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SHIPDOC USERS GUIDE

by

William M. Richardson
Floyd A. Brown

AVIATION AND SURFACE EFFECTS DEPARTMENT

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DAVID W. TAYLOR NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER

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ABSTRACT

This user's guide is for the Ship Design Optimization Code (SHIPDOC), a renamed extension of Mare Island Naval Shipyard computer program ARCJ6. SHIPDOC solves for a vehicle which is optimized subject to user definied optimization criteria and constraints. Any type of vehicle may be input to SHIPDOC since the vehicle description is data to SHIPDOC. The vehicle description (data base) is provided by the user, and can vary in scope and detail as required by the user, since there are no built-in or hard-wired vehicle descriptions, constraints, or objective functions - all are provided by the user. The guide covers all versions of SHIPDOC since its inception in 1969, and includes the latest version, V409300, which runs in 1/3 to 1/15 of the time of previous versions while providing more user versatility. The guide briefly covers the rationale for treating the conceptual and preliminary design problem as that of minimization subject to constraints. The bulk of the guide shows the directives used to build the ship description (data base) files, the directives used to modify the data base and run the program, and discusses the output expected from the program.

ADMINISTRATIVE INFORMATION

The Ship Design Optimzation Code (SHIPDOC) a renamed extension of Mare Island Naval Shipyard computer program ARCJ6, was developed, and its writeups and guides were written by, or under the guidance of either the Surface Effect Ship Division (Code 1630) of the Aviation and Surface Effect Department at the David Taylor Naval Ship Research and Development Center (DTNSRDC), or the Engineering Computer Applications Branch (Code M246) of the Design Division at Mare Island Naval Shipyard.

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Appn - RDT&E N17x1319.3093, BCN - 52304, AAA - 65872, TR Type - 2D, Cost Code - LP 9403596000, and BT - 7054. In addition Mare Island Naval Shipyard was authorized to use SSPO Management Account No 66 411.09 for reporting.

1.0 EXECUTIVE SUMMARY

1.1 Introduction

This user's guide indicates how to use and prepare a ship description (data base) for the Ship Design Optimization Code (SHIPDOC), a renamed extension of Mare Island Naval Shipyard computer program ARCJ6, provides an overview and rationale for the design solution method used, summarizes the capabilities of the major versions of SHIPDOC, and indicates directive input modes and user guide applicability.

SHIPDOC proper has no ship description built in. SHIPDOC processes ship description (data base) files and performs optimization as desired by the user. To date, ship description files have been prepared for submarines, small water plane twin hull (SWATH), and surface effect ships (SES). This guide therefore describes the directives which can be used to build a ship description file and the directives used to run the program, rather than the technology realizations for a particular ship type.

The guide is divided into five major sections: a) executive summary (sec 1.0), b) introduction to the problem, solution methodology, and data base building capabilities (sec 2.0), c) definition of the data base (ship description file), (sec 3.0), d) planning and executing a run (sec 4.0), and e) explanation of output (sec 5.0).

1.2 Design Solution Method

SHIPDOC has been developed under five guiding principles which are summarized below:

1) The program is to be applicable for all types of ships.
2) The program is also to be applicable to all stages of design.
3) The program architecture is such that the naval architect is in control of the design via visible and traceable design algorithms.
4) The number and kind of built-in constraints on organizing the algorithms should be kept to a minimum.
5) Finally, the program should find an optimal solution subject to user specified constraints or conditions.

1.2.1 Why Optimal Solutions?

First, an optimal solution means that no more resources are being used than is necessary to do the job (perform the mission).

Secondly, there is increased ease in making technology comparisons or evaluating the effect of changes in one or many vessel parameters and design constraints since the magnitude of differences between each optimized configuration is due to the effect of technology or parameter changes only - optimization washes out the effect of different solutions to the same set of constraints. Refering to Figure 1-1-1, it will be noted that any design solution which does not violate the constraints (lies above both constraint A and constraint B), is a feasible design (one that does the mission). In many cases there are an infinite number of these design solutions - one can often find a ship which is too large or otherwise uses more resources than are needed for the performance of the mission. If we were to make technology or parameter change comparisons using the solution points shown in Figure 1-1-1, the use of any solution point except the optimal would result in penalizing the comparison by the difference between the solution point selected and the optimal solution point.

Thirdly, optimal solutions are efficient in terms of design effort and have quick responses times to requests. Again referring to Figure 1-1-1, it will be noted that by formulating the design problem as optimization subject to constraints, the resulting set of simultaneous non-linear equations can be solved simultaneously to find the solution, thus doing away with the need to iterate design spirals, some of which may pass through infeasible regions.

Finally, the finding of an optimum by solving a simultaneous problem involving many variables and constraints is efficient compared to domain searching. For example, if it takes only three perturbations per variable to find the minimum due to that variable, and there are as few as four variables of interest, then there are $3^4 = 81$ feasible points to be found to find the miminum for those four variables. For each of these 81 feasible points, sets of (usually) non-linear equality and inequality constraints must be satisfied, thus leading to the need to solve these other sets of equations for each feasible point. By contrast, the solution of the set of simultaneous equations involving the variables and the constraints takes many fewer than 81 cycles, and so is faster and less expensive.

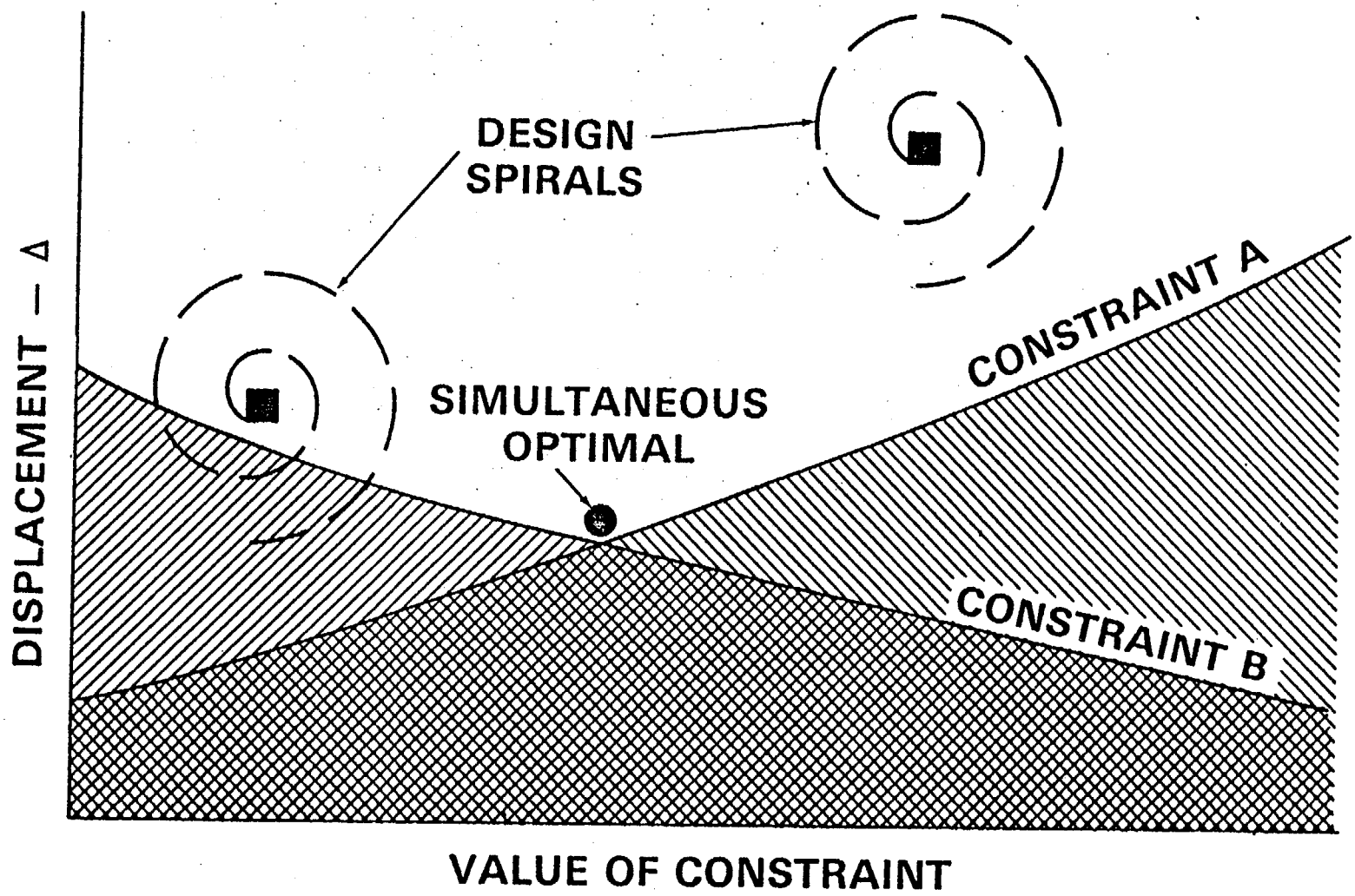


Figure 1-1-1: Ship Design Techniques

1.2.2 Keeping the Ship Description Separate From the SHIPDOC Program

The first four guding principles can be realized by allowing the user to formulate the problem and by keeping out of the user's way by providing minimum restrictions. This is done by allowing the use to provide his own ship description (data base) organized in a non-hierarchal fashion. This allows the value of any variable to be accessed by name by any other variable - there are, for example, no subroutines. The user can organize his data base any way he chooses. Figure 1-1-2 illustrates this division. On one side is the SHIPDOC program which processes the ship description file (data base) and performs the optimization. On the other side is the user defined ship description file consisting of user defined subsets (or blocks) and functional relations all of which exist on the same level and is thus non-hierarchal. The dotted and dashed lines are reminders that the sets and contents of the sets shown are arbitrary, not built in or hard-wired. The number of sets and what they mean is decided by the user. Consequently, the level of detail in the data base is arbitrary, and can vary from block to block as needed. The doubled ended arrows are reminders that any variable in any block can be directly accessed by any other variable in either that or any other block.

SHIPDOC automatically documents the data base used.

The directive structure for building the ship description file emphasizes physical relations between the variables although non-physically based relations may also be used as desired by the user. Provision is made for locating forces within a zone or compartment both vertically and longitudinally. Ships consisting of a single compartment or many compartments on many decks may be defined in the data base.

Variable values may be defined in terms of other variables or by table data, and variables may be defined partly in terms of themselves (recursively).

1.3 Capabilities of Major Versions of SHIPDOC

1.3.1 Major Versions

There are three major plateaus in the evolution and development of SHIPDOC.

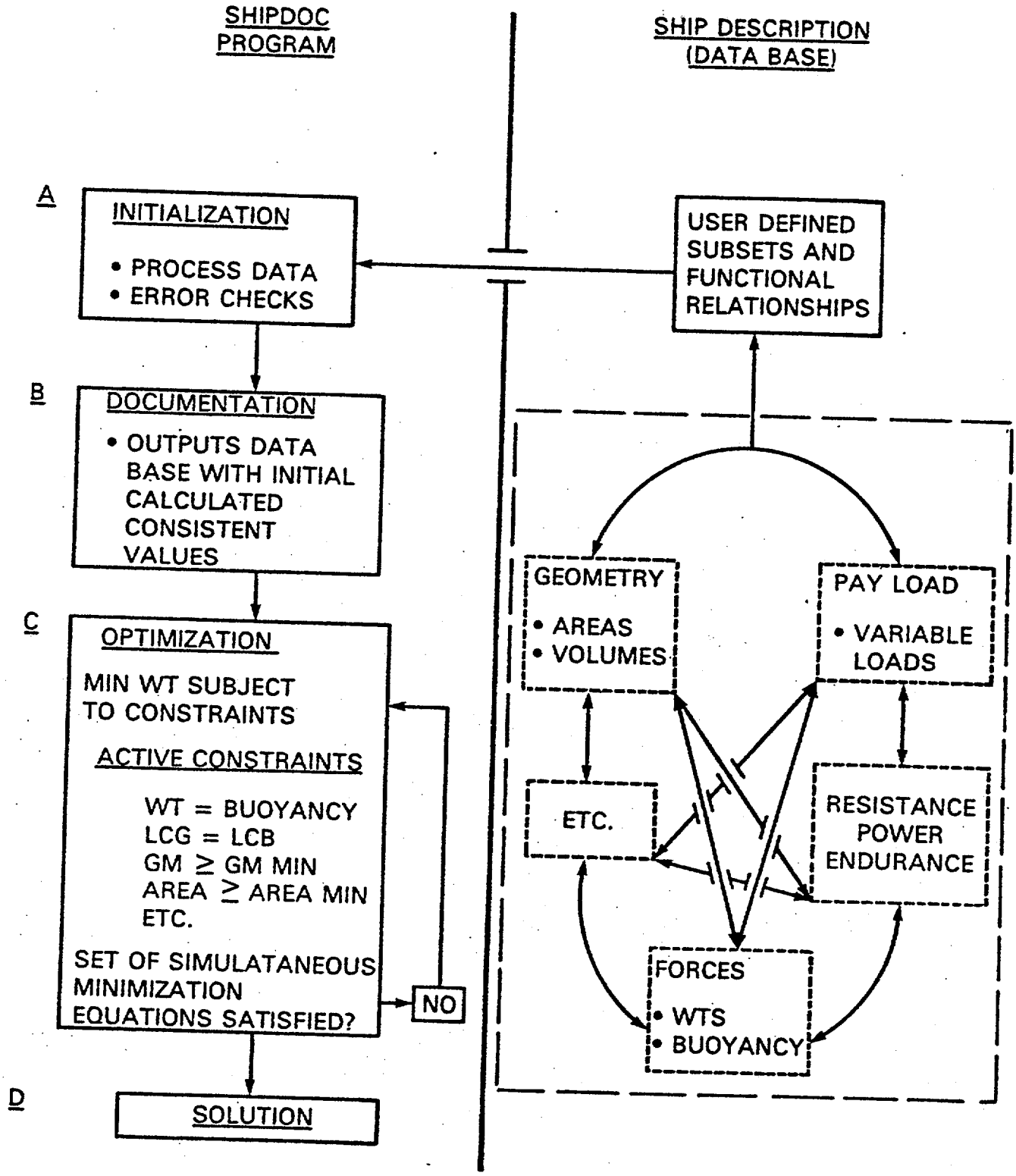


Figure 1-1-2: SHIPDOC / Data Base Schematic

The first plateau consisted of the original version of the program developed for submarine conceptual design. This first version, which existed from 1969 to 1976, allowed five direct variables of which stability lead was the fifth and included four built-in constraints: WT-BUOY = 0, LCG = LCB or minimum transverse stability met (whichever required the least lead), reserve buoyancy = specified fraction of submerged volume, and center of reserve buoyancy = LCB. The data base was sequential in that loop structures were not permitted. With implied redefinition of some constraints, surface ships were also accommodated.

The second plateau existed from 1976 to 1983 when loop structures were allowed in the data base and the user was given control over which of the five direct variables and four constraints were to be active during a given optimization run. During 1979, an internal modification was made to reduce the running time, and at the same time preliminary versions of users and programmers manuals were prepared to reflect the current status of the program.

The third plateau is the current (1984) version (V409300) which allows users to specify as data what is to be minimized (the objective function) such as weight or cost, allows the user to specify up to 15 direct variables, allows the user to specify up to 30 constraints as data, and allows access to the definition of summation variables. Summation variables are the names used on force and scalar definition directives to indicate categories and groupings such as weight, buoyancy, reserve buoyancy, etc. Previous versions used summation variables but these could not be directly accessed by the user. Summation variables were also extended to scalar definition directives.

In the various versions the number of indirect variables and constants ranged from about 700 to about 1700 depending upon machine and problem size. Concurrently with the expansion of the program capabilities to the third plateau, internal modifications were made which reduced the running time by a factor of 3 while doing optimization, and by a factor of 4 when doing checkout runs.

The third plateau version also allows the running time to reflect the effect of the number of variables and constraints actually active during a given run. As a consequence, small problems now run about 15 times faster than when using the second plateau version.

1.4 Directive Input Modes and User Guide Applicability

1.4.1 Directive Input Model

There are two modes for inputing directives: by card images and by use of an interactive program named SDEDIT. This user's guide shows directive examples using card images. The interactive program will prompt the user and will prepare the card image equivalents for the SHIPDOC input file. By keeping the input to SHIPDOC in card image equivalents data bases prepared during the years from 1969 on before the interactive program was developed may still be used by SHIPDOC.

1.4.2 User Guide Applicability

This user's guide was originally prepared for the second plateau version of the program. Unless otherwise noted, the information herein is applicable to all versions of ARCJ6 or SHIPDOC.

2.0 INTRODUCTION

SHIPDOC is the designation for a nonlinear optimization computer program that solves for the minimum of an objective function such as a minimum weight for a vehicle while simul[8]neously satisfying specified performance characteristics and nonlinear constraints such as, for example, trim, stability, range, speed, and payload. The vehicle description is user-supplied. Therefore, for example, the minimum weight can be solved for any vehicle for which the program vehicle description and nonlinear constraints make sense.

2.1 THE PROBLEM

The difficulty of selecting the basic geometric parameters and size of a ship to satisfy specified performance criteria is a central problem in the preliminary design of moving vehicles, whether primarily airborne or waterborne, or operating at the interface of the two. A solution to the problem of selecting the basic vehicle size and weight is not unique. For most sets of operating and performance specifications there are an infinite number of vehicles which will satisfy the given specifications. For example, there are often many vehicles which are larger than necessary for the given performance specifications.

2.2 THE SOLUTION METHOD

The solution method used to reduce the number of candidate vehicles is to solve for that vehicle which minimizes an objective such as minimum weight and still meets the required specifications. This can be accomplished by formulating the solution to the preliminary design problem as, for example, one of minimizing the weight of the vehicle subject to constraints. The performance specifications for the problem plus naval architectural considerations provide the constraint conditions. Examples of performance specifications include required speed,

payload, and range. Examples of naval architectural considerations are the requirements that the buoyancy or lift of the ship equals the weight of the ship plus its variable load, that the ship is in reasonable trim, and that the stability is adequate.

From a physical viewpoint, the solutions for ship size and proportions are usually the result of a compromise among conflicting physical forces. The approach taken here is to describe the specified requirements in terms of the physical forces and parameters involved. To provide a meaningful result, the problem must not be oversimplified, and yet at the same time, must be kept manageable. The solution method adopted here consists of several parts:

1. A User-Supplied Ship and Physics Description.

The person best able to decide on the applicable physics and engineering information necessary, both in scope and level of detail, is the person who has the job to do. Computer program SHIPDOC is organized so the user provides the vehicle description in terms of the directive (data) types that the program recognizes--there is no implied vehicle description built into the program. SHIPDOC then uses this user-supplied vehicle description as the base data from which the optimization equations are formulated and then solved.

2. A Modular Approach to Vehicle Description and Physics.

The modular approach implies that the ship description is built up from a combination of smaller elements, the number of which can be expanded, modified, or contracted in scope by the user to fit a given task. The forces on these smaller elements are in turn described by physical relationships which also are defined by the user.

3. Formulating the Various Descriptions in Symbols Rather than Numbers as Much as Possible.

Program SHIPDOC solves for a consistent set of numerical values which satisfy the user relationships defined under item 2, as well as for the values satisfying minimization equations formed by SHIPDOC. Consequently, only these functional relationships need to be known before starting a solution; a consistent set of numerical values (a parent or base ship) is not needed.

4. Formulation of the Ship Description in Terms of Nonlinear Algebraic Equations, the Linking Together and Evaluation of Which is Performed Numerically.

Since the description of the forces on the vehicle is usually nonlinear when described in terms of the variables of interest to the designer, provision is made to handle a nonlinear problem. This is achieved by both allowing nonlinear relations to be defined between elements of the vehicle and by providing a nonlinear optimization solution solver.

2.3 PROGRAM SHIPDOC FUNCTIONAL DESCRIPTION

Computer program SHIPDOC performs the following functions in the order given:

1. Interprets the vehicle description and functional relationship directive (card) types recognized by the program, builds the base data to be used for a particular problem, and establishes the necessary cross-references for the information on the various directive types.

2. Checks for inconsistencies and missing information among the elements of the universe defined by the user-supplied vehicle and physical relationship information. This feature is of great practical usefulness since it is possible to have several hundred variable names in the base data, and the job of reliably cross-checking manually for missing or inconsistent information rapidly becomes prohibitive if done manually.

3. Prepares and prints tables showing what is in the base data and its numerical values.

4. Performs the weight minimization, subject to the constraint conditions, by using a simultaneous nonlinear equation solver which numerically finds the values of the variables that satisfy the set of simultaneous partial differential and algebraic equations that are required to be satisfied at a minimum solution point.

5. Prepares and prints output tables including the following:

a. Comparison between initial and final values of variables.

b. Summary of items forming final weight and buoyancy of the ship.

c. Weight report using NAVY SWBS format for weight and variable loads which comprise the vehicle.

2.4 VEHICLE DESCRIPTION AND FUNCTIONAL RELATIONS (BASE DATA)

2.4.1 Overall Structure of Base Data.

1. Purpose of Base Data. The usual use of the base data (vehicle description of the engineering and physical relationships) is to be able to compute forces and moments on the vehicle, with special emphasis usually given to the computation of the magnitude and location of the weight and buoyancy. The weight is often the factor to be minimized; the requirement that weight equal the buoyancy is almost invariably a constraint equation. Usually, the requirement that the longitudinal center of buoyancy is the same as the longitudinal center of gravity also is imposed as a constraint; and often, a transverse stability criterion becomes significant in determining the vehicle parameters, thereby requiring vertical center information.

2. Force Specification. A directive type called ITEM is used to specify a force, either weight or buoyancy. Associated with each ITEM directive is an

LV directive which enables the longitudinal and vertical location of the force to be computed. The magnitudes of the force and arms are found by substituting the current numerical values for the variable names specified on the directives.

Forces are located with respect to a compartment or zone. The length of a compartment or zone is usually a variable whose value may change from the start of the optimization run to its conclusion. The program automatically keeps track of where the start of each compartment or zone is located.

3. Variables. (a) Variables may get their numerical value from other variables, which, in turn, may get their values from still other variables. (See Figure 1.) As a consequence, a very complex set of relationships may be built up by pyramiding many relationships, each of which is relatively simple in form.

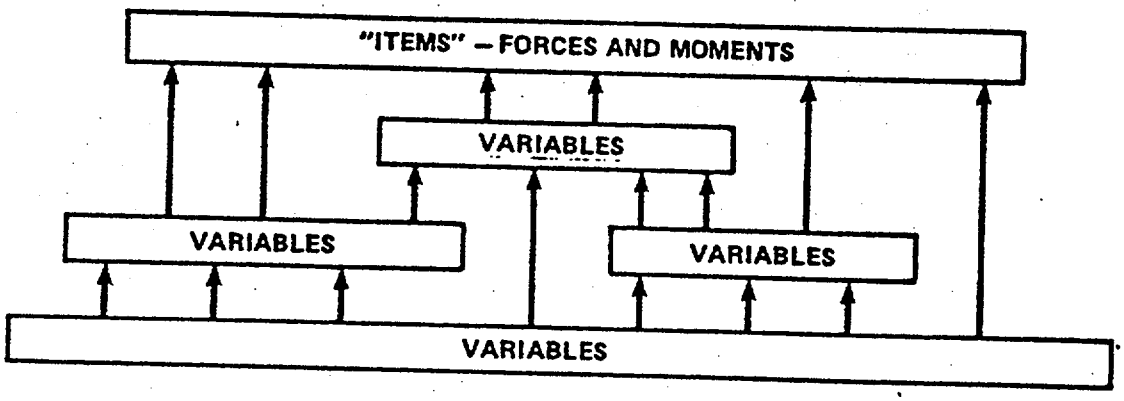


Figure 1-2-1 - SHIPDOC Data Structure--Pre 1976

(b) This pyramid structure was used to define the base data of SHIPDOC from its inception in 1969 until 1976, when an additional structure was added: data loops. Now variables can be defined by other variables, some of which get their values in part from the variables for which they were the defining variable. That is, a loop structure is now possible. (See Figure 2.)

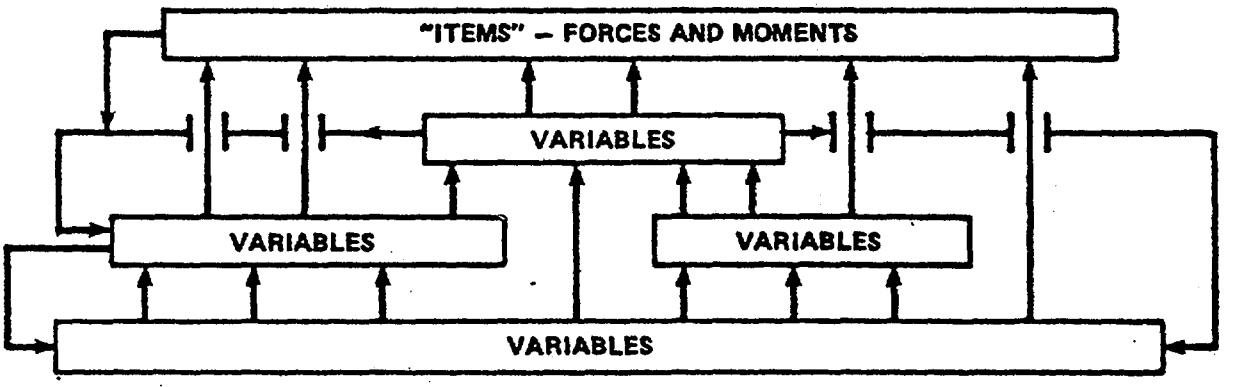


Figure 1-2-2 - SHIPDOC Data Structure—1976 to Present

Variables can get their values from any other variable without regard for the necessity of arranging the variables in a hierarchy, as was the case with the earlier version. The usefulness of this loop feature becomes apparent if you consider the case in which the magnitude of a weight (such as structure) depends upon the total weight of the ship--one usually cannot be computed without knowing the other.

A disadvantage of using the loop structure in the base data is that the program running time is increased when it is employed, since the numerical values of the variables have to be iterated to consistency each time a step (cycle) is made toward the minimization solution. In a hierarchical base data structure a single pass through the base data is sufficient to set consistent values throughout.

A second possible disadvantage, which very rarely occurs in practice, is to arrange the variables in such a fashion that the within cycle iteration fails to converge. The probability of this occurring can be reduced by arranging,

insofar as possible, the flow of information among the variables so that change in the value of a variable within a loop from iteration to iteration is in some sense small. For example, in the computation of skin friction drag, if predicted by a formula such as D=f(k,V,A), would usually be preceded by the defining of values for k, V, and A, rather than by defining them after defining the drag.

2.4.2 Types of Functional Relationships Available.

There are two classes of functional relationships available--individual and group. The five individual types available are used to define the value associated with a single vector or scalar directive, constraint, or objective function. The two group relations are variables which require more than one scalar or vector quantity to define their value.

2.4.2.1 There are five types of individual functional relationships* currently defined that can be used to determine the value of a variable. In increasing order of complexity they are as follows:

1. Constants having a name and a value.

2. Main or direct variables - V_{I_i}. These are user-named variables with respect to which the derivatives of the objective function such as weight are taken in order to form some of the optimization equations. Their values are directly changed by the optimization algorithm.

3. Sum of single term power series - (VAR). These user-named variables are related to the direct variables by:

$$VAR = k_o \left(C + \Sigma_i \, k_i \, V_{I_i}^{E_i} \right)^E ,$$

*There is no correlation between functional class or type and its position in a data structure. Classes and types may be intermixed at any level in a hierarchy or used in any position in a loop structure.

where k_o is computed by the program based on user-provided initial values for V_{I_i} (the direct variables), constants C and C_i, and exponents E_i and E.

4. Power series of two variables (FUN2). The user provides the FUN2 name and sets of tabular or table data. The functional form is given by

$$FUN2 = \sum_{j=0}^{M} \sum_{k=0}^{N} \left(a_{jk} \, x^j \, y^k \right),$$

where the coefficients a_{jk} are determined by SHIPDOC using the least squares method based on user-supplied tabular data $F_i = (X_i, Y_i)$, $i = 1,\ldots,P$. P must be at least equal to (M+1) * (N+1), and must be less than 101. The user specifies the levels of M and N independently from 0-4; 4 is the largest exponent (j or k above) that SHIPDOC allows. A power series function of one variable can be specified, if desired, by specifying either M or N = 0.

This capability often serves in making use of the results of either experimental data or the output from other computer programs, which would require an undue or prohibitive amount of time to run as part of the optimization program.

5. FORTRAN-style equations - (FE_m). User named equations have dummy variable names in the equation which are replaced by the variable names specified in a user-named lists FL. A list name must therefore always accompany an equation name. For example: if the user supplied the equation FE_m = (XO + X1/X2)*X3*XO with a list setting a one-to-one correspondence between XO = AAA1, X1 = BBB2, X2 = BBB4, and X3 = BBB6, the program will find the current values of AAA1, BBB2, BBB4, and BBB6, then substitute these values into the equation wherever the corresponding dummy variable name appears so that the result is to get E_m = (AAA1 + BBB2/BBB4)*BBB6*AAA1. Equations are specified using dummy variable names, so that the same functional form of an equation may be used with many different

lists. The equations use a subset of FORTRAN. The operators recognized are add, subtract, multiply, divide, and exponentiate, and the syntax consists of right and left parentheses. Up to nine levels of parentheses may be used.

2.4.2.2 Group functional relations were first made available to users in 1984 starting with SHIPDOC version V409300, even though the first group functional relation has existed internally for vector quantities since the first version of the program. These group functional relations are called summation variables. The two group functional relations are:

1. Sum of values of a set of vector and/or scalar relationsips. Each vector or scalar directive has a flag field which is not the same as the name field. This flag field name may be the same on more than one vector or scalar directive in contrast to the name of a particular vector or scalar directive name which must be unique. The value associated with the flag field name is the sum of the values of the vector and scalar magnitudes having that flag field name.

2. Sum formed by forming the sum of a set of the first type of summation variables.

2.4.3 Summary of the Base Data Organization.

The base data is explicit for each user in scope and level of detail. Each user makes a base to suit his own needs.

Since the vehicle description (base data) is input as data, and hence, is explicit, all variables, equations, tabular data, and force descriptions can be and are displayed for the user.

The base data is functionally modular, meaning that the form of an equation or the data for a tabular fit may be changed with no effect on the logical structure of the base data. Variables, equations, and force descriptions may be added to or deleted from an existing base with no effect on other modules or

physical and engineering descriptions, (given that ways of finding values exist for all variables named).

3.0 DEFINING YOUR DATABASE

Before a user can run SHIPDOC, he must completely define the base data by using the directive types recognized by the program. A setup for a minimum weight solution will be used as the primary example. These directives "tell" SHIPDOC all of the results desired and explicitly define all desired relationships pertaining, for example, to:

- Weight of the vehicle and contents
- Buoyancy or lift of the vehicle
- Speed, range, and payload
- Center of buoyancies (vertical and longitudinal coordinates)
- Center of gravities (vertical and longitudinal coordinates)
- Minimum vertical stability desired
- For submarines
    - Percentage of reserve buoyancy
    - Location limits of stability load
- Program control modes

3.1 DIRECTIVE SUMMARY TABLE

Directives are classified by function as shown in Table 1. A notation (V409300) means that directive is not recognized by earlier versions of SHIPDOC.

TABLE 1 - SHIPDOC DIRECTIVE SUMMARY

SHIPDOC Function	Directive Type	Name Required	Use
Define problem	OBJF	Yes	Function to be minimized. (V409300)
	PBND	Yes	Specifies constraint. (V409300)
Define variable	CON	Yes	Name and value of constants.

SHIPDOC Function	Directive Type	Name Required	Use
Define variable	MAIN	No	Name and initial value of direct variables. Modification for V409300.
	ITEM	Yes	Specifies how to find magnitude of quantity used as vector such as weight or buoyancy.
	LV	Same as ITEM name	Specifies how to find location within a zone of a vector quantity--required for each ITEM.
	VARN	Yes	Specifies how to find magnitude of quantity used as scalar.
	VAR1	Yes	Linear combination of single term power series of direct (MAIN) variables.
	VAR2	Yes	
	MAX	Yes	Maximum or minimum of specified set members. (V409300)
	MIN	Yes	
	SUMI	Yes	Defines user specified summation variable and set names for ITEM magnitudes and moments. (V409300)
	SUMV	No	Defines user specified summation variable names. (V409300)
	SUMS	Yes	Defines user specified summation set name and members. (V409300)
Define functional relations	FUN2	Yes	Provide interpolation between two-dimensional data fitted by least squares.
	FE_i	Yes	Specifies algebraic equation using +, -, *, /, **, (, and) using dummy variable names X0-X9, Y0-Y9, Z0-Z9, and U0-U9. i ranges from 1-4 depending upon the length of the equation.
	FLj	Yes	Specifies actual variable names to use in place of dummy variable names in FE_i directive. j ranges from 1-3 depending upon the length of the list.

SHIPDOC Function	Directive Type	Name Required	Use
Variable limits	LIM	Same as direct variable	Set upper and lower bounds on values of direct variables.
	LIM	Same as ITEM name	Set upper and lower bounds on ITEM magnitude, ITEM longitudinal arm magnitude, and ITEM vertical arm magnitude.
	LIM	Same as VARN name	Set upper and lower bounds on VARN magnitude.
	LIM	Same as VAR name	Set upper and lower bounds on VAR magnitude.
	LIMF	Same as FUN2 name	Set upper and lower bounds on value of FUN2.
	LDLC	No	Set fore and aft bounds and vertical location for ballast lead (used primarily for submarine data decks). Used before V409300.
	PRGM	No	See Control section of this table.
Control	PRGM	No	• Sets maximum number of optimization cycles. • Sets which direct variables can change values and which constraints are to be used during optimization. (Before V409300) • Sets flag whether any direct variable can be less than zero. • Sets upper and lower bounds on all variables which can be overridden name-by-name by using the variable limit directives, which variable limit directives take precedence. • Sets flag whether cross reference table and loader table is to be written.

SHIPDOC Function	Directive Type	Name Required	Use
Control	Hk	No	Header directives, in general, cause zeroing of data arrays. k may be blank (the usual case), or k = I in which case directives are echoed as they are input, or k = T in which case certain computations are printed out in order to trace SHIPDOC functioning.
	NOGO	No	Causes consistent values to be found for variables, no optimization is performed--used primarily for checkout runs.
	STVR	No	Sets direct variable values and the implied direct variable values (one for each constraint being used) to be used at the start of optimization. (Before V409300)
	END	No	Start optimization.
	ENDR	No	Stop execution.
Redefine variable	CONC	Same as name of constant to be re-defined	Change anything about constant except its name.
	ITMC LC VA1C VA2C VRNC	Same as name of variable to be redefined	Change anything about ITEM except its name. LV VAR1 VAR2 VARN
Comment	C	No	Any desired comment.
	SUBH	No	Subheader--will be second line of header printed at top of each page. (V409300)

Please note: The names assigned in the define problem and define variable sections of Table 1 must be unique between directive types since SHIPDOC in effect makes a single table of all the names defined. The names used for FUN2, FE_i, and FL_j directives can be the same between directive types. In any directive group, such as ITEM or FUN2, the names defined must be unique.

The remainder of this section on defining your database shows the information required for each directive type except those having to do with program control, and program limits.

3.1.1 Directive Input Modes

There are two modes for inputing directives: by card images and by use of an interactive program named SDEDIT. This user's guide shows directive examples using card images. The interactive program will prompt the user and will prepare the card image equivalents for the SHIPDOC input file. By keeping the input to SHIPDOC in card image equivalents data bases prepared during the years from 1969 on before the interactive program was developed may still be used by SHIPDOC.

3.2 SHIPDOC VERSIONS

There are three major plateaus in the evolution and development of SHIPDOC. The program, developed at Mare Island Naval Shipyard for the Underwater Long Range Missile System (ULMS) submarine project, was called ARCJ6 during its first two major freeze versions or plateaus. To emphasize its usefulness for all vehicles, it has been renamed SHIPDOC which stands for SHIP Design Optimization Code.

The first plateau consisted of the original version of the program developed for submarine conceptual design. This first version, which existed from 1969 to 1976, allowed five direct variables of which stability lead was the fifth and included four built-in constraints: WT-BUOY = 0, LCG = LCB or minimum transverse stability met (whichever required the least lead), reserve buoyancy = specified fraction of submerged volume, and center of reserve buoyancy = LCB. The data base was sequential in that loop structures were not permitted. With implied redefinition of some constraints, surface ships were also accommodated.

The second plateau existed from 1976 to 1983 when loop structures were allowed in the data base and the user was given control over which of the five direct variables and four constraints were to be active during a given optimization run. During 1979, an internal modification was made to reduce the running time, and at the same time preliminary versions of users and programmers manuals were prepared to reflect the current status of the program.

The third plateau is the current (1984) version (V409300) which allows users to specify as data what is to be minimized (the objective function), allows the user to specify the constraints as data, and allows access to and definition of summation variables. Summation variables are the names used on force and scalar definition directives to indicate categories and groupings such as weight, buoyancy, reserve buoyancy, etc. Previous versions used summation variables but these could not be directly accessed by the user. Summation variables were also extended to to scalar definition directives.

3.2.1 User Guide Applicability

This user's guide was originally prepared for the second plateau version of the program. Unless otherwise noted, the information herein is applicable to all versions of ARCJ6 or SHIPDOC.

3.3 BUILDING THE SHIP DESCRIPTION FILE (DATA BASE)

The layout of the remainder of this section shows the building up of a data base (ship description file) in a step-by-step manner. Since the data base is non-hierarchal and hence requires no segregation into subroutines, directive types may be grouped together as the user finds convenient.

This section is laid out upon the assumption that what is to be minimized (the objective function) is known, that the constraints are known, and that a data base (ship description) will be built to allow the values of the constraints

and of the objective function to be found. In practice, once a data base has been built, the changing of constraints usually requires only very few or no changes in the data base, while changing the objective function usually requires no to few changes in the data base. It is useful to think out what objective functions and constraints may be likely to be needed before embarking upon the building of the data base.

If the user desires to find a minimum weight vehicle using some of the built-in constraints existing in the first and second plateau versions and no more than four user specified direct variables, he can use SHIPDOC version V407190. If a different objective, function, different constraints, more than four user specified direct variables, or direct access to summation variables are desired, the user must use SHIPDOC version V409300. If the user chooses to use SHIPDOC version V409300, the objective function, all the constraints, and the summation variable definitions will have to be defined by the user. Note that the great majority of the data base is independent of which version is being used and can therefore be used unchanged by either version.

While the example used in the remainder of this section shows the steps in the building of a data base to find a minimum weight ship using program built-in constraints (version V407190) which version requires the use of ITEM (force) directives and the use of the built-in summation variables such as WT or DISW and BUOY or DISB, the use of version V409300 does not require the use of ITEM directives unless geometric location information is required, and places no restrictions upon the names of the summation variables used.

3.3.1 Actions Before Starting the Ship Description File

The ship is first divided into compartments or zones (the entire vehicle may be one zone if desired), and the user specifies the force acting upon each

ITEM (force) in a zone and the method for computing the magnitude and arms of each force. It is the combined effect of all these ITEMs on the ship which must be computed and recomputed to minimize the ship's weight and meet the active constraint conditions such as: weight equals buoyancy, minimum vertical stability, LCG=LCB, and range.

Next, list all of the items or parameters that describe the ship. Recall that ITEMS are forces which have a magnitude and a location within a compartment or zone.

Once you have the list of all items and parameters to be included in the mathematical model for the ship, give each a distinct (up to 4-character) name and list how each is to be defined. Can an item or parameter be defined directly as a linear combination of the main variables V_{I_i}? Is there a formula to express the item or parameter in terms of V_{I_i} and/or other variables? Perhaps the relationship cannot be described algebraically, but can be described point-wise, that is, in tabular form. In other words, how can you find the value of an item or parameter? What do you need to define each item or parameter for the program? In the case of items or parameters defined by formulas or by tables, what new relationships must you define (and how) to have all quantities explicitly described for the program? Keep repeating this until all the quantities and relationships you need for your ship model have been listed. Remember there are no built-in descriptions or relationships; you must define everything--including constants--for the program. You may start to write the directives after you complete this process and ascertain that there is no quantity left undefined. (If a name is used but not defined, SHIPDOC will issue an error message.) It is usually convenient to keep ITEMs grouped together in the data base, but not

required. The mix of directive types which define an ITEM's value is usually grouped as a package such as, for example, a resistance estimation package.

A word of caution is necessary here. Of course, it is desirable to have a complete mathematical model for SHIPDOC to work with, but you must also consider the sizes of the available arrays. For example, the current configuration of SHIPDOC has room for up to 300 ITEMS. If your number of ITEMS (do not include all the supportive relationships) is more than 300, you will have to reduce the number to 300 or less by combining the same type ITEM for several compartments and deleting others. The alternative is to change the array size in the program, which takes about one-half to one day.

3.3.2 USE AND FUNCTION OF DIRECTIVES FOR SHIP DESCRIPTION FILE

Start your coding by giving each item, each quantity, and each relationship to be defined a meaningful and distinct name of up to 4 characters. The names in SHIPDOC are up to 4 character alpha-numeric strings which have no implied typing for computational purposes since all data base computations are performed using floating point. Thus, A1, I48 or A/B are all valid names. Four blanks is <u>not</u> a valid name.

A comment on which names must be unique in SHIPDOC. Within each group of tables, names must be unique; but names in <u>different</u> groups <u>may</u> be the same. That is, all list names should be distinct from each other since they form a group; but a list name can also be the same as a constant, direct variable, VAR, VARN, ITEM, summation variable and set, maxmin, constraint, or objective function name. The same comment applies to equation and function names since all equations form a group and all FUN2 functions form a group. All constant, VAR, VARN, ITEM, direct variable, summation variable and set, maxmin, constraint, or objective

function names must be distinct with respect to each other since they form a group.

We will describe each type of relationship coding first and then the general VARN and ITEM coding, since how you code ITEMs will depend upon the relationships you have defined for them. Finally, for V409300, user defined summation variables, constraints, and the objective function will be described.

3.3.2.1 CON Directives

CON directives are used to define the names and values of constants. Since SHIPDOC works by finding the numeric value associated with a given name when that name is used in an expression, confusion would result if both numeric values and alpha-numeric strings were valid entries. Consequently, all data entry fields are either alpha-numeric or numeric. To use a constant in an alpha-numeric field requires that the constant have a name. The CON directive furnishes the correlation between the name and value for a constant.

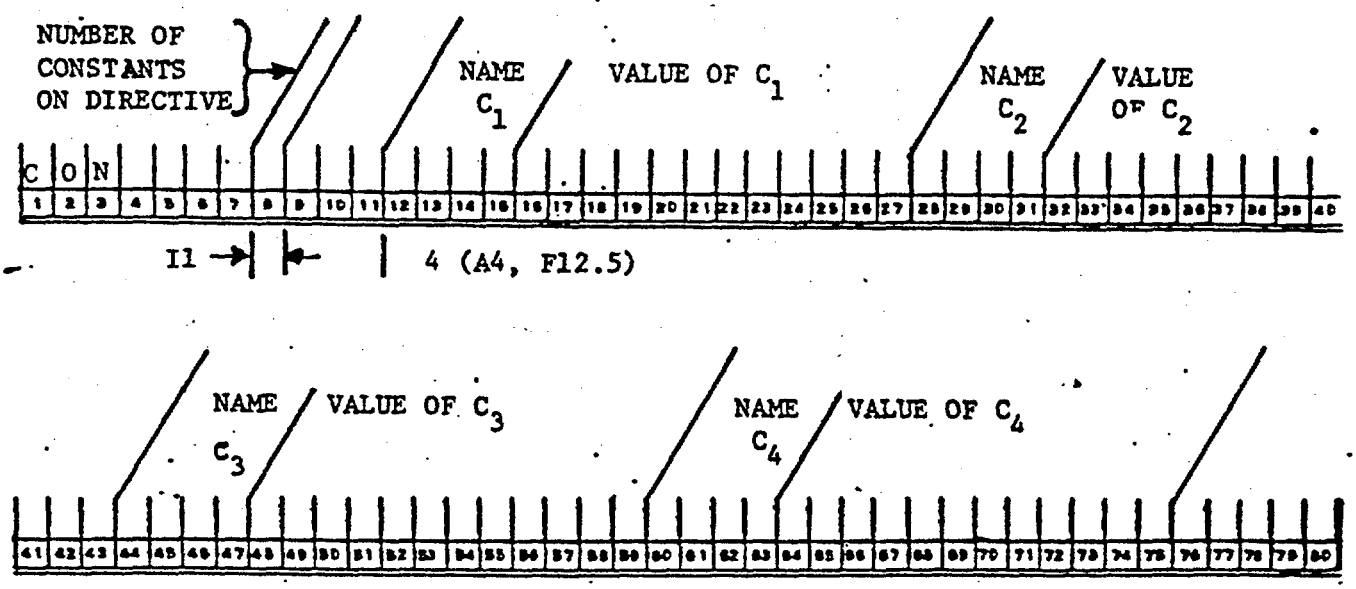


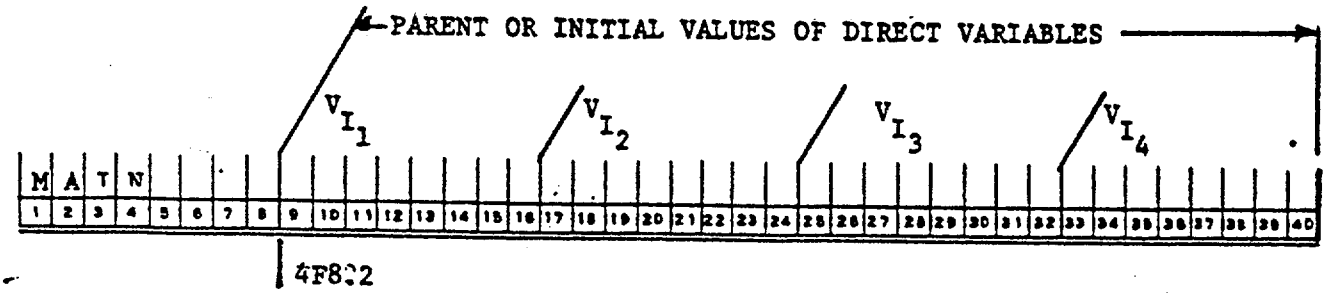
Figure 1-3-1: CON DIRECTIVE

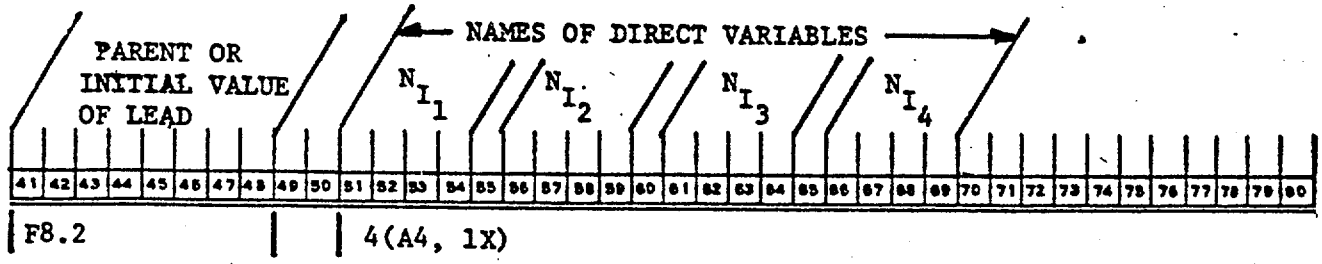
3.3.2.2 MAIN Directive

We now start dealing with variables which may have their values changed during the course of SHIPDOC execution.

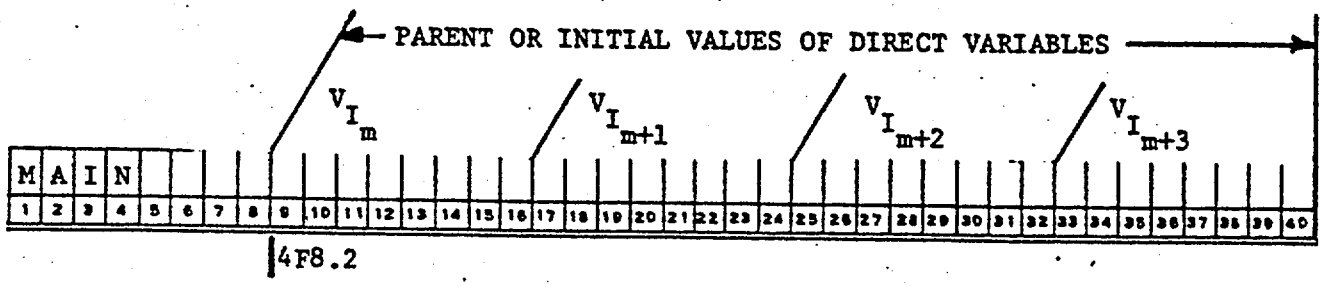
Start by giving the direct variables distinct names. These are the variables with respect to which derivatives will be taken for optimization and whose values are directly changed by the optimization algorithm. All names that are input by the user must fit in a 4-character field. The format of the MAIN directive shows what SHIPDOC requires for SHIPDOC versions V407190 and earlier: four names plus initial values for each plus an initial value for stability lead.

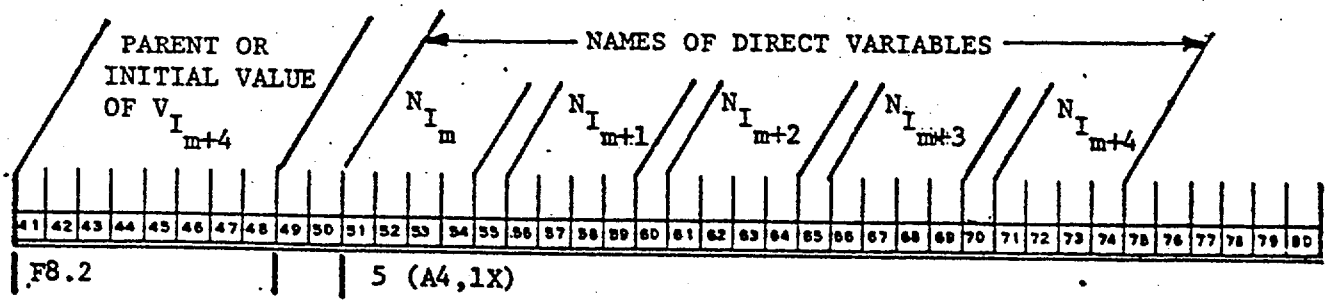
The current (V409300) version allows up to 15 direct variables to be defined using a slightly expanded form of the MAIN directive. Stability lead is no longer an implied direct variable. Up to five direct variable names and their initial values are specified on each MAIN directive used. Therefore up to three MAIN directives may be used.





MAIN DIRECTIVE - BEFORE V409300





MAIN DIRECTIVE - V409300

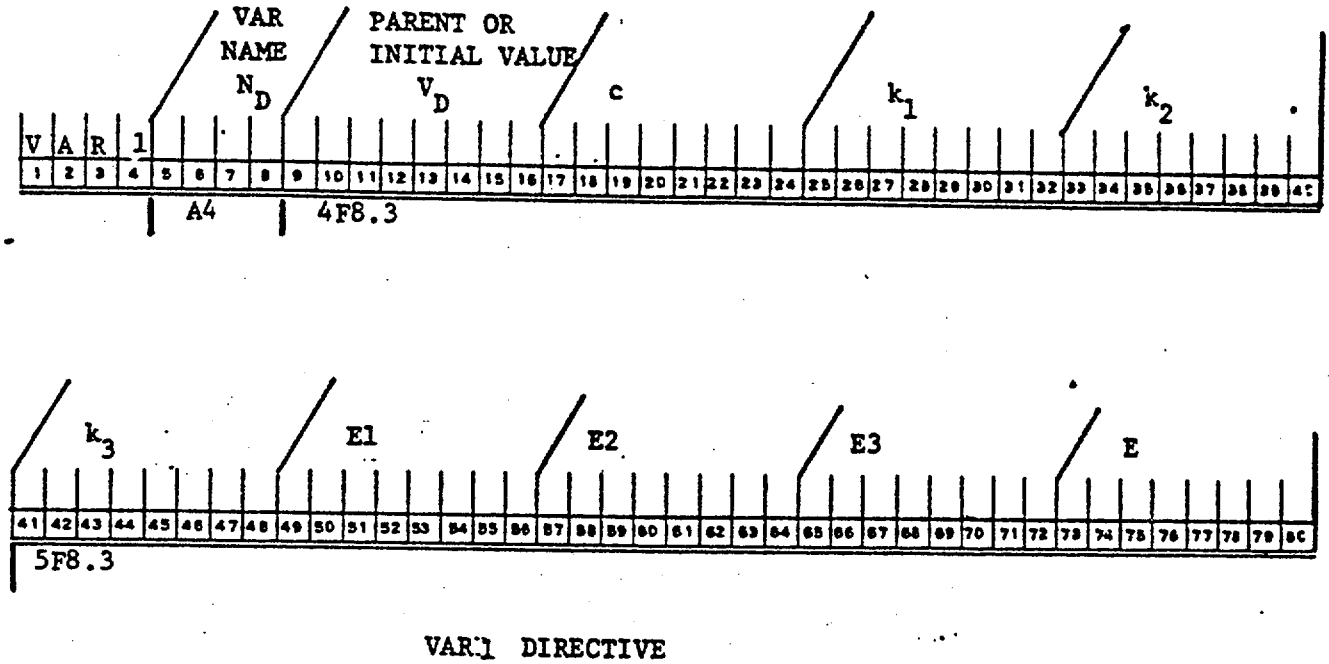
Figure 1-3-2: MAIN DIRECTIVE

3.3.2.3 VAR Directives

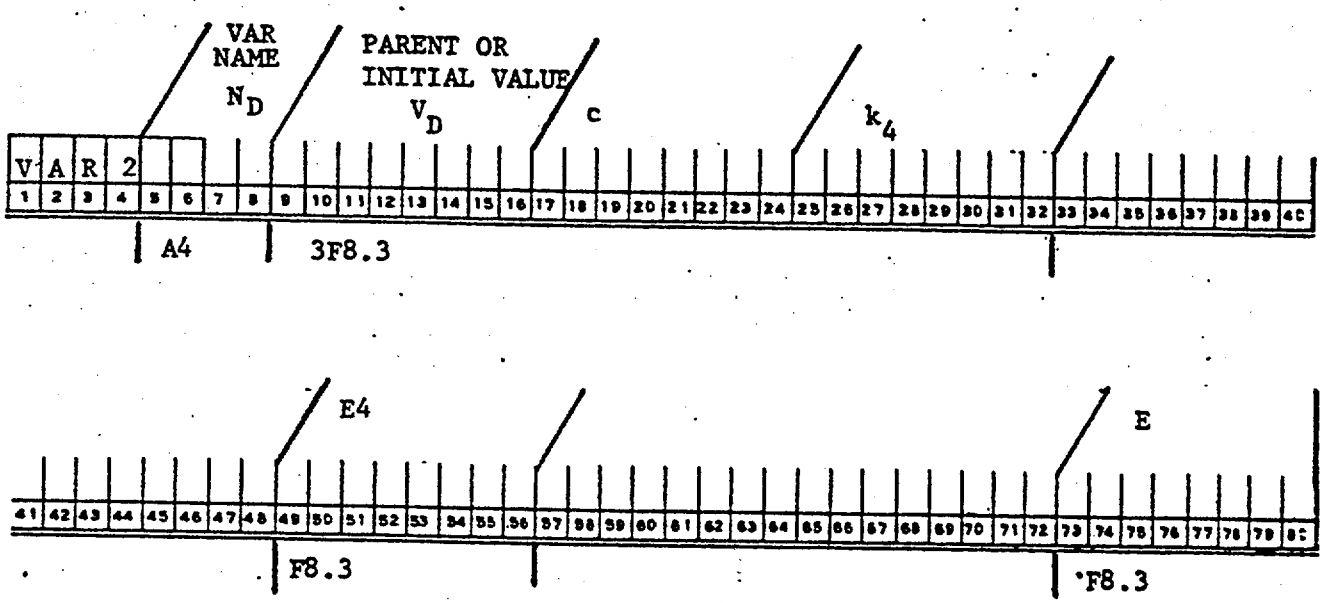
For those quantities that can be expressed as one term power series or linear combinations of only the first four direct variables V_{I_1}, first determine the coefficients (except k_o) and exponents (all exponents must be ≥ 0.) for the following formula:

$$VAR = k_o(c + k_1 V_{I_1}^{E1} + k_2 V_{I_2}^{E2} + k_3 V_{I_3}^{E3} + k_4 V_{I_4}^{E4})^E$$

SHIPDOC has room for 50 of these VAR variables. For VAR directives, SHIPDOC has two directive inputs: VAR1 and VAR2.



VAR1 DIRECTIVE



VAR2 DIRECTIVE

Figure 1-3-3: VAR DIRECTIVES

The VAR1 directive is used by itself if c = 0 or in conjunction with a VAR2 directive (see following paragraph) if c≠0. If c≠0 and the variable V_{I_4} is the only variable involved, a VAR2 directive can also be used by itself. Note that you do not specify k_o on the directive, but enter the initial value of the VAR instead. SHIPDOC will solve the equation initial value = $k_o(c+ \ldots + k_4 V_{I_4}^{E4\,E})$ for $k_o = \frac{\text{initial value}}{c+ \ldots + k_4 V_{I_4}^{E4})^E}$ for you.

When c≠0 and other V_{I_i} are involved, you must use both directives with the VAR2 directive immediately following the VAR1 directive in the data deck. Note that the VAR name must be the same on both directives in this case, and that the initial value, c, and E are repeated on the VAR2 directive from the VAR1 directive. This repetition is necessary so that the VAR2 directive can stand alone if k_1, k_2, and k_3 are all 0. Do not ignore them on the VAR2 directive; the values (or blanks) entered on the VAR2 directive will replace the parent value, c, and E entered on the VAR1 directive.

3.3.2.4 Equation Directives FEm, m = 1,4

For those quantities that must be evaluated by a different formula, or involving quantities other than the direct variables, SHIPDOC can use slightly modified FORTRAN equations using a subset of FORTRAN operations. To waste as little storage space as possible, SHIPDOC uses different storage tables for FORTRAN equations of different lengths, hence the distinction between FE1, FE2, FE3, and FE4 directives. Also, to facilitate repeated use of the same equation name, SHIPDOC uses only 1 or 2-character equation symbols. SHIPDOC will accept only the following dummy variable names in an equation:

DUMMY VARIABLES - X0, X1, X2, X3, X4, X5, X6, X7, X8, X9, Y0, Y1, Y2, Y3, Y4, Y5, Y6, Y7, Y8, Y9, Z0, Z1, Z2, Z3, Z4, Z5, Z6, Z7, Z8, Z9, U0, U1, U2, U3, U4, U5, U6, U7, U8, U9 or blank,

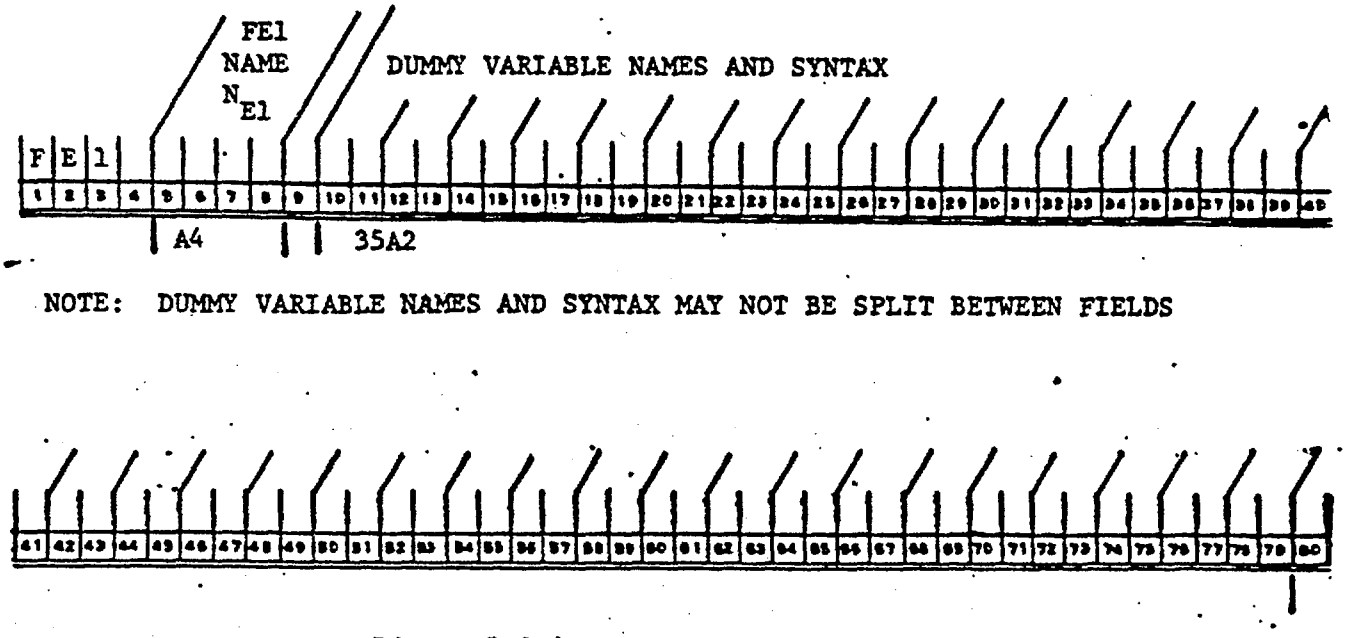
and will accept only the following operation symbols:

+, -, /, *, **, (,) which are symbols for plus, minus, divide, multiply, exponentiate, left parentheses, and right parentheses.

The easiest way to determine which to use (FE1, FE2, FE3, or FE4) is to write the equation on a coding form starting in column 10 (for each line) and using two columns for each symbol across the page. If you have not completed the equation at column 79, start a new line at column 10 if necessary. If the equation will not fit on four lines this way, SHIPDOC will not accept it. If the equation requires one line, use an FE1 directive. If it requires two lines, use an FE2 directive and one continuation, etc. Then, you can go back and fill in FEi at column 1 on the <u>first</u> line of the equation, remembering that the continuation cards require <u>no</u> identifier.

3.3.2.4.1 FE1 Directive

A FORTRAN equation that contains 35 or fewer of the above symbols is input on an FE1 card:



NOTE: DUMMY VARIABLE NAMES AND SYNTAX MAY NOT BE SPLIT BETWEEN FIELDS

Figure 1-3-4: FE1 DIRECTIVE

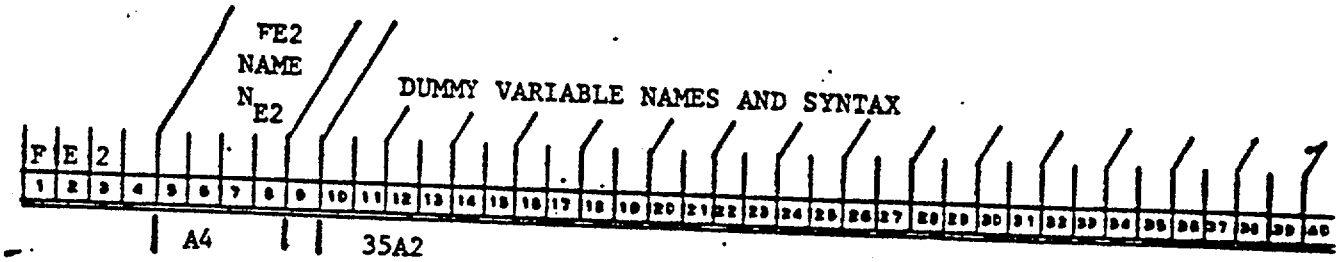
The operation symbols may be either right or left justified in their respective 2-character slot; with only <u>one</u> symbol to a slot. Symbols can be reused providing the <u>standard rules for FORTRAN are observed</u>; this includes repeating the dummy variable names. Also, note that SHIPDOC will not accept more than nine sets of nested parentheses. (Storage is only allocated to compute nine levels.) SHIPDOC makes room for <u>65</u> 1-card equations.

Note that arithmetic constants are <u>not</u> acceptable as equation symbols. <u>Each</u> distinct constant (coefficient or exponent) and each distinct variable must have a <u>different</u> dummy variable associated with it. Keep track of this correspondence as you write your equations; you will have to provide a list of the constant and variable actual names (see page 1-3-8), so that SHIPDOC will know what value to insert in place of the dummy variable name when the equation is evaluated.

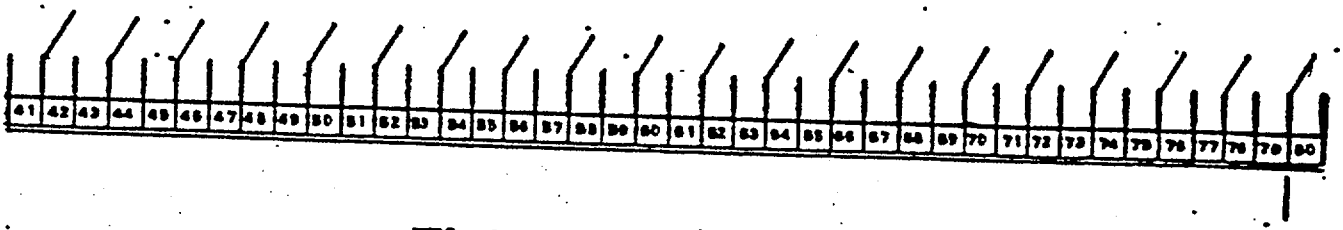
Note also that each equation is given a name (up to 4-characters long). These names do not have to be distinct from names previously used for ITEMS, CONS, VARS, direct variables, VARNS and for V409300, objective function, constraints, and summation variables and sets, and maxmin variables. Although blanks do not affect its accuracy, an equation may take more storage space and increase processing time if you include blanks; thus it is best to avoid them. In addition, blanks may also make an equation more difficult to read.

3.3.2.4.2 FE2, FE3, and FE4 Directives

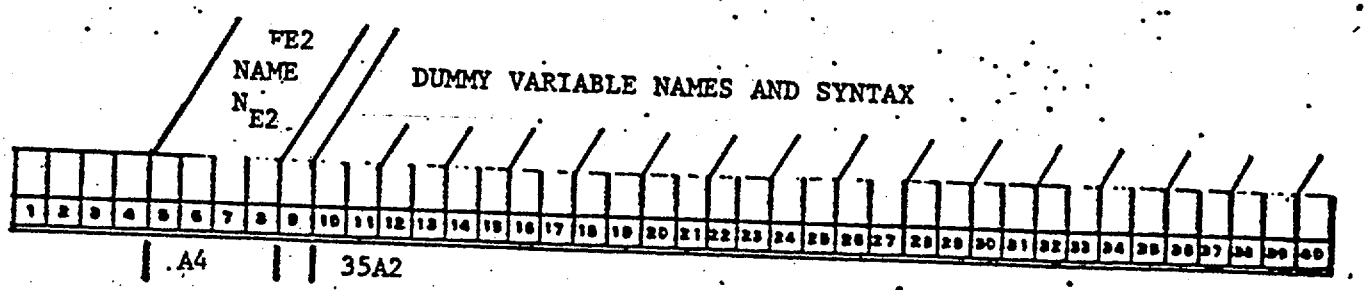
SHIPDOC will accept FORTRAN equations adhering to the previously described characteristics and fitting on as many as four cards (up to 140 2-character symbols). If an equation has more than 35 and less than 71 symbols, input it on two cards--the FE2 directive and one continuation card:

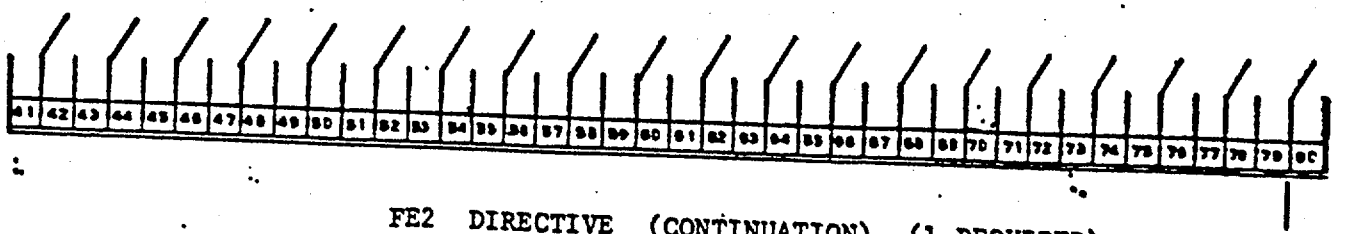


NOTE: DUMMY VARIABLE NAMES AND SYNTAX MAY NOT BE SPLIT BETWEEN FIELDS



FE2 DIRECTIVE (START)



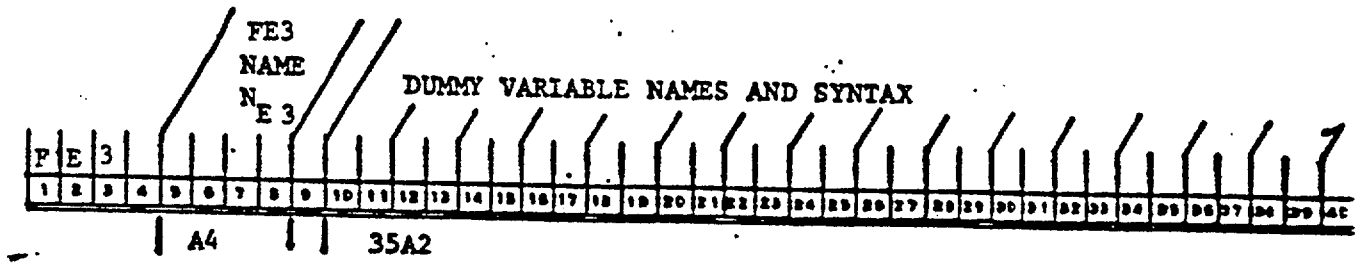


FE2 DIRECTIVE (CONTINUATION) (1 REQUIRED)

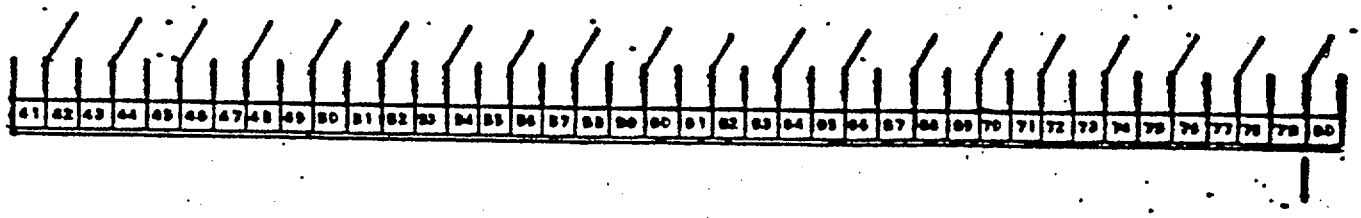
Figure 1-3-5: FE2 DIRECTIVE

The first 35 2-character symbols go on the FE2 directive, while the remainder go on the continuation card. Note that both cards must have the same equation name and the continuation card must immediately follow the FE2 directive in the data deck. All restrictions quoted for an FE1 directive also apply to these as well as other equation cards. Each FE2 equation will use 70 words of storage. Note that no card identifier is used for the continuation card; SHIPDOC simply assumes one continuation card will follow an FE2 card. Also, note that the program only will accept up to 10 2-card equations.

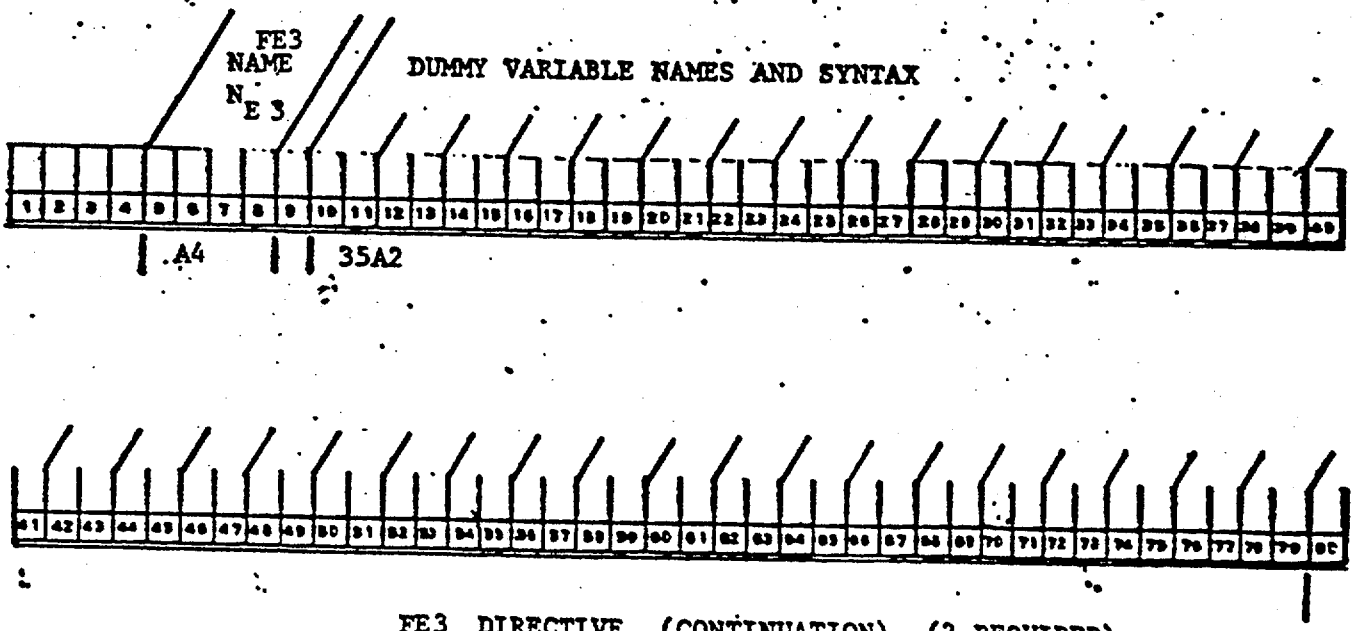
If an equation has more than 70 but less than 106 symbols, use an FE3 directive and two continuation cards as shown in the following figure.



NOTE: DUMMY VARIABLE NAMES AND SYNTAX MAY NOT BE SPLIT BETWEEN FIELDS



FE3 DIRECTIVE (START)

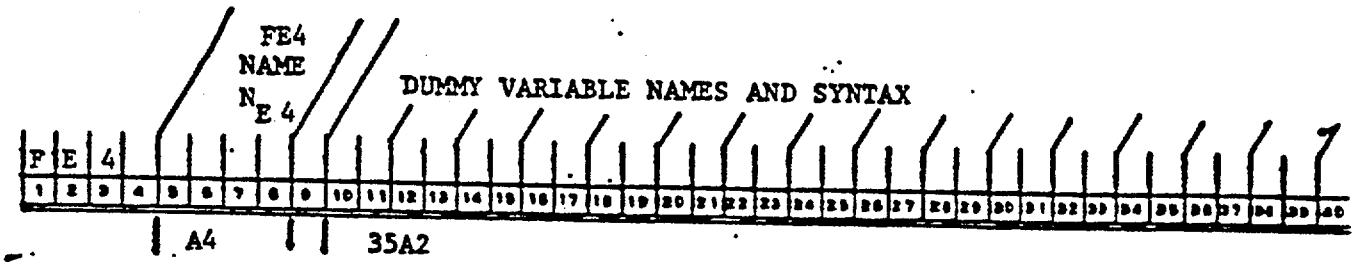


FE3 DIRECTIVE (CONTINUATION) (2 REQUIRED)

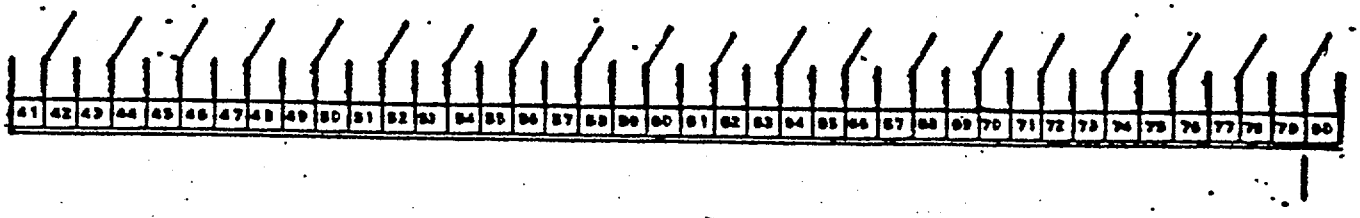
Figure 1-3-6: FE3 DIRECTIVE

Most of the comments about an FE1 or an FE2 directive apply here also. Note that all three cards must have the same equation name; the FE3 directive and the first continuation both contain 35 symbols, while the second continuation card contains up to 35 symbols, which amounts to 105 words of storage, not including the name. Presently, SHIPDOC will accept five 3-card equations.

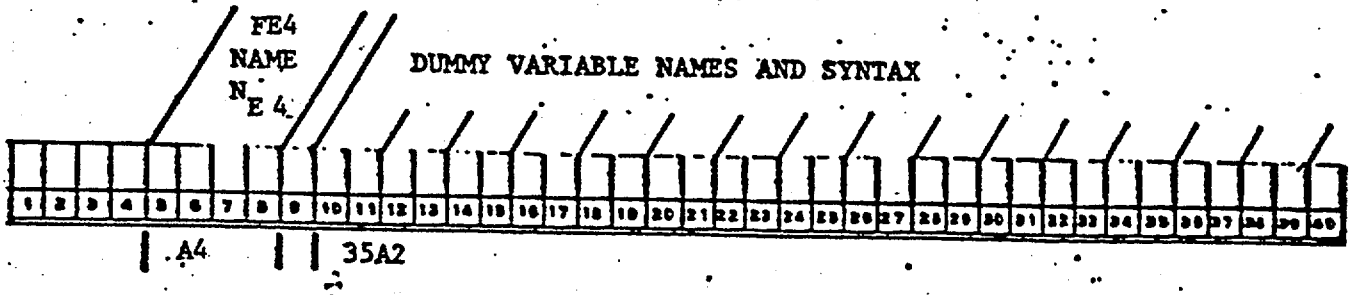
If an equation has more than 105 and less than 141 symbols, use an FE4 directive and <u>three</u> continuation cards. The first 35 symbols go on the FE4 card;

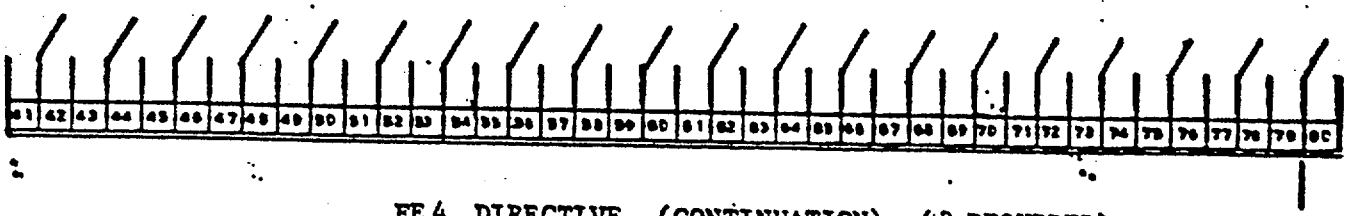


NOTE: DUMMY VARIABLE NAMES AND SYNTAX MAY NOT BE SPLIT BETWEEN FIELDS



FE 4 DIRECTIVE (START)





FE 4 DIRECTIVE (CONTINUATION) (3 REQUIRED)

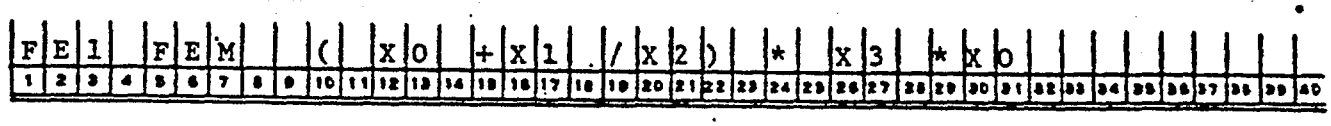
Figure 1-3-7: FE4 DIRECTIVE

the second 35 on the first continuation card; the third 35 on the second continuation card; and the remainder on the fourth continuation card, which provides for 140 symbols (140 words in storage plus the name). As with regard to an FE2 and FE3 equation directive, SHIPDOC <u>assumes</u> the right number of continuation cards will immediately follow the FE4 directive in the data deck. The program accepts <u>three</u> 4-card equations.

3.3.2.5 List Directives FLn, n = 1,3

List directives provide the one-to-one correspondence between the dummy variable names used in the equations and the actual variable names whose values are to be used.

In the introduction, an example of how the dummy variables operate was described. It is repeated here and expanded to directive form:



FE1 DIRECTIVE WITH NAME FEM

X0 X1 X2 X3

FL1 DIRECTIVE WITH NAME FLN

Figure 1-3-8: EXAMPLE OF LIST-EQUATION CORRESPONDENCE

Suppose you wish to evaluate E=(AAA1 + $\frac{BBB2}{BBB4}$) (BBB6) (AAA1). Proceeding left to right, note the different names: AAA1, BBB2, BBB4, and BBB6. We'll match these with the <u>first</u> 4 dummy variable names X0, X1, X2, and X3 and write the equation as E=(X0+X1/X2)*X3*X0 using X0 in <u>both</u> positions at which AAA1 occurred. This is an equation acceptable to SHIPDOC, but you must also tell the program which variables' values are to replace the dummy variables during evaluation (the dummy variables have <u>no</u> value). You tell the program this by a list (FEn) directive. To conserve storage, again SHIPDOC uses more than one table, storing these lists according to their lengths, either 1, 2, or 3 cards long, hence the distinction between FL1, FL2, and FL3 directives.

An equation can be used with more than one list as long as the list contains a variable name of each dummy variable in the equation. For example: $3x^2 + 4x1+5$ and $2a^3+4a$ could both be evaluated by using X0*(X1**X2)+X3*X1+X4. By having one equation and two lists instead of two equations and two lists, we cut down on the storage required to contain the base data.

3.3.2.5.1 FL1 Directive

If a list contains 14 or fewer names, use an FL1 directive:

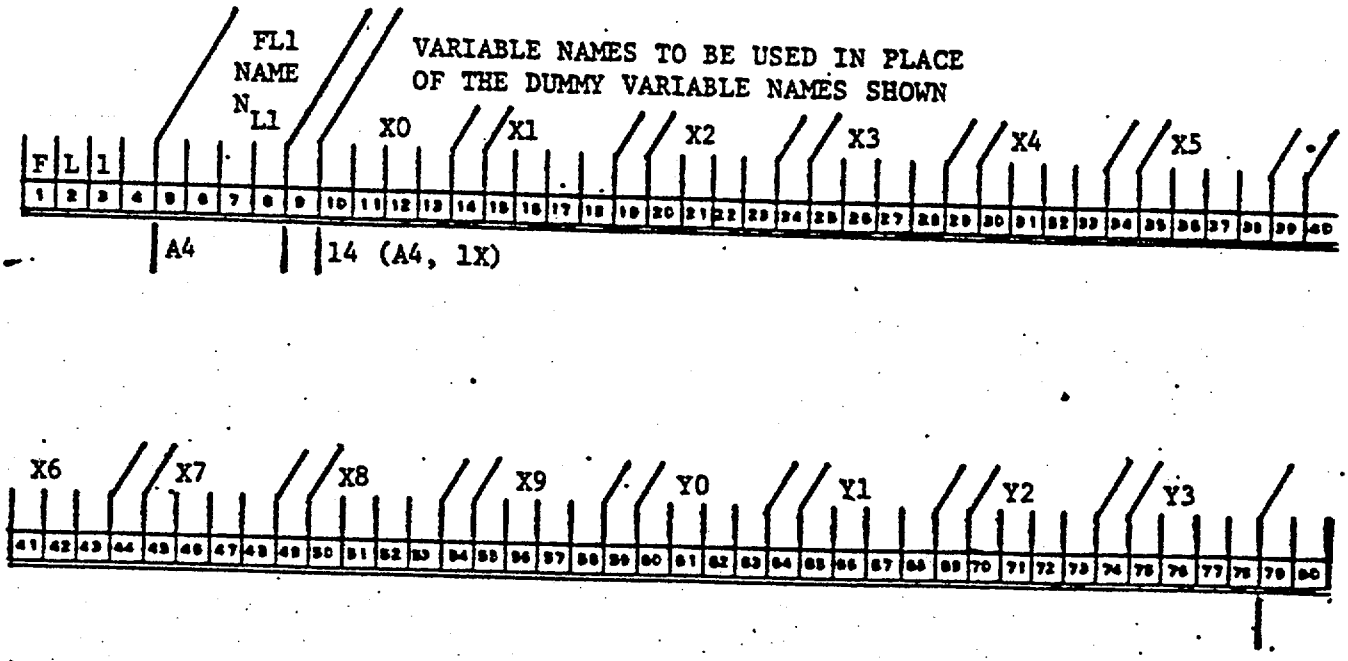
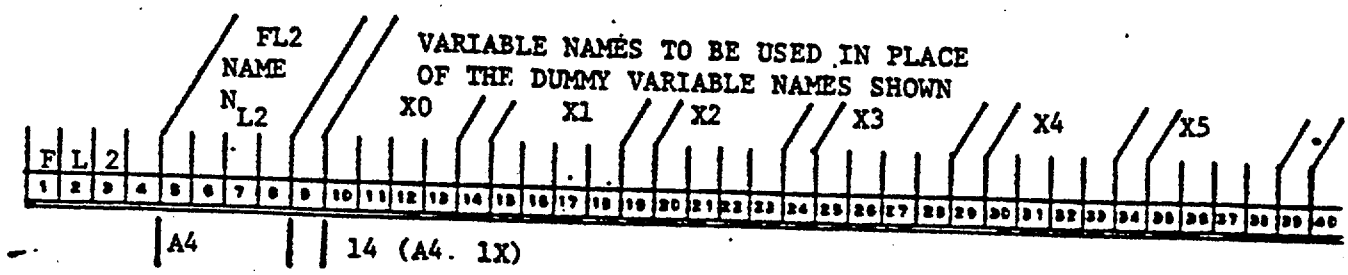
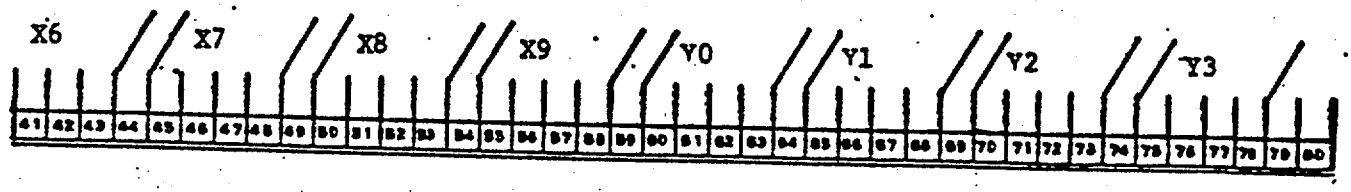


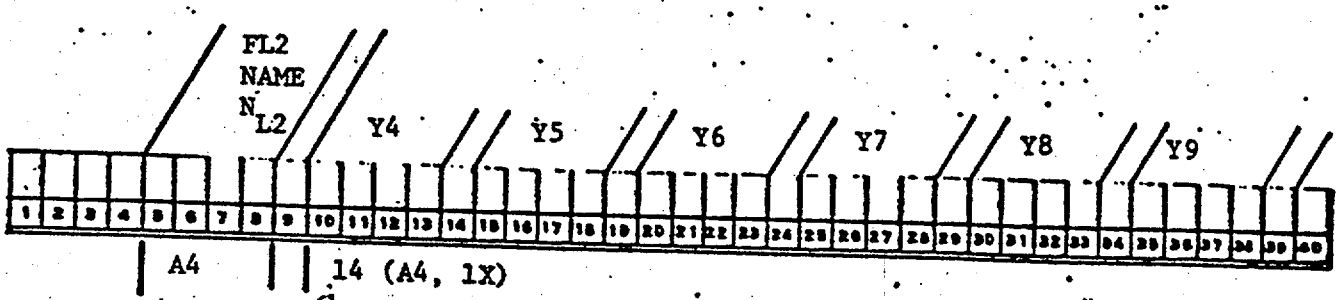
Figure 1-3-9: FL1 DIRECTIVE

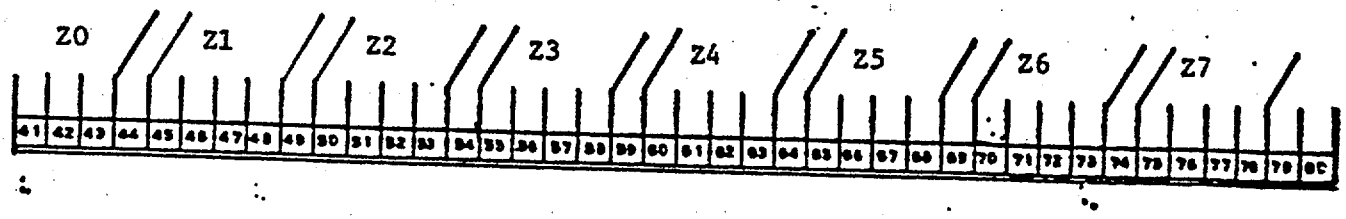
Starting in column 10, list the (up to 4-character) variable names, skipping a space between each pair. These names may be any constant CON, VAR variable, any direct variable V_{I_i}, any VARN variable, or any ITEM name. SHIPDOC version V409300 allows in addition the names of objective functions, constraints, or summation variables and sets, and maxmin variables. No equation, list, or FUN2 function name is accepted. Any field may be left blank if the particular dummy variable corresponding to that field is not needed with this list as long as every dummy variable used has a corresponding variable name. Note that every list must have a unique (up to 4-character) name and that the correspondence between dummy variables and variable names is fixed, that is, the third variable name's value will replace X2 automatically. The eleventh variable name's value will automatically replace Y0, etc.





FL2 DIRECTIVE (START)





FL2 DIRECTIVE (CONTINUATION) (1 REQUIRED)

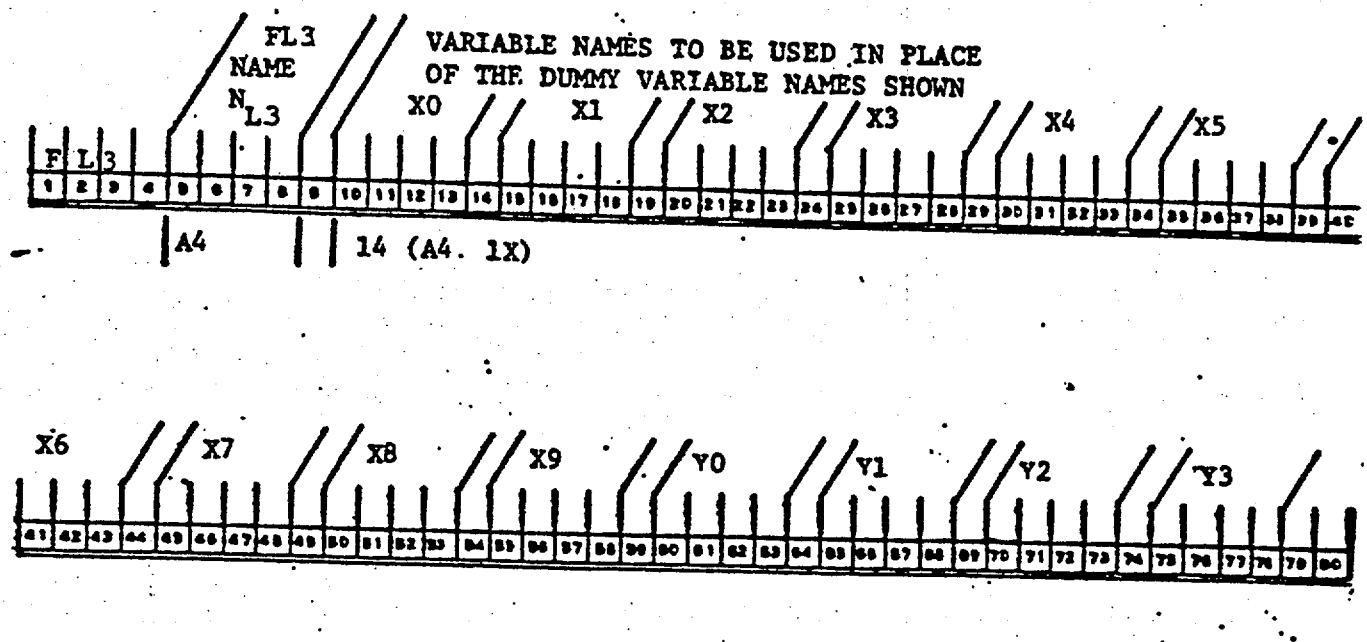
Figure 1-3-10: FL2 DIRECTIVE

3.3.2.5.2 FL2 Directive

If a list contains more than 14 and less than 29 names, use an FL2 directive and <u>one</u> continuation card: both must have the same list name, and the correspondence to dummy variables is fixed as shown. Note that the first 14 automatically correspond to X0- Y3, the same as for an FL1 directive. The second 14 names automatically correspond to Y4 - Z7. The same restrictions apply to these as for an FL1 directive. SHIPDOC can accept <u>650</u> 1-card lists but only <u>10</u> 2-card lists.

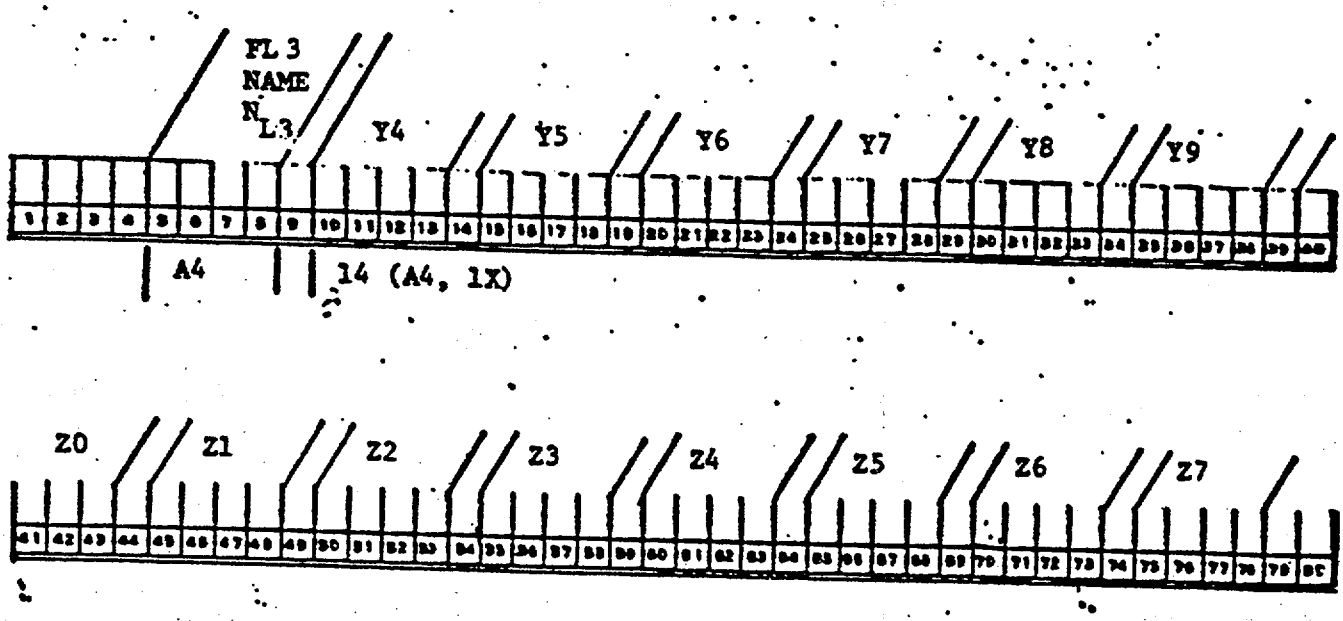
3.3.2.5.3 FL3 Directive

If a list contains more than 28 and less than <u>41</u> names, use an FL3 directive and <u>two</u> continuation cards:

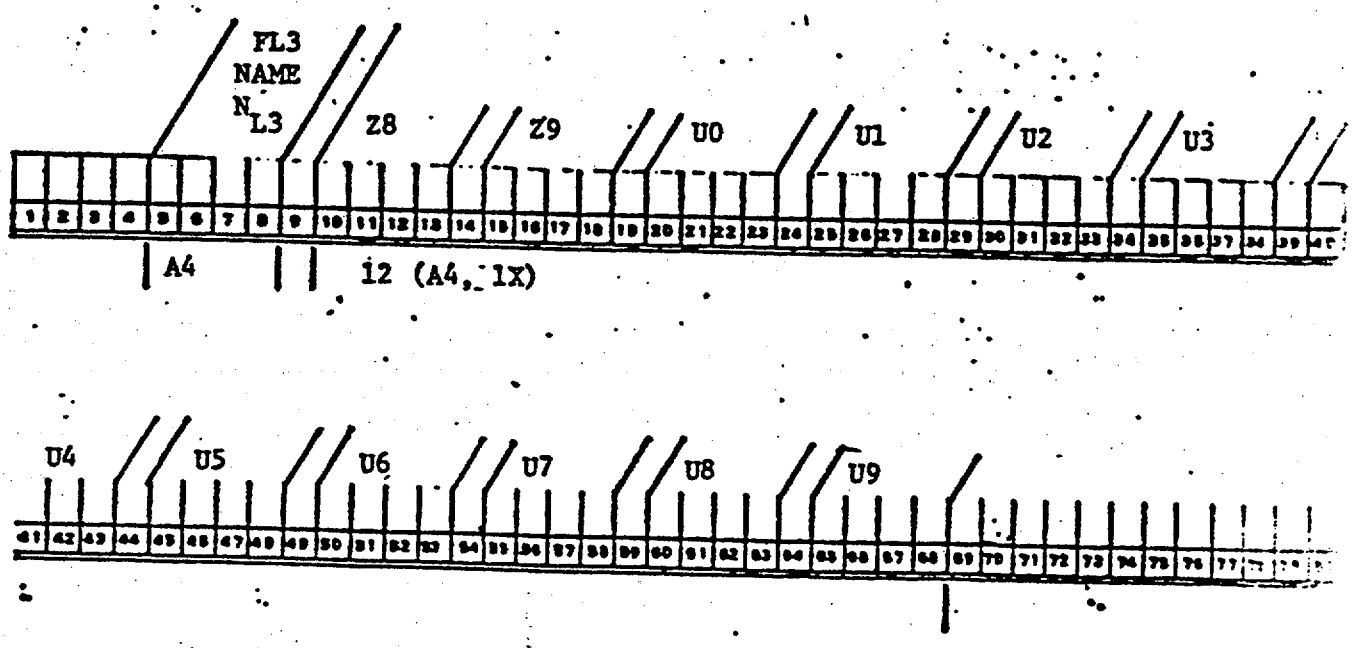


FL3 DIRECTIVE (START)

Figure 1-3-11: FL3 DIRECTIVE



FL3 DIRECTIVE (CONTINUATION) (1 REQUIRED)



FL3 DIRECTIVE - 2nd CONTINUATION

Figure 1-3-11: FL3 DIRECTIVE

The first 14 fields correspond to X0 - Y3, just as for FL1 and FL2 directives. The 14 fields on the first continuation card correspond to Y4 - Z7, the same as for the continuation card of an FL2 directive. The last continuation card can contain up to 12 more names that will correspond to Z8 - U9. In the case of FL2 and FL3 directives, SHIPDOC will assume the continuation card(s) immediately follow(s) the first one. Each FL2 and its continuation must have the same list name, as do each FL3 and its continuations. Please note that SHIPDOC has room for only five 3-card lists and that no list cannot contain more than 40 names.

3.3.2.6 Alternative Definition of Constants

Notice in the example at the end of section 3.3.2.5, we could have used variable names TREE, TWO, P4, FIVE, M4, and ZERO for 3, 2, +4, 5, -4, and 0. While SHIPDOC contains a special table for constants, they can also be defined as the VARs previously described and input on VAR1 cards. In the following example,

$$3=3*(1 + 0.0*V_{I_1}^{E1} + 0.0*V_{I_2}^{E2} + 0.0*V_{I_3}^{E3} + 0.0*V_{I_4}^{E4})^1 = 3 \cdot (1)^1 = 3,$$ no matter

what values E1, E2, E3 and E4 have.

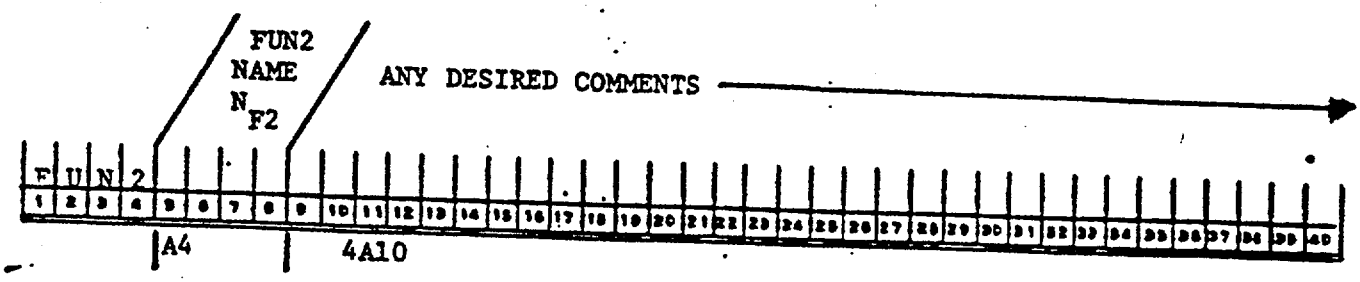
3.3.2.7 FUN2 Directive

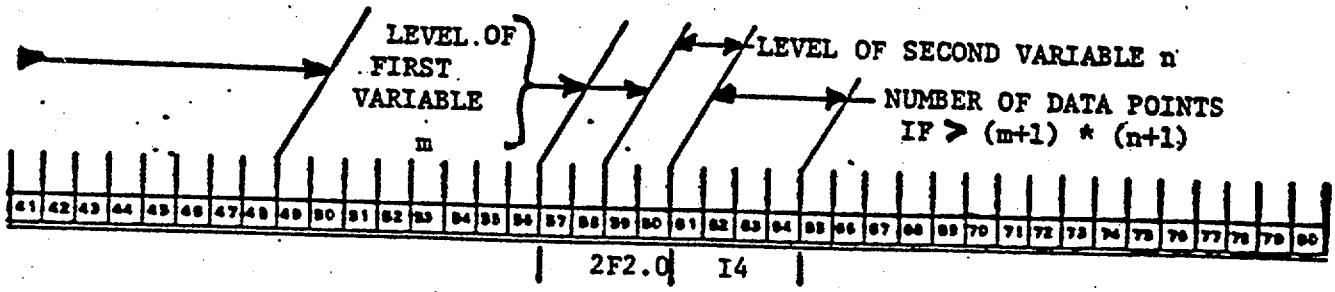
Functions of two variables are available so that tabular data can be used in the minimization process. This allows the use of the results of either experimental data or the output from other computer programs. The two variables are order dependent and are dummy variables, which means that a function can apply to more than one pair of variables. A function is approximated from the tabular data entered by the user, with a level of fit (highest exponent allowed in the general form):

$$F = \sum_{j=0}^{m} \sum_{k=0}^{n} (a_{jk} * x^j * y^k)$$ where j, k range from 0-4 maximum

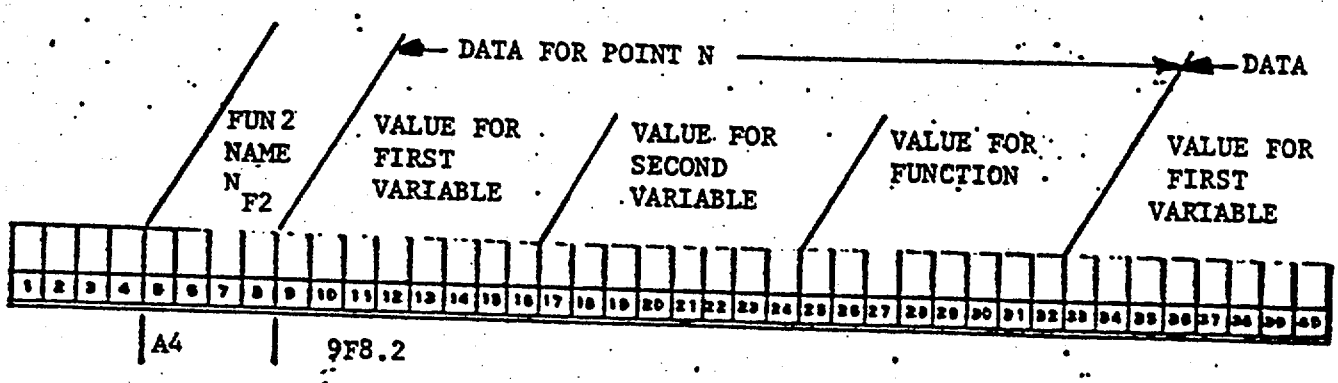
A least squares method is used to solve for the set of coefficients a_{jk}. Storage is allocated for a 25 x 25 matrix. From the general form, $(m+1)\cdot(n+1)$ must be $\leq$ 25, so up to 25 coefficients a_{jk} can be estimated.

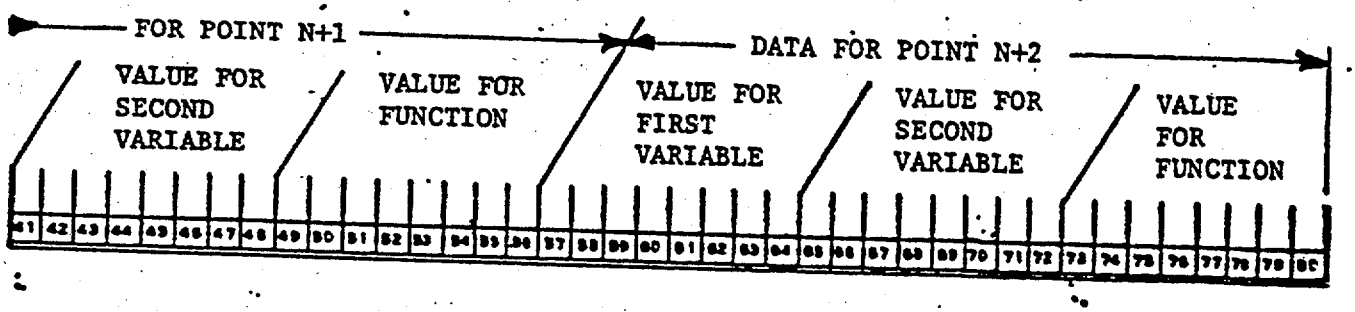
Use a FUN2 directive start to start the definition of a new function. It has a (up to 4-character) distinct function name and the level for each of the two variables as well as space for the number of data points if the number of data points is greater than $(m+1)\cdot(n+1)$. If this space is left blank, SHIPDOC assumes $(m+1)\cdot(n+1)$ data points will follow. Forty columns are allotted for a description of what the function does.





FUN2 DIRECTIVE (START)





FUN2 DIRECTIVE (CONTINUATION)

Figure 1-3-12: FUN2 DIRECTIVE

Use the FUN2 directive continuation to enter data for the function. There are three sets of data per continuation.

You may enter as many data points (up to 102) as you wish. Any data points entered after 102 are not accepted; in fact, SHIPDOC will not even recognize the extra data-point cards! Data does not have to be entered at regularly-spaced intervals with respect to either variable. In setting up a system of equations to solve for the a_{jk}, SHIPDOC assumes you will enter at least (m+1)*(n+1) data points. If the levels are 2 and 3, we need at least (2+1)(3+1) = 3·4=12 data points to solve the 12 least squares equations; if the levels are 1 and 2, we need at least (1+1) (2+1) = 2·3=6 data points to solve the 6 least squares equations. For the maximum levels of 4 and 4, we need at least (4+1)*(4+1) = 25 data points to solve the 25 least squares equations for the 16 coefficients (resulting in a 25 x 25 coefficient matrix). Summarizing: SHIPDOC will accept a number of data-point cards N: $\frac{m+1)\ (n+1)}{3} \leq N \leq 34$ only.

The data points are entered 3 sets to a card in the format shown above. SHIPDOC expects them to immediately follow the corresponding FUN2 directive in the data deck. The function name on all data-point cards must match the name on the FUN2 directive. Note that no identifier is required for these "continuation" cards as SHIPDOC assumes they will immediately follow their FUN2 directive. If they do not, they will not be recognized by SHIPDOC. Presently, there is room for 25 functions.

3.3.2.8 VARN Directive

As discussed in the introduction, pages 1-2-5 and 1-2-6, there are available directives in SHIPDOC which can be defined in terms of any other variable without restricting ourselves to a hierarchial variable structure. These VARN (scalar) and ITEM (vector) directives may even be partly defined in terms of themselves.

An example of this is the total weight of the ship, which may depend upon the outfit weight and vice versa. VARNs are also used so that we can use one equation's value in evaluating another equation or function or one function's value in computing another function's or equation's value; there is no way to put both an equation and list names in another equation or function or a function name and its two variable names in an equation or another function. With VARNs, the user can probably reduce the number of data entries his ship model requires.

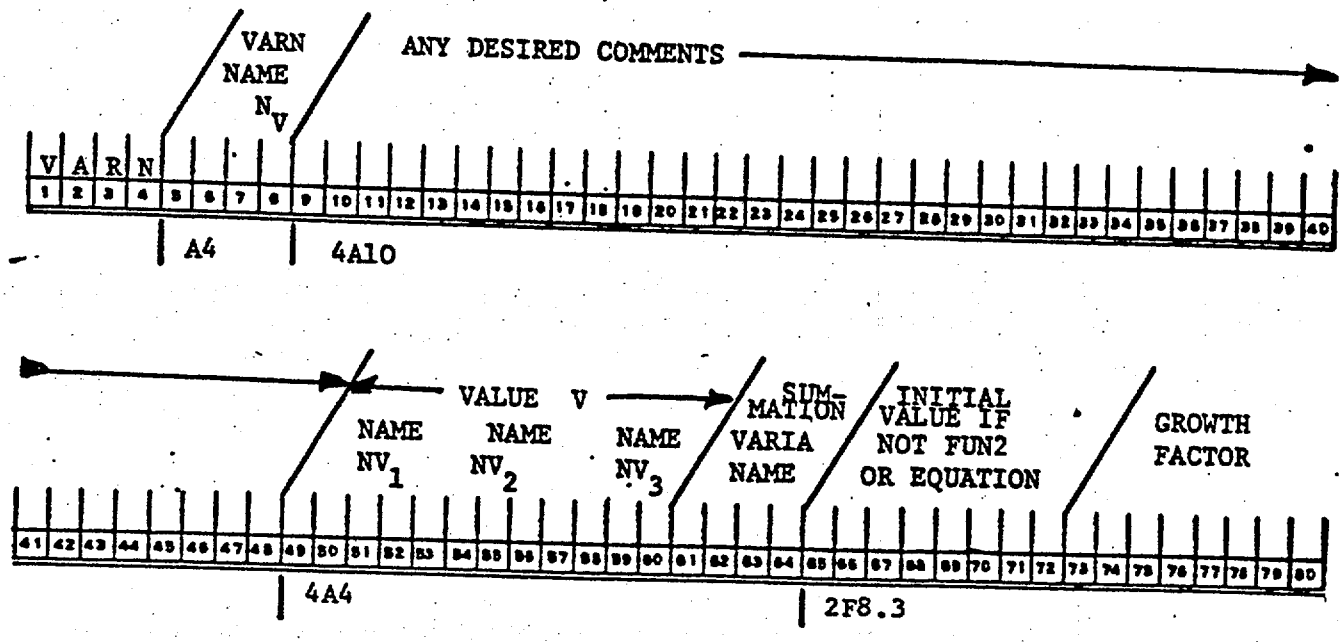


Figure 1-3-13: VARN DIRECTIVE

Note on the format for a VARN directive, there is provision for up to three names in columns 49-60. You enter 1, 2, or 3 names depending upon the relationship defining the three name value for this VARN:

a. The relationship is defined in terms of a single variable.

b. The relationship is defined in terms of an equation (and list).

c. The relationship is defined in terms of a function of two variables.

If (a.), the VARN card must have only one name present and that name must be in columns 49-52. This is the signal for SHIPDOC to process a single variable VARN. Putting the single name in one of the other spaces ruins this indication system.

If (b.), SHIPDOC expects the list name in columns 49-52, the equation name in columns 53-56, and nothing in columns 57-60. This is the signal for the program to evaluate the equation having the name specified in columns 53-56 using the list name specified in columns 49-52. If you reverse the names, the program will not be able to find the equation or list as it will be looking in equation tables for the list and in the list tables for the equation. (Both the list and equation names must be defined by use of the appropriate FLn and FEm directive.) If you put a name in columns 57-60, the program assumes it is a function of two variables instead of what you intended.

If (c.), SHIPDOC expects 3 names in columns 49-60: the two variable names (in order) in columns 49-52 and 53-56, and the function name in columns 57-60. If you put them in the wrong order, that is, the function name is not last, the program will not be able to find the function (it will be looking in a variable table). If you should swap the two variable names from what you intended, you will still get a functional value, but it will be for f(y,x) rather than f(x,y). In other words, the number of names tells SHIPDOC which type of relationship is involved while the order is fixed and cannot be changed by the user. In case of (a.) or (c.), the variable names may be any constant, direct variable, VAR, VARN, or ITEM names. In addition, V409300 allows the use of summation variable and set, maxmin, constraint, and objective function names. Function, list, or equation names are not recognized. SHIPDOC will accept up to 500 VARNs.

The magnitude of the VARN (the value associated with the VARN name N_V) is given by multiplying the three name value times the growth factor. If a zero or blank growth factor is read in, SHIPDOC sets the value of the growth factor equal to 1.0. This is done since versions prior to V409300 had no provision for growth factors on VARN directives.

3.3.2.9 ITEM and LV Directives

Having named your direct variables and defined the VARs, VARNs, equations, lists, and functions of two variables applicable to your ship model, you are ready to code the input for the ITEMs themselves. Since ITEMS are vector quantities, there are two directives for each ITEM: the ITEM directive for a description of the item as well as the method for computing its magnitude, and the LV directive with compartment data and method for computing the longitudinal and vertical arms of the item.

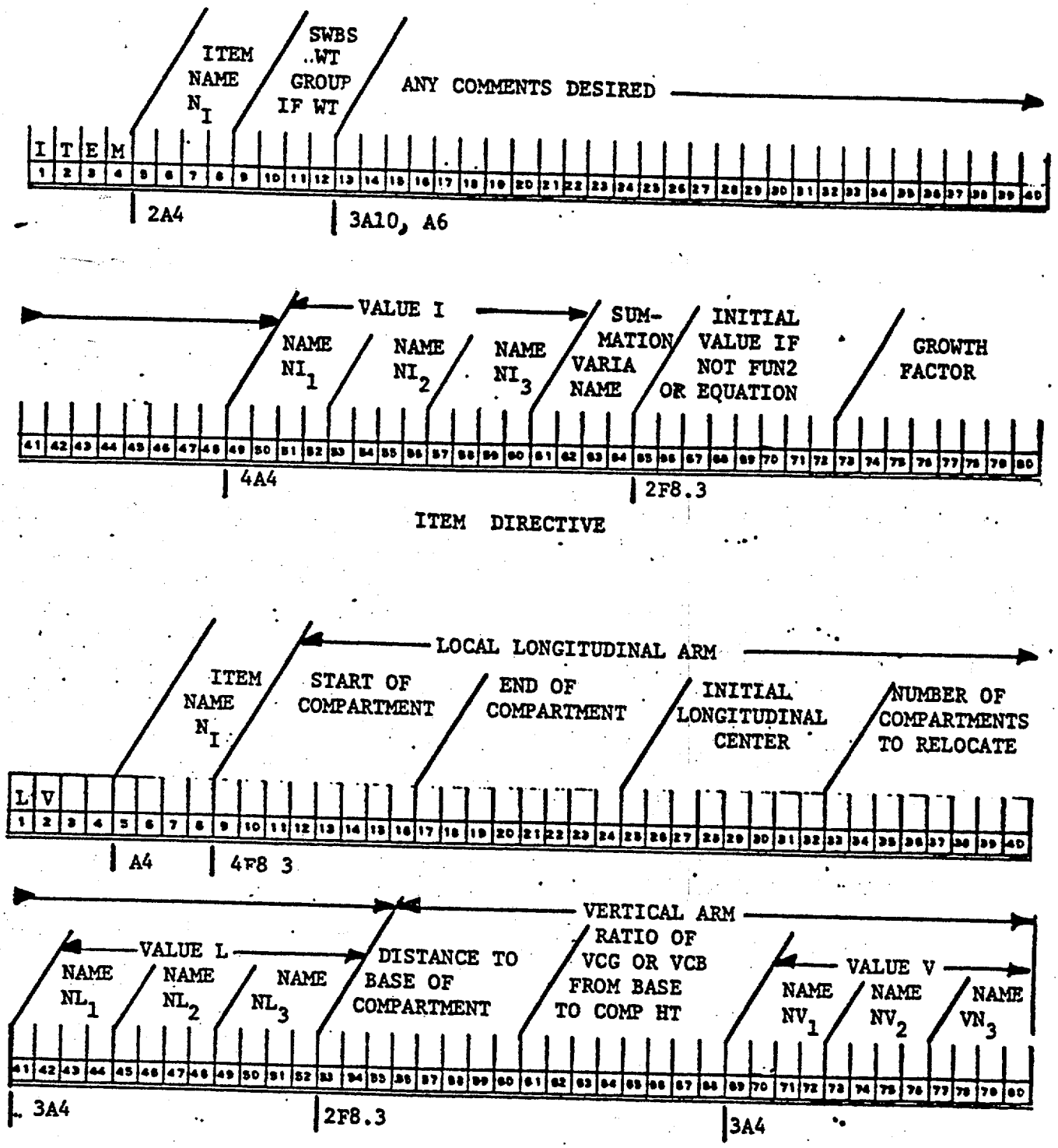


Figure 1-3-14: ITEM AND LV DIRECTIVES

3.3.2.9.1 ITEM Directive

Each ITEM has its unique name in columns 5-8. Columns 49-60 are for up to three names with the same fixed order, restrictions, and significance as on VARN directives--that is, how to compute the items's three name value. See LV directive (below) for the effect on ITEM magnitude if a distributed summation variable (col. 61-64) is used. Columns 13-16 contain the weight group SWBS code, if the item is part of a SWBS group; otherwise, this field must be blank. (See list of accepted weight group names and their meanings, in section 1-5, "Interpreting the Printout.")

If the item does not figure in the weight and card columns 13-16 are not blank, SHIPDOC will be adding the item's value (magnitude) anyway, leading to an incorrect weight report. Columns 61-64 are for the item summation variable name from the list below; remember if the summation variable name is WT or DISW, there must be a weight group name in columns 13-16. SHIPDOC version V407190 and earlier recognize these distinct built-in summation variable names for ITEM summation variable fields:

WT	Point weight
DISW	Distributed weight
BUOY	Point buoyancy
DISB	Distributed buoyancy
RB	Point reserve buoyancy
DISR	Distributed reserve buoyancy
FF	Free flood
DFF	Distributed free flood
FC	Free communication
DFC	Distributed free communication

INF	For information only
DINF	Distributed for information only
INP	In port
DINP	Distributed in port
BMT	Transverse BM for transverse stability
DBMT	Distributed transverse BM for transverse stability

The categories without the D or DIS are forces acting at a point, while those with the D or DIS have their magnitude distributed over the whole compartment or zone length. SHIPDOC will multiply a D or DIS ITEM's magnitude times the compartment or zone length before combining with the ship's total. In the case of WT or DISW ITEMS, it is necessary to specify the weight group according to the Navy SWBS 3-digit weight and variable load breakdown. (See "Interpreting the Printout" for the WEIGHT REPORT.) All WT and DISW ITEMS must have a weight group.

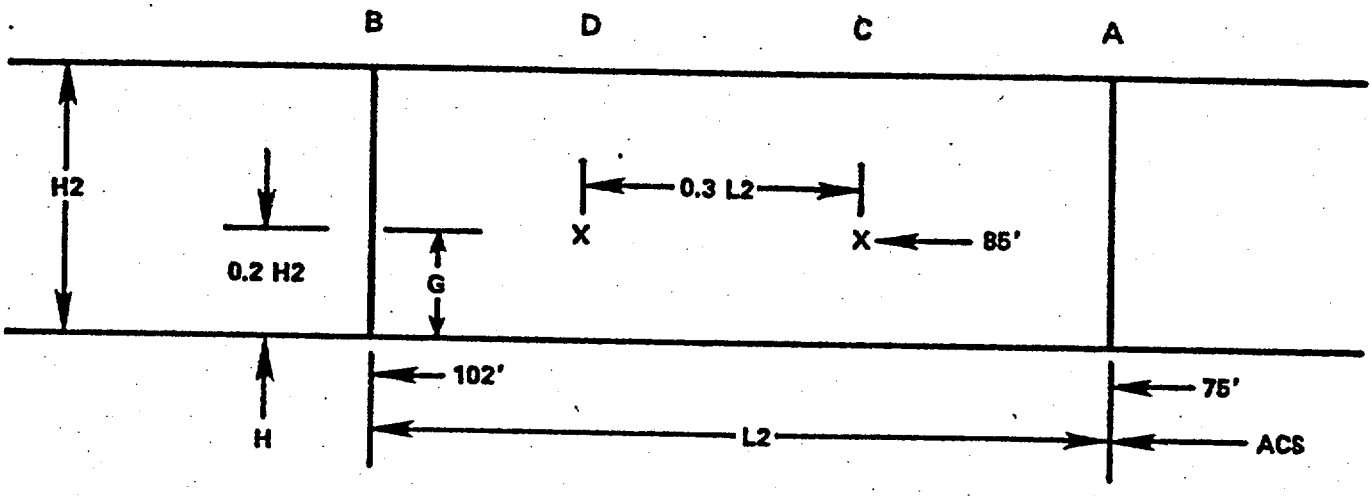
SHIPDOC version V409300 allows the user to specify summation variable names and summation set names which may be used on either ITEM or VARN directives. The SUMV directive (section 3.3.2.10.1) specifies point summation variable names. The SUMI directive (section 3.3.2.10.1) specifies whether the summation variable name is to be considered as a point value or distributed value name and also specifies the longitudinal and vertical moment names. Note that distributed value names make sense only for ITEM directive summation variable fields and should not be used on VARN directive summation variable fields.

SHIPDOC version V409300 does not have any predefined summation variable and set names built in, therefore the user will have to furnish these names.

The growth factor is a constant which multiplies the item's magnitude as determined from the relationships in col. 49-60. A zero or blank growth factor results in an error indication.

3.3.2.9.2 LV Directive

On the LV directive, the item's name must be repeated from the ITEM directive. The LV directive must immediately follow its ITEM directive. As stated previously, this directive describes the compartment or zone of the ship model acted upon by the item (force) and its location in the compartment, as well as how to compute the longitudinal and vertical arms of the force. Directive columns 41-52 for the compartment length and directive columns 73-80 for the distance above the local reference contain up to three names used similarly to the corresponding situation for VARNs and ITEMs with one difference. If all 3 name fields are blank, SHIPDOC assumes the arm is a constant. As before, if only the first name field is filled, a single variable is assumed; if the first two fields are non-blank, a list and equation are assumed if the third name field contains a name, SHIPDOC assumes the relationship is a function of the two names that must be in the other two fields in order. This description fits both the compartment length and vertical dimension computations.



(1) USER FURNISHES DISTANCE FROM WEIGHT REPORT OR SKETCH OR ESTIMATE

(2) PROGRAM HOLDS RATIO $\left[\frac{C-A}{B-A} + \frac{D-C}{B-A}\right]$ CONSTANT

Figure 1-3-15: LOCATING ITEMS

The above figure relates the entries on the LV directive concerning the location of the item (force) X. The start of the compartment (directive columns 9-16) is the dimension A, measured from the longitudinal reference line. The end of the compartment (directive columns 17-24) is the dimension B, measured from the longitudinal reference line. SHIPDOC will compute the compartment length D=B-A for you. Coordinate C is the location of the LCG or LCB of this force or buoyancy from the longitudinal reference line. SHIPDOC will compute the ratio $\frac{C-A}{B-A} = \frac{F}{D}$ so as to hold the item's point force in the same position relative to the start of the compartment as the compartment length L2 changes. G is the current value for the vertical dimension of X from the deck and H is the distance from the vertical reference line to the base of the compartment. (Note that H is held constant.) The ratio of G to the compartment height H2 is called I and is fixed. If a force is to be repositioned longitudinally within the compartment each and every time it is computed, you must also enter E (measured in units of D = compartment length) which will be added to (C-A)/D. The result of all this is to get the longitudinal arm L = ACS + ((E + F)/D)*L2 and the vertical arm V = H+I*H2 locating the item within the ship. SHIPDOC keeps track of the start of the compartment or zone (the ACS value) automatically.

The key to starting a new compartment or zone is for the start compartment dimension A to change relative to the previous ITEM. SHIPDOC then adds the length of the previous compartment (using the length of the last ITEM's compartment or zone) to the current start of compartment or zone dimension ACS from the longitudinal reference line to obtain the new start of compartment distance (ACS) from the longitudinal reference line. Consequently, the dimensions A and B may be either measured from the longitudinal reference line, or the A dimension

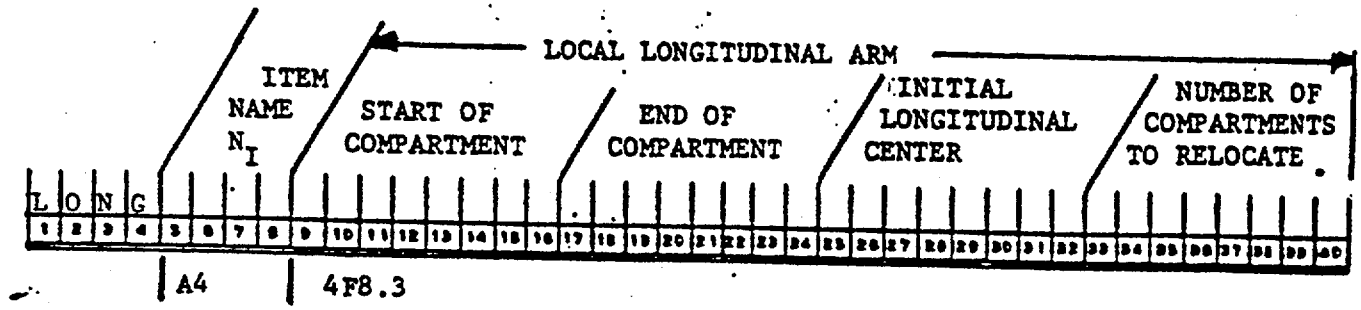
may be arbitrary, such as zero, provided that A must change in order to start a new compartment or zone.

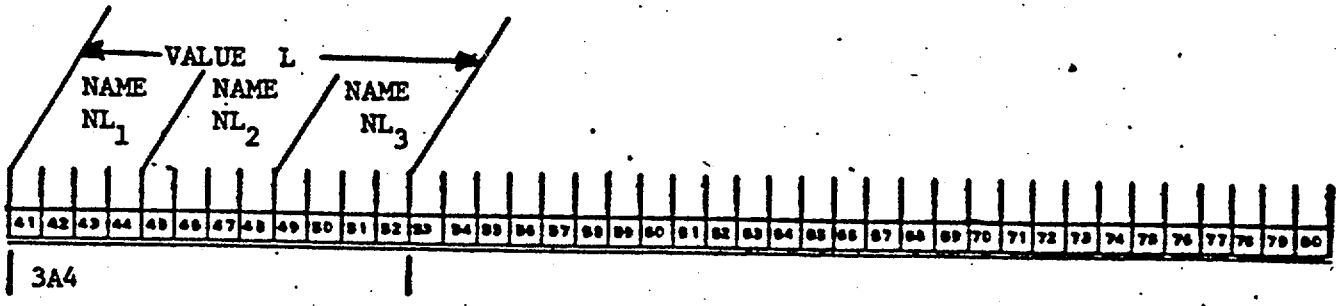
An important consequence is that all ITEMs in a compartment or zone must be grouped together in order to have the longitudinal arm computed correctly.

For a multideck ship, a relocate number E = 999 (relocate by 999 compartment lengths) acts as a flag causing SHIPDOC to set the start of the compartment or zone back to zero.

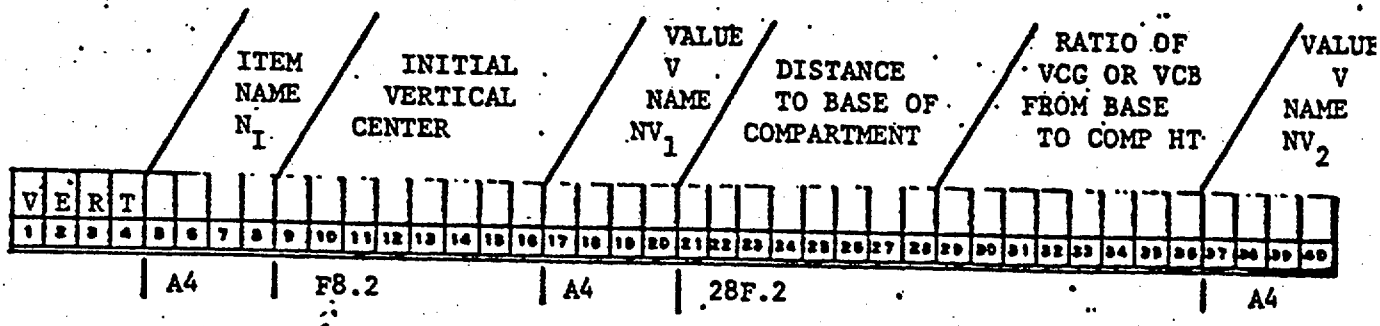
3.3.2.9.3 LONG and VERT Directives

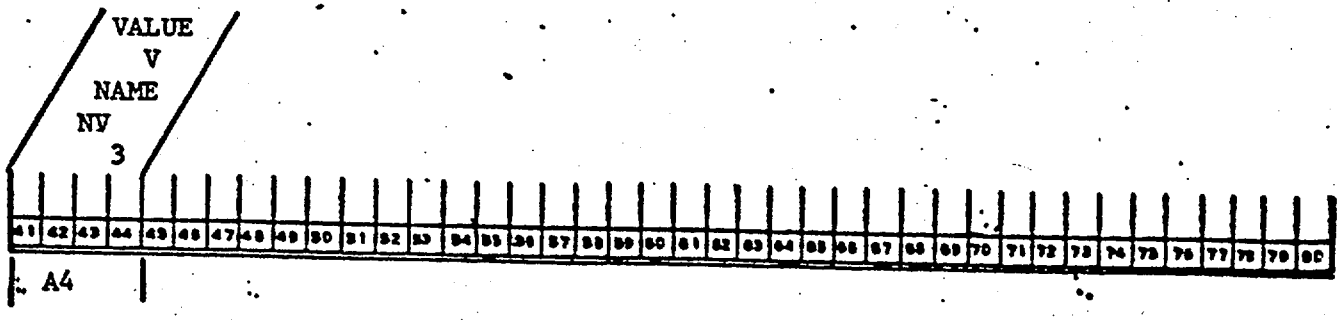
Input formats left over from before the earliest version of the program were added still permit you to use two directives--LONG and VERT in place of the LV directive: If you prefer to use these instead of the LV directive, make sure the same item name goes on all three (ITEM, LONG, and VERT directives) and that the LONG and VERT directives immediately follow the corresponding ITEM directive. The information required is the same as for the LV directive with two exceptions--only 1 variable name is possible (main variable, VAR, or VARN) and the LEAD entry in the longitudinal data is the amount of ballast for this compartment. Version V407190 of SHIPDOC ignores any entry here, and looks for the parent LEAD amount on the MAIN directive when using versions prior to V409300.





LONG DIRECTIVE





VERT DIRECTIVE

Figure 1-3-16: VERT AND LONG DIRECTIVES

3.3.2.10 Summation and Summation Set Variables

Summation variables and summation set variables allow the sum of the values of a set of variables to be found without having to define either an ITEM or VARN with an associated list and equation.

Summation and summation set variables may be user specified in SHIPDOC version V409300 only. For the list of summation variable names available in earlier versions of SHIPDOC see section 3.3.2.9.1

Summation variables allow the user to obtain the algebraic sum of the values of all ITEMS and/or all VARNS having the specified summation variable name in col 61-64. For ITEMS, separate summation variable names can be specified for point and distributed magnitudes as well as longitudinal and vertical momnents. For VARNS, only point magnitude summation variables make sense.

A summation set variable value is the algebraic sum of the values associated with the members of the specified summation set.

Only summation variable names may be used on ITEM or VARN directives. Any variable name, including other summation set names, may be used in specifying the members of a summation set.

Summation variables are specified using SUMI and SUMV directives, while SUMI and SUMS directives are used to define summation set variables.

3.3.2.10.1 Summation Variables - SUMI and SUMV Directives

Summation variable refers to the variable name in the summation field (col 61-64) of either an ITEM or a VARN directive. The value of a summation variable is the sum of the magnitudes of all ITEMS and VARNS on which the summation variable name appears. Summation variables are typed as either

point or distributed. If typed as point, the ITEM value is not multiplied by a parameter from the associated LV directive, if typed as distributed, it is. For an ITEM the mangitude = (value obtained from the three name value (col 49-60) * (growth factor) * (value obtained from the three name value (col 49-60) of the associated LV directive if the summation variable is typed as distributed). For a VARN the magnitude = (value obtained from the three name value (col 40-60)) * (growth factor). If, for example, the summation variable BUOY was used on all ITEM directives which involved either buoyancy or lift, the value of BUOY would be the displacement. As another example, if the user specified W1 as the summation variable name on all ITEMS which are part of SWBS group 1, the value of W1 would be the weight of group 1.

Since SHIPDOC deals with moments as well as forces, the user can also specify names for longitudinal and vertical moments about the respective global reference lines.

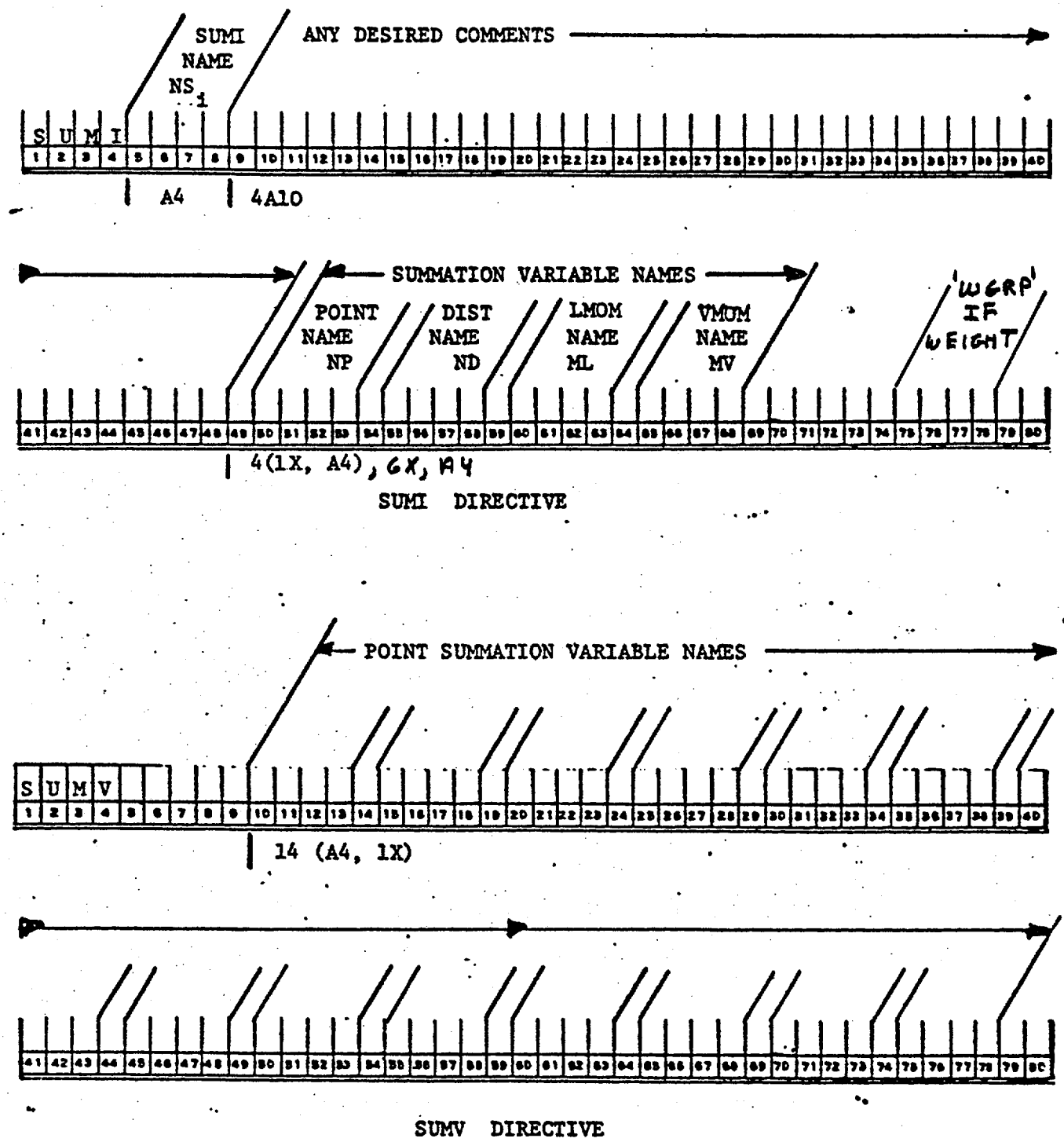


Figure 1-3-17: SUMMATION VARIABLE DEFINITION DIRECTIVES -SUMI AND SUMV

The SUMI directive (the I is a reminder that the directive is used primarily with ITEMS) has four positional fields in cols 50-68. The first name is typed as a point summation variable, while the second name is typed as a distributed summation variable. The third and fourth names are the longitudinal and vertical moment summation variables associated with the first two names. The value of the moment summation variables is changed when either the first or second name is used in the summation variable field of an ITEM. The moment increment = (magnitude of the ITEM) * (distance to ship (global) reference line, not the distance to the start or base of the zone or compartment). The SUMV directive (the V is a reminder that this directive is used primarily with VARNS) specifies up to 14 point summation variable names.

Any point summation name may be used on either ITEM or VARN directives, but if used on both, should be used with cuation. If moments are being accumulated and used, the use of a point summation variable name on a VARN as well as an ITEM will result in an increment in the value of that summation variable with no associated increment in the value of the associated moment, thus resulting in an incorrect moment arm.

SHIPDOC has space for 120 distinct summation variable names.

3.3.2.10.2 Summation and Summation Set Variables - SUMI and SUMS Directives

Summation sets allow the user to define variables the value of which is the sum of the values associated with each individual set member. Any variable name may be used as a member (element) of a summation set, including other summation set names.

The SUMI directive does double duty in that it defines summation variables and also a summation set. The value of the first two summation variables (for

point and distributed magnitudes) are added together to obtain the value associated with the SUMI name NS_i. This permits the sum of point plus distributed magnitudes associated with a given category to be lumped together.

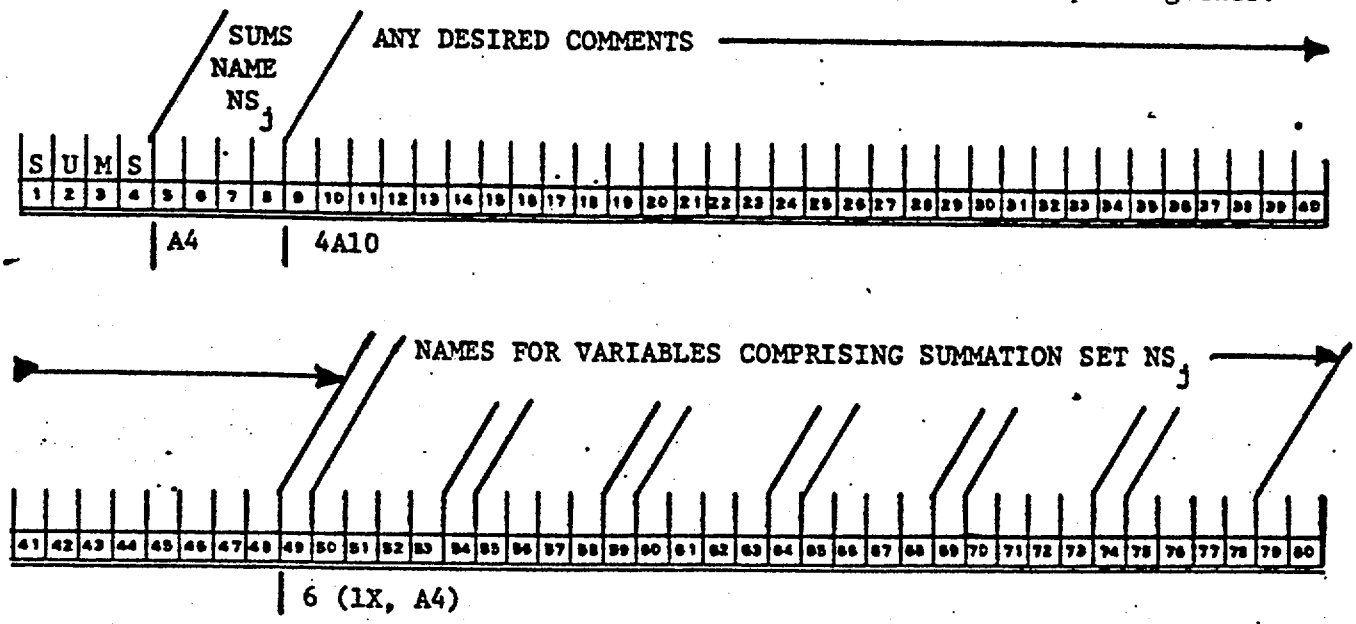


Figure 1-3-18: SUMS DIRECTIVE

The SUMS directive is used to obtain the sum of the values of the associated set members, especially summation varaibles, without resort to defining a VARN and its associated equation and list. Any variable name may be a set member, including other summation set names.

SHIPDOC has space for 60 summation sets.

3.3.2.11 MAX and MIN Directives

The variable names defined by the MAX and MIN directives are assigned a value which is the greatest of the individual values associated with the other names on the directive (MAX), or is the least of the individual values associated with the other names on the directives (MIN). Constant names may be used.

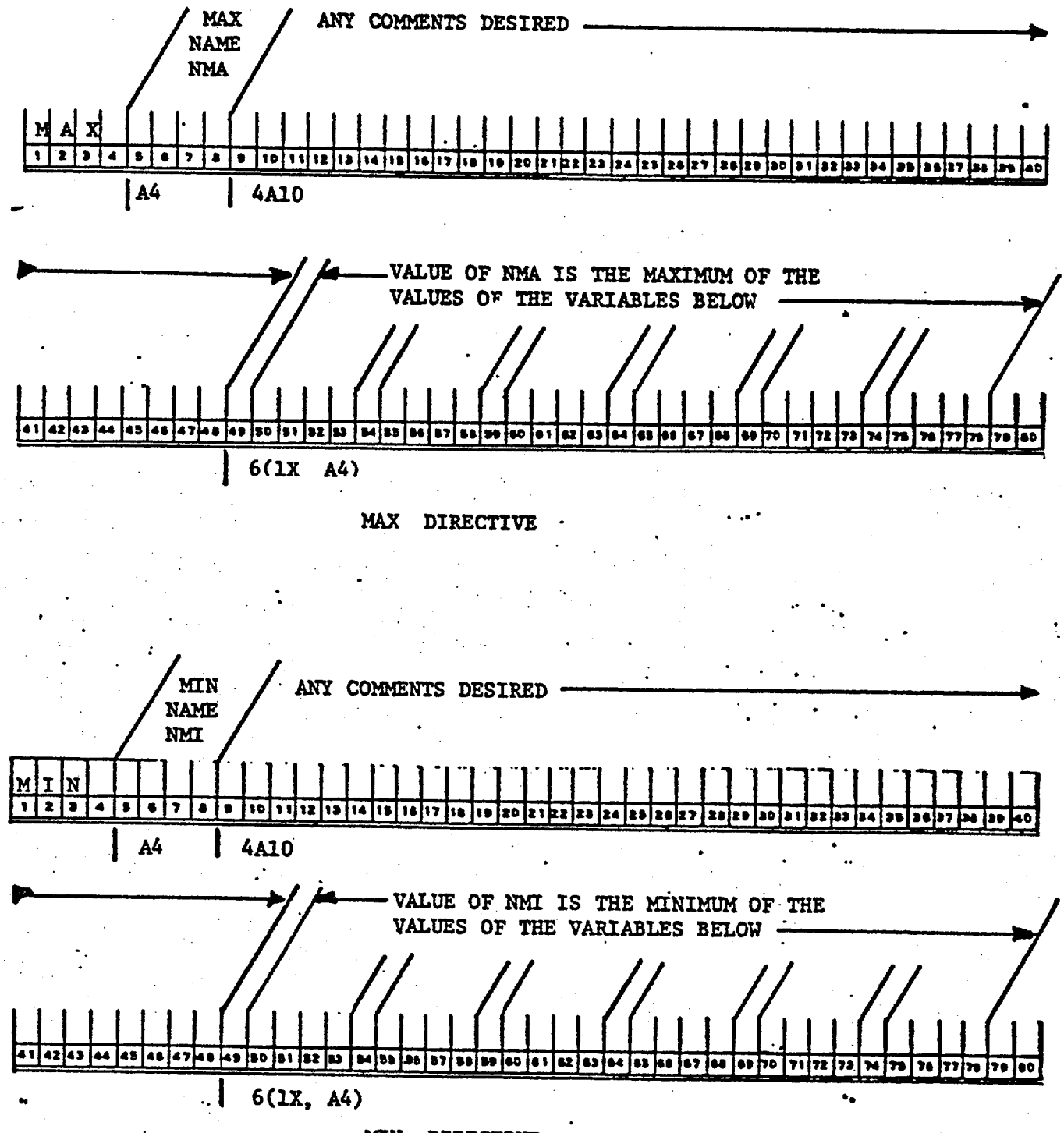


Figure 1-3-19: MAX AND MIN DIRECTIVES.

3.3.3 LIMITS AND CONSTRAINTS

The set of directives the use which allows specification of the physical and geometric relationships and the technologies for a particular ship type form the core of the ship description file (the data base) and have been described in section 3.3.2. This set of relationships describes the technology for any ship to which the technology applies and so is quite general. We now need to begin to specialize this technology base so as to obtain a specific ship.

There are two more additions which are needed in the ship description file in order to extract a particular ships from all the possible ships implicitly resident in the data base. The first is to set limits on the variable values and specify constraints which the physics and geometry of the solution must satisfy. The second is to select an explicit ship from the set of relationships and constraints by specifying what is to be minimized.

This section deals with the directives which specify limits and constraints, while the next section (3.3.4) deals with the objective function directive.

This section is laid out in order of increasing generality of limits and constraints, starting with numerical limits on single variables, then numerical constraints on the entire ship, followed by algebraic constraints upon the entire ship, and finally, selection of which direct variables and constraints are to be active during a minimization (optimization) run.

3.3.3.1 Numerical Limits on Individual Variables - LDLC, LIM, and LIMF Directives

3.3.3.1.1 LDLC Directive

The limits for the location of stability lead (LDLC directive) is used prior to V409300. The LDLC directive values are ignored by V409300. For V409300, the limits must be provided by the user. The LCG range and VCG or stability lead (ballast) is to be entered separately on the LDLC directive, regardless of whether an LV or a LONG and VERT directive pair were used.

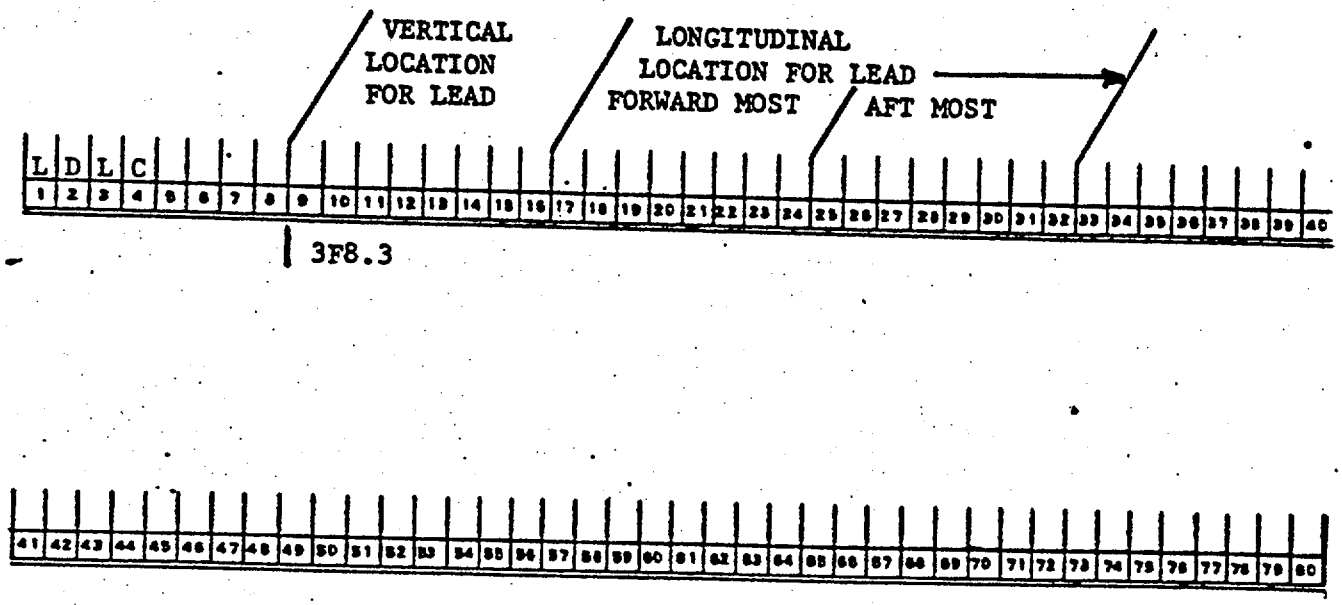


Figure 1-3-20: LDLC DIRECTIVE

The location dimensions are simply the coordinates with reference to the ship vertical and longitudinal reference lines. If the amount of lead required for longitudinal trim is greater then for transverse stability, SHIPDOC computes whether the lead should go forward or aft at the locations specified by the LDLC directive. Only one of these LDLC directives is allowed per solution.

3.3.3.1.2 LIM and LIMF Directives

The LIM and LIMF directives are used to overide, for a particular variable of FUN2 function, the numeric limits specified for all variables on the PRGM directive (see section 1-4-2). The PRGM directive specifies the same numeric lower and upper bounds or limits for all variables.

The LIM directive is used to set lower and upper bounds for any variable except summation varaibles, summation set variables, max or min variables, variable constraints (PBND, see below), or the objective function. The variables to which the LIM directive does not apply are those which are found by concatenations or selections among a set of variables to which the LIM directive does apply.

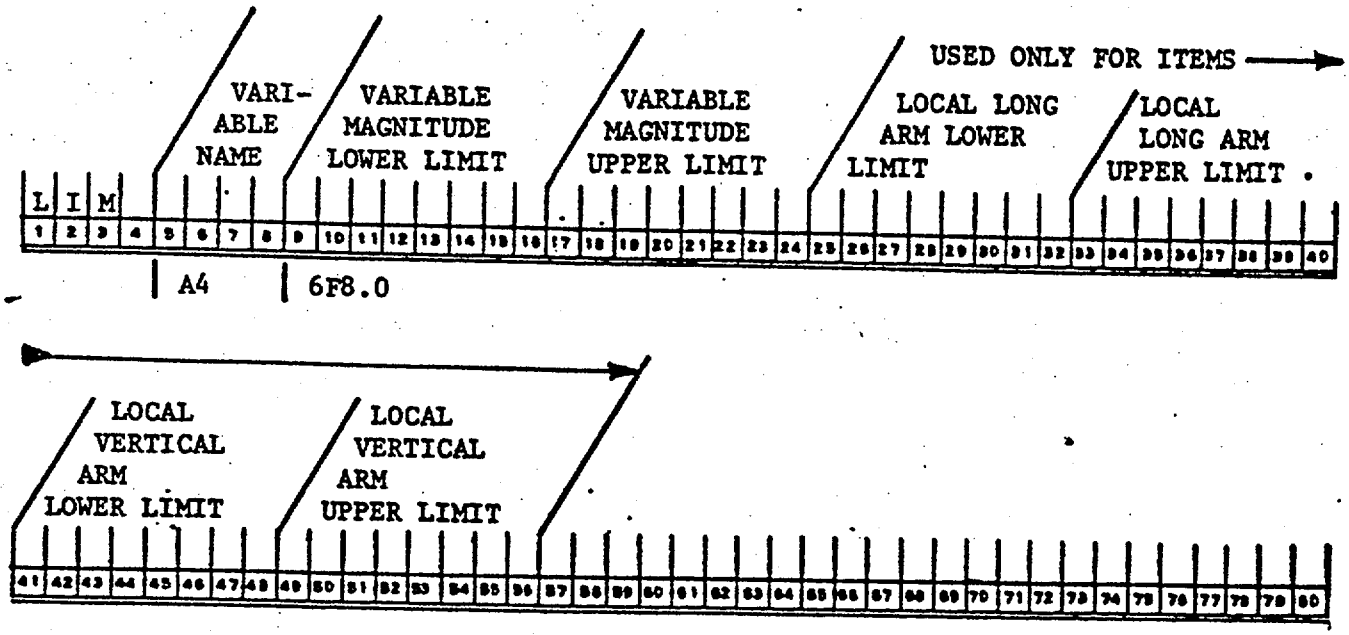


Figure 1-3-21: LIM DIRECTIVE

3.3.3.1.3 LIMF Directive

Since a FUN2 directive may have the same name as a variable in the group which is limited by a LIM directive, the LIMF directive is used to set lower and upper bounds on the values of the value of a least squares fitted function of two variables (FUN2). Note the limited value of the function may not be consistent with the value of the function using the two variable values used to compute it.

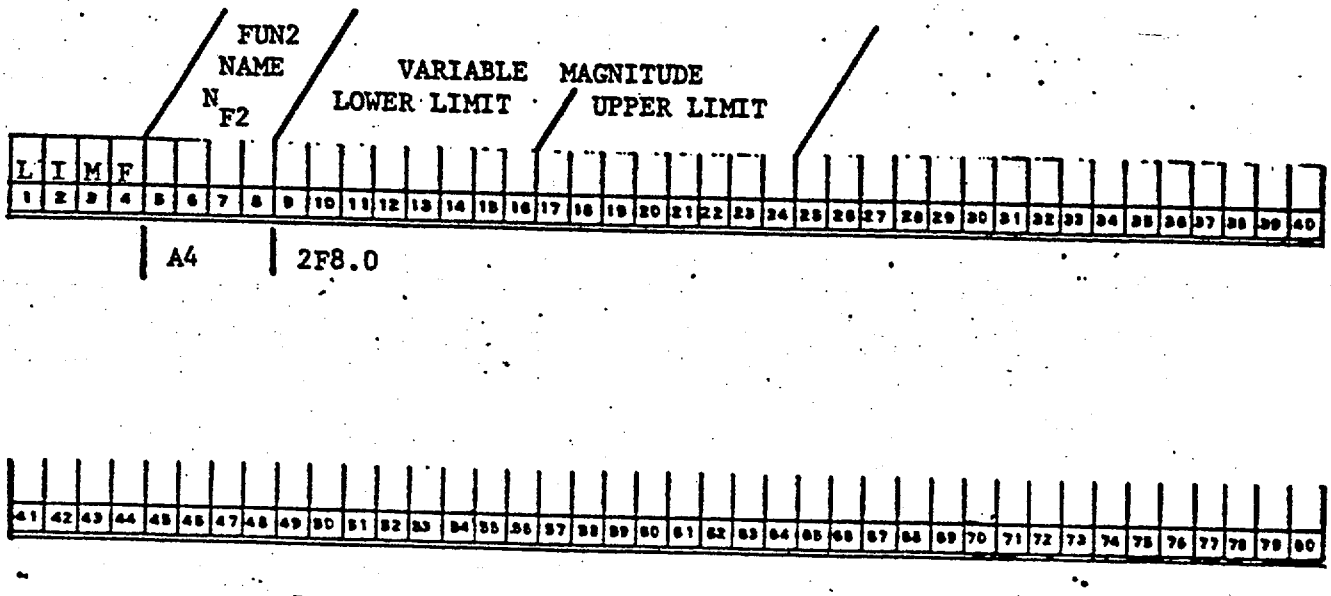


Figure 1-3-22: LIMF DIRECTIVE

3.3.3.2 Numerical Constraints on the Interaction of Variables - RESB and STAB Directive

3.3.3.2.1 RESB Directives

THe RESB directive specifies the required ranges for a surface ship or the required ratios of reserve bouyancy (usually MBT buoyancy) to submerged buoyancy in a submarine for the different solutions to be attempted on a run. When the numerical value in a field is less than 10, it is assumed to be the ratio of reserve buoyancy (usually main ballast tankage) to submerged pressure hull volume. Some ship description files (data base) compute the required amount of fuel to meet the specified range inside the data base so that the range constraint is automatically satisfied. For such a case, when using versions before V409300, the range constraint should be made inactive by setting the appropriate flag (see section 1-4-4) in order to prevent inconsistencies with the 'hard wire' range logic in earlier versions of SHIPDOC.

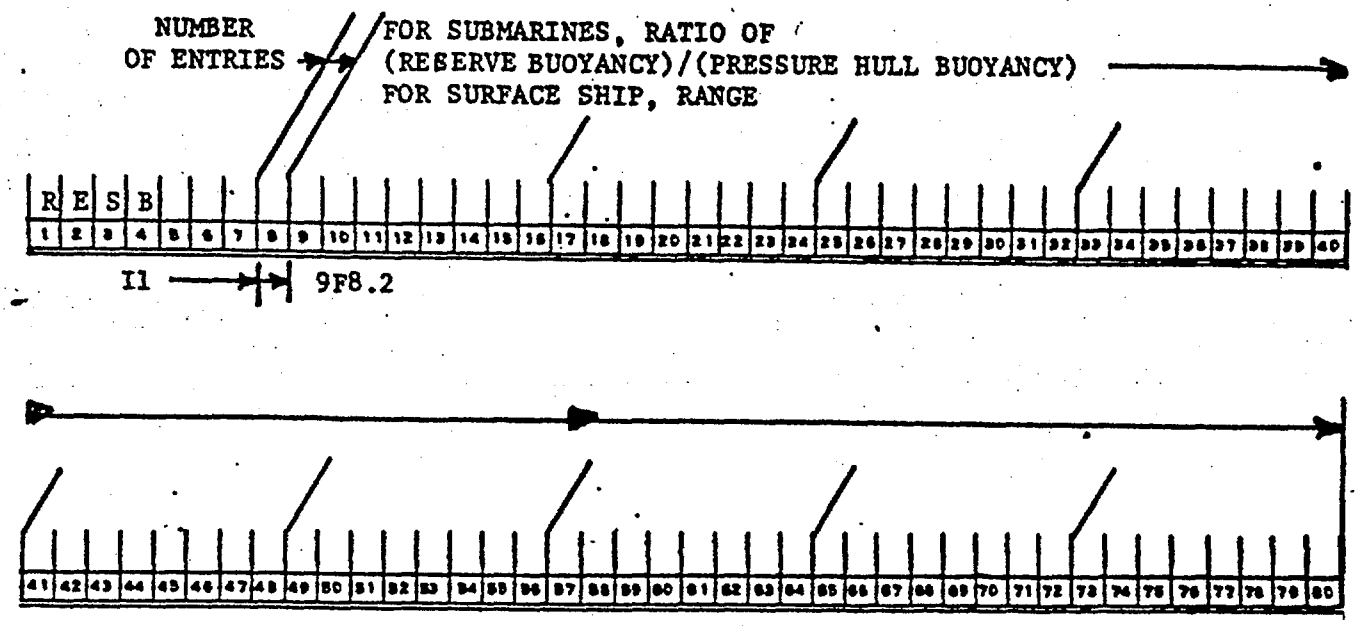


Figure 1-3-23: RESB DIRECTIVE

The number in column 8 of the RESB or STAB directive must show how many values are to be found on the directive. Only one RESB or STAB directive is usually desirable on a run, since the minimization routine will start over for every different combination or RESB directive entry and STAB directive entry. You would not want to waste computer time with zero values through 9 x 9 = 81 optimizations.

3.3.3.2.2 STAB Directive

The STAB directive is used to specify required amounts of initial transverse stability (GM)

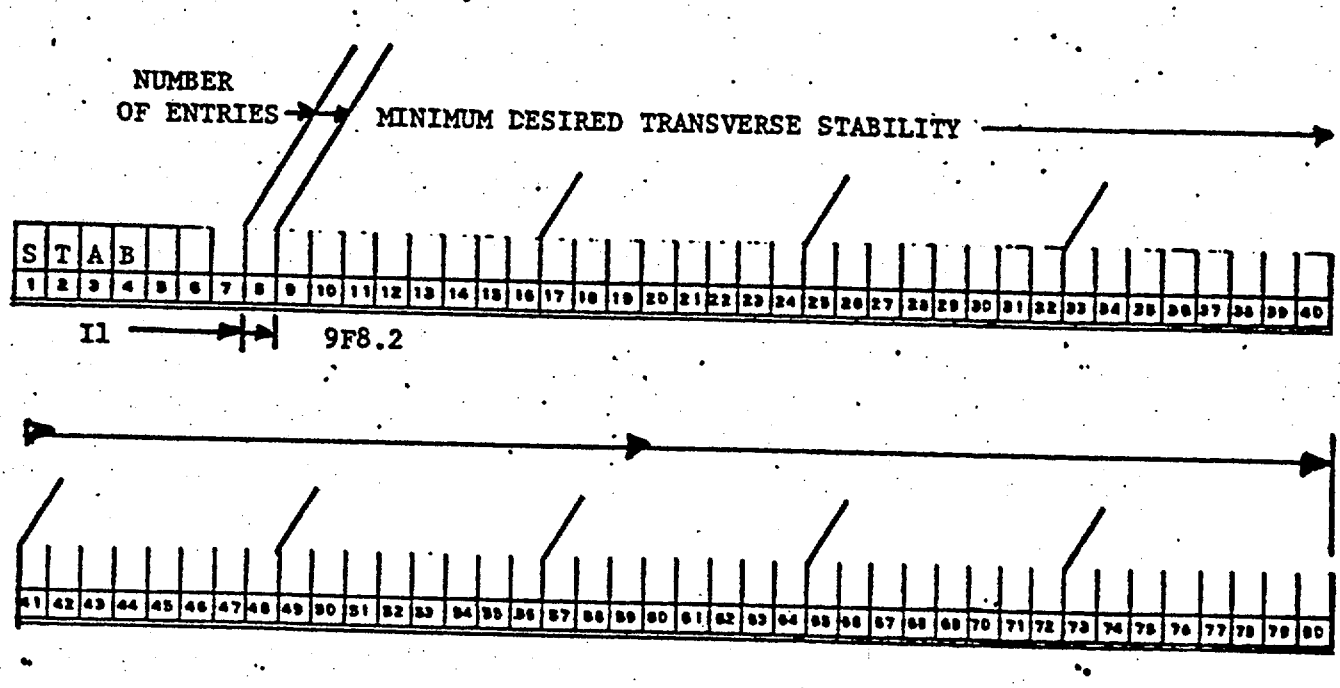


Figure 1-3-24: STAB DIRECTIVE

SHIPDOC versions prior to V409300 used the built-in or 'hard-wired' summation variables names WT, DISW, BUOY, DISB, BMT, and DBMT (see p 1-3-37, 38) in order to compute GM.

3.3.3.3 Algebraic Constraints on the Interaction of Variables - PBND Directive

In addition to numerical limits or bounds or constraints on individual variables values for function values, there are requirements, or constraints on the overall design. These constraints arise from two sources: application of the laws of physics and from mission requirements. Examples from applying the laws of physics are that for hydrostatic or aerostatic equilibrium the weight equals the buoyancy, that the longitudinal center of gravity and longitudinal center of buoyancy or lift be equal and that the vessel have sufficient intact transverse stability. Examples of mission requirements are that the vessel have a certain range and sufficient volume to carry out its mission. It should be noted that in general these constraints are non-linear functions of the variables involved in defining the ship description file (the data base).

The above examples of constraints illustrate the two classes of non-linear (or linear) constraints: equality and inequality. Equality constraints are those such that A-B = 0. For exapmle, the weight-buoyancy = 0 for equlibrium. Inequality constraint are those such that C-D $\geq$ 0. For example if (actual GM) - (required GM) > 0, the vessel is satisfactory. In the case of an inequality constraint, if at an optimium (minimum) solution point, C-D > 0, the equality is said to be non-binding, or non-constraining, or inactive, while if at the solution point C-D = 0, the inequality constraint becomes binding or constraining, and is said to be an active constraint. Note that equality constraints are always active, while inequality constraints may

be either active or inactive deppending upon whether they constrain the solution.

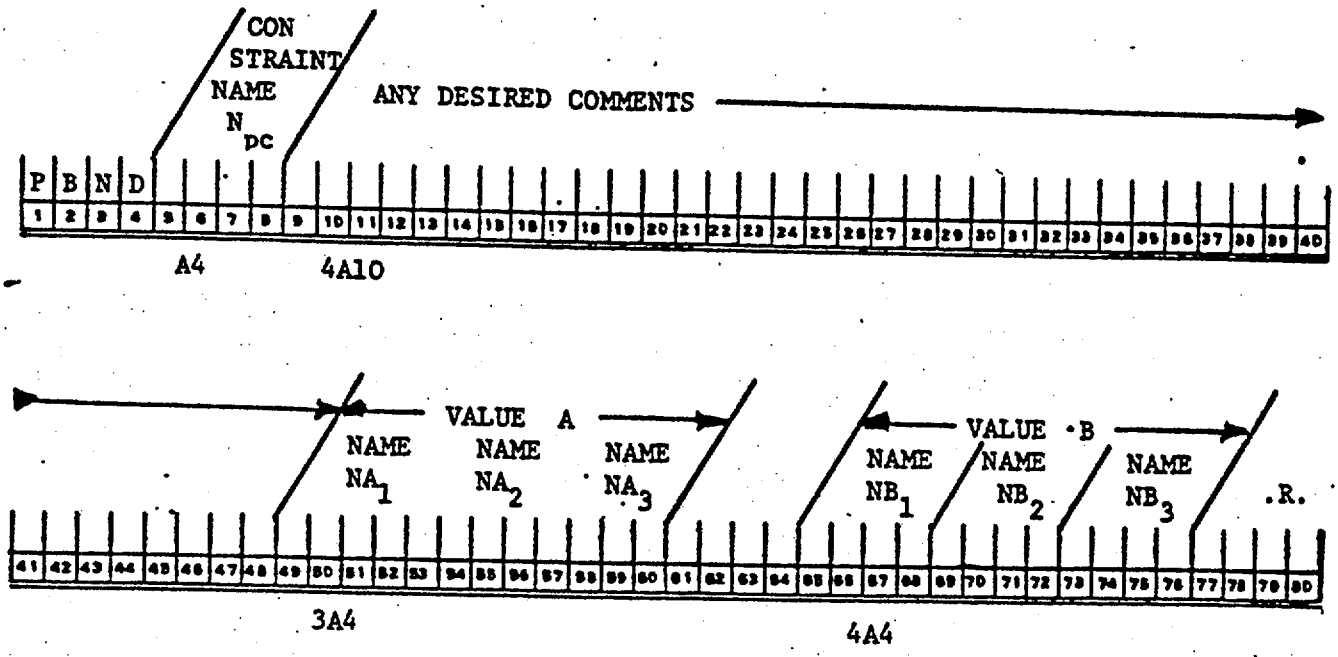
Prior to SHIPDOC version V409300, all algebraic constraints were built in or 'hard-wired' into SHIPDOC. There are four of these 'hard-wired' constraints which were initially set up to facilitate submarine design: 1) that weight-buoyancy = 0, 2) that (reserve buoyancy)/(submerged buoyancy) = specified fraction, 3) that LCR-LCB = 0, where LCR = longitudinal center of reserve buoyancy and LCB = longitudinal center of buoyancy and 4) either, that LCG-LCB = 0 (where LCG is the longitudinal center of gravity), or, that GM = specified minimum, whichever required more stability lead. These constraints resulted in submarines which when sumberged were in equilibrium and trim with sufficient stability, and were approximately on even keel when surfaced.

In order to facilitate estimation for surface ships the reserve buoyancy constraint was used as a range constraint (see RESB directive), while the center of reserve buoyancy constraint was used as a volume constraint with the user able to specify whether the volume constraint was to be an equality constraint ((actual volume)-(required volume)) = 0, or an inequality constant - one which becomes active only if the actual volume is less than the required volume. These constraints resulted in surface ship designs which were in equilibrium and trim with sufficient transverse stability which met range constraints with sufficient underdeck volume.

Submarines did not require a volume constraint since for a submerged submarine the enclosed volume is directly proportional to the buoyancy, nor did they require a range constraint since U.S. Navy submarines of that era and since have been nuclear powered.

3.3.3.3.1 PBND Directive

SHIPDOC version V409300 has no built-in or 'hard-wired' constraints. The problem bound or PBND directive is used to specify constraints. The name of the constraint may be used as a variable in any other directive.



NOTE: NONLINEAR CONSTRAINT N_{pc} IS (A-B).R.ZERO
WHERE .R. IS .GT., .EQ., OR .LT.

Figure 1-3-25: PBND DIRECTIVE

The form of these non-linear constraints is A-B.R.0 where A and B are values found by using the three name value fields (see p 1-3-35 for their meaning and use) and .R. is one of the following .GT., .EQ., or .LT.. For an equality constraint, use .EQ.. For inequality constraints, use either .GT. or .LT. as appropriate. Up to 30 of these non-linear constraints (recall that a linear constraint is a special case of a non-linear constraint) may be used.

3.3.3.4 Non-Changing Variables and Non-Active Constraints NONA Directive

The final step in specializing the ship description file (data base) to a particular application is to select which direct variables (the variables directly changed by the optimization algiorthm) are to be allowed to vary, and to select which constraints are to be taken account (paid attention to) when obtaining a solution. The NONA directive is used to indicate which direct (MAIN) variables and (PBND) constraints are <u>not</u> to be active, so any direct variable or constraint not named on a NONA directive will be assumed to be part of the optimization.

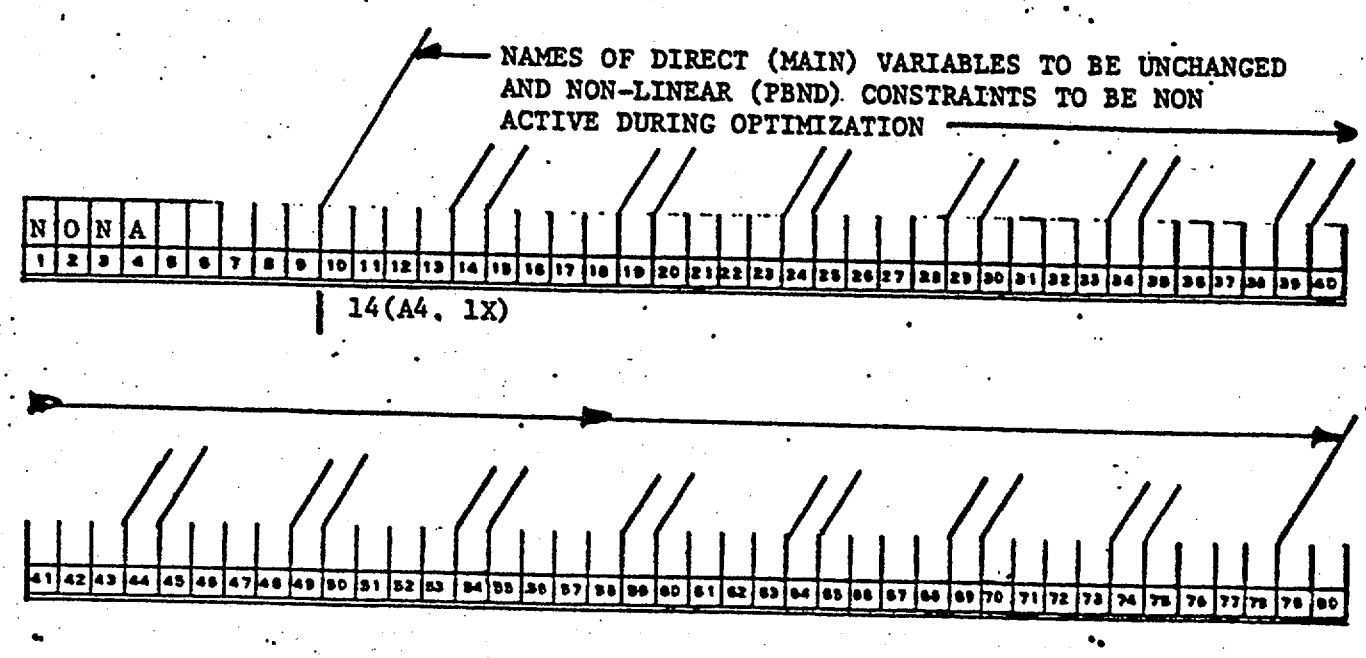


Figure 1-3-26: NONA DIRECTIVE

The names of the direct variables and constraints involved are external on the NONA directives. Any direct variable so named will have no change in its value during the course of the optimization. Any PBND constraint so named will result in any potential effect of that constraint being ignored.

3.3.4 OBJECTIVE FUNCTIONS - OBJF DIRECTIVE

With the ship description (data file) set up, individual variable limits and overall constraints selected as necessary, the final step is to select what is to be optimized (minimized in the usual case). The quantity to be optimized is called the objective function.

SHIPDOC versions prior to V409300 has one built in or 'hard-wired' objective function-the total ship weight. This objective function could not be changed without reprogramming. The current version, V409300, lets the user specify the objective function. As a consequence, weight, cost or a weighted mixture of the two, or any other criterion or combinations of criteria may be specified provided that the ship description file contains information on how to compute its value.

3.3.4.1 OBJT Directive

The form of the OBJF directive is shown below:

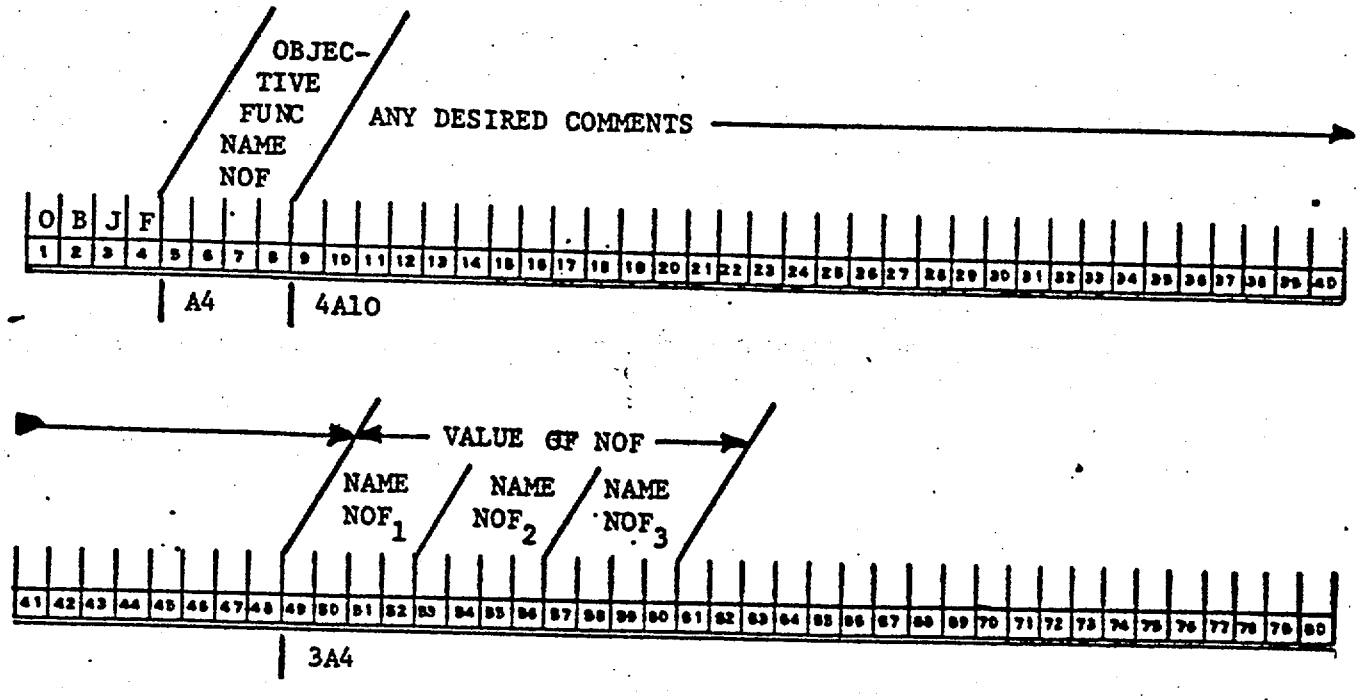


Figure 1-3-27: OBJF DIRECTIVE

The name of the objective function may be used as a variable in any other directive. The value of the objective function, NOF, is the value found by using the three name value fields (see p 1-3-35 for them meaning and use).

4.0 PLANNING YOUR RUN OF SHIPDOC

You are now ready to add program control directives to your data deck in order to make a run of SHIPDOC. The versatility of the program will be more apparent when you have finished reading this section. You, the user, determine exactly how much SHIPDOC is to do by making various control directive entries. The logic behind much of what is to be described is based on the following notions:

Since the description of all the forces on a vehicle is usually nonlinear when described in terms of the variables of interest to the designer, provision is made in the program to handle a nonlinear problem. The most important aspect of a nonlinear problem as contrasted to the linear case is that the solution to the problem (if it exists) is not necessarily unique. Attention must be given to the possibility that while the program has found a minimum, this minimum may only be a local minimum and not a global minimum. In the following figure, points A, B, C, and D are all local minimums - that is, they are the smallest values in their immediate neighborhoods while C is also the global minimum--the smallest value over the whole domain of interest. We want C, not A, B, or D.

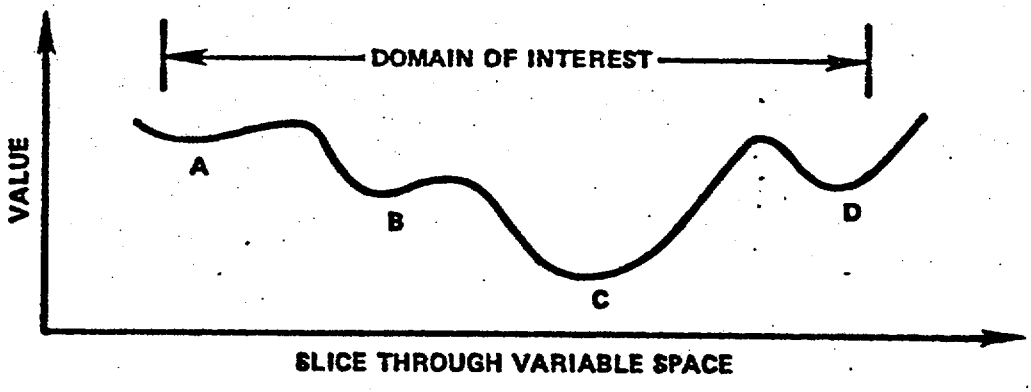


Figure 1-4-1 - Local and Global Minima

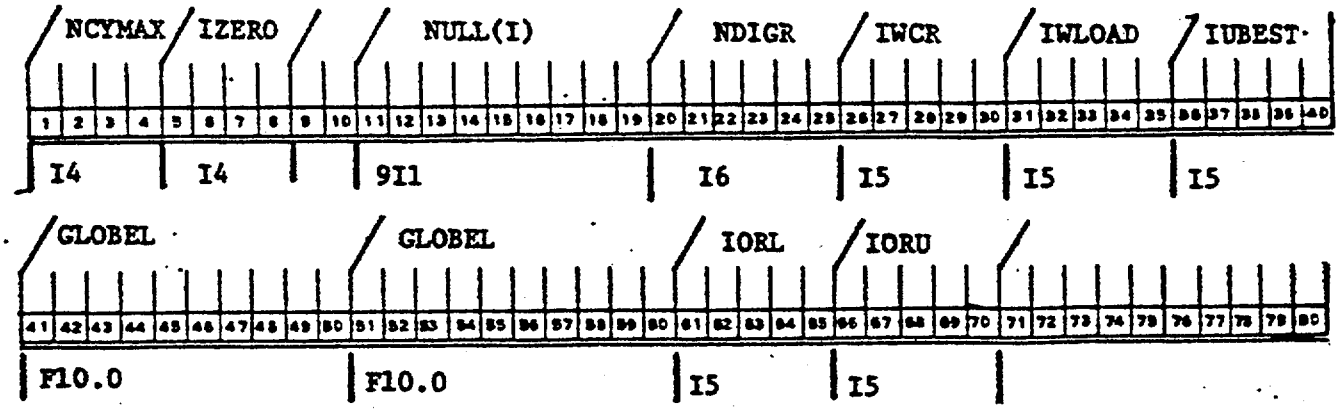
The check for whether a global minimum has been found is usually to run the problem again using a second (or even more) initial estimate(s) of the solution [other sets of initial values that differ widely from the first set of initial estimates]. If the same solution point is obtained, increased confidence may be had in that the solution found is the global minimum we seek, not a local minimum. This is the reason for the various change directives which we will be describing as well as for the provision in SHIPDOC to solve a problem more than once.

The user not only determines how many solutions are to be attempted (if any), but also determines how many cycles of the total ship model recomputations to allow before stopping the converging process—the program could continue to run getting closer and closer to the minimum for each solution attempted. The user can also determine how many printouts of the database (before solutions) are needed. The user can also have SHIPDOC hold certain direct variables and/or lead amount constant for a run; this allows investigation into the effects of each variable on the ship model and minimization results. All of this results in VERSATILITY. In the directions for various options, we will start with the simplest run possible and work up to the most complicated.

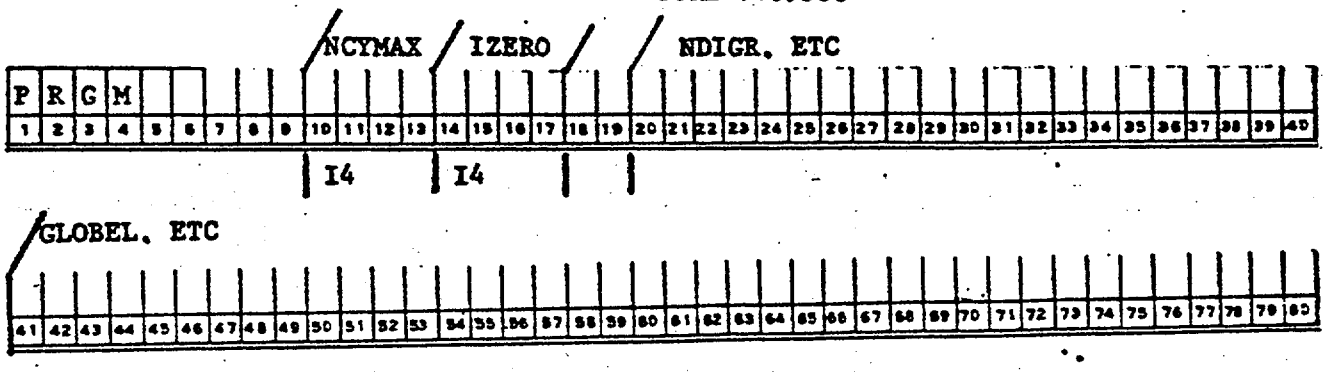
4.1 BASIC CONTROL DIRECTIVES - PRGM, HEADERS, AND ENDR

4.1.1 PRGM DIRECTIVE

For every run of SHIPDOC, there are three basic directives required. The first directive of the data deck is the program control directive. For version V409300, this is named a PRGM directive. For earlier versions of SHIPDOC there is no special directive name in columns 1-4, so NCYMAX is used as the (implied) PRGM directive name. The use of PRGM in column 1-4 will automatically cause V409300 to be used, otherwise V407190 will be used. The NULL table is used before V409300. The NONA directive is used for V409300 and later and replaces the NULL table. The first



PRGM DIRECTIVE - BEFORE V409300



PRGM DIRECTIVE - V409300

NAME	DEFINITION OR USE
NCYMAX	maximum number of optimization cycles
IZERO	if .NE. 0, no direct variable may be .LT. zero
NULL(I)	if .NE. 0, freeze direct variable value or ignore constraint
NDIGR	if = 2, make 2 digit weight report; if = 3, make 3 digit weight report
IWCR	if .NE. 0, write cross reference table
IWLOAD	if .NE. 0, write variable addresses
IUBEST	if .NE. 0, use 'best' solution found
GLOBEL	global lower limit for all variables
GLOBEU	global upper limit for all variables
IORL	if .NE. 0, ignore global lower limit
IORU	if .NE. 0, ignore global upper limit

Figure 1-4-2: PRGM DIRECTIVE

directive contains the number of iterations (NCYMAX) and direct variable lower limit (IZERO) information, the NULL table (V407190 only), as well as the variable global limits (which may be redefined on an individual basis), whether to use two or three digit weight reporting, override flags for global limits, and intermediate print flags. There can be only one of these directives read during a run. The fields NCYMAX and IZERO are both right justified (meaning that the last digit of the number is in the right most column of the field). NCYMAX is the maximum number of iterations the user will permit in order to find a solution. Remember that computer time is valuable, and a close approximation to the solution is practically as good as the exact value and is much cheaper!

IZERO is an indicator to tell SHIPDOC whether to allow negative values for the direct variables or not. The user determines this by entering either any nonzero number in columns 5-8 if negative values are not to be permitted, or enter 0 (or nothing) if negative direct variable values are to be permitted. Direct variables are often physically meaningless if negative, but often mathematically correct minimization results may be obtained with negative values, hence the necessity of inhibiting negative values if desired. NULL (9) is a table of single digit indicators either 0 (or nothing) or 1. The indicator 1 in any of the columns 11-15 means to hold direct variable # (card column -10) constant for this run.

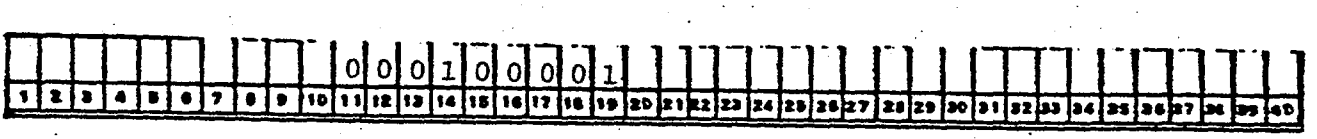


Figure 1-4-3: EXAMPLE OF USE OF NULL

For example, in the figure above the 1 in card column 14 [NULL(4)] means to "strikeout" any changes to V_{I_4} while the 1 in card column 19 [NULL(9)] means to deactivate constraint C_4. NULL(1) is another handy switch just for the user. If you desire to skip the solution process and just get the printout of the ship model resulting from your database, enter 2 in card column 11 [NULL(1)].

4.1.2 HEADER DIRECTIVES

The second card in the data deck must be one of the various header directives available in the program. Not only do these directives store a heading to be printed at the top of every page so you can identify your printout, but the subroutine that prints the heading also zeroes the base data storage areas prior to entry of your data. Old settings in memory can ruin a good run so you do not want to take the chance that your entries will not wipe out all old memory settings. In addition, you can set certain printer output levels by the type of header directive you select.

4.1.2.1 H DIRECTIVE

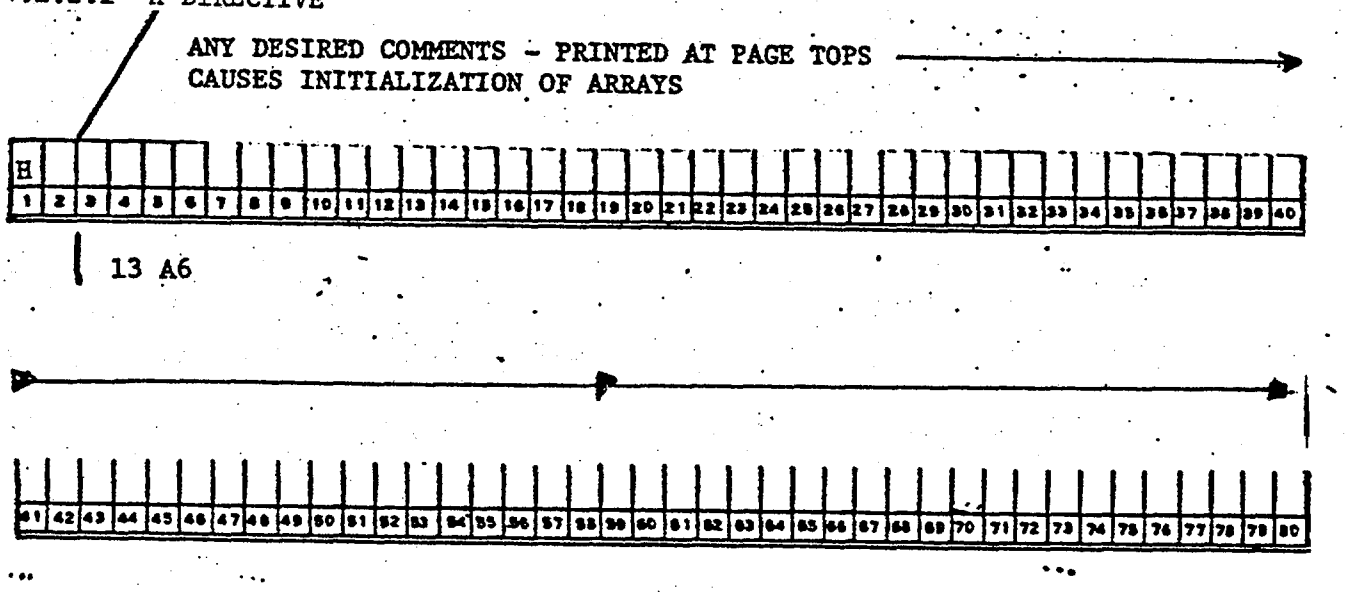


Figure 1-4-4: HEADER DIRECTIVE

The H directive is the normal header directive. Whatever you punch in columns 3-80 is printed at the top of every page after this card is entered. It resets the page counter to 0, then adds 1 before printing the first time. It also causes the zeroing of the base data storage areas.

4.1.2.2 HI DIRECTIVE

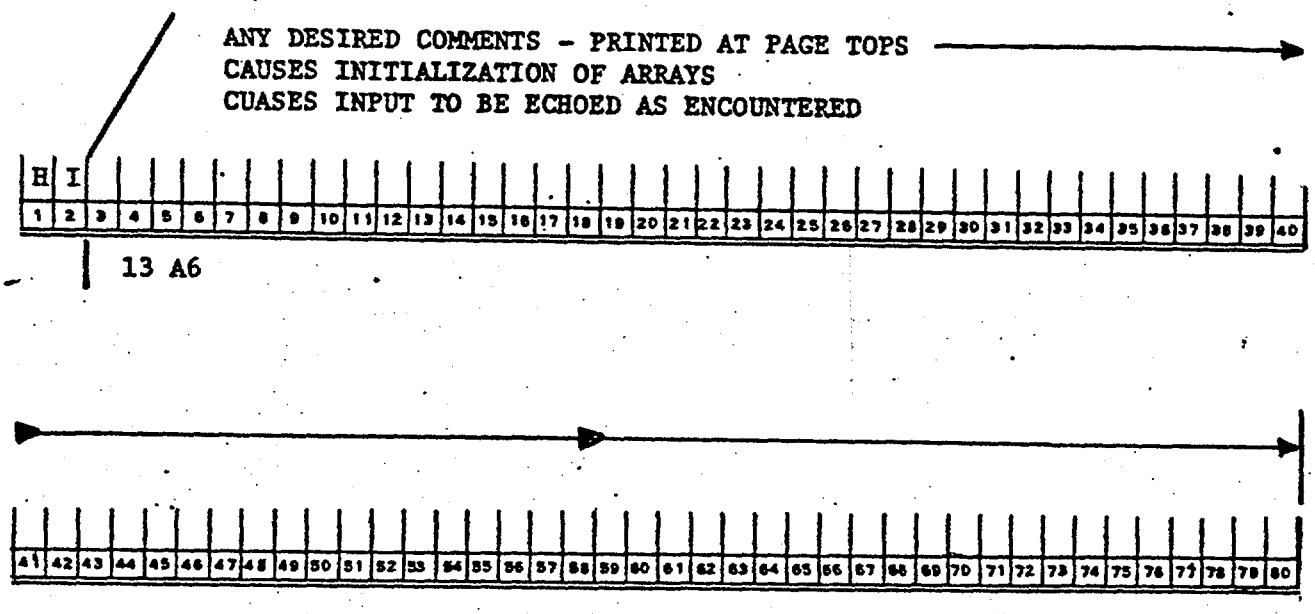


Figure 1-4-5: HI DIRECTIVE

The HI directive does exactly the same things as an H directive, but it also turns on a switch causing all* subsequent input directives to be printed as they are entered. This is useful for a first test run just for checking your input. SHIPDOC will print all erroneous input directives with a message identifying the particular error involved. By getting all* directives printed as well, you can more easily locate the bad directive in the data deck.

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* Continuation cards for equations and lists, and data-point cards for functions will not normally be printed.

4.1.2.3 HP AND HT DIRECTIVES

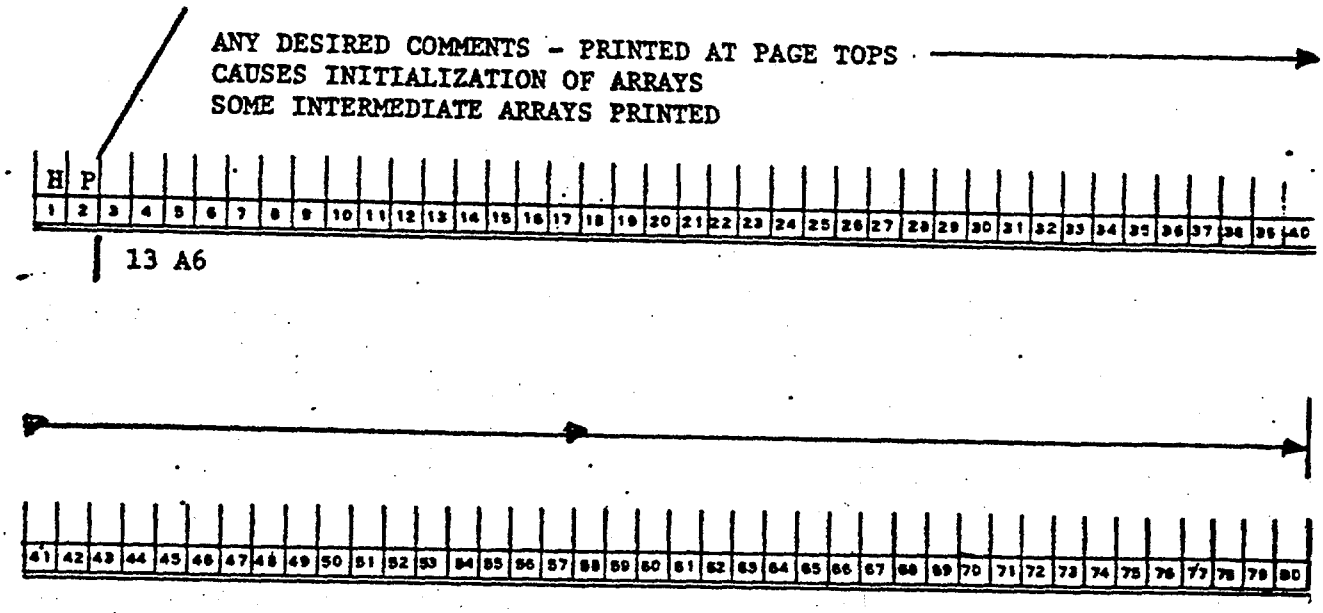


Figure 1-4-6: HP DIRECTIVE

The HP directive also performs the same duties as an H directive, but it also turns on a switch so that some of the intermediate results will be printed. SHIPDOC will usually print the final results; but by using an HP directive, you can see part of the changes as the program approaches those results.

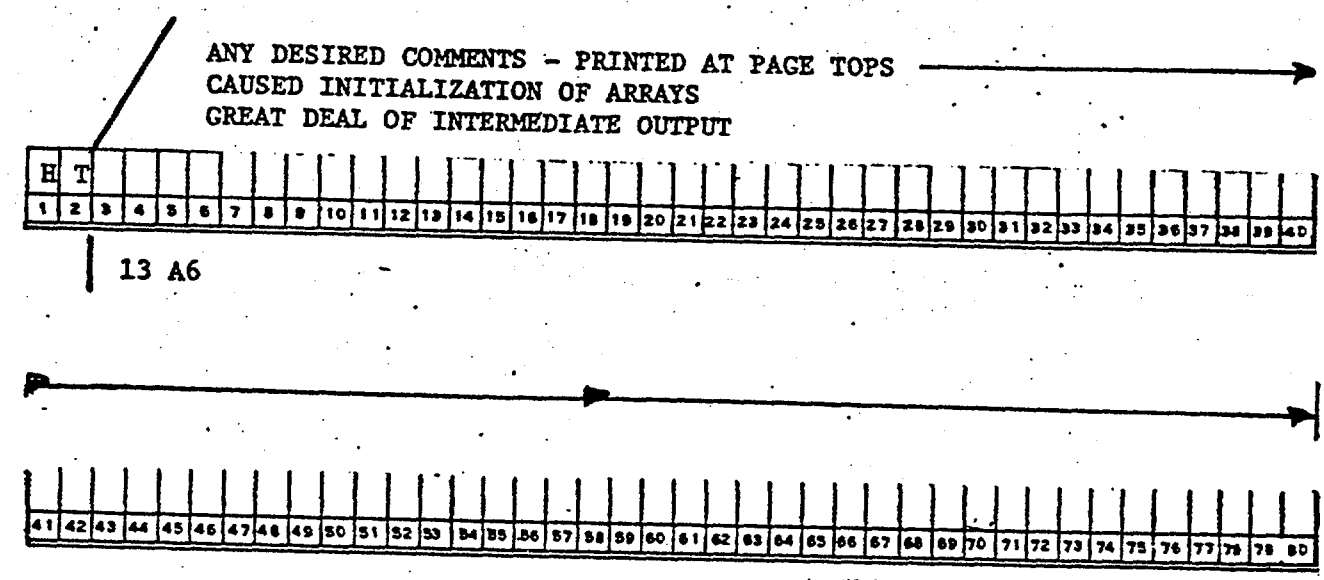


Figure 1-4-7: HT DIRECTIVE

The HT directive performs the same duties as an H card, too. In addition, it turns on a switch so that practically all of the intermediate results will be printed. This is the header card to use if you want to trace the progress of the program as it reaches its results. An enormous amount of printout results from using an HT directive. It is primarily designed for the author to check the program's functioning and would not normally be used by the average user.

4.1.2.4 HEADER DIRECTIVES SUMMARY

If you were to desire more than one of the above options - (B) printing all input directives, (C) some intermediate arrays printed, or (D) all intermediate arrays printed--you could include more than one of the above directives. The intermediate results printed after an HP directive will also be printed after an HT directive, so it does not make sense to use both of those. Also remember, all of the above directives zero the database storage areas, so you would not want to use one after starting your database entry. If you do use more than one directive, put them together in the data deck after NCYMAX/IZERO/NULL. Only the last heading entered will be printed as it will replace previous heading entries. So to get more than one of the above results, you only need to enter the heading on the last one.

4.1.2.5 SUBH DIRECTIVE

The subheader (SUBH) directive (V409300) if used will be printed as the second header line on each page, immediately following the information on which each header directive has been used.

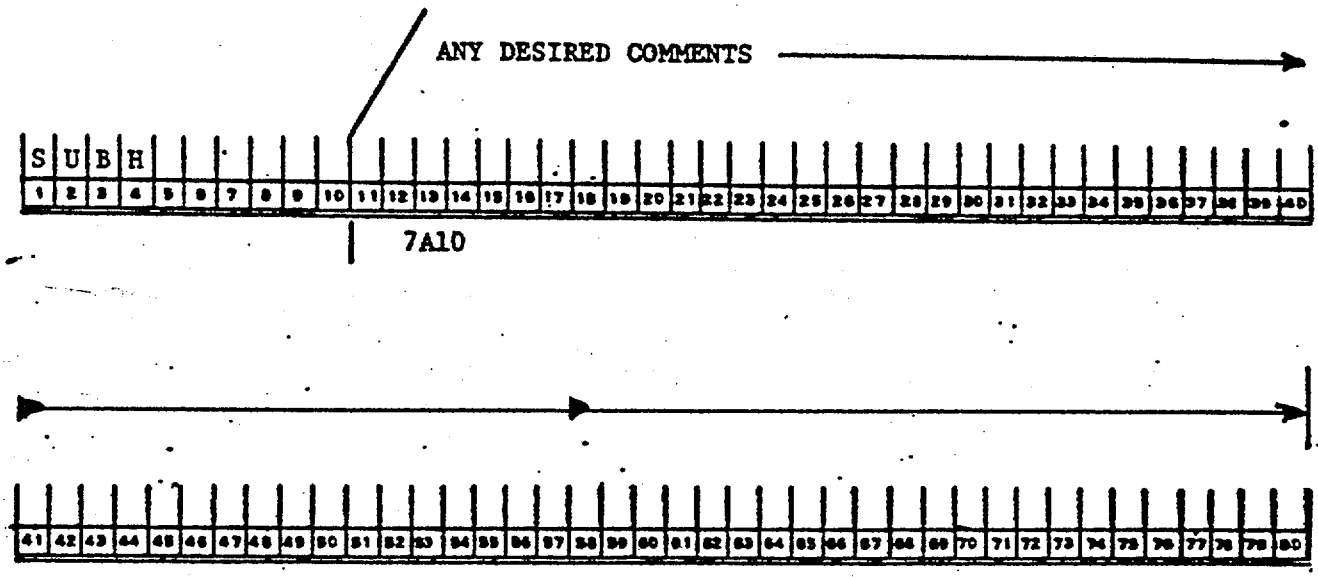
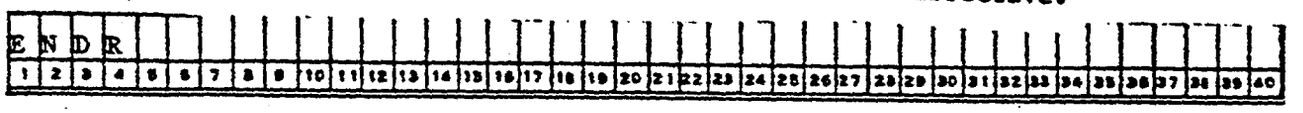


Figure 1-4-8: SUBH DIRECTIVE

4.1.3

The last directive in any data deck must be an ENDR directive.



ENDR DIRECTIVE HALTS EXECUTION - STOPS RUN

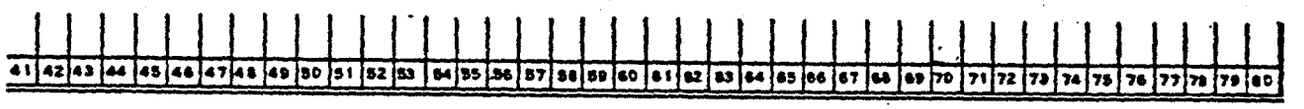


Figure 1-4-9: ENDR DIRECTIVE

This tells the program to stop and signals the end of the run no matter how much you, the user, want the program to do.

4.1.4 RUN OPTIONS - NOGO AND END DIRECTIVE

The above directives - NCYMAX/IZERO/NULL, a header, and ENDR - must always be present and can be placed in the data deck now. The user must decide how much he wants done in a particular run before selecting other entries. As stated before, the possibilities are numerous:

1. Enter and check the database only--recommended for first run.
2. Option 1 followed by a ship model printout and WEIGHT REPORT only.
3. Option 1 followed by a database REPORT only.
4. Option 1 followed by a database REPORT, a solution attempt, and a ship model printout, and WEIGHT REPORT.
5. Option 1 followed by a solution attempt and a ship model printout and WEIGHT REPORT--no database REPORT.
6. Any of options 2-5 followed by entering/checking changes and/or additions to the database only.

7. Option 6 followed by any of options 2-5 as many times as you want.

8. Any of options 2-7 while "striking out" changes to some direct variable(s) or basic lead amount or constraint variations.

9. Any of options 2-7 while allowing all direct variables and basic lead amount to change.

First, decide if you want to hold any direct variable or the basic lead amount constant or disregard certain constraints for this run. If you do not, enter all zeroes or nothing in NULL(9)--that is, in columns 11-19 on the NCYMAX directive. If you do want to hold some constant, enter a 1 in the appropriate column(s) (CC) as described on page 4. Remember this however: only one of these NCYMAX directives can be entered on a run; so whatever you enter on this first directive will apply to all solutions attempted on this run.

If you should desire option 2 above - that is, enter and check the database--then printout ship model and WEIGHT REPORT for that database with no solution attempted, enter a 2 in column 11 on the NCYMAX directive. Once this option is selected, it will apply for the whole run. No matter how many changes/additions to the database you enter, no solution is ever attempted; you can only get additional ship model printouts and WEIGHT REPORTS. This is a useful option only in experimenting with the effects of changes to the database on the ship model.

Option 1 is recommended for your first run so you will not waste valuable computer time with a bad database. Simply put the NCYMAX (The values are not important for this option.) and header directives in front of your database cards, and the ENDR afterwards. Notice that no changes are possible here, and

no database REPORT or ship model printout/WEIGHT REPORT results. You only enter and check your database; any errors will be noted for you.* In addition, you can get a listing of input directives by using the HI header card. The HT header directive would result in extra printing only for functions in the database while the HP directive will have no effect at all.

Remember--once SHIPDOC reads the ENDR card, it is all over for this run.

4.1.4.1 NOGO DIRECTIVE

In order to get option 3, follow your database cards with a NOGO card and then the ENDR directive if one REPORT is all that is desired.

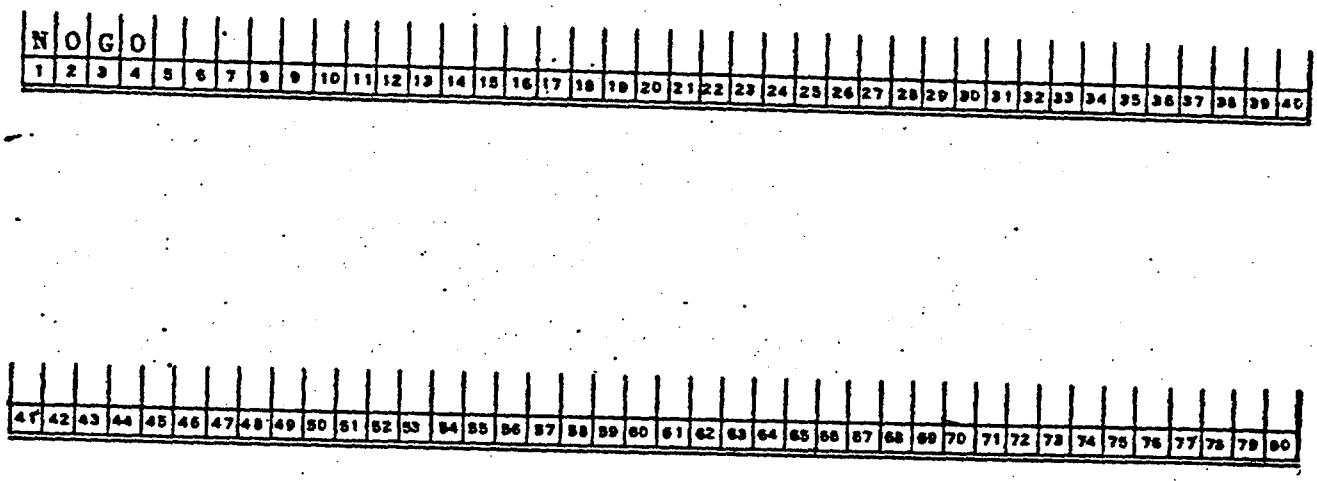


Figure 1-4-10: NOGO DIRECTIVE

A NOGO directive tells SHIPDOC to write a database REPORT and do not go to the solution process. If that is all you want, then the ENDR directive ends it all. If you want more, save the ENDR directive and add directives to tell SHIPDOC what else to do.

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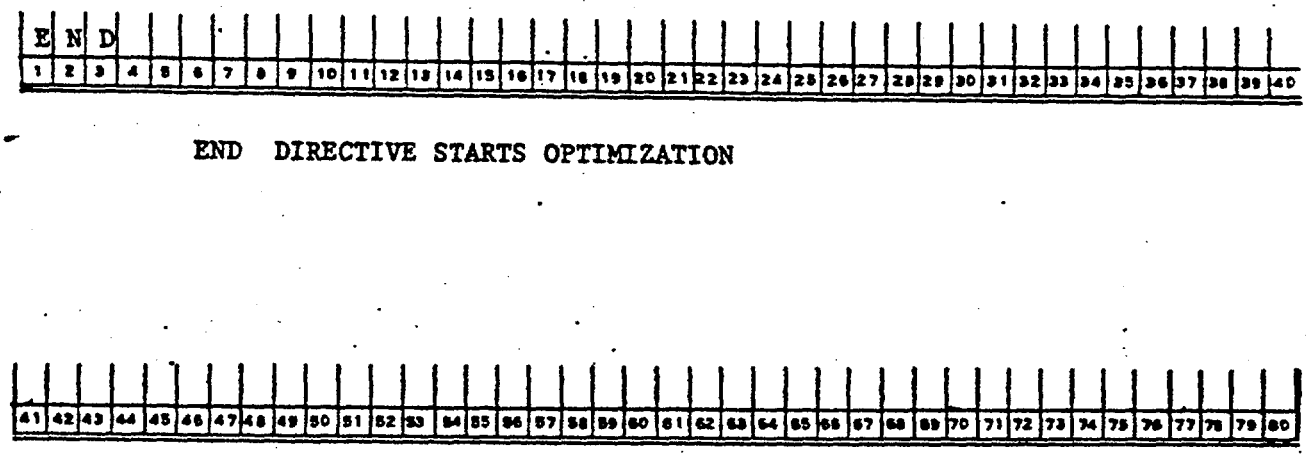
*See Printout Description - Part (A).

4.1.4.2 END DIRECTIVE



END DIRECTIVE STARTS OPTIMIZATION

Figure 1-4-11: END DIRECTIVE

In general, an END directive tells SHIPDOC to start the solution process using the existing database. If you want only one solution and its accompanying printouts* along with the database REPORT, you may simply place an END directive and an ENDR directive after the database directives. This was the original option of SHIPDOC before the multiple solution option was added. The same result can be obtained with a NOGO, then END, and then ENDR directive after your database directives. If you don't want a solution, then do not use an END directive after the data deck; only use a NOGO/ENDR combination to stop after a REPORT or a NOGO directive, if more is to follow.

*Every solution is accompanied by a ship model report and a Navy SWBS WEIGHT REPORT.

4.1.5 Best Estimate of the Solution - STVR and STRT Directives

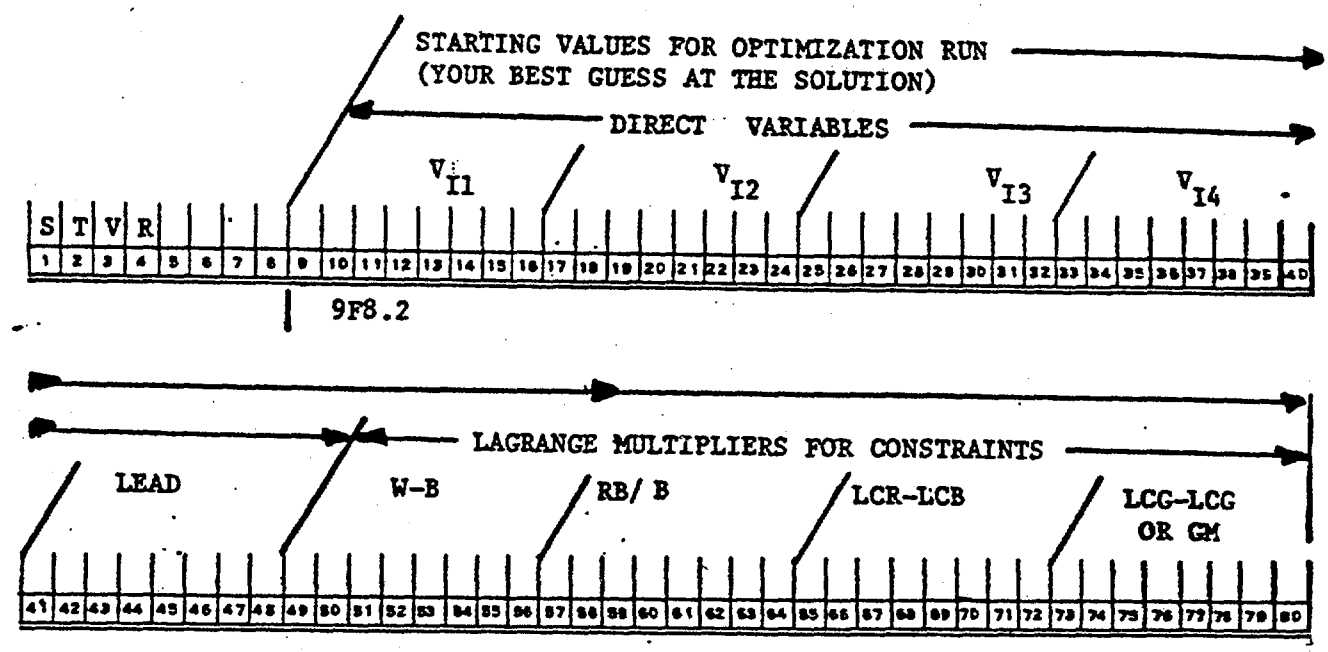
SHIPDOC will automatically use the initial values entered as the starting values for all entries when starting an optimization or zero cycle run. However, if you should desire to use another set of starting values for the direct variables, you may enter these using a start vector (STVR) directive (used before V409300), or STRT directives (V409300).

Before taking an optimization step, the ship description file (data base) is interated to consistency with the current value or the direct variables. Note that the initial values in the ship description file do not have to be consistent with the initial values of the direct variables (except for VAR directives), or put another way, a balanced or parent ship is not required as initial input to SHIPDOC. Since the final values of the direct variables may be quite different from the initial values, the STVR or STRT directives allow computer time to be saved by allowing the user to use his best estimate of the solution.

The differences in form between the two directives arises because in versions of SHIPDOC prior to V409300 only four direct variables were allowed, thus, a one-one correspondence could be set up between the direct variables and the STVR directive position. In version V409300, not only may more than four direct variables be specified, but some may not be used in a given run (due to use of the NONA directive). As a consequence, V409300 requires that both the name and value for a direct variable be given on the STRT directive.

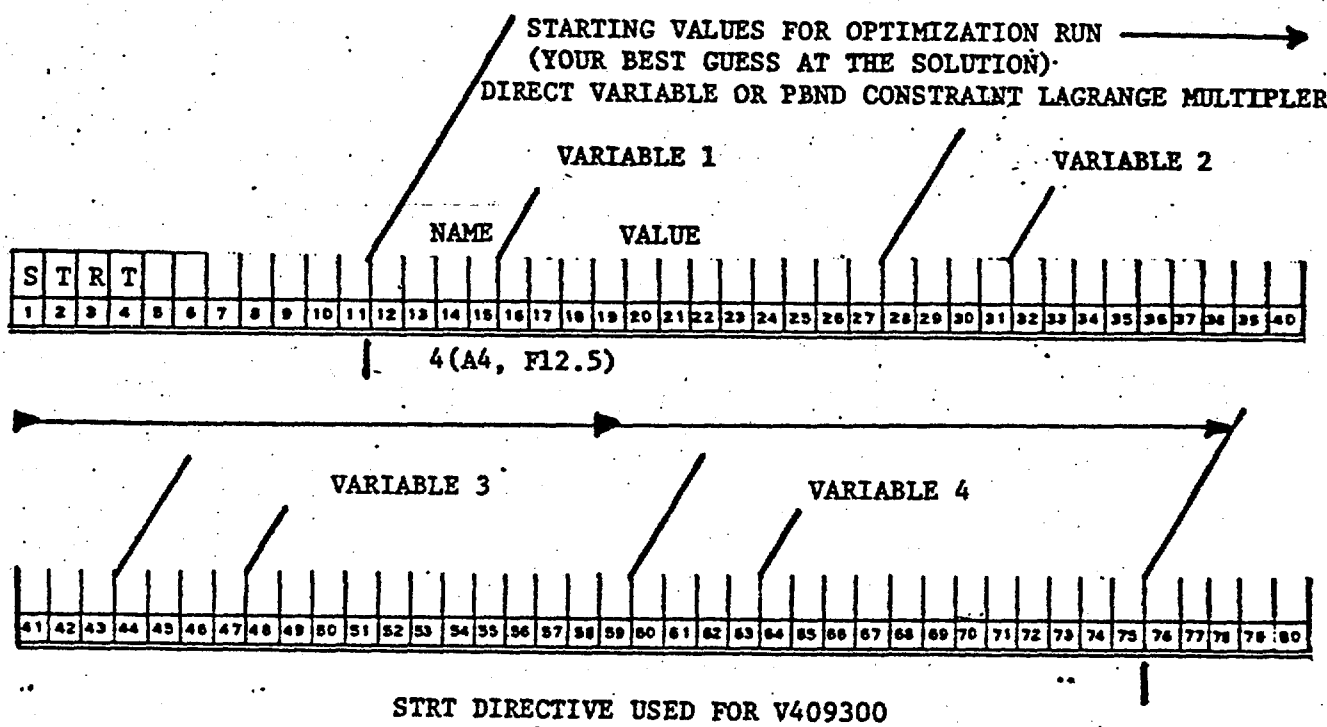
It will be noted that on both the STVR and STRT directive values associated with constraints are specified. This value is not the value of the constraint, but of the associated LaGrange multipler. The price paid for each

active constraint is the addition of another direct variable, called a LaGrange multiplier, which enters into the optimization. SHIPDOC handles the generation and record keeping of these variables automatically. The STVR or STRT directives allow the user to set initial values or overide current values of these additional direct variables (the LaGrange multipliers).



STVR DIRECTIVE USED PRIOR TO V409300

STVR DIRECTIVE



STRT DIRECTIVE USED FOR V409300

STRT DIRECTIVE

Figure 1-4-12: STVR AND STRT DIRECTIVES

4.2 CHANGING THE DATABASE

You can get two or more solutions on a single run to check for the global minimum solution. Since it makes little sense to use the same database for more than one solution, provision is made to change your initial solution estimate(s) before any new solution is attempted. Using the change directives, you can change selected parts of your database before a new solution is attempted. Each change is checked for errors before continuing, so you might want to put ENDR after your changes (in case of errors).

4.2.1 CHANGING VAR DIRECTIVES

4.2.1.1 VPAR DIRECTIVE

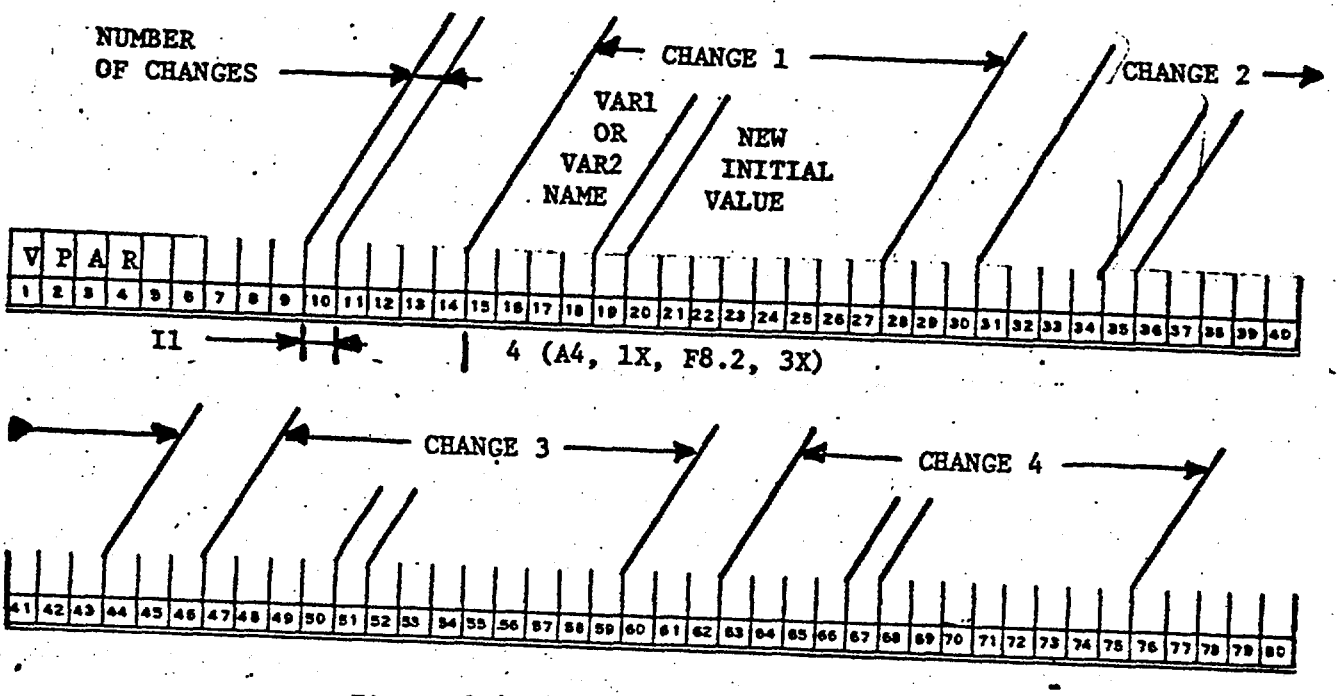


Figure 1-4-13: VPAR DIRECTIVE

The VPAR directive can be used to change parent values of VAR variables only. The number of changes on each directive (up to 4) must be present in column 10 so SHIPDOC will know when to stop changing. In order to change parent values of the direct variables, you can use another MAIN card as shown on page 1 or page 2 of

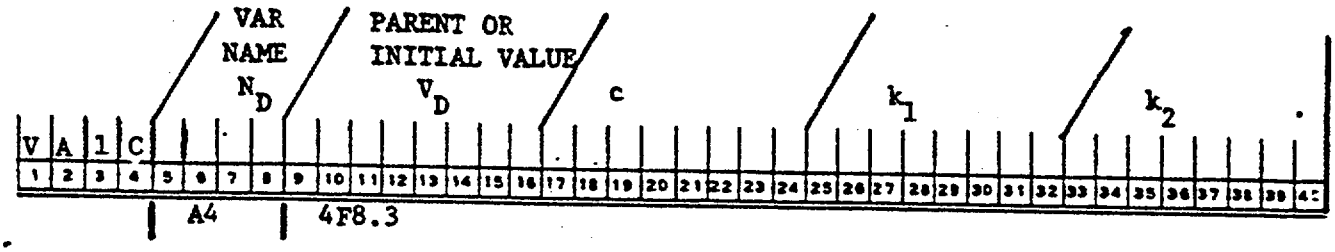
DEFINING YOUR DATABASE.* You can also set new starting values for the direct variables with another STVR directive as shown on page 14 to 16 of this section.

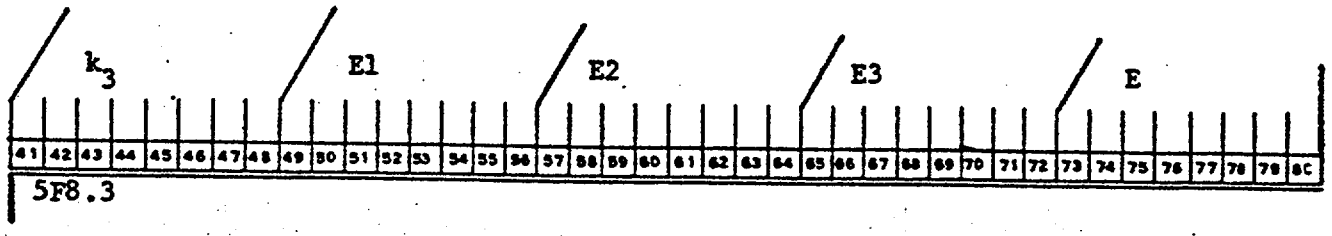
. Parent values of the VARNS cannot be changed during a run.

4.2.1.2 VA1C AND VA2C DIRECTIVE

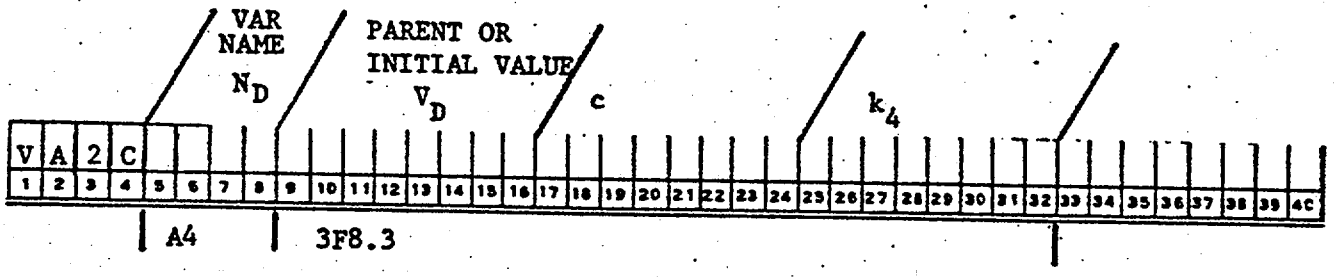
You can also change any VAR variable's basic definition by using VA1C and/or VA2C directives. These are exactly like the VAR1 and VAR2 directives described on pages 13 to 15 of DEFINING YOUR BASE DATA except that the contents of these directives will replace the data for an existing VAR variable whose name must

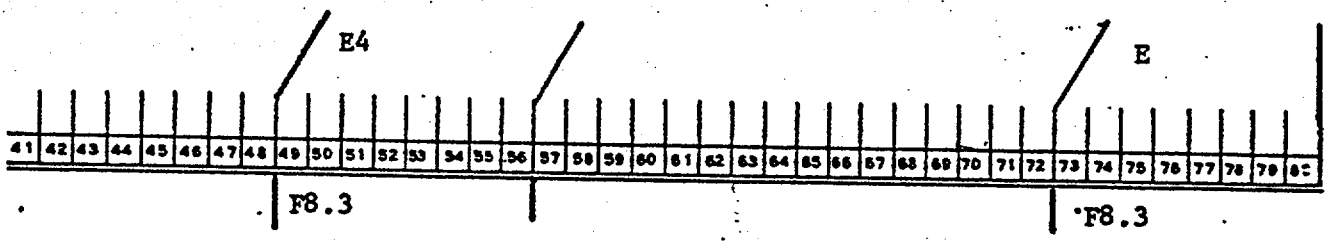
* Make sure the main variable names are repeated exactly as originally entered.





VAR1 DIRECTIVE





VAR2 DIRECTIVE

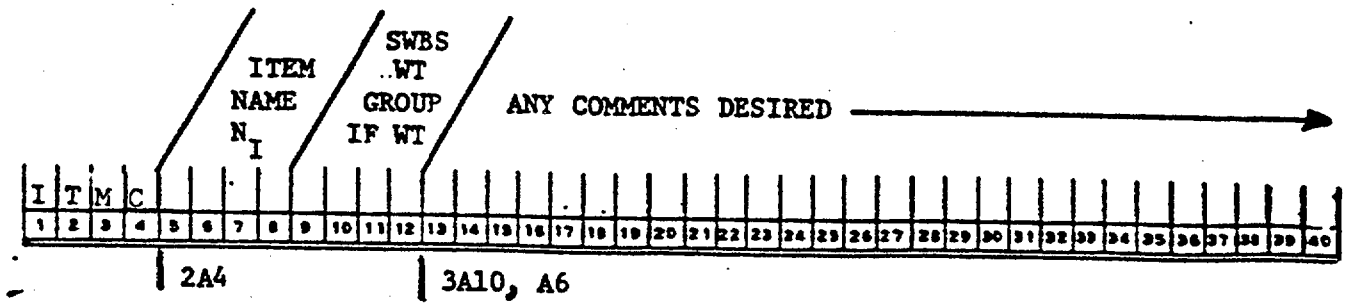
Figure 1-4-14: VA1C AND VA2C DIRECTIVES

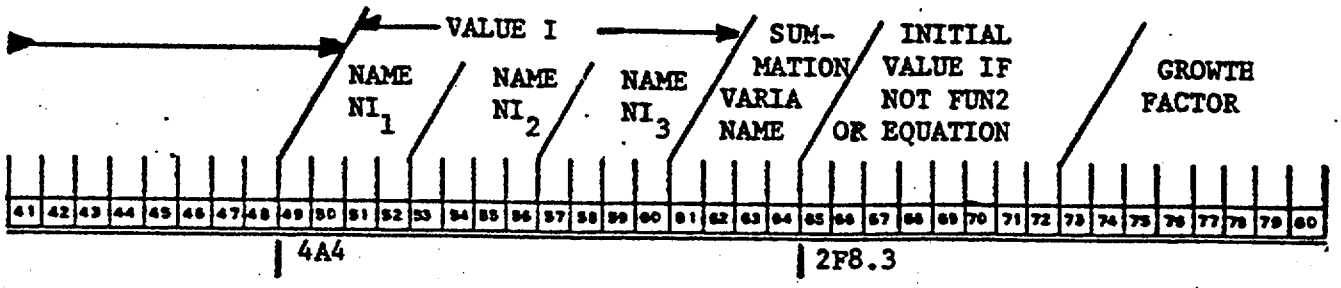
be in columns 5-8. The VA1C directive can be used by itself if K4 or E4 are not to be changed; the VAR2C directive can be used by itself if you only want to change C, K4, E4, or E. Otherwise, use both directives, with the VA2C directive immediately following the VA1C directive in the data deck. Since data on these directives will replace existing data, any blank field will destroy previously stored values. So be sure any previously stored data that you want saved is repeated on these change directives.

4.2.2 ITMC AND LVC DIRECTIVES

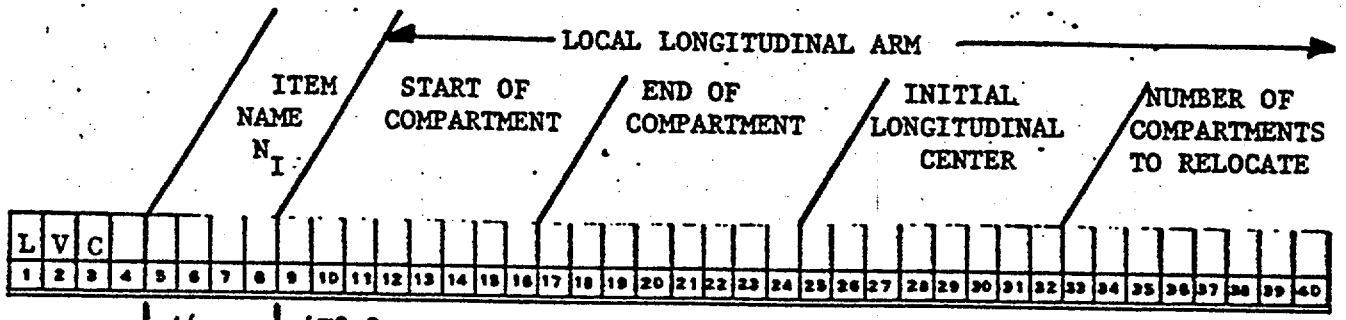
4.2.2.1 CHANGING ITEMS

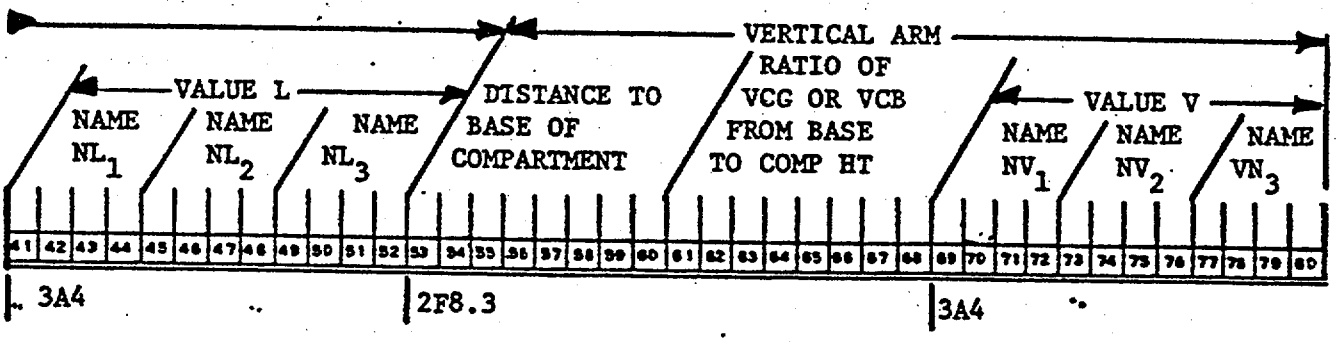
You can also change the data for any previously entered ITEM by using an ITMC and/or an LVC directive. The data on these directives will replace any data stored previously, so any part of it you want saved must be repeated here along with the new data. The name in columns 5-8 must match that of a previously entered ITEM. If there is no change to the item's location data, only the ITMC directive needs to be used for the item's changes. Note that the fields on the ITMC card are exactly the same as on an ITEM directive (page 28, DEFINING YOUR DATABASE) while the fields on an LVC directive match those on an LV card (page 40, DEFINING YOUR DATABASE).





ITEM DIRECTIVE





LV DIRECTIVE

Figure 1-4-15: ITMC AND LVC DIRECTIVES

4.2.3 COMMENTS ON CHANGES

For any of the above change directives, if a name in columns 5-8 is misspelled or does not exist in the previously entered database, you will get an error indication and the changes will not be made. Any other changes are made by simply entering the new data on the same directives as previously used: a new STAB directive* (page 56, DEFINING YOUR DATABASE) can be used to enter new vertical stability values; a new RESB* directive (page 55, DEFINING YOUR DATABASE) enters new reserve buoyancy values; another LDLC directive (page 52, DEFINING YOUR DATABASE) enters the coordinates for a new lead location. Note that there is no provision to change equations, lists, functions, or VARNs during the run. For this reason, you would not want to change a main variable name by having a blank name field or a name other than the original one on any new MAIN directive entered. Changing these would require changing every equation, list, function, or VARN involving them. Changes to equations, lists, functions, or VARNs can only be made by changing the data deck between runs.

---

* There should be no need for this as room is allotted on each directive for up to nine values and the problem will be solved for every combination of STAB and RESB values.

4.3 ADDITIONS TO THE SHIP DESCRIPTION FILE

In addition to the changes mentioned above, you may also add to your database between REPORTS and/or solutions. As long as you don't exceed the allotted storage in each type table, you may enter more VARs, VARNs, equations, lists, functions, and/or items using the same input formats as described in DEFINING YOUR DATABASE. To guide you here, the maximums are shown in the following table:

Constants	-	1000
VAR variables	-	50
VARN variables	-	500
1-card equations	-	65
2-card equations	-	10
3-card equations	-	5
4-card equations	-	3
1-card lists	-	650
2-card lists	-	10
3-card lists	-	5
Functions defined by tabular data	-	25
Items (all categories)	-	300

You may change your base data set and get another REPORT and/or solution as many times as you wish in a single run. Signal end of changes with a NOGO directive for the REPORT and/or an END directive for the solution. Every solution is accompanied by its own ship model printout and Navy SWBS WEIGHT REPORT. If NULL(1)=2, that is, a 2 is punched in column 11 on the NCYMAX directive, you will get the REPORT(s) and/or ship model printout(s) and WEIGHT REPORT(s) without any solution being attempted.

There is also a provision for you to change headings between solutions and/or printouts. An HS card will replace the old stored 78-character page heading with a new one, and reset the page count to 0 before adding 1 and printing it. It does not zero the database as the other H-type cards do. This header card also turns on the intermediate array printout switch mentioned for an HP card. Do not use one of the other H-type cards here--remember that they zero the database as well as input a page heading.

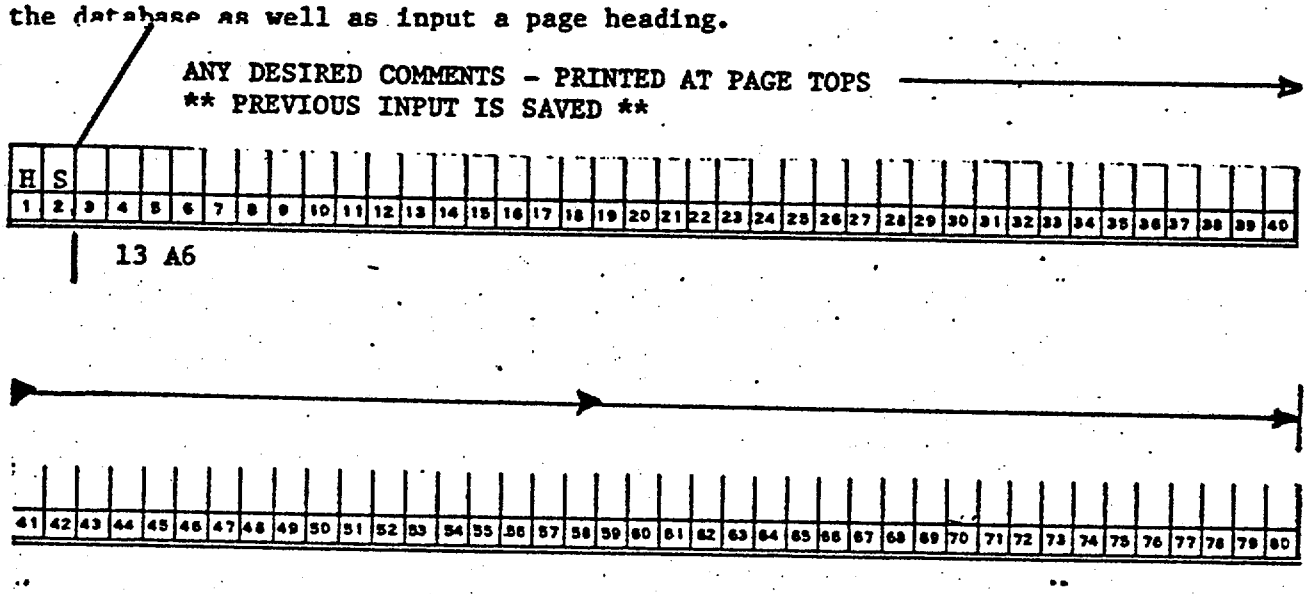


Figure 1-4-16: HS DIRECTIVE

This sums up the capabilities of SHIPDOC except for one additional feature. You may add your own lines of documentation to the run by including any desired comments and/or notes on C cards (comment cards):

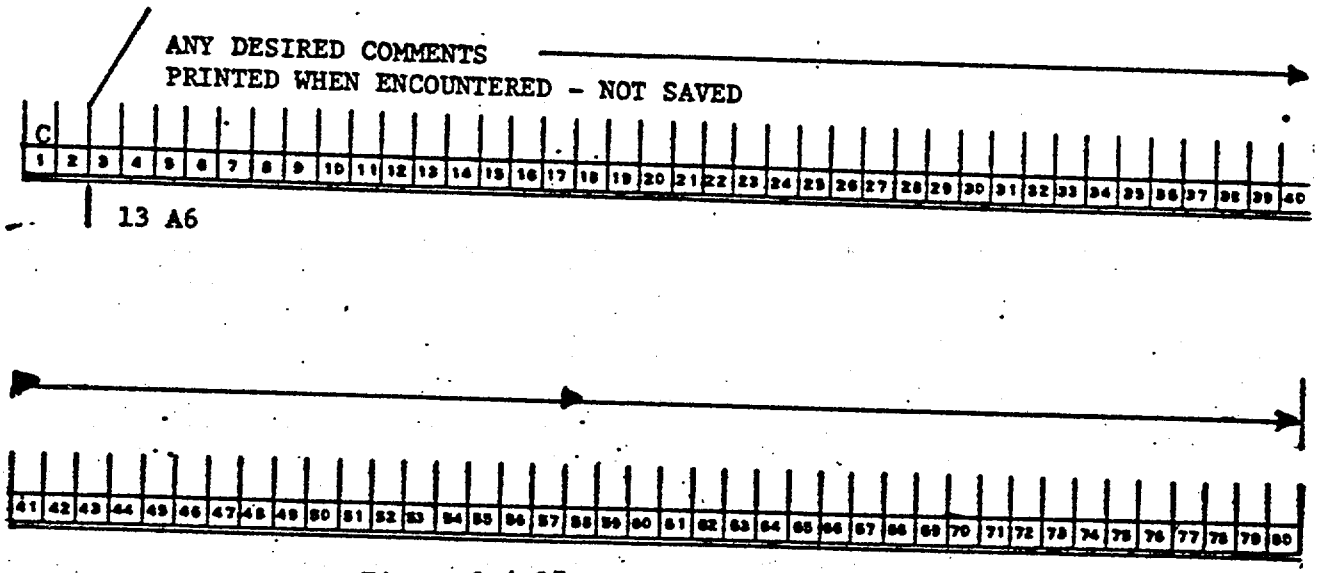


Figure 1-4-17: COMMENT

Anything you enter in card columns 3-80 is simply printed wherever it occurs in the data deck. Any comments and reminders as to definitions of constants, relationships, and so forth, that the user cares to have printed, are candidates for comment cards. You can have none or 1000, it makes no difference to the database; comment cards only add to the run the time it takes to recognize them and print them.

4.4 CONTROL AND CHANGE SUMMARY

At this point, it is apparent that program SHIPDOC offers a wide range of options to the user. We will now summarize these options and how to finish setting up your data deck for each.

The program sets the input types possible and their formats, the direct variable number and meaning, what goes into the basic printout, some basic naval architectural constraints (before V409300), and how a solution is found. You, the user, determine everything else: the actual base data set contents, the relationships and names used, how many (if any) solutions and/or printouts to get, how many cycles to run before giving up on convergence, which (if any) direct variables to hold constant, which (if any) constraint conditions to

ignore, whether to permit negative values in the solution or not, whether extra printing is to be done or not, what the heading is to be, and so forth.

By using just END and ENDR after the data deck, you automatically get both a REPORT and solution. By using NOGO and END after the data deck, you get the same result; but you also go back for more information. You can follow data base changes with either END to get just another solution or NOGO, END to get both REPORT and solution. Although it makes sense to keep changing the base data set and getting new solutions without new database REPORTS (no NOGO card), it would not make sense to change the base data set and just print it (no END card), getting no new solution. You can get a REPORT of the new base data set before every solution by using both NOGO and END after each set of changes; or you can get a REPORT of the new base data set before some solutions using both NOGO and END, skipping the REPORT, and going directly to the solution by using just an END card after a set of changes (this is after the first REPORT and solution). You can skip all subsequent REPORTS by using nothing but END cards after sets of changes. Note there is no way to skip the first base data set REPORT and still get a solution. An ENDR after the database deck will cut out everything including that first REPORT. The INPUT-SOLVE or INPUT-REPORT-SOLVE cycles can only be ended with an ENDR after the last END.

In fact, an ENDR directive will stop the run anytime, even in the middle of entering or changing your database!!! An END or NOGO directive in the middle of entering or changing your database will also stop the input process to proceed with REPORT (a NOGO directive) or SOLVE (an END directive), completing the input at the next INPUT point. So make sure these all-important control directives are placed at the end of any set of database directives and that the ENDR directive is last.

5.0 THE SHIPDOC PRINTOUTS

5.1 INTRODUCTION

The printout resulting from a run of SHIPDOC can consist of four basic parts:

1. That generated during input and checking the database entries

2. DATABASE REPORT(s)

3. A solution tracker and/or ship model printout showing the minimization results (or the best approximation obtained)

4. Navy SWBS WEIGHT REPORT on final ship model for all items broken down into weight groups.

In any run, there can be one or more or even several of each of the above depending upon the user's desires. Each will be described separately and its general format shown in the pages listed above.

The first page is simply a listing of all overlay and subroutine IDs to identify the <u>version</u> of SHIPDOC that was used for this run. It also serves to make sure the user/operator entered <u>all</u> program decks required for a complete run.

The second page is the title page. The nine digits below "STRIKEOUTS ARE (1 = SO)" are the contents of the NULL Table that you entered in card columns 11-19 of the <u>first</u> input directive if versions before V407190 are used. Remember that the first five are 1s if you want any of the direct variables ($V_{I_1} - V_{I_4}$) or lead to be held constant during the run. Also recall that if the first NULL column (CC 11) is 2, solutions are skipped to go directly to the ship model printout and WEIGHT REPORT, based upon the existing database.

```
RUN NO   08/13/83  01.26.07.          OPTIMIZATION PROGRAM SHIPDOC

                                      BASED ON MARE ISLAND NAVAL SHIPYARD
                                      OPTIMIZATION PROGRAM ARCJ6

 THE FOLLOWING DECKS ARE FROM OVERLAY 20,0 . . .
 ARCJ6          **307280**     BASE 91019
 CONVRG         **307280**     BASE 30516
 CRACKA         **907200**     BASE VER
 CRACKE         **R07200**     BASE VER
 ERPOR          **J6 004**     BASE 7269
 PMF            **307280**     BASE 7269I
 VALUE          **307280**     BASE VER
 VALUE3         **307280**     BASE VER I
 VARVAL         **307280**     BSE 91019I
 ZERO           **307280**     BASE 91019

 THE FOLLOWING DECKS ARE FROM OVERLAY 21,0 . . .
 CKVARN     **307280**BSE 91019I
 READ       **307280**BASE 91019
 DUPVAR     **012050**BASE VER
 SFUN2      **30728C**M001 3129I
 VEXIST     **307280**BSE 91019I

 THE FOLLOWING DECKS ARE FROM OVERLAY 22,0 . . .
 REPORT         **3C72R0**     BSE 91019I

 THE FOLLOWING DECKS ARE FROM OVERLAY 23,0 . . .
 NONLIN     **607060**BASE 7269
 SULVE      **307280**BASE 91019
 SSWTCH     **90720C**CNG CLL NA

 THE FOLLOWING DECKS ARE FROM OVERLAY 24,0 . . .
 WTPEPT2    **30728C**BASE 91019

 THE FOLLOWING DECKS ARE FROM OVERLAY 25,0 . . .
 LOAD           **307280**     BASE 91019
 SETE           **3072E0**     BASE VER I
 SETF           **3C5310**     BASE VER I
 SETL           **307280**     BASE VER I
 SETV           **3C7280**     BSE 907201
```

1-5-2

Figure 1-5-1: SHIPDOC DECK VERSION INFORMATION

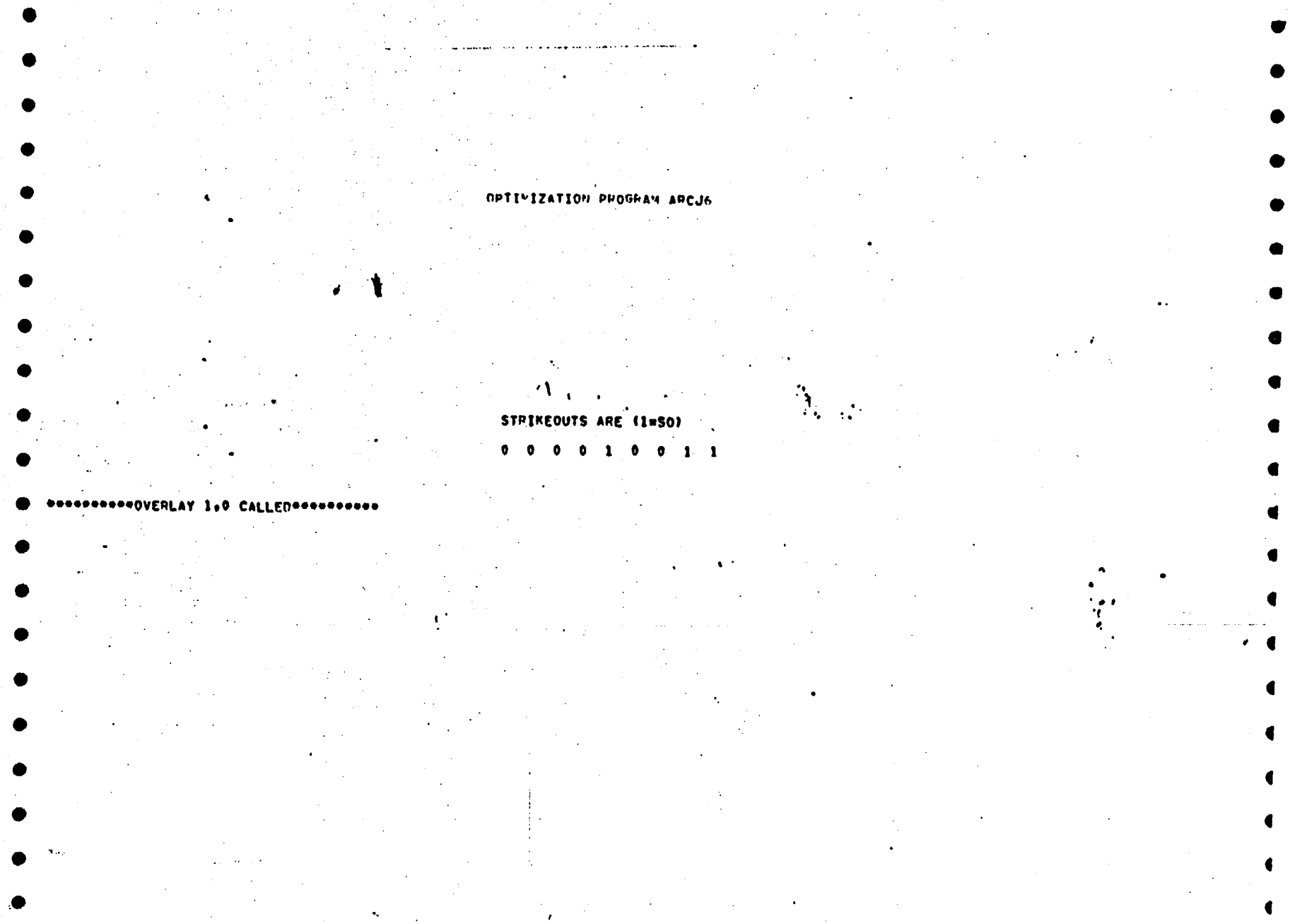


Figure 1-5-2: NULL TABLE - BEFORE V407190

5.2 ERROR MESSAGES AND DESCRIPTIONS

Printout (1) may be long or short depending upon the user's desires. If the HI header directive is entered, all subsequent input directives are listed. All C cards (comment) are printed regardless of the header directive used. If any of the many data entry errors SHIPDOC is programmed to check for occur, each erroneous directive will be printed along with either: "* * * * * * * * * * ERROR NUMBER xy * * * * * * * * * *" or "* * * * * * * * * * WARNING NUMBER xy * * * * * * * * *" where xy is a number.

The following is a general list of errors recognized by the program and the number printed for each:

1. Unrecognizable directive type--input ignored.
2. Cards out of order--unstep the number of items.
3. Nondefined item category--unstep the number of items.
4. Item to be modified not in table--change ignored.
5. Variable not in table--unstep number of items.
6. Function not in table--unstep number of items.
7. Function data out of order.
8. Too many levels specified for a variable--function deleted from table.
9. Variable to be modified not in table--changes ignored.
10. Growth factor of an item is zero.
11. A buoyancy summation variable on an ITEM directive has a weight group name.
12. Two variables have the same name--first one used.

*30. Equation name not in storage.

*31. List name not in storage.

*32. Dummy variable name not in storage.

*33. Syntax error in an equation.

*34. Too many levels of parentheses in an equation.

Error 1 can occur for several reasons:

a. Misspelled directive-type identifier or not one SHIPDOC is programmed to accept.

---

*The number printed will be the highest of the above error #'s found, regardless of how many other errors are present.

b. All data-point cards after an unacceptable function (error 8) or all data-point cards following one with the wrong function name (error 7) or all data-point cards after the thirty-fourth one (a maximum of 34 is permitted).

Error 2 can occur only when an LV and (or LONG and VERT directives) do not follow their respective ITEM directives; or LVC directive does not follow its ITMC directive.

Error 3 occurs if the item summation category on an ITEM or ITMC directive does not match (1) one accepted by the V407190 version program: WT, DISW, BUOY, DISB, RB, DISR, FF, DFF, FC, DFC, INF, DINF, INP, DINP, BMT, or DBMT, of (2) match one of the summation categories defined on SUMV directives for ITEMs and VARNs when using V409300.

Error 4 can occur only if ITEM name on ITMC or LVC directive is not one of the previously entered ones.

Error 5 can occur if a name in the variable name spaces on a VARN, ITEM, ITMC, LV, LONG, VERT, LVC, or any of the variable name list directives (FL_j and their continuation cards) cannot be found in the direct variable, VAR, VARN or ITEM variable tables.

Error 6 will occur if a name in a function name space on a VARN, ITEM, ITMC, LV, LONG, VERT, or LVC directive cannot be found in the previously entered function tables.

Error 7 can occur only if a function data-point card does not contain the previously entered function's name. (See also error 1 (b)).

Error 8 can occur only if a function's exponential level is > 4.

Error 9 occurs only if name on VA1C or VA2C directive cannot be found in the previously entered VAR Table.

"Warning 10" is printed if the growth factor field on an ITEM or ITMC card is blank or contains 0.

"Warning 11" is printed along with the basic item data before a WEIGHT REPORT if an ITEM or ITMC directive has entered:

a. No weight group name for a WT or DISW item.

b. Any FF, DFF, FC, DFC, INF, DINF, INP, DINP, BMT, or DBMT items with or without a weight group name.

"Warning 12" is printed if any VARN name entered is the same as a previously entered main variable, VAR, or VARN name.

If either error 5 or 6 occurs for a VARN, then you will also get "ABOVE ERROR MESSAGE(S) DUE TO VARN NO N = XXXX' where N is the bad VARN's number and XXXX is its name.

When an ITEM, ITMC, or VARN is defined in terms of an equation (and its correspondence list of variable names), one other error indication may also be made:

Equation Table (1,2,3, or 4)	Equation No. in that table	List Table (1,2, or 3)	List No. in that table	Error * #

Where error number = 2 if equation name not found in any table.

3 if list name not found in any table.

4 an equation symbol is not an acceptable operation symbol or dummy variable X0 Z9.

5 same as 4 except not dummy variable X0 U9.

7 unmatched) or (in an equation.

8 more than 9 levels of nested parentheses in an equation.

---

* The number printed will be the highest of the above error #'s found, regardless of how many other errors are present.

5.3 VPAR CHANGE INDICATION

If a VPAR directive is used between solutions, you will also get a "CHANGE PARENT VALUES" indication listing variable name(s), old parent value(s), and new parent value(s).

5.4 FUN2 DIRECTIVE PRINTOUT

To avoid using vast amounts of storage space to store <u>all</u> data for functions of two variables defined by user that the author plans to print, the <u>part</u> of your database REPORT on functions is actually printed under (1) instead of (2) (page 1). For <u>each</u> function defined by the user with a FUN2 directive and its associated data-point cards, you will get one of the following pages defining that function:

DATA ON PCOA, FUNCTION NO 13

		LEVELS FIRST	LEVELS SECOND	
DESCRIPTION	SEPARATION RATIO = .06 L/B = 2.5,8,11,1	3.	3.	(A)

DATA POINTS ENTERED

VAR NO 1	VAR NO 2	DEP. VAR	VAR NO 1	VAR NO 2	DEP. VAR	VAR NO 1	VAR NO 2	DEP. VAR
.4400	1.0000	.2747	.5200	1.0000	1.0740	.6000	1.0000	1.2983
.7000	1.0000	1.1390	.8000	1.0000	.9081	.9000	1.0000	.7206
1.0000	1.0000	.5836	1.0000	2.5000	.6221	1.0000	4.0000	.5619
.4400	2.5000	.1931	.5200	2.5000	.6820	.6000	2.5000	.8821
.7000	2.5000	.8607	.8000	2.5000	.7739	.9000	2.5000	.6907
.4400	4.0000	.1624	.5200	4.0000	.4789	.6000	4.0000	.7064
.7000	4.0000	.7226	.8000	4.0000	.6553	.9000	4.0000	.5982
.4400	5.5000	.1892	.5200	5.5000	.3492	.6000	5.5000	.5552
.7000	5.5000	.6521	.8000	5.5000	.6039	.9000	5.5000	.5294
1.0000	5.5000	.4330	1.0000	7.0000	.4487	1.0000	8.5000	.4832
.4400	7.0000	.1975	.5200	7.0000	.2956	.6000	7.0000	.4379
.7000	7.0000	.5777	.8000	7.0000	.5803	.9000	7.0000	.5113
.4400	8.5000	.1872	.5200	8.5000	.2729	.6000	8.5000	.3584
.7000	8.5000	.5012	.8000	8.5000	.5504	.9000	8.5000	.5022

(B)

COEFFICIENTS FOR THE GENERAL FORM-

FIRST VARIABLE BY ROWS, SECOND VARIABLE BY COLUMNS

-.216559E+02	.592695E+01	-.587356E+00	.222228E-01
.954178E+02	-.265622E+02	.261495E+01	-.964648E-01
-.125901E+03	.354132E+02	-.332231E+01	.112277E+00
.526637E+02	-.146427E+02	.124905E+01	-.346116E-01

(C)

DOMAIN MAP, FIRST VARIABLE DOWN, SECOND VARIABLE ACROSS

	.100E+01	.175E+01	.250E+01	.325E+01	.400E+01	.475E+01	.550E+01	.625E+01	.700E+01	.775E+01	.850E+01
.440E+00	.313E+00	.247E+00	.203E+00	.176E+00	.164E+00	.161E+00	.166E+00	.173E+00	.181E+00	.183E+00	.179E+00
.496E+00	.944E+00	.665E+00	.563E+00	.472E+00	.407E+00	.363E+00	.333E+00	.313E+00	.295E+00	.276E+00	.249E+00
.552E+00	.115E+01	.947E+00	.786E+00	.663E+00	.572E+00	.506E+00	.459E+00	.422E+00	.391E+00	.359E+00	.317E+00
.608E+00	.121E+01	.107E+01	.899E+00	.769E+00	.671E+00	.599E+00	.546E+00	.504E+00	.468E+00	.429E+00	.382E+00
.664E+00	.127E+01	.108E+01	.924E+00	.805E+00	.716E+00	.649E+00	.599E+00	.559E+00	.524E+00	.486E+00	.441E+00
.720E+00	.117E+01	.101E+01	.887E+00	.792E+00	.719E+00	.665E+00	.623E+00	.590E+00	.559E+00	.527E+00	.489E+00
.776E+00	.100E+01	.898E+00	.813E+00	.746E+00	.694E+00	.654E+00	.622E+00	.597E+00	.574E+00	.551E+00	.524E+00
.832E+00	.826E+00	.772E+00	.726E+00	.686E+00	.652E+00	.624E+00	.601E+00	.582E+00	.566E+00	.554E+00	.544E+00
.888E+00	.675E+00	.666E+00	.650E+00	.629E+00	.607E+00	.584E+00	.563E+00	.547E+00	.537E+00	.535E+00	.545E+00
.944E+00	.542E+00	.611E+00	.610E+00	.595E+00	.570E+00	.541E+00	.514E+00	.493E+00	.484E+00	.493E+00	.524E+00
.100E+01	.618E+00	.564E+00	.631E+00	.599E+00	.554E+00	.504E+00	.457E+00	.422E+00	.409E+00	.424E+00	.478E+00

(D)

Figure 1-5-3: SAMPLE FUN2 DIRECTIVE OUTPUT

Part (A) is the information from the FUN2 directive (see page 12 DEFINING YOUR DATABASE). Part (B) lists all the data-point cards (up to 24) entered by the user to define the function. Notice they are printed exactly as entered--three at a time (page 12, DEFINING YOUR DATABASE). Part (C) gives the coefficients a_{jk} for the least squares approximation to the function that fits the general form $\sum_{j=0}^{m} \sum_{k=0}^{n} a_{jk} \, x^j y^k$ where m and n are the levels of fit (highest exponents for the unnamed variables x and y. The coefficients are printed to fit the following variable format: Notice that only that part of the array--that is, only those coefficients used by a function will be printed.

Part (D) of the function's description is a domain/range mapping table. The entire domain of the first variable x (from all data-point cards) is divided into 10 equal segments x_p; the entire domain of the second variable y (from all data-point cards) is divided into 10 equal parts y_r also. Then the function f's value for each (x_k, y_m) is computed and put in table form:

		Span of y		
		Split into 11 = points		
		y_o	y_m	y_{11}
Span of x	x_o			
split into	x_k		$F(x_p, y_r)$	
11 = points	x_{11}			

In essence, this table contains the approximated point-graph of the function over $D_{VAR1} * D_{VAR2}$.

Note that in the case of more than one REPORT of the database, you cannot repeat the function(s)'s definitions. It would take too much storage to save all of the above information so only the FUN2 directive information and the coefficients are kept for later use. They can never be changed except by changing the data deck between runs. However, new functions entered between solutions will get the above treatment as SHIPDOC inputs and checks new data. The function's number is simply the order in which the functions were entered and serves as the function tables index.

If the HT header [redacted] was used, before each "Function Report" of page 9 is printed, you will also get a printout of the system of simultaneous equations in matrix form used to solve for the a_{ij}:

(understood)

$$\begin{bmatrix} \text{AUX} \end{bmatrix} \begin{bmatrix} a_{oo} \\ \vdots \\ a_{mm} \end{bmatrix} = \begin{bmatrix} \text{RHS} \end{bmatrix}$$

as well as the contents of RHS after the solution (same as part (C) page 9).

This completes the description of all printout that can result in any input/check cycle of the program.

5.5 DATABASE REPORT

5.5.1 Standard Report

This is a summary of all stored portions of the database, except functions. This part may be repeated as many times as you like as you make changes or add to your database. Old unchanged, old changed, or new parts of the base data set will all be printed each time.

The three tables of variables: direct variables V_{I_i}, V_{I_i}, dependent variables (VARs), and VARN variables are printed first along with the user-defined stability and range or reserve buoyancy. These form additional constraints for everything that follows. Since VARNs are defined in terms of functions or equations as well as other variables, the VARN table is printed after the equations. (Functions were printed in part (1).)

MAIN VARIABLE NAMES	LCUE	PCUE	HTWD	BCUE	LEAD
INITIALIZING VALUES	400.00	700.00	33.00	24.00	1.00
START VECTOR	400.00	700.00	33.00	24.00	1.00
LOWER LIMIT	-.100000+301	-.100000+301	-.100000+301	-.100000+301	-.100000+301
UPPER LIMIT	.100000+301	.100000+301	.100000+301	.100000+301	.100000+301

(A) (B) (C)

REQD VERT STAB. FT 2.00000

REQUIRED RANGES 6200.00000 *

(D)

(E)

MAIN VARIABLE LCUE VARIES THIS RUN.

MAIN VARIABLE PCUE VARIES THIS RUN.

MAIN VARIABLE HTWD VARIES THIS RUN.

MAIN VARIABLE BCUE FIXED THIS RUN.

MAIN VARIABLE LEAD FIXED THIS RUN.

CONSTRAINT NO 1 ACTIVE THIS RUN.

CONSTRAINT NO 2 INACTIVE THIS RUN.

CONSTRAINT NO 3 ACTIVE THIS RUN.

CONSTRAINT NO 4 INACTIVE THIS RUN.

3 DIGIT WEIGHT REPORT SELECTED.

BEST TRAP INACTIVE THIS RUN.

CROSS REFERENCE TABLE IS NOT WRITTEN THIS RUN.

VARIABLE ADDRESS TABLE IS NOT WRITTEN THIS RUN.

Figure 1-5-4: SAMPLE DIRECT VARIABLE AND CONSTRAINT INFORMATION

RUN NO 08/16/83 10.00.02. DS SES MONO CUSHION CUSHION CHINE FIX HTCB = 20 PAGE 21

TABLE OF VAR VARIABLES

NO	NAME	PARENT	KO	KL	KF	KA	KK	KL	F	A	R	L	E
1	VCGS	10.000	.02415	-10.00000	1.00000	0.00000	0.00000	0.00000	1.00000	0.00000	0.00000	0.00000	1.00000

Figure 1-5-4: SAMPLE DIRECT VARIABLE AND CONSTRAINT INFORMATION (CONT)

At (A), you'll find the main variable names V_{I_i} that you entered and LEAD, the one quantity you cannot give a name in V407190. (B) lists the parent values for each, while (C) lists the current values. If no STVR directive (V407190) or STRT directive (V409300) was entered in one of the input cycles, SHIPDOC assumes that the parent values are to be the start vector. In subsequent REPORTS after the first, (C) will list the last best set of values obtained. (D) and (E) simply list the last STAB and RESB directive values entered by the user. The intent is to list all user-defined constraints for the next solution attempt.

At (F), and on the next one or two pages (as required by the number of VARs entered), is your VAR table. Recalling the basic definition of a VAR = $k_o * (k_l + k_f V_{I_1}{}^F + k_a V_{I_2}{}^A + k_r V_{I_3}{}^R + k_\ell V_{I_4}{}^L)^E$, you can see that the table simply lists the coefficients and exponents in order from the formula. Recall also that since you entered the VAR's parent value instead of k_o on the VAR1, VAR2, VA1C, or VA2C card, SHIPDOC has computed k_o for you and printed it here. The VAR number is the order in which it was entered in the VAR table index.

Listed next are all FORTRAN-style equations entered thus far in order--1-card equations first, then 2-card equations, and so forth. Remember that each type has its own table to conserve storage space (that is, different lengths), so the equation numbers repeat if there is more than one type. Again, these are just the various table indices.

[ALL EQUATION TABLES]

IN ORDER: E1, E2, E3, E4.]

NO	NAME	1-CARD EQUATIONS
1	ACS1	X0 * X1 - X2 * X3 - X4 * X4 * X5 * X2 * X2 * X6 * (X1 - X4) * (X1 - X4) * X7
2	BHR1	X0 * X1 * X2 * X1 * X3 * X4
3	BHR2	X0 * (X1 * X2 * X3 / X4) * X5
4	BOA	X0 * X1 * (X2 - X3) * X4
5	DISP	(X0 * X1 * (X2 / X3) * (X4 + (X2 / X3) * X5 * X6 * X7 * X8)) / X9
6	EA/B	X0 / X1
7	HSD	(X0 * X1) / (X2 * X3 * X4)
8	NCUE	(X0 - X3) * X2 * (X4 - X0) * X1
9	LSHP	X0 * X1 * X2 * X3 * X4 * (X5 - X4) * X6
10	SEP2	X0 * X1
11	STH2	((X0 ** X1) * X2)
12	STLD	(X0 - ((X1 - X2 * (X3 - (X4 - X5) / X6)) ** X9)) * X8 * X6 * X6 * X7 / Y0
13	VOLB	(X0 * (X1 - X2) - ((X1 - X2) ** X3) * X4) * X5 * X6 / X7
14	V120	X0 * (X1 / (X2 * X3))
15	VSH	(X0 - (X1 * (X2 - X3) - ((X2 - X3) ** X4) * X5)) * X6 * X7 / X8
16	EODR	(- X1 + ((X1 * X1 - X4 * X0 * X2) ** X5)) / (X3 * X0)
17	EA	X0 + X1 * X2 + X3 * X4 * X5 + X6 * X7 * X8 * X9 + Y0 * Y1 * Y2 * Y3
18	EB	X0 + X1 * X2 * X3 * X4 + X5 * X6 + X7 * X8 * X9 + Y0 * Y1 * (Y2 ** Y3)
19	ED	X0 * X1 * X2 * X3 * X4 * ((X5 + X6) ** X7) + X8 * (X9 ** Y0) * (Y1 ** Y2) * Y3
20	EE	X0 * X1 * (X2 ** X3) + X4 * X5 * (X6 ** X7) + X8 * X9 * (Y0 ** Y1)
21	EF	X0 * X1 + X2 * ((X3 + X4 * X5 + X6 * X7 + X8 * X9) ** Y0) * Y1 * (Y2 ** Y3)
22	EG	X0 * (X1 ** X2) * ((X3 + X4 * X5) ** X6) * X7 * X8 / X9 / (Y0 ** Y1) * Y2 * Y3
23	EAIR	X0 * (X1 - X2 * (X3 / X4 - X5)) * X6 / X7 * (X8 ** X9) * Y0 * Y1
24	EABC	X0 * X1 * X2 * X3 * X4 * X5 / X6 / X7 / (X8 ** X9)
25	EODF	(- X1 + X4 * ((X1 * X1 - X5 * X5 * X0 * X2) ** X5)) / (X5 * X0) + X6
26	EGG	(X0 - X1) / X2 * (X3 * X7 / Y1 - X4 * (X8 ** X9) - X5 * X6 / Y0) * Y2
27	EC	X0 * X1 + X2 * (X3 ** X4) + X5 * (X6 ** X7) + X8 * (X9 ** Y0) + Y1 * (Y2 ** Y3)
28	ESUM	X0 * (X1 + X2 + X3 + X4 + X5 + X6 + X7 + X8 + X9 + Y0 + Y1 + Y2 + Y3)

NO	NAME	2-CARD EQUATIONS
1	EHB2	(X5 * X6 / (X0 * X0 * X1) - X4 * (X7 + X4 * X2 * X3)) / ((X2 * (X8 + X0 * X4 * X3)) / X0 + X7) + X4
2	ASH	(X0 - X1) * (X2 + X4 + X3 * X5) * X1 * X6 + (X0 - X1) * (X0 - X1) * X7 * X2 + (X8 * X0 - X1) * (X9 / Y1) * X2 + (X6 - Y0)
3	FLAT	(+ (X4 * X5 * X3) + (((X4 * X5 * X3) ** X6) + X6 * X6 * (X0 * X1 * X2 * X3) * X5 * X7) ** X8) / (X6 * (X0 * X1 * X2 * X3))
4	ECDF	X1 + (X3 - X4) / X4 / X5 * (X2 - X0) + ((X3 - X4) / X4) * ((X3 - X4) / X4) * (X2 - X5 * X1 + X0) / X5

Figure 1-5-5: SAMPLE EQUATION DIRECTIVE LISTING

After the equations comes the printout of all variable name lists entered by the user. There are three of these tables—for 1-card, 2-card, or 3-card lists. All 1-card lists and the first 14 names in the other two tables are printed under the X0-Y3 heading to show the correspondence fixed by SHIPDOC between dummy variables used in the previous equation(s) and the listed variable names.

```
RUN NT   08/13/83  C1.26.07.          DS SES TWIN CUSTISR              FIX BCUE=24, FREE LCUE,PCUE,HTWD *                PAGE   26

NO   LIST NAME     VARIABLE NAMES ON 1 CARD AND THEIR CORRESPONDENCE

                   X0     X1     X2     X3     X4     X5     X6     X7     X8     X9     Y0     Y1     Y2     Y3
  1    CIOS        NCUE   C1     C1     C1     C1     C1     C1     C1     C1     C1
  2    ACS1        BHB1   HSD1   HTWD   BCUE   DCB1   CTA1   CTB1   TANF
  3    ACS2        HSD2   HTWD   BHB2   C2     NCUE   STH2   DCB2   CTA2   DHB2   C.40   BCUE   FLT2   SEP2   TANF
  4    BHB1        BCUE   C2     FLT1   DCB1   CTA1
  5    BHB2        NCUE   BCUE   CO     STH2   C2     SEP2
  6    BOA1        BHB1   C2     HSD1   DCB1   TANF
  7    BOA2        BHB2   C2     HSD2   DHB2   TANF
  8    DCB1        LCW1   LCUE   PCO1   CTA1   CC     CTB1   C2     FLT1   BCUE   DISP   C1     C-1    C1/2   C35
  9    DCB2        LCW2   LCUE   PCO2   CTA2   CO     CTB2   C2     FLT2   BCUE   DISP   C2     C-1    C1/2   C35
 10    AAA         CO     PCO1   CTO1   C1     PC11   CTI1   CO     CO     CO     CO     CO     CO     CO     CO
 11    BBB         CO     C2     FLT1   C2     PCO1   DCB1   C2     PCI1   CTI1   DCB1   CO     CO     CO     CO
 12    VVL         C1     C1     C1     C-1    C35    DISP   LHW1   C1     C1     C1     CO     CO     CO     CO
 13    CCC         VVL    PCO1   DCB1   C2     FLT1   DCB1   PCI1   CTI1   DCB1   DCB1   CO     CO     CO     CO
 14    HHH         AAA    BBB    CCC    C2     C4     C1/2   CO     CO     CO     CO     CO     CO     CO     CO
 15    DHB1        HPH    C1     DCB1   CO     CO     CO     CO     CO     CO     CO     CO     CO     CO     CO
 16    DHB2        C2     LHW2   PCO2   CTA2   DCB2   DISP   C35    FLT2   STH2
 17    DIS1        C1     LCUE   PCUE   RHOG   BCUE   CTA1   PCO1   C2     FLT1   C35
 18    DIS2        C2     LCUE   PCUE   RHOG   BCUE   CTA2   PCO2   C2     FLT2   C35
 19    FLT1        NSH1   LCUE   TFTD   LWKB   C1     DISP   C2     KBCL   C1/2
 20    FLT2        NSH2   LCUE   TFTD   LWKB   C1     DISP   C2     KBCL   C1/2
 21    H/B1        HSD1   BOA1
 22    H/B2        HSD2   BOA2
 23    HBOW        C1     HSDK   CO     CO     CO     CO     CO     CO     CO     CO     CO     CO     CO     CO
 24    HSD1        C1     HSDK   CO     CO     CO     CO     CO     CO     CO     CO     CO     CO     CO     CO
 25    HSD2        C1     HSDK   CO     CO     CO     CO     CO     CO     CO     CO     CO     CO     CO     CO
 26    HSDK        C1     HTWD   HTCB   CO     CO     CO     CO     CO     CO     CO     CO     CO     CO     CO
 27    HSTN        C1     HSDK   CO     CO     CO     CO     CO     CO     CO     CO     CO     CO     CO     CO
 28    LCW1        CTRS   DCB1   LCUE   TA60   DCB1   CO     CO
 29    LCW2        CTRS   DCB2   LCUE   TA60   DCB2   CO     CO
 30    LHW1        CTRS   DHB1   LCUE   TA60   DCB1   DHB1   CTRB
 31    LHW2        CTRS   DHB2   LCUE   TA60   DCB2   DHB2   CTRB
 32    LOA1        CTRS   HSTN   LCUE   TA60   DCB1   HBOW   CTRB
 33    LOA2        CTRS   HSTN   LCUE   TA60   DCB2   HBOW   CTRB
 34    SEP2        C2     STH2
 35    STH2        BCUE   C1     C1     C1     C1     C1     C2     C1     C1     C1     C1     C1     C1     C1
 36    STL1        SLCA   SLCB   SLCC   SLCD   HTWD   DHB1   LCUE   BCUE   H1/3   C1/2   1000
 37    STL2        SLCA   SLCB   SLCC   SLCD   HTWD   DHB2   LCUE   BCUE   H1/3   C1/2   1000
 38    VCB2        BOA2   HSDK   HTWD   C2     TANF   LOA2   CCB2   1000
 39    VCB1        BOA1   HSDK   HTWD   C2     TANF   LOA1   CCB1   1000
 40    VSH1        ACS1   BOA1   HSDK   HTWD   C2     TANF   LOA1   PCO1   1000
 41    VSH2        ACS2   BOA2   HSDK   HTWD   C2     TANF   LOA2   PCO2   1000
 42    VOLA        C1     VOLB   VSH    CO     CO     CO     CO     CO     CO     CO     CO     CO     CO     CO
 43    WFT1        C2     C035   C050   C065   S135   S150   S165   H/B1
 44    WFT2        C2     C050   C065   C075   S250   S265   S275   H/B2
 45    W120        STB    LOA    CL/H   HBOW
 46    W160        C160   C1     C1FO   VOLA   E160   C1QO   W200   E1FO   D160   VOLA   E100   D1FO   VOLA   E1IO
 47    W170        C170   C1     C1GO   VOLA   E170   C1RO   W400   E1GO   CO     C1     C1     CO     C1     C1
 48    W180        C180   C1     C1HO   W200   E180   C1SO   W500   E1HO   CO     C1     C1     CO     C1     C1
 49    W190        CO     CO     CO     CO     CO     CO     CO     CO     CO     CO     K190   BCUE   CIOS   HTWD
 50    WTFT        LOA    WTFT   CO     CO     CO     CO     CO     CO     CO     CO     CO     CO     CO     CO
```

Figure 1-5-6: SAMPLE LIST DIRECTIVE LISTING

Now we are ready to print the VARN table. Recall that in the introduction (page 5), it was pointed out that a VARN is a special variable in that it can be defined in terms of other relationships which in turn depend on that VARN's value. Because of this possible loop structure, SHIPDOC makes sure we have a consistent set of VARN values before printing the VARN table by recomputing the entire table's values over and over until

$$\text{RATIO} = \frac{\text{PREVIOUS VALUE} - \text{CURRENT VALUE}}{\text{CURRENT}} < 10^{-7}$$ for all VARNs. That is, as RATIO approaches 0 for all VARNs, we are converging to consistency. After the maximum number of passes through the VARN Table, any VARN which does not meet the RATIO $<10^{-7}$ test will be indicated without titles:

(VARN NO.) (PREVIOUS VALUE) (CURRENT VALUE) (RATIO)

99999—— ±.99999E ±99—— ±.99999E ±99—— ±.99999E ±99

For this base data set REPORT, checking for consistency and recomputation of inconsistent VARNs may be done 19 times before "giving up" and printing the table anyway. V409300 will iterate up to 40 times so as to be consistent with the solution finder maximum number of within cycle iterations.

The VARN table itself is easy to interpret. The six columns on the left are the contents of the VARN directives you entered. The last column on the right shows the current values found above (consistent or not).

TABLE OF VARN VARIABLES

NO	NAME	DESCRIPTION		VAR1	VAR2	FUN2	PARENT		
101	OFID	FIN FES DESIGN	303300	OFID	EABC		6589.796823	-.100000+301	.100000+301
102	POC	CUSH PPES FLO CRUISE CUSHBORNE	303300	POC	EABC		691.048973	-.100000+301	.100000+301
103	POH	CUSH PPES FLO CRUISE HULLBORNE	303300	POH	EABC		1071.668559	-.100000+301	.100000+301
104	PO	CPUISE PANGE CUSHION PRESSUPE	303300	PO	EB		1071.668559	-.100000+301	.100000+301
105	POD	CUSHION PRESSURE FLO PSF DESIGN	3033C0	POD	EB		691.048973	-.100000+301	.100000+301
106	CPFC	PPES. PED. FACTOR CUSHBORNE	303300	CPFC	ETNH		.810747	-.100000+301	.100000+301
107	DPFC	PPES. PED. FACTOR CUSHBORNE DES	303300	DPFC	ETNH		.957078	-.100000+301	.100000+301
108	CPF	CRUISE PRESSURE REDUCTION FACT	303300	CPF	EB		0.000000	-.100000+301	.100000+301
109	CPFD	DES PRES PEDUCTION FACTOR	303300	CPFD	EB		.957078	-.100000+301	.100000+301
110	HFC	CUSH DRAFT IN. FACTOR CUSHBORNE	303300	HFC	ETNH		1.773701	-.100000+301	.100000+301
111	HFDC	DES CUSH DRAFT INCREASE FACTOR	303300	HFDC	ETNH		1.364472	-.100000+301	.100000+301
112	WRC0	DOC WAVE RES COEF F/A=0.00	303300	FRL	L/BB	RCC0	.146653	-.100000+301	.100000+301
113	WRC6	DOC WAVE RES COEF F/A=0.06	303300	FRL	L/BB	RCC6	.110485	-.100000+301	.100000+301
114	WRC*	DOC WAVE RES COEF F/A=0.12	303300	FRL	L/BB	RCC*	.091206	-.100000+301	.100000+301
115	SRC0	DOC SEAL RES COEF F/A=0.0	303300	FRS	L/BB	RCC0	.177470	-.100000+301	.100000+301
116	SRC6	DOC SEAL RES COEF F/A=0.06	303300	FRS	L/BB	RCC6	.139847	-.100000+301	.100000+301
117	SRC*	DOC SEAL RES COEF F/A=0.12	303300	FRS	L/BB	RCC*	.124197	-.100000+301	.100000+301
118	WRD0	DOC WAVE RES COEF FOR F/A=0.00	303300	FRLD	L/BB	RCC0	.556982	-.100000+301	.100000+301
119	WRD6	DOC WAVE RES COEF FOR F/A=0.06	303300	FRLD	L/BB	RCC6	.448961	-.100000+301	.100000+301
120	WRD*	DOC WAVE RES COEF FOR F/A=0.12	303300	FRLD	L/BB	RCC*	.388838	-.100000+301	.100000+301
121	SRD0	DOC SEAL RES COEF FOR F/A=0.00	303300	FRSD	L/BB	RCC0	.375442	-.100000+301	.100000+301
122	SRD6	DOC SEAL RES COEF FOR F/A=0.06	303300	FRSD	L/BB	RCC6	.333785	-.100000+301	.100000+301
123	SRD*	DOC SEAL RES COEF FOR F/A=0.12	303300	FRSD	L/BB	RCC*	.329712	-.100000+301	.100000+301
124	WUD0	DOC WAVE RES COEF FOR F/A=0.00	303300	FRLD	L/BB	RC00	.295727	-.100000+301	.100000+301
125	WUD6	DOC WAVE RES COEF FOR F/A=0.06	303300	FRLD	L/BB	RC06	.190251	-.100000+301	.100000+301
126	WUD*	DOC WAVE RES COEF FOR F/A=0.12	303300	FRLD	L/BB	RC0*	.139498	-.100000+301	.100000+301
127	WRCF	DOC WAVE RES COEF FOR F/A	303300	WRCF	ECDF		.118173	-.100000+301	.100000+301
128	SRCF	DOC SEAL RES COEF FOR F/A	303300	SPCF	ECDF		.147423	-.100000+301	.100000+301
129	DUFR	UPPER FR RATIO FOR DES WAVE RES	303300	DUFR	ETNH		1.000000	-.100000+301	.100000+301
130	DLFR	LOWER FR RATIO FOR DES WAVE RES	303300	DLFR	ETNH		.000000	-.100000+301	.100000+301
131	SLFR	LOWER FR RATIO FOR DES SEAL RES	303300	SLFR	ETNH		1.000000	-.100000+301	.100000+301
132	SUFR	UPPER FR RATIO FOR DES SEAL RES	303300	SUFR	ETNH		0.000000	-.100000+301	.100000+301
133	WUDF	DOC WAVE RES COEF UPPER FR DES	303300	WUDF	ECDF		.212148	-.100000+301	.100000+301
134	WLDF	DOC WAVE RES COEF LOWER FR DES	303300	WLDF	ECDF		.472164	-.100000+301	.100000+301
135	WRDF	DOC WAVE RES COEF FOR F/A DES	303300	WRDF	EC		.212148	-.100000+301	.100000+301
136	SLDF	DOC SEAL RES COEF LOWER FR DES	303300	SLDF	ECDF		.340908	-.100000+301	.100000+301
137	SUDF	DOC SEAL RES COEF UPPEP FR DES	303300	SUDF	ETNH		.152663	-.100000+301	.100000+301
138	SPDF	DOC SEAL RES COEF FOR F/A DES	303300	SPDF	EC		.340908	-.100000+301	.100000+301
139	DFS2	DISP RED FACTOR 50\ FUEL	303300	DFS2	EAIR		.915644	-.100000+301	.100000+301
140	DFS4	DISP PED FACTOR 0\ FUEL	303300	DFS4	EAIR		.820208	-.100000+301	.100000+301
141	ATOC	WET AREA HULL SIDES CUSH CRUISE	303300	ATOC	EGG		36.256958	-.100000+301	.100000+301
142	ATOC	WET AREA HULL SIDES CUSH DESIGN	303300	ATOC	EGG		23.474828	-.100000+301	.100000+301
143	ATOH	WET AREA HULL SIDES HULLBORNE	303300	ATOH	EGG		41.091586	-.100000+301	.100000+301
144	ATOT	WET AREA HULL SIDES CRUISE	303300	ATOT	EB		41.091586	-.100000+301	.100000+301
145	ATOD	WET AREA HULL SIDES DESIGN	303300	ATOD	EB		23.474828	-.100000+301	.100000+301
146	CWDC	CUSH WAVE RES DESIGN CUSHBORNE	303300	CWDC	EABC		213447.114788	-.100000+301	.100000+301
147	CWC	CUSH WAVE RES CRUISE CUSHBORNE	303300	CWC	EABC		160718.425348	-.100000+301	.100000+301
148	CWD	CUSH WAVE RES DESIGN	303300	CWD	EB		213447.114788	-.100000+301	.100000+301
149	CW0	CUSH WAVE RES CRUISE 100 FUEL	303300	CW0	EB		0.000000	-.100000+301	.100000+301
150	CW2	50\ FUEL	303300	CW2	EABC		0.000000	-.100000+301	.100000+301

Figure 1-5-7: SAMPLE VARN DIRECTIVE LISTING

The next of the base data set tables to be printed is the ITEM table itself. (See below.) For only single variable items (no function of two variables or equation and list), a conversion coefficient = $\frac{\text{parent value}}{\text{current value}}$ is comprised first.* Then, the basic information from the ITEM (or ITMC) directives are printed along with this new value (if it is a single variable item); otherwise, the inversion coefficient field remains zero as originally initialized by the H-type directive(s) input by the user.

*This may change between solutions.

NO	NAME	WT GRP	DESCRIPTION
46	W313	313	SESDES
47	W314	314	SESDES
48	W321	321	SESDES
49	W323	323	SESDES
50	W324	324	SESDES
51	W331	331	SESDES
52	W332	332	SESDES
53	W342	342	SESDES
54	W343	343	SESDES
55	W398	398	SESDES
56	W399	399	SESDES
57	W411	411	SESDES
58	W412	412	SESDES
59	W415	415	SESDES
60	W421	421	SESDES
61	W422	422	SESDES
62	W423	423	SESDES
63	W424	424	SESDES
64	W426	426	SESDES
65	W427	427	SESDES
66	W431	431	SESDES
67	W432	432	SESDES
68	W433	433	SESDES
69	W434	434	SESDES
70	W435	435	SESDES
71	W436	436	SESDES
72	W437	437	SESDES
73	W438	438	SESDES
74	W439	439	SESDES
75	W441	441	SESDES
76	W442	442	SESDES
77	W443	443	SESDES
78	W445	445	SESDES
79	W446	446	SESDES
80	W451	451	SESDES
81	W452	452	SESDES
82	W454	454	SESDES
83	W455	455	SESDES
84	W456	456	SESDES
85	W462	462	SESDES
86	W463	463	SESDES
87	W465	465	SESDES
88	W466	466	SESDES
89	W471	471	SESDES
90	W472	472	SESDES

BASIC ITEM AND ITEM WT INFORMATION

	VAR1	VAR2	FUN2	TYPE	PARENT	GR FAC	CON FAC
307200	W313	EA		WT	.537	1.00000	0.00000
307200	W314	EA		WT	18.900	1.00000	0.00000
307200	W321	EA		WT	38.751	1.00000	0.00000
307200	W323	EA		WT	1.341	1.00000	0.00000
307200	W324	EA		WT	26.102	1.00000	0.00000
307200	W331	EA		WT	3.493	1.00000	0.00000
307200	W332	EA		WT	10.310	1.00000	0.00000
307200	W342	EA		WT	0.000	1.00000	0.00000
307200	W343	EA		WT	6.530	1.00000	0.00000
307200	W398	EA		WT	2.880	1.00000	0.00000
307200	W399	ESUM		WT	1.420	1.00000	0.00000
307200	W411	EA		WT	0.000	1.00000	0.00000
307200	W412	EA		WT	14.000	1.00000	0.00000
307200	W415	EA		WT	0.000	1.00000	0.00000
307200	W421	EA		WT	0.000	1.00000	0.00000
307200	W422	EA		WT	0.000	1.00000	0.00000
307200	W423	EA		WT	0.000	1.00000	0.00000
307200	W424	EA		WT	0.000	1.00000	0.00000
307200	W426	EA		WT	5.900	1.00000	0.00000
307200	W427	EA		WT	0.000	1.00000	0.00000
307200	W431	EA		WT	0.000	1.00000	0.00000
307200	W432	EA		WT	0.000	1.00000	0.00000
307200	W433	EA		WT	0.000	1.00000	0.00000
307200	W434	EA		WT	0.000	1.00000	0.00000
307200	W435	EA		WT	0.000	1.00000	0.00000
307200	W436	EA		WT	0.000	1.00000	0.00000
307200	W437	EA		WT	0.000	1.00000	0.00000
307200	W438	EA		WT	0.000	1.00000	0.00000
307200	W439	EA		WT	0.000	1.00000	0.00000
307200	W441	EA		WT	32.200	1.00000	0.00000
307200	W442	EA		WT	0.000	1.00000	0.00000
307200	W443	EA		WT	0.000	1.00000	0.00000
307200	W445	EA		WT	0.000	1.00000	0.00000
307200	W446	EA		WT	0.000	1.00000	0.00000
307200	W451	EA		WT	1.000	1.00000	0.00000
307200	W452	EA		WT	7.500	1.00000	0.00000
307200	W454	EA		WT	0.000	1.00000	0.00000
307200	W455	EA		WT	.600	1.00000	0.00000
307200	W456	EA		WT	0.000	1.00000	0.00000
307200	W462	EA		WT	11.300	1.00000	0.00000
307200	W463	EA		WT	169.500	1.00000	0.00000
307200	W465	EA		WT	0.000	1.00000	0.00000
307200	W466	EA		WT	0.000	1.00000	0.00000
307200	W471	EA		WT	0.000	1.00000	0.00000
307200	W472	EA		WT	10.000	1.00000	0.00000

Figure 1-5-8: SAMPLE ITEM DIRECTIVE LISTING

Immediately after the basic ITEM table comes the ITEM location table. The item numbers and names are the same as in the previous table. The data going across is simply the data from the LV, LVC, or LONG and VERT directives entered by the user:

- Longitudinal
  - Start of parent compartment
  - End of parent compartment
  - Location (coordinate) of item
  - Relocate factor (number of compartments)
  - List or first variable name
  - Equation or second variable name
  - Function name, if any
  - How to determine current arm
- Vertical
  - Distance to baseline
  - Ratio of VCG or VCB to parent
  - List or first variable name
  - Equation or second variable name
  - Function name, if any
  - How to determine current arm

ITEM LOCATION DATA

NO	ITEM NAME	COMPARTMENT DATA START	END	PARENT	REPEAT	LCG VAL1	VAL2	FUNL	LCGN	DISTANCE TO BASE	RATIO VERT TO LONG	VCG VAV1	VAV2	FUNV	VCGN
46	W313	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
47	W314	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
48	W321	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
49	W323	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
50	W324	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
51	W331	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
52	W332	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
53	W342	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
54	W343	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
55	W398	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
56	W399	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
57	W411	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
58	W412	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
59	W415	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
60	W421	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
61	W422	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
62	W423	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
63	W424	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
64	W426	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
65	W427	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
66	W431	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
67	W432	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
68	W433	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
69	W434	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
70	W435	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
71	W436	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
72	W437	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
73	W438	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
74	W439	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
75	W441	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
76	W442	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
77	W443	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
78	W445	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
79	W446	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
80	W451	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
81	W452	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
82	W454	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
83	W455	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
84	W456	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
85	W462	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
86	W463	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
87	W465	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
88	W466	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
89	W471	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			
90	W472	0.000	1.000	.500	0.000	LCUE				0.000	0.00000	VCGS			

Figure 1-5-9: SAMPLE LV DIRECTIVE LISTING

5.5.2 Optional Cross Reference Table

The remainder of the database REPORT is an optional cross reference between all variables (main variables, VARs, and VARNs) and items. It shows a variable name is part of any item's definition(s), that is, if the variable name was on an ITEM, LV, ITMC, LVC, LONG, or VERT directive, and actually indicates which value it plays a part in finding. Before V409300 ~~Hove-correctly~~, the table puts XX beneath the correct column heading to show if the variable name is:

VAR1 or VAR2 on an ITEM (ITMC) directive.

VAR1 or VAR2 (used to find longitudinal arm) on LV, LVC, or LONG directive.

VAR1 or VAR2 (used to find vertical arm) on LV, LVC, or VERT directive.

For V409300, the cross reference table lists the directive type, the number in that directive table, and the directive name.

CROSS REFERENCE BETWEEN VARIABLES AND ITEMS

NO	NAME	NO	ITEM	DESCRIPTION	WTV1	WTV2	LOV1	LOV2	VEV1	VEV2
		20	BS	SHIPMAR WWAPG=DES,BUILD,CONST,GFM						
		21	XBM	SHIP RIGHTING ARM CARD FT TONS					XX	
									XX	
50	LBOW									
		27	BBB	BOW BUOY OF SIDEHULL BOW (LT)						
		28	BBE	BOW ADDED BUOY OF SIDEHULL BOW (LT)			XX			
							XX			
51	LCUE									
		25	BBA	CUSH BUOY OF CUSHION (LT/FT)			XX			
52	LFCU									
		26	X8	CUSH LENGTH BTWN ST CUSH AND ST SH			XX			
53	LMID									
		29	BBC	MID BUOY OF SIDEHULL MID (LT/FT)						
		30	BBF	MID ADDED BUOY OF SIDEHULL MID LT/FT			XX			
							XX			
54	LV12									
		12	BK	SHIPVL12WFT = FUEL JP-5 W/O RESID (F42)			XX			
		13	V1	SHIPVL12 ON STATION FUEL = HIGH SPEED			XX			
		14	V2	SHIPVL12 ON STATION FUEL = LOW SPEED			XX			
		22	XINF	SHIP RESR IS USED FOR RANGE, ARM OF			XX			
		23	RNG	SHIP ITEM " RNG" IS LONG ARM OF VL12			XX			
55	LSTN									
		31	BBD	STN BUOY OF SIDEHULL STN (LT)						
		32	BBG	STN ADDED BUOY OF SIDEHULL STN LT/FT			XX			
							XX			
56	LTCU									
		24	XA	SHIP LENGTH TO START OF CUSHION			XX			
57	NCRW									
		9	BM	SHIPVL01-CT = SHIPS FORCE (F1) (LT)		XX				
		11	BJ	SHIPVL04-CT = STORES (F3) LT		XX				
		17	BM	SHIPVL12-CT = FRESH WATER (F52) LT	XX					
58	NWRW									
		13	V1	SHIPVL12 ON STATION FUEL = HIGH SPEED		XX				
59	NWPL									
		14	V2	SHIPVL12 ON STATION FUEL = LOW SPEED		XX				
60	NTEG									
61	NTFL									

Figure 1-5-10: SAMPLE CROSS REFERENCE LISTING - PRIOR TO V409300

CROSS REFERENCE LISTING FOR EQ-1

REFERENCING EQ-1 NO	NAME	REFERENCED BY TYPE	NO	NAME	TYPE	NO	NAME	TYPE	NO	NAME	TYPE	NO	NAME	TYPE	NO	NAME	TYPE	NO	NAME
		ITEM	135	W427	ITEM	136	W431	ITEM	137	W432	ITEM	138	W433	ITEM	139	W434	ITEM	140	W435
		ITEM	141	W436	ITEM	142	W437	ITEM	143	W438	ITEM	144	W439	ITEM	145	W441	ITEM	146	W442
		ITEM	147	W443	ITEM	148	W445	ITEM	149	W446	ITEM	150	W451	ITEM	151	W452	ITEM	152	W454
		ITEM	153	W455	ITEM	154	W456	ITEM	155	W621	ITEM	156	W622	ITEM	157	W623	ITEM	158	W624
		ITEM	159	W625	ITEM	160	W631	ITEM	161	W633	ITEM	162	W634	ITEM	163	W635	ITEM	164	W636
		ITEM	165	W637	ITEM	166	W638	ITEM	167	W641	ITEM	168	W642	ITEM	169	W643	ITEM	170	W644
		ITEM	171	W651	ITEM	172	W652	ITEM	173	W654	ITEM	174	W655	ITEM	175	W656	ITEM	176	W661
		ITEM	177	W662	ITEM	178	W663	ITEM	179	W664	ITEM	180	W665	ITEM	181	W671	ITEM	182	W672
		ITEM	183	W698	ITEM	184	W699	ITEM	185	W711	ITEM	186	W712	ITEM	187	W713	ITEM	188	W721
		ITEM	189	W751	ITEM	190	W761	ITEM	191	W782	ITEM	192	W783	ITEM	193	W791	ITEM	194	W792
		ITEM	195	W793	ITEM	196	W798	ITEM	197	W799	VARN	63	W11S	VARN	64	W11M	VARN	67	X116
		VARN	95	FRS	VARN	96	FRSD	VARN	224	PCPC	VARN	225	PCP	VARN	226	PCL	VARN	239	HPT
		VARN	252	FRBL	VARN	255	FPL2	VARN	273	FCA1	VARN	279	PCA1	VARN	285	DUM1	VARN	286	DUM2
		VARN	287	DUM3	VARN	293	W200	VARN	295	KWI	VARN	304	SIX6	VARN	311	NF10	VARN	312	CONP
		VARN	314	NOFF	VARN	316	NCPO	VARN	318	NENL	VARN	323	XF31	VARN	329	WF00	VARN	335	V1.3
		VARN	341	V2.1	VARN	342	V22A	VARN	348	V31A	VARN	352	V33A	VARN	356	V3.5	VARN	357	V3.6
26	EB	ITEM	74	W542	ITEM	76	W551	ITEM	81	W562	ITEM	124	W343	VARN	114	PO	VARN	119	POB
		VARN	118	CPF	VARN	119	CPFD	VARN	156	ATOT	VARN	157	ATOD	VARN	160	DWD	VARN	161	DWO
		VARN	184	OSAO	VARN	272	TRBM	VARN	283	KW	VARN	331	V1.1	VARN	333	V1.2	VARN	354	V3.3
27	ED	VARN	274	AIRL	VARN	276	AIRP	VARN	277	TFN1	VARN	278	TFN2	VARN	279	TFN3	VARN	280	TFN4
		VARN	334	V13A	VARN	343	V22B	VARN	344	V22C	VARN	345	V2.2	VARN	346	V2.3	VARN	349	V31B
		VARN	350	V3.1	VARN														
28	EE	ITEM	105	W248	ITEM	108	W256	VARN	217	FIN2	VARN	218	PIN2	VARN	219	FOT2	VARN	220	POT2
		VARN	303	W500	VARN	308	W600	VARN	336	VOFF	VARN	337	VCPO	VARN	338	VENL	VARN	339	VOFM
		VARN	340	VPOE	VARN	351	V3.2	VARN	353	V33B	VARN								
29	FACT	VARN	172	FACT	VARN	173	FAC2												
30	EF	VARN	93	FRL	VARN	94	FRLD	VARN	99	CSAR	VARN	100	OWAT	VARN	101	OWAD	VARN	102	L/BB
		VARN	109	CFIN	VARN	180	FRC1	VARN	181	FRD1	VARN	182	FRC2	VARN	191	VFPM	VARN	193	VFDM
		VARN	203	FRB	VARN	204	FRBD	VARN	211	DIAP	VARN	330	V111	VARN	332	V12A	VARN	355	V3.4
31	EG	VARN	259	WTRP	VARN	260	WTRC	VARN	261	TRAN	VARN	269	T1L	VARN	266	T2L	VARN	267	WSHP
		VARN	268	WSHF	VARN	269	H1	VARN	270	WTD1	VARN	271	DZLM	VARN	281	TFMP	VARN	282	TFML
		VARN	289	DT1	VARN														
32	EAIR	VARN	97	DAID	VARN	98	DAIR	VARN	149	DFS2	VARN	150	DFS4						
33	EABC	ITEM	104	W245	VARN	1	L/B	VARN	74	CIDS	VARN	91	VFPS	VARN	92	VFPD	VARN	105	CFOL
		VARN	106	DFOL	VARN	107	DFOD	VARN	110	DFIN	VARN	111	DFID	VARN	112	POC	VARN	113	PON
		VARN	158	DWOC	VARN	159	DWC	VARN	162	DW2	VARN	163	DW4	VARN	164	DFRD	VARN	165	DFRC
		VARN	185	OSA2	VARN	186	OSA4	VARN	187	DOTO	VARN	188	DOTO	VARN	189	DOT2	VARN	190	DOT4
		VARN	195	DRWD	VARN	196	DRWO	VARN	197	DRW2	VARN	198	DRW4	VARN	206	GFLD	VARN	209	GFLD
		VARN	209	TDV2	VARN	210	JZKT	VARN	212	KTJO	VARN	213	KTJ2	VARN	216	POUT	VARN	227	HPP
		VARN	228	THPO	VARN	229	THP2	VARN	230	THP4	VARN	231	HPL	VARN	232	LHPO	VARN	233	LHP2
		VARN	234	LHP4	VARN	236	HPPR	VARN	237	HPFM	VARN	238	HPLS	VARN	239	HPLT	VARN	240	HPPT
		VARN	241	HPEP	VARN	242	HPPE	VARN	243	HPLE	VARN	244	FLPO	VARN	245	FLP2	VARN	246	FLP4
		VARN	247	FLCO	VARN	248	FLC2	VARN	249	FLC4	VARN	253	FPBE	VARN	257	FUL2	VARN	290	F42S
		VARN	262	RPL	VARN	263	RPP	VARN	264	PPC	VARN	290	NFAM	VARN	310	SM10	VARN	313	NF11
34	EODF																		

Figure 1-5-11: SAMPLE CROSS REFERENCE LISTING - V409300

The same general format as shown on the previous page will be followed first for all entries in the VAR Table—for each one listing all items whose values depend upon that VAR. Then, for every VARN, all items involving it will be listed with XX under which variable it is. Lastly, the same is done for the main variables. This table is a handy reference to keep track of exactly how the numerous variables are used. With the number of variables (up to 50 VARs, up to 500 VARNs, and 4 direct (V407190), you could easily confuse them. This is the end of one base data set REPORT.

5.6 SOLUTION TRACKER AND/OR RESULTING SHIP MODEL PRINTOUT (INTERMEDIATE)

This section is used when it is desirable to trace the changes in the direct or main variables values and in minimization equations during the course of finding a solution.

This part of SHIPDOC's printout occurs during the solution subroutine. If NULL(1)=2 (V407190), then no solution is attempted and the program simply prints the ship model tables for the direct variable values entered by the user. If NULL(1)≠2 and an END directive is used, either after the initial data entry or after a NOGO directive, you will get a printout tracking the solution process.

The first figure shows the format of the general printout used to track the solution process. If an HT or HP header directive was used, you will also get certain other data printed as described later (page 35). The line (A) on the figure displays the direct variable values in card columns 1-9. Before the first iteration of the solution cycle, these values will reflect the initial values (or user entered start vector if an STVR directive (V407190) was used). Subsequent repetitions of this basic tracker format will start with the "best" set of values thus far found. These are the values that will be incremented (both forward and backward) as SHIPDOC seeks to minimize ship weight and meet required constraint conditions.

```
* * * * * PROGRESS REPORT FOR CYCLE  6 * * * * *

                                        ISEL = 2        IFWD = 1

     VARMS=          LCUE          PCUE          MTWD          BCUE          LEAD          ****          ****          ****          **** (A)
CURRENT VALUES:  .46023E+03    .52268E+03    .29967E+02    .24000E+02    .10000E+01    .2C602E+00  0.            .10000E+01  0.        (D2)
  BEST VALUES:   .40000E+03    .70000E+03    .33000E+02    .24C00E+02    .1GG00E+01    .10000E+31    .10000E+31  0.
SUMWT, SUMBU, RESR, SUMPB-     .70501E+04    .70453E+04    .62000E+04    .10000E-09                                                (E)

  .38864E+02   .23738E+00  -.88350E+01  0.          0.          -.64534E+00  0.          0.          0.          =   .14930E+02 (F)
  .23738E+00  -.13645E+00   .13716E-02  0.          0.          -.13383E+02  0.          0.          0.          =  -.27662E+00
 -.88350E+01   .13716E-02  -.79922E+02  0.          0.           .36795E+02  0.          0.          0.          =   .44375E+02
  0.           0.           0.           .10000E+01  0.          0.          0.          0.          0.          =   0.
  0.           0.           0.           0.           .10000E+01  0.          0.          0.          0.          =   0.
 -.64534E+00  -.13383E+02   .36795E+02  0.          0.           .10000E+01  0.          0.          0.          =   .48559E+01
  0.           0.           0.           0.          0.          0.           .10000E+01  0.          0.          =   0.
  0.           0.           0.           0.          0.          0.          0.           .10000E+01  0.          =   0.
  0.           0.           0.           0.          0.          0.          0.          0.           .10000E+01  =   0.

NONLIN RESULT--- RESULT NOT MINIMIZED, BEGIN ANOTHER CYCLE
```


Figure 1-5-12: SAMPLE SOLUTION TRACKER OUTPUT

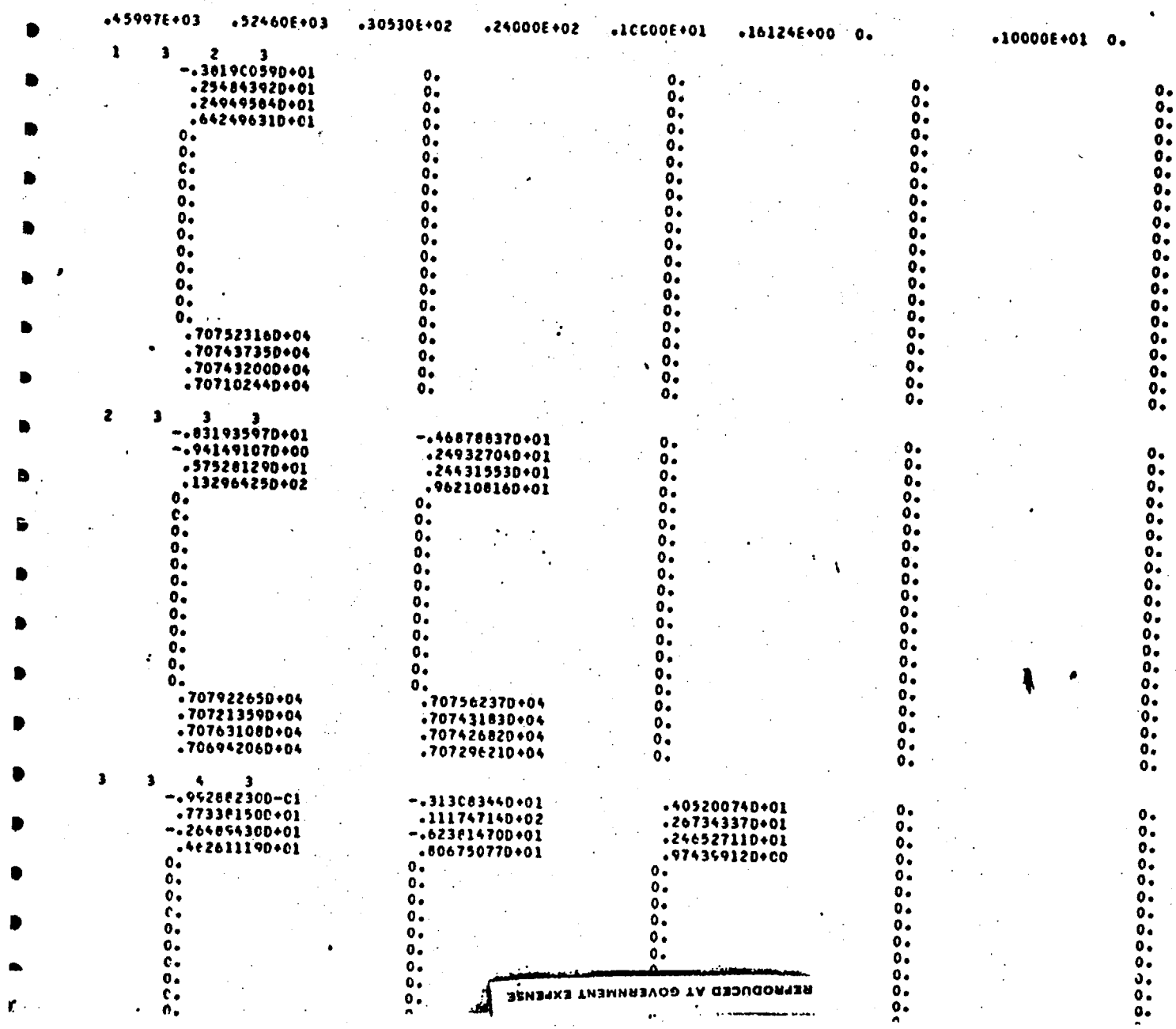
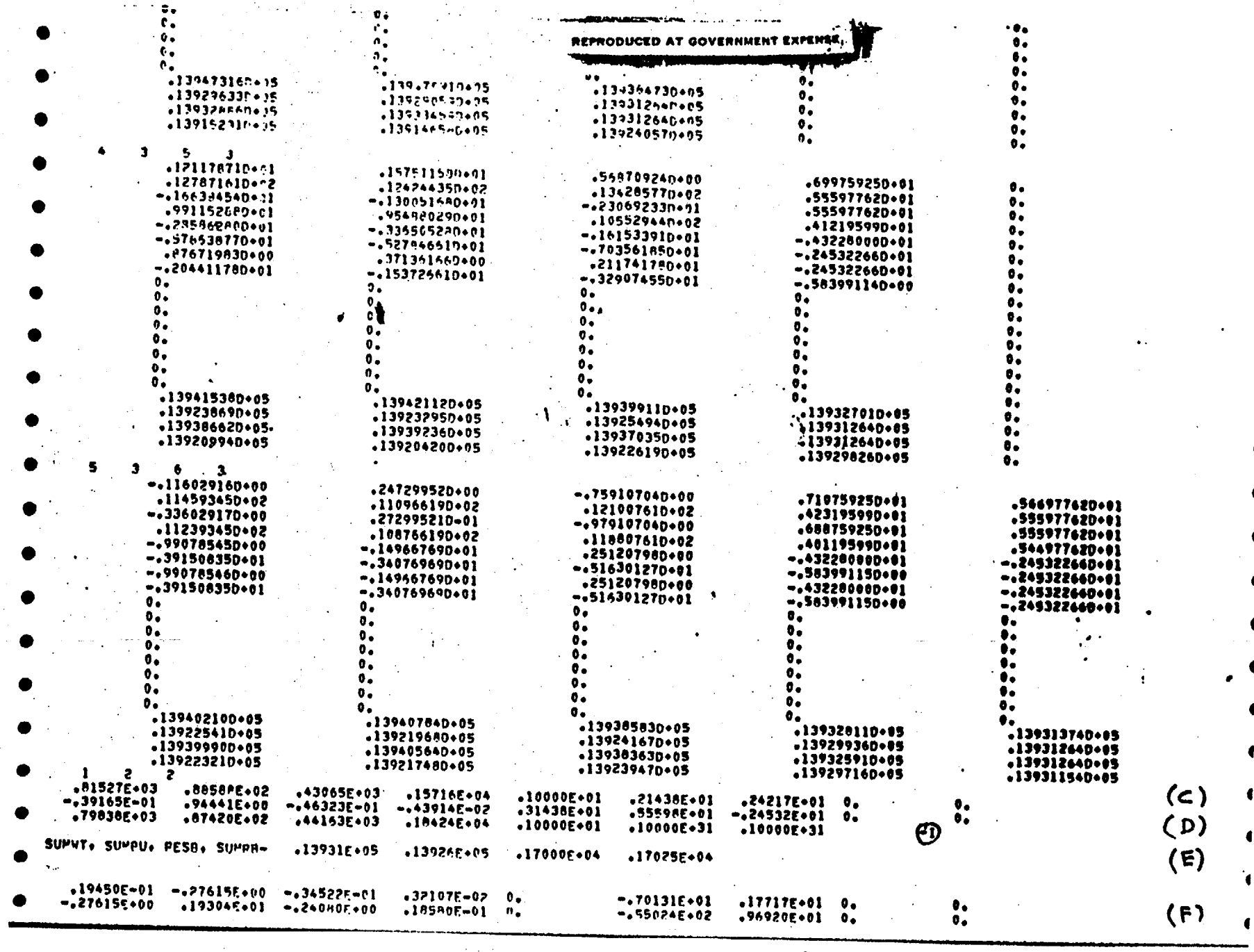


Figure 1-5-12: SAMPLE SOLUTION TRACKER OUTPUT (cont)



(C)
(D)
(E)
(F)

Figure 1-5-12: SAMPLE SOLUTION TRACKER OUTPUT (cont)

The five repetitions of portion (B) of the tracker printout for V407190 shows the changing contents of the constraint error array as the program recomputes the values for the ship model as each V_{I_i} is first incremented forward while the others are incremented backward, then as each F_{I_I} is incremented backward while others are stepped forward. The four digits before each of the five (B)s are the major loop index values--they will always be printed in the following order:

1 3 2 3	Where the first digit is the number of
2 3 3 3	the total constraint error computation
3 3 4 3	and 1 less than the third digit is the
4 3 5 3	number of the last V_{I_i} that was stepped
5 3 6 3	forward and backward first.

	amt off having SUM WT= SUMBU	amt off having reserve buoy	how much off having desired ranges	how much off having balanced ship	
with V_{I_1} stepped forward	and	others	forward		1
	and	others	backward		2
with V_{I_2} stepped forward	and	others	forward		3
	and	others	backward		4
with V_{I_2} stepped forward	and	others	forward		5
	and	others	backward		6
with V_{I_2} stepped backward	and	others	forward		7
	and	others	backward		8
with V_{I_3} stepped forward	and	others	forward		9
	and	others	backward		10
with V_{I_3} stepped backward	and	others	forward		11
	and	others	backward		12
with V_{I_4} stepped forward	and	others	forward		13
	and	others	backward		14
with V_{I_4} stepped backward	and	others	forward		15
	and	others	backward		16
total SUMWT results	with V_{I_j} forward and others forward also				17
	with V_{I_j} backward and others forward				18
total SUMWT results	with V_{I_j} forward and others backward				19
	with V_{I_j} backward and others backward				20

The above chart shows the significance of the values in each (B) portion printed. Notice that the first column is recomputed five times while the last one is computed only during the last ship model computation.

Following five of the above (B) printouts and the associated reevaluations for the ship model, (for versions previous to V407190) you will see at (C) three digits which identify the number of this solution cycle (0 is the starting one) and the current setting of two indicators ISEL and IFWD. ISEL = 1 'STAB' / 2 "TRIM" describes which stability of the ship is controlling while IFWD = 1 - FWD describes location for stability

2 - AFT

3 - CMPT (computed : vertical stability)

lead. These values change as the optimization continues. The three lines at (D) are respectively the current values of the direct variables VARMs and La Grange multipliers, the error vector used in the upcoming nonlinear solution, and the set of "best" values thus far obtained. At (E), we have values for total weight, total buoyancy, the required range or reserve buoyancy value, and the actual range or reserve buoyancy obtained for the current cycle. At (F), we have displayed the coefficient matrix for the system of nonlinear equations which this cycle will seek to solve, INCLUDING THE ERROR VECTOR.

What follows this cycle solution is determined by the results of the solution attempt. If all constraints are approximately met ($< \varepsilon_i = 10^{-6} * \Sigma_k |$ AUX(i,k)| for each constraint), then SHIPDOC will stop recomputing the ship base data set values and printout the current base data value. No ending message will be printed here unless an HT card was used; and then '25005' is printed at (G) to indicate that SHIPDOC will now display the ship model solution. If the solution attempt was unsuccessful (that is, constraint errors are not approaching zero), SHIPDOC goes back and starts a new series of base data set

reevaluations based on the current "best" values for V_{I_i} which are displayed as at (A) as the solution tracker printout begins anew.

If the number of solution cycles required to minimize the ship's weight and meet desired constraints exceeds NCYMAX, the number of such cycles allowed by the user, you will get a "25002" message at (G), followed by "BEST" and the ship model reports. If any V_{I_i}'s current value is outside the bounds set by SHIPDOC (10^{20}) indicating the ship model is not converging to a limit, you will get the "25003" message at (G) followed by "BEST" and the ship model printouts.

If none of the error conditions of the last paragraph occur and the conditions for a successful solution are not met, you will have no indication on the printout unless you used an HT or HP card. Then "25001" will be printed at (G) before starting the tracker printout again at (A). Notice that in each of the above cases where the attempt to find a solution is interrupted, you get the "BEST" message at (G) to let you know that the following model report is only the "best" obtained thus far and is not to be interpreted as the solution.

An HP or HT card will add to the solution tracker printout as follows:

a. "25001" _ _ _ _ # at the start to mark the beginning of solution cycle #; printed before the solution tracker printout begins at (A).

b. After getting the current values for V_{I_i} printed at (A), you will also get a printout of the DELTA Table at (H). This table contains the current values for:

	values for convergence	basic increment	lower bound for V_{I_i}	upper bound for V_{I_i}
V_{I1}			-10^{20}	$+10^{20}$
V_{I2}				
V_{I3}				
V_{I4}				

c. [HT-only] For each item's values added to get the total ship model's values you will get the ship totals thus far:

sum of weight	sum of buoyancies	sum of reserve buoyancies
sum of longitudinal arms for weight	sum of longitudinal arms for buoyancy	sum of longitudinal arms for res. buoyancies
sum of vertical arms for weight	sum of vertical arms for buoyancy	sum of vertical arms for res. buoyancies

item no.	item's current magnitude	longitudinal location of this item as % of compartment length	vertical location of this item as % of vertical arm
item's current compartment length	item category	relationship type involved (0,1,101)	ship's length thus far

These four lines at (I) are printed for <u>every</u> item <u>every</u> time the summation process is run if an HT card is used.

d. After <u>each</u> summation process to compute values for the ship model, you will also get the current values of ISEL and IFWD at (J) (see page 18) so you can watch how their values change too.

Afterwards, you get one (B) portion (see page 17) followed by more (C) and another (D) before the next (B) portion. This <u>tracing</u> of the solution process step by step is the option whose switch is turned on by an HT card. Norice that for each solution cycle, you can get "25001" and the Delta Table only once, but the four lines at (I) occur for <u>every</u> item <u>each</u> time the ship's model is recomputed.

If NULL(1) = 2 (V407190), the previously described solution tracker portion is skipped for the most part regardless of whether an HP or HT header card was used or not. Without an HP or HT, you will only get line (A) (page 29). With an HP card, you will get "25001", line (A), and Table (H). With an HT card, you will get "25001", line (A), Table (H), plus <u>one</u> series of (I) before each of the following Tables.

5.7 SHIP MODEL PRINTOUT/SOLUTION RESULTS

Fig 1-5-13 shows the final values for all WT, DISW, BUOY, DISB, RB, and DISR items - the magnitude and arms of each. The final lines contain <u>total</u> computed values for the whole ship for these items.

RUN NO 08/13/83 01.26.07. OS SES TWIN CUSHION FIX BCUE=24, FREF LCUE,PCUE,HTWD PAGE 94

NO	ITEM	DESCRIPTION		WT	LCG	VCG	BUOY	LCB	VCB	AB	RLCB	RVCB
1	W110			2140.03	246.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	W120	TR BKHD	303300	120.00	256.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	W150		307200	75.00	256.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	W160	FINAL WT. REPORT	303300	185.76	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	W170	FINAL WT. REPORT	303300	35.39	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	W180	FINAL WT. REPORT	303300	102.27	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	W190	SEALS WT GRP 119	307200	21.90	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	WF11		307200	5.70	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	WF12		307200	4.68	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	WF13		307200	29.50	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	WF21		307200	161.70	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	WF22		307200	0.00	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	WF23		307200	27.90	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	WF26		307200	18.70	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	WF31		307200	49.04	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	WF32		307200	1.19	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	WF39		307200	1.25	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	WF41		307200	1344.26	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	WF42		307200	75.00	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	WF46		307200	0.00	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	WF49		307200	0.00	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	WF52		307200	57.37	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	WF53		307200	5.00	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	WF54		307200	1.00	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	WF55		307200	6.55	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	W233	SESDES	307200	150.12	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	W234	SESDES	307200	76.72	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	W235	SESDES	307200	.00	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	W237	AUXILIARY PROPULSION CODOG	307200	.00	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	W241	SESDES	307200	97.13	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	W242	SESDES	307200	2.46	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32	W243	SESDES	307200	60.99	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33	W244	SESDES	307200	11.34	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
34	W245	SESDES	307200	35.61	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	W248	SESDES	307200	14.62	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36	W251	SESDES	307200	14.79	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
37	W252	SESDES	307200	2.09	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
38	W256	SESDES	307200	2.19	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
39	W259	SESDES	307200	7.07	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	W261	SESDES	307200	5.13	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41	W262	SESDES	307200	4.77	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
42	W264	SESDES	307200	1.37	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
43	W298	SESDES	307200	2.79	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
44	W299	SESDES	307200	9.53	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
45	W311	SESDES	307200	36.00	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
46	W313	SESDES	307200	.54	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
47	W314	SESDES	307200	18.90	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
48	W321	SESDES	307200	39.23	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
49	W323	SESDES	307200	1.36	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	W324	SESDES	307200	26.24	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
51	W331	SESDES	307200	4.00	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
52	W332	SESDES	307200	10.31	229.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure 1-5-13: SAMPLE OF SOLUTION OUTPUT - ITEMS

To prepare the final tables for printout, SHIPDOC again recomputes all VARs, VARNs, and ITEMS based upon the best set of main variable values found. If NULL = 2, these will be the same as the original values. As previously described, in computing VARNs to consistency you <u>may first</u> get more indications of inconsistency such as shown on page 19.

Fig. 1-5-14 compares the initial and current values of <u>all</u> items' magnitude <u>and</u> arms. The number, name, and description are straight from the ITEM (or ITMC) directive. The initial values had been stored; the items' <u>latest</u> values are computed anew.

COMPARISION BETWEEN PARENT AND CURRENT VALUES OF ITEMS

NO	ITEM	WT GRP	DESCRIPTION		PARENT SIZE	PARENT LONG	PARENT VERT	CURRENT SIZE	CURRENT LONG	CURRENT VERT
46	W313	313	SESDES	307200	.54	.50	0.00	.54	229.82	0.00
47	W314	314	SESDES	307200	18.90	.50	0.00	18.90	229.82	0.00
48	W321	321	SESDES	307200	38.75	.50	0.00	39.23	229.82	0.00
49	W323	323	SESDES	307200	1.34	.50	0.00	1.36	229.82	0.00
50	W324	324	SESDES	307200	26.10	.50	0.00	26.24	229.82	0.00
51	W331	331	SESDES	307200	3.49	.50	0.00	4.00	229.82	0.00
52	W332	332	SESDES	307200	10.31	.50	0.00	10.31	229.82	0.00
53	W342	342	SESDES	307200	0.00	.50	0.00	0.00	229.82	0.00
54	W343	343	SESDES	307200	6.53	.50	0.00	6.55	229.82	0.00
55	W398	398	SESDES	307200	2.88	.50	0.00	2.88	229.82	0.00
56	W399	399	SESDES	307200	1.42	.50	0.00	1.43	229.82	0.00
57	W411	411	SESDES	307200	0.00	.50	0.00	0.00	229.82	0.00
58	W412	412	SESDES	307200	14.00	.50	0.00	14.00	229.82	0.00
59	W415	415	SESDES	307200	0.00	.50	0.00	0.00	229.82	0.00
60	W421	421	SESDES	307200	0.00	.50	0.00	0.00	229.82	0.00
61	W422	422	SESDES	307200	0.00	.50	0.00	0.00	229.82	0.00
62	W423	423	SESDES	307200	0.00	.50	0.00	0.00	229.82	0.00
63	W424	424	SESDES	307200	0.00	.50	0.00	0.00	229.82	0.00
64	W426	426	SESDES	307200	5.90	.50	0.00	5.90	229.82	0.00
65	W427	427	SESDES	307200	0.00	.50	0.00	0.00	229.82	0.00
66	W431	431	SESDES	307200	0.00	.50	0.00	0.00	229.82	0.00
67	W432	432	SESDES	307200	0.00	.50	0.00	0.00	229.82	0.00
68	W433	433	SESDES	307200	0.00	.50	0.00	0.00	229.82	0.00
69	W434	434	SESDES	307200	0.00	.50	0.00	0.00	229.82	0.00
70	W435	435	SESDES	307200	0.00	.50	0.00	0.00	229.82	0.00
71	W436	436	SESDES	307200	0.00	.50	0.00	0.00	229.82	0.00
72	W437	437	SESDES	307200	0.00	.50	0.00	0.00	229.82	0.00
73	W438	438	SESDES	307200	0.00	.50	0.00	0.00	229.82	0.00
74	W439	439	SESDES	307200	0.00	.50	0.00	0.00	229.82	0.00
75	W441	441	SESDES	307200	32.20	.50	0.00	32.20	229.82	0.00
76	W442	442	SESDES	307200	0.00	.50	0.00	0.00	229.82	0.00
77	W443	443	SESDES	307200	0.00	.50	0.00	0.00	229.82	0.00
78	W445	445	SESDES	307200	0.00	.50	0.00	0.00	229.82	0.00
79	W446	446	SESDES	307200	0.00	.50	0.00	0.00	229.82	0.00
80	W451	451	SESDES	307200	1.00	.50	0.00	1.00	229.82	0.00
81	W452	452	SESDES	307200	7.50	.50	0.00	7.50	229.82	0.00
82	W454	454	SESDES	307200	0.00	.50	0.00	0.00	229.82	0.00
83	W455	455	SESDES	307200	.60	.50	0.00	.60	229.82	0.00
84	W456	456	SESDES	307200	0.00	.50	0.00	0.00	229.82	0.00
85	W462	462	SESDES	307200	11.30	.50	0.00	11.30	229.82	0.00
86	W463	463	SESDES	307200	169.50	.50	0.00	169.50	229.82	0.00
87	W465	465	SESDES	307200	0.00	.50	0.00	0.00	229.82	0.00
88	W466	466	SESDES	307200	0.00	.50	0.00	0.00	229.82	0.00
89	W471	471	SESDES	307200	0.00	.50	0.00	0.00	229.82	0.00
90	W472	472	SESDES	307200	10.00	.50	0.00	10.00	229.82	0.00

Figure 1-5-14: SAMPLE SOLUTION OUTPUT - ITEM COMPARISON

The final tables compare the initial and current values of all VAR and VARN variables. First comes the comparison for VAR variables; (fig 1-5-15):

Last comes the comparison for all VARN variables; (fig 1-5-16):

This completes the description of the solution tracker and resulting ship model printouts.

COMPARISION BETWEEN PARENT AND CURRENT VALUES OF VAR VARIABLES

NO	NAME	PARENT	CURRENT
1	VCGS	10.00000	11.52942

Figure 1-5-15: SAMPLE SOLUTION OUTPUT - VAR COMPARISON

COMPARISION BETWEEN PARENT AND CURRENT VALUES OF VARN VARIABLES

NO	NAME	DESCRIPTION		VAR1	VAR2	FUN2	PARENT	CURRENT
91	CWAD	WATER DYNAMIC PRESSURE DESIGN	303300				2550.982946	2550.982946
92	L/BB	CUSH L/ (B+SIBE)	303300				6.168704	7.517736
93	F/A	CUSH SEPARATION RATIO	303300				.044571	.042814
94	FCIL	FOIL AREA	303300				.055324	.000336
95	CFOL	FOIL CHORD LENGTH	303300				.002305	.000014
96	DFOL	FOIL RESISTANCE /	303300				1.512209	.020692
97	DFOD	FOIL PES DESIGN	303300				3.402470	.046558
98	AFIN	FIN AREA	303300				98.082962	85.920529
99	CFIN	FIN CHORD AR=1.5	303300				8.086324	7.568378
100	DFIN	FIN RESISTANCE	303300				2928.794143	2592.769268
101	DFID	FIN PES DESIGN	303300				6589.786823	5833.721852
102	PCC	CUSH PRES FLD CRUISE CUSHBORNE	303300				691.048973	524.329396
103	PCH	CUSH PRES FLD CRUISE HULLBORNE	303300				1071.668559	911.009568
104	PO	CRUISE RANGE CUSHION PRESSURE	303300				1071.668559	911.009568
105	POD	CUSHION PRESSURE FLD PSF DESIGN	303300				691.048973	524.329396
106	CPFC	PRES. RED. FACTOR CUSHBORNE	303300				.810747	.806288
107	DPFC	PRES. RED. FACTOR CUSHBORNE DES	303300				.957078	.922522
108	CPF	CRUISE PRESSURE REDUCTION FACT	303300				0.000000	0.000000
109	CPFD	DES PRES REDUCTION FACTOR	303300				.957078	.922522
110	HFC	CUSH DRAFT IN. FACTOR CUSHBORNE	303300				1.773701	1.812914
111	HFDC	DES CUSH DRAFT INCREASE FACTOR	303300				1.364472	1.451054
112	WRC0	DOC WAVE RES COEF F/A=0.00	303300				.146653	.080598
113	WRC6	DOC WAVE RES COEF F/A=0.06	303300				.110485	.059804
114	WRC*	DOC WAVE RES COEF F/A=0.12	303300				.091206	.033585
115	SRC0	DOC SEAL RES COEF F/A=0.0	303300				.177470	.133033
116	SRC6	DOC SEAL RES COEF F/A=0.06	303300				.139847	.098279
117	SRC*	DOC SEAL RES COEF F/A=0.12	303300				.124197	.079616
118	WRD0	DOC WAVE RES COEF FOR F/A=0.00	303300				.956982	.237951
119	WRD6	DOC WAVE RES COEF FOR F/A=0.06	303300				.448961	.187598
120	WRD*	DOC WAVE RES COEF FOR F/A=0.12	303300				.388838	.120629
121	SRD0	DOC SEAL RES COEF FOR F/A=0.00	303300				.379442	.319660
122	SRD6	DOC SEAL RES COEF FOR F/A=0.06	303300				.333785	.272063
123	SRD*	DOC SEAL RES COEF FOR F/A=0.12	303300				.329712	.272361
124	WUD0	DOC WAVE RES COEF FOR F/A=0.00	303300				.295727	.239415
125	WUD6	DOC WAVE RES COEF FOR F/A=0.06	303300				.190251	.137904
126	WUD*	DOC WAVE RES COEF FOR F/A=0.12	303300				.139498	-.023319
127	WRCF	DOC WAVE RES COEF FOR F/A	303300				.118173	.062643
128	SRCF	DOC SEAL RES COEF FOR F/A	303300				.147423	.106995
129	DUFR	UPPER FR RATIO FOR DES WAVE RES	303300				1.000000	.000000
130	DLFR	LOWER FR RATIO FOR DES WAVE RES	303300				.000000	1.000000
131	SLFR	LOWER FR RATIO FOR DES SEAL RES	303300				1.000000	1.000000
132	SUFR	UPPER FR RATIO FOR DES SEAL RES	303300				0.000000	0.000000
133	WUDF	DOC WAVE RES COEF UPPER FR DES	303300				.212148	.173083
134	WLDF	DOC WAVE RES COEF LOWER FR DES	303300				.472164	.203683
135	WRDF	DOC WAVE RES COEF FOR F/A DES	303300				.212148	.203683

Figure 1-5-16: SAMPLE SOLUTION OUTPUT - VARN COMPARISON

5.8 NAVY SWBS WEIGHT REPORT

This part of the printout requires an END directive in the data deck. Regardless of whether the actual solution process is skipped (NULL = 2) or not, if you get a ship model printout, you will also get a WEIGHT REPORT reporting on totals for WT, DISW, BUOY, DISB, RB, and DISR by weight group name. As mentioned on page 5, the basic item data and '*****WARNING NUMBER 11 *****' will be printed <u>first</u> for all items (from ITEM or ITMC cards) <u>if</u>:

a. <u>No</u> weight group name is given for WT or DISW items.

b. They are FF, DFF, FC, DFC, INF, DINF, INT, DINP, BMT, or DBMT items--with or without a weight group name.

The computed magnitude and arms of these items are <u>not</u> included in the weight report totals; only those items with weight group names entered in card columns 13 - 16 of the ITEM or ITMC directives are totaled here.

The final report for the <u>whole</u> ship is last:

All three numerical columns match the column headings (printed once): WT, LCG, and VCG where LCG and VCG give the coordinates of each subgroup WT's location. The final LEAD value (V_{I_5}) is in the first column of line (C); either 'STAB' or 'TRIM' is printed at (G) according to whether vertical or longitudinal stability is controlling (see page 18) and lead location (LCG, VCG) is generalized at (H), the final setting of IFWD (see page 18) determining whether 'FWD,' 'AFT,' or 'CMPT' is printed.

ITEM	DESCRIPTION	WT	LCG	VCG
SUBGROUP 600	OUTFIT AND FURNISHING, GENERAL	.00	0.00	0.00
SUBGROUP 610	SHIP FITTINGS	.00	0.00	0.00
SUBGROUP 611	HULL FITTINGS	2.03	229.82	0.00
SUBGROUP 612	RAILS, STANCHIONS, AND LIFELINES	3.44	229.82	0.00
SUBGROUP 613	RIGGING AND CANVAS	.53	229.82	0.00
SUBGROUP 620	HULL COMPARTMENTATION	.00	0.00	0.00
SUBGROUP 621	NON-STRUCTURAL BULKHEADS	31.06	229.82	0.00
SUBGROUP 622	FLOOR PLATES AND GRATINGS	20.54	229.82	0.00
SUBGROUP 623	LADDERS	6.22	229.82	0.00
SUBGROUP 624	NON-STRUCTURAL CLOSURES	5.29	229.82	0.00
SUBGROUP 625	AIRPORTS, FIXED PORTLIGHTS, AND WINDOWS	.12	229.82	0.00
SUBGROUP 630	PRESERVATIVES AND COVERINGS	.00	0.00	0.00
SUBGROUP 631	PAINTING	33.21	229.82	0.00
SUBGROUP 632	ZINC COATING	.00	0.00	0.00
SUBGROUP 633	CATHODIC PROTECTION	1.64	229.82	0.00
SUBGROUP 634	DECK COVERING	25.35	229.82	0.00
SUBGROUP 635	HULL INSULATION	135.39	229.82	0.00
SUBGROUP 636	HULL DAMPING	20.00	229.82	0.00
SUBGROUP 637	SHEATHING	.00	0.00	0.00
SUBGROUP 638	REFRIGERATED SPACES	6.12	229.82	0.00
SUBGROUP 639	RADIATION SHIELDING	.00	0.00	0.00
SUBGROUP 640	LIVING SPACES	.00	0.00	0.00
SUBGROUP 641	OFFICER BERTHING AND MESSING SPACES	13.13	229.82	0.00
SUBGROUP 642	NONCOM. OFFICER BERTH AND MESS. SPACES	6.72	229.82	0.00
SUBGROUP 643	ENLISTED PERSONNEL BERTHING,MESS.SPACES	44.10	229.82	0.00
SUBGROUP 644	SANITARY SPACES AND FIXTURES	9.05	229.82	0.00
SUBGROUP 645	LEISURE AND COMMUNITY SPACES	.00	0.00	0.00
SUBGROUP 650	SERVICE SPACES	.00	0.00	0.00
SUBGROUP 651	COMMISSARY SPACES	21.95	229.82	0.00
SUBGROUP 652	MEDICAL SPACES	2.89	229.82	0.00
SUBGROUP 653	DENTAL SPACES	.00	0.00	0.00
SUBGROUP 654	UTILITY SPACES	1.54	229.82	0.00
SUBGROUP 655	LAUNDRY SPACES	3.85	229.82	0.00
SUBGROUP 656	TRASH DISPOSAL SPACES	1.27	229.82	0.00
SUBGROUP 660	WORKING SPACES	.00	0.00	0.00
SUBGROUP 661	OFFICES	9.20	229.82	0.00
SUBGROUP 662	MACHINERY CONTROL CENTER FURNISHINGS	.41	229.82	0.00
SUBGROUP 663	ELECTRONICS CONTROL CENTER FURNISHINGS	5.96	229.82	0.00
SUBGROUP 664	DAMAGE CONTROL STATIONS	5.39	229.82	0.00
SUBGROUP 665	WKSHOP,LAB,TEST AREAS(PRTBLE TOOL,EQUIP)	48.47	229.82	0.00
SUBGROUP 670	STOWAGE SPACES	.00	0.00	0.00
SUBGROUP 671	LOCKERS AND SPECIAL STOWAGE	17.95	229.82	0.00
SUBGROUP 672	STOREROOMS AND ISSUE ROOMS	53.85	229.82	0.00
SUBGROUP 673	CARGO STOWAGE	.00	0.00	0.00
SUBGROUP 690	SPECIAL PURPOSE SYSTEMS	.00	0.00	0.00
SUBGROUP 698	OUTFIT AND FURNISHINGS OPERATING FLUIDS	1.57	229.82	0.00
SUBGROUP 699	OUTFIT AND FURNISH.REPAIR PARTS AND TOOL	5.37	229.82	0.00
TOTAL GRP 6	OUTFITTING, FURNISH.	543.59	229.82	0.00

Figure 1-5-17: SAMPLE SOLUTION OUTPUT - WEIGHT REPORT

Appended Full Printout


```
C   STORED **: ------> *DATA SET NOT STORED* 28-FEB-89 10:55:54
C   STORED   :
C   STORED   : NOTES -
C   STORED   : NOTES -
C   SESSION  : SDEDIT- EDIT MODE              28-FEB-89 10:55:54
C   SOURCE   :         DATA SET  SFS90227     27-FEB-89 08:43:14   ARCHIVE FILE:
C   SOURCE   : [NSRDCCHENGT.ADF]DEFAULT.ADF;1
C   SOURCE   : NOTES - SAME AS SFS80602 WITH BMAX=108, RANG=4000, VK=50 KTS AVE,
C   SOURCE   : NOTES -  HPT=300,000, L/B=8.5,
C   CHANGE--->FL1 <>TRBP< C0   C0   C0   C0   C0   C0   C0   C0   C0   ..... MOD
C   CHANGE--->FL1 <>DTOD< MDRG DAID DFID DFOD DWD  DSWD DSAD DOTD DRWD ..... MOD
C   CHANGE--->CON <>VKCR<    50.0         SPEED FOR RANGE, LFSES        ..... MOD
C   CHANGE--->CON <>VKDS<    50.0         SPEED FOR WEIGHT, LFSES       ..... MOD
C   CHANGE--->CON <>VKC5<    50.0         MAXIMUM SPEED, LFSES          ..... MOD
C   CHANGE--->SUBH<>    <  VKCR=50 KTS AVE CRUISE, SS3, HPT (LIFT + PRO..... MOD
C   CHANGE--->FL1 <>W200< SB2A C1   SB2B C0   C0   C0   C0   C0   C0   ..... MOD
C   STORED **: ------> DATA SET  SFS90227     27-FEB-89 08:43:14   ARCHIVE FILE:
C   STORED   : [NSRDCCHENGT.ADF]DEFAULT.ADF;1
C   STORED   : NOTES - SAME AS SFS80602 WITH BMAX=108, RANG=4000, VK=50 KTS AVE,
C   STORED   : NOTES -  HPT=300,000, L/B=8.5,
C   SESSION  : SDEDIT- EDIT MODE              27-FEB-89 08:43:14
C   SOURCE   :         DATA SET  SFS80602     2-JUN-88 19:47:33    ARCHIVE FILE:
C   SOURCE   : [NSRDCCHENGT.ADF]DEFAULT.ADF;1
C   SOURCE   : NOTES - SAME AS SFS80520 WITH ETAC = 1.0 HULL INTERACTION TERM FO
C   SOURCE   : NOTES - R PCP, BMAX=150, ML/B = 5.7, RANG = 4800 NM
C   STORED **: ------> DATA SET  SFS80602     2-JUN-88 19:47:33    ARCHIVE FILE:
C   STORED   : [NSRDCCHENGT.ADF]DEFAULT.ADF;1
C   STORED   : NOTES - SAME AS SFS80520 WITH ETAC = 1.0 HULL INTERACTION TERM FO
C   STORED   : NOTES - R PCP, BMAX=150, ML/B = 5.7, RANG = 4800 NM
C   SESSION  : SDEDIT- EDIT MODE              2-JUN-88 19:47:33
C   SOURCE   :         DATA SET  SFS80520     20-MAY-88 11:32:10   ARCHIVE FILE:
C   SOURCE   : [NSRDCCHENGT.ADF]DEFAULT.ADF;1
C   SOURCE   : NOTES - SAME AS SFS80425 WITH MODS TO VKD5 TO YIELD DRAG W/O CARG
C   SOURCE   : NOTES - O. PC5,DIS5 ADDED
C   STORED **: ------> DATA SET  SFS80520     20-MAY-88 11:32:10   ARCHIVE FILE:
C   STORED   : [NSRDCCHENGT.ADF]DEFAULT.ADF;1
C   STORED   : NOTES - SAME AS SFS80425 WITH MODS TO VKD5 TO YIELD DRAG W/O CARG
C   STORED   : NOTES - O. PC5,DIS5 ADDED
C   SESSION  : SDEDIT- EDIT MODE              20-MAY-88 11:32:10
C   SOURCE   :         DATA SET  SFS80425     25-APR-88 11:36:30   ARCHIVE FILE:
C   SOURCE   : [NSRDCCHENGT.ADF]DEFAULT.ADF;1
C   SOURCE   : NOTES - SAME AS SFS71116A WITH NEW MAIN (L=900) AND ALL FREE MAIN
C   SOURCE   : NOTES -  VARIABLES.  CYCLE LIMIT = 5, REL. TOLERANC
C   STORED **: ------> DATA SET  SFS80425     25-APR-88 11:36:30   ARCHIVE FILE:
C   STORED   : [NSRDCCHENGT.ADF]DEFAULT.ADF;1
C   STORED   : NOTES - SAME AS SFS71116A WITH NEW MAIN (L=900) AND ALL FREE MAIN
C   STORED   : NOTES -  VARIABLES.  CYCLE LIMIT = 5, REL. TOLERANC
C   SESSION  : SDEDIT- EDIT MODE              25-APR-88 11:36:30
C   SOURCE   :         DATA SET  SFS71116     16-NOV-87 10:57:01   ARCHIVE FILE:
C   SOURCE   : [NSRDCCHENGT.ADF]DEFAULT.ADF;1
C   SOURCE   : NOTES - SAME AS SFS70617A WITH HPIN INCREASED TO 60000. BHP. FIXE
C   SOURCE   : NOTES - D BEAM
C   STORED **: ------> DATA SET  SFS71116     16-NOV-87 10:57:01   ARCHIVE FILE:
C   STORED   : DEFAULT.ADF;1
C   STORED   : NOTES - SAME AS SFS70617A WITH HPIN INCREASED TO 60000. BHP. FIXE
C   STORED   : NOTES - D BEAM
C   SESSION  : SDEDIT- TRANSFER MODE          28-MAR-88 07:32:08
C   SOURCE   :         DATA SET  SFS71116     16-NOV-87 10:57:01   ARCHIVE FILE:
C   SOURCE   : INTER.ADF;1
C   SOURCE   : NOTES - TRANSFER MODE - STORED NOTES ARE COPY OF SOURCE NOTESFIXE
C   SOURCE   : NOTES -
C   STORED **: ------> DATA SET  SFS71116     16-NOV-87 10:57:01   ARCHIVE FILE:
```

```
C    STORED    : DEFAULT.ADF;1
C    STORED    : NOTES - SAME AS SFS70617A WITH HPIN INCREASED TO 60000. BHP. FIXE
C    STORED    : NOTES - D BEAM
C    SESSION   : SDEDIT- TRANSFER MODE          16-MAR-88 15:37:03
C    SOURCE    :         DATA SET  SFS71116     16-NOV-87 10:57:01   ARCHIVE FILE:
C    SOURCE    : INTER.ADF;1
C    SOURCE    : NOTES - TRANSFER MODE - STORED NOTES ARE COPY OF SOURCE NOTESFIXE
C    SOURCE    : NOTES -
C    STORED **: ------> DATA SET  SFS71116     16-NOV-87 10:57:01   ARCHIVE FILE:
C    STORED    : INTER.ADF;1
C    STORED    : NOTES - SAME AS SFS70617A WITH HPIN INCREASED TO 60000. BHP. FIXE
C    STORED    : NOTES - D BEAM
C    SESSION   : SDEDIT- TRANSFER MODE           9-MAR-88 07:58:59
C    SOURCE    :         DATA SET  SFS71116     16-NOV-87 10:57:01   ARCHIVE FILE:
C    SOURCE    : DEFAULT.ADF;1
C    SOURCE    : NOTES - TRANSFER MODE - STORED NOTES ARE COPY OF SOURCE NOTESFIXE
C    SOURCE    : NOTES -
C    STORED **: ------> DATA SET  SFS71116     16-NOV-87 10:57:01   ARCHIVE FILE:
C    STORED    : DEFAULT.ADF;1
C    STORED    : NOTES - SAME AS SFS70617A WITH HPIN INCREASED TO 60000. BHP. FIXE
C    STORED    : NOTES - D BEAM
C    SESSION   : SDEDIT- TRANSFER MODE           2-MAR-88 09:45:09
C    SOURCE    :         DATA SET  SFS71116     16-NOV-87 10:57:01   ARCHIVE FILE:
C    SOURCE    : INTER.ADF;1
C    SOURCE    : NOTES - TRANSFER MODE - STORED NOTES ARE COPY OF SOURCE NOTESFIXE
C    SOURCE    : NOTES -
C    STORED **: ------> DATA SET  SFS71116     16-NOV-87 10:57:01   ARCHIVE FILE:
C    STORED    : DEFAULT.ADF;1
C    STORED    : NOTES - SAME AS SFS70617A WITH HPIN INCREASED TO 60000. BHP. FIXE
C    STORED    : NOTES - D BEAM
C    SESSION   : SDEDIT- TRANSFER MODE          25-FEB-88 10:44:10
C    SOURCE    :         DATA SET  SFS71116     16-NOV-87 10:57:01   ARCHIVE FILE:
C    SOURCE    : INTER.ADF;1
C    SOURCE    : NOTES - TRANSFER MODE - STORED NOTES ARE COPY OF SOURCE NOTESFIXE
C    SOURCE    : NOTES -
C    STORED **: ------> DATA SET  SFS71116     16-NOV-87 10:57:01   ARCHIVE FILE:
C    STORED    : DEFAULT.ADF;1
C    STORED    : NOTES - SAME AS SFS70617A WITH HPIN INCREASED TO 60000. BHP. FIXE
C    STORED    : NOTES - D BEAM
C    SESSION   : SDEDIT- TRANSFER MODE          17-FEB-88 09:16:04
C    SOURCE    :         DATA SET  TEST         16-NOV-87 10:57:01   ARCHIVE FILE:
C    SOURCE    : INTER.ADF;1
C    SOURCE    : NOTES - TRANSFER MODE - STORED NOTES ARE COPY OF SOURCE NOTESFIXE
C    SOURCE    : NOTES -
C    STORED **: ------> DATA SET  TEST         16-NOV-87 10:57:01   ARCHIVE FILE:
C    STORED    : DEFAULT.ADF;1
C    STORED    : NOTES - SAME AS SFS70617A WITH HPIN INCREASED TO 60000. BHP. FIXE
C    STORED    : NOTES - D BEAM
C    SESSION   : SDEDIT- TRANSFER MODE          10-DEC-87 11:32:42
C    SOURCE    :         DATA SET  SFS71116A    16-NOV-87 10:57:01   ARCHIVE FILE:
C    SOURCE    : [NSRDC50151.ADF]DEFAULT.ADF;1
C    SOURCE    : NOTES - TRANSFER MODE - STORED NOTES ARE COPY OF SOURCE NOTESFIXE
C    SOURCE    : NOTES -
C        ADD HB PLUS CB FOR RANGE
C        CON RANG REFLECTS CB PORTION OF RANGE
C        DEFINE CONSTANT P233 TO REFLECT PAXMAN DIESEL WTS AND MOD LIST WTD1
C        DEFINE LSFC AND USE IN LISTS FLC0, FLC2, AND FLC4
C        REARRANGE CONSTANTS
```

DATA ON S135, FUNCTION NO 1

		LEVELS FIRST	LEVELS SECOND
DESCRIPTION	WT/FT = F(LOAD,AREA), H/B = 0.35 308110	2	2

DATA POINTS ENTERED

VAR NO 1	VAR NO 2	DEP. VAR	VAR NO 1	VAR NO 2	DEP. VAR	VAR NO 1	VAR NO 2	DEP. VAR
226.000	2862.00	3.55000	453.000	2862.00	4.38000	906.000	2862.00	6.45000
452.000	4564.00	6.14000	905.000	4564.00	7.73000	1810.00	4564.00	11.4300
679.000	6001.00	8.07000	1358.00	6001.00	10.0100	2720.00	6001.00	14.7500
200.000	1.00000	0.500000E-02	1000.00	1.00000	0.500000E-02	2000.00	1.00000	0.500000E-02

COEFFICIENTS FOR THE GENERAL FORM-

FIRST VARIABLE BY ROWS, SECOND VARIABLE BY COLUMNS

-0.541263E-02	0.752221E-03	0.452918E-07
0.111501E-03	0.248445E-05	-0.348319E-09
-0.547008E-07	-0.259059E-09	0.517207E-13

DOMAIN MAP, FIRST VARIABLE DOWN, SECOND VARIABLE ACROSS

	0.100E+01	0.601E+03	0.120E+04	0.180E+04	0.240E+04	0.300E+04	0.360E+04	0.420E+04	0.480E+04	0.540E+04	0.600E+04
0.200E+03	0.159E-01	0.751E+00	0.147E+01	0.217E+01	0.286E+01	0.353E+01	0.419E+01	0.483E+01	0.545E+01	0.605E+01	0.665E+01
0.452E+03	0.356E-01	0.109E+01	0.208E+01	0.299E+01	0.382E+01	0.459E+01	0.528E+01	0.590E+01	0.644E+01	0.691E+01	0.731E+01
0.704E+03	0.483E-01	0.141E+01	0.264E+01	0.375E+01	0.474E+01	0.560E+01	0.633E+01	0.694E+01	0.742E+01	0.778E+01	0.801E+01
0.956E+03	0.541E-01	0.170E+01	0.318E+01	0.448E+01	0.561E+01	0.656E+01	0.734E+01	0.795E+01	0.839E+01	0.865E+01	0.874E+01
0.121E+04	0.528E-01	0.197E+01	0.367E+01	0.516E+01	0.642E+01	0.748E+01	0.831E+01	0.893E+01	0.934E+01	0.953E+01	0.950E+01
0.146E+04	0.446E-01	0.221E+01	0.413E+01	0.579E+01	0.720E+01	0.835E+01	0.925E+01	0.989E+01	0.103E+02	0.104E+02	0.103E+02
0.171E+04	0.294E-01	0.243E+01	0.455E+01	0.638E+01	0.792E+01	0.917E+01	0.101E+02	0.108E+02	0.112E+02	0.113E+02	0.111E+02
0.196E+04	0.721E-02	0.263E+01	0.493E+01	0.692E+01	0.859E+01	0.995E+01	0.110E+02	0.117E+02	0.121E+02	0.122E+02	0.120E+02
0.222E+04	-0.220E-01	0.280E+01	0.528E+01	0.742E+01	0.922E+01	0.107E+02	0.118E+02	0.126E+02	0.130E+02	0.131E+02	0.129E+02
0.247E+04	-0.581E-01	0.295E+01	0.559E+01	0.787E+01	0.980E+01	0.114E+02	0.126E+02	0.134E+02	0.139E+02	0.140E+02	0.138E+02
0.272E+04	-0.101E+00	0.307E+01	0.586E+01	0.828E+01	0.103E+02	0.120E+02	0.133E+02	0.142E+02	0.148E+02	0.149E+02	0.148E+02

DATA ON S150, FUNCTION NO 2

		LEVELS FIRST	LEVELS SECOND
DESCRIPTION	WT/FT = F(LOAD,AREA), H/B = 0.50 308110	2	2

DATA POINTS ENTERED

VAR NO 1	VAR NO 2	DEP. VAR	VAR NO 1	VAR NO 2	DEP. VAR	VAR NO 1	VAR NO 2	DEP. VAR
226.000	5551.00	5.45000	453.000	5551.00	5.43000	906.000	5551.00	6.79000
452.000	8840.00	8.87000	905.000	8840.00	9.33000	1810.00	8840.00	11.5300
679.000	11611.0	10.8500	1358.00	11611.0	11.7100	2720.00	11611.0	14.9100
200.000	1.00000	0.500000E-02	1000.00	1.00000	0.500000E-02	2000.00	1.00000	0.500000E-02

COEFFICIENTS FOR THE GENERAL FORM-

FIRST VARIABLE BY ROWS, SECOND VARIABLE BY COLUMNS

-0.173017E-01	0.867339E-03	0.620331E-08
0.294680E-04	0.550723E-06	-0.504142E-10
-0.885172E-08	0.573835E-10	0.176705E-15

DOMAIN MAP, FIRST VARIABLE DOWN, SECOND VARIABLE ACROSS

	0.100E+01	0.116E+04	0.232E+04	0.348E+04	0.464E+04	0.581E+04	0.697E+04	0.813E+04	0.929E+04	0.104E+05	0.116E+05
0.200E+03	-0.108E-01	0.112E+01	0.224E+01	0.335E+01	0.446E+01	0.555E+01	0.663E+01	0.770E+01	0.876E+01	0.980E+01	0.108E+02
0.452E+03	-0.466E-02	0.128E+01	0.253E+01	0.372E+01	0.488E+01	0.599E+01	0.705E+01	0.807E+01	0.904E+01	0.997E+01	0.109E+02
0.704E+03	0.340E-03	0.145E+01	0.282E+01	0.412E+01	0.533E+01	0.647E+01	0.752E+01	0.850E+01	0.940E+01	0.102E+02	0.110E+02
0.956E+03	0.423E-02	0.163E+01	0.314E+01	0.453E+01	0.582E+01	0.699E+01	0.805E+01	0.899E+01	0.983E+01	0.105E+02	0.112E+02
0.121E+04	0.699E-02	0.181E+01	0.347E+01	0.498E+01	0.634E+01	0.755E+01	0.862E+01	0.955E+01	0.103E+02	0.110E+02	0.114E+02
0.146E+04	0.865E-02	0.200E+01	0.381E+01	0.544E+01	0.689E+01	0.816E+01	0.925E+01	0.102E+02	0.109E+02	0.114E+02	0.118E+02
0.171E+04	0.918E-02	0.220E+01	0.417E+01	0.593E+01	0.748E+01	0.881E+01	0.993E+01	0.108E+02	0.115E+02	0.120E+02	0.122E+02
0.196E+04	0.860E-02	0.240E+01	0.455E+01	0.645E+01	0.810E+01	0.950E+01	0.107E+02	0.116E+02	0.122E+02	0.126E+02	0.128E+02
0.222E+04	0.690E-02	0.262E+01	0.494E+01	0.699E+01	0.875E+01	0.102E+02	0.114E+02	0.124E+02	0.130E+02	0.133E+02	0.134E+02
0.247E+04	0.409E-02	0.284E+01	0.535E+01	0.755E+01	0.944E+01	0.110E+02	0.123E+02	0.132E+02	0.138E+02	0.141E+02	0.141E+02
0.272E+04	0.152E-03	0.306E+01	0.578E+01	0.814E+01	0.102E+02	0.118E+02	0.131E+02	0.141E+02	0.147E+02	0.150E+02	0.149E+02

DATA ON S165, FUNCTION NO 3

		LEVELS FIRST	LEVELS SECOND
DESCRIPTION	WT/FT = F(LOAD,AREA), H/B = 0.65 308111	2	2

DATA POINTS ENTERED

VAR NO 1	VAR NO 2	DEP. VAR	VAR NO 1	VAR NO 2	DEP. VAR	VAR NO 1	VAR NO 2	DEP. VAR
226.000	8814.00	7.93000	453.000	8814.00	7.92000	906.000	8814.00	8.21000
452.000	14027.0	11.8900	905.000	14027.0	12.1000	1810.00	14027.0	12.7400
679.000	18416.0	15.6000	1358.00	18416.0	15.6900	2720.00	18416.0	17.3200
200.000	1.00000	0.500000E-02	1000.00	1.00000	0.500000E-02	2000.00	1.00000	0.500000E-02

COEFFICIENTS FOR THE GENERAL FORM-

FIRST VARIABLE BY ROWS, SECOND VARIABLE BY COLUMNS

0.138744E-01	0.922536E-03	-0.445317E-08
0.572163E-04	0.496334E-07	-0.389372E-11
-0.315130E-07	0.280722E-11	0.104492E-14

DOMAIN MAP, FIRST VARIABLE DOWN, SECOND VARIABLE ACROSS

	0.100E+01	0.184E+04	0.368E+04	0.553E+04	0.737E+04	0.921E+04	0.111E+05	0.129E+05	0.147E+05	0.166E+05	0.184E+05
0.200E+03	0.250E-01	0.172E+01	0.339E+01	0.502E+01	0.661E+01	0.817E+01	0.970E+01	0.112E+02	0.126E+02	0.141E+02	0.154E+02
0.452E+03	0.342E-01	0.176E+01	0.344E+01	0.507E+01	0.667E+01	0.823E+01	0.975E+01	0.112E+02	0.127E+02	0.141E+02	0.154E+02
0.704E+03	0.395E-01	0.178E+01	0.348E+01	0.513E+01	0.674E+01	0.830E+01	0.982E+01	0.113E+02	0.127E+02	0.141E+02	0.154E+02
0.956E+03	0.407E-01	0.181E+01	0.352E+01	0.519E+01	0.681E+01	0.838E+01	0.990E+01	0.114E+02	0.128E+02	0.142E+02	0.155E+02
0.121E+04	0.380E-01	0.183E+01	0.357E+01	0.526E+01	0.689E+01	0.847E+01	0.100E+02	0.115E+02	0.129E+02	0.143E+02	0.156E+02
0.146E+04	0.312E-01	0.185E+01	0.361E+01	0.532E+01	0.698E+01	0.858E+01	0.101E+02	0.116E+02	0.131E+02	0.144E+02	0.158E+02
0.171E+04	0.205E-01	0.186E+01	0.365E+01	0.539E+01	0.707E+01	0.869E+01	0.103E+02	0.118E+02	0.132E+02	0.146E+02	0.160E+02
0.196E+04	0.572E-02	0.188E+01	0.369E+01	0.545E+01	0.716E+01	0.881E+01	0.104E+02	0.120E+02	0.134E+02	0.149E+02	0.163E+02
0.222E+04	-0.130E-01	0.189E+01	0.373E+01	0.552E+01	0.726E+01	0.895E+01	0.106E+02	0.122E+02	0.137E+02	0.151E+02	0.166E+02
0.247E+04	-0.358E-01	0.189E+01	0.377E+01	0.560E+01	0.737E+01	0.909E+01	0.108E+02	0.124E+02	0.139E+02	0.155E+02	0.169E+02
0.272E+04	-0.626E-01	0.190E+01	0.381E+01	0.567E+01	0.748E+01	0.925E+01	0.110E+02	0.126E+02	0.142E+02	0.158E+02	0.173E+02

DATA ON S250, FUNCTION NO 4

		LEVELS FIRST	LEVELS SECOND
DESCRIPTION	WT/FT = F(LOAD,AREA), H/B = 0.50 308110	2	2

DATA POINTS ENTERED

VAR NO 1	VAR NO 2	DEP. VAR	VAR NO 1	VAR NO 2	DEP. VAR	VAR NO 1	VAR NO 2	DEP. VAR
93.0000	5743.00	6.10000	185.000	5743.00	6.01000	370.000	5743.00	6.21000
186.000	9148.00	11.1600	372.000	9148.00	11.2300	744.000	9148.00	11.5100
278.000	12016.0	14.6900	557.000	12016.0	15.2600	1110.00	12016.0	16.2800
2000.00	5743.00	10.2000	2000.00	9148.00	12.5100	2000.00	12016.0	15.8300
200.000	1.00000	0.500000E-02	1000.00	1.00000	0.500000E-02	2000.00	1.00000	0.500000E-02

COEFFICIENTS FOR THE GENERAL FORM-

FIRST VARIABLE BY ROWS, SECOND VARIABLE BY COLUMNS

-0.122323E+00	0.100408E-02	0.150538E-07
0.112067E-03	-0.838415E-07	0.282060E-10
0.594988E-08	0.285827E-09	-0.324188E-13

DOMAIN MAP, FIRST VARIABLE DOWN, SECOND VARIABLE ACROSS

	0.100E+01	0.120E+04	0.240E+04	0.361E+04	0.481E+04	0.601E+04	0.721E+04	0.841E+04	0.961E+04	0.108E+05	0.120E+05
0.930E+02	-0.111E+00	0.111E+01	0.239E+01	0.372E+01	0.509E+01	0.652E+01	0.799E+01	0.952E+01	0.111E+02	0.127E+02	0.144E+02
0.284E+03	-0.890E-01	0.115E+01	0.244E+01	0.379E+01	0.521E+01	0.668E+01	0.821E+01	0.980E+01	0.114E+02	0.132E+02	0.149E+02
0.474E+03	-0.668E-01	0.120E+01	0.253E+01	0.392E+01	0.537E+01	0.688E+01	0.845E+01	0.101E+02	0.118E+02	0.135E+02	0.153E+02
0.665E+03	-0.441E-01	0.128E+01	0.265E+01	0.408E+01	0.557E+01	0.712E+01	0.872E+01	0.104E+02	0.121E+02	0.139E+02	0.157E+02
0.856E+03	-0.209E-01	0.137E+01	0.281E+01	0.430E+01	0.582E+01	0.740E+01	0.901E+01	0.107E+02	0.124E+02	0.141E+02	0.159E+02
0.105E+04	0.270E-02	0.149E+01	0.301E+01	0.455E+01	0.612E+01	0.772E+01	0.934E+01	0.110E+02	0.127E+02	0.144E+02	0.161E+02
0.124E+04	0.268E-01	0.163E+01	0.324E+01	0.485E+01	0.646E+01	0.808E+01	0.969E+01	0.113E+02	0.129E+02	0.145E+02	0.161E+02
0.143E+04	0.513E-01	0.180E+01	0.351E+01	0.520E+01	0.685E+01	0.848E+01	0.101E+02	0.116E+02	0.132E+02	0.147E+02	0.161E+02
0.162E+04	0.763E-01	0.198E+01	0.382E+01	0.559E+01	0.729E+01	0.892E+01	0.105E+02	0.120E+02	0.134E+02	0.147E+02	0.160E+02
0.181E+04	0.102E+00	0.219E+01	0.417E+01	0.603E+01	0.777E+01	0.940E+01	0.109E+02	0.123E+02	0.136E+02	0.148E+02	0.158E+02
0.200E+04	0.128E+00	0.242E+01	0.455E+01	0.651E+01	0.830E+01	0.992E+01	0.114E+02	0.127E+02	0.138E+02	0.147E+02	0.155E+02

DATA ON S265, FUNCTION NO 5

		LEVELS FIRST	LEVELS SECOND
DESCRIPTION	WT/FT = F(LOAD,AREA), H/B = 0.65 308110	2	2

DATA POINTS ENTERED

VAR NO 1	VAR NO 2	DEP. VAR	VAR NO 1	VAR NO 2	DEP. VAR	VAR NO 1	VAR NO 2	DEP. VAR
93.0000	9352.00	8.84000	185.000	9352.00	8.83000	370.000	9352.00	8.85000
186.000	14890.0	15.0100	372.000	14890.0	14.9500	744.000	14890.0	15.4200
278.000	19553.0	21.7800	557.000	19553.0	22.1800	1110.00	19553.0	23.1000
2000.00	9352.00	11.0400	2000.00	14890.0	15.2700	2000.00	19553.0	22.6800
200.000	1.00000	0.500000E-02	1000.00	1.00000	0.500000E-02	2000.00	1.00000	0.500000E-02

COEFFICIENTS FOR THE GENERAL FORM-

FIRST VARIABLE BY ROWS, SECOND VARIABLE BY COLUMNS

0.833963E-01	0.868599E-03	0.917843E-08
-0.164103E-03	-0.491239E-06	0.358469E-10
0.105486E-06	0.280519E-09	-0.187210E-13

DOMAIN MAP, FIRST VARIABLE DOWN, SECOND VARIABLE ACROSS

	0.100E+01	0.196E+04	0.391E+04	0.587E+04	0.782E+04	0.978E+04	0.117E+05	0.137E+05	0.156E+05	0.176E+05	0.196E+05
0.930E+02	0.699E-01	0.173E+01	0.349E+01	0.534E+01	0.728E+01	0.932E+01	0.115E+02	0.137E+02	0.160E+02	0.184E+02	0.209E+02
0.284E+03	0.461E-01	0.158E+01	0.326E+01	0.507E+01	0.702E+01	0.910E+01	0.113E+02	0.137E+02	0.162E+02	0.188E+02	0.216E+02
0.474E+03	0.300E-01	0.148E+01	0.310E+01	0.488E+01	0.684E+01	0.896E+01	0.113E+02	0.137E+02	0.163E+02	0.191E+02	0.221E+02
0.665E+03	0.216E-01	0.142E+01	0.300E+01	0.478E+01	0.674E+01	0.890E+01	0.112E+02	0.138E+02	0.165E+02	0.194E+02	0.225E+02
0.856E+03	0.209E-01	0.140E+01	0.298E+01	0.475E+01	0.673E+01	0.891E+01	0.113E+02	0.139E+02	0.166E+02	0.196E+02	0.228E+02
0.105E+04	0.278E-01	0.142E+01	0.302E+01	0.481E+01	0.681E+01	0.900E+01	0.114E+02	0.140E+02	0.168E+02	0.198E+02	0.230E+02
0.124E+04	0.425E-01	0.149E+01	0.312E+01	0.495E+01	0.696E+01	0.917E+01	0.116E+02	0.141E+02	0.169E+02	0.199E+02	0.230E+02
0.143E+04	0.649E-01	0.159E+01	0.329E+01	0.516E+01	0.720E+01	0.941E+01	0.118E+02	0.143E+02	0.171E+02	0.199E+02	0.230E+02
0.162E+04	0.949E-01	0.175E+01	0.353E+01	0.546E+01	0.753E+01	0.973E+01	0.121E+02	0.146E+02	0.172E+02	0.199E+02	0.228E+02
0.181E+04	0.133E+00	0.194E+01	0.384E+01	0.584E+01	0.794E+01	0.101E+02	0.124E+02	0.148E+02	0.173E+02	0.199E+02	0.226E+02
0.200E+04	0.178E+00	0.217E+01	0.421E+01	0.630E+01	0.843E+01	0.106E+02	0.128E+02	0.151E+02	0.174E+02	0.198E+02	0.222E+02

DATA ON S275, FUNCTION NO 6

		LEVELS FIRST	LEVELS SECOND
DESCRIPTION	WT/FT = F(LOAD,AREA), H/B = 0.75 308110	2	2

DATA POINTS ENTERED

VAR NO 1	VAR NO 2	DEP. VAR	VAR NO 1	VAR NO 2	DEP. VAR	VAR NO 1	VAR NO 2	DEP. VAR
93.0000	12202.0	11.4100	185.000	12202.0	11.5800	370.000	12202.0	11.6600
186.000	19425.0	17.7200	372.000	19425.0	17.7000	744.000	19425.0	17.6800
278.000	25507.0	26.8200	557.000	25507.0	26.9200	1110.00	25507.0	28.0500
2000.00	12202.0	13.8000	2000.00	19425.0	19.4000	2000.00	25507.0	29.7000
200.000	1.00000	0.500000E-02	1000.00	1.00000	0.500000E-02	2000.00	1.00000	0.500000E-02

COEFFICIENTS FOR THE GENERAL FORM-

FIRST VARIABLE BY ROWS, SECOND VARIABLE BY COLUMNS

0.307726E+00	0.949316E-03	0.110359E-08
-0.388307E-03	-0.946931E-06	0.426341E-10
0.175185E-06	0.461148E-09	-0.193584E-13

DOMAIN MAP, FIRST VARIABLE DOWN, SECOND VARIABLE ACROSS

	0.100E+01	0.255E+04	0.510E+04	0.765E+04	0.102E+05	0.128E+05	0.153E+05	0.179E+05	0.204E+05	0.230E+05	0.255E+05
0.930E+02	0.274E+00	0.251E+01	0.482E+01	0.718E+01	0.961E+01	0.121E+02	0.147E+02	0.173E+02	0.200E+02	0.227E+02	0.255E+02
0.284E+03	0.212E+00	0.212E+01	0.418E+01	0.639E+01	0.875E+01	0.113E+02	0.139E+02	0.167E+02	0.197E+02	0.228E+02	0.261E+02
0.474E+03	0.164E+00	0.181E+01	0.369E+01	0.578E+01	0.809E+01	0.106E+02	0.134E+02	0.164E+02	0.196E+02	0.230E+02	0.266E+02
0.665E+03	0.127E+00	0.160E+01	0.334E+01	0.536E+01	0.764E+01	0.102E+02	0.130E+02	0.161E+02	0.195E+02	0.232E+02	0.271E+02
0.856E+03	0.104E+00	0.147E+01	0.315E+01	0.512E+01	0.740E+01	0.999E+01	0.129E+02	0.161E+02	0.196E+02	0.234E+02	0.275E+02
0.105E+04	0.937E-01	0.144E+01	0.310E+01	0.508E+01	0.737E+01	0.999E+01	0.129E+02	0.162E+02	0.198E+02	0.237E+02	0.279E+02
0.124E+04	0.959E-01	0.149E+01	0.319E+01	0.522E+01	0.755E+01	0.102E+02	0.132E+02	0.165E+02	0.200E+02	0.240E+02	0.282E+02
0.143E+04	0.111E+00	0.163E+01	0.344E+01	0.554E+01	0.794E+01	0.106E+02	0.136E+02	0.169E+02	0.205E+02	0.243E+02	0.285E+02
0.162E+04	0.139E+00	0.186E+01	0.383E+01	0.606E+01	0.853E+01	0.113E+02	0.142E+02	0.175E+02	0.210E+02	0.247E+02	0.287E+02
0.181E+04	0.179E+00	0.218E+01	0.437E+01	0.676E+01	0.933E+01	0.121E+02	0.151E+02	0.182E+02	0.216E+02	0.251E+02	0.289E+02
0.200E+04	0.233E+00	0.259E+01	0.506E+01	0.764E+01	0.103E+02	0.132E+02	0.161E+02	0.192E+02	0.223E+02	0.256E+02	0.290E+02

DATA ON STB1, FUNCTION NO 7

		LEVELS FIRST	LEVELS SECOND
DESCRIPTION	WT/TR BKHD = F(H/B,AREA), SES 308110	2	2

DATA POINTS ENTERED

VAR NO 1	VAR NO 2	DEP. VAR	VAR NO 1	VAR NO 2	DEP. VAR	VAR NO 1	VAR NO 2	DEP. VAR
0.350000	2862.00	16.0000	0.500000	5551.00	27.8000	0.650000	8814.00	42.1000
0.350000	4564.00	23.7000	0.500000	8840.00	41.9000	0.650000	14027.0	63.9000
0.350000	6001.00	33.2000	0.500000	11611.0	60.0000	0.650000	18416.0	92.6000
0.350000	1.00000	0.200000E-02	0.500000	1.00000	0.200000E-02	0.650000	1.00000	0.200000E-02

COEFFICIENTS FOR THE GENERAL FORM-

FIRST VARIABLE BY ROWS, SECOND VARIABLE BY COLUMNS

-0.158552E-01	0.868288E-02	-0.748652E-07
0.171335E+00	-0.135291E-01	0.535450E-06
0.742345E+00	0.990816E-02	-0.535354E-06

DOMAIN MAP, FIRST VARIABLE DOWN, SECOND VARIABLE ACROSS

	0.100E+01	0.184E+04	0.368E+04	0.553E+04	0.737E+04	0.921E+04	0.111E+05	0.129E+05	0.147E+05	0.166E+05	0.184E+05
0.350E+00	0.140E+00	0.980E+01	0.198E+02	0.301E+02	0.407E+02	0.516E+02	0.629E+02	0.745E+02	0.864E+02	0.986E+02	0.111E+03
0.380E+00	0.161E+00	0.949E+01	0.192E+02	0.292E+02	0.396E+02	0.503E+02	0.614E+02	0.728E+02	0.846E+02	0.967E+02	0.109E+03
0.410E+00	0.184E+00	0.921E+01	0.186E+02	0.284E+02	0.385E+02	0.490E+02	0.599E+02	0.712E+02	0.828E+02	0.948E+02	0.107E+03
0.440E+00	0.208E+00	0.896E+01	0.181E+02	0.276E+02	0.375E+02	0.478E+02	0.585E+02	0.696E+02	0.811E+02	0.929E+02	0.105E+03
0.470E+00	0.233E+00	0.874E+01	0.176E+02	0.270E+02	0.367E+02	0.467E+02	0.572E+02	0.681E+02	0.794E+02	0.911E+02	0.103E+03
0.500E+00	0.260E+00	0.855E+01	0.172E+02	0.263E+02	0.358E+02	0.457E+02	0.560E+02	0.667E+02	0.778E+02	0.893E+02	0.101E+03
0.530E+00	0.288E+00	0.840E+01	0.169E+02	0.258E+02	0.351E+02	0.448E+02	0.549E+02	0.654E+02	0.763E+02	0.876E+02	0.992E+02
0.560E+00	0.317E+00	0.827E+01	0.166E+02	0.253E+02	0.345E+02	0.440E+02	0.538E+02	0.641E+02	0.748E+02	0.858E+02	0.973E+02
0.590E+00	0.348E+00	0.818E+01	0.164E+02	0.249E+02	0.339E+02	0.432E+02	0.529E+02	0.629E+02	0.734E+02	0.841E+02	0.953E+02
0.620E+00	0.380E+00	0.811E+01	0.162E+02	0.246E+02	0.334E+02	0.425E+02	0.520E+02	0.618E+02	0.720E+02	0.825E+02	0.934E+02
0.650E+00	0.413E+00	0.808E+01	0.161E+02	0.244E+02	0.330E+02	0.419E+02	0.512E+02	0.608E+02	0.706E+02	0.809E+02	0.914E+02

DATA ON STB2, FUNCTION NO 8

		LEVELS FIRST	LEVELS SECOND
DESCRIPTION	WT/TR BKHD = F(H/B,AREA), SECAT 308110	2	2

DATA POINTS ENTERED

VAR NO 1	VAR NO 2	DEP. VAR	VAR NO 1	VAR NO 2	DEP. VAR	VAR NO 1	VAR NO 2	DEP. VAR
0.500000	5743.00	26.2000	0.650000	9352.00	42.3000	0.750000	12202.0	54.9000
0.500000	9148.00	45.7000	0.650000	14890.0	72.8000	0.750000	19425.0	94.1000
0.500000	12016.0	55.5000	0.650000	19553.0	87.0000	0.750000	25507.0	111.900
0.350000	1.00000	0.200000E-02	0.500000	1.00000	0.200000E-02	0.650000	1.00000	0.200000E-02

COEFFICIENTS FOR THE GENERAL FORM-

FIRST VARIABLE BY ROWS, SECOND VARIABLE BY COLUMNS

-0.167699E+02	0.324911E-02	0.212381E-06
0.748934E+02	0.277384E-02	-0.681042E-06
-0.797806E+02	0.626233E-03	0.459940E-06

DOMAIN MAP, FIRST VARIABLE DOWN, SECOND VARIABLE ACROSS

	0.100E+01	0.255E+04	0.510E+04	0.765E+04	0.102E+05	0.128E+05	0.153E+05	0.179E+05	0.204E+05	0.230E+05	0.255E+05
0.350E+00	-0.326E+00	0.108E+02	0.224E+02	0.343E+02	0.467E+02	0.594E+02	0.725E+02	0.861E+02	0.100E+03	0.114E+03	0.129E+03
0.390E+00	0.308E+00	0.117E+02	0.233E+02	0.352E+02	0.472E+02	0.595E+02	0.720E+02	0.847E+02	0.976E+02	0.111E+03	0.124E+03
0.430E+00	0.687E+00	0.123E+02	0.241E+02	0.358E+02	0.477E+02	0.596E+02	0.715E+02	0.835E+02	0.956E+02	0.108E+03	0.120E+03
0.470E+00	0.811E+00	0.127E+02	0.246E+02	0.363E+02	0.480E+02	0.596E+02	0.712E+02	0.826E+02	0.940E+02	0.105E+03	0.116E+03
0.510E+00	0.680E+00	0.129E+02	0.249E+02	0.367E+02	0.483E+02	0.597E+02	0.710E+02	0.820E+02	0.928E+02	0.103E+03	0.114E+03
0.550E+00	0.293E+00	0.128E+02	0.250E+02	0.369E+02	0.485E+02	0.598E+02	0.709E+02	0.816E+02	0.920E+02	0.102E+03	0.112E+03
0.590E+00	-0.349E+00	0.125E+02	0.249E+02	0.370E+02	0.487E+02	0.600E+02	0.709E+02	0.814E+02	0.916E+02	0.101E+03	0.111E+03
0.630E+00	-0.125E+01	0.119E+02	0.246E+02	0.369E+02	0.487E+02	0.601E+02	0.710E+02	0.815E+02	0.916E+02	0.101E+03	0.110E+03
0.670E+00	-0.240E+01	0.111E+02	0.241E+02	0.366E+02	0.487E+02	0.602E+02	0.713E+02	0.819E+02	0.920E+02	0.102E+03	0.111E+03
0.710E+00	-0.381E+01	0.101E+02	0.234E+02	0.362E+02	0.486E+02	0.604E+02	0.717E+02	0.825E+02	0.928E+02	0.103E+03	0.112E+03
0.750E+00	-0.547E+01	0.876E+01	0.225E+02	0.357E+02	0.484E+02	0.605E+02	0.722E+02	0.833E+02	0.939E+02	0.104E+03	0.114E+03

DATA ON RCC0, FUNCTION NO 9

		LEVELS FIRST	LEVELS SECOND
DESCRIPTION	SEPARATION RATIO = .00 L/B = 2,5,8,11,1	4	3

DATA POINTS ENTERED

VAR NO 1	VAR NO 2	DEP. VAR	VAR NO 1	VAR NO 2	DEP. VAR	VAR NO 1	VAR NO 2	DEP. VAR
0.260000	1.00000	0.318842	0.280000	1.00000	0.333160E-01	0.300000	1.00000	0.253615
0.320000	1.00000	0.759745	0.340000	1.00000	0.868876	0.360000	1.00000	0.588065
0.380000	1.00000	0.249049	0.400000	1.00000	0.727500E-01	0.420000	1.00000	0.984110E-01
0.260000	2.50000	0.276955	0.280000	2.50000	0.902690E-01	0.300000	2.50000	0.148001
0.320000	2.50000	0.501675	0.340000	2.50000	0.688068	0.360000	2.50000	0.598348
0.380000	2.50000	0.393785	0.400000	2.50000	0.229589	0.420000	2.50000	0.166688
0.260000	4.00000	0.213308	0.280000	4.00000	0.118312	0.300000	4.00000	0.139903
0.320000	4.00000	0.360662	0.340000	4.00000	0.505333	0.360000	4.00000	0.488061
0.380000	4.00000	0.390580	0.400000	4.00000	0.300889	0.420000	4.00000	0.257356
0.260000	5.50000	0.172194	0.280000	5.50000	0.112289	0.300000	5.50000	0.132275
0.320000	5.50000	0.298421	0.340000	5.50000	0.409413	0.360000	5.50000	0.401447
0.380000	5.50000	0.336648	0.400000	5.50000	0.281345	0.420000	5.50000	0.262372
0.260000	7.00000	0.144594	0.280000	7.00000	0.102443	0.300000	7.00000	0.121237
0.320000	7.00000	0.255485	0.340000	7.00000	0.347861	0.360000	7.00000	0.346653
0.380000	7.00000	0.299017	0.400000	7.00000	0.257280	0.420000	7.00000	0.244384
0.260000	8.50000	0.124596	0.280000	8.50000	0.927650E-01	0.300000	8.50000	0.110580
0.320000	8.50000	0.223736	0.340000	8.50000	0.302784	0.360000	8.50000	0.305125
0.380000	8.50000	0.269270	0.400000	8.50000	0.237565	0.420000	8.50000	0.228525

COEFFICIENTS FOR THE GENERAL FORM-

FIRST VARIABLE BY ROWS, SECOND VARIABLE BY COLUMNS

0.803711E+03	-0.234546E+03	0.271314E+02	-0.108796E+01
-0.984593E+04	0.294099E+04	-0.348774E+03	0.143748E+02
0.447017E+05	-0.136640E+05	0.165894E+04	-0.700796E+02
-0.890936E+05	0.278612E+05	-0.345805E+04	0.149344E+03
0.657853E+05	-0.210321E+05	0.266454E+04	-0.117367E+03

DOMAIN MAP, FIRST VARIABLE DOWN, SECOND VARIABLE ACROSS

	0.100E+01	0.175E+01	0.250E+01	0.325E+01	0.400E+01	0.475E+01	0.550E+01	0.625E+01	0.700E+01	0.775E+01	0.850E+01
0.260E+00	0.310E+00	0.296E+00	0.277E+00	0.255E+00	0.230E+00	0.205E+00	0.181E+00	0.161E+00	0.144E+00	0.134E+00	0.132E+00
0.276E+00	0.327E-01	0.464E-01	0.582E-01	0.681E-01	0.758E-01	0.813E-01	0.845E-01	0.852E-01	0.833E-01	0.787E-01	0.714E-01
0.292E+00	0.174E+00	0.148E+00	0.131E+00	0.122E+00	0.118E+00	0.118E+00	0.119E+00	0.120E+00	0.118E+00	0.112E+00	0.992E-01
0.308E+00	0.469E+00	0.389E+00	0.328E+00	0.283E+00	0.251E+00	0.229E+00	0.215E+00	0.204E+00	0.195E+00	0.184E+00	0.167E+00
0.324E+00	0.725E+00	0.613E+00	0.522E+00	0.450E+00	0.393E+00	0.350E+00	0.317E+00	0.292E+00	0.273E+00	0.256E+00	0.240E+00
0.340E+00	0.826E+00	0.723E+00	0.633E+00	0.556E+00	0.490E+00	0.434E+00	0.389E+00	0.353E+00	0.325E+00	0.305E+00	0.292E+00
0.356E+00	0.730E+00	0.679E+00	0.625E+00	0.569E+00	0.513E+00	0.461E+00	0.413E+00	0.372E+00	0.340E+00	0.319E+00	0.312E+00
0.372E+00	0.468E+00	0.498E+00	0.504E+00	0.490E+00	0.462E+00	0.426E+00	0.386E+00	0.349E+00	0.318E+00	0.299E+00	0.298E+00
0.388E+00	0.147E+00	0.254E+00	0.321E+00	0.354E+00	0.361E+00	0.350E+00	0.327E+00	0.300E+00	0.275E+00	0.260E+00	0.262E+00
0.404E+00	-0.521E-01	0.793E-01	0.171E+00	0.230E+00	0.262E+00	0.272E+00	0.268E+00	0.255E+00	0.240E+00	0.228E+00	0.226E+00
0.420E+00	0.125E+00	0.163E+00	0.195E+00	0.221E+00	0.241E+00	0.255E+00	0.262E+00	0.263E+00	0.257E+00	0.244E+00	0.225E+00

DATA ON RCC6, FUNCTION NO 10

		LEVELS FIRST	LEVELS SECOND
DESCRIPTION	SEPARATION RATIO = .06 L/B = 2,5,8,11,1	4	3

DATA POINTS ENTERED

VAR NO 1	VAR NO 2	DEP. VAR	VAR NO 1	VAR NO 2	DEP. VAR	VAR NO 1	VAR NO 2	DEP. VAR
0.260000	1.00000	0.301240	0.280000	1.00000	0.389280E-01	0.300000	1.00000	0.242172
0.320000	1.00000	0.712013	0.340000	1.00000	0.815529	0.360000	1.00000	0.558286
0.380000	1.00000	0.247448	0.400000	1.00000	0.875700E-01	0.420000	1.00000	0.114702
0.260000	2.50000	0.243099	0.280000	2.50000	0.580760E-01	0.300000	2.50000	0.149156
0.320000	2.50000	0.491453	0.340000	2.50000	0.631803	0.360000	2.50000	0.504357
0.380000	2.50000	0.293061	0.400000	2.50000	0.150918	0.420000	2.50000	0.124783
0.260000	4.00000	0.192328	0.280000	4.00000	0.818550E-01	0.300000	4.00000	0.107251
0.320000	4.00000	0.334042	0.340000	4.00000	0.475401	0.360000	4.00000	0.443691
0.380000	4.00000	0.324527	0.400000	4.00000	0.213587	0.420000	4.00000	0.157499
0.260000	5.50000	0.151985	0.280000	5.50000	0.813760E-01	0.300000	5.50000	0.986320E-01
0.320000	5.50000	0.259808	0.340000	5.50000	0.365535	0.360000	5.50000	0.355963
0.380000	5.50000	0.289526	0.400000	5.50000	0.226564	0.420000	5.50000	0.192578
0.260000	7.00000	0.125779	0.280000	7.00000	0.739440E-01	0.300000	7.00000	0.890760E-01
0.320000	7.00000	0.217956	0.340000	7.00000	0.301983	0.360000	7.00000	0.294543
0.380000	7.00000	0.245802	0.400000	7.00000	0.205413	0.420000	7.00000	0.190687
0.260000	8.50000	0.107300	0.280000	8.50000	0.666990E-01	0.300000	8.50000	0.798360E-01
0.320000	8.50000	0.187714	0.340000	8.50000	0.259264	0.360000	8.50000	0.253794
0.380000	8.50000	0.213022	0.400000	8.50000	0.180857	0.420000	8.50000	0.173678

COEFFICIENTS FOR THE GENERAL FORM-

FIRST VARIABLE BY ROWS, SECOND VARIABLE BY COLUMNS

0.697102E+03	-0.158951E+03	0.121664E+02	-0.195064E+00
-0.852962E+04	0.199178E+04	-0.158973E+03	0.297335E+01
0.386796E+05	-0.924938E+04	0.767680E+03	-0.161954E+02
-0.770001E+05	0.188518E+05	-0.162250E+04	0.376925E+02
0.567923E+05	-0.142281E+05	0.126634E+04	-0.318296E+02

DOMAIN MAP, FIRST VARIABLE DOWN, SECOND VARIABLE ACROSS

	0.100E+01	0.175E+01	0.250E+01	0.325E+01	0.400E+01	0.475E+01	0.550E+01	0.625E+01	0.700E+01	0.775E+01	0.850E+01
0.260E+00	0.291E+00	0.268E+00	0.245E+00	0.223E+00	0.200E+00	0.179E+00	0.160E+00	0.143E+00	0.129E+00	0.119E+00	0.112E+00
0.276E+00	0.383E-01	0.367E-01	0.381E-01	0.415E-01	0.461E-01	0.509E-01	0.551E-01	0.578E-01	0.582E-01	0.552E-01	0.481E-01
0.292E+00	0.171E+00	0.139E+00	0.116E+00	0.101E+00	0.920E-01	0.877E-01	0.862E-01	0.856E-01	0.843E-01	0.803E-01	0.721E-01
0.308E+00	0.444E+00	0.369E+00	0.309E+00	0.262E+00	0.226E+00	0.199E+00	0.180E+00	0.165E+00	0.155E+00	0.145E+00	0.135E+00
0.324E+00	0.681E+00	0.579E+00	0.493E+00	0.422E+00	0.364E+00	0.317E+00	0.280E+00	0.251E+00	0.229E+00	0.214E+00	0.202E+00
0.340E+00	0.774E+00	0.676E+00	0.590E+00	0.515E+00	0.450E+00	0.395E+00	0.349E+00	0.311E+00	0.282E+00	0.261E+00	0.247E+00
0.356E+00	0.684E+00	0.624E+00	0.565E+00	0.510E+00	0.458E+00	0.410E+00	0.367E+00	0.330E+00	0.299E+00	0.275E+00	0.259E+00
0.372E+00	0.443E+00	0.440E+00	0.429E+00	0.412E+00	0.389E+00	0.363E+00	0.335E+00	0.307E+00	0.280E+00	0.257E+00	0.239E+00
0.388E+00	0.149E+00	0.202E+00	0.238E+00	0.261E+00	0.273E+00	0.274E+00	0.267E+00	0.254E+00	0.238E+00	0.219E+00	0.199E+00
0.404E+00	-0.297E-01	0.383E-01	0.934E-01	0.136E+00	0.168E+00	0.189E+00	0.201E+00	0.203E+00	0.197E+00	0.185E+00	0.165E+00
0.420E+00	0.144E+00	0.138E+00	0.140E+00	0.149E+00	0.162E+00	0.175E+00	0.188E+00	0.196E+00	0.198E+00	0.192E+00	0.173E+00

DATA ON RCC*, FUNCTION NO 11

		LEVELS FIRST	LEVELS SECOND
DESCRIPTION	SEPARATION RATIO = .12 L/B = 2,5,8,11,1	4	3

DATA POINTS ENTERED

VAR NO 1	VAR NO 2	DEP. VAR	VAR NO 1	VAR NO 2	DEP. VAR	VAR NO 1	VAR NO 2	DEP. VAR
0.260000	1.00000	0.291129	0.280000	1.00000	0.481380E-01	0.300000	1.00000	0.233397
0.320000	1.00000	0.674798	0.340000	1.00000	0.779523	0.360000	1.00000	0.546471
0.380000	1.00000	0.259992	0.400000	1.00000	0.111664	0.420000	1.00000	0.136531
0.260000	2.50000	0.210805	0.280000	2.50000	0.519850E-01	0.300000	2.50000	0.173484
0.320000	2.50000	0.478069	0.340000	2.50000	0.565093	0.360000	2.50000	0.422221
0.380000	2.50000	0.236610	0.400000	2.50000	0.138308	0.420000	2.50000	0.152212
0.260000	4.00000	0.175504	0.280000	4.00000	0.540930E-01	0.300000	4.00000	0.105900
0.320000	4.00000	0.344826	0.340000	4.00000	0.462329	0.360000	4.00000	0.390834
0.380000	4.00000	0.244957	0.400000	4.00000	0.135452	0.420000	4.00000	0.106530
0.260000	5.50000	0.141127	0.280000	5.50000	0.595150E-01	0.300000	5.50000	0.819420E-01
0.320000	5.50000	0.254598	0.340000	5.50000	0.364322	0.360000	5.50000	0.341013
0.380000	5.50000	0.246616	0.400000	5.50000	0.157186	0.420000	5.50000	0.113775
0.260000	7.00000	0.115647	0.280000	7.00000	0.570840E-01	0.300000	7.00000	0.724860E-01
0.320000	7.00000	0.202993	0.340000	7.00000	0.292663	0.360000	7.00000	0.288506
0.380000	7.00000	0.229494	0.400000	7.00000	0.165206	0.420000	7.00000	0.125431
0.260000	8.50000	0.977840E-01	0.280000	8.50000	0.519180E-01	0.300000	8.50000	0.656020E-01
0.320000	8.50000	0.171293	0.340000	8.50000	0.243509	0.360000	8.50000	0.244502
0.380000	8.50000	0.205781	0.400000	8.50000	0.161418	0.420000	8.50000	0.130404

COEFFICIENTS FOR THE GENERAL FORM-

FIRST VARIABLE BY ROWS, SECOND VARIABLE BY COLUMNS

0.638226E+03	-0.146617E+03	0.148791E+02	-0.605350E+00
-0.777032E+04	0.178888E+04	-0.179467E+03	0.716151E+01
0.350564E+05	-0.808842E+04	0.801686E+03	-0.313248E+02
-0.694223E+05	0.160532E+05	-0.157093E+04	0.599954E+02
0.509336E+05	-0.118030E+05	0.113969E+04	-0.424647E+02

DOMAIN MAP, FIRST VARIABLE DOWN, SECOND VARIABLE ACROSS

	0.100E+01	0.175E+01	0.250E+01	0.325E+01	0.400E+01	0.475E+01	0.550E+01	0.625E+01	0.700E+01	0.775E+01	0.850E+01
0.260E+00	0.280E+00	0.243E+00	0.214E+00	0.191E+00	0.173E+00	0.159E+00	0.147E+00	0.137E+00	0.126E+00	0.114E+00	0.100E+00
0.276E+00	0.476E-01	0.434E-01	0.399E-01	0.371E-01	0.351E-01	0.337E-01	0.332E-01	0.333E-01	0.341E-01	0.357E-01	0.379E-01
0.292E+00	0.171E+00	0.146E+00	0.124E+00	0.105E+00	0.901E-01	0.781E-01	0.691E-01	0.628E-01	0.592E-01	0.580E-01	0.590E-01
0.308E+00	0.425E+00	0.360E+00	0.306E+00	0.261E+00	0.224E+00	0.194E+00	0.171E+00	0.153E+00	0.138E+00	0.128E+00	0.119E+00
0.324E+00	0.646E+00	0.551E+00	0.471E+00	0.406E+00	0.353E+00	0.310E+00	0.276E+00	0.248E+00	0.224E+00	0.203E+00	0.183E+00
0.340E+00	0.735E+00	0.632E+00	0.548E+00	0.479E+00	0.423E+00	0.379E+00	0.342E+00	0.312E+00	0.284E+00	0.258E+00	0.230E+00
0.356E+00	0.657E+00	0.574E+00	0.507E+00	0.454E+00	0.412E+00	0.378E+00	0.350E+00	0.325E+00	0.301E+00	0.275E+00	0.245E+00
0.372E+00	0.439E+00	0.397E+00	0.365E+00	0.342E+00	0.324E+00	0.310E+00	0.299E+00	0.287E+00	0.272E+00	0.254E+00	0.229E+00
0.388E+00	0.172E+00	0.176E+00	0.182E+00	0.190E+00	0.198E+00	0.206E+00	0.211E+00	0.213E+00	0.211E+00	0.204E+00	0.190E+00
0.404E+00	0.983E-02	0.374E-01	0.619E-01	0.832E-01	0.101E+00	0.117E+00	0.129E+00	0.138E+00	0.144E+00	0.148E+00	0.148E+00
0.420E+00	0.170E+00	0.161E+00	0.151E+00	0.141E+00	0.131E+00	0.123E+00	0.117E+00	0.114E+00	0.116E+00	0.122E+00	0.135E+00

DATA ON RC00, FUNCTION NO 12

		LEVELS FIRST	LEVELS SECOND
DESCRIPTION	SEPARATION RATIO = .00 L/B = 2,5,8,11,1	3	3

DATA POINTS ENTERED

VAR NO 1	VAR NO 2	DEP. VAR	VAR NO 1	VAR NO 2	DEP. VAR	VAR NO 1	VAR NO 2	DEP. VAR
0.440000	1.00000	0.267894	0.520000	1.00000	1.12505	0.600000	1.00000	1.36823
0.700000	1.00000	1.19784	0.800000	1.00000	0.949657	0.900000	1.00000	0.747894
0.440000	2.50000	0.197995	0.520000	2.50000	0.650202	0.600000	2.50000	0.924035
0.700000	2.50000	0.969389	0.800000	2.50000	0.896506	0.900000	2.50000	0.801239
0.440000	4.00000	0.260905	0.520000	4.00000	0.473109	0.600000	4.00000	0.656152
0.700000	4.00000	0.760432	0.800000	4.00000	0.783406	0.900000	4.00000	0.764872
1.00000	1.00000	0.599655	1.00000	2.50000	0.711634	1.00000	4.00000	0.727671
0.440000	5.50000	0.276967	0.520000	5.50000	0.430204	0.600000	5.50000	0.526305
0.700000	5.50000	0.604502	0.800000	5.50000	0.661242	0.900000	5.50000	0.689925
0.440000	7.00000	0.259948	0.520000	7.00000	0.408043	0.600000	7.00000	0.475440
0.700000	7.00000	0.509058	0.800000	7.00000	0.559731	0.900000	7.00000	0.609802
0.440000	8.50000	0.242348	0.520000	8.50000	0.377775	0.600000	8.50000	0.446904
0.700000	8.50000	0.459632	0.800000	8.50000	0.486009	0.900000	8.50000	0.532267
1.00000	5.50000	0.694604	1.00000	7.00000	0.642654	1.00000	8.50000	0.578073

COEFFICIENTS FOR THE GENERAL FORM-

FIRST VARIABLE BY ROWS, SECOND VARIABLE BY COLUMNS

-0.273628E+02	0.109471E+02	-0.149451E+01	0.653165E-01
0.121745E+03	-0.506173E+02	0.718062E+01	-0.325987E+00
-0.164129E+03	0.717888E+02	-0.105374E+02	0.492303E+00
0.702834E+02	-0.320005E+02	0.482994E+01	-0.230680E+00

DOMAIN MAP, FIRST VARIABLE DOWN, SECOND VARIABLE ACROSS

	0.100E+01	0.175E+01	0.250E+01	0.325E+01	0.400E+01	0.475E+01	0.550E+01	0.625E+01	0.700E+01	0.775E+01	0.850E+01
0.440E+00	0.298E+00	0.248E+00	0.225E+00	0.222E+00	0.232E+00	0.251E+00	0.271E+00	0.286E+00	0.290E+00	0.277E+00	0.241E+00
0.496E+00	0.878E+00	0.694E+00	0.561E+00	0.471E+00	0.417E+00	0.388E+00	0.377E+00	0.375E+00	0.373E+00	0.362E+00	0.335E+00
0.552E+00	0.122E+01	0.971E+00	0.786E+00	0.651E+00	0.558E+00	0.498E+00	0.464E+00	0.445E+00	0.434E+00	0.422E+00	0.400E+00
0.608E+00	0.136E+01	0.111E+01	0.917E+00	0.769E+00	0.660E+00	0.584E+00	0.533E+00	0.500E+00	0.479E+00	0.462E+00	0.442E+00
0.664E+00	0.135E+01	0.114E+01	0.973E+00	0.837E+00	0.730E+00	0.648E+00	0.586E+00	0.542E+00	0.510E+00	0.486E+00	0.468E+00
0.720E+00	0.123E+01	0.109E+01	0.970E+00	0.863E+00	0.771E+00	0.692E+00	0.626E+00	0.573E+00	0.532E+00	0.501E+00	0.481E+00
0.776E+00	0.105E+01	0.994E+00	0.928E+00	0.859E+00	0.788E+00	0.720E+00	0.655E+00	0.597E+00	0.549E+00	0.512E+00	0.490E+00
0.832E+00	0.860E+00	0.874E+00	0.863E+00	0.833E+00	0.788E+00	0.734E+00	0.675E+00	0.617E+00	0.565E+00	0.523E+00	0.498E+00
0.888E+00	0.695E+00	0.763E+00	0.794E+00	0.796E+00	0.775E+00	0.736E+00	0.687E+00	0.634E+00	0.583E+00	0.541E+00	0.513E+00
0.944E+00	0.605E+00	0.689E+00	0.738E+00	0.758E+00	0.753E+00	0.730E+00	0.695E+00	0.652E+00	0.609E+00	0.570E+00	0.540E+00
0.100E+01	0.634E+00	0.683E+00	0.713E+00	0.727E+00	0.728E+00	0.718E+00	0.699E+00	0.674E+00	0.645E+00	0.615E+00	0.586E+00

DATA ON RC06, FUNCTION NO 13

		LEVELS FIRST	LEVELS SECOND
DESCRIPTION	SEPARATION RATIO = .06 L/B = 2,5,8,11,1	3	3

DATA POINTS ENTERED

VAR NO 1	VAR NO 2	DEP. VAR	VAR NO 1	VAR NO 2	DEP. VAR	VAR NO 1	VAR NO 2	DEP. VAR
0.440000	1.00000	0.274651	0.520000	1.00000	1.07399	0.600000	1.00000	1.29833
0.700000	1.00000	1.13895	0.800000	1.00000	0.908109	0.900000	1.00000	0.720619
1.00000	1.00000	0.583640	1.00000	2.50000	0.622134	1.00000	4.00000	0.561454
0.440000	2.50000	0.193111	0.520000	2.50000	0.682012	0.600000	2.50000	0.882083
0.700000	2.50000	0.860713	0.800000	2.50000	0.773946	0.900000	2.50000	0.690660
0.440000	4.00000	0.162446	0.520000	4.00000	0.478885	0.600000	4.00000	0.706405
0.700000	4.00000	0.722559	0.800000	4.00000	0.655251	0.900000	4.00000	0.598183
0.440000	5.50000	0.189171	0.520000	5.50000	0.349173	0.600000	5.50000	0.555205
0.700000	5.50000	0.652085	0.800000	5.50000	0.603890	0.900000	5.50000	0.529401
1.00000	5.50000	0.432961	1.00000	7.00000	0.448727	1.00000	8.50000	0.483220
0.440000	7.00000	0.197476	0.520000	7.00000	0.295588	0.600000	7.00000	0.437850
0.700000	7.00000	0.577704	0.800000	7.00000	0.580346	0.900000	7.00000	0.511252
0.440000	8.50000	0.187155	0.520000	8.50000	0.272924	0.600000	8.50000	0.358431
0.700000	8.50000	0.501209	0.800000	8.50000	0.550433	0.900000	8.50000	0.502163

COEFFICIENTS FOR THE GENERAL FORM-

FIRST VARIABLE BY ROWS, SECOND VARIABLE BY COLUMNS

-0.216559E+02	0.592691E+01	-0.587349E+00	0.222223E-01
0.954177E+02	-0.265621E+02	0.261492E+01	-0.964625E-01
-0.125901E+03	0.354130E+02	-0.332226E+01	0.112274E+00
0.526636E+02	-0.146426E+02	0.124903E+01	-0.346100E-01

DOMAIN MAP, FIRST VARIABLE DOWN, SECOND VARIABLE ACROSS

	0.100E+01	0.175E+01	0.250E+01	0.325E+01	0.400E+01	0.475E+01	0.550E+01	0.625E+01	0.700E+01	0.775E+01	0.850E+01
0.440E+00	0.313E+00	0.247E+00	0.203E+00	0.176E+00	0.164E+00	0.161E+00	0.166E+00	0.173E+00	0.181E+00	0.183E+00	0.179E+00
0.496E+00	0.844E+00	0.685E+00	0.563E+00	0.472E+00	0.407E+00	0.363E+00	0.333E+00	0.313E+00	0.295E+00	0.276E+00	0.249E+00
0.552E+00	0.115E+01	0.947E+00	0.786E+00	0.663E+00	0.572E+00	0.506E+00	0.459E+00	0.422E+00	0.391E+00	0.359E+00	0.317E+00
0.608E+00	0.128E+01	0.107E+01	0.899E+00	0.769E+00	0.671E+00	0.599E+00	0.546E+00	0.504E+00	0.468E+00	0.429E+00	0.382E+00
0.664E+00	0.127E+01	0.108E+01	0.924E+00	0.805E+00	0.716E+00	0.649E+00	0.599E+00	0.559E+00	0.524E+00	0.486E+00	0.441E+00
0.720E+00	0.117E+01	0.101E+01	0.887E+00	0.792E+00	0.719E+00	0.665E+00	0.623E+00	0.590E+00	0.559E+00	0.527E+00	0.489E+00
0.776E+00	0.100E+01	0.898E+00	0.813E+00	0.746E+00	0.694E+00	0.654E+00	0.622E+00	0.597E+00	0.574E+00	0.551E+00	0.524E+00
0.832E+00	0.826E+00	0.772E+00	0.726E+00	0.686E+00	0.652E+00	0.624E+00	0.601E+00	0.582E+00	0.566E+00	0.554E+00	0.544E+00
0.888E+00	0.675E+00	0.666E+00	0.650E+00	0.629E+00	0.607E+00	0.584E+00	0.563E+00	0.547E+00	0.537E+00	0.535E+00	0.545E+00
0.944E+00	0.592E+00	0.611E+00	0.610E+00	0.595E+00	0.570E+00	0.541E+00	0.514E+00	0.493E+00	0.484E+00	0.493E+00	0.524E+00
0.100E+01	0.618E+00	0.640E+00	0.631E+00	0.599E+00	0.554E+00	0.504E+00	0.457E+00	0.422E+00	0.409E+00	0.424E+00	0.478E+00

DATA ON RC0*, FUNCTION NO 14

		LEVELS FIRST	LEVELS SECOND
DESCRIPTION	SEPARATION RATIO = .12 L/B = 2,5,8,11,1	3	3

DATA POINTS ENTERED

VAR NO 1	VAR NO 2	DEP. VAR	VAR NO 1	VAR NO 2	DEP. VAR	VAR NO 1	VAR NO 2	DEP. VAR
0.440000	1.00000	0.285073	0.520000	1.00000	1.03102	0.600000	1.00000	1.24087
0.700000	1.00000	1.09286	0.800000	1.00000	0.882885	0.900000	1.00000	0.715794
0.440000	2.50000	0.245480	0.520000	2.50000	0.699670	0.600000	2.50000	0.818315
0.700000	2.50000	0.757790	0.800000	2.50000	0.688725	0.900000	2.50000	0.643869
0.440000	4.00000	0.152056	0.520000	4.00000	0.558911	0.600000	4.00000	0.705686
0.700000	4.00000	0.614320	0.800000	4.00000	0.529030	0.900000	4.00000	0.508480
1.00000	1.00000	0.594505	1.00000	2.50000	0.612092	1.00000	4.00000	0.519966
0.440000	5.50000	0.124050	0.520000	5.50000	0.427004	0.600000	5.50000	0.616583
0.700000	5.50000	0.572313	0.800000	5.50000	0.464589	0.900000	5.50000	0.412146
0.440000	7.00000	0.120688	0.520000	7.00000	0.338532	0.600000	7.00000	0.534265
0.700000	7.00000	0.537161	0.800000	7.00000	0.445015	0.900000	7.00000	0.378997
0.440000	8.50000	0.121127	0.520000	8.50000	0.278812	0.600000	8.50000	0.465158
0.700000	8.50000	0.497275	0.800000	8.50000	0.428450	0.900000	8.50000	0.363612
1.00000	5.50000	0.415571	1.00000	7.00000	0.362926	1.00000	8.50000	0.334452

COEFFICIENTS FOR THE GENERAL FORM-

FIRST VARIABLE BY ROWS, SECOND VARIABLE BY COLUMNS

-0.211537E+02	0.746410E+01	-0.136732E+01	0.858075E-01
0.922914E+02	-0.320194E+02	0.581614E+01	-0.365575E+00
-0.120642E+03	0.414292E+02	-0.752433E+01	0.477286E+00
0.500670E+02	-0.167761E+02	0.304000E+01	-0.195067E+00

DOMAIN MAP, FIRST VARIABLE DOWN, SECOND VARIABLE ACROSS

	0.100E+01	0.175E+01	0.250E+01	0.325E+01	0.400E+01	0.475E+01	0.550E+01	0.625E+01	0.700E+01	0.775E+01	0.850E+01
0.440E+00	0.325E+00	0.291E+00	0.255E+00	0.219E+00	0.184E+00	0.152E+00	0.125E+00	0.105E+00	0.947E-01	0.948E-01	0.107E+00
0.496E+00	0.815E+00	0.680E+00	0.575E+00	0.496E+00	0.438E+00	0.397E+00	0.367E+00	0.344E+00	0.323E+00	0.299E+00	0.267E+00
0.552E+00	0.110E+01	0.908E+00	0.764E+00	0.661E+00	0.591E+00	0.544E+00	0.514E+00	0.490E+00	0.465E+00	0.429E+00	0.375E+00
0.608E+00	0.122E+01	0.101E+01	0.848E+00	0.736E+00	0.661E+00	0.613E+00	0.583E+00	0.560E+00	0.536E+00	0.499E+00	0.441E+00
0.664E+00	0.122E+01	0.101E+01	0.852E+00	0.743E+00	0.669E+00	0.622E+00	0.593E+00	0.572E+00	0.551E+00	0.520E+00	0.470E+00
0.720E+00	0.112E+01	0.938E+00	0.802E+00	0.703E+00	0.635E+00	0.590E+00	0.562E+00	0.543E+00	0.527E+00	0.505E+00	0.472E+00
0.776E+00	0.972E+00	0.832E+00	0.723E+00	0.640E+00	0.579E+00	0.537E+00	0.509E+00	0.490E+00	0.478E+00	0.467E+00	0.454E+00
0.832E+00	0.810E+00	0.718E+00	0.640E+00	0.575E+00	0.522E+00	0.481E+00	0.451E+00	0.431E+00	0.420E+00	0.418E+00	0.423E+00
0.888E+00	0.674E+00	0.627E+00	0.579E+00	0.530E+00	0.483E+00	0.442E+00	0.407E+00	0.382E+00	0.369E+00	0.370E+00	0.387E+00
0.944E+00	0.600E+00	0.590E+00	0.565E+00	0.527E+00	0.483E+00	0.438E+00	0.395E+00	0.361E+00	0.339E+00	0.336E+00	0.355E+00
0.100E+01	0.627E+00	0.638E+00	0.623E+00	0.589E+00	0.542E+00	0.488E+00	0.434E+00	0.385E+00	0.347E+00	0.328E+00	0.333E+00

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C   ECDF 2ND ORDER INTERPOLATOR BETWEEN 3 PTS SPACED X4 DISTANCE APART
C        X0 IS THE FIRST PT VALUE, X1 IS THE SECOND PT VALUE
C        X2 IS THE THIRD PT VALUE, X5=2
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MAIN VARIABLE NAMES	INITIALIZING VALUES	START VECTOR	LOWER LIMIT	UPPER LIMIT
LCUE	690.00	690.00	-0.10000000+301	0.10000000+301
PCUE	551.50	551.50	-0.10000000+301	0.10000000+301
HTWD	30.00	30.00	-0.10000000+301	0.10000000+301
BCUE	81.00	81.00	-0.10000000+301	0.10000000+301

MAIN VARIABLE LCUE FIXED THIS RUN.

MAIN VARIABLE PCUE VARIES THIS RUN.

MAIN VARIABLE HTWD FIXED THIS RUN.

MAIN VARIABLE BCUE FIXED THIS RUN.

CONSTRAINT WTBY ACTIVE THIS RUN.

CONSTRAINT LBOA INACTIVETHIS RUN.

CONSTRAINT LL/B INACTIVETHIS RUN.

CONSTRAINT VAVR INACTIVETHIS RUN.

CONSTRAINT HPWR INACTIVETHIS RUN.

CONSTRAINT HBSS INACTIVETHIS RUN.

CONSTRAINT CBSS INACTIVETHIS RUN.

CONSTRAINT LVCG INACTIVETHIS RUN.

3 DIGIT WEIGHT REPORT SELECTED.

BEST TRAP INACTIVE THIS RUN.

CROSS REFERENCE TABLE IS NOT WRITTEN THIS RUN.

VARIABLE ADDRESS TABLE IS NOT WRITTEN THIS RUN.

TABLE OF STORED CONSTANTS

NO	NAME	VALUE	DESCRIPTION	NO	NAME	VALUE	DESCRIPTION
(1)	**A1	0.00000E+00		(2)	**A2	0.00000E+00	
(3)	**A3	0.00000E+00	********** SPEEDS	(4)	**A4	0.00000E+00	********** SPEEDS
(5)	VKCR	50.000	SPEED FOR RANGE, LFSES	(6)	VKC3	15.000	SPEED FOR HULLBORNE RANGE, LFSES
(7)	VKDS	50.000	SPEED FOR WEIGHT, LFSES	(8)	VKC5	50.000	MAXIMUM SPEED, LFSES
(9)	**B1	0.00000E+00		(10)	**B2	0.00000E+00	
(11)	**B3	0.00000E+00	********** SIGNIFICANT WAVE HTS	(12)	**B4	0.00000E+00	********** SIGNIFICANT WAVE HTS
(13)	SIGD	2.9000	H1/3 DESIGN SPEED, MPS	(14)	SIG5	2.9000	H1/3 HIGH SPEED, MPS
(15)	SIGC	2.9000	H1/3 FOR CRUISE SPEED RANGE	(16)	H1/3	26.000	H1/3 FOR GLOBAL STRUCTURAL LOADS
(17)	LSSD	18.000	SEA STATE MAX POWER LIMIT H1/3	(18)	**C1	0.00000E+00	
(19)	**C2	0.00000E+00		(20)	**C3	0.00000E+00	********** RANGES
(21)	**C4	0.00000E+00	********** RANGES	(22)	RANG	4000.0	DESIGN SPEED RANGE, MPS
(23)	RAN3	4000.0	HULLBORNE RANGE, MPS	(24)	**D1	0.00000E+00	
(25)	**D2	0.00000E+00		(26)	**D3	0.00000E+00	********** MARGIN RATIOS
(27)	**D4	0.00000E+00	********** MARGIN RATIOS	(28)	HPIN	60000.	INSTALLED BHP / GT PROPUL.
(29)	CMAR	0.10000	SFS WEIGHT DESIGN AND BUILD MARGIN	(30)	MVLR	1.0000	MARGIN ON REQUIRED VOLUME
(31)	MPWR	1.0000	SPEED/ PWR MARGIN (DTO3,DTO5)	(32)	MDRG	1.0000	DRAG MARGIN MULTIPLIER
(33)	MF10	0.10000	MARGIN RATIO ON ACCOMODATIONS	(34)	SFCF	1.0000	FUEL FACTOR (SFC FACTOR)
(35)	PBFF	1.0000	70518 SFS PROPUL FUEL RATE MARGIN @ VKCR	(36)	LBFF	1.0500	051785 LIFT FUEL RATE MARGIN VKCR
(37)	RMAR	1.1000	70518 SFS RANGE MARGIN @ VKCR	(38)	TPAL	0.98000	TAILPIPE ALLOWANCE
(39)	GF11	1.0000	70430 STRUCT GROWTH FACTOR GRP 111	(40)	GF12	0.10000	70524 STRUCT BHDS GROWTH FACTOR
(41)	**E1	0.00000E+00		(42)	**E2	0.00000E+00	
(43)	**E3	0.00000E+00	********** HULL GEOMETRY	(44)	**E4	0.00000E+00	********** HULL GEOMETRY
(45)	NCUE	1.0000	NUM CUSHIONS (1=SES),(2=SECAT)	(46)	BMAX	108.00	MAXIMUM BEAM LIMIT
(47)	ML/B	8.5000	MAXIMUM L/B LIMIT OF CUSH	(48)	DH	7.5000	DECK HEIGHT, FT
(49)	HTCB	30.000	CENTERBODY HEIGHT, SFS	(50)	FLT1	4.0000	SFS KEEL FLAT 70523
(51)	TANF	0.10000E-04	110485 0 DEGREES FLARE ANGLE(TANGENT)	(52)	COSF	1.0000	COSINE SIDEHULL FLARE ANGLE
(53)	CTA1	1.0000	COT OUTER DEADRISE ANGLE, SES	(54)	MSPO	0.70700	COEFF FOR SINE OF OUTER DEADRISE ANGLE
(55)	SSPO	0.70700	SINE COEFF SECAT OUTER DEADRISE ANGLE	(56)	T1FI	0.57700	TANGENT OF INNER FLARE ANGLE
(57)	CTB1	0.57700	COT INNER DEADRISE ANGLE, SES	(58)	MSPI	0.86600	COEFF. CALC OF SINE INNER DEADRISE
(59)	SSPI	0.86600	SINE COEFF SECAT INNER DEADRISE ANGLE	(60)	PCO1	0.86000	PRISMATIC COEF OUTER, SES
(61)	PCI1	0.55000	PRISMATIC COEF INNER, SES	(62)	VDCK	4.0000	DECK HOUSE VOL - 20X20X10
(63)	VHNG	180.00	VOLUME HANGER, FT3/1000	(64)	VMOD	-20.000	VOLUME DEDUCTION FOR BOW RAMP
(65)	**F1	0.00000E+00		(66)	**F2	0.00000E+00	
(67)	**F3	0.00000E+00	********** RESISTANCE COEFFICIENTS	(68)	**F4	0.00000E+00	********** RESISTANCE COEFFICIENTS
(69)	MDH1	-0.18545	MDC HB COEF, DRAG	(70)	MDH2	2.2708	MDC HB EXP, DRAG
(71)	SDH1	-0.27409	SECAT HB COEF, DRAG	(72)	SDH2	3.5381	SECAT HB EXP, DRAG
(73)	SFL1	0.20400	SECAT SEAL DRAG COEFF	(74)	SHF1	1.5000	SECAT DRAFT CORRECT. COEFF
(75)	SHF2	-0.50000	SECAT DRAFT CORRECT COEFF	(76)	SHF3	0.40000	SECAT DRAFT CORRECT COEFF.
(77)	DCBR	1.0000	= 0. FOR HB DESIGN, = 1.0 FOR CB DESIGN	(78)	DHBR	0.00000E+00	= 1.0 FOR HB DESIGN, = 0. FOR CB DESIGN
(79)	CCBR	1.0000	= 0. FOR HB CRUISE, = 1.0 FOR CB CRUISE	(80)	CHBR	0.00000E+00	= 1.0 FOR HB CRUISE, = 0. FOR CB CRUISE
(81)	5CBR	1.0000	2ND DESIGN VELOCITY CUSHIONBORNE	(82)	5HBR	0.00000E+00	2ND DESIGN VELOCITY HULLBORNE
(83)	**J1	0.00000E+00		(84)	**J2	0.00000E+00	
(85)	**J3	0.00000E+00	********** MACHINERY PLANT	(86)	**J4	0.00000E+00	********** MACHINERY PLANT
(87)	NPEC	4.0000	NO. PROPULSION ENGINES @ VKCR	(88)	NPE3	2.0000	NUMBER OF TURBINES HULLBORNE CRUISE
(89)	NTLC	2.0000	NUM TURBINES LIFT CRUISE	(90)	NDLC	0.00000E+00	NUM DIESELS LIFT CRUISE
(91)	NTPC	4.0000	NO. PROPULSION GT @ VKCR	(92)	GENC	1.0000	GENERATOR CODE-1=DIESEL,2=GAS TURBINE
(93)	N311	2.0000	NUM GENERATORS	(94)	NDP	0.00000E+00	NUM INSTALLED PROPUL DIESELS
(95)	NDL	0.00000E+00	NO. INSTALLED LIFT ENGINES	(96)	NTP	4.0000	NO. INSTALLED PROPULSION GT
(97)	NTL	2.0000	NO. INSTALLED LIFT GT	(98)	NTE	6.0000	042287 TOT NUM LIFT+PROP ENG
(99)	NLSY	2.0000	051685 NUM INDEPENDENT LIFT SYSTEMS	(100)	KFAN	8.0000	NUMBER OF LIFT FANS

TABLE OF STORED CONSTANTS

NO	NAME	VALUE	DESCRIPTION	NO	NAME	VALUE	DESCRIPTION
(101)	**G1	0.00000E+00		(102)	**G2	0.00000E+00	
(103)	**G3	0.00000E+00	********** MACHINERY PLANT COEFFICIENTS	(104)	**G4	0.00000E+00	********** MACHINERY PLANT COEFFICIENTS
(105)	SHLF	2.0000	SHAFT LENGTH LIFT FAN, FT	(106)	ETAF	0.80000	FAN EFFICIENCY COEFF.
(107)	SHLP	100.00	SHAFT LENGTH PROPUL, FT	(108)	ETAA	0.94500	051585 PC COEFF
(109)	ETAS	0.97000	051785 PC COEFF	(110)	ETAT	0.96000	051785 GB & BRG LOSSES FOR BHP CALC PROP
(111)	ETAD	1.0000	COEFF VKJ0 AND TVO2	(112)	ETAW	0.97000	COEFF FOR J2KT,KTJ0,POUT
(113)	ETAC	1.0000	80520 MODIFIER HULL INTERACTION ON ETPC	(114)	ESFC	0.39000	SFC, SHIP'S SERVICE LOAD
(115)	LSFC	0.38000	042287 LIFT SFC @VKCR, LM2500	(116)	DSFC	0.44000	051785 SFC PROPUL ENGS @ VKCR
(117)	TSFC	0.36000	042287 PROP SFC @VKCR, LM5000	(118)	CELF	0.77000	051785 ELEC LOAD FACTOR ON VKCR RNGE
(119)	KWIN	1650.0	70518 PD-214 KW PER GEN SET	(120)	CKHP	1.3400	CONVERSION HP / KW
(121)	CCC4	4048.0		(122)	CCC3	5012.0	
(123)	VOLI	0.00000E+00		(124)	FIN	1500.0	051785 FAN INPUT RPM
(125)	FOUT	1500.0	051786 FAN OUTPUT RPM	(126)	PIN	3600.0	0517985 LM2500 PROPUL INPUT RPM
(127)	NPRT	4.0000	NO. PROPULSION REDUCTION GRBXS	(128)	NFNT	2.0000	NUM OF FAN TRANSMISSIONS
(129)	NPCL	4.0000	NUM PROPUL CLUTCHES	(130)	NFCL	4.0000	NUM FAN CLUTCHES
(131)	NSHP	4.0000	NO. PROPULSION SHAFTS	(132)	NSHF	4.0000	NUM LIFT FAN SHAFTS
(133)	NSHC	4.0000	NO. LIFT FAN CLUTCHES	(134)	CAED	0.00000E+00	051785 PC SWITCH
(135)	CSCN	0.00000E+00	051785 PC SWITCH	(136)	CMCH	1.0000	051785 PC SWITCH
(137)	**H1	0.00000E+00		(138)	**H2	0.00000E+00	
(139)	**H3	0.00000E+00	********** ENDURANCE INPUTS	(140)	**H4	0.00000E+00	********** ENDURANCE INPUTS
(141)	NDAY	30.000	ENDURANCE, DAYS	(142)	NSDD	30.000	NUM DAYS DRY STORES
(143)	NSDC	30.000	NUM DAYS CHILLED STORES	(144)	NSDF	30.000	NUM DAYS FROZEN STORES
(145)	NSDG	30.000	NUM DAYS PERSONAL STORES	(146)	NF23	0.00000E+00	
(147)	WCOM	0.00000E+00	NOT USED	(148)	WEAP	0.00000E+00	NOT USED
(149)	**I1	0.00000E+00		(150)	**I2	0.00000E+00	
(151)	**I3	0.00000E+00	********** PERSONNEL INPUTS	(152)	**I4	0.00000E+00	********** PERSONNEL INPUTS
(153)	AV10	1.0000	NUM PERSONNEL FOR STORES	(154)	KOFF	7.0000	NO. OF OFFICERS, MPS
(155)	KCPO	12.000	NO. OF CHIEF PETTY OFFICERS, MPS	(156)	KENL	30.000	NO. OF ENLISTED, MPS
(157)	**L1	0.00000E+00		(158)	**L2	0.00000E+00	
(159)	**L3	0.00000E+00	********** REQUIRED VOLUME COEFF.	(160)	**L4	0.00000E+00	********** REQUIRED VOLUME COEFF.
(161)	VSTR	0.00000E+00		(162)	V121	2500.0	PAYLOAD VOLUME (5000 SHORT TONS)
(163)	V123	0.00000E+00	CARGO VOLUME	(164)	V124	0.00000E+00	LCAC VOLUME (125000FT3 PER CRAFT)
(165)	WF43	0.00000E+00		(166)	V132	0.00000E+00	JVX VOLUME - (30,000/1,000 PER JVX)
(167)	V137	0.00000E+00	AIRCRAFT ORDNANCE	(168)	111A	0.12280	
(169)	111B	0.76300		(170)	112A	0.36900E-01	
(171)	112B	0.65100		(172)	122A	0.33000E-03	
(173)	128A	0.30500E-05		(174)	128B	1.5190	
(175)	126A	0.20176E-01		(176)	126B	0.30000	
(177)	136A	0.47810E-01		(178)	131A	0.34000E-04	
(179)	135A	0.15000E-02		(180)	182A	0.15000E-04	
(181)	134A	0.17700E-02		(182)	211A	0.82500E-01	
(183)	211C	0.21400E-01		(184)	211D	0.78500	
(185)	211B	0.95600		(186)	212A	0.43060E-01	
(187)	212C	0.20000E-01		(188)	212D	0.72000	
(189)	212B	0.90000		(190)	213A	0.26090E-01	
(191)	213B	0.93000		(192)	213C	0.40150E-01	
(193)	213D	0.68700		(194)	211E	0.21500E-01	
(195)	211F	0.94800		(196)	212E	0.39950E-01	
(197)	212F	0.89000		(198)	213E	0.30970E-01	
(199)	213F	0.70000		(200)	222A	0.20000E-01	ASSET VOLUME

TABLE OF STORED CONSTANTS

NO	NAME	VALUE	DESCRIPTION	NO	NAME	VALUE	DESCRIPTION
(201)	225A	0.13000E-03	ASSET VOLUME	(202)	224A	0.37000E-03	ASSET VOLUME
(203)	224B	0.23900E-02	ASSET VOLUME	(204)	224C	0.69000	
(205)	221A	0.13000E-03	ASSET VOLUME	(206)	221B	0.66000	
(207)	223A	0.46500E-02	ASSET VOLUME	(208)	223B	0.47000	
(209)	222B	0.44500E-02	ASSET VOLUME	(210)	222C	0.41000	
(211)	222D	0.80000		(212)	233A	0.39050E-01	
(213)	231A	0.14000E-03	ASSET VOLUME	(214)	231B	0.23900E-03	ASSET VOLUME
(215)	231C	0.69000		(216)	313A	0.20000E-01	
(217)	311A	0.10000E-02		(218)	311B	0.64000E-03	
(219)	313B	0.35830E-03		(220)	313C	1.1200	
(221)	314A	0.42600E-02	ASSET VOLUME	(222)	314B	0.97400	
(223)	311C	0.45810E-01		(224)	311D	0.20800	
(225)	312A	0.27000E-03	ASSET VOLUME	(226)	312B	0.73900	
(227)	320A	0.79250E-01		(228)	320B	0.67800	
(229)	333A	0.45000		(230)	331A	0.11700E-05	ASSET VOLUME
(231)	331B	0.40000E-04		(232)	331C	0.16000E-04	
(233)	331D	0.75000E-03		(234)	331E	0.80000	
(235)	333B	0.23580E-03		(236)	333C	1.2000	
(237)	331F	0.20191E-02		(238)	331G	1.0140	
(239)	332C	0.29500E-03		(240)	332A	0.12800E-03	
(241)	332B	0.96400		(242)	340A	0.33000E-05	
(243)	340B	1.5000		(244)	351A	0.45850E-01	
(245)	351B	0.40000E-03		(246)	352A	0.34242E-02	
(247)	360A	0.30000E-01		(248)	370A	0.19200E-01	ASSET VOLUME
(249)	370B	0.98300		(250)	**M1	0.00000E+00	
(251)	**M2	0.00000E+00		(252)	**M3	0.00000E+00	********** PERFORMANCE COEFF.
(253)	**M4	0.00000E+00	********** PERFORMANCE COEFF.	(254)	C233	498.20	
(255)	C23C	0.80000		(256)	C23M	1200.0	
(257)	D233	-0.10530E-01		(258)	C234	15.400	
(259)	C23D	0.18400E-03		(260)	C235	0.22430E-03	
(261)	C23E	0.54400		(262)	C23P	-0.99000	
(263)	C236	0.77640E-03		(264)	D235	2122.0	
(265)	D23E	-0.73330		(266)	D23P	0.15077E-02	
(267)	CB35	-0.33330		(268)	D23L	0.49600E-08	
(269)	C232	6.5300		(270)	C23B	0.47380E-03	
(271)	C23L	0.27310E-07		(272)	D232	28.428	
(273)	D23B	-0.70000		(274)	CB32	0.62300E-08	
(275)	D23C	-1.4300		(276)	C24A	10.040	
(277)	C244	0.18600		(278)	C243	0.70000E-02	
(279)	C24C	0.66660		(280)	C245	0.28900E-02	70519 LSES PROPULSORS CRP TRANSOM MOUNTE
(281)	C248	0.10125E+06		(282)	C24H	2116.2	
(283)	C24S	1.0000	LIFT POWER MARGIN FACTOR	(284)	D248	0.28570	
(285)	E248	0.21000E-01		(286)	E24H	0.92000E-02	
(287)	D24H	0.80700		(288)	C251	0.70000E-04	70519 LSES COMBUSTION AIR
(289)	C25A	0.77000E-05		(290)	C25K	0.23770E-05	70518 LSES COMBUSTION AIR COEFF
(291)	D251	0.43970E-01	70518 LSES COMBUSTION AIR COEF	(292)	C252	0.86900E-02	
(293)	C260	0.13200E-03		(294)	C290	0.61600E-03	
(295)	C259	0.42000E-05		(296)	C25J	0.29000E-05	
(297)	C25T	0.27545E-01		(298)	D259	0.17300E-05	70519 LSES UPTAKES COEFF
(299)	C241	922.17		(300)	C242	0.26700E-04	

TABLE OF STORED CONSTANTS

NO	NAME	VALUE	DESCRIPTION	NO	NAME	VALUE	DESCRIPTION
(301)	C24K	0.82000		(302)	F3T0	0.33000E-03	
(303)	F5T0	0.45000E-04		(304)	CKW1	4.9543	
(305)	CKW2	0.28119E-02		(306)	CKW3	3.1934	
(307)	CKW4	1.1684		(308)	CKW5	1.3000	
(309)	CKW6	1.3000		(310)	C310	0.17900	
(311)	C3A0	0.31500E-01		(312)	C320	0.13940E-01	
(313)	C3B0	0.93000E-02		(314)	C330	0.26790E-01	
(315)	C3C0	0.22000E-02		(316)	C340	0.00000E+00	
(317)	C3D0	0.33000E-01		(318)	C390	0.17900E-02	
(319)	C3J0	0.31500E-03		(320)	C3T0	0.31500E-03	
(321)	D390	0.61000E-04		(322)	D3J0	0.62076E-04	
(323)	D3T0	0.26790E-03		(324)	F390	0.22000E-04	
(325)	F3J0	0.85300E-01		(326)	C510	0.40000	
(327)	C5A0	0.72600E-01		(328)	C5K0	0.21140E-01	
(329)	D510	0.75000E-03		(330)	C520	0.30040E-01	
(331)	C5B0	0.15000E-04		(332)	C530	0.30000	
(333)	C5C0	0.63770E-01		(334)	C5M0	0.54000E-01	
(335)	C540	0.17000E-05		(336)	CEE0	1.6000	
(337)	C5E0	0.22110E-01		(338)	C560	0.80000	
(339)	C5F0	0.11500E-01		(340)	C570	0.29900E-02	
(341)	C5G0	0.26000E-01		(342)	C5R0	5.0000	
(343)	C580	0.26000E-02		(344)	C583	0.11400E-01	
(345)	C584	5.0000		(346)	909A	0.71500E-03	
(347)	909B	0.34500E-01		(348)	909C	0.40000E-01	
(349)	909D	20.000		(350)	C590	0.18600	
(351)	C5J0	0.31580E-01		(352)	C5T0	0.45954E-02	
(353)	D590	0.69000E-06		(354)	D5J0	0.10200E-06	
(355)	D5T0	0.17940E-03		(356)	F590	0.15600E-02	
(357)	F5J0	0.30000		(358)	C610	0.13070E-03	
(359)	C620	0.95000		(360)	C6B0	0.14700E-04	
(361)	C6L0	0.23460E-01		(362)	C630	0.15900E-01	
(363)	C6C0	0.35700E-04		(364)	C6M0	0.17000	
(365)	D630	0.32620E-01		(366)	C640	0.23500E-01	
(367)	C6D0	0.37500		(368)	C6N0	0.19200	
(369)	D640	0.14000		(370)	C650	0.60300E-01	
(371)	C660	7.5000		(372)	C6F0	0.60100E-01	
(373)	C6Q0	0.10600E-03		(374)	C670	0.28500E-01	
(375)	C6G0	0.28000E-02		(376)	CKTF	1.6878	
(377)	CLSC	1.0300		(378)	CDOA	0.43000	
(379)	CDA1	0.55000E-01		(380)	CFI1	0.23200	
(381)	CFO1	0.74000		(382)	CFO2	12.000	
(383)	E	2.7183	NUMBER = BASE NATURAL LOGARITHMS	(384)	CDOW	0.45900E-02	
(385)	CDEX	0.15900		(386)	CSAM	5.0990	
(387)	CSIG	15.300		(388)	MDRC	1.0000	
(389)	MPF1	0.74000		(390)	MPF2	0.26000	
(391)	MHF1	1.8750		(392)	MHF2	-0.87500	
(393)	MHF3	0.45000		(394)	MFL1	0.24000	
(395)	MSS1	0.41380		(396)	MSS2	0.67000E-02	
(397)	MSS3	0.46550		(398)	SSS1	0.38850	
(399)	SSS2	0.57000E-02		(400)	SSS3	0.16530	

TABLE OF STORED CONSTANTS

NO	NAME	VALUE	DESCRIPTION	NO	NAME	VALUE	DESCRIPTION
(401)	CHDF	0.60000E-01		(402)	CH5F	0.60000E-01	SAME AS CHDF
(403)	C422	0.44643E-03		(404)	C140	700.00	
(405)	SDRC	0.71050		(406)	SPF1	0.90000	
(407)	SPF2	0.10000		(408)	CMOB	6.7000	
(409)	CFB0	0.50000		(410)	CFB1	2.5020	
(411)	CFB2	-0.57500		(412)	CFB3	0.18300	
(413)	C219	-0.11975E+07		(414)	C754	-1.6274	
(415)	CKT0	0.21453		(416)	CKT1	-0.56909	
(417)	CKT2	0.75048		(418)	CKT3	-0.28658	
(419)	JPEK	1.2000		(420)	CPE0	62.626	
(421)	CPE5	-23.458	PART OF PROPEL. EFF. EQN AT VKDS	(422)	CPE1	-258.86	
(423)	CPE2	427.40		(424)	CPE3	-350.68	
(425)	CPE4	143.51		(426)	CCB1	0.95000	
(427)	CCB2	0.95000		(428)	**S1	0.00000E+00	
(429)	**S2	0.00000E+00		(430)	**S3	0.00000E+00	********** STRUCTURAL WEIGHT INPUTS.
(431)	**S4	0.00000E+00	********** STRUCTURAL WEIGHT COEFF	(432)	W130	0.00000E+00	
(433)	W140	0.00000E+00		(434)	TFTD	10.000	TONS/FT2 ON KEEL BLOCKS
(435)	CL/H	1.5000		(436)	CSTH	0.84299	
(437)	SEP1	0.00000E+00	SEPARATION BETWEEN CUSHIONS, SES	(438)	CTRB	0.57735	COTANGENT RAKE ANGLE, BOW
(439)	CTRS	0.10000E-02	COTANGENT RAKE ANGLE, STERN	(440)	TA60	1.7321	TANGENT OF 60 DEGREES
(441)	KBCL	4.0000	CLEARANCE BETWEEN KEEL BLOCKS, FT	(442)	LWKB	1.0000	LENGTH/WIDTH RATIO KEEL BLOCKS
(443)	FADD	14.000	ADDITIONAL FREEBOARD FOR BM, 706170	(444)	SH13	45.900	STRUCTURAL BM H13, 706170
(445)	SLCA	398.00	STRUC LOAD COEF A, 706170	(446)	SLCB	899.84	STRUC LOAD COEF B, 706170
(447)	SLCC	-0.27939E+06	STRUC LOAD COEF C, 706170	(448)	SLCD	0.41884E-05	STRUC LOAD COEF D, 706170
(449)	NSH1	2.0000		(450)	**K1	0.00000E+00	
(451)	**K2	0.00000E+00		(452)	**K3	0.00000E+00	********** WEIGHT COEFFICIENTS
(453)	**K4	0.00000E+00	********** WEIGHT COEFFICIENTS	(454)	C24J	0.12220E-02	
(455)	C24M	0.88450		(456)	C24L	0.16510E-01	
(457)	C410	41.920		(458)	C420	9.5200	
(459)	C430	88.450		(460)	C440	31.950	
(461)	C450	71.130		(462)	C460	154.51	
(463)	C470	14.710		(464)	C480	41.460	
(465)	C490	24.930		(466)	C710	20.120	
(467)	C720	354.96		(468)	C730	0.00000E+00	
(469)	C740	0.00000E+00		(470)	C750	2.0000	
(471)	C760	5.0000		(472)	C770	0.00000E+00	
(473)	C780	135.57		(474)	C790	59.250	
(475)	EDCL	0.00000E+00		(476)	SEXL	1.0000	
(477)	CIRL	1.0000		(478)	DEXL	1.0000	
(479)	EDCP	0.00000E+00		(480)	SEXP	1.0000	
(481)	CIRP	1.0000		(482)	DEXP	1.0000	
(483)	HIHP	1.0000		(484)	SYNP	1.0000	
(485)	AICP	1.0000		(486)	DINP	1.0000	
(487)	HIHL	1.0000		(488)	SYNL	1.0000	
(489)	AICL	1.0000		(490)	DINL	1.0000	
(491)	DCIL	0.00000E+00		(492)	DCIP	2.5000	
(493)	DCXL	0.00000E+00		(494)	DCXP	0.69930	70518 LSES EXHAUST SYSTEM
(495)	**K5	0.00000E+00		(496)	**K6	0.00000E+00	
(497)	**K7	0.00000E+00	********** WEIGHT ITEMS COEFF.	(498)	**K8	0.00000E+00	********** WEIGHT ITEMS COEFF.
(499)	WMOD	0.00000E+00		(500)	C120	19.273	

TABLE OF STORED CONSTANTS

NO	NAME	VALUE	DESCRIPTION	NO	NAME	VALUE	DESCRIPTION
(501)	C1B0	0.16066E-02		(502)	E120	1.4318	
(503)	C160	0.78123		(504)	C1F0	0.61993E-02	
(505)	E160	1.2089		(506)	C1Q0	0.40630E-04	
(507)	E1F0	1.7655		(508)	D160	0.77962E-02	
(509)	E1Q0	1.2534		(510)	D1F0	0.14046	
(511)	E1Z0	0.73999		(512)	C170	2.9275	
(513)	C1G0	0.10089		(514)	E170	0.65837	
(515)	C1R0	0.28824		(516)	E1G0	0.72603	
(517)	C180	0.00000E+00		(518)	C1H0	0.11776	
(519)	E180	1.0000		(520)	C1S0	0.93335E-02	
(521)	E1H0	1.2873		(522)	C002	0.20000E-02	
(523)	K150	-0.42000		(524)	K161	0.14960	70518 PD-214 STRUCT CAST., WELDMENTS FO
(525)	K163	0.30000E-01		(526)	K164	0.00000E+00	
(527)	K167	0.16000		(528)	K169	0.21000	
(529)	K170	0.62000		(530)	K182	0.10000E-01	70518 LSES PROPULSION PLANT FDNS
(531)	K183	0.22550E-01	70518 LSES ELECTRIC PLANT FDNS.	(532)	K184	0.82140E-01	GROUP 400 FOUNDATIONS (DDG 51)
(533)	K185	0.18500E-01	70518 LSES AUXIL. SYS FDNS.	(534)	K186	0.27900E-01	O&F FOUNDATIONS (DDG 51)
(535)	K187	0.75000E-01	ARMAMENT FOUNDATIONS (DDG 51)	(536)	K190	0.20000E-01	
(537)	K119	0.14400E-01		(538)	X233	0.00000E+00	DIESEL ENGINE WEIGHT
(539)	X234	0.00000E+00	GAS TURBINE ENGINE WEIGHT	(540)	K234	0.56000E-01	TURBINE WEIGHT COEFFICIENT
(541)	K241	0.60800E-02		(542)	K242	0.26700E-04	
(543)	K244	0.19500	70519 LSES PROPULSION SHAFT BRGS	(544)	K252	0.31700E-02	70519 LSES PROPULSION CONTROL SYS
(545)	K256	0.11000E-01		(546)	K261	0.30000E-04	70518 PD-214 FUEL SERVICE SYS
(547)	K262	0.31300E-04	70519 LSES MAIN PROPUL LUBE SYS	(548)	K264	0.30000E-04	70518 PD-214 LUBE OIL FILL AND XFER
(549)	K4.5	4.5000		(550)	K298	0.10000E-03	70519 LSES PD-214, OPERATING FLUIDS
(551)	K299	0.40000E-04		(552)	K251	0.10000E-03	70519 LSES COMBUSTION AIR SYS
(553)	K259	0.10600E-01	70519 LSES UPTAKES	(554)	KDUM	0.10000E-04	
(555)	K7.5	7.5000		(556)	KE06	0.10000E-05	
(557)	DDA	2.0000	MODEL 6-71T, 60HZ,200KW GEN SET	(558)	W/31	0.30000	WEIGHT/GENERATOR, LT
(559)	K311	0.11200E-01	AMPHIB 021287	(560)	K313	0.38460E-03	AMPHIB 021287
(561)	K314	0.19000E-02	AMPHIB 021287	(562)	K321	0.84000E-02	AMPHIB 021287
(563)	L321	0.32000E-01	70519 LSES SHIP SERVICE POWER CABLE	(564)	K323	0.34600E-01	AMPHIB 021287
(565)	K324	0.70000E-02	AMPHIB 021287	(566)	K331	0.13000E-01	AMPHIB 021287
(567)	K332	0.26780E-01	AMPHIB 021287	(568)	K342	0.00000E+00	AMPHIB 021287
(569)	K343	0.61000E-02	AMPHIB 021287	(570)	K398	0.15000E-01	AMPHIB 021287
(571)	K399	0.45000E-03	AMPHIB 021287	(572)	K400	2.0000	GRP 4 IF NOT ITEMIZED
(573)	K411	1.0500	032086 PXM	(574)	K412	2.0000	032086 PXM
(575)	K415	0.42000	032086 PXM	(576)	K421	0.10400	032086 NON ELEC / ELEC NAV AIDS
(577)	K422	0.18200	ELECTRICAL NAV AIDS	(578)	K423	0.61000	032086 ELECTRONIC NAV SYS,AN/SPS-64(V)4,
(579)	K424	0.27100	ELECTRONIC NAV SYS, ACOUS	(580)	K426	0.30300	ELECTRICAL NAV SYS
(581)	K427	0.18000	032086 INETIAL NAV AN/WSN-2	(582)	K428	0.53000E-01	
(583)	K431	0.14900	I. C. SWITCHBOARDS	(584)	K432	0.34000E-01	TELEPHONE SYS
(585)	K433	0.15000	ANNOUNCING SYS	(586)	K434	0.50990	ENTERTAIN AND TRAIN SYS
(587)	K435	0.83600E-01	VOICE TUBES AND MESS PASS SYS	(588)	K436	0.00000E+00	
(589)	K437	0.00000E+00		(590)	K438	0.29000	032086 INTEGRATED CTRL SYS PXM
(591)	K439	0.25000E-01	REC AND TEL SYS	(592)	K441	3.9300	032086 RADIO SYS LINK 11
(593)	K442	0.00000E+00		(594)	K443	1.7100	032086 COMMUN EXTERN ANT & ELEC (PGG)
(595)	K444	0.26000		(596)	K445	0.17600	TTY AND FAC SYS
(597)	K446	0.19400	SECURITY EQUIP SYS	(598)	K451	0.16000	040486 DECCA & E/O SENSOR
(599)	K452	0.00000E+00	032086	(600)	K454	0.00000E+00	

TABLE OF STORED CONSTANTS

NO	NAME	VALUE	DESCRIPTION
(601)	K455	0.65000	040486 IFF MKXV
(602)	K456	1.0000	032086 SEA GIRAFFE RADAR
(603)	K461	0.00000E+00	032086 VARIABLE DEPTH SONAR
(604)	K462	0.00000E+00	051585 NO THIN LINE TOWED ARRAY NATO
(605)	K463	8.7200	040486 NATO TOWED ARRAY & VDS
(606)	K464	0.00000E+00	
(607)	K465	0.00000E+00	
(608)	K466	2.6500	040486 SQQ 28 & LAMPS III COMM
(609)	K471	5.4500	032086 ECM SYS MK-36 (2)+AN/SLQ-32U2(1)
(610)	K472	0.00000E+00	
(611)	K474	3.7000	032086 SSTD (473)
(612)	K475	29.180	032086 DEGAUSSING GEAR
(613)	K481	1.4800	040486 INTEGRATED FCS
(614)	K482	0.00000E+00	032086 MISSILE FIRE CNTRL SYS
(615)	K483	3.2800	040486 MK 116 ASW FCS
(616)	K484	0.00000E+00	032086 6 UYK 445 & EXTRA CONSOLES
(617)	K485	0.00000E+00	
(618)	K489	0.00000E+00	
(619)	K491	0.00000E+00	ELEC TEST CKOUT, MON EQUIP
(620)	K492	0.00000E+00	
(621)	K493	0.00000E+00	
(622)	K495	0.00000E+00	DELTA WEIGHT FOR NATO PCM
(623)	K498	0.00000E+00	
(624)	K499	0.10000	032086 REPAIR PARTS
(625)	K511	-0.31381	AMPHIB 021287
(626)	L511	0.20709	AMPHIB 021287
(627)	M511	0.69889	AMPHIB 021287
(628)	K512	0.16010E-01	70518 PD-214 VENTILATING CARGO AND MACHY
(629)	K513	0.18000E-01	PD-214 PAGE C-8
(630)	K514	17.857	70518 PD-214 AIR CONDITIONING
(631)	L514	0.17840E-01	AMPHIB 021287
(632)	M514	0.48590E-01	AMPHIB 021287
(633)	K516	0.15000E-03	AMPHIB 021287
(634)	K521	0.43170E-01	AMPHIB 021287
(635)	K522	0.53000E-02	AMPHIB 021287
(636)	K523	0.82200E-01	AMPHIB 021387
(637)	K524	0.37500E-02	AMPHIB 021287
(638)	L521	0.50000E-03	
(639)	M521	1.5129	
(640)	K526	0.11500E-04	ASSET
(641)	K528	0.12000E-01	AMPHIB 021287
(642)	K529	0.88000E-02	AMPHIB 021287
(643)	K531	0.00000E+00	AMPHIB 021287
(644)	L531	0.11000	AMPHIB 021287
(645)	M531	0.75000	AMPHIB 021287
(646)	K532	-0.44130	AMPHIB 021287
(647)	L532	0.28570	AMPHIB 021287
(648)	M532	0.62030	
(649)	K533	0.15000E-01	AMPHIB 021287
(650)	K541	30.000	AMPHIB 021287
(651)	L541	0.10000E-01	AMPHIB 021287
(652)	K551	0.85000E-03	70518 PD-214 COMPRESSED AIR SYSTEM
(653)	L551	0.12000	AMPHIB 021287
(654)	M551	0.74920	AMPHIB 021287
(655)	K553	0.00000E+00	70518 PD-214, DELETED FOR SFS, O2,N2
(656)	K555	0.92900E-02	AMPHIB 021287
(657)	K556	0.00000E+00	AMPHIB 021287
(658)	L556	0.00000E+00	AMPHIB 021287
(659)	K561	4.4440	70518 PD-214 STEERING SYSTEM
(660)	L561	0.60000E-02	AMPHIB 021287
(661)	K571	0.11900E-02	70518 PD-214, REPLENISHMENT AT SEA
(662)	K572	0.23500E-02	70518 PD-214, STORES AND EQUIP. HNDLG.
(663)	K562	0.66700	70518 LSES, RUDDERS
(664)	L562	0.65000E-01	AMPHIB 021287
(665)	M562	0.89520	AMPHIB 021287
(666)	K581	0.18700E-01	70518, PD-214, ANCHOR
(667)	K582	0.68400E-02	70518 PD-214 ANCHOR,MOORING,TOWING
(668)	K583	0.30000E-01	AMPHIB 021287
(669)	K584	220.00	70518 PD-214, MECH. OPERATED DOORS, RAMP
(670)	K586	0.00000E+00	70518 LSES PG 7-20,
(671)	K588	0.00000E+00	AMPHIB 021287
(672)	K593	0.25800E-01	AMPHIB 021287
(673)	K595	0.00000E+00	042287
(674)	K598	0.25800E-01	70518 LSES PG 7-20, OPERATING FLUIDS
(675)	L598	1.2300	AUX SYS OP FLUID EXP (ASSET) (032885)
(676)	K599	0.13000	AMPHIB 021287
(677)	K542	0.60000	AMPHIB 021287
(678)	K543	0.17000E-04	AMPHIB 021287
(679)	L475	-0.71500E-03	
(680)	K611	0.88200E-04	AMPHIB 021287
(681)	K612	0.11250E-03	AMPHIB 021287
(682)	K613	0.11500E-04	AMPHIB 021287
(683)	K621	0.17300E-01	AMPHIB 021287
(684)	K622	0.18000E-05	AMPHIB 021287
(685)	L622	8.6470	70518 LSES PG 8-5, FLOOR PLATES & GRATIN
(686)	K623	0.30000	AMPHIB 021287
(687)	L623	0.47000E-02	AMPHIB 021287
(688)	K624	0.16000	AMPHIB 021287
(689)	L624	0.28600E-02	AMPHIB 021287
(690)	K625	2.0000	AMPHIB 021287
(691)	L625	0.10000E-03	AMPHIB 021387
(692)	K631	0.18410E-01	70518 PD-214, PAINT
(693)	K633	0.35700E-04	AMPHIB 021287
(694)	K634	0.24000E-03	PD-214 PAGE C-7
(695)	K635	0.34200E-02	PD-214 PAGE C-7
(696)	L635	-0.10000E-03	AMPHIB 021387
(697)	K636	0.00000E+00	AMPHIB 021287
(698)	K637	0.40500	AMPHIB 021287
(699)	K638	0.22300E-01	AMPHIB 021287
(700)	K641	0.35000	AMPHIB 021287

TABLE OF STORED CONSTANTS

NO	NAME	VALUE	DESCRIPTION	NO	NAME	VALUE	DESCRIPTION
(701)	K642	0.15300	AMPHIB 021287	(702)	K643	0.11200	AMPHIB 021287
(703)	K644	0.14100E-01	AMPHIB 021287	(704)	K645	0.18300E-01	AMPHIB 021287
(705)	L645	-2.7500	AMPHIB 021287	(706)	K651	0.33600E-01	AMPHIB 021287
(707)	L651	0.99900	COMMISARY SPACES INTERCEPT (HYD & SES)	(708)	K652	0.75000E-02	AMPHIB 021287
(709)	K654	0.40000E-02	AMPHIB 021287	(710)	K655	0.15000E-01	AMPHIB 021287
(711)	K656	0.30000E-02	AMPHIB 021287	(712)	K661	0.59060	AMPHIB 021287
(713)	K662	0.30000E-01	AMPHIB 021287	(714)	K663	0.14800	70518 LSES PG 8-5, ELECTRON. CNTRL. CENT
(715)	K664	0.68000	70518 LSES PG. 8-5, DC STATION	(716)	L664	0.35000	DAMAGE CNTRL STA (PHM)
(717)	K665	25.000	AMPHIB 021287	(718)	K671	0.85400	70518 PD-214,LSES
(719)	K672	0.96000E-01	AMPHIB 021287	(720)	K698	0.00000E+00	AMPHIB 021287
(721)	K699	0.10000E-01	AMPHIB 021287	(722)	K711	0.00000E+00	042287
(723)	K712	0.00000E+00	042287	(724)	K713	0.00000E+00	042287
(725)	K721	0.00000E+00	042287	(726)	K723	0.00000E+00	042287
(727)	K741	0.00000E+00		(728)	K751	0.00000E+00	042287
(729)	K761	0.00000E+00		(730)	K763	0.00000E+00	042287
(731)	K782	0.00000E+00		(732)	K783	0.00000E+00	
(733)	K791	0.00000E+00		(734)	K798	0.00000E+00	
(735)	K799	0.80000E-01	ARMAMENT REPAIR PARTS	(736)	K792	0.00000E+00	DELTA WEIGHT FOR NATO PCM
(737)	K793	0.00000E+00	5 OF 10 LT ADDITIONAL PAYLOAD	(738)	F42A	0.00000E+00	042287 AVIATION FUEL
(739)	CF10	0.17900		(740)	C1.1	0.90909	
(741)	CFA0	0.14700		(742)	CFK0	0.10300	
(743)	CF20	80.000		(744)	CF30	0.14300E-02	DRY STORES COEF (ASSET)
(745)	CFC0	0.73600E-03	CHILL STORES COEF (ASSET)	(746)	CFM0	0.49600E-03	FROZEN STORES COEF (ASSET)
(747)	DF30	0.47200E-03	GENERAL STORES COEF (ASSET)	(748)	DFC0	0.17300E-03	STOCK & CLOTHES COEF (ASSET)
(749)	DF32	0.49000E-02	GENERAL STORES COEF (ASSET)2	(750)	DFM0	0.41667	
(751)	CF40	58.333		(752)	CFD0	0.25000	
(753)	CF50	0.22280		(754)	CFE0	0.12000	
(755)	KF11	0.17900	WEIGHT PER OFFICER	(756)	KF12	0.14700	WEIGHT PER CPO
(757)	KF13	0.10300	WEIGHT PER ENLISTED	(758)	KF21	1.0000	70519 SFS SELF DEFENSE AMMUNITION
(759)	KF22	0.00000E+00	042287	(760)	KF23	0.00000E+00	042287
(761)	KF24	0.00000E+00	INPUT	(762)	KF25	0.00000E+00	INPUT
(763)	KF26	0.00000E+00	040486	(764)	KF29	0.00000E+00	INPUT
(765)	KF46	0.18000E-03	LUBE OIL COEF (DDG51)	(766)	1.34	1.3400	HP PER KW CONVERSION
(767)	KF49	0.00000E+00	SPECIAL FUELS & LUBE (INPUT)	(768)	KF52	0.32000E-01	FRESH WATER (TONS PER MAN) (PHM)
(769)	KF53	1.0000	RESERVE FEEDWATER (INPUT)	(770)	KF55	0.17000E-01	SANITARY LIQUID COEF PER ACOM
(771)	KF61	0.00000E+00	CARGO, ORDNANCE, ORDNANCE DELIVERY SYS.	(772)	KF62	0.00000E+00	CARGO, STORES
(773)	KF63	0.00000E+00	CARGO, FUELS AND LUBRICANTS	(774)	KF64	0.00000E+00	CARGO, LIQUIDS (NON-FUEL TYPE)
(775)	KF65	0.00000E+00	CARGO, CRYOGENIC AND LIQUIFIED GAS	(776)	KF66	4687.5	CARGO, AMPHIBIOUS ASSAULT SYSTEMS
(777)	KF67	0.00000E+00	CARGO, GASES	(778)	KF69	0.00000E+00	CARGO, MISCELLANEOUS
(779)	K800	800.00		(780)	Q243	1.1000	
(781)	Q252	0.16900	70519 LSES PROPULSION CNTRL SYS	(782)	Q.2	0.20000	
(783)	**Y1	0.00000E+00		(784)	**Y2	0.00000E+00	
(785)	**Y3	0.00000E+00	********** PHYSICAL CONSTANTS	(786)	**Y4	0.00000E+00	********** PHYSICAL CONSTANTS
(787)	GRAV	32.174	ACCELERATION DUE TO GRAVITY, FT/SEC**2	(788)	RHOG	64.000	WEIGHT DENSITY SEA WATER, LB/FT3
(789)	RHOW	1.9900	MASS DENSITY SEA WATER, SLUGS/FT3	(790)	RHOA	0.23780E-02	MASS DENSITY AIR, SLUGS/FT3
(791)	**Z1	0.00000E+00		(792)	**Z2	0.00000E+00	
(793)	**Z3	0.00000E+00	********** NUMBERS	(794)	**Z4	0.00000E+00	********** NUMBERS
(795)	C001	0.10000E-02		(796)	10-3	0.10000E-02	NUMBER = 0.001
(797)	1.02	1.0200	NUMBER = 1.02	(798)	352	352.00	DUMMY KW FOR SSDG SETS
(799)	1000	1000.0	NUMBER = 1000.0	(800)	7500	7500.0	NUMBER = 7500.

TABLE OF STORED CONSTANTS

NO	NAME	VALUE	DESCRIPTION	NO	NAME	VALUE	DESCRIPTION
(801)	C0	0.00000E+00	NUMBER = 0.0 (ZERO)	(802)	CSML	0.10000E-10	NUMBER = 10**(-11) (SMALL NUMBER)
(803)	C1	1.0000	NUMBER = 1.0	(804)	C-1	-1.0000	NUMBER = -1.0
(805)	C1/2	0.50000	NUMBER = 0.5	(806)	C.5	0.50000	NUMBER = .5
(807)	C.59	0.59000	NUMBER = 0.59	(808)	C.01	0.10000E-01	NUMBER = 0.01
(809)	C.05	0.50000E-01	NUMBER = 0.05	(810)	C2/3	0.66667	NUMBER = 0.66666667
(811)	C4	4.0000	NUMBER = 4.0	(812)	C1/3	0.33333	NUMBER = 0.33333333
(813)	C5	5.0000	NUMBER = 5.0	(814)	C5.7	5.7000	5.7LT/FT FOR GRP 110
(815)	C.57	0.57000	NUMBER = 0.57	(816)	C.15	-0.15000	NUMBER = -0.15
(817)	C.20	0.20000	NUMBER=0.20 (KWI)	(818)	C0.5	0.50000	NUMBER = 0.5
(819)	0.52	0.52000	WT/FT - W111 - TJ STRUCTURE	(820)	C60	60.000	NUMBER = 60.0
(821)	C-.5	-0.50000	NUMBER = -0.5	(822)	C.25	0.25000	NUMBER = 0.25
(823)	C14	14.000	NUMBER = 14.0	(824)	C0.4	0.40000	NUMBER = 0.4
(825)	C6	6.0000	NUMBER = 6.0	(826)	C0.6	0.60000	NUMBER = 0.6
(827)	C1.5	1.5000		(828)	C-2	-2.0000	
(829)	C3	3.0000		(830)	C2	2.0000	
(831)	C.79	0.79000	NUMBER = 0.79	(832)	C.80	0.80000	NUMBER = 0.80
(833)	C.82	0.82000	NUMBER = 0.82	(834)	C.43	0.43000	NUMBER = 0.43
(835)	C.34	0.34000	NUMBER = 0.34	(836)	C360	360.00	
(837)	-2.5	-2.5000	NUMBER = -2.5	(838)	C224	2240.0	NUMBER = 2240.
(839)	C550	550.00	NUMBER = 550.	(840)	C.40	0.40000	NUMBER = 0.40
(841)	C035	0.35000	NUMBER = 0.35	(842)	C050	0.50000	NUMBER = 0.50
(843)	C065	0.65200	NUMBER=.652	(844)	C075	0.75000	NUMBER = 0.75
(845)	C35	35.000	NUMBER = 35.0	(846)	C.1	0.10000	NUMBER = 0.1
(847)	K9	9.0000		(848)	K30	30.000	
(849)	K11	11.000					

TABLE OF VAR VARIABLES

NO	NAME	PARENT	K0	K1	KF	KA	KR	KL	F	A	R	L	E
1	VCGS	10.000	0.00000	-10.00000	1.00000	0.00000	0.00000	0.00000	1.00000	0.00000	0.00000	0.00000	1.00000

VAR VARIABLE LIMITS

NUM	NAME	LOWERLIMIT	UPPER LIMIT
1	VCGS	0.000000E+00	0.000000E+00

NUM	NAME	LOWER LIMIT	UPPER LIMIT	LOWER LIMIT	UPPER LIMIT	LOWER LIMIT	UPPER LIMIT
1	S135	-0.100000+301	0.100000+301	0.200000E+03	0.272000E+04	0.100000E+01	0.600100E+04
2	S150	-0.100000+301	0.100000+301	0.200000E+03	0.272000E+04	0.100000E+01	0.116110E+05
3	S165	-0.100000+301	0.100000+301	0.200000E+03	0.272000E+04	0.100000E+01	0.184160E+05
4	S250	-0.100000+301	0.100000+301	0.930000E+02	0.200000E+04	0.100000E+01	0.120160E+05
5	S265	-0.100000+301	0.100000+301	0.930000E+02	0.200000E+04	0.100000E+01	0.195530E+05
6	S275	-0.100000+301	0.100000+301	0.930000E+02	0.200000E+04	0.100000E+01	0.255070E+05
7	STB1	-0.100000+301	0.100000+301	0.350000E+00	0.650000E+00	0.100000E+01	0.184160E+05
8	STB2	-0.100000+301	0.100000+301	0.350000E+00	0.750000E+00	0.100000E+01	0.255070E+05
9	RCC0	-0.100000+301	0.100000+301	0.260000E+00	0.420000E+00	0.100000E+01	0.850000E+01
10	RCC6	-0.100000+301	0.100000+301	0.260000E+00	0.420000E+00	0.100000E+01	0.850000E+01
11	RCC*	-0.100000+301	0.100000+301	0.260000E+00	0.420000E+00	0.100000E+01	0.850000E+01
12	RC00	-0.100000+301	0.100000+301	0.440000E+00	0.100000E+01	0.100000E+01	0.850000E+01
13	RC06	-0.100000+301	0.100000+301	0.440000E+00	0.100000E+01	0.100000E+01	0.850000E+01
14	RC0*	-0.100000+301	0.100000+301	0.440000E+00	0.100000E+01	0.100000E+01	0.850000E+01

NO	NAME	1-CARD EQUATIONS
1	ACS1	X0 * X1 - X2 * X3 - X8 * X4 * X4 * X5 + X2 * X4 * X6 + (X1 - X4) * (X1 - X4) * X7
2	AOSH	X0 * X1 * X2 * X3 + (X4 * (X0 - X1) ** X2) - X1 * X1 * X3
3	BHB1	X0 + X1 * X2 + X1 * X3 * X4
4	BHB2	X0 * (X1 + (X0 * X2) + (X3 / X0) + (X4 * X5) + (X6 - X4) * X7)
5	BOA	X0 + X1 * (X2 - X3) * X4
6	DISP	(X0 * X1 * (X2 / X3) * (X4 + (X2 / X3) * X5 * X6 + X7 * X8)) / X9
7	EA/B	X0 / X1
8	HSD	(X0 * X1) / (X2 * X3 * X4)
9	CTAD	(X0 - X1) / (X2 * X3)
10	NCUE	(X0 - X3) * X2 + (X4 - X0) * X1
11	LSHP	X0 * X1 + X2 + X3 * X4 + (X5 - X4) * X6
12	SEP2	X0 * X1
13	STLD	(X0 - ((X1 - X2 * (X3 - (X4 - X5) / X6)) ** X9)) * X8 * X6 * X6 * X7 / Y0
14	STH2	((X0 ** X1) * X2)
15	VOLB	(X0 * (X1 - X2) - ((X1 - X2) ** X3) * X4) * X5 * X6 / X7 + X8
16	STHC	X0 + X1 * X2 + X1 * X3
17	STHH	X0 + (X1 - X2) * X3 + (X1 - X2) * X4
18	STCX	(X0 - X1) * X2 + (X3 - X0) * X4
19	STHX	(X0 - X1) * X2 + (X3 - X0) * X4
20	SFRM	(X0 - X1 + X2) / X3
21	STL1	(X0 + X1 * X2 + X3 * X2 * X2) * X4 * X5 * X5 * X6 * X7 / X8
22	W120	X0 * (X1 / (X2 * X3))
23	VSH	(X0 - (X1 * (X2 - X3) - ((X2 - X3) ** X4) * X5)) * X6 * X7 / X8
24	EQDR	(- X1 + ((X1 * X1 - X4 * X0 * X2) ** X5)) / (X3 * X0)
25	EA	X0 + X1 * X2 + X3 * X4 * X5 + X6 * X7 * X8 * X9 + Y0 * Y1 * Y2 * Y3
26	EB	X0 + X1 * X2 + X3 * X4 + X5 * X6 + X7 * X8 * X9 + Y0 * Y1 * (Y2 ** Y3)
27	ED	X0 * X1 + X2 * X3 * X4 * ((X5 + X6) ** X7) + X8 * (X9 ** Y0) * (Y1 ** Y2) * Y3
28	EE	X0 * X1 * (X2 ** X3) + X4 * X5 * (X6 ** X7) + X8 * X9 * (Y0 ** Y1)
29	EF	X0 * X1 + X2 * ((X3 + X4 * X5 + X6 * X7 + X8 * X9) ** Y0) * Y1 * (Y2 ** Y3)
30	EG	X0 * (X1 ** X2) * ((X3 + X4 * X5) ** X6) * X7 * X8 / X9 / (Y0 ** Y1) + Y2 * Y3
31	EAIR	X0 * (X1 - X2 * (X3 / X4 - X5)) * X6 / X7 * (X8 ** X9) * Y0 * Y1
32	EABC	X0 * X1 * X2 * X3 * X4 * X5 / X6 / X7 / (X8 ** X9)
33	EQDF	(- X1 + X4 * ((X1 * X1 - X5 * X5 * X0 * X2) ** X5)) / (X5 * X0) + X6
34	EGG	(X0 - X1) / X2 * (X3 * X7 / Y1 - X4 * (X8 ** X9) - X5 * X6 / Y0) * Y2
35	EC	X0 * X1 + X2 * (X3 ** X4) + X5 * (X6 ** X7) + X8 * (X9 ** Y0) + Y1 * (Y2 ** Y3)
36	ESUM	X0 * (X1 + X2 + X3 + X4 + X5 + X6 + X7 + X8 + X9 + Y0 + Y1 + Y2 + Y3)
37	ATH	(X0 / X5) + (X1 / X6) + (X2 + X1) * (X7 / X3 + X4)

NO NAME 2-CARD EQUATIONS

1 EHB2
```
( X5 * X6 / ( X0 * X0 * X1 ) - X4 * ( X7 + X4 * X2 * X3 ) )
/ ( ( X2 * ( X8 + X0 * X4 * X3 ) ) / X0 + X7 ) + X4
```

2 ASH
```
( X0 - X1 ) * ( X2 + X4 + X3 * X5 ) * X1 * X6 + ( X0 - X1 ) * ( X0 - X1 ) * X7 * X2
+ ( X8 * X0 - X1 ) * ( X9 / Y1 ) * X2 + ( X6 - Y0 )
```

3 FLAT
```
( + ( X4 * X5 * X3 ) + ( ( ( X4 * X5 * X3 ) ** X6 ) + X6 * X6 * ( X0 * X1 * X2 * X3
) * X5 * X7 ) ** X8 ) / ( X6 * ( X0 * X1 * X2 * X3 ) )
```

4 ECDF
```
X1 + ( X3 - X4 ) / X4 / X5 * ( X2 - X0 ) + ( ( X3 - X4 ) / X4 ) * ( ( X3 - X4 ) /
X4 ) * ( X2 - X5 * X1 + X0 ) / X5
```

NO NAME 3-CARD EQUATIONS

1 ACS2
```
( X0 - X1 ) * X2 + X3 * X4 * ( X5 * X1 - X6 * X6 * X7 - ( X8 - X6 ) * ( X5 / X3 - X6
* X7 ) ) + X4 * ( ( X1 - X8 ) * X9 * ( Y0 + Y1 - X5 ) / X3 ) + ( X1 - X8 ) * X9 *
( Y2 - X5 ) / X3 + ( ( X0 - X8 ) ** X3 ) * Y3
```

2 EQDE
```
( ( ( X3 - X1 ) * ( X5 - X4 ) - ( X2 - X1 ) * ( X6 - X4 ) ) * ( ( X7 - X1 ) ** X0
) + ( ( ( X2 - X1 ) ** X0 ) * ( X6 - X4 ) - ( ( X3 - X1 ) ** X0 ) * ( X5 - X4 ) )
* ( X7 - X1 ) ) / ( ( X2 - X1 ) * ( X3 - X1 ) * ( X2 - X3 ) ) + X4
```

3 EWLD
```
( - ( X6 * X7 + X8 * X1 / X0 ) + ( ( ( X6 * X7 + X8 * X1 / X0 ) ** X6 ) - X6 * X6 *
( X2 * X3 + X4 * X5 ) * ( Y1 * X9 * Y3 / ( Y0 * X0 ) ) ) ** Y2 )
/ ( X6 * ( X2 * X3 + X4 * X5 ) )
```

4 ETNH
```
( X0 - X1 ) * ( X2 ** X3 ) * X4 * ( X5 + X6 * ( X7 ** ( ( X8 - X9 ) * Y0 ) - X7 ** (
( X9 - X8 ) * Y0 ) ) / ( X7 ** ( ( X8 - X9 ) * Y0 ) + X7 ** ( ( X9 - X8 ) * Y0 ) )
)
```

NO	LIST NAME	VARIABLE NAMES ON 1 CARD AND THEIR CORRESPONDENCE													
		X0	X1	X2	X3	X4	X5	X6	X7	X8	X9	Y0	Y1	Y2	Y3
1	CIDS	NCUE	C1	C1	C1	C1	C1	C1	C1	C1	C1				
2	ZERO	C0	C0												
3	ACS1	BHB1	HSD1	HTWD	BCUE	DCB1	CTA1	CTB1	TANF	C2					
4	BOA1	BHB1	C2	HSD1	DCB1	TANF									
5	BHB1	BCUE	C2	FLT1	DCB1	CTA1									
6	DCB1	LCW1	LCUE	PCO1	CTA1	C0	CTB1	C2	FLT1	BCUE	DISP	C1	C-1	C1/2	C35
7	AAA	C0	PCI1	CTB1	C1	PCO1	TANF	C0	C0	C0	C0	C0	C0	C0	C0
8	BBB	C0	C2	FLT1	C0	C0	C0	C2	PCI1	DCB1	CTB1	C2	PCO1	DCB1	CTA1
9	WVL	C1	C1	C1	C-1	C35	DISP	LHW1	C1	C1	C1	C0	C0	C0	C0
10	CCC	WVL	C0	C0	C2	FLT1	DCB1	PCO1	DCB1	DCB1	CTA1	PCI1	DCB1	DCB1	CTB1
11	HHH	AAA	BBB	CCC	C2	C4	C1/2	C0	C0	C0	C0	C0	C0	C0	C0
12	DHB1	HHH	C1	DCB1	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
13	DIS1	C1	LCUE	PCUE	RHOG	BCUE	CTA1	PCO1	C2	FLT1	C35				
14	FLT1	NSH1	LCUE	TFTD	LWKB	C1	DISP	C2	KBCL	C1/2					
15	H/B1	HSD1	BOA1												
16	HBOW	C1	HSDK	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
17	HSD1	C1	HSDK	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
18	HSDK	C1	HTWD	HTCB	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
19	HSTN	C1	HSDK	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
20	LCW1	CTRS	DCB1	LCUE	TA60	DCB1	C0	C0							
21	LHW1	CTRS	DHB1	LCUE	TA60	DCB1	DHB1	CTRB							
22	LOA1	CTRS	HSTN	LCUE	TA60	DCB1	HBOW	CTRB							
23	STC1	FLT1	DCB1	CTA1	CTB1										
24	STH1	STC1	DHB1	DCB1	TANF	T1FI									
25	SFRM	HTWD	DHB1	FADD	LHW1										
26	STL1	SLCA	SLCB	SFRM	SLCC	SH13	LHW1	BCUE	SLCD	1000					
27	VCB1	BOA1	HSDK	HTWD	C2	TANF	LOA1	CCB1	1000	VMOD					
28	AISH	C0	C0	C0	C0	C0	C0	C1/2	HTWD	HTWD	T1FI	C0	C0	C0	C0
29	AFLT	C0	FLT1	HTWD	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
30	AOSH	HTWD	DCB1	C2	CTA1	TANF									
31	VSH1	C0	C0	C0	10-3	AFLT	LOA1	10-3	PCO1	AOSH	LOA1	10-3	PCI1	AISH	LOA1
32	VOLA	C1	VOLB	VSH	VSH	VLSS	C0	C0	C0	C0	C0	C0	C0	C0	C0
33	WFTM	C2	C035	C050	C065	S135	S150	S165	H/B1						
34	W11M	WMOD	C0	C0	GF11	C5.7	LOA	C0	C0	C0	C0	C0	C0	C0	C0
35	W111	NCUE	W11M	C0	C1	C2									
36	W119	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	K119	BCUE	CIDS	HTWD
37	W110	W111	C1	W119	C0	C0	C0								
38	W120	STB	LOA	CL/H	HBOW	GF12									
39	W150	C0	C0	C0	C0	C002	1000	VLSS	C002	K150	1000	VHNG			
40	W16X	C160	C1	C1F0	VOLA	E160	C1Q0	W200	E1F0	D160	VOLA	E1Q0	D1F0	VOLA	E1Z0
41	W161	C0	K161	W16X	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
42	W163	C0	K163	W16X	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
43	W164	K164	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
44	W167	C0	K167	W16X	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
45	W169	C0	K169	W16X	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
46	W160	C1	W161	W163	W164	W167	W169	C0	C0	C0	C0	C0	C0	C0	C0
47	W17X	C170	C1	C1G0	VOLA	E170	C1R0	W400	E1G0	C0	C1	C1	C0	C1	C1
48	W170	C0	K170	W17X	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
49	W182	C0	C0	C0	C1	K182	W200	C0	C0	C0	C0	C0	C0	C0	C0
50	W183	C0	C0	C0	C0.5	K183	W300	C0	C0	C0	C0	C0	C0	C0	C0

NO	LIST NAME	VARIABLE NAMES ON 1 CARD AND THEIR CORRESPONDENCE													
		X0	X1	X2	X3	X4	X5	X6	X7	X8	X9	Y0	Y1	Y2	Y3
51	W184	C0	C0	C0	C0.5	K184	W400	C0	C0	C0	C0	C0	C0	C0	C0
52	W185	C0	C0	C0	C0.5	K185	W500	C0	C0	C0	C0	C0	C0	C0	C0
53	W186	C0	C0	C0	C0.5	K186	W600	C0	C0	C0	C0	C0	C0	C0	C0
54	W187	C0	C0	C0	C0.5	K187	W700	C0	C0	C0	C0	C0	C0	C0	C0
55	W180	C1	W182	W183	W184	W185	W186	W187	C0	C0	C0	C0	C0	C0	C0
56	WSUM	C1	W110	W120	W130	W140	W150	W160	W170	W180	C0	C0	C0	C0	C0
57	W100	C1	WSUM	W190	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
58	W190	C0	K190	WSUM	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
59	WTFT	LOA	WTFT	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
60	ACS	NCUE	ACS1	C0	C1	C2									
61	BOA	NCUE	BOA1	C0	C1	C2									
62	DISP	NCUE	DIS1	C0	C1	C2									
63	H	NCUE	DHB1	C0	C1	C2									
64	HC	NCUE	DCB1	C0	C1	C2									
65	LHW	NCUE	LHW1	C0	C1	C2									
66	LSW	NCUE	LCW1	C0	C1	C2									
67	LOA	NCUE	LOA1	C0	C1	C2									
68	SEP	NCUE	SEP1	C0	C1	C2									
69	STB	NCUE	STB1	C0	C1	C2									
70	STH	NCUE	STH1	C0	C1	C2									
71	VOLB	NCUE	VCB1	C0	C1	C2									
72	VSH	NCUE	VSH1	C0	C1	C2									
73	DIS5	DISP	KF66	C1	C1										
74	PC5	POD	DIS5	DISP	C1	C1									
75	V111	C0	C0	111A	W400	C-1	W420	C-1	W430	C0	C1	111B	DH	C1	C1
76	V1.1	V111	C0	C0	C0	C0	C0	C0	C0	C0	C0	112A	DH	W400	112B
77	V12A	122A	DISP	128A	W700	C1	WF20	C0	C1	C0	C1	128B	DH	NDAY	C1
78	V1.2	V12A	C1	V121	C1	V123	C1	V124	C0	C0	C0	126A	DH	VOLR	126B
79	V13A	136A	WF43	131A	DISP	DH	C0	C1	C1	135A	NDAY	C1	WF23	C0.6	DH
80	V1.3	V13A	C1	V132	C1	V137	C1	182A	DISP	DH	C1	134A	NDAY	WF23	DH
81	VOFF	211A	DH	NF11	211B	211C	DH	NF11	211D	C0	C1	C1	C1	C0	C0
82	VCPO	212A	DH	NF12	212B	212C	DH	NF12	212D	C0	C1	C1	C1	C0	C0
83	VENL	213A	DH	NF13	213B	213C	DH	NF13	213D	C0	C1	C1	C1	C0	C0
84	VOFM	211E	DH	NF11	211F	C0	C1	C1	C1	C0	C1	C1	C1	C0	C0
85	VPOE	212E	DH	NF12	212F	213E	DH	NF13	213F	C0	C1	C1	C1	C0	C0
86	V2.1	VPOE	C1	VOFM	C1	C.82	VENL	C1	C1	C.80	VCPO	C1	C1	C.79	VOFF
87	V22A	C0	222A	DH	225A	DISP	DH	C001	DH	NF10	C1	C1	C1	C1	C1
88	V22B	C1	V22A	224A	NF10	DH	C1	NDAY	C1/2	224B	NDAY	C1/2	NF10	224C	DH
89	V22C	C1	V22B	221A	NDAY	DH	C1	NF10	221B	223A	NDAY	C1/2	NF10	223B	DH
90	V2.2	C1	V22C	C0	C1	C1	C1	C1	C1	222B	NDAY	222C	NF10	222D	DH
91	V2.3	233A	WF50	231A	DH	NDAY	C1	NF10	C1	231B	NDAY	C1	NF10	231C	DH
92	V1+2	C1	V1.1	V1.2	V1.3	V2.1	V2.2	V2.3	C0	C0	C0	C0	C0	C0	C0
93	V31A	C0	313A	DH	311A	BOA	DH	311B	VOLA	DH	C1	C0	C1	C1	C1
94	V31B	C1	V31A	313B	DH	C1	C1	VOLA	313C	314A	NF10	314B	DH	C1	C1
95	V3.1	C1	V31B	311C	DH	C1	C1	VOLA	311D	312A	C1	C1	HPT	312B	DH
96	V3.2	320A	C1	HPT	320B	C0	C0	C1	C0	C0	C0	C1	C0	C1	C1
97	V33A	C0	333A	DH	331A	VOLA	DH	331B	DH	NDAY	NF10	331C	DISP	DH	C1
98	V33B	331D	DH	DISP	331E	333B	DH	VOLA	333C	331F	DH	VOLA	331G	C1	C0
99	V3.3	V33A	C1	V33B	C0	C0	C0	C0	332C	DH	KWI	332A	DH	DISP	332B
100	V3.4	C0	C0	340A	W200	C1	W300	C1	W500	C1	W600	C1	DH	NDAY	340B

NO	LIST NAME	VARIABLE NAMES ON 1 CARD AND THEIR CORRESPONDENCE													
		X0	X1	X2	X3	X4	X5	X6	X7	X8	X9	Y0	Y1	Y2	Y3
101	V3.5	C0	C0	C0	351A	WF40	C1	351B	DISP	C1	C1	352A	V3.4	C1	C1
102	V3.6	C0	360A	VOLA	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
103	V3.7	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	370A	DH	VSH	370B
104	V3+	C1	V3.1	V3.2	V3.3	V3.4	V3.5	V3.6	V3.7	VOLI	VSTR	C0	C0	C0	C0
105	VOLR	MVLR	V1+2	V3+	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
106	VLSS	VDCK	C1	VHNG											
107	909E	BOA	C23P	BCUE	C0	NCUE									
108	DUM1	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	KDUM	HTCB	BOA	LOA
109	DUM2	C0	C0	C0	C0	C0	C0	C1	KDUM	LCUE	BOA	C0	C0	C0	C0
110	DUM3	C0	C0	C0	KDUM	VOLA	1000	C0	C0	C0	C0	C0	C0	C0	C0
111	SIX6	K7.5	C0	C0	K4.5	VOLA	C001	C0	C0	C0	C0	C0	C0	C0	C0
112	SH10	C1	C1	C1	C1	C1	DISP	K30	C1	C1	C1	C0	C0	C0	C0
113	NF10	NF11	C1	NF12	C1	NF13	C1	C1	C0	C0	C0	C0	C0	C0	C0
114	NF11	C1	C1	C1	C1	C1	KOFF	C1	C1	C1	C1	C0	C0	C0	C0
115	TRBP	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	K234	NTP	HPIN	C1/2
116	TRBL	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	K234	NTL	HPLS	C1/2
117	W234	TRBP	C1	TRBL	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
118	RPL	C1	C1	C1	C1	C1	FIN	FOUT	C1	C1	C1	C0	C0	C0	C0
119	RPP	C1	C1	C1	C1	C1	PIN	POUT	C1	C1	C1	C0	C0	C0	C0
120	W233	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
121	DZLM	C233	HPLE	C23C	C23M	C0	HPLE	D23C	NDL	C1	C1	C1	C1	C1	WTD1
122	WTD1	C233	HPPE	C23C	C23M	C0	HPPE	D23C	NDP	C1	C1	C1	C1	C0	C0
123	NENL	NF13	MF10	NF13	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
124	NCPO	NF12	MF10	NF12	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
125	NOFF	NF11	MF10	NF11	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
126	ACOM	NOFF	C1	NCPO	C1	C1	NENL	C0	C0	C0	C0	C0	C0	C0	C0
127	NF12	C1	C1	C1	C1	C1	KCPO	C1	C1	C1	C1	C0	C0	C0	C0
128	NF13	C1	C1	C1	C1	C1	KENL	C1	C1	C1	C1	C0	C0	C0	C0
129	RPC	C1	C1	C1	C1	C1	K800	POUT	C1	C1	C1	C0	C0	C0	C0
130	T1L	HPLS	C1	C0	C1	C1	RPL	C3	C1	C1	FOUT	RPL	C2	C0	C0
131	T2L	C241	FIN	C1/2	C1	C1	RPL	C1	C1	C1	RPL	HPLS	C1/2	C0	C0
132	TRAN	C24A	T1L	C24K	C0	C1	C1	C1	NFNT	C1	C1	T2L	C24K	C1	WTRP
133	WTRP	K241	C1	C1	RPP	C1	C1	C3	HPP	C1	POUT	RPP	C2	C0	C0
134	WTRC	K241	C1	C1	RPC	C1	C1	C3	HPT	C1	POUT	RPC	C2	C0	C0
135	W241	TRAN	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
136	W242	C0	C0	C0	K242	HPPR	NSHP	C1	K242	HPLS	NSHF	C0	C0	C0	C0
137	WSHF	C243	C1	C1	C0	C1	HPLS	C24C	NSHF	SHLF	C1	FOUT	C24C	C0	C0
138	WSHP	C243	C1	C1	C0	C1	HPPR	C24C	NSHP	SHLP	C1	POUT	C24C	C0	C0
139	W243	C0	Q243	WSHF	C1	Q243	WSHP	C0	C0	C0	C0	C0	C0	C0	C0
140	W244	C0	K244	W243	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
141	W245	NSHP	C245	DIAP	DIAP	DIAP	C1	C1	C1	C1	C1	C0	C0	C0	C0
142	NFAN	C1	C1	C1	C1	C1	KFAN	NCUE	C1	C1	C1	C0	C0	C0	C0
143	H1	C248	C1	C1	C24H	C24S	P0D	D248	C1	C1	C1	C24H	D248	C-1	C248
144	DT1	D24H	QFL5	C1/2	C0	C1	NFAN	C-.5	C1	C1	C1	H1	C.25	C0	C0
145	W248	E248	NFAN	DT1	C2	E24H	NFAN	DT1	C3	C3	NFAN	C1	C0	C0	C0
146	PCA1	C0	C0	C0	C0	C0	C0	C251	HPPE	NTP	HIHP	C25A	HPPE	NTP	SYNP
147	AIRP	C1	PCA1	C25K	DCIP	HPPE	NTP	DINP	C1	D251	DCIP	C1	NTP	C1	AICP
148	FCA1	C0	C0	C0	C0	C0	C0	C251	HPLE	NTL	HIHL	C25A	HPLE	NTL	SYNL
149	AIRL	C1	FCA1	C25K	DCIL	HPLE	NTL	DINL	C1	D251	DCIL	C1	NTL	C1	AICL
150	W251	AIRP	C1	AIRL	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0

NO	LIST NAME	VARIABLE NAMES ON 1 CARD AND THEIR CORRESPONDENCE													
		X0	X1	X2	X3	X4	X5	X6	X7	X8	X9	Y0	Y1	Y2	Y3
151	W252	HPT	Q252	Q.2	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
152	W256	K256	NTP	HPPE	C1/2	K256	NTL	HPLE	C1/2	C0	C0	C1	C0	C0	C0
153	KWI	C0	N311	KWIN	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
154	TFN1	C0	C0	C259	NTP	EDCP	C0	HPPE	C1.5	C25J	HPPE	C1.5	NTP	C1	SEXP
155	TFN3	C0	C0	C25T	DCXP	NTP	C0	CIRP	C1	TFN1	C1	C1	C1	C1	C1
156	TFNP	D259	HPPE	C1	C0	C1	DCXP	C1	NTP	DEXP	C1	C1	C1	C1	TFN3
157	TFN2	C0	C0	C259	NTL	EDCL	C0	HPLE	C1.5	C25J	HPLE	C1.5	NTL	C1	SEXL
158	TFN4	C0	C0	C25T	DCXL	NTL	C0	CIRL	C1	TFN2	C1	C1	C1	C1	C1
159	TFNL	D259	HPLE	C1	C0	C1	DCXP	C1	NTL	DEXL	C1	C1	C1	C1	TFN4
160	W259	TFNP	C1	TFNL	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
161	W261	C0	K261	HPT	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
162	W262	C1/2	K262	HPT	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
163	W264	C0	K264	HPT	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
164	W298	C0	K298	HPT	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
165	W299	C0	K299	HPT	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
166	SB2A	C1	W233	W234	W241	W242	W243	W244	W245	W248	W251	W252	W256	W259	W261
167	SB2B	C1	W262	W264	W298	W299	C0	C0	C0	C0	C0	C0	C0	C0	C0
168	W200	K800	C1	K11	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
169	DLGN	C0	N311	DDA											
170	GTGN	C0	K311	KWI											
171	W311	C0	K311	KWI	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
172	W313	C0	K313	KWI	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
173	W314	C0	K314	KWI	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
174	W321	C0	K321	KWI	C1	L321	VOLA	C0	C0	C0	C0	C0	C0	C0	C0
175	W323	C0	K323	W321	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
176	W324	C0	K324	KWI	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
177	W331	C0	K331	VOLA	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
178	W332	C0	K332	ACOM	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
179	W342	C0	K342	KWI	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
180	W343	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	K343	C1	KWI	C1/2
181	W398	C0	K398	W311	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
182	W399	K399	KWI	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
183	W300	C1	W311	W313	W314	W321	W323	W324	W331	W332	W342	W343	W398	W399	C0
184	W511	C1	K511	L511	ACOM	M511	C0	C1	C0	C0	C1	C0	C0	C1	C0
185	W512	C0	K512	V1.2	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
186	W513	C0	K513	VSH	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
187	W514	K514	L514	VLSS	C1	M514	ACOM	C0	C0	C0	C0	C0	C0	C0	C0
188	W516	C0	C0	C0	K516	NDAY	ACOM	C0	C0	C0	C0	C0	C0	C0	C0
189	W521	C0	K521	VSH	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
190	W522	C0	K522	VOLA	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
191	W524	C0	K524	VOLA	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
192	W526	C0	C0	C0	K526	LCUE	BOA	C0	C0	C0	C0	C0	C0	C0	C0
193	W528	C0	K528	VSH	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
194	W529	C0	K529	VSH	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
195	W531	C1	K531	L531	ACOM	M531	C0	C1	C0	C0	C1	C0	C0	C1	C0
196	W532	C1	K532	L532	ACOM	M532	C0	C1	C0	C0	C1	C0	C0	C1	C0
197	W533	C0	K533	ACOM	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
198	W541	C1	K541	L541	WF41	C1	C0	C1	C0	C0	C1	C0	C0	C1	C0
199	W542	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C1	K542	WF42	C1/2
200	W543	C0	C0	C0	C0	C0	C0	K543	LCUE	DH	WF46	C0	C0	C0	C0

NO	LIST NAME	VARIABLE NAMES ON 1 CARD AND THEIR CORRESPONDENCE													
		X0	X1	X2	X3	X4	X5	X6	X7	X8	X9	Y0	Y1	Y2	Y3
201	W551	C0	K551	VOLA	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
202	W553	C0	C0	C0	K553	LCUE	BCUE	C0	C0	C0	C0	C0	C0	C0	C0
203	W555	C0	K555	VOLA	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
204	W556	K556	C0	C0	L556	VOLA	C.1	C0	C0	C0	C0	C0	C0	C0	C0
205	W562	C0	K562	W561	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
206	W561	K561	L561	VOLA	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
207	W571	C0	K571	WF00	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
208	W572	C0	K572	WF00	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
209	W581	C0	K581	VOLA	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
210	W582	C0	K582	VOLA	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
211	W583	C0	K583	ACOM	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
212	W584	K584	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
213	W586	K586	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
214	W588	K588	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
215	W593	C0	K593	ACOM	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
216	W595	K595													
217	SB5A	K598	W511	W512	W513	W514	W516	W521	W524	W526	W528	W529	W531	W532	W533
218	SB5B	K598	W541	W542	W543	W551	W555	W556	W561	W571	W572	W581	W582	W583	W584
219	SB5C	K598	W586	W588	W593	W595	C0	C0	C0	C0	C0	C0	C0	C0	C0
220	W598	SB5A	C1	SB5B	C1	C1	SB5C	C0	C0	C0	C0	C0	C0	C0	C0
221	W599	C0	K599	W598	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
222	W500	C1	W598	K598	C-1	C1	C1	W598	C1	C1	C1	W599	C1	C0	C0
223	W611	C0	C0	C0	K611	LCUE	BCUE	C0	C0	C0	C0	C0	C0	C0	C0
224	W612	C0	C0	C0	K612	LCUE	BCUE	C0	C0	C0	C0	C0	C0	C0	C0
225	W613	C0	C0	C0	K613	LCUE	BCUE	C0	C0	C0	C0	C0	C0	C0	C0
226	W621	C0	K621	VOLA	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
227	W622	L622	C0	C0	K622	VOLA	VOLA	C0	C0	C0	C0	C0	C0	C0	C0
228	W623	K623	L623	VOLA	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
229	W624	K624	L624	VOLA	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
230	W625	K625	L625	VLSS	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
231	W631	C0	K631	W100	C-1	K631	W164	C-1	C1	K631	W190	C0	C0	C0	C0
232	W633	C0	C0	C0	K633	LCUE	BCUE	C0	C0	C0	C0	C0	C0	C0	C0
233	W634	C0	K634	VOLA	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
234	W635	C0	K635	VOLA	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
235	W636	K636	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
236	W637	C0	K637	W635	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
237	W638	C0	K638	ACOM	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
238	W641	C0	K641	NOFF	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
239	W642	C0	K642	NCPO	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
240	W643	C0	K643	NENL	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
241	W644	C0	K644	ACOM	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
242	W645	C0	K645	ACOM	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
243	W651	L651	K651	ACOM	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
244	W652	C0	K652	ACOM	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
245	W654	C0	K654	ACOM	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
246	W655	C0	K655	ACOM	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
247	W656	C0	K656	ACOM	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
248	W650	C1	W651	W652	W654	W655	W656	C0	C0	C0	C0	C0	C0	C0	C0
249	W661	C0	K661	SIX6	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
250	W662	C0	K662	SIX6	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0

NO	LIST NAME	VARIABLE NAMES ON 1 CARD AND THEIR CORRESPONDENCE													
		X0	X1	X2	X3	X4	X5	X6	X7	X8	X9	Y0	Y1	Y2	Y3
251	W663	C0	K663	SIX6	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
252	W664	C3	C0	C0	K664	VOLA	C001	C0	C0	C0	C0	C0	C0	C0	C0
253	W665	C0	C0	C0	K665	VSH	C001	C0	C0	C0	C0	C0	C0	C0	C0
254	W671	C0	C0	C0	K671	VOLA	C001	C0	C0	C0	C0	C0	C0	C0	C0
255	W672	C0	K672	ACOM	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
256	W698	C0	K698	W650	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
257	SB6A	K699	W611	W612	W613	W621	W622	W623	W624	W625	W631	W633	W634	W635	W636
258	SB6B	K699	W637	W638	W641	W642	W643	W644	W651	W652	W654	W655	W656	W661	W662
259	SB6C	K699	W663	W664	W665	W671	W672	C0	C0	C0	C0	C0	C0	C0	C0
260	W699	SB6A	C1	SB6B	C1	C1	SB6C	C0	C0	C0	C0	C0	C0	C0	C0
261	W600	C1	W699	K699	C-1	C1	C1	W698	C1	C1	C1	W699	C1	C0	C0
262	WF11	C0	KF11	NF11	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
263	WF12	C0	KF12	NF12	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
264	WF13	C0	KF13	NF13	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
265	WF21	KF21	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
266	WF22	KF22	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
267	WF23	KF23	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
268	WF24	KF24	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
269	WF25	KF25	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
270	WF26	KF26	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
271	WF29	KF29	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
272	XF31	C0	C0	C0	CF30	NF10	NSDD	C0	C0	C0	C0	C0	C0	C0	C0
273	WF31	XF31	C0	C0	CFC0	NF10	NSDC	C1	CFM0	NF10	NSDF	C1	DFC0	NF10	NSDG
274	WF32	C0	NF10	DF32	NF10	DF30	NSDG	C0	C0	C0	C0	C0	C0	C0	C0
275	WF39	C0	DFM0	NF23	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
276	WF41	C0	1.02	F42S	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
277	WF42	F42A	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
278	WF46	C0	KF46	HPT	KF46	1.34	KWI	C0	C0	C0	C0	C0	C0	C0	C0
279	WF49	KF49	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
280	WF52	C0	KF52	ACOM	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
281	WF53	KF53	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
282	WF54	C1	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
283	WF55	C0	KF55	ACOM	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
284	WF61	KF61	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
285	WF62	KF62	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
286	WF63	KF63	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
287	WF64	KF64	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
288	WF65	KF65	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
289	WF66	KF66	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
290	WF67	KF67	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
291	WF69	KF69	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
292	WF60	C1	WF61	WF62	WF63	WF64	WF65	WF66	WF67	WF69	C0	C0	C0	C0	C0
293	WF20	C1	WF21	WF22	WF23	WF24	WF25	WF26	WF29	C0	C0	C0	C0	C0	C0
294	WF40	C1	WF41	WF42	WF46	WF49	C0	C0	C0	C0	C0	C0	C0	C0	C0
295	WF50	C1	WF52	WF53	WF54	WF55	C0	C0	C0	C0	C0	C0	C0	C0	C0
296	WFX1	C1	WF11	WF12	WF13	WF21	WF22	WF23	WF26	WF31	WF32	WF39	WF41	WF42	WF46
297	WFX2	C1	WF49	WF52	WF53	WF54	WF55	WF24	WF25	WF29	WF60	C0	C0	C0	C0
298	WF00	WFX1	C1	WFX2	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
299	W411	K411	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
300	W412	K412	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0

NO	LIST NAME	VARIABLE NAMES ON 1 CARD AND THEIR CORRESPONDENCE													
		X0	X1	X2	X3	X4	X5	X6	X7	X8	X9	Y0	Y1	Y2	Y3
301	W415	K415	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
302	W421	K421	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
303	W422	K422	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
304	W423	K423	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
305	W424	K424	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
306	W426	K426	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
307	W427	K427	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
308	W420	C1	W421	W422	W423	W424	W426	W427	C0	C0	C0	C0	C0	C0	C0
309	W431	K431	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
310	W432	K432	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
311	W433	K433	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
312	W434	K434	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
313	W435	K435	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
314	W436	K436	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
315	W437	K437	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
316	W438	K438	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
317	W439	K439	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
318	W430	C1	W431	W432	W433	W434	W435	W436	W437	W438	W439	C0	C0	C0	C0
319	W441	K441	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
320	W442	K442	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
321	W443	K443	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
322	W445	K445	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
323	W446	K446	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
324	W451	K451	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
325	W452	K452	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
326	W454	K454	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
327	W455	K455	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
328	W456	K456	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
329	W461	K461	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
330	W462	K462	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
331	W463	K463	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
332	W465	K465	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
333	W466	K466	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
334	W471	K471	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
335	W472	K472	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
336	W474	K474	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
337	W475	C0	C0	C0	K475	C1	C1	C0	C0	C0	C0	C0	C0	C0	C0
338	W481	K481	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
339	W482	K482	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
340	W483	K483	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
341	W485	K485	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
342	W489	K489	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
343	W491	K491	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
344	W492	K492	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
345	W493	K493	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
346	W495	K495	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
347	W498	K498	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
348	W499	K499	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
349	SB4A	C1	W411	W412	W415	W421	W422	W423	W424	W426	W427	W431	W432	W433	W434
350	SB4B	C1	W435	W436	W437	W438	W439	W441	W442	W443	W445	W446	W451	W452	W454

NO	LIST NAME	VARIABLE NAMES ON 1 CARD AND THEIR CORRESPONDENCE													
		X0	X1	X2	X3	X4	X5	X6	X7	X8	X9	Y0	Y1	Y2	Y3
351	SB4C	C1	W456	W462	W463	W465	W466	W471	W472	W474	W475	W482	W483	W485	W489
352	SB4D	C1	W491	W492	W493	W495	W499	W455	W481	C0	C0	C0	C0	C0	C0
353	W711	K711	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
354	W712	K712	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
355	W713	K713	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
356	W721	K721	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
357	W723	K723	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
358	W751	K751	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
359	W761	K761	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
360	W763	K763	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
361	W782	K782	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
362	W783	K783	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
363	W791	K791	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
364	W792	K792	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
365	W793	K793	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
366	W798	K798	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
367	W799	K799	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
368	W400	C1	SB4A	SB4B	SB4C	SB4D	C0	C0	C0	C0	C0	C0	C0	C0	C0
369	W700	C1	W711	W712	W721	W751	W761	W782	W783	W791	W798	W799	C0	C0	C0
370	WSNM	C1	W100	W200	W300	W400	W500	W600	W700	C0	C0	C0	C0	C0	C0
371	WM20	C0	CMAR	WSNM	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
372	FRL	C0	C0	VFPS	C0	C0	C0	C0	C0	LCUE	GRAV	C-.5	C1	C1	C1
373	HPT	HPP	C1	HPL	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
374	HPPR	C1	C1	C1	C1	C1	HPP	NSHP	C1	C1	C1	C0	C0	C0	C0
375	HPFN	C1	C1	C1	C1	C1	HPL	NFAN	C1	C1	C1	C0	C0	C0	C0
376	HPLS	C1	C1	C1	C1	C1	HPL	NLSY	C1	C1	C1	C0	C0	C0	C0
377	HPLT	C1	C1	C1	C1	C1	HPL	NLSY	C1	C1	C1	C0	C0	C0	C0
378	HPPT	C1	C1	C1	C1	C1	HPP	NPRT	C1	C1	C1	C0	C0	C0	C0
379	HPEP	C1	C1	C1	C1	C1	HPT	NTE	C1	C1	C1	C0	C0	C0	C0
380	HPPE	C1	C1	C1	C1	C1	HPP	NTP	C1	C1	C1	C0	C0	C0	C0
381	HPLE	C1	C1	C1	C1	C1	HPL	NTL	C1	C1	C1	C0	C0	C0	C0
382	ETPA	CPE0	C1	CPE1	JPEK	C1	CPE2	JPEK	C2	CPE3	JPEK	C3	CPE4	JPEK	C4
383	ETAP	ETPA	C1	CPE5	JPEK	C5	C0	C1	C1	C0	C1	C1	C0	C1	C1
384	ETP1	CPE0	C1	CPE1	JCRU	C1	CPE2	JCRU	C2	CPE3	JCRU	C3	CPE4	JCRU	C4
385	ETPC	ETP1	C1	CPE5	JCRU	C5	C0	C1	C1	C0	C1	C1	C0	C1	C1
386	PCP	C0	C0	C0	CAED	ETAP	ETAA	C0	CSCN	ETAP	ETAS	CMCH	ETAP	ETAC	ETAT
387	PCPC	C0	C0	C0	C0	ETPC	ETAA	C1	C0	ETPC	ETAS	C1	ETPC	ETAC	ETAT
388	PCL	C0	C0	C0	CAED	ETAF	ETAA	C1	CSCN	ETAF	ETAS	C1	CMCH	ETAF	ETAT
389	CDRC	NCUE	MDRC	SDRC	C1	C2									
390	HBOT	NCUE	FLT1	C0	C1	C2									
391	CPF1	NCUE	MPF1	SPF1	C1	C2									
392	CPF2	NCUE	MPF2	SPF2	C1	C2									
393	CHF1	NCUE	MHF1	SHF1	C1	C2									
394	CHF2	NCUE	MHF2	SHF2	C1	C2									
395	CHF3	NCUE	MHF3	SHF3	C1	C2									
396	CSPO	NCUE	MSPO	SSPO	C1	C2									
397	CSPI	NCUE	MSPI	SSPI	C1	C2									
398	CDH1	NCUE	MDH1	SDH1	C1	C2									
399	CDH2	NCUE	MDH2	SDH2	C1	C2									
400	CFL1	NCUE	MFL1	SFL1	C1	C2									

NO	LIST NAME	VARIABLE NAMES ON 1 CARD AND THEIR CORRESPONDENCE													
		X0	X1	X2	X3	X4	X5	X6	X7	X8	X9	Y0	Y1	Y2	Y3
401	CSS1	NCUE	MSS1	SSS1	C1	C2									
402	CSS2	NCUE	MSS2	SSS2	C1	C2									
403	CSS3	NCUE	MSS3	SSS3	C1	C2									
404	SEPD	C1	SEP	CSML	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
405	FRLD	C0	C0	VFPD	C0	C0	C0	C0	C0	LCUE	GRAV	C-.5	C1	C1	C1
406	VFPS	VKCR	CKTF	C1	C1	C1	C1	C1	C1	C1	C1				
407	VFPD	VKDS	CKTF	C1	C1	C1	C1	C1	C1	C1	C1				
408	DAIR	CDOA	C1	CDA1	LOA	BOA	C2	RHOA	C2	VFPS	C2	BOA	HBOW		
409	DAID	CDOA	C1	CDA1	LOA	BOA	C2	RHOA	C2	VFPD	C2	BOA	HBOW		
410	L/B	C1	C1	C1	C1	C1	LCUE	BCUE	C1	C1	C1				
411	LCU	LCUE	C1												
412	BCU	BCUE	C1												
413	HTW	HTWD	C1												
414	PCU	PCUE	C1												
415	CSAR	C0	C0	C1	C0	C0	C0	C0	C0	LCUE	BCUE	C-.5	C1	CIDS	C-.5
416	QWAT	C0	C0	C0.5	C1	C0	C0	C0	C0	C0	C0	C1	RHOW	VFPS	C2
417	QWAD	C0	C0	C0.5	C1	C0	C0	C0	C0	C0	C0	C1	RHOW	VFPD	C2
418	L/BB	C0	C0	LCUE	BCUE	C0.5	HBOT	HC	CDRC	C0	C0	C-1	C1	CIDS	C-1
419	FOIL	CIDS	C1	DISP	C2/3	CFO1	C1	C-1	E	L/B	CFO2	C1			
420	CFOL	C1	C1	C1	C1	C1	FOIL	SEPD	C1	C1	C1				
421	CFIN	C0	C0	C1	C0	C0	C0	C0	C0	AFIN	C2/3	C0.5	C1	C1	C1
422	AFIN	CFI1	C0	DISP	C2/3	C1	C1	C0	E	C1	C0	C1			
423	DFIN	QWAT	CDOW	C4	CIDS	AFIN	C1	C1	C1	CFIN	CDEX				
424	DFID	QWAD	CDOW	C4	CIDS	AFIN	C1	C1	C1	CFIN	CDEX				
425	DFOL	C0	C1	C2	C1	C1	C1	C1	C1	C1	C1				
426	DFOD	C0	C1	C2	C1	C1	C1	C1	C1	C1	C1				
427	CPFC	C1	C0	C1	C1	C1	CPF1	CPF2	E	FRL	C0.4	C14			
428	DPFC	C1	C0	C1	C1	C1	CPF1	CPF2	E	FRLD	C0.4	C14			
429	CPFD	C0	DCBR	DPFC	DHBR	C0	C0	C0	C0	C0	C0	C0	C0	C1	C0
430	CPF	C0	CCBR	CPFC	CHBR	C0	C0	C0	C0	C0	C0	C0	C0	C1	C0
431	P0H	H	RHOG	C1	C1	C1	C1	C1	C1	C1	C1				
432	P0C	HC	RHOG	C1	C1	C1	C1	C1	C1	C1	C1				
433	P0	C0	CCBR	P0C	CHBR	P0H	C0	C0	C0	C0	C0	C0	C0	C1	C0
434	P0D	C0	DCBR	P0C	DHBR	P0H	C0	C0	C0	C0	C0	C0	C0	C1	C0
435	HFDC	C1	C0	C1	C1	C1	CHF1	CHF2	E	FRLD	CHF3	C6			
436	HFC	C1	C0	C1	C1	C1	CHF1	CHF2	E	FRL	CHF3	C6			
437	ATOC	P0C	C0	RHOG	HFC	CPFC	HFC	C-1	C1	CSPI	C-1	CSPI	CSPO	C1	C0
438	ATDC	P0C	C0	RHOG	HFDC	DPFC	HFDC	C-1	C1	CSPI	C-1	CSPI	CSPO	C1	C0
439	ATH1	HC	HC	H	COSF	C0	CSPI	CSPO	C1						
440	ATH2	HC	HC	H	COSF	C1	CSPI	CSPO	C1						
441	ATOH	NCUE	ATH1	ATH2	C1	C2									
442	ATOT	C0	CCBR	ATOC	CHBR	ATOH	C0	C0	C0	C0	C0	C0	C0	C1	C0
443	ATOD	C0	DCBR	ATDC	DHBR	ATOH	C0	C0	C0	C0	C0	C0	C0	C1	C0
444	FRS	CFL1	FRL	C1/3	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
445	FRSD	CFL1	FRLD	C1/3	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
446	WRCF	WRC0	WRC6	WRC*	F/A	CHDF	C2								
447	SRCF	SRC0	SRC6	SRC*	F/A	CHDF	C2								
448	SLDF	SRD0	SRD6	SRD*	F/A	CHDF	C2								
449	SUDF	C1	C0	C1	C1	WRDF	C.57	C.15	E	FRLD	C1	C6			
450	WLDF	WRD0	WRD6	WRD*	F/A	CHDF	C2								

NO	LIST NAME	VARIABLE NAMES ON 1 CARD AND THEIR CORRESPONDENCE													
		X0	X1	X2	X3	X4	X5	X6	X7	X8	X9	Y0	Y1	Y2	Y3
451	WUDF	WUD0	WUD6	WUD*	F/A	CHDF	C2								
452	DUFR	C1	C0	C1	C1	C0.5	C1	C-1	E	C.43	FRLD	C140			
453	DLFR	C1	C0	C1	C1	C0.5	C1	C-1	E	FRLD	C.43	C140			
454	SLFR	C1	C0	C1	C1	C0.5	C1	C-1	E	FRLD	C0.5	C140			
455	SUFR	C1	C0	C1	C1	C0.5	C1	C-1	E	C0.5	FRLD	C140			
456	WRDF	DUFR	WUDF	DLFR	WLDF	C1	C0	C1	C1	C0	C1	C1	C0	C1	C1
457	SRDF	SUFR	SUDF	SLFR	SLDF	C1	C0	C1	C1	C0	C1	C1	C0	C1	C1
458	F/A	CIDS	C1	LCUE	SEP	C-1	HC	CDRC	C1	HBOT	C1	C1	C1	C1	
459	SSD	C1	C0	C1	CSS1	CSS2	CSS3	C-1	VFPM	VFPM	C2	C1	C1	C1	
460	SSDD	C1	C0	C1	CSS1	CSS2	CSS3	C-1	VFDM	VFDM	C2	C1	C1	C1	
461	VFPM	C0	C0	VFPS	C0	C0	C0	C0	C0	CSAM	CSAR	C0.5	C1	C1	C1
462	VFDM	C0	C0	VFPD	C0	C0	C0	C0	C0	CSAM	CSAR	C0.5	C1	C1	C1
463	DWC	C2	WRCF	P0C	CPFC	DISP	C224	LCUE	RHOG	C1	C1				
464	DW0	C0	CCBR	DWC	CHBR	C0	C0	C0	C0	C0	C0	C0	C0	C1	C0
465	DWDC	C2	WRDF	P0C	DPFC	DISP	C224	LCUE	RHOG	C1	C1				
466	DWD	C0	DCBR	DWDC	DHBR	C0	C0	C0	C0	C0	C0	C0	C0	C1	C0
467	DW2	DW0	DFS2	DFS2	C1	C1	C1	C1	C1	C1	C1				
468	DW4	DW0	DFS4	DFS4	C1	C1	C1	C1	C1	C1	C1				
469	DFRC	C2	CIDS	LSW	QWAT	CDOW	C1	C1	C1	LSW	CDEX				
470	DFRD	C2	CIDS	LSW	QWAD	CDOW	C1	C1	C1	LSW	CDEX				
471	DSW0	DFRC	C0	C1	ATOT	C-1	C-.5	SIGC	C1	HBOT	C1	C1	C1	C1	
472	DSWD	DFRD	C0	C1	ATOD	C-1	C-.5	SIGD	C1	HBOT	C1	C1	C1	C1	
473	DSW2	DFRC	C0	C1	ATOT	C-1	C-.5	SIGC	DFS2	HBOT	C1	C1	C1	C1	
474	DSW4	DFRC	C0	C1	ATOT	C-1	C-.5	SIGC	DFS4	HBOT	C1	C1	C1	C1	
475	DSAC	C1	CPFC	C422	C0	CDH1	C0	C0	C0	FRL	CDH2	C1	C1	DISP	C0
476	DSAH	C1	C0	C422	C0	CDH1	C0	C0	C0	FRL	CDH2	C1	C1	DISP	C0
477	DSA0	C0	CCBR	DSAC	CHBR	DSAH	C0	C0	C0	C0	C0	C0	C0	C1	C0
478	DSAD	C1	CPFD	C422	C0	CDH1	C0	C0	C0	FRLD	CDH2	C1	C1	DISP	
479	DSA2	DSA0	DFS2	C1	C1	C1	C1	C1	C1	C1	C1				
480	DSA4	DSA0	DFS4	C1	C1	C1	C1	C1	C1	C1	C1				
481	DOTD	DWD	C1	C1	C1	C1	SRDF	WRDF	C1	C1	C1				
482	DOT0	DW0	C1	C1	C1	C1	SRCF	WRCF	C1	C1	C1				
483	DOT2	DW2	C1	C1	C1	C1	SRCF	WRCF	C1	C1	C1				
484	DOT4	DW4	C1	C1	C1	C1	SRCF	WRCF	C1	C1	C1				
485	DRW0	SSD	SIGC	CSIG	DISP	C224	CSAR	C360	C1	C1	C1				
486	DRWD	SSDD	SIGD	CSIG	DISP	C224	CSAR	C360	C1	C1	C1				
487	DTO0	MDRG	DAIR	DFIN	DFOL	DW0	DSW0	DSA0	DOT0	DRW0	C1	C1	C1	C1	C1
488	DTO4	MDRG	DAIR	DFIN	DFOL	DW4	DSW4	DSA4	DOT4	DRW4	C1	C1	C1	C1	C1
489	DTO2	MDRG	DAIR	DFIN	DFOL	DW2	DSW2	DSA2	DOT2	DRW2	C1	C1	C1	C1	C1
490	DTOD	1000	SLCB	C1	C1	C1	C1	C1	C1	C1	C1	C1	C1	C1	C1
491	DRW2	DRW0	DFS2	C1	C1	C1	C1	C1	C1	C1	C1				
492	DRW4	DRW0	DFS4	C1	C1	C1	C1	C1	C1	C1	C1				
493	QFLM	CFB0	C1	CFB1	FRB	C1	CFB2	FRB	C2	CFB3	FRB	C3	C0	C1	C1
494	QFDM	CFB0	C1	CFB1	FRBD	C1	CFB2	FRBD	C2	CFB3	FRBD	C3	C0	C1	C1
495	QFLO	QFLM	CIDS	C1	C1	C1	C1	C1	CMOB	BCUE	-2.5				
496	QFLD	QFDM	CIDS	C1	C1	C1	C1	C1	CMOB	BCUE	-2.5				
497	FRB	C0	C0	VFPS	C0	C0	C0	C0	C0	BCUE	GRAV	C-.5	C1	C1	C1
498	FRBD	C0	C0	VFPD	C0	C0	C0	C0	C0	BCUE	GRAV	C-.5	C1	C1	C1
499	THPD	VFPD	DT	C1	C1	C1	C1	C550	PCPC	C1	C1				
500	LHPD	P0D	QFLD	CPFD	C1	C1	C24S	C550	PCL	C1	C1				

NO	LIST NAME	VARIABLE NAMES ON 1 CARD AND THEIR CORRESPONDENCE												
		X0	X1	X2	X3	X4	X5	X6	X7	X8	X9	Y0	Y1	Y2	Y3
501	THP0	VFPS	DTO0	C1	C1	C1	C1	C550	PCPC	NPEC	C1				
502	THP2	VFPS	DTO2	C1	C1	C1	C1	C550	PCPC	NPEC	C1				
503	THP4	VFPS	DTO4	C1	C1	C1	C1	C550	PCPC	NPEC	C1				
504	LHP0	P0C	QFLO	CPFC	C1	C1	C24S	C550	PCL	NTLC	C1				
505	LHP2	P0C	QFLO	DFS2	CPFC	C1	C24S	C550	PCL	NTLC	C1				
506	LHP4	P0C	QFLO	DFS4	CPFC	C1	C24S	C550	PCL	NTLC	C1				
507	J2KT	C1	C1	C1	C1	JPEK	JPEK	KTPK	RHOW	ETAW	C2	C0	C0	C0	C0
508	TOV2	C1	C1	C1	C1	C1	DT	NSHP	ETAD	VFPD	C2	C0	C0	C0	C0
509	JCRU	C1	C1	C1	C1	VFPS	C60	POUT	DIAP	C1	C1	C0	C0	C0	C0
510	DIAP	C0	C0	C1	C0	C0	C0	C0	C0	J2KT	TOV2	C1/2	C1	C1	C1
511	KTPK	CKT0	C1	CKT1	JPEK	C1	CKT2	JPEK	C2	CKT3	JPEK	C3	C0	C1	C1
512	C2J2	CKT2	KTJ2	C1	C1	C0	C0	C0	C1	C1	C1	C1	C1	C1	C1
513	KTJ0	ETAD	RHOW	VFPS	VFPS	ETAW	ETAW	DTO0	C1	DIAP	C-2				
514	KTJ2	C1	C1	C1	C1	C1	C1	KTJ0	NTPC	C1	C1				
515	POUT	C1	C1	C1	C60	ETAW	VFPD	JPEK	DIAP	C1	C1				
516	FIN2	C1	C1	FIN	C1/2	C0	C0	C1	C1	C0	C0	C1	C1	C0	C0
517	PIN2	C1	C1	PIN	C1/2	C0	C0	C1	C1	C0	C0	C1	C1	C0	C0
518	FOT2	C1	C1	FOUT	C1/2	C0	C0	C1	C1	C0	C0	C1	C1	C0	C0
519	POT2	C1	C1	POUT	C1/2	C0	C0	C1	C1	C0	C0	C1	C1	C0	C0
520	FLP0	THP0	TSFC	PBFF	C1	C1	C1	C1	C1	C1	C1				
521	FLP2	THP2	TSFC	PBFF	C1	C1	C1	C1	C1	C1	C1				
522	FLP4	THP4	TSFC	PBFF	C1	C1	C1	C1	C1	C1	C1				
523	FLC0	LHP0	LSFC	C1	C1	C1	C1	C1	C1	C1	C1				
524	FLC2	LHP2	LSFC	C1	C1	C1	C1	C1	C1	C1	C1				
525	FLC4	LHP4	LSFC	C1	C1	C1	C1	C1	C1	C1	C1				
526	FRBP	NPEC	C0	C6	FLP0	C-1	C-2	FLP2	C1	FLP4	C1	C1/2	C1	C1	
527	FRBE	KWI	CKHP	ESFC	CELF	C1	C1	C1	C1	C1	C1				
528	FRBC	NTLC	C0	C6	FLC0	C-1	C-2	FLC2	C1	FLC4	C1	C1/2	C1	C1	
529	FRBL	C0	C0	C0	CCBR	FRBC	LBFF	C0	C0	C0	C0	C0	C0	C0	C0
530	FRBT	SFCF	FRBL	FRBP	FRBE	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
531	FPL2	C0	NPEC	FLP0	NPEC	C2	FLP2	NTLC	FLC0	CCBR	C1	NTLC	FLC2	C2	CCBR
532	ELP2	C1	C0	C3	C3	C0	C-1	FPL2	FRBE	C1	C1	C1	C1	C1	
533	FUL2	ELP2	C1	RANG	C1	C1	C1	VKCR	C224	C2	C1				
534	F42S	FRBT	RMAR	RANG	C1	C1	C1	VKCR	C224	C1	C1				
535	DFS2	C1	C1	C1	FUL2	DISP	C0	C1	C1	C1	C1	C1	C1	C1	C1
536	DFS4	C1	C1	C1	F42S	DISP	C0	C1	C1	C1	C1	C1	C1	C1	C1
537	FRL3	C0	C0	VFP3	C0	C0	C0	C0	C0	LCUE	GRAV	C-.5	C1	C1	C1
538	VFP3	VKC3	CKTF	C1	C1	C1	C1	C1	C1	C1	C1				
539	DAI3	CDOA	C1	CDA1	LOA	BOA	C2	RHOA	C2	VFP3	C2	BOA	HBOW		
540	QWA3	C0	C0	C0.5	C1	C0	C0	C0	C0	C0	C0	C1	RHOW	VFP3	C2
541	DFI3	QWA3	CDOW	C4	CIDS	AFIN	C1	C1	C1	CFIN	CDEX				
542	SSD3	C1	C0	C1	CSS1	CSS2	CSS3	C-1	3VFP	3VFP	C2	C1	C1	C1	
543	3VFP	C0	C0	VFP3	C0	C0	C0	C0	C0	CSAM	CSAR	C0.5	C1	C1	C1
544	DFR3	C2	CIDS	LSW	QWA3	CDOW	C1	C1	C1	LSW	CDEX				
545	ATO5	C0	DCBR	AT5C	DHBR	ATOH	C0	C0	C0	C0	C0	C0	C0	C1	C0
546	DSW3	DFR3	C0	C1	ATOT	C-1	C-.5	SIGC	C1	HBOT	C1	C1	C1	C1	
547	DSA3	C1	C0	C422	C0	CDH1	C0	C0	C0	FRL3	CDH2	C1	C1	DISP	C0
548	3DSA	C0	C0	C0	C1	DSA3	C0	C0	C0	C0	C0	C0	C0	C1	C0
549	DRW3	SSD3	SIGC	CSIG	DISP	C224	CSAR	C360	C1	C1	C1				
550	DTO3	MPWR	DAI3	DFI3	C0	C0	DSW3	3DSA	C0	DRW3	C1	C1	C1	C1	C1

NO	LIST NAME	VARIABLE NAMES ON 1 CARD AND THEIR CORRESPONDENCE													
		X0	X1	X2	X3	X4	X5	X6	X7	X8	X9	Y0	Y1	Y2	Y3
551	THP3	VFP3	DTO3	C1	C1	C1	C1	C550	PCPC	NPE3	C1				
552	FLP3	THP3	TSFC	PBFF	C1	C1	C1	C1	C1	C1	C1				
553	FRB3	NTP	C0	C6	FLP3	C-1	C-2	FLP3	C1	FLP3	C1	C1/2	C1	C1	
554	FR3T	SFCF	C0	FRB3	FRBE	C0	C0	C0	C0	C0	C0	C0	C0	C0	C0
555	3F42	FR3T	C1	RAN3	C1	C1	C1	VKC3	C224	TPAL	C1				
556	FRB5	C0	C0	VFP5	C0	C0	C0	C0	C0	BCUE	GRAV	C-.5	C1	C1	C1
557	QF5M	CFB0	C1	CFB1	FRB5	C1	CFB2	FRB5	C2	CFB3	FRB5	C3	C0	C1	C1
558	QFL5	QF5M	CIDS	C1	C1	C1	C1	C1	CMOB	BCUE	-2.5				
559	LHP5	PC5	QFL5	CPF5	C1	C1	C24S	C550	PCL	C1	C1				
560	FRL5	C0	C0	VFP5	C0	C0	C0	C0	C0	LCUE	GRAV	C-.5	C1	C1	C1
561	VFP5	VKC5	CKTF	C1	C1	C1	C1	C1	C1	C1	C1				
562	DAI5	CDOA	C1	CDA1	LOA	BOA	C2	RHOA	C2	VFP5	C2	BOA	HBOW		
563	QWA5	C0	C0	C0.5	C1	C0	C0	C0	C0	C0	C0	C1	RHOW	VFP5	C2
564	DFI5	QWA5	CDOW	C4	CIDS	AFIN	C1	C1	C1	CFIN	CDEX				
565	5VFP	C0	C0	VFP5	C0	C0	C0	C0	C0	CSAM	CSAR	C0.5	C1	C1	C1
566	DFR5	C2	CIDS	LSW	QWA5	CDOW	C1	C1	C1	LSW	CDEX				
567	SL5F	SRD0	SRD6	SRD*	F/A	CH5F	C2								
568	SLF5	C1	C0	C1	C1	C0.5	C1	C-1	E	FRL5	C0.5	C140			
569	SU5F	C1	C0	C1	C1	WR5F	C.57	C.15	E	FRL5	C1	C6			
570	SUF5	C1	C0	C1	C1	C0.5	C1	C-1	E	C0.5	FRL5	C140			
571	SR5F	SUF5	SU5F	SLF5	SL5F	C1	C0	C1	C1	C0	C1	C1	C0	C1	C1
572	DOT5	DW5	C1	C1	C1	C1	SR5F	WR5F	C1	C1	C1				
573	DW5	C0	5CBR	DW5C	5HBR	C0	C0	C0	C0	C0	C0	C0	C0	C1	C0
574	WL5F	WRD0	WRD6	WRD*	F/A	CHDF	C2								
575	5LFR	C1	C0	C1	C1	C0.5	C1	C-1	E	FRL5	C.43	C140			
576	WU5F	WUD0	WUD6	WUD*	F/A	CHDF	C2								
577	5UFR	C1	C0	C1	C1	C0.5	C1	C-1	E	C.43	FRL5	C140			
578	WR5F	5UFR	WU5F	5LFR	WL5F	C1	C0	C1	C1	C0	C1	C1	C0	C1	C1
579	DW5C	C2	WR5F	PC5	5PFC	DIS5	C224	LCUE	RHOG	C1	C1				
580	SSD5	C1	C0	C1	CSS1	CSS2	CSS3	C-1	5VFP	5VFP	C2	C1	C1	C1	
581	5PFC	C1	C0	C1	C1	C1	CPF1	CPF2	E	FRL5	C0.4	C14			
582	HF5C	C1	C0	C1	C1	C1	CHF1	CHF2	E	FRL5	CHF3	C6			
583	AT5C	PC5	C0	RHOG	HF5C	5PFC	HF5C	C-1	C1	CSPI	C-1	CSPI	CSPO	C1	C0
584	DSW5	DFR5	C0	C1	ATO5	C-1	C-.5	SIG5	C1	HBOT	C1	C1	C1	C1	
585	CPF5	C0	5CBR	5PFC	5HBR	C0	C0	C0	C0	C0	C0	C0	C0	C1	C0
586	DSA5	C1	CPF5	C422	C0	CDH1	C0	C0	C0	FRL5	CDH2	C1	C1	DIS5	C0
587	5DSA	C0	C0	C0	C1	DSA5	C0	C0	C0	C0	C0	C0	C0	C1	C0
588	DRW5	SSD5	SIG5	CSIG	DIS5	C224	CSAR	C360	C1	C1	C1				
589	DTO5	MPWR	DAI5	DFI5	C0	DW5	DSW5	DSA5	DOT5	DRW5	C1	C1	C1	C1	C1
590	THP5	VFP5	DTO5	C1	C1	C1	C1	C550	PCPC	C1	C1				
591	EHT	C0	C2	HTWD	C-1	C2	FLT1	C0	C1	C1	C1	C0	C1	C1	C1
592	EDFT	H	C.5	LSSD	C0	C1	C1	C0	C1	C1	C1	C0	C1	C1	C1

THERE WERE 441 VARNS WITH BLANK SUMMATION FIELDS

PROGRESS REPORT FOR CYCLE NUMBER 0

CURRENT VALUE OF OBJECTIVE FUNCTION MNWT SOLVE FOR MINIMUM WEIGHT (FLD) 16152.271

CURRENT VALUE OF ALL CONSTRAINTS

WTBY	WEIGHT = BOUYANCY	226.15576	CONSTRAINING THIS CYCLE
LBOA	BMAX - BOA > 0	1.8195407	NOT ACTIVE THIS RUN
LL/B	ML/B - L/B > 0	-.18518519E-01	NOT ACTIVE THIS RUN
VAVR	ACTUAL VOLUME - REQD VOLUME .GE. 0	-161.40304	NOT ACTIVE THIS RUN
HPWR	BHP/GT AVAIL. - BHP/GT REQD > 0	4127.6019	NOT ACTIVE THIS RUN
HBSS	HTWD - H > LSSD / 2	-6.4505685	NOT ACTIVE THIS RUN
CBSS	HTWD - LSSD > 0	12.000000	NOT ACTIVE THIS RUN
LVCG	BCUE - EHT > 0 WHERE EHT = 2*HTWD-2*FLT1	29.000000	NOT ACTIVE THIS RUN

CURRENT VALUE OF ALL DIRECT VARIABLES

LCUE	690.00000	FIXED THIS RUN	PCUE	551.50000	VARIES THIS RUN	HTWD	30.000000 FIXED THIS RUN
BCUE	81.000000	FIXED THIS RUN					

CURRENT VALUE OF LA GRANGE MULTIPLIERS FOR CONSTRAINTS POTENTIALLY ACTIVE THIS RUN

WTBY 0.100000E+01

THE ERROR VECTOR IS

0.319808E+02 0.226156E+03
EQUATION SOLUTION RELATIVE TOLERANCE IS 0.10000E-01

NEW VALUES OF ALL DIRECT VARIABLES

LCUE	690.00000	FIXED THIS RUN	PCUE	541.26545	VARIES THIS RUN	HTWD	30.000000 FIXED THIS RUN
BCUE	81.000000	FIXED THIS RUN					

NEW VALUE OF LA GRANGE MULTIPLIERS FOR CONSTRAINTS POTENTIALLY ACTIVE THIS RUN

WTBY -.443539E+00

NONLIN RESULT--- RESULT NOT MINIMIZED, BEGIN ANOTHER CYCLE

PROGRESS REPORT FOR CYCLE NUMBER 1

CURRENT VALUE OF OBJECTIVE FUNCTION MNWT SOLVE FOR MINIMUM WEIGHT (FLD) 16047.156

CURRENT VALUE OF ALL CONSTRAINTS

WTBY	WEIGHT = BOUYANCY	4.3956210	CONSTRAINING THIS CYCLE
LBOA	BMAX - BOA > 0	2.1370245	NOT ACTIVE THIS RUN
LL/B	ML/B - L/B > 0	-.18518519E-01	NOT ACTIVE THIS RUN
VAVR	ACTUAL VOLUME - REQD VOLUME .GE. 0	-169.33519	NOT ACTIVE THIS RUN
HPWR	BHP/GT AVAIL. - BHP/GT REQD > 0	5590.8185	NOT ACTIVE THIS RUN
HBSS	HTWD - H > LSSD / 2	-6.1884196	NOT ACTIVE THIS RUN
CBSS	HTWD - LSSD > 0	12.000000	NOT ACTIVE THIS RUN
LVCG	BCUE - EHT > 0 WHERE EHT = 2*HTWD-2*FLT1	29.000000	NOT ACTIVE THIS RUN

CURRENT VALUE OF ALL DIRECT VARIABLES

LCUE	690.00000	FIXED THIS RUN	PCUE	541.26545	VARIES THIS RUN	HTWD	30.000000	FIXED THIS RUN
BCUE	81.000000	FIXED THIS RUN						

CURRENT VALUE OF LA GRANGE MULTIPLIERS FOR CONSTRAINTS POTENTIALLY ACTIVE THIS RUN

WTBY -.443539E+00

THE ERROR VECTOR IS

-.390623E-01 0.439562E+01
EQUATION SOLUTION RELATIVE TOLERANCE IS 0.10000E-01

NEW VALUES OF ALL DIRECT VARIABLES

LCUE	690.00000	FIXED THIS RUN	PCUE	541.06675	VARIES THIS RUN	HTWD	30.000000	FIXED THIS RUN
BCUE	81.000000	FIXED THIS RUN						

NEW VALUE OF LA GRANGE MULTIPLIERS FOR CONSTRAINTS POTENTIALLY ACTIVE THIS RUN

WTBY -.420938E+00

NONLIN RESULT--- MINIMIZATION COMPLETE, FINAL REPORTS FOLLOW

COMPARISON BETWEEN PARENT AND CURRENT VALUES OF OBJECTIVE FUNCTION

NAME	DESCRIPTION	PARENT	CURRENT	VAR1	VAR2	FUN2
MNWT	SOLVE FOR MINIMUM WEIGHT (FLD)	15932.421	16045.186	WTOT		

COMPARISON BETWEEN PARENT AND CURRENT VALUES OF DIRECT VARIABLES

NO	NAME	PARENT	CURRENT
1	LCUE	690.00000	690.00000
2	PCUE	551.50000	541.06675
3	HTWD	30.000000	30.000000
4	BCUE	81.000000	81.000000

COMPARISON BETWEEN PARENT AND CURRENT VALUES OF CONSTRAINTS

PROGRAM CONSTRAINTS FORM IS : A - B (.GE. , .EQ. , OR .LE.) 0.0

NUM	NAME	DESCRIPTION	A-VAR1	A-VAR2	A-FUN2		B-VAR1	B-VAR2	B-FUN2	OPER	PARENT VALUE	CURRENT VALUE
1	WTBY	WEIGHT = BOUYANCY	BTOT			-	WTOT			.EQ.	446.00533	0.29115183E-01
2	LBOA	BMAX - BOA > 0	BMAX			-	BOA			.GE.	1.8195407	2.1431887
3	LL/B	ML/B - L/B > 0	ML/B			-	L/B			.GE.	-.18518519E-01	-.18518519E-01
4	VAVR	ACTUAL VOLUME - REQD VOLUME .GE. 0	ALOV			-	RLOV			.GE.	-161.24088	-169.49092
5	HPWR	BHP/GT AVAIL. - BHP/GT REQD > 0	HPIN			-	THP2			.GE.	4127.1487	5618.8715
6	HBSS	HTWD - H > LSSD / 2	HTWD			-	EDFT	EA		.GE.	-6.4505685	-6.1833022
7	CBSS	HTWD - LSSD > 0	HTWD			-	LSSD			.GE.	12.000000	12.000000
8	LVCG	BCUE - EHT > 0 WHERE EHT = 2*HTWD-2*FLT1	BCUE			-	EHT	EA		.GE.	29.000000	29.000000

MEMBERS OF SUMI SETS

NO	ITEM	DESCRIPTION		WTOT	LARM	VARM	BTOT	LARM	VARM		LARM	VARM
1	W111			4186.23	352.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	W119	SEALS WT GRP 119	307200	34.99	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	W120	TR BKHD	303300	144.19	367.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	W150		307200	216.80	367.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	W161	70518 PD-214 STRUCT WELDMENTS, CASTI		56.28	367.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	W163			11.29	367.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	W164			0.00	367.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	W167			60.20	367.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	W169			79.01	367.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	W170	FINAL WT. REPORT	303300	18.67	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	W182	70518 LSES PROPULSION PLANT FDNS		8.11	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	W183	70518 LSES ELECTRIC PLANT FDNS.		2.85	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	W184	DDG 51		2.82	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	W185	70518 LSES AUXIL. SYS. FDNS.		5.64	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	W186	DDG 51		4.08	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	W187	DDG 51		0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	W190		309140	96.62	367.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	W233	SESDES	307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	W234	70519 LSES PROPUL. & LIFT GAS TURBIN		71.40	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	W235	SESDES	307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	W237	AUXILIARY PROPULSION CODOG	307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	W241	SESDES	307200	76.97	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	W242	SESDES	307200	7.81	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	W243	SESDES	307200	99.20	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	W244	SESDES	307200	19.34	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	W245	SESDES	307200	35.24	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	W248	SESDES	307200	44.22	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	W251	70518 LSES COMBUSTION AIR SYSTEM		21.30	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	W252	SESDES	307200	1.63	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	W256	SESDES	307200	13.22	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	W259	70518 LSES EXHAUST SYSTEM		153.94	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32	W261	70518 PD-214 FUEL SERVICE SYSTEM		7.47	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33	W262	70519 LSES LUBE OIL SYS MAIN PROPUL.		8.29	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
34	W264	70518 PD-214 LUBE OIL FILL AND XFER		7.47	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	W298	SESDES	307200	24.89	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36	W299	SESDES	307200	9.96	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
37	W311	SHIP SERVICE POWER GENERATORS		36.96	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
38	W313	BATTERIES (ASSET) (032885)		1.27	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
39	W314	PWR CONV EQUIP (ASSET) (032885)		6.27	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	W321	SHIP SERV PWR CABLE (SES DES) (032885		133.79	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41	W323	CASUALTY PWR CABLE (SES DES) (032885)		4.63	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
42	W324	SWITCHGEAR&PANELS (ASSET) (032885)		23.10	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
43	W331	LIGHTING DIST (ASSET) (032885)		43.09	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
44	W332	LIGHTING FIX (SES DES) (032885)		1.44	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
45	W342	SESDES	307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
46	W343	AMPHIB 021287		0.35	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
47	W398	ELEC PLNT OP FLUIDS (ASSET) (032885)		0.55	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
48	W399	ELECT PLNT PARTS (ASSET) (032885)		1.48	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
49	W411	SESDES	307200	1.05	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	W412	SESDES	307200	2.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

MEMBERS OF SUMI SETS

NO	ITEM	DESCRIPTION		WTOT	LARM	VARM	BTOT	LARM	VARM		LARM	VARM
51	W415	SESDES	307200	0.42	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
52	W421	SESDES	307200	0.10	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
53	W422	SESDES	307200	0.18	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
54	W423	SESDES	307200	0.61	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
55	W424	SESDES	307200	0.27	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
56	W426	SESDES	307200	0.30	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
57	W427	SESDES	307200	0.18	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
58	W431	SESDES	307200	0.15	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
59	W432	SESDES	307200	0.03	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
60	W433	SESDES	307200	0.15	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
61	W434	SESDES	307200	0.51	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
62	W435	SESDES	307200	0.08	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
63	W436	SESDES	307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
64	W437	SESDES	307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
65	W438	SESDES	307200	0.29	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
66	W439	SESDES	307200	0.03	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
67	W441	SESDES	307200	3.93	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
68	W442	SESDES	307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
69	W443	SESDES	307200	1.71	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70	W445	SESDES	307200	0.18	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
71	W446	SESDES	307200	0.19	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
72	W451	SESDES	307200	0.16	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
73	W452	SESDES	307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
74	W454	SESDES	307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
75	W455	SESDES	307200	0.65	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
76	W456	SESDES	307200	1.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
77	W461			0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
78	W462	SESDES	307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
79	W463	SESDES	307200	8.72	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
80	W465	SESDES	307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
81	W466	SESDES	307200	2.65	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
82	W471	SESDES	307200	5.45	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
83	W472	SESDES	307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
84	W474	SESDES	307200	3.70	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
85	W475	SESDES	307200	29.18	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
86	W481	SESDES	307200	1.48	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
87	W482	SESDES	307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
88	W483	SESDES	307200	3.28	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
89	W485	SESDES	307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
90	W489	SESDES	307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
91	W491	SESDES	307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
92	W492	SESDES	307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
93	W493	SESDES	307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
94	W495	SESDES	307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95	W498	SESDES	307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
96	W499	SESDES	307200	0.10	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
97	W511	AMPHIB 021287		3.05	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
98	W512	70518 PD-214 VENTILATING CARGO USE L		40.14	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
99	W513	ASSET 032885		8.42	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	W514	70518 AIR CONDITIONING PD-214		23.76	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

MEMBERS OF SUMI SETS

NO	ITEM	DESCRIPTION	WTOT	LARM	VARM	BTOT	LARM	VARM		LARM	VARM
101	W516	ASSET 032885	0.24	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
102	W521	PD-214 PAGE C-8	20.18	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
103	W522	HYD & SES DATA 032885	17.57	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
104	W524	HYD & SES DATA 032885	12.43	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
105	W526	ASSET 032885	0.84	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
106	W528	PD-214 PAGE C-8	5.61	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
107	W529	PD-214 PAGE C-8	4.11	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
108	W531	AMPHIB 021287	2.19	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
109	W532	AMPHIB 021287	2.95	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
110	W533	ASSET 032885	0.81	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
111	W541	AMPHIB 021287	68.10	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
112	W542	AMPHIB 021287	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
113	W543	SESDES 307200	4.01	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
114	W551	70518 PD-214 COMPRESSED AIR SYSTEM	2.82	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
115	W553	70518 PD-214, O2,N2 GAS SYS	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
116	W555	FIRE EXT SYS (ASSET) 032885	30.79	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
117	W556	SESDES 307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
118	W561	70518 PD-214, STEERING SYSTEM	24.33	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
119	W562	70518 LSES,RUDDERS	16.23	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
120	W571	70518 PD-214, REPLENISHMENT AT SEA	10.19	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
121	W572	70518 PD-214, STORES AND EQUIP HNDLG	20.11	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
122	W581	70518 PD-214, ANCHOR HNDLG & STOWAGE	61.99	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
123	W582	70518 PD-214, MOORING & TOWING	22.67	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
124	W583	BOAT HNDLG & STOW (ASSET) (032885)	1.62	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
125	W584	70518 PD-214, MECH. OPERATED DOORS,	220.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
126	W586	70518 LSES, NOT USED FOR SFS	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
127	W588	SESDES 307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
128	W593	ENVIR POLUT CNTRL SYS (ASSET) (032885	1.39	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
129	W595	032086 SONAR WINCHES	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
130	W598	70518 LSES, OPERATING FLUIDS	15.29	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
131	W599	AUX SYS REPAIR PTS (ASSET) (032885)	1.99	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
132	W611	SESDES 307200	4.93	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
133	W612	SESDES 307200	6.29	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
134	W613	SESDES 307200	0.64	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
135	W621	SESDES 307200	57.35	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
136	W622	70518 LSES, FLOOR PLATES & GRATINGS	28.43	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
137	W623	SESDES 307200	15.88	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
138	W624	SESDES 307200	9.64	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
139	W625	SESDES 307200	2.02	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
140	W631	70518 PD-214,PAINT	88.94	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
141	W633	SESDES 307200	2.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
142	W634	PD-214 PAGE C-7	0.80	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
143	W635	70518 PD-214 PG C-7, HULL INSULATION	11.34	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
144	W636	SESDES 307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
145	W637	SESDES 307200	4.59	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
146	W638	SESDES 307200	1.20	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
147	W641	SESDES 307200	2.69	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
148	W642	SESDES 307200	2.02	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
149	W643	SESDES 307200	3.70	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
150	W644	SESDES 307200	0.76	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

MEMBERS OF SUMI SETS

NO	ITEM	DESCRIPTION		WTOT	LARM	VARM	BTOT	LARM	VARM		LARM	VARM
151	W645	SESDES	307200	0.99	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
152	W651	SESDES	307200	2.81	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
153	W652	SESDES	307200	0.40	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
154	W654	SESDES	307200	0.22	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
155	W655	SESDES	307200	0.81	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
156	W656	SESDES	307200	0.16	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
157	W661	SESDS	307200	13.24	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
158	W662	SESDS	307200	0.67	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
159	W663	70518 LSES, ELECTRON. CNTRL CNTR FUR		3.32	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
160	W664	70518 LSES, DC STATION		5.25	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
161	W665	PD-214 PAGE C-10		11.69	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
162	W671	70518 LSES LOCKERS AND SPECIAL STOW		2.83	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
163	W672	SESDS	307200	5.17	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
164	W698	SESDS	307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
165	W699	SESDS	307200	2.90	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
166	W711	SESDES	307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
167	W712	SESDES	307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
168	W713	SESDES	307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
169	W721	SESDES	307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
170	W723	SESDES	307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
171	W751	SESDES	307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
172	W761	SESDES	307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
173	W763	SESDES	307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
174	W782	SESDES	307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
175	W783	SESDES	307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
176	W791	SESDES	307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
177	W792	SESDES	307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
178	W793	SESDES	307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
179	W798	SESDES	307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
180	W799	SESDES	307200	0.08	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
181	WF11		307200	1.25	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
182	WF12		307200	1.76	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
183	WF13		307200	3.09	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
184	WF21	70519 SHIP AMMUNITION		1.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
185	WF22		307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
186	WF23		307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
187	WF24			0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
188	WF25			0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
189	WF26		307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
190	WF29			0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
191	WF31		307200	4.17	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
192	WF32		307200	0.93	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
193	WF39		307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
194	WF41		307200	3809.53	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
195	WF42		307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
196	WF46		307200	45.60	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
197	WF49		307200	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
198	WF52		307200	1.72	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
199	WF53		307200	1.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200	WF54		307200	1.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

MEMBERS OF SUMI SETS

NO	ITEM	DESCRIPTION	WTOT	LARM	VARM	BTOT	LARM	VARM		LARM	VARM
201	WF55	307200	0.92	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
202	WF61	CARGO, ORDNANCE, ORDNANCE DELIVERY S	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
203	WF62	CARGO, STORES	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
204	WF63	CARGO, FUELS AND LUBRICANTS	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
205	WF64	CARGO, LIQUIDS (NON-FUEL TYPE)	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
206	WF65	CARGO, CRYOGENIC AND LIQUIFIED GAS	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
207	WF66	CARGO, AMPHIBIOUS ASSAULT SYSTEMS	4687.50	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
208	WF67	CARGO, GASES	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
209	WF69	CARGO, MISCELLANEOUS	0.00	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
210	WM20	MARGIN, ENTIRE SHIP	696.31	345.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
211	YOUB	BUOYANCY, ENTIRE SHIP	0.00	0.00	0.00	16045.21	345.00	0.00	0.00	0.00	0.00
MAGNITUDES AND ARMS FOR WTOT BTOT			16045.19	347.88	0.00	16045.21	345.00	0.00	0.00	0.00	0.00

COMPARISON BETWEEN PARENT AND CURRENT VALUES OF ITEMS - POINT OR DISTRIBUTED MAGNITUDES, LOCAL ARMS

NO	ITEM	WT GRP	DESCRIPTION		PARENT PT,D	PARENT LONG	PARENT VERT	CURRENT PT,D	CURRENT LONG	CURRENT VERT	VAR1	VAR2	FUN2	SUMV
1	W111	111			4187.33	352.62	0.00	4186.23	352.52	0.00	W111	NCUE		WT
2	W119	119	SEALS WT GRP 119	307200	34.99	345.00	0.00	34.99	345.00	0.00	W119	EA		WT
3	W120	120	TR BKHD	303300	144.99	367.31	0.00	144.19	367.21	0.00	W120	W120		WT
4	W150	150		307200	216.80	367.31	0.00	216.80	367.21	0.00	W150	EA		WT
5	W161	161	70518 PD-214 STRUCT WELDMENTS, CASTI		56.60	367.31	0.00	56.28	367.21	0.00	W161	EA		WT
6	W163	163			11.35	367.31	0.00	11.29	367.21	0.00	W163	EA		WT
7	W164	164			0.00	367.31	0.00	0.00	367.21	0.00	W164	EA		WT
8	W167	167			60.54	367.31	0.00	60.20	367.21	0.00	W167	EA		WT
9	W169	169			79.45	367.31	0.00	79.01	367.21	0.00	W169	EA		WT
10	W170	170	FINAL WT. REPORT	303300	18.71	345.00	0.00	18.67	345.00	0.00	W170	EA		WT
11	W182	182	70518 LSES PROPULSION PLANT FDNS		8.11	345.00	0.00	8.11	345.00	0.00	W182	EA		WT
12	W183	183	70518 LSES ELECTRIC PLANT FDNS.		2.86	345.00	0.00	2.85	345.00	0.00	W183	EA		WT
13	W184	184	DDG 51		2.82	345.00	0.00	2.82	345.00	0.00	W184	EA		WT
14	W185	185	70518 LSES AUXIL. SYS. FDNS.		5.29	345.00	0.00	5.64	345.00	0.00	W185	EA		WT
15	W186	186	DDG 51		4.10	345.00	0.00	4.08	345.00	0.00	W186	EA		WT
16	W187	187	DDG 51		0.00	345.00	0.00	0.00	345.00	0.00	W187	EA		WT
17	W190	190		309140	96.68	367.31	0.00	96.62	367.21	0.00	W190	EA		WT
18	W233	233	SESDES	307200	0.00	345.00	0.00	0.00	345.00	0.00	W233	EA		WT
19	W234	234	70519 LSES PROPUL. & LIFT GAS TURBIN		71.56	345.00	0.00	71.40	345.00	0.00	W234	EA		WT
20	W235	235	SESDES	307200	0.00	345.00	0.00	0.00	345.00	0.00	W235			WT
21	W237	237	AUXILIARY PROPULSION CODOG	307200	0.00	345.00	0.00	0.00	345.00	0.00	W237			WT
22	W241	241	SESDES	307200	77.12	345.00	0.00	76.97	345.00	0.00	W241	EA		WT
23	W242	242	SESDES	307200	7.85	345.00	0.00	7.81	345.00	0.00	W242	EA		WT
24	W243	243	SESDES	307200	99.20	345.00	0.00	99.20	345.00	0.00	W243	EA		WT
25	W244	244	SESDES	307200	19.34	345.00	0.00	19.34	345.00	0.00	W244	EA		WT
26	W245	245	SESDES	307200	35.24	345.00	0.00	35.24	345.00	0.00	W245	EABC		WT
27	W248	248	SESDES	307200	43.98	345.00	0.00	44.22	345.00	0.00	W248	EE		WT
28	W251	251	70518 LSES COMBUSTION AIR SYSTEM		0.44	345.00	0.00	21.30	345.00	0.00	W251	EA		WT
29	W252	252	SESDES	307200	1.63	345.00	0.00	1.63	345.00	0.00	W252	STH2		WT
30	W256	256	SESDES	307200	13.25	345.00	0.00	13.22	345.00	0.00	W256	EE		WT
31	W259	259	70518 LSES EXHAUST SYSTEM		0.08	345.00	0.00	153.94	345.00	0.00	W259	EA		WT
32	W261	261	70518 PD-214 FUEL SERVICE SYSTEM		7.49	345.00	0.00	7.47	345.00	0.00	W261	EA		WT
33	W262	262	70519 LSES LUBE OIL SYS MAIN PROPUL.		8.32	345.00	0.00	8.29	345.00	0.00	W262	EA		WT
34	W264	264	70518 PD-214 LUBE OIL FILL AND XFER		7.49	345.00	0.00	7.47	345.00	0.00	W264	EA		WT
35	W298	298	SESDES	307200	24.98	345.00	0.00	24.89	345.00	0.00	W298	EA		WT
36	W299	299	SESDES	307200	9.99	345.00	0.00	9.96	345.00	0.00	W299	EA		WT
37	W311	311	SHIP SERVICE POWER GENERATORS		36.96	345.00	0.00	36.96	345.00	0.00	W311	EA		WT
38	W313	313	BATTERIES (ASSET) (032885)		1.27	345.00	0.00	1.27	345.00	0.00	W313	EA		WT
39	W314	314	PWR CONV EQUIP (ASSET) (032885)		6.27	345.00	0.00	6.27	345.00	0.00	W314	EA		WT
40	W321	321	SHIP SERV PWR CABLE (SES DES) (032885		134.32	345.00	0.00	133.79	345.00	0.00	W321	EA		WT
41	W323	323	CASUALTY PWR CABLE (SES DES) (032885)		4.65	345.00	0.00	4.63	345.00	0.00	W323	EA		WT
42	W324	324	SWITCHGEAR&PANELS (ASSET) (032885)		23.10	345.00	0.00	23.10	345.00	0.00	W324	EA		WT
43	W331	331	LIGHTING DIST (ASSET) (032885)		43.31	345.00	0.00	43.09	345.00	0.00	W331	EA		WT
44	W332	332	LIGHTING FIX (SES DES) (032885)		1.44	345.00	0.00	1.44	345.00	0.00	W332	EA		WT
45	W342	342	SESDES	307200	0.00	345.00	0.00	0.00	345.00	0.00	W342	EA		WT

COMPARISON BETWEEN PARENT AND CURRENT VALUES OF ITEMS - POINT OR DISTRIBUTED MAGNITUDES, LOCAL ARMS

NO	ITEM	WT GRP	DESCRIPTION		PARENT PT,D	PARENT LONG	PARENT VERT	CURRENT PT,D	CURRENT LONG	CURRENT VERT	VAR1	VAR2	FUN2	SUMV
46	W343	343	AMPHIB 021287		0.35	345.00	0.00	0.35	345.00	0.00	W343	EB		WT
47	W398	398	ELEC PLNT OP FLUIDS (ASSET)(032885)		0.55	345.00	0.00	0.55	345.00	0.00	W398	EA		WT
48	W399	399	ELECT PLNT PARTS (ASSET)(032885)		1.48	345.00	0.00	1.48	345.00	0.00	W399	ESUM		WT
49	W411	411	SESDES	307200	1.05	345.00	0.00	1.05	345.00	0.00	W411	EA		WT
50	W412	412	SESDES	307200	2.00	345.00	0.00	2.00	345.00	0.00	W412	EA		WT
51	W415	415	SESDES	307200	0.42	345.00	0.00	0.42	345.00	0.00	W415	EA		WT
52	W421	421	SESDES	307200	0.10	345.00	0.00	0.10	345.00	0.00	W421	EA		WT
53	W422	422	SESDES	307200	0.18	345.00	0.00	0.18	345.00	0.00	W422	EA		WT
54	W423	423	SESDES	307200	0.61	345.00	0.00	0.61	345.00	0.00	W423	EA		WT
55	W424	424	SESDES	307200	0.27	345.00	0.00	0.27	345.00	0.00	W424	EA		WT
56	W426	426	SESDES	307200	0.30	345.00	0.00	0.30	345.00	0.00	W426	EA		WT
57	W427	427	SESDES	307200	0.18	345.00	0.00	0.18	345.00	0.00	W427	EA		WT
58	W431	431	SESDES	307200	0.15	345.00	0.00	0.15	345.00	0.00	W431	EA		WT
59	W432	432	SESDES	307200	0.03	345.00	0.00	0.03	345.00	0.00	W432	EA		WT
60	W433	433	SESDES	307200	0.15	345.00	0.00	0.15	345.00	0.00	W433	EA		WT
61	W434	434	SESDES	307200	0.51	345.00	0.00	0.51	345.00	0.00	W434	EA		WT
62	W435	435	SESDES	307200	0.08	345.00	0.00	0.08	345.00	0.00	W435	EA		WT
63	W436	436	SESDES	307200	0.00	345.00	0.00	0.00	345.00	0.00	W436	EA		WT
64	W437	437	SESDES	307200	0.00	345.00	0.00	0.00	345.00	0.00	W437	EA		WT
65	W438	438	SESDES	307200	0.29	345.00	0.00	0.29	345.00	0.00	W438	EA		WT
66	W439	439	SESDES	307200	0.03	345.00	0.00	0.03	345.00	0.00	W439	EA		WT
67	W441	441	SESDES	307200	3.93	345.00	0.00	3.93	345.00	0.00	W441	EA		WT
68	W442	442	SESDES	307200	0.00	345.00	0.00	0.00	345.00	0.00	W442	EA		WT
69	W443	443	SESDES	307200	1.71	345.00	0.00	1.71	345.00	0.00	W443	EA		WT
70	W445	445	SESDES	307200	0.18	345.00	0.00	0.18	345.00	0.00	W445	EA		WT
71	W446	446	SESDES	307200	0.19	345.00	0.00	0.19	345.00	0.00	W446	EA		WT
72	W451	451	SESDES	307200	0.16	345.00	0.00	0.16	345.00	0.00	W451	EA		WT
73	W452	452	SESDES	307200	0.00	345.00	0.00	0.00	345.00	0.00	W452	EA		WT
74	W454	454	SESDES	307200	0.00	345.00	0.00	0.00	345.00	0.00	W454	EA		WT
75	W455	455	SESDES	307200	0.65	345.00	0.00	0.65	345.00	0.00	W455	EA		WT
76	W456	456	SESDES	307200	1.00	345.00	0.00	1.00	345.00	0.00	W456	EA		WT
77	W461	461			0.00	345.00	0.00	0.00	345.00	0.00	W461	EA		WT
78	W462	462	SESDES	307200	0.00	345.00	0.00	0.00	345.00	0.00	W462	EA		WT
79	W463	463	SESDES	307200	8.72	345.00	0.00	8.72	345.00	0.00	W463	EA		WT
80	W465	465	SESDES	307200	0.00	345.00	0.00	0.00	345.00	0.00	W465	EA		WT
81	W466	466	SESDES	307200	2.65	345.00	0.00	2.65	345.00	0.00	W466	EA		WT
82	W471	471	SESDES	307200	5.45	345.00	0.00	5.45	345.00	0.00	W471	EA		WT
83	W472	472	SESDES	307200	0.00	345.00	0.00	0.00	345.00	0.00	W472	EA		WT
84	W474	474	SESDES	307200	3.70	345.00	0.00	3.70	345.00	0.00	W474	EA		WT
85	W475	475	SESDES	307200	29.18	345.00	0.00	29.18	345.00	0.00	W475	EA		WT
86	W481	481	SESDES	307200	1.48	345.00	0.00	1.48	345.00	0.00	W481	EA		WT
87	W482	482	SESDES	307200	0.00	345.00	0.00	0.00	345.00	0.00	W482	EA		WT
88	W483	483	SESDES	307200	3.28	345.00	0.00	3.28	345.00	0.00	W483	EA		WT
89	W485	485	SESDES	307200	0.00	345.00	0.00	0.00	345.00	0.00	W485	EA		WT
90	W489	489	SESDES	307200	0.00	345.00	0.00	0.00	345.00	0.00	W489	EA		WT

COMPARISON BETWEEN PARENT AND CURRENT VALUES OF ITEMS - POINT OR DISTRIBUTED MAGNITUDES, LOCAL ARMS

NO	ITEM	WT GRP	DESCRIPTION	PARENT PT,D	PARENT LONG	PARENT VERT	CURRENT PT,D	CURRENT LONG	CURRENT VERT	VAR1	VAR2	FUN2	SUMV
91	W491	491	SESDES 307200	0.00	345.00	0.00	0.00	345.00	0.00	W491	EA		WT
92	W492	492	SESDES 307200	0.00	345.00	0.00	0.00	345.00	0.00	W492	EA		WT
93	W493	493	SESDES 307200	0.00	345.00	0.00	0.00	345.00	0.00	W493	EA		WT
94	W495	495	SESDES 307200	0.00	345.00	0.00	0.00	345.00	0.00	W495	EA		WT
95	W498	498	SESDES 307200	0.00	345.00	0.00	0.00	345.00	0.00	W498	EA		WT
96	W499	499	SESDES 307200	0.10	345.00	0.00	0.10	345.00	0.00	W499	EA		WT
97	W511	511	AMPHIB 021287	3.05	345.00	0.00	3.05	345.00	0.00	W511	EC		WT
98	W512	512	70518 PD-214 VENTILATING CARGO USE L	40.14	345.00	0.00	40.14	345.00	0.00	W512	EA		WT
99	W513	513	ASSET 032885	8.50	345.00	0.00	8.42	345.00	0.00	W513	EA		WT
100	W514	514	70518 AIR CONDITIONING PD-214	23.76	345.00	0.00	23.76	345.00	0.00	W514	EA		WT
101	W516	516	ASSET 032885	0.24	345.00	0.00	0.24	345.00	0.00	W516	EA		WT
102	W521	521	PD-214 PAGE C-8	20.38	345.00	0.00	20.18	345.00	0.00	W521	EA		WT
103	W522	522	HYD & SES DATA 032885	17.66	345.00	0.00	17.57	345.00	0.00	W522	EA		WT
104	W524	524	HYD & SES DATA 032885	12.49	345.00	0.00	12.43	345.00	0.00	W524	EA		WT
105	W526	526	ASSET 032885	0.84	345.00	0.00	0.84	345.00	0.00	W526	EA		WT
106	W528	528	PD-214 PAGE C-8	5.66	345.00	0.00	5.61	345.00	0.00	W528	EA		WT
107	W529	529	PD-214 PAGE C-8	4.15	345.00	0.00	4.11	345.00	0.00	W529	EA		WT
108	W531	531	AMPHIB 021287	2.19	345.00	0.00	2.19	345.00	0.00	W531	EC		WT
109	W532	532	AMPHIB 021287	2.95	345.00	0.00	2.95	345.00	0.00	W532	EC		WT
110	W533	533	ASSET 032885	0.81	345.00	0.00	0.81	345.00	0.00	W533	EA		WT
111	W541	541	AMPHIB 021287	30.00	345.00	0.00	68.10	345.00	0.00	W541	EC		WT
112	W542	542	AMPHIB 021287	0.00	345.00	0.00	0.00	345.00	0.00	W542	EB		WT
113	W543	543	SESDES 307200	4.03	345.00	0.00	4.01	345.00	0.00	W543	EA		WT
114	W551	551	70518 PD-214 COMPRESSED AIR SYSTEM	2.83	345.00	0.00	2.82	345.00	0.00	W551	EA		WT
115	W553	553	70518 PD-214, O2,N2 GAS SYS	0.00	345.00	0.00	0.00	345.00	0.00	W553	EA		WT
116	W555	555	FIRE EXT SYS (ASSET) 032885	30.95	345.00	0.00	30.79	345.00	0.00	W555	EA		WT
117	W556	556	SESDES 307200	0.00	345.00	0.00	0.00	345.00	0.00	W556	EA		WT
118	W561	561	70518 PD-214, STEERING SYSTEM	24.43	345.00	0.00	24.33	345.00	0.00	W561	EA		WT
119	W562	562	70518 LSES,RUDDERS	16.30	345.00	0.00	16.23	345.00	0.00	W562	EA		WT
120	W571	571	70518 PD-214, REPLENISHMENT AT SEA	10.30	345.00	0.00	10.19	345.00	0.00	W571	EA		WT
121	W572	572	70518 PD-214, STORES AND EQUIP HNDLG	20.34	345.00	0.00	20.11	345.00	0.00	W572	EA		WT
122	W581	581	70518 PD-214, ANCHOR HNDLG & STOWAGE	62.29	345.00	0.00	61.99	345.00	0.00	W581	EA		WT
123	W582	582	70518 PD-214, MOORING & TOWING	22.79	345.00	0.00	22.67	345.00	0.00	W582	EA		WT
124	W583	583	BOAT HNDLG & STOW (ASSET) (032885)	1.62	345.00	0.00	1.62	345.00	0.00	W583	EA		WT
125	W584	584	70518 PD-214, MECH. OPERATED DOORS,	220.00	345.00	0.00	220.00	345.00	0.00	W584	EA		WT
126	W586	586	70518 LSES, NOT USED FOR SFS	0.00	345.00	0.00	0.00	345.00	0.00	W586	EA		WT
127	W588	588	SESDES 307200	0.00	345.00	0.00	0.00	345.00	0.00	W588	EA		WT
128	W593	593	ENVIR POLUT CNTRL SYS (ASSET) (032885	1.39	345.00	0.00	1.39	345.00	0.00	W593	EA		WT
129	W595	595	032086 SONAR WINCHES	0.00	345.00	0.00	0.00	345.00	0.00	W595	EA		WT
130	W598	598	70518 LSES, OPERATING FLUIDS	14.35	345.00	0.00	15.29	345.00	0.00	W598	EA		WT
131	W599	599	AUX SYS REPAIR PTS (ASSET) (032885)	1.87	345.00	0.00	1.99	345.00	0.00	W599	EA		WT
132	W611	611	SESDES 307200	4.93	345.00	0.00	4.93	345.00	0.00	W611	EA		WT
133	W612	612	SESDES 307200	6.29	345.00	0.00	6.29	345.00	0.00	W612	EA		WT
134	W613	613	SESDES 307200	0.64	345.00	0.00	0.64	345.00	0.00	W613	EA		WT
135	W621	621	SESDES 307200	57.63	345.00	0.00	57.35	345.00	0.00	W621	EA		WT

COMPARISON BETWEEN PARENT AND CURRENT VALUES OF ITEMS - POINT OR DISTRIBUTED MAGNITUDES, LOCAL ARMS

NO	ITEM	WT GRP	DESCRIPTION	PARENT PT,D	PARENT LONG	PARENT VERT	CURRENT PT,D	CURRENT LONG	CURRENT VERT	VAR1	VAR2	FUN2	SUMV
136	W622	622	70518 LSES, FLOOR PLATES & GRATINGS	28.62	345.00	0.00	28.43	345.00	0.00	W622	EA		WT
137	W623	623	SESDES 307200	15.96	345.00	0.00	15.88	345.00	0.00	W623	EA		WT
138	W624	624	SESDES 307200	9.69	345.00	0.00	9.64	345.00	0.00	W624	EA		WT
139	W625	625	SESDES 307200	2.02	345.00	0.00	2.02	345.00	0.00	W625	EA		WT
140	W631	631	70518 PD-214,PAINT	88.99	345.00	0.00	88.94	345.00	0.00	W631	EA		WT
141	W633	633	SESDES 307200	2.00	345.00	0.00	2.00	345.00	0.00	W633	EA		WT
142	W634	634	PD-214 PAGE C-7	0.80	345.00	0.00	0.80	345.00	0.00	W634	EA		WT
143	W635	635	70518 PD-214 PG C-7, HULL INSULATION	11.39	345.00	0.00	11.34	345.00	0.00	W635	EA		WT
144	W636	636	SESDES 307200	0.00	345.00	0.00	0.00	345.00	0.00	W636	EA		WT
145	W637	637	SESDES 307200	4.61	345.00	0.00	4.59	345.00	0.00	W637	EA		WT
146	W638	638	SESDES 307200	1.20	345.00	0.00	1.20	345.00	0.00	W638	EA		WT
147	W641	641	SESDES 307200	2.69	345.00	0.00	2.69	345.00	0.00	W641	EA		WT
148	W642	642	SESDES 307200	2.02	345.00	0.00	2.02	345.00	0.00	W642	EA		WT
149	W643	643	SESDES 307200	3.70	345.00	0.00	3.70	345.00	0.00	W643	EA		WT
150	W644	644	SESDES 307200	0.76	345.00	0.00	0.76	345.00	0.00	W644	EA		WT
151	W645	645	SESDES 307200	0.99	345.00	0.00	0.99	345.00	0.00	W645	EA		WT
152	W651	651	SESDES 307200	2.81	345.00	0.00	2.81	345.00	0.00	W651	EA		WT
153	W652	652	SESDES 307200	0.40	345.00	0.00	0.40	345.00	0.00	W652	EA		WT
154	W654	654	SESDES 307200	0.22	345.00	0.00	0.22	345.00	0.00	W654	EA		WT
155	W655	655	SESDES 307200	0.81	345.00	0.00	0.81	345.00	0.00	W655	EA		WT
156	W656	656	SESDES 307200	0.16	345.00	0.00	0.16	345.00	0.00	W656	EA		WT
157	W661	661	SESDS 307200	13.28	345.00	0.00	13.24	345.00	0.00	W661	EA		WT
158	W662	662	SESDS 307200	0.67	345.00	0.00	0.67	345.00	0.00	W662	EA		WT
159	W663	663	70518 LSES, ELECTRON. CNTRL CNTR FUR	3.33	345.00	0.00	3.32	345.00	0.00	W663	EA		WT
160	W664	664	70518 LSES, DC STATION	5.27	345.00	0.00	5.25	345.00	0.00	W664	EA		WT
161	W665	665	PD-214 PAGE C-10	11.80	345.00	0.00	11.69	345.00	0.00	W665	EA		WT
162	W671	671	70518 LSES LOCKERS AND SPECIAL STOW	2.84	345.00	0.00	2.83	345.00	0.00	W671	EA		WT
163	W672	672	SESDS 307200	5.17	345.00	0.00	5.17	345.00	0.00	W672	EA		WT
164	W698	698	SESDS 307200	0.00	345.00	0.00	0.00	345.00	0.00	W698	EA		WT
165	W699	699	SESDS 307200	2.91	345.00	0.00	2.90	345.00	0.00	W699	EA		WT
166	W711	711	SESDES 307200	0.00	345.00	0.00	0.00	345.00	0.00	W711	EA		WT
167	W712	712	SESDES 307200	0.00	345.00	0.00	0.00	345.00	0.00	W712	EA		WT
168	W713	713	SESDES 307200	0.00	345.00	0.00	0.00	345.00	0.00	W713	EA		WT
169	W721	721	SESDES 307200	0.00	345.00	0.00	0.00	345.00	0.00	W721	EA		WT
170	W723	723	SESDES 307200	0.00	345.00	0.00	0.00	345.00	0.00	W723	EA		WT
171	W751	751	SESDES 307200	0.00	345.00	0.00	0.00	345.00	0.00	W751	EA		WT
172	W761	761	SESDES 307200	0.00	345.00	0.00	0.00	345.00	0.00	W761	EA		WT
173	W763	763	SESDES 307200	0.00	345.00	0.00	0.00	345.00	0.00	W763	EA		WT
174	W782	782	SESDES 307200	0.00	345.00	0.00	0.00	345.00	0.00	W782	EA		WT
175	W783	783	SESDES 307200	0.00	345.00	0.00	0.00	345.00	0.00	W783	EA		WT
176	W791	791	SESDES 307200	0.00	345.00	0.00	0.00	345.00	0.00	W791	EA		WT
177	W792	792	SESDES 307200	0.00	345.00	0.00	0.00	345.00	0.00	W792	EA		WT
178	W793	793	SESDES 307200	0.00	345.00	0.00	0.00	345.00	0.00	W793	EA		WT
179	W798	798	SESDES 307200	0.00	345.00	0.00	0.00	345.00	0.00	W798	EA		WT
180	W799	799	SESDES 307200	0.08	345.00	0.00	0.08	345.00	0.00	W799	EA		WT

COMPARISON BETWEEN PARENT AND CURRENT VALUES OF ITEMS - POINT OR DISTRIBUTED MAGNITUDES, LOCAL ARMS

NO	ITEM	WT GRP	DESCRIPTION		PARENT PT,D	PARENT LONG	PARENT VERT	CURRENT PT,D	CURRENT LONG	CURRENT VERT	VAR1	VAR2	FUN2	SUMV
181	WF11	F11		307200	1.25	345.00	0.00	1.25	345.00	0.00	WF11	EA		WT
182	WF12	F12		307200	1.76	345.00	0.00	1.76	345.00	0.00	WF12	EA		WT
183	WF13	F13		307200	3.09	345.00	0.00	3.09	345.00	0.00	WF13	EA		WT
184	WF21	F21	70519 SHIP AMMUNITION		1.00	345.00	0.00	1.00	345.00	0.00	WF21	EA		WT
185	WF22	F22		307200	0.00	345.00	0.00	0.00	345.00	0.00	WF22	EA		WT
186	WF23	F23		307200	0.00	345.00	0.00	0.00	345.00	0.00	WF23	EA		WT
187	WF24	F24			0.00	345.00	0.00	0.00	345.00	0.00	WF24	EA		WT
188	WF25	F25			0.00	345.00	0.00	0.00	345.00	0.00	WF25	EA		WT
189	WF26	F26		307200	0.00	345.00	0.00	0.00	345.00	0.00	WF26	EA		WT
190	WF29	F29			0.00	345.00	0.00	0.00	345.00	0.00	WF29	EA		WT
191	WF31	F31		307200	4.17	345.00	0.00	4.17	345.00	0.00	WF31	EA		WT
192	WF32	F32		307200	0.93	345.00	0.00	0.93	345.00	0.00	WF32	EA		WT
193	WF39	F39		307200	0.00	345.00	0.00	0.00	345.00	0.00	WF39	EA		WT
194	WF41	F41		307200	3907.29	345.00	0.00	3809.53	345.00	0.00	WF41	EA		WT
195	WF42	F42		307200	0.00	345.00	0.00	0.00	345.00	0.00	WF42	EA		WT
196	WF46	F46		307200	45.75	345.00	0.00	45.60	345.00	0.00	WF46	EA		WT
197	WF49	F49		307200	0.00	345.00	0.00	0.00	345.00	0.00	WF49	EA		WT
198	WF52	F52		307200	1.72	345.00	0.00	1.72	345.00	0.00	WF52	EA		WT
199	WF53	F53		307200	1.00	345.00	0.00	1.00	345.00	0.00	WF53	EA		WT
200	WF54	F54		307200	1.00	345.00	0.00	1.00	345.00	0.00	WF54	EA		WT
201	WF55	F55		307200	0.92	345.00	0.00	0.92	345.00	0.00	WF55	EA		WT
202	WF61	F61	CARGO, ORDNANCE, ORDNANCE DELIVERY S		0.00	345.00	0.00	0.00	345.00	0.00	WF61	EA		WT
203	WF62	F62	CARGO, STORES		0.00	345.00	0.00	0.00	345.00	0.00	WF62	EA		WT
204	WF63	F63	CARGO, FUELS AND LUBRICANTS		0.00	345.00	0.00	0.00	345.00	0.00	WF63	EA		WT
205	WF64	F64	CARGO, LIQUIDS (NON-FUEL TYPE)		0.00	345.00	0.00	0.00	345.00	0.00	WF64	EA		WT
206	WF65	F65	CARGO, CRYOGENIC AND LIQUIFIED GAS		0.00	345.00	0.00	0.00	345.00	0.00	WF65	EA		WT
207	WF66	F66	CARGO, AMPHIBIOUS ASSAULT SYSTEMS		4687.50	345.00	0.00	4687.50	345.00	0.00	WF66	EA		WT
208	WF67	F67	CARGO, GASES		0.00	345.00	0.00	0.00	345.00	0.00	WF67	EA		WT
209	WF69	F69	CARGO, MISCELLANEOUS		0.00	345.00	0.00	0.00	345.00	0.00	WF69	EA		WT
210	WM20	M20	MARGIN, ENTIRE SHIP		693.01	345.00	0.00	696.31	345.00	0.00	WM20	EA		WT
211	YOUB		BUOYANCY, ENTIRE SHIP		16378.43	345.00	0.00	16045.21	345.00	0.00	DISP	NCUE		BUOY
212	VOLR		REQUIRED VOLUME/1000		3492.41	345.00	0.00	3484.29	345.00	0.00	VOLR	ESUM		RLOV
213	VOLA		AVAILABLE VOLUME/1000		3331.17	345.00	0.00	3314.80	345.00	0.00	VOLA	ESUM		ALOV

COMPARISON BETWEEN PARENT AND CURRENT VALUES OF VAR VARIABLES

NO	NAME	PARENT	CURRENT
1	VCGS	10.000	0.00000E+00

COMPARISON BETWEEN PARENT AND CURRENT VALUES OF VARN VARIABLES

NO	NAME	DESCRIPTION		PARENT	CURRENT	VAR1	VAR2	FUN2	SUMV
1	A1**			0.000000E+00	0.000000E+00	ZERO	SEP2		
2	A2**	********** DISPLACEMENTS		0.000000E+00	0.000000E+00	ZERO	SEP2		
3	DIS1	TOTAL HYDRO + AEROSTATIC LIFT, SES		16378.4	16045.2	DIS1	DISP		
4	DISP	TOTAL HYDRO + AEROSTATIC LIFT		16378.4	16045.2	DISP	NCUE		
5	DIS5	80520 SHIP DISPLACEMENT W/O CARGO F66		11690.9	11357.7	DIS5	CTAD		
6	PC5	80520 CUSHION PRESSURE AT DIS5		392.406	381.560	PC5	HSD		
7	B1**			0.000000E+00	0.000000E+00	ZERO	SEP2		
8	B2**	HULL GEOMETRY MINI MODULE OUTPUT		0.000000E+00	0.000000E+00	ZERO	SEP2		
9	B3**	----------		0.000000E+00	0.000000E+00	ZERO	SEP2		
10	L/B	CUSHION LENGTH/BEAM	303300	8.51852	8.51852	L/B	EABC		
11	LCU	CUSHION LENGTH		690.000	690.000	LCU	SEP2		
12	BCU	CUSHION BEAM		81.0000	81.0000	BCU	SEP2		
13	HTW	HEIGHT TO WET DECK		30.0000	30.0000	HTW	SEP2		
14	PCU	CUSHION PRESSURE		551.500	541.067	PCU	SEP2		
15	H	OFF CUSHION DRAFT		27.4506	27.1833	H	NCUE		
16	HC	ON CUSHION DRAFT		8.58972	8.42789	HC	NCUE		
17	ACS	051785 CROSECT AREA MIDSHP		3941.91	3925.20	ACS	NCUE		
18	LOA	051785 LENGTH OVER ALL		734.620	734.426	LOA	NCUE		
19	BOA	BEAM OVER ALL		106.180	105.857	BOA	NCUE		
20	CIDS	NUMBER OF CUSHIONS	303300	1.00000	1.00000	CIDS	EABC		
21	STC1	051785 SIDEHULL BEAM @ CHINE MIDSHP, SES		17.5460	17.2908	STC1	STHC		
22	STH1	051785 SIDEHL THKNESS @ HB WL, SES		28.4289	28.1128	STH1	STHH		
23	HBOT	KEEL BOTTOM THICKNESS	303300	4.00000	4.00000	HBOT	NCUE		
24	HSDK	HEIGHT KEEL TO STRENGTH DECK		60.0000	60.0000	HSDK	ESUM		
25	HSD1	HEIGHT KEEL TO STRENGTH DECK, SES		60.0000	60.0000	HSD1	ESUM		
26	HBOW	HEIGHT OF BOW		60.0000	60.0000	HBOW	ESUM		
27	HSTN	HEIGHT OF STERN		60.0000	60.0000	HSTN	ESUM		
28	LCW1	WATERLINE LENGTH CB, SES		704.886	704.606	LCW1	LSHP		
29	LHW1	WATERLINE LENGTH HB, SES		715.795	715.453	LHW1	LSHP		
30	LOA1	051785 LENGTH OVER ALL, SES		734.620	734.433	LOA1	LSHP		
31	DCB1	ON CUSHION DRAFT SES		8.58972	8.42789	DCB1	EWLD		
32	AAA	INTERMEDIATE DRAFT CALC HB		0.317359	0.317359	AAA	EA		
33	BBB	INTERMEDIATE DRAFT CALC HB		28.2262	27.8452	BBB	EA		
34	WVL	INTERMEDIATE DRAFT CALC HB		-800.851	-784.933	WVL	EABC		
35	CCC	INTERMEDIATE DRAFT CALC HB		-645.265	-633.883	CCC	EA		
36	HHH	HEIGHT CHINE TO HB WL.		18.8609	18.7554	HHH	EQDR		
37	DHB1	051785 OFF CUSHION DRAFT, SES		27.4506	27.1833	DHB1	EA		
38	BHB1	051785 BEAM @ HB WL, SES		106.179	105.856	BHB1	BHB1		
39	BOA1	051785 BEAM @ STRENGTH DECK, SES		106.180	105.857	BOA1	BOA		
40	ACS1	051785 CROSS SECTION AREA, SES		3941.91	3925.20	ACS1	ACS1		
41	LHW	HULLBORNE WATERLINE LENGTH		715.795	715.453	LHW	NCUE		
42	LSW	CUSHIONBORNE WATERLINE LENGTH		704.886	704.606	LSW	NCUE		
43	STH	051785 SIDEHL THKNESS @ HB WL		28.4289	28.1128	STH	NCUE		
44	SEP	051785 CUSHION SEPARATION, SECAT		0.000000E+00	0.000000E+00	SEP	NCUE		
45	H/B1	051785 HTSD/BOA, SES		0.565076	0.566803	H/B1	EA/B		

COMPARISON BETWEEN PARENT AND CURRENT VALUES OF VARN VARIABLES

NO	NAME	DESCRIPTION		PARENT	CURRENT	VAR1	VAR2	FUN2	SUMV
46	AISH	051785 CROSECT AREA, INNER SIDEHL		259.650	259.650	AISH	EA		
47	AFLT	051785 CROSECT AREA ABV KEEL FLAT, SIDEH		120.000	120.000	AFLT	EA		
48	AOSH	051785 CROSECT AREA OUTER SIDEHL		441.600	434.644	AOSH	AOSH		
49	NFAN	051785 NUM FANS/CUSHION		8.00000	8.00000	NFAN	EABC		
50	C1**			0.000000E+00	0.000000E+00	ZERO	SEP2		
51	C2**	HULL SUBDIVISION VOLUMES MINI MODULE OP.		0.000000E+00	0.000000E+00	ZERO	SEP2		
52	C3**	----------		0.000000E+00	0.000000E+00	ZERO	SEP2		
53	VSH1	051785 VOL/SIDEHL/1000, SES		472.054	467.541	VSH1	EA		
54	VCB1	051785 VOL CROSTRUCT/1000, SES		2203.06	2195.72	VCB1	VOLB		
55	VOLB	051785 VOL CROSTRUCT/1000		2203.06	2195.72	VOLB	NCUE		
56	VSH	051785 VOL EA SIDEHL/1000		472.054	467.541	VSH	NCUE		
57	VLSS	012386 SUPERSTRUCTURE VOL./1000		184.000	184.000	VLSS	EA		
58	D1**			0.000000E+00	0.000000E+00	ZERO	SEP2		
59	D2**	HULL STRUCTURAL MINI MODULE OUTPUT		0.000000E+00	0.000000E+00	ZERO	SEP2		
60	D3**	----------		0.000000E+00	0.000000E+00	ZERO	SEP2		
61	STB1	WT/TR BKHD, SES		17.7626	17.6691	H/B1	ACS1	STB1	
62	STB	051785 WEIGHT EA TRANSV BHD		17.7626	17.6691	STB	NCUE		
63	SFRM	STRUC FREEBOARD RATIO FOR BM		0.231204E-01	0.235050E-01	SFRM	SFRM		
64	STL1	LONG BEND MOM, K-FT-LT, 706170		2149.87	2110.64	STL1	STL1		
65	S135	WT/FT, H/B = 0.35 SES		12.0639	11.9126	STL1	ACS1	S135	
66	S150	WT/FT, H/B = 0.50 SES		7.56170	7.44421	STL1	ACS1	S150	
67	S165	WT/FT, H/B = 0.65 SES		3.97533	3.95216	STL1	ACS1	S165	
68	WFTM	051785 WT/FT @ SES H/B		5.90602	5.78103	WFTM	EQDE		
69	W11M	051685 CHANGED SES WT COEF FRM AL TO STL		4187.33	4186.23	W11M	EA		
70	WTFT	051785 WEIGHT/FOOT GP 1		4187.33	4186.23	W111	NCUE		
71	W110	051785 SUMMATION 11		4222.32	4221.22	W110	EA		
72	W160	051785 SUMMATION 16		207.941	206.735	W160	ESUM		
73	W16X		309140	378.349	376.227	W16X	EC		
74	W17X		309140	30.1835	30.1154	W17X	EC		
75	W180	SUMMATION		23.1868	23.5127	W180	ESUM		
76	E1**			0.000000E+00	0.000000E+00	ZERO	SEP2		
77	E2**	RESISTANCE MODULE OUTPUT		0.000000E+00	0.000000E+00	ZERO	SEP2		
78	E3**	----------		0.000000E+00	0.000000E+00	ZERO	SEP2		
79	CDRC	CORRECTION FOR CIRCULAR ARC HULLS	303300	1.00000	1.00000	CDRC	NCUE		
80	CPF1	COEF FOR PRES CORRECTION EQN	303300	0.740000	0.740000	CPF1	NCUE		
81	CPF2	COEF FOR PRES CORRECTION EQN	303300	0.260000	0.260000	CPF2	NCUE		
82	CHF1	COEF FOR DRAFT CORRECTION EQN	303300	1.87500	1.87500	CHF1	NCUE		
83	CHF2	COEF FOR DRAFT CORRECTION EQN	303300	-0.875000	-0.875000	CHF2	NCUE		
84	CHF3	COEF FOR DRAFT CORRECTION EQN	303300	0.450000	0.450000	CHF3	NCUE		
85	P0H	CUSH PRES FLD CRUISE HULLBORNE	303300	1756.84	1739.73	P0H	EABC		
86	P0C	CUSH PRES FLD CRUISE CUSHBORNE	303300	549.742	539.385	P0C	EABC		
87	P0	CRUISE RANGE CUSHION PRESSURE	303300	549.742	539.385	P0	EB		
88	P0D	CUSHION PRESSURE FLD PSF DESIGN	303300	549.742	539.385	P0D	EB		
89	CPFC	PRES. RED. FACTOR CUSHBORNE	303300	0.995118	0.995118	CPFC	ETNH		
90	DPFC	PRES. RED. FACTOR CUSHBORNE DES	303300	0.995118	0.995118	DPFC	ETNH		

COMPARISON BETWEEN PARENT AND CURRENT VALUES OF VARN VARIABLES

NO	NAME	DESCRIPTION		PARENT	CURRENT	VAR1	VAR2	FUN2	SUMV
91	CPF	CRUISE PRESSURE REDUCTION FACT	303300	0.995118	0.995118	CPF	EB		
92	CPFD	DES PRES REDUCTION FACTOR	303300	0.995118	0.995118	CPFD	EB		
93	HFC	CUSH DRAFT IN. FACTOR CUSHBORNE	303300	1.34711	1.34711	HFC	ETNH		
94	HFDC	DES CUSH DRAFT INCREASE FACTOR	303300	1.34711	1.34711	HFDC	ETNH		
95	WRC0	DOC WAVE RES COEF F/A=0.00	303300	0.438349	0.438095	FRL	L/BB	RC00	
96	WRC6	DOC WAVE RES COEF F/A=0.06	303300	0.388619	0.387959	FRL	L/BB	RC06	
97	WRC*	DOC WAVE RES COEF F/A=0.12	303300	0.464728	0.463997	FRL	L/BB	RC0*	
98	CSPO	SINE OF OUTSIDE DEADRISE ANGLE	303300	0.707000	0.707000	CSPO	NCUE		
99	CSPI	SINE OF INSIDE DEADRISE ANGLE	303300	0.866000	0.866000	CSPI	NCUE		
100	CDH1	HULL FORM DRAG COEFFICIENT	303300	-0.185450	-0.185450	CDH1	NCUE		
101	CDH2	HULL FORM DRAG EXPONENT T	303300	2.27080	2.27080	CDH2	NCUE		
102	CFL1	SEAL DRAG FR SHIFT FROM WAVE DRAG	303300	0.240000	0.240000	CFL1	NCUE		
103	CSS1	ROUGH WATER FORM RES COEF	303300	0.413800	0.413800	CSS1	NCUE		
104	CSS2	ROUGH WATER FORM RES COEF	303300	0.670000E-02	0.670000E-02	CSS2	NCUE		
105	CSS3	ROUGH WATER FORM RES COEF	303300	0.465500	0.465500	CSS3	NCUE		
106	SEPD	DUMMY SEPARATION	303300	0.100000E-10	0.100000E-10	SEPD	ESUM		
107	VFPS	051585 CALM WATER SPEED =VKCR, RNGE=1500		84.3900	84.3900	VFPS	EABC		
108	VFPD	051585 SEA STATE 6 DES SPEED=VKDS, NO RN		84.3900	84.3900	VFPD	EABC		
109	FRL	FROUDE NO. BASED ON LENGTH	303300	0.566388	0.566388	FRL	EF		
110	FRLD	FR NO. BASED ON LENGTH DESIGN	303300	0.566388	0.566388	FRLD	EF		
111	FRS	SEAL DRAG FROUDE NO. CRUISE	303300	0.428796	0.428796	FRS	EA		
112	FRSD	SEAL DRAG FROUDE NO. DESIGN	303300	0.428796	0.428796	FRSD	EA		
113	DAID	AIR RES DESIGN	303300	16921.5	16845.4	DAID	EAIR		
114	DAIR	AIR RESISTANCE	303300	16921.5	16845.4	DAIR	EAIR		
115	CSAR	SQUARE ROOT OF CUSHION AREA	303300	0.422993E-02	0.422993E-02	CSAR	EF		
116	QWAT	WATER DYNAMIC PRESSURE	303300	7086.06	7086.06	QWAT	EF		
117	QWAD	WATER DYNAMIC PRESSURE DESIGN	303300	7086.06	7086.06	QWAD	EF		
118	L/BB	CUSH L/ (B+SIBE)	303300	7.53360	7.54693	L/BB	EF		
119	F/A	CUSH SEPARATION RATIO	303300	0.000000E+00	0.000000E+00	F/A	EGG		
120	FOIL	FOIL AREA	303300	0.000000E+00	0.000000E+00	FOIL	ETNH		
121	CFOL	FOIL CHORD LENGTH	303300	0.000000E+00	0.000000E+00	CFOL	EABC		
122	DFOL	FOIL RESISTANCE	303300	0.000000E+00	0.000000E+00	DFOL	EABC		
123	DFOD	FOIL RES DESIGN	303300	0.000000E+00	0.000000E+00	DFOD	EABC		
124	AFIN	FIN AREA	303300	149.625	147.588	AFIN	ETNH		
125	CFIN	FIN CHORD AR=1.5	303300	9.98748	9.91928	CFIN	EF		
126	DFIN	FIN RESISTANCE	303300	13501.0	13331.8	DFIN	EABC		
127	DFID	FIN RES DESIGN	303300	13501.0	13331.8	DFID	EABC		
128	SRC0	DOC SEAL RES COEF F/A=0.0	303300	0.262731	0.262397	FRS	L/BB	RC00	
129	SRC6	DOC SEAL RES COEF F/A=0.06	303300	0.162134	0.162265	FRS	L/BB	RC06	
130	SRC*	DOC SEAL RES COEF F/A=0.12	303300	0.404223E-01	0.406032E-01	FRS	L/BB	RC0*	
131	WRD0	DOC WAVE RES COEF FOR F/A=0.00	303300	0.438349	0.438104	FRLD	L/BB	RC00	
132	WRD6	DOC WAVE RES COEF FOR F/A=0.06	303300	0.388619	0.387981	FRLD	L/BB	RC06	
133	WRD*	DOC WAVE RES COEF FOR F/A=0.12	303300	0.464728	0.464021	FRLD	L/BB	RC0*	
134	SRD0	DOC SEAL RES COEF FOR F/A=0.00	303300	0.262731	0.262397	FRSD	L/BB	RC00	
135	SRD6	DOC SEAL RES COEF FOR F/A=0.06	303300	0.162134	0.162265	FRSD	L/BB	RC06	

COMPARISON BETWEEN PARENT AND CURRENT VALUES OF VARN VARIABLES

NO	NAME	DESCRIPTION		PARENT	CURRENT	VAR1	VAR2	FUN2	SUMV
136	SRD*	DOC SEAL RES COEF FOR F/A=0.12	303300	0.404223E-01	0.406032E-01	FRSD	L/BB	RC0*	
137	WUD0	DOC WAVE RES COEF FOR F/A=0.00	303300	0.438349	0.438104	FRLD	L/BB	RC00	
138	WUD6	DOC WAVE RES COEF FOR F/A=0.06	303300	0.388619	0.387981	FRLD	L/BB	RC06	
139	WUD*	DOC WAVE RES COEF FOR F/A=0.12	303300	0.464728	0.464021	FRLD	L/BB	RC0*	
140	WRCF	DOC WAVE RES COEF FOR F/A	303300	0.438349	0.438095	WRCF	ECDF		
141	SRCF	DOC SEAL RES COEF FOR F/A	303300	0.262731	0.262397	SRCF	ECDF		
142	DUFR	UPPER FR RATIO FOR DES WAVE RES	303300	1.00000	1.00000	DUFR	ETNH		
143	DLFR	LOWER FR RATIO FOR DES WAVE RES	303300	0.000000E+00	0.000000E+00	DLFR	ETNH		
144	SLFR	LOWER FR RATIO FOR DES SEAL RES	303300	0.000000E+00	0.000000E+00	SLFR	ETNH		
145	SUFR	UPPER FR RATIO FOR DES SEAL RES	303300	1.00000	1.00000	SUFR	ETNH		
146	WUDF	DOC WAVE RES COEF UPPER FR DES	303300	0.438349	0.438104	WUDF	ECDF		
147	WLDF	DOC WAVE RES COEF LOWER FR DES	303300	0.438349	0.438104	WLDF	ECDF		
148	WRDF	DOC WAVE RES COEF FOR F/A DES	303300	0.438349	0.438104	WRDF	EC		
149	SLDF	DOC SEAL RES COEF LOWER FR DES	303300	0.262731	0.262397	SLDF	ECDF		
150	SUDF	DOC SEAL RES COEF UPPER FR DES	303300	0.314892	0.314716	SUDF	ETNH		
151	SRDF	DOC SEAL RES COEF FOR F/A DES	303300	0.314892	0.314716	SRDF	EC		
152	DFS2	DISP RED FACTOR 50\ FUEL	303300	0.888471	0.889080	DFS2	EAIR		
153	DFS4	DISP RED FACTOR 0\ FUEL	303300	0.766115	0.767231	DFS4	EAIR		
154	ATOC	WET AREA HULL SIDES CUSH CRUISE	303300	19.8581	19.4839	ATOC	EGG		
155	ATDC	WET AREA HULL SIDES CUSH DESIGN	303300	19.8581	19.4839	ATDC	EGG		
156	ATH1	SES WET AREA HULLBORNE	308310	58.1087	57.2638	ATH1	ATH		
157	ATH2	SECAT WET AREA HULLBORNE	308310	94.1490	92.8750	ATH2	ATH		
158	ATOH	WET AREA HULL SIDES HULLBORNE	308310	58.1087	57.2638	ATOH	NCUE		
159	ATOT	WET AREA HULL SIDES CRUISE	303300	19.8581	19.4839	ATOT	EB		
160	ATOD	WET AREA HULL SIDES DESIGN	303300	19.8581	19.4839	ATOD	EB		
161	DWDC	CUSH WAVE RES DESIGN CUSHBORNE	303300	398451.	382776.	DWDC	EABC		
162	DWC	CUSH WAVE RES CRUISE CUSHBORNE	303300	398451.	382769.	DWC	EABC		
163	DWD	CUSH WAVE RES DESIGN	303300	398451.	382776.	DWD	EB		
164	DW0	CUSH WAVE RES CRUISE 100 FUEL	303300	398451.	382769.	DW0	EB		
165	DW2	50\ FUEL	303300	314529.	302565.	DW2	EABC		
166	DW4	0\ FUEL	303300	233863.	225314.	DW4	EABC		
167	DFRD	SIDEHULL FRIC RES TERM DESIGN	303300	16162.8	16157.4	DFRD	EABC		
168	DFRC	SIDEHULL FRICTION DRAG TERM	303300	16162.8	16157.4	DFRC	EABC		
169	DSWD	SIDEHULL FRICTION RES DESIGN	303300	409049.	402867.	DSWD	EGG		
170	DSW0	SIDEHULL FRICTION RES. 100\ FUEL	303300	409049.	402867.	DSW0	EGG		
171	DSW2	50\ FUEL	303300	373252.	367948.	DSW2	EGG		
172	DSW4	0\ FUEL	303300	333980.	329589.	DSW4	EGG		
173	DSAD	SIDEHULL FORM RES DESIGN	303300	9134.99	8949.14	DSAD	EGG		
174	DSAC	SIDEHULL FORM RESIS CRUISE SPEED		9134.99	8949.14	DSAC	EGG		
175	DSAH	SIDEHULL FORM RESIS HULLBORNE		0.187119E+07	0.183312E+07	DSAH	EGG		
176	DSA0	SIDEHULL FORM RESIS 100 FUEL, HB		9134.99	8949.14	DSA0	EB		
177	DSA2	50\ FUEL	303300	8116.17	7956.50	DSA2	EABC		
178	DSA4	0\ FUEL	303300	6998.45	6866.06	DSA4	EABC		
179	DOTD	SEAL RESISTANCE DESIGN	303300	286231.	274971.	DOTD	EABC		
180	DOT0	SEAL RESISTANCE 100\ FUEL	303300	238817.	229259.	DOT0	EABC		

COMPARISON BETWEEN PARENT AND CURRENT VALUES OF VARN VARIABLES

NO	NAME	DESCRIPTION		PARENT	CURRENT	VAR1	VAR2	FUN2	SUMV
181	DOT2	SEAL RESISTANCE 50\ FUEL	303300	188518.	181221.	DOT2	EABC		
182	DOT4	SEAL RESISTNACE 0\ FUEL	303300	140169.	134952.	DOT4	EABC		
183	VFPM	MODEL VELOCITY F/S	303300	12.3937	12.3937	VFPM	EF		
184	SSD	SEA STATE DRAG INCREASE FACTOR	303300	4.56486	4.56486	SSD	EGG		
185	VFDM	SS MODEL VELOCITY DESIGN	303300	12.3937	12.3937	VFDM	EF		
186	SSDD	SS DRAG INCREASE FACTOR DESIGN	303300	4.56486	4.56486	SSDD	EGG		
187	DRWD	ROUGH WATER RES DESIGN	303300	87310.7	85534.4	DRWD	EABC		
188	DRW0	ROUGH WATER RES 100\ FUEL	303300	87310.7	85534.4	DRW0	EABC		
189	DRW2	ROUGH WATER RES 50\ FUEL	303300	77573.0	76046.9	DRW2	EABC		
190	DRW4	ROUGH WATER RES 0\ FUEL	303300	66890.0	65624.7	DRW4	EABC		
191	DT	TOTAL RESISTANCE DESIGN	303300	911842.	911842.	DTOD	ESUM		
192	DTO0	TOTAL RESISTANCE 100\ FUEL	303300	0.117319E+07	0.113956E+07	DTO0	ESUM		
193	DTO2	50\ FUEL	303300	992415.	965919.	DTO2	ESUM		
194	DTO4	0\ FUEL	303300	812329.	792528.	DTO4	ESUM		
195	FRB	FROUDE NUMBER BASED ON BEAM	303300	1.65309	1.65309	FRB	EF		
196	FRBD	DES FR NUMBER BASED ON BEAM	303300	1.65309	1.65309	FRBD	EF		
197	QFLM	AIR FLOW RATE MODEL CFS	303300	3.89141	3.89141	QFLM	EC		
198	QFLO	AIR FLOW RATE FULL SCALE	303300	34296.1	34296.1	QFLO	EABC		
199	QFDM	AIR FLOW RATE MODEL CFS DESIGN	303300	3.89141	3.89141	QFDM	EC		
200	QFLD	AIR FLOW RATE F. S. DESIGN	303300	34296.1	34296.1	QFLD	EABC		
201	Q1**			0.000000E+00	0.000000E+00	ZERO	SEP2		
202	Q2**	PROPELLER MINI MODULE OUTPUT		0.000000E+00	0.000000E+00	ZERO	SEP2		
203	Q3**	----------		0.000000E+00	0.000000E+00	ZERO	SEP2		
204	TOV2	THRUST/VEL**2	303300	32.0094	32.0094	TOV2	EABC		
205	JCRU	CRUISE ADVANCE RATIO	303300	1.23711	1.23711	JCRU	EABC		
206	J2KT	J**2/KT	303300	6.56777	6.56777	J2KT	EABC		
207	DIAP	PROPELLOR DIAMETER	303300	14.4993	14.4993	DIAP	EF		
208	KTJ0	PART OF KTJ**2 EQN	303300	2.38950	2.46001	KTJ0	EABC		
209	KTJ2	051785 KTJ**2 EQN @VKCR & CON=NTPC		0.104625	0.101626	KTJ2	EABC		
210	C2J2	INTERCEPT COEF	303300	0.645854	0.648853	C2J2	EGG		
211	KTPK	PEAK KT AT DESIGN SPEED	303300	0.117098	0.117098	KTPK	EC		
212	POUT	PROP RPM AT DESIGN SPEED	303300	282.283	282.283	POUT	EABC		
213	FIN2	051785 FAN ENG INPUT RPM SQRT		38.7298	38.7298	FIN2	EE		
214	PIN2	051785 PROP ENG INPUT RPM SQRT		60.0000	60.0000	PIN2	EE		
215	FOT2	051785 FAN RPM SQRT		38.7298	38.7298	FOT2	EE		
216	POT2	051785 PROPELLER RPM SQRT		16.8013	16.8013	POT2	EE		
217	ETPA	FIRST PART OF PROP EFF EQN, DES	303300	59.0560	59.0560	ETPA	EC		
218	ETP1	FIRST PART OF PROP EFF EQN, CRU	303300	68.6831	68.6831	ETP1	EC		
219	ETAP	PROPELLER EFFIC. @ DESIGN SPEED		0.685007	0.685007	ETAP	EC		
220	ETPC	PROP EFFICIENCY AT CRUISE	303300	0.709724	0.709724	ETPC	EC		
221	PCPC	PROPULSIVE COEF AT CRUISE	303300	0.681335	0.681335	PCPC	EA		
222	PCP	PROPULSIVE COEF AT DESIGN	303300	0.657607	0.657607	PCP	EA		
223	PCL	LIFT SYSTEM EFFICIENCY	303300	0.768000	0.768000	PCL	EA		
224	R1**			0.000000E+00	0.000000E+00	ZERO	SEP2		
225	R2**	PERFORMANCE CUSHIONBORNE DESIGN VKDS		0.000000E+00	0.000000E+00	ZERO	SEP2		

COMPARISON BETWEEN PARENT AND CURRENT VALUES OF VARN VARIABLES

NO	NAME	DESCRIPTION	PARENT	CURRENT	VAR1	VAR2	FUN2	SUMV
226	R3**	----------	0.000000E+00	0.000000E+00	ZERO	SEP2		
227	HPEP	051785 AVG BHP ALL ENG @ VKDS	41627.3	41483.1	HPEP	EABC		
228	HPLE	051785 BHP/LIFT ENG @ VKDS, FLD	22208.7	21776.2	HPLE	EABC		
229	HPPE	051685 BHP PER PROPUL ENG @ VKDS, FLD	51336.6	51336.6	HPPE	EABC		
230	HPP	051685 PROPULSION BHP AT VKDS	205346.	205346.	THPD	EABC		
231	HPL	051685 TOTAL LIFT BHP @ VKDS, FLD	44417.5	43580.7	LHPD	EABC		
232	HPT	051685 TOT LIFT+PROPUL BHP @ VKDS, FLD	249764.	248927.	HPT	EA		
233	HPPR	051785 PROPULSION BHP/SHAFT @ VKDS	51336.6	51336.6	HPPR	EABC		
234	S1**		0.000000E+00	0.000000E+00	ZERO	SEP2		
235	S2**	PERFORMANCE CUSHIONBORNE RANGE	0.000000E+00	0.000000E+00	ZERO	SEP2		
236	S3**	----------	0.000000E+00	0.000000E+00	ZERO	SEP2		
237	THP0	BHP PER PROPUL. ENG @ FLD CRUISE SPEED	66050.4	64157.1	THP0	EABC		
238	THP2	70513 BHP PER PROPELLER @ MOD 50 &CRUISE	55872.9	54381.1	THP2	EABC		
239	THP4	70513 BHP PER PROP ENG @ MOD 0 & VKCR	45734.0	44619.2	THP4	EABC		
240	LHP0	051685 LIFT BHP PER ENG @ VKCR, FLD	22208.7	21790.3	LHP0	EABC		
241	LHP2	051685 LIFT BHP PER ENG @ VKCR, MOD50	19731.8	19373.3	LHP2	EABC		
242	LHP4	051685 LIFT BHP PER ENG @ VKCR, MOD0	17014.4	16718.2	LHP4	EABC		
243	HPFN	051785 LIFT BHP/FAN @ VKCR	5552.18	5447.58	HPFN	EABC		
244	HPLS	051785 BHP/LIFT SYS @ VKCR	22208.7	21790.3	HPLS	EABC		
245	HPLT	051785 BHP/LIFT GB @ VKCR	22208.7	21790.3	HPLT	EABC		
246	HPPT	051785 BHP/PROPUL GB @ VKCR	51336.6	51336.6	HPPT	EABC		
247	FLP0	051785 PROP FUEL BURN RATE/ENG @ FLD	23778.2	23096.6	FLP0	EABC		
248	FLP2	051785 PROP FUEL BURN RATE/ENG @ MOD50	20114.2	19577.2	FLP2	EABC		
249	FLP4	051785 FUEL BURN RATE/ENG @ MOD0	16464.2	16062.9	FLP4	EABC		
250	FLC0	051785 LIFT FUEL BURN RATE/ENG @ FLD	8439.32	8280.33	FLC0	EABC		
251	FLC2	051785 LIFT FUEL BURN RATE/ENG @ MOD50	7498.09	7361.87	FLC2	EABC		
252	FLC4	051785 LIFT FUEL BURN RATE/ENG @ MOD0	6465.48	6352.92	FLC4	EABC		
253	FRBP	051785 AVG PROP FUEL BURN RATE @ VKCR	80466.2	78312.2	FRBP	EGG		
254	FRBC	051785 AVG LIFT FUEL BURN RATE W/O LBFF	14965.7	14693.6	FRBC	EGG		
255	FRBL	051785 AVG LIFT FUEL BURN RATE W/LBFF	15714.0	15428.3	FRBL	EA		
256	FRBE	051785 FUEL BURN RATE ELECTRIC W/O EBFF	1327.93	1327.93	FRBE	EABC		
257	FRBT	051785 AVG TOT FUEL BRN RATE W/ADDL SFCF	97508.1	95068.4	FRBT	ESUM		
258	FPL2	51785 3*AVG PRP+LFT BRNRT TO MD50 WOSFCF	302897.	295012.	FPL2	EA		
259	ELP2	051785 AVG TOT BRNRT TO MD50 W/O SFCF	102294.	99665.3	ELP2	EGG		
260	WTRP	307200	70.7421	70.7421	WTRP	EG		
261	FUL2	FUEL USED UP TO MID TIME 303300	1826.67	1779.74	FUL2	EABC		
262	F42S	FUEL TO MEET RANGE IF ONLY ONE RANGE LEG	3830.68	3734.83	F42S	EABC		
263	V1**		0.000000E+00	0.000000E+00	ZERO	SEP2		
264	V2**	PERFORMANCE HULLBORNE 3 OUTPUT	0.000000E+00	0.000000E+00	ZERO	SEP2		
265	V3**	----------	0.000000E+00	0.000000E+00	ZERO	SEP2		
266	VFP3	VELOCITY F/S HB PORTION OF CRUISE	25.3170	25.3170	VFP3	EABC		
267	FRL3	FR NO LENGTH, HB PORTION CRUISE	0.169916	0.169916	FRL3	EF		
268	DAI3	AIR RESISTANCE, HB PORTION CRUISE	1522.94	1516.08	DAI3	EAIR		
269	QWA3	WATER DY PRESS, HB PORTION OF CRUISE	637.746	637.746	QWA3	EF		
270	DFI3	FIN RESISTANCE, HB PORTION OF CRUISE	1215.09	1199.86	DFI3	EABC		

COMPARISON BETWEEN PARENT AND CURRENT VALUES OF VARN VARIABLES

NO	NAME	DESCRIPTION	PARENT	CURRENT	VAR1	VAR2	FUN2	SUMV
271	DFR3	S.H. FRIC DRAG TERM, HB PORTION CRUISE	1454.65	1454.16	DFR3	EABC		
272	DSW3	S.H. FRIC RES, HB PORTION OF CRUISE	36814.4	36258.0	DSW3	EGG		
273	DSA3	FORM DRAG HULL, HB PORTION OF CRUISE	121553.	119080.	DSA3	EGG		
274	3DSA	WILL BE SAME AS DSA3	121553.	119080.	3DSA	EB		
275	3VFP	VELOCITY USED FOR HB PORTION CRUISE	3.71810	3.71810	3VFP	EF		
276	SSD3	S.S. DRAG INC FAC, HB PORTION CRUISE	1.91143	1.91143	SSD3	EGG		
277	DRW3	ROUGH WATER RES, HB PORTION CRUISE	36559.3	35815.5	DRW3	EABC		
278	DTO3	TOTAL RES, HB PORTION CRUISE	197670.	193874.	DTO3	ESUM		
279	THP3	EFF THRUST HP, HB PORTION CRUISE	6677.26	6549.06	THP3	EABC		
280	FLP3	PROP FUEL BURN RATE, HB PORTION CRUISE	2403.81	2357.66	FLP3	EABC		
281	FRB3	AVG PROP FUEL RATE, HB PORTION CRUISE	9615.25	9430.65	FRB3	EGG		
282	FR3T	AVG TOT FUEL RATE, HB PORTION CRUISE	10943.2	10758.6	FR3T	ESUM		
283	3F42	FUEL TO MEET HB PORTION CRUISE	1329.35	1306.92	3F42	EABC		
284	Y1**		0.000000E+00	0.000000E+00	ZERO	SEP2		
285	Y2**	PERFORMANCE CUSHIONBORNE 5 OUTPUT	0.000000E+00	0.000000E+00	ZERO	SEP2		
286	Y3**	----------	0.000000E+00	0.000000E+00	ZERO	SEP2		
287	FRB5	2ND DES VEL FR NUMBER BASED ON BEAM	1.65309	1.65309	FRB5	EF		
288	QF5M	AIR FLOW RATE, MODEL CFS, 2ND DES VEL	3.89141	3.89141	QF5M	EC		
289	QFL5	AIR FLOW RATE, F.S., 2ND DES VEL	34296.1	34296.1	QFL5	EABC		
290	LHP5	LIFT HORSEPOWER, 2ND DES VEL	31705.2	30828.9	LHP5	EABC		
291	VFP5	2ND CUSHIONBORNE DESIGN VELOCITY F/S	84.3900	84.3900	VFP5	EABC		
292	FRL5	FR NO LENGTH, 2ND DESIGN VELOCITY	0.566388	0.566388	FRL5	EF		
293	DAI5	AIR RESISTANCE, 2ND DESIGN VELOCITY	16921.5	16845.4	DAI5	EAIR		
294	QWA5	WATER DY PRESS, 2ND DESIGN VELOCITY	7086.06	7086.06	QWA5	EF		
295	DFI5	FIN RESISTANCE, 2ND DESIGN VELOCITY	13501.0	13331.8	DFI5	EABC		
296	DFR5	S.H. FRIC DRAG TERM, 2ND DESIGN VEL	16162.8	16157.4	DFR5	EABC		
297	SL5F	DOC SEAL RES COEF, LOW FR 2ND DES VEL	0.262731	0.262397	SL5F	ECDF		
298	SLF5	LOW FR RATIO, 2ND DES SEAL RES	0.000000E+00	0.000000E+00	SLF5	ETNH		
299	SU5F	DOC SEAL RES COEF, UP FR, 2ND DES VEL	0.314892	0.314710	SU5F	ETNH		
300	SUF5	UP FR RATIO, 2ND DES VEL, SEAL RES	1.00000	1.00000	SUF5	ETNH		
301	SR5F	DOC SEAL RES COEF, F/A 2ND DES VEL	0.314892	0.314710	SR5F	EC		
302	DOT5	SEAL RESISTANCE, 2ND DES VEL	145838.	137788.	DOT5	EABC		
303	DW5	CUSH WAVE RES, 2ND DESIGN VELOCITY	203015.	191670.	DW5	EB		
304	WL5F	DOC RES COEF, LOW FR, 2ND DES VEL	0.438349	0.438104	WL5F	ECDF		
305	5LFR	LOW FR RATIO, 2ND DES VEL WAVE RES	0.000000E+00	0.000000E+00	5LFR	ETNH		
306	WU5F	DOC RES COEF, UP FR, 2ND DES VEL	0.438349	0.438104	WU5F	ECDF		
307	5UFR	UP FR RATIO FOR 2ND DES VEL WAVE RES	1.00000	1.00000	5UFR	ETNH		
308	WR5F	DOC WAVE COEFF FOR 2ND DES VEL	0.438349	0.438104	WR5F	EC		
309	DW5C	2ND DES VEL CUSHION WAVE RESISTANCE	203015.	191670.	DW5C	EABC		
310	SSD5	2ND DES VEL SS DRAG INCREASE FACTOR	4.56486	4.56486	SSD5	EGG		
311	5PFC	PRESS REDUCTION FACT, 2ND DES VEL	0.995118	0.995118	5PFC	ETNH		
312	HF5C	2ND DES VEL CUSH DRAFT INCREASE FACTOR	1.34711	1.34711	HF5C	ETNH		
313	AT5C	WET AREA HULL SIDE CB 2ND DES VEL	14.1747	13.7829	AT5C	EGG		
314	ATO5	ATOD, 2ND DES VEL	14.1747	13.7829	ATO5	EB		
315	DSW5	S.H. FRIC RES, 2ND DESIGN VELOCITY	317189.	310753.	DSW5	EGG		

COMPARISON BETWEEN PARENT AND CURRENT VALUES OF VARN VARIABLES

NO	NAME	DESCRIPTION		PARENT	CURRENT	VAR1	VAR2	FUN2	SUMV
316	CPF5	2ND DES VEL PRESS REDUCTION FACTOR		0.995118	0.995118	CPF5	EB		
317	DSA5	FORM DRAG HULL, 2ND DES VEL		6520.56	6334.71	DSA5	EGG		
318	5DSA	WILL BE SAME DSA5		6520.56	6334.71	5DSA	EB		
319	5VFP	VELOCITY USED FOR 2ND DES VEL		12.3937	12.3937	5VFP	EF		
320	DRW5	ROUGH WATER RES, 2ND DES VEL		62322.4	60546.1	DRW5	EABC		
321	DTO5	TOTAL RES, 2ND DESIGN VELOCITY		765313.	737274.	DTO5	ESUM		
322	THP5	EFF THRUST HP, 2ND DES VEL		172348.	166034.	THP5	EABC		
323	AA4*			0.000000E+00	0.000000E+00	ZERO	SEP2		
324	AA5*	MACHINERY PROPULSION PLANT MINI OUTPUT		0.000000E+00	0.000000E+00	ZERO	SEP2		
325	AA6*	----------		0.000000E+00	0.000000E+00	ZERO	SEP2		
326	WTRC	WEIGHT OF CRUISE TRANSMISSIONS		37.7491	37.6226	WTRC	EG		
327	TRAN	TRANSMISSION WEIGHT		77.1238	76.9713	TRAN	EG		
328	RPL		303300	1.00000	1.00000	RPL	EABC		
329	RPP		303300	12.7532	12.7532	RPP	EABC		
330	RPC		307200	2.83404	2.83404	RPC	EABC		
331	T1L		303300	118.447	116.215	T1L	EG		
332	T2L		303300	479.319	483.899	T2L	EG		
333	WSHP	WEIGHT OF PROPUL. SHAFTS		89.8467	89.8467	WSHP	EG		
334	WSHF	WEIGHT OF FAN SHAFTS		0.337597	0.333344	WSHF	EG		
335	H1		303300	6905.53	6785.32	H1	EG		
336	DT1		303300	5.79631	5.82181	DT1	EG		
337	DZLM	WEIGHT OF DEISELS		0.000000E+00	0.000000E+00	DZLM	EG		
338	TRBP	PROPULSION TURBINE WEIGHT		54.8686	54.8686	TRBP	EB		
339	TRBL	LIFT SYS TURBINE WEIGHT		16.6909	16.5329	TRBL	EB		
340	FCA1		311070	3.45124	3.38402	FCA1	EA		
341	AIRL		311070	3.45124	3.38402	AIRL	ED		
342	PCA1		311070	15.9554	15.9554	PCA1	EA		
343	AIRP	70519 COMBUSTION AIR FOR PROPUL GT		0.439700	17.9205	AIRP	ED		
344	TFN1		311070	0.116000E-19	134.927	TFN1	ED		
345	TFN2		311070	19.1961	18.6381	TFN2	ED		
346	TFN3		311070	0.770478E-01	135.004	TFN3	ED		
347	TFN4		311070	19.1961	18.6381	TFN4	ED		
348	TFNP		311070	0.770478E-01	135.252	TFNP	EG		
349	TFNL		311070	19.2499	18.6908	TFNL	EG		
350	AA1*			0.000000E+00	0.000000E+00	ZERO	SEP2		
351	AA2*	MACHINERY ELECTRIC PLANT MINI OUTPUT		0.000000E+00	0.000000E+00	ZERO	SEP2		
352	AA3*	----------		0.000000E+00	0.000000E+00	ZERO	SEP2		
353	KWI	INSTALLED ELECT KW		3300.00	3300.00	KWI	EA		
354	DLGN	DIESEL GENERATORS, (SPECIFIC)		4.00000	4.00000	DLGN	EA		
355	GTGN	GAS TURBINE GENERATORS, (ASSET)		36.9600	36.9600	GTGN	EA		
356	CC1*			0.000000E+00	0.000000E+00	ZERO	SEP2		
357	CC2*	MANNING MINI MODULE OUTPUT		0.000000E+00	0.000000E+00	ZERO	SEP2		
358	CC3*	----------		0.000000E+00	0.000000E+00	ZERO	SEP2		
359	NF10	SHIPS FORCE W/O MARGINS		49.0000	49.0000	NF10	EA		
360	ACOM	SHIP'S FORCE WITH ACCOMODATION MARGIN		53.9000	53.9000	ACOM	EA		

COMPARISON BETWEEN PARENT AND CURRENT VALUES OF VARN VARIABLES

NO	NAME	DESCRIPTION		PARENT	CURRENT	VAR1	VAR2	FUN2	SUMV
361	NF11	NUM OFFICERS W/O MARGIN		7.00000	7.00000	NF11	EABC		
362	NOFF	NUM OFFICERS WITH ACCOMODATION MARGIN		7.70000	7.70000	NOFF	EA		
363	NF12	NUM CPO W/O MARGIN		12.0000	12.0000	NF12	EABC		
364	NCPO	NUM CPO WITH ACCOMODATION MARGIN		13.2000	13.2000	NCPO	EA		
365	NF13	NUM ENLISTED W/O MARGIN		30.0000	30.0000	NF13	EABC		
366	NENL	NUM ENLISTED WITH ACCOMODATION MARGIN		33.0000	33.0000	NENL	EA		
367	BB1*			0.000000E+00	0.000000E+00	ZERO	SEP2		
368	BB2*	SUMMATION SUMS MINI MODULE OUTPUT		0.000000E+00	0.000000E+00	ZERO	SEP2		
369	BB3*	----------		0.000000E+00	0.000000E+00	ZERO	SEP2		
370	WSNM	051785 SUMMATION LIGHTSHIP WEIGHT		6930.11	6963.11	WSNM	ESUM		
371	DUM1	051785 CUBIC NUM CROSTRUCT/10000		23.4007	23.3232	DUM1	EA		
372	DUM2	051785 CUSHION AREA/1,000,000		0.732645	0.730412	DUM2	EA		
373	DUM3	051785 SHIP CUBIC NUM/1000		33.3117	33.1480	DUM3	EA		
374	WSUM	051785 SUMMATION GP11-18		4833.95	4831.13	WSUM	ESUM		
375	W100	051785 SUMMATION GP1		4930.63	4927.75	W100	ESUM		
376	WTD1		303300	0.000000E+00	0.000000E+00	WTD1	EG		
377	SB2A		307200	377.191	551.743	SB2A	ESUM		
378	SB2B		307200	50.7775	50.6033	SB2B	ESUM		
379	W200	SUMMATION OF GROUP 2		811.000	811.000	W200	EA		
380	W300	SUMMATION OF GROUP 3		253.702	252.922	W300	ESUM		
381	W420		307200	1.65000	1.65000	W420	ESUM		
382	W430		307200	1.24150	1.24150	W430	ESUM		
383	SB4A		307200	5.96290	5.96290	SB4A	ESUM		
384	SB4B		307200	6.56860	6.56860	SB4B	ESUM		
385	SB4C		307200	53.9800	53.9800	SB4C	ESUM		
386	SB4D		307200	2.23000	2.23000	SB4D	ESUM		
387	W400	SUMMATION OF GROUP 4		68.7415	68.7415	W400	ESUM		
388	W500	SUMMATION OF GROUP 5		572.340	609.942	W500	EE		
389	SIX6		307200	22.4902	22.4166	SIX6	EA		
390	SB6C		307200	0.284143	0.282655	SB6C	ESUM		
391	SB6B		307200	0.333441	0.332734	SB6B	ESUM		
392	SB6A		307200	2.28952	2.28238	SB6A	ESUM		
393	W600	SUMMATION OF GROUP 6		293.618	292.675	W600	EE		
394	W700	SUMMATION OF GROUP 7		0.800000E-01	0.800000E-01	W700	ESUM		
395	SH10		307200	545.948	534.840	SH10	EABC		
396	SB5A		307200	3.22912	3.21788	SB5A	ESUM		
397	SB5B		307200	11.0831	12.0390	SB5B	ESUM		
398	SB5C		307200	0.358780E-01	0.358780E-01	SB5C	ESUM		
399	W650		307200	4.40009	4.40009	W650	ESUM		
400	XF31		307200	2.10210	2.10210	XF31	EA		
401	WF20	SUMMATION OF VAR LOADS F20		1.00000	1.00000	WF20	ESUM		
402	WF40	SUMMATION OF VAR LOADS F40		3953.04	3855.13	WF40	ESUM		
403	WF50	SUMMATION OF VAR LOADS F50		4.64110	4.64110	WF50	ESUM		
404	WF60	SUMMATION OF VAR LOADS F60		4687.50	4687.50	WF60	ESUM		
405	WFX1		307200	3965.25	3867.34	WFX1	ESUM		

COMPARISON BETWEEN PARENT AND CURRENT VALUES OF VARN VARIABLES

NO	NAME	DESCRIPTION		PARENT	CURRENT	VAR1	VAR2	FUN2	SUMV
406	WFX2		307200	4692.14	4692.14	WFX2	ESUM		
407	WF00	SUMMATION OF VARIABLE LOADS		8657.39	8559.48	WF00	EA		
408	DD1*			0.000000E+00	0.000000E+00	ZERO	SEP2		
409	DD2*	VOLUME / SPACE MINI MODULE OUTPUT		0.000000E+00	0.000000E+00	ZERO	SEP2		
410	DD3*	----------		0.000000E+00	0.000000E+00	ZERO	SEP2		
411	V111		303300	22.4811	22.4811	V111	EF		
412	V1.1	REQD VOL COMUN, DETECT, EVALU.		26.8274	26.8274	V1.1	EB		
413	V12A		303300	5.40565	5.29569	V12A	EF		
414	V1.2	REQD VOL WEAPONS		2507.15	2507.04	V1.2	EB		
415	V13A		303300	4.17650	4.09153	V13A	ED		
416	V1.3	REQD VOL AVIATION		6.01907	5.89662	V1.3	EA		
417	VOFF	REQD VOL OFFICERS		4.71524	4.71524	VOFF	EE		
418	VCPO	REQD VOL CPO		3.92036	3.92036	VCPO	EE		
419	VENL	REQD VOL ENLISTED PERSONNEL		7.74207	7.74207	VENL	EE		
420	VOFM		303300	1.02012	1.02012	VOFM	EE		
421	VPOE		303300	5.24739	5.24739	VPOE	EE		
422	V2.1	REQD VOL LIVING (SHIPS FORCE)		19.4773	19.4773	V2.1	EA		
423	V22A		303300	17.4865	17.1616	V22A	EA		
424	V22B		303300	19.6832	19.3583	V22B	ED		
425	V22C		303300	21.2597	20.9348	V22C	ED		
426	V2.2	REQD VOL SUPPORTING FUNCTIONS		24.2880	23.9631	V2.2	ED		
427	V2.3	REQD VOL STOWAGE		2.54476	2.54476	V2.3	ED		
428	V1+2	SUMMATION OF V1 + V2 REQD VOLS		2586.31	2585.75	V1+2	ESUM		
429	V31A		303300	16.9360	16.8550	V31A	EA		
430	V31B		303300	42.0516	41.8402	V31B	ED		
431	V3.1	REQD VOL CONTROL (SHIP OPERATIONS)		63.6416	63.3795	V3.1	ED		
432	V3.2	REQD VOL MAIN PROPULSION MACHY		361.846	361.024	V3.2	EE		
433	V33A		303300	5.81064	5.77051	V33A	EA		
434	V33B		303300	99.5757	98.9026	V33B	EE		
435	V3.3	REQD VOL AUXILIARY SYS & EQUIP		123.775	122.844	V3.3	EB		
436	V3.4	REQD VOL MAINTENANCE		7.85169	7.99760	V3.4	EF		
437	V3.5	REQD VOL STOWAGE		187.825	183.203	V3.5	EA		
438	V3.6	REQD VOL TANKAGE		99.9350	99.4440	V3.6	EA		
439	V3.7	REQD VOL PASSAGEWAYS,ACCESS,MISC		61.2204	60.6450	V3.7	EB		
440	V3+	SUMMATION OF V3 REQD VOLS		906.096	898.538	V3+	ESUM		
441	909E	EFFECTIVE SIDEHULL BEAM FOR DEGAUSSING		25.9905	25.6668	909E	BOA		

COMPARISON BETWEEN PARENT AND CURRENT VALUES OF SUMMATION VARIABLES

NO	NAME	PARENT	CURRENT
1	WT	15932.4	16045.2
2	DISW	0.200000E-09	0.200000E-09
3	LMWT	0.554345E+07	0.558185E+07
4	VMWT	0.400000E-19	0.400000E-19
5	BUOY	16378.4	16045.2
6	DISB	0.600000E-09	0.600000E-09
7	LMBU	0.565056E+07	0.553560E+07
8	VMBU	0.800000E-19	0.800000E-19
9	ALOV	3331.17	3314.80
10	RLOV	3492.41	3484.29

COMPARISON BETWEEN PARENT AND CURRENT VALUES OF SUMMATION SETS (SUMI VALUE = SUM1 + SUM2 ONLY)

NO	TYPE	NAME	DESCRIPTION	PARENT	CURRENT	SUM1	SUM2	SUM3	SUM4	SUM5	SUM6
1	SUMI	WTOT	FULL LOAD WEIGHT OF SHIP	15932.4	16045.2	WT	DISW	LMWT	VMWT		
2	SUMI	BTOT	TOTAL HYDRO + AEROSTATIC FORCE	16378.4	16045.2	BUOY	DISB	LMBU	VMBU		

NAVY SWBS 3 DIGIT WEIGHT REPORT

ITEM	DESCRIPTION	WT	LCG	VCG
SUBGROUP 100	HULL STRUCTURE, GENERAL	0.00	0.00	0.00
SUBGROUP 110	SHELL AND SUPPORTING STRUCTURE	0.00	0.00	0.00
SUBGROUP 111	SHELL PLATING, SURF.SHIP AND SUB PRESS.H	4186.23	352.52	0.00
SUBGROUP 112	SHELL PLATING, SUB NON-PRESSURE HULL	0.00	0.00	0.00
SUBGROUP 113	INNER BOTTOM	0.00	0.00	0.00
SUBGROUP 114	SHELL APPENDAGES	0.00	0.00	0.00
SUBGROUP 115	STANCHIONS	0.00	0.00	0.00
SUBGROUP 116	LONG.FRAMING,SURF.SHIP AND SUB PRESS.HLL	0.00	0.00	0.00
SUBGROUP 117	TRANS.FRAMING,SURF.SHIP AND SUB PRES.HLL	0.00	0.00	0.00
SUBGROUP 118	LONG.AND TRANS.SUB NON-PRESS.HULL FRAMIN	0.00	0.00	0.00
SUBGROUP 119	LIFT SYSTEM FLEXIBLE SKIRTS AND SEALS	34.99	345.00	0.00
SUBGROUP 120	HULL STRUCTURAL BULKHEADS	144.19	367.21	0.00
SUBGROUP 121	LONGITUDINAL STRUCTURAL BULKHEADS	0.00	0.00	0.00
SUBGROUP 122	TRANSVERSE STRUCTURAL BULKHEADS	0.00	0.00	0.00
SUBGROUP 123	TRUNKS AND ENCLOSURES	0.00	0.00	0.00
SUBGROUP 124	BULKHEADS IN TORPEDO PROTECTION SYSTEM	0.00	0.00	0.00
SUBGROUP 125	SUBMARINE HARD TANKS	0.00	0.00	0.00
SUBGROUP 126	SUBMARINE SOFT TANKS	0.00	0.00	0.00
SUBGROUP 130	HULL DECKS	0.00	0.00	0.00
SUBGROUP 131	MAIN DECK	0.00	0.00	0.00
SUBGROUP 132	2ND DECK	0.00	0.00	0.00
SUBGROUP 133	3RD DECK	0.00	0.00	0.00
SUBGROUP 134	4TH DECK	0.00	0.00	0.00
SUBGROUP 135	5TH DECK AND DECKS BELOW	0.00	0.00	0.00
SUBGROUP 136	01 HULL DECK (FORCASTLE AND POOP DECKS)	0.00	0.00	0.00
SUBGROUP 137	02 HULL DECK	0.00	0.00	0.00
SUBGROUP 138	03 HULL DECK	0.00	0.00	0.00
SUBGROUP 139	04 HULL DECK	0.00	0.00	0.00
SUBGROUP 140	HULL PLATFORMS AND FLATS	0.00	0.00	0.00
SUBGROUP 141	1ST PLATFORM	0.00	0.00	0.00
SUBGROUP 142	2ND PLATFORM	0.00	0.00	0.00
SUBGROUP 143	3RD PLATFORM	0.00	0.00	0.00
SUBGROUP 144	4TH PLATFORM	0.00	0.00	0.00
SUBGROUP 145	5TH PLATFORM	0.00	0.00	0.00
SUBGROUP 149	FLATS	0.00	0.00	0.00
SUBGROUP 150	DECK HOUSE STRUCTURE	216.80	367.21	0.00
SUBGROUP 151	DECK HOUSE STRUCTURE TO FIRST LEVEL	0.00	0.00	0.00
SUBGROUP 152	1ST DECK HOUSE LEVEL	0.00	0.00	0.00
SUBGROUP 153	2ND DECK HOUSE LEVEL	0.00	0.00	0.00
SUBGROUP 154	3RD DECK HOUSE LEVEL	0.00	0.00	0.00
SUBGROUP 155	4TH DECK HOUSE LEVEL	0.00	0.00	0.00
SUBGROUP 156	5TH DECK HOUSE LEVEL	0.00	0.00	0.00
SUBGROUP 157	6TH DECK HOUSE LEVEL	0.00	0.00	0.00
SUBGROUP 158	7TH DECK HOUSE LEVEL	0.00	0.00	0.00
SUBGROUP 159	8TH DECK HOUSE LEVEL AND ABOVE	0.00	0.00	0.00

NAVY SWBS 3 DIGIT WEIGHT REPORT

ITEM	DESCRIPTION	WT	LCG	VCG
SUBGROUP 160	SPECIAL STRUCTURES	0.00	0.00	0.00
SUBGROUP 161	STRUCT. CAST.,FORGINGS, AND EQUIV.WELDMT	56.28	367.21	0.00
SUBGROUP 162	STACKS AND MACKS (COMBINED STACK, MAST)	0.00	0.00	0.00
SUBGROUP 163	SEA CHESTS	11.29	367.21	0.00
SUBGROUP 164	BALLISTIC PLATING	0.00	0.00	0.00
SUBGROUP 165	SONAR DOMES	0.00	0.00	0.00
SUBGROUP 166	SPONSONS	0.00	0.00	0.00
SUBGROUP 167	HULL STRUCTURAL CLOSURES	60.20	367.21	0.00
SUBGROUP 168	DECKHOUSE STRUCTURAL CLOSURES	0.00	0.00	0.00
SUBGROUP 169	SPECIAL PURPOSE CLOSURES AND STRUCTURES	79.01	367.21	0.00
SUBGROUP 170	MASTS, KINGPOSTS, AND SERVICE PLATFORMS	18.67	345.00	0.00
SUBGROUP 171	MASTS, TOWERS, TETRAPODS	0.00	0.00	0.00
SUBGROUP 172	KINGPOSTS AND SUPPORT FRAMES	0.00	0.00	0.00
SUBGROUP 179	SERVICE PLATFORMS	0.00	0.00	0.00
SUBGROUP 180	FOUNDATIONS	0.00	0.00	0.00
SUBGROUP 181	HULL STRUCTURE FOUNDATIONS	0.00	0.00	0.00
SUBGROUP 182	PROPULSION PLANT FOUNDATIONS	8.11	345.00	0.00
SUBGROUP 183	ELECTRIC PLANT FOUNDATIONS	2.85	345.00	0.00
SUBGROUP 184	COMMAND AND SURVEILLANCE FOUNDATIONS	2.82	345.00	0.00
SUBGROUP 185	AUXILIARY SYSTEMS FOUNDATIONS	5.64	345.00	0.00
SUBGROUP 186	OUTFIT AND FURNISHINGS FOUNDATIONS	4.08	345.00	0.00
SUBGROUP 187	ARMAMENT FOUNDATIONS	0.00	345.00	0.00
SUBGROUP 190	SPECIAL PURPOSE SYSTEMS	96.62	367.21	0.00
SUBGROUP 191	BALLAST,FIXED OR FLUID,AND BUOYANCY UNIT	0.00	0.00	0.00
SUBGROUP 197	WELDING	0.00	0.00	0.00
SUBGROUP 198	FREE FLOODING LIQUIDS	0.00	0.00	0.00
SUBGROUP 199	HULL REPAIR PARTS AND SPECIAL TOOLS	0.00	0.00	0.00
TOTAL GRP 1	HULL STRUCTURE	4927.79	354.39	0.00

NAVY SWBS 3 DIGIT WEIGHT REPORT

ITEM	DESCRIPTION	WT	LCG	VCG
SUBGROUP 200	PROPULSION PLANT, GENERAL	0.00	0.00	0.00
SUBGROUP 210	ENERGY GENERATING SYSTEM (NUCLEAR)	0.00	0.00	0.00
SUBGROUP 211	(RESERVED)	0.00	0.00	0.00
SUBGROUP 212	NUCLEAR STEAM GENERATOR	0.00	0.00	0.00
SUBGROUP 213	REACTORS	0.00	0.00	0.00
SUBGROUP 214	REACTOR COOLANT SYSTEM	0.00	0.00	0.00
SUBGROUP 215	REACTOR COOLANT SERVICE SYSTEM	0.00	0.00	0.00
SUBGROUP 216	REACTOR PLANT AUXILIARY SYSTEMS	0.00	0.00	0.00
SUBGROUP 217	NUCLEAR POWER CONTROL AND INSTRMENTATION	0.00	0.00	0.00
SUBGROUP 218	RADIATION SHIELDING (PRIMARY)	0.00	0.00	0.00
SUBGROUP 219	RADIATION SHIELDING (SECONDARY)	0.00	0.00	0.00
SUBGROUP 220	ENERGY GENERATING SYSTEM (NON-NUCLEAR)	0.00	0.00	0.00
SUBGROUP 221	PROPULSION BOILERS	0.00	0.00	0.00
SUBGROUP 222	GAS GENERATORS	0.00	0.00	0.00
SUBGROUP 223	MAIN PROPULSION BATTERIES	0.00	0.00	0.00
SUBGROUP 224	MAIN PROPULSION FUEL CELLS	0.00	0.00	0.00
SUBGROUP 230	PROPULSION UNITS	0.00	0.00	0.00
SUBGROUP 231	PROPULSION STEAM TURBINES	0.00	0.00	0.00
SUBGROUP 232	PROPULSION STEAM ENGINES	0.00	0.00	0.00
SUBGROUP 233	PROPULSION INTERNAL COMBUSTION ENGINES	0.00	0.00	0.00
SUBGROUP 234	PROPULSION GAS TURBINES	71.40	345.00	0.00
SUBGROUP 235	ELECTRIC PROPULSION	0.00	57.50	0.00
SUBGROUP 236	SELF-CONTAINED PROPULSION SYSTEMS	0.00	0.00	0.00
SUBGROUP 237	AUXILIARY PROPULSION DEVICES	0.00	59.88	0.00
SUBGROUP 238	SECONDARY PROPULSION (SUBMARINES)	0.00	0.00	0.00
SUBGROUP 239	EMERGENCY PROPULSION (SUBMARINES)	0.00	0.00	0.00
SUBGROUP 240	TRANSMISSION AND PROPULSOR SYSTEMS	0.00	0.00	0.00
SUBGROUP 241	PROPULSION REDUCTION GEARS	76.97	345.00	0.00
SUBGROUP 242	PROPULSION CLUTCHES AND COUPLINGS	7.81	345.00	0.00
SUBGROUP 243	PROPULSION SHAFTING	99.20	345.00	0.00
SUBGROUP 244	PROPULSION SHAFT BEARINGS	19.34	345.00	0.00
SUBGROUP 245	PROPULSORS	35.24	345.00	0.00
SUBGROUP 246	PROPULSOR SHROUDS AND DUCTS	0.00	0.00	0.00
SUBGROUP 247	WATER JET PROPULSORS	0.00	0.00	0.00
SUBGROUP 248	LIFT SYSTEM FANS AND DUCTING	44.22	345.00	0.00
SUBGROUP 250	PROP. SUPPORT SYS.(EXCEPT FUEL,LUBE OIL)	0.00	0.00	0.00
SUBGROUP 251	COMBUSTION AIR SYSTEM	21.30	345.00	0.00
SUBGROUP 252	PROPULSION CONTROL SYSTEM	1.63	345.00	0.00
SUBGROUP 253	MAIN STEAM PIPING SYSTEM	0.00	0.00	0.00
SUBGROUP 254	CONDENSORS AND AIR EJECTORS	0.00	0.00	0.00
SUBGROUP 255	FEED AND CONDENSATE SYSTEM	0.00	0.00	0.00
SUBGROUP 256	CIRCULATING AND COOLING SEA WATER SYS.	13.22	345.00	0.00
SUBGROUP 258	H.P. STEAM DRAIN SYSTEM	0.00	0.00	0.00
SUBGROUP 259	UPTAKES (INNER CASING)	153.94	345.00	0.00
SUBGROUP 260	PROP. SUPPORT SYS. (FUEL AND LUBE OIL)	0.00	0.00	0.00

NAVY SWBS 3 DIGIT WEIGHT REPORT

ITEM	DESCRIPTION	WT	LCG	VCG
SUBGROUP 261	FUEL SERVICE SYSTEM	7.47	345.00	0.00
SUBGROUP 262	MAIN PROPULSION LUBE OIL SYSTEM	8.29	345.00	0.00
SUBGROUP 263	SHAFT LUBE OIL SYSTEM (SUBMARINES)	0.00	0.00	0.00
SUBGROUP 264	LUBE OIL FILL, TRANS. AND PURIFICATION	7.47	345.00	0.00
SUBGROUP 290	SPECIAL PURPOSE SYSTEMS	0.00	0.00	0.00
SUBGROUP 298	PROPULSION PLANT OPERATING FLUIDS	24.89	345.00	0.00
SUBGROUP 299	PROP. PLANT REPAIR PARTS, SPECIAL TOOLS	9.96	345.00	0.00
TOTAL GRP 2	PROPULSION PLANT	602.35	345.00	0.00

NAVY SWBS 3 DIGIT WEIGHT REPORT

ITEM	DESCRIPTION	WT	LCG	VCG
SUBGROUP 300	ELECTRIC PLANT, GENERAL	0.00	0.00	0.00
SUBGROUP 310	ELECTRIC POWER GENERATION	0.00	0.00	0.00
SUBGROUP 311	SHIP SERVICE POWER GENERATION	36.96	345.00	0.00
SUBGROUP 312	EMERGENCY GENERATORS	0.00	0.00	0.00
SUBGROUP 313	BATTERIES AND SERVICE FACILITIES	1.27	345.00	0.00
SUBGROUP 314	POWER CONVERSION EQUIPMENT	6.27	345.00	0.00
SUBGROUP 320	POWER DISTRIBUTION SYSTEMS	0.00	0.00	0.00
SUBGROUP 321	SHIP SERVICE POWER CABLE	133.79	345.00	0.00
SUBGROUP 322	EMERGENCY POWER CABLE SYSTEM	0.00	0.00	0.00
SUBGROUP 323	CASUALTY POWER CABLE SYSTEM	4.63	345.00	0.00
SUBGROUP 324	SWITCHGEAR AND PANELS	23.10	345.00	0.00
SUBGROUP 330	LIGHTING SYSTEM	0.00	0.00	0.00
SUBGROUP 331	LIGHTING DISTRIBUTION	43.09	345.00	0.00
SUBGROUP 332	LIGHTING FIXTURES	1.44	345.00	0.00
SUBGROUP 340	POWER GENERATION SUPPORT SYSTEMS	0.00	0.00	0.00
SUBGROUP 341	SSTG LUBE OIL	0.00	0.00	0.00
SUBGROUP 342	DIESEL SUPPORT SYSTEMS	0.00	0.00	0.00
SUBGROUP 343	TURBINE SUPPORT SYSTEMS	0.35	345.00	0.00
SUBGROUP 390	SPECIAL PURPOSE SYSTEMS	0.00	0.00	0.00
SUBGROUP 398	ELECTRIC PLANT OPERATING FLUIDS	0.55	345.00	0.00
SUBGROUP 399	ELEC.PLANT REPAIR PARTS, SPECIAL TOOLS	1.49	345.00	0.00
TOTAL GRP 3	ELECTRIC PLANT	252.95	345.00	0.00

NAVY SWBS 3 DIGIT WEIGHT REPORT

ITEM	DESCRIPTION	WT	LCG	VCG
SUBGROUP 400	COMMAND AND SURVEILLANCE, GENERAL	0.00	0.00	0.00
SUBGROUP 410	COMMAND AND CONTROL SYSTEMS	0.00	0.00	0.00
SUBGROUP 411	DATA DISPLAY GROUP	1.05	345.00	0.00
SUBGROUP 412	DATA PROCESSING GROUP	2.00	345.00	0.00
SUBGROUP 413	DIGITAL DATA SWITCHBOARDSS	0.00	0.00	0.00
SUBGROUP 414	INTERFACE EQUIPMENT	0.00	0.00	0.00
SUBGROUP 415	DIGITAL DATA COMMUNICATIONS	0.42	345.00	0.00
SUBGROUP 417	COMMAND AND CONTROL ANALOG SWITCHBOARDS	0.00	0.00	0.00
SUBGROUP 420	NAVIGATION SYSTEMS	0.00	0.00	0.00
SUBGROUP 421	NON-ELECTRIC/ELECTRONIC NAVIGATION AIDS	0.10	345.00	0.00
SUBGROUP 422	ELECTRICAL NAVIG. AIDS(INCL.NAVIG.LIGHT)	0.18	345.00	0.00
SUBGROUP 423	ELECTRONIC NAVIGATION SYSTEMS, RADIO	0.61	345.00	0.00
SUBGROUP 424	ELECTRONIC NAVIGATION SYS. ACOUSTICAL	0.27	345.00	0.00
SUBGROUP 425	PERISCOPES	0.00	0.00	0.00
SUBGROUP 426	ELECTRICAL NAVIGATION SYSTEMS	0.30	345.00	0.00
SUBGROUP 427	INERTIAL NAVIGATION SYSTEMS	0.18	345.00	0.00
SUBGROUP 428	NAVIGATION CONTROL MONITORING	0.00	0.00	0.00
SUBGROUP 430	INTERIOR COMMUNICATIONS	0.00	0.00	0.00
SUBGROUP 431	SWITCHBOARDS FOR I.C. SYSTEMS	0.15	345.00	0.00
SUBGROUP 432	TELEPHONE SYSTEMS	0.03	345.00	0.00
SUBGROUP 433	ANNOUNCING SYSTEMS	0.15	345.00	0.00
SUBGROUP 434	ENTERTAINMENT AND TRAINING SYSTEMS	0.51	345.00	0.00
SUBGROUP 435	VOICE TUBES AND MESSAGE PASSING SYSTEMS	0.08	345.00	0.00
SUBGROUP 436	ALARM, SAFETY, AND WARNING SYSTEMS	0.00	0.00	0.00
SUBGROUP 437	INDICATING, ORDER,AND METERING SYSTEMS	0.00	0.00	0.00
SUBGROUP 438	INTEGRATED CONTROL SYSTEMS	0.29	345.00	0.00
SUBGROUP 439	RECORDING AND TELEVISION SYSTEMS	0.03	345.00	0.00
SUBGROUP 440	EXTERIOR COMMUNICATIONS	0.00	0.00	0.00
SUBGROUP 441	RADIO SYSTEMS	3.93	345.00	0.00
SUBGROUP 442	UNDERWATER SYSTEMS	0.00	0.00	0.00
SUBGROUP 443	VISUAL AND AUDIBLE SYSTEMS	1.71	345.00	0.00
SUBGROUP 444	TELEMETRY SYSTEMS	0.00	0.00	0.00
SUBGROUP 445	TTY AND FACSIMILE SYSTEMS	0.18	345.00	0.00
SUBGROUP 446	SECURITY EQUIPMENT SYSTEMS	0.19	345.00	0.00
SUBGROUP 450	SURVEILLANCE SYSTEMS (SURFACE)	0.00	0.00	0.00
SUBGROUP 451	SURFACE SEARCH RADAR	0.16	345.00	0.00
SUBGROUP 452	AIR SEARCH RADAR (2D)	0.00	0.00	0.00
SUBGROUP 453	AIR SEARCH RADAR (3D)	0.00	0.00	0.00
SUBGROUP 454	AIRCRAFT CONTROL APPROACH RADAR	0.00	0.00	0.00
SUBGROUP 455	IDENTIFICATION SYSTEMS (IFF)	0.65	345.00	0.00
SUBGROUP 456	MULTIPLE MODE RADAR	1.00	345.00	0.00
SUBGROUP 459	SPACE VEHICLE ELECTRONIC TRACKING	0.00	0.00	0.00
SUBGROUP 460	SURVEILLANCE SYSTEMS (UNDERWATER)	0.00	0.00	0.00
SUBGROUP 461	ACTIVE SONAR	0.00	0.00	0.00
SUBGROUP 462	PASSIVE SONAR	0.00	0.00	0.00

NAVY SWBS 3 DIGIT WEIGHT REPORT

ITEM	DESCRIPTION	WT	LCG	VCG
SUBGROUP 463	MULTIPLE MODE SONAR	8.72	345.00	0.00
SUBGROUP 464	CLASSIFICATION SONAR	0.00	0.00	0.00
SUBGROUP 465	BATHYTHERMOGRAPH	0.00	0.00	0.00
SUBGROUP 470	COUNTERMEASURES	0.00	0.00	0.00
SUBGROUP 471	ACTIVE ECM (INCL COMBO. ACTIVE/PASSIVE)	5.45	345.00	0.00
SUBGROUP 472	PASSIVE ECM	0.00	0.00	0.00
SUBGROUP 473	TORPEDO DECOYS	0.00	0.00	0.00
SUBGROUP 474	DECOYS (OTHER)	3.70	345.00	0.00
SUBGROUP 475	DEGAUSSING	29.18	345.00	0.00
SUBGROUP 476	MINE COUNTERMEASURES	0.00	0.00	0.00
SUBGROUP 480	FIRE CONTROL SYSTEMS	0.00	0.00	0.00
SUBGROUP 481	GUN FIRE CONTROL SYSTEMS	1.48	345.00	0.00
SUBGROUP 482	MISSILE FIRE CONTROL SYSTEMS	0.00	0.00	0.00
SUBGROUP 483	UNDERWATER FIRE CONTROL SYSTEMS	3.28	345.00	0.00
SUBGROUP 484	INTEGRATED FIRE CONTROL SYSTEMS	0.00	0.00	0.00
SUBGROUP 489	WEAPON SYSTEM SWITCHBOARDS	0.00	0.00	0.00
SUBGROUP 490	SPECIAL PURPOSE SYSTEMS	0.00	0.00	0.00
SUBGROUP 491	ELEC. TEST, CKOUT, AND MONITORING EQUIP.	0.00	0.00	0.00
SUBGROUP 492	FLIGHT CONTROL AND INSTRMT LANDING SYS.	0.00	0.00	0.00
SUBGROUP 493	NON COMBAT DATA PROCESSING SYSTEMS	0.00	0.00	0.00
SUBGROUP 494	METEOROLOGICAL SYSTEMS	0.00	0.00	0.00
SUBGROUP 495	SPECIAL PURPOSE INTELLIGENCE SYSTEMS	0.00	0.00	0.00
SUBGROUP 498	COMMAND AND SURVEILLANCE OPERATING FLUID	0.00	0.00	0.00
SUBGROUP 499	COMMAND, SURV. REPAIR PARTS, SPEC. TOOLS	0.10	345.00	0.00
TOTAL GRP 4	COMMAND AND SURVEIL.	66.09	345.00	0.00

NAVY SWBS 3 DIGIT WEIGHT REPORT

ITEM	DESCRIPTION	WT	LCG	VCG
SUBGROUP 500	AUXILIARY SYSTEMS, GENERAL	0.00	0.00	0.00
SUBGROUP 510	CLIMATE CONTROL	0.00	0.00	0.00
SUBGROUP 511	COMPARTMENT HEATING SYSTEM	3.05	345.00	0.00
SUBGROUP 512	VENTILATION SYSTEM	40.14	345.00	0.00
SUBGROUP 513	MACHINERY SPACE VENTILATION SYSTEM	8.42	345.00	0.00
SUBGROUP 514	AIR CONDITIONING SYSTEM	23.76	345.00	0.00
SUBGROUP 515	AIR REVITALIZATION SYSTEMS (SUBMARINES)	0.00	0.00	0.00
SUBGROUP 516	REFRIGERATION SYSTEM	0.24	345.00	0.00
SUBGROUP 517	AUXILIARY BOILERS AND OTHER HEAT SOURCES	0.00	0.00	0.00
SUBGROUP 520	SEA WATER SYSTEMS	0.00	0.00	0.00
SUBGROUP 521	FIREMAN AND FLUSHING (SEA WATER) SYSTEM	20.18	345.00	0.00
SUBGROUP 522	SPRINKLER SYSTEM	17.57	345.00	0.00
SUBGROUP 523	WASHDOWN SYSTEM	0.00	0.00	0.00
SUBGROUP 524	AUXILIARY SEA WATER SYSTEM	12.43	345.00	0.00
SUBGROUP 526	SCUPPERS AND DECK DRAINS	0.84	345.00	0.00
SUBGROUP 527	FIREMAN ACTUATED SERVICES - OTHER	0.00	0.00	0.00
SUBGROUP 528	PLUMBING DRAINAGE	5.61	345.00	0.00
SUBGROUP 529	DRAINAGE AND BALLASTING SYSTEM	4.11	345.00	0.00
SUBGROUP 530	FRESH WATER SYSTEMS	0.00	0.00	0.00
SUBGROUP 531	DISTILLING PLANT	2.19	345.00	0.00
SUBGROUP 532	COOLING WATER	2.95	345.00	0.00
SUBGROUP 533	POTABLE WATER	0.81	345.00	0.00
SUBGROUP 534	AUX.STEAM AND DRAINS WITHIN MACHINE. BOX	0.00	0.00	0.00
SUBGROUP 535	AUX.STEAM AND DRAINS OUT OF MACHINE. BOX	0.00	0.00	0.00
SUBGROUP 536	AUXILIARY FRESH WATER COOLING	0.00	0.00	0.00
SUBGROUP 540	FUELS, LUBRICANTS, HANDLING AND STORAGE	0.00	0.00	0.00
SUBGROUP 541	SHIP FUEL AND FUEL COMPENSATING SYSTEM	68.10	345.00	0.00
SUBGROUP 542	AVIATION AND GENERAL PURPOSE FUELS	0.00	0.00	0.00
SUBGROUP 543	AVIATION, GENERAL PURPOSE LUBE. OIL	4.01	345.00	0.00
SUBGROUP 544	LIQUID CARGO	0.00	0.00	0.00
SUBGROUP 545	TANK HEATING	0.00	0.00	0.00
SUBGROUP 549	SPEC. FUEL, LUBE. HANDLING, STOWAGE	0.00	0.00	0.00
SUBGROUP 550	AIR, GAS, AND MISC. FLUID SYSTEMS	0.00	0.00	0.00
SUBGROUP 551	COMPRESSED AIR SYSTEMS	2.82	345.00	0.00
SUBGROUP 552	COMPRESSED GASES	0.00	0.00	0.00
SUBGROUP 553	O2 N2 SYSTEM	0.00	0.00	0.00
SUBGROUP 554	LP BLOW	0.00	0.00	0.00
SUBGROUP 555	FIRE EXTINGUISHING SYSTEMS	30.79	345.00	0.00
SUBGROUP 556	HYDRAULIC FLUID SYSTEM	0.00	0.00	0.00
SUBGROUP 557	LIQUID GASES, CARGO	0.00	0.00	0.00
SUBGROUP 558	SPECIAL PIPING SYSTEMS	0.00	0.00	0.00
SUBGROUP 560	SHIP CONTROL SYSTEMS	0.00	0.00	0.00
SUBGROUP 561	STEERING AND DIVING CONTROL STSTEMS	24.33	345.00	0.00
SUBGROUP 562	RUDDER	16.23	345.00	0.00
SUBGROUP 563	HOVERING AND DEPTH CONTROL (SUBMARINES)	0.00	0.00	0.00

NAVY SWBS 3 DIGIT WEIGHT REPORT

ITEM	DESCRIPTION	WT	LCG	VCG
SUBGROUP 564	TRIM SYSTEM (SUBMARINES)	0.00	0.00	0.00
SUBGROUP 565	TRIM AND HEEL SYSTEMS (SURFACE SHIPS)	0.00	0.00	0.00
SUBGROUP 566	DIVING PLANES AND STABILIZING FINS (SUB)	0.00	0.00	0.00
SUBGROUP 567	STRUT AND FOIL SYSTEMS	0.00	0.00	0.00
SUBGROUP 568	MANEUVERING SYSTEMS	0.00	0.00	0.00
SUBGROUP 570	UNDERWAY REPLENISHMENT SYSTEMS	0.00	0.00	0.00
SUBGROUP 571	REPLENISHMENT-AT-SEA SYSTEMS	10.19	345.00	0.00
SUBGROUP 572	SHIP STORES AND EQUIP. HANDLING SYSTEMS	20.11	345.00	0.00
SUBGROUP 573	CARGO HANDLING SYSTEMS	0.00	0.00	0.00
SUBGROUP 574	VERTICAL REPLENISHMENT SYSTEMS	0.00	0.00	0.00
SUBGROUP 580	MECHANICAL HANDLING SYSTEMS	0.00	0.00	0.00
SUBGROUP 581	ANCHOR HANDLING AND STOWAGE SYSTEMS	61.99	345.00	0.00
SUBGROUP 582	MOORING AND TOWING SYSTEMS	22.67	345.00	0.00
SUBGROUP 583	BOATS, BOAT HANDLING AND STOWAGE SYSTEMS	1.62	345.00	0.00
SUBGROUP 584	MECH. OPER. DOOR,GATE,RAMP,TURNTABLE SYS	220.00	345.00	0.00
SUBGROUP 585	ELEVATING AND RETRACTING GEAR	0.00	0.00	0.00
SUBGROUP 586	AIRCRAFT RECOVERY SUPPORT SYSTEMS	0.00	0.00	0.00
SUBGROUP 587	AIRCRAFT LAUNCH SUPPORT SYSTEMS	0.00	0.00	0.00
SUBGROUP 588	AIRCRAFT HANDLING, SERVICING AND STOWAGE	0.00	0.00	0.00
SUBGROUP 589	MISC. MECHANICAL HANDLING SYSTEMS	0.00	0.00	0.00
SUBGROUP 590	SPECIAL PURPOSE SYSTEMS	0.00	0.00	0.00
SUBGROUP 591	SCIENTIFIC AND OCEAN ENGINEERING SYS.	0.00	0.00	0.00
SUBGROUP 592	SWIMMER AND DIVER SUPPORT, PROTECT. SYS.	0.00	0.00	0.00
SUBGROUP 593	ENVIRONMENTAL POLLUTION CONTROL SYS.	1.39	345.00	0.00
SUBGROUP 594	SUBMARINE RESCUE, SALVAGE, SURVIVAL SYS.	0.00	0.00	0.00
SUBGROUP 595	TOWING,LAUNCHING,HANDLING FOR UNDERWATER	0.00	0.00	0.00
SUBGROUP 596	HANDLING SYS FOR DIVER, SUBMER. VEHICLES	0.00	0.00	0.00
SUBGROUP 597	SALVAGE SUPPORT SYSTEMS	0.00	0.00	0.00
SUBGROUP 598	AUXILIARY SYSTEMS OPERATING FLUIDS	15.29	345.00	0.00
SUBGROUP 599	AUX. SYSTEMS REPAIR PARTS AND TOOLS	1.99	345.00	0.00
TOTAL GRP 5	AUXILIARY SYSTEMS	643.82	345.00	0.00

NAVY SWBS 3 DIGIT WEIGHT REPORT

ITEM	DESCRIPTION	WT	LCG	VCG
SUBGROUP 600	OUTFIT AND FURNISHINS, GENERAL	0.00	0.00	0.00
SUBGROUP 610	SHIP FITTINGS	0.00	0.00	0.00
SUBGROUP 611	HULL FITTINGS	4.93	345.00	0.00
SUBGROUP 612	RAILS, STANCHIONS, AND LIFELINES	6.29	345.00	0.00
SUBGROUP 613	RIGGING AND CANVAS	0.64	345.00	0.00
SUBGROUP 620	HULL COMPARTMENTATION	0.00	0.00	0.00
SUBGROUP 621	NON-STRUCTURAL BULKHEADS	57.35	345.00	0.00
SUBGROUP 622	FLOOR PLATES AND GRATINGS	28.43	345.00	0.00
SUBGROUP 623	LADDERS	15.88	345.00	0.00
SUBGROUP 624	NON-STRUCTURAL CLOSURES	9.64	345.00	0.00
SUBGROUP 625	AIRPORTS, FIXED PORTLIGHTS, AND WINDOWS	2.02	345.00	0.00
SUBGROUP 630	PRESERVATIVES AND COVERINGS	0.00	0.00	0.00
SUBGROUP 631	PAINTING	88.94	345.00	0.00
SUBGROUP 632	ZINC COATING	0.00	0.00	0.00
SUBGROUP 633	CATHODIC PROTECTION	2.00	345.00	0.00
SUBGROUP 634	DECK COVERING	0.80	345.00	0.00
SUBGROUP 635	HULL INSULATION	11.34	345.00	0.00
SUBGROUP 636	HULL DAMPING	0.00	0.00	0.00
SUBGROUP 637	SHEATHING	4.59	345.00	0.00
SUBGROUP 638	REFRIGERATED SPACES	1.20	345.00	0.00
SUBGROUP 639	RADIATION SHIELDING	0.00	0.00	0.00
SUBGROUP 640	LIVING SPACES	0.00	0.00	0.00
SUBGROUP 641	OFFICER BERTHING AND MESSING SPACES	2.70	345.00	0.00
SUBGROUP 642	NONCOM. OFFICER BERTH AND MESS. SPACES	2.02	345.00	0.00
SUBGROUP 643	ENLISTED PERSONNEL BERTHING,MESS.SPACES	3.70	345.00	0.00
SUBGROUP 644	SANITARY SPACES AND FIXTURES	0.76	345.00	0.00
SUBGROUP 645	LEISURE AND COMMUNITY SPACES	0.99	345.00	0.00
SUBGROUP 650	SERVICE SPACES	0.00	0.00	0.00
SUBGROUP 651	COMMISSARY SPACES	2.81	345.00	0.00
SUBGROUP 652	MEDICAL SPACES	0.40	345.00	0.00
SUBGROUP 653	DENTAL SPACES	0.00	0.00	0.00
SUBGROUP 654	UTILITY SPACES	0.22	345.00	0.00
SUBGROUP 655	LAUNDRY SPACES	0.81	345.00	0.00
SUBGROUP 656	TRASH DISPOSAL SPACES	0.16	345.00	0.00
SUBGROUP 660	WORKING SPACES	0.00	0.00	0.00
SUBGROUP 661	OFFICES	13.24	345.00	0.00
SUBGROUP 662	MACHINERY CONTROL CENTER FURNISHINGS	0.67	345.00	0.00
SUBGROUP 663	ELECTRONICS CONTROL CENTER FURNISHINGS	3.32	345.00	0.00
SUBGROUP 664	DAMAGE CONTROL STATIONS	5.25	345.00	0.00
SUBGROUP 665	WKSHOP,LAB,TEST AREAS(PRTBLE TOOL,EQUIP)	11.69	345.00	0.00
SUBGROUP 670	STOWAGE SPACES	0.00	0.00	0.00
SUBGROUP 671	LOCKERS AND SPECIAL STOWAGE	2.83	345.00	0.00
SUBGROUP 672	STOREROOMS AND ISSUE ROOMS	5.17	345.00	0.00
SUBGROUP 673	CARGO STOWAGE	0.00	0.00	0.00
SUBGROUP 690	SPECIAL PURPOSE SYSTEMS	0.00	0.00	0.00

NAVY SWBS 3 DIGIT WEIGHT REPORT

ITEM	DESCRIPTION	WT	LCG	VCG
SUBGROUP 698	OUTFIT AND FURNISHINGS OPERATING FLUIDS	0.00	0.00	0.00
SUBGROUP 699	OUTFIT AND FURNISH.REPAIR PARTS AND TOOL	2.90	345.00	0.00
TOTAL GRP 6	OUTFITTING, FURNISH.	293.66	345.00	0.00

NAVY SWBS 3 DIGIT WEIGHT REPORT

ITEM	DESCRIPTION	WT	LCG	VCG
SUBGROUP 700	ARMAMENT, GENERAL	0.00	0.00	0.00
SUBGROUP 710	GUNS AND AMMUNITION	0.00	0.00	0.00
SUBGROUP 711	GUNS	0.00	0.00	0.00
SUBGROUP 712	AMMUNITION HANDLING	0.00	0.00	0.00
SUBGROUP 713	AMMUNITION STOWAGE	0.00	0.00	0.00
SUBGROUP 720	MISSILES AND ROCKETS	0.00	0.00	0.00
SUBGROUP 721	LAUNCHING DEVICES (MISSILES AND ROCKETS)	0.00	0.00	0.00
SUBGROUP 722	MISSILE,ROCKET,GUIDANCE CAPSULE HAND.SYS	0.00	0.00	0.00
SUBGROUP 723	MISSILE AND ROCKET STOWAGE	0.00	0.00	0.00
SUBGROUP 724	MISSILE HYDRAULICS	0.00	0.00	0.00
SUBGROUP 725	MISSILE GAS	0.00	0.00	0.00
SUBGROUP 726	MISSILE COMPENSATING	0.00	0.00	0.00
SUBGROUP 727	MISSILE LAUNCHER CONTROL	0.00	0.00	0.00
SUBGROUP 728	MISSILE HEATING, COOLING, TEMP. CONTROL	0.00	0.00	0.00
SUBGROUP 729	MISSILE MONITORING, TEST AND ALIGNMENT	0.00	0.00	0.00
SUBGROUP 730	MINES	0.00	0.00	0.00
SUBGROUP 731	MINE LAUNDHING DEVICES	0.00	0.00	0.00
SUBGROUP 732	MINE HANDLING	0.00	0.00	0.00
SUBGROUP 733	MINE STOWAGE	0.00	0.00	0.00
SUBGROUP 740	DEPTH CHARGES	0.00	0.00	0.00
SUBGROUP 741	DEPTH CHARGE LAUNCHING DEVICES	0.00	0.00	0.00
SUBGROUP 742	DEPTH CHARGE HANDLING	0.00	0.00	0.00
SUBGROUP 743	DEPTH CHARGE STOWAGE	0.00	0.00	0.00
SUBGROUP 750	TORPEDOES	0.00	0.00	0.00
SUBGROUP 751	TORPEDO TUBES	0.00	0.00	0.00
SUBGROUP 752	TORPEDO HANDLING	0.00	0.00	0.00
SUBGROUP 753	TORPEDO STOWAGE	0.00	0.00	0.00
SUBGROUP 754	SUBMARINE TORPEDO EJECTION	0.00	0.00	0.00
SUBGROUP 760	SMALL ARMS AND PYROTECHNICS	0.00	0.00	0.00
SUBGROUP 761	SM. ARMS, PYROTECHNICS LAUNCHING DEVICES	0.00	0.00	0.00
SUBGROUP 762	SMALL ARMS AND PYROTECHNICS HANDLING	0.00	0.00	0.00
SUBGROUP 763	SMALL ARMS AND PYROTECHNICS STOWAGE	0.00	0.00	0.00
SUBGROUP 770	CARGO MUNITIONS	0.00	0.00	0.00
SUBGROUP 772	CARGO MUNITIONS HANDLING	0.00	0.00	0.00
SUBGROUP 773	CARGO MUNITIONS STOWAGE	0.00	0.00	0.00
SUBGROUP 780	AIRCRAFT RELATED WEAPONS	0.00	0.00	0.00
SUBGROUP 782	AIRCRAFT RELATED WEAPONS HANDLING	0.00	0.00	0.00
SUBGROUP 783	AIRCRAFT RELATED WEAPONS STOWAGE	0.00	0.00	0.00
SUBGROUP 790	SPECIAL PURPOSE SYSTEMS	0.00	0.00	0.00
SUBGROUP 792	SPECIAL WEAPONS HANDLING	0.00	0.00	0.00
SUBGROUP 793	SPECIAL WEAPONS STOWAGE	0.00	0.00	0.00
SUBGROUP 797	MISC. ORDNANCE SPACES	0.00	0.00	0.00
SUBGROUP 798	ARMAMENT OPERATING FLUIDS	0.00	0.00	0.00
SUBGROUP 799	ARMAMENT REPAIR PARTS AND SPECIAL TOOLS	0.08	345.00	0.00
TOTAL GRP 7	ARMAMENT	0.08	344.99	0.00
	LIGHT SHIP WITHOUT MARGIN	6786.75	351.82	0.00

NAVY SWBS 3 DIGIT WEIGHT REPORT

ITEM	DESCRIPTION	WT	LCG	VCG
SUBGROUP M00	MARGINS	0.00	0.00	0.00
SUBGROUP M10	CONTRACTOR CONTROLLED MARGINS	0.00	0.00	0.00
SUBGROUP M11	DESIGN AND BUILDING MARGIN	0.00	0.00	0.00
SUBGROUP M12	BUILDING MARGIN (RESERVED)	0.00	0.00	0.00
SUBGROUP M20	GOVT. CONTROLLED MARGIN (SURFACE SHIP)	696.31	345.00	0.00
SUBGROUP M21	CONTRACT DESIGN MARGIN (SURFACE SHIP)	0.00	0.00	0.00
SUBGROUP M22	CONTRACT MODIFICATION MARGIN (SURF.SHIP)	0.00	0.00	0.00
SUBGROUP M23	GFM MARGIN (SURFACE SHIP)	0.00	0.00	0.00
SUBGROUP M24	FUTURE GROWTH MARGIN (SURFACE SHIP)	0.00	0.00	0.00
SUBGROUP M25	SERVICE LIFE MARGIN (SURFACE SHIP)	0.00	0.00	0.00
SUBGROUP M26	NUCLEAR MACHINERY MARGIN (SURFACE SHIP)	0.00	0.00	0.00
SUBGROUP M30	GOVT. CONTROLLED MARGIN STATUS (SUBS)	0.00	0.00	0.00
SUBGROUP M31	CONTRACT DESIGN MARGIN (SUBMARINE)	0.00	0.00	0.00
SUBGROUP M32	NAVSHIPS DEVELOPMENT MARGIN (SUBS)	0.00	0.00	0.00
SUBGROUP M33	NUCLEAR MACHINERY MARGIN (SUBS)	0.00	0.00	0.00
SUBGROUP M34	FUTURE GROWTH MARGIN (SUBMARINE)	0.00	0.00	0.00
SUBGROUP M35	STABILITY LEAD STATUS (SUBMARINE)	0.00	0.00	0.00
SUBGROUP M36	TRIMMING LEAD STATUS (SUBMARINES)	0.00	0.00	0.00
SUBGROUP M40	BALLAST STATUS (SUBMARINE)	0.00	0.00	0.00
SUBGROUP M41	LEAD, INTERNAL (SUBMARINE)	0.00	0.00	0.00
SUBGROUP M42	LEAD, EXTERNAL (SUBMARINES)	0.00	0.00	0.00
SUBGROUP M43	LEAD, MBT (SUBMARINES)	0.00	0.00	0.00
SUBGROUP M44	STEEL, INTERNAL (SUBMARINE)	0.00	0.00	0.00
SUBGROUP M45	STEEL, EXTERNAL (SUBMARINE)	0.00	0.00	0.00
SUBGROUP M46	STEEL, MBT (SUBMARINE)	0.00	0.00	0.00
SUBGROUP M47	LEAD CORRECTION, MBT (SUBS)	0.00	0.00	0.00
SUBGROUP M48	LEAD CORRECTION, OTHER THAN MBT (SUBS)	0.00	0.00	0.00
TOTAL GRP M	MARGINS	696.31	345.00	0.00
	LIGHT SHIP WITH MARGIN	7483.06	351.18	0.00

NAVY SWBS 3 DIGIT WEIGHT REPORT

ITEM	DESCRIPTION	WT	LCG	VCG
SUBGROUP F00	LOADS (FULL LOAD CONDITION)	0.00	0.00	0.00
SUBGROUP F10	SHIP FORCE, AMPHIB FORCE, TROOPS, PASSEN	0.00	0.00	0.00
SUBGROUP F11	SHIPS OFFICERS	1.25	345.00	0.00
SUBGROUP F12	SHIPS NONCOMMISSIONED OFFICERS	1.76	345.00	0.00
SUBGROUP F13	SHIPS ENLISTED MEN	3.09	345.00	0.00
SUBGROUP F14	MARINES	0.00	0.00	0.00
SUBGROUP F15	TROOPS	0.00	0.00	0.00
SUBGROUP F16	AIR WING PERSONNEL	0.00	0.00	0.00
SUBGROUP F19	OTHER PERSONNEL	0.00	0.00	0.00
SUBGROUP F20	MISSION RELATED EXPENDABLES AND SYSTEMS	0.00	0.00	0.00
SUBGROUP F21	SHIP AMMUNITION (FOR USE BY SHIP)	1.00	345.00	0.00
SUBGROUP F22	ORDINANCE DELIVERY SYSTEMS AMMUNITION	0.00	0.00	0.00
SUBGROUP F23	ORDINANCE DELIVERY SYSTEMS	0.00	0.00	0.00
SUBGROUP F24	ORDINANCE REPAIR PARTS (SHIP AMMO)	0.00	0.00	0.00
SUBGROUP F25	ORD. REPAIR PARTS (ORD. DELIV. SYS.AMMO)	0.00	0.00	0.00
SUBGROUP F26	ORDINANCE DELIVERY SYS.SUPPORT EQUIP.	0.00	0.00	0.00
SUBGROUP F29	SPECIAL MISSION RELATED SYS. EXPENDABLES	0.00	0.00	0.00
SUBGROUP F30	STORES	0.00	0.00	0.00
SUBGROUP F31	PROVISION AND PERSONNEL STORES	4.17	345.00	0.00
SUBGROUP F32	GENERAL STORES	0.93	345.00	0.00
SUBGROUP F33	MARINES STORES (FOR SHIPS COMPLEMENT)	0.00	0.00	0.00
SUBGROUP F39	SPECIAL STORES	0.00	0.00	0.00
SUBGROUP F40	FUELS AND LUBRICANTS	0.00	0.00	0.00
SUBGROUP F41	DIESEL FUEL	3809.53	345.00	0.00
SUBGROUP F42	JP-5	0.00	0.00	0.00
SUBGROUP F43	GASOLINE	0.00	0.00	0.00
SUBGROUP F44	DISTILLATE FUEL	0.00	0.00	0.00
SUBGROUP F45	NAVY STANDARD FUEL OIL (N.S.F.O.)	0.00	0.00	0.00
SUBGROUP F46	LUBRICATING OIL	45.60	345.00	0.00
SUBGROUP F49	SPECIAL FUELS AND LUBRICANTS	0.00	0.00	0.00
SUBGROUP F50	LIQUIDS AND GASES (NON-FUEL TYPE)	0.00	0.00	0.00
SUBGROUP F51	SEA WATER	0.00	0.00	0.00
SUBGROUP F52	FRESH WATER	1.72	345.00	0.00
SUBGROUP F53	RESERVE FEED WATER	1.00	345.00	0.00
SUBGROUP F54	HYDRAULIC FLUID	1.00	345.00	0.00
SUBGROUP F55	SANITARY TANK LIQUID	0.92	345.00	0.00
SUBGROUP F56	GAS (NON-FUEL TYPE)	0.00	0.00	0.00
SUBGROUP F59	MISC. LIQUIDS (NON-FUEL TYPE)	0.00	0.00	0.00
SUBGROUP F60	CARGO	0.00	0.00	0.00
SUBGROUP F61	CARGO, ORDNANCE, ORDNANCE DELIVERY SYS.	0.00	0.00	0.00
SUBGROUP F62	CARGO, STORES	0.00	0.00	0.00
SUBGROUP F63	CARGO, FUELS AND LUBRICANTS	0.00	0.00	0.00
SUBGROUP F64	CARGO, LIQUIDS (NON-FUEL TYPE)	0.00	0.00	0.00
SUBGROUP F65	CARGO, CRYOGENIC AND LIQUIFIED GAS	0.00	0.00	0.00
SUBGROUP F66	CARGO, AMPHIBIOUS ASSAULT SYSTEMS	4687.50	345.00	0.00

NAVY SWBS 3 DIGIT WEIGHT REPORT

ITEM	DESCRIPTION	WT	LCG	VCG
SUBGROUP F67	CARGO, GASES	0.00	0.00	0.00
SUBGROUP F69	CARGO, MISCELLANEOUS	0.00	0.00	0.00
SUBGROUP F70	SEA WATER BALLAST (SUBMARINES)	0.00	0.00	0.00
SUBGROUP F71	MAIN WATER BALLAST (SUBMARINES)	0.00	0.00	0.00
SUBGROUP F72	VARIABLE BALLAST WATER (SUBMARINES)	0.00	0.00	0.00
SUBGROUP F73	RESIDUAL WATER (SUBMARINES)	0.00	0.00	0.00
	TOTAL VARIABLE LOAD	8559.48	345.00	0.00
	FULL LOAD WITH MARGIN	16042.54	347.88	0.00

NAVY SWBS 1 DIGIT WEIGHT REPORT

GROUP	DESCRIPTION	WT	LCG	VCG
TOTAL GRP 1	HULL STRUCTURE	4927.79	354.39	0.00
TOTAL GRP 2	PROPULSION PLANT	602.35	345.00	0.00
TOTAL GRP 3	ELECTRIC PLANT	252.95	345.00	0.00
TOTAL GRP 4	COMMAND AND SURVEIL.	66.09	345.00	0.00
TOTAL GRP 5	AUXILIARY SYSTEMS	643.82	345.00	0.00
TOTAL GRP 6	OUTFITTING, FURNISH.	293.66	345.00	0.00
TOTAL GRP 7	ARMAMENT	0.08	344.99	0.00
	LIGHT SHIP WITHOUT MARGIN	6786.75	351.82	0.00
	MARGINS	696.31	345.00	0.00
	LIGHT SHIP WITH MARGIN	7483.06	351.18	0.00
	VARIABLE LOAD	8559.48	345.00	0.00
	FULL LOAD WITH MARGIN	16042.54	347.88	0.00

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* NUMBER OF NON-LOADING ERRORS AND/OR  *
*       WARNINGS ENCOUNTERED WHILE     *
*      PROCESSING THE DATA BASE WAS    *
                    0
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BASED ON MARE ISLAND NAVAL SHIPYARD

OPTIMIZATION PROGRAM ARCJ6

THE FOLLOWING DECKS ARE FROM OVERLAY 30,0 . . .

ARCJ6	**705050**	VAXB 50926	VAXB 50926 = CDC BASE 40930 V509260
CONVRG	**705050**	VAXB 50926	VAXB 50926 = CDC BASE 30516 V5017A
ERROR	**502110**	VAXB 50926	VAXB 50926 = CDC BASE 7269 V502110
NAMEG	**705050**	VAXB 50926	VAXB 50926 = CDC BASE 40712 V41205A
PAGE	**510080**	VAXB 51008	SPLIT OF ZERO INTO SETALL AND PAGE
PMF	**705050**	VAXB 50926	VAXB 50926 = CDC BASE 7269I V41205A
RWLAB	**610140**	VAXB 51008	CDC BASE PART OF OV1
VALNEW	**705050**	VAXB 50926	VAXB 50926 = CDC BASE 40930 V502190
VARVAL	**705050**	VAXB 50926	VAXB 50926 = CDC BASE 91019I V41205A

THE FOLLOWING DECKS ARE FROM OVERLAY 31,0 . . .

CKVARN	**705050**	VAXB 51008	VAXB 51008 = CDC BSE 91019I V41205A
READ	**705050**	VAXB 50926	VAXB 50926 = CDC BASE 91019 V509260
DUPVAR	**40930A**	VAXB 51008	VAXB 51008 = CDC BASE VER V40930A
READC1	**705050**	VAXB 50926	VAXB 50926 = CDC BASE 50926 SEC 1
READC2	**705050**	VAXB 50926	VAXB 50926 = CDC BASE 50926 SEC 2
READC3	**705050**	VAXB 50926	VAXB 50926 = CDC BASE 50926 SEC 3
SETALL	**705050**	VAXB 50926	VAXB 50926 = CDC BASE 91019 V502190
SFTNV	**510080**	VAXB 51008	VAXB 51008 = CDC BASE 50926 OV1 SEC
SFUN2	**705050**	VAXB 51008	VAXB 51008 = CDC MOD1 3125I V40930A

THE FOLLOWING DECKS ARE FROM OVERLAY 32,0 . . .

REPORT	**705050**	VAXB 51008	VAXB 51008 = CDC BSE 91019I V502130
ERROR5	**510080**	VAXB 51008	VAXB 51008 = CDC BASE 40710 V50206A
ESET	**705050**	VAXB 51008	VAXB 51008 = CDC BASE VER I V40710A
LOAD	**705050**	VAXB 51008	VAXB 51008 = CDC BASE 91019 V50206A
LTNV	**510080**	VAXB 51008	VAXB 51008 = PORTION OF SUB LOAD
SETE	**705050**	VAXB 51008	VAXB 51008 = CDC BASE VER I V40719A
SETF	**705050**	VAXB 51008	VAXB 51008 = CDC BASE VER I V40719A
SETL	**705050**	VAXB 51008	VAXB 51008 = CDC BASE VER I V40719A
SETV	**705050**	VAXB 51008	VAXB 51008 = CDC BSE 90720I V41205A
XREFDM	**705050**	VAXB 51008	VAXB 51008 = CDC BASE 40930 V41205A

THE FOLLOWING DECKS ARE FROM OVERLAY 36,0 . . .

RPTNO2	**705050**	VAXB 50926	VAXB 50926 = CDC BASE 40930 V504080
XREFRP	**705050**	VAXB 51008	VAXB 51008 = CDC BASE 40930 V502110

THE FOLLOWING DECKS ARE FROM OVERLAY 33,0 . . .

SOLVE	**705050**	VAXB 51008	VAXB 51008 = CDC BASE 40930 V508092
COMREP	**705050**	VAXB 51008	VAXB 51008 = CDC BASE 40930 V504080
NONLIN	**508090**	VAXB 50108	VAXB 51008 = CDC BASE 7269 V508090

THE FOLLOWING DECKS ARE FROM OVERLAY 34,0 . . .

WTREPT2	**705050**	VAXB 51008	VAXB 51008 = CDC BASE 91019 V502130