption was made that the shipping volumes associated with facility construction would be the responsibility of the construction contractor and the costs would be covered by his contract), and startup

dollar costs for each of the various cognizant Systems Commands. The principal source of manpower and vehicle requirements, shipping volumes of supplies and equipment, and non-NAVFAC startup costs was the Table of Advanced Base Functional Components. The principal source of acreage, electrical power and construction time requirements, and NAVFAC startup costs was NAVFAC's Facilities Planning Guide in conjunction with the unit costs of permanent facilities given in NAVFAC P-438.⁵ For those components not addressed in the above references, other sources of data had to be exploited. Vehicle procurement costs were derived from the Army Force Planning Cost Handbook.⁶ Some unit construction costs were taken from Means Cost Data⁷ and from a personal communication with Wheatly Associates, Palo Alto, California.⁸ In some cases where no directly applicable cost data could be found, the project team estimated costs using analogy between similar types of facilities.

After the resource requirements were calculated for a basic size component, these values were divided by the basic size value of the component's pacing facility, resulting in the establishment of ripple factors and component estimating relationship parameters* that could be used to determine resource requirements for component sizes different than the basic size. The values used for the components' basic sizes, ripple factors and component estimating relationship parameters are specified in the next section of this appendix.

* In the model, officer, enlisted, and power requirements are computed in accordance with the relationship $Y = mX$, where m is the associated ripple factor and X is the pacing facility requirement. For the other resource requirements, the relationship $Y = b + mX$ is used, where b is a constant, m is an estimating coefficient, and X is the pacing facility requirement. However, in the present data base, the constant b is assumed as zero for all components.

3. Component Descriptions and Requirements

Tables A-2 and A-3 summarize the component ripple factors and estimating relationship parameters that are inputs for the ABCOMO computer program. Table A-4 presents a list of the nomenclature used in the pacing facility requirement equations.

In the pages that follow Table A-4, each component used in the supply base configuration is identified and the various resource requirement parameters and the pacing facility requirement equation for that component are specified. A brief statement of mission is also included and the configuration source is identified, where ABFC refers to a component defined in the Table of Advanced Base Functional Components (but with its facilities permanentized), SRI refers to a component that was completely defined by the SRI project team, and ABFC/SRI refers to an SRI modified component listed in the Table of Advanced Base Functional Components. The data sources used are also identified on each component page, where the numerical values refer to the data sources listed at the end of this appendix.

Table A-2

COMPONENT RIPPLE FACTORS

Component ID	Pacing Facility		Req. Units	Officer Ripple	EM Ripple	Power Ripple
	Category Code	Description				
A3	610-10	Administrative Office	SF	.0026	.0169	.00868
A4	610-20	Data Processing Center	SF	.00208	.0118	.00625
A5	218-70	Office Equipment/Appliance Repair	SF	.0133	.0917	.208
A7	730-15	Correctional Facility	SF	.0006	.0089	.009
BB	165-10	Dredging	CY	0.0	0.0	0.0
B5A	159-64	Waterfront Operations Building	SF	.00139	.0847	.0153
B13C	137-40	Port Control Office	SF	.00146	.00542	.005
C3A	131-15	Communication Center	SF	.00197	.0246	.0658
C7	137-40	Visual Station	SF	0.0	.0446	.067
C13	135-20	Central Telephone Office	SF	0.0	.0366	.0139
C27J	131-35	Receiver Building	SF	.00104	.0125	.0625
C32A	141-40	Aircraft Operations Building	SF	.0114	.108	.00985
DA	151-61	Supply Container Handling Pier	FB	0.0	0.0	.55
D3A1	411-10	Ship Fuel Storage	BL	.00000625	.000813	.000225
D3A2	411-50	Jet Engine Fuel Storage	BL	.00000625	.000813	.000225
D4C1	411-40	MOGAS Storage	BL	.000033	.00037	.0007
D4C2	411-30	Diesel Fuel Storage	BL	.000033	.00037	.0007
D4C3	124-65	Activity Heating Fuel Storage	BL	.000033	.00037	.0007
D20	610-10	Disbursing Office	SF	.00075	.0625	.00625
D24A	740-13	Exchange Laundry Plant	SF	.000375	.00775	.0344
D29A	141-12	Air Cargo Terminal	SF	.0000714	.00109	.000214
D31A	441-10	General Purpose Warehouse	SF	.000115	.0008	.00125
D31E	151-60	Supply Pier	FB	0.0	0.0	.549
D32A	431-10	Cold Storage Warehouse	SF	0.0	.000862	.0308

Table A-2 (Concluded)

Component ID	Pacing Facility		Req. Units	Officer Ripple	EM Ripple	Power Ripple
	Category Code	Description				
D33A	214-20	Automotive Maintenance Shop	SF	.0005	.0175	.0108
F1	610-10	Administration (minimum)	SF	.00641	.144	.0107
G2	510-10	Hospital	SF	.000289	.00107	.00208
G9	530-10	Outpatient Clinic	SF	.000208	.00208	.00313
G28	540-10	Dental Clinic	SF	.0026	.00547	.0117
HA	111-10	Aircraft Runway	SY	0.0	.000108	.00132
H9J	211-05	Maintenance Hangar (hi-bay)	SF	.000135	.00176	.0152
J3A	421-22	High Explosive Magazine	SF	.000047	.000747	.00141
J3D	151-10	Ammunition Pier	FB	0.0	0.0	.637
J4	143-20	Explosive Ordnance Disposal Building	SF	.00104	.00313	.0115
NA	711-20	Family Housing	SF	.00000135	.0000113	.00507
NB	721-11	Bachelor Enlisted Quarters	SF	0.0	.000667	.00586
NC	724-00	Bachelor Officers' Quarters	SF	0.0	.000135	.0055
ND	740-30	Exchange Service Station	SF	0.0	.001844	.0316
NE	740-37	Special Services Office	SF	.00019	.00133	.144
N10B	171-20	Applied Instruction Building	SF	.000122	.000365	.00916
N14	740-10	Chapel	SF	.00075	.00075	.0015
N16	740-60	Commissioned Officers' Mess (open)	SF	.000125	.00125	.00525
N17	740-63 740-66	EM Club/PO Mess (open)	SF	.000179	.00221	.0049
P5	219-10	Public Works Shop	SF	.000875	.0338	.0583
P5A	214-20	Automotive Maintenance Shop	SF	.0000625	.0025	.014
P12A	730-10	Fire Station	SF	0.0	.0087	.00696
P15	811-00	Electric Power Source	KW	0.0 ^{1/}	9.0 ^{1/}	0.0
P16	831-10	Sewage Treatment Plant	KG	0.0	.0275	.2
P18	841-09	Water Treatment Facility	KG	0.0	.00573	.2

1/ For Electric Power Plant, a basic complement of nine EM is assumed. Other required personnel are furnished by other base components. In the model, these parameters are constants and not ripple factors.

Table A-3

COMPONENT ESTIMATING RELATIONSHIP PARAMETERS

Component ID	Component Description	Construction Cost (dollars)		Equipment Cost (dollars)		Equipment Volume (cu ft)		Construction Time (man days)		Required Land (acres)	
		Const.	Coef.	Const.	Coef.	Const.	Coef.	Const.	Coef.	Const.	Coef.
A3	Administration Office, Post Office	0.0	182.78	0.0	14.61	0.0	.611	0.0	.295	0.0	.000391
A4	Data Processing Facility	0.0	154.87	0.0	31.14	0.0	.565	0.0	.208	0.0	.000278
A5	Electronic Maintenance	0.0	787.69	0.0	162.44	0.0	3.308	0.0	.92	0.0	.00217
A7	Shore Patrol Headquarters	0.0	126.913	0.0	5.644	0.0	.1999	0.0	.1807	0.0	.00035
B8	Waterfront Safety Facilities	0.0	9.95	0.0	0.0	0.0	0.0	0.0	.00223	0.0	0.0
B5A	Boat Pool	0.0	37C.34	0.0	5054.44	0.0	370.21	0.0	.353	0.0	.000556
B13C	Port Services Office	0.0	72.50	0.0	23.96	0.0	1.568	0.0	.103	0.0	.0000833
C3A	Naval Station Communications	0.0	143.57	0.0	314.75	0.0	6.395	0.0	.208	0.0	.0219
C7	Visual Station, Operating Base	0.0	435.87	0.0	134.81	0.0	2.969	0.0	.487	0.0	.00112
C13	Internal Communications	0.0	2114.91	0.0	14.76	0.0	.430	0.0	.207	0.0	1.059
C27J	Direction Finder Station	0.0	615.91	0.0	175.34	0.0	5.384	0.0	.348	0.0	.0781
C32A	Air Traffic Control Component	0.0	806.16	0.0	2095.92	0.0	17.48	0.0	.4	0.0	.0114
DA	Container Operations (non-ammunition)	0.0	10527.51	0.0	120.06	0.0	5.02	0.0	.746	0.0	.0206
D3A1	Tank Farm, Ship Fuel	0.0	21.8	0.0	1.65	0.0	.169	0.0	.0487	0.0	.000108
D3A2	Tank Farm, Jet Engine Fuel	0.0	32.48	0.0	1.65	0.0	.169	0.0	.0487	0.0	.00011
D4C1	Tank Farm, Base Supply HOGAS	0.0	47.82	0.0	6.42	0.0	.420	0.0	.169	0.0	.00023
D4C2	Tank Farm, Base Supply, Diesel	0.0	48.39	0.0	6.51	0.0	.427	0.0	.172	0.0	.00024
D4C3	Tank Farm, Base Heating Fuel	0.0	83.02	0.0	6.42	0.0	.420	0.0	.169	0.0	.00023
D20	Disbursing Office	0.0	73.05	0.0	9.73	0.0	.627	0.0	.12	0.0	.000225
D24A	Ships Store Facility	0.0	156.25	0.0	21.16	0.0	1.17	0.0	.197	0.0	.00035
D29A	Air Cargo Terminal	0.0	41.79	0.0	15.03	0.0	.714	0.0	.050	0.0	.00007
D31A	Supply Storage and Administration	0.0	37.75	0.0	1.51	0.0	.441	0.0	.0483	0.0	.00012
D31E	Supply Support Facilities	0.0	6960.16	0.0	119.9	0.0	5.01	0.0	.745	0.0	.00426
D32A	Refrigerated Storage	0.0	107.49	0.0	.650	0.0	.122	0.0	.0634	0.0	.0000157
D33A	Materials Handling Facilities	0.0	75.64	0.0	559.43	0.0	27.36	0.0	.144	0.0	.0001

Table A-3 (Concluded)

Component ID	Component Description	Construction Cost (dollars)		Equipment Cost (dollars)		Equipment Volume (cu ft)		Construction Time (man days)		Required Land (acres)	
		Const.	Coef.	Const.	Coef.	Const.	Coef.	Const.	Coef.	Const.	Coef.
P1	Cargo Handling Battalion	0.0	257.42	0.0	2922.48	0.0	84.	0.0	.276	0.0	.00267
G2	Hospital	0.0	124.878	0.0	2.827	0.0	.312	0.0	.125	0.0	.0000726
G9	Dispensary	0.0	115.95	0.0	8.72	0.0	.905	0.0	.118	0.0	.000208
G28	Dental Clinic	0.0	127.27	0.0	25.17	0.0	1.485	0.0	.0703	0.0	.000234
HA	Airfield Operations Support	0.0	75.222	0.0	1.032	0.0	.0592	0.0	.0151	0.0	.000413
H9J	Aircraft Maintenance Facilities	0.0	239.139	0.0	4.420	0.0	.950	0.0	.0978	0.0	.00024
J3A	Ammunition Depot	0.0	126.054	0.0	10.663	0.0	.584	0.0	.136	0.0	.0117
J3D	Ordnance Support Facilities	0.0	14716.49	0.0	1507.08	0.0	440.584	0.0	48.26	0.0	.00422
J4	Explosive Ordnance Disposal	0.0	492.31	0.0	203.79	0.0	7.881	0.0	.349	0.0	.333
NA	Family Support	0.0	72.52	0.0	.155	0.0	.0775	0.0	.129	0.0	.000482
NB	Enlisted Personnel Support	0.0	114.29	0.0	3.519	0.0	.625	0.0	.128	0.0	.0000474
NC	Officer Personnel Support	0.0	108.87	0.0	.929	0.0	.126	0.0	.120	0.0	.000044
ND	Personal Services (all personnel)	0.0	900.13	0.0	16.01	0.0	1.950	0.0	.641	0.0	.00369
NE	Recreational Facilities (all personnel)	0.0	2746.28	0.0	42.95	0.0	8.906	0.0	2.478	0.0	.00642
N10B	Military Training and Education	0.0	160.15	0.0	2.901	0.0	.373	0.0	.147	0.0	.00130
N14	Chapel	0.0	180.25	0.0	5.847	0.0	.709	0.0	.12	0.0	.000225
N16	Officers' Recreation	0.0	171.37	0.0	5.917	0.0	1.244	0.0	.12	0.0	.00015
N17	Enlisted Recreation	0.0	94.18	0.0	2.76	0.0	.788	0.0	.0858	0.0	.00621
P5	Public Works Unit	0.0	212.70	0.0	637.48	0.0	24.865	0.0	.371	0.0	.00163
P5A	Automotive Maintenance	0.0	93.28	0.0	37.41	0.0	1.363	0.0	.162	0.0	.000388
P12A	Fire Protection	0.0	63.38	0.0	47.62	0.0	2.134	0.0	.111	0.0	.000087
P15	Base Power Plant	0.0	575.	0.0	18.49	0.0	3.049	0.0	.144	0.0	.000333
P16	Waste Management	0.0	5467.86	0.0	288.9	0.0	28.99	0.0	2.044	0.0	.042
P18	Water System	0.0	1945.83	0.0	0.0	0.0	0.0	0.0	.869	0.0	.0287

Table A-4

NOMENCLATURE FOR PACING FACILITY REQUIREMENT EQUATIONS

Variable	Definition	Units
AP_i	Daily wartime ammunition consumption for aircraft of type i	lb/day
AS_i	Daily wartime ammunition consumption for ships of type i	lb/day
C	Number of civilians on base	men
C_{gc}	Daily consumption of general cargo items per man	lb/man/day
DOS_a	Days of supply for ammunition (operating stocks)	days
DOS_{ar}	Days of supply for ammunition (wartime reserves)	days
DOS_b	Days of supply for base fuel (operating stocks)	days
DOS_{br}	Days of supply for base fuel (wartime reserves)	days
DOS_c	Days of supply for general cargo (operating stocks)	days
DOS_{cr}	Days of supply for general cargo (wartime reserves)	days
DOS_p	Days of supply for aircraft fuel (operating stocks)	days
DOS_{pr}	Days of supply for aircraft fuel (wartime reserves)	days
DOS_s	Days of supply for ship fuel (operating stocks)	days
DOS_{sr}	Days of supply for ship fuel (wartime reserves)	days
E_B	Number of enlisted men in base support force	men
E_L	Number of enlisted men in land-based operational force	men
E_S	Number of enlisted men in sea-based operational force	men
F_a	Fraction of ammunition that is containerized	
F_{ac}	Fraction of break-bulk cargo that is delivered by air	
F_c	Fraction of cargo that is containerized	
FP_i	Daily wartime fuel consumption for aircraft of type i	bbl/day
FS_i	Daily wartime fuel consumption for ships of type i	bbl/day
g	Fraction of at-sea men with impact ashore	
M_B	Number of military personnel in base support force	men
M_L	Number of military personnel in land-based operational force	men
M_S	Number of military personnel in sea-based operational force	men

Table A-4 (Concluded)

Variable	Definition	Units
NA_{L1}	Number of land-based rotary wing aircraft and other aircraft of length equal to or less than 85 ft assigned to the base	aircraft
NA_{L2}	Number of land-based fixed wing aircraft of length greater than 85 ft assigned to the base	aircraft
N_{comp}	Number of functional components in base configuration	components
N_p	Number of aircraft types	types
NP_i	Number of aircraft of type i	aircraft
N_s	Number of ship types	types
NS_i	Number of ships of type i	ships
O_B	Number of officers in base support force	men
O_L	Number of officers in land-based operational force	men
O_S	Number of officers in sea-based operational force	men
PC_{aa}	Ratio of peacetime-to-wartime aircraft ammunition consumption	
PC_{af}	Ratio of peacetime-to-wartime aircraft fuel consumption	
PC_{sa}	Ratio of peacetime-to-wartime ship ammunition consumption	
PC_{sf}	Ratio of peacetime-to-wartime ship fuel consumption	
P_{me}	Proportion of enlisted men accompanied by their families	
P_{mo}	Proportion of officers accompanied by their families	
P_r	Proportion of subsistence material that is refrigerated	
Q_a	Daily wartime ammunition transhipped through base	lb/day
R_i	Pacing facility requirement for component of type i	component dependent
R_{pi}	Power requirement for component of type i	kW
SV_c	Specific volume of general cargo	MT/ST
SV_{nr}	Specific volume of non-refrigerated cargo	MT/ST
SV_r	Specific volume of refrigerated cargo	MT/ST
X_a	Daily wartime ammunition shipped to base	lb/day

Component ID	Description	Configuration Source			
A3	Administrative Office and Post Office	ABFC/SRI			
Mission: Provides facilities and personnel for the direction, administration, and coordination of base activities; includes base post office.					
Pacing Facility	610-10 Administrative Office				
Other Principal Facilities	740-33 Post Office				
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
6.0	39.0	0.9	20	679	1408
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$421,121		\$33,662		2034 SF	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	.0026		.0169		.00868
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	182.78	14.61	.611	.295	.000391
Pacing Facility Requirement Equation: $(0.9 \text{ SF/man}) \cdot (M_B + M_L + gM_S)$					
Data Sources Used: 1,2,3,5,6					

Component ID	Description	Configuration Source			
A4	Data Processing Facility	SRI			
Mission: Provides direct data processing support to administrative functions such as personnel, fiscal, supply, and others.					
Pacing Facility	610-20 Data Processing Center				
Other Principal Facilities					
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
3.0	17.0	0.4	9	299	813
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$223,006		\$44,844		1440 SF	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	.00208		.0118		.00625
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	154.87	31.14	.565	.208	.000278
Pacing Facility Requirement Equation: One 1440 SF Facility per Base					
Data Sources Used: 3,5					

Component ID	Description	Configuration Source
A5	Electronic Maintenance	SRI
Mission: Performs maintenance and repair of office equipment, small appliances, and electronics/communications equipment.		
Pacing Facility	218-70 Office Equipment/Appliance Repair Shop	
Other Principal Facilities	217-10 Electronics/Communications Maintenance Shop	
BASIC SIZE COMPONENT		
Personnel		
Officers	EM	
8.0	55.0	
	Land (acres)	
	Power (KW)	
	Construction Time (man-days)	
	Equipment Shipping Vol. (cu. ft.)	
	1.3	125
	552	1985
Construction Cost	Initial Outfitting Cost (Supplies & Equipment)	Pacing Facility Basic Size
\$472,616	\$97,463	600 SF
MODEL PARAMETERS		
Ripple Factors	Officers	Enlisted
	.0133	.0917
		Power
		.208
Estimating Relationship Parameters	Construction Cost	Equipment Cost
	787.69	162.44
	Equipment Shipping Volume	Construction Time
	3.308	.92
		Land
		.00217
Pacing Facility Requirement Equation:		
$200 \text{ SF} + (0.08 \text{ SF/man}) \cdot (M_B + M_L + gM_S)$		
Data Sources Used: 2,3,4,5,8		

Component ID	Description		Configuration Source		
A7	Shore Patrol Headquarters		ABFC/SRI		
Mission: Houses the shore patrol and military and civilian police forces for the base, and provides holding cells for imprisonment of criminals and suspects.					
Pacing Facility	730-15	Correctional Facility			
Other Principal Facilities	730-20	Police Station			
	730-25	Gate/Sentry House			
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
6.0	89.0	3.5	90	1807	1999
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$1,269,132		\$56,440		10,000 SF	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	.00060		.0089		.0090
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	126.913	5.644	.1999	.1807	.00035
Pacing Facility Requirement Equation: $2500 \text{ SF} + (1.581 \text{ SF/man}) \cdot (M_B + M_L + gM_S)$					
Data Sources Used: 2,3,4,5,6					

Component ID	Description	Configuration Source			
BB	Waterfront Safety Facilities	SRI			
Mission: Provides protected channel and harbor for visiting ships.					
Pacing Facility	165-10 Dredging				
Other Principal Facilities	154-30 Seawalls 163-10 Mooring Dolphins 164-10 Breakwater				
BASIC SIZE COMPONENT					
Personnel					
Officers	EM				
0	0				
	Land (acres)				
	Power (KW)				
	Construction Time (man-days)				
	Equipment Shipping Vol. (cu. ft.)				
	0	0			
Construction Cost	Initial Outfitting Cost (Supplies & Equipment)	Pacing Facility Basic Size			
\$13,267,142	0	1,333,333 CY			
MODEL PARAMETERS					
Ripple Factors	Officers	Enlisted	Power		
	0	0	0		
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	9.95	0	0	.00223	0
Pacing Facility Requirement Equation:					
Average of 1,333,333 CY per Base					
Data Sources Used: 3,4,7					

Component ID	Description		Configuration Source		
B5A	Boat Pool		ABFC		
Mission: Provides waterfront and harbor services to visiting ships.					
Pacing Facility	159-64 Waterfront Operations Building				
Other Principal Facilities	151-20 Dock for Boat Pool 163-20 Moorings				
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
2.0	122.0	0.8	22	509	533,109
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$533,296		\$7,278,395		1440 SF	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	.00139		.0847		.0153
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	370.34	5054.44	370.21	.353	.000556
Pacing Facility Requirement Equation: One 1440 SF Facility per Base					
Data Sources Used: 2,5,6					

Component ID	Description				Configuration Source
B13C	Port Services Office				ABFC
Mission: The operational headquarters for assigning ship berthing spaces, providing pilotage, and coordinating logistic support and harbor services for visiting ships.					
Pacing Facility	137-40 Port Control Office				
Other Principal Facilities					
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
7.0	26.0	0.4	24	493	7527
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$348,020		\$115,018		4800 SF	
MODEL PARAMETERS					
Ripple Factors		Officers	Enlisted	Power	
		.00146	.00542	.005	
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	72.50	23.96	1.568	.103	.0000833
Pacing Facility Requirement Equation:					
$(7.2 \text{ SF/MT/day}) \cdot [SV_c \cdot C_{gc} \cdot (G + M_B + M_L + M_S + (1 - p)M_S) + (1.07 \text{ MI/ST}) \cdot (X_a + Q_a)] / 2000$					
Data Sources Used: 2,3,4,5,6					

Component ID	Description		Configuration Source		
C3A	Naval Station Communications		ABFC		
Mission: Provides operational and control functions for the base radio communications system.					
Pacing Facility	131-15	Communications Center			
Other Principal Facilities	131-35 131-50 132-10	Receiver Building Transmitter Building Antenna, Communications			
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
9.0	112.0	100	300	949	29,160
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$654,685		\$1,435,262		4560 SF	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	.00197		.0246		.0658
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	143.57	314.75	6.395	.208	.0219
Pacing Facility Requirement Equation:					
One 4560 SF Facility per Base					
Data Sources Used: 2,5,6					

Component ID	Description	Configuration Source			
C7	Visual Station Operating Base	ABFC/SRI			
Mission: Provides operational space and equipment for visual communications with fleet units.					
Pacing Facility	137-40 Visual Station				
Other Principal Facilities	169-10 Visual signal tower				
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
0	20.0	0.5	30	218	1330
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$195,268		\$60,394		448 SF	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	0		.0446		.067
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	435.87	134.81	2.969	.487	.00112
Pacing Facility Requirement Equation: $(0.269 \text{ SF/MT/day}) \cdot [SV_c \cdot C_{gc} \cdot (C + M_B + M_L + M_S + (1-g)M_S) + (1.07 \text{ MT/ST}) \cdot (X_a + Q_a)] / 2000$					
Data Sources Used: 2,3,5					

Component ID	Description	Configuration Source
C13	Internal Communications	ABFC/SRI
Mission: Provides internal telephone communications between offices, shops, and family housing on the base.		
Pacing Facility	135-20 Central Telephone Office	
Other Principal Facilities		
BASIC SIZE COMPONENT		
Personnel		
Officers	EM	
0	21.0	
	Land (acres)	Power (KW)
	1.0	8
	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
	119	247
Construction Cost	Initial Outfitting Cost (Supplies & Equipment)	Pacing Facility Basic Size
\$1,213,961	\$8,473	574 SF
MODEL PARAMETERS		
Ripple Factors	Officers	Enlisted
	0	.0366
		.0139
Estimating Relationship Parameters	Construction Cost	Equipment Cost
	2114.91	14.76
	Equipment Shipping Volume	Construction Time
	.430	.207
		Land
		.00174
Pacing Facility Requirement Equation:		
$250 \text{ SF} + (0.168 \text{ SF/man}) \cdot (M_B + M_L + gM_S)$		
Data Sources Used: 2,3,4,5,6		

Component ID	Description	Configuration Source			
C27J	Direction Finder Station	ABFC/SRI			
Mission: Provides personnel and equipment for operation of a high frequency radio direction finder station with TACAN capabilities.					
Pacing Facility	131-35 Receiver Building				
Other Principal Facilities	131-50 Transmitter Building 133-25 TACAN Building 133-35 UHF Homer Beacon Building				
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
1.0	12.0	75	60	334	5169
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$591,277		\$168,324		960 SF	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	.00104		.0125		.0625
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	615.91	175.34	5.384	.348	.0781
Pacing Facility Requirement Equation:					
One 960 SF Facility per Base					
Data Sources Used: 2,3,4,5,6,8					

Component ID	Description	Configuration Source			
C32A	Air Traffic Control Component	ABFC/SRI			
Mission: Provides facilities for the administration of flight operational activities including navigation, flight control, communications and weather service.					
Pacing Facility	141-40 Aircraft Operations Building				
Other Principal Facilities	141-70 Control Tower 218-20 Equipment Maintenance Shop 441-12 Storage/out-of-stores 441-35 General Storage				
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
15.0	142.0	15	13	528	23073
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$1,064,133		\$2,766,614		1320 SF	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	.0114		.108		.00985
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	806.16	2095.92	17.48	.4	.0114
Pacing Facility Requirement Equation:					
One 1320 SF Facility per Base					
Data Sources Used: 2,3,4,5,6					

Component ID	Description	Configuration Source			
DA	Container Operations (Non-ammunition)	SRI			
Mission: Provides specially-equipped pier(s), storage yards, shops, and offices for the handling, storage, repair, and operational control of non-ammunition cargo containers.					
Pacing Facility	151-61 Supply Container Handling Pier				
Other Principal Facilities	149-82 Container Holding Yard (Loaded) 152-61 Supply Container Handling Wharf 153-30 Container Operations Building 218-10 Container Repair and Test Building 425-20 Container Holding Yard (Empty)				
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
0	0	18.5	495	671	4519
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$9,474,763		\$108,054		900 FB	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	0		0		.55
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	10527.51	120.06	5.02	.746	.0206
Pacing Facility Requirement Equation: $(0.084 \text{ FB/MT}) \cdot SV_c \cdot F_c \cdot C_{gc} \cdot (C + M_B + M_L + M_S) / 2000$					
Data Sources Used: 1,4,5					

Component ID	Description	Configuration Source
D3A1	Tank Farm, Ship Fuel	ABFC/SRI
Mission: Provides on base storage of ship fuels and facilities for transferring fuels to and from visiting ships.		
Pacing Facility	411-10 Ship Fuel Storage	
Other Principal Facilities	125-10 POL Pipeline 125-16 Pump Station 143-75 POL Testing Building 163-20 Tanker Mooring 411-82 Contaminated Fuel Storage	
BASIC SIZE COMPONENT		
Personnel		
Officers	EM	
0.75	9.75	
Land (acres)	Power (KW)	
13	27	
Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)	
5838	20266	
Construction Cost	Initial Outfitting Cost (Supplies & Equipment)	Pacing Facility Basic Size
\$2,615,418	\$197,951	120,000 BL
MODEL PARAMETERS		
Ripple Factors	Officers	Enlisted
	.00000625	.0000813
		.000225
Estimating Relationship Parameters	Construction Cost	Equipment Cost
	21.8	1.65
	Equipment Shipping Volume	Construction Time
	.169	.0487
	Land	
	.000108	
Pacing Facility Requirement Equation: $(DOS_{sr} + PC_{sf} \cdot DOS_r) \cdot \sum_{i=1}^{N_s} (FS_i \cdot NS_i)$		
Data Sources Used: 1,2,3,4,5,6		

Component ID	Description	Configuration Source
D3A2	Tank Farm, Jet Engine Fuel	ABFC/SRI
Missiou: Provides on base storage of aircraft jet fuel and facilities for transferring fuels to and from visiting ships and aircraft		
Pacing Facility	411-50 Jet Engine Fuel Storage	
Other Principal Facilities	121-20 Aircraft Truck Fueling Facility 125-10 POL Pipeline 125-16 Pump Station 143-75 POL Testing Building 163-20 Tanker Mooring 411-82 Contaminated Fuel Storage	
BASIC SIZE COMPONENT		
Personnel		
Officers	EM	
0.25	3.25	
Land (acres)	Power (KW)	
4.4	9	
Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)	
1946	6755	
Construction Cost	Initial Outfitting Cost (Supplies & Equipment)	Pacing Facility Basic Size
\$1,299,212	\$65,983	40,000 BL
MODEL PARAMETERS		
Ripple Factors	Officers	Enlisted
	.00000625	.0000813
		Power
		.000225
Estimating Relationship Parameters	Construction Cost	Equipment Cost
	32.48	1.65
		Equipment Shipping Volume
		.169
		Construction Time
		.0487
		Land
		.00011
Pacing Facility Requirement Equation: $(\text{DOS}_{pr} + \text{PC}_{af} \cdot \text{DOS}_p) \cdot \sum_{i=1}^{N_p} (\text{FP}_i \cdot \text{NP}_i) / 42$		
Data Sources Used: 1,2,3,4,5,6		

Component ID	Description				Consideration Source
D4C1	Tank Farm, Base Supply MOGAS				ABFC/SRI
Mission: Provides on base storage of motor gasoline to supply land based equipment and harbor craft, and facilities for transferring fuel from tanker to storage.					
Pacing Facility	411-40 Motor Gasoline Storage				
Other Principal Facilities	122-20 Small Craft Fueling Pier 125-10 POL Pipeline 125-16 Pump Station 143-75 POL Testing Building 163-20 Tanker Mooring 411-82 Contaminated Fuel Storage				
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
0.33	3.7	2.3	7	1693	4203
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$478,223		\$64,168		10,000 BL	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	.000033		.00037		.0007
Estimating Relationship Parameter	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	47.82	6.42	.420	.169	.0007
Pacing Facility Requirement Equation: $(0.15 \text{ BL/man/day}) \cdot (C + M_B + M_L + gM_S) \cdot (DOS_b + DOS_{br})$					
Data Sources Used: 1,2,3,4,5,6					

Component ID	Description	Configuration Source			
D4C2	Tank Farm, Base Supply Diesel Fuel	ABFC/SRI			
Mission: Provides on base storage of diesel fuel to supply land based equipment and harbor craft, and facilities for transferring fuel from tanker to storage.					
Pacing Facility	411-30 Diesel Fuel Storage				
Other Principal Facilities	122-20 Small Craft Fueling Pier 125-10 POL Pipeline 125-16 Pump Station 143-75 POL Testing Building 163-20 Tanker Mooring 411-82 Contaminated Fuel Storage				
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
0.66	7.3	4.8	14	3438	8534
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$967,782		\$130,282		20,000 BL	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	.000033		.00037		.0007
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	48.39	6.51	.427	.172	.00024
Pacing Facility Requirement Equation: $(0.04 \text{ BL/man/day}) \cdot (M_B + M_L + gM_S) \cdot (DOS_b + DOS_{br})$					
Data Sources Used: 1,2,3,4,5,6					

Component ID	Description				Configuration Source
D4C3	Tank Farm, Base Supply Heating Fuel				ABFC/SRI
Mission: Provides on base storage of heating fuel for base use, and facilities for transferring fuel from tanker to storage					
Pacing Facility	124-65	Activity Heating Fuel Storage			
Other Principal Facilities	125-10	POL Pipeline			
	125-16	Pump Station			
	143-75	POL Testing Building			
	163-20	Tanker Mooring			
	411-82	Contaminated Fuel Storage			
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
0.33	3.7	2.3	7	1693	4203
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$830,223		\$64,168		10,000 BL	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	.000033		.00037		.0007
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	83.02	6.42	.420	.169	.00023
Pacing Facility Requirement Equation: $(0.0556 \text{ BL/man/day}) \cdot (C + M_B + M_L + gM_S) \cdot (DOS_b + DOS_{br})$					
Data Sources Used: 1,2,3,4,5,6					

Component ID	Description				Configuration Source
D20	Disbursing Office				ABFC
Mission: Provides complete disbursing facilities including buildings, equipment, and personnel for handling financial accounts of base personnel					
Pacing Facility	610-10 Disbursing Office				
Other Principal Facilities					
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
3.0	25.0	0.9	25	480	2507
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$292,208		\$38,931		4000 SF	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	.00075		.00625		.00625
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	73.05	9.73	.627	.12	.000225
Pacing Facility Requirement Equation: $(0.4 \text{ SF/man}) \cdot (M_B + M_L + gM_S)$					
Data Sources Used: 2,3,5,6,8					

Component ID	Description		Configuration Source		
D24A	Ship's Store Facility		ABFC		
Mission: A small department store selling personal goods to all base personnel.					
Pacing Facility	740-13	Exchange Laundry Plant			
Other Principal Facilities	740-01 740-05 740-09 821-50	Navy Exchange Ships Store Snack Bar Tailor/Cobbler/Barber Shop Steam Plant			
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
3.0	62.0	2.8	275	1577	9362
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$1,250,024		\$169,273		8000 SF	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	.000375		.00775		.0344
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	156.25	21.16	1.17	.197	.00035
Pacing Facility Requirement Equation: $5000 \text{ SF} + (0.59 \text{ SF/man}) \cdot (M_B + M_L + gM_S)$					
Data Sources Used: 2,3,4,5,6					

Component ID	Description				Configuration Source
D29A	Air Cargo Terminal				ABFC
Mission: Provides facilities to process air freight to and from the base.					
Pacing Facility	141-12 Air Cargo Terminal				
Other Principal Facilities					
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
5.0	76.0	4.9	15	3469	49947
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$2,925,548		\$1,052,129		70,000 SF	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	.0000714		.00109		.000214
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	41.79	15.03	.714	.050	.00007
Pacing Facility Requirement Equation: $8000 \text{ SF} + (104 \text{ SF/MT/day}) \cdot F_{ac} \cdot SV_c \cdot (1 - F_c) \cdot C_{gc} \cdot (C + M_B + M_L + gM_S) / 2000$					
Data Sources Used: 2,3,4,5,6					

Component ID	Description	Configuration Source			
D31A	Supply Storage and Administration	ABFC			
Mission: Comprises the personnel, storage, and office space to perform the tasks of a supply facility, <u>excluding</u> cold storage, transportation, materials handling, and waterfront operations.					
Pacing Facility	441-10 General Warehouse				
Other Principal Facilities	610-10 Office Building				
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
23.0	160.0	24	252	9659	88177
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$7,549,054		\$301,621		200,000 SF	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	.000115		.0008		.00125
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	37.75	1.51	.441	.0483	.00012
Pacing Facility Requirement Equation: $(7.448 \text{ SF/MT}) \cdot SV_{nr} \cdot (1 - P_r) \cdot C_{gc} \cdot (C + M_B + M_L + M_S) \cdot (DOS_c + DOS_{cr}) / 2000$					
Data Sources Used: 1,2,3,4,5,6					

Component ID	Description	Configuration Source			
D31E	Supply Support Facilities	SRI			
Mission: Provides specially equipped Pier(s) storage areas, and storage sheds for the handling, storage, and operational control of non-ammunition break-bulk cargo.					
Pacing Facility	151-60 Supply Pier				
Other Principal Facilities	152-60 Supply Wharf 153-10 Cargo Staging Area 153-20 Waterfront Transit Shed 441-30 Hazardous and Flammables Storehouse 451-10 Open Storage Area				
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
0	0	6.6	851	1154	7772
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$10,788,254		\$185,852		1550 FB	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	0		0		.549
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	6960.16	119.9	5.01	.745	.00426
Pacing Facility Requirement Equation: $(0.274 \text{ FB/MT}) \cdot SV_c \cdot C_{gc} \cdot [(1-F_c) \cdot (C+M_B+M_L+M_S) + (1-g)M_S] / 2000$					
Data Sources Used: 1,5					

Component ID	Description	Configuration Source
D32A	Refrigerated Storage	ABFC
Mission: Comprises the buildings, refrigerating units, and personnel necessary to receive, store, and issue refrigerated stores; includes technical personnel to perform minor repairs to refrigeration units.		
Pacing Facility	431-10 Cold Storage Warehouse	
Other Principal Facilities	610-10 Administrative Office	
BASIC SIZE COMPONENT		
Personnel		
Officers	EM	
0	22.0	
	Land (acres)	
	Power (KW)	
	Construction Time (man-days)	
	Equipment Shipping Vol. (cu. ft.)	
	0.4	
	786	
	1620	
	3122	
Construction Cost		
Initial Outfitting Cost (Supplies & Equipment)		
Pacing Facility Basic Size		
\$2,744,972		
\$16,603		
25,536 SF		
MODEL PARAMETERS		
Ripple Factors	Officers	
	Enlisted	
	Power	
	0	
	.000862	
	.0308	
Estimating Relationship Parameters	Construction Cost	
	Equipment Cost	
	Equipment Shipping Volume	
	Construction Time	
	Land	
	107.49	
	.650	
	.122	
	.0634	
	.0000157	
Pacing Facility Requirement Equation:		
$(7.84 \text{ SF/MT}) \cdot SV_r \cdot P_r \cdot C_{gc} \cdot (C + M_B + M_L + M_S) \cdot (DOS_c + DOS_{cr}) / 2000$		
Data Sources Used: 1,2,3,4,5		

Component ID	Description	Configuration Source			
D33A	Materials Handling Facilities	ABFC			
Mission: Provides materials handling and automotive equipment plus organizational and field maintenance for materials handling equipment.					
Pacing Facility	214-20 Equipment Maintenance Shop				
Other Principal Facilities					
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
2.0	70.0	0.4	43	575	109,456
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$302,544		\$2,237,712		4000 SF	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	.0005		.0175		.0108
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	75.64	559.43	27.36	.144	.0001
Pacing Facility Requirement Equation: $(6.429 \text{ SF/MT/day}) \cdot [SV_c \cdot C_{gc} \cdot (C + M_B + M_L + M_S + (1-g)M_S) + (1.07 \text{ MT/ST}) \cdot (X_a + Q_a)] / 2000$					
Data Sources Used: 2,3,5,6					

Component ID	Description				Configuration Source
F1	Cargo Handling Battalion				ABFC
Mission: Provides personnel and equipment to load and offload general cargo and ammunition from visiting ships and aircraft.					
Pacing Facility	610-10 Administration Office				
Other Principal Facilities:	210-50 Battery Shop				
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
12.0	270.0	5	20	516	157,245
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$481,897		\$5,470,881		1872 SF	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	.00641		.144		.0107
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	257.42	2922.48	84	.276	.00267
Pacing Facility Requirement Equation: $(0.78 \text{ SF/MT/day}) \cdot [SV_c \cdot C_{gc} \cdot (C + M_B + M_L + M_S + (1-g)M_S) + (1.07 \text{ MT/ST}) \cdot (X_a + Q_a)] / 2000$					
Data Sources Used: 2,3,5,6					

Component ID	Description				Configuration Source
G2	Hospital				ABFC/SRI
Mission: Provides hospital services to all personnel on base.					
Pacing Facility	510-10 Hospital				
Other Principal Facilities	143-10 Ambulance Garage 219-10 Public Works Shop 431-10 Cold Storage Warehouse 441-10 General Warehouse 610-10 Administrative Office 722-10 Galley-Mess 724-30 Mess Hall 730-40 Laundry 821-50 Steam Plant				
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
108.0	400.0	27.1	777	46,546	116,362
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$46,624,271		\$1,055,556		373,360	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	.000289		.00107		.00208
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	124.878	2.827	.312	.125	.0000726
Pacing Facility Requirement Equation: $40000 \text{ SF} + (2.33 \text{ SF/man}) \cdot (C + M_B + M_L + M_S)$					
Data Sources Used: 2,3,4,5,6,8					

Component ID	Description	Configuration Source
G9	Dispensary	ABFC/SRI
Mission: Provides sick call and emergency dispensary in-patient care where hospital facilities are available near by.		
Pacing Facility	530-10 Clinic, Outpatient	
Other Principal Facilities	610-10 Administrative Office	
BASIC SIZE COMPONENT		
Personnel		
Officers	EM	
1.0	10.0	
Land (acres)	Power (KW)	Construction Time (man-days)
1	15	567
Equipment Shipping Vol. (cu. ft.)		
4345		
Construction Cost	Initial Outfitting Cost (Supplies & Equipment)	Pacing Facility Basic Size
\$556,542	\$41,837	4800 SF
MODEL PARAMETERS		
Ripple Factors	Officers	Enlisted
	.000208	.00208
		Power
		.00313
Estimating Relationship Parameters	Construction Cost	Equipment Cost
	115.95	8.72
		Equipment Shipping Volume
		.905
		Construction Time
		.118
		Land
		.000208
Pacing Facility Requirement Equation: $4000 \text{ SF} + (0.51 \text{ SF/man}) \cdot (C + M_B + M_L + gM_S)$		
Data Sources Used: 2,3,4,5,6		

Component ID	Description	Configuration Source			
G28	Dental Clinic	ABFC			
Mission: Provides facilities for the dental care of all base personnel.					
Pacing Facility	540-10 Dental Clinic				
Other Principal Facilities					
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
10.0	21.0	0.9	45	270	5703
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$488,711		\$96,666		3840 SF	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	.0026		.00547		.0117
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	127.27	25.17	1.485	.0703	.000234
Pacing Facility Requirement Equation: $(0.384 \text{ SF/man}) \cdot (C + M_B + M_L + gM_S)$					
Data Sources Used: 2,3,5,6					

Component ID	Description	Configuration Source			
HA	Airfield Operations Support	SRI			
Mission: Provides runway, taxiway, parking, fueling, and safety facilities for visiting aircraft.					
Pacing Facility	111-10 Runway, Fixed Wing				
Other Principal Facilities	111-20 Helicopter Landing Pad 112-10 Taxiway 113-20 Aircraft Parking Apron 116-45 Line Vehicle Parking 121-10 Aircraft Direct Fueling Station 124-30 Aircraft Ready Fuel Storage 134-62 Wind Direction Indicator 134-64 Runway Distance Markers 136-10 Approach Lighting 136-20 Parking and Service Area Lighting 136-30 Runway Edge Lighting 136-50 Taxiway Lighting 136-65 Heliport Pad Lighting 141-20 Aircraft Fire and Rescue Station				
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
0	24.0	91.8	294	3356	13,157
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$16,715,930		\$229,355		222,222 SY	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	0		.000108		.00132
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	75.222	1.032	.0592	.0151	.000413
Pacing Facility Requirement Equation:					
One 222,222 SY Runway per Base					
Data Sources Used: 1,3,4,5,6,7					

Component ID	Description	Configuration Source													
H9J	Aircraft Maintenance Facilities	SRI													
Mission: Provides maintenance services for visiting aircraft and their on-board flight safety equipment.															
Pacing Facility	211-05 Maintenance Hangar, OH Space (Hi-Bay)														
Other Principal Facilities	211-06 Maintenance Hangar, 01 Space (Crew/Equipment) 211-07 Maintenance Hangar, 02 Space (Administrative) 211-34 Parachute and Survival Equipment Shop														
BASIC SIZE COMPONENT															
Personnel <table border="1"> <tr> <th>Officers</th><th>EM</th><th>Land (acres)</th><th>Power (KW)</th><th>Construction Time (man-days)</th><th>Equipment Shipping Vol. (cu. ft.)</th></tr> <tr> <td>3.0</td><td>39.0</td><td>5.4</td><td>337</td><td>2173</td><td>21,103</td></tr> </table>		Officers	EM	Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)	3.0	39.0	5.4	337	2173	21,103		
Officers	EM	Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)										
3.0	39.0	5.4	337	2173	21,103										
Construction Cost \$5,311,526		Initial Outfitting Cost (Supplies & Equipment) \$98,177		Pacing Facility Basic Size 22,211 SF											
MODEL PARAMETERS															
Ripple Factors <table border="1"> <tr> <th>Officers</th><th>Enlisted</th><th>Power</th></tr> <tr> <td>.000135</td><td>.00176</td><td>.0152</td></tr> </table>		Officers	Enlisted	Power	.000135	.00176	.0152								
Officers	Enlisted	Power													
.000135	.00176	.0152													
Estimating Relationship Parameters <table border="1"> <tr> <th>Construction Cost</th><th>Equipment Cost</th><th>Equipment Shipping Volume</th><th>Construction Time</th><th>Land</th></tr> <tr> <td>239.139</td><td>4.420</td><td>.950</td><td>.0978</td><td>.000243</td></tr> </table>	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land	239.139	4.420	.950	.0978	.000243					
Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land											
239.139	4.420	.950	.0978	.000243											
Pacing Facility Requirement Equation: $(23.33 \text{ SF/MT/day}) \cdot F_{ac} \cdot SV_c \cdot (1 - F_c) \cdot C_{gc} \cdot (C + M_B + M_L + M_S) / 2000$ $+ [(1331 \text{ SF/AC}) \cdot NA_{L1} + (3173 \text{ SF/AC}) \cdot NA_{L2}]$ Note: The amount of hangar space requirement representing space for maintenance activities for land-based operational aircraft [bracketed term in equation above] is not used to establish personnel requirements since these aircraft squadrons have pre-specified organic maintenance complements.															
Data Sources Used: 1,4,5,6															

Component ID	Description	Configuration Source			
J3A	Ammunition Depot	ABFC			
Mission: Provides facilities and personnel for storing, maintaining, issuing, and reworking all types of ammunition.					
Pacing Facility	421-22 High Explosive Magazine				
Other Principal Facilities	214-20 Equipment Maintenance Shop 216-10 Projectile Assembly Shop 610-10 Administrative Office 890-09 Utility Building				
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
10.0	159.0	2480	299	28,836	124,221
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$26,816,318		\$2,268,451		212,736 SF	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	.000047		.000747		.00141
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	126.054	10.663	.584	.136	.0117
Pacing Facility Requirement Equation: $(19 \text{ SF/ST}) \cdot (\text{DOS}_{ar} + \text{PC}_{aa} \cdot \text{DOS}_a) \cdot \sum_{i=1}^{N_p} (\text{AP}_i \cdot \text{NP}_i) / 2000$ $+ (14 \text{ SF/ST}) \cdot (\text{DOS}_{ar} + \text{PC}_{sa} \cdot \text{DOS}_a) \cdot \sum_{i=1}^{N_s} (\text{AS}_i \cdot \text{NS}_i) / 2000$					
Data Sources Used: 1,2,3,5,6					

Component ID	Description	Configuration Source			
J3D	Ordnance Support Facilities	SRI			
Mission: Provides pier(s), rework, and special ordnance storage facilities for ordnance materials. Supports Component J3A, Ammunition Depot					
Pacing Facility	151-10 Ammunition Pier				
Other Principal Facilities	151-70 Ordnance Container Handling Pier 152-10 Ammunition Wharf 152-70 Ordnance Container Handling Wharf 212-10 Ordnance Component Rework Building 421-32 Inert Storehouse 421-42 Smokedrum Storehouse 421-48 Small Arms/Pyrotechnics Magazine 421-62 Special Weapons Magazine (Nuclear) 421-72 Missile Magazine 425-10 Open Ammunition Storage Pad				
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
0	0	3.8	573	670	4,515
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$13,244,844		\$107,979		900 FB	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	0		0		.637
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	14716.49	120.00	5.02	.744	.00422
Pacing Facility Requirement Equation: $[(.084 \text{ FB/MT}) \cdot X_a \cdot F_a + (.228 \text{ FB/MT}) \cdot ((1 - F_a) \cdot X_a + Q_a)] / 2000$					
Data Sources Used: 1,4,5					

Component ID	Description				Configuration Source
J4	Explosive Ordnance Disposal				ABFC
Mission: Provides personnel and equipment to render safe and dispose of unusable explosive ordnance.					
Pacing Facility	143-20 Explosive Ordnance Disposal Building				
Other Principal Facilities					
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
1.0	3.0	320	11	335	7,566
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$472,618		\$195,635		960 SF	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	.00104		.00313		.0115
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	492.31	203.79	7.881	.349	.333
Pacing Facility Requirement Equation: One 960 SF Facility per Base					
Data Sources Used: 2,3,5,6					

Component ID	Description				Configuration Source
NA	Family Support				SRI
Mission: Provides housing, schools, commissary, and child care services to families on base.					
Pacing Facility	711-20 Family Housing				
Other Principal Facilities	730-45 Dependent School 740-23 Commissary 740-74 Child Care Center				
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
3.0	25.0	107	11255	287,297	172,152
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$161,156,507		\$344,886		2,222,111 SF	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	.00000135		.0000113		.00507
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	72.52	.155	.0775	.129	.0000482
Pacing Facility Requirement Equation: $(1333 \text{ SF/man}) \cdot (P_{mo} \cdot O_B + P_{me} \cdot E_B)$					
Data Sources Used: 4,5,8,9					

Component ID	Description		Configuration Source		
NB	Enlisted Personnel Support		SRI		
Mission: Provides living quarters, messing, and uniform shop facilities for bachelor enlisted personnel on base.					
Pacing Facility	721-11	Bachelor Enlisted Quarters			
Other Principal Facilities	722-10	Enlisted Dining Facility (Detached)			
	730-13	Issue/Retail Clothing and Uniform Center			
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
0	238.0	16.9	2090	45,606	223,023
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$40,757,032		\$1,254,802		356,619 SF	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	0		.000667		.00586
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	114.29	3.519	.625	.128	.0000474
Pacing Facility Requirement Equation:					
$(118 \text{ SF/man}) \cdot [(1 - P_{me}) \cdot E_B + E_L + gE_S]$					
Data Sources Used: 2,4,5,6,8					

Component ID	Description				Configuration Source
NC	Officer Personnel Support				SRI
Mission: Provides living quarters for bachelor officers on the base (without messing facilities).					
Pacing Facility	724-00 Bachelor Officers' Quarters				
Other Principal Facilities					
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
0	15.0	4.9	612	13,360	14,022
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$12,121,658		\$103,421		111,340 SF	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	0		.000135		.0055
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	108.87	.929	.126	.120	.000044
Pacing Facility Requirement Equation: $(586 \text{ SF/man}) \cdot [(1 - P_{mo}) \cdot O_B + O_L + gO_S]$					
Data Sources Used: 2,4,5,8					

Component ID	Description		Configuration Source				
ND	Personal Services (all personnel)		SRI				
Mission: Provides bakery, banking, family services, filling station, and parking facilities for all base personnel.							
Pacing Facility	740-30	Exchange Service and Auto Repair Station					
Other Principal Facilities	730-30	Bakery					
	740-18	Bank					
	740-25	Personal Family Services Center					
	740-86	Exchange Installation Warehouse					
	852-10	Parking Areas					
BASIC SIZE COMPONENT							
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)		
Officers	EM						
0	9.0	18	154	3129	9518		
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size			
\$4,752,634		\$78,144		4880 SF			
MODEL PARAMETERS							
Ripple Factors		Officers		Enlisted		Power	
		0		.001844		.0316	
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume		Construction Time		Land
	900.13	16.01	1.950		.641		.00369
Pacing Facility Requirement Equation: $900 \text{ SF} + (0.522 \text{ SF/man}) \cdot (M_B + M_L + gM_S)$							
Data Sources Used: 4,5,6,7,8							

Component ID	Description		Configuration Source				
NE	Recreational Facilities (all personnel)		SRI				
Mission: Provides sports, hobby, theater, and library facilities for all base personnel.							
Pacing Facility	740-37	Special Services Issue and Office					
Other Principal Facilities	740-36	Hobby Shop (Arts and Crafts)					
	740-38	Hobby Shop (Automotive)					
	740-40	Bowling Alley					
	740-43	Gymnasium					
	740-55	Youth Center					
	740-56	Theater					
	740-76	Library					
	750-20	Playing Fields					
	750-30	Outdoor Swimming Pool					
750-40	Golf Course						
BASIC SIZE COMPONENT							
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)		
Officers	EM						
1.0	7.0	33.8	760	13,040	46,872		
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size			
\$14,653,670		\$226,071		5263 SF			
MODEL PARAMETERS							
Ripple Factors		Officers		Enlisted		Power	
		.00019		.00133		.144	
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume		Construction Time	Land	
	2746.28	42.95	8.906		2.478	.00642	
Pacing Facility Requirement Equation: 1000 SF+(0.631 SF/man)•(.1C+M _B +M _L +gM _S)							
Data Sources Used: 4,5,6,8							

Component ID	Description				Configuration Source
N10B	Military Training and Education				SRI
Mission: Provides instruction classrooms, small arms firing range, drill field, and educational/training counseling services to base military personnel.					
Pacing Facility	171-20	Applied Instruction Building			
Other Principal Facilities	179-40	Small Arms Range-Outdoor			
	179-60	Parade and Drill Field			
	740-88	Educational Services Office			
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
4.0	12.0	42.8	301	4,820	12,265
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$5,260,890		\$95,286		32,850 SF	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	.000122		.000365		.00916
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	160.15	2.901	.373	.147	.00130
Pacing Facility Requirement Equation: $(7.5 \text{ SF/man}) \cdot (E_B + E_L + gE_S)$					
Data Sources Used: 4,5,6,8					

Component ID	Description				Configuration Source
N14	Chapel				ABFC
Mission: Provides religious worship and counseling services to all base personnel.					
Pacing Facility	740-10 Chapel				
Other Principal Facilities					
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
3.0	3.0	0.9	6	480	2834
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$720,993		\$23,389		4000 SF	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	.00075		.00075		.0015
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	180.25	5.847	.709	.12	.000225
Pacing Facility Requirement Equation: $2450 \text{ SF} + (1.426 \text{ SF/man}) \cdot (C + M_B + M_L + gM_S)$					
Data Sources Used: 2,3,4,5,6,8					

Component ID	Description				Configuration Source		
N16	Officers' Recreation				ABFC		
Mission: Provides social recreation and messing facilities for officers on the base and their dependents.							
Pacing Facility		740-60 Commissioned Officers' Mess (Open)					
Other Principal Facilities							
BASIC SIZE COMPONENT							
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)		
Officers	EM						
2.0	20.0	2.4	84	1920	19,909		
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size			
\$2,741,863		\$94,676		16,000 SF			
MODEL PARAMETERS							
Ripple Factors		Officers		Enlisted		Power	
		.000125		.00125		.00525	
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume		Construction Time		Land
	171.37	5.917	1.244		.12		.00015
Pacing Facility Requirement Equation:							
$8000 \text{ SF} + (7.382 \text{ SF/man}) \cdot [(1 + .5P_{mo}) \cdot O_B + O_L + gO_S]$							
Data Sources Used: 2,3,4,5,8							

Component ID	Description	Configuration Source			
N17	Enlisted Recreation	ABFC			
Mission: Provides social recreation for enlisted men on the base, and their dependents.					
Pacing Facility	740-63 Enlisted Mens' Club 740-66 Petty Officers' Mess (Open)				
Other Principal Facilities					
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
3.0	37.0	104	82	1436	13,191
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$1,576,172		\$46,212		16,736 SF	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	.000179		.00221		.0049
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	94.18	2.76	.788	.0858	.00621
Pacing Facility Requirement Equation:					
$12000 \text{ SF} + (4.636 \text{ SF/man})(E_B + E_L + gE_S)$					
Data Sources Used: 2,3,4,5					

Component ID	Description	Configuration Source			
P5	Public Works Unit	ABFC/SRI			
Mission: Provides technically trained personnel and equipment required for the maintenance and operation of public works and utilities on the base.					
Pacing Facility	219-10 Public Works Shop				
Other Principal Facilities	214-20 Equipment Maintenance Shop 214-55 Vehicle Wash Platform 219-25A Public Works Shops Store 610-10 Administrative Office				
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
10	270.0	13	466	2968	198,923
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$1,701,593		\$5,099,817		8000 SF	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	.000875		.0338		.0583
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	212.70	637.48	24.865	.371	.00163
Pacing Facility Requirement Equation: $(2.5 \text{ SF/man}) \cdot (M_B + M_L + gM_S)$					
Data Sources Used: 1,2,3,4,5,6					

Component ID	Description	Configuration Source			
P5A	Automotive Maintenance	ABFC			
Mission: Provides personnel, tools, and equipment for organizational and field maintenance of Navy-owned automotive, and weight handling equipment (excludes materials handling and construction equipment).					
Pacing Facility	214-20 Automotive Vehicle Maintenance Shop				
Other Principal Facilities	123-10 Fuel Dispensing Station 214-55 Vehicle Wash Platform 441-10 Office/Storage/Outfitting Building				
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
1.0	40.0	6.2	224	2586	21,803
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$1,492,447		\$598,563		16,000 SF	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	.0000625		.0025		.014
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	93.28	37.41	1.363	.162	.000388
Pacing Facility Requirement Equation: $2900 \text{ SF} + (1.871 \text{ SF/man}) \cdot (M_B + M_L)$					
Data Sources Used: 2,3,4,5,6					

Component ID	Description	Configuration Source			
P12A	Fire Protection-Structural and Oil	ABFC			
Mission: Provides the capability for fighting structural, brush, and grass fires, as well as fires at the fuel tank farms on the base.					
Pacing Facility	730-10 Fire Station				
Other Principal Facilities	730-11 Fire Hose Drying Structure				
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
0	40.0	0.4	32	512	9,815
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$291,525		\$219,074		4600 SF	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	0		.0087		.00696
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	63.38	47.62	2.134	.111	.000087
Pacing Facility Requirement Equation: $(0.613 \text{ SF/man}) \cdot (C + M_B + M_L + gM_S)$					
Data Sources Used: 2,3,4,5,6					

Component ID	Description	Configuration Source
P15	Base Power Plant	ABFC
Mission: Provides generator station, transmission lines, and transformer stations to supply electrical power to all base activities.		
Pacing Facility	811-00 Electric Power Plant	
Other Principal Facilities	812-12 Transformer Station 812-30 Electrical Distribution System	
BASIC SIZE COMPONENT		
Personnel		
Officers	EM	
0	9.0	
Land (acres)	Power (KW)	Construction Time (man-days)
1	0	431
Equipment Shipping Vol. (cu. ft.)		
9,146		
Construction Cost	Initial Outfitting Cost (Supplies & Equipment)	Pacing Facility Basic Size
\$1,725,000	\$55,465	3000 KW
MODEL PARAMETERS		
Ripple Factors	Officers*	Enlisted*
	0	9.0
		0
Estimating Relationship Parameters	Construction Cost	Equipment Cost
	575	18.49
	Equipment Shipping Volume	Construction Time
	3.049	.144
	Land	
	.000333	
Pacing Facility Requirement Equation: $\sum_{i=1}^{N_{comp}} (R_i \cdot R_{pi})$		
Data Sources Used: 2,3,4,6,10		

* For the Electric Power Plant, a basic complement of nine enlisted men is assumed. Other required personnel are furnished by other base components. In the model, these parameters are constants and not ripple factors.

Component ID	Description	Configuration Source			
P16	Waste Management	SRI			
Mission: Provides sewage and waste treatment, outfall sewage disposal, and sanitary cut-fill disposal for base waste.					
Pacing Facility	831-10 Combination Sewage and Industrial Waste Treatment Plant				
Other Principal Facilities	831-20 Outfall Sewer Line 833-15 Sanitary Cut-fill Disposal Area				
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
0	24.0	36.6	174	1782	25,279
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$4,767,972		\$251,920		872 KG	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	0		.0275		.2
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	5467.86	288.9	28.99	2.044	.042
Pacing Facility Requirement Equation: $(0.1 \text{ KG/man}) \cdot (C + M_B + M_L + gM_S)$					
Data Sources Used: 5,6,7,8,11					

Component ID	Description	Configuration Source			
P18	Water System	SRI			
Mission: Provides water wells, water treatment and water distribution services for the base.					
Pacing Facility	841-09 Water Treatment Facility				
Other Principal Facilities	841-20 Supply Mains and Pumping Facilities 841-50 Water Wells				
BASIC SIZE COMPONENT					
Personnel		Land (acres)	Power (KW)	Construction Time (man-days)	Equipment Shipping Vol. (cu. ft.)
Officers	EM				
0	5.0	25	174	758	0
Construction Cost		Initial Outfitting Cost (Supplies & Equipment)		Pacing Facility Basic Size	
\$1,696,763		0		872 KG	
MODEL PARAMETERS					
Ripple Factors	Officers		Enlisted		Power
	0		.00573		.2
Estimating Relationship Parameters	Construction Cost	Equipment Cost	Equipment Shipping Volume	Construction Time	Land
	1945.83	0	0	.869	.0287
Pacing Facility Requirement Equation: $(0.1 \text{ KG/man}) \cdot (C + M_B + M_L + gM_S)$					
Data Sources Used: 1,5,7,8,11					

DATA SOURCES

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3. "Facilities Planning Guide," Volume 2, NAVFAC P-437, February 1979.
4. "Facility Planning Factor Criteria for Navy and Marine Corps Shore Installations," NAVFAC P-80, August 1974.
5. Draft copy NAVFAC P-438, Construction Cost Data (computer printout), January 20, 1979, in two volumes.
6. "Army Force Planning Cost Handbook," Directorate of Cost Analysis, Office of the Comptroller of the Army, July 1973.
7. "Building Construction Cost Data, 1979," 37th Annual Edition, Robert Snow Means Company, Inc., Duxbury, Massachusetts, 1978.
8. Private communication with Wheatley Associates, contractors, Palo Alto, California.
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10. "A Feasibility Study of Windpower for the New England Area," Final Report, SRI International, October 1979.
11. U.S. Budget, FY 1980.
12. "Regional Master Plan, Naval Complex, Adak, Alaska," Western Division, Naval Facilities Engineering Command, San Bruno, California (undated).
13. "Detailed Inventory of Naval Shore Facilities: MARCORPS Supply Center, Barstow, California," 30 June 1973.

Appendix B
ABCOMO COMPUTER PROGRAM LISTING

Appendix B

ABCOMO COMPUTER PROGRAM LISTING

This appendix presents a complete listing of the ABCOMO computer program. The program is written in the FORTRAN Extended language (version 3.0) for the CONTROL DATA 6400 computer. The listing presents first the program execution routine PROGRAM MAIN. The applicable sub-routines are then listed in alphabetical order.

CDC 6700 FTN V3.0-355F OPT=0 80/05/24. 04.28.48.

```

PROGRAM MAIN      TRACE
PROGRAM MAIN(INPUT,OUTPUT,TAPES
COMMON /BLK1/  A(100),TABLE(100,10),IPOINT(100,2),INDEX(100),
A      IEND,IFRONT,LAST,NOAC,NOS,IERR,P(75),PP(23),ROF,MEF,
B      DMO,DME,DAO,DAE,OBAS,EBAS,TPERS
      CALL INIT
      CALL REINIT
      CALL INPUT
10     CALL ATRCFT
      CALL SHIPS
      IF(IERR.NE.0)GO TO 20
      CALL IAMMO
      CALL FIG1(RO,RE)
      CALL FIG2(RO,RE)
      CALL CPIERS
      CALL APIERS
      CALL RIPPLE
      CALL FIG3
      CALL COMON
      CALL COSTS
20     CONTINUE
      CALL REINIT
      GO TO 10
      END

```

SUBROUTINE AIRCFT

```

C
C THIS ROUTINE READS AIRCRAFT COMPLEMENT CARDS AND PERFORMS
C PRELIMINARY CALCULATIONS FOR USE BY OTHER ROUTINES
C
      COMMON /BLK1/ A(100),TABLE(100,10),IPOINT(100,2),INDEX(100),
      IEND,IIFRONT,LAST,NOAC,NOS,IERH,P(75),PP(23),ROF,REF,
      DMO,DME,DAO,DAE,UBAS,EBAS,IPEMS
      COMMON /BLK2/ IANUM(100),ISNUM(100),OS(100),ES(100),STYPE(100),
      AMMO(100),AAMMO(100),FUEL(100),M1,M1A,M2,M2A,M3,
      M3A,D50,DSE,IANUML(100),XA,SH,ISFLG,IAFLG,IGAS(100)
      COMMON /BLK3/ DOSC,DUSCH,DOSP,DOSPR,DUSS,DOSSR,DOSH,DOSBR,
      DOSA,DOSAK,PCAF,PCSF,PCAA,PCSA,FC,FA,G,FAC,
      TYPE1,TYPE2,TYPE3,TEMAMO
      COMMON /BLK4/ IBIG,D0,DE,HSQUAD,TACAC,CAHAC,PATAC,HELUS,
      MSLTAC,MSLCAR,MSLPAT,MSLHEL
      COMMON /BLK5/ JX(100),KX(100),LX(100),X1(100),X2(100),X3(100),
      X4(100),X5(100),X(100)
      REAL LA,LAP,LCL,LCP,M1A,M2A,M3A,M1,M2,M3
      DATA EOF /6H*****/,BLANK/1H /,END/3HEND/

C READ AIRCRAFT COMPLEMENT
C
      20 READ(5,1006)Z,Y,CODE
      1006 FORMAT(A8,1X,F3.0,1X,A8)
      IF(Z.EQ.EOF)GO TO 71
      IF(J.LT.0)CALL IERROR(12,Z)
      WRITE(6,1000)
      1000 FORMAT(1H1)
      STOP
      30 CONTINUE
      J=Y+.1

C TEST FOR END OF AIRCRAFT
C
      35 IF(Z.EQ.EOF)GO TO 71
      IF(J.LT.0)CALL IERROR(12,Z)

C SET CARRIER BASED FLAG
C
      40 ISHP=1
      IF(CODE.EQ.BLANK)ISHP=0

C SET AIRCRAFT FLAG
C
      45 IAFLG=1

C DETERMINE AIRCRAFT TYPE
C
      50 UO=0 I=1,NOAC
      IF(Z.EQ.X(1))GO TO 60
      40 CONTINUE

C IF ILLEGAL A/C TYPE, STOP PROGRAM
C
      55 CALL IERROR(12,Z)

```

CDC 6700 FTN V3.0-355F UPT=0 H0/05/29. 09.26.4H.

```

SUBROUTINE AIRCFT TRACE
C
C 60 CONTINUE
C
C INCREMENT NUMBER PER TYPE
C
60 IANUML(I)=IANUML(I)+J*(1-ISHP)
   IANUM(I)=IANUM(I)+J
C
C INCREMENT OFFICERS AND ENLISTED MEN DUE TO THIS DRIVER INPUT
C
C
70 DO=DO+Y*X1(I)*(1-ISHP)
   DE=DE+Y*X2(I)*(1-ISHP)
   USO=USO+Y*X1(I)*ISHP
   USE=USE+Y*X2(I)*ISHP
   DAO=DAO+Y*X1(I)*ISHP
   DAE=DAE+Y*X2(I)*ISHP
C
C INCREMENT TEMPORARY AMMO
C
75 TEMAMO=TEMAMO+AAMMO(I)*Y*ISHP
C
C INCREMENT TOTAL AMMO
C
80 IF(ISHP.EQ.0)GO TO 10
   XA=XA+AAMMO(I)*Y
   GO TO 15
10 XA=XA+AAMMO(I)*Y
15 CONTINUE
C
C COMPUTE TYPES 1 AND 2 AIRCRAFT COUNTS
C
85 IF(JX(I).EQ.4)GO TO 80
   IF(A4(I).LE.85.)GO TO 80
   TYPE2=TYPE2+Y*(1-ISHP)
   GO TO 90
80 TYPE1=TYPE1+Y*(1-ISHP)
90 CONTINUE
C
C READ NEXT DRIVER INPUT
C
95 GO TO 20
71 CONTINUE
   RETURN
   END

```

CUC 6700 FTM V3.0-355F OPT=0 80/05/29. 09.26.48.

SUBROUTINE APIEKS THACE

SUBROUTINE APIEKS

```

C
C      THIS ROUTINE CALCULATES ROUNDED PIER AND WHARF REQUIREMENTS
C      FROM THE RAM REQUIREMENTS M1A,M2A,M3A
C
5      COMMON /BLK1/ A(100),TABLE(100,10),IPOINT(100,2),INDEX(100),
A      IEND,IFRONT,LAST,NOAC,NUS,IERR,P(75),PP(23),ROF,MEF,
B      DMO,DME,DAO,DAE,OHAS,EBAS,TPERS
C
10     COMMON /BLK2/ IANUM(100),ISNUM(100),OS(100),ES(100),STYPE(100),
A      AMMO(100),AAMMO(100),FUEL(100),M1,M1A,M2,M2A,M3,
B      M3A,D50,USE,IANUML(100),XA,SH,ISFLG,IAFLG,IGAS(100)
C
COMMON /BLK3/ DOSC,DOSCK,DOSP,DOSPR,DOSD,DOSR,DOSU,DOSBR,
A      DOSA,DOSAK,PCAF,PCSF,PCAA,PCSA,FC,FA,G,FAC,
B      TYPE1,TYPE2,TYPE3,TEMAMO
REAL LA,LAP,LC,LCF,M1A,M2A,M3A,M4A,M1,M2,M3
C
C      COMPUTE AMMO CONTAINER PIER REQUIREMENTS
C
AMOD1A=AMOD(M1A,2.*P(45))
M1APRM=0
IF(AMOD1A.NE.0.)M1APRM=1
FB1A=2.*P(45)*M1APRM-AMOD1A
FBCUNA=M1A-AMOD1A+2.*P(45)*M1APRM
C
C      COMPUTE AMMO BREAK BULK PIER REQUIREMENTS
C
AMOD2A=AMOD(M2A,2.*P(46))
FB2A=M2A-AMOD2A
M2APRM=1
IF(AMOD2A.LT.FB1A)M2APRM=0
FBSUPA=FB2A+2.*P(46)*M2APRM
C
C      COMPUTE AMMO TOTAL FB REQUIREMENTS
C
A(11)=FBCUNA+FBSUPA
RETURN
END

```

THIS ROUTINE COMPUTES COMPONENT REQUIREMENTS AND PRINTS OUT
REQUIREMENTS REPORTS

```
COMMON /BLK1/ A(100),TABLE(100,10),IPOINT(100,2),INDEX(100),
A IEND,IFRONT,LAST,NOAC,NOS,ICRR,P(75),PP(23),ROF,REF,
B DMO,DME,UAD,DAE,UBAS,EHAS,IPERS
COMMON /BLK2/ IANUM(100),ISNUM(100),OS(100),ES(100),STYPE(100),
A AMMO(100),AAMMO(100),FUEL(100),M1,M1A,M2,M2A,M3,
B M3A,D50,USE,IANUML(100),XA,SH,ISFLG,IAFLG,IGAS(100)
COMMON /BLK3/ UOSC,DOSCR,DOSP,DOSPR,DOS5,DOS5R,DOSH,DOS8M,
A DOSA,DOSAR,PCAF,PCSF,PCAA,PCSA,FCFA,G,FAC,
B TYPE1,TYPE2,TYPE3,TEMAMO
COMMON /BLK6/ IDAY,IGEOT,ILINES,IDPLUS,IPAGE,IBUF(12),IGEO,
A ERF(100),ORF(100),ITITLE(4),LNCT,NCEO
COMMON /BLK9/ CTABLE(100,15),CONSTR,EQUIP,EVOL,CONTIM,FLAND,
A CFGE,CSCTOT
HEAL LA,LAP,LC,LCP,M1A,M2A,M3A,M1,M2,M3
INTEGER OS,ES,AMMO,FUEL
```

SET UP REQUIREMENTS TITLE

```
ITITLE(1)=8HSUMMARY
ITITLE(2)=8HOF PROJE
ITITLE(3)=8HCTED REQ
ITITLE(4)=8HUIREMENT
CALL HEADER
ILINES=ILINES+6
WRITE(6,1001)
```

WRITE REQUIREMENTS REPORT

```
DO 10 I=1,LAST
ILINES=ILINES+1
IF (ILINES.LE.LNCT)GO TO 919
CALL HEADER
WRITE(6,1001)
ILINES=ILINES+7
```

919 CONTINUE

```
WRITE(6,1002) (TABLE(I,J),J=1,5),ORF(INDEX(I)),ENF(INDEX(I)),
A (INDEX(I)),TABLE(I,6)
```

10 CONTINUE

```
1001 FORMAT(T69,9HCOMPONENT,T89,15HPACING FACILITY/T21,9HCOMPONENT,
A T40,15HPACING FACILITY,T64,18HBASE OPS PERSONNEL,
B T91,11HREQUIREMENT/T25,2HID,T63,
C 21HOFFICERS ENLISTED/)
1002 FORMAT(T25,A8,T35,4A6,T65,F6.1,T77,F6.1,T88,F10.1,2X,A4)
```

SET UP COMPONENT TITLE

```
ITITLE(1)=8HSUMMARY
ITITLE(2)=8HOF COMPO
ITITLE(3)=8HMENT REQ
ITITLE(4)=8HUIREMENT
```

```

60      CALL HEADFR
        ILINES=ILINES+6
        WRITE(6,1003)
1003    FORMAT(T6,5HCOMP.,T24,9HCOMPONENT,T48,12HCONSTRUCTION,T65,
        A 9HEQUIPMENT,T81,9HEQUIPMENT,T96,12HCONSTRUCTION,T112,
        B 4HLAND/T7,2HIU,T23,11HDESCRIPTION,T52,4HCOST,T67,
        C 4HCOST,T83,4HCURE,T100,4HTIME,T112,5HREUMT/T47,
        D 10H(THOUSANDS,T63,10H(THOUSANDS,T79,12H(MEASUREMENT,
        E T97,10H(MAN-DAYS),T111,7H(ACRES)/T48,11HOF DOLLARS),
        F T64,11HOF DOLLARS),T83,5HTONS)/)

        C
        C
        C      COMPUTE AND WRITE COMPONENT REPORT
        C
        C      CONSTR=0.
        C      EQUIP=0.
        C      EVOL=0.
        C      CONTIM=0.
        C      FLAND=0.
        C      DO 20 I=1, LAST
        C      IA=AINDEX(I)+.5
        C      IF(IA.LE.0)GO TO 15
        C      FCO=(CTABLE(I,6)+CTABLE(I,7)*IA)/1000.
        C      FE=(CTABLE(I,8)+CTABLE(I,9)*IA)/1000.
        C      FV=(CTABLE(I,10)+CTABLE(I,11)*IA)/40.
        C      FCOT=CTABLE(I,12)+CTABLE(I,13)*IA
        C      FLAN=CTABLE(I,14)+CTABLE(I,15)*IA
        C      GO TO 18
15      CONTINUE
        FCO=0.
        FE=0.
        FV=0.
        FCOT=0.
        FLAN=0.
18      CONTINUE
        I1=FCO+.5
        J1=FE+.5
        K1=FV+.5
        L1=FCOT+.5
        M1=FLAN+.5
        ILINES=ILINES+1
        IF(ILINES.LE.LNCT)GO TO 925
        CALL HEADER
        WRITE(6,1003)
        ILINES=ILINES+7
925      CONTINUE
        WRITE(6,1004) (CTABLE(I,J),J=1,5),I1,J1,K1,L1,M1
1004    FORMAT(5X,A4,2X,4A8,5X,3(19,7X),19,5X,16)
        CONSTR=CONSTR+FCO
        EQUIP=EQUIP+FE
        EVOL=EVOL+FV
        CONTIM=CONTIM+FCOT
        FLAND=FLAND+FLAN
20      CONTINUE
        I1=CONSTR+.5
        J1=EQUIP+.5

```

```

SUBROUTINE COMPON      TRACE
      K1=EVOL*.5
      L1=CONTIM*.5
      M1=FLAND*.5
      WRITE(6,1005)I1,J1,K1,L1,M1
115      1005 FORMAT(I5,I13(1H-)/T28,14HTOTAL FOR BASE,4(7X,I9),5X,I6)
      WRITE(6,1006)
1006 FORMAT(/I5,48HFOOTNOTE - CONSTRUCTION COSTS NOT MODIFIED TO ME,
      A      33HFLECT GEOGRAPHIC COST MULTIPLIERS//)
      RETURN
120      END

```

CUC 6700 FTN V3.0-355F OPT=0 80/05/24. 09.28.4H.

SUBROUTINE COSTS

```

C
C THIS SUBROUTINE COMPUTES THE INITIAL INVESTMENT COSTS
C FOR THE BASE CONSTRUCTION AND INITIAL OUTFITTING. THE
C RECURRING ANNUAL OPERATIONS AND SUPPORT COSTS FOR THE BASE.
C AND THE ANNUAL TRANSPORT COSTS FOR THE SUPPORTED FORCES SUPPLIES.
C
COMMON /BLK1/ AT(100),TABLE(100,10),IPOINT(100,2),INDEX(100),
A IEND,IFRONT,LAST,NQAC,NOS,IEHR,P(75),P(123),MOF,HEF,
H LMO,UME,DAO,DAE,OHAS,EBAS,TPERS
COMMON /BLK3/ DUSC,DUSCH,DOSP,DUSPH,DUSS,DOSSR,DOSH,DUSHR,
A DUSA,DUSAM,PCAF,PCSF,PCAA,PCSA,FL,FA,G,FAC,
H TYPE1,TYPE2,TYPE3,TENAMO
COMMON /BLK6/ IDAY,IGEUT,ILINES,INPLUS,IPAGE,IHUF(12),IGEO,
A ERF(100),ORF(100),ITITLE(4),LNCT,NGEO
COMMON /BLK8/ GC,PH,SUBH,PPMPD(10),CPP(13),
A XPLMT,XAMTP,ZMSTR,ZMSTR,ZMSTR,ZMSTR,XPMI,XPSMT,XPMI
COMMON /BLK9/ CTABLE(100,15),CONSTR,EQUIP,EVOL,CONTIN,FLAND,
A CFGEO,CSC10T
COMMON /BLK11/ SCPP(12),CTPGEU,CTSGEO,CTHGEU,CPO,CPE,
A PPMNAV(10),DENS(5)
COMMON /BLK12/ PCMU,PCME,DEPPMU,DEPPME,HLOU,HLOM,HLEU,HLEM,
A PCPLAN,CPALAN,CLALAN
DATA IE0F/bh*****/
CPEHS=(CPO*OHAS+CPE*EBAS)
TBAS=OBAS*EBAS
CSUP=SCPP(1)*PPMNAV(1)*([1,-PPMPD(9)]+SCPP(9)*PPMNAV(1)*PPMPD(9)
HSPV=CPP(1)*PPMPD(1)*([1,-PPMPD(9)]
DO 10 I=2,6
CSUP=CSUP+SCPP(1)*PPMNAV(1)
HSPV=HSPV+CPP(1)*PPMPD(1)
10 CONTINUE
CSUP=CSUP+TBAS*0.365
HSPV=HSPV*9.125
HSPV=PPMPD(1)*CPP(1)*PPMPD(9)*9.125
SFSPV=HSPV*TPERS
SFSPV=HSPV*TPERS
SFSPV=365.*A(7)*PCSF/(DUSSR*PCSF*DUSS)
SFAPU=365.*A(8)*PCAF/(DUSSP*PCAF*DUSSP)
SFSPU=SFSPU/DENS(4)
SFAPU=SFAPU/DENS(5)
EPEHS=(1.*PCMU*DEPPMU)*OHAS*([1,-PCME*DEPPME)*EBAS
HSPV=HSPV*EPEHS
HSPV=HSPV*EPEHS
BLVUL=((HLOU*(1.-PCMU)+BLOM*PCMU)*OHAS*(HLEU*(1.-PCME)+
A BLEM*PCME)*EBAS)/40.
WHFOEL=0.
CHFOEL=0.
DO 15 I=1,3
CHFOEL=CHFOEL+A(93-1)*SCPP(1+9)*365./((USB*DUSSH)
WHFOEL=WHFOEL+A(93-1)*365./((USSH*DUSSH)*DENS(1))
15 CONTINUE
CHFOEL=CHFOEL/1000.
20 CONTINUE
C

```

SUBROUTINE COSTS TRACE

C HEAD AND WRITE GEOGRAPHIC DEPENDENT INPUTS

HEAD(5,1500)(ITITLE(1),1=1,4)

1500 FORMAT(4A8)

IF(ITITLE(1).EQ.IEOF)GO TO 30

NGEU=NGEO+1

CALL HEADER

HEAD(5,2000)CFGEO,CTSGEO,CTRGEO,CTPGEO,CTFGE0,CTAGE0,PCPLAN,

CPALAN,CLALAN

2000 FORMAT(6,3,1X,5(F7.2,1X),F5.3,1X,2(F7.1,1X))

WRITE(6,2001)CFGEO,CTSGEO,CTRGEO,CTPGEO,CTFGE0,CTAGE0,PCPLAN,

CPALAN,CLALAN

2001 FORMAT(139,27HGE0GRAPHIC DEPENDENT INPUTS//T33,14HCONSTRUCTION C,

A 16H0ST MULTIPLIER --,2X,F6.3/

C T37,15HTRANSPORT COSTS/T48,

D 15HGENERAL CARGO --,1X,F7.2,2X,24HDOLLARS PER MEASUREMENT ,

E 3HTON/T49,14HREEFER CARGO --,1X,F7.2,2X,15HDOLLARS PER MEA,

F 12HMEASUREMENT TON/T52,11HPERSONNEL --,1X,F7.2,2X,9HDOLLARS P,

G 9HER PERSON/T53,10HBULK POL --,1X,F7.2,2X,10HDOLLARS PE,

H 10HR LONG TON/T51,12HAMMUNITION --,1X,F7.2,2X,9HDOLLARS P,

I 18HER MEASUREMENT TON/T24,27HPROPORTION LAND REQUIREMENT,

J 11H PURCHASED ,

K 1H--3X,F5.3/T43,20HLAND PURCHASE COST --,1X,F7.1,2X,

L 16HDOLLARS PER ACRE/T46,17HLAND LEASE COST --,1X,F7.1,2X,

M 16HDOLLARS PER ACRE)

WRITE(6,500)

500 FORMAT(//////T50,29HBASE INITIAL INVESTMENT COSTS//)

C

C COMPUTE AND WRITE BASE INITIAL INVESTMENT COSTS

C

CONSR=CONSTR*CFGEO

TEQUIP=(CTSGEO*EVOL)/1000.

TPERS=EPERS*CTPGEO/1000.

TPERBL=(CTSGEO*BLVOL)/1000.

CILAND=PCPLAN*FLAND*CPALAN/1000.

TOTINV=CONSR*EQUIP+TEQUIP+TPERS+TPERBL+CILAND

I=CONSR*.5

J=TEQUIP*.5

K=TPERS*.5

L=TPERBL*.5

M=CILAND*.5

N=TOTINV*.5

WRITE(6,1000)I,11,J,11,K,11,L

1000 FORMAT(149,31HCOSTS IN THOUSANDS OF DOLLARS)///T47,9HBASE FACI,

A 19HILITY CONSTRUCTION --,17/

B T30,38HINITIAL OUTFITTING (EQUIPMENT AND SUPP,

C 7HLIES) --,17/T38,37HTRANSPORT OF EQUIPMENT AND SUPPLIES --,

D 17/T31,44HTRANSPORT OF BASE PERSONNEL AND DEPENDENTS --,17/

E T41,34HTRANSPORT OF PERSONAL BELONGINGS --,17/T57,6HLAND A,

F 12HACQUISITION --,17/T31,51(1H-)/T39,19HTOTAL BASE INITIAL ,

G 17HINVESTMENT COST --,17)

CALL HEADER

C

C COMPUTE BASE ANNUAL RECURRING COSTS

C

CUC 6/00 FTA V3.0-355T (PT=0 H0/05/24 04.20.48.

```

C
115 CTRFUE=CTFGEU*HMFUEL/1000.
    CTSUP=(CTSGEU*HSPV+CTHGEU*HSPVH)/1000.
    CTPERS=2.*EPERS*CTPGEO/3000.
    CTPBL=2.*CTSGEU*HLVOL/3000.
    CLLAND=(1.*PCPLAN)*FLAND*CLALAN/1000.
    TOTUAS=CPERS*CSUP+CTSUP+CTPERS+CTPHL+CLLAND+CTHFUE+CHFUEL
    J=CPERS*.5
    I1=CSUP*.5
    J=CTSUP*.5
    J3=CBFUEL*.5
    J2=CTHFUE*.5
    J1=CTPERS*.5
    K=CTPHL*.5
    K1=CLLAND*.5
    L=TOTUAS*.5
    WRITE(6,1003)
1003 FORMAT(//////T51,27HBASE ANNUAL RECURRING COSTS//)
1001 FORMAT(149,31HCOSTS IN THOUSANDS OF DOLLARS)///T56,9HPEKSONNEL,
    A 10H BILLETS --,17/T51,24HSUPPLIES AND EQUIPMENT --,17/T38,
    B 37HTRANSPORT OF SUPPLIES AND EQUIPMENT --,17/T64,6HBASE FUE,
    C 3HL --,17/T51,24HTRANSPORT OF BASE FUEL --,17/T25,7HTRANSPO,
    D 43HRT OF ROTATIONAL PERSONNEL AND DEPENDENTS --,17/T41,
    E 34HTRANSPORT OF PERSONAL BELONGINGS --,17/T63,9HLAND LEAS,
    F 3ME --,17/T25,57(1H--)/T41,29HTOTAL BASE ANNUAL RECURRING C,
    G 5HST --,17)

C
C COMPUTE SUPPORTED FORCES ANNUAL TRANSPORT
C COSTS(CONUS TO FORWARD BASE) OF SUPPLIES,
C EQUIPMENT, POL, AND AMMUNITION
C
CSFSUP=(CTSGEU*SFSPV+CTRGEU*SFSPVR)/1000.
CSFSFU=CTFGEU*SFSPV/1000.
CSFAFU=CTFGEU*SFAPV/1000.
CSFSAM=CTAGEU*PCSA*XPMT*.365
CSFAAM=CTAGEU*PCAA*XPMT*.365
I =CSFSUP*.5
I1 =CSFSFU*.5
J =CSFAFU*.5
J1 =CSFSAM*.5
K =CSFAAM*.5
WRITE(6,1002)I,I1,J,J1,K
1002 FORMAT(//////T33,45HSUPPORTED FORCES ANNUAL TRANSPORT COSTS - CON,
    A18HUS TO FORWARD BASE//T49,31HCOSTS IN THOUSANDS OF DOLLARS)///
    B151,24HSUPPLIES AND EQUIPMENT --,17/T64,11HSHIP FUEL --,17/T60,
    C15HAIRORAFT FUEL --,17/T58,17HSHIP AMMUNITION --,17/T54,
    D21HAIRORAFT AMMUNITION --,17)
    GO TO 20
30 CONTINUE
    RETURN
    END

```

CUC 6700 FTN V3.0-3551 OPT=0 80/05/29. 09.20.48.

TRACE

SUBROUTINE CPIENS

```

C
C THIS ROUTINE CALCULATES ROUNDED PIER AND WHARF REQUIREMENTS
C FROM THE RAM REQUIREMENTS M1, M2, M3
C
COMMON /BLK1/ A(100),TABLE(100,10),IPOINT(100,2),INDEX(100),
A IEND,IFRONT,LAST,NOAC,NOS,IERN,P(75),PP(23),HOF,REF,
B DMO,DME,DAO,DAE,OBAS,EBAS,IPENS
COMMON /BLK2/ IANUM(100),ISNUM(100),OS(100),ES(100),STYPE(100),
A AMMO(100),AAHMO(100),FUEL(100),M1,M1A,M2,M2A,M3,
B M3A,DSO,DSE,IANUML(100),XA,SH,ISFLG,IAFLG,IGAS(100)
COMMON /BLK3/ DOSS,DOSCR,DOSP,DOSPR,DOSF,DOSR,DOSR,DOSBR,
A DOSA,DOSAH,PCAF,PCSF,PCAA,PCSA,FC,FA,G,FAC,
B TYPE1,TYPE2,TYPE3,TEMAMO
REAL LA,LAP,LC,LCP,M1A,M2A,M3A,M1,M2,M3,M4

C
C COMPUTE CARGO CONTAINER PIER REQUIREMENT
C
AMOD1=AMOD(M1,2)*P(16)
M1PRM=0
IF (AMOD1.NE.0.)M1PRM=1
FBCUN=M1-AMOD1*2.*P(16)*M1PRM
A(93)=FBCUN
C
C COMPUTE CARGO BREAK BULK PIER REQUIREMENT
C
AMOD2=AMOD(M2,2)*P(27)
M2PRM=0
IF (AMOD2.NE.0.)M2PRM=1
FBSUP=M2-AMOD2*2.*P(27)*M2PRM
A(85)=FBSUP
RETURN
END

```

SUBROUTINE FIG1(R0,RE)

C THIS ROUTINE CALCULATES FACILITY REQUIREMENTS FOR MEN
C INDEPENDENT FACILITIES
C

COMMON /BLK1/ A(100),TABLE(100,10),IPOINT(100,2),INDEX(100),
IEND,IFRONT,LAST,NOAC,NOS,IERR,P(75),PP(23),ROF,REF,
DMO,UME,DAO,UAE,OBAS,EBAS,IPEHS
COMMON /BLK2/ IANUM(100),ISNUM(100),OS(100),ES(100),STYLE(100),
AMMO(100),AMMO(100),FUEL(100),M1,M1A,M2,M2A,M3,
M3A,D50,DSE,IANUML(100),XA,SH,ISFLG,IAFLG,IGAS(100)
COMMON /BLK3/ DOSS,DOSSCH,DOSP,DOSPR,DOS,DOSSR,DOSH,DOSSR,
A DOSSA,DOSAR,PCAF,PCSF,PCAA,PCSA,FC,FA,G,FAC,
TYPE1,TYPE2,TYPE3,TEMAMO
COMMON /BLK4/ IBIG,DO,DE,HSQUAD,TACAC,CAHAC,PATAC,HELUS,
HSLTAC,HSLCAR,HSLPAT,HSLHEL
COMMON /BLK5/ JX(100),KX(100),LX(100),X1(100),X2(100),X3(100),
X4(100),X5(100),X(100)
REAL LA,LAP,LC,LCP,M1A,M2A,M3A,M1,M2,M3
INTEGER OS,ES

COMPONENT A4

A(1)=P(2)

COMPONENT 8B

A(2)=P(7)

COMPONENT 85A

A(3)=P(8)

COMPONENT C3A

A(4)=P(10)

COMPONENT C27J

A(5)=P(14)

COMPONENT C32A

A(6)=P(15)

COMPONENT D3A1

A(7)=0.

DO 10 I=1,NOS

10 A(7)=A(7)+FUEL(I)*ISNUM(I)
A(7)=A(7)+(DOSSR*PCSF*DOSS)

COMPONENT D3A2

A(8)=0.

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SUBROUTINE FIG2(RD,RE)

THIS SUBROUTINE SETS THE COEFFICIENTS OF THE MATRIX A AND SETS
THE VECTOR B FOR THE SYSTEM OF EQUATIONS AX=B WHERE VECTOR X
CONTAINS THE PROJECTIONS FOR COMPONENTS WHOSE REQUIREMENT IS A
FUNCTION OF MEN

THE FIRST 2 ELEMENTS OF X ARE THE TOTAL NUMBER OF OFFICERS
AND ENLISTED IN THE BASE SUPPORT FORCE

RO IS THE OFFICER REQUIREMENT FROM OTHER COMPONENTS

RE IS THE ENLISTED REQUIREMENT FROM OTHER COMPONENTS

COMMON /BLK1/ A(100),TAHLE(100,10),IPOINT(100,2),INDEX(100),
IEND,IFRONT,LAST,NOAC,NOS,IERR,P(75),PPI(23),ROF,REF,
DME,DME,DAO,DAE,OBAS,EBAS,TPERS

COMMON /BLK2/ IANUM(100),ISNUM(100),OS(100),ES(100),STYPE(100),
AMHO(100),AAMHO(100),FUEL(100),M1,M1A,M2,M2A,M3,

M3A,DSO,DSE,IANUML(100),XA,SH,ISFLG,IAFLG,IGAS(100)
COMMON /BLK3/ DOSC,DOSCR,DOSP,DOSPR,DOSD,DOSR,DOSB,DOSBR,
DOSA,DOSAR,PCAF,PCSF,PCAA,PCSA,FC,FA,G,FAC,

TYPE1,TYPE2,TYPE3,TEMANO
COMMON /BLK4/ IBIG,DO,DE,HSQUAD,TACAC,CARAC,PATAC,HELOS,

HSLTAC,HSLCAR,HSLPAT,HSLHEL

COMMON /BLK6/ IDAY,IGEOCT,ILINES,IDPLUS,IPAGE,IBUF(12),IGEO,
ERF(100),ORF(100),ITITLE(4),LMCT,NGEO

COMMON /BLK7/ X(50)

COMMON /BLK8/ GC,PR,SURK,PPMPD(10),CPP(13),

XPLMT,XAMTP,ZMSTR,ZMSTNK,ZMSTC,PRI,XPSMT,XPAMT
COMMON /BLK12/ PCMO,PCME,DEPPMO,DEPPME,BLOU,BLOM,BLEU,BLEM,
PCPLAN,CPALAN,CLALAN

INTEGER OS,ES

DIMENSION B(50),AA(50,50)

REAL LA,LAP,LC,LCP,M1A,M2A,M3A,M1,M2,M3

COL=PCMO*DEPPMO

CEL=PCME*DEPPME

COL1=1, COL

CEL1=1, CEL

COMPONENT A3

AA(1,1)= P(1)

AA(1,2)= P(1)

COMPONENT A5

AA(2,1)=P(4)

AA(2,2)=P(4)

COMPONENT A7

AA(3,1)=P(6)

AA(3,2)=P(6)

CARGO THRUPUT COEFFICIENTS

C1=C*GC*ZMSTC/2000.

60 C2=(1.-FC)*GC*ZMSTC/2000.
C3=(1.-G)*GC*ZMSTC/2000.
CLNK=FC*GC*(1.-PRI)*ZMSTNR/2000.
C2NK=(1.-FC)*GC*(1.-PRI)*ZMSTNR/2000.
C3NK=(1.-G)*GC*(1.-PRI)*ZMSTNR/2000.
C1R=FC*GC*PRI*ZMSTH/2000.
C2R=(1.-FC)*GC*PRI*ZMSTH/2000.
C3R=(1.-G)*GC*PRI*ZMSTH/2000.

65 C COMPONENT B13C
C AA(4,1)=COL1*P(9)*(C1+C2)
C AA(4,2)=CEL1*P(9)*(C1+C2)

70 C COMPONENT C7
C
C AA(5,1)=COL1*P(11)*(C1+C2)
C AA(5,2)=CEL1*P(11)*(C1+C2)

75 C COMPONENT C13
C
C AA(6,1)=P(13)
C AA(6,2)=P(13)

80 C COMPONENT DA
C
C AA(7,1)=COL1*P(17)*C1
C AA(7,2)=CEL1*P(17)*C1

85 C COMPONENT D4C1
C
C AA(8,1)=COL1*P(18)*(D0SB+D0SBR)
C AA(8,2)=CEL1*P(18)*(D0SB+D0SBR)

90 C COMPONENT D4C2
C
C AA(9,1)= P(19)*(D0SB+D0SBR)
C AA(9,2)= P(19)*(D0SB+D0SBR)

95 C COMPONENT D4C3
C
C AA(10,1)=COL1*P(20)*(D0SB+D0SBR)
C AA(10,2)=CEL1*P(20)*(D0SB+D0SBR)

100 C COMPONENT D20
C
C AA(11,1)=P(21)
C AA(11,2)=P(21)

105 C COMPONENT D2+A
C
C AA(12,1)=P(23)
C AA(12,2)=P(23)

110 C COMPONENT D29A

SUBROUTINE	FIG2	THACE
118	C	AA(13,1)=COL1*P(25)*FAC*C2 AA(13,2)=CELL*P(25)*FAC*C2 COMPONENT D31A
120	C	AA(14,1)=COL1*P(26)*(C1N+C2N)*(D0SC+D0SCR) AA(14,2)=CELL*P(26)*(C1N+C2N)*(D0SC+D0SCR) COMPONENT D31E
120	C	AA(15,1)=COL1*P(28)*C2 AA(15,2)=CELL*P(28)*C2 COMPONENT D32A
130	C	AA(16,1)=COL1*P(29)*(C1H+C2R)*(D0SC+D0SCR) AA(16,2)=CELL*P(29)*(C1H+C2R)*(D0SC+D0SCR) COMPONENT D33A
130	C	AA(17,1)=COL1*P(30)*(C1+C2) AA(17,2)=CELL*P(30)*(C1+C2) COMPONENT F1
140	C	AA(18,1)=COL1*P(31)*(C1+C2) AA(18,2)=CELL*P(31)*(C1+C2) COMPONENT G2
145	C	AA(19,1)=COL1*P(33) AA(19,2)=CELL*P(33) COMPONENT G9
150	C	AA(20,1)=COL1*P(35) AA(20,2)=CELL*P(35) COMPONENT G2B
155	C	AA(21,1)=COL1*P(37) AA(21,2)=CELL*P(37) COMPONENT H9J
160	C	AA(22,1)=COL1*P(39)*FAC*C2 AA(22,2)=CELL*P(39)*FAC*C2 COMPONENT NA
165	C	AA(23,1)=P(51)*PCMO AA(23,2)=P(52)*PCME COMPONENT NB

SUBROUTINE	FIG2	TRACE
170	C	AA(24,1)=0. AA(24,2)=P(53)*(1.-PCME) COMPONENT NC AA(25,1)=P(54)*(1.-PCMO) AA(25,2)=0. COMPONENT ND AA(26,1)=P(56) AA(26,2)=P(56) COMPONENT NE AA(27,1)=P(58)*(1.*0.1*COL) AA(27,2)=P(58)*(1.*0.1*CEL) COMPONENT N10B AA(28,1)=0. AA(28,2)=P(59) COMPONENT N14 AA(29,1)=P(61)*COL1 AA(29,2)=P(62)*CEL1 COMPONENT N16 AA(30,1)=P(64)*(1.*.5*PCMO) AA(30,2)=0. COMPONENT N17 AA(31,1)=0. AA(31,2)=P(66) COMPONENT P5 AA(32,1)=P(67) AA(32,2)=P(67) COMPONENT P5A AA(33,1)=P(69) AA(33,2)=P(69) COMPONENT P12A AA(34,1)=COL1*P(70) AA(34,2)=CEL1*P(70) COMPONENT P16
175	C	
180	C	
185	C	
190	C	
195	C	
200	C	
205	C	
210	C	
215	C	
220	C	

SUBROUTINE FIG2 TRACE

```

C
AA(J5,1)=COL1*P(71)
AA(J5,2)=CEL1*P(71)
C
C
C COMPONENT P18
C
AA(J6,1)=COL1*P(72)
AA(J6,2)=CEL1*P(72)
C
C RIPPLE FACTORS
C
JJ=101-IFRONT
II=102-IFRONT
AA(JJ,1)=1.
AA(JJ,2)=0.
AA(II,1)=0.
AA(II,2)=1.
JK=JJ+1
DO 40 I=3,JK
AA(JJ,I)=TABLE(IPOINT(102-I,2),7)
AA(II,I)=TABLE(IPOINT(102-I,2),8)
40 CONTINUE
DO 10 K=1,II
10 B(K)=0.
C
C CONSTANT TERMS
C
DLO=DO+DMO
DLE=DE+DME
TOTGA=DLO+DLE+G*(DSO+DSE)
TOTGO=DLO+G*DSO
TOTGE=DLE+G*DSE
TOTU=DLO+DLE+DSO+DSE
TOTL=DLE+DSE
B(1)=-P(1)*TOTGA
B(2)=-P(4)*TOTGA-P(3)
B(3)=-P(6)*TOTGA-P(5)
B(4)=-P(9)*(C1+C2)*TOTGA-P(9)*C3*(DSO+DSE)-P(9)*XAMTP
B(5)=-P(11)*(C1+C2)*TOTGA-P(11)*C3*(DSO+DSE)-P(11)*XAMTP
B(6)=-P(13)*TOTGA-P(12)
B(7)=-P(17)*C1*TOTA
B(8)=-P(18)*TOTGA*(DO5B+DO5HR)
B(9)=-P(19)*TOTGA*(DO5B+DO5HR)
B(10)=-P(20)*TOTGA*(DO5B+DO5HR)
B(11)=-P(21)*TOTGA
B(12)=-P(23)*TOTGA-P(22)
B(13)=-P(25)*FAC*C2*TOTA-P(24)
B(14)=-P(26)*(C1NR+C2NR)*(DO5C+DO5CR)*TOTA
B(15)=-P(28)*C2*TOTA-P(28)*C3*(DSO+DSE)
B(16)=-P(29)*(C1R+C2R)*(DO5C+DO5CR)*TOTA
B(17)=-P(30)*(C1+C2)*TOTA-P(30)*C3*(DSO+DSE)-P(30)*XAMTP
B(18)=-P(31)*(C1+C2)*TOTA-P(31)*C3*(DSO+DSE)-P(31)*XAMTP
B(19)=-P(33)*TOTA-P(32)
B(20)=-P(35)*TOTGA-P(34)

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AD-A089 333

SRI INTERNATIONAL MENLO PARK CA
ADVANCED NAVAL SUPPLY BASE COST MODEL (ABCOMO). (U)
APR 78 R H MONAHAN, W SCHUBERT

F/6 15/5

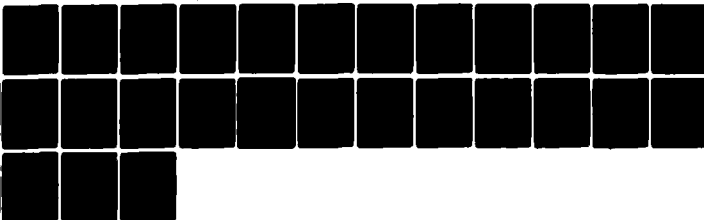
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3 OF 3

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CDC 6700 FTW V3.0-355F OPT=0 R0/05/24. 04.28.48.

SUBROUTINE FIG2 TRACE

```

335 L3=L+L2
      N3=N+N2
      L4=J4+K4
      ITOT=I3+J3+K3+L3+N3+L4
      TPENS=DO+DSO+DMO+DE+DSE+DME
      ILINES=ILINES+8
      IF (ILINES.GT.LNCT) CALL HEADER
      C
      C WRITE MANPOWER REPORT
      C
      C WRITE(6,30) I,J,K,L,N,J4,ITOT,I2,J2,K2,L2,N2,K4,ITOT,I3,J3,K3,L3,
      C A N3,L4,ITOT
      C 30 FORMAT(/T62,8HMANPOWER//T26,10HLAND-BASED,T39,9HSEA-BASED,T54,
      C A 4HSHIP,T64,11HOTHER FORCE,T78,8HBASE OPS,T94,4HBASE,I106,
      C B 5HTOTAL/T26,2(8HAIRCRAFT,5X),T52,9HPERSONNEL,T66,
      C C 8HELEMENTS,T78,9HPERSONNEL,T91,10HDEPENDENTS,T104,
      C D 9HPERSONNEL/T26,2(9HPERSONNEL,4X)//T16,8HOFFICERS,T27,
      C E 7(I6,7X)/T16,8HENLISTED,T27,7(I6,7X)/T16,5HTOTAL,T27,
      C F 7(I6,7X))
      C
      C READ OFF TOTAL REQUIREMENTS THAT ARE A FUNCTION OF MEN
      C
      C JJ=JJ+2
      C DO 50 I=3,JJ
      C IF(X(I).LT.0) CALL IERROR(11,DUM)
      C 50 A(I02-I)=X(I)
      C
      C SET RAW FEET OF CARGO BERTHING
      C
      C M1=X(9)
      C M2=X(17)
      C RETURN
      C END
360

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CDC 6700 FTM V3.0-355f OPT=0 R0/05/29. 0%20.48.

SUBROUTINE FIG3 THACE

SUBROUTINE FIG3

```

C
C THIS SUBROUTINE INCREASES MAINT. HANGAR REQUIREMENT TO ACCOUNT
C FOR LAND-BASED AIRCRAFT AND CALCULATES BASE POWER REQUIREMENTS
C
C COMMON /BLK1/ A(100),TABLE(100,10),IPOINT(100,2),INDEX(100),
C IEND,IFRONT,LAST,NOAC,NOS,IERR,P(75),PP(23),ROF,REF,
C DMO,DNE,DAO,DAE,ORAS,EBAS,IPERS
C COMMON /BLK2/ IANUM(100),ISNUM(100),OS(100),ES(100),STYPE(100),
C AMMO(100),AMMO(100),FUEL(100),M1,M1A,M2,M2A,M3,
C M3A,USO,DSE,IANUML(100),XA,SH,ISFLG,IAFLG,IGAS(100)
C COMMON /BLK3/ DOSC,DOSCR,DOSP,DOSPR,DOSR,DOSR,DOSR,DOSR,
C UOSA,DOSAR,PCAF,PCSF,PCAA,MCSA,FC,FA,G,FAC,
C TYPE1,TYPE2,TYPE3,TEMAMO
C COMMON /BLK7/ X(50)
C INTEGER OS,ES,AMMO,FUEL
C REAL LA,LAP,LC,LCP,M1A,M2A,M3A,M1,M2,M3
C
C INCREASE MAINT. HANGAR REQUIREMENT FOR LAND-BASED A/C
C
C A(78)=A(78)+P(40)*TYPE1+P(41)*TYPE2
C
C COMPUTE BASE POWER REQUIREMENTS
C
C DO 10 I=1,IEND
C 10 A(100)=A(100)+A(1)*TABLE(IPOINT(I,2),9)
C DO 20 I=IFRONT,99
C 20 A(100)=A(100)+A(1)*TABLE(IPOINT(I,2),9)
C RETURN
C END

```

SUBROUTINE HEADER

```

C
C THIS ROUTINE WRITES REPORT HEADINGS GIVEN THE REPORT NUMBERS.
C TITLE,CASE NUMBER,SUPPORTED FORCE NUMBER, AND GEOGRAPHICAL
C AREA NUMBER
C
COMMON /BLK6/ IDAY,IGEECT,ILINES,IDPLUS,IPAGE,IBUF(12),IGEO,
A ERF(100),ORF(100),ITITLE(4),LNCT,NGEO
DATA IBLANK/1H /
IPAGE=IPAGE+1
IF(NGEO.GT.0)GO TO 116
115 IF(IGEO.EQ.IBLANK.AND.IDAY.EQ.IBLANK)GO TO 111
IF(IGEO.EQ.IBLANK)GO TO 112
IF(IDAY.EQ.IBLANK)GO TO 113
WRITE(6,1014)IGEECT,IDPLUS,IPAGE,(IBUF(1),I=1,6),(ITITLE(1),I=1,4)
A ,IGEO,IDAY
1014 FORMAT(1H1,T15,9HREPORT 2-,I2,1H-,I2,T120,4HPAGE,13/T15,2A6,T30,
A 4A6//T48,4AB/T48,8HCASE ID-,A8,T67,9HFORCE ID-,A4//)
ILINES=6
GO TO 114
112 WRITE(6,1020)IGEECT,IDPLUS,IPAGE,(IBUF(1),I=1,6),(ITITLE(1),I=1,4)
A ,IDAY
1020 FORMAT(1H1,T15,9HREPORT 2-,I2,1H-,I2,T120,4HPAGE,13/T15,2A6,T30,
A 4A6//T48,4AB/T58,9HFORCE ID-,A4//)
ILINES=6
GO TO 114
113 WRITE(6,1021)IGEECT,IDPLUS,IPAGE,(IBUF(1),I=1,6),(ITITLE(1),I=1,4)
A ,IGEO
1021 FORMAT(1H1,T15,9HREPORT 2-,I2,1H-,I2,T120,4HPAGE,13/T15,2A6,T30,
A 4A6//T48,4AB/T55,8HCASE ID-,A8//)
ILINES=6
GO TO 114
111 WRITE(6,1022)IGEECT,IDPLUS,IPAGE,(IBUF(1),I=1,6),(ITITLE(1),I=1,4)
1022 FORMAT(1H1,T15,9HREPORT 2-,I2,1H-,I2,T100,4HPAGE,13/T15,2A6,T30,
A 4A6//T48,4AB//)
ILINES=5
GO TO 114
116 WRITE(6,1023)IGEECT,IDPLUS,NGEO,IPAGE,(IBUF(1),I=1,6),
A (ITITLE(1),I=1,4),IGEO,IDAY
1023 FORMAT(1H1,T15,9HREPORT 2-,I2,1H-,I2,1H-,I2,T117,4HPAGE,13/
A T15,2A6,T30,4A6//T48,4AB/T48,8HCASE ID-,A8,T67,
A 9HFORCE ID-,A4//)
114 CONTINUE
RETURN
END

```

SUBROUTINE IAMMO

C THIS ROUTINE CALCULATES THE AMMUNITION REQUIREMENTS FOR
C A BASE LOADING TO THE REQUIREMENTS REPORT.

COMMON /BLK1/ A(100),TABLE(100,10),IPOINT(100,2),INDEX(100),
IEND,IFRONT,LAST,NOAC,NOS,IERM,P(175),PP(23),ROF,REF,
UHO,DME,UAO,DAE,OBAS,EBAS,IPERS
COMMON /BLK2/ IANUM(100),ISNUM(100),OS(100),ES(100),STYPE(100),
AMMO(100),AAMMO(100),FUEL(100),M1,M1A,M2,M2A,M3,
M3A,DSO,DSE,IANUML(100),XA,SH,ISFLG,IAFLG,IGAS(100)
COMMON /BLK3/ DOSC,DOSCR,DOSP,DOSPR,DOSD,DOSDR,DOSD,DOSE,DOSEB,
A DOSA,DOSAN,PCAF,PCSF,PCAA,PCSA,FC,FA,G,FAC,
TYPE1,TYPE2,TYPE3,TEMAMO
COMMON /BLK4/ IBIG,DO,DE,MSQUAD,TACAC,CAHAC,PATAC,MELOS,
A HSLTAC,HSLCAR,HSLPAT,HSLHEL
COMMON /BLK5/ JX(100),KX(100),LX(100),X1(100),X2(100),X3(100),
X4(100),X5(100),X(100)
COMMON /BLK6/ IDAY,IGEECT,ILINES,IDPLUS,IPAGE,IBUF(12),IGE0,
A ERF(100),ORF(100),ITITLE(4),LNCT,NGEO
COMMON /BLK8/ GC,PR,SUBR,PPMPD(10),CPP(13),
A XPLMT,XAMTP,ZMSTR,ZMSTNR,ZMSTC,PR1,XPSMT,XPAMT
DIMENSION IGCMT(10),IGCMT(10),IDES(30),LINE(100)
REAL LA,LAP,LC,LCP,M1A,M2A,M3A,M1,M2,M3
NGEO=0

C CALCULATE DAILY AMMO IN SHORT TONS AND MEASUREMENT TONS PER DAY

XPLU=XA/2000.
IXPLO=XPLO*.5
XPLMT=P(49)*XPLO

C CALCULATE DAILY AIRCRAFT AMMO REQUIREMENTS

104 AM=XA-SH
XPSMT=P(49)*SH/2000.
XPAMT=P(49)*AM/2000.

C CALCULATE DAILY AMMO TRANSHIPPED

QA=XA-(AM-TEMAMO)

C CALCULATE DAILY AMMO THRUPT IN MEASUREMENT TONS

XAMTP=P(49)*(XA+QA)/2000.
IF(UA-GE.-1.E-4)GO TO 92
CALL IERROR(4,DUM)

C WRITE ERROR MESSAGE

92 CONTINUE

C CALCULATE FEET OF BERTHING - CONTAINER AMMO

M1A=P(47)*XA*FA/2000.

```

C
C
C
60  CALCULATE FLEET OF BERTHING - GENL AMMO PIER
    M2A=P(48)*((1.-FA)*XA+UA)/2000.
    ICFLG=0
C
C
C
65  CALCULATE FORCE DEPENDENT PERSONNEL
    FDP=DO*DE*DSO*USE*UMO*DME
C
C
C
70  CALCULATE GENERAL CARGO PER DAY IN SHORT TONS AND MEASUREMENT TONS
    ITOTWT=0
    ITOTMT=0
    DO 95 I=1,8
    IGCWT(I)=((PPMPD(I)*FDP)/2000.)*.5
    IGCMT(I)=((CPP(I)*PPMPD(I)*FDP)/40)*.5
    ITOTWT=ITOTWT+IGCWT(I)
    ITOTMT=ITOTMT+IGCMT(I)
    95 CONTINUE
C
C
C
75  CALCULATE REFRIG. AND NON-REFRIG. DATA
    SUBM=PPMPD(1)*PR
    ISUBR=SUBR*FDP/2000.*.5
    ISUBNR=IGCWT(1)-ISUBR
    IMTH=SUBR*FDP*CPP(1)/40.*.5
    IMTNR=IGCMT(1)-IMTR
    ITWNR=ITOTWT-ISUBR
    ITMNR=ITOTMT-IMTR
    ZSUBR=1.*ISUBR
    ZMTH=1.*IMTR
    ZTWNR=1.*ITWNR
    ZTMNR=1.*ITMNR
    ZMSTNR=ZTMNR/ZTWTNR
    IF (ZSUBR.LE.0.)GO TO 951
    ZMSTR=ZMTR/ZSUBR
    GO TO 952
    951 ZMSTR=1.
    952 CONTINUE
    ZMSTC=(ZMTR+ZTMNR)/(ZSUBR+ZTMNR)
    PRI=ZSUBR/(ZSUBR+ZTMNR)
C
C
C
100  CALCULATE TOTAL GENERAL CARGO LBS PER MAN PER DAY
    GC=0
    DO 96 I=1,8
    GC=GC+PPMPD(I)
    96 CONTINUE
C
C
C
105  CALCULATE SHIP FUEL IN THOUSANDS OF BARRELS PER DAY
    SHFU=0.
    DO 40 I=1,NOS
    SHFU=SHFU+ISNUM(I)*FUEL(I)

```

40 CONTINUE
ISHTU=SHFU/1000.**5

C CALCULATE AIRCRAFT JET FUEL IN THOUSANDS OF BARRELS PER DAY

119 C

ACFU=0.
DO 41 I=1,NOAC
ACFU=ACFU+IANUM(I)*XS(I)
41 CONTINUE
IACFU=ACFU/42000.**5

120 C

SET UP LOADING TITLE FOR HEADER

C

ITITLE(1)=8H SUM
ITITLE(2)=8HMARY OF
ITITLE(3)=8HBASE LQA
ITITLE(4)=8HNDING
CALL HEADER
IF (IAFLG.EQ.0)GO TO 93
ILINES=ILINES+5

125 C

WRITE AIRCRAFT HEADER

C

WRITE(6,1023)

1023 FORMAT(/T55,19HAIACRAFT COMPLEMENT//T46,4HTYPE,T58,4HLAND,T66,
A 7HCARRIER,T78,5HTOTAL,T58,5HBASED,T67,5HBASED/)

130 C

WRITE AIRCRAFT COMPLEMENT
DO 97 I=1,NOAC
IF (IANUM(I).EQ.0)GO TO 97
ICAR=IANUM(I)-IANUML(I)

140 C

SET FLAG FOR CARRIER BASED AIRCRAFT

C

IF (ICAR.NE.0)ICFLG=1
ILINES=ILINES+1
IF (ILINES.LE.LNCT)GO TO 116
CALL HEADER
ILINES=ILINES+1

150 C

116 CONTINUE
WRITE(6,1011)X(I),IANUML(I),ICAR,IANUM(I)
1011 FORMAT(T46,A8,T59,I3,T68,I3,T79,I3)

97 CONTINUE
IAFLG=0

155 C

93 CONTINUE
IF (ISFLG.EQ.0)GO TO 94
ILINES=ILINES+7
IF (ILINES.LE.LNCT)GO TO 123
CALL HEADER
ILINES=ILINES+7

160 C

123 CONTINUE

WRITE SHIP HEADER

165 C

WRITE(6,1012)
1012 FORMAT(/T57,15MSHIP COMPLEMENT//T57,4MTYPE,T67,5MTOTAL/)

C
C
C
WRITE SHIP COMPLEMENT

DO 98 I=1,NOS
IF(15NUM(I).EQ.0)GO TO 98
ILINES=ILINES+1
IF(11LINES.LE.LNCT)GO TO 122
CALL HEADER
ILINES=ILINES+1

122 CONTINUE
WRITE(6,1013)STYPE(1),15NUM(1)
1013 FORMAT(T57,A8,T68,I3)

98 CONTINUE
94 CONTINUE

C
C
C
SET UP SUPPLY CONSUMPTION RATES TITLE

ITITLE(1)=8M SUPP
ITITLE(2)=8MLY CONSU
ITITLE(3)=8MPTION R
ITITLE(4)=8MATES
IF((11LINES+37).GE.LNCT)CALL HEADER

C
C
C
WRITE GENERAL CARGO HEADER

WRITE(6,1700)ISUBR,IMTR,ISUBNR,IMTNR
1700 FORMAT(/T55,21HGENERAL CARGO PER DAY,/,T35,15HCLASS OF SUPPLY,
A T70,5HSHORT,T82,11HMEASUREMENT,/,T35,15HAND DESCRIPTION,
B T71,4HTONS,T86,4HTONS,/,T34,16HI SUBSISTENCE,/,T40,
C 12HREFRIGERATED,T64,110,5X,110,/,T40,16HNON-REFRIGERATED,
D T64,110,5X,110)

C
C
C
LOAD GENERAL CARGO DESCRIPTION AND UNDERLINE ARRAYS

IDES(1)=8MII CLO
IDES(2)=8MTHING,TO
IDES(3)=8MHOLS,ETC
IDES(4)=8MIII PAC
IDES(5)=8MHKAGED PO
IDES(6)=8MHL
IDES(7)=8MIV CON
IDES(8)=8MSTRUCT.
IDES(9)=8MMATERIAL
IDES(10)=8MVI PER
IDES(11)=8MSONAL DE
IDES(12)=8MMAND
IDES(13)=8MVII MAJ
IDES(14)=8MOR END I
IDES(15)=8MITEMS
IDES(16)=8MVIII MED
IDES(17)=8MICAL MAT
IDES(18)=8MERIAL
IDES(19)=8MIX REP

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```

SUBROUTINE IAMMO TRACE
  IDES(20)=8HAIR PART
  IDES(21)=8MS
  DO 42 I=1,50
    42 LINE(I)=2H-
  C
  C
  C WRITE REMAINING GENERAL CARGO FACTORS
  N=1
  DO 150 I=2,8
    L=N+2
    WRITE(6,1705) (IDES(J),J=N,L),IGCWT(I),IGCMT(I)
    1705 FORMAT(134,3A8,T64,I10,5X,I10)
    N=N+3
    ILINES=ILINES+1
    IF (ILINES.LE.LNCT) GO TO 150
    CALL HEADER
    ILINES=ILINES+1
    150 CONTINUE
  C
  C
  C WRITE TOTAL GENERAL CARGO
  WRITE(6,1720) (LINE(I),I=1,28),ISUBR,IMTR,ITWTR,ITMTR
  1720 FORMAT(/,T34,28A2,/,T34,19HTOTAL GENERAL CARGO,/,T36,
    A 12HREFRIGERATED,T64,I10,5X,I10,/,T36,16HNON-REFRIGERATED,
    B T64,I10,5X,I10)
  C
  C
  C WRITE TOTAL SHIP FUEL, AIRCRAFT JET FUEL, AND AMMUNITION
  WRITE(6,1730) (LINE(I),I=1,28),ISHFU,IACFU,IXPLO
  1730 FORMAT(/,T34,28A2,/,T34,25HTOTAL FUEL AND AMMUNITION,/,T36,
    A 30HSHIP FUEL (DIESEL FUEL,MARINE),T71,I10,3X,11HTHOUSANDS 0
    B2HF ,15HBARRELS PER DAY,/,T36,19HAIRCRAFT FUEL (JET),T71,I10,3X,
    C 28HTHOUSANDS OF BARRELS PER DAY,/,T36,10HAMMUNITION,T71,
    D I10,3X,18HSHORT TONS PER DAY)
  C
  C
  C WRITE REFRIGERATED AND TOTAL GENERAL CARGO DAILY CONSUMPTION RATES
  WRITE(6,1710) GC,SUBR
  1710 FORMAT(/,/,T50,23HDAILY CONSUMPTION RATES,/,T34,19HTOTAL GENERAL
    BCARGO, T65,F10.6,3X,11HLBS/MAN/DAY,/,T34,26HREFRIGERATED GENERAL C
    CARGO, T65,F10.6,3X,11HLBS/MAN/DAY)
  C
  C
  C CHECK FOR CARRIER BASED PLANES BUT NO SHIPS
  IF (ISFLG.FQ.0.AND.ICFLG.NE.0) CALL IERROR (10,DUM)
  RETURN
  END

```

```

SUBROUTINE IERROR(N,X)
C
C THIS ROUTINE PROCESSES DIFFERENT ERROR CONDITION GIVEN AN
C ERROR CODE
C
      COMMON /BLK1/ A(100),TABLE(100,10),IPOINT(100,2),INDEX(100),
      IEND,IFRONT,LAST,NOAC,NOS,IERR,P(75),PP(23),ROF,REF
      DMO,DWE,DAO,DAE,OBAS,EBAS,TPERS
      IERR=IERR+1
      GO 10 (10,20,30,40,50,60,70,80,90,100,110,120,130).N
      10 WRITE(6,1000)X
      RETURN
      1000 FORMAT(5H *** ,A8,25H INVALID COMPONENT ID ***)
      20 WRITE(6,1010)X
      RETURN
      1010 FORMAT(5H *** ,A8,26H INVALID AIRCRAFT TYPE ***)
      30 WRITE(6,1020)X
      RETURN
      1020 FORMAT(5H *** ,A8,22H INVALID SHIP TYPE ***)
      40 WRITE(6,1030)X
      STOP
      1030 FORMAT(31H *** INSUFFICIENT AMMO ASHORE ***/
      A 22H *** PROGRAM ABORT ***)
      50 WRITE(6,1040)X
      STOP
      1040 FORMAT(24H *** UNDEFINED ERROR ***/
      B 22H *** PROGRAM ABORT ***)
      60 WRITE(6,1050)X
      STOP
      1050 FORMAT(24H *** UNDEFINED ERROR ***/
      A 22H *** PROGRAM ABORT ***)
      70 WRITE(6,1060)X
      STOP
      1060 FORMAT(24H *** UNDEFINED ERROR ***/
      A 22H *** PROGRAM ABORT ***)
      80 WRITE(6,1070)X
      STOP
      1070 FORMAT(24H *** UNDEFINED ERROR ***/
      A 22H *** PROGRAM ABORT ***)
      90 WRITE(6,1080)X
      STOP
      1080 FORMAT(24H *** UNDEFINED ERROR ***/
      A 22H *** PROGRAM ABORT ***)
      100 WRITE(6,1090)X
      STOP
      1090 FORMAT(42H *** NO SHIPS BUT CARRIER BASED PLANES ***/
      B 22H *** PROGRAM ABORT ***)
      110 WRITE(6,1100)X
      STOP
      1100 FORMAT(41H *** NEGATIVE NUMBERS IN ANSWER ARRAY ***/
      B42H *** PROBABLE CAUSE LARGE RIPPLE FACTOR ***/
      B 22H *** PROGRAM ABORT ***)
      120 WRITE(6,1110)X
      1110 FORMAT(31H *** NEGATIVE NUMBER PLANES ***)
      RETURN

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SUBROUTINE IERROR      TRACE
130 WRITE(6,1120)
1120 FORMAT(30H *** NEGATIVE NUMBER SHIPS ***)
      RETURN
      END

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SUBROUTINE INIT

```

C
C THIS ROUTINE INITIALIZES THE LINKAGE VECTOR IPOINT AND ASSIGNS
C THE INITIAL VALUES TO THE DEFAULT VECTORS PP AND P.
C
COMMON /BLK1/ A(100),TABLE(100,10),IPOINT(100,2),INDEX(100),
A IEND,IFRONT,LAST,NOAC,NOS,IERR,P(75),PP(23),NOF,REF,
B DMO,DME,DAO,DAE,OBAS,EBAS,TPERS
COMMON /BLK2/ IANUM(100),ISNUM(100),OS(100),ES(100),STYPE(100),
A AMMO(100),AMMO(100),FUEL(100),MI,MIA,M2,M2A,M3,
B M3A,D50,DSE,IANUM(100),XA,SH,ISFLG,IAFLG,IGAS(100)
COMMON /BLK3/ DO5C,DOSCR,DOSP,DOSPR,DOSD,DOSR,DOSH,DOSBR,
A DOSA,DOSAR,PCAF,PCSF,PCAA,PCSA,FC,FA,G,FAC,
B TYPE1,TYPE2,TYPE3,TEMAMO
COMMON /BLK4/ IBIG,DO,DEHSQUAD,TACAC,CAHAC,PATAC,MELOS,
A HSLTAC,HSLCAR,HSLPAT,HSLHEL
COMMON /BLK6/ IDAY,IGEOT,ILINES,IDPLUS,IPAGE,IBUF(12),IGE0,
A ERF(100),ORF(100),ITITLE(4),LNCT,NGE0
REAL LA,LAP,LC,LCP,MIA,M2A,M3A,M1,M2,M3
INTEGER OS,ES
DATA IPOINT/4HA4,4HBB,4H85A,4HC3A,4HC27J,4HC32A,4HD3A1,
A4HD3A2,4HHA,4HJ3A,4HJ3D,4HJ4,5J*0,4HP18,4HP16,4HP12A,
B4HP5A,4HPS,4HNI7,4HNI6,4HNI4,4HN10B,4HNE,4HND,4HNC,
C4HNB,4HNA,4HH9J,4HJ28,4HJ9,4HG2,4HF1,4HD33A,4HD32A,
D4HD31E,4HD31A,4HD29A,4HD24A,4HD20,4HD4C3,4HD4C2,4HD4C1,4HDA,
E4HC13,4HC7,4HB13C,4HA7,4HA5,4HA3,4HP15,100*0/
LNCT=50
C
C ZERO ANSWER VECTOR
C
DO 30 I=1,100
30 INDEX(I)=0
IFRONT=64
P(1)=0.9
P(2)=1440.
P(3)=200.
P(4)=0.08
P(5)=2500.
P(6)=1.581
P(7)=1333333.
P(8)=1440.
P(9)=7.2
P(10)=4560.
P(11)=0.269
P(12)=250.
P(13)=0.168
P(14)=960.
P(15)=1320.
P(16)=1025.
P(17)=.084
P(18)=0.15
P(19)=0.04
P(20)=0.0556
P(21)=0.4

```

SUBROUTINE	INIT	TRACE
60	P(22)=5000. P(23)=0.59 P(24)=8000. P(25)=104. P(26)=7.448 P(27)=685. P(28)=0.274 P(29)=7.84 P(30)=6.429 P(31)=0.78 P(32)=40000. P(33)=2.33 P(34)=4000. P(35)=0.51 P(36)=0.0 P(37)=0.384 P(38)=222222. P(39)=23.33 P(40)=1331. P(41)=3173. P(42)=1997. P(43)=19. P(44)=14. P(45)=1025. P(46)=685. P(47)=0.090 P(48)=0.243 P(49)=1.07 P(50)=960. P(51)=1333. P(52)=1333. P(53)=118. P(54)=586. P(55)=900. P(56)=0.522 P(57)=1000. P(58)=0.631 P(59)=7.5 P(60)=2450. P(61)=1.426 P(62)=1.426 P(63)=8000. P(64)=7.832 P(65)=12000. P(66)=4.636 P(67)=2.5 P(68)=2900. P(69)=1.871 P(70)=.613 P(71)=0.1 P(72)=0.1 PP(1)=30. PP(2)=90. PP(3)=30. PP(4)=90.	
65		
70		
75		
80		
85		
90		
95		
100		
105		
110		

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SUBROUTINE	INIT	TRACE
115		PP(5)=30. PP(6)=90. PP(7)=30. PP(8)=90. PP(9)=30. PP(10)=90. PP(11)=0.5 PP(12)=0.5 PP(13)=0.01 PP(14)=0.01 PP(15)=0.3 PP(16)=0.2 PP(17)=0.03 PP(18)=0.1 RETURN END
120		
125		

SUBROUTINE INPUT

```

C
C THIS ROUTINE READS STATIC DATA DEFAULT OVERWIDES, HEADER
C INFORMATION, PERFORMS PRELIMINARY CALCULATION AND WRITES THE
C STATIC DATA REPORT.
C
COMMON /BLK1/ A(100),TABLE(100,10),IPOINT(100,2),INDEX(100),
A IEND,IFRONT,LAST,NOAC,NOS,IERR,P(75),PP(23),NOF,REF,
B UMO,UME,DAO,DAE,ORAS,EBAS,TPERS
COMMON /BLK2/ IANUM(100),ISNUM(100),OS(100),ES(100),STYPE(100),
A AMMO(100),AAMMO(100),FUEL(100),M1,M1A,M2,M2A,M3,
B M3A,DSO,DSE,IANUML(100),XA,SH,ISFLG,IAFLG,IGAS(100)
COMMON /BLK3/ DOSC,DOSCK,DOSP,DOSPR,DOSD,DOSSR,DOSH,DOSBR,
A DOSA,DOSAR,PCAF,PCSF,PCAA,PCSA,FC,FA,G,FAC,
B TYPE1,TYPE2,TYPE3,TEMAMO
COMMON /BLK4/ IBIG,D0,DE,HSQUAD,TACAC,CARAC,PATAC,HELOS,
A HSLTAC,HSLCAR,HSLPAT,HSLHEL
COMMON /BLK5/ JX(100),KX(100),LX(100),X1(100),X2(100),X3(100),
A X4(100),X5(100),X(100)
COMMON /BLK6/ IDAY,IGEOT,ILINES,IDPLUS,IPAGE,IBUF(12),IGEO,
A ERF(100),ORF(100),ITITLE(4),LNCT,NGEO
COMMON /BLK8/ GC,PR,SUBH,PPMPD(10),CPP(13),
A XPLMT,XAMTP,ZMSTR,ZMSTNK,ZMSTC,PRI,XPSMT,XPAMT
COMMON /BLK9/ CTABLE(100,15),CONSTR,EQUIP,EVOL,CONTIM,FLAND,
A CFGE0,CSCOT
COMMON /BLK11/ SCPP(12),CTPGEO,CTSGEO,CTRGEO,CPO,CPE,
A PPMNAV(10),DENS(5)
COMMON /BLK12/ PCMO,PCME,DEPPMO,DEPPME,BLOU,BLOM,BLEU,BLEM,
A PCPLAN,CPALAN,CLALAN
REAL LA,LAP,LC,LCP,M1A,M2A,M3A,M1,M2,M3
DIMENSION IDOC(100),DOM(100),IDEC(100),DEM(100),ITABLE(100,10)
EQUIVALENCE (TABLE(1,1),ITABLE(1,1))
INTEGER OS,ES
DATA EOF/6H*****/
C
C READ HEADER CARD
C
1017 READ(5,1017)(IBUF(I),I=1,12)
FORMAT(2A6,1X,10A6)
IPAGE=1
ILINES=0
IGEUCT=0
IDPLUS=0
C
C READ OUTPUT OPTION CARD
C
1016 READ(5,1016)IOPUT
FORMAT(I1)
IF(IOPUT.EQ.1)GO TO 948
C
C WRITE AIRCRAFT HEADER
C
ILINES=9
WRITE(6,947)IPAGE,IBUF(1),IBUF(2)
947 FORMAT(1H1,I15,12HREPORT 1-1-1,I120,4HPAGE,I3,/,I15,2A6/

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```

110 IF(IOPUT.EQ.1)GO TO 645
    C
    C WRITE SHIP HEADER
    C
    ILINES=9
    IPAGE=IPAGE+1
    WRITE(6,646)IPAGE,IBUF(1),IBUF(2)
    646 FORMAT(1H1,T15,12HREPORT 1-1-1,T120,4HPAGE,13/T15,2A6/
    D T54,21HSHIP STATIC DATA FILE////
    A T36,4HSHIP,T54,10HCOMPLEMENT,T73,17HCONSUMPTION RATES/
    B T52,14HOFF ENL,T73,17HFUEL AMMO/T70,
    C 22H(HBL/DAY) (LBS/DAY))
    645 CONTINUE
    C
    120 READ SHIP PARAMETER CARD
    C
    C
    DO 0 I=1,101
    READ(5,1001)STYPE(I),OS(I),ES(I),FUEL(I),AMMO(I)
    1001 FORMAT(A8,1X,I4,1X,I4,2(1X,F6.0))
    C
    C CHECK FOR END OF SHIP FILE
    C
    IF(STYPE(I).EQ.EOF)GO TO 9
    IF(IOPUT.EQ.1)GO TO 644
    C
    130 WRITE SHIP PARAMETER CARD
    C
    C
    ILINES=ILINES+1
    IF(ILINES.LE.LNCT)GO TO 904
    IPAGE=IPAGE+1
    ILINES=9
    WRITE(6,646)IPAGE,IBUF(1),IBUF(2)
    904 CONTINUE
    140 WRITE(6,647)STYPE(I),OS(I),ES(I),FUEL(I),AMMO(I)
    647 FORMAT(136,A8,T51,I4,T62,I4,T73,F6.0,T86,F6.0)
    644 CONTINUE
    8 CONTINUE
    C
    C SET NUMBER OF SHIP TYPES
    C
    150 9 NOS=I-1
    IF(IOPUT.EQ.1)GO TO 907
    C
    C WRITE RIPPLE FACTOR HEADER
    C
    C
    IPAGE=IPAGE+1
    WRITE(6,908)IPAGE,IBUF(1),IBUF(2)
    ILINES=8
    908 FORMAT(1H1,T15,12HREPORT 1-1-1,T120,4HPAGE,13/T15,2A6/
    D T56,19HRIPPLE FACTOR TABLE////T12,
    A 9HCOMPONENT,T30,15HPACING FACILITY,T51,5HUNITS,T61,
    B 7HOFFICER,T76,8HENLISTED,T91,5MPOWER,
    C /T15,2HID,T61,36HRIPPLE,9X)///
    907 CONTINUE
    C
    160
    165

```

SUBROUTINE INPUT TRACE

C READ RIPPLE FACTOR TABLE ENTRIES

C DO J1 I=1,101

C READ(5,101)(TABLE(I,J),J=1,9)

170 101 FORMAT(A6,1X,4A6,1X,A4,3(1X,F10.9))

C CHECK FOR END OF RIPPLE FACTOR FILE

C IF(TABLE(I,1).EQ.EOF)GO TO 41

175 IF(IOPUT.EQ.1)GO TO 910

C WRITE RIPPLE FACTOR CARD

C

C ILLINES=ILINES+1

C IF(ILLINES.LE.LNCT)GO TO 905

C IPAGE=IPAGE+1

C ILLINES=8

C WRITE(6,908)IPAGE,IBUF(1),IBUF(2)

905 CONTINUE

C WRITE(6,909)(TABLE(I,J),J=1,9)

909 FORMAT(115,A6,125,4A6,152,A4,155,3F15.9)

910 CONTINUE

C CHECK FOR VALID COMPONENT ID

C

C DO 12 J=1,100

C IF((TABLE(I,1).EQ.IPOINT(J,1))GO TO 21

12 CONTINUE

C WRITE ERROR MESSAGE

C

C CALL IERROR(1,I)

C

C SET FORWARD AND BACKWARD POINTER

C

21 IPOINT(J,2)=I

C INDEX(I)=J

31 CONTINUE

41 CONTINUE

C SET COMPONENT COUNT

C

C LAST=I-1

C

C READ COMPONENT E.R. PARAMETERS

C

C DO 92 I=1, LAST

C READ(5,1510)(CTABLE(I,J),J=1,15)

1510 FORMAT(A6,1X,4A6,4(1X,E8.1)/19X,6(1X,E8.1))

92 CONTINUE

C IF(IOPUT.EQ.1)GO TO 90

C

C WRITE COMPONENT HEADER

C

C IPAGE=IPAGE+1

C

220

SUBROUTINE INPUT TRACE

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      A SCPP(9),(SCPP(I),I=10,12)
1911 FORMAT(119,16H1 SUBSISTENCE,T51,4(F10.6,7X)/119,10H11 CLOTH,
      A13MNG,TOOLS,ETC,T51,4(F10.6,7X)/119,17H111 PACKAGED POL,T51,
      A4(F10.6,7X)/119,24H1V CONSTRUCT, MATERIAL,T51,4(F10.6,7X)/119,
      A20H1V PERSONAL DEMAND,T51,4(F10.6,7X)/119,17H111 MAJOR END IT,
      A3HEMS,T51,4(F10.6,7X)/119,21H111 MEDICAL MATERIAL,T51,4(F10.6,7X)
      A7119,17H1X REPAIR PANTS,T51,4(F10.6,7X)/119,16HREEFER PROPORTIO,
      A18MN OF SUBSISTENCE =,T54,F5.3/T35,18HREEFER UNIT COST =,T54,
      A6F6.2,T61,17HDOLLARS PER POUND/T36,17HMOGAS UNIT COST =,T54,
      A6F6.2,T61,18HDOLLARS PER BARREL/T35,18HDIESEL UNIT COST =,T54,
      A6F6.2,T61,18HDOLLARS PER BARREL/T29,24HHEATING FUEL UNIT COST =,
      A6F6.2,T61,18HDOLLARS PER BARREL
      WRITE(6,1913)(DENS(I),I=1,5),P(49)
1913 FORMAT(119,16H1 AND AMMUNITION SPECIFIC VOLUME FACTORS/T46,
      A7HMOGAS =,T54,F10.6,T65,20HBARRELS PER LONG TON/T45,8HDIESEL =,
      A7HMOGAS =,T54,F10.6,T65,20HBARRELS PER LONG TON/T39,14HHEATING FUEL =,T54,
      A7HMOGAS =,T54,F10.6,T65,20HBARRELS PER LONG TON/T37,16HSHIP FUEL(DFM) =,T54,
      A7HMOGAS =,T54,F10.6,T65,20HBARRELS PER LONG TON/T33,20HAIRCRAFT FUEL(JET) =,
      A7HMOGAS =,T54,F10.6,T65,20HBARRELS PER LONG TON/T41,12HAMMUNITION =,T54,
      A7HMOGAS =,T54,F10.6,T65,30HMEASUREMENT TONS PER SHORT TON)
901 CONTINUE
C
C      READ BASE PERSONNEL INPUT PARAMETERS
C
      READ(5,1523)CP0,CPE,PCMO,PCME,DEPPMO,DEPPME,BLOU,BLOM,BLEU,BLEM
1523 FORMAT(2(F7.3,1X),2(F5.3,1X),2(F5.2,1X),4(F8.1,1X))
C
C      READ DEFAULT OVER-HIDES FOR ALGORITHM CONSTANTS
C
      ILINES=0
      DO 81 J=1,64
      READ(5,1005)CC,I,DUM
C
C      CHECK FOR END OF ALGORITHM OVER-HIDES
C
      IF(CC.EQ.EOF)GO TO 83
      IF(J.EQ.1)GO TO 106
      ILINES=ILINES+1
      IF(ILINES.LE.LNCT)GO TO 105
106 IPAGE=IPAGE+1
      ILINES=10
C
C      WRITE OVER-RIDE HEADER
C
      WRITE(6,648)IPAGE,IBUF(1),IBUF(2)
648 FORMAT(1H1,115,12HREPORT 1-1-1,1120,4HPAGE,13/T15,2A6////T41,
      A30HSUMMARY OF ALGORITHM OVERRIDES//T35,8HCATEGORY,T47,
      B5HINDEX,T60,3HOLD,T72,3HNEW/T37,4HCODE,T59,5HVALUE,T71,
      C5HVALUE//)
105 CONTINUE
      WRITE(6,649)CC,I,P(1),DUM
649 FORMAT(T35,A8,T47,14,T56,F9.2,T68,F9.2)
      81 P(I)=DUM
      83 CONTINUE
C

```

C READ DEFAULT OVER-RIDES FOR INPUT PARAMETERS

DO 95 I=1,24
 READ(5,1005)CC,J,DUM
 1005 FORMAT(A8,X,13,X,10.3)

C CHECK FOR END OF PLANNING NUMBER OVER-RIDES

IF(CC.EQ.EOF)GO TO 96
 IF(1.EQ.1)GO TO 110
 I LINES=I LINES+1
 IF (I LINES.LE.LNCT)GO TO 108
 IPAGE=IPAGE+1
 I LINES=10

C WRITE OVER-RIDE HEADER

WRITE(6,1909)IPAGE,IBUF(1),IBUF(2)
 1909 FORMAT(1M1,T15,12HREPORT 1-1-1,T120,4HPAGE,13/T115,2A6/////)
 A T41,30H SUMMARY OF PARAMETER OVERRIDES//T37,4HITEM,T47,
 B SHINDEX,T60,3HOLD,T72,3HNEW/T59,5HVALUE,T71,5HVALUE//
 GO TO 108

110 CONTINUE

I LINES=I LINES+15
 IF(I LINES.GT.LNCT)GO TO 109
 WRITE(6,1908)

1908 FORMAT(////T41,30H SUMMARY OF PARAMETER OVERRIDES//T37,4HITEM,T47,
 A SHINDEX,T60,3HOLD,T72,3HNEW/T59,5HVALUE,T71,5HVALUE//)
 I LINES=I LINES-10
 GO TO 107

109 CONTINUE

IPAGE=IPAGE+1

I LINES=10

WRITE(6,1909)IPAGE,IBUF(1),IBUF(2)

107 CONTINUE

108 CONTINUE

WRITE(6,649)CC,J,PP(J),DUM

95 PP(J)=DUM

C SET PLANNING PARAMETERS

96 DOSC=PP(1)

DOSCR=PP(2)

DOSP=PP(3)

DOSPR=PP(4)

DOSS=PP(5)

DOSSR=PP(6)

DOSB=PP(7)

DOSBK=PP(8)

DOSA=PP(9)

DOSAK=PP(10)

PCAF=PP(11)

PCSF=PP(12)

PCAA=PP(13)

PCSA=PP(14)

SUBROUTINE INPUT TRACE

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390      C      FC = PP(115)
      C      FA = PP(116)
      C      G  = PP(117)
      C      FAC = PP(118)
      C      FIX DAYS OF SUPPLY
      C
      C      K = DOSC
      C      KR = DOSCR
      C      J = DOSP
      C      JR = DOSPR
      C      L = DOSS
      C      LR = DOSSR
      C      M = DOSB
      C      MR = DOSBR
      C      N = DOSA
      C      NR = DOSAR
      C
      C      WRITE DAYS OF SUPPLY
      C
      C      IPAGE=IPAGE+1
      C      WRITE(6,1018) IPAGE,IBUF(1),IBUF(2)
      C      1018 FORMAT(1H,T15,12HREPORT 1-1-1,T120,4HPAGE,13/T115,2A6////)
      C      WRITE(6,1007) K,KR,J,JR,L,LR,M,MR,N,NR
      C      1007 FORMAT(126,14HDAYS OF SUPPLY//T32,9HOPERATING/T33,6HSTOCKS,T44,
      C      A 8HRESERVES//T115,5HCARGO,T35,2(13,9X)/T115,13HAIRCRAFT FUEL,T35,
      C      B 2(13,9X)/T115,9HSHIP FUEL,T35,2(13,9X)/T115,9HBASE FUEL,T35,
      C      C 2(13,9X)/T115,10HAMMUNITION,T35,2(13,9X)////)
      C
      C      WRITE PEACETIME-TO-WARTIME RATIOS
      C
      C      WRITE(6,1008) PCAF,PCSF,PCAA,PCSA
      C      1008 FORMAT(116,27HPEACETIME-TO-WARTIME RATIOS//T16,13HAIRCRAFT FUEL,
      C      A T36,F6.4/T16,9HSHIP FUEL,T36,F6.4/T16,19HAIRCRAFT AMMUNITION,
      C      B T36,F6.4/T16,15HSHIP AMMUNITION,T36,F6.4////)
      C
      C      WRITE OTHER PLANNING FACTORS
      C
      C      WRITE(6,1009) FC,FA,G,FAC
      C      1009 FORMAT(131,22HOTHER PLANNING FACTORS//T24,20HFRACTION CARGO CONTA,
      C      A 10HMINERIZED =,F6.4/T25,29HFRACTION AMMO CONTAINERIZED =,F6.4/T14,
      C      B 40HFRACTION AT-SEA MEN WITH IMPACT ASHORE =,F6.4/T10,
      C      C 44HFRACTION BREAK-BULK CARGO DELIVERED BY AIR =,F6.4)
      C
      C      WRITE BASE PERSONNEL INPUT PARAMETERS
      C
      C      IPAGE=IPAGE+1
      C      WRITE(6,1521) IPAGE,IBUF(1),IBUF(2)
      C      1521 FORMAT(1H,T15,12HREPORT 1-1-1,T120,4HPAGE,13/T115,2A6////)
      C      WRITE(6,1524) CPO,CPE,PCMO,PCME,DEPMD,DEPPMD,BLOU,HLOM,BLEU,BLEM
      C      1524 FORMAT(139,31HBASE PERSONNEL INPUT PARAMETERS//T42,10HOFFICER BI,
      C      A 11HLET COST =,2X,F7.3,2X,20HTHOUSANDS OF DOLLARS/T37,
      C      R 26HENLISTED MAN BILLET COST =,2X,F7.3,2X,14HTHOUSANDS OF D,
      C      C 6HOLLARS/T21,39HFRACTION OFFICERS WITH FAMILIES OVERSEA,
      C      D 3MS =,2X,F5.3/T17,36HFRACTION ENLISTED MEN WITH FAMILIES,

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CDC 6700 FTN V3.0-355F OPT=0 80/05/29. 09.28.48.

TRACE

SUBROUTINE INPUT

X 10HOVERSEAS --,2X,F5.3/T21.9HNUMBER OF,
 E 33H DEPENDENTS PER MARRIED OFFICER --2X,F5.2/T16.7HNUMBER ,
 F 40HOF DEPENDENTS PER MARRIED ENLISTED MAN --,2X,F5.2/T16,
 G 30HPERSONAL BELONGINGS ALLOWANCES/T43.17HUNMARRIED OFFICER,
 H 3MS --,1X,F8.1.1,2X,10HCUBIC FEET/T45.18HMARRIED OFFICERS --,
 I 1X,F8.1.1,2X,10HCUBIC FEET/T39.24HUNMARRIED ENLISTED MEN --,
 J 1X,F8.1.1,2X,10HCUBIC FEET/T41.22HMARRIED ENLISTED MEN --,
 K 1X,F8.1.1,2X,10HCUBIC FEET////)

C SET CASE NUMBER VARIABLE
 C

IGEOCT=0
 RETURN
 END

448

450

CDC 6700 FTN V3.0-355F OPT=0 60/05/29. 09.20.48.

SUBROUTINE REINIT TRACE

SUBROUTINE REINIT

THIS ROUTINE RESETS VARIABLES BETWEEN CYCLES

```

5      COMMON /BLK1/ A(100),TABLE(100,10),IPOINT(100,2),INDEX(100),
      A      IEND,IFRONT,LAST,NOAC,NOS,IERR,P(75),PP(23),ROF,REF,
      B      UMO,DME,DAO,DAE,ORAS,EBAS,IPERS
      COMMON /BLK2/ IANUM(100),ISNUM(100),OS(100),ES(100),STYPE(100),
      A      AMMO(100),AAMMO(100),FUEL(100),M1,M1A,M2,M2A,M3,
      B      M3A,USO,USE,IANUML(100),XA,SH,ISFLG,IAFLG,IGAS(100)
      COMMON /BLK3/ DOSC,DOSCH,DOSP,DOSPR,DOSD,DOSR,DOSB,DOSHH,
      A      DOSA,DOSAM,PCAF,PCSF,PCAA,PCSA,FC,FA,G,FAC,
      B      TYPE1,TYPE2,TYPE3,TEMAMO
      COMMON /BLK4/ IBIG,DO,DE,HSQUAD,TACAC,CAMAC,PATAC,HELOS,
      A      HSLTAC,HSLCAR,HSLPAT,HSLMEL
      REAL LA,LAP,LC,LCP,M1A,M2A,M3A,M1,M2,M3
      ISFLG=0
      IAFLG=0
      IBIG=0
      TEMAMO=0
      DO=0
      DE=0
      DAO=0
      DAE=0
      DOS=0
      DSE=0
      TYPE1=0
      TYPE2=0
      XA=0
      DO 10 I=1,100
      IANUM(I)=0
      ISNUM(I)=0
      IANUML(I)=0
10      A(I)=0
      IERR=0
      REF=0
      ROF=0
      RETURN
      END

```

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SUBROUTINE RIP
  C
  C SUBROUTINE RIP(N,A,B,X)
  C THIS SUBROUTINE USES THE GAUSS-JORDAN PROCESS TO SOLVE A SYSTEM
  C OF LINEAR EQUATIONS OF THE FORM  $A \cdot X = B$ .
  C A IS AN N BY N MATRIX.
  C B AND X ARE VECTORS OF LENGTH N.
  C THE VECTOR X CONTAINS THE SOLUTION.
  C THE INPUT VARIABLES N, A, AND B ARE NOT CHANGED.
  C
  C DIMENSION C(50,50),A(50,50),B(50),X(50)
  C
  C COPY A INTO C AND B INTO X.
  C
  C DO 10 I=1,N
  C   X(I)=B(I)
  C   DO 1 J=1,N
  C     10 C(I,J)=A(I,J)
  C
  C BEGIN GAUSS-JORDAN PROCESS
  C
  C DO 60 K=1,N
  C
  C FIND ELEMENT OF LARGEST MAGNITUDE IN COLUMNK, BEGINNING WITH ROW K.
  C
  C Z1=0.0
  C KX=N
  C DO 20 J=K,N
  C   Z2=ABS(C(J,K))
  C   IF(Z2.LE.Z1)GO TO 20
  C   Z1=Z2
  C   KX=J
  C
  C 20 CONTINUE
  C   IF(Z1.NE.0.0)GO TO 30
  C
  C WRITE ERROR MESSAGE IF THERE IS NO SOLUTION.
  C
  C WRITE(6,25)
  C 25 FORMAT(43H0***ERROR*** NO UNIQUE SOLUTION EXISTS./)
  C STOP
  C
  C DECIDE IF ROWS NEED TO BE SWITCHED.
  C
  C 30 IF(KX.EQ.K)GO TO 45
  C
  C SWITCH ROWS K AND KX.
  C
  C DO 40 J=K,N
  C   Z1=C(K,J)
  C   C(K,J)=C(KX,J)
  C   C(KX,J)=Z1
  C   Z1=X(K)
  C   X(K)=X(KX)
  C   X(KX)=Z1
  C   Z2=C(K,K)
  C
  C 40
  C
  C 45
  C
  C 50
  C
  C 55

```

CUC 6700 FTM V3.0-355F OPT=0 R0/05/29. 09.28.48.

SUBROUTINE HIP TRACE
C ELIMINATE OFF-DIAGONAL ELEMENTS IN COLUMN K.

DO 60 J=1,N
IF(J.EQ.K)GO TO 60
Z3=C(J,K)/Z2

60

SUBTRACT Z3 * ROW K FROM ROW J.

DO 50 I=K,N

50 C(J,I)=C(J,I)-Z3*C(K,I)
X(I)=X(J)-Z3*X(K)
60 CONTINUE

65

DIVIDE BY MAIN DIAGONAL TO OBTAIN RESULT.

DO 70 K=1,N

70 X(K)=X(K)/C(K,K)
RETURN
END

70

CDC 6700 FTM V3.0-355F OPT=0 80/05/29. 09.26.48.

SUBROUTINE RIPPLE TRACE

SUBROUTINE RIPPLE

```

C
C THIS ROUTINE CALCULATES THE RIPPLE MEN ASSOCIATED WITH EACH
C COMPONENT
C
COMMON /BLK1/ A(100),TABLE(100,10),IPOINT(100,2),INDEX(100),
A IEND,IFRONT,LAST,NOAC,NOS,ICRR,P(75),PP(23),ROF,MEF,
R DMO,DME,DAO,DAE,OHAS,EHAS,TPERS
COMMON /BLK2/ IANUM(100),ISNUM(100),OS(100),ES(100),STYPE(100),
A AMMO(100),AAMMO(100),FUEL(100),M1,M1A,M2,M2A,M3,
B M3A,DSO,USE,IANUML(100),XA,SH,ISFLG,IAFLG,IGAS(100)
COMMON /BLK6/ IDAY,IGEOCT,ILINES,IDPLUS,IPAGE,IBUF(12),IGEO,
A ERF(100),ORF(100),ITITLE(4),LMCT,NGEO
REAL M1A,M2A,M3A,M1,M2,M3
C
C CALCULATE OFFICERS AND ENLISTED FOR ALL FACILITIES
C
DO 20 I=1,99
ORF(I)=TABLE(IPOINT(I,2),7)*A(I)
20 ERF(I)=TABLE(IPOINT(I,2),8)*A(I)
C
C CALCULATE OFFICERS AND ENLISTED FOR PIERS
C
ORF(11)=(M1A*M2A)*TABLE(IPOINT(11,2),7)
ERF(11)=(M1A*M2A)*TABLE(IPOINT(11,2),8)
ORF(85)=M2*TABLE(IPOINT(85,2),7)
ERF(85)=M2*TABLE(IPOINT(85,2),8)
ORF(93)=M1*TABLE(IPOINT(93,2),7)
ERF(93)=M1*TABLE(IPOINT(93,2),8)
C
C SET OFFICERS AND ENLISTED FOR POWER PLANT
C
ORF(100)=TABLE(IPOINT(100,2),7)
ERF(100)=TABLE(IPOINT(100,2),8)
RETURN
END

```

```

REAU SHIP COMPLEMENT
SH=0.
99 REAU(5,1007)Z,Y,IGEO,IDAY
1007 FORMAT(A8,1X,F3.0,1X,A8,A4,
J,Y,.,1
CHECK FOR END OF SHIPS
IF(4.EQ.EOF)GO TO 103
IF(J.LT.0)CALL IERROR(13,Z)
SET SHIP FLAG
ISFLG=1
DETERMINE SHIP TYPE
DO 91 I=1,101
IF(STYPE(I).EQ.Z)GO TO 102
91 CONTINUE
IF ILLEGAL SHIP TYPE STOP
CALL IERROR(3,Z)
INCREMENT AMMO REQUIREMENTS
102 XA=XA+Y*AMMO(I)
INCREMENT SHIP MUNITIONS

```

CDC 6700 FTN V3.0-355F OPT=0 H0/05/24. 09.20.4H.

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SURROUTINE SHIPS THACE
C SH=SH*Y*AMMO(I)
C
C INCREMENT OFFICERS AND ENLISTED DUF TO THIS DRIVER INPUT
60 DSO=DSO*Y*OS(I)
USE=USE*Y*ES(I)
C INCREMENT SHIP COUNT BY TYPE
65 ISNUM(I)=ISNUM(I)+J
GO TO 99
103 CONTINUE
C INCREMENT REPORT NUMBERS
70 IF (IGEO.EQ.LSTGEO) GO TO 109
LSTGEO=IGEO
IGEOCT=IGEOCT+1
IDPLUS=0
109 CONTINUE
IDPLUS=IDPLUS+1
IPAGE=0
80 HEAD(5,1001)DNO,DME
1001 FORMAT(2(F5.0,1X)/)
C CHECK ERROR COUNT - RETURN IF NON-ZERO AFTER WHITING MESSAGE
C
C IF (IERR.EQ.0) GO TO 104
WHILE (6,1016) IERR
1016 FORMAT('H ***',13,32H ERRORS ENCOUNTERED ON INPUT ***/
A 22H *** PROGRAM ABORT ***)
104 CONTINUE
RETURN
END
90

```

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