

AD 42639

DAMAGE STABILITY SYSTEM
For The
SHIP HULL CHARACTERISTIC PROGRAM

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DAMAGE STABILITY SYSTEM FOR THE SHIP HULL CHARACTERISTICS PROGRAM

I. GENERAL

The Damage Stability system for the Ship Hull Characteristics Program (SHCP) consists of two major supervisor programs;

A. Subroutine CMPRTMNT

This program supervises the generation of compartment offsets for compartment bulkheads and all intermediate ship stations that lie within the bounds of the compartment, based on an outline description of each bulkhead. A Compartment Data Table (CDT), similar in form to the Ship Data Table (SDT), of offsets, sectional areas, centers of area, and breakpoint, is then created and stored on the Ship Data Tape (SDTPE) for later recall by Subroutine DAMAGE.

B. Subroutine DAMAGE

This program supervises the calculation of damage stability characteristics of the ship minus selected flooded compartments for a range of draft, trim, and heel conditions. The sequence of events for each condition of compartments, draft, trim, and heel is as follows:

1. The SDT is read from the SDTPE.
2. The volumetric properties of the intact ship are calculated.
3. For each selected compartment, the associated CDT is read from the SDTPE and the volumetric properties of the compartment are calculated and stored.
4. The net volumetric properties and the righting arm for the ship minus compartments, i.e., the flooded condition, is computed and output for the condition is printed out.

The Compartment Data Tables may be created by use of Subroutine CMPRTMNT or by submitting compartment offsets in the same manner of submission as ship offsets for the Ship Data Table. If the compartments are submitted by the latter method, the LBP card must contain the Length of the Ship, and the stations must be in terms of ship stations.

C. Program Identification Numbers for calling by the Executive Routine

CMPRTMNT.....	007
DAMAGE.....	008

II. Subroutine CMPRTMNT

A. Execution Time: 50 seconds/compartment, maximum

B. Input:

1. Ship Data Table (on tape)
2. Card Types 1, 2, 6: see NAVSEC documentation of the EXECutive Program for description of card types 1, 2, 6, E, which are always required. NAVSHIPS 0900-006-5600.
3. Card Type 25: Number of compartments; Format-I5; NCOMP1

For each compartment

4. Card Type 26: Compartment serial number, compartment name, date, symmetry sentinal, number of bulkheads in the compartment; Format-I4, 10A4, 6X, 2I3; ISERNO, NAME 1S, DATE, 11SYM, NBULK. Symmetry sentinal definitions: 000, compartment on, or flooded on, both sides of the centerline; b-1, compartment on, or flooded on, the port side only; b+1 compartment on, or flooded on, the starboard side only. (b represents blank)

For each bulkhead

5. Card Type 27: Number of outline points on the bulkhead, distance of bulkhead from FP 9 (in feet); Format-I5, F10.2; NINT(I), XBLK(I)

For each outline point

6. Card Type 28: Z of outline point, Y of outline point; Format-2F10.2; ZINT(I, IPT), YINT(I, IPT)

C. Sample Input

2 compartments, 2 bulkheads each, 3 outline points on 1st bulkhead of each compartment, 4 outline points on 2nd bulkhead of each compartment;

Card deck by card type number: 1,2,6,25,26,27,28,28,28,27,28,28,28,28,26,27,28,28,28,27,28,28,28,28,E

III Subroutine DAMAGE

- A. Execution Time: $(1 + \text{number of compartments in set}) \times 5 \times \text{number of drafts} \times \text{number of heels} \times \text{number of trims}$.

time is in seconds for a set of compartments

B. Input:

1. Ship Data Table and Compartment Data Tables (on SDTPE)
2. Card Types 1,2,6 ; see NAVSEC documentation of EXECUTIVE routine for description of card types 1,2,6 which are always required.
NAVSHIPS 0900-006-5600
3. Card Type 29: Number of sets of compartments (maximum:20);
Format- 15; NSET

For each compartment set

4. Card Type 30: Number of compartments in set (maximum:25);
Format- 14; L1COMP(I)
5. Card Type 31: List of serial numbers of compartments in set 1 and associated permeabilities (10 Compartments per card);
Format- 10(14,F4.2); L2COMP(I,J), PERM8(I,J)
6. Card Type 32: Number of trims, number of drafts, number of heels (maximum:3,8,10); Format - 315; N4TRIM, N4DRFT, N4HEEL
7. Card Type 33: Input trim angles in degrees (one per card);
Format - F10.3; D1TRIM
8. Card Type 34: Input drafts in feet above baseline (one per card);
Format - F10.3; D1DRFT
9. Card Type 35: Input heel angles in degrees (one per card);
Format - F10.3; D1HEEL

C. Sample Input

Two sets of compartments, the first set with less than 10 compartments, the second set with more than 10, 5 drafts, no trims and 6 heels;

Card deck by card type number: 1,2,6,29,30,31,31,30,31,32,34,34,
34,34,35,35,35,35,35,E

NOTE: There is no Card Type 33 because no trims were submitted. In this case a trim of zero is assumed and submission of Card Type 33 is not required.

The Damage Stability Computer Programs described herein are for incorporation into the Ship Hull Characteristics Program developed by Mr. G. E. Hirschberg and Lt. R. L. Warters at the Naval Ship Engineering Center, Washington, D. C.

For documentation of those programs not part of the Damage Stability System, the reader should see the documentation produced by NavSec:

Nav Ships Number 0900-06-	TITLE
5600	EXECUTIVE
5610	AREAS
5620	BAL
5630	COEF1C
5640	COEF1I
5650	DRAFT
5670	FNTPIF, FNTPIF, FNTGIF, TRANSF, & TESTS
5690	FLNGTH
5700	HYDRO
5710	HILIM
5720	OFFSET
5730	STRNTH
5740	TABLE
5750	TEST1
5760	TEST2
5770	VOLUME
5790	WAVE
5800	WPLANE
5810	WPLAN1
5820	WETSRF
5830	INTACT

DOUBLE OFFSET MODIFICATION

I. Modification Description:

The modifications described herein permits YGHULL to handle all conceivable hull forms with the exception of the trimaran for all of the major supervisors within the program system.

The major modification to the program exists in Subroutine AREAS. Except for housekeeping changes such as changes in the DIMENSION and COMMON Statements and limits of some DO Loops the system remains unchanged.

If the hull form is such that double offsets exist over some portion of the entire length - the catamaran hull form and a well are examples - the hull is submitted to the program in two parts. One "hull" is the offsets of the outer portion of the hull. The second "hull" consists of offsets of the inboard portion of the hull. See Figure 1. The Subroutine AREAS then subtracts the properties of the "inner hull" from the "outer hull" to get the properties of the actual ship hull form. The properties of the section are then returned to Subroutine VOLUME and the system then proceeds normally.

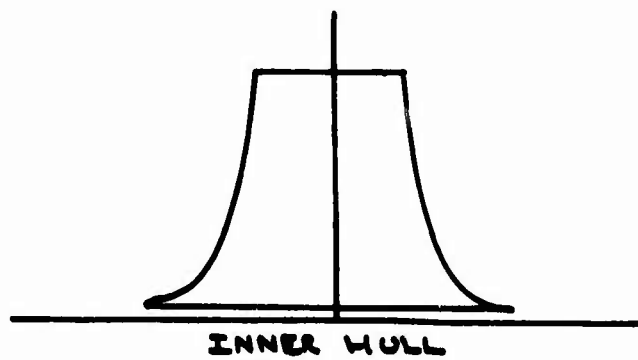
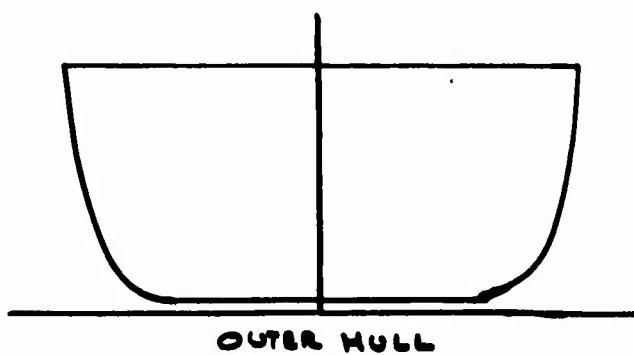
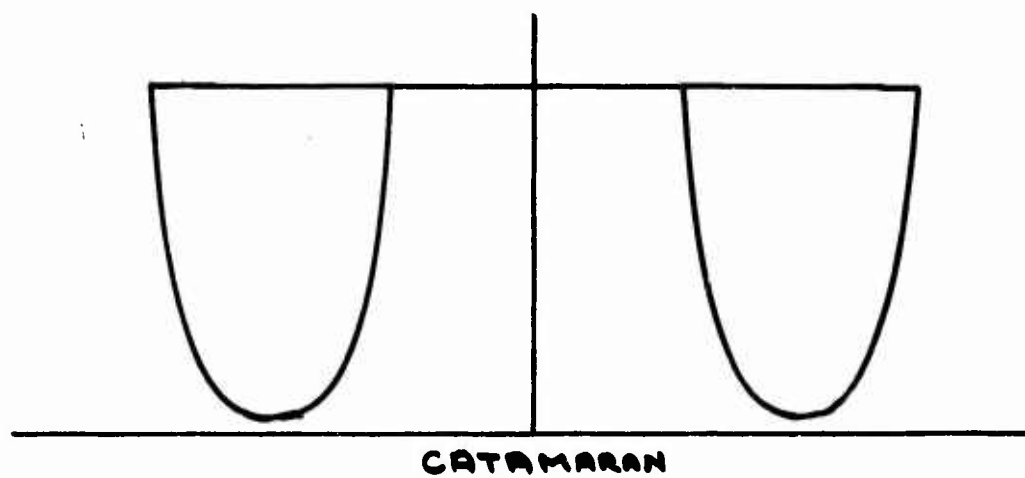
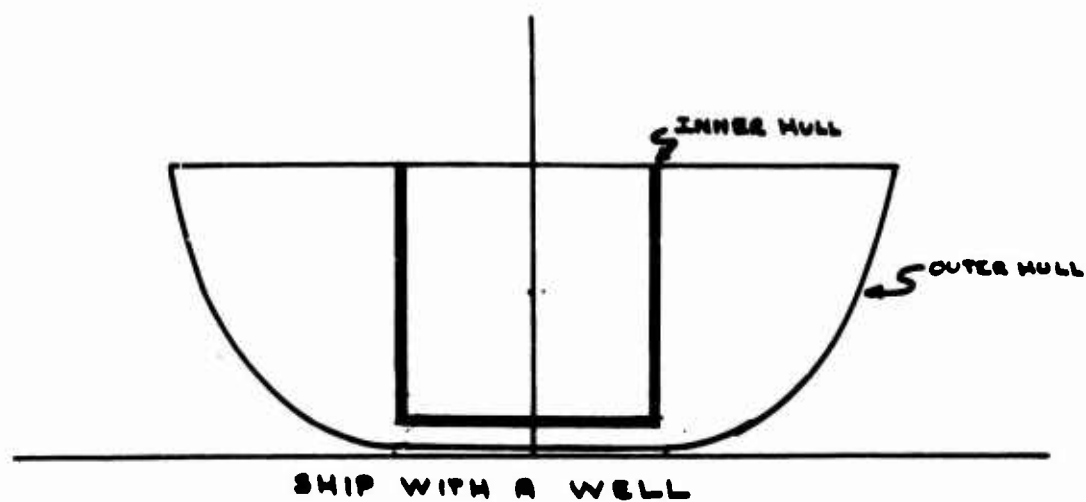
The basic operation of AREAS is now as follows:

The program proceeds through AREAS normally to the point just before returning to the calling program which is Statement 1307. At that point the new variable ICAT is interrogated to see if it is equal to one, two or three. If ICAT is one, then AREAS assumes a normal ship and returns to the calling program. If ICAT is two, AREAS assumes a "dual hull" form and stores the properties computed so far in temporary accumulators. These are the properties of the "outer hull". The variable ICAT is then set equal to three and the station indicator ISTAT is increased by NSTAT, the number of stations in one hull. The change in the index ISTAT is based on the premise that that two "hulls" are submitted in sequential order with the "outer hull" being first, the "inner hull" being second and each hull having the same number of stations located at the same place along the longitudinal axis. The program then makes another pass through AREAS and computes the properties of the "inner hull".

This time when the program gets to the test of the variable ICAT following Statement 1307 the value of this variable is three (3). The program then branches to Statement 799 where the net properties of the section are computed. ICAT is reset to two and ISTAT is reset to its original value. Control then returns to the calling program with properties of the net sections stored in the work table.

II Input:

Each "hull" is submitted in accordance with standard procedures, the last point on the last station of each hull having a breakpoint indicator value of 99999.



DOUBLE OFFSET MODIFICATION (continued)

Each "hull" must have data submitted at the same stations. If there is no inner hull at a station - in the case of a well on inner hull exists only in way of the well - a data card must still be submitted for that station, the Y and Z values being zero with a breakpoint indicator value of 88888 or 99999 if it is the last station.

On any given station, the data points on the inner hull may be independent of the data points on the outer hull.

The outer hull is submitted first, the inner hull follows, and the LBP card is last.

Card Type 1: The number 002 should be punched in cc. 51-53 if two hulls are being submitted; 000 for a regular hull.

LONGITUDINAL BREAKPOINT MODIFICATION

I Modification Description:

The standard version of the Ships Hull Characteristics Program performs longitudinal integration from the first station to the last station by integrating groups of 3 consecutive stations according to Simpson's first rule (1, 4, 1) and summing the results. If there are an even number of stations, or if the middle station in a group of 3 does not lie half way between the first and third, interpolation is performed to find the values of the missing, or evenly spaced, station. However, there is no method of taking into account any longitudinal discontinuities in the hull, such as the end of a poop or forecastle deck, or the boundaries of a well (the latter require incorporation of the Double Offset Modification to SHCP). The modification described herein eliminates this restriction.

This is accomplished by submitting twice any station where longitudinal integration should stop, and begin again. For example, in Figure 1 it is desired to stop integration at the end of the sonar dome (and then begin again). Thus, Station 4 should be submitted twice.

Figure 2 illustrates a slightly different case. Here the area of Station 5 is different when integrating aft from Station 1, than when integrating aft from Station 5. Consequently, the first Station 5 submitted will describe the area 5A in Figure 2, and the second Station 5 submitted will describe the area 5B. The program integrates to the first Station 5 encountered (area 5A), and begins again at the second Station 5 (area 5B).

Figure 3 illustrates the use of this feature when using the Double Offset Modification. Here a well begins at Station 6 and ends at Station 8. Thus it is desired to resubmit both of these station twice. They are submitted as illustrated 6A1, 6A2, 6B1, 6B2, 8A1, 8A2, 8B1, 8B2.

Each double station counts as two stations with respect to all arrays. This should be considered when counting total station so as not to exceed the maximum number permitted, which is 30.

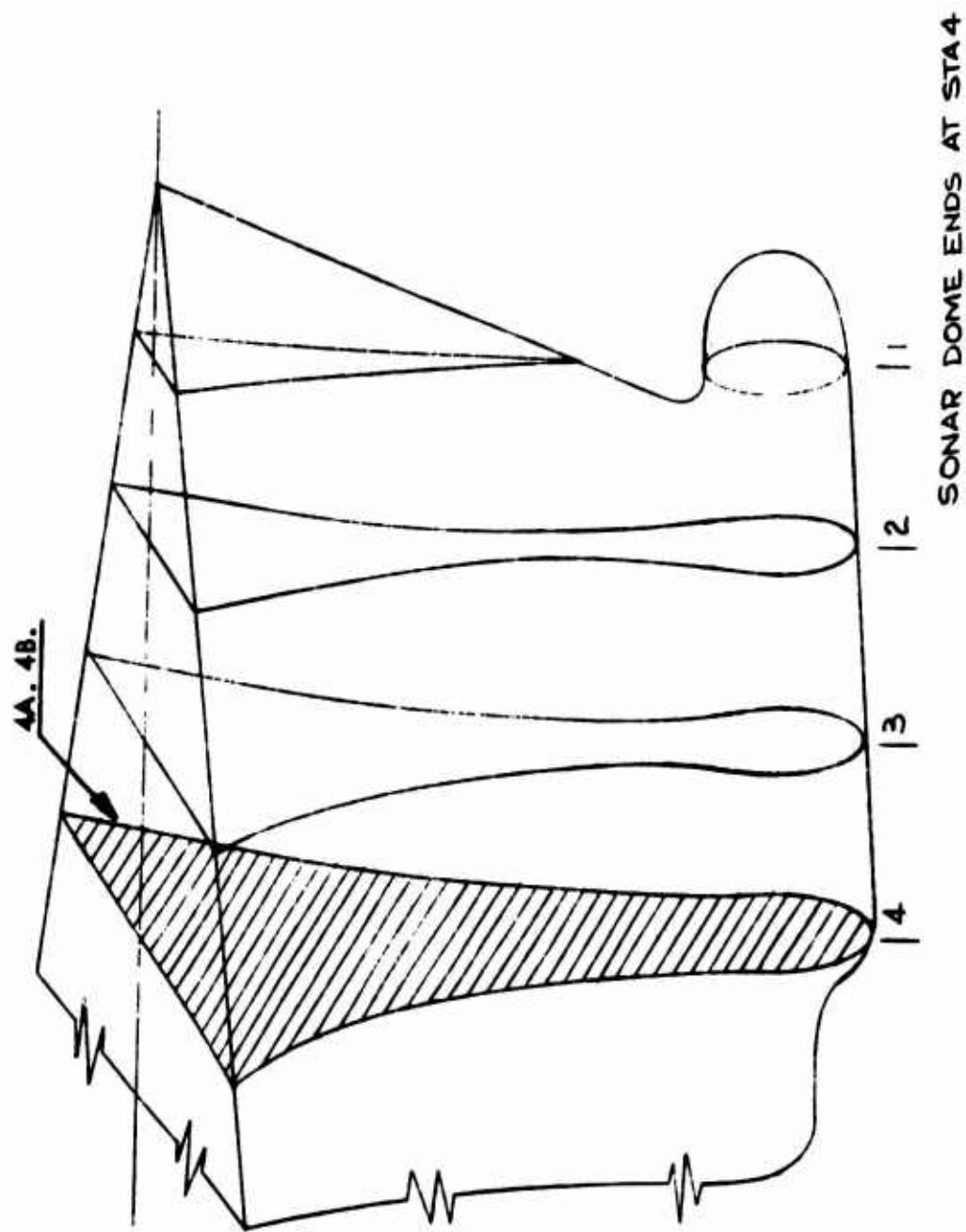
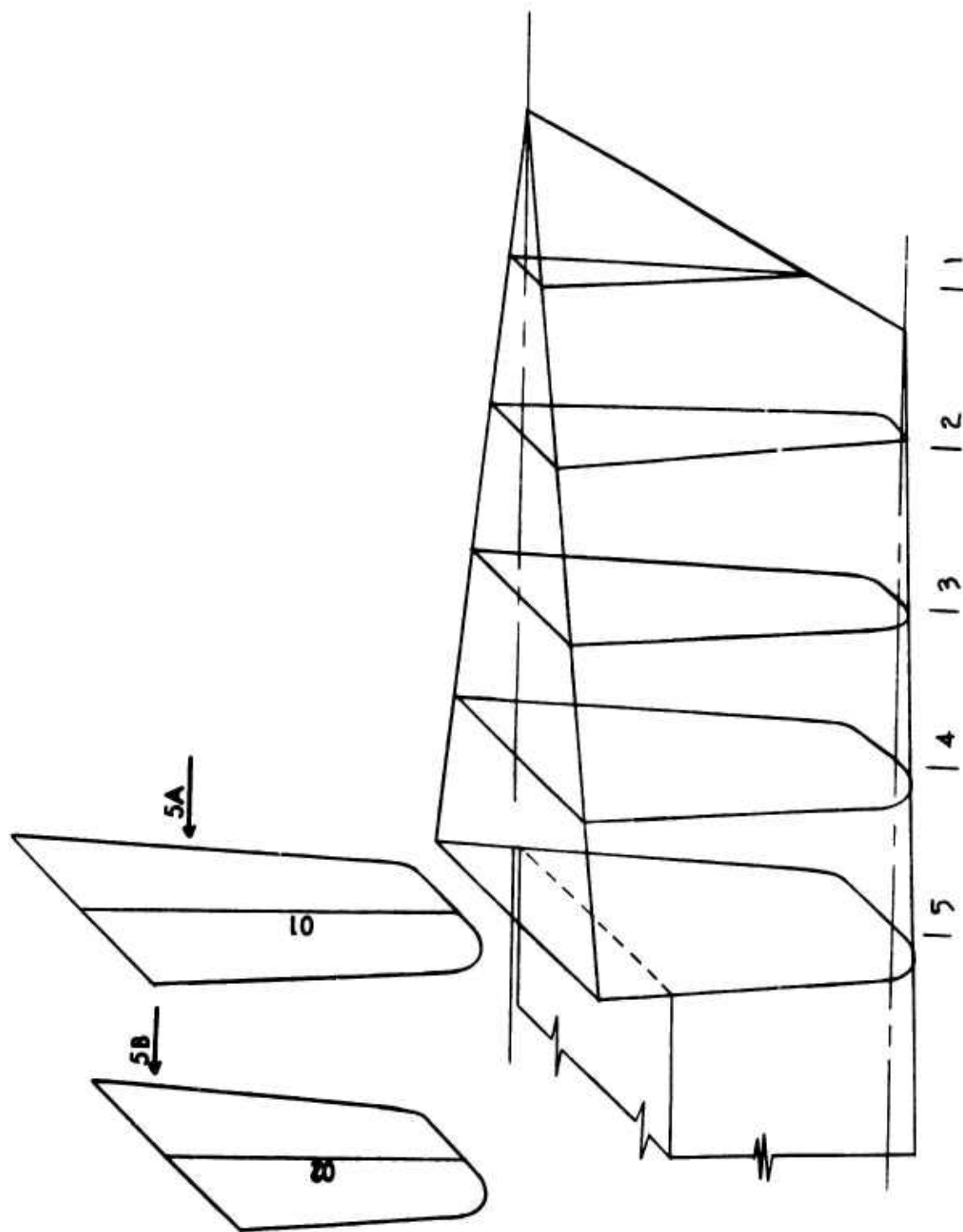


FIGURE 1



FOC'S/L DECK ENDS AT STA 5
FIGURE 2

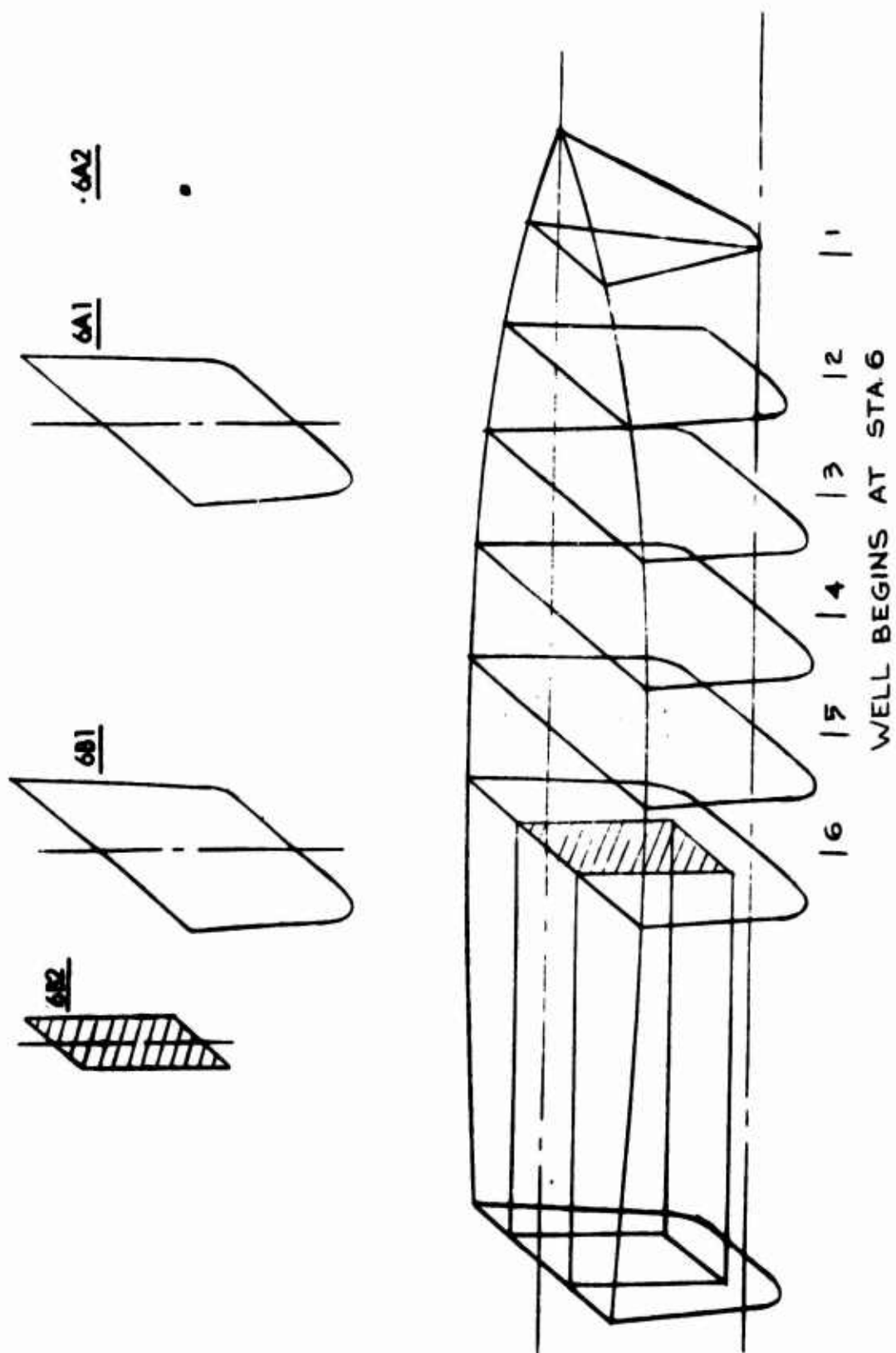


FIGURE 3

SUBROUTINE CMPRTMNT

Description:

This program supervises the generation of compartment offsets for compartment bulkheads and all intermediate ship stations that lie within the bounds of the compartment, based on an outline description of each bulkhead.

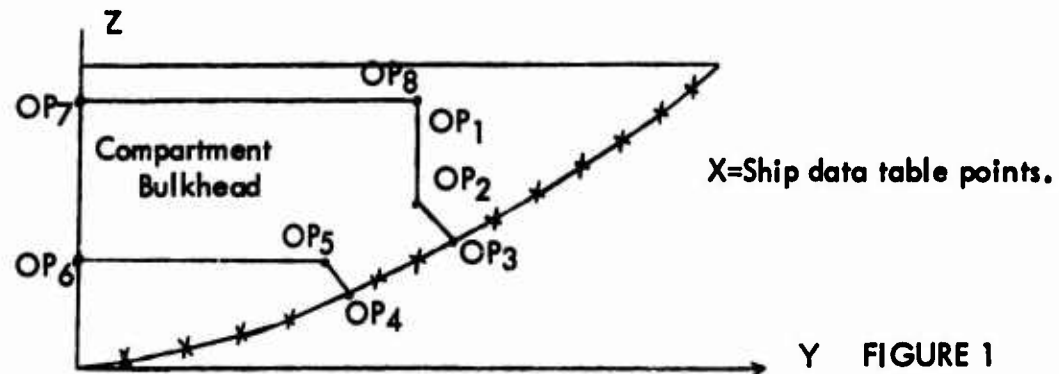
The basic operation of the program for each compartment is as follows:

1. The Ship Data Table (SDT) is read from the Ship Data Tape (SDTPE).
2. The compartment title card is read.
3. The outline point description for all bulkheads are read.
4. The outline point description of each bulkhead is tested to determine if a double hull is required for the compartment.
5. Subroutine GENERATE is called which generates the compartment offsets.
6. The compartment offsets are transferred to the ship offset arrays.
7. Subroutine OFFSET is called where the SDT for the compartment is created and stored on the SDTPE.

BULKHEAD OUTLINE DEFINITION POINTS

Each bulkhead is described by a series of Z and Y coordinates which defines the outline of the bulkhead section with reference to the ship section and the ship's YZ coordinate system. These points shall be referred to hereafter as "outline points" or "OP's."

Outline points exist wherever there is a discontinuity in the section outline, such as the intersection of a longitudinal bulkhead with a deck or the hull. Figure 1 illustrates the definition of outline points.



It should be noted that the half section of the bulkhead is defined, the bulkhead being assumed to be symmetrical about the centerline. The value of the input variable $11SYM$ on the Compartment Title Card indicates which side of the centerline or both that the compartment lies on.

The northeast most point of the bulkhead is OP #1. Successive OP's are taken at each discontinuity in the outline proceeding in a clockwise direction. The last OP, #8 in Figure 1, is identical to OP #1.

There are four basic types of OP's:

1. $Z = \text{value}$, $Y = \text{value}$; describes an OP occurring entirely with the ship section. (OPs #1, 2, 5, 6, 7 in Figure 1)
2. $Z = \text{value}$, $Y = 9999$; describes an OP defining an intersection with the hull surface (OPs #3, 4 in Figure 2)
3. $Z = 9999$, $Y = \text{value}$ or 9999 ; describes an OP existing at the top of the ship section (Figure 2, OPs 1, 3, 4)
4. $Z = -9999$, $Y = \text{value}$ or 9999 ; describes an OP existing at the bottom of the ship section. (Figure 2, OP #2)

BULKHEAD OUTLINE DEFINITION POINTS (continued)

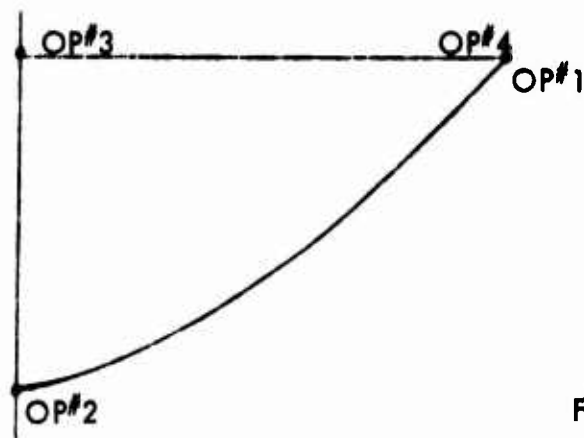


FIGURE 2

Use of these four OP types must be strictly adhered to within the above definitions. Violations of these rules will produce errors in the bulkhead section definition.

Figures 3 thru 6 further illustrate the use of the four OP types with a single hull vessel.

The use of the four OP types is identical with a double hull vessel. Care should be taken that all OP values are defined with respect to the centerline of the ship not of the individual hull. In other words, use the same coordinate system used to originally describe the ship.

Figures 7 thru 11 illustrate principles of use with double hulls.

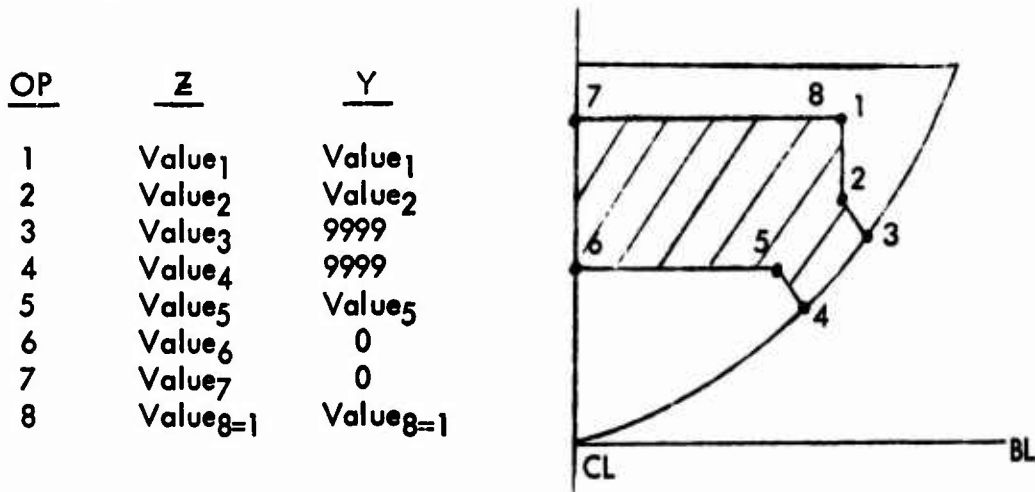


FIGURE 3

BULKHEAD OUTLINE DEFINITION POINTS (continued)

<u>OP</u>	<u>Z</u>	<u>Y</u>
1	9999	Value ₁
2	Value ₂	9999
3	-9999	0
4	9999	0
5	9999	Value ₅₌₁

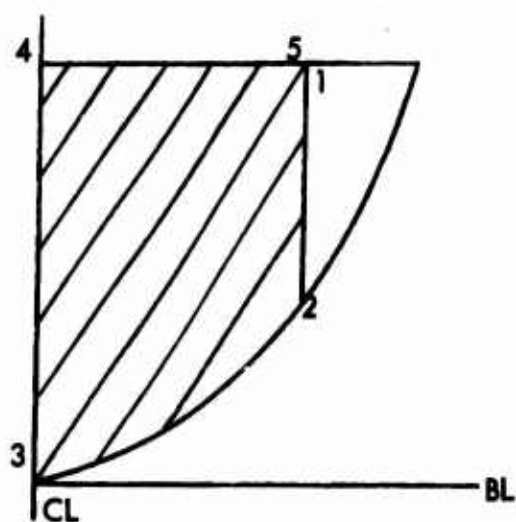


FIGURE 4

<u>OP</u>	<u>Z</u>	<u>Y</u>
1	9999	9999
2	-9999	0
3	9999	0
4	9999	9999

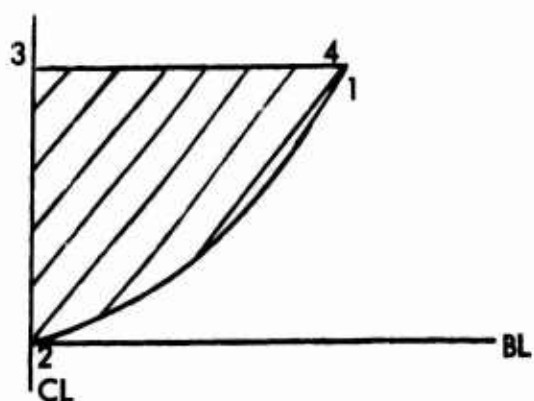


FIGURE 5

<u>OP</u>	<u>Z</u>	<u>Y</u>
1	Value ₁	9999
2	Value ₂	9999
3	Value ₃	Value
4	Value ₄	Value
5	Value ₅₌₁	9999

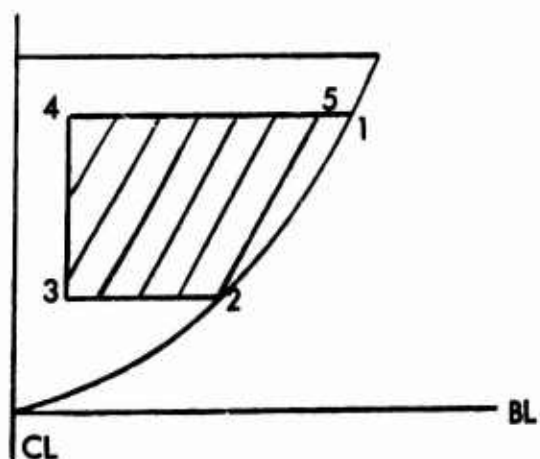


FIGURE 6

BULKHEAD OUTLINE DEFINITION POINTS (continued)

<u>OP</u>	<u>Z</u>	<u>Y</u>
1	Value ₁	9999
2	-9999	Value ₂
3	Value ₃	Value ₃
4	Value ₄ =1	9999

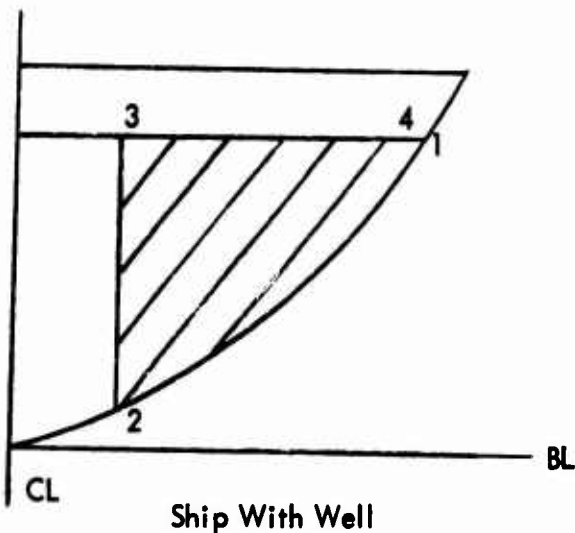


FIGURE 7

<u>OP</u>	<u>Z</u>	<u>Y</u>
1	Value ₁	9999
2	Value ₂	9999
3	Value ₃	9999
4	Value ₄	9999
5	Value ₅	9999

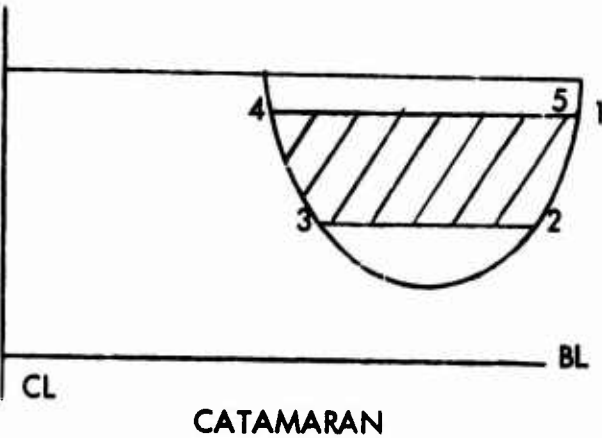


FIGURE 8

<u>OP</u>	<u>Z</u>	<u>Y</u>
1	9999	9999
2	-9999	9999
3	9999	9999
4	9999	9999

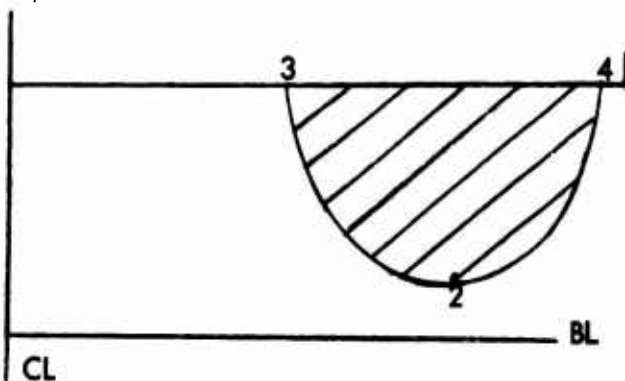


FIGURE 9

NOTE: OP 2 is always required - i.e. lowest point on hull.

BULKHEAD OUTLINE DEFINITION (continued)

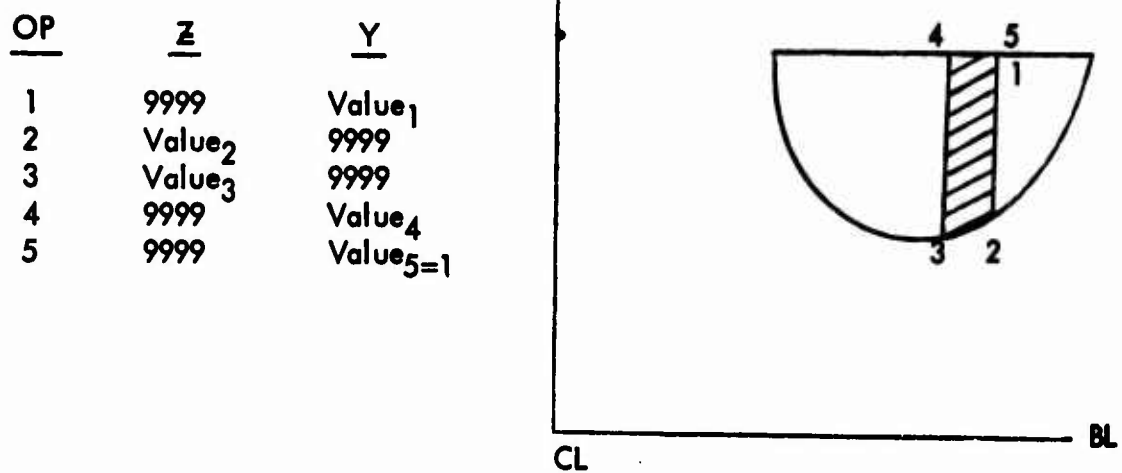


FIGURE 10

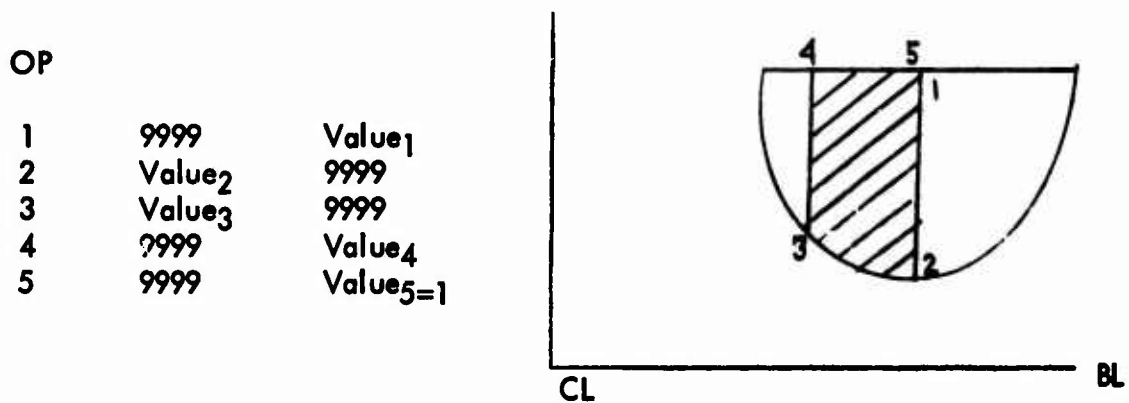
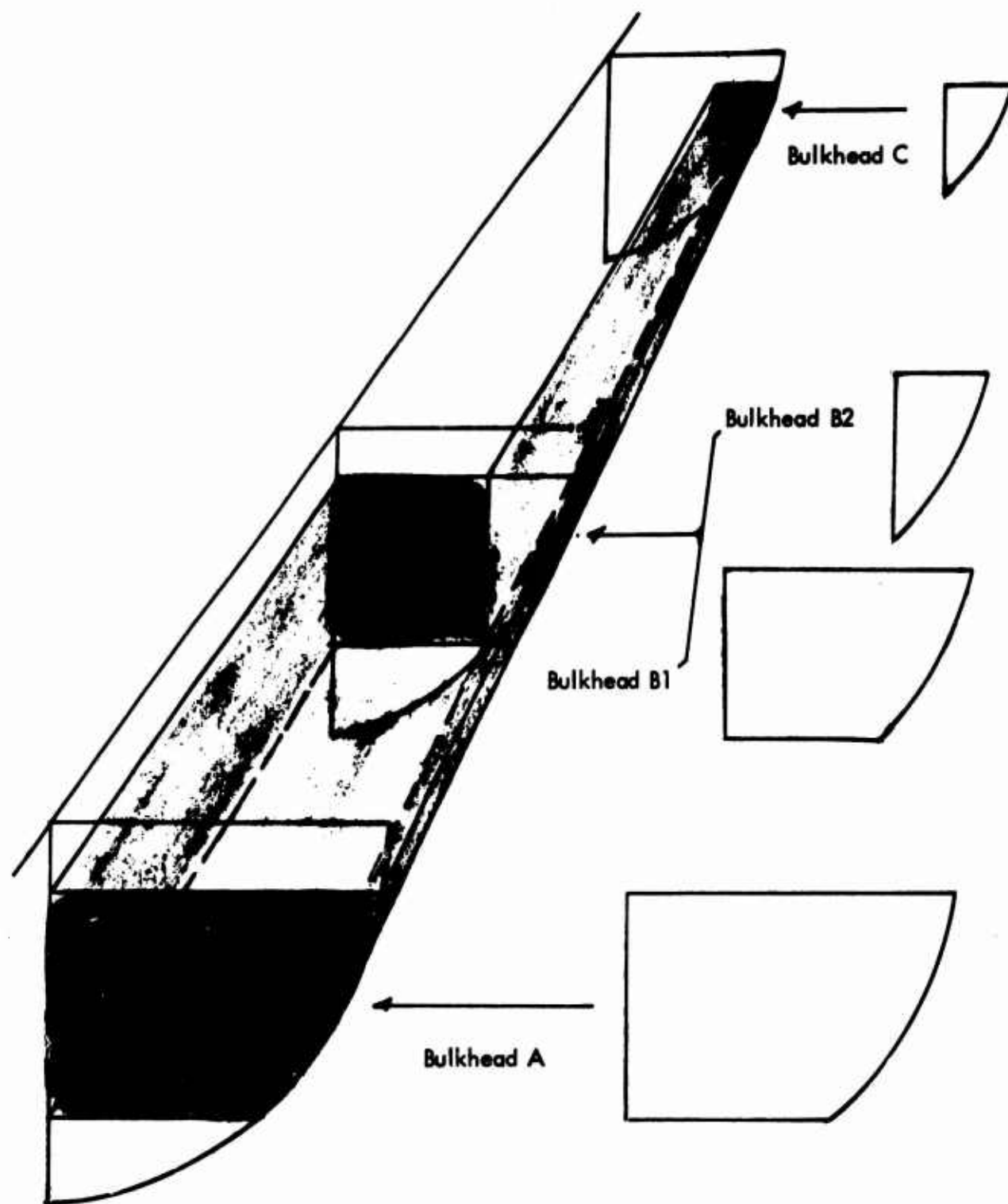


FIGURE 11

NOTE: The OP definition of Figures 10 and 11 are identical, even though in the former case the hull surface used is the "outer ship hull" and in the latter case it is the "inner ship hull." The program determines which ship hull to use by the following logic: OPs are taken clockwise from the NE point; therefore, if ΔZ between the first OP that is a hull intersection and the following OP which must also be a hull intersection, that is $Z_3 - Z_2$, is negative, the ship hull must be the outer one; if ΔZ is positive, it must be the inner one. This follows from the definition of ship outer and inner hulls- the outer hull being that portion of the hull surfact lying outboard of the lowest point; the inner hull being that portion of the hull surfact lying inboard of the lowest point.

COMPARTMENT DEFINITION



COMPARTMENT DEFINITION (continued)

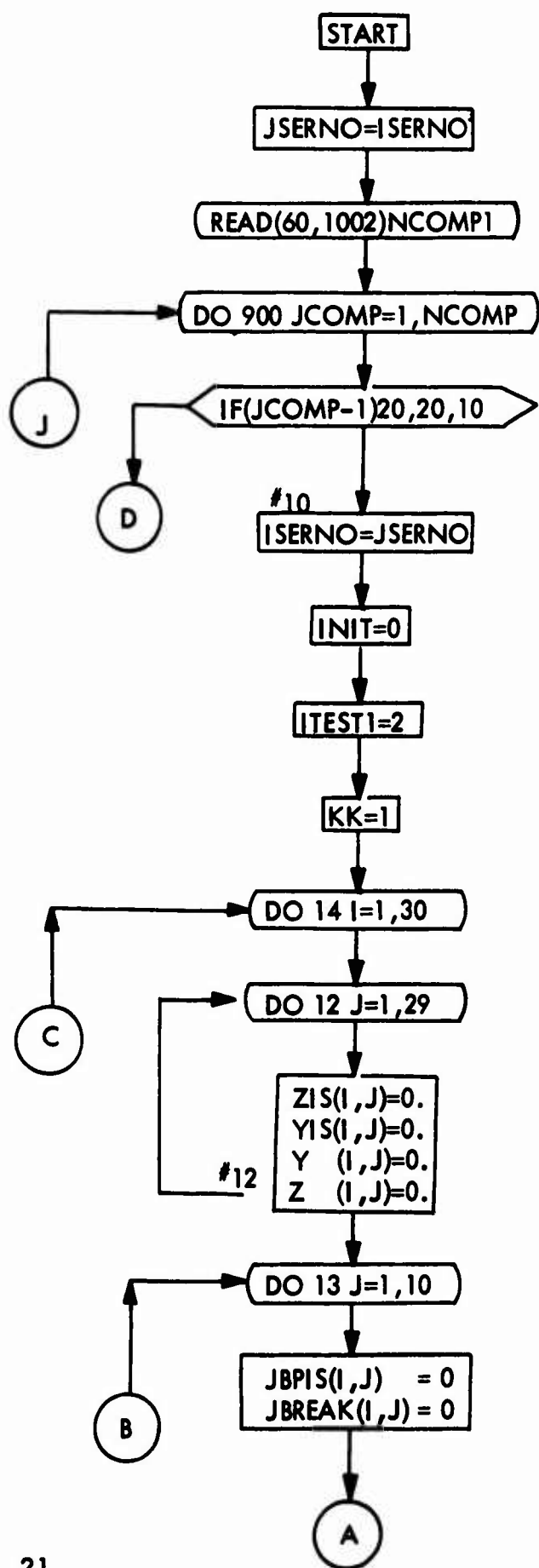
Four "bulkheads" are required to describe the compartment illustrated on the previous page. Bulkheads A and C are obvious. At B two "bulkheads" are submitted, B1 and B2, to alter the cross section of the compartment. These "bulkheads" have the same longitudinal location in the ship and are consequently treated as a double station. Thus, in integrating between A and B, the B1 cross section is used; in integrating between B and C, the B2 cross section is used.

The illustrated compartment may be described as one "compartment", i.e. from A-C, only when the entire run from A-C exists on both sides of the centerline, or on either side. If the symmetry of the compartment from A-B is not the same as that from A-C, i.e. A-B exists on both sides of the centerline but B-C exists only on one, the compartment must be submitted in 2 parts, or as 2 separate compartments. When executing the Damage Stability Program, it would then be necessary to call both compartments, even though they are physically one. The sentinel IISYM on the compartment title card describes the compartment symmetry: 0 = both sides of centerline; + = starboard side only; - = port side only. The following table delineates all possible combinations for the illustrated compartment.

COMPARTMENT DEFINITION (continued)

COMPARTMENT DESCRIPTION			COMPARTMENT LOCATION			
Number of Compartments	Compartment run	II SYM	A-B Stbd	A-B Port	B-C Stbd	B-C Port
1	A-C	0	X	X	X	X
1	A-C	-1		X		X
1	A-C	+1	X		X	
2	A-B	0				
	B-C	+1	X	X	X	
2	A-B	0				
	B-C	-1	X	X		X
2	A-B	+1				
	B-C	0	X		X	X
2	A-B	-1				
	B-C	0		X	X	X

SUBROUTINE CMPRTMNT



FLOWCHART

NOTE: SDT: Ship Data Table
SDTPE: Ship Data Tape

Store ship serial number.

Read number of compartments.

Do for each compartment.

IF JCOMP=1 ship data table
has already been read in EXEC;
GO TO 20.

ISERNO=ship serial number.

SDTPE exists (for OFFSET).

Ship is on SDTPE (for OFFSET).

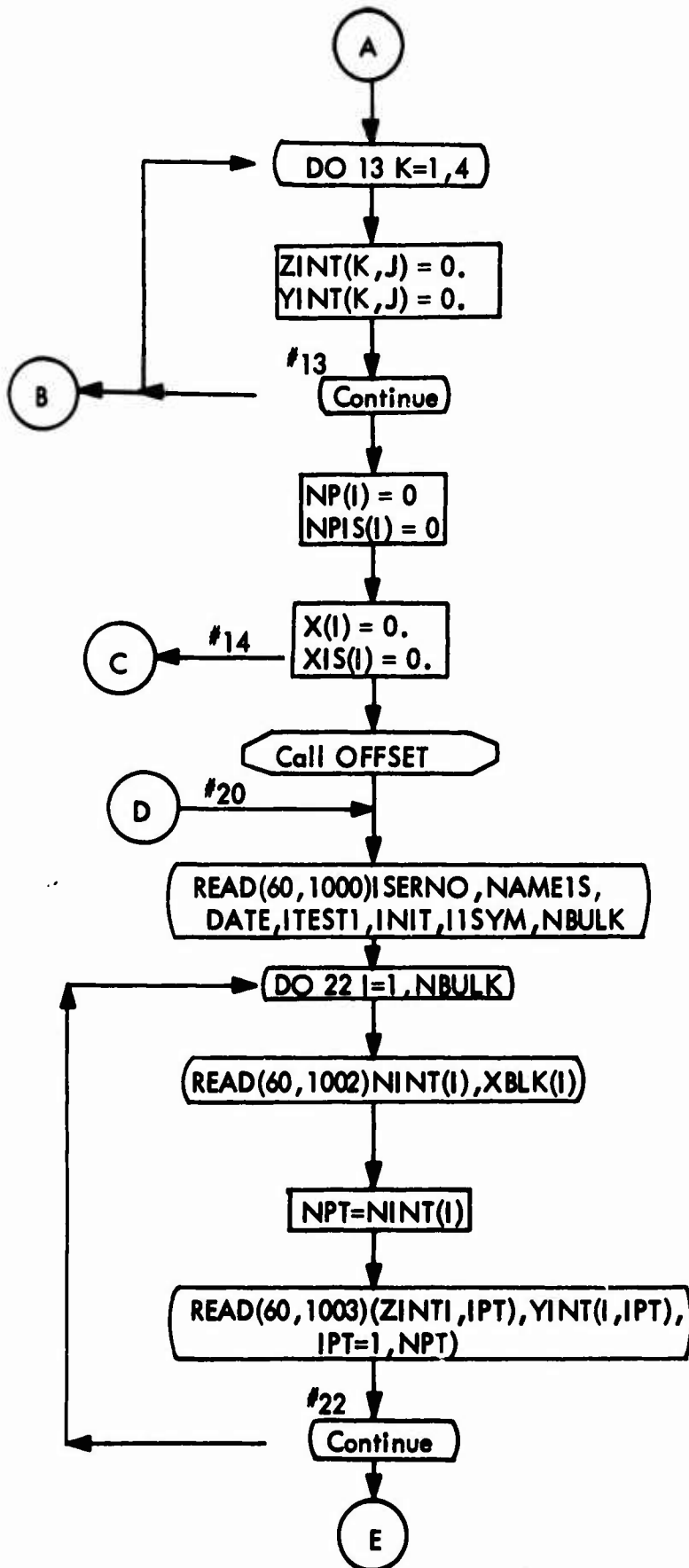
Do not print out SDT (for OFFSET).

Clear ship and compartment
offset arrays to zero.

Clear Ship and compartment
breakpoint tables to zero.

SUBROUTINE CMPRTMNT

FLOWCHART (continued)



Clear compartment outline point arrays to zero.

Clear ship and compartment number of points/station tables to zero.

Clear ship and compartment "station distance from FP" arrays to zero.

Subroutine OFFSET read SDT of ship from SDTPE.

Read compartment title card.

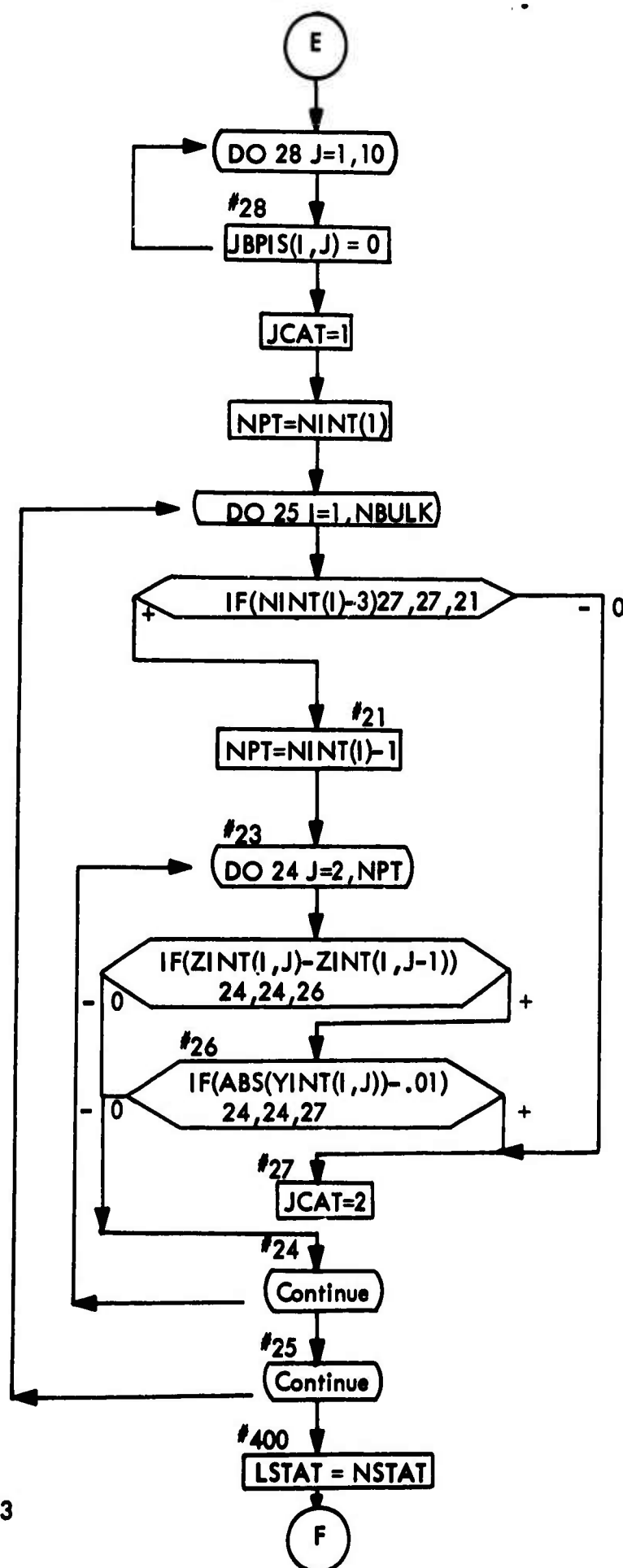
Do for each bulkhead.

Read number of outline points on bulkhead and distance of bulkhead from FP.

Number of outline points on bulkhead.

Read in outline points.

SUBROUTINE CMPRTMNT



FLOWCHART (continued)

Clear compartment breakpoint table to zero.

Assume compartment has single hull.

Number of outline points on first bulkhead.

Test to determine if compartment has double hull. Test each bulkhead.

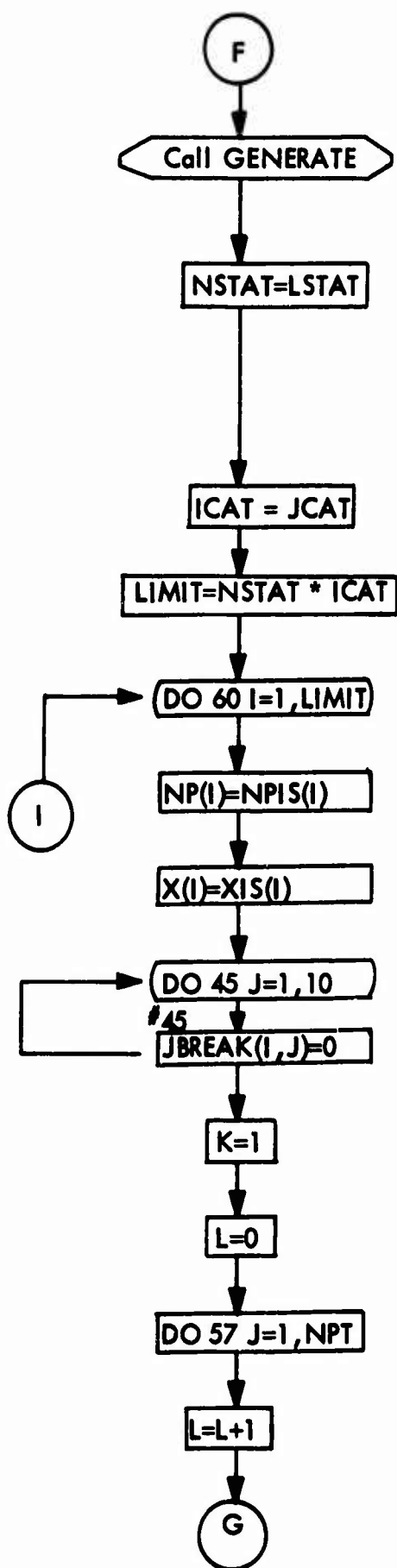
If the number of points on the bulkhead is equal to 3, the compartment must have a double hull (See Notes #1).

Otherwise, do not consider last outline point as it is the same as the first outline point.

Test ΔZ between successive outline points. When ΔZ becomes positive test the Y value of the outline point. If Y is zero the point lies on the ship centerline, which does not require a double hull; go on to next outline point. If Y is positive a double hull will be required; reset JCAT to 2. If any one bulkhead requires a double hull, so will the compartment as a whole. Go on to 400.

Assume number of stations in compartment equals the number of ship stations.

SUBROUTINE CMPRTMNT



FLOWCHART (continued)

Subroutine GENERATE creates the table of compartment offsets and stores them in the IS arrays.

The following statements transfer the compartment data to the ship tables. The compartment thus becomes a "ship". Number of stations in "ship" equals the number of stations in the compartment.

Single/double hull indicator.

Array size for stations.

Do for each station.

Number of points/station.

Distance of station from FP.

Clear ship breakpoint table to zero.

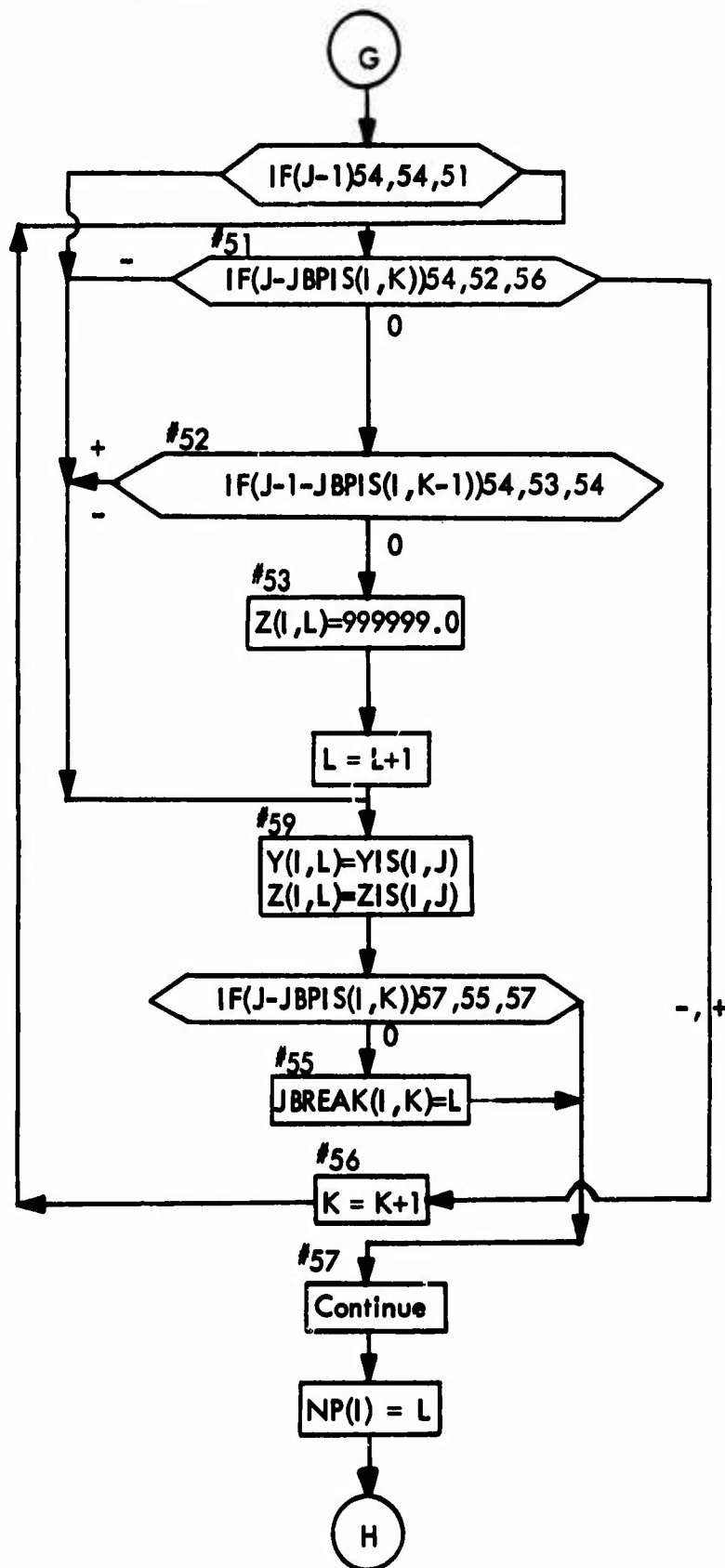
K=index of compartment breakpoint table.

L=index of ship offset table.

J-index of compartment offset table (do for each offset).

Increase index of ship offset table by 1.

SUBROUTINE CMPRTMNT



FLOWCHART (continued)

If this is first offset go right to transfer area (#54).

If the index of the offset is less than the next breakpoint, go to transfer area (#54). If the index is greater, increase the breakpoint index (#56).

If the index is equal to that of the next breakpoint, test to see if the previous point was also a breakpoint. If it was not, go to transfer area (#54). If it was, two successive breakpoints have occurred, and a space in the table must be left for insertion of an intermediate point. Insert the signal value of $Z=999999.0$ and increase the "ship" offset table, L , by 1.

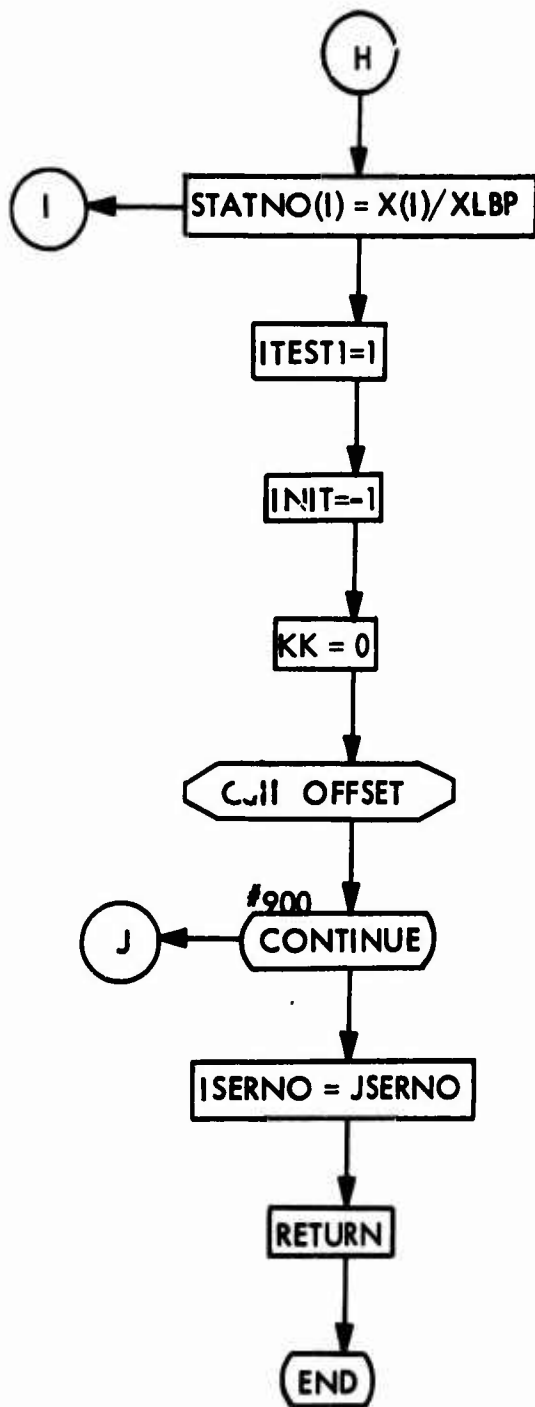
Transfer the offset in the compartment table to the ship table.

If this offset was a breakpoint, store the index in the "ship" breakpoint table. Go on to next offset

Increase index of compartment breakpoint table by 1.

Number of points on station = final value of L .

SUBROUTINE CMPRTMNT



FLOWCHART (continued)

Station number of compartment stations expressed as a % of LBP.

Put "ship" on tape (for OFFSET).

For OFFSET.

Print out "ship" data table (for OFFSET).

Create SDT for compartment and write on SDTPE, also print SDT.

Restore ship serial number.

Return to EXEC(YGHULL).

SUBROUTINE GENERATE

Program Description:

GENERATE supervises the formulation of offset tables for the compartment based upon the general bulkhead descriptions and the ships offsets as delineated in the Ship Data Table (SDT).

The operation is basically a merge of bulkheads and intermediate ship stations contained in the SDT into a table giving a full description of the compartment. This manipulation involves three basic sets of arrays:

1. Bulkhead arrays.
 - XBLK() The distance of each bulkhead from the F.P.
 - ZINT(,) The Z value of the bulkhead outline points.
 - YINT(,) The Y value of the bulkhead outline points.
2. Ship Data Table
 - X() The distance of ship stations from the F.P.
 - Z(,) The Z coordinates of the station offsets.
 - Y(,) The Y coordinates of the station offsets.
3. Compartment Data Table
 - XIS() The distance of the compartment station from the F.P.
 - ZIS(,) The Z coordinates of the station offsets.
 - YIS(,) The Y coordinates of the station offsets.

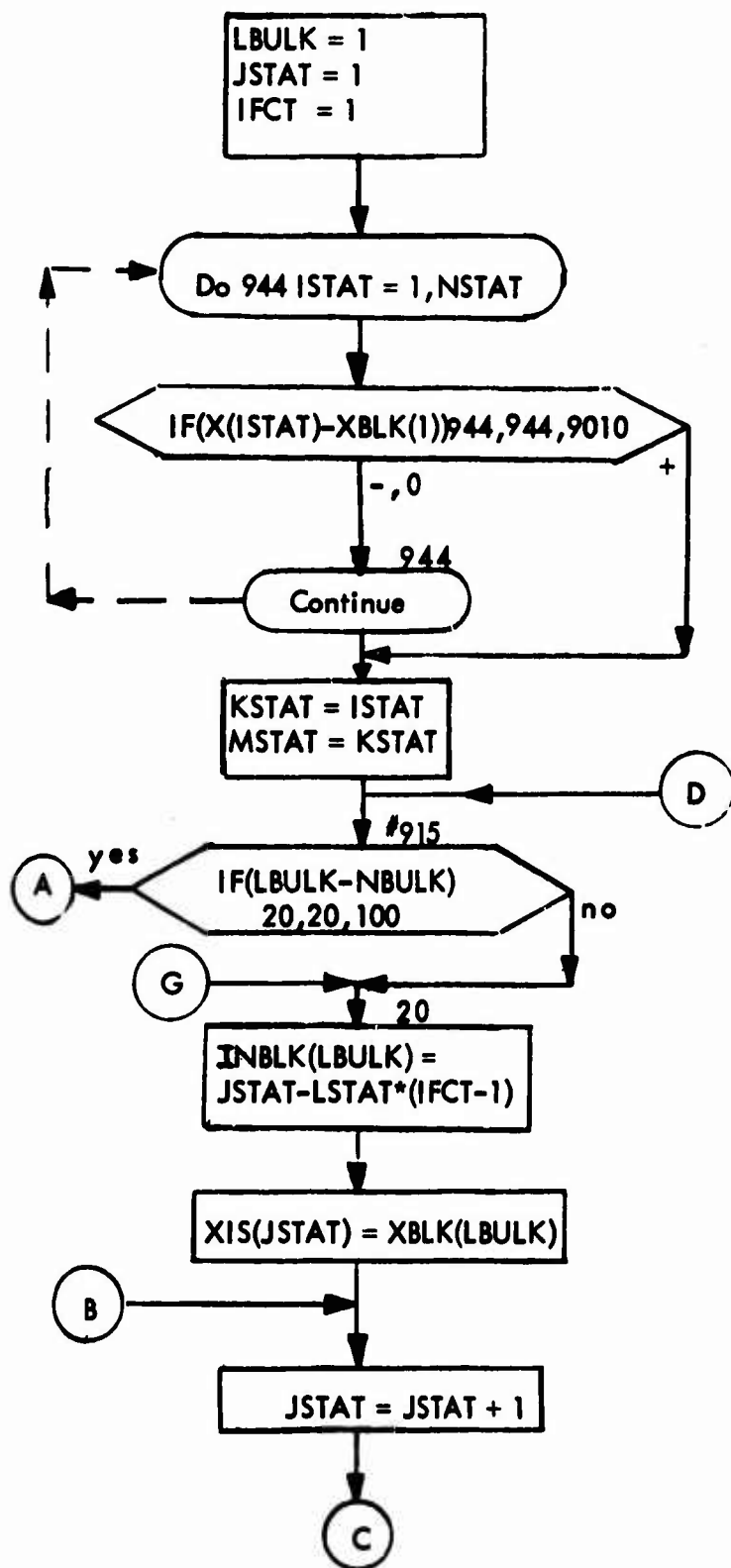
GENERATE works only with the X arrays, utilizing subroutines SECTN, STORE, and MOD for modifying the Y and Z arrays. In essence, it determines the station indices in the IS arrays where the bulkheads and intermediate ship stations will be located. Figure 1 illustrates the transfer of information involved.

SUBROUTINE GENERATE

SYMBOL LIST

KSTAT	Index of ship stations in the Ship Data Table.
JSTAT	Index of compartment stations in the Compartment Data Table.
LBULK	Index of bulkheads in bulkhead arrays.
NSTAT	Number of stations in one ship hull.
LSTAT	Number of stations in one compartment hull.
MSTAT	Index of 1st station aft in X, Y, Z array of forward most bulkhead.
ICAT	1 - ship single hull; 2 - ship double hull.
JCAT	1 - compartment single hull; 2 - compartment double hull.

SUBROUTINE GENERATE



FLOWCHART

Set bulkhead index LBULK,
compartment section index
JSTAT, and control character
IFCT equal to 1.

Locate first ship station aft
of forward most bulkhead.

Store index of this station
in KSTAT and MSTAT.

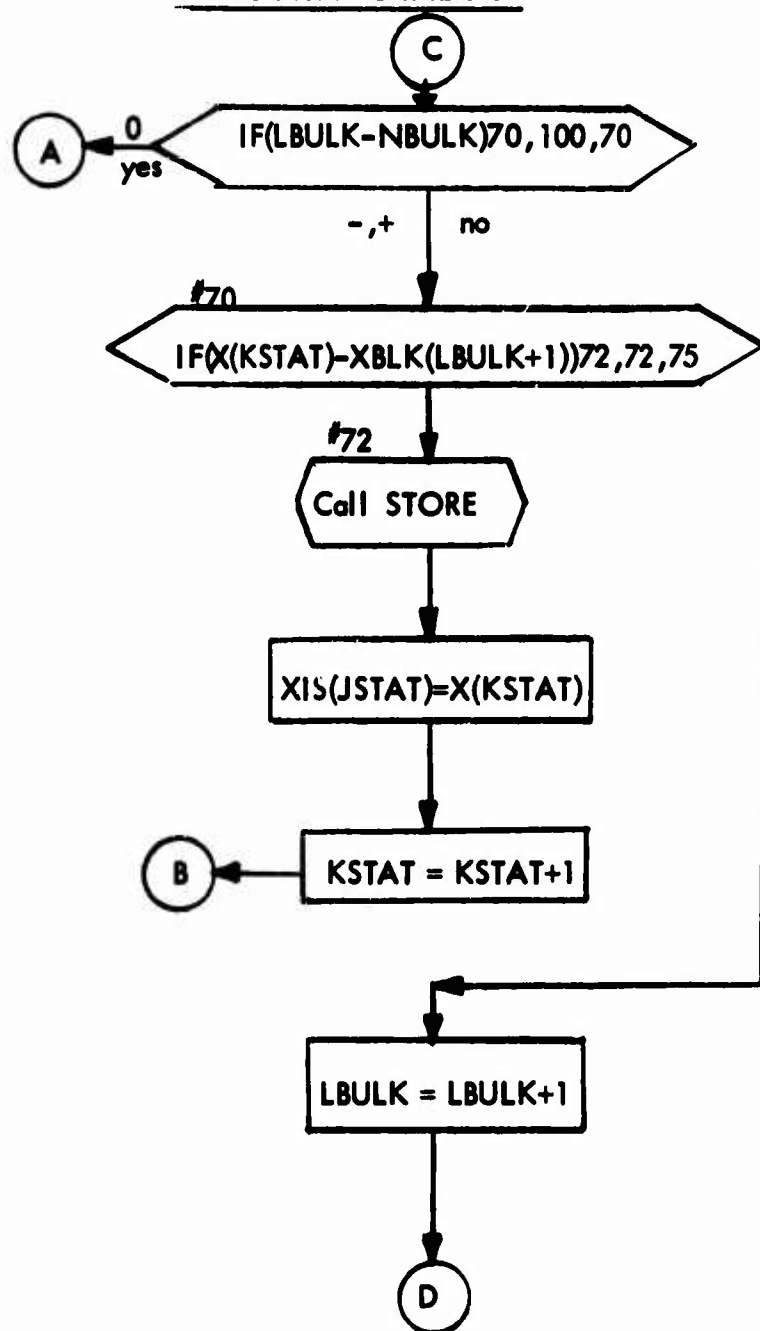
If this is the last bulkhead,
go to #100.

Store index of bulkhead in
compartment section arrays
in INBLK (LBULK).

Store X of bulkhead in XIS
array.

Increase index of IS arrays
by 1.

SUBROUTINE GENERATE



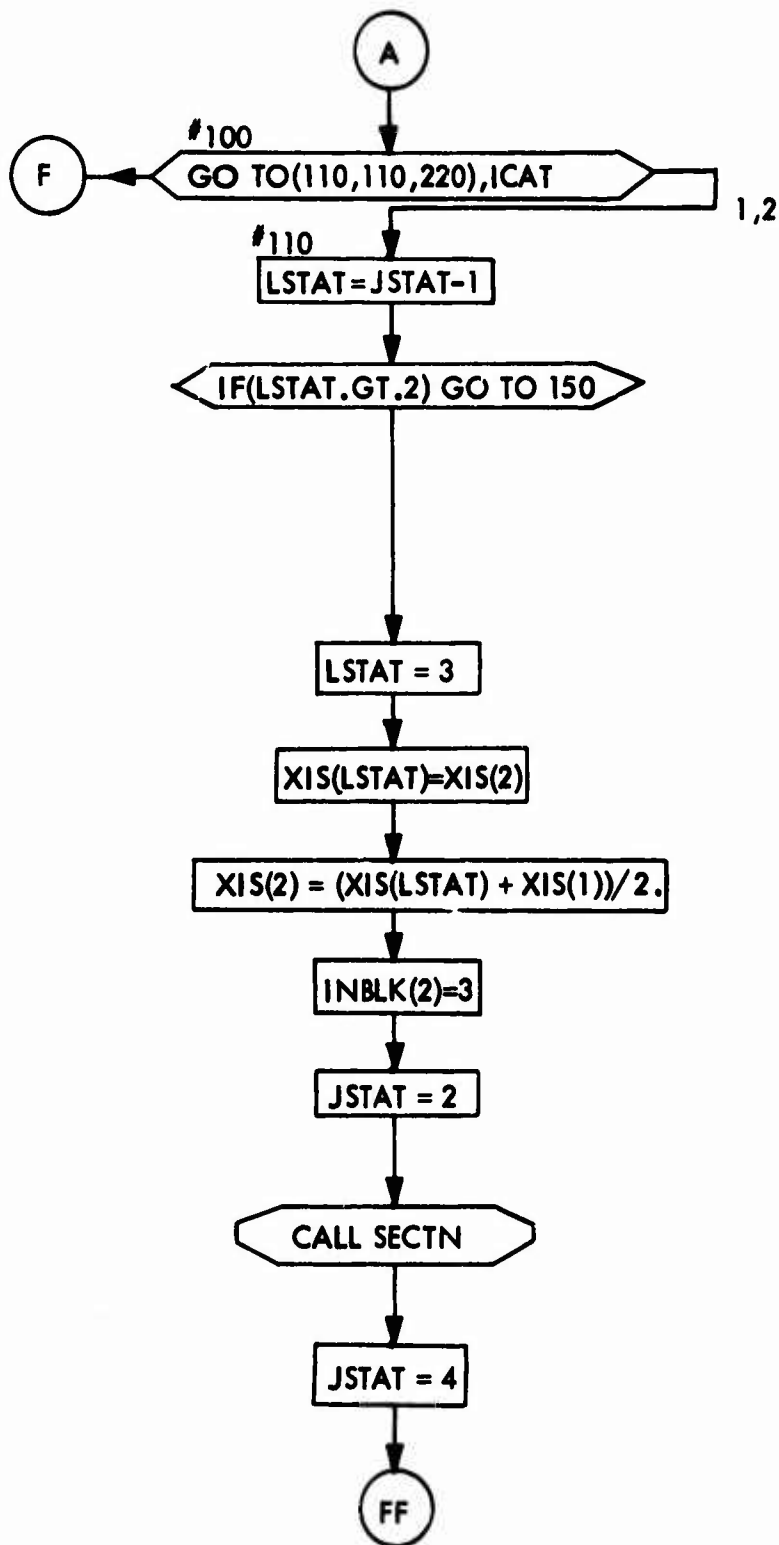
FLOWCHART (continued)

If this is last bulkhead,
go to 100

If the ship station at X(KSTAT)
is forward of the next bulkhead
XBLK(LBULK+1), this ship station
lies within the bounds of the
compartment. Transfer the off-
sets of the ship station to the
sections position in the com-
partment (IS) arrays using Sub-
routine STORE, store the station
location in XIS(JSTAT); and
increase the compartment section
index, KSTAT.

If X(KSTAT) is aft of the next
bulkhead X(LBULK+1), increase
the bulkhead index by 1, go to

SUBROUTINE GENERATE



FLOWCHART (continued)

If this is the 2nd pass through for a double hull ship, GO TO 220.

LSTAT = number of stations, including bulkheads, in the compartment.

If LSTAT is not greater than 2, no station in the Ship Data Table lay between the two bulkheads. An intermediate station must be generated in order to preserve the curvature of the hull.

Number of compartment station = 3.

Move 2nd bulkhead to station 3.

New intermediate station halfway between bulkheads.

2nd bulkhead located at station 3.

Station index = 2.

Compute offsets of intermediate station in Subroutine SECTN.

Station index = 4.

SUBROUTINE GENERATE

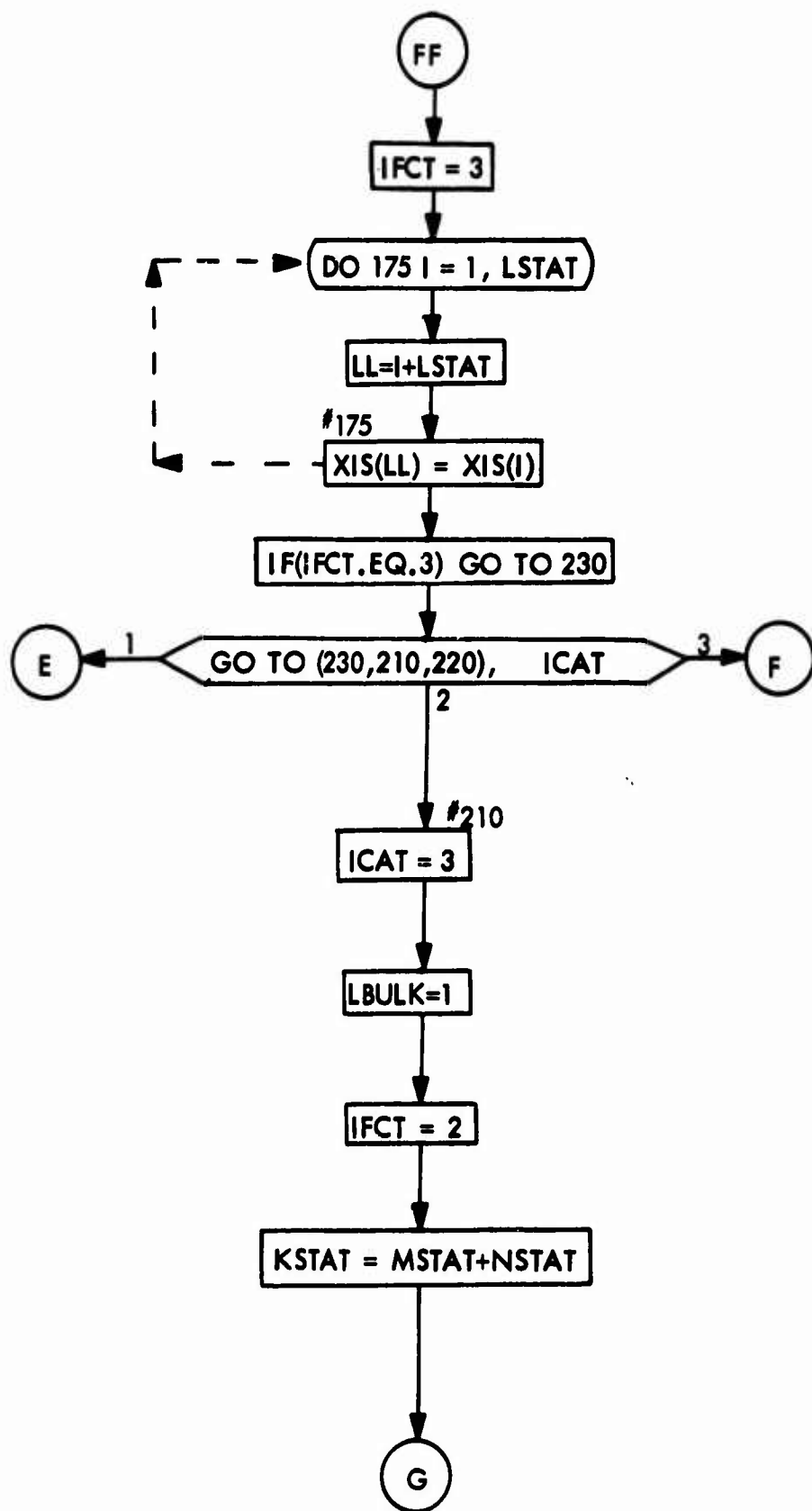
FLOWCHART (continued)

Control character.

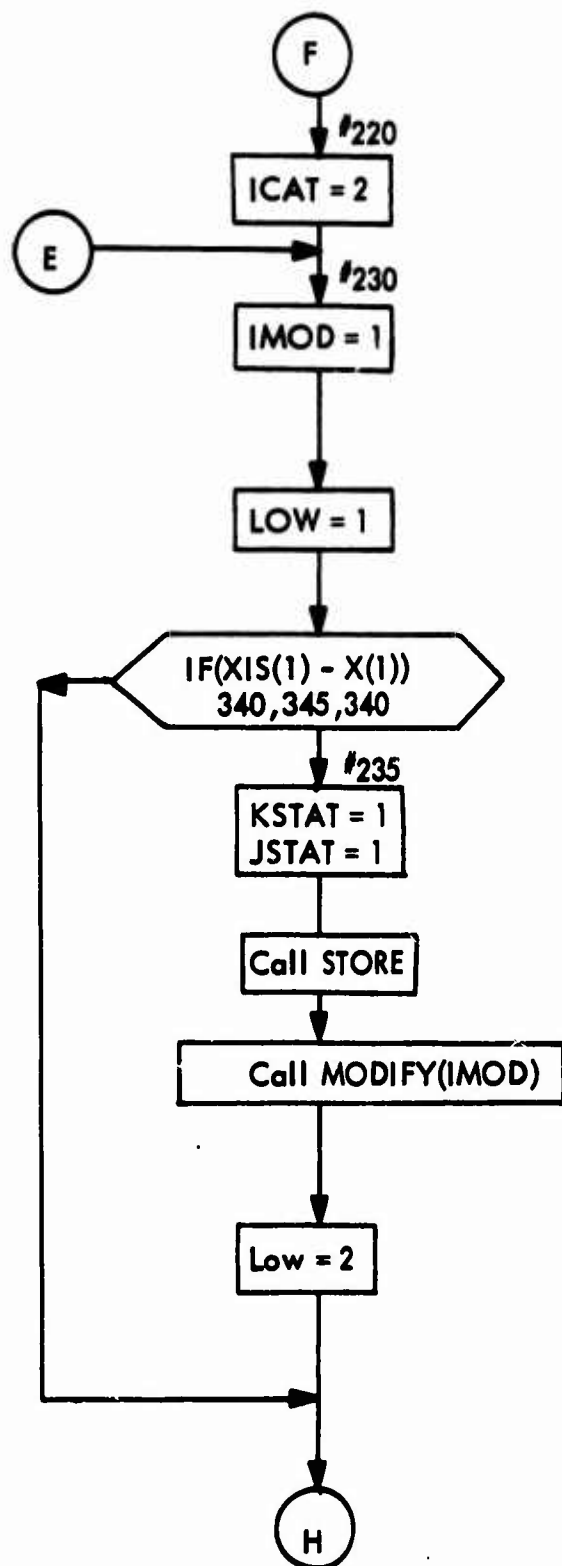
Store X of compartment stations in positions where inner compartment hull will be stored. Storage is sequential - outer hull, then inner hull.

If ICAT = 1, the ship has a single hull, GO TO 230. If ICAT = 3, the ship has a double hull and this is the second pass, GO TO 220.

If ICAT = 2, the ship has a double hull and this is the first pass. The inner hull must now be considered. Set ICAT = 3 and IFCT = 2 for control purposes; reinitialize LBULK, the bulkhead index, and set the ship station index KSTAT at the location of the first inner hull station aft of the forward most bulkhead. Go back to store inner hull ship stations.



SUBROUTINE GENERATE



FLOWCHART (continued)

Reset ICAT

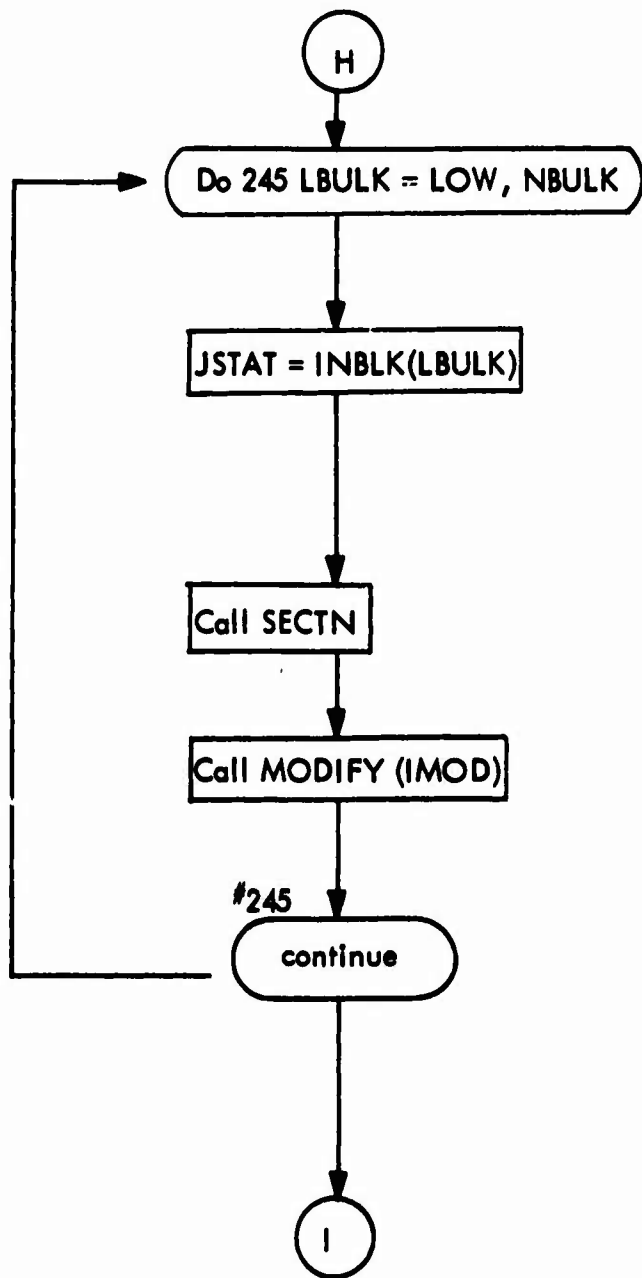
Indicator for Subroutine MODIFY signifying that bulkheads, as distinguished from intermediate stations, are being considered.

Index of 1st bulkhead to be calculated by Subroutine SECTN

If the first bulkhead lies on the first ship station, Subroutine SECTN may not be used. The offsets of the first bulkhead, which is the first station, are transferred to the IS arrays via Subroutine STORE. Subroutine MODIFY is then called to modify these offsets in accordance with the bulkhead outline description contained in the arrays ZINT and YINT.

Low is reset to 2, the second bulkhead.

SUBROUTINE GENERATE



FLOWCHART (continued)

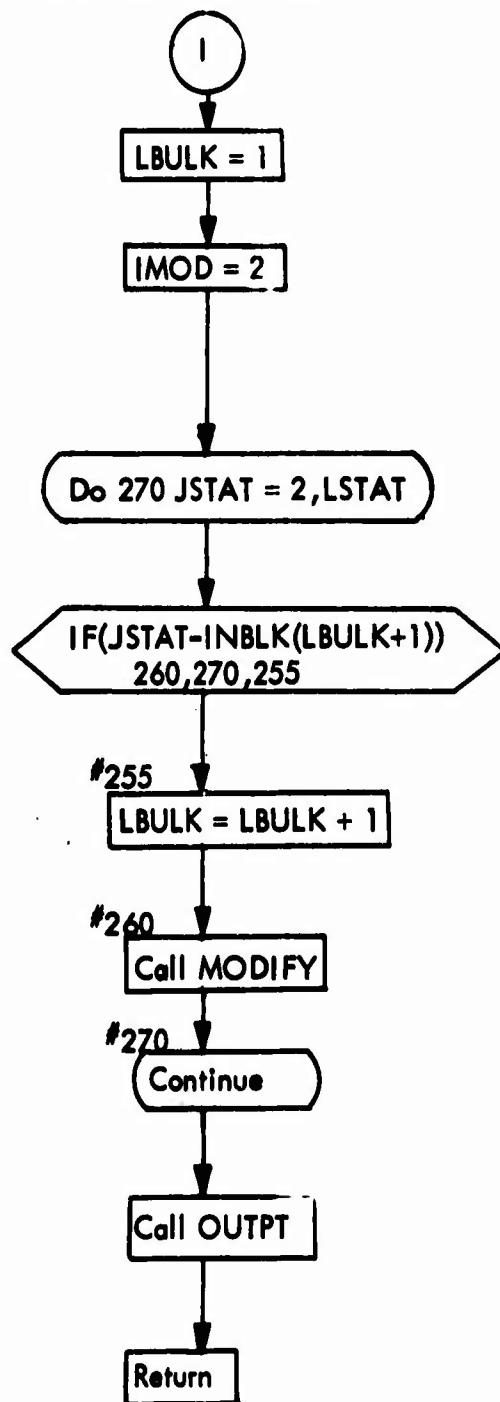
Do for each bulkhead.

INBLK(LBULK) contains the index in the IS arrays where bulkhead LBULK is to be stored.

Subroutine SECTN calculates the offsets at the bulkhead location of the full ship section and stores them in the IS arrays at location JSTAT

Subroutine MODIFY modifies these offsets in accordance with the bulkhead outline description contained in the arrays ZINT and YINT.

SUBROUTINE GENERATE



FLOWCHART (continued)

Bulkhead index is set to 1.

Indicator for Subroutine MODIFY indicating that intermediate stations, as distinguished from bulkheads, are being considered.

Go through all compartment stations.

If JSTAT is less than INBLK(LBULK+1), which is the index of the next bulkhead, then the station JSTAT in the IS array is an intermediate station; Subroutine MODIFY modifies these offsets in accordance with the bulkhead outline description contained in the arrays ZINT and YINT. If JSTAT = INBLK(LBULK+1), the station is a bulkhead and has already been operated on (See previous page). If JSTAT > INBLK(LBULK+1), increase LBULK by 1.

Print offsets of compartment.

Return to Subroutine CMPRTMNT

SUBROUTINE SECTN

Description:

Generally, hull offsets are given only for ordinate stations. Many applications, however require offsets at intermediate locations. SECTN finds the hull offsets for an intermediate section lying between two ordinate stations.

Fig. 1 shows a typical situation with an intermediate section to be defined

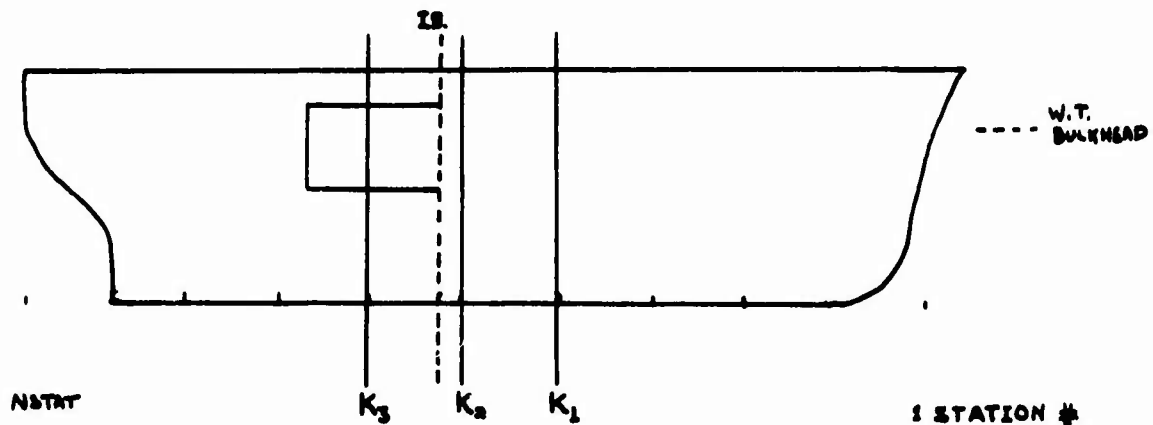


FIG. 1

between ordinate stations K_2 and K_3 . Since the intermediate section (abbr. I.S.) is taken closer to ordinate K_2 than K_3 , it is reasonable to assume that the hull at I.S. will be shaped more like the section at station K_2 than that at K_3 . Therefore if offsets for K_2 are given at certain drafts $Z(K_2, l)$, $l=1, NP$ and we assume this set of offsets properly describes the hull shape, then defining offsets for I.S. at these same drafts should give a reasonably good representation of the hull shape at I.S. This means that any irregularities in K_2 will show up also in I.S. To further emphasize the similarity, if station K_2 has a breakpoint at draft $Z(K_2, lBP)$ we define a breakpoint for I.S. at this draft.

Having chosen a draft, $Z(K_2, l)$, offsets on K_1 and K_3 can be found either because they themselves are given as input or can be interpolated from the offsets which are. When possible, then, a smooth second order curve is passed through the points on K_1 , K_2 and K_3 defined by the given draft and the corresponding offsets. The offset on I.S. for a draft of $Z(K_2, l)$ is then assumed to lie on this curve, its exact value being determined from the relative spacing (measured in distance from the F.P.) of K_1 , K_2 , I.S., K_3 .

SUBROUTINE SECTN (continued)

The meaning of the "when possible" is illustrated in Figs. 2., 3.

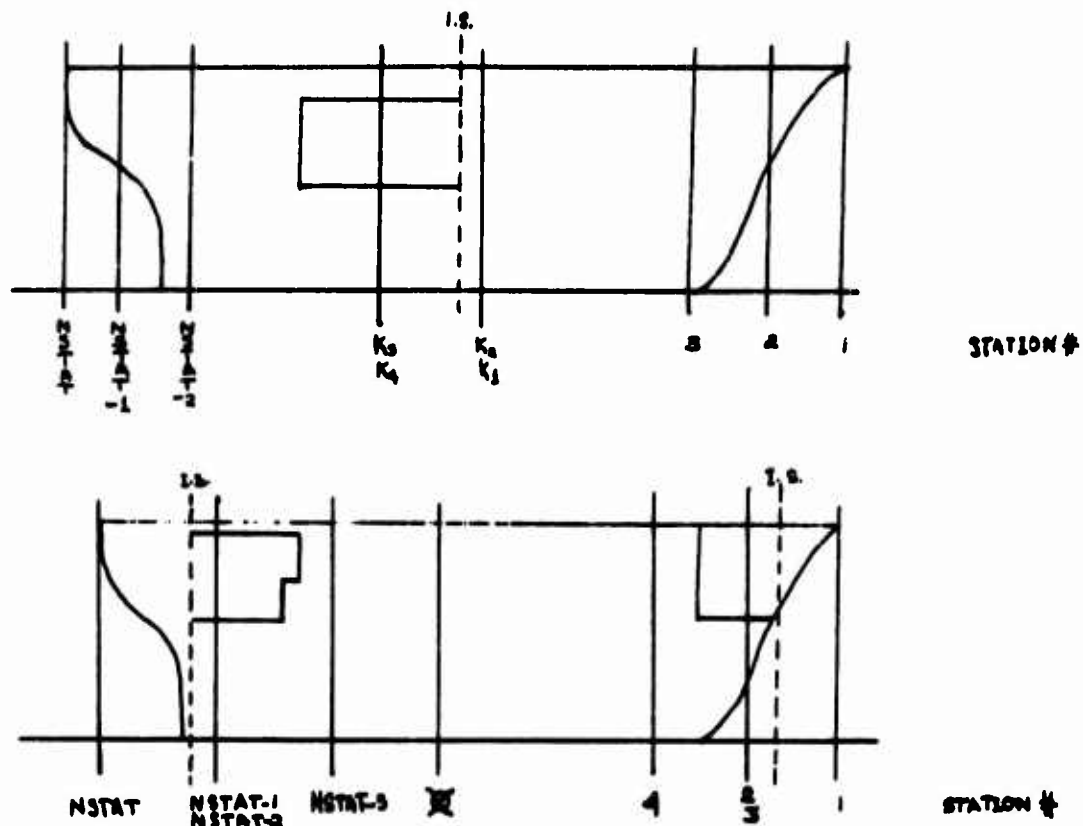


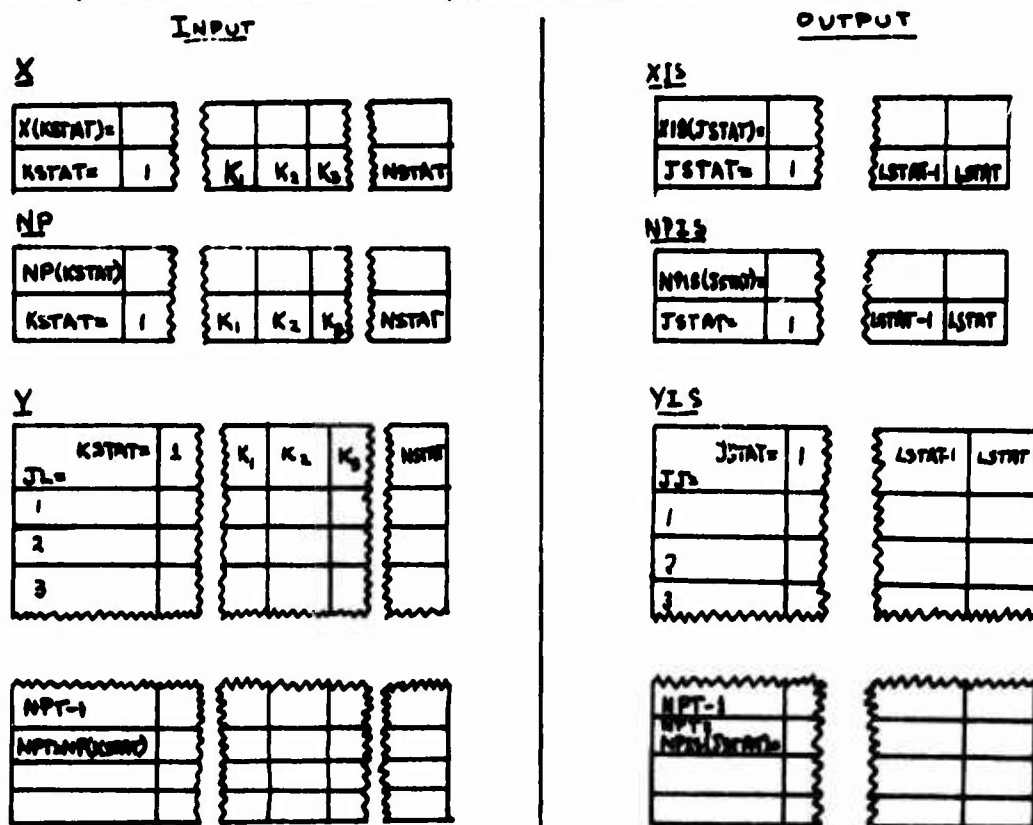
Figure 2 illustrates the situation when K_1 and K_2 both designate the same "double" station which is the usual manner in which abrupt changes in the hull (discontinuities in the waterplane or half-breadth plan) are handled. Figure 3 illustrated an intermediate section located adjacent to the first and last stations. In all three cases and in any of the possible combinations there are not three stations which can give a meaningfully continuous curve with which to interpolate the I.S. offsets. In these cases a simple linear interpolation is used.

When all the required offsets have been stored the intermediate hull section is defined unless the ship has a "double hull". In this case only the outer hull has been defined and a second pass through the routine is necessary to handle the inner hull.

SUBROUTINE SECTN (continued)

Program Method (Introduction)

Below is a somewhat simplified functional diagram which should help to clarify some of the indexes and operations used in SECTN.



Z constructed like Y table.

JBREAK constructed like Y table except bottom row index = 10, the maximum number of breakpoints, instead of NPT.

ZIS table constructed like YIS table.

JBPIS table constructed like YIS table except only has 10 rows, the maximum number of breakpoints, instead of NPIS rows.

Diagram 1

SUBROUTINE SECTN (continued)

1) Basically, a single pass through SECTN selects 3 indices K_1 K_2 K_3 (the notation is somewhat altered in the program listing) representing consecutive ordinate stations such that I.S. is closest to ordinate station K_2 . These three indices specify three numbers in the NP array representing the number of offsets on each station. The indices also specify three columns in each of the Y and Z arrays. SECTN operates on these columns in such a way as to create a new column

$$YIS(JSTAT, JJ) \left| \begin{array}{l} NPIS \\ JJ=1 \end{array} \right. \text{ and a new column } ZIS(JSTAT, JJ) \left| \begin{array}{l} NPIS \\ JJ=1 \end{array} \right. \text{ in the YIS and ZIS}$$

arrays respectively. The choosing of which column is to be filled in, i.e. the setting of JSTAT, is external to the routine and need not concern us here. The entries in these columns represent the offset coordinates for I.S. Also, the number of offsets NPIS(JSTAT) is entered from

$$NP(KSTAT) \left| \begin{array}{l} KSTAT=K_2 \end{array} \right. \text{ and the breakpoint table } JBREAK(KSTAT, JBRK) \left| \begin{array}{l} 10 \\ JBRK=1 \end{array} \right.$$

$$\text{is transferred to } JBPIS(JSTAT, JBRK) \left| \begin{array}{l} 10 \\ JBRK=1 \end{array} \right. \text{ Thus all the data concerning I.S. } KSTAT=K_2$$

is entered in the IS arrays.

2) This describes a basic run through the program. The only time this description is not sufficient is in the case of a double hulled ship. In this case a second pass through SECTN to create the entries for the inner hull is necessary. For a double hulled ship the Y, Z, NP, and JBREAK arrays are each expanded by a factor of 2 to 2*NSTAT in the horizontal dimension. This is because at each station there are now twice as many entries (inner as well as outer hulls). All the entries for the outer hull precede all the entries for the inner hull.

Similarly, in SECTN, all the IS arrays (except XIS since the locations of the sections remain the same for inner and outer hulls) have their horizontal dimensions doubled to 2*LSTAT.

SUBROUTINE SECTN (continued)

On this second pass through SECTN, the proper data for station K_2 , for example is now found NSTAT columns to the right in column $K_2 + \text{NSTAT}$. Likewise, if the I.S. offsets on the outer hull were stored in columns NSTAT of YIS and ZIS the offsets on the inner hull will be stored at columns JSTAT + LSTAT.

Now follows a detailed description of the actual program. In reading this a listing of SECTN should be referred to,

Detail:

(Variable names are defined in the next section) The upper limit, LIM, of a DO statement is set to the number of ordinate stations less one. The function of the loop is to locate the position of I.S. between two adjacent stations. To do this the following function is calculated:

$$\text{DIS} = \frac{(X_{i+1} - \text{XIS})}{\text{XIS} - X_i}$$

The properties of DIS are given in the table below for $\text{XIS} \neq X(1)$.

TABLE I

DIS- Relation between arguments

- | | | |
|----|----|---|
| a. | <0 | $\text{XIS} < X_i < X_{i+1}$ or $X_i < X_{i+1} < \text{XIS}$ |
| b. | =0 | $\text{XIS} = X_{i+1}$ |
| c. | >0 | $X_i < \text{XIS} < X_{i+1}$ |
| d. | >1 | $(\text{XIS} - X_i) < (X_{i+1} - \text{XIS})$ i.e. XIS is closer to X_i |
| e. | <1 | $(X_{i+1} - \text{XIS}) < (\text{XIS} - X_i)$ i.e. XIS is closer to X_{i+1} |

The loop is repeated until either condition b. or c. occur. In the event $\text{DIS} = 0$ the I.S. lies on one of the ordinate stations, namely on station $\text{JW}+1$. The program exits from the loop and calls a subroutine. Subroutine STORE, which transfers entries from the NP, Y, Z and JBREAK arrays into the corresponding IS arrays as described under 1) above. In this connection it may be useful to think of the index $\text{JW}+1$ as corresponding to the index K_2 .

$\text{DIS} = 0$ or condition b.

SUBROUTINE SECTN (continued)

After returning from STORE the program has finished unless the ship is double hulled. If so ICAT=2* and a computed GO TO sends control to Statement 230. Here ICAT is set to 3 to prevent a third pass through SECTN and JW, which for this case corresponds to K₂-1, and JSTAT is transformed as in 2) above. Control is transferred to Statement 5 which, since DIS=0, again results in a CALL STORE and then a transfer to Statement 240 (because ICAT=3). Statement 240 resets JSTAT and ICAT for use in the calling program and returns control to the calling program.

In the event $DIS > 0$, I.S. lies between ordinate stations JW and JW+1. The program exits from the loop and checks for conditions d. or e. of Table I.

DIS > 0 or
condition c.

NOTE: From here on the formula 'A $\longleftrightarrow$ B' means that the symbol, A, occurring in the program listing corresponds to the symbol or phase, B, occurring in the section of this documentation called "Program Description".

The object at this point in the program is to designate a variable NCLOS K_2 , and a variable NFAR K_3 (see Fig. 1) unless I.S. lies to the right of K_2 in which case NFAR K_1 . In the first case $X(NFAR) \leq X(NCLOS)$, in the second case the inequality is reversed (Statements 30 to 40+00001). In either case $X(NCLOS)$ is the location of the closest ordinate station to I.S. Statement 50 now interpolates, in a straight line sense, the height of the keel of I.S., using statement function FLINT. i.e. The lowest point of I.S. is considered to lie on the line joining the lowest points of stations NFAR and NCLOS

We know at this point between which two stations the I.S. lies and, through the indices NCLOS and NFAR, which of the two is closer.

A) The ideal situation at this point from the point of view of accuracy is to have the I.S. positioned as shown in Fig. 4 (identical to Fig. 1) or 5.

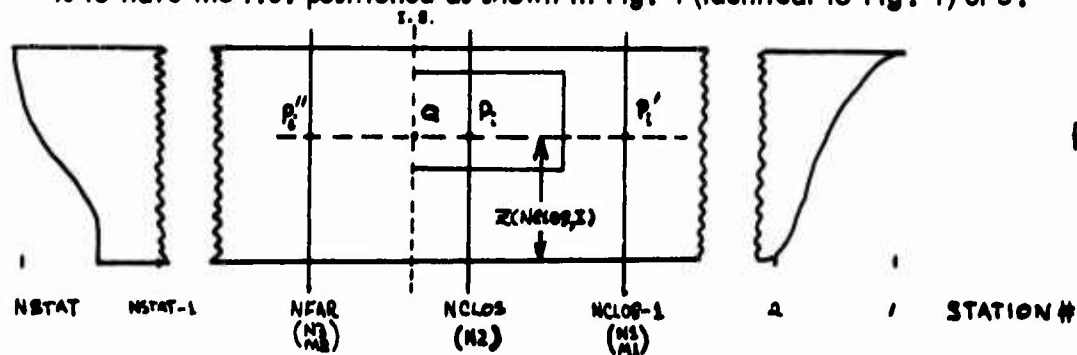


FIG.4

*ICAT is an indicator set by the calling program.



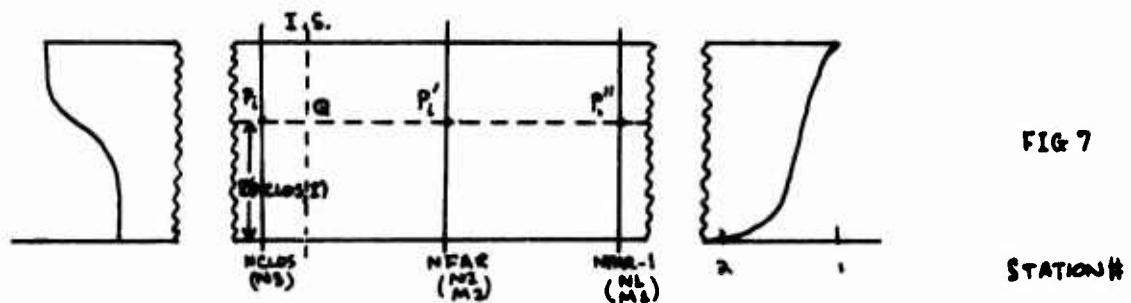
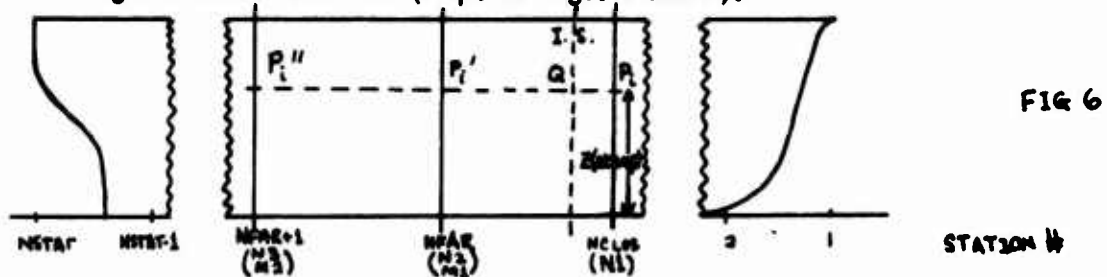
ZIS(JSTAT,I) is simply the draft, Z(NCLOS,I) of P_i . YIS(JSTAT,I) must be interpolated from the offsets of points P_i' , P_i , and P_i'' . The drafts at these points are all the same. The offsets at each station are found by calling WPLAN1 which returns these offsets in the array Y1. WPLAN1 is thus called 3 times per point Q, once for each station. (DO 140, Statement 130+00006). Then the second order curve, whose coefficients have been found in Statement 130 (CALL CQEF11) based on the ordinate values of the sections, is "passed through" P_i , P_i , P_i . (Statement 150). This process is repeated for each point on station number NCLOS (i.e. N2).

This discussion distorts slightly one minor point. It will be noticed from the listing that the offsets and drafts for the ordinate stations have a different index, JL, from the I.S. which uses JJ. This differs from the above usage which seems to imply a one-to-one correspondence between points on station NCLOS and points on I.S. This would indeed be the case except that, whereas points in the output array YIS always start at the beginning with the index JJ=1, it is possible that there may be some unusable points on the ordinate station NCLOS. This will always happen if, for example, station NCLOS has a point whose draft is less than the lowest draft on station NFAR. There would then be no way of interpolating an offset on NFAR as explained in the preceding paragraph. Therefore, the indexing of the ordinate station points begins with the first usable point, J1ST, on station NCLOS (lower index, DO 150, Statement 130+00004). J1ST for the cases pictured in Figs. 4 & 5 is calculated, in Statement 110 through 120, as the first point of closest station with a draft greater than the drafts of the first points of either neighboring station (M1 or M2).

***NOTE: The statements 130+00001, 2, 3 were inserted to prevent the coefficients returned from COEF11 from being written over. The coefficients are used in Statement 150, but COEF11 is again called in Statement 140+00001 by Subroutine WPLAN1.**

SUBROUTINE SECTN (continued)

B) The preceding discussion holds almost unchanged for the cases pictured in Figs. 6 and 7 in which it has not been possible to use a station to the right or left of NCLOS (resp. for Figs. 6 and 7).



This situation arises most frequently when NCLOS is a double station, but can also occur when NCLOS is either the first or last station on the ship. (It is implicitly assumed here that no great error is introduced in the interpolation for Q due to I.S. being near one end or the other of the fitted curve).

C) The only remaining cases are those pictured in Figs. 2 and 3 where it is not possible to use any ordinate station to the right or left of NCLOS and NFAR and a linear fit is necessary.

For these cases Statements 160 to 170 perform an analogous function to Statements 110-120 discussed under A) above. Similarly, 180 to 200 are completely analogous to Statements 130-150. The only difference is in the number of stations and the formula used for the interpolation.

Once the offsets for I.S. have been calculated, control is transferred to Statement 220 which is a DO which transfers the breakpoint table, JBREAK for NCLOS into the JBPIS array. Following this NPIS(JSTAT) = the number of data points on I.S. is set equal to NP(NCLOS), the number of data points on NCLOS.

At this point all the necessary arrays have been filled and the program checks for a double hull (cf. para. 2), P.4).

SUBROUTINE SECTN (continued)

The only statements remaining which have not been covered in detail are 50+00001 through 100 which set the indices N1, N2, N3, M1, M2. But I think that the logic and the output of this section are sufficiently clear from the figures to warrant only this remark: that a statement of the form $IF(X(L)-X(L+1))A,B,A$ where $L=NCLOS$ or $NFAR$, is a check for a double station as discussed in paragraph B) P. above.

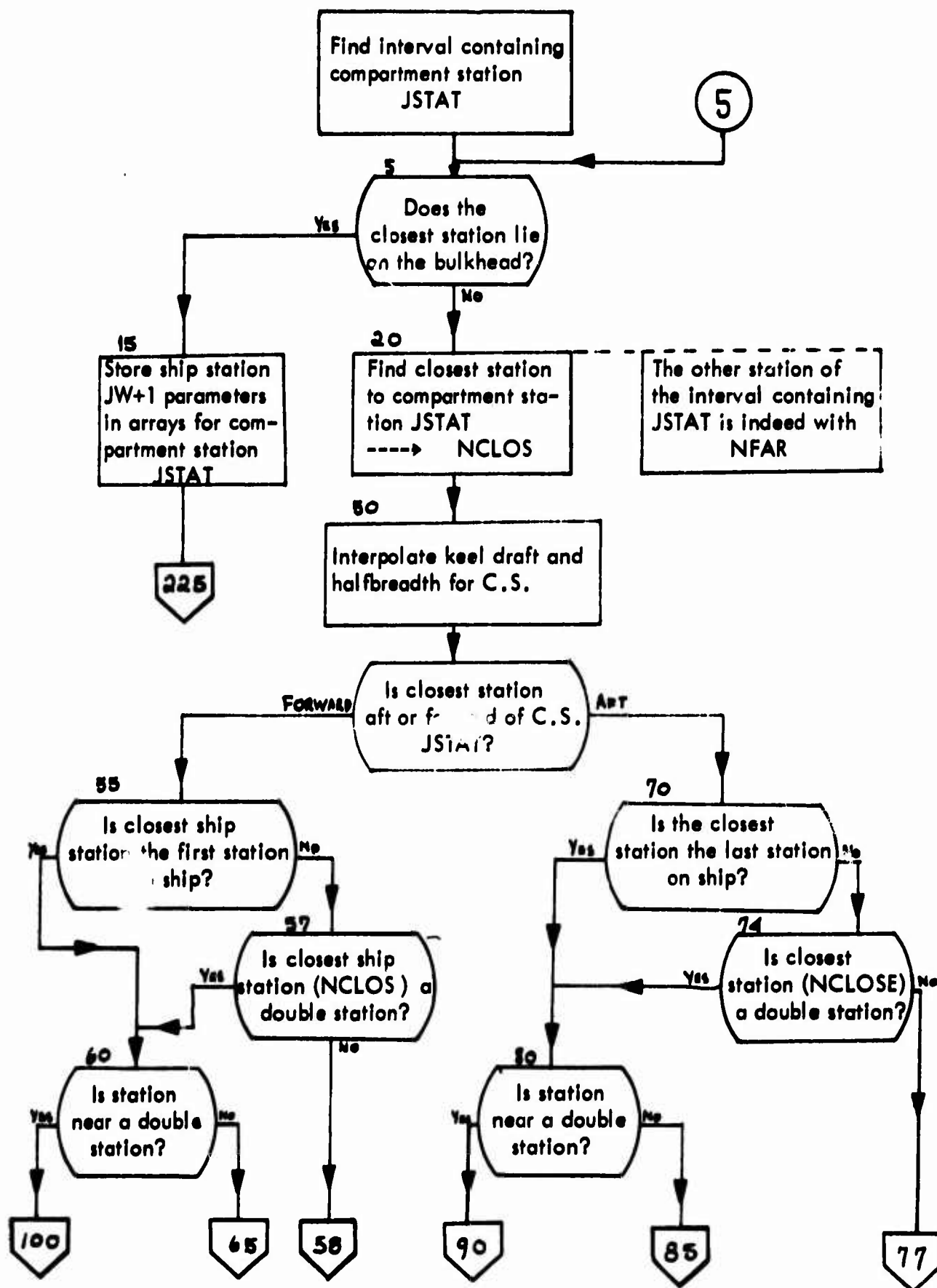
SUBROUTINE SECTNSYMBOL LIST

DIS	Function used for checking location of I.S.
J1ST	Index of first usable point on NCLOS for interpolation.
JW	Index of lower ordinate station of interval containing I.S.
LIM	Number of ordinate stations less than 1.
N1,N2,N3	Indices for curve fit. N1 corresponds to rightmost station used, N2 the middle station, N3 the leftmost. (F.P. is at right of profile).
NCLOS	Index of ordinate station closest to I.S. which is always one of the stations used in the curve fit.
NFAR	Index of ordinate station next closest to I.S. which is also always used in the curve fit.
M1, M2	Corresponds to two stations used in curve fit other than NCLOS. M1 is always less than M2.

NOTE: Variables, apart from general indices, which appear in the program listing and do not appear above are treated elsewhere in the YGHULL documentation.

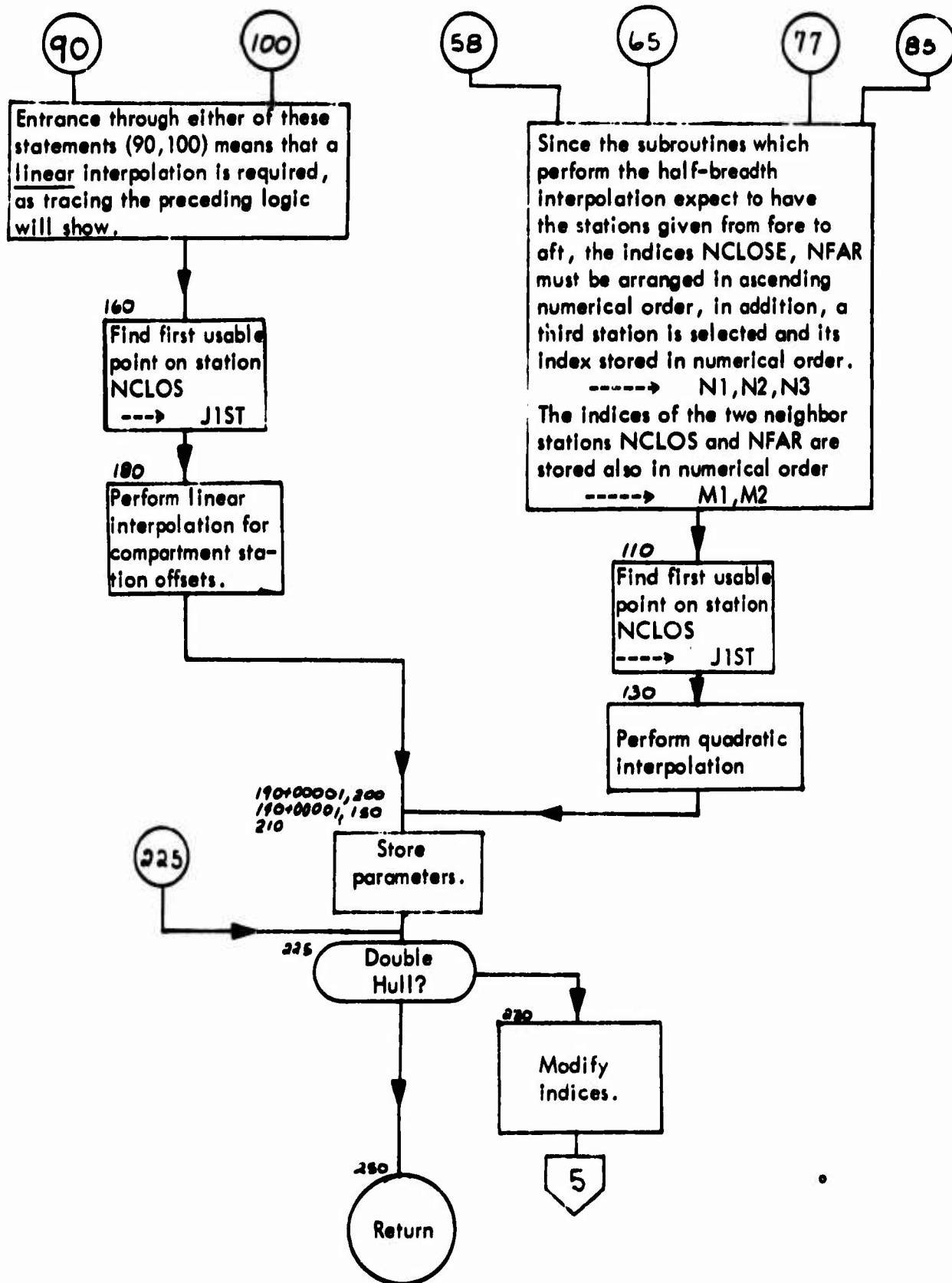
SUBROUTINE SECTN

MACRO FLOWCHART



SUBROUTINE SECTN (continued)

MACRO FLOWCHART



SUBROUTINE STORE

Purpose:

STORE fills the compartment section arrays (___IS arrays) when the section corresponds to a station in the Ship Data Table.

Description: Input consists of:

- a. The number of points on the station to be transferred.
- b. The offset tables (i.e., Y and Z arrays) from the Ship Data Table.
- c. The breakpoint table, JBREAK, also from the SDT.

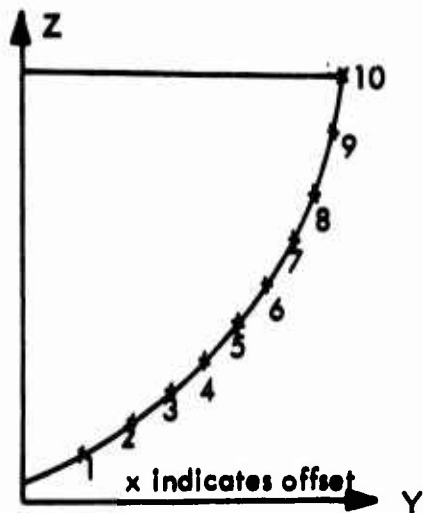
Output consists of the same numbers transferred to the ___IS arrays NPIS, YIS, ZIS, JBPIS (see diag. 1 of SECTN documentation).

The transfer is accomplished by two arithmetic statements and two DO LOOPS. Those loops operate on the offset tables and breakpoint table in that order.

SUBROUTINE MODIFY

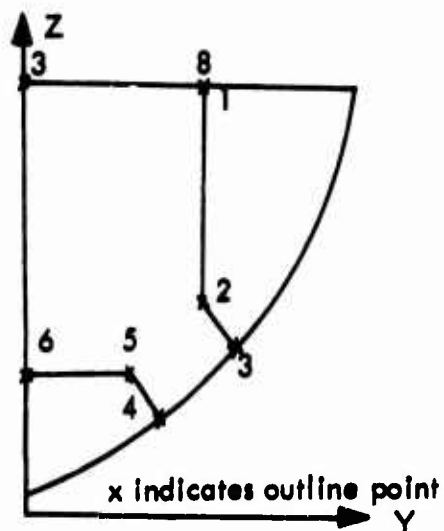
Description:

This program takes the ship section and modifies it in accordance with the description given by the bulkhead outline points. For example, Figure 1 illustrates the ship section and the associated table of offsets; Figure 2 illustrates the bulkhead outline and the associated table of outline points, Figure 3 illustrates the resulting compartment section description and the associated table of offsets.



	Y	Z	Breakpoint
1	1.0	.8	*
2	3.0	1.1	
3	4.0	1.5	
4	5.0	2.0	
5	6.0	2.8	
6	6.6	3.2	
7	7.5	4.2	
8	8.0	6.0	
9	8.7	8.0	
10	9.0	10.0	*

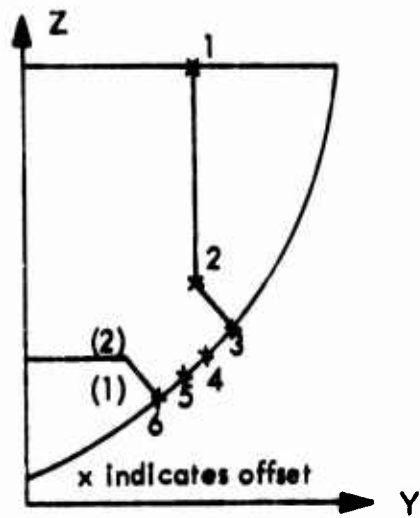
FIGURE 1



	YINT	ZINT
1	5.5	9999.0
2	5.5	6.0
3	9999.	5.0
4	9999.	3.0
5	4.0	4.0
6	0.0	4.0
7	0.0	9999.0
8	5.5	9999.0

FIGURE 2

SUBROUTINE MODIFY (continued)



OUTER HULL			
	Y	Z	Breakpoint
1	6.4	3.0	*
2	6.6	3.2	*
3	7.5	4.2	*
4	7.6	5.0	
5	5.5	6.0	
6	5.5	10.0	*

INNER HULL			
	Y	Z	Breakpoint
(1)	6.4	3.0	*
(2)	4.0	4.0	*

FIGURE 3

SUBROUTINE MODIFY

SYMBOL LIST

I Arrays

1. Compartment Data Table arrays

XIS()	The distance of the compartment station from the FP.
YIS(,)	The Y coordinates of the station offsets.
ZIS(,)	The Z coordinates of the station offsets.
NPIS()	The number of offsets on each station.
JBPIS(,)	Table of breakpoints for each station.

2. Temporary storage arrays for ship section.

YIST(,)	The Y coordinates of the station offsets.
ZIST(,)	The Z coordinates of the station offsets.
NPIST()	The number of offsets on the station.
JBPST(,)	Table of breakpoints on each station.

3. Bulkhead Outline Point arrays

XBLK()	The distance of each bulkhead from the FP.
ZINT(,)	The Z value of the bulkhead outline points.
YINT(,)	The Y value of the bulkhead outline points.
NINT()	The number of outline points on each bulkhead.

II Indices and Control Sentinels

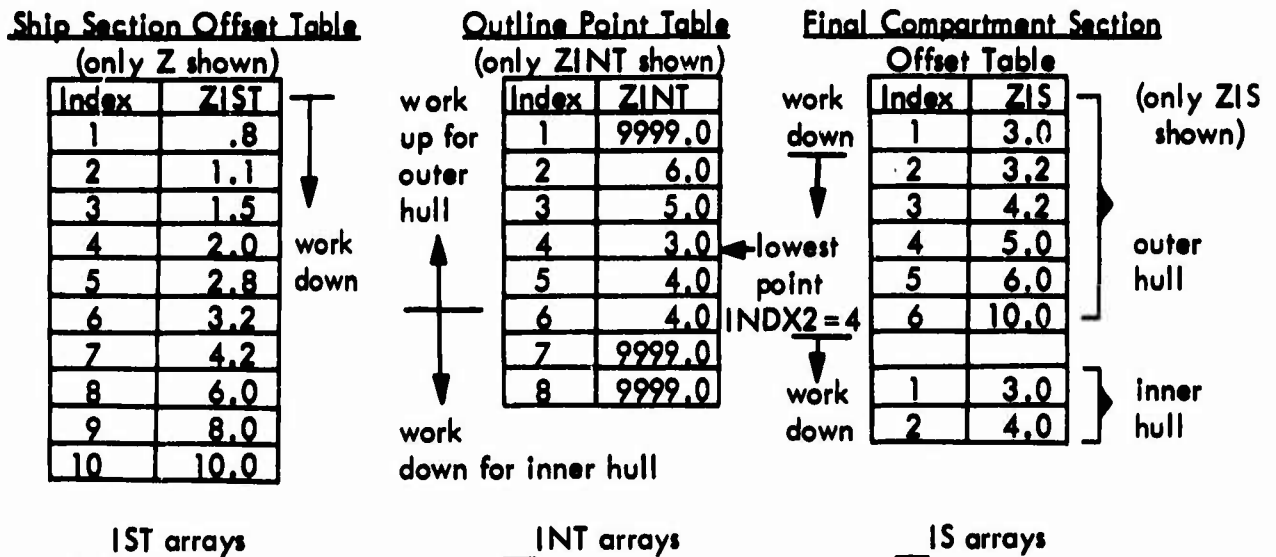
INDX1	Outline point index.
INDX2	Index of outline point with lowest Z.
INDX3	Hull index for __IST arrays; 1=outer hull, 2=inner hull.

SUBROUTINE MODIFYSYMBOL LIST (continued)

INDX4	Index of outline point just below (lower Z) INDX1.
INDX5	Outline point index.
INT	Lower limit of DO LOOP for transferring ship section offsets to Compartment Data Table.
INT1	Lower limit of DO LOOP for outline points.
JSTAT	Station index in Compartment Data Table arrays.
LMT	Upper limit of DO LOOP for outline point.
LMT1	Upper limit of DO LOOP for transferring ship section offsets to Compartment Data Table.
LBULK	Bulkhead index.
L2	Offset index in Compartment Data Table arrays.
L3	Index of initial ship section breakpoint to be tested.
L4	Breakpoint index in Compartment Data Table arrays.
L5	Control sentinel: if outline point being considered is lowest point, 2 if any other outline point.
L6	Control sentinel: 2 if outer hull, 1 if inner hull

SUBROUTINE MODIFY (continued)

NOTES REFERENCED BY FLOWCHART



1. The DO 500 LOOP goes from outline point to outline point (INT) merging with the ship section offsets (IST) to form the Compartment Section Offset Table (IS). This table is created starting at the lowest point, consequently, the Ship Section Offset Table must be looked at from the lowest point and the Outline Point Table must be looked at starting at the lowest point. However, this latter table is in order from the Northeast most point (See Bulkhead Outline Definition Points), clockwise, and consequently the lowest outline point lies somewhere in the middle of the table. Thus the lowest outline point is located and its index stored in INDX2. Since the DO LOOP index must run down the table, the index of the outline point used in expressions must be altered to increase in the order increasing Z's.

When working on the outer hull (using the above illustration) the DO LOOP index runs from 1 to 4 while the actual index should run from 4 to 1. The index expression becomes

$$\text{INDX1} = \text{LMT} - \text{I} + 1$$

where LMT is the number of points in the table (4) and I is the DO LOOP index.

While working on the inner hull the actual index corresponds to the DO LOOP index

$$\text{INDX1} = \text{I}.$$

Rather than use a COMPUTED GO TO to determine which index is valid, a single expression is used.

SUBROUTINE MODIFY (continued)

$$\text{INDX1} = (\text{LMT}-1+1) * (\text{L6}-1) + 1 * (2-\text{L6})$$

where L6 is 2 when working on the outer hull, and L6 is 1 when working on the inner hull.

2. INDX4 is the index of the point below INDX1 (lower). For the same reason as in #1. above, this point is located either 1 index higher or lower than INDX1 depending on whether the outer or inner hull is being considered. The resulting expression for the index becomes

$$\text{INDX4} = \text{INDX1} + 1 * (\text{L6}-1) - 1 * (\text{L6}-2).$$

3.

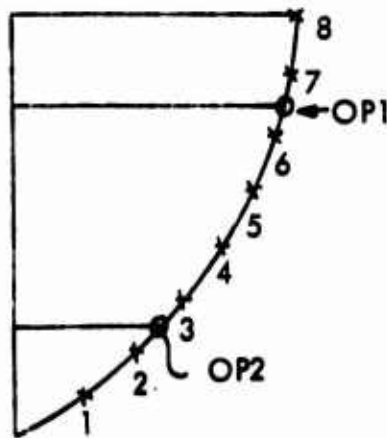


FIGURE 3a.

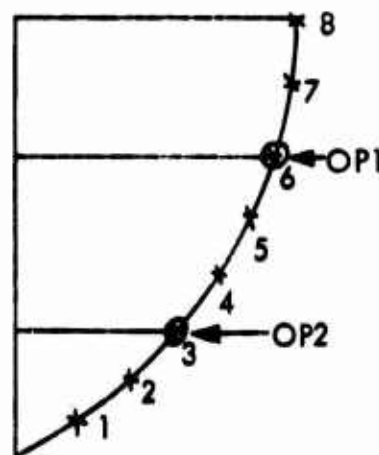


FIGURE 3b.

All ship section points lying between OP1 and OP2 are transferred to the Compartment Section Offset Table.

K = sentinel indicating whether OP1 lies on a ship section offset (whose index is NWP) or between two ship section offsets (whose indices are NWP and NWP+1). The values of K for these two conditions are 2 and 3 respectively.

NWP = index of ship section offset on which lies OP1, or just below OP1 if OP1 is between 2 offsets.

Since only offsets lying between OP1 and OP2 are to be transferred, the index of the upper offset to be transferred is

$$\text{LMT} = \text{NWP} - 3 + \text{K}.$$

SUBROUTINE MODIFY (continued)

For example, in Figure 3a., $NWP = 6$ and $K = 3$; thus
 $LMT = 6 - 3 + 3 = 6$.

In Figure 3b., $NWP = 6$ and $K = 2$; thus
 $LMT = 6 - 3 + 2 = 5$.

INT = index of lowest offset to be transferred. LWP is NWP for the lower outline point, OP2. Thus
 $INT = LWP + 1$.

In Figure 3a., $LWP = 2$; thus
 $INT = 2 + 1 = 3$.

In Figure 3b., $LWP = 3$; thus
 $INT = 3 + 1 = 4$.

In summary, offsets 3 to 6 are transferred in Figure 3a., and offsets 4 to 5 are transferred in Figure 3b.

4. INDX5 is the index of the outline point under consideration. The program encounters this statement when considering either the lowest outline point, INDX2, or any other outline point, INDX1. Thus, INDX5 equals either INDX2 or INDX1 depending on the situation. Since $L5 = 1$ when the lowest outline point is under consideration, and $L5 = 2$, when any other outline point is under consideration, the resulting expression for INDX5 is

$$INDX5 = INDX2 * (2 - L5) + INDX1 * (L5 - 1)$$

5.

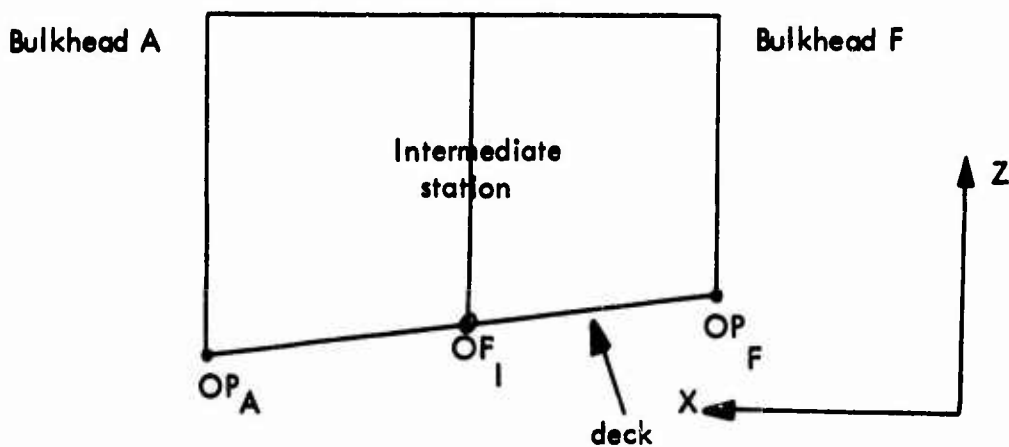


FIGURE 5a.

SUBROUTINE MODIFY (continued)

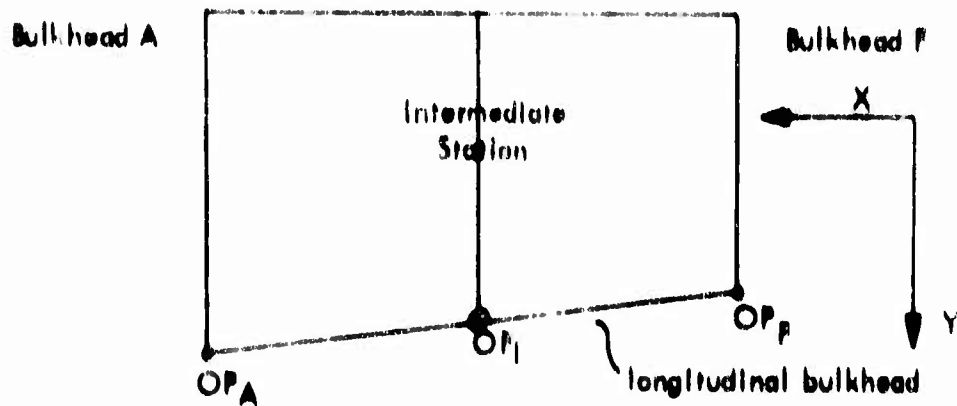


FIGURE 5b.

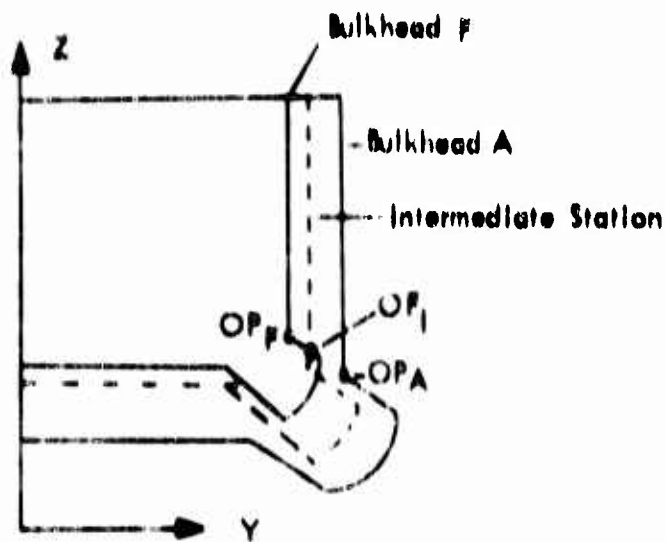


FIGURE 5a.

In the case where a compartment has a boundary of a sloping longitudinal bulkhead a sloping deck, the intermediate station must be modified so that a linear relationship exists between it and the bounding compartment bulkheads.

Thus if $(Z_{OPA} - Z_{OPF}) \neq 0$, the corresponding Z at the intermediate station is

$$(Z_{OPA} - Z_{OPF}) / (X_A - X_F) * X_I + Z_{OPF}$$

If $(Y_{OPA} - Y_{OPF}) \neq 0$, the corresponding Y at the intermediate station is

$$(Y_{OPA} - Y_{OPF}) / (X_A - X_F) * X_I + Y_{OPF}$$

SUBROUTINE MODIFY (continued)

6.

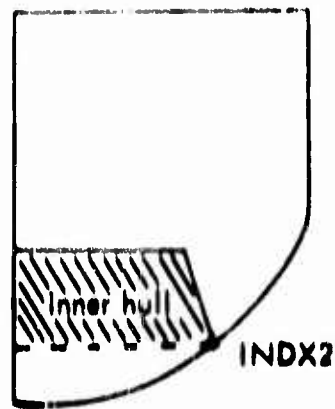


FIGURE 6a.

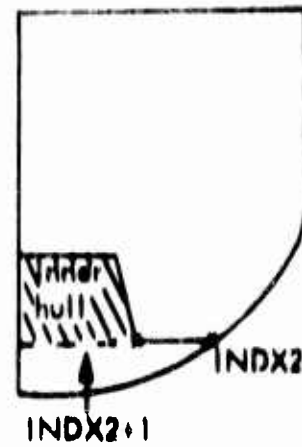
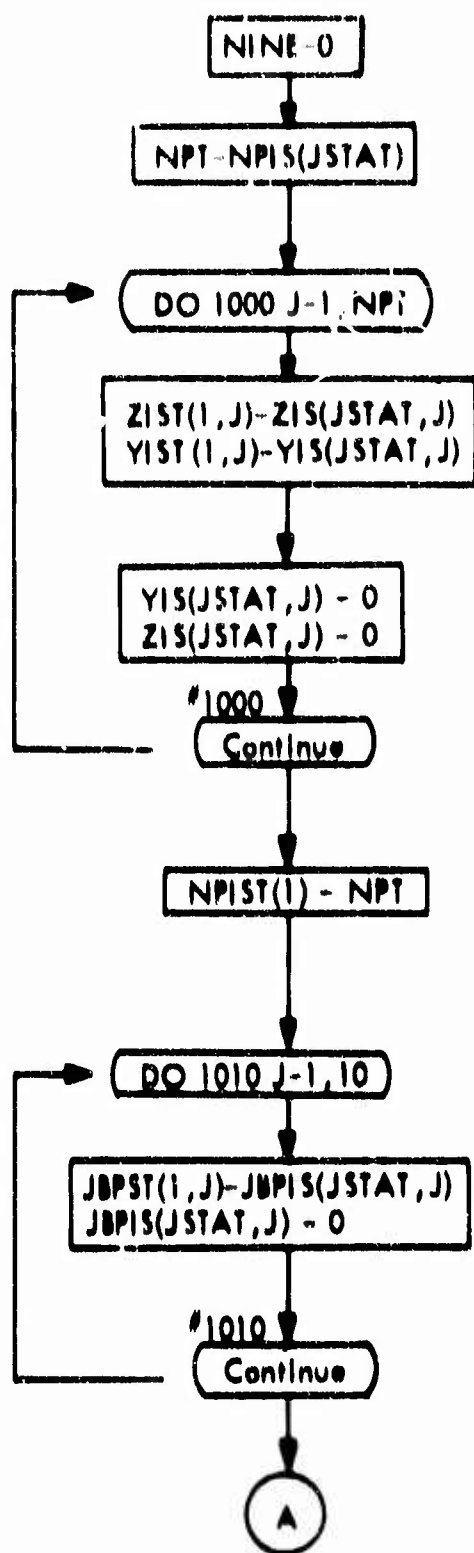


FIGURE 6b.

INDX2 is the index of the first lowest outline point encountered. The inner hull normally starts at INDX2, as in Figure 6a. However if ΔZ between INDX2 and INDX2+1 equals zero, as in figure 6b, the inner hull starts at INDX2+1.

SUBROUTINE MODIFY

FLOWCHART



Control character = 0

NPT - number of points on the ship section, outer hull.

Transfer Z and Y points of ship section outer hull to temporary storage arrays ZIST and YIST, outer hull, and clear ZIS and YIS arrays, outer hull, to zero.

Store "number of points" on outer ship hull in NPIST(1).

Transfer breakpoint locations on ship section outer hull to temporary storage array JBPST, outer hull, and clear array JBPIS, outer hull, to zero.

SUBROUTINE MODIFY (continued)

6.

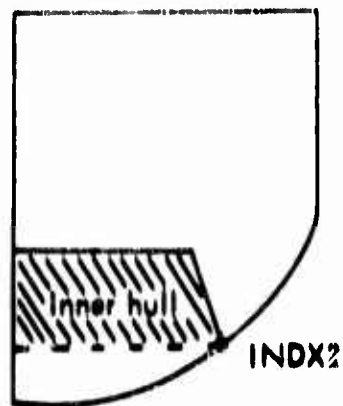


FIGURE 6a.

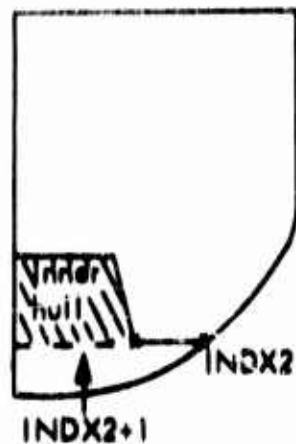
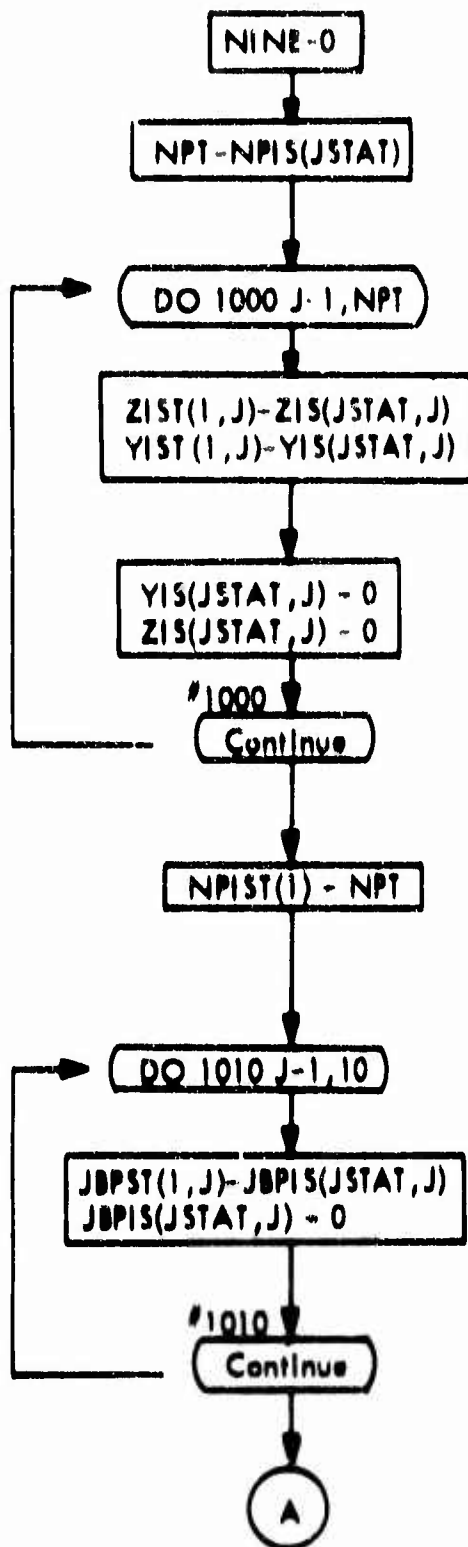


FIGURE 6b.

INDX2 is the index of the first lowest outline point encountered. The inner hull normally starts at INDX2, as in Figure 6a. However if ΔZ between INDX2 and INDX2+1 equals zero, as in figure 6b, the inner hull starts at INDX2+1.

SUBROUTINE MODIFY

FLOWCHART



Control character - 0

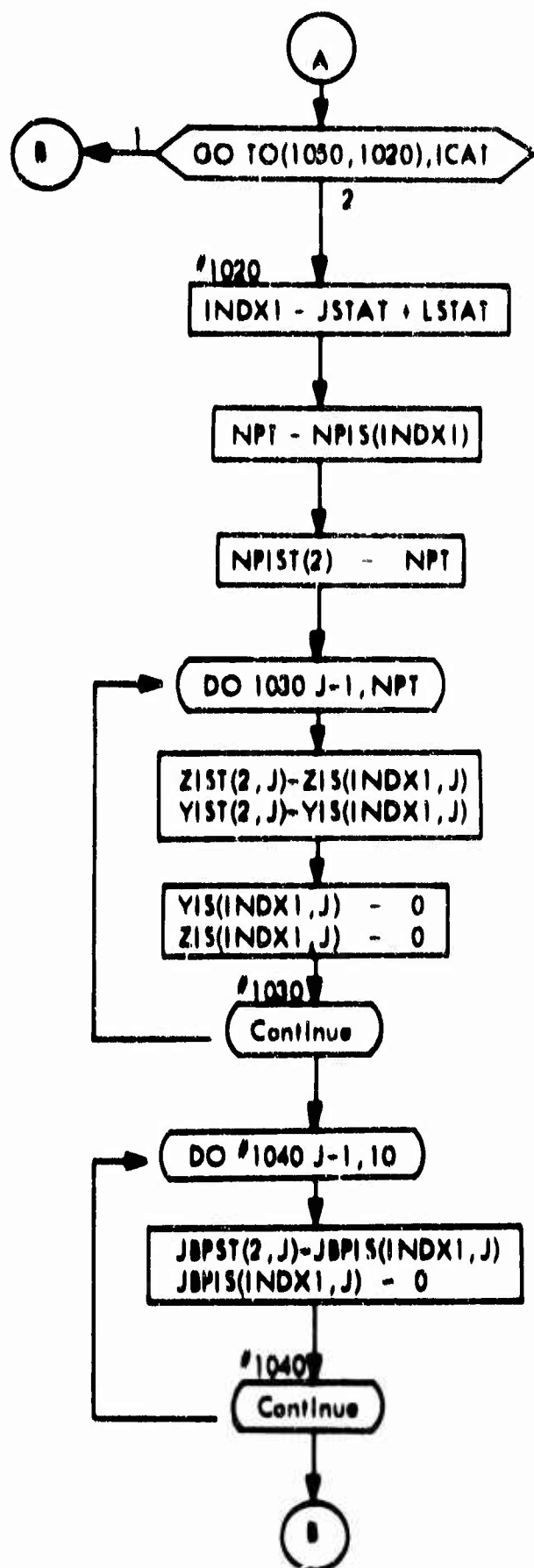
NPT - number of points on the ship section, outer hull.

Transfer Z and Y points of ship section outer hull to temporary storage arrays ZIST and YIST, outer hull, and clear ZIS and YIS arrays, outer hull, to zero.

Store "number of points" on outer ship hull in NPIST(1).

Transfer breakpoint locations on ship section outer hull to temporary storage array JBPST, outer hull, and clear array JBPI5, outer hull, to zero.

SUBROUTINE MODIFY



FLOWCHART (continued)

ICA1 = 2, ship has 2 hulls GO TO #1020 to transfer inner hull to temporary storage.

Index of inner hull = Index of outer hull + number of stations in compartment hull.

Number of points in inner hull.

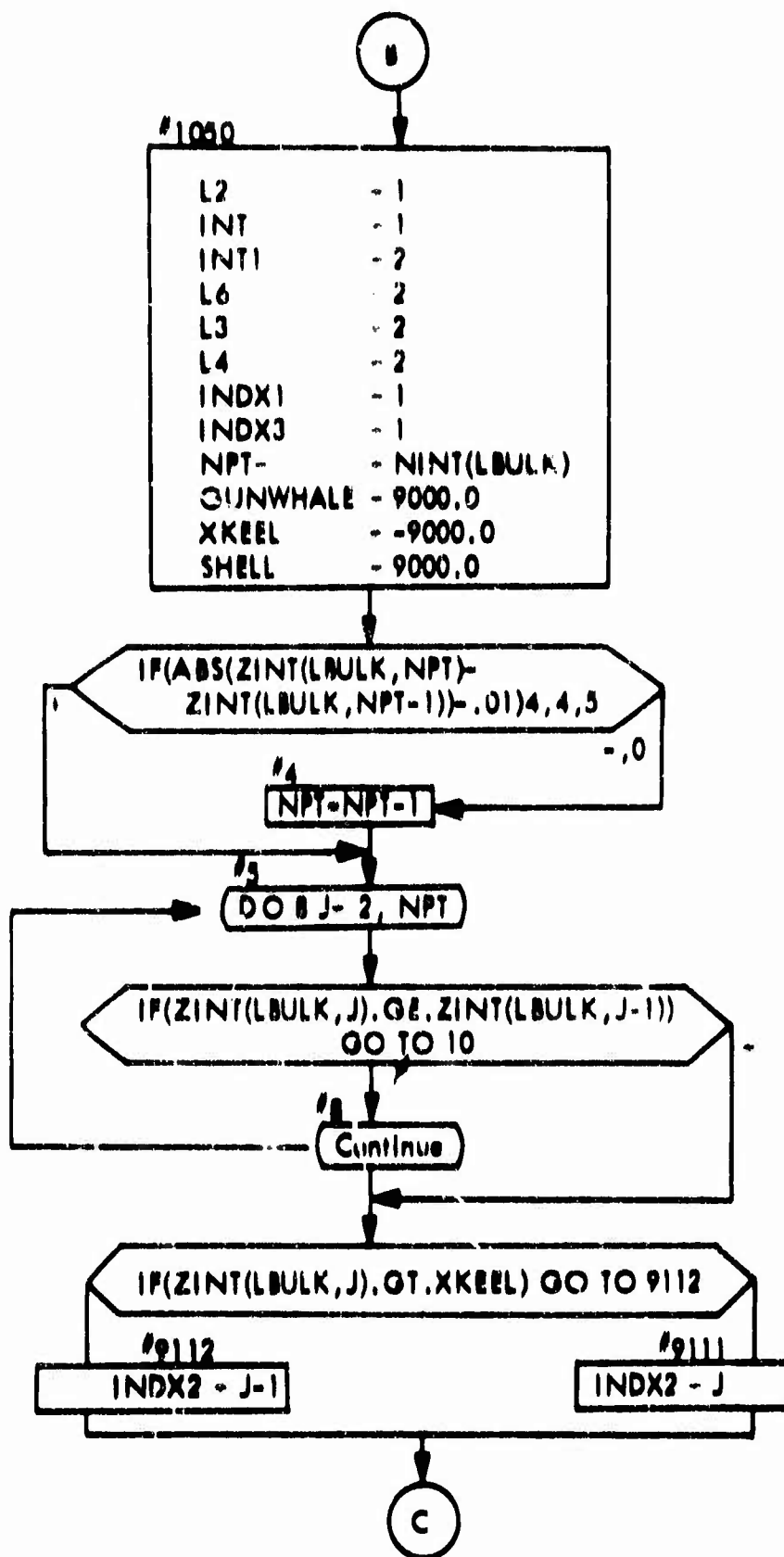
Store number of points on inner hull in NPIS(2).

Transfer Z and Y points of station, inner hull to temporary storage arrays ZIST and YIST, inner hull, and clear ZIS and YIS, arrays, inner hull to zero

Transfer breakpoint locations on inner hull to temporary storage array JBPST, inner hull, and clear array JBPIS, inner hull, to zero.

SUBROUTINE MODIFY

FLOWCHART (continued)



Initialization
(See Symbol List)

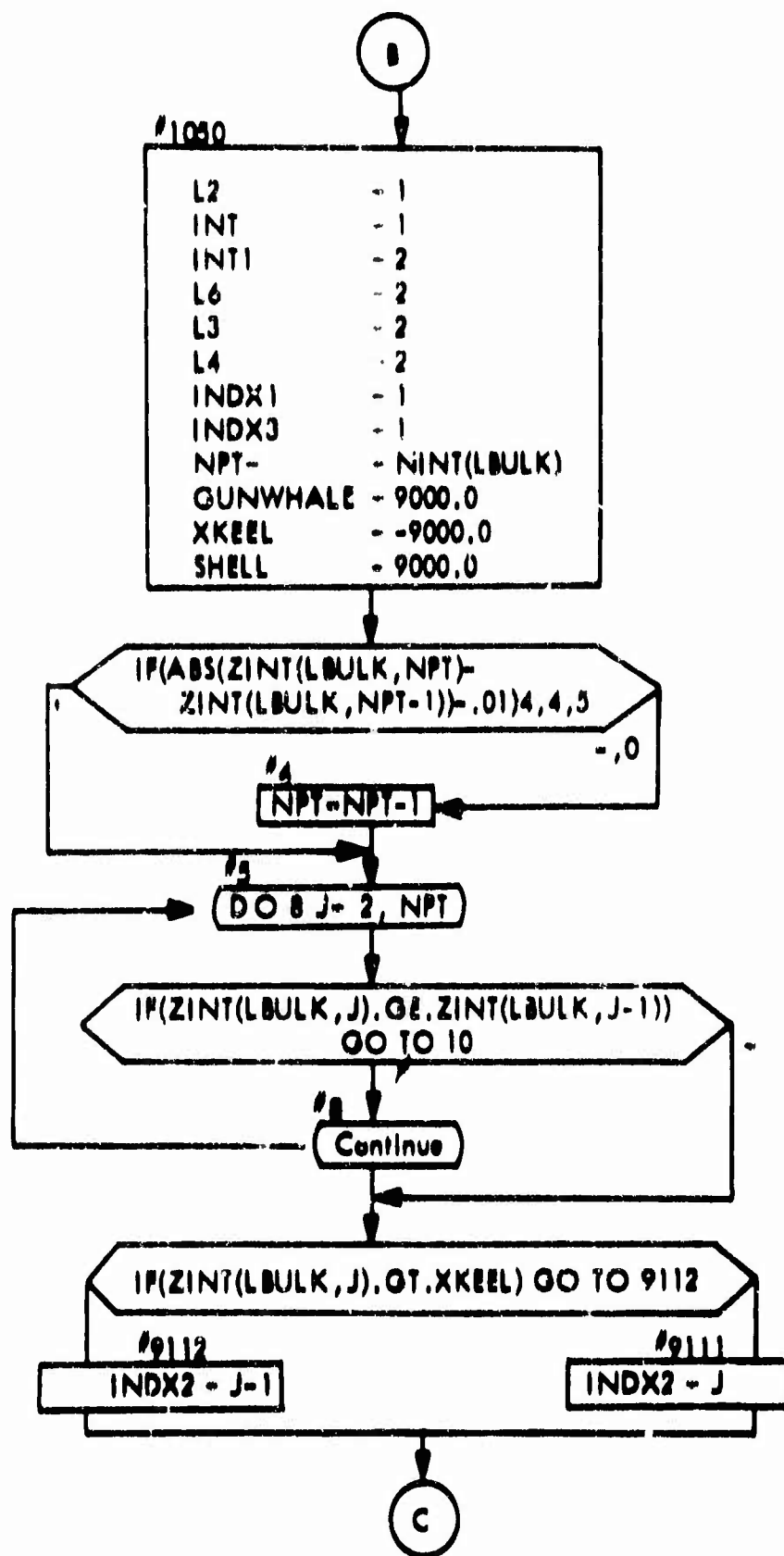
Drop consideration of last
outline point if Z of that
point is same as Z of second
to last outline point.

Locate lowest
outline point.

If lowest point is at keel,
lowest point is at index J; if
above keel, it is at J-1.
Store index of lowest point
in INDX2.

SUBROUTINE MODIFY

FLOWCHART (continued)



Initialization
(See Symbol List)

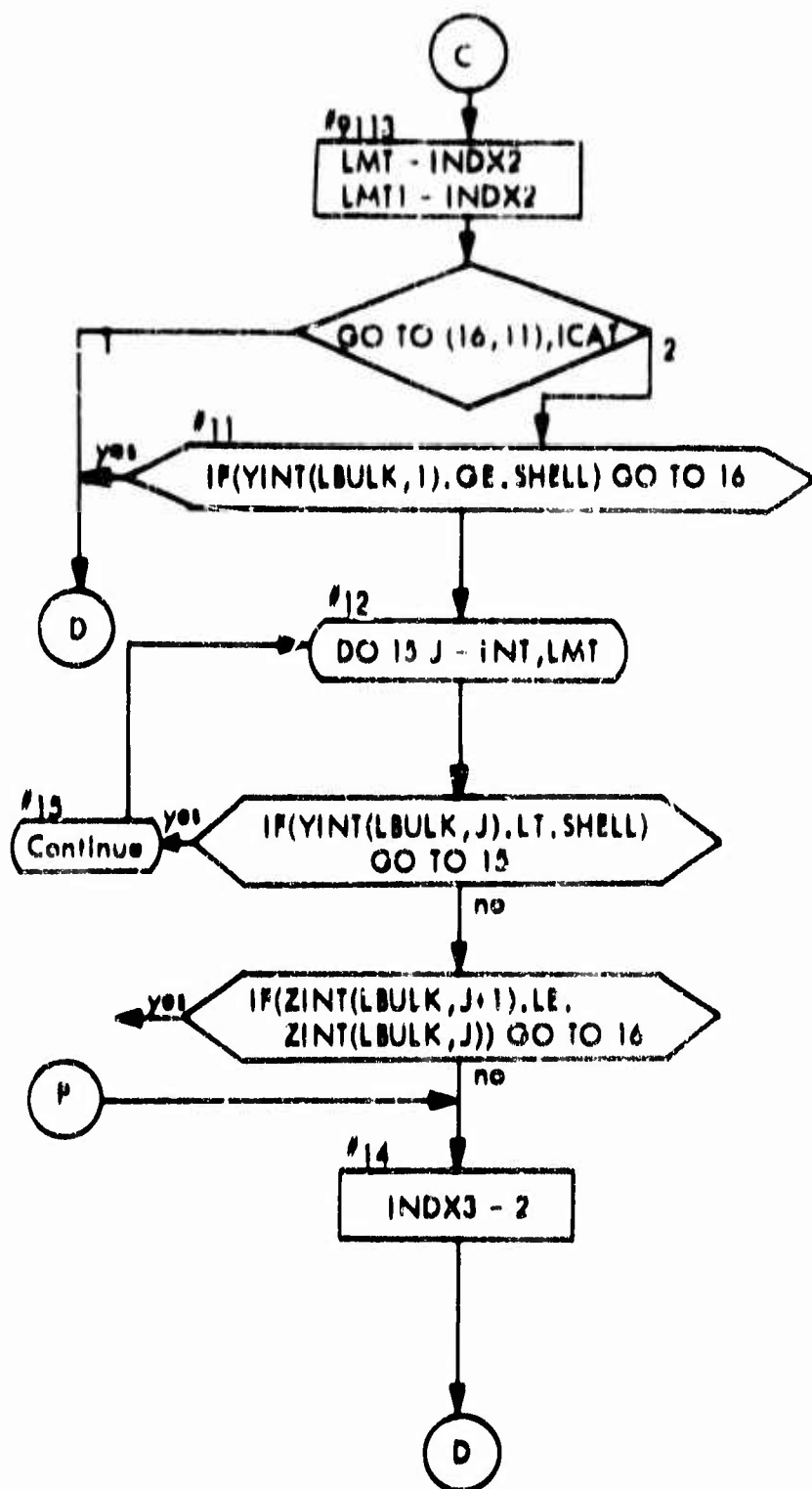
Drop consideration of last
outline point if Z of that
point is same as Z of second
to last outline point.

Locate lowest
outline point.

If lowest point is at keel,
lowest point is at index J, if
above keel, it is at J-1.
Store index of lowest point
in INDX2.

SUBROUTINE MODIFY

FLOWCHART (continued)



LMT - number of outline points for this hull (inner or outer) of compartment.
LMT1 - Do loop limit.

If ICAT = 2, ship has double hull.
If ICAT = 1, ship has single hull.

If first outline point is on shell, it must be on outer hull since points are taken clockwise, GO TO 16; if not, test further.

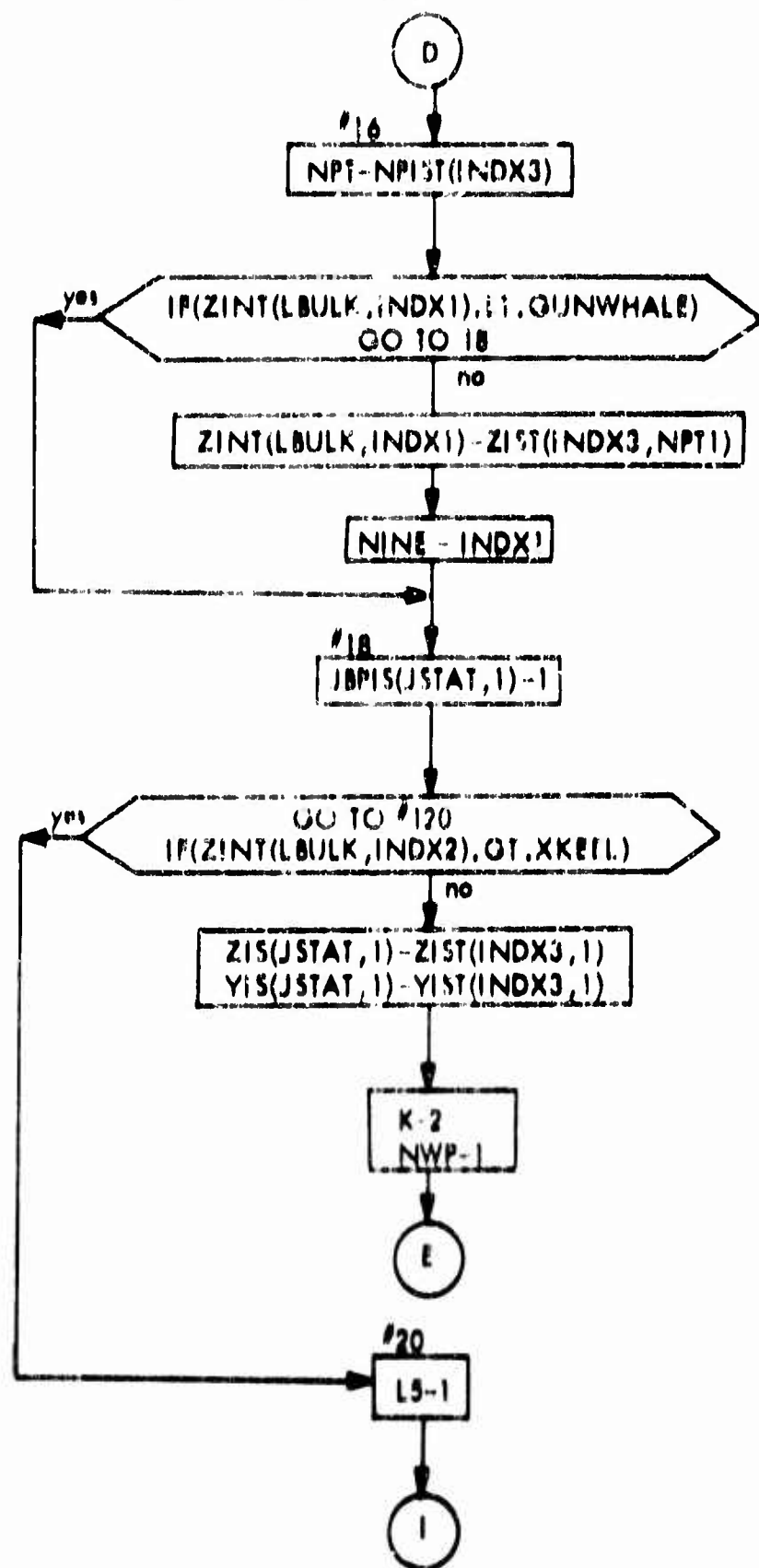
Test all outline points on this compartment hull.

If point does not lie on shell, go to test next point.

Go in clockwise, and assuming that once the bulkhead intersects the shell it must follow the shell for some distance, then the next outline point must also be a shell intersection. Then if Z of the 2nd point is less than Z of the 1st the intersection must lie on the outer ship hull. If Z of the 2nd point is greater than Z of the 1st, it must lie on the inner ship hull and the ship hull index, INDX3 must be reset to 2.

SUBROUTINE MODIFY

FLOWCHART (continued)



Number of points on ship hull.

If bulkhead goes to top of ship section, Z value of upper outline point is set equal to Z of upper point on ship section.

Index of outline point where substitution was made.

First point on compartment station is always a breakpoint.

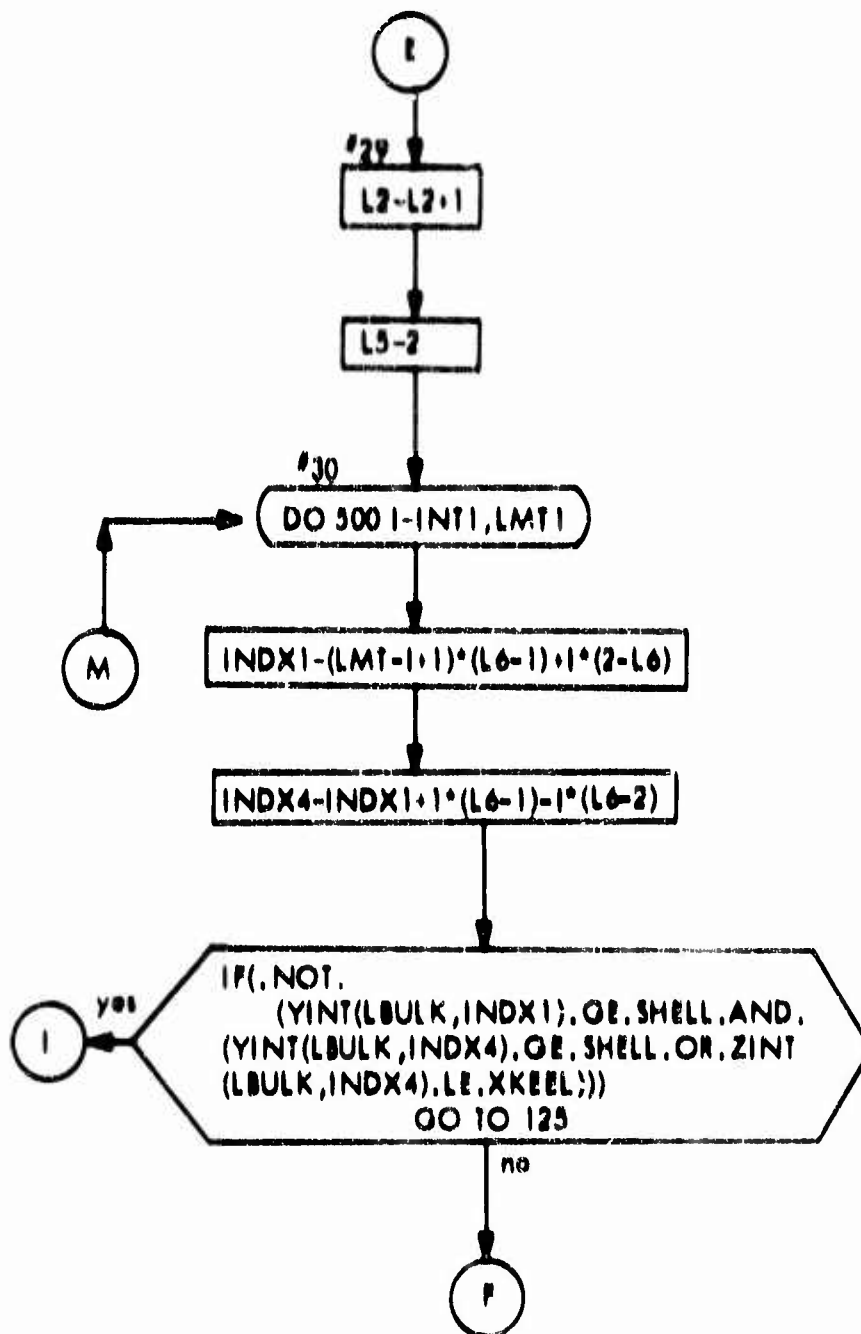
If bulkhead goes to bottom of ship section, Z and Y of first point on compartment section are set equal to lowest point on ship section.

Sentinel indicating first compartment point lies on a ship point (K-2) and index of that point (NWP-1).

Sentinel indicating use of lowest compartment outline point. (See Statement #125)

SUBROUTINE MODIFY

FLOWCHART (continued)



Increase index of compartment section points by 1 as storage of point was just completed.

Sentinel indicating use of compartment outline point under consideration (INDEX=INDX1, see area around Statement #125)

Do for each outline point on this compartment hull.

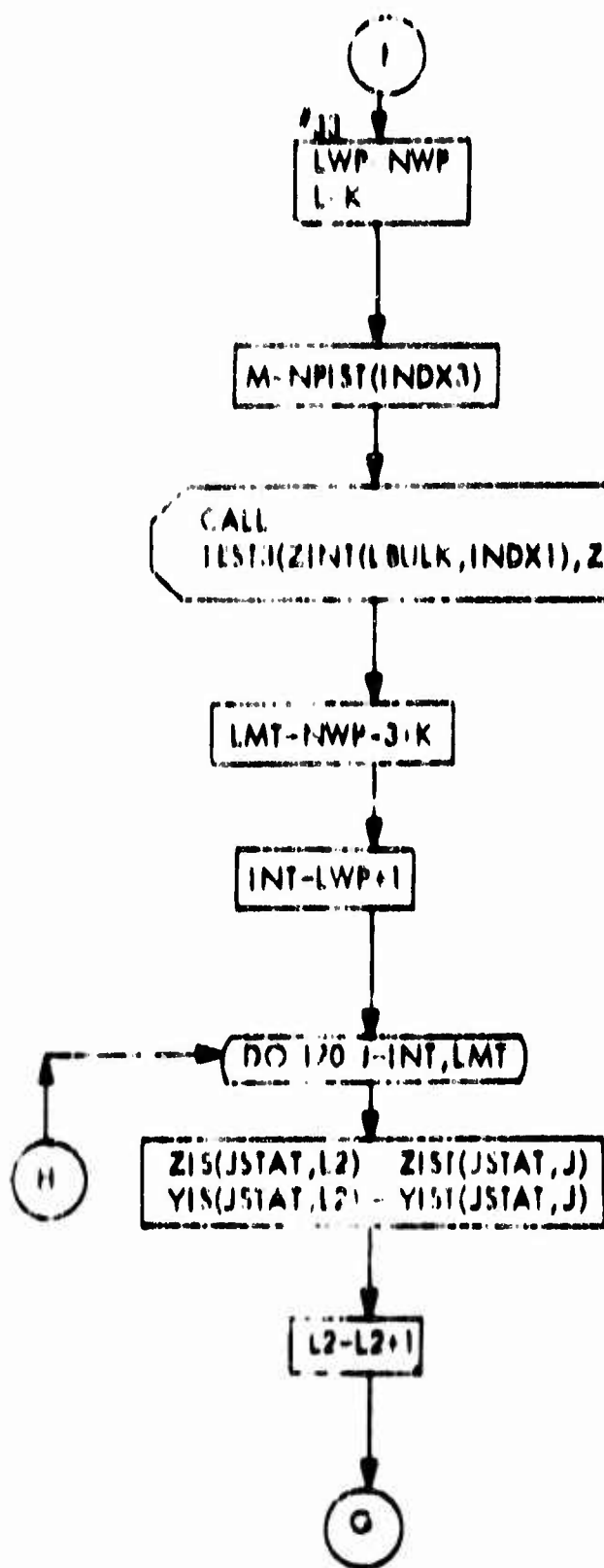
Index of outline point.
(See notes, #1)

Index of next highest outline point.
(See notes, #2)

If the current outline point is on the shell, and either the previous (lower Z) outline point is on the shell or is the keel, those points on the ship section lying between the two outline points must be transferred to the compartment section; go on. If this statement is not true, the bulkhead does not intersect the shell between these two points; GO TO Statement #125.

SUBROUTINE MODIFY

FLOWCHART (continued)



Store Index, NWP, and location sentinel (indicating point is on NWP or between NWP and NWP+1, (See Subroutine TEST3), K, of last outline point that lies on shell.

Number of points on ship hull section- for Subroutine TEST3.

Find relative location of outline point in ship section table of offsets.

Index of highest point on ship section to be transferred to compartment section (See notes, #3)

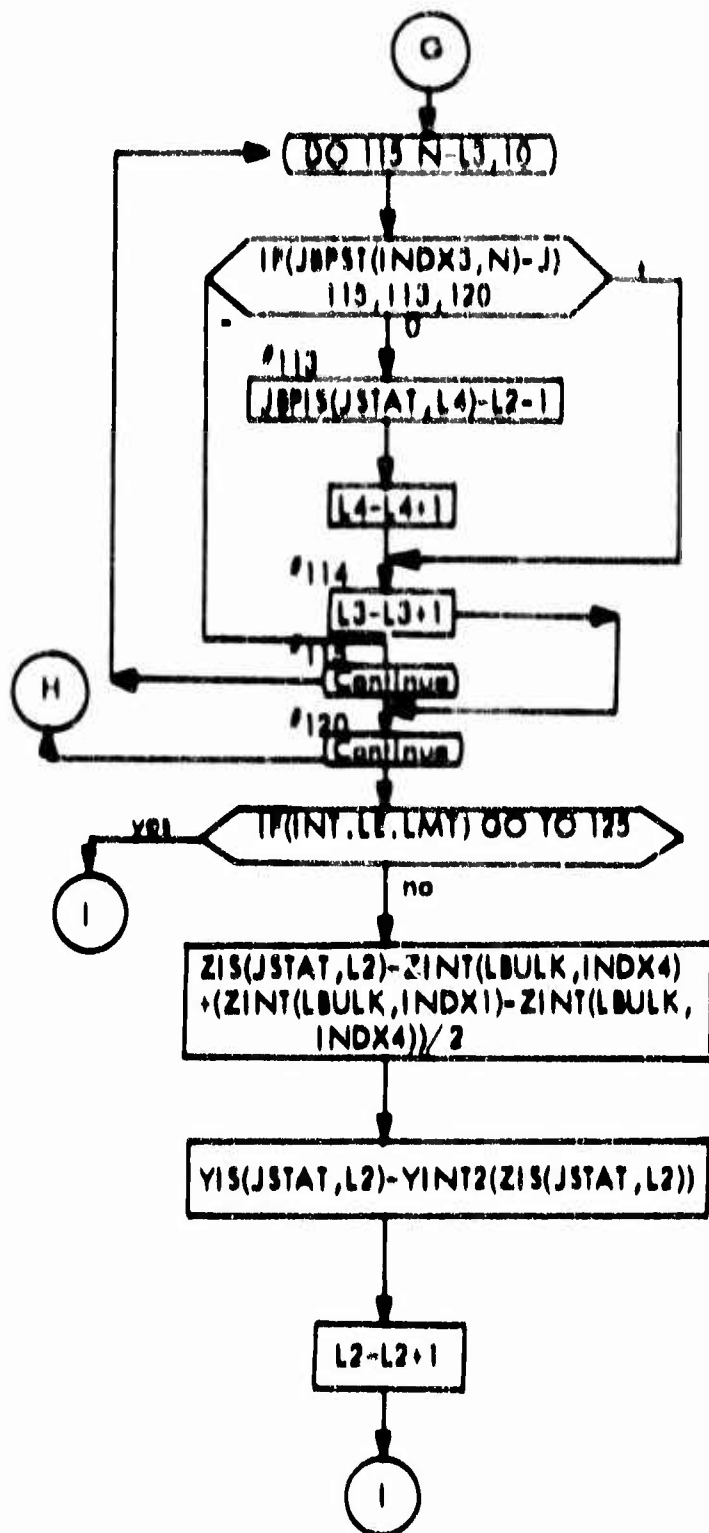
Index of lowest point on ship section to be transferred to compartment section.

Transfer ship section offsets, Index J, to compartment section offset table, Index L2.

Increase Index of compartment section offset table.

SUBROUTINE MODIFY

FLOWCHART (continued)



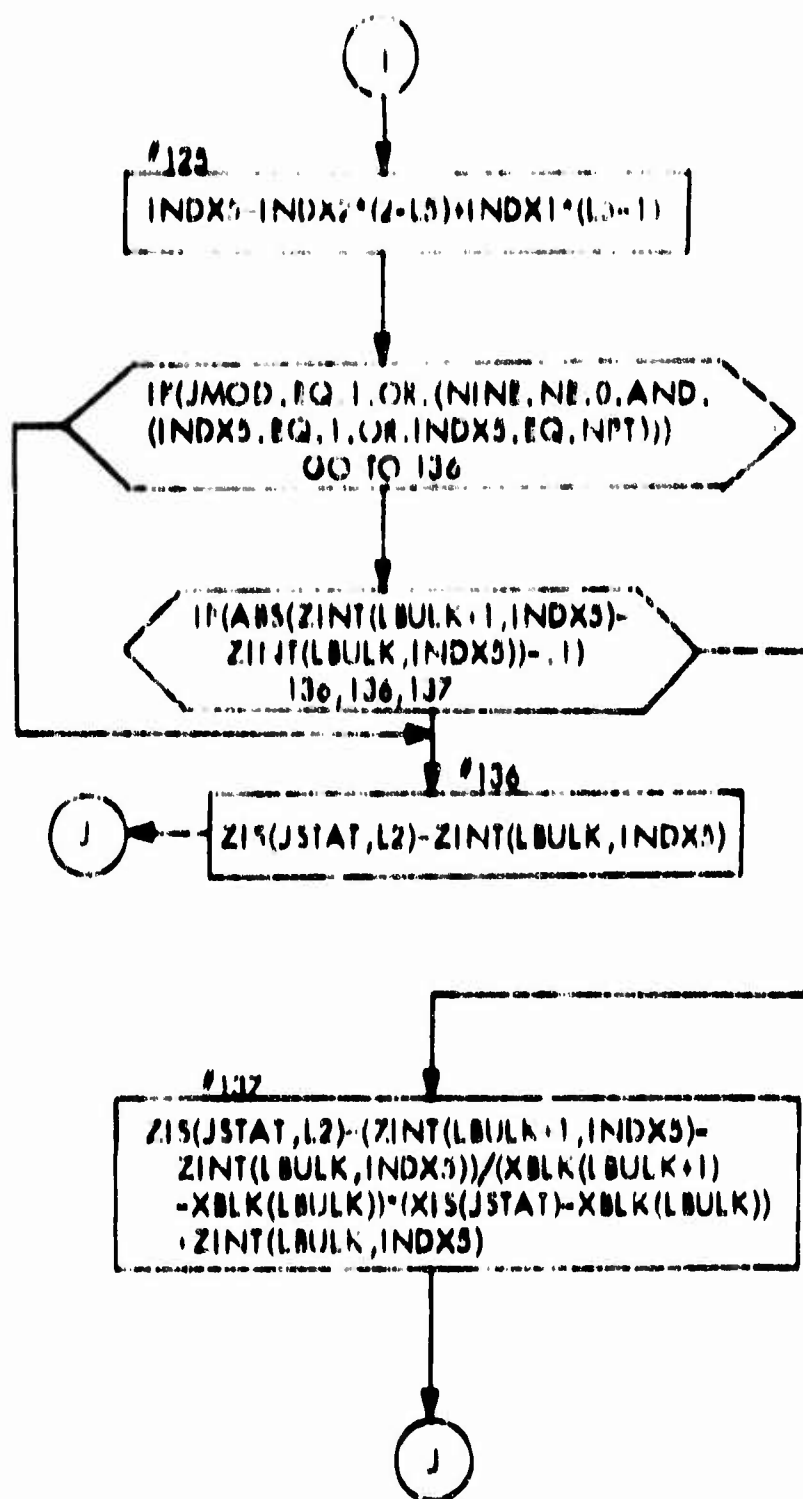
Search ship section breakpoint table. If any breakpoint index - index of offset just transferred, define compartment section breakpoint as index of offset in compartment section offset table (#113); increase index of compartment section breakpoint table by 1 (L4=L4+1).

Increase index of ship breakpoint table where search will begin.

If the index of the first ship section offset to be transferred in the above DO 120 LOOP is greater than the index of the last one, no points were transferred as none lay between the two outline points. Therefore, an intermediate offset must be created in order to preserve the curvature of the section. It is taken at a point halfway (Z direction) between the two outline points, and stored in the compartment section offset table. The index of this table (L2) is then increased by 1.

SUBROUTINE MODIFY

FLOWCHART (continued)



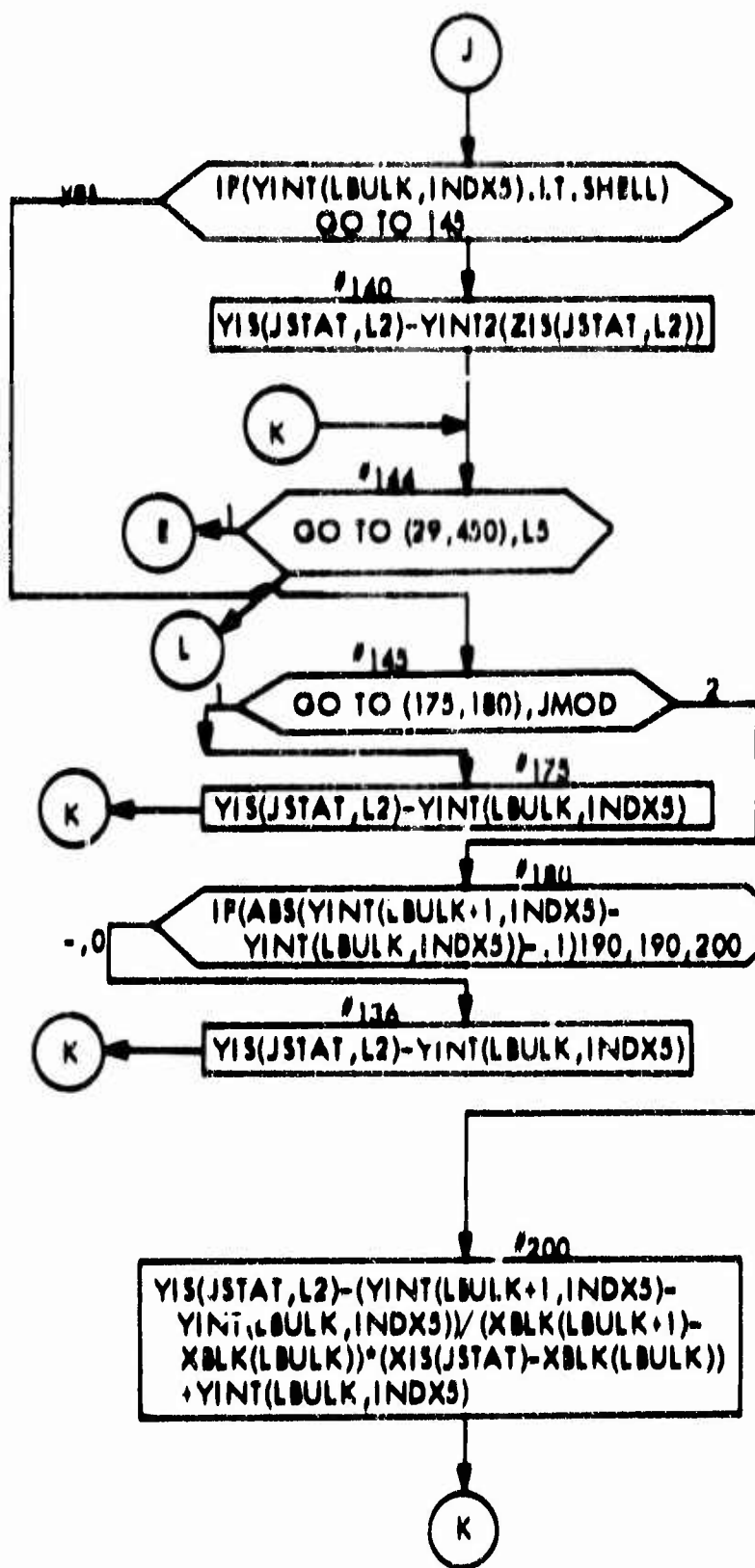
Index of outline point.
See notes, #4.

If this is a bulkhead (JMOD=1), or if an intermediate station and the outline point in question is the top of either the inner or outer compartment hull and also lies on the top of the ship section, then Z of the compartment offset is the Z of the outline point. (Statement #136). Otherwise, ... (for intermediate stations only), test ΔZ between the outline point on the bulkheads fore and aft of the intermediate station. If $\Delta Z=0$, the Z of the compartment offset is the Z of the outline point. (Statement #136)

If $\Delta Z \neq 0$, interpolate the Z of the compartment offset by a linear relationship between the Zs of the outline points on the surrounding bulkheads. (See notes, #5)

SUBROUTINE MODIFY

FLOWCHART(continued)



If the outline point is within the shell, GO TO #145.

If it lies on the shell, the Y value of the compartment offset - the Y value of the shell at the Z of the outline point (use interpolation routine YINT2).

If L5=1, outline point is lowest point, GO TO #29. If L5=2 it is not, GO TO #450.

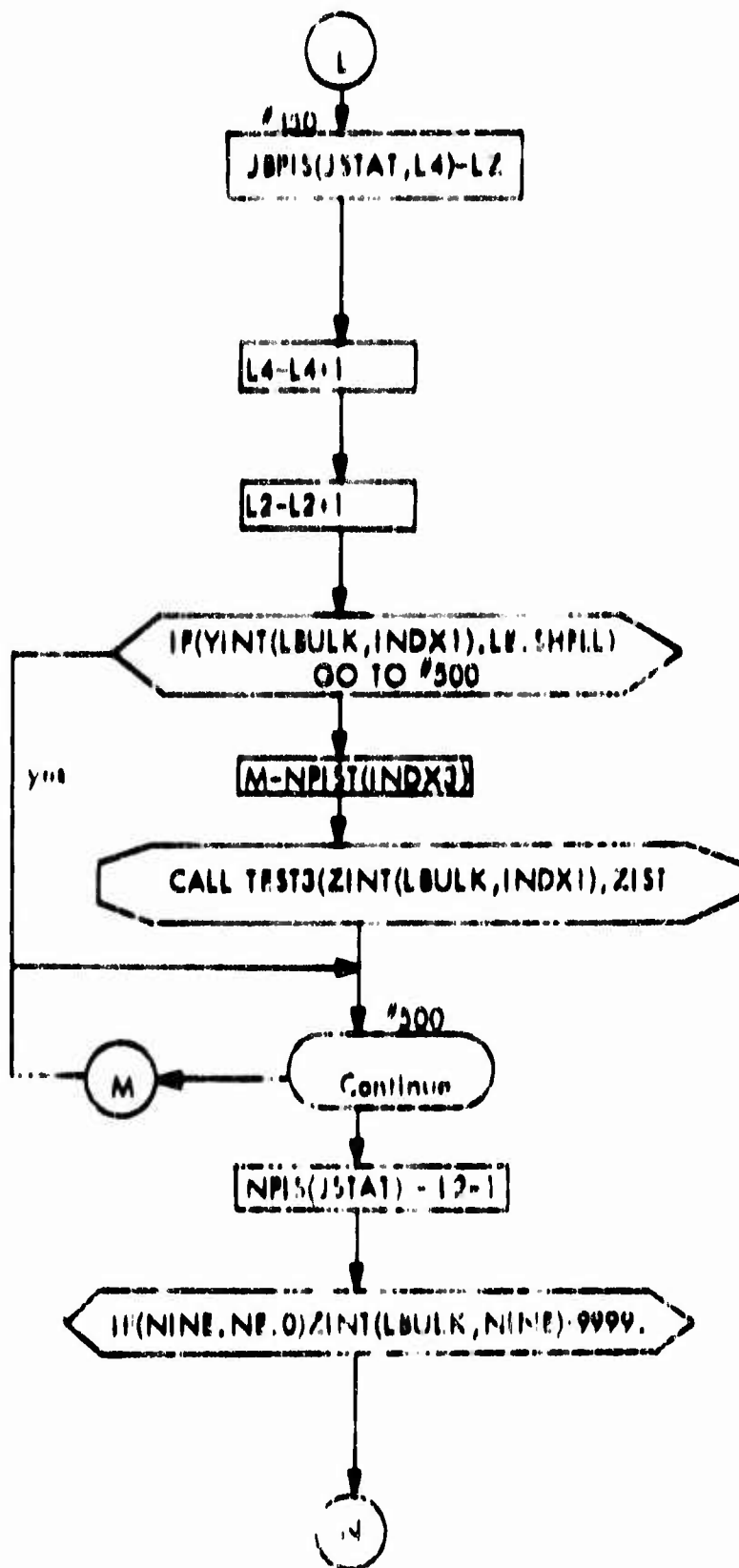
If this is a bulkhead (JMOD=1), the Y value of the compartment offset - the Y value of the outline point.

(This is an intermediate station, and the outline point lies within the shell). Test ΔY between the outline point on the bulkheads fore and aft of the intermediate station. If $\Delta Y=0$, the Y of the compartment offset is the Y of the outline point (Statement #190).

If $\Delta Y \neq 0$, interpolate the Y of the compartment offset by a linear relationship between the Ys of the outline points on the surrounding bulkheads. (See notes, #5)

SUBROUTINE MODIFY

FLOWCHART (continued)



Store index of compartment offset in compartment breakpoint table. (offset just stored was outline point and all outline points are breakpoints).

Increase compartment breakpoint table index by 1.

Increase compartment offset table index by 1.

If the outline point just operated on lay within the shell, go on to the next outline point.

If it lay on the shell, find the relative location of the outline point in the ship section table of offsets. (M is the number of points on the ship section).

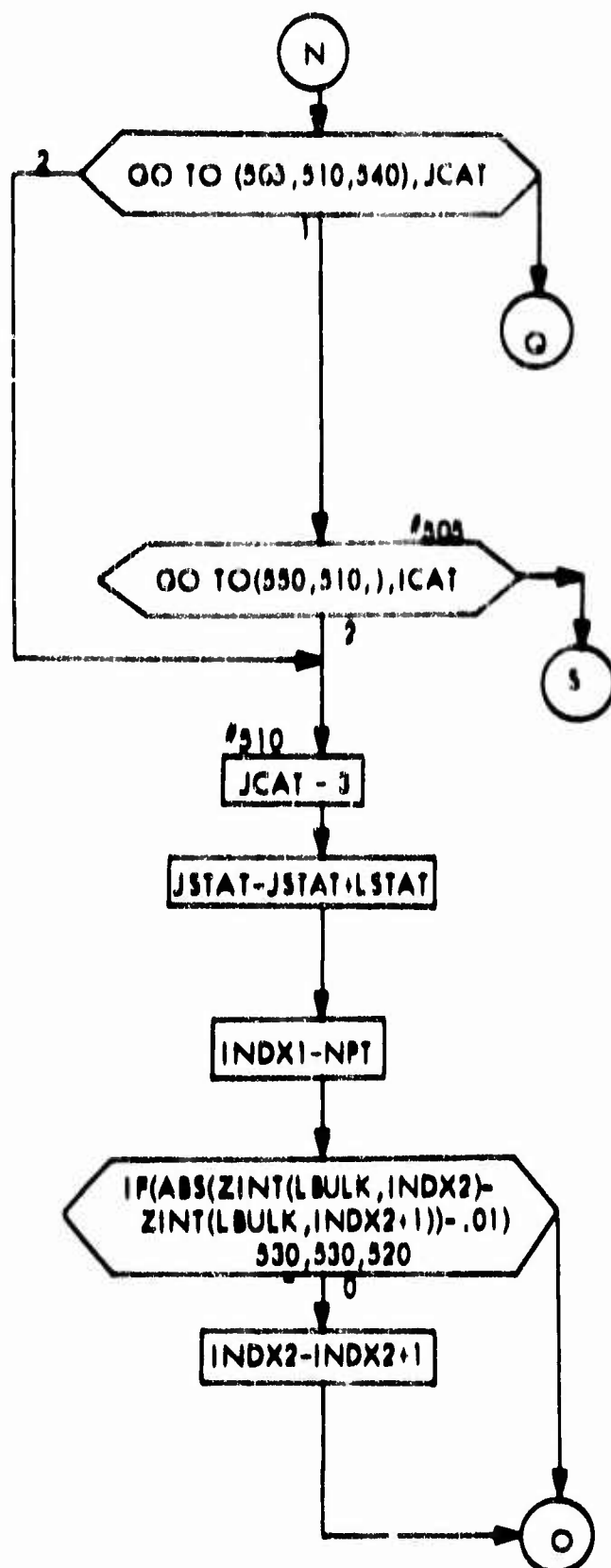
Go on to next outline point.

The number of points on the compartment section.

If NINE $\neq$ 0, the top outline point in the section lay on the top of the section and the actual Z value replaced the signal value of 9999.0 (See Statement #161, page D). Restore signal value of 9999.0.

SUBROUTINE MODIFY

FLOWCHART (continued)



If JCAT - 1, bulkhead outline point definitions indicate single hull; GO TO #560 to test to hip has double hull. If JCAT - 2, compartment has double hull, outer hull has just been modified; GO TO #510 for inner hull initialization. If JCAT - 3, compartment has double hull, and inner hull has just been modified; GO TO #540.

If ICA1 - 1, ship has single hull; GO TO #550. If ICA1 - 2 ship has double hull and therefore compartment must also have double hull; GO TO #510.

Signals modification of inner hull.

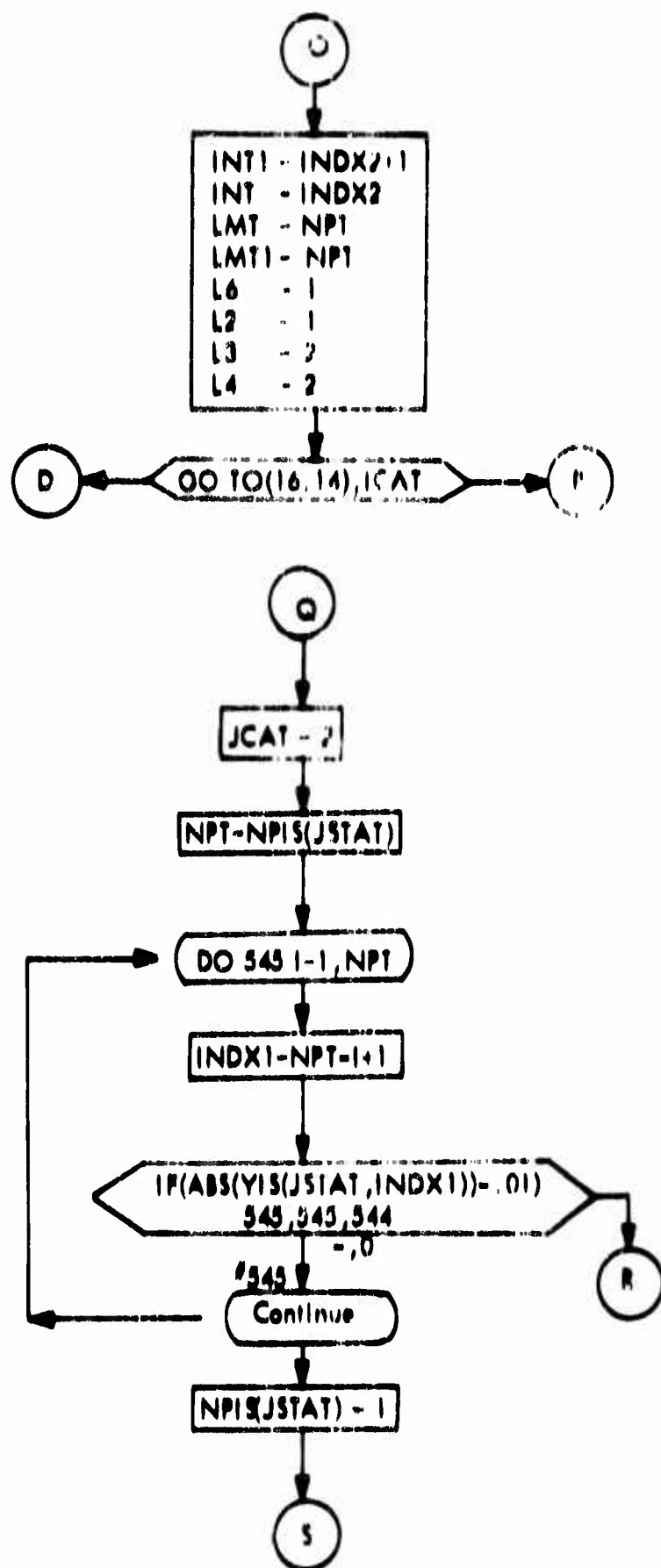
Index of inner hull - Index of outer hull + number of compartment stations.

Index of outline point defining top of inner compartment section.

If $\Delta Z = 0$ between lowest outline point and next outline point, increase index of lowest outline point by 1 (to second point) (See Notes #6).

SUBROUTINE MODIFY

FLOWCHART (continued)



Initialisation for inner compartment hull.
(See Symbol Lit)

If ICAT = 1, ship has single hull, OO TO 16. If ICAT = 2, ship has double hull, OO TO 14 to set ship hull index to inner ship hull

Reset JCAT.

Number of points on inner compartment hull.

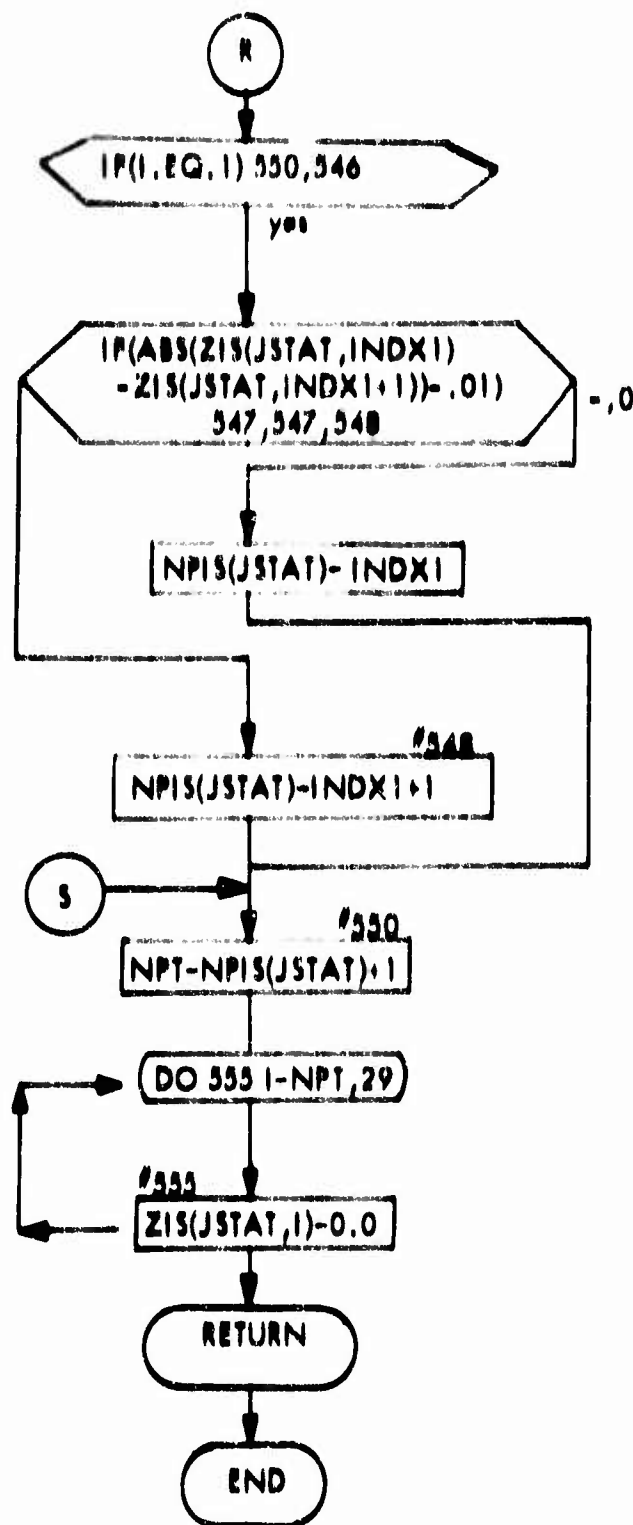
Search all points on inner hull.

Start at highest point and work down (work backwards from end of table)

If the Y of the offset is zero look at the next point; if YIS ≠ 0 go to R.

If all offsets have zero Y, there is effectively no inner hull. Set # of points on section inner hull to 1.

SUBROUTINE MODIFY



FLOWCHART (continued)

If offset has a Y of zero (I-1), go to #550; if there is at least one offset with a Y of zero go to #546.

If $\Delta Z=0$ between the first point of positive Y, INDX1, and the last point of zero Y, INDX1+1, the last valid point on the station is at INDX1, and therefore, the number of points on the inner compartment section equals INDX1.

($\Delta Z=0$) - the last valid point is at INDX1+1.

Set all Z above last valid point to zero.

Return to Subroutine GENERATE.

SUBROUTINE DAMAGE

1. PROGRAM DESCRIPTION:

A. General

This subroutine calculates the damage stability characteristics of the ship minus selected flooded compartments for any draft, heel, and trim condition. There is no balance of the ship; the properties are calculated at the set values of draft, heel and trim. The compartments are submitted in the same manner as the ship, namely, by a series of offsets on a minimum of 3 stations. All compartment must be submitted and their associated Compartment Data Table stored on the Ship Data Tape (LU 30) prior to execution of this routine.

B. Basic Logic

1. Input Section:

- a. The number of compartment sets (NSET) is read in.
- b. For each set of compartments the number of compartments in the set (L), their serial numbers (L2COMP(I,J)) and permeabilities (PERMB(I,J)) are read in.
- c. The number of input trims (N4TRIM), drafts (N4DRFT), and heels (N4HEEL) are read in.
- d. If N4TRIM = 0, then the first trim = DITRIM(1) = is set equal to zero. Otherwise, the input trims are read in and the first one-DITRIM(1) is set equal to zero.
- e. The input drafts (DIDRFT(I)) are read in.
- f. The input heel angles (DIHEEL(I)) are read in.
- g. A list of the input data is printed out.

2. Calculation Section:

- a. The inter-program sentinels KW, ITEST1, and KW are defined.
- b. JSERNO is defined as
ISERNO, the serial number of the ship.
- c. The set index I is initialized.
- d. The trim index ITRIM is initialized and the trim angle converted from degrees to radians.
- e. The draft index IDRFT is initialized.

- f. The heel index I3 is initialized and the heel angle converted from degrees to radians.
- g. ISERNO, the serial number of the ship or compartment being operated on, is set equal to JSERNO, the serial number of the ship.
- h. The Subroutine OFFSET is called, where the Ship Data Table is read from the Ship Data Tape.
- i. The Subroutine VOLUME is called where the volumetric properties of the ship are calculated.
- j. The volumetric properties of the ship are stored in VISHIP, TCBISH, XLCBISH and VCBISH.
- k. L is set equal to the number of compartments in set I.
- l. The compartment index I4 is defined.
- m. ISERNO is set equal to the serial number of compartment I4 in set I.
- n. ITEST1 is set equal to 2 (this signals OFFSET that the Compartment Data Table is on the Ship Data Tape).
- o. OFFSET is called where the Compartment Data Table is read from the Ship Data Tape.
- p. VOLUME is called where the volumetric properties of the compartment are calculated.
- q. The volumetric properties of the compartment are stored in VOLIC(I4), TCBIC(I4), XLCBIC(I4), and VCBIC(I4).
- r. If all compartments in set I have been calculated, go to S; otherwise increment compartment index I4 and go to m.
- s. The compartment total accumulators are set to zero.
- t. The volumetric properties of the compartments in set I are summed and their individual values printed out.
- u. The volumetric properties of the total flooded volume and the intact ship are printed out.
- v. The flooded volume is subtracted from the intact ship and the net properties of the flooded ship are printed out. The righting arm is computed and printed out.

- w. Increment heel Index I3 and go back to g; If all heel angles have been calculated, increment draft Index IDRFT and go back to f; If all drafts have been calculated, increment trim Index ITRIM and go back to e; If all trims have been calculated, increment compartment set Index I and go back to d; If all sets have been calculated, return to executive program.

II INPUT

A. COMPARTMENT DESCRIPTIONS

A.1 Method 1- Submit Compartment Offsets

Each compartment is submitted as a regular "ship" according to the instructions pertaining thereto. For each compartment a minimum of 3 stations are required. They should be submitted in accordance with data cards 1, 2, 3, 4, and 5.

Card Type 1: CC 40-50 should be punched accordingly: 000, compartment on both sides of centerline; b+1, compartment on starboard side; b-1, compartment on port side. (b represents blank).

Two restrictions exist at present on the method of compartment description which must be followed:

1. The station spacing used in describing the compartments must be identical to that of the parent ship; i.e., the station numbers on the Type 3 Data Card must be in terms of the parent ship.

2. The "LBP" on the Type 5 Data Card must be that of the parent ship, not the length of the compartment.

When the compartment description data is submitted the Type 2 Data Card should be blank - this signifies that no actual major supervisors are to be executed for the compartment; only the Data Table will be formed and stored on tape.

A.2 Method 2- Submit Bulkhead Outline - See Subroutine CMPRTMNT

The compartments are identified to the damage stability routine by the serial number that appeared on the Type 1 Data Card used in their submission to the program.

Once the compartments are submitted they are stored on the Ship Data Tape and need not be resubmitted for future runs.

B. INPUT FOR DAMAGE STABILITY ROUTINE - See System Description

III Output:

Table of volumes of flooded compartments - VOLIC.

Vertical centers of buoyancy of flooded compartments - VCBIC.

Transverse centers of buoyancy of flooded compartments - TCBIC.

Longitudinal centers of buoyancy of flooded compartments - XLCBIC.

Total flooded volume - VOLIT.

Vertical center of buoyancy of total flooded volume - VCBIT.

Transverse center of buoyancy of total flooded volume - TCBIT.

Longitudinal center of buoyancy of total flooded volume - XLCBIT.

Volume of intact ship - VISHIP.

Vertical center of buoyancy of intact ship - VCBISH.

Transverse center of buoyancy of intact ship - TCBISH.

Longitudinal center of buoyancy of intact ship - XLCBISH.

Volume of damaged ship - VOLIT.

Displacement of damaged ship - DSPL.

Vertical center of buoyancy of damaged ship - VCBIT.

Transverse center of buoyancy of damaged ship - TCBIT.

Longitudinal center of buoyancy of damaged ship - XLCBIT.

Righting arm of damaged ship - ROTARM.

NOTE: Flooded volumes are actual volumes $\times$ input permeabilities.

FUNCTION YINT2(TEST)

This program is identical to WPLAN1 except for the following items:

- 1) YINT2(TEST) is called as a function subprogram rather than as a subroutine.
- 2) The test value of draft at which the halfbreadth is desired is now included in the calling statement as TEST, rather than stored in COMMON.
- 3) The following array and variables have been replaced as indicated* (for description of the meaning of the different arrays see the documentation for subroutine MODIFY):

ZIST--->Z
YIST--->Y
YINT--->YI(ISTAT)
L---->M
IBREA--->IBREAK
INDXJ--->JSTAT
JBPST----->JBREAK

- 4) The function FINTP2 is now written out explicitly.
- 5) For further details see NavShips 0900-006-5810.

*The symbol "--->" means "replaces".

SUBROUTINE TEST3

This subroutine is similar in logic and objective to Subroutine TEST1 of the original Ship Hull Characteristic Program, namely, the determination of the relative position of a test value with respect to a table of sequential numbers. It is used for locating bulkhead outline points on the ship section.

Two sentinels are OUTPUT:

K: A sentinel indicating the status of the test value with respect to the array defined follows:

- K = 1 the value of TEST is less than the maximum value in the array.
- K = 2 the value of TEST = a value in the array.
- K = 3 the value of TEST lies between 2 values in the array (Indices NWP and NWP+1).

NWP: The index in the array of the value in array corresponding to TEST(K-2), or the first value less than TEST(K-3).

For further details see NavShips 0900-006-5750 where the following arrays and variables have been replaced as indicated:

NPT---► M
INDX3---► ISTAT

PROGRAM MODIFICATION TO SHCP (YOHULL)

I For Double Offset Modification.

A. The following changes must be made to DIMENSION variables in all programs:

1. All variables with a subscript 15 must have the first dimension which is 30 changed to 60.
2. All variables ending in 25 must have their dimension changed from 30 to 60.
3. The following draft variables must also have their dimensions increased from 30 to 60: H, H1H00, HIMAR and HISAO.
4. The first dimension of JBREAK shall be increased from 30 to 60 and the first dimension of the variables S shall be increased from 30 to 60.
5. The first dimension of the variables Y and Z shall be increased from 30 to 60.
6. The dimension of the variables X, NP, STATNO and YI shall be increased from 30 to 60.
7. YIINT(4,30) shall be added to DIMENSION.

B. The following variables shall be added to COMMON: ICAT, LIMIT and YIINT.

The following is a list of required program modifications, referenced by the card numbers that occur in the program listings in the individual program write-ups.

C. Hull Characteristics Executive Program NavShips 0900-006-5600

111SYN,ICAT	Hull0810
ILBP,XMID,JDUMMY,LIMIT	Hull0850
1320 DO 1141 ISTAT-1,LIMIT	Hull0870
ILBP,XMID,JDUMMY,LIMIT	Hull0940
DO 5462 ISTAT-1,LIMIT	Hull0950
IF(ICAT-2)728,1289,1289	Hull1610
728 KW-1	Hull1611
1289 IPRG-1	Hull1860
111SYN,ICAT	Hull3990

D. Subroutine OFFSET NavShips 0900-006-5720

DO 1756 ISTAT-1,60	OFFS0740
ILBP,XMID,JDUMMY,LIMIT	OFFS0830
319 DO 330 ISTAT-1,LIMIT	OFFS0910
140 DO 141 ISTAT-1,LIMIT	OFFS0940
ICAT-JDUMMY	OFFS0991
IF(ICAT-2)333,334,335	OFFS1771
334 ICAT-3	OFFS1772
ISTAT-ISTAT+1	OFFS1773
LIMIT-2*NSTAT	OFFS1774
GO TO 10	OFFS1775
335 ICAT-2	OFFS1776
NSTAT-NSTAT/2	OFFS1777
GO TO 346	OFFS1778
333 LIMIT-NSTAT	OFFS1779
346 DO 411 ISTAT-1,LIMIT	OFFS1780
DO 851 ISTAT-1,LIMIT	OFFS2110
ILBP,XMID,ICAT,LIMIT	OFFS2400
DO 190 ISTAT-1,LIMIT	OFFS2410
DO 860 ISTAT-1,LIMIT	OFFS2690

E. Subroutine HYDRO NavShips 0900-006-5700

ILIMIT-LIMIT	HYDR1681
890 LIMIT-ILIMIT	HYDR1860
RETURN	HYDR1861

F. Subroutine AREAS NavShips 0900-006-5700

12-ISTAT	AREA0799
GO TO(3110,889,890),ICAT	AREA3300
889 YIINT(1,ISTAT)-Y55(1)	AREA3301

	GO TO 3110	AREA3302
890	11-1STAT-NSTAT	AREA3303
	Y1INT(3,11)-Y33(1)	AREA3304
	GO TO 3110	AREA3305
	IF(ICAT-2)777,778,779	AREA3384
778	S1-S25(1STAT)	AREA3385
	AREA-AREA25(1STAT)	AREA3386
	TCO-TCO25(1STAT)	AREA3387
	VCO-VCO25(1STAT)	AREA3388
	IF(ABS(THET1H)-.0001)667,667,668	AREA3389
668	Y1INT(2,1STAT)-Y33(2)	AREA3390
667	ICAT-3	AREA3391
	1STAT-1STAT+NSTAT	AREA3392
	GO TO 222	AREA3393
779	VCO25(12)-(VCO*AREA-VCO25(1STAT)*AREA25 (1STAT))/ -AREA25(1S	AREA3394
	1TAT))	AREA3395
	TCO25(12)-(TCO*AREA-TCO25(1STAT*AREA25(1STAT))/ (AREA+AREA25(1S	AREA3396
	1TAT))	AREA3397
	AREA25(12)-AREA-AREA25(1STAT)	AREA3398
	S25(12)-S1+S25(1STAT)-2.0*S(1STAT,L)	AREA3399
	ICAT-2	AREA3400
	IF(ABS(THET1H)-.0001)664,664,665	AREA3401
665	Y1INT(4,1STAT)-Y33(2)	AREA3402
664	1STAT-1STAT-NSTAT	AREA3403

PROGRAM MODIFICATION TO SHCP (YOHULL)
(continued)

II. Modifications for Incorporation of Subroutines DAMAGE & CMPRTMNT

The following is a list of required modifications to SHCP, referenced by the card number that occur in the program listings in the individual program write-ups:

A. Hull Characteristics Executive Program NavShips 0900-006-5600

1BP,XMID,JDUMMY,LIMIT,KDUMMY	HULL0850
1LBP,XMID,IDUMMY,LIMIT,KDUMMY	HULL0940
62 GO TO (20,70,90,3999,3999,1142,40,95)	HULL1890
95 CALL CMPRTMNT	HULL3775
GO TO 60	HULL3776
300 GO TO (330,340,350,360,370,380,390,500),ITEST1	HULL3820
390 CALL DAMAGE	HULL3971
IPROG-IPKGO+1	HULL3972
GO TO 140	HULL3973

B. Subroutine OFFSET NavShips 0900-006-5720

1BP,XMID,JDUMMY,LIMIT,KDUMMY	OFFS0830
11SYM-KDUMMY	OFFS0992
1LBP,XMID,ICAT,LIMIT,11SYM	OFFS2400
WRITE(30) IEOP,NAME,NSTAT,NP,XLBP,XMID	OFFS2470
ICAT,LIMIT,11SYM	

DATA PREPARATION

The required input for the Hull Characteristics Program depends upon which major subroutines are desired to be executed. The Card Type Usage Map on the following page indicates the required card types for each of the major subroutines. A particular card type may require more than one card and this fact is indicated in the input description.

For any one run of a ship only one of each pertinent card type may be submitted. Start at the highest number program being called and work back, adding those card types required for other called programs not required by any higher called program.

Only one card Type E is required per run, regardless of the number of ships being run. It is placed at the end of the data deck.

Cards type 9, 10, and 14 are optional - see card type descriptions.

Data cards for any computer run are submitted in ascending order by card type number, except for Card Types 25 through 35. See System Description, pages 2 and 3 of this report, for details.

CARD TYPE USAGE MAP

PROG. NO.	CARD TYPE													
	PROGRAM		1	2	3	4	5	6	7	8	9	0	1	2
1	HYDROSTATICS & BOLLER													
2	DERIVE A NEW HULL FORM FROM A PARENT													
3	LONGITUDINAL STRENGTH													
4	FLOODABLE LENGTH													
5	LIMITING DRAFTS													
6	INTACT STABILITY													
7	COMPARTMENT GENERATION													
8	DAMAGE STABILITY													

***Once the offsets and LIP are submitted they are stored on the Ship Data Tape as part of the Ship Data Table; therefore, card types 3, 4, and 5 must be submitted only once for each ship, thereafter, only those card types pertaining to the called programs should be submitted for any run (see Card Type 1). However, if the offsets are changed, the ship must be given a new serial number and the offsets resubmitted.

* Last CD of this type must be a 999 (13) CD.

CARD TYPE	Card Columns	Input Format	Program Symbol	Definition	Remarks
1 Ship Identification (one card)	1-4 5-26 27-44 45-61 62-90	B B44 2A4 B I3	ESRNO NAME IS DATE TEST1 BULT	Ship serial number Ship name or title Date of program run A serial (for Remark in B) 1 IF four ship of same type 0 ALL OTHERS (+1) SCHEDULED S-02, ONLY -1 POWER S-10, ONLY 0 SCHEDULED S-02, ONLY 1 SCHEDULED S-02, ONLY 2 POWER S-10, ONLY	1. Submit the number 1 when efforts are being submitted. Submit the number 2 when efforts are to be read from the Ship Data Type. 2. All ships are identified to the system by a serial number. This number is assigned when the ship is initially submitted and is used thereafter whenever the ship is run. If the efforts are changed, the ship must be given a new serial number and resubmitted. 3. One card of this type required.
	51-53 54-56	B, I2 I3	DSYN ICAT	Identification numbers of the programs to be run	1. Submit 001 for Hydrostatics and Drifts Submit 003 for Longitudinal Strength Submit 004 for Transverse Strength Submit 005 for Limiting Details Submit 006 for Initial Stability Submit 007 for Damage Stability Submit 008 for Composite General 2. Submit 000 for printout of Ship Data Table values of interrelated areas, VCG, TCG, CMTA, X, Y, Z. Submit 001 if these values are not to be printed out. 3. One card of this type is required.
	1-3 4-6 7-9 etc.	B B B B	IP (see remark 1)	A serial	1. Offset data is assumed to be from the table center which gives values in counts. 200 counts equals one inch of plan. The program converts these counts to feet. Therefore, if efforts are submitted in decimal feet, ZSCALE and YSCALE should be entered as 0.005. 2. One card of this type is required.
	25-27	B	IK (see remark 2)		
3 Scale Data (one card)	1-10 11-20 21-30	F10.3 F10.3 F10.3	SPACE1 ZSCALE YSCALE	Station spacing (LBP/ft. in. at AP) Scale of drawing in vertical direction (inches per foot) Scale of drawing in horizontal direction (inches per foot)	

CARD TYPE	Card Columns	Input Format	Program Symbol	Definition	Remarks
4 Offset Data (one card per offset)	1-6 7-13 14-20 21-36	F6.3 F7.0 F7.0 B	STATSO Y Z ITEST1	Station number (distance from FP/station spacing) Half breadth Distance above/below baseline (+/-) A section identifying the offset point (See Remark No. 1)	1. Submit 999999 for each breakpoint. Submit 999999 for the last point on the station. Submit 999999 for the last point on the last station. Submit 999999 for all other offsets. 2. The station number is minus for all stations forward of the FP. 3. Offsets are to be submitted by station, with points in order from the baseline to the deck edge. 4. A separate card is required for each offset.
5 Ship Data (one card)	1-10	F10.2	LBP	Length between perpendiculars	1. Only one card of this type is required.
6 Ship Data (one card)	1-10 11-20 21-30 31-40	F10.3 F10.3 F10.3 F10.3	XLOG VOLID HIBASC THIM	Design LOG (in feet from amidships, + fore, - aft) Design displacement (in tons) Design draft (in feet above baseline at amidships) Design trim (total trim in feet, + down by bow, - down by stern)	1. Only one of the following combinations of two fields are to be submitted: VOLID and XLOG VOLID and THIM HIBASC and THIM 2. These fields not used must be filled with minus (0's) 3. One card of this type is required.
7 Hydrostatics and Buoyancy (one card)	1-3 4-7 8-10	B B I3	SWL NTIM N3MEDI	Number of output waterlines (See Remark No. 1) Number of output trims NUMBER OF OUTPUT VEEES (2's in column, row - a) (See Remark 0.3 - b) Heels ship to port	1. The maximum number of waterlines is nineteen (19) 2. The maximum number of trims is six (6) 3. If Hydrostatics are desired only at zero trim, no output trims need be submitted. If other trims are desired, only those other than zero trim need be submitted. 4. One card of this type is required.

CARD TYPE	Card Number	Input Format	Program Symbol	Definition	Remarks
8	Input card for each output station. The maximum number is maximum (128), see remark 1, card type 7.	F10.2	EMOCT	Distance of the output station above or below the baseline (in feet)	1. Submit a separate card of this type for each output station. The maximum number of cards permitted is six (6), see remark 2, card type 7.
	Input card for each output station.	F10.2	EMOCS	Output trim (in feet)	1. Submit a separate card of this type for each output trim. The maximum number of cards permitted is six (6), see remark 2, card type 7.
10		F10.3	TIMEVN	Output Head (in degrees)	1. one card / output head, max = 4, see remark 2, card type 7.
11	This card type reserved for future use.				
12	Input card for each output station.	B FS.2	WSTAT WST1	Number of weight stations assigned for wave height (see Remark No. 7)	1. Submit 0 for 1.1 V/LRP wave height Submit 1 for 1.0/7.50 wave height
	Input card for each output station.	B FS.2	WAVCS	Number of wave centers from midships (°) (see Remark No. 7)	2. Express as a decimal fraction of wave height
	Input card for each output station.	B FS.2	XLAMCH	Ratio of λ/LRP	3. Express as a decimal fraction of LRP
	Input card for each output station.	B FS.2	WLEN	Number of wave lengths wave height increment (see Remark No. 7)	4. Express as a decimal fraction of wave height
	Input card for each output station.	B FS.2	WLENL	Number of wave lengths wave length increment (see Remark No. 7)	5. One card of this type required
	Input card for each output station.	B FS.2	WLENC	Number of wave centers wave center increment (see Remark No. 7)	
	Input card for each output station.	B FS.2	WLENL	Number of wave lengths wave length increment (see Remark No. 7)	
	Input card for each output station.	B FS.2	WLENC	Number of wave centers wave center increment (see Remark No. 7)	

CARD TYPE	Card Columns	Input Format	Program Symbol	Definition	Remarks
18 Leading Digits (see card)	1-3	D	NOCOMP(J,1)	Identification numbers of compartments flooded in group 1	1. This card is for the forward compartment groups.
	4-6 7-9 10-12 13-15 16-18 19-21 22-24 25-27 28-30 31-33	D D D BLANK D D D BLANK D D D D D D D	NOCOMP(J,2) NOCOMP(J,3) NOCOMP(J,3) NOCOMP(J,3) NOCOMP(J,3) NOCOMP(J,3) NOCOMP(J,3) NOCOMP(J,3) NOCOMP(J,3) NOCOMP(J,3) NOCOMP(J,3) NOCOMP(J,3) NOCOMP(J,3) NOCOMP(J,3) NOCOMP(J,3)	Identification numbers of compartments flooded in group 2 Identification numbers of compartments flooded in group 3	2. A compartment may appear in more than one group. 3. A maximum of three groups may be submitted in any combination. 4. If there are no forward compartments, a blank card must be submitted. 5. One card of this type required.
19 Leading Digits (see card)	1-3	D	NOCOMP(J,2)	Identification numbers of compartments flooded in group 4	1. This card is for the aft compartment groups.
	4-6 7-9 10-12 13-15 16-18 19-21 22-24 25-27 28-30 31-33	D D D BLANK D D D BLANK D D D D D D D	NOCOMP(J,2) NOCOMP(J,2) NOCOMP(J,2) NOCOMP(J,2) NOCOMP(J,2) NOCOMP(J,2) NOCOMP(J,2) NOCOMP(J,2) NOCOMP(J,2) NOCOMP(J,2) NOCOMP(J,2) NOCOMP(J,2) NOCOMP(J,2) NOCOMP(J,2) NOCOMP(J,2)	Identification numbers of compartments flooded in group 5 Identification numbers of compartments flooded in group 6	2. If there are no aft groups a blank card must be submitted. 3. Notes 1 and 3 of card type 18 apply. 4. One card of this type required.
20 Leading Digits (see card per compartment)	1-3	D	NAMEC	Identification number of the compartment	1. Submit a separate card for each different compartment identified on the two preceding cards.
	4-5 6-15	BLANK F1A.3	IDDAND	Distance of the forward end of the compartment from the FP	
	16-25	F1A.3	IDDAND	Distance of the aft end of the compartment from the FP	
	26-35	F1A.2	PERIOD	Periodicity	
21 Leading Digits (see card)	1-3			Control card for coding sheets	1. Submit 9's in specified field. 2. One card of this type required.

CARD TYPE	Card Columns	Input Format	Program Specified	Definition	Remarks
22 Basic Summary Per Card	1-3	B	INUSPL	Number of displacements (disks) Spec remark No. 11 Displacements in terms of Disks in feet	1. Submit 4 if displacements are given, submit 1 if disks are given. 2. A minimum of five displacements are permitted. 3. One card of this type required.
	4-5	FI	INUSPL		
	6-15	F1A.5	VOL.5 (U)		
	16-25	F1A.5	VOL.5 (C)		
	26-35	F1A.5	VOL.5 (C)		
	36-45	F1A.5	VOL.5 (C)		
23 Basic Summary Per Card	1-3	B	INLOG	Number of LOG's/Trans Punch 0 or 1 (See remark No. 2) LOG's in feet from sand- shale or bed. - after CR, section in feet & down by hole. - down by string	1. Submit 4 if LOG's are given Submit 1 if trans are given 2. A minimum of 5 LOG's may be specified 3. One card of this type required
	4-5	FI	INLOG		
	6-15	F1A.5	XLOGS (U)		
	16-25	F1A.5	XLOGS (C)		
	26-35	F1A.5	XLOGS (C)		
	36-45	F1A.5	XLOGS (C)		
24 Basic Summary Per Card	1-3	B	INDEL	Number of angles of bed Angle of bed in degrees	1. A minimum of 10 angles of bed may be specified 2. One card of this type is required
	4-5	BLANK			
	6-12	F1.5	DEL		
	13-20	F1.5	DEL		
	21-26	F1.5	DEL		
	27-33	F1.5	DEL		
	34-40	F1.5	DEL		
	41-47	F1.5	DEL		
	48-54	F1.5	DEL		
	55-61	F1.5	DEL		
	62-68	F1.5	DEL		
	69-75	F1.5	DEL		

CARD TYPE	CARD COLUMN	INPUT FORMAT	PROGRAM SYMBOL	DEFINITION	REMARKS
25 Compartment Generation (one card)	1-5	I5	NCOMP1	Number of Compartments	
26 Compartment Generation (one card per compartment)	1-4 5-36 37-44 51-53	I4 B44 Z44 B	ISBNO NAME15 DATE IISYM	Compartment serial no. Compartment name Date -1 starboard side only -1 port side only 0 symmetrical about Z See Subroutine COMP1MENT Number of bulkheads (maximum: 4)	
27 Compartment Generation (See Page 2 sequence)	1-5 6-15	I5 F10.2	NENT(0) XBULK()	Number of outline points on the bulkhead Distance of the bulk- head from the F.P. in feet	(maximum: 10)
28 Compartment Generation (See Page 2 for card sequence)	1-10 11-20	F10.2 F10.2	ZINT(0, IPT) YINT(0, IPT)	Z of outline point Y of outline point	Maximum of 10 points

CARD TYPE	CARD COLUMN	INPUT FORMAT	PROGRAM SYMBOL	DEFINITION	REMARKS
29 Damage Stability (one card)	1-5	I5	NSET	Number of sets of compartments	(maximum:20)
30 Damage Stability (See Page 3 for card sequence)	1-4	1-	LCCOMP (I)	Number of compartments in the set	(maximum:25)
31 Damage Stability (See Page 3 for card sequence)	1-80	1004,F4.2)	LZCOMP (I,J) PEBMS (I,J)	Serial number of compartments in the set and associated parameters	Data in order by serial number, param, serial number, param, etc. maximum of 10 compartments/ card
32 Damage Stability (one card)	1-5 6-10 11-15	I5 I5 I5	NATBMA NADIFT NAGEEL	Number of trims Number of drafts Number of booms	(maximum:3) (maximum:8) (maximum:10) If no trims other than zero are desired, NATBMA = 0
33 Damage Stability (one card/ trim)	1-10	F10.3	DITBMA	Trim angle in degrees	(maximum:3) See card type 32. If no other trim other than zero are desired, this card should be ignored

CARD TYPE	CARD COLUMN	INPUT FORMAT	PROGRAM SYMBOL	DEFINITION	REMARKS
34 Damage Stability (one card/draft)	1-10	F10.3	DIDIFT	Drafts above baseline in feet	(maximum: 5) See card type 32
Damage 35 Stability (one card/head)	1-10	F10.3	DIMEEL	Head angle in degrees	(maximum: 10) See card type 32 Angle sign: +, head to port, - head to starboard
E	1-4	I4	9999	End of JOB	

MACHINE REQUIREMENTS AND CONTROL CARDS

This version of the Ship Hull Characteristics Program is written in Fortran IV for execution on the Control Data Corporation 3600 System.

Core required for the system is 32,530 words (decimal) consisting of 16,686 words for common storage and 15,844 words for the programs.

To run the system on other than CDC equipment, compare the following Fortran statements in CDC Fortran IV to those on the considered equipment.

1. DATA

2. CDC Fortran IV permits variable names up to 8 characters; the only cases of names longer than 6 characters in the system are Subroutine **GENERATE** and its call in **CMPRTMNT**, Subroutine **CMPRTMNT** and its call in **YOHULL**, and the variable **QUNWHALE** in Subroutine **MODIFY**.

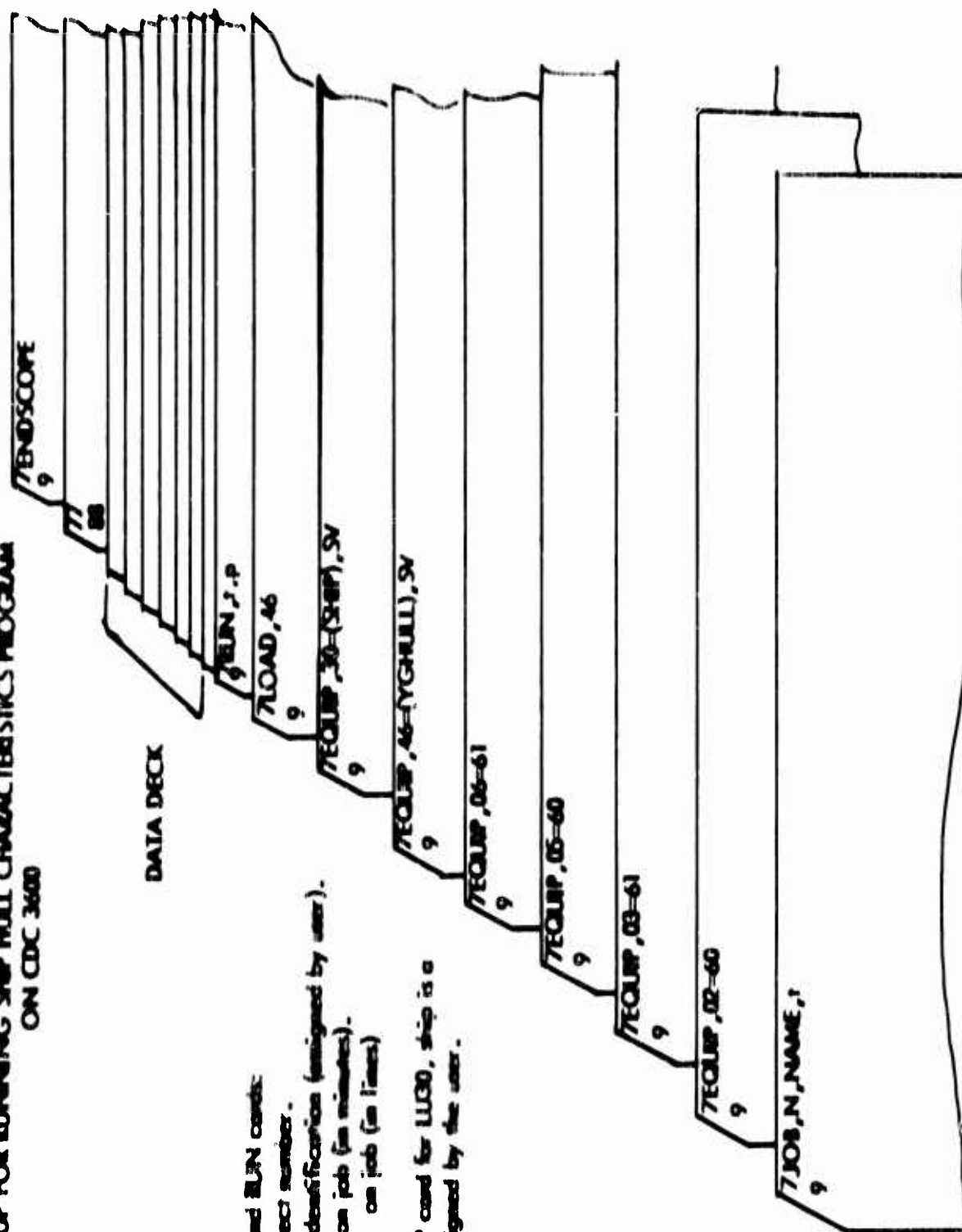
The card check set up for running on the CDC 3600 is illustrated on the following page.

DATA DECK SET UP FOR RUNNING SHIP HULL CHARACTERISTICS PROGRAM ON CDC 3600

Note

1. On the JOB and RUN cards:
N = CDC project number.
NAME = job identification (assigned by user).
t = time limit on job (in minutes).
p = print limit on job (in lines).
2. On the EQUIP card for LUGO, ship is a
tape label assigned by the user.

DATA DECK



REIS GASTON-3030315 - MR. GASTON - 27. 4. 50.

5170 522. 4C. 4515 5410 - 3400 - 5170 51

1301-1302

THE U.S. AIR FORCE
THE U.S. NAVY
U.S. MARINE CORPS

[illegible]

SITE- ASTORIA BEACHES ORGANIZATION
 SAGE SECTION
 219.00 FT FROM TO
 COUNTY. SECTION
 232.20 FT FROM TO

Year	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100
1900	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100

SHIP- STATIONING- STATION SIZE SERIAL NUMBER- 1512 DATE- 07/07/67

SHIP-2 OUTPUT- (SHIPMENT (007))

SHIP DATA TABLE

THE FOLLOWING PAGES CONTAIN THE SHIP DATA TABLE OF INTERPOLATED STATIONS AND COMPUTED SECTIONAL AREAS. VOLS. HALF SECTION TONS AND HALF SECTION SIZES. THE TABLE IS THE OUTPUT OF SHIP-2.

DEFINITIONS AND UNITS ARE AS FOLLOWS:

Z - HEIGHT IN FEET ABOVE BASELINE

V - HALF VOLUME IN FEET

AREAS - FULL SECTION AREA IN SQUARE FEET

VOLS - VERTICAL CENTER OF GRAVITY OF SECTION AREA ABOVE BASELINE IN FT.

TOS - TRANSVERSE CENTER OF GRAVITY OF HALF SECTION AREA MEASURED FROM THE CENTERLINE IN FT.

STATION - HALF SECTION STATION IN FT.

1931-1935, 1936-1937, 1938-1939, 1940-1941, 1942-1943, 1944-1945, 1946-1947, 1948-1949, 1950-1951, 1952-1953, 1954-1955, 1956-1957, 1958-1959, 1960-1961, 1962-1963, 1964-1965, 1966-1967, 1968-1969, 1970-1971, 1972-1973, 1974-1975, 1976-1977, 1978-1979, 1980-1981, 1982-1983, 1984-1985, 1986-1987, 1988-1989, 1990-1991, 1992-1993, 1994-1995, 1996-1997, 1998-1999, 2000-2001, 2002-2003, 2004-2005, 2006-2007, 2008-2009, 2010-2011, 2012-2013, 2014-2015, 2016-2017, 2018-2019, 2020-2021, 2022-2023, 2024-2025, 2026-2027, 2028-2029, 2030-2031, 2032-2033, 2034-2035, 2036-2037, 2038-2039, 2040-2041, 2042-2043, 2044-2045, 2046-2047, 2048-2049, 2050-2051, 2052-2053, 2054-2055, 2056-2057, 2058-2059, 2060-2061, 2062-2063, 2064-2065, 2066-2067, 2068-2069, 2070-2071, 2072-2073, 2074-2075, 2076-2077, 2078-2079, 2080-2081, 2082-2083, 2084-2085, 2086-2087, 2088-2089, 2090-2091, 2092-2093, 2094-2095, 2096-2097, 2098-2099, 2100-2101, 2102-2103, 2104-2105, 2106-2107, 2108-2109, 2110-2111, 2112-2113, 2114-2115, 2116-2117, 2118-2119, 2120-2121, 2122-2123, 2124-2125, 2126-2127, 2128-2129, 2130-2131, 2132-2133, 2134-2135, 2136-2137, 2138-2139, 2140-2141, 2142-2143, 2144-2145, 2146-2147, 2148-2149, 2150-2151, 2152-2153, 2154-2155, 2156-2157, 2158-2159, 2160-2161, 2162-2163, 2164-2165, 2166-2167, 2168-2169, 2170-2171, 2172-2173, 2174-2175, 2176-2177, 2178-2179, 2180-2181, 2182-2183, 2184-2185, 2186-2187, 2188-2189, 2190-2191, 2192-2193, 2194-2195, 2196-2197, 2198-2199, 2200-2201, 2202-2203, 2204-2205, 2206-2207, 2208-2209, 2210-2211, 2212-2213, 2214-2215, 2216-2217, 2218-2219, 2220-2221, 2222-2223, 2224-2225, 2226-2227, 2228-2229, 2230-2231, 2232-2233, 2234-2235, 2236-2237, 2238-2239, 2240-2241, 2242-2243, 2244-2245, 2246-2247, 2248-2249, 2250-2251, 2252-2253, 2254-2255, 2256-2257, 2258-2259, 2260-2261, 2262-2263, 2264-2265, 2266-2267, 2268-2269, 2270-2271, 2272-2273, 2274-2275, 2276-2277, 2278-2279, 2280-2281, 2282-2283, 2284-2285, 2286-2287, 2288-2289, 2290-2291, 2292-2293, 2294-2295, 2296-2297, 2298-2299, 2300-2301, 2302-2303, 2304-2305, 2306-2307, 2308-2309, 2310-2311, 2312-2313, 2314-2315, 2316-2317, 2318-2319, 2320-2321, 2322-2323, 2324-2325, 2326-2327, 2328-2329, 2330-2331, 2332-2333, 2334-2335, 2336-2337, 2338-2339, 2340-2341, 2342-2343, 2344-2345, 2346-2347, 2348-2349, 2350-2351, 2352-2353, 2354-2355, 2356-2357, 2358-2359, 2360-2361, 2362-2363, 2364-2365, 2366-2367, 2368-2369, 2370-2371, 2372-2373, 2374-2375, 2376-2377, 2378-2379, 2380-2381, 2382-2383, 2384-2385, 2386-2387, 2388-2389, 2390-2391, 2392-2393, 2394-2395, 2396-2397, 2398-2399, 2400-2401, 2402-2403, 2404-2405, 2406-2407, 2408-2409, 2410-2411, 2412-2413, 2414-2415, 2416-2417, 2418-2419, 2420-2421, 2422-2423, 2424-2425, 2426-2427, 2428-2429, 2430-2431, 2432-2433, 2434-2435, 2436-2437, 2438-2439, 2440-2441, 2442-2443, 2444-2445, 2446-2447, 2448-2449, 2450-2451, 2452-2453, 2454-2455, 2456-2457, 2458-2459, 2460-2461, 2462-2463, 2464-2465, 2466-2467, 2468-2469, 2470-2471, 2472-2473, 2474-2475, 2476-2477, 2478-2479, 2480-2481, 2482-2483, 2484-2485, 2486-2487, 2488-2489, 2490-2491, 2492-2493, 2494-2495, 2496-2497, 2498-2499, 2500-2501, 2502-2503, 2504-2505, 2506-2507, 2508-2509, 2510-2511, 2512-2513, 2514-2515, 2516-2517, 2518-2519, 2520-2521, 2522-2523, 2524-2525, 2526-2527, 2528-2529, 2530-2531, 2532-2533, 2534-2535, 2536-2537, 2538-2539, 2540-2541, 2542-2543, 2544-2545, 2546-2547, 2548-2549, 2550-2551, 2552-2553, 2554-2555, 2556-2557, 2558-2559, 2560-2561, 2562-2563, 2564-2565, 2566-2567, 2568-2569, 2570-2571, 2572-2573, 2574-2575, 2576-2577, 2578-2579, 2580-2581, 2582-2583, 2584-2585, 2586-2587, 2588-2589, 2590-2591, 2592-2593, 2594-2595, 2596-2597, 2598-2599, 2600-2601, 2602-2603, 2604-2605, 2606-2607, 2608-2609, 2610-2611, 2612-2613, 2614-2615, 2616-2617, 2618-2619, 2620-2621, 2622-2623, 2624-2625, 2626-2627, 2628-2629, 2630-2631, 2632-2633, 2634-2635, 2636-2637, 2638-2639, 2640-2641, 2642-2643, 2644-2645, 2646-2647, 2648-2649, 2650-2651, 2652-2653, 2654-2655, 2656-2657, 2658-2659, 2660-2661, 2662-2663, 2664-2665, 2666-2667, 2668-2669, 2670-2671, 2672-2673, 2674-2675, 2676-2677, 26

Sam E 5.45-CHP-12-1971

CLASIS	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400
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[illegible]

STATION	6.731	LOCATOR	244.20	67.540	69	10	1015
6.000	13.553	3.005	9.059		6.777	13.553	
14.500	17.042	14.017	9.356		7.840	16.751	
13.000	20.223	173.259	13.000		6.040	21.957	
16.750	21.006	331.335	12.073		9.913	25.977	
20.500	22.542	607.000	16.945		16.130	29.432	
22.750	22.953	500.950	15.965		12.316	32.140	
25.000	23.208	742.000	17.330		15.046	36.359	

FLORIN 1950-1951 = 3.710
FLORIN 1951-1952 = 3.710
FLORIN 1952-1953 = 3.710

Station 1000 5-10-60

Time 1:00:00 1000000 1000000 1000000

COMPARISON OF SURVEYING DATA

LINE NO.	DATE	TIME	TIME	TIME
1511	12-20-60	10:00	10:00	10:00
1512	12-20-60	10:10	10:10	10:10
1521	12-20-60	10:20	10:20	10:20
1522	12-20-60	10:30	10:30	10:30

FL000000

VOLUME 235000 100000 100000

TOTAL 100000 100000 100000

FL000000

TIME 10:00 10:10 10:20

DISPLACEMENT OF SURVEYING DATA

DISPLACEMENT OF SURVEYING DATA

DISPLACEMENT OF SURVEYING DATA

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DISPLACEMENT OF SURVEYING DATA

DISPLACEMENT OF SURVEYING DATA

SAMPLE OUTPUT - DAMAGE (500)

Correction for KG - 1000000 1000000 1000000

$$\frac{1000000}{1000000}$$

PROGRAM LISTINGS

07/31/67

Line	Code	Statement	Column	Row
		PROGRAM Y0 MUL1	Y0	200
		EXECUTIVE ROUTINE	Y0	300
		DIMENSION CHNOML(30)	Y0	400
		DIMENSIONALWP3(20), AREA1S(60,20), ANFAAP(40), AREA4S(20,30), NML(20), OI	Y0	200
		IMNT(20), CIALPH(20), CIP(20), CIMP(20), CIONPT(20), DATE(2), OISPL3(20), OI	Y0	300
		LOWL(20), M(60), MCOMP(20), MIMON(60), MIMAR(40), MOUT(20), MISAO(40), MOI	Y0	400
		IBCOMP(20), ICOMP(2), JBREAK(60,10), JMAX(3), KMAX(2,3), KP(6), NAME(6), NOI	Y0	500
		AME1S(6), NCOMP(2,3,3), NP(60), PERM(10), PERM1(1)	Y0	600
		DIMENSIONPRM2(10), NAB(5,5,10), B(40,20), SPS(60), SPSMIP(20), STATNO(10)	Y0	700
		160), SECTIM(20), TCR(C(20), TCRS(5,4,10), TCOIS(60,40), TCRS(60), THETSDI	Y0	800
		IM(10), TPI(20), TRIM3(4), VCRIC(20), VCRS(4,5,10), VCOIS(60,20), VCRS(60)	Y0	900
		10), VOL3(20), VOLC(5), VOLIC(20), WEIGHT(20), X(40), XIDAM(30), XIDAMS(10)	Y0	1000
		1), XIDAMS(20), XIDAMS(20), XIW(20), XIDAM(30), XIDAMS(10)	Y0	1100
		DIMENSIONKPS(20), KMS(20), KML(20), KMT(20), XLIAM(30,3), XLCM1C(20)	Y0	1200
		1), XLCR3(20), XLCF3(20), XLCOI(20), XLCOI(20), XMTI(20), Y(60,20), YI(60)	Y0	1300
		1, Z(60,20), YIINT(4,30), THETJM(4)	Y0	1400
		DIMENSION XLVM(20)	Y0	1490
		COMMON/1/ALMA, AWP, AWPJ, AREA1S, AREA2S, ANFA4S, NML, NMT, CIA, CIALPH, COI	Y0	1500
		11B, CIG, CIP, CIONPT, CIMP, CONST, DATE, OISPL, OISPL3, UWL, M, MIMASC, MCOMP	Y0	1600
		1, MIBCOMP, MIMOO, MIMAN, MOUT, MISAO, MPMAN, MPMAN, MPMAN, MW, IIAFT, IIAL, OI	Y0	1700
		11PWO, IISYM, IIC, IIM, IIL, IIC, IIM, IIL, IIBREAK, ICOMP, ICHRY, INITDI	Y0	1800
		1, ISENTL, IBERNO, ISTAT, IISOP, ITEST1, ITEST2, IY, JBREAK	Y0	1900
		COMMON/2/JMAX, K, KK, KMAX, KP, KVOL, KW, M, MA, NRUFT, NINSPL, NIMEEL, NILCOI	Y0	2000
		1, NIPERM, NITRIM, NAME, NAME1S, NCOMP1, NCOMP2, NSTAT, NP, NSTAT, NSTAT1, NBOI	Y0	2100
		1, TATS, NSTAT3, NSTAT4, NML, NWP, PERM, PERM1, PERM2, NAB, S, XISMP, SPS, SPSMID	Y0	2200
		1, SPACE, STATNO, SECTIM, TCR, TCRIC, TCRS, TCOIS, TCRS, THETIM, THETI1, THEDI	Y0	2300
		1, TAT, THETIM, TPI, TRIM3, VCRIC, VCRS, VCOIS, VCRS, VOL	Y0	2400
		COMMON/3/VOLIC, VOLID, VOL3, VOL4, WAVCFN, WCIINC, WEIGHT, WMIINC, WMI MUL, OI	Y0	2500
		1, WLIINC, X, XIDAM, XIDAMS, XILIM, XIM, XIW, XIDAM, XIDAMS, XPLIM, XPS, XPLIM, XNI	Y0	2600
		1, XILIM, XIIL, XIIT, XKB, XKB3, XKML, XKMT, XLIAM, XLP, XLCR, XLCR1C, XLCR3, XLDI	Y0	2700
		1, XCF, XLCF3, XLCOI, XLCOIW, XLCOR, XLMR1M, XLMRDA, XMIU, XMMO1, XMMO3V, XMTI, YOI	Y0	2800
		1, YI, YIMA, Z, WAV, OC, XIDAMS, XIDAMS, XLMRPR, IIAL	Y0	2900
		COMMON/4/ICAT, YIINT, NIMEEL, THETJM, LIMIT	Y0	3000
		DATA (ASTNIM = AM * 1), (DWL = 6H DWL), (BLANK = AM)	Y0	3400
		THETJM=0,0	Y0	3500
		TIME1 = TIMEF(NUMMY)/60000.	Y0	3600
		IEOF = 999999	Y0	3700
		READ(5,207) IBERNO, (NAME1S(1), I=1,4), (DATE(1), I=1,2), ITEST1, INIT,	Y0	3800
		111SYM, ICAT	Y0	3900
807		FORMAT(14,104,413)	Y0	4000
		IF(INIT)1817,2100,1817	Y0	4100
2300		READ(30) ISENTL, (NAME(1), I=1,4), NSTAT, (NP(ISTAT), ISTAT=1,60) , XLYO	Y0	4200
		1BP, XMID, JOUMMY, LIMIT, KUUMMY	Y0	4300
		IF(ISENTL=999999)1320,1300,1320	Y0	4400
1320		DO 1141 ISTAT = 1, LIMIT	Y0	4500
		NPOINT = NP(ISTAT)	Y0	4600
1141		READ(30) STATNO(ISTAT), X(ISTAT), (Y(ISTAT, IPOINT), Z(ISTAT, IPOINT), Y0	Y0	4700
		1, AREA1S(ISTAT, IPOINT), VCOIS(ISTAT, IPOINT), TCOIS(ISTAT, IPOINT), S(ISTAT	Y0	4800
		2AT, IPOINT), IPOINT = 1, NPOINT), (JBREAK(ISTAT, IBREAK), IBREAK = 1,10Y0	Y0	4900
		3)	Y0	5000
		WRITE(40) ISENTL, (NAME(1), I=1,4), NSTAT, (NP(ISTAT), ISTAT=1,60) , XLYO	Y0	5100
		1BP, XMID, JOUMMY, LIMIT, KUUMMY	Y0	5200
		DO 5462 ISTAT = 1, LIMIT	Y0	5300
		NPOINT = NP(ISTAT)	Y0	5400
5462		WRITE(40) STATNO(ISTAT), X(ISTAT), (Y(ISTAT, IPOINT), Z(ISTAT, IPOINT), Y0	Y0	5500
		1, AREA1S(ISTAT, IPOINT), VCOIS(ISTAT, IPOINT), TCOIS(ISTAT, IPOINT), S(ISTAT	Y0	5600

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STAT,IPPOINT),IPPOINT = 1,NPOINT), (JBREAK(ISTAT,JBREAK), JBREAK = 1,10Y0 5700
3 ) Y0 5800
GO TO 2300 Y0 5900
1300 WRITE (40)IGOF, (NAME(I),I = 1,N),NSTAT,(NP(ISTAT),ISTAT=1,60 1,XLY0 6000
1BP,XMID,ICAT,LIMIT,ISYM Y0 6100
REWIND 30 Y0 6200
REWIND 40 Y0 6300
1017 ISTOP = 0 Y0 6400
READ (5,1)(KP(I), I = 1,N),AK Y0 6500
CALL OFFSET Y0 6600
IF(KP(1))000,000,10Y Y0 6700
107 IF(ISTAT=007)000,000,100 Y0 6800
100 IF(ISTOP=1)000,00,100 Y0 6900
C FIND THE LOCATION OF THE FWD AND AFT PERPENDICULARS Y0 7000
C X(1)FWD=X(FWD PERP) Y0 7100
C X(1)AFT=X(AFT PERP) Y0 7200
109 DO 204 I = 1,NSTAT Y0 7300
IF(ABS(X(1))-A,3) 201,001,203 Y0 7400
201 IF=0=1 Y0 7500
GO TO 204 Y0 7600
202 IF(ABS(X(1))-X(MP)=0.3) 203,203,204 Y0 7700
203 IAPT=1 Y0 7800
204 CONTINUE Y0 7900
80 READ (5,3)XLC0,VOL10,MIBASC,TRIM Y0 8000
IF(ISTOP=1) 000,1209,000 Y0 8100
6001 WRITE (5,006)(NAME(I), I = 1,N), (SRNO,(DATE(I), I = 1,2) Y0 8200
KW = 1 Y0 8300
KVOL = 1 Y0 8400
IF(VOL10=000000,0) 01,02,02 Y0 8500
A1 IF(VOL10)000,000,03 Y0 8600
02 THET17 = ATAN(TRIM/XLBP) Y0 8700
CALL VOLUME Y0 8800
XLC0 = XLCR Y0 8900
VOL10=VOL Y0 9000
GO TO 85 Y0 9100
83 IF(MIBASC=000000,0) 900,900,03 Y0 9200
821 VOL10 = VOL10/95.0 Y0 9300
IF(XLC0=000000,0) 030,04,04 Y0 9400
830 IIRAL=1 Y0 9500
CALL BAL Y0 9600
TRIM=XLBP*(SIN(THET17)/COS(THET17)) Y0 9700
GO TO 85 Y0 9800
901 FORMAT(5H DATA SUBMISSION ERROR ON VOL10,XLC0,MIBASC,TRIM CARD= SY0 9900
1EE INPUT INSTRUCTIONS = CANNOT PROCED.) Y0 10000
900 WRITE (5,051) Y0 10100
ISTOP = 1 Y0 10200
GO TO 1209 Y0 10300
A4 THET17 = ATAN(TRIM/XLBP) Y0 10400
IIRAL = 3 Y0 10500
CALL BAL Y0 10600
XLC0 = XLCR Y0 10700
A5 VOL1 = VOL10/39.0 Y0 10800
WRITE (5,061)VOL1, XLC0 Y0 10900
A6 FORMAT(2H DESIGN DISPLACEMENT=F10.3,GM TONS/ Y0 11000
1 12H DESIGN LCG=F10.3, 2H. Y0 11100
2 20HFT FROM MIDSHIPS (+ FWD) ) Y0 11200

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WRITE (6,88)MINASC
88 FORMAT(14H DESIGN DRAFT= F10.3,3H FT)
WRITE (6,87)THM
87 FORMAT(13H DESIGN TRIM= F10.3,3H (- IS BY NOW, + IS BY STERN))
XLOA = X(ISTAT)-X(1)
WRITE (6,1362)XLOA,XLOA
1362 FORMAT(13H LENGTH BETWEEN PERPENDICULARS = F8.2, 4H FT./ 10H LENGTH
1M OVERALL = F8.2, 4H FT.)
IF (ICAT-2) 720,1200,1200
720 KW=1
CALL DRAFT
DO 600 ISTAT=1,NSTAT
CALL AREAS
CONTINUE
600 MA=1
DO 601 ISTAT=2,NSTAT
IF (AREAS(MA)-AREAS(ISTAT)) 600,601,601
601 MA=ISTAT
CONTINUE
ISTAT=MA
A1=AREAS(MA)
WRITE (6,603)A1,MA
603 FORMAT(10H STATION OF MAX AREA (AT NWL) IS LOCATED,
1 F10.3,17H FT FROM FWD PER
2RP)
CALL WPLAN
V1=MAUV(1,ISTAT)
BEAM = V1*MA08,A
WRITE (6,604)WPLAN
CX = A1*MA/BEAM*(W1(MA)+(ABS(Z(MA,1))-Z(MA,1))/2,0)
WRITE (6,1374)CX
1374 FORMAT(10H SECTION AREA COEFFICIENT AT STATION OF MAXIMUM AREA=
1 F8.3)
604 FORMAT(10H BEAM AT STA OF MAX AREA= F10.3,3H FT)
1200 IPR00 = 1
40 ITEST3 = KP(IPR00)
IF (ITEST3) 999,130,62
87 GO TO (20,70,90,3000,3049,1142,60,99),ITEST3
70 READ(5,1) NWL,NITRIM,N3HEEL
READ (6,2222)(M1OUT(I), I = 1,NWL)
IF (NITRIM) 2223,727,2223
2223 READ (6,2222)(TRIM3(I), I = 1,NITRIM)
2222 FORMAT(F10.3)
727 IF (N3HEEL) 729,2224,729
729 READ(6,2222)(THET3H(I), I = 1,N3HEEL)
2224 WRITE (6,806)(NAME(I), I = 1,8), ISPRNO, (DATE(I), I = 1,2)
DO 905 I = 1,8
905 NWL(I) = BLANK
DO 1000 I = 1,NWL
IF (ABS(M1OUT(I)-M1BASC)-0.001) 909,909,999
999 IF (M1OUT(I)-M1BASC) 1900,902,903
1900 CONTINUE
GO TO 900
903 N1NWL = NWL-1.5
NWL = NWL + 1
DO 904 I = 1,N1NWL

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Y0 11300
 Y0 11400
 Y0 11500
 Y0 11600
 Y0 11700
 Y0 11800
 Y0 11900
 Y0 12000
 Y0 12100
 Y0 12200
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 Y0 12400
 Y0 12500
 Y0 12600
 Y0 12700
 Y0 12800
 Y0 12900
 Y0 13000
 Y0 13100
 Y0 13200
 Y0 13300
 Y0 13400
 Y0 13500
 Y0 13600
 Y0 13700
 Y0 13800
 Y0 13900
 Y0 14000
 Y0 14100
 Y0 14200
 Y0 14300
 Y0 14400
 Y0 14500
 Y0 14600
 Y0 14700
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 Y0 15200
 Y0 15300
 Y0 15400
 Y0 15500
 Y0 15600
 Y0 15700
 Y0 15800
 Y0 15900
 Y0 16000
 Y0 16100
 Y0 16200
 Y0 16300
 Y0 16400
 Y0 16500
 Y0 16600
 Y0 16700
 Y0 16800

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NENWL = NWL-1.0
904 HIOUT(NENWL) = HIOUT(NENWL-1)
HIOUT(NENWL-1) = HIRASC
DNL(NENWL-1) = DNL1
GO TO 908
909 WRITE (6,910)
910 FORMAT(14H DESIGN WATERLINE GREATER THAN ANY OUTPUT WATERLINE SUBY
IMITTED)
NWL = NWL + 1
HIOUT(NWL) = HIRASC
DNL(NWL) = DNL1
GO TO 908
909 DNL(1) = DNL1
909 WRITE (6,901)NWL, (HIOUT(1),DNL(1), I = 1,NWL)
901 FORMAT(24H NUMBER OF OUTPUT WATERLINES=13// 24H HEIGHT OF OUTPUT
1 WATERLINES / 24H ABOVE BASELINE IN FEET/(F10.2,A6))
WRITE (6,1400)
1400 FORMAT(14H DESIGN WATERLINE INDICATED BY DNL)
IF (NITRIM) 2225, 230, 2225
2225 WRITE (6,2227)NITRIM, (IRIM3(1), I = 1,NITRIM)
2227 FORMAT(1//24H NUMBER OF OUTPUT THINS=14/14H THINS IN FEET/(F10.2))
230 IF (N3HEEL) 731, 40, 731
731 WRITE (6,2228) N3HEEL, (IMET3H(1), I = 1, N3HEEL)
2228 FORMAT(1//24H NUMBER OF OUTPUT MERLS=13/24H MERL ANGLES IN DEGREES
1/(F10.5))
40 IPROG = IPROG + 1
GO TO 40
70 CALL DERIVE
GO TO 40
90 HEAD (6,400)NSTAT4,MW1,WAVGEN,XLMRJR,11WW,WW1INC,11WL,WL1INC,11WYO
1C,WCIINC
IF (11WW) 3001, 3000, 3001
3000 11WW=1
3001 IF (11WL) 3003, 3002, 3003
3002 11WL=1
3003 IF (11WC) 3005, 3004, 3005
3004 11WC=1
3005 READ (6,401)(X1W(J),WEIGHT(J),XLCQ1W(J),SECT1H(J),J=1,NSTAT4)
WRITE (6,806)(NAME(I), I = 1,4), ISERNO, (DATE(I), I = 1,2)
WRITE (6,804)NSTAT4, WAVGEN, XLMRJR
904 FORMAT(14H NUMBER OF WEIGHT STATIONS=15/15H WAVE CENTERF0.2,PH,
1 25HFT FROM ANIDSHIPS (+ FWD)
2 /15H WAVE LENGTH/LBP = F0.3)
ITEST1 = MW1 + 1.0
GO TO (905,90A,990),ITEST1
990 WRITE (6,806)(NAME(I), I = 1,4), ISERNO, (DATE(I), I = 1,2)
WRITE (6,952)
952 FORMAT(24H DATA SUBMISSION ERROR OF MW1= SEE INPUT INSTRUCTIONS=
1 71H WILL EXECUTE LONGITUDINAL STRENGTH WITH WAVE LENGTH = 1.1*SQ.YO
2 ROOT LBP)
MW1 = 0.0
905 WRITE (6,807)
907 FORMAT(13H WAVE HEIGHT=1.1 * SQ. ROOT LBP)
GO TO 920
906 WRITE (6,808)
908 FORMAT(15H WAVE HEIGHT=LBP/20)

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524 WRITE (6,1521)
1521 FORMAT(/15H WRIGHT STATION EXHNRWRIGHTX19MLCO OF WRIGHT
1.10X,10HSECT MODUL /
214H (FT FROM PP),6X,6H(TONS),4X 15HFROM AMIQUHIPS /
3 32X,11HIFT, 6 FWD) //)
DO 1021 J=1,NSTAT4
IF (ABS(SECTIM(J))=0.0001) 1023,1023,1022
1022 WRITE (6,521)X(W(J),WEIGHT(J),MLCO(W(J),SECTIM(J)
521 FORMAT (F14.2,DXP10.2,3X,F10.2,10X,F10.2)
GO TO 1021
1023 WRITE (6,521)X(W(J),WEIGHT(J),MLCO(W(J)
1021 CONTINUE
GO TO 60
3999 IF (ITEST3=4) 4000,4000,4010
4000 ITEST1=10
IPROG=IPROG+1
IF (NP(IPROG)=0) 100,4020,100
4020 ITEST1=10
IPROG=IPROG+1
GO TO 100
4010 ITEST1=20
IPROG=IPROG+1
C ITTEST1=10,PLNGTH ONLY,=10,PLNGTH AND MILIM,=20,MILIM ONLY
100 WRITE (6,800) (NAME(I), I=1,6), IBERNO, (DATE(I), I=1,3)
JSTAT = NSTAT+1
LL = 1
DO 1340 I = 1,33
1340 CHNOML(I) = BLANK
DO 101 J = 1,JSTAT
READ (5,104) STAT, HGMAR
104 FORMAT(F7.3,F14.2)
IF (STAT=9999.0) 102,1030,1030
102 DO 105 L = 1,NSTAT
IF (STATNO(L) = STAT) 105,107,105
107 HGMAR(L) = HGMAR
CHNOML(L) = ASTRIM
GO TO 101
105 CONTINUE
103 WRITE (6,703) STAT, HGMAR
101 CONTINUE
1030 WRITE (6,523) (STATNO(J),X(J),HGMAR(J),CHNOML(J), J=1,NSTAT)
523 FORMAT(15H MARGIN LINE/115H MARGIN LINE ASSUMED 3 INCHES BELOW UPPY
1ERMOST 2 OF STATION EXCEPT WHERE INDICATED BY * IN WHICH CASE THAY
2T HEIGHT/23H WAS SUBMITTED AS INPUT//
32H STATIONX16MDISTANCE FROM PPX15HHEIGHT ABOVE RL/
416XMIN FEET)16XMIN FEET/(F7.3,DXP10.2,DXP10.2,AG))
703 FORMAT(31H MARGIN LINE CHANGE AT STATION PR.3: 42H CANNOT BE MADE
1- THERE IS NO SUCH INPUT STATION)
524 FORMAT(///26H NUMBER OF PERMEABILITIES 13//15H PERMEABILITIES/(P
110.3))
701 IF (ITEST1=10) 103,103,120
103 READ (5,8)NIPERM, (PERM(J), J=1,NIPERM)
WRITE (6,524)NIPERM, (PERM(J), J=1,NIPERM)
IF (ITEST1=10) 40,120,999
120 DO 2012 I=1,6
2012 PERM(I)=999.0

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Y0 22500
 Y0 22600
 Y0 22700
 Y0 22800
 Y0 22900
 Y0 23000
 Y0 23100
 Y0 23200
 Y0 23300
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 Y0 23600
 Y0 23700
 Y0 23800
 Y0 23900
 Y0 24000
 Y0 24100
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 Y0 24300
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 Y0 26800
 Y0 26900
 Y0 27000
 Y0 27100
 Y0 27200
 Y0 27300
 Y0 27400
 Y0 27500
 Y0 27600
 Y0 27700
 Y0 27800
 Y0 27900
 Y0 28000

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DO 2001 I=1,2                                Y0 20100
DO 2001 J=1,3                                Y0 20200
JMAX(I)=0                                    Y0 20300
2001 KMAX(I,J)=0                              Y0 20400
READ (5,1000) ((INCOMP(I,J,K),K=1,3),J=1,3),I=1,3) Y0 20500
1000 FORMAT(3(3I3,3X))                        Y0 20600
1004 READ (5,1001) NAME1C,X1DAM3,X2DAM3,PERM3 Y0 20700
1001 FORMAT(13,2X,7F10,3)                    Y0 20800
IF (NAME1C=999) 1002,1008,1002              Y0 20900
1002 X1DAM3(NAME1C)=X1DAM3                    Y0 21000
X2DAM3(NAME1C)=X2DAM3                        Y0 21100
PERM3(NAME1C)=PERM3                          Y0 21200
GO TO 1004                                    Y0 21300
1008 WRITE (6,1005)                           Y0 21400
1005 FORMAT(1H,10X,40MFOR LIMITING DRAFT CALCULATIONS THE FOLLOWING/INVO Y0 21500
1,13X,30MCOMPARTMENT GROUPS HAVE BEEN SUBMITTED //) Y0 21600
DO 1006 I=1,2                                Y0 21700
1006 DO 1006 J=1,3                            Y0 21800
IF (INCOMP(I,J,1)) 1010,1004,1010          Y0 21900
1010 JMAX(I)=JMAX(I)+1                        Y0 22000
GO TO (1001,1002), I                        Y0 22100
1001 WRITE (6,1004)                          Y0 22200
1004 FORMAT(7,10M FORWARD GROUP :13:40M CONTAINING THE FOLLOWING COMPAY Y0 22300
1MENTS )                                    Y0 22400
GO TO 2007                                  Y0 22500
1002 WRITE (6,1005)                          Y0 22600
1005 FORMAT(13M AFTER GROUP :13: 40M CONTAINING THE FOLLOWING COMPART Y0 22700
1MENTS )                                    Y0 22800
2007 DO 1009 K=1,3                            Y0 22900
IF (INCOMP(I,J,K)) 1007,1006,1007          Y0 23000
1007 KMAX(I,J)=KMAX(I,J)+1                  Y0 23100
WRITE (6,1070) INCOMP(I,J,K)                Y0 23200
1070 FORMAT(10)                              Y0 23300
1009 CONTINUE                                Y0 23400
1004 CONTINUE                                Y0 23500
WRITE (6,2004)                                Y0 23600
2004 FORMAT(140M COMPARTMENT DESCRIPTIONS //) Y0 23700
WRITE (6,2002)                                Y0 23800
2002 FORMAT(4X,                               Y0 23900
1 12M COMPARTMENT 3X,12M FORWARD 12M AFTER :12MPERMYO 22000
2 2X,12M LIMIT (PT) : 2X,12M LIMIT (PT) : Y0 22100
3 12M NUMBER 3X,10M LIMIT (PT) 2X,10M LIMIT (PT) : Y0 22200
4/1X,5MFROM PP,4X : 5MFROM PP) //) Y0 22300
DO 2011 M=1,78                                Y0 22400
IF (ABS(PERM3(M)-999,0)=0,0001) 2011,2011,2013 Y0 22500
2013 WRITE (6,2000) M,X1DAM3(M),X2DAM3(M),PERM3(M) Y0 22600
2000 FORMAT(112,3X,7F12,3)                    Y0 22700
2011 CONTINUE                                Y0 22800
GO TO 40                                      Y0 22900
1142 KVOL = 1                                  Y0 23000
KW = 1                                         Y0 23100
READ(5,14) N1DSPL,I1DSPL,VOL3                Y0 23200
READ(5,14) N1LC0,I1LC0,KLC00                 Y0 23300
READ(5,10) N1HEEL,THE12M                     Y0 23400
14 FORMAT(13,12,5F10,5)                       Y0 23500
14 FORMAT(13,2X,1AF7,2)                       Y0 23600

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IF(IIDSP) 510.510.511	Y0 33700
511 THETIT = 0.	Y0 33800
DO 512 L=1,NIDSP	Y0 33900
NIDASC=VOLB(L)	Y0 34000
CALL VOLUME	Y0 34100
512 VOLB(L) = VOL	Y0 34200
513 IF(IILCO) 513.513.514	Y0 34300
514 IIRAL = 3	Y0 34400
DO 515 L=1,NILCO	Y0 34500
THETIT = ATAN(XLCOS(L)/ALAP)	Y0 34600
CALL BAL	Y0 34700
515 XLCOS(L)=XLCO	Y0 34800
516 WRITE (6,1) NIDSP, (VOLB(I), I=1, NIDSP)	Y0 34900
FORMAT(3X10HINPUT NR OF LCO,10,10HINPUT LCO,04,0(F10,3,3X))	Y0 35000
FORMAT(3X10HINPUT NR OF DSP,10,10HINPUT DSP,04,0(F10,3,3X))	Y0 35100
WRITE (6,1) NILCO, (XLCOS(I), I=1, NILCO)	Y0 35200
WRITE (6,1) NIIRAL, (THETIT(I), I=1, NIIRAL)	Y0 35300
FORMAT(3X10HINPUT NR OF MEEL,10,10HINPUT MEEL,04,0(F10,3,3X))	Y0 35400
IPROG=IPROG+1	Y0 35500
GO TO 40	Y0 35600
99 CALL CMPTMNT	Y0 35700
GO TO 40	Y0 35800
130 IPROG = 1	Y0 35900
NP(ISTOP) = 0	Y0 36000
140 ITEST = NP(IPROG)	Y0 36100
TIME = TIMEP(DUMMY)/60000.-TIME1	Y0 36200
TIME1 = TIMEP(DUMMY)/60000.	Y0 36300
WRITE(6,000) TIME	Y0 36400
000 FORMAT(0 ELAPSED TIME-MINUTES =0 F10,3)	Y0 36500
IF(ITEST) 000,000,300	Y0 36600
300 GO TO(330,000,300,300,300,300,300,500),ITEST	Y0 36700
330 CALL HYDRO	Y0 36800
GO TO 400	Y0 36900
340 CALL STANTH	Y0 37000
GO TO 500	Y0 37100
360 CALL PLNGTH	Y0 37200
GO TO 500	Y0 37300
370 CALL MILIM	Y0 37400
500 IPROG = IPROG + 1	Y0 37500
GO TO 340	Y0 37600
380 CALL INTACT	Y0 37700
IPROG = IPROG + 1	Y0 37800
GO TO 340	Y0 37900
390 CALL DAMAGE	Y0 38000
IPROG = IPROG + 1	Y0 38100
GO TO 340	Y0 38200
900 READ(6,007) ISERNO, (NAME1B(I), I=1,4), (DATE(I), I=1,2), ITEST, INITY,	Y0 38300
IISYN, ICAT	Y0 38400
IF(ISERNO-9999) 1017,999,999	Y0 38500
998 REWIND 30	Y0 38600
999 STOP	Y0 38700
FORMAT(013)	Y0 38800
FORMAT(0F10,3)	Y0 38900
400 FORMAT(15,3F5,3,3(10,F5,2))	Y0 39000
401 FORMAT(4F10,3)	Y0 39100
411 FORMAT(F10,3)	Y0 39200

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420 FORMAT(15)

2 FORMAT(13,/(F10.2))

006 FORMAT(6H10H1P-4A2A4,5H10HBERIAL NUMBER-14,5H0HDATE-2A4/)
END

Y0 39400

Y0 39500

Y0 39600

Y0 39700

48 200

AM	200
AM	300
DI	400
DI	500
DI	600
DI	700
DI	800
DI	900
DI	1000
DI	1100
DI	1200
DI	1300
DI	1400
DI	1500
DI	1600
DI	1700
DI	1800
DI	1900
DI	2000
DI	2100
DI	2200
DI	2300
DI	2400
DI	2500
DI	2600
DI	2700
DI	2800
DI	2900
DI	3000
AM	3100
AM	3200
AM	3300
AM	3400
AM	3500
AM	3600
AM	3700
AM	3800
AM	3900
AM	4000
AM	4100
AM	4200
AM	4300
AM	4400
AM	4500
AM	4600
AM	4700
AM	4800
AM	4900
AM	5000
AM	5100
AM	5200
AM	5300
AM	5400
AM	5500
AM	5600

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C	K=1,STAD INTERSECTIONS ONLY	AR	5700
C	K=2,PORT AND STAD INTERSECTIONS	AR	5800
C	K=4,PORT INTERSECTIONS ONLY	AR	5900
	GO TO (7100,3100,3100,3104),K7	AR	6000
7100	NWP=NWP(ISTAT)-1	AR	6100
3100	IF(I1SYM) 3110,3104,3104	AR	6200
3104	SINE1=1.0	AR	6300
	SINE2=1.0	AR	6400
	ISTART=1	AR	6500
	LSTOP=NWP+1	AR	6600
	IF(LSTOP=N) 6103,6103,7100	AR	6700
6103	SLOPES=TAN2	AR	6800
	GO TO 3103	AR	6900
3100	GO TO (6100,3106,3106,3106),K7	AR	7000
6100	IF(I1SYM) 6100,6100,3120	AR	7100
3106	IF(I1SYM) 3107,3107,3120	AR	7200
3107	SINE1=1.0	AR	7300
	SINE2=1.0	AR	7400
	ISTART=NWP+1	AR	7500
	LSTOP=NWP(ISTAT)	AR	7600
	IF(ISTART=LSTOP) 6101,6101,6100	AR	7700
6101	GO TO (6100,3101,3101,6104),K7	AR	7800
3101	ZSS(1)=M(ISTAT)	AR	7900
	YSS(1)=0.0	AR	8000
	YSSIGN(N1INT)=1.0	AR	8100
	SLOPES=TAN2	AR	8200
	11 TEST=4	AR	8300
	1 START=L STOP	AR	8400
	GO TO 3103	AR	8500
8901	1 START=NWP+1	AR	8600
	11 TEST=2	AR	8700
	SINE 2=1.0	AR	8800
	GO TO 3103	AR	8900
3120	AREAS(ISTAT)=0.0	AR	9000
	TCOS(ISTAT)=0.0	AR	9100
	VCOS(ISTAT)=0.0	AR	9200
	SS(ISTAT)=0.0	AR	9300
	GO TO 7000	AR	9400
6104	SINE2=-1	AR	9500
	ISTART = ISTART-1	AR	9600
3103	DO 400 1=ISTART,LSTOP	AR	9700
	IF(11TEST=2) 401,6101,401	AR	9800
6101	TESTPR=TEST(Z(ISTAT,1),M(ISTAT),THETIM,V(ISTAT,1),SINE1,SINE2)	AR	9900
	IF(TESTPR) 400,120,3111	AR	10000
3111	IF(TESTPR=0.001) 120,120,110	AR	10100
C	IF TESTPR=0,INTERSECTION IS AT Z(ISTAT,NWP)	AR	10200
C	IF TESTPR IS LESS THAN 0,NO INTERSECTION	AR	10300
120	AREAS(N1INT)=AREAS(ISTAT,1)/2.0	AR	10400
	VCOS(N1INT)=VCOS(ISTAT,1)	AR	10500
	TCOS(N1INT)=TCOS(ISTAT,1)	AR	10600
	ZSS(N1INT)=Z(ISTAT,1)	AR	10700
	YSS(N1INT)=Y(ISTAT,1)	AR	10800
	GO TO 3108	AR	10900
110	IF(1-11102,1101,1102	AR	11000
1101	YSS(N1INT)=ABS(M(ISTAT)-Z(ISTAT,1)/SLOPES)	AR	11100
	ZSS(N1INT)= Z(ISTAT,1)		

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      GO TO 401
C
1102 DO 111 IBREAK=1,10
      IF (JBREAK(ISTAT,IBREAK)=1) 111,112,111
111 CONTINUE
      M=1
      GO TO 113
112 DO 114 IBREAK=1,10
      IF (JBREAK(ISTAT,IBREAK)=1) 114,115,114
114 CONTINUE
      M=1
      GO TO 113
C
      LINEAR INTERPOLATION
C
115 IF (ABS (Y(ISTAT,1)-Y(ISTAT,1-1))=0.0001) 0102,0102,0106
0106 SLOPE1=(Z(ISTAT,1)-Z(ISTAT,1-1))/(Y(ISTAT,1)-Y(ISTAT,1-1))
      YSS(N1INT)=(Z(ISTAT,1-1)-M(ISTAT)-Y(ISTAT,1-1)*SLOPE1)/(SLOPE1
      1-SLOPE2)
0108 ZSS(N1INT)=SLOPE2*YSS(N1INT)+M(ISTAT)
      GO TO 401
0102 YSS(N1INT)=Y(ISTAT,1)
      GO TO 0106
C
      PARABOLIC INTERPOLATION
C
113 ZP13=TRANS(Z(ISTAT,M),Y(ISTAT,M),THET,M,SINE1)
      ZP12=TRANS(Z(ISTAT,M-1),Y(ISTAT,M-1),THET,M,SINE1)
      ZP11=TRANS(Z(ISTAT,M-2),Y(ISTAT,M-2),THET,M,SINE1)
      HP1=TRANS(M(ISTAT),0.0,THET,M,0.0)
      YP13=TRANS(Y(ISTAT,M),Z(ISTAT,M),THET,M,-SINE1)
      YP12=TRANS(Y(ISTAT,M-1),Z(ISTAT,M-1),THET,M,-SINE1)
      YP11=TRANS(Y(ISTAT,M-2),Z(ISTAT,M-2),THET,M,-SINE1)
      CALL COEF1(ZP11,ZP12,ZP13,HP1)
      YP1=C1A*YP13+C1H*YP12+C1C*YP11
      YSS(N1INT)=TRANS(YP1,HP1,THET,M,SINE1)
      ZSS(N1INT)=TRANS(HP1,YP1,THET,M,-SINE1)
C
C
      END OF INTERSECTION SOLUTION
C
      AREA SOLUTION
C
401 M=NP (ISTAT)
      CALL TEST1(ZSS(N1INT),Z)
      GO TO (20,30,50,40),K
20 AREA2S(ISTAT)=AREA1S(ISTAT,M)
      TCO2S(ISTAT)=TCO1S(ISTAT,M)
      VCO2S(ISTAT)=VCO1S(ISTAT,M)
      KK=ISTAT
      SS(ISTAT) = S(ISTAT,M)
      GO TO 10
30 AREA2S(ISTAT)=AREA1S(ISTAT,NUP)
      VCO2S(ISTAT) = VCO1S(ISTAT,NUP)
      TCO2S(ISTAT) = TCO1S(ISTAT,NUP)
      SS(ISTAT) = S(ISTAT,NUP)
      GO TO 10
40 AREA2S(ISTAT)=0.0
      TCO2S(ISTAT)=0.0
      VCO2S(ISTAT)=0.0
      SS(ISTAT) = 0.0

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AR 11200
AR 11300
AR 11400
AR 11500
AR 11600
AR 11700
AR 11800
AR 11900
AR 12000
AR 12100
AR 12200
AR 12300
AR 12400
AR 12500
AR 12600
AR 12700
AR 12800
AR 12900
AR 13000
AR 13100
AR 13200
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AR 13400
AR 13500
AR 13600
AR 13700
AR 13800
AR 13900
AR 14000
AR 14100
AR 14200
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AR 16000
AR 16100
AR 16200
AR 16300
AR 16400
AR 16500
AR 16600
AR 16700

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00 10 10
90 DO 49 JBREAK = 1:10
  IF (JBREAK(ISTAT,JBREAK)-NWP-1) 49,70,49
49 CONTINUE
40 M = NWP
  GO TO 80
70 IF (JBREAK(ISTAT,JBREAK-1)-NWP) 71,72,71
72 AREA28(ISTAT)=AREA18(ISTAT,NWP)+
  1 (AREA18(ISTAT,NWP+1)-AREA18(ISTAT
  2,NWP)) / (Z88(N1INT)
  3-Z(ISTAT,NWP)) / (Z(ISTAT,NWP+1)-Z(ISTAT,NWP))
  VCO28(ISTAT)=VCO18(ISTAT,NWP)+
  1 (VCO18(ISTAT,NWP+1)-VCO18(ISTAT,NWP))
  2* (Z88(N1INT)
  3-Z(ISTAT,NWP)) / (Z(ISTAT,NWP+1)-Z(ISTAT,NWP))
  TCO28(ISTAT)=TCO18(ISTAT,NWP)+
  1 (TCO18(ISTAT,NWP+1)-TCO18(ISTAT,NWP))
  2* (Z88(N1INT)
  3-Z(ISTAT,NWP)) / (Z(ISTAT,NWP+1)-Z(ISTAT,NWP))
  GO TO 3490
71 M=NWP-1
80 Z1 = Z(ISTAT,M)
  Z2 = Z(ISTAT,M+1)
  Z3 = Z(ISTAT,M+2)
  CALL CORF1(Z1,Z2,Z3,Z88(N1INT))
  AREA28(ISTAT)=FINTP2(AREA18(ISTAT,M+1),AREA18(ISTAT,M+2),
  1 AREA18(ISTAT,M+1))
  IF (AREA28(ISTAT) 2000,3000,3000
2000 AREA28(ISTAT) = 0.0
  VCO28(ISTAT) = 0.0
  TCO28(ISTAT) = 0.0
  GO TO 2490
3000 VCO28(ISTAT) = FINTP2(VCO18(ISTAT,M+1),VCO18(ISTAT,M+2),VCO18(ISTAT,M+1))
  TCO28(ISTAT) = FINTP2(TCO18(ISTAT,M+1),TCO18(ISTAT,M+2),TCO18(ISTAT,M+1))
  1 TCO18(ISTAT,M)
3490 S28(ISTAT) = FINTP2(S(ISTAT,M+1),S(ISTAT,M+2),S(ISTAT,M))
  10 IF (S28(ISTAT) 1490,1307,420
420 AREA28(N1INT)=AREA28(ISTAT)/2.0
  TCO28(N1INT)=TCO28(ISTAT)
  VCO28(N1INT)=VCO28(ISTAT)
3100 SINE2=-SINE2
  N1INT=N1INT+1
400 CONTINUE
C END OF AREA SOLUTION
C FIND FINAL INTERSECTION
  IF (I1TEST=3) 8000,8903,8901
8901 I1TEST=2
8900 IF (N1INT=1) 4250,4250,4251
4250 GO TO (6150,6150,6150,6151),K 7
4251 IF ((N1INT / 2) = 2 - N1INT) 201,202,201
  201 N1INT=N1INT-1
  GO TO 512
202 GO TO (2002,2003,2003,2003),K 7
2002 Y88(N1INT) = ABS(M18(ISTAT) - Z(ISTAT,LSTOP)) / SLOPED
  Z88(N1INT)=Z(ISTAT,LSTOP)

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AR 16800
AR 16900
AR 17000
AR 17100
AR 17200
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AR 21800
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AR 22200
AR 22300

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      AREABS(NINT)=AREABS(ISTAT,LSTOP) /2.0
      TCOBS(NINT)=TCOBS(ISTAT,LSTOP)
      VCOBS(NINT)=VCOBS(ISTAT,LSTOP)
      GO TO 512
510 AREABS(ISTAT)=AREABS(ISTAT,LSTOP) /2.0
      TCOBS(ISTAT)=TCOBS(ISTAT,LSTOP)
      VCOBS(ISTAT)=VCOBS(ISTAT,LSTOP)
      GO TO 7000
511 AREABS(ISTAT)=0.0
      TCOBS(ISTAT)=0.0
      VCOBS(ISTAT)=0.0
      GO TO 7000
2003 IF (SINE) 2002,2004,2004
2004 ZBS(NINT)=H(ISTAT)
      YBS(NINT)=0.0
      ITEST=3
      ISTART=LSTOP
      GO TO 3103
C CORRECTIONS AND SUMMATION FOR ONE SIDE
512 NINT=NINT-1
      IF (SINE) 504,504,502
504 IF (ABS(YBS(1))-0.0001) 502,502,501
501 AREABS(ISTAT)=0.0
      TCOBS(ISTAT)=0.0
      VCOBS(ISTAT)=0.0
      GO TO 503
502 AREABS(ISTAT)=AREABS(1)
      VCOBS(ISTAT)=VCOBS(1)
      TCOBS(ISTAT)=TCOBS(1)
503 DO 500 I=1,NINT
C EVEN OR ODD GROUP
      IF ((I/2)*2-I) 510,510,511
510 IF (SINE) 500,500,500
505 VCOBS(ISTAT)=(VCOBS(ISTAT)+AREABS(ISTAT)-AREABS(1)+VCOBS(1)
      +VCOBS(I+1)+AREABS(I+1))/(AREABS(ISTAT)+AREABS(1)+AREABS(I+1))
      TCOBS(ISTAT)=(TCOBS(ISTAT)+AREABS(ISTAT)-AREABS(1)+TCOBS(1)
      +TCOBS(I+1)+AREABS(I+1))
      AREABS(ISTAT)=(AREABS(ISTAT)+AREABS(1)+AREABS(I+1))
      GO TO 500
C ODD GROUP
C COMPUTE TRAPZOID
511 AICORR=(YBS(1)+YBS(1+1))*(ZBS(1+1)-ZBS(1))/2.
500 TICORR=((ZBS(1+1)-ZBS(1))/2.0)*((YBS(1)+4*(YBS(1+1))+YBSAR
      1(1+1)+YBS(1+1)+YBS(1))/3.0)
      VICORR=((ZBS(1+1)-ZBS(1))*2)*((YBS(1)/2.+(YBS(1+1)
      +YBS(1))/2.)*ZBS(1)+AICORR
C
      IF (SINE) 507,507,509
507 AICORR=AREABS(1+1)-AREABS(1)-AICORR
      TICORR=
      AREABS(1+1)+TCOBS(1+1)-AREABS(1)+TCOBS(1)- TICORR
      VICORR=
      AREABS(1+1)+VCOBS(1+1)-AREABS(1)+VCOBS(1)- VICORR
509 TCOBS(ISTAT)=(TCOBS(ISTAT)+AREABS(ISTAT)+ TICORR)/(AREABS(ISTAT
      +AICORR)

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AR 22400
AR 22500
AR 22600
AR 22700
AR 22800
AR 22900
AR 23000
AR 23100
AR 23200
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AR 27000
AR 27100
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AR 27400
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AR 27700
AR 27800
AR 27900

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VCORS(ISTAT)=(VCORS(ISTAT)*AREAS(ISTAT)*	VICORN)/(AREAS(ISTAT)	28000
ISTAT)*A)ICORN)		AR 28100
AREAS(ISTAT)=AREAS(ISTAT)*A)ICORN		AR 28200
500 CONTINUE		AR 28300
C END LOGIC		AR 28400
7000 CONTINUE		AR 28500
IF(SINE1) 7001,7002,7002		AR 28600
7002 AREAS=AREAS(ISTAT)		AR 28700
TCORS=TCORS(ISTAT)*(-SINE1)		AR 28800
VCORS=VCORS(ISTAT)		AR 28900
SINE1=-1.0		AR 29000
SINE2=1.0		AR 29100
N)INT=1		AR 29200
I)TEST=2		AR 29300
GO TO (3110,3220,3220),ICAT		AR 29400
322 Y)INT(1,ISTAT)=YB(1)		AR 29500
GO TO 3110		AR 29600
322 I)=ISTAT-N)STAT		AR 29700
Y)INT(3,1)=YB(1)		AR 29800
GO TO 3110		AR 29900
7001 AREAS=AREAS(ISTAT)*AREAS		AR 30000
IF(ABS(AREAS)-.001)7006,7006,7006		AR 30100
7006 TCORS(ISTAT)=(VCORS*AREAS+TCORS(ISTAT)*AREAS(ISTAT))/AREAS		AR 30200
VCORS(ISTAT)=(VCORS*AREAS+VCORS(ISTAT)*AREAS(ISTAT))/AREAS		AR 30300
AREAS(ISTAT)=AREAS		AR 30400
TCORS(ISTAT)=TCORS(ISTAT)*THETM/ABS(THETM)		AR 30500
7007 THETM=THETM		AR 30600
1327 X2S(ISTAT)=X(ISTAT)		AR 30700
IF(ICAT=2)777,778,779		AR 30800
778 S1=S2S(ISTAT)		AR 30900
AREA=AREAS(ISTAT)		AR 31000
TCO=TCORS(ISTAT)		AR 31100
VCO=VCORS(ISTAT)		AR 31200
IF(ABS(THETM)-.0001)667,667,668		AR 31300
668 Y)INT(2,ISTAT)=YB(2)		AR 31400
667 ICAT=3		AR 31500
ISTAT=ISTAT+N)STAT		AR 31600
GO TO 222		AR 31700
779 VCORS(12)=(VCO*AREA-VCORS(ISTAT)*AREAS(ISTAT))/(AREA-AREAS(ISTAT)		AR 31800
12AT)		AR 31900
TCORS(12)=(TCO*AREA-TCORS(ISTAT)*AREAS(ISTAT))/(AREA-AREAS(ISTAT)		AR 32000
12AT)		AR 32100
AREAS(12)=AREA-AREAS(ISTAT)		AR 32200
S2S(12)=S1*S2S(ISTAT)-2.0*S(ISTAT,1)		AR 32300
ICAT=2		AR 32400
ISTAT=ISTAT-N)STAT		AR 32500
IF(ABS(THETM)-.0001)777,777,668		AR 32600
668 Y)INT(4,ISTAT)=YB(2)		AR 32700
777 M=MM		AR 32800
RETURN		AR 32900
7006 AREAS(ISTAT)=0.0		AR 33000
TCORS(ISTAT)=0.0		AR 33100
VCORS(ISTAT)=0.0		AR 33200
GO TO 7007		AR 33300
END		AR 33400

BA	400
DI	200
DI	300
HOI	400
HOI	500
DI	600
DI	700
DI	800
DI	900
DI	1000
DI	1100
DI	1200
DI	1300
DI	1400
DI	1400
DI	1500
DI	1600
DI	1700
DI	1800
DI	1900
DI	2000
DI	2100
DI	2200
DI	2300
DI	2400
DI	2500
DI	2600
DI	2700
DI	2800
DI	2900
DI	3000
DI	400
DI	500
DI	600
DI	600
RA	600
RA	650
BA	600
BA	700
BA	800
BA	900
BA	1000
BA	1100
BA	1200
BA	1300
BA	1400
BA	1500
BA	1600
BA	1700
BA	1800
BA	1900
BA	2000
BA	2100
BA	2200
BA	2300

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10 TOTAL=1
THEY 17.0.0
00 TO 23

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20	ASSIGN 290 TO IOPTN	NA	2400
21	MIBASC=10.0	BA	2500
	XLCH=-1000.0	BA	2600
	VOL2=-10.0	BA	2700
	GO TO IONAPT,(26,30)	BA	2800
26	CALL DRAFT	BA	2900
C		BA	3000
C	DETERMINE WHETHER SHIP CAN BE BALANCED	BA	3100
C		NA	3200
30	IF (THEY1140.00.00	NA	3300
40	JJ=NSTAT	NA	3400
	GO TO A0	NA	3500
50	JJ=1	NA	3600
60	IF ((H(JJ)-HIMAR(JJ))*COS(THET11)*COS(THET1H) - 0.0) 70.00.00	NA	3700
70	IF (THEY117-0.0) 40.00.00	BA	3800
80	IMAL=0	BA	3900
	GO TO 290	BA	4000
90	GO TO (95,275),IFRUNK	BA	4050
C		BA	4100
C	BEGIN ITERATIVE SEARCH FOR DRAFT GIVING CORRECT DISPLACEMENT	BA	4200
C		BA	4300
95	CALL VOLUME	BA	4400
	WRITE(10,1000) MIBASC,THEY11,VOL,VOL10,XLCH,XLCO	NA	4500
	ISIU=1	NA	4600
100	IF (ABS(VOL10-VOL)-.001*VOL10) 100,100,110	NA	4700
C		BA	4800
C	MAKE INCREMENTAL CORRECTION TO DRAFT	BA	4900
C		BA	5000
110	IF (VOL2) 130,130,120	BA	5100
120	IF (ABS(VOL2-VOL) - 1.0) 130,130,140	NA	5200
130	DELTIM=10.0*(VOL10-VOL)/VOL10	NA	5300
	GO TO 120	NA	5400
140	DELTIM=ABS(DELTIM)*(VOL10-VOL)/ABS(VOL2-VOL)	NA	5500
150	IF (ABS(DELTIM)-0.1*SUMT(XLMP)) 170,170,160	NA	5600
160	DELTIM=.1*SQRT(XLMP)*(VOL10-VOL)/ABS(VOL10-VOL)	BA	5700
170	MIBASC=MIBASC+DELTIM	BA	5800
	VOL2=VOL	BA	5900
	IFRUNK=1	BA	6000
	GO TO 30	BA	6100
C		NA	6200
180	GO TO IOPTN,(190,240)	NA	6300
C		BA	6400
C	BEGIN ITERATIVE SEARCH FOR TRIM GIVING CORRECT LCM.	BA	6500
C		BA	6600
190	GO TO (200,290),ISIU	BA	6700
200	IF (ABS(XLCH-XLCO) - 0.1) 220,220,210	BA	6800
C		BA	6900
C	MAKE INCREMENTAL CORRECTION TO TRIM.	BA	7000
C		BA	7100
210	IF (XLCH1-1000.0) 230,230,220	BA	7200
220	IF (ABS(XLCH1-XLCH) - 0.01) 230,230,240	BA	7300
230	DELT11=(XLCH-XLCO)*12.0*MIBASC/((XLMP**2)/2.0)	NA	7400
	GO TO 250	NA	7500
240	DELT11=ABS(DELT11)*(XLCH-XLCO)/ABS(XLCH1-XLCH)	BA	7600
250	IF (ABS(DELT11)-ATAN(1.0/XLMP)) 270,270,260	BA	7700
260	DELT11=(ATAN(1.0/XLMP))*(XLCH-XLCO)/ABS(XLCH1-XLCO)		

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270 THET17=THET17*DEL17
    XLCB1=XLCB
    IFSUNK=2
    GO TO 30
275 CALL VOLUME
    WRITE(10,1000) MIBASC,THET17,VOL,VOL10,XLCB,XLC0
    GO TO 200
280 IS10=2
    GO TO 100
C
290 RETURN
1000 FORMAT(10X,6(E12.4,2X))
END
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```
BA 7800
BA 7900
BA 7950
BA 7960
BA 8000
BA 8100
BA 8200
BA 8300
BA 8400
BA 8500
BA 8600
BA 8700
BA 8800
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SUBROUTINE CORFIC
DIMENSION Z(3)
DIMENSIONALWP3(20),AREA1(60,20),AREA2(60),AREA3(20,30),BML(20),DI
1BMT(20),C1ALPH(20),C1P(20),C1WP(20),C1DOP(20),DATE(2),DISPL3(20),DI
1OWL(20),H(60),H1COMP(20),H1MON(60),H1MAN(60),H1OUT(20),H1BAS(60),HDI
12COMP(20),1COMP(2),JBREAK(60,10),JMAX(3),KMAX(2,3),KP(6),NAME(8),NDI
1AME1(8),NCOMP(2,3,3),NP(60),PERM(10),PERM1(3)
DIMENSIONPERMP(10),HAB(5,5,10),S(60,24),SPS(60),STAMP(20),STATNO(10)
160),SECT1M(20),TCR1C(20),TCR5(5,5,10),TCR1H(60,24),TCR2(60),THET1NDI
1H(10),TPI(20),TRIM3(6),VCR1C(20),VCR5(5,5,10),VCO1(60,24),VCR2(60)
10),VOL3(20),VOL5(5),VOL1C(20),WEIGHT(20),X(60),X1DAM(30),X1DAM2(100)
1),X1DAM6(20),X2DAM6(20),X1W(24),X2DAM(30),X2DAM6(10)
DIMENSIONX2S(20),XKM3(20),XKML(20),XKMT(20),X1DAM(30,3),XLCM1C(200)
1),XLCM3(20),XLCF3(20),XLCOLW(20),XLCOS(5),XMT1(20),Y(60,24),Y1(60)DI
1,Z(60,24),Y1INT(4,30),THET3M(6)
DIMENSION XLVW(20)
COMMON/1/ALMA,A1WP,A1WP3,AREA1S,AREA2S,AREA4S,BML,MNT,C1A,C1ALPH,C1
110,C1C,C1P,C1DOP,C1WP,CNST,DATE,DISPL,DISPL3,OWL,H,H1MANC,H1COMPDI
1,H1COMP,H1MON,H1MAN,H1OUT,H1BAS,H2MAN,H3MAN,H4MAN,H41,1APT,1HAL,DI
11PND,1SYM,1WC,1WH,1WL,1WC,1WH,1WL,JBREAK,1COMP,1CHKV,INITDI
1,1SENTL,1SEHNO,1STAT,1SOP,1TEST1,1TEST2,1Y,JBREAK
COMMON/2/JMAX,K,KK,KMAX,KP,KVOL,KW,M1MAN,N1RUT,N1DPL,N1HEEL,N1LCODI
1,N1PERM,N1TRIM,NAME,NAME1S,NCOMP1,NCOMP2,NSTAT,NP,NSTAT,NSTAT1,NSDI
1TAT2,NSTAT3,NSTAT4,NWL,NWP,PERM,PERM1,PERM2,HAB,S,S1STP,SPS,S3SHIDI
1P,SPACE,STATNO,SECT1M,TCR,TCR1C,TCR2,TCR3,TCR4,TCR5,THET1M,THET1Y,THEDI
1T2T,THET3M,TPI,TRIM3,VCR1C,VCR5,VCO1S,VCR2,VOL
COMMON/3/VOL1C,VOL1D,VOL3,VOL5,WAVCFN,WC1INC,WEIGHT,WH1INC,WH1MUL,DI
1WL1INC,X,X1DAM,X1DAM6,X1LIM,X1M,X1W,X2DAM,X2UAM,XPLIM,X2S,X3LIM,XDI
14LIM,X1L,X1L7,XK3,XKM3,XKML,XKMT,X1DAM,XLHP,XLCM,XLCM1C,XLCM3,XLDI
1CF,XLCF3,XLCO,XLCOLW,XLCOS,XLMRIN,XLMROA,XMID,XMOM1L,XMOM3V,XMT1,YDI
1,Y1,Y1MA,Z,WAVLOC,X1DAM6,X2DAM6,XLMB2R,IABAL
COMMON/4/ICAT,Y1INT,N3HEEL,THET3M,LIMIT
IF(1TEST1)10,100,100
10 SLOPE = (Y(1S)AT,Y+1)-Y(1STAT,Y+1)/(Z(1STAT,Y+1)-Z(1STAT,Y+1))
120 CONST = Y(1STAT,Y+1)-SLOPE*Z(1STAT,Y+1)
Y(1STAT,Y+2) = Y(1STAT,Y+1)
Z(1STAT,Y+2) = Z(1STAT,Y+1)
Z(1STAT,Y+3) = (Z(1STAT,Y+2) + Z(1STAT,Y+1))/2.0
Y(1STAT,Y+1) = SLOPE*Z(1STAT,Y+1) + CONST
JBREAK(1STAT,JBREAK) = Y+2
1TEST1 = 0
IF(JBREAK(1STAT,JBREAK) = NP(1STAT)) 100,101,101
101 NP(1STAT) = NP(1STAT) + 1
100 DO 10 J = 1,3
J = M-1.0
Y1(1) = Y(1STAT,J)
10 Z1(1) = Z(1STAT,J)
20 C1 = Y1(1)-Y1(2)
C2 = Z1(1)**2 - Z1(2)**2
C3 = Z1(1)-Z1(2)
C4 = Y1(1)-Y1(3)
C5 = Z1(1)**2 - Z1(3)**2
C6 = Z1(1)-Z1(3)
C1A = (C1*C6-C3*C4)/(C2*C6-C3*C4)
C1R = (C1-C1A*C2)/C3
C1C = Y1(1) - C1A*Z1(1)**2 - C1R*Z1(1)

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IF (ITEST1 = 1) GO TO 40,90
40 Z1(1) = Z1(2)
Z1(2) = Z1(2) + (Z1(3) - Z1(2)) / 2.0
Y1(1) = Y1(2)
Y1(2) = FINTP1(Z1(2), CIA, CIB, CIC)
DO 30 J = 1, J
J = M + 1
Y(ISTAT, J) = Y1(1)
30 Z(ISTAT, J) = Z1(1)
JNHEAK(ISTAT, JNHEAK) = 1Y + 2
IF (JNHEAK(ISTAT, JNHEAK) - NP(ISTAT)) 32, 90, 31
71 NP(ISTAT) = NP(ISTAT) + 1
JNHEAK(ISTAT, JNHEAK) = NP(ISTAT)
32 ITEST1 = 0
GO TO 20
90 IF (ABS(Z1(3) - Z1(1) - 2.0 * Z1(2)) - 0.02) 40, 60, 500
900 IF (Z1(3) + Z1(1) - 2.0 * Z1(2)) 70, 60, 70
70 Z(ISTAT, M + 1) = (Z1(1) + Z1(3)) / 2.0
Y(ISTAT, M + 1) = FINTP1(Z(ISTAT, M + 1), CIA, CIB, CIC)
60 IF (Y(ISTAT, 1Y + 1) - 0.5) 120, 65, 65
120 ITEST3 = 456
KK = 0
WRITE (6, 806) (NAME(I), I = 1, 8), ISERNO, (DATE(I), I = 1, 2)
806 FORMAT(8HSHIP-4XRA4, 8X14H SERIAL NUMBFR-1X, 8X8H UATF-2A4)
WRITE (6, 1100) STATNO(ISTAT), M
65 RETURN
1100 FORMAT(34H DATA SUBMISSION ERROR AT STATION F8.3, 13H AROUND POINT CO
113, 43H. A NEGATIVE OFFSET HAS BEEN INTERPOLATED.// 120H SHIP CO
2DATA TABLE OF INTERPOLATED OFFSETS, AREAS, VCO, TCO, AND GIRTH WILL RCO
JE COMPLETED BUT THE PROGRAM WILL NOT BE EXECUTED // 97H A UNHEAKPCO
40INT IS PROBABLY MISSING. CHECK DATA AT STATION INDICATED AND THCO
BE INPUT INSTRUCTIONS. // 99H RESUBMIT THE DATA USING THE SAME SHCO
61P SERIAL NUMBFR AS THE SHIP DATA TABLE WAS NOT STORED ON TAPE.) CO
90 STOP 1111
END

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CO 5700
CO 5800
CO 5900
CO 6000
CO 6100
CO 62
CO 63
CO 6400
CO 6500
CO 6600
CO 6700
CO 6800
CO 6900
CO 7000
CO 7100
CO 7200
CO 7300
CO 7400
CO 7500
CO 7600
CO 7700
CO 7800
CO 7900
CO 8000
CO 8100
CO 8200
CO 8300
CO 8400
CO 8500
CO 8600
CO 8700
CO 8800
CO 8900
CO 9000
CO 9100

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SUBROUTINE COEF1(X1,X2,X3,X1)
DIMENSION A1WP(20), AREA1S(60,20), AREA2S(60), AREA4S(20,30), HML(20), DI
1BMT(20), CIALPH(20), CIP(20), C1WP(20), CIDOFT(20), DATE(2), DISPL3(20), DI
1OWL(20), H(60), HICOMP(20), HIMO(60), HIMAH(40), H1OUT(20), H1SAG(60), HDI
12COMP(20), ICOMP(2), JBREAK(60,10), JMAX(3), KMAX(2,3), KP(6), NAME(6), NDI
1AME1S(6), NCOMP2(2,3,3), NP(40), PERM1(6), PERM1(3)
DIMENSION PERM2(16), HAB(5,5,10), S(40,20), S2S(60), S3SHIP(20), STATNO(6)
160), SECTIM(25), TCRIC(25), TCRS(5,5,10), TCOIS(60,20), TCO2S(60), THETSO
1M(10), TPI(20), TRIM3(6), VCRIC(25), VCRS(5,5,10), VCOIS(60,20), VCO2S(60)
10), VOL3(20), VOL5(5), VOLIC(25), WEIGHT(25), X(60), X1DAM(30), X1DAM2(100)
1), X1DAM6(20), X2DAM6(20), X1W(25), X2DAM(30), X2DAM2(10)
DIMENSION XPS(6), XKU3(20), XKML(20), XKMT(20), X1DAM(30,3), XLCM1C(250)
1), XLCR3(20), XLCF3(20), XLCOIW(25), XLCOS(5), XMTI(20), Y(60,20), Y1(60) DI
1,Z(60,20), Y1INT(4,30), THETJM(5)
DIMENSION ALVM(25)
COMMON/1/ A1MA, A1WP, A1WP1, AREA1S, AREA2S, AREA4S, HML, BMT, CIALPH, CIALPH, COI
11B, C1C, C1P, CIDOFT, C1WP, CONST, DATE, DISPL1, DISPL3, OWL, H, HIMAB, HICOMP DI
1, H2COMP, HIMO, HIMAH, H1OUT, H1SAG, H2MAR, H3MAR, H4MAR, HW1, I1AFT, I1NAL, DI
11FWD, I1BYM, I1WC, I1WH, I1WL, I2WC, I2WH, I2WL, I1BREAK, ICOMP, ICHK9, INTDI
1, ISENTL, ISFRNO, ISTAT, ISTOP, ITEST1, ITEST3, IY, JBREAK
COMMON/2/ JMAX, K, KK, KMAX, KP, KVOL, KW, H1MA, N1RUTT, N1RPL, N1HEEL, N1LCODI
1, N1PERM, N1TRIM, NAME, NAME1S, NCOMP1, NCOMP2, NSTAT, NP, NSTAT, NSTAT1, NSDI
1STAT2, NSTAT3, NSTAT4, NWL, NWP, PERM, PERM1, PERM2, HAB, S, S1SHIP, S2S, S3SHIDI
1P, SPACF, STATNO, SECTIM, TCM, TCRIC, TCRS, TCOIS, TCO2S, THETJM, THET1Y, THEDI
1T2T, THET3H, TPI, TRIM3, VCMIC, VCRS, VCOIS, VCO2S, VOL
COMMON/3/ VOLIC, VOLID, VOL3, VOL5, WAVCPN, WC1INC, WEIGHT, WH1INC, WH1MUL, DI
1WL1INC, X, X1DAM, X1DAM2, X1LIM, X1M, X1W, X2DAM, X2DAM2, X2LIM, X2S, X3LIM, XDI
14LIM, X11L, X11T, XKR, XKU3, XKML, XKMT, X1DAM, X1BP, XLCR, XLCR1C, XLCR3, XLDI
1CF, XLCF3, XLCO, XLCOIW, XLCOS, XLMAR, XLMROA, X1D, XMON1L, XMON3V, XMTI, YDI
1, Y1, Y1MA, Z, WAVLOC, X1DAM6, X2DAM6, X1MBPR, I60AL
COMMON/4/ ICAT, Y1INT, N1HEEL, THET3H, LIMIT
U = (X1-X2)/(X2-X1)
ALPH = (X3-X2)/(X2-X1)
CIA = (U**2 + 1)/(ALPH**2 + ALPH)
C1C = (ALPH*U**2 - 1)*ALPH**2/(ALPH**2 + ALPH)
C1B = (ALPH - U*U*ALPH - U**4)/ALPH
RETURN
END

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      VINT(K,J)=0.
13  CONTINUE
      NP(I)=0
      NPIS(I)=0
      X(I)=0.
14  XIS(I)=0.
      CALL OFFSET
20  READ(60,1000) (SERNO,NAME),S,DATE,ITPST,INIT,I,SYM,NBULK
      DO 22 I = 1,NBULK
        READ(60,1000) NINT(I),XSLK(I)
        NPT=NINT(I)
        READ(60,1000) (VINT(I,IP), VINT(I,IP),IPY=1,NP(I)
22  CONTINUE
      DO 28 J=1,10
24  JRPIS(I,J)=0
      JCAT=1
      NPT = NINT(I)
      DO 26 I=1,NBULK
        IF (NINT(I)=3) 23,23,21
21  NPT= NINT(I)-1
23  DO 24 J=2,NPT
        IF (ZINT(I,J)=ZINT(I,J-1)) 24,24,24
24  IF (ABS(VINT(I,J))-0.01) 24,24,27
27  JCAT = 2
      GO TO 400
24  CONTINUE
25  CONTINUE
400  LSTAT=NSTAT
40  CALL GENERATE
      NSTAT = LSTAT
      ICAT=JCAT
      LIMIT=NSTAT+ICAT
40  DO 40 I=1,LIMIT
      NP(I)=NPIS(I)
      X(I)=XIS(I)
      NPT=NPIS(I)
      DO 45 J = 1,10
45  JBREAK(I,J)=0
      K=1
      L=0
      DO 57 J=1,NPT
      L=L+1
      IF (J=1) 54,54,57
51  IF (J-JRPIS(I,K)) 54,52,56
52  IF (J=1-JRPIS(I,K-1)) 54,53,54
43  Z(I,L)=000000.0
      L=L+1
54  Y(I,L)=YIS(I,J)
      Z(I,L)=ZIS(I,J)
      IF (J-JRPIS(I,K)) 57,55,57
55  JBREAK(I,K) = 1
      GO TO 57
56  K=K+1
      GO TO 51
57  CONTINUE
      NP(I) = L

```

CM	2400
CM	2500
CM	2600
CM	2700
CM	2800
CM	2900
CM	3000
CM	3100
CM	3200
CM	3300
CM	3400
CM	3500
CM	3600
CM	3700
CM	3800
CM	3900
CM	4000
CM	4100
CM	4200
CM	4300
CM	4400
CM	4500
CM	4600
CM	4700
CM	4800
CM	4900
CM	5000
CM	5100
CM	5200
CM	5300
CM	5400
CM	5500
CM	5600
CM	5700
CM	5800
CM	5900
CM	6000
CM	6001
CM	6002
CM	6100
CM	6200
CM	6300
CM	6400
CM	6500
CM	6600
CM	6700
CM	6800
CM	6900
CM	7000
CM	7100
CM	7200
CM	7300
CM	7400
CM	7500
CM	7600
CM	7700
CM	7710

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40 STATNO(11) = X(1)/ALBP
ITEST(1)
INIT(1)
KK=0
CALL OFFSET
960 CONTINUE
ISEMNO = JSEMNO
RETURN
1000 FORMAT(1E+10A4,9I3)
1002 FORMAT(1B,9I0.8)
1003 FORMAT(2F10.8)
END

CM 7000
CM 0000
CM 0100
CM 0200
CM 0300
CM 0400
CM 0400
CM 0500
CM 0600
CM 0700
CM 0800
CM 0900

DA 000

DA	200
DA	300
DA	400
DA	450
DI	400
DI	500
MDI	400
MDI	500
DI	600
IOI	700
MDI	800
MDI	900
MDI	1000
DI	1100
MDI	1200
IOI	1300
DI	1400
DI	1450
COI	1500
POI	1600
DI	1700
YDI	1800
DI	1900
MDI	2000
MDI	2100
IOI	2200
KDI	2300
DI	2400
DI	2500
MDI	2600
LUI	2700
YDI	2800
DI	2900
DI	3000
DA	3100
DA	3200
DA	3300
DA	3400
DA	3500
DA	3600
DA	3700
DA	3800
DA	3900
DA	4000
DA	4100
DA	4200
DA	4300
DA	4400
DA	4500
DA	4600
DA	4700
DA	4800
DA	4900
DA	5000
DA	5100
DA	5200
DA	5300
DA	5400
TDA	5500

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1Y) = (10(19*(0F4,2*10)))
906 FORMAT(//% NUMBER OF INPUT DRAFTS=%10.1)
907 FORMAT(//% INPUT DRAFTS = % 10F10.2)
908 FORMAT(//% NUMBER OF INPUT HEEL ANGLES=%14.1)
909 FORMAT(//% INPUT HEEL ANGLES = % 10F10.2)
910 FORMAT(//% NUMBER OF INPUT TRIMS=%14.1)
911 FORMAT(//% INPUT TRIMS IN DEGREES=% 10F10.2)
WRITE(6,906) NAME,ISERNNO,DATE
WRITE(6,913)
WRITE(6,904) NDET
DO 90 1=1,NDET
L=L1COMP(1)
90 WRITE(6,904) 1,(L2COMP(1,J)*PERMR(1,J),J=1,L)
WRITE(6,906) NDET
WRITE(6,907) D1DET
WRITE(6,908) N1HEEL
WRITE(6,909) D1HEEL
WRITE(6,910) N1TRIM
WRITE(6,911) D1TRIM
912 FORMAT(//% DEFINITIONS OF DAMAGE STABILITY OUT-UT-%COMPARTMENT PROPODA
TENTIES-% VOLUMES IN CU. FT., CORRECTED FOR PERMEABILITY-% LCBSOA
2 IN FT FROM MIDSHIPS-% SHIP DISPLACEMENT IN TONS-% MIGHTING AREA
JM IN FEET%)
913 FORMAT(//% DAMAGE STABILITY INPUT DATA%)
904 FORMAT(6M1SHIP=RAA,6X,10M1SERIAL NUMBER=IS,6M1DATE=PA4/)
KVOL=1
KK=1
ITEST1=2
KW=1
JSENN=ISENN
DO 900 1=1,NDET
DO 900 1TRIM=1,N1TRIM
THE11=D1TRIM(1TRIM)*.017453293
DO 900 1DET=1,N1DET
H1RASC=D1DET(1DET)
DO 900 1J=1,N1HEEL
THE1H=D1HEEL(1J)*.017453293
ISENN=JSENN
CALL OFFSET
DO 907 INAME=1,8
907 NAME2B(INAME)=NAME (INAME)
CALL VOLUME
V1SHIP=VOL
TCB1SH=TCB
KLCB1SH=KLCB
VCB1SH=KXK
L=L1COMP(1)
DO 90 14=1,L
ISENN=L2COMP(1,14)
ITEST1=2
CALL OFFSET
IF(ITEST1.EQ.947) GO TO 9999
CALL VOLUME
VOL1C(14)=VOL*PERMR(1,14)
TCB1C(14)=TCB
KLCB1C(14)=KLCB

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DA 9600
 DA 9700
 DA 9800
 DA 9900
 DA 6000
 DA 6100
 DA 6200
 DA 6300
 DA 6400
 DA 6500
 DA 6600
 DA 6700
 DA 6800
 DA 6900
 DA 7000
 DA 7100
 DA 7200
 DA 7300
 DA 7400
 DA 7500
 DA 7600
 DA 7700
 DA 7800
 DA 7900
 DA 8000
 DA 8100
 DA 8150
 DA 8200
 DA 8300
 DA 8400
 DA 8500
 DA 8600
 DA 8700
 DA 8800
 DA 8900
 DA 9000
 DA 9100
 DA 9200
 DA 9300
 DA 9310
 DA 9320
 DA 9400
 DA 9500
 DA 9600
 DA 9700
 DA 9800
 DA 9900
 DA 10000
 DA 10100
 DA 10200
 DA 10300
 DA 10301
 DA 10400
 DA 10500
 DA 10600
 DA 10700

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90 VCRIC(14)=XND DA 10800
914 FORMAT(10 TRIM=15 DEG. DRAFT=70.0 FT. HEEL=75.0 DEGREES//) DA 10900
918 FORMAT(10 COMPARTMENT PROPERTIES OF FLOODED WATER=10 COMP. NO. VOA 11000
10LUM LCB VCB TCB//) DA 11100
916 FORMAT(3X15,2X10.0,2X7.2,1X6.2,1X6.2) DA 11200
WRITE(6,000) NAME20,JBENNO,DATE DA 11300
WRITE(6,014) D1TRIM(1TRIM),D1DRAFT(1DRAFT),D1HEEL(11) DA 11400
WRITE(6,018) DA 11500
VOLIT=0. DA 11600
TCBIT=0. DA 11700
VCBIT=0. DA 11800
ALCBIT=0. DA 11900
DO 80 I=1,L DA 12000
WRITE(6,010) L*COMP(1,14),VOLIC(14),ALCBIC(14),VCRIC(14),TCNIC(14) DA 12100
TCBIT= (TCBIT*VOLIT+TCBIC(14)*VOLIC(14))/(VOLIT+VOLIC(14)) DA 12200
VCBIT= (VCBIT*VOLIT+VCBIC(14)*VOLIC(14))/(VOLIT+VOLIC(14)) DA 12300
ALCBIT= (ALCBIT*VOLIT+ALCBIC(14)*VOLIC(14))/(VOLIT+VOLIC(14)) DA 12400
80 VOLIT=VOLIT+VOLIC(14) DA 12500
WRITE(6,017) TITLE(1),TITLE(2),TITLE(3),VOLIT,ALCBIT,VCBIT,TCBIT DA 12600
WRITE(6,017) TITLE(4),TITLE(5),TITLE(6),VISHIP,ALCBISH,VCBISH,TCNISH DA 12700
IM DA 12800
917 FORMAT(1X46,2X/1X46,3X10.0,70.2,2X7.2) DA 12900
TCBIT= (VISHIP*TCNISH-VOLIT*TCBIT)/(VISHIP-VOLIT) DA 13000
VCBIT= (VISHIP*VCNISH-VOLIT*VCBIT)/(VISHIP-VOLIT) DA 13100
ALCBIT= (VISHIP*ALCBISH-VOLIT*ALCBIT)/(VISHIP-VOLIT) DA 13200
VOLIT=VISHIP-VOLIT DA 13300
USPL=VOLIT/30. DA 13400
WRITE(6,017) TITLE(1),TITLE(2),TITLE(6),VOLIT,ALCBIT,VCBIT,TCBIT DA 13500
WRITE(6,018) USPL DA 13600
918 FORMAT(10 DISPLACEMENT OF DAMAGED SHIP IN TONS=10 P(10.2) DA 13700
ROTAHM=TCBIT/ROB(1HETIM), VCBIT=VCN(1HETIM)-TCBIT*OBIN(1HETIM),0.2/DA 13800
ICOB(1HETIM) DA 13900
WRITE(6,019)ROTAHM DA 14000
919 FORMAT(10 RIGHTING ARM IN FEET=10 P(10.2) DA 14100
990 CONTINUE DA 14200
9990 RETURN DA 14300
END DA 14400

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SUBROUTINE DENVTE
DIMENSION A1(20),Y2(30)
DIMENSION DELA(30),DELA2(30)
DIMENSIONALWPS(20),ANEA1S(40,20),ANFAPS(40),ANEAAS(20,30),HML(20),DI
IMT(20),CIA(20),CIP(20),CIWP(20),CIDOPT(20),DATE(2),DISPLJ(20),DI
ICWL(20),H1(20),H1COMP(20),H1HON(20),H1MAR(20),H1OUT(20),H1SAG(20),H1
ICOMP(20),ICOMP(20),JUREAK(40,10),JMAX(3),KMAX(2,3),NP(2),NAME(1),NDI
IAMRIS(2),NCOMP(2,3,3),NP(20),PERM(10),PERM(3)
DIMENSIONPERM(10),HAB(5,5,10),S(40,20),SPS(40),SSSHIP(20),STATNO(2)
1001,SECTIM(20),TCHIC(20),TCMH(5,5,10),TCOIS(40,20),TCOIS(40),THEIS(20)
H1(10),TPI(20),THIM3(6),VCHIC(20),VCHS(4,5,10),VCOIS(40,20),VCOIS(40)
101,VOL1(20),VOL1(4),VOLIC(20),WEIGHT(20),X1(40),X1DAM(30),X1DAM2(180)
11,X1DAM6(20),X1DAM6(20),X1W(20),X1DAM(30),X1DAM2(18)
DIMENSIONXPS(40),XKMS(20),XKML(20),XKMT(20),X1DAM(30,3),XLCN1C(200)
11,XLCN1(20),XLCFJ(20),XLCOW(20),XLCOW(20),XMTI(20),Y1(40,20),Y1(40)DI
1,Z1(40,20),Y1INT(4,30),IMFTJH(4)
DIMENSIONALVM(20)
COMMON/1/A1MA,A1WP,A1WPS,ANEA1S,ANFAPS,ANEAAS,HML,IMT,CIA,CIALPH,CID
11H,CIC,CIP,CIDOPT,CIP,CONST,DATE,DISPL,DISPLJ,DWL,H,H1HASC,H1COMPDI
1,H1COMP,H1HON,H1MAR,H1OUT,H1SAG,H2MAR,H3MAR,HOMAN,HML,IAFT,IALAL,DI
11FWD,11SYM,11WC,11WM,11WL,11WC,11WM,11WL,11HREK,1COMP,1CHKW,1INTDI
1,1SENTL,1SEMO,1STAT,1STOP,1TST1,1TST2,1Y,JUREAK
COMMON/2/JMAX,K,KK,KMAX,KP,KVOL,KW,M,MAIN,IBUIT,NIDISPL,N1HKL,N1LC(20)
1,N1PERM,N1TRIM,NAME,NAMEIS,NCOMP,NCOMP2,NSTAT,NP,NSTAT,NSTAT,NBDI
1STAT2,NSTAT3,NSTAT4,NWL,NWP,PERM,PERM1,PERM2,HAB,S,SHIP,SPS,SSSHIPDI
1P,SPACE,STATNO,SAC1,M,ICB,ICN1C,TCMH,TCOIS,ICOPB,THEIS,THEIT,THEUI
1TET,THEYH,TPI,THIM3,VCHIC,VCHS,VCOIS,VCOIS,VOL
COMMON/3/VOLIC,VOLIN,VOLJ,VOLA,NAVCEN,WC1INC,WEIGHT,WH1INC,WH1MUL,DI
1WL1INC,X,X1DAM,X1DAM2,X1LIM,X1M,X1W,X1DAM,X1DAM2,X1LIM,X1S,X1LIM,XOI
14LIM,X1IL,X1IT,XKMS,XKMS,XKML,XKMT,X1DAM,X1LP,XLCN,XLCN1C,XLCN3,XLU
1CP,XLCFJ,XLCOW,XLCOW,XLCOS,XLMRIN,XLMRDA,XMID,XMOM1L,XMOMJ,XMTI,YDI
1,Y1,Y1MA,Z,WAV,OC,X1DAM6,X1DAM6,XLMRPR,IALAL
COMMON/4/ICAT,Y1INT,NHREL,IMFTJH,LIMIT
READ(5,20) CHWL,AIMLD,M1DML,D1MLO,XLCWL,XKWL,PHI
20 FORMAT(7F10.2)
DCY=0.0
DCX=0.0
1STAT=MA
H1(STAT)=H1HASC
4 CX1=ANEAAS(1STAT)/(Y1MA*2.0*H1HASC)
IF (ABS(CX1DWL-CX1)-0.0001) 7.7.8
5 DCX=CX1DWL-CX1
UCY=DCY*DCX
NPOINT=NP(1STAT)
DO 6 IPOINT=1,NPOINT
Y1(STAT,IPOINT)=Y1(STAT,IPOINT)*DCX*Y1MA*(1.0-(ABS(Y1(STAT,IPOINT)
1-Y1MA/2.0)/(Y1MA/2.0)))**2.0
A CONTINUE
CALL TABLE
1STAT=MA
H1(STAT)=H1HASC
CALL AREAS
GO TO 4
7 IAFT=1IAFT=1
DO 10 1STAT=1FWD,IAFT
IF (1STAT=MA) 8.8.8

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A	JSTAT=ISTAT	DE	2400
	DO TO 10	DE	3000
9	JSTAT=ISTAT+1	DE	3100
10	NPOINT=NP(JSTAT)	DE	3200
	DIST=1.0-(ABS(X(ISTAT)-X(MA))/XLMP*2.0)	DE	3300
	DO 10 IPOINT=1,NPOINT	DE	3400
12	Y(IJSTAT,IPOINT)=Y(JSTAT,IPOINT)+DCY*Y(MA)*DIST*(1.0-(ABS(Y(JSTAT,IPOINT)-Y(MA/2.0)/(Y(MA/2.0)))**2.0)	DE	3500
14	CONTINUE	DE	3600
	CALL TABLE	DE	3700
	ISTAT=MA	DE	3800
	CALL AREAS	DE	3900
	ALMA=AREAS(ISTAT)	DE	4000
	KVOL=1	DE	4100
	CALL VOLUME	DE	4200
	RUN=X(1)AFT)-X(MA)	DE	4300
	ENT=X(MA)	DE	4400
C	LCR FROM STATION OF MAXIMUM AREA (POSITIVE FORWARD)	DE	4500
	ALCM=X(MA)-X(MID*ALCB	DE	4600
C	NORMALISE LCR IN TERMS OF ENTRANCE AND RUN LENGTHS	DE	4700
	ZNAM=ALCM/ENT	DE	4800
	ZMAR2=(-ALCM)/RUN	DE	4900
C	PRISMATIC OF PARENT	DE	5000
	PHI=VOL/(AREAS(MA)*XLMP)	DE	5100
C	REQUIRED CHANOF IN PRISMATIC	DE	5200
	DPHI=CPDWL-PHI	DE	5300
C	CONSIDER ENTRANCE AND RUN AS TWO DAMAGED COMPARTMENTS WITH PERM=1	DE	5400
	KVOL=4	DE	5500
	NCOMP=2	DE	5600
	X1DAM(1)=X(1)PWD)	DE	5700
	X1DAM(2)=X(MA)	DE	5800
	X2DAM(1)=X(MA)	DE	5900
	X2DAM(2)=X(1)AFT)	DE	6000
	PERM(1)=1.0	DE	6100
	PERM(2)=1.0	DE	6200
	CALL VOLUME	DE	6300
C	NORMALIZE LCR & OF ENTRANCE AND RUN IN TERMS OF RESPECTIVE LENGTHS	DE	6400
C	BOTH THE VALUES ARE POSITIVE	DE	6500
	FXNAM=(X(MA)-X(MID*ALCHIC(1))/ENT	DE	6600
	AXMAR=(X(MID*ALCHIC(2)-X(MA))/RUN	DE	6700
C	FIND PRISMATIC COEFFICIENTS OF ENTRANCE AND RUN	DE	6800
	FPHI=VOLIC(1)/(ALMA*ENT)	DE	6900
	APHI=VOLIC(2)/(ALMA*RUN)	DE	7000
C	NORMALIZE MAU1 OF GYRATION OF ENTRANCE AND RUN	DE	7100
	PH=(ENT-XLVR(1))/ENT	DE	7200
	AK=(XLVR(2)-RUN)/RUN	DE	7300
C	NORMALISE STATION DISTANCES FROM STATION OF MAX AREA	DE	7400
	DO 30 ISTAT=1,MA	DE	7500
10	X2S(ISTAT)=(ENT-X(ISTAT))/ENT	DE	7600
	DO 40 ISTAT=MA,NSTAT	DE	7700
40	X2S(ISTAT)=(X(ISTAT)-ENT)/RUN	DE	7800
	X2S(1)PWD)=1.0	DE	7900
	X2S(1)AFT)=1.0	DE	8000
	X2S(MA)=0.0	DE	8100
C	CHECK IF REQUIRED CP IS CLOSE ENOUGH TO THAT OF PARENT	DE	8200
	IF(ABS(DPHI)-0.0001)42,42,50	DE	8300
		DE	8400

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42 DO 44 ISTAT=11PWO,11APT
44 DELX(ISTAT)=0.1
   DO TO 55
50 CALL DRVZ(ZBAR1,ZBAR2,PMH1,APH1,PK,AN,DELX,DELX2,PMH1,CPH1,11APT,
   11PWO,PKBAR,AKBAR)
C  SHIFT STATIONS
54 DO 60 ISTAT=11PWO,11APT
60 K2B(ISTAT)=K2B(ISTAT)+DELX(ISTAT)
   DO 100 ISTAT=11PWO,11APT
   IF (ISTAT=MA) 70,80,80
70 AFTPT=0.0
   FORPT=(-1.0)
   DO TO 90
80 AFTPT=1.0
   FORPT=0.0
90 K(ISTAT) = (ENT+K2B(ISTAT)*(AFTPT-MIN(FORPT,ENT)))*XLOWL/XLRP
   NPOINT=N*(ISTAT)
   YRATIO = B1MLD/(Y1MA+2.0)
   ZRATIO=XLOWL/M1BASC
   DO 100 IPOINT=1,NPOINT
   Y(ISTAT,IPOINT)=Y(ISTAT,IPOINT)*YRATIO
   Z(ISTAT,IPOINT)=Z(ISTAT,IPOINT)*ZRATIO
100 CONTINUE
   CALL TABLE
   ISTAT = MA
   M(ISTAT) = MLOWL
   CALL AREAS
   A1MA = AREASB(ISTAT)
   Y1MA = B1MLD/4.0
   XLRP = XLOWL
   XMID = XLRP/2.1
   RETURN
   M1BASC = MLOWL
   ITEST1 = 3
   INIT = 0
   CALL OFFSET
   ITEST1 = 2
   END

```

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DE 8500
DE 8600
DE 8700
DE 8806
DE 8903
DE 9000
DE 9100
DE 9200
DE 9300
DE 9400
DE 9500
DE 9600
DE 9700
DE 9800
DE 9900
DE 10000
DE 10100
DE 10200
DE 10300
DE 10400
DE 10500
DE 10600
DE 10700
DE 10800
DE 10900
DE 11000
DE 11100
DE 11200
DE 11300
DE 11400
DE 11500
DE 11600
DE 11601
DE 11602
DE 11603
DE 11604
DE 11605
DE 11700

```

**** FORTRAN SOURCE CODE ERRORS ****

01016 TYPE ERROR IN STATEMENT NUMBER 100
THERE IS NO PATH TO THIS STATEMENT

PLUS 10

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48 DO 44 ISTAT=11FWD,11APT	DE 8500
44 DELX(ISTAT)=0.0	DE 8600
DO TO 55	DE 8700
50 CALL DRIVE(ZBAR,ZBAR,PPI,APHI,PM,AK,DELX,DELX2,PPI,DPPI,11APT,	DE 8800
11FWD,PBAR,ANBAR)	DE 8900
C SHIFT STATIONS	DE 9000
55 DO 60 ISTAT=11FWD,11APT	DE 9100
60 XRS(ISTAT)=XRS(ISTAT)+DELX(ISTAT)	DE 9200
DO 100 ISTAT=11FWD,11APT	DE 9300
IF (ISTAT=MA) 70,80,80	DE 9400
70 APTPT=0.0	DE 9500
PUMPT=(-1.0)	DE 9600
DO TO 90	DE 9700
80 APTPT=1.0	DE 9800
PUMPT=0.0	DE 9900
90 X(ISTAT) = (ENT+XRS(ISTAT)*(APTPT+HUN+PUMPT*ENT))*XLOWL/XLMP	DE 10000
NPOINT=NP(ISTAT)	DE 10100
YRATIO = HMLD/(YIMA*2.0)	DE 10200
ZRATIO=HLOWL/HBASC	DE 10300
DO 100 IPOINT=1,NPOINT	DE 10400
Y(ISTAT,IPOINT)=Y(ISTAT,IPOINT)*YRATIO	DE 10500
Z(ISTAT,IPOINT)=Z(ISTAT,IPOINT)*ZRATIO	DE 10600
100 CONTINUE	DE 10700
CALL TABLE	DE 10800
ISTAT = MA	DE 10900
H(ISTAT) = HLOWL	DE 11000
CALL AREAS	DE 11100
AJMA = AREAS(ISTAT)	DE 11200
YIMA = HMLD/2.0	DE 11300
XLMP = FLOWL	DE 11400
X MID = XLMP/2.0	DE 11500
RETURN	DE 11600
HIBASC = HLOWL	DE 11691
ITEST1 = 3	DE 11692
INIT = 0	DE 11693
CALL OFFSET	DE 11694
ITEST1 = 2	DE 11695
END	DE 11700

**** PORTMAN SOURCE CODE ERRORS ****

C1016 TYPE ERROR IN STATEMENT NUMBER 100
THERE IS NO PATH TO THIS STATEMENT

PLUS 10

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```

SUBROUTINE DRV (ZBAR1,ZBAR2,PPHI:APHI,PH,AK,DELA,DELX2,PHI,DP,1, DR 200
  INAPT,NFOR,FXBAR,AKBAR) DR 300
  DIMENSION DELX(30), DELX2(30) DR 400
  DIMENSIONALWP3(20),AREA18(60,20),AREAS(60),ARZAS(20,30),HML(20),DI DR 500
  BMT(20),C1ALPH(20),C1P(20),C1WP(20),C1DOPT(20),DATE(2),DISPL3(20),DI DR 600
  IDWL(20),H(60),HCOMP(20),HMO(60),HMAN(60),H1OUT(20),H1BAG(60),HDI DR 700
  ICOMP(20),ICOMP(2),JMBRAN(60,10),JMAX(3),KMAX(2,3),KP(6),NAME(6),NOI DR 800
  NAME18(6),NCOMP(2,3,3),NP(60),PERM(16),PERM1(3) DI 900
  DIMENSIONPERMS(16),NAB(5,5,10),S(60,20),S2S(60),S3SHIP(20),STATNO(10 DR 1000
  160),SECTIM(20),TCBIC(20),TCB(5,5,10),TCO18(60,20),TCO2S(60),THE160 DR 1100
  10),TPI(20),THINS(6),VCBIC(20),VCB(5,5,10),VCO18(60,20),VCO2S(60) DR 1200
  10),VOL3(20),VOL18(6),VOL1C(20),WEIGHT(20),X(60),X1DAM(30),X1DAM2(100 DR 1300
  10),X1DAM3(20),X1DAM4(20),X1W(20),X1DAM(30),X1DAM2(10) DI 1400
  DIMENSIONK2S(60),K2S(20),KXML(20),KXMT(20),X1DAM(30,3),XLCBIC(20) DR 1500
  10),XLCB3(20),XLCF3(20),XLCO18(20),XLCO4(5),XMT1(20),Y(60,20),Y1(60) DI 1600
  10),Z(60,20),Y1INT(4,10),THE13M(9) DI 1700
  DIMENSION XLVH(20) DI 1800
  COMMON/1/AMA,A1WP,A1WP3,AREA18,AREAS,ARZAS,BML,BMT,C1A,C1ALPH,C1 DR 1900
  18,C1C,C1P,C1DOPT,C1WP,CONST,DATE,DISPL,DISPL3,OWL,H,H1BAG,H1COMP DI 2000
  10,H2COMP,H1MO,H1MAN,H1OUT,H1BAG,H2MAN,H3MAN,H2MAN,HW1,IAPT,I1AL,DI 2100
  10,I1PHO,I1BYH,I1WC,I1WH,I1WL,I2WC,I2WH,I2UL,I2REAR,ICOMP,ICHECK,INIY DI 2200
  10,I1SENTL,I1ERNO,I1STAT,I1OP,I1PST,I1TGT,I1Y,JMBRAN DI 2300
  COMMON/2/JMAX,K,KK,KMAX,KP,KVOL,KW,M,MAN,N1OUT,N1DISPL,N1HEEL,N1LCODI 2400
  10,N1PERM,N1TRIM,NAME,NAME18,NCOMP1,NCOMP2,NSTAT,NP,NSTAT,NSTAT1,NBDI 2500
  10,TA2,NSTAT3,NSTAT4,NWL,NWP,PERM,PERM1,PERM2,NAB,S,S1SHIP,S2S,S3SHIDI 2600
  10,P,SPACE,STATNO,SECTIM,TCB,TCBIC,TCB5,TCO18,TCO2S,THE1IM,THE1Y,THEDI 2700
  10,T2T,THE1SH,TPI,THINS,VCBIC,VCB5,VCB18,VCB2S,VOL DI 2800
  COMMON/3/VOL1C,VOL1D,VOL3,VOL5,WAVLEN,WCLINC,WEIGHT,W1INC,W1MUL,DI 2900
  10,W1INC,X,X1DAM,X1DAM2,X1LIM,X1M,X1W,X1DAM,X1DAM2,X1LIM,X2S,X1LIM,XDI 3000
  10,LIM,X1L,X1Y,XNB,XK2S,XKML,XKMT,X1DAM,X1BP,XLCB,XLCB3,XLCBIC,XLCB DI 3100
  10,CF,XLCF3,XLCO,XLCO1W,XLCOS,XLM2R,XLM2A,XMID,XMOM1,XMOM3V,XMT1,YDI 3200
  10,Y1,Y1MA,Z,WAV,OC,X1DAM,X1DAM2,XLM2R,XLM2A,XAL DI 3300
  COMMON/4/ICAT,Y1INT,N3HEEL,THF13M,LIMIT DI 3400
  ERR1 = 1 DR 3500
  ERR1 IS AN ERROR INDICATOR FOR THE CHANGE IN THE FOR AND APT DR 3600
  PRISMATIC CHANGE. IF ERR1 = 2 THEN PRISMATIC CHANGE IS OUT DR 3700
  OF HOUNDS. DR 3800
  SET VARIABLES FOR LCD CHANGE(DELTA LCD) AND PARALLEL DR 3900
  MIDDLE BODY EQUAL TO ZPRO DR 4000
  PMSFR = 0.0 DR 4100
  PMSA = 0.0 DR 4200
  DELPA = 0.0 DR 4300
  DELPA = 0.0 DR 4400
  DZM1 = 0.0 DR 4500
  DZM2 = 0.0 DR 4600
  ZERO OUT DELX AND DELX2 ARRAYS DR 4700
  DO 2 I = 1,30 DR 4800
    DELX(I) = 0.0 DR 4900
    DELX2(I) = 0.0 DR 5000
  SET CONSTANTS DEPENDENT ONLY ON THE GEOMETRICAL DR 5100
  PROPERTIES OF THE BASIS FORM. DR 5200
  FZM2 = 1.0 = 2.0° FXBAR DR 5300
  AZM2 = 1.0 = 2.0° AXBAR DR 5400
  AP = PPH1 * (FZM2) = PMSFR * (1.0 - PPH1) DR 5500
  AA = APH1 * (AZM2) = PMSA * (1.0 - APH1) DR 5600
  BP = PPH1 * (2.0° FXBAR = 3.0° (Fkeep) = PMSFR * FZM2) / AP DR 5700

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```

C
C
BA = APHI * (1.0 - PMBA) - 2.0 * (APHI * PMBA) / AA
CF = (AP * (1.0 - PMBA) - PMBA * PMBA) / (1.0 - PMBA)
CA = (RA * (1.0 - APHI) - APHI * PMBA) / (1.0 - PMBA)
SET TEST LIMITS FOR CHANGE IN PRISMATIC FOR AND APT
SECTIONS
FOPIP = DELPH / (1.0 - PMBA)
ADPIP = DELPA / (1.0 - PMBA)
PIPT = (DELPH * (1.0 - PMBA) - 0.4 * AP * (1.0 - FOPIP)) / (1.0 -
1 PMBA)
PPPT = (DELPH * (1.0 - PMBA) - 0.4 * AP * (1.0 - FOPIP)) / (1.0 -
1 PMBA)
PIAPT = (DELPA * (1.0 - APHI) - 0.4 * AA * (1.0 - ADPIP)) / (1.0 -
1 PMBA)
PIAPT = (DELPA * (1.0 - APHI) - 0.4 * AA * (1.0 - ADPIP)) / (1.0 -
1 PMBA)
PREPARE TO CALC. CHANGE IN FOR AND APT PRISMATICS
ZPH = PHI * PMBA
CFOP = CF * DELPH
CAOP = CA * DELPA
BSM = BF * BA
C
CALC. CHANGES IN PRISMATIC
DPHFR = (1.0 * (UPHI * (MA * ZPH) + DPHFR * ZPH) + CFOP - CAOP)
1 / BSM
DPHA = (2.0 * (UPHI * (MA * ZPH) + DPHFR * ZPH) - CFOP + CAOP)
1 / BSM
OMP1 = 1.0 - FPHI
OMP2 = 1.0 - APHI
QB1 = AP * (1.0 - FOPIP) + DPHFR * (1.0 - PMBA) - FOPIP * OMP1
1 PMBA * FOPIP * OMP1
QB2 = AA * (1.0 - ADPIP) + DPHA * (1.0 - PMBA) - ADPIP * OMP2
2 PMBA * ADPIP * OMP2
QA1 = (FOPIP * OMP1) - DPHFR
QA2 = (ADPIP * OMP2) - DPHA
C
CHECK IF PRISMATIC CHANGES ARE IN RANGE
IF (DPHFR > 200.00)
50 IF (PPPT - DPHFR) 200.00, 150
60 IF (PIPT - DPHFR) 150.00, 200
150 ENR1 = 2
GO TO 2000
200 IF (DPHA > 200.00)
250 IF (PIAPT - DPHA) 200.00, 150
260 IF (PIAPT - DPHA) 150.00, 200
300 CONTINUE
C
CHANGE FOREBODY SECTION
DO 320 IK = NFOR, MA
QC1 = AP * (FOPIP - QB1(1K)) - (PMBA * (DPHFR * (PMBA * FOPIP) * OMP1)
317 IF (IK) 321, 322, 323
321 IF (IK = 0.000000) 322, 323, 324
322 IK = 0.00
GO TO 322
323 WRITE(3, 334) QB1(1K), IK
330 FORMAT(5X, 'FOREBODY STATION = ', F8.3, 'X, 6DELX2 = ', F8.3, 'IS OUT
1 OF RANGE ')
323 IF (IK = 1.0) 322, 322, 323
324 IF (ABS(IK - 1.0) = 0.000000) 322, 324, 324

```

DR 2900
 CR 3000
 CR 3100
 CR 3200
 CR 3300
 CR 3400
 CR 3500
 CR 3600
 CR 3700
 CR 3800
 CR 3900
 CR 4000
 CR 4100
 CR 4200
 CR 4300
 CR 4400
 CR 4500
 CR 4600
 CR 4700
 CR 4800
 CR 4900
 CR 5000
 CR 5100
 CR 5200
 CR 5300
 CR 5400
 CR 5500
 CR 5600
 CR 5700
 CR 5800
 CR 5900
 CR 6000
 CR 6100
 CR 6200
 CR 6300
 CR 6400
 CR 6500
 CR 6600
 CR 6700
 CR 6800
 CR 6900
 CR 7000
 CR 7100
 CR 7200
 CR 7300
 CR 7400
 CR 7500
 CR 7600
 CR 7700
 CR 7800
 CR 7900
 CR 8000
 CR 8100
 CR 8200
 CR 8300
 CR 8400

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326	XY = 1.000	DR	8500
	GO TO 322	DR	8600
324	XY = (1 - QB) - SORT(QB1**2 - 4.0*QA1*QC1) / (2.0*QA1)	DR	8700
	IF (XY = 1.0) 317,322,341	DR	8800
341	WRITE(3,301) XRB(IK), XY	DR	8900
322	DELX(IK) = XY	DR	9000
320	DELX(IK) = (1.0 - XRB(IK)) * (FOP1P * ((XRB(IK) - PMBPN) / AP)	DR	9100
	1 * (OPMFN = (FOP1P * (1.0 - FPH1))))	DR	9200
C	CHANGE APT BODY SECTION	DR	9300
	MA1 = MA * 1	DR	9400
	GO 330 IK = MA1,NAFT	DR	9500
	QCB = AA * (ADP1P - XRB(IK)) - (PMBA * ODMA) - (PMBA * ADP1P) * OMDP	DR	9600
	XY = (1 - QB2) - SORT(QB2**2 - 4.0*QAB*QCB) / (2.0*QAB)	DR	9700
330	IF (XY) 331,332,333	DR	9800
331	IF (XY = 0.00000) 332,339,330	DR	9900
332	XY = 0.000	DR	10000
	GO TO 338	DR	10100
338	WRITE(3,301) XRB(IK), XY	DR	10200
331	FORMAT(IX, APT BODY STATION = *.PB.3.PA, DELX200, PB.3.015 OUT	DR	10300
	10F RANGE *)	DR	10400
333	IF (XY = 1.0) 332,332,330	DR	10500
339	IF (ABS(XY - 1.0) = 0.00000) 336,336,334	DR	10600
334	XY = 1.000	DR	10700
	GO TO 332	DR	10800
334	XY = (1 - QB2) - SORT(QB2**2 - 4.0*QAB*QCB) / (2.0*QAB)	DR	10900
	IF (XY = 1.0) 330,332,370	DR	11000
370	WRITE(3,301) XRB(IK), XY	DR	11100
332	DELX(IK) = XY	DR	11200
330	DELX(IK) = (1.0 - XRB(IK)) * (ADP1P * ((XRB(IK) - PMBA) / AA)	DR	11300
	1 * (ODMA = (ADP1P * (1.0 - APH1))))	DR	11400
2000	RETURN	DR	11500
	END	DR	11600

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```

SUBROUTINE DRAFT
DIMENSIONALWP3(20),AREA1(60,20),AREAS(60),AREA4(20,20),BML(20),D1
1BMT(20),C1ALPH(20),C1P(20),C1WP(20),C1DPT(20),DATE(2),DISPL3(23),D1
1DWL(20),H1(60),H1COMP(20),H1HOR(60),H1MAR(60),H1OUT(20),H1SAG(60),H1
1SCOMP(20),JCOMP(2),JUREAK(60,10),JMAX(3),KMAX(2,3),KP(2),NAME(2),ND1
1AME1(2),NCOMP(2,3,3),NP(60),PERM(10),PERM(13)
1DIMENSIONPRMB(1),HAB(5,5,10),S(10,20),SPS(60),SSSHIP(20),STATNO(1
100),SECTIM(25),TCBIC(25),TCBS(5,5,10),TCBIS(60,20),TCOR(60),THETSD1
1H(10),TP1(20),TRIM3(6),VCBIC(25),VCBS(5,5,10),VCOIS(60,20),VCOBS(60
10),VOL3(20),VOL5(5),VOLIC(25),WEIGHT(25),X1(60),X1DAM(30),X1DAMS(180
1),X1DAMS(20),X1DAMS(20),X1W(24),X1DAM(30),X1DAM(10)
1DIMENSIONHDS(20),XHS(20),XHML(20),XHMT(20),X1DAM(30,3),XLCBIC(250
1),XLCBS(20),XLCF3(20),XLCOW(25),XLCOS(5),XMT(20),Y(60,20),Y1(60)D1
1,2(60,20),Y1INT(4,30),THRT3M(5)
1DIMENSIONALVH(25)
1COMMON/1/ALMA,A1WP,A1WP3,AREA1,AREAS,AREA4,BML,BMT,C1A,C1ALPH,C1C
1B,C1C,C1P,C1DPT,C1WP,CONST,DATE,DISPL,D1SPL3,UWL,H1,H1BANC,H1COMP
1,H2COMP,H1HOB,H1MAR,H1OUT,H1SAG,H1MAR,H1MAR,H1MAR,H1AFT,11BAL,D1
11FND,11BYN,11WC,11HM,11WL,11WC,11WM,11WL,11REAK,1COMP,1CHKV,1INIT
1,1SENTL,1BERNO,1STAT,1TOP,1TEST1,1TEST3,1Y,JUREAK
1COMMON/2/JMAX,K,KK,KMAX,KP,KVOL,KW,M,MA,N1OUT,N1DPL,N1HEEL,N1LCOD
1,N1PERM,N1TRIM,NAME,NAME1S,NCOMP,NCOMP,NSTAT,NP,NSTAT,NSTAT1,NSD
1,STAT,1NSTAT3,NSTAT4,NL,NUP,PERM,PERM1,PERM2,HAB,S,S,SHIP,SPS,SSSHIP
1,P,SPACE,STATNO,SECTIM,TCB,TCBIC,TCBS,VCOIS,TCOR,THETIM,THETIT,THED
1TAT,THETIM,TP1,TRIM3,VCBIC,VCBS,VCOIS,VCOBS,VOL
1COMMON/3/VOLIC,VOLID,VOL3,VOLR,WAVCN,WCLINC,WEIGHT,WHINC,WHIML,D1
1WL,INC,X,X1DAM,X1DAMS,X1LIM,X1M,X1W,X1DAM,X1DAM,X1LIM,X1S,X1LIM,XD1
14LIM,X1L,X1T,XHS,XHS3,XHML,XHMT,X1DAM,XLSP,XLCR,XLCBIC,XLCBS,XLD1
1CF,XLCF3,XLCB,XLCOW,XLCOS,XLMBIN,XLMRD4,XMID,XMOMIL,XMOMJV,XMT,YD1
1,Y1,Y1MA,Z,WAY,LOC,X1DAMS,X1DAMS,X1MBSP,16BAL
1COMMON/4/ICAT,Y1INT,NHEEL,THRT3M,LIMIT
5 DO 10 ISTAT=1,LIMIT
10 H1(ISTAT)=H1ASC=(X1MID-H1(ISTAT))*SIN(THETIT)/COS(THETIT)
50 TO (17,18,1A),KW
15 DO 30 ISTAT=1,LIMIT
30 H1(ISTAT)=H1(ISTAT)*H1SAG(ISTAT)
50 TO 17
16 DO 20 ISTAT=1,LIMIT
20 H1(ISTAT)=H1(ISTAT)*H1HOB(ISTAT)
17 RETURN
END

```

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```
FUNCTION FINT0(A,B,C,FACTOR)
FINT0=(A+4.0*B+C)*FACTOR
RETURN
END
```

P1	200
P1	300
P1	400
P1	500

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FUNCTION PINTP(XH,A,B,C)
PINTP = A+B+C
RETURN
END

P1	806
P1	300
P1	400
P1	500

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```

FUNCTION FINTP2 (Y11,Y1M,Y1L)
  DIMENSIONAL WP3(20),ANGA1S(60,20),AREAS(60),AREA4S(20,30),BML(20),D1
  BMT(20),C1ALPH(20),C1P(20),C1WP(20),C1OFT(20),DATE(2),DISPL3(20),D1
  D1WL(20),H(60),H1COMP(20),H1MO(60),H1MAR(40),H1OUT(20),H1SAB(40),H1D1
  1SCOMP(20),1COMP(2),JMAXAN(40,10),JMAX(3),KMAX(2,3),KP(8),NAME(8),NO1
  1AME1S(8),NCOMP(2,3,3),NP(60),PERM(18),PERM1(3)
  DIMENSION PERM2(18),RAB(8,8,10),S(60,20),S2S(60),S2SHIP(20),STATNO(1
  160),SECTIM(20),TCBIC(25),TCBS(5,5,10),TCB1S(60,20),TCBS(60),THETSD1
  1H(10),TPI(20),TRIM3(8),VCBIC(25),VCBS(5,5,10),VCO1S(60,20),VCO2S(60)
  10),VOL3(20),VOL5(5),VOL1C(25),WEIGHT(25),X(60),X1DAM(30),X1DAMS(180)
  11),X1DAMS(20),X2DAMS(20),X1W(24),X2DAM(30),X2DAMS(18)
  DIMENSION XPS(24),XKMS(20),XKML(20),XKMT(24),X11DAM(30,3),XLCBIC(250)
  11),XLCB3(20),XLCF3(20),XLCG1W(25),XLCOR(8),XMT1(20),Y(60,20),Y1(60),D1
  1,2(60,20),Y1INT(4,30),THET3H(8)
  DIMENSION XLVH(25)
  COMMON/1/ALMA,A1WP3,ANGA1S,AREAS,AREA4S,BML,BMT,C1A,C1ALPH,C1D1
  11S,C1C,C1P,C1OFT,C1WP,CONST,DATE,DISPL,D1SPL3,DWL,H,H1SAB,H1COMP,D1
  1,H1COMP,H1MO,H1MAR,H1OUT,H1SAB,H1MAR,H1MAR,H1M1,11AFT,11MAL,D1
  111PD,11SYM,11NC,11W,11WL,11NC,11PM,11UL,11REAN,1COMP,1CHKV,111YD1
  1,1SENT1,1SERNO,1STAT,1S1OP,1TEST1,1TEST3,1Y,JMAXAN
  COMMON/2/JMAX,K,KK,KMA,KP,KVOL,KW,M,MA,N1OUT,N1OSPL,N1HREL,N1LCOD1
  1,N1PERM,N1TRIM,NAME,NAME1S,NCOMP,NCOMP,NSTAT,NP,NSTAT,NSTAT1,NBO1
  1TAT2,NSTAT3,NSTAT4,NWL,NWP,PERM,PERM1,PERM2,RAB,S,S1SHIP,S2S,S2SHIP,D1
  1P,SPACE,STATNO,SECTIM,TCB,TCBIC,TCBS,TCB1S,TCBS,THET1H,THET1Y,THED1
  1T4T,THET3H,TPI,TRIM3,VCBIC,VCBS,VCO1S,VCO2S,VOL
  COMMON/3/VOL1C,VOL1D,VOL3,VOL4,WAVGEN,WC1INC,WEIGHT,WH1INC,WH1MUL,D1
  1WL1INC,X,X1DAM,X1DAMS,X1LIM,X1M,X1W,X2DAM,X2DAMS,XPLIM,X2S,X3LIM,H01
  14LIM,X11L,X11Y,XH0,XH03,XKML,XKMT,X11DAM,XL0P,XLCB,XLCB3C,XLCB3,XL01
  1CP,XLCF3,XLCG,XLCG1W,XLCG0,XLMB1R,XLMDA,XM1D,XMOM1L,XMOMJV,XMT1,YO1
  1,Y1,Y1MA,2,WAVLOC,X1DAMS,X2DAMS,XLMD0R,1ABAL
  COMMON/4/ICAT,Y1INT,N3HREL,THET3H,LIMIT
  FINTP2 = C1A*Y1M + C1B*Y1L + C1C*Y1L
  RETURN
END

```

[illegible]

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```

C
C
DO 444 I = 1,NSTAT
  LOOP=1
  N = 1
  774 PERM(I) = PERM(I)
  JCOUNT = 0
  ICOUNT = 0
C
C  NIPERM=NUMBER OF DIFFERENT PERMFAMILIES FOR WHICH FLOODABLE
C  LENGTH IS TO BE CALCULATED
C
  XL(DAM(I,N))=0.00*XLMM
  1111 XL(DAM(I,N))=0.0
  IF (X(I)-X(I)) 100,100,101
  100 XL(DAM(I,N))=0.0
  GO TO 4
C
  101 IF (X(INSTAT)-X(I)) 100,100,102
  102 NIPERM=1000,0
  LICKER=0
  IF (LICKER) 40,40,41
  41 GO TO (410,411),LICKER
  410 XL(DAM(I,N))=(X(I)-X(I))*2.0
  GO TO 4
  411 XL(DAM(I,N))=(X(INSTAT)-X(I))*2.0
  GO TO 4
  40 IF (X(I)-X(I))-XL(DAM(I,N))/2.0 42,42,44
  40 IF (X(INSTAT)-X(I))-XL(DAM(I,N))/2.0 44,44,46
  46 LICKER=2
  XL(DAM(I,N))=2.0*(X(INSTAT)-X(I))
  GO TO 4
  42 LICKER=1
  XL(DAM(I,N))=2.0*(X(I)-X(I))
  IF (XL(DAM(I,N))) 40,40,400
  401 XL(DAM(I,N))=0.0
  400 XLICOR=XL(DAM(I,N))-XL(DAM(I,N))
C
  XL(DAM(I,N))=XL(DAM(I,N))
C
  XL(DAM)=DAMAGE LENGTH OF PREVIOUS ITERATION
C
  X(DAM(I))=X(I)-XL(DAM(I,N))/2.0
  X(DAM(I))=X(I)+XL(DAM(I,N))/2.0
C
C
  300 CALL HAL
  WRITE(10,999) X(I),ICOUNT,JCOUNT,FINAL,XL(DAM(I,N)),XL(DAM(I,N)),X(LLL),
  1LLL = 1,INSTAT)
  999 FORMAT(' X=PA.2, THY,ICOUNT=13, JCOUNT=13, FINAL=13, /
  10 CURRENT LENGTH DAMAGE=PA.2, PREV. LENGTH DAMAGE=PA.2, /' NAME=
  25= 30PA.0, /)
  IF (FINAL=0) 301,303,303
  301 FINAL = 0
  ICOUNT=ICOUNT+1
  IF (ICOUNT=20) 313,312,312

```

PL 0700
 PL 0800
 PL 0900
 PL 1000
 PL 1100
 PL 1200
 PL 1300
 PL 1400
 PL 1500
 PL 1600
 PL 1700
 PL 1800
 PL 1900
 PL 2000
 PL 2100
 PL 2200
 PL 2300
 PL 2400
 PL 2500
 PL 2600
 PL 2700
 PL 2800
 PL 2900
 PL 3000
 PL 3100
 PL 3200
 PL 3300
 PL 3400
 PL 3500
 PL 3600
 PL 3700
 PL 3800
 PL 3900
 PL 4000
 PL 4100
 PL 4200
 PL 4300
 PL 4400
 PL 4500
 PL 4600
 PL 4700
 PL 4800
 PL 4900
 PL 5000
 PL 5100
 PL 5200
 PL 5300
 PL 5400
 PL 5500
 PL 5600
 PL 5700
 PL 5800
 PL 5900
 PL 6000
 PL 6100
 PL 6200
 PL 6300
 PL 6400
 PL 6500
 PL 6600
 PL 6700
 PL 6800
 PL 6900
 PL 7000
 PL 7100
 PL 7200
 PL 7300
 PL 7400
 PL 7500
 PL 7600
 PL 7700
 PL 7800
 PL 7900
 PL 8000
 PL 8100
 PL 8200
 PL 8300
 PL 8400
 PL 8500
 PL 8600
 PL 8700
 PL 8800
 PL 8900
 PL 9000
 PL 9100
 PL 9200
 PL 9300
 PL 9400
 PL 9500
 PL 9600
 PL 9700
 PL 9800
 PL 9900
 PL 10000
 PL 10100
 PL 10200
 PL 10300
 PL 10301
 PL 10302
 PL 10303
 PL 10304
 PL 10305
 PL 10400
 PL 10400
 PL 10500
 PL 10501

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```

310 WRITE(A1:313) X(1),XLIDAM(1,N),PERM(1)
313 FORMAT(// ' AT STATION LOCATED 0.0 FT FROM PP: LENGTH OF DAMAGE
100.0 FT: AND PERMEABILITY OF 0.0.0.0 WHICH ABSOLUTELY WILL NOT
BALANCE'//)
XLIDAM(1,N) = A.
GO TO 4
314 XLICOR=ABS(0.0-XLICOR)
GO TO 3
301 TIAL=P
C
300 H0MAN=1000.0
C DETERMINE THE LEAST DISTANCE FROM WATER LINE TO MARGIN LINE
C
C
DO 12 J=1,NSTAT
H0MAN=H1MAN(J)-H(J)
IF (H0MAN-H1MAN) 12,12,10
10 H0MAN=H1MAN
12 CONTINUE
IF (ABS(H0MAN)-0.04) 4,4,14
14 ICOUNT = ICOUNT + 1
IF (ICOUNT .LT. 10) GO TO 10
IF (H0MAN-H1MAN) 16,17,17
16 JCOUNT = 0
GO TO 91
17 JCOUNT = JCOUNT + 1
IF (JCOUNT-2) 18,18,18
807 IF (XLICOR-1.0) 18,18,200
800 XLICOR=XLICOR/10.0
GO TO 54
18 XLIDAM(1,N)=H0MAN*(XLIDAM(1,N)-XLIDAM)/(H0MAN-H1MAN)+XLIDAM(1,N)
LOOP(1)=LOOP(1)+100*(N-1)
GO TO 4
19 IF (H1MAN-100.0) 20,21,21
C
C IF (H1MAN-100.0) IS NEGATIVE, CORRECTION CANNOT BE BASED ON PAST
C EXPERIENCE, HENCE AN ARBITRARY CORRECTION IS MADE
C
C
H1MAN=LEAST DISTANCE FROM WATER LINE TO MARGIN LINE OF PREVIOUS
C ITERATION
C
80 XLICOR=0.1*XLIDAM(1,N)
GO TO 82
81 IF (ABS(H1MAN - H0MAN) = .00001) 1111,1111,941
941 XLICOR=XLICOR*ABS(H0MAN/(H1MAN-H0MAN))
82 H1MAN=H0MAN
XLICOR=ABS(XLICOR)
IF (XLICOR-0.025*XLICOR) 94,94,353
353 XLICOR=0.025*XLICOR
84 IF (H0MAN) 3,4,4
3 XLIDAM(1,N)=XLIDAM(1,N)+XLICOR
LICHEK=0
GO TO 6
6 XLIDAM(1,N)=XLIDAM(1,N)*XLICOR
GO TO 7

```

PL 10902
 PL 10903
 PL 10904
 PL 10905
 PL 10906
 PL 10907
 PL 10908
 PL 10909
 PL 10910
 PL 10911
 PL 10912
 PL 10913
 PL 10914
 PL 10915
 PL 10916
 PL 10917
 PL 10918
 PL 10919
 PL 10920
 PL 10921
 PL 10922
 PL 10923
 PL 10924
 PL 10925
 PL 10926
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 PL 10928
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 PL 10930
 PL 10931
 PL 10932
 PL 10933
 PL 10934
 PL 10935
 PL 10936
 PL 10937
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 PL 10939
 PL 10940
 PL 10941
 PL 10942
 PL 10943
 PL 10944
 PL 10945
 PL 10946
 PL 10947
 PL 10948
 PL 10949
 PL 10950

FL 18000
FL 18010
FL 18014
FL 18020
FL 18021
FL 18022
FL 18023
FL 18024
FL 18025
FL 18030
FL 18700
FL 18800
FL 18900
FL 1A000
FL 1A100
FL 1A200
FL 1A300
FL 1A400
FL 1A500
FL 1A600
FL 1A700
FL 1A800
FL 1A900
FL 17000
FL 17100
FL 17200
FL 17300
FL 17400
FL 17500
FL 17600
FL 17700
FL 17800
FL 17900
FL 18000
FL 18100
FL 18200
FL 18300
FL 18400
FL 18500
FL 18600
FL 18700
FL 18800

100

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SUBROUTINE GENERATE                                02    200
DIMENSION INBLK(4), INKST(4)                      02    210
DIMENSIONAL WP3(20), AREA1(60,29), AREA2(60), AREA4(20,30), BML(20), D1  02    220
BMT(20), CIALPH(20), CIP(20), CWP(20), CDOFT(20), DATE(2), DISPL3(20), D1  02    230
DWL(20), H(60), HICOMP(20), HIMO(60), HIMAR(40), HIOUT(20), HIBAO(40), HD1  02    240
ICOMP(20), ICOMP(2), JUREAK(60,10), JMAX(3), KMAX(2,3), KP(8), NAME(8), ND1  02    250
IAME(8), NCOMP(2,3,3), NP(60), PERM(18), PERM1(3) 02    260
DIMENSIONAL RM2(18), NAB(5,5,10), S(60,29), SPB(60), SSHIP(20), STATNO(0) 02    270
100), SECTIM(20), TCBIC(20), TCB(5,5,10), TCO(60,29), TCOB(60), TMT(20) 02    280
H(10), TP(20), TMM(6), VCBIC(20), VCB(5,5,10), VCO(60,29), VCOB(60) 02    290
10), VOL3(20), VOL(5,4), VOLIC(20), WRIGHT(20), X(60), XIDAM(30), XIDAMP(100) 1000
1), XIDAM(20), XIDAM(20), XIW(25), XIDAM(30), XIDAM(18) 01    1100
DIMENSIONAL KP(6), KKB(20), KML(20), KMT(20), XLIDAM(30,3), XLCBIC(20) 1200
1), XLCB(20), XLCF3(20), XLCOW(20), XLCOR(6), XMT(20), Y(60,29), Y(60) D1 1300
1, Z(60,29), YINT(4,30), TMT3H(4) 01    1400
DIMENSIONAL LVH(20) 01    1490
COMMON/1/ALMA,ALWP,ALWP3,AREA1,AREA2,AREA4,BML,BMT,CIAL,CIALPH,CO1 1500
11R,CIC,CIP,CDOFT,CWP,CONST,DATE,DISPL,D1,DISPL3,DWL,H,HIBAO,HICOMP, 1600
1,HICOMP,HIMO,HIMAR,HIOUT,HIBAO,HIMAR,HIMAR,HIMAR,HMT,11APT,11BAL,D1 1700
11PND,11RYM,11WC,11WM,11WL,11WC,11WM,11WL,11BRC,11COMP,11CHKV,11N1D1 1800
1,1SENTL,11SENNO,11STAT,11OP,11ST1,11ST2,11Y,JUREAK 01    1900
COMMON/2/JMAX,K,KK,KMAX,KP,KVOL,KW,M,MA,N1OUT,N1NSPL,N1NEEL,N1LCOD1 2000
1,N1PERM,N1TRIM,NAME,NAME1,NCOMP,NCOMP2,NSTAT,NP,NSTAT,NSTAT,NBD1 2100
1,STAT,NSTAT,NSTAT4,NUL,NUP,PERM,PERM1,PERM2,RAB,S,S1SHIP,SPB,SSHIP,D1 2200
1P,SPACE,STATNO,SECTIM,TCB,TCBIC,TCB,TCO,TCO1,TCOB,TMTIM,TMTIT,TMT01 2300
1T,T,TMT3H,TP,TMM,VCBIC,VCB,VCOW,VCOS,VCOS,VOL 01    2400
COMMON/3/VOLIC,VOL1D,VOL3,VOL5,WAVCFN,WC1INC,WELINT,WELINC,WELMUL,D1 2500
1WL1INC,X,XIDAM,XIDAM,XILIM,XIM,XIW,XIDAM,XIDAM,XPLIM,XPS,XLIM,XD1 2600
1ALIM,X11L,X11T,XKB,XKB3,XKML,XKMT,XLIDAM,XLNP,XLCB,XLCBIC,XLCB3,XLD1 2700
1CF,XLCF3,XLCO,XLCOW,XLCOR,XLMBR,XLMRD,XMID,XMOM1,XMOM3V,XMT,YOI 2800
1,YI,YIMA,Z,WAVLOC,XIDAM,XIDAM,XLMSPR,11BAL 01    2900
COMMON/4/ICAT,YINT,NHEEL,TMT3H,LIMIT 01    3000
DIMENSIONAL XIS(30),YIS(30,29),ZIS(30,29),YIST(2,29),ZIST(2,29), 01    310
1ZINT(4,10),YINT(4,10),XBLK(4),NINT(4),NPIS(30),YNPIS(30,10), 01    320
JJPST(2,10),NPIS(2) 01    330
COMMON XIS,YIS,ZIS,XBLK,YINT,ZINT,NPIS,NINT,YIS,ZIST,NPIS,JNPIS,D1 01    340
1JJPST,1NDX3,JSTAT,KSTAT,LSTAT,MSTAT,NALUK,LBULK,JCAT 01    350
LBULK=1 02    360
IFCT = 1 02    370
JSTAT=1 02    380
DO 944 ISTAT = 1,NSTAT 02    390
IF(X(ISTAT)-XBLK(1))944,944,9010 02    400
944 CONTINUE 02    410
9010 KSTAT = ISTAT 02    420
MSTAT= KSTAT 02    430
915 IF(LBULK-NBULK)20,20,100 02    440
20 INBLK(LBULK) = JSTAT-LSTAT*(IFCT-1) 02    450
INKST(LBULK) = KSTAT 02    460
XIS(JSTAT)=XBLK(LBULK) 02    470
45 JSTAT=JSTAT+1 02    480
IF(LBULK-NBULK)70,100,10 02    490
70 IF(X(KSTAT)-XBLK(LBULK+1))72,72,75 02    500
72 CALL STORE 02    510
XIS(JSTAT)=X(KSTAT) 02    520
KSTAT = KSTAT + 1 02    530
GO TO 65 02    540

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75 LBULK=LBULK+1
   GO TO 915
100 GO TO (110,115,220),ICAT
110 LSTAT=JSTAT-1
   IF (LSTAT .GT. 0) GO TO 180
   LSTAT = 3
   XIS(LSTAT) = XIS(2)
   XIS(2) = (XIS(LSTAT) + XIS(1))/2.0
   INBLK(2) = 3
   JSTAT = 2
   CALL SECTN
   JSTAT = 0
   IFCT = 3
140 DO 175 I = 1,LSTAT
   LL = 1+LSTAT
175 XIS(LL) = XIS(1)
   IF (IFCT .EQ. 3) GO TO 230
200 GO TO (230,210,220),ICAT
210 ICAT = 3
   LBULK = 1
   IFCT = 2
   KSTAT = MSTAT+KSTAT
   GO TO 20
220 ICAT = 2
230 IMOD=1
   LOW=1
   IF (XIS(1)-XIS(1)) 240,235,240
235 KSTAT=1
   JSTAT = 1
   CALL STORE
   CALL MODIFY(IMOD)
   LOW=2
240 DO 245 LBULK=LOW+NBULK
   JSTAT = INBLK(LBULK)
   KSTAT = INKST(LBULK)
   CALL SECTN
   CALL MODIFY(IMOD)
245 CONTINUE
   LBULK = 1
   IMOD = 2
   ON 270 JSTAT = 2,LSTAT
   KSTAT = 1
253 IF (JSTAT = INBLK(LBULK+1)) 260,270,259
255 LBULK = LBULK + 1
260 CALL MODIFY(IMOD)
270 CONTINUE
   CALL OUTPT
   RETURN
   END

```

```

02 2300
02 2400
02 2500
02 2550
02 2551
02 2552
02 2553
02 2554
02 2555
02 2556
02 2557
02 2558
02 2559
02 2560
02 2570
02 2600
02 2640
02 2600
02 2700
02 2800
02 2850
02 2900
02 3000
02 3100
02 3200
02 3400
02 3500
02 3600
02 3650
02 3700
02 3750
02 3800
02 3900
02 4000
02 4100
02 4200
02 4300
02 4400
02 4500
02 4600
02 4700
02 4800
02 4900
02 5010
02 5100
02 5200
02 5300
02 5400
02 5500
02 5600
02 5700

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SUBROUTINE MILIM
  DIMENSIONALWPJ(20),AREAS(60,29),ARFAPS(60),AREAAS(20,30),BML(20),OI
  BMT(20),C1ALPH(20),C1P(20),C1WP(20),C1OUP(20),QATE(2),DISPL3(20),OI
  BOWL(20),M1(60),M1COMP(20),M1MOB(60),M1MAR(60),M1OUT(20),M1SAG(AC),MO
  BCOMP(20),ICOMP(2),JUREAK(60,10),JMAX(3),KMAX(2,3),KP(6),NAME(8),NO
  BAMEIS(8),NCOMP2(2,3,3),NP(60),PERM(16),PERM1(3)
  DIMENSIONPERMP(16),NAB(5,5,10),S(AC,29),SPS(60),STSHIP(20),STATNO(0
  160),SECTIM(25),TCNIC(25),TCBS(5,5,10),TCBIS(60,29),TCOBS(60),THEYSD
  IM(10),TP1(20),TRIM3(6),VCNIC(PS),VCBS(4,5,10),VCOIS(60,29),VCONR(60
  10),VOL3(20),VOLB(5),VOLIC(25),WEIGHT(PS),X(40),X1DAM(20),X1DAMB(180
  1),X1DAM6(20),X2DAM6(20),X1W(29),X2DAM(20),X2DAMB(181)
  DIMENSIONX2B(24),XKMS(20),XKML(20),XKMT(24),X1DAM(20,3),XLCBIC(200
  1),XLCBS(20),XLCF3(20),XLCB1W(PS),XLCBS(5),XMY1(20),Y(60,29),Y1(60)OI
  1,Z(60,29),Y1INT(4,30),THEY3M(4)
  DIMENSION XLVH(PS)
  COMMON/1/ALMA,A1WPJ,AREAS,AREAPS,ARFAPS,BML,BMT,C1A,C1ALPH,C1
  1IM,C1C,C1P,C1OUP,C1WP,CUNST,DATE,DISPL,DISPL3,DWL,M,M1RANC,M1COMP
  1,M2COMP,M1MOB,M1MAR,M1OUT,M1SAG,M2MAR,M3MAR,M4MAR,MW1,11AFT,11BAL,OI
  11FWD,11BYM,11WC,11WM,11WL,11WC,11WM,11WL,11UREAK,1COMP,1CHEN9,1NITD
  1,1SENTL,1SERNO,1STAT,1SD,1TFT1,1TFT2,1Y,JUREAK
  COMMON/2/JMAX,K,KK,KMAX,KP,KVOL,KW,M,MA,N1OUT,N1DISPL,N1HEEL,N1LCB
  1,N1PERM,N1TRIM,NAME,NAMEIS,NCOMP1,NCOMP2,NSTAT,NP,NSTAT,NSTAT1,NBD
  1TAT2,NSTAT3,NSTAT4,NWL,NWP,PERM,PERM1,PERM2,NAB,S,S,SHIP,SPS,S2SHIP
  1P,SPACE,STATNO,SECTIM,TCN,TCNIC,TCBS,TCBIS,TCOBS,THEYIM,THEYIT,THEYD
  1T2,THEY3M,TP1,TRIM3,VCBIC,VCBS,VCBIS,VCOBS,VOL
  COMMON/3/VOLIC,VOLIO,VOL3,VOLA,WAVCFN,WCINC,WEIGHT,WIINC,WIIMIL,OI
  1WLINC,X,X1DAM,X2DAMB,X1LM,X1M,X1W,X2DAM,X2DAMB,X2LM,X2B,X3IM,XOI
  1ALIM,X1IL,X11,XMS,KMS3,XKML,XKMT,X1DAM,X1BP,XLCB,XLCBIC,XLCB7,XLO
  1CF,XLCF3,XLCB,XLCB1W,XLCBS,XLCB1R,XLMBOA,XMID,XMOMIL,XMUM3V,XMT1,YOI
  1,Y1,Y1MA,Z,WAVLOC,X1DAM6,X2DAM6,XLMBOA,1BAL
  COMMON/4/ICAT,Y1INT,N3MBEL,1MFT3M,L1M1T
  VOL1=VOLIO
  11BAL=1
  XLCB1=XLCB

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```

2046 FORMAT(//
1      12M AFTER GROUP ,12, 30M CONTAINING THE FOLLOWING COMPARTM
MENTS 11M IS FLOODED /)
GO TO 2057
2051 WRITE (6,2054)
2054 FORMAT(//12M FORWARD GROUP ,12,30M CONTAINING THE FOLLOWING COMPAN
MENTS , 11M IS FLOODED /)
2057 CONTINUE
WRITE (6,3002)
3002 FORMAT(4X,
1      12M COMPARTMENT 3X,12M FORWARD 12M AFTER ,12M PERM
SEABILITY/ 5X
3      12M NUMBER 3X,10M LIMIT (FT) 2X,10M LIMIT (FT)
4/21X,5MFROM FP),4X , 5MFROM FP)
WRITE (6,2006)(NCOMP(J),M),X1DAM(M),X2DAM(M),PERM(M),M=1,K1MAX)
2006 FORMAT(112,3X,9F12.3)
C
WRITE (6,103)
DO 40 I=1,6
GO TO (301,300),J
301 TRIMIF=1-7
GO TO 303
300 TRIMIF=7-1
303 CONTINUE
THEY1=TRIMIF/(3.0*SQRT(XLNP))
MIBASC=10.0
M3MAR=-1000.0
CALL DRAFT
C
C GET MINIMUM DISTANCE BETWEEN WATERLINE AND MARGIN LINE
C
7 M4MAR=1000.0
C
DO 12 KCNT=1,NSTAT
M3MAR=M3MAR(KCNT)-M(KCNT)
IF(M4MAR-M3MAR) 12,12,10
10 M4MAR=M3MAR
12 CONTINUE
C
C IF(ABS(M4MAR)-1.04) 4,4,15
15 IF(M3MAR-100.0) 50,51,51
50 DLTIM=0.1*MIBASC
GO TO 52
51 DLTIM=DLTIM*ABS(M4MAR/(M3MAR-M4MAR))
52 M3MAR=M4MAR
DLTIM=ABS(DLTIM)
54 IF(M4MAR) 3,4,5
5 ? DLTIM = - DLTIM
6 DO 60 KCNT=1,NSTAT
60 M(KCNT)=M(KCNT)+DLTIM
MIBASC = MIBASC + DLTIM
C
C
GO TO 7
4 CONTINUE

```

11300
11400
11500
11600
11700
11800
11900
12000
12100
12200
12300
12400
12500
12600
12700
12800
12900
13000
13100
13200
13300
13400
13500
13600
13700
13800

```

THEYBY=THEYBY+47.2958
C
KVOL=8
CALL VOLUME
VOLIO=VOL
C
XLCB = XLCB
KVOL=1
C
KVOL=1 FOR NO DAMAGE
C
CALL BAL
VOLB=VOL/35.0
WRITE (6,106)THEYBY,M(11FWD),M(11AFT) ,VOLB,XLCB
40 CONTINUE
VOLIO=VOL1
XLCB=XLCB1
RETURN
106 FORMAT(///31M
107 FORMAT(//1M ,
1
48MTRIM,DEGREE)
8.6X,12MDISPLACEMENT ,8X,31M LIM DRAFT FWD LIM DRAFT AFT
357X,7M (TONS) /) LCB (FT FROM AMIDSHIPS, • FWD)
108 FORMAT(36M
109 FORMAT(1M ,F12.4,4F12.4)
END

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SUBROUTINE HYDRO
DIMENSION MAS(20)
DIMENSION TCB(20)
DIMENSIONALWP(20),AREAS(60,20),AREAS(60),AREAS(20,20),BML(20),DI
IMBT(20),CIALPH(20),CIP(20),CWP(20),CIDOFT(20),DATE(2),DISPL(20),DI
DWL(20),M(60),MCOMP(20),MH00(60),MHAR(60),MIOUT(20),MISAO(60),MOI
ZCOMP(20),ICOM(2),JBREAK(60,10),JMAX(3),KMAX(2,3),KP(6),NAME(8),NOI
NAME(8),NCOMP(2,3,3),NP(60),PERM(18),PERM(13)
DIMENSIONPERMS(18),MAB(5,5,10),S(40,20),SPS(60),SJMIP(20),S[ATNO(2
160),SECTIM(20),TCBIC(20),TCBS(5,5,10),TCOIS(60,20),TCOBS(60),THET(20
1M(10),TPI(20),THIM(6),VCMIC(20),VCRS(5,5,10),VCOIS(60,20),VCOBS(60
10),VOL(20),VOL(5),VOLIC(20),WEIGHT(20),X(60),XIDAM(30),XIDAME(180)
1),XIDAM(20),XIDAM(20),XID(20),XIDAM(30),XIDAME(180)
DIMENSIONKBS(60),KMB(20),KML(20),KMT(20),KLI(30,3),KLCBIC(200)
1),KLCB(20),KLCF(20),KLCOW(20),KLCOR(6),KMTI(20),Y(60,20),YI(60)DI
1,2(60,20),YIINT(4,30),THETJM(6)
DIMENSIONALVR(20)
COMMON/1/ALMA,AIWP,AIWP3,AREAS,AREAS,AREAS,BML,IMT,CIA,CIALPH,CID
110,CIC,CIP,CIDOFT,CWP,CUNST,DATE,DISPL,DISPL3,DWL,M,MISANC,MICOMPDI
1,MZCOMP,MH00,MHAR,MIOUT,MISAO,MHAR,MHAR,MHAR,MH1,IAFT,IBAL,DI
11PWO,ISYM,IIWC,IIWM,IIWL,IIWC,IPWH,IPWL,INREAR,ICOMP,ICHECK,INITDI
1,ISENTE,ISERNNO,ISTAT,ISOP,ITEST1,ITEST2,ITEST3,ITEST4,JBREAK
COMMON/2/JMAX,K,KK,KMAX,KP,KVOL,KW,M,MHAR,MIOUT,NIDISPL,NIMREL,NILCOI
1,NIPERM,NITRM,NAME,NAMEIS,NCOMP1,NCOMP2,NSTAT,NP,NSTAT,NSTAT1,NBOI
1STAT2,NSTAT3,NSTAT4,NWL,NWP,PERM,PERM1,PERM2,MAB,5,5,SJMIP,SPS,SJMIDI
1P,SPACE,STATNO,SECTIM,TCB,TCBIC,TCBS,TCOIS,TCOBS,THETIM,THETIT,THEDI
1TAT,THETIM,TPI,THIM3,VCMIC,VCRS,VCOIS,VCOBS,VOL
COMMON/3/VOLIC,VOLID,VOL3,VOLS,VOLCNR,VCIINC,WEIGHT,WHINC,WHIMUL,DI
1WLINC,X,XIDAM,XIDAME,XLIM,XIM,XIW,XIDAM,XIDAME,XPLIM,XBS,XLIM,DI
14LIM,XIL,XIIT,KK,KMB3,KML,KMT,XLIDAM,XLBP,XLCR,XLCBIC,XLCB3,XLOI
1CF,XLCF3,XLCO,XLCOW,XLCOS,XLMRIN,XLMRDA,XMID,XMOMIL,XMOMJV,XMTI,YDI
1,YI,YIMA,Z,WAVLOC,XIDAM,XIDAME,XLMRIN,XLMRDA,XMID,XMOMIL,XMOMJV,XMTI,YDI
COMMON/4/ICAT,YIINT,NIMREL,THETJM,LIMIT
WRITE (6,6001) (NAME(I),I=1,8),ISERNNO,(DATE(I),I=1,2)
WRITE (6,6010)
9010 FORMAT( //
1 13MOMHYDROSTATIC /73MOMTHE FOLLOWING PAGES CONTAIN THE RESUMY
2LTS OF THE HYDROSTATIC CALCULATIONS. 73M THIS IS AN OUTPUT OF SUBRMY
3OUTINE HYDRO
4//22M UNITS AND DEFINITIONS /1
WRITE (6,6010)
6010 FORMAT(
1 64M AREAS IN TABLE OF SECTIONAL AREAS ARE IN SQUARE FEET./
2 66M CIDOFTS - CHANGE IN DISPLACEMENT FOR ONE FOOT TRIM BY STERN INMY
3 TONS./
4 68M DISPLACEMENT - DISPLACEMENT IN LONG TONS./
5 70M DRAFT - HEIGHT ABOVE BASELINE IN FEET. /
6010 FORMAT(
1 68M KB - HEIGHT OF CENTER OF BUOYANCY ABOVE BASELINE IN FEET./
2 72M LCB - LONGITUDINAL CENTER OF BUOYANCY OF DISPLACED VOLUME IN MY
3 FEET FROM AMIDSHIPS (0 IS PWD)./
4 74M LCF - LONGITUDINAL CENTER OF FLOTATION IN FEET FROM AMIDSHIPS
5 (0 IS PWD). /
WRITE (6,6020)
WRITE (6,6010)
6020 FORMAT(

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Line	Code	Statement	Unit	Value
130H	LONG.	LONGITUDINAL KM IN FEET./	NY	6700
230H	LONG.	LONGITUDINAL BM IN FEET./	NY	6800
343H	MTI	MOMENT TO TRIM ONE INCH IN FOOT TONS./	NY	6900
4	PRISMATIC COEFFICIENT	= BASED ON DESIGN DRAFT(DWL) AND THE MAXIMUM STATION AREA AT THE DWL.)	NY	6000
	WRITE	(6.6030)	NY	6100
6040	FORMAT		NY	6200
131H	TPI	TONS PER INCH IMMERSION./	NY	6300
2	34H	TRANSV BM = TRANSVERSE BM IN FEET./	NY	6400
334H	TRANSV KM	= TRANSVERSE KM IN FEET./	NY	6500
458H	VOLUME	= VOLUME OF SHIP DISPLACEMENT IN CUBIC FEET.)	NY	6600
	WRITE	(6.6040)	NY	6700
6040	FORMAT		NY	6800
172H	WETTED SURFACE	= SURFACE AREA OF WETTED PORTION OF HULL IN SQUARE BARE FEET./	NY	7000
353H	WPLANE AREA	= AREA OF THE WATERPLANE IN SQUARE FEET./	NY	7100
411H	WPLANE COEF	= WATERPLANE COEFFICIENT BASED ON BEAM AT DESIGN DRAFT OF STATION OF MAXIMUM AREA AT DESIGN DRAFT.)	NY	7200
	WRITE	(6.6041)	NY	7300
6041	FORMAT		NY	7400
140H	WPLANE I COEF	= WATERPLANE INERTIA COEFFICIENT BASED ON BEAM AT DESIGN DRAFT OF STATION OF MAXIMUM AREA AT DESIGN DRAFT.)	NY	7500
	KVOL	= 1	NY	7600
	KW	= 1	NY	7700
	IF	(NITRIM) 310, 300, 310	NY	7800
300	TRIM3(1)	= 0.0	NY	7900
	NITRIM	= 1	NY	8000
	DO	TO 311	NY	8100
311	NITRIM	= NITRIM + 1	NY	8200
	TRIM3(NITRIM)	= 0.0	NY	8300
311	IF	(N3HEEL) 444, 445, 446	NY	8400
446	THET3H(1)	= 0.	NY	8500
	N3HEEL	= 1	NY	8600
	DO	TO 446	NY	8700
446	N3HEEL	= N3HEEL + 1	NY	8800
	THET3H(N3HEEL)	= 0.	NY	8900
446	DO	300 IHEEL = 1, N3HEEL	NY	9000
	THET1H	= THET3H(IHEEL) * 0.017453293	NY	9100
	DO	300 ITRIM = 1, NITRIM	NY	9200
	THET1I	= ATAN(TRIM3(ITRIM)/XLBP)	NY	9300
	DO	10 IWL = 1, NWL	NY	9400
	HIBASC	= H10U1(IWL)	NY	9500
	CALL	VOLUME	NY	9600
	CALL	WPLANE	NY	9700
	DO	400 ISTAT = 1, NSTAT	NY	9800
400	AREA4B(IWL, ISTAT)	= AREA4B(ISTAT)	NY	9900
	XLCD3(IWL)	= XLCD	NY	10000
	VOL3(IWL)	= VOL	NY	10100
	RA3(IWL)	= TCB / COS(THET1H) * KKB * SIN(THET1H)	NY	10200
	1 - TCB * SIN(THET1H) * 0.2 / COS(THET1H)		NY	10300
	TCB3(IWL)	= TCB	NY	10400
	KKB3(IWL)	= KKB	NY	10500
	DISPL3(IWL)	= DISPL	NY	10600
	B3SHIP(IWL)	= B3SHIP	NY	10700
	A1WP3(IWL)	= A1WP	NY	10800
	XLCP3(IWL)	= XLCP	NY	10900
	TPI(IWL)	= A1WP3(IWL) / 420.0	NY	11000

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IF(ABS(VOL)=0.0001) 9400,9400,9400
9400 NMT(IWL)=0.0
    BML(IWL)=0.0
    GO TO 901
9405 BMT(IWL) = X117 /VOL3(IWL)
    BML(IWL) = X111 /VOL3(IWL)
    IF (ABS(BML(IWL)) = .00001) 9500,9500,9501
9501 XKML(IWL) = BML(IWL) * XKM3(IWL)
    XNMT(IWL) = BMT(IWL) * XKM3(IWL)
    GO TO 904
9500 XKML(IWL) = 0.0
    XNMT(IWL) = 0.0
9505 C1DOPT(IWL) = -12.0*TP1(IWL)*XLCF3(IWL)/XLEP
    XMT(IWL) = DISPL3(IWL)*BML(IWL)/(15.0*XLEP)
    IF(ICAT=2) 9422,9422,9423
9423 CIP(IWL)=0.
    CIALPH(IWL)=0.
    CIWP(IWL)=0.
    GO TO 10
9422 CIP(IWL)=VOL3(IWL)/(A1MA*XLEP)
    CIWP(IWL) = A1WP3(IWL)/(XLEP*Y1MA*P.0)
    CIALPH(IWL)=X117/(0.0007*XLEP*Y1MA*P.3)
    WRITE (6,906) (NAME(I), I = 1,8),ISERNO,(DATE(I), I = 1,2)
    WRITE (6,907)
9507 FORMAT(11A30) = ALL PRISMATIC, WPLANE, AND WPLANE1 COEFFICIENTS
    1 ARE BASED ON THE AREA AND BEAM AT THE OWL OF THE STATION /
    2 2TH OF MAXIMUM AREA AT THE OWL/
    WRITE(6,908) TRIM3(1TRIM),THEY3H(1THEEL)
    1 (OWL(I), MIOUT(I),VOL3(I),DISPL3(I),XLEH
    1 B3(I),XKM3(I),Q3SHIP(I),CIP(I),CIWP(I),CIALPH(I), I=1,NWL)
    WRITE(6,901) TRIM3(1TRIM),THEY3H(1THEEL)
    1 (OWL(I), MIOUT(I), A1WP3(I),XLCF3(I),TPH
    1 I(I),C1DOPT(I),BML(I), BMT(I),XKML(I),XNMT(I), I=1,NWL)
    WRITE(6,900) NAME,ISERNO,DATE
    DO 9640 IWL = 1,NWL
9640 WRITE(6,9640) MIOUT(IWL),TCB3(IWL),RA3(IWL)
9640 FORMAT(10A30) [CA NIGHT ARMO/(3F10.2)]
9700 CONTINUE
    ILMT = LIMIT
    LIMIT = 10
    INIT = 1
9800 WRITE (6,906) (NAME(I), I = 1,8),ISERNO, (DATE(I), I = 1,2)
9800 NPART = LIMIT/10
    WRITE (6,960) NPART
    IF(NSTAT=LIMIT)9400,9400,970
9800 LIMIT = NSTAT
9700 WRITE (6,950) (STATNO(J), J = INIT,LIMIT)
    WRITE (6,952)
    DO 980 IWL = 1,NWL
9800 WRITE (6,951) OWL(IWL),MIOUT(IWL),(AREA40(IWL,ISAT),ISAT=INIT,LIMIT
    1IT)
9801 FORMAT(A6,F7.2,10(3X,F7.1))
    IF(NSTAT=LIMIT)990,990,994
990 INIT = INIT+10
    LIMIT = LIMIT + 10
    IF(INIT=21)990,990,999

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890 LIMIT = ILIMIT                                HY 16800
      RETURN                                        HY 16900
896 FORMAT(AMSHIP-4X8A4:BX14MSERIAL NUMBER-14:BX8HUART-2A4/)  HY 17000
899 FORMAT(1/36M SECTIONAL AREA IN SQUARE FEET-PART:IP)      HY 17100
899 FORMAT(6X:                                HY 17200
      1      BM STATION(0(3X7.2))                HY 17300
899 FORMAT(6X:6M DRAFT)                                HY 17400
899 FORMAT(1/3)HOMYDROSTATIC - PART I ---TH(MOPB.3.1X)MPT---MFEL=PB.3HY 17500
      1.1X7HDE/REB/1H06X                            HY 17600
      1      BMHAPT,6X6M VOLUME3X12MDIRPLACHY 17700
      2EMFNT3X1HLCB7X6H66X14MWEYED SURFACE7X6H6HSMATIC1X11HWPLANE COEFHY 17800
      33X13HWPLANE 1 COEF/                            HY 17900
      4(AA:                                PB.4.6X,P9.0.4X,P9.1.3X,P7.4.3X,P9.2.6X,P10.0,HY 18000
      50X,P6.3.6X,P6.3.11X,P6.3.1)                HY 18100
899 FORMAT(1/3)HOMYDROSTATIC - PART II ---TH(MOPB.3.1X)MPT---MFEL=PHY 18200
      18.3.1X7HDE/REB/1H06X                            HY 18300
      1      4MDR4P14X11HWPLANE AREA6X1HLCY 18400
      2P7X3MTP14X7HCB10P78X6HLONG. 6M3X6HTRANSV 6M3X6HLONG. 6M3X6HTRANSV HY 18500
      3M6X3MTP1/                                    HY 18600
      4(AA:                                PB.6.6X,P9.0.3X,P7.2.3X,P7.2.  PB.8.6X,P8.2.3X,P7.2.4X,HY 18700
      5PB.8.3X,P7.2.3X,P7.1.1)                    HY 18800
      END                                            HY 18900

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      IF (ABS(VOL) - 0.0001) 9400,9400,9400
9400  WMT(IWL) = 0.0
      BML(IWL) = 0.0
      GO TO 801
9405  WMT(IWL) = X117 / VOL3(IWL)
      BML(IWL) = X111 / VOL3(IWL)
      IF (ABS(BML(IWL)) - .00001) 9500,9500,9501
      BML(IWL) = BML(IWL) + XMR3(IWL)
      WMT(IWL) = WMT(IWL) + XMR3(IWL)
      GO TO 802
800  XKML(IWL) = 0.0
      XWMT(IWL) = 0.0
802  CIDOPT(IWL) = -12.0 * TP1(IWL) * XLCF3(IWL) / XLP
      XMT(IWL) = DISPL3(IWL) * BML(IWL) / (12.0 * XLP)
      IF (ICAT = 2) 8422,8423,8423
8423  CIP(IWL) = 0.
      CIALPH(IWL) = 0.
      CIWP(IWL) = 0.
      GO TO 10
8422  CIP(IWL) = VOL3(IWL) / (A1MA * XLP)
      CIWP(IWL) = A1WP3(IWL) / (A1WP * Y1MA * P.0)
      CIALPH(IWL) = X117 / (0.0007 * XLP * Y1MA * P.0)
      WRITE (6,806) (NAME(I), I = 1,8), ISERN0, (DATE(I), I = 1,2)
      WRITE (6,807)
807  FORMAT(114HNOTE - ALL PRISMATIC, WPLANE, AND WPLANE1 COEFFICIENTS
      ARE BASED ON THE AREA AND BEAM AT THE OWL OF THE STATION /
      27H OF MAXIMUM AREA AT THE OWL/)
      WRITE(6,808) TRIM3(ITRIM), THET3H(THREL),
      (OWL(I), MIOUT(I), VOL3(I), DISPL3(I), XLCF3(I),
      XMR3(I), XMR3(I), XMR3(I), CIP(I), CIWP(I), CIALPH(I), I=1,NWL)
      WRITE(6,809) TRIM3(ITRIM), THET3H(THREL),
      (OWL(I), MIOUT(I), A1WP3(I), XLCF3(I), TP1(I),
      I=1,NWL), CIDOPT(I), BML(I), WMT(I), XKML(I), XWMT(I), XMT(I), I=1,NWL)
      WRITE(6,806) NAME, ISERN0, DATE
      DO 9648 IWL = 1, NWL
9648  WRITE(6,9649) MIOUT(IWL), TCB3(IWL), RA3(IWL)
9649  FORMAT(' ONAPT ' / CR RIGHT ARM / (3F10.2))
800  CONTINUE
      ILIMIT = LIMIT
      LIMIT = 10
      INIT = 1
809  WRITE (6,806) (NAME(I), I = 1,8), ISERN0, (DATE(I), I = 1,2)
808  NPART = LIMIT / 10
      WRITE (6,840) NPART
      IF (NSTAT - LIMIT) 840,840,870
840  LIMIT = NSTAT
870  WRITE (6,850) (STATNO(J), J = INIT, LIMIT)
      WRITE (6,852)
      DO 880 IWL = 1, NWL
880  WRITE (6,851) OWL(IWL), MIOUT(IWL), (AREA4S(IWL, IS[AT], ISTAT=INIT, LIM
      IT)
851  FORMAT(A6,F7.2,10(3H,F7.1))
      IF (NSTAT - LIMIT) 890,890,894
890  INIT = INIT + 10
      LIMIT = LIMIT + 10
      IF (INIT - 21) 880,880,880

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HY 11200
 HY 11300
 HY 11400
 HY 11500
 HY 11600
 HY 11700
 HY 11800
 HY 11900
 HY 12000
 HY 12100
 HY 12200
 HY 12300
 HY 12400
 HY 12500
 HY 12600
 HY 12700
 HY 12800
 HY 12900
 HY 13000
 HY 13100
 HY 13200
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 HY 14800
 HY 14900
 HY 15000
 HY 15100
 HY 15200
 HY 15300
 HY 15400
 HY 15500
 HY 15600
 HY 15700
 HY 15800
 HY 15900
 HY 16000
 HY 16100
 HY 16200
 HY 16300
 HY 16400
 HY 16500
 HY 16600
 HY 16700

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000 LIMIT = ILIMIT                                NY 16800
      RETURN                                       NY 16900
006 FORMAT(AMSHIP-4X8A4:BX10MSERIAL NUMBER-19:BX8HDATE-2A4/) NY 17000
008 FORMAT(1/36M SECTIONAL AREA IN SQUARE FEET-PART:1P) NY 17100
000 FORMAT(1X.
      1      BM STATION(0(1XPT.P)) NY 17200
006 FORMAT(1X.6M URAFT) NY 17300
000 FORMAT(3)HOMHYDROSTATIC - PART I ---T(1M=PB.3:1A)1MPT---MPEL=PB.3NY 17400
      1:1X7HDEGREE8/1M6X NY 17500
      1      BMHAPT:BX6MVOLUME3X12HDIPLACHY 17600
      2EMENT3X3MLC87XPMH8BX10MWEETED SURFACE1X0MORISMATIC3X1:HWPLANE COEF NY 17700
      33X13HWPLANE 1 COEF/ NY 17800
      4(1A:      PB.4:BX:PB.0:AX:PB.1:3X:PT.2:3X:PB.2:BX:PT.0:0:NY 17900
      5BX:PB.7:BX:PB.3:11X:PB.3:1) NY 18000
006 FORMAT(1/36MOMHYDROSTATIC - PART II ---T(1M=PB.3:1X)1MPT---MPEL=PNY 18100
      19.3:1X7HDEGREE8/1M6X NY 18200
      1      4H0RAPI4X11HWPLANE AREA8X3MLCHY 18300
      2PTX3MTP:4X7HCINOPT8X0MLONG. 8M3X8MTNSV 8M3X0MLONG. 8M3X8MTNSV NY 18400
      3M8X3MMY1/ NY 18500
      4(1A:      PB.2:3X:PB.0:0:3X:PT.2:3X:PT.2:      PB.2:4X:PB.2:3X:PT.2:4X:PT NY 18600
      5PB.2:3X:PT.2:3X:PT.1:1) NY 18700
      END NY 18800

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SUBROUTINE INTACT
DIMENSION H(5,5,10),TRIM(5,5,10)
DIMENSIONALWP(20),AREA1(50,29),AREAS(50),AREA4(20,30),BML(20),DI
1BMT(20),C1ALPH(20),C1P(20),C1WP(20),C1DPT(20),DATE(2),DISPL3(20),DI
1DWL(20),H(50),H1COMP(20),H1MO(50),H1MA(40),H1OUT(20),H1SAG(40),HDI
1RCOMP(20),ICOMP(2),JHREAR(50,10),JHAR(3),KMAX(2,3),KP(2),NAME(2),NDI
1AME1(5),NCOMP(2,3,3),NP(50),PERM(10),PERM1(3)
DIMENSIONPERM2(10),RAS(5,5,10),S(50,20),SPS(50),SSHIP(20),STATNO(2)
100),SECT(10),TCR(10),TCB(5,5,10),TCB1(50,29),TCB2(50),THETSDI
10),TPI(20),TRIM3(5),VCH(10),VCR(5,5,10),VCO(50,29),VCOB(50)
1VOL3(20),VOL5(5),VOLIC(20),WEIGHT(50),X(50),X10AM(30),X1DAM(100)
1X1DAM(20),X2DAM(20),X1W(20),X2DAM(30),X2DAM(10)
DIMENSIONKPS(50),KKB3(20),KKML(20),KKMT(20),X110AM(30,3),XLCB1C(200)
1),XLCB3(20),XLCF3(20),XLCB1W(20),XLCB(5),XMT1(20),Y(40,29),Y1(50)DI
1,2(50,29),Y1INT(4,30),THET3H(5)
DIMENSION XLVH(25)
COMMON/1/ALMA,ALWP,ALWP3,AREA1S,AREAS,AREA4S,BML,BMT,C1A,C1ALPH,C1
1B,C1C,C1P,C1DPT,C1WP,CUNST,DATE,DISPL,DISPL3,DWL,H,H1BANC,H1COMPDI
1,H1RCOMP,H1MO,H1MAR,H1OUT,H1SAG,H1MAR,H1MAR,H1MAR,H1W),IAPT,I1AL,DI
1I1PNO,I1BYN,I1WC,I1WM,I1WL,I1WC,I1RM,I1WL,I1REAR,ICOMP,ICHECK,INTDI
1,I1SENL,I1ERNO,I1STAT,I1OP,I1TEST,I1TEST3,I1JHREAR
COMMON/2/JHAR,K,KK,KHAR,KP,KVOL,KW,M,MA,M1BUTT,M1DPL,M1HEEL,M1LCODI
1,N1PERM,N1TRIM,NAME,NAM1S,NCOMP,NCOMP,NSTAT,NP,NSTAT,NSTAT1,NSDI
1TAT2,NSTAT3,NSTAT4,NUL,NWP,PERM,PERM1,PERM2,RAS,S,SSHIP,SPS,SSHIPDI
1P,SPACE,STATNO,SECTIM,TCB,TCR1,TCB,TCB1S,TCB2,THETIM,THET3T,THEDI
1T3T,THET3H,TPI,TRIM3,VCH,VCR,VCO1S,VCO2S,VOL
COMMON/3/VOLIC,VOL1D,VOL3,VOL5,WAVCPN,WC1INC,WEIGHT,WH1INC,WH1MUL,DI
1WL1INC,X,X10AM,X1DAM,X1LIM,X1M,X1W,X2DAM,X2VAM,X2LIM,X2S,X2LIM,XDI
1ALIM,X1L,X1T,KK3,KK33,KKML,KKMT,X110AM,X1LP,XLCR,XLCB1C,XLCB3,XLOI
1CF,XLCF3,XLCB,XLCB1W,XLCB,XLMR3,XLMRDA,XMID,XMON1L,XMON3V,XMT1,YDI
1,Y1,Y1MA,Z,WAYLOC,X1DAM6,X2DAM6,XLMR3R,XLMR3L,XLMR3V,XMT1,YDI
COMMON/4/ICAT,Y1INT,N3HEEL,THET3H,LIMIT
KVOL=1
IPRINT = 7
I1BAL=1
WRITE(6,806) (NAME(I3),I3=1,5),I1ERNO,(DATE(I3),I3=1,2)
WRITE(6,700)
VOL9D=VULID
DO 400 L=1,N1HREFL
400 THET3H(L)=THET3H(L)+.017463293
DO 100 I=1,N1USPL
VOL5(I)=VOL5(I)+35.0
DO 100 J=1,N1ICO
DO 100 L=1,N1MFEL
VOL1D=VOL5(I)
XLCB=XLCB(I)
THETIM=THET3H(L)
CALL BAL
IF (I1BAL = 0) 301, 300, 301
300 I1BAL = 1
TCB = 0.0
KK3 = 0.0
THETIM = THETIM + 57.2958
THET3T = THET3T + 57.2958
VOL1D = VOL1D/15.0
WRITE(6,806) (NAME(I3),I3=1,5),I1ERNO,(DATE(I3),I3=1,2)

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WRITE(6,600) IN 8700
WRITE (6,302)THETIM, THETIT, VOLID IN 8800
102 FORMAT(50H SHIP WILL NOT BALANCE UNDER FOLLOWING CONDITIONS // 12MIN 8900
1 HEEL ANGLE ,PA.2.0H DEGREES ,BX,12H TRIM ANGLE ,PA.2.0H DEGREES ,IN 9000
20X,14H DISPLACEMENT ,P11.3.0H TONS ) IN 9100
101 TCBS(1,J,L) = YCM IN 9200
VCBS(1,J,L)=XCM IN 9300
MC(1,J,L) = M/MASC IN 9400
THIMB(1,J,L) = M(1,APT)-M(1,FWD) IN 9500
100 MAB(1,J,L)=YCM/COS(THETIM)+XCM*SIN(THETIM) IN 9600
1-TCM*SIN(THETIM)+M/COS(THETIM) IN 9700
DO 200 L=1,NHEEL IN 9800
200 THETSH(L)=THETIM(L)/.017453294 IN 9900
WRITE(6,800) (NAME(13),13=1:8),ISPRNO,(DATE(13),19=1:2) IN 7000
WRITE(6,600) IN 7100
WRITE (6,101) IN 7200
DO 200 1=1,NIDGPI IN 7300
VOLB(1)=VOLB(1)/30.0 IN 7400
DO 200 J=1,N1(1) IN 7500
DO 200 L=1,NHEEL IN 7600
IPRINT = IPRINT + 1 IN 7700
WRITE (6,102)VOLB(1), MLCOS(J), THETSH(L), TCBS(1,J,L), VCBS(1,J,L) IN 7800
11, MAB(1,J,L), MC(1,J,L),THIMB(1,J,L) IN 7900
IF (IPRINT=5) 200,709,709 IN 8000
709 IPRINT = 7 IN 8100
WRITE(6,800) (NAME(13),13=1:8),ISPRNO,(DATE(13),13=1:2) IN 8200
WRITE(6,600) IN 8300
WRITE(6,101) IN 8400
400 CONTINUE IN 8500
101 FORMAT(14X,50HDISP(4X)0MINPUT TRIM0X,4HHEEL(0X,3H)CR,10X,3HVCB,11X, IN 8600
12HMA0X0HDRAFT0X)0HFINAL TRIM) IN 8700
102 FORMAT(10X,0H(P10.3,3X)/) IN 8800
VOLID=VOL0U IN 8900
THETIM = 0.0 IN 9000
400 FORMAT(30X,30X,20H INTACT CROSS CURVES//) IN 9100
700 FORMAT(75H THE FOLLOWING PAGES CONTAIN THE RESULTS OF INTACT CROSSIN 9200
1 CURVE CALCULATIONS//12H DEFINITIONS//34H DISPL- INPUT DISPLACEMENT IN 9300
2NT IN TONS/10H INPUT TRIM IN FEET/20H HEEL ANGLE IN DEGREE/30H TCM IN 9400
3H-TRANSV CB FROM CL IN FT /20H VCB- VERT CB ADV CL IN FT / IN 9500
424H RA- RIGHTING ARM IN FT /30H DRAFT- DRAFT AMIDSHIPS IN FT / IN 9600
517H FINAL TRIM IN FT ) IN 9700
400 FORMAT(6H)SHIP-45044,0X)0HSERIAL NUMBER=15,0X)0HDATE=2A4/) IN 9800
RETURN IN 9900
END IN 10000

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	SUBROUTINE TEST1 (TEST,ARRAY)	TE	800
C		TE	300
	DIMENSION ARRAY(60,29)	TE	400
	DIMENSIONALWP3(20),AREA1S(60,29),AREA2S(60),AREA4S(20,30),BML(20),DI	TE	800
	SMY(20),C1ALPH(20),C1P(20),C1WP(20),C1DOFT(20),DAYF(2),DISPL3(20),DI	TE	300
	OWL(20),H(60),H1COMP(20),H1MCO(60),H1MAH(40),H1OUT(20),H1SAG(60),HDI	TE	400
	SCOMP(20),ICOMP(2),JBREAK(60,10),JMAX(3),KMAX(2,3),KP(6),NAME(1),NDI	TE	500
	NAME1S(1),NCOMP(2,3,3),NP(60),PERM(18),PFRM(3)	TE	600
	DIMENSIONPFRM(18),RAD(5,5,10),S(60,29),SPB(60),STRMIP(20),STATNO(01	TE	700
	60),SECTIM(25),TCM1C(25),TCM4(5,5,10),TCO1S(60,29),TCO2S(60),THEY(50)	TE	800
	H(10),TP1(20),THIM3(6),VCM1C(25),VCM5(5,5,10),VCO1S(60,29),VCO2S(60)	TE	900
	10),VOL3(20),VOL5(4),VOL1C(25),WEIGHT(25),X(60),X1DAM(30),X1DAM2(180)	TE	1000
	1),X1DAM6(20),X2DAM6(20),X1W(25),X2DAM(30),X2DAM2(18)	TE	1100
	DIMENSIONKRR(60),KMB3(20),KML(20),KMT(20),X1DAM(30,3),XLCM1C(250)	TE	1200
	1),XLCM3(20),ALCF3(20),XLCOLW(25),XLCOL5(5),KMT1(20),Y(60,29),Y1(60)	TE	1300
	1,Z(60,29),Y1INT(4,30),THEY3H(4)	TE	1400
	DIMENSION X1VR(25)	TE	1400
	COMMON/1/ALMA,ALWP,ALWP3,AREA1S,AREA2S,AREA4S,BML,SMY,C1A,C1ALPH,CO	TE	1500
	1R,C1C,C1P,C1DOFT,C1WP,CONST,NATE,DISPL,DISPL3,OWL,H,H1SAG,H1COMP	TE	1600
	1,HSCOMP,H1MCO,H1MAH,H1OUT,H1SAG,H2MAH,H3MAH,H4MAH,HW1,IAFT,IAL,DI	TE	1700
	1IFND,1SYM,1WC,1WM,1WL,1WC,1WM,1WL,1JBRK,1COMP,1CHK9,INITOI	TE	1800
	1,1SENT,1SPNO,1STAT,1BIOP,1TEST1,1TEST2,1Y,JBREAK	TE	1900
	COMMON/2/JMAX,K,K,KMAX,KP,KVOL,KW,M,MA,NIRUT,NIDISPL,N1HEEL,N1LCOD	TE	2000
	1,N1PERM,N1TRIM,NAME,NAME1S,NCOMP1,NCOMP2,NSTAT,NP,NSTAT,NSTAT1,NSDI	TE	2100
	1TAT2,NSTAT3,NSTAT4,NWL,NWP,PFRM,PFRM1,PFRM2,PFRM3,PFRM4,PFRM5,PFRM6	TE	2200
	1P,APACE,STATNO,SECTIM,TCM,TCM1C,TCM4,TCO1S,TCO2S,THEY1H,THEY1Y,THEO	TE	2300
	1TST,THEY3H,TP1,THIM3,VCM1C,VCM5,VCO1S,VCO2S,VOL	TE	2400
	COMMON/3/VOL1C,VOL10,VOL3,VOL5,WAVCEN,WCLINC,WEIGHT,W1INC,W1MUL,DI	TE	2500
	1WL1INC,X1DAM,X1DAM2,X1LIM,X1M,X1W,X2DAM,X2DAM2,X2LIM,X2S,X3LIM,NDI	TE	2600
	14LIM,X1L,X1L1Y,KK,KK2,KK3,KKML,KKMT,X1DAM,X1LBP,X1LCA,X1LCH,X1LCH3,X1DI	TE	2700
	1CF,X1LCP,X1LCO,X1LCO1W,X1LCO4,X1LH1R,X1LH2D,X1MID,X1MOM1,X1MOM2V,X1MT1,YO	TE	2800
	1,Y1,Y1MA,Z,WAV,OC,X1DAM6,X2DAM6,X1MBPM,16NAL	TE	2900
	COMMON/4/ICAT,Y1INT,N1HEEL,THEY3H,LIMIT	TE	3000
	LOGIC SECTIONS REFER TO PROGRAM WRITUP	TE	3400
C		TE	3500
C		TE	3600
C		TE	3700
C		TE	3800
	IF (TEST-ARRAY(1STAT,M)) 8,9,6	TE	3900
	LOGIC SECTION P	TE	4000
	DO 10 IWP = 1,M	TE	4100
	NWP = M-IWP+1	TE	4200
	IF (ABS(ARRAY(1STAT,NWP)-TEST)-.000001) 18,19,400	TE	4300
400	IF (ARRAY(1STAT,NWP)-TEST) 20,19,10	TE	4400
	CONTINUE	TE	4500
C		TE	4600
	LOGIC SECTION 1	TE	4700
	K = 4	TE	4800
	GO TO 30	TE	4900
C		TE	5000
	LOGIC SECTION 4	TE	5100
	IF K=2	TE	5200
	GO TO 30	TE	5300
C		TE	5400
	LOGIC SECTION 5	TE	5500
	IF K=3	TE	5600
	GO TO 30	TE	5700
C		TE	5800
	LOGIC SECTION 6	TE	5900
	IF K=1	TE	6000
	RETURN	TE	6100
	END	TE	6200

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SUBROUTINE TEST2
DIMENSION A(100), AREA(100), AREA2(100), AREA3(100), AREA4(100), AREA5(100), AREA6(100), AREA7(100), AREA8(100), AREA9(100), AREA10(100), AREA11(100), AREA12(100), AREA13(100), AREA14(100), AREA15(100), AREA16(100), AREA17(100), AREA18(100), AREA19(100), AREA20(100), AREA21(100), AREA22(100), AREA23(100), AREA24(100), AREA25(100), AREA26(100), AREA27(100), AREA28(100), AREA29(100), AREA30(100), AREA31(100), AREA32(100), AREA33(100), AREA34(100), AREA35(100), AREA36(100), AREA37(100), AREA38(100), AREA39(100), AREA40(100), AREA41(100), AREA42(100), AREA43(100), AREA44(100), AREA45(100), AREA46(100), AREA47(100), AREA48(100), AREA49(100), AREA50(100), AREA51(100), AREA52(100), AREA53(100), AREA54(100), AREA55(100), AREA56(100), AREA57(100), AREA58(100), AREA59(100), AREA60(100), AREA61(100), AREA62(100), AREA63(100), AREA64(100), AREA65(100), AREA66(100), AREA67(100), AREA68(100), AREA69(100), AREA70(100), AREA71(100), AREA72(100), AREA73(100), AREA74(100), AREA75(100), AREA76(100), AREA77(100), AREA78(100), AREA79(100), AREA80(100), AREA81(100), AREA82(100), AREA83(100), AREA84(100), AREA85(100), AREA86(100), AREA87(100), AREA88(100), AREA89(100), AREA90(100), AREA91(100), AREA92(100), AREA93(100), AREA94(100), AREA95(100), AREA96(100), AREA97(100), AREA98(100), AREA99(100), AREA100(100)
AREA = 1.0
AREA2 = 2.0
AREA3 = 3.0
AREA4 = 4.0
AREA5 = 5.0
AREA6 = 6.0
AREA7 = 7.0
AREA8 = 8.0
AREA9 = 9.0
AREA10 = 10.0
AREA11 = 11.0
AREA12 = 12.0
AREA13 = 13.0
AREA14 = 14.0
AREA15 = 15.0
AREA16 = 16.0
AREA17 = 17.0
AREA18 = 18.0
AREA19 = 19.0
AREA20 = 20.0
AREA21 = 21.0
AREA22 = 22.0
AREA23 = 23.0
AREA24 = 24.0
AREA25 = 25.0
AREA26 = 26.0
AREA27 = 27.0
AREA28 = 28.0
AREA29 = 29.0
AREA30 = 30.0
AREA31 = 31.0
AREA32 = 32.0
AREA33 = 33.0
AREA34 = 34.0
AREA35 = 35.0
AREA36 = 36.0
AREA37 = 37.0
AREA38 = 38.0
AREA39 = 39.0
AREA40 = 40.0
AREA41 = 41.0
AREA42 = 42.0
AREA43 = 43.0
AREA44 = 44.0
AREA45 = 45.0
AREA46 = 46.0
AREA47 = 47.0
AREA48 = 48.0
AREA49 = 49.0
AREA50 = 50.0
AREA51 = 51.0
AREA52 = 52.0
AREA53 = 53.0
AREA54 = 54.0
AREA55 = 55.0
AREA56 = 56.0
AREA57 = 57.0
AREA58 = 58.0
AREA59 = 59.0
AREA60 = 60.0
AREA61 = 61.0
AREA62 = 62.0
AREA63 = 63.0
AREA64 = 64.0
AREA65 = 65.0
AREA66 = 66.0
AREA67 = 67.0
AREA68 = 68.0
AREA69 = 69.0
AREA70 = 70.0
AREA71 = 71.0
AREA72 = 72.0
AREA73 = 73.0
AREA74 = 74.0
AREA75 = 75.0
AREA76 = 76.0
AREA77 = 77.0
AREA78 = 78.0
AREA79 = 79.0
AREA80 = 80.0
AREA81 = 81.0
AREA82 = 82.0
AREA83 = 83.0
AREA84 = 84.0
AREA85 = 85.0
AREA86 = 86.0
AREA87 = 87.0
AREA88 = 88.0
AREA89 = 89.0
AREA90 = 90.0
AREA91 = 91.0
AREA92 = 92.0
AREA93 = 93.0
AREA94 = 94.0
AREA95 = 95.0
AREA96 = 96.0
AREA97 = 97.0
AREA98 = 98.0
AREA99 = 99.0
AREA100 = 100.0

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```
X2= X2B(ISTAT-1)
X3= X2B(ISTAT-2)
GO TO 10
00 X1M= X2B(ISTAT) + SPACE
X=9
RETURN
END
```

```
TE 5700
TE 5800
TE 5900
TE 6000
TE 6100
TE 6200
TE 6300
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SUBROUTINE TEST3 (TEST,ARRAY)
DIMENSION ARRAY (2,20)
DIMENSIONALWP3 (20),AREAS (60,20),AREAS (60),AREAS (20,30),BML (20),DI
IMMT (20),C1ALPH (20),C1P (20),C1WP (20),C1DFT (20),DATE (9),DISPL3 (20),DI
DNL (20),H (60),HCOMP (20),HMOD (60),HMMAR (40),H1OUT (20),H1SAG (40),HDI
HCOMP (20),HCOMP (2),JUREAK (60,10),JMAX (3),KMAX (2,3),KP (6),NAME (4),NDI
NAME (3,4),NCOMP (2,3,3),NP (60),PERM (18),PERM (3)
DIMENSIONPFRM (18),RAR (5,5,10),S (40,20),SPS (60),S3SHIP (20),STATNO (01
60),SECTIM (20),TCHIC (20),TCHS (5,5,10),TCOIS (60,20),TCORR (60),THETSOI
M (10),TPI (20),THIMJ (4),VCHIC (20),VCHS (4,4,10),VCOIS (60,20),VCOPS (60
10),VOL3 (20),VOL5 (5),VOLIC (20),WEIGHT (20),X (40),X1DAM (30),X1DAM2 (100
1),X1DAM3 (20),X2DAM3 (20),X1W (20),X2DAM (30),X2DAM2 (10)
DIMENSIONXPS (4),XKBS (20),XKML (20),XKMT (20),XLIUAM (30,3),XLCM1C (200
1),XLCM3 (20),XLCF3 (20),XLCR3W (20),XLCR3A (4),XMTI (20),Y (40,20),Y1 (60,01
1,2,40,20),Y1INT (4,30),HET3M (5)
DIMENSION XLVH (20)
COMMON/1/ALMA,ALWP,ALWP3,AREAS,AREAS,AREAS,BML,IMMT,C1A,C1ALPH,C1P
C1C,C1P,C1DFT,C1WP,CONST,DATE,DISPL,DISPL3,DNL,H,H1MASC,H1COMPDI
H1HCOMP,H1MOD,H1MAR,H1OUT,H1SAG,H1MAR,H1MAR,H1MAR,H1AFT,H1AL,DI
H1FWD,H1SYM,H1WC,H1WH,H1WL,H1WC,H1WH,H1WL,H1HCOMP,H1CHK9,INITDI
H1SENTI,H1SERNO,H1STAT,H1TOP,H1TEST1,H1TEST3,H1Y,JUREAK
COMMON/2/JMAX,K,KK,KMAX,KP,KVOL,KW,KMA,N,NUIT,NIDRPL,N1HEEL,N1LCSDI
N1PERM,N1TRIM,NAME,NAME18,NCOMP1,NCOMP4,NSTAT,NP,NSTAT,NSTAT1,NBDI
ITAT2,NSTAT3,NSTAT4,NWL,NWP,PERM,PERM1,PERM2,RAR,S,S3SHIP,SPS,S3SHIPDI
IP,SPACE,STATNO,SECTIM,TCB,TCB1C,TCB3,TCOIS,TCORR,THETIM,THET1Y,THEO
ITAT,THET3M,TPI,THIMJ,VCHIC,VCHS,VCOIS,VCOPS,VOL
COMMON/3/VOLIC,VOL10,VOL3,VOL4,WAVCFN,WG1INC,WEIGHT,WH1INC,WH1MUL,DI
WL1INC,K,X1DAM,X1DAM2,X1LIM,X1M,X1W,X2DAM,X2DAM2,X2LIM,X2S,X2LIM,XDI
X4LIM,X1L,X1Y,XKBS,XKBS,XKML,XKMT,XLIUAM,XLRP,XLCR,XLCM1C,XLCM3,XLDI
ICF,XLCF3,XLCO,XLCO1W,XLCOS,XLMR1W,XLMRDA,XMID,XMOM1,XMOM3V,XMTI,YDI
Y1,Y1MA,Z,WAV,OC,X1DAM2,X2DAM2,XLMRDR,IALAL
COMMON/4/ICAT,Y1INT,N3HEEL,HET3M,LIMIT
DIMENSION XIS (10),VIS (30,20),ZIS (30,20),Y1ST (2,20),Z1ST (2,20),
IZINT (4,10),Y1INT (4,10),XULK (4),NINT (4),NP19 (30),JRPIS (30,10),
JRPST (2,10),NPST (2)
COMMON XIS,VIS,ZIS,XULK,Y1INT,Z1INT,NP19,NINT,VIS1,Z1ST,NP1ST,JRPIS,DI
JUMPST,INDX3,JSTAT,KSTAT,LSTAT,MSTAT,NMULK,LHUL,KJCAT
1 NP1 = NP1ST (INDX3)
DO 40 IWP = 1,NP1
NWP = NP1-IWP+1
IF (ABS (ARRAY (INDX3,NWP)-TEST) .EQ. 1) 15,14,0
5 IF (ARRAY (INDX3,NWP)-TEST) 10,14,40
15 K=2
RETURN
20 K=3
RETURN
40 CONTINUE
K=1
RETURN
END

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SUBROUTINE VOLIME                                VO  200
DIMENSION AREA(2), VCOJS(2), TCOJS(2)          VO  300
DIMENSION AREA(1), VCOMS(3), TCOMS(3), HBS(3)  VO  400
DIMENSIONALWP(20), AREA(5(60,29), AREABS(60), AREAAS(20,30), RML(20), DI  200
BMT(20), CIALPH(20), CIP(20), CIWP(20), CIOOPT(20), UATF(20), DISPL3(20), DI  300
DNL(20), H(60), HICOMP(20), HMON(60), HMAR(60), HIOUT(20), HIBAG(60), HDI  400
ISCOMP(20), ICOMP(20), JUREAK(60,10), JMAX(3), HMAX(2,3), KP(6), NAME(6), NDI  500
IAME(5(6), NCOMP(2,3,3), NP(60), PERM(15), PERM(13)  DI  600
DIMENSIONPRM(15), HAS(5(5,10), S(60,29), SPS(60), SSHIP(20), S[ATNO(0I  700
(60), SECT(1), TCR(15), TCR(5(5,10), TCO(5(60,29), TCOBS(60), THE(150I  800
H(10), TP(15), THM3(6), VCRIC(5), VCRB(5(5,10), VCOIS(60,29), VCOBS(60I  900
10), VOL3(20), VOL4(5), VOLIC(20), WEIGHT(20), H(60), XIDAM(20), XIDAM2(180I 1000
1), XIDAM6(20), XIDAM6(20), XIDAM(24), XIDAM(30), XIDAM2(14)  DI 1100
DIMENSIONKPR(6), KKN3(20), KML(20), KMT(24), XLIDAM(30,3), XLCBIC(250I 1200
1), XLCB3(20), XLCF3(20), XLCB(15), XLCB(6), XMT(120), Y(60,24), Y(160) DI 1300
1, Z(60,29), YINT(6,30), THET3H(5)  DI 1400
DIMENSION XLVR(25)  DI 1490
COMMON/1/ALMA, AWP, AWP3, AREA15, AREABS, AREPAS, RML, RMT, CIA, CIALPH, COI 1500
15, CIC, CIP, CIOOPT, CIWP, CONST, DATE, DISPL, DISPL3, DNL, H, HIBAG, HICOMP, DI 1600
1, HICOMP, HMON, HMAR, HIOUT, HIBAG, HMAR, HMAR, HMAR, HMI, IAPT, IIBAL, DI 1700
11PND, IISYM, IISC, IISW, IISL, IISC, IISW, IISL, IUREAK, ICOMP, ICHEK9, INITDI 1800
1, ISENTI, ISPRNO, ISTAT, ISOP, ITST1, ITST3, IY, JUREAK  DI 1900
COMMON/2/JMAX, K, KK, KMAX, KP, KVOL, KW, H, HMA, N, RUT, NINPL, NHEEL, NILCSDI 2000
1, N, PERM, NITRM, NAME, NAME15, NCOMP1, NCOMP2, NNSTAT, NP, NSTAT, NSTAT1, NDI 2100
1, NSTAT3, NSTAT4, NNL, NWP, PERM, PERM1, PERM2, HAS(5,5), SSHIP, SPS, SSHIPDI 2200
1P, RSPACE, STATNO, SECTIM, TCR, TCRIC, TCR4, TCO15, TCOBS, THETIM, THEIT, THEUI 2300
1TET, THET3H, TP1, THM3, VCRIC, VCRB, VCOIS, VCOBS, VOL  DI 2400
COMMON/3/VOLIC, VOL10, VOL3, VOL4, WAVCN, WCLINC, WEIGHT, WHINC, WHIMUL, DI 2500
1WLINC, X, XIDAM, XIDAM2, XLIM, XIM, XIW, XIDAM, XIDAM2, XPLIM, XPS, XJLIM, XDI 2600
14LIM, XJL, XJY, KKN, KKN3, KML, KMT, XLIDAM, XLB, XLCB, XLCBIC, XLCB3, XLDI 2700
1CF, XLCF3, XLCB, XLCB(15), XLCB(6), XLMR1, XLMR4, XMTD, XMON1, XMON3V, XMTI, VOI 2800
1, Y1, YIMA, Z, WAVLOC, XIDAM6, XIDAM6, XLMR1, IABAL  DI 2900
COMMON/4/ICAT, YINT, NHEEL, THET3H, LIMIT  DI 3000
VOL1=0.0  VO 3100
SHIP=0.0  VO 3200
XMON3V=0.0  VO 3300
XMON3T=0.0  VO 3400
XMON1L=0.0  VO 3500
XMON2L=0.  VO 3600
CALL DRAFT  VO 3700
DO 100 ISTAT = 1, NSTAT  VO 4000
CALL AREA8  VO 4100
100 CONTINUE  VO 4200
DO TO (150,150,(20,374), KVOL  VO 4300
140 NSTAT1=1  VO 4400
NSTAT2 = NSTAT  VO 4500
ITEST3=3  VO 4600
DO TO (175,175), KVOL  VO 4700
374 ITES3 = 1  VO 4800
DO TO 375  VO 4900
125 VOLIC(1)=0.0  VO 5000
VCRIC(1)=0.0  VO 5100
TCRIC(1)=0.0  VO 5200
XLCBIC(1)=0.0  VO 5300
NCOMP1=NSTAT4-(ICHEK9-1)  VO 5400
ITEST3=2  VO 5500

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375 DO 400 J = 1,NCOMP1                                VO 5000
      GO TO (9999,474,475,476),KVOL                     VO 5700
425 XIDAM(J) = X(1)                                       VO 5800
      JPKK=J,ICHECK=1                                     VO 5900
      XSDAM(J) = X(1W(JPKK))                             VO 6000
475 XTEST=XIDAM(J)                                       VO 6100
      N=1                                                  VO 6200
499 ON 500 ISTAT1=[,NSTAT                                VO 6300
519 IF(ABS(XTEST-XSD(ISTAT1))-0.0001) 590,550,5516      VO 6400
5516 IF(XTEST-XSD(ISTAT1))525,550,500                   VO 6500
575 IF(ISTAT1=NSTAT)530,535,535                         VO 6600
590 ISTAT2=ISTAT1                                       VO 6700
      GO TO 540                                           VO 6800
530 IF(X(ISTAT1) .NE. X(ISTAT1+1)) GO TO 531            VO 6900
      IF(X(ISTAT1+1) .NE. X(ISTAT1+2)) GO TO 534        VO 6905
      DELX = XSD(ISTAT1) - XSD(ISTAT1+1)                VO 6910
      DELX1 = XTEST - XSD(ISTAT1+1)                     VO 6915
      AREA2(N) = (AREA2(ISTAT1)-AREA2(ISTAT1+1))/DELX + DELX1 * AREA2VO 6920
      I(ISTAT1+1)                                       VO 6921
      TCO2(N) = (TCO2(ISTAT1)-TCO2(ISTAT1+1)) / DELX+DELX1+ VO 6930
      ITCO2(ISTAT1+1)                                   VO 6931
      VCO2(N)=(VCO2(ISTAT1)-VCO2(ISTAT1+1))/DELX+DELX1+VCO2 VO 6935
      I(ISTAT1+1)                                       VO 6936
      ICOMP(N) = ISTAT1 + N - 2                         VO 6940
      GO TO 560                                           VO 6945
551 ISTAT2 = ISTAT1 + 1                                  VO 7000
560 CALL COEF1(XSD(ISTAT2-2),XSD(ISTAT2-1),XSD(ISTAT2),XTEST) VO 7100
      ISTAT2=ISTAT1                                       VO 7200
      MURASC=FINTP(M(ISTAT2-1),M(ISTAT2),M(ISTAT2-2))   VO 7300
      CIA=CIA                                           VO 7400
      CIB=CIB                                           VO 7500
      CIC=CIC                                           VO 7600
      DO 501A I=1,3                                       VO 7700
      ISTAT=ISTAT2+I-1                                    VO 7800
      AREA2(I)=AREA2(ISTAT)                              VO 7900
      VCO2(I)=VCO2(ISTAT)                                VO 8000
      TCO2(I)=TCO2(ISTAT)                                VO 8100
      M2(I)=M(ISTAT)                                     VO 8200
      M(ISTAT)=MURASC,                                   VO 8300
      CALL AREA2                                         VO 8400
501B CONTINUE                                           VO 8500
      CIA=CIA                                           VO 8600
      CIB=CIB                                           VO 8700
      CIC=CIC                                           VO 8800
541 AREA2(N)=FINTP(AREA2(ISTAT2-1),AREA2(ISTAT2),AREA2(ISTAT2-2)) VO 8900
      VCO2(N)=FINTP(VCO2(ISTAT2-1),VCO2(ISTAT2),VCO2(ISTAT2-2)) VO 9000
      TCO2(N)=FINTP(TCO2(ISTAT2-1),TCO2(ISTAT2),TCO2(ISTAT2-2)) VO 9100
      ICOMP(N)=ISTAT2+N-2                                VO 9200
      DO 502B I=1,3                                       VO 9300
      ISTAT=ISTAT2+I-1                                    VO 9400
      AREA2(ISTAT)=AREA2(I)                              VO 9500
      VCO2(ISTAT)=VCO2(I)                                VO 9600
      TCO2(ISTAT)=TCO2(I)                                VO 9700
502B M(ISTAT)=M2(I)                                       VO 9800
      ISTAT=ISTAT2+I-1                                    VO 9900
      GO TO 560                                           VO 10000

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000 IF (X(ISTAT)-X(ISTAT+1))004,002,004
002 IF (XKST=XDAM(J))006,004,006
004 ISTAT = ISTAT + 1
004 AREAS(N) = AMPAS(ISTAT)
VCOB(N)=VCOB(ISTAT)
TCOB(N)=TCOB(ISTAT)
ICOMP(N)=ISTAT
006 IF (XKST=XDAM(J))000,600,0000
000 XKST=XDAM(J)
N=2
GO TO 010
000 CONTINUE
0000 STOP
000 NSTAT=ICOMP(1)
NSTAT2=ICOMP(2)
AREAS(NSTAT)=AREAS(1)
VCOB(NSTAT)=VCOB(1)
TCOB(NSTAT)=TCOB(1)
XKB(NSTAT)=XDAM(J)
AREAS(NSTAT2)=AREAS(2)
VCOB(NSTAT2)=VCOB(2)
TCOB(NSTAT2)=TCOB(2)
XKB(NSTAT2)=XDAM(J)
002 NSTAT2=NSTAT2-1
001 GO TO (000,170,170,170)*KVOL
170 M2=0
IF (ABS(AREAS(NSTAT))-0.1)0110,0110,0140
0110 M=NSTAT+1
0120 IF (ABS(AREAS(M))-0.1)0130,0130,0140
0130 IF (NSTAT2-M2=NSTAT2) 0132,0131,0131
0131 VOL = 0.
SISHP = 0.
GO TO 201
0132 M = M+1
M2=M2+1
GO TO 0120
0140 NSTAT=NSTAT+M2
IF (NSTAT-NSTAT2)0133,0134,0133
0134 NSTAT = NSTAT - 1
GO TO 0703
0133 M2 = 0
IF (ABS(AREAS(NSTAT2))-0.1)0150,0150,0180
0150 M=NSTAT2+1
0160 IF (ABS(AREAS(M))-0.1)0170,0170,0180
0170 M2=M2+1
M=M+1
GO TO 0160
0180 NSTAT2 = NSTAT2+M2
0703 ISTAT = NSTAT
17A CALL TEST2
ISTAT=M
GO TO (7017,224,223)*K
223 KIM = KIM
KIM = KIM - K24(ISTAT)
DELK = K25(ISTAT + 1) - K25(ISTAT)
224 DELK = K25(ISTAT+1)-K25(ISTAT)

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VO 10100
VO 10200
VO 10300
VO 10400
VO 10500
VO 10600
VO 10700
VO 10800
VO 10900
VO 11000
VO 11100
VO 11200
VO 11300
VO 11400
VO 11500
VO 11600
VO 11700
VO 11800
VO 11900
VO 12000
VO 12100
VO 12200
VO 12300
VO 12400
VO 12500
VO 12600
VO 12700
VO 12800
VO 12900
VO 13000
VO 13100
VO 13200
VO 13300
VO 13400
VO 13500
VO 13600
VO 13700
VO 13800
VO 13900
VO 14000
VO 14100
VO 14200
VO 14300
VO 14400
VO 14500
VO 14600
VO 14700
VO 14800
VO 14900
VO 15000
VO 15100
VO 15170
VO 15180
VO 15200
VO 15201

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AREA1M=(AREAS(ISTAT+1)-AREAS(ISTAT))/DELX * XIM * AREAS(ISTAT)
TCO1M=(TCOS(ISTAT+1)-TCOS(ISTAT))/DELX * XIM * TCOSS(ISTAT)
VCO1M=(VCOSS(ISTAT+1)-VCOSS(ISTAT))/DELX * XIM * VCOSS(ISTAT)
S1M=(SBS(ISTAT+1)-SBS(ISTAT))/DELX * XIM * SBS(ISTAT)
XIM = XIM
GO TO 271
225 AREA1M=AREAS(ISTAT+1)
VCO1M=VCOSS(ISTAT+1)
TCO1M=TCOS(ISTAT+1)
S1M = SBS(ISTAT+1)
GO TO 275
7017 MODASC=FINTP2(M(ISTAT2-1),M(ISTAT2),M(ISTAT2-2))
ISTAT2=ISTAT
CBA=CIA
CBR=CIR
CBC=CIC
DO 7018 1=1,3
ISTAT=ISTAT2-1
AREAS(1)=AREAS(ISTAT)
VCOSS(1)=VCOSS(ISTAT)
TCOS(1)=TCOS(ISTAT)
MBS(1)=M(ISTAT)
M(ISTAT)=MODASC
CALL AREAS
7018 CONTINUE
CIA=CAA
CIR=CAR
CIC=CC
240 M=ISTAT2
AREA1M=FINTP2(AREAS(M-1),AREAS(M),AREAS(M-2))
IF (AREA1M) 9101,9102,9102
9101 AREA1M=0
9102 VCO1M = FINTP2(VCOSS(M-1),VCOSS(M),VCOSS(M-2))
TCO1M=FINTP2(TCOS(M-1),TCOS(M),TCOS(M-2))
S1M = FINTP2(SBS(M-1),SBS(M),SBS(M-2))
7019 DO 7020 1=1,3
ISTAT=ISTAT2-1
AREAS(ISTAT)=AREAS(1)
VCOSS(ISTAT)=VCOSS(1)
TCOS(ISTAT)=TCOS(1)
7020 M(ISTAT)=MBS(1)
ISTAT=ISTAT2
7021 IF (1=ISTAT2) 274,271,275
271 M = ISTAT * 1
275 VOL1 = VOL1 + FINTO1 (AREAS(ISTAT),AREA1M,AREAS(M),SPACE/3.0)
XMO13V = XMO13V + FINTO1 (AREAS(ISTAT),VCOSS(ISTAT),AREA1M,VCO1M,AVO
AREAS(M) * VCOSS(M),SPACE/3.0)
XMO13T=XMO13T + FINTO1 (AREAS(ISTAT),TCOS(ISTAT),AREA1M*TCO1M,AREA1V
125(M) * TCOSS(M),SPACE/3.0)
XMO1L = XMO1L + FINTO1 (AREAS(ISTAT)*MBS(ISTAT),AREA1M*XIM,AREA2V
15(M) * XBS(M),SPACE/3.0)
XMO1L = XMO1L + FINTO1 (AREAS(ISTAT)*XBS(ISTAT)*2,AREA1M*XIM*2,
1AREAS(M)*XBS(M)*2,SPACE/3.0)
IF (ITEM13-3) 200,200,200
290 S1M1P = S1M1P + FINTO1 (SBS(ISTAT),S1M,SBS(M),SPACE*2.0/3.0)
200 ISTAT = ISTAT + 2

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VO 18202
VO 18303
VO 18404
VO 18505
VO 18606
VO 18707
VO 18808
VO 18909
VO 19000
VO 19101
VO 19202
VO 19303
VO 19404
VO 19505
VO 19606
VO 19707
VO 19808
VO 19909
VO 20000
VO 20101
VO 20202
VO 20303
VO 20404
VO 20505
VO 20606
VO 20707
VO 20808
VO 20909
VO 21000
VO 21101
VO 21202
VO 21303
VO 21404
VO 21505
VO 21606
VO 21707
VO 21808
VO 21909
VO 22000
VO 22101
VO 22202
VO 22303
VO 22404
VO 22505
VO 22606
VO 22707
VO 22808
VO 22909
VO 23000
VO 23101
VO 23202
VO 23303
VO 23404
VO 23505
VO 23606
VO 23707
VO 23808
VO 23909
VO 24000
VO 24101
VO 24202
VO 24303
VO 24404
VO 24505
VO 24606
VO 24707
VO 24808
VO 24909
VO 25000
VO 25101
VO 25202
VO 25303
VO 25404
VO 25505
VO 25606
VO 25707
VO 25808
VO 25909
VO 26000
VO 26101
VO 26202
VO 26303
VO 26404
VO 26505
VO 26606
VO 26707
VO 26808
VO 26909
VO 27000
VO 27101
VO 27202
VO 27303
VO 27404
VO 27505
VO 27606
VO 27707
VO 27808
VO 27909
VO 28000
VO 28101
VO 28202
VO 28303
VO 28404
VO 28505
VO 28606
VO 28707
VO 28808
VO 28909
VO 29000
VO 29101
VO 29202
VO 29303
VO 29404
VO 29505
VO 29606
VO 29707
VO 29808
VO 29909
VO 30000

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IF (ISTAT = NSTAT) 176,174,201	VO 20100
201 GO TO (225,200,210),ITEB73	VO 20200
200 VOLIC(JPKK)=VOL1	VO 20300
IF (ABS(VOL1) = .00001) 201,201,209	VO 20400
201 VCHIC(JPKK) = 0.0	VO 20500
TCNIC(JPKK)=0.0	VN 20600
ALCHIC(JPKK) = 0.0	VN 20700
GO TO 210	VO 20800
202 VCHIC(JPKK) = XMOM3V/VOL1	VN 20900
TCNIC(JPKK)=XMOM3T/VOL1	VO 21000
ALCHIC(JPKK)=XMOM1L/VOL1	VN 21100
GO TO 235	VO 21200
210 VOL = VOL1	VO 21300
DISPL = VOL1/39.0	VN 21400
IF (ABS(VOL1) = .00001) 211,211,212	VO 21500
211 XMR = 0.0	VO 21600
TCR=0.0	VO 21700
ALCM = 0.0	VO 21800
GO TO 214	VO 21900
212 XMR = XMOM3V/VOL1	VO 22000
ALCM = XMRD = (XMOM1L/VOL1)	VO 22100
TCR=XMOM3T/VOL1	VO 22200
214 GO TO (220,230),KVOL	VO 22300
210 ITEB73=1	VO 22400
VOL1 = 0.0	VO 22500
XMOM3V = 0.0	VO 22600
XMOM3T=0.0	VO 22700
XMOM1L = 0.0	VO 22800
XMOM2L = 0.	VO 22900
GO TO 235	VN 23000
220 RETURN	VO 23100
224 VOLIC(J) = VOL1*PERM(J)	VO 23200
IF (VOL1) 2750,2750,2750	VO 23300
2754 VCHIC(J) = 0.0	VO 23400
TCNIC(J)=0.0	VO 23500
ALCHIC(J) = 0.0	VO 23600
ALVM(J) = 0.	VO 23700
GO TO 235	VN 23800
2754 VCHIC(J) = XMOM3V/VOL1	VO 23900
TCNIC(J)=XMOM3T/VOL1	VO 24000
ALCHIC(J) = XMRD=(XMOM1L/VOL1)	VO 24100
ALVM(J) = SORT(XMOM2L/VOL1)	VO 24200
234 VOL1=0.0	VO 24300
XMOM3V=0.0	VO 24400
XMOM3T=0.0	VO 24500
XMOM1L=0.0	VO 24600
XMOM2L = 0.	VO 24700
ISTAT=NSTAT1	VO 24800
CALL AREAS	VO 24900
ISTAT = NSTAT2 + 1	VO 25000
240 CALL AREAS	VO 25100
400 CONTINUE	VO 25200
GO TO (225,200,210,220),KVOL	VO 25300
200 DO 399 J=1,NCNMP1	VO 25400
XMR=(VOL*XMR-VOLIC(J)*VCHIC(J))/(VOL-VOLIC(J))	VO 25500
TCR=(VOL*TCR-VOLIC(J)*TCNIC(J))/(VOL-VOLIC(J))	VO 25600

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      XLCB=(VOL*XLCB-VOLIC(J)*XLCBIC(J))/(VOL-VOLIC(J))
399 VOL=VOL-VOLIC(J)
      RETURN
      END
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VO 25300
VO 25400
VO 25500
VO 25600
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Line	Code	Statement	Variable	Value
1		SUBROUTINE WAVP		
2		DIMENSIONAL WP3(20),AMEA1(10,20),AMEA2(10),AMEA3(20,30),NML(20),OI		200
3		IBMT(20),C1ALPH(20),C1P(20),C1WP(20),C1OFT(20),UATR(2),DISPL3(20),OI		200
4		LOWL(20),M1(40),M1COMP(20),M1MOR(40),M1MAH(40),M1OUT(20),M1SAG(40),M1		400
5		ISCOMP(20),ICOMP(2),JHREAK(60,10),JMAX(2),KMAX(2,3),KPI(R),NAME(R),NDI		600
6		NAME1(4),NCOMP(2,3,3),NP(40),NEMH(10),PFHM(3)		600
7		DIMENSIONPFMP(1),RAB(5,5,10),S(40,24),S2S(60),STATIM(20),STATNO(10		700
8		100),SECTIM(20),TCHIC(20),TCH(4,5,10),TCO1(40,20),TCO2(60),THE1(20)		800
9		M(10),TP1(20),THIM3(4),VCHIC(40),VCH(4,5,10),VCO1(40,20),VCO2(60)		400
10		10),VOL3(20),VO1(4),VOLIC(20),WE1(20),W(40),X1DAM(20),X1DAMP(10)		1000
11		1),X1DAM(20),XPDAM(40),X1W(20),XPDAM(20),XPDAM(10)		1100
12		DIMENSIONKPB(2),KKR3(20),KKML(20),KKMT(20),XLUAM(20,3),XLCIC(20)		1200
13		1),XLCM3(20),XLPF3(20),XLCO1W(20),XLCO1(5),KMT1(20),Y(40,24),Y1(40)		1300
14		1),Z(40,24),Y1INT(4,30),THE1(20)		1400
15		DIMENSION KLVH(20)		1400
16		COMMON/1/AMA,A1WP,AHLA1,AMEA2,AMEA3,AMEA4,NML,KMT,C1A,C1ALPH,C1		1500
17		1M,C1C,C1P,C1OFT,C1WP,CUNT,NATR,N1PL,DISPL3,UWL,M,M1MAH,C,M1COMP		1600
18		1,M1COMP,M1MOR,M1MAH,M1OUT,M1SAG,M1MAH,M1MAR,M1MAR,M1W,11APT,11MAL,DI		1700
19		111FNO,11SYM,11WC,11WM,11WL,11WC,11PM,11PL,11REAK,11COMP,11CHEN,11ITDI		1800
20		11SENT,11ERNO,11STAT,111OM,11PT1,11ERT3,11Y,JHREAK		1900
21		COMMON/2/JMAX,K,KK,KMA,KP,KVOL,KW,M,MA,N1MUT,N1NPL,N1HEFL,N1LCOD		2000
22		1,N1PFHM,N1THIM,NAME,NAME1,NCOMP1,NCOMP2,NSTAT1,NSTAT2,NSTAT3,NSTAT4		2100
23		1,STAT2,NSTAT3,NSTAT4,NWL,NWP,PFHM,PFHM1,PFHM2,RAB,S,S1MIP,S2S,S2MIDI		2200
24		1P,SPACK,STATNO,SECTIM,TCO,TCNIC,TCO1,TCO2,TCO3,THE1M,THE1T,THE1O		2300
25		11ST,THE1M,TH1,THIM1,VCH1C,VCH1,VC01S,VC02S,VOL		2400
26		COMMON/3/VOLIC,VO1(1),VOL3,VOL4,WAVCEN,WCLINC,W1(20),W1INC,W1MUL,DI		2500
27		1WLINC,X,X1DAM,X1DAM,X1LIM,X1M,X1W,X1DAM,X1UAM2,X1LIM,X1P,X1LIM,X1		2600
28		14LIM,X1IL,X1IT,KK,KK3,KKML,KKMT,X1DAM,X1LP,X1CR,X1CR1C,X1CR1,X1OI		2700
29		1CF,X1CF3,X1CO,X1CO1W,X1CO1,X1M1M,X1M1M,X1M1M,X1M1M,X1M1M,X1M1M,X1M1M		2800
30		1,Y1,Y1MA,Z,WAVLOC,X1DAM,X1DAM,X1M1M,X1M1M,X1M1M,X1M1M,X1M1M,X1M1M		2900
31		COMMON/4/ICAT,Y1INT,N1HEFL,THE1M,LIMIT		3000
32		W1MUL = (PL0AT(1-WH / 2) * (2WH - 1) * WHINC) * 1.0	WA	3200
33		XLMR2 = XLMR1 * (1PLUAT(1-WL / 2) * (2WL - 1) * WLINC) * 1.0	WA	3300
34		WAVLOC = WAVCEN * (1PLUAT(1-WC / 2) * (2WC - 1) * WCINC) * XLMR2	WA	3400
35		1	WA	3500
36		XLMRDA = XLMR2 * XLP	WA	3600
37		MW1 = MW1 * 1	WA	3600
38		1MW = MW1	WA	3600
39		GO TO (1,62,64),1MW	WA	3700
40		MW2 = (1,1,62,64) / 2.0 * W1MUL	WA	3800
41		GO TO 66	WA	3900
42		MW2 =	WA	4000
43		1 XLP / 40.0 1 * W1MUL	WA	4100
44		GO TO 66	WA	4100
45		MW2 = 2.02 * XLMR2 * 0.4	WA	4100
46		1MOO = 1	WA	4200
47		GO TO 30	WA	4300
48		1MOO = (-1)	WA	4400
49		GO TO 10 1 = 1, LIMIT	WA	4500
50		IF 1MOO = 1, SHIP 19 HOGGING, IF = 1, SHIP 19 HOGGING	WA	4600
51		X2 = ABS(X1) * (X1MW / 2.0) * (X1MW2 - 1.0) * WAVLOC	WA	4700
52		IF 1MOO = 1, 21, 21, 22	WA	4800
53		X2 = X2 * XLMRDA / 2.0	WA	4900
54		IF (X2 - XLMRDA / 2.0) 23, 23, 20	WA	5000
55		X2 = ABS(XLMRDA - X2)	WA	5100
56		GO TO 22	WA	5200

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23	CONTINUE	WA	6300
	THETA=K2*6.2832/ALMRODA	WA	6400
	RADIUS=ALMRODA/A.2032	WA	6500
	IF (HWR-RADIUS) 7.7.7008	WA	6600
7002	PRINT 7003	WA	6700
7003	FORMAT(3H WAVE HEIGHT TOO LARGE FOR WAVE LENGTH. INVALID RESULTS	WA	6800
	1 FOLLOW)	WA	6900
	RETURN	WA	6000
7	X1=RADIUS*THETA*(HWR)*SIN(THETA)	WA	6100
C	X1=TRIAL VALUE OF X1	WA	6200
	IF (ABS(X2-X1)-0.000) 5.5.6	WA	6300
6	THETA=THETA+((X2-X1)/ALMRODA)*A.2032	WA	6400
	GO TO 7	WA	6500
5	HW=HWR*(1.0-COS(THETA))	WA	6600
	IF (IMOS) 71.71.70	WA	6700
70	HIMOS(1)=HW	WA	6800
	GO TO 1A	WA	6900
71	HISAO(1)=HW	WA	7000
10	CONTINUE	WA	7100
	IF (IMOS) 35.75.40	WA	7200
35	RETURN	WA	7300
	END	WA	7400

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SUBROUTINE WETSRF
  DIMENSION Z(13),WB(3)
  DIMENSIONALWP3(20),AREA15(60,20),AREAPR(60),AREA45(20,20),BML(20),DI
  BMT(20),C1ALPH(20),CIP(20),CIWP(20),CIDOPT(20),DATE(2),DISPL3(20),DI
  DNL(20),H(60),HICOMP(20),HIMOG(60),HIMAR(40),H1OUT(20),H1BAG(40),HDI
  HCOMP(20),ICOMP(2),JUREAK(60,10),JMAX(3),KMAX(2,3),KP(6),NAME(4),NOI
  NAME15(4),NCOMP(2,3),NP(60),PERM(14),PRM(3)
  DIMENSIONPRM2(10),RAD(5,5,10),S(40,20),SPB(60),STRHIP(20),STATNO(10
  160),SECTIM(20),TCR(10),TCR5(5,5,10),TCR10(60,20),TCR25(60),THETNDI
  H(10),TP(10),THIM3(6),VCR(10),VCR5(5,5,10),VCR10(60,20),VCR25(40
  10),VOL3(20),VOL5(5),VOL10(20),WEIGHT(20),X(60),X1DAM(30),X1DAMP(100
  1),X1DAM6(20),X1DAM8(20),X1W(20),X1DAM(30),X1DAM8(14)
  DIMENSIONK25(60),KKN3(20),KXML(20),KXMT(20),X1DAM(30,3),XLCB(100
  1),XLCB3(20),XLCF3(20),XLCOW(20),XLCOR(6),XMTI(20),Y(60,20),Y1(60)DI
  1,2(40,20),Y1INT(4,20),THET3H(6)
  DIMENSION XLVH(20)
  COMMON/1/ALMA,A1WP,A1WP3,AREA15,AREAPR,AREAPB,BML,BMT,C1A,C1ALPH,CN
  110,C1C,CIP,CIDOPT,C1WP,CONST,DATE,DISPL,DISPL3,UNI,H,M,HABSC,HICOMPDI
  1,H2COMP,HIMOG,HIMAR,H1OUT,H1BAG,HIMAR,HIMAR,HIMAR,H1,11AFT,11HAL,DI
  11FWD,11SYM,11WC,11WH,11WL,11WC,11WH,11WL,11UREAK,11COMP,11CHK9,INITDI
  1,1SENTL,1SERNO,1STAT,1SOP,1TRST1,1TRST2,1Y,JUREAK
  COMMON/2/JMAX,K,KX,KMAX,KP,KVOL,KW,M,MA,NTAUT,NINBPL,NIMEEL,NILCODI
  1,N1PERM,N1TRIM,NAME,NAME15,NCOMP1,NCOMP2,NSTAT,NP,NSTAT,NSTAT1,NSDI
  1STAT2,NSTAT3,NSTAT4,NUL,NUP,PERM,PRM1,PRM2,RAD,5,5,SHIP,SPB,5,5,SHDI
  1P,SPACE,STATNO,SECTIM,TCR,TCR10,TCR5,TCR10,TCR25,THETIM,THET17,THETDI
  1TAT,THET15H,TP1,TRIM3,VCR10,VCR5,VCR10,VCR25,VOL
  COMMON/3/VOL10,VOL3,VOL5,VOL9,WAVCN,WCI1NC,WEIGHT,WH1NC,WH1MUL,DI
  1WL1INC,X,X1DAM,X1DAM8,X1LIM,X1M,X1W,X1DAM,X1DAM8,X1LIM,X25,X3LIM,XDI
  14LIM,X1L,X1Y,KK,KK3,KXML,KXMT,X1DAM,X1MP,XLCB,XLCB3,XLCB3,XLDI
  1CF,XLCF3,XLCO,XLCOW,XLCOR,XLMR1R,XLMRDA,XMIO,XMOM1,XMOM5V,XMTI,YDI
  1,Y1,Y1MA,Z,WAV,OC,X1DAM6,X1DAM8,X1MSPR,IADAL
  COMMON/4/CAT,Y1INT,N3MBEL,THET3H,LIMIT
  ICOUNT = 0
  DO 10 I = 1,3
    J = IV-1
    IF (ABS(Y1STAT,J)) = .000001 : 50,50,10
  50 ICOUNT = ICOUNT + 1
  10 Z1(1) = Z1(STAT,J)
    IF (ICOUNT = 3) 10,60,60
  60 S1(STAT, IV-1) = S1(STAT, IV)
    S1(STAT, IV-2) = S1(STAT, IV)
    GO TO 40
  4 IF (ABS(C1A) = .00001) 10,10,10
  10 C2 = SORT(1.0, C1A**2)
    DO 30 I = 1,3
      WB(1) = C2,Z1(1)
    GO TO 40
  30 C3A = 4.0*C1A**2
    C3B = 4.0*C1A**2
    C3C = C1A**2 * 1.0
    DO 20 I = 1,3
      C3X = SORT(1INTP1(Z1(1),C3A,C3B,C3C))
      C3X = 2.0*C3A**2(1)+C3B**2.0*SORT(C3A)+C3X
      IF (C3X) 21,20,20
  21 WB(1) = 0.0
    DO 25 J = 1,2

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      IVJ=IV+J
20  WS(J+1) = 2.27*(Z(ISTAT+IVJ)-Z(ISTAT,IV))*2*(Y(ISTAT+IVJ)-Y(ISTAT,IV))**2
      IYAT=IV+1
      ON TO 40
50  WS(1) = ((2.6*CB*Z(1)*CB*CB)/((4.0*CB*CB) + ((4.0*CB*CB*CB*CB)-CB**2)*
      1)/(1.0*CB*CB))*((.0/50*CB*CB)*ALOG(CB*CB))
40  S(ISTAT+IV+1) = WS(2) = WS(1) * S(ISTAT+IV)
      S(ISTAT+IV+2) = WS(3) = WS(1) * S(ISTAT+IV)
40  RETURN
      END

```

WP	200
DI	200
DI	300
DI	400
DI	500
DI	600
DI	700
DI	800
DI	900
DI	1000
DI	1100
DI	1200
DI	1300
DI	1400
DI	1490
DI	1500
DI	1600
DI	1700
DI	1800
DI	1900
DI	2000
DI	2100
DI	2200
DI	2300
DI	2400
DI	2500
DI	2600
DI	2700
DI	2800
DI	2900
DI	3000
WP	3500
WP	3600
WP	3700
WP	3800
WP	3900
WP	4000
WP	4100
WP	4200
WP	4300
WP	4400
WP	4500
WP	4600
WP	4700
WP	4800
WP	4900
WP	5000
WP	5100
WP	5200
WP	5300
WP	5400
WP	5500
WP	5600

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SUMMOUTING WPLAN1
DIMENSIONALWPJ(20), AREA1S(60,20), AREAPS(40), AREAAS(20,30), NML(20), DI
IMNT(20), CIALPH(20), CIP(20), CIMP(20), CIONPT(40), DATE(2), DISPL3(20), DI
IDWL(20), M(60), MICOMP(20), MIMON(60), MIMAN(40), MIOU(20), MISAO(40), MDI
ISCOMP(20), ICOMP(2), JHHEAN(40,10), JMAX(7), KMAX(2,3), KP(4), NAME(4), NOI
IAME1S(4), NCOMP(2,3,3), NP(60), PERM(14), PERM1(3)
DIMENSIONPFRMP(18), RAB(5,5,10), R(40,20), SPR(60), STRHIP(20), STATNO(01
160), SECTIM(25), TCRIC(25), TCRB(5,5,10), TCU1R(60,20), TCOBS(40), THEY601
IM(10), TPI(20), THIM3(6), VCRIC(25), VCRB(5,5,10), VCU1R(60,20), VCOBS(601
10), VOL3(20), VOL4(4), VOLIC(25), WEIGHT(25), X(40), XIDAM(30), XIDAMP(1801
1), XIDAMA(20), XIDAMO(20), XIW(24), XIDAM(30), XIDAME(14)
DIMENSIONKPS(60), KKS3(20), KKM1(20), KKM2(20), KLIUAM(30,3), KLCM1C(2001
1), KLCR3(20), KLCF3(20), KLCOIW(24), KLCOR(5), KMT1(20), Y(40,20), Y1(60)01
1, Z(60,20), Y1INT(4,30), THEY3M(4)
DIMENSION ALVN(PR)
COMMON/1/ALMA,ALWP,ALWPJ,ANEA1S,ANEA2S,ANEA3S,NML,IMT,CIA,CIALPH,CUI
1IM,CIC,CIP,CIONPT,CIMP,CONST,DATE,NISPL,DISPL3,DWL,M,MIMABO,MICOMPD1
1,MISCOMP,MIMOO,MIMAN,MIOU,MISAO,MIMAN,MIMAN,MIMAN,MWJ,IAFT,IALAL,DI
11PWO,ISYM,ISWC,ISWH,ISWL,ISWC,ISWH,ISWL,ISHEAN,ICOMP,ICMPKV,INITOI
1,ISENTL,ISERNO,ISTAT,ISOP,ISPT,ISTEY3,Y,JHHEAN
COMMON/2/JMAX,K,KK,KMAX,KP,KVOL,KW,M,MAN,IRUIT,NISPL,NHEFL,NILCOOI
1,NIPERM,NITIM,NAME,NAME1S,NCOMP1,NCOMP2,NSTAT,NP,NSTAT,NSTAT1,NBO1
1,AT2,NSTAT3,NSTAT4,NUL,NUP,PERM,PERM1,PERM2,RAB(5,5,10),STRHIP,SPS,SSOMIOI
IP,SPACE,STATNO,SECTIM,TCR,TCRIC,TCRB,TCU1R,TCOBS,THEY1M,THEY1Y,THEY1
1Y1,THEY3M,TPI,THIM3,VCRIC,VCRB,VCOBS,VCOBS,VOL
COMMON/3/VOLIC,VOL1D,VOL3,VOLM,WAVCPN,WCIINC,WEIGHT,WIMINC,WIMUL,DI
1WL1INC,K,XIDAM,XIDAMP,XILIM,XIM,XIW,XIDAM,XIDAMP,XPLIM,KPS,X3LIM,XDI
1ALIM,XIL1,XI1T,KKS3,KKM1,KKM2,KLIAM,KLMP,KLCR,KLCOI1C,KLCR3,XLO1
1CF,KLCF3,KLC9,KLCOIW,KLCOR,KLMAR,KLMAR,KMID,KMOMIL,KMOMJV,KMT1,YOI
1,Y1,Y1MA,Z,WAV,OC,XIDAMO,XIDAMO,KLMOPR,IABAL
COMMON/4/ICAT,Y1INT,NHEFL,THEY3M,LIMIT
M=NP(ISTAT)
CALL TEST1(M(ISTAT),Z)
GO TO (9,10,40,41),M
5 Y1(ISTAT) = 0.4
GO TO 10
30 Y1(ISTAT) = Y(ISTAT,NWP)
GO TO 30
40 DO 39 I=1,10
IF (JHHEAN(ISTAT,IHHEAN)-NWP-1) 39,40,30
39 CONTINUE
40 M = NWP
GO TO 40
51 IF (JHHEAN(ISTAT,IHHEAN)-NWP) 40,41,40
51 Y1(ISTAT) = Y(ISTAT,NWP) + (Y(ISTAT,NWP+1) - Y(ISTAT,NWP))
1 * (M(ISTAT) - 2(ISTAT,NWP)) /
2 (2(ISTAT,NWP) - 2(ISTAT,NWP+1))
RETURN
40 M = NWP+1
40 Z1 = Z(ISTAT,M)
Z2 = Z(ISTAT,M+1)
Z3 = Z(ISTAT,M+2)
CALL CORF1(Z1,Z2,Z3,M(ISTAT))
Y1(ISTAT) = FINTP2(Y(ISTAT,M+1),Y(ISTAT,M+2),Y(ISTAT,M))
IF (Y1(ISTAT)) 40,10,10
8000 Y1(ISTAT) = 0.4

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10 RETURN
END

WP 8700
WP 8800

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NO	STATEMENT	WP
	SUBROUTINE WPLAN	200
	DIMENSIONALWP3(20),AMTA(5(60,29),AREAS(60),AREAS(20,30),RML(20),DI	200
	10MT(20),C1ALPH(20),C1P(20),C1WP(20),C1OUT(20),DATE(2),DISPL3(20),DI	300
	10WL(20),H(60),H1COMP(20),H1H0(60),H1MAR(60),H1OUT(20),H1SAG(60),HDI	400
	12COMP(20),1COMP(2),JMBEAK(60,10),JMAX(7),KMAX(2,3),KP(6),NAME(6),NDI	500
	1AME(5(8),NCOMP(2,3,3),NP(60),PERM(18),PERM(13)	600
	DIMENSIONPFRM(18),RAB(5,5,10),S(60,29),SPS(60),S3RHP(20),STATNO(DI	700
	160),SECTIM(25),TCM(C(20),TCB(5,5,10),TCO(5(60,29),TCOB(60),THEYSDI	800
	1M(10),TPI(20),THIM3(6),VCM(C(20),VCB(5,5,10),VCO(5(60,29),VCOB(60)	900
	10),VOL3(20),VOL4(4),VOLIC(25),WEIGHT(25),X(60),X1DAM(20),X1DAMP(180)	1000
	1),X1DAM(20),X2DAM(20),X1W(25),X2DAM(20),X2DAM(18)	1100
	DIMENSIONX24(4),XKM3(20),XKML(20),XKMT(20),XLIUAM(30,3),XLCB(C(250)	1200
	1),XLCB(20),XLCF(20),XLCOW(25),XLCO(4),XMT(20),Y(60,29),Y1(60)DI	1300
	1,Z(60,29),Y1INT(4,30),INFT3H(5)	1400
	DIMENSION XLVR(25)	1490
	COMMON/1/ALMA,A1WP,AREAS,AREAS,AREAS,RML,MT,C1A,C1ALPH,C1	1500
	10,C1C,C1P,C1OUT,C1WP,CONST,DATE,DISPL,DISPL3,UWL,H,H1SAG,H1COMPDI	1600
	1,H2COMP,H1H0,H1MAR,H1OUT,H1SAG,H1MAR,H1MAR,H1MAR,H1,11AF1,11MAL,DI	1700
	11FWD,11SYM,11WC,11WH,11WL,11WC,11WH,11WL,11HFAK,1COMP,1CHKV,IN1DI	1800
	1,1SENTL,1SFNO,1STAT,1STOP,1TAT1,1TERT3,1Y,JMBEAK	1900
	COMMON/2/JMAX,K,K,KMAX,KP,KVOL,KW,M,MA,N1NUT,T,N1NPL,N1HEEL,N1LCODI	2000
	1,N1PERM,N1THIM,NAME,NAME15,NCOMP1,NCOMP2,NSTAT,NP,NSTAT,NSTAT1,NDI	2100
	1TAT2,NSTAT3,NSTAT4,NWL,NWP,PERM,PERM1,PERMP,NA0,5,4,4H1P,525,43H1DI	2200
	1P,SPACE,STATNO,SECTIM,TCR,TCM(C,TCB,TCO(5,TCOB,THEYIM,THEY1T,THEDI	2300
	1TAT,THEYIM,TPI,THIM3,VCM(C,VCB,VCO(5,VCOB,VOL	2400
	COMMON/3/VOLIC,VOL10,VOL3,VOL4,WAVCEN,WCIINC,WEIGHT,WH1INC,WH1MUL,DI	2500
	1WL1INC,X,X1DAM,X1DAM2,X1LIM,X1M,X1W,X2DAM,X2DAM2,X2LIM,X2LIM,XDI	2600
	14LIM,X1L,X1T,XK3,XK3,XKML,XKMT,XLIUAM,XLWP,XLCB,XLCB(C,XLCB3,XLDI	2700
	1CF,XLCF3,XLCO,XLCOW,XLCO,XLMH,XLMH,XLMH,XMID,XMOM1,XMOM3V,XMT1,YDI	2800
	1,Y1,Y1MA,Z,WAV,OC,X1DAM,X2DAM,XLMOP,1MAL	2900
	COMMON/4/ICAT,Y1INT,N3HEEL,INFT3H,LIMIT	3000
	A1WP=0.0	3100
	X1L=0.0	3200
	X1T=0.0	3300
	XMOM1W=0.0	3400
	XMOM1T=0.0	3500
	SIGN=7.0	3600
	SIGN2 = +1.0	3700
	IF (ICAT-2) 10,9,10	3800
	IF (AMF(THYIM)=-.0001) 10,10,30	3900
10	CALL DRAFT	4000
	DO 20 ISTAT = 1,LIMIT	4100
	CALL WPLAN	4200
20	CONTINUE	4300
	IF (NSTAT-LIMIT) 21,60,230	4400
21	DO 22 ISTAT = 1,NSTAT	4500
	Y1INT(1,ISTAT) = Y1(ISTAT)	4600
	Y1INT(2,ISTAT) = Y1(ISTAT)	4700
	I1 = ISTAT + NSTAT	4800
	Y1INT(3,ISTAT) = Y1(I1)	4900
	Y1INT(4,ISTAT) = Y1(I1)	5000
22	CONTINUE	5100
30	IMUL=1	5200
40	DO 50 ISTAT=1,NSTAT	5300
	Y1(ISTAT) = Y1INT(IMUL+ISTAT)	5400
50	CONTINUE	5500

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60 DO 110 ISTAT=NSTAT1,NSTAT2,2	WP	5700
CALL TFSZ	WP	5800
GO TO(80,70,65),K	WP	5900
65 YIM=(Y1(ISTAT+1)-Y1(ISTAT))/(X25(ISTAT+1)-X25(ISTAT))*XIM*Y1(ISTAT	WP	5901
1)	WP	5902
GO TO 90	WP	5903
70 YIM=Y1(ISTAT+1)	WP	6000
GO TO 100	WP	6100
80 YIM=FINTP2(Y1(M-1),Y1(M),Y1(M-2))	WP	6200
IF (1-NSTAT2) 80,90,100	WP	6300
90 M=ISTAT+1	WP	6400
100 A1WP=(FINTO(Y1(ISTAT),YIM,Y1(M),SPACE*2.0/3.0))*SIGN*A1WP	WP	6500
X11T=(FINTO(Y1(ISTAT)*3,YIM*3,Y1(M)*3,SPACE*2.0/3.0))*SIGN*X11T	WP	6600
XMONW=(FINTO(Y1(ISTAT)*X(ISTAT),YIM*XIM,Y1(M)*X(M),SPACE*2.0/3.0)	WP	6700
1))*SIGN*XMONW	WP	6800
X11L=(FINTO(Y1(ISTAT)*(XMI0-X(ISTAT))*3,YIM*(XMI0-X(M))*3,Y1(M)*	WP	6900
1)*(XMI0-X(M))*3,SPACE*2.0/3.0))*SIGN*X11L	WP	7000
XMONIT = FINTO(Y1(ISTAT)*3,YIM*3,Y1(M)*3,SPACE/3.0) * SIGN	WP	7100
1-XMONIT	WP	7200
110 CONTINUE	WP	7300
IF (ICAT=2) 170,120,170	WP	7400
120 IF (IMUL=3) 130,101,160	WP	7500
130 IMUL = IMUL + 1	WP	7600
IF (IMUL=2) 140,150,140	WP	7700
140 SIGN = -1.0	WP	7800
SIGNB = +1.0	WP	7900
GO TO 40	WP	8000
150 SIGNB = -1.0	WP	8100
GO TO 40	WP	8200
161 IMUL = IMUL + 1	WP	8300
SIGNB = -1.0	WP	8400
GO TO 40	WP	8500
160 A1WP = A1WP/2.5	WP	8600
X11T = X11T/2.5 - XMONI1*2/A1WP	WP	8700
XMONIW=XMONIW/2.0	WP	8800
X11L=X11L/2.0	WP	8900
170 IF (AMR(A1WP) = 0000) 210 910,180	WP	9000
180 IF (A1WP) 230,210,190	WP	9100
190 XLCF=XMI0-XMONIW/A1WP	WP	9200
IF (THETIM) 200,220,200	WP	9300
200 HEEL=1.0/COS(THETIM)	WP	9400
A1WP=A1WP*HEEL	WP	9500
XMONIW=XMONIW*HEEL	WP	9600
X11L=X11L*HEEL	WP	9700
X11T=X11T*HEEL*3	WP	9800
GO TO 220	WP	9900
210 XLCF=0.0	WP	10000
220 X11L=X11L-(XLCF*3)*A1WP	WP	10100
RETURN	WP	10200
230 STOP 99999	WP	10300
END	WP	10400

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[illegible]

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YYAC1A*VIST(INDEX,L*2)+CIC*VIST(INDEX,L*1)+CIC*VIST(INDEX,L)  
99 FORMAT(*VINTB=AF10.2*316/(10F10.2))  
IF(YY)2000*9*9  
2000 YY=0  
9 VINTB=YY  
10 RETURN  
END
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VI 2500  
VI 2530  
VI 2600  
VI 2700  
VI 2800  
VI 2900  
VI 3000
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SUBROUTINE OUTPUT                                OU 200
DIMENSION KBT1(20),KBT2(20),MULL(3)           OU 210
DIMENSIONALWPJ(20),ARFAS(40,20),ARFAS(40),ARFAS(20,30),RML(20),DI 220
LCMT(20),C1ALPH(20),C1P(40),C1WP(20),C1NOFY(20),DATE(2),DISPL3(20),DI 300
LOWL(20),M(40),M1COMP(20),M1MON(40),M1MAN(40),M1OUT(20),M1SAG(40),M1 400
1SCOMP(20),1COMP(2),JUREAN(40,10),JMAX(3),KMAX(2,3),KP(4),NAME(3),NDI 500
1AME1S(4),NCOMP(2,3,3),NP(40),PERM(14),PERM(3) 600
DIMENSIONPERMP(3),RAB(5,5,10),S(40,20),SPR(40),S3RMP(20),STATNO(2) 700
140),SECTIM(20),TCRIC(25),TCRS(5,5,10),TCOIS(40,20),TCOBS(40),THETSDI 800
1M(10),TP(20),THIM3(4),VCRIC(20),VCRS(4,5,10),VCOIS(40,20),VCOBS(40) 900
10),VOL3(20),VOL4(4),VOLIC(20),WEIGHT(20),X(4),X1DAM(30),X1DAM2(100) 1000
1),X1DAM3(20),X1DAM4(20),X1W(20),X1DAM(20),X1DAM4(14) 1100
DIMENSIONXPS(40),XKMS(20),XKML(20),XKMT(20),X1DAM(30,3),XLCRIC(200) 1200
1),XLCRS(20),XLCPS(20),XLCOS(100),XLCOR(4),XMT(20),Y(40,20),Y1(40)DI 1300
1,7(40,20),Y1INT(4,30),YMT3M(4) 1400
DIMENSIONALVN(20) 1490
COMMON/1/ALMA,ALWP,ALWPJ,ARFAS,ARFAS,ARFAS,RML,RMT,C1A,C1ALPH,C1 1500
1IN,C1C,C1P,C1NOFY,C1WP,CONST,DATE,DISPL,DISPL3,LOWL,M,M1BASC,M1COMPDI 1600
1,M1COMP,M1MON,M1MAN,M1OUT,M1SAG,M1MAN,M1MAN,M1MAN,M1AFT,1MAL,DI 1700
11FWD,1SYM,1WC,1WM,1WL,1WC,1PM,1WL,1HKEA,1COMP,1CHKV,INITDI 1800
1,1SENTL,1SENU,1STAT,1SOP,1TPY,1TERYS,1Y,JUREAN 1900
COMMON/2/JMAX,K,KK,KMAX,KP,KVOL,KW,M,MA,NIRUT,NIDAPL,NHEEL,NILCOI 2000
1,NIPERM,N1THIM,NAME,NAME1S,NCOMP1,NCOMP2,NSTAT,NP,NSTAT,NSTAT,NSDI 2100
1TAT2,NSTAT3,NSTAT4,NWL,NWP,PERM,PERM1,PERMP,RAB,S,3RMP,SPR,S3RMI 2200
1P,APACF,STATNU,SECTIM,TCR,TCRIC,TCRS,TCOIS,TCOBS,THETIM,THETI,THEDI 2300
1T27,THETIM,TP,THIM3,VCRIC,VCRS,VCOIS,VCOBS,VOL 2400
COMMON/3/VOLIC,VOLID,VOL3,VOL4,WAVCN,WCI,INC,WEIGHT,WM,INC,WM,MUL,DI 2500
1WL,INC,X,X1DAM,X1DAM4,X1LIM,X1M,X1W,X1DAM,X1DAM4,X1LIM,X1M,X1 2600
1LIM,X1L,X1Y,XKA,XKMS,XKML,XKMT,X1DAM,X1DAM,X1DAM,X1DAM,X1DAM,X1D 2700
1CF,XLCPS,XLCOS,XLCOS,XLCOR,XLMR,XLMR,XLMR,XLMR,XLMR,XLMR,XLMR,XLM 2800
1,Y1,Y1MA,Z,WAV,OC,X1DAM,X1DAM,X1DAM,X1DAM,X1DAM,X1DAM,X1DAM,X1D 2900
COMMON/4/ICAT,Y1INT,NHEEL,THETIM,LIMIT 3000
DIMENSION XIN(30),YIS(30,20),ZIS(30,20),YIST(2,20),ZIST(2,20), 3100
1ZINT(4,10),YINT(4,10),XBLK(4),NINT(4),NPIS(30),JRPIS(30,10), 3200
1JRPST(10),NPIS(12) 3300
COMMON XIS,YIS,ZIS,XBLK,YINT,ZINT,NPIS,NINT,YIS,ZIST,NPIS,JRPIS,DI 3400
1JRPST,INX,JSTAT,NSTAT,LSTAT,MSTAT,NBLK,LBLK,JCAT 3500
DATA(MULL=AMUTER,AMINER,AMHULL) 3600
COMMON/5/JSENU 3700
DATA(1ABIR=1M),1BLNK=1M 3800
INTR=STAT=1 3900
LMT2=MSTAT,LSTAT=NBLK=1 4000
2000 FORMAT(//61X'-- SHIP OFFSETS --') 4100
2009 FORMAT(4X,0207X,Y07(6X,0207X,Y0)/) 4200
2011 FORMAT(//48X'-- COMPARTMENT OFFSETS --') 4300
1004 FORMAT(1015) 4400
1010 FORMAT(2F10.2) 4500
2001 FORMAT(27X'COMPARTMENT SECTION DEFINITIONS// * NOTE- YINT= 9999OU 4600
1DENOTES HULL INTERSECTION//7X,ZINT= 9999 DENOTES TOP OF SHIP HULL*OU 4700
17X,ZINT=9999 DENOTES BOTTOM OF SHIP HULL*//) 4800
2002 FORMAT(//*NOTE- ASTERISK DENOTES BREAKPOINT*) 4900
2004 FORMAT(3X,PR,2,3X,PR,2) 5000
WRITE(6,2003) JSENU,NAME,1SENU,NAME1S 5100
2003 FORMAT(1SHIP SER. NO.*16 SHIP NAME=0000 COMP. SER. NO.*16 COU 5200
1MP, NAME=0000,/) 5300
WRITE(3,2001) 5400

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NPT = NINT(1)	OU	1900
2020 FORMAT(6X=HBLK,=P0.1,2(9X=HBLK,=P4.1))	OU	2000
2025 FORMAT(6X=ZINT,4X=VINT,2(7X=ZINT,4X=VINT))	OU	2100
WRITE(3,2020) (HBLK(J),J=1,NBLK)	OU	2200
WRITE(3,2025)	OU	2300
DO 2030 J = 1,NPT	OU	2400
2030 WRITE(3,2026) (ZINT(1,J),VINT(1,J),I=1,NBLK)	OU	2500
2026 FORMAT(2P0.1,2(3X=2P0.1))	OU	2600
WRITE(3,2002)	OU	2700
IFCT = 1	OU	2750
ICOUNT = 1	OU	2760
200 DO 600 ISTAT=1, LSTAT	OU	2800
JSTAT=KSTAT + ISTAT-2+KSTAT*(IFCT-1)	OU	2900
KSTAT=ISTAT+LSTAT*(IFCT-1)	OU	3000
NPT=NPT(JSTAT)	OU	3100
IF(NPT .LT. NPIS(KSTAT)) NPT = NPIS(KSTAT)	OU	3150
DO 300 I=1,20	OU	3200
KMP1(I)=10LNK	OU	3300
300 KMP2(I) = 10LNK	OU	3400
DO 330 I=1,10	OU	3500
IF(JMPKAK(JSTAT,I)) 320,320,310	OU	3600
310 JPT=JMPKAK(JSTAT,I)	OU	3700
KMP1(JPT)=10LNK	OU	3800
320 IF(JMPIS(KSTAT,I)) 330,330,320	OU	3900
330 JPT = JMPIS(KSTAT,I)	OU	4000
KMP2(JPT)=10LNK	OU	4100
330 CONTINUE	OU	4200
WRITE(6,3000)K(JSTAT), KIS(KSTAT),MULL(IFCT), MULL (3)	OU	4300
WRITE(6,3010) (Z(JSTAT,IPT), KMP1(IPT),V(JSTAT,IPT),ZIS(KSTAT,IPT)	OU	4400
I),KMP2(IPT),VJIS(KSTAT,IPT),IPT=1,NPT)	OU	4500
3000 FORMAT(10X=SHIP SECTION COMPART. SECTION#P0.2,= PT FROM	OU	4600
10M P0.13.2,= PT FROM P0.1/6X=20)K0V0)K0Z0)K0V0 10X=26)	OU	4700
3010 FORMAT(P0.2,2X,A1,P0.2,4X,P0.2,2X,A1,P0.2)	OU	4800
1020 FORMAT(10X=)	OU	4900
ICOUNT=ICOUNT+1	OU	5000
IF(ICOUNT .NE. 2) GO TO 600	OU	5100
ICOUNT=0	OU	5200
LYNT = LSTAT+JCAT	OU	5300
WRITE (6,3040)	OU	5400
600 CONTINUE	OU	5500
GO TO (670,620,430),JCAT	OU	5600
620 JCAT=3	OU	5700
IFCT=2	OU	5800
GO TO 200	OU	5900
630 JCAT = 2	OU	6000
670 RETURN	OU	6100
END	OU	7000

[illegible]

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GO 1000 J0111	MO	2400
J0111(2,0) = J0111(INDX1,0)	MO	2500
1000 J0111(INDX1,0) = 0	MO	2600
1000 (201	MO	2700
INT1	MO	2800
INT102	MO	2900
LA02	MO	3000
LA02	MO	3100
LA02	MO	3200
INDA101	MO	3300
INDA101	MO	3400
SMPL = 0.0000	MO	3500
AREL = 0.00000	MO	3600
GUNWALL = 0.00000	MO	3700
INT101(INDX1)	MO	3800
C DISCARD LAST POINT IF ZINT IS SAME AS SECOND TO LAST POINT	MO	3900
IF (ZINT(INDX1,0) - ZINT(INDX1,1) = 0) THEN	MO	4000
N = NPT101	MO	4100
C LOCATE LOWEST ZINT AND STORE INDEX IN INDA2	MO	4200
N = 0	MO	4300
IF (ZINT(INDX1,0) < ZINT(INDX1,1)) GO TO 10	MO	4400
N = 1	MO	4500
IF (ZINT(INDX1,1) < ZINT(INDX1,2)) THEN	MO	4600
N = 2	MO	4700
N11 INDA2 = 1	MO	4800
GO TO 1011	MO	4900
N12 INDA2 = 2	MO	5000
N13 INDA2 = 3	MO	5100
INT101	MO	5200
C DOES SMPL HAVE INNER AND OUTER HULL, YES TO 11, NO TO 10	MO	5300
GO TO 1111111111	MO	5400
C IF FIRST POINT IS ON HULL, THEN IT MUST BE ON OUTER HULL SINCE POINTS	MO	5500
C ARE TAKEN CLOCKWISE. IF IT IS NOT, IT IS FURTHER = 12	MO	5600
C	MO	5700
IF (ZINT(INDX1,0) < ZINT(INDX1,1)) THEN	MO	5800
C	MO	5900
C TEST DELTA ZINT OF FIRST 2 HULL INTERSECTIONS. IF ZINT(2) LESS	MO	6000
C THAN ZINT(1), INT. ON OUTER HULL. IF GREATER, INT. ON INNER HULL.	MO	6100
C	MO	6200
IF GO IS 0 THEN	MO	6300
IF (ZINT(INDX1,0) < ZINT(INDX1,1)) THEN	MO	6400
IF (ZINT(INDX1,1) < ZINT(INDX1,2)) THEN	MO	6500
IN INDA2	MO	6600
INT101	MO	6700
GO TO 10	MO	6800
IN CONTINUE	MO	6900
IN NPT101(INDA2)	MO	7000
C IF HIGH ZINT=9999 (TOP OF SECTION), EQUATE TO ACTUAL VALUE	MO	7100
IF (ZINT(INDX1,INDA2) < 9999) THEN	MO	7200
ZINT(INDX1,INDA2) = ZINT(INDX1,NPT1)	MO	7300
N101 = INDA2	MO	7400
IN J0111(INDA2) = 1	MO	7500
C	MO	7600
C IF LOW ZINT=9999 (BOTTOM OF SECTION), EQUATE TO ACTUAL VALUE	MO	7700
IF (ZINT(INDX1,INDA2) < 9999) THEN	MO	7800
ZINT(INDX1,INDA2) = ZINT(INDX1,NPT1)	MO	7900

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10	Z19(JSTAT,1)=Z19(IINDEX,1)	MO	7400
	V19(JSTAT,1)=V19(IINDEX,1)	MO	7500
	REP	MO	7600
	NWP=1	MO	7700
	GO TO 20	MO	7800
20	LN = 1	MO	7900
	GO TO 125	MO	8000
25	L2=L2+1	MO	8100
	L9=2	MO	8200
30	DO 500 I=INT(LMT)	MO	8300
	INDA=(LMT-I+1)*(LN-1)+I*(2-LN)	MO	8400
	INDA=INDA+I*(LN-1)+I*(2-LN)	MO	8500
	IF (.NOT. (VINT(LMUL,INDA).GE.SHELL .AND. (VINT(LMUL,INDA).GT.	MO	8600
	15HLL .OR. ZINT(LMUL,INDA).LE.APEPL)) GO TO 125	MO	8700
35	LWP = NWP	MO	8800
	LEK	MO	8900
	MONPRT (INDA)	MO	9000
	CALL TEST(ZINT(LMUL,INDA),Z19)	MO	9100
	LMT= NWP-LEK	MO	9200
	INT= LWP	MO	9300
	GO 120 I=INT(LMT)	MO	9400
	Z19(JSTAT,L2)=Z19(IINDEX,J)	MO	9500
	V19(JSTAT,L2)=V19(IINDEX,J)	MO	9600
	L2=L2+1	MO	9700
	GO 110 NO L2=1	MO	9800
	IF (JMOD(INDA,J)-J) 115,110,120	MO	9900
110	JMOD(JSTAT,L2)=L2-1	MO	10000
	L2=L2+1	MO	10100
115	L2=L2+1	MO	10200
	GO TO 120	MO	10300
115	CONTINUE	MO	10400
120	CONTINUE	MO	10500
	IF (INT(L2,LMT) GO TO 125	MO	10600
	Z19(JSTAT,L2)=ZINT(LMUL,INDA)+ZINT(LMUL,INDA)-ZINT(LMUL,INDA	MO	10700
	24)/2.0	MO	10800
	V19(JSTAT,L2) = VINT(Z19(JSTAT,L2))	MO	10900
	L2 = L2 + 1	MO	11000
125	INDA = INDA*(2-LN)+INDA*(LN-1)	MO	11100
	IF (JMOD(INDA,LN).NE.NP.0 .AND. (INDA.RQ.1 .OR. INDA.RQ.NP))	MO	11200
	1 GO TO 130	MO	11300
130	IF (ABS(ZINT(LMUL,INDA)-ZINT(LMUL,INDA))-1) 135,135,137	MO	11400
135	Z19(JSTAT,L2)=ZINT(LMUL,INDA)	MO	11500
	GO TO 138	MO	11600
137	Z19(JSTAT,L2)=(ZINT(LMUL,INDA)-ZINT(LMUL,INDA))/(XBL(LMUL	MO	11700
	2+1)-XBL(LMUL)*(X19(JSTAT)-XBL(LMUL)+ZINT(LMUL,INDA)	MO	11800
138	IF (VINT(LMUL,INDA).LT. SHELL) GO TO 145	MO	11900
140	V19(JSTAT,L2) = VINT(Z19(JSTAT,L2))	MO	12000
145	GO TO (24,450),LN	MO	12100
145	GO TO (175,180),JMOD	MO	12200
175	V19(JSTAT,L2) = VINT(LMUL,INDA)	MO	12300
	GO TO 144	MO	12400
180	IF (ABS(VINT(LMUL,INDA)-VINT(LMUL,INDA))-1) 140,190,200	MO	12500
190	V19(JSTAT,L2)=VINT(LMUL,INDA)	MO	12600
	GO TO 144	MO	12700
200	V19(JSTAT,L2)=(VINT(LMUL,INDA)-VINT(LMUL,INDA))/(XBL(LMUL	MO	12800
	2+1)-XBL(LMUL)*(X19(JSTAT)-XBL(LMUL)+VINT(LMUL,INDA)	MO	12900

GO TO 144	MD 13010
455 NPIS(JSTAT,1) = 0	MD 13100
460 L401	MD 13200
470 L201	MD 13300
IF (INT(1000*INDAT) .LT. 5000) GO TO 500	MD 13400
480 NPIS(JSTAT)	MD 13500
491 CALL TEST(ZINT(1000*INDAT),ZINT)	MD 13600
500 CONTINUE	MD 13700
NPIS(JSTAT) = 12-1	MD 13800
IF (INT(1000*ZINT(1000*INDAT)) = 9999.0)	MD 13900
GO TO (505,510,500),JCAT	MD 14000
505 GO TO (550,510),JCAT	MD 14100
510 JCAT=1	MD 14200
JSTAT,INTAT,STAT	MD 14300
INDAT=NPIS	MD 14400
IF (ABS(ZINT(1000*INDAT)-ZINT(1000*INDAT+1)) = .01) 530,540,520	MD 14500
530 INDAT=INDAT+1	MD 14600
540 INT=INDAT	MD 14700
INT=INDAT	MD 14800
INT=NPIS	MD 14900
L401	MD 15000
L201	MD 15100
L101	MD 15200
L402	MD 15300
GO TO (10,14),JCAT	MD 15400
550 JCAT=2	MD 15500
NPIS = NPIS(JSTAT)	MD 15600
GO 555 INT=NPIS	MD 15700
INDAT = NPIS+1	MD 15800
IF (ABS(ZINT(1000*INDAT)-ZINT(1000*INDAT+1)) = .01) 560,555,565	MD 15900
555 IF (1000*INDAT) = 550,555	MD 16000
560 CONTINUE	MD 16100
NPIS(JSTAT)=1	MD 16200
GO TO 550	MD 16300
565 IF (ABS(ZINT(1000*INDAT)-ZINT(1000*INDAT+1)) = .01) 567,562,564	MD 16400
567 NPIS(JSTAT)=INDAT	MD 16500
GO TO 550	MD 16600
562 NPIS(JSTAT)=INDAT+1	MD 16700
564 NPIS = NPIS(JSTAT) + 1	MD 16800
GO 555 INT = NPIS+2	MD 16900
555 ZINT(1000*INDAT) = 0.0	MD 17000
RETURN	MD 17100
END	

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SUBROUTINE OFFSET
  DIMENSION NDUMMY(64)
  DIMENSIONALWP3(20), AREA15(60,20), ANPAP4(60), AREA48(20,30), BML(20), DI
  BMT(20), CIALPH(20), CIP(20), CIWP(20), CINOPT(20), DATE(2), DISPL3(20), DI
  DWL(20), H(60), HICOMP(20), HINHON(60), H1MAN(60), H1OUT(20), H1SAG(60), HDI
  IZCOMP(20), ICOMP(2), JUREAK(60,10), JMAX(3), KMAX(2,3), KP(6), NAME(6), ND
  IAME15(6), NCOMP2(2,3,3), NP(60), PERM(16), PERM1(3)
  DIMENSIONPERM2(16), HAB(5,5,10), S(60,24), SPB(60), STRSHIP(20), STATNO(
  160), SECTIM(25), TCHIC(25), TCRS(5,5,10), TCO15(60,24), TCRS(60), THEYSD
  IM(10), TPI(20), THIM3(6), VCHIC(25), VCRS(4,4,10), VCO15(60,24), VCRS(60)
  10), VOL3(20), VOL15(5), VOLIC(25), WEIGHT(25), X(60), X1DAM(30), X1DAMR(180)
  1), X1DAM6(20), X2DAM6(20), X1W(25), X2DAM(30), X2DAM6(16)
  DIMENSIONKPS(60), XKU3(20), XKML(20), XKMT(20), XL1DAM(30,3), XLCMIC(250)
  1), XLCMT(20), XLCF(120), XLCOW(25), XLCOM(5), XMT1(20), Y(60,24), Y1(60)
  1, Z(60,24), Y1INT(4,30), THET3M(5)
  DIMENSION XLVH(24)
  COMMON/1/ALMA, A1WP, A1WP3, AREA15, AREA25, ANPAP5, HML, HMT, CIA, CIALPH, CD
  11H, CIC, CIP, CINOPT, CIWP, CONST, DATE, DISPL, DISPL3, DWL, H, H1MANC, H1COMPD
  1, H2COMP, HINHON, H1MAN, H1OUT, H1SAG, HPMAN, H3MAN, H4MAN, HW1, IIAFY, I1MAL, DI
  11PND, I1SYM, I1WC, I1WH, I1WL, I2WC, I2WH, I2WL, IUREAK, ICOMP, ICHEKV, INITD
  1, ISENTL, ISEKNO, ISTAT, ISOP, ITEST1, ITEST2, IY, JUREAK
  COMMON/2/JMAX, K, KK, KMAX, KP, KVOL, KW, MA, MAINIMUTT, NIDRPL, N1HEEL, N1LCOD
  1, N1PERM, N1TRIM, NAME, NAME15, NCOMP1, NCOMP2, NSTAT, NP, NSTAT, NSTAT1, NEO
  1TAT2, NSTAT3, NSTAT4, NWL, NWP, PERM, PERM1, PERM2, HAQ, S, 91SHIP, SPB, 93SHID
  1P, SPACE, STATNU, SECTIM, TCH, TCHIC, TCRS, TCO15, TCRS, THEYIM, THEYIT, THEO
  1TAT, THEYIM, TPI, THIM3, VCHIC, VCRS, VCO15, VCRS, VOL
  COMMON/3/VOLIC, VOLID, VOL3, VOL4, WAVCFN, WCIINC, WEIGHT, WHINC, WHIMUL, DI
  1WLINC, X, X1DAM, X1DAM2, X1LIM, X1M, X1W, X2DAM, X2DAM2, X2LIM, X2S, X3LIM, XDI
  14LIM, X11L, X11T, XKK, XKU3, XKML, XKMT, XL1DAM, XLHP, XLCR, XLCBIC, XLCR3, XLD
  1CF, XLCF3, XLCO, XLCOW, XLCOB, XLMBIR, XLHODA, XMID, XMOM1L, XMOMJV, XMT1, YDI
  1, Y1, Y1MA, Z, WAVOC, X1DAM6, X2DAM6, XLHODR, LABAL
  COMMON/4/ICAT, Y1INT, N3HEEL, THET3M, LIMIT
  IEOF = 999999
  IF (INIT) 1757, 1754, 1754
  1754 IF (ITEST1-3) 1749, 1749, 1749
  1755 DO 1756 ISTAT = 1, 60
  DO 1756 IPOINT = 1, 29
  1756 Z(ISTAT, IPOINT) = 999999.0
  1757 GO TO (5, 6), ITEST1
  6 ITEST2 = ISEKNO
  GO TO 300
  8 ITEST2 = IEOF
  IF (INIT) 300, 300, 130
  300 READ(30) ISENTL, NDUMMY, DUMMY2, DUMMY3, DUMMY, LMT
  IF (ISENTL - ITEST2) 319, 309, 320
  309 BACKSPACE 30
  IF (ITEST1-2) 318, 140, 310
  310 BACKSPACE 30
  READ(30) DUMMY2
  IF (INIT) 317, 130, 130
  320 IF (ISENTL - IEOF) 319, 315, 319
  319 DO 330 ISTAT = 1, LMT
  330 READ(30) DUMMY2
  GO TO 300
  140 READ(30) ISENTL, NAME, NSTAT, NP, XLBP, XMID, JDUMMY, LIMIT, KDUMMY
  DO 141 ISTAT = 1, LIMIT

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NPOINT = NP(ISTAT)                                OF 5400
READ (30)STATNO(ISTAT), X(ISTAT), Y(ISTAT, IPOINT), Z(ISTAT, IPOINT), OF 5500
LAREA(ISTAT, IPOINT), VCU(ISTAT, IPOINT), YCO(ISTAT, IPOINT), S(ISTAT, OF 5600
ZAT, IPOINT), IPOINT = 1, NPOINT), (JHREAK(ISTAT, IHREAK), IHREAK = 1, 10) OF 5700
141 H(MAR(ISTAT) = Z(ISTAT, NPOINT) - .25          OF 5800
    ICAT = JOUMMY                                    OF 5900
    IISYM = KOUMMY                                    OF 6000
    GO TO 7                                           OF 6100
130 DO 11 I = 1, 8                                    OF 6200
11 NAME(I) = NAME(9(I))                              OF 6300
    DO 12 ISTAT = 1, 60                              OF 6400
    NP(ISTAT) = 0                                      OF 6500
    DO 13 IHREAK = 1, 10                              OF 6600
13 JHREAK(ISTAT, IHREAK) = 0                          OF 6700
    ISTAT = 1                                         OF 6800
    READ (5,1)SPACF, ZSCALE, YSCALE                 OF 6900
    ZSCALE = ZSCALE*200.0                            OF 7000
    IF (ABS(YSCALE) - 0.00001) 9144, 9144, 9141     OF 7100
9143 YSCALE = YSCALE*200.0                            OF 7200
    GO TO 10                                           OF 7300
9144 YSCALE = ZSCALE                                  OF 7400
10 IZ = 1                                             OF 7500
    JHREAK(ISTAT, 1) = 1                             OF 7600
    IHREAK = 2                                         OF 7700
20 READ (5,2)STATNO(ISTAT), Y(ISTAT, IZ), Z(ISTAT, IZ), ITEST OF 7800
    Y(ISTAT, IZ) = Y(ISTAT, IZ)/YSCALE              OF 7900
    Z(ISTAT, IZ) = Z(ISTAT, IZ)/ZSCALE              OF 8000
    IF (ABS(Y(ISTAT, IZ)) - .1) 4254, 4254, 4257     OF 8100
4254 Y(ISTAT, IZ) = .1                               OF 8200
C 4257 IF (IZ-2) 20, 41, 20                          OF 8300
C 4257 IF (IZ-2) 20, 41, 20                          OF 8400
C 4257 IF (IZ-2) 20, 41, 20                          OF 8500
C 43 IF (ITEST) 12, 62, 70                            OF 8600
C 43 IF (ITEST) 12, 62, 70                            OF 8700
C 62 IF (Z(ISTAT, IZ) - 999999.0) 66, 66, 66        OF 8800
66 M = IZ - 1                                         OF 8900
    GO TO 61                                           OF 9000
64 M = IZ - 2                                         OF 9100
61 IF (Z(ISTAT, IZ) - Z(ISTAT, M) - ABS( Y(ISTAT, IZ) - Y(ISTAT, M) ) / 200.0) 90, 90 OF 9200
    1, 31                                             OF 9300
80 IF (IZ-2) 20, 41, 20                              OF 9400
41 Y(ISTAT, IZ-1) = Y(ISTAT, IZ)                   OF 9500
    Z(ISTAT, IZ-1) = Z(ISTAT, IZ)                   OF 9600
    GO TO 20                                           OF 9700
C 70 TEST IF LAST POINT IS AN INSERT                 OF 9800
C 70 IF (Z(ISTAT, IZ-1) - 999999.0) 701, 710, 701   OF 9900
C 70 TEST IF LAST POINT IS A BREAKPOINT              OF 10000
C 701 IF (JHREAK(ISTAT, IHREAK-1) - (IZ-1)) 702, 710, 702 OF 10100
C 701 TEST IF THE SLOPE OF A LINE BETWEEN THE LAST POINT AND THIS POINT OF 10200
C 701 IS GREATER THAN .005                          OF 10300
C 702 IF (IZ(ISTAT, IZ) - Z(ISTAT, IZ-1) - ABS( Y(ISTAT, IZ) - Y(ISTAT, IZ-1) ) OF 10400
    1) / 200.0) 701, 703, 710                       OF 10500
C 702 REPLACE THE LAST POINT WITH THIS POINT        OF 10600
C 703 Z(ISTAT, IZ-1) = Z(ISTAT, IZ)                 OF 10700
    Y(ISTAT, IZ-1) = Y(ISTAT, IZ)                   OF 10800
    Z(ISTAT, IZ) = 999999.0                         OF 10900

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	12 = 12 - 1	OF 11000
C	TEST OFFSET STATUS INDICATOR	OF 11100
700	IF (1TEST1 - 77777) 32.72.71	OF 11200
72	JBREAK(1STAT,1BREAK) = 12	OF 11300
	1BREAK = 1BREAK + 1	OF 11400
	IF (12/2) 32.73.31	OF 11500
13	12 = 12 + 2	OF 11600
	GO TO 20	OF 11700
C	TEST THE OFFSET STATUS INDICATOR	OF 11800
25	IF (1TEST1) 32.31.24	OF 11900
26	IF (1TEST1 - 77777) 32.31.27	OF 12000
27	IF (1TEST1 - 88888) 32.40.28	OF 12100
28	IF (1TEST1 - 99999) 32.51.32	OF 12200
C	ADD ONE TO POINT INDEX	OF 12300
31	12 = 12 + 1	OF 12400
	GO TO 20	OF 12500
71	IF (1TEST1 - 88888) 32.40.30	OF 12600
40	JBREAK(1STAT,1BREAK) = 12	OF 12700
42	NP(1STAT) = 12	OF 12800
	MIMAR(1STAT) = 7(1STAT,12) - .25	OF 12900
	X(1STAT) = STAINO(1STAT) * MPACK1	OF 13000
722	1STAT = 1STAT + 1	OF 13100
	GO TO 10	OF 13200
90	IF (1TEST1 - 99999) 32.51.32	OF 13300
91	JBREAK(1STAT,1BREAK) = 12	OF 13400
92	NP(1STAT) = 12	OF 13500
	NSTAT = 1STAT	OF 13600
	X(1STAT) = STAINO(1STAT) * MPACK1	OF 13700
	MIMAR(1STAT) = 7(1STAT,12) - .25	OF 13800
	IF (ICAT - 2) 33.33.33	OF 13900
334	ICAT = 3	OF 14000
	1STAT = 1STAT + 1	OF 14100
	LIMIT = 2 * NSTAT	OF 14200
	GO TO 10	OF 14300
339	ICAT = 2	OF 14400
	NSTAT = NSTAT / 2	OF 14500
	GO TO 346	OF 14600
333	LIMIT = NSTAT	OF 14700
344	DO 411 1STAT = 1, LIMIT	OF 14800
	IF (NP(1STAT) - 2) 7023, 7023, 7024	OF 14900
7024	WRITE (6, 806) (NAME(I), I = 1, N), 1SERNO, (DATE(I), I = 1, 2)	OF 15000
	WRITE (6, 7025) NP(1STAT), STAINO(1STAT)	OF 15100
	1STOP = 1	OF 15200
	GO TO 411	OF 15300
7029	FORMAT (1X, 13, 1)M POINTS ON STATIONPA.3, 5PM. THE MAXIMUM ALLOWED FOR	OF 15400
	15 29 - SEE INPUT INSTRUCTIONS/46M I CANNOT CHECK SLOPE BETWEEN BREF	OF 15500
	2AKPOINTS ON THIS STATION)	OF 15600
7023	DO 41 1BREAK = 2, 10	OF 15700
	JBRK1 = JBREAK(1STAT, 1BREAK)	OF 15800
	JBRK2 = JBREAK(1STAT, 1BREAK - 1)	OF 15900
	IF (JBRK1 - 1) 411, 411, 723	OF 16000
723	IF (2(1STAT, JBRK1) - 2(1STAT, JBRK2) - ARR(Y(1STAT, JBRK1) - Y(1STAT, JBRK2)	OF 16100
	1BK2 1) / 200.0192, 42, 41	OF 16200
41	CONTINUE	OF 16300
411	CONTINUE	OF 16400
	IF (INIT) 5140, 6000, 6000	OF 16500

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92 WRITE (6:806) (NAME(I), I=1,N), (SEHNO, (DATE(I), I=1,2) OF 16600
WRITE (6:93) STATNO(ISTAT), Z(ISTAT, JHAK) OF 16700
93 FORMAT(19H THE SHIP HAS A FLAT BOTTOM AT STATION FR.3.12H AND A Z OF 16800
107 FR.5.21H FT. ABOVE THE BASELINE/4TH THIS IS ILLFUAL-CANNOT PHUCOF 16900
22ED: CHECK INPUT INSTRUCTIONS) OF 17000
ISTOP = 1 OF 17100
IF (INIT) 5170:6000:6000 OF 17110
9000 READ (5:7) XLUP OF 17200
XMD = XLUP/2.0 OF 17300
WRITE (6:806) (NAME(I), I=1,8), (SEHNO, (DATE(I), I=1,2) OF 17400
WRITE (6:4000) OF 17500
WRITE (6:4000) OF 17600
4000 FORMAT(10H1ABLE OF OFFSETS - INPUT DATA/ OF 17700
1 71H THE FOLLOWING PAGES CONTAIN THE OFFSETS AS SUBMITTED IN THE DOF 17800
DATA DECK./ 74H HREAKPOINTS(SEE INPUT INSTRUCTIONS) ARE INDICATED ROF 17900
BY THE WORD HREAKPOINT. OF 18000
4 / 4TH THIS TABLE IS THE OUTPUT OF SUBROUTINE OFFSET. //) OF 18100
9000 FORMAT(18H DEFINITIONS AND UNITS ARE AS FOLLOWS./ 35H Z - HEIGHT OF 18200
1 IN FEET ABOVE BASELINE / 35H Y - HALF BREADTH IN FEET ) OF 18300
WRITE (6:806) (NAME(I), I=1,N), (SEHNO, (DATE(I), I=1,2) OF 18400
800 FORMAT(18HSHIP-4X800,4X18HSEHNOAL NUMBER-14,8X8HDATE-2A4/) OF 18500
WRITE (6:800) OF 18600
800 FORMAT(22H0TABLE OF OFFSETS-INPUT DATA//) OF 18700
XCOUNT = 6 OF 18800
DO 851 ISTAT = 1, LIMIT OF 18900
NPOINT = NP(ISTAT) OF 19000
KCOUNT = KCOUNT + 1 + NPOINT OF 19100
IF (KCOUNT - 60) 850, 850, 849 OF 19200
819 KCOUNT = 4 + NPOINT OF 19300
WRITE (6:806) (NAME(I), I=1,8), (SEHNO, (DATE(I), I=1,2) OF 19400
WRITE (6:800) OF 19500
890 IHREAK = 1 OF 19600
WRITE (6:846) STATNO(ISTAT), X(ISTAT) OF 19700
846 FORMAT(18H0STATNOF7.3,2X,7HLOCATEDFR.2.11H FT FROM FR/8X1H210X(HY) OF 19800
840 M1 = JHREAK(ISTAT, IHREAK) OF 19900
845 M2 = JHREAK(ISTAT, IHREAK+1) - 1 OF 20000
IF (M2-1) 9217, 818, 9417 OF 20100
9217 IF (M1-M2) 819, 819, 819 OF 20200
819 WRITE (6:801) (Z(ISTAT, IPOINT), Y(ISTAT, IPOINT), IPOINT = M1, M2) OF 20300
801 FORMAT(2F10.2) OF 20400
819 IF (JHREAK(ISTAT, IHREAK+1) - NP(ISTAT)) 820, 841, 820 OF 20500
820 WRITE (6:801) (Z(ISTAT, M2+1), Y(ISTAT, M2+1) OF 20600
8011 FORMAT(2F10.2, 12H HREAKPOINT) OF 20700
IHREAK = IHREAK + 1 OF 20800
M1 = JHREAK(ISTAT, IHREAK) + 1 OF 20900
IF (ABS( Z(ISTAT, M1) - 999999.0) - 0.0001) 847, 847, 845 OF 21000
847 M1 = M1 + 1 OF 21100
DO TO 845 OF 21200
8511 WRITE (6:801) Z(ISTAT, M2+1), Y(ISTAT, M2+1) OF 21300
851 CONTINUE OF 21400
IF (ISTOP-1) 5160, 804, 5150 OF 21500
5160 CALL TABLE OF 21600
DO 8163 I = 1, LIMIT OF 21601
INT = NP(I) + 1 OF 21602
DO 8163 J = INT, 20 OF 21603
5163 Z(I,J) = 0. OF 21604

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WRITE (30)ISERNO,(NAME(1),I=1,N),NSTAT,(NP(ISTAT),ISTAT=1,NO) 1,XOF 21700
ILRP,XMID,ICAT,LIMIT,ISYM OF 21800
DO 190 ISTAT = 1,LIMIT OF 21900
  NPOINT = NP(ISTAT) OF 22000
190 WRITE (30)STATNO(ISTAT),X(ISTAT),Y(ISTAT,IPPOINT),Z(ISTAT,IPPOINT)OF 22100
  1,AREAS(ISTAT,IPPOINT),VCOS(ISTAT,IPPOINT),TCOS(ISTAT,IPPOINT),S(ISTAT,IPPOINT),IPPOINT = 1,NPOINT),JHWEAK(ISTAT,JHWEAK),JHWEAK = 1,100F 22200
  3) OF 22300
  3) OF 22400
  WRITE (30)ISOF,(NAME(1),I=1,N),NSTAT,(NP(ISTAT),ISTAT=1,NO) 1,XOF 22500
  ILRP,XMID,ICAT,LIMIT,ISYM OF 22600
  7 NSTAT = NSTAT-1 OF 22700
  GO TO 5174 OF 22709
5171 DO 5172 I=1,N OF 22710
5172 NAME(I) = NAME(I) OF 22720
  GO TO 5174 OF 22760
5174 IF (N) 804,805,806 OF 22800
  804 WRITE (6,804)(NAME(I),I=1,N),ISERNO,(DATE(I),I=1,2) OF 22900
  WRITE (6,1000) OF 23000
  WRITE (6,2000) OF 23100
1000 FORMAT(1A)SHIP DATA TABLE / OF 23200
  1/1000 THE FOLLOWING PAGES CONTAIN THE SHIP DATA TABLE OF INTERPOLATED OF 23300
  2/1000 OFFSETS AND COMPUTED SECTIONAL AREAS, VCOS, / 300 HALF SECTION OF 23400
  3/1000 TCOS, AND HALF SECTION GIRTHS. THE TABLE IS THE OUTPUT OF SHIPROOF OF 23500
  4/1000 TIME TABLE. // 1000 DEFINITIONS AND UNITS ARE AS FOLLOWS. / OF 23600
  5 1/2 - HEIGHT IN FEET ABOVE BASELINE / 3/2 - HALF BREADTH OF 23700
  6 1/2 - FULL SECTION AREA IN SQUARE FEET / 1 OF 23800
2000 FORMAT(7H VCOS - VERTICAL CENTER OF GRAVITY OF SECTION AREA ABOVE OF 23900
  1 BASELINE IN FT. / 2/2 - TRANSVERSE CENTER OF GRAVITY OF OF 24000
  3/2 - HALF SECTION AREA MEASURED FROM THE CENTERLINE IN FT. / 4/2 - GIRTH OF 24100
  5/2 - HALF SECTION GIRTH IN FT. / 1 OF 24200
  WRITE (6,806)(NAME(I),I=1,N),ISERNO,(DATE(I),I=1,2) OF 24300
  WRITE (6,804) OF 24400
  804 FORMAT(10H)TABLE OF INTERPOLATED OFFSETS AND COMPUTED SECTIONAL OF 24500
  1/1000 AREAS, VCOS, GIRTHS, AND HALF SECTION TCOS // OF 24600
  KCOUNT = 0 OF 24700
  DO 860 ISTAT = 1,LIMIT OF 24800
    NPOINT = NP(ISTAT) OF 24900
    KCOUNT = KCOUNT + 1 + NPOINT OF 25000
    IF (KCOUNT - 60,860,860,860) OF 25100
  860 KCOUNT = 0 + NPOINT OF 25200
  WRITE (6,806)(NAME(I),I=1,N),ISERNO,(DATE(I),I=1,2) OF 25300
  WRITE (6,804) OF 25400
  860 WRITE (6,803)STATNO(ISTAT),X(ISTAT),Z(ISTAT,IPPOINT),Y(ISTAT,IPPOINT)OF 25500
  1,AREAS(ISTAT,IPPOINT),VCOS(ISTAT,IPPOINT),TCOS(ISTAT,IPPOINT),S(ISTAT,IPPOINT),IPPOINT = 1,NPOINT) OF 25600
  2(ISTAT,IPPOINT),IPPOINT = 1,NPOINT) OF 25700
  807 FORMAT(10H)STAT,ONF 7.3,2X, OF 25800
  1 7HLOCATED ON 2.11H FT FROM PP/4X1H210X1HY9X4HAROF 25900
  2E6X3HVCOS7X3H7C04X10H GIRTH /1A10.3) OF 26000
  3 FORMAT(10,2) OF 26100
  1 FORMAT(3F1A,3) OF 26200
  2 FORMAT(6.3,2E7.0,16) OF 26300
  809 NEWIND 30 OF 26400
  RETURN OF 26500
  815 WRITE (6,806)(NAME(I),I=1,N),ISERNO,(DATE(I),I=1,2) OF 26600
  WRITE (6,816) OF 26700
  GO TO 5170 OF 26800

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016 FORMAT (0000 SHIP IS NOT ON SHIP DATA TAPE. RUN WILL BE TERMINATED) OF 26900
1.) OF 27000
32 WRITE (6:000) (NAME(I), I = 1:4), (SENNO, (DATE(I), I = 1:2) OF 27100
WRITE (6:4) OF 27200
4 FORMAT(102H END CODE OF OFFSET CARD OTHER THAN BLANKS, 00000, 7770) OF 27300
177. 00000. ON 00000. CANNOT PROCEED, CHECK DATA) OF 27400
5170 17891 = 567 OF 27500
REWIND 10 OF 27600
RETURN OF 27600
END) OF 27700
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SUBROUTINE SECTN                                     SE 200
  DIMENSIONALWP3(20),ANFA15(60,29),ANFA29(60),ANFA45(20,30),RML(20),DI 200
  IMT(20),C1ALPH(20),C1P(20),C1WP(20),C1DOFT(20),UATF(20),DISPL3(20),DI 300
  LWL(20),H(60),HICOMP(20),HIMOD(60),HIMAR(60),HIOUT(20),H19AG(60),MOI 400
  IZCOMP(20),ICOMP(2),JHHEAK(60,10),JMAX(3),KMAX(2,3),KM(6),NAME(8),NDI 500
  IAME15(6),NCOMP2(2,3,3),NP(60),PERM1(6),PERM1(3) 600
  DIMENSIONPERM2(10),HAB(5,5,10),S(60,29),S2S(60),S3SHIP(20),STATNO(DI 700
  160),SECTIM(29),TCHIC(29),TCL55(5,5,10),TCUR(60,29),TCUP5(60),THET16DI 800
  IM(10),TPI(20),TRIM3(6),VCHIC(29),VCH5(5,5,10),VCO19(60,29),VCO2S(6DI 900
  10),VOL9(20),VO19(4),VOLIC(29),WEIGHT(29),X(60),XIDAM(30),XIDAMP(18DI 1000
  1),XIDAM2(20),X2DAM2(20),X1W(24),XPDAM(30),X2DAM2(18) 1100
  DIMENSIONK2S(4),KKH(20),KKML(20),KKMY(20),KL1UAM(10,3),KLCBIC(29DI 1200
  1),KLCB3(20),KLCF3(20),KLC01W(29),KLC05(6),KMT1(20),Y(60,29),Y1(60)DI 1300
  1,Z(60,29),Y1INT(4,30),IMPT3H(5) 1400
  DIMENSION KLVH(29) 1490
  COMMON/1/ALMA,A1WP,A1WPJ,AHEA19,ANFA29,ANFA45,RML,IMT,C1A,C1ALPH,CDI 1500
  1IH,C1C,C1P,C1DOFT,C1WP,CONST,DATAF,DISPL,DISPL3,UWL,H,HIMANC,HICOMPD 1600
  1,H2COMP,HIMOD,HIMAR,HIOUT,H19AG,HPMAR,H3MAR,HAMAH,HW},IAPT,IHAL,DI 1700
  1IIFWD,IISYM,I1WC,I1WH,I1WL,I2WC,I2WH,I2WL,IHHEAK,ICOMP,ICHEKV,INITDI 1800
  1,ISENCL,ISERN0,ISTAT,IS1OP,I1FST1,I1FST2,I1FST3,I1FST4,I1FST5,I1FST6 1900
  COMMON/2/JMAX,K,KK,KKMAX,KP,KVOL,KW,M,MAIN,IBUIT,N104PL,N1HREF,N1LCODI 2000
  1,N1PERM,N1TRIM,NAME,NAME19,NCOMP1,NCOMP2,NSTAT,NP,NSTAT,NSTAT1,NSDI 2100
  1,STAT2,NSTAT3,NSTAT4,NWL,NWP,PERM,PERM1,PERM2,HAB5,5,9,SHIP,S2S,S3SHIPDI 2200
  1P,NPACF,STATNO,SECTIM,TCH,TCCHIC,TCR9,TC019,TCUP5,THET1H,THET1Y,THEDI 2300
  1T1,THET3H,TPI,TRIM3,VCHIC,VCH5,VCO15,VCO2S,VOL 2400
  COMMON/3/VOLIC,VOL10,VOL3,VOL9,WAVCN,KC1INC,WEIGHT,WHINC,WHIMUL,DI 2500
  1WLINC,X,XIDAM,XIDAM2,X1LIM,X1M,X1W,X2DAM,X2DAM2,XPL1M,X2S,X3LIM,XDI 2600
  14LIM,X1L,X1Y,KK,KK3,KKML,KKMT,KL1DAM,KLWP,KLCB,KLCBIC,KLCB3,XLDI 2700
  1CF,KLCF3,KLC0,KLC01W,KLC05,KLMNH,KLMND,~XID,XMUM1,KMOM3V,KMT1,YDI 2800
  1,Y1,Y1MA,Z,WAV,OC,XIDAM2,X2DAM2,KLMRSH,IHAL 2900
  COMMON/4/ICAT,Y1INT,N3HEEL,IMPT3H,LIMIT 3000
  DIMENSION X15(10),Y15(30,29),Z15(30,29),Y15T(2,29),Z15T(2,29), 3100
  1Z1NT(4,10),Y1NT(4,10),XMLK(4),N1NT(4),NP19(30),JMP19(30,10), 3200
  2JMPST(2,10),NP15T(2) 3300
  COMMON X15,Y15,Z15,KLK,Y1NT,Z1NT,NP19,N1NT,Y15T,Z15T,NP15T,JMP15,DI 3400
  1JMPST,INDX,JSTAT,KSTAT,LSTAT,MSTAT,NMLK,LMLK,JCAT 3500
  FLINT(YA,YR,KA,KH,XI)=YA*(YM-YA)*(XI-KA)/(KH-KA) 3600
  C 37 600
  C FIND CLOSEST SHIP STATION TO COMPARTMENT STATION JSTAT 38 700
  LIM=NSTAT-1 39 800
  DO 10 JW=1,LIM 40 900
  DIS=(X(JW)-X15(JSTAT))/(X15(JSTAT)-X1JW) 41 1000
  C IF COMPARTMENT END MULKHEAD IS A SHIP STATION STORE PARA= 42 1100
  C METERS AND RETURN 43 1200
  IF (ANS(DIS)=.) 44 1210
  5 IF (DIS) 10,15,20 45 1300
  10 CONTINUE 46 1400
  C 47 1500
  19 ISTAT=KSTAT 48 1600
  KSTAT=JW+1 49 1700
  CALL STORE 50 1800
  KSTAT=ISTAT 51 1900
  GO TO(250,225,240),ICAT 52 2000
  C TO WHICH SHIP STATION IS COMPARTMENT STATION CLOSEST 53 2100
  20 IF (DIS=1.) 40,60,30 54 2200
  30 NCL05=JW 55 2300

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NPAR=JW+1	57	2400
GO TO 50	57	2500
40 NCLOS=JW+1	57	2600
NPAR=JW	57	2700
	57	2800
(	57	2900
INTERPOLATE HULL HEAD (COMPARTMENT STATION) KEEL HEIGHT	57	2900
AND KEEL OFFSET.	57	2910
(	57	2920
90 Z19(JSTAT,1)=PI INT(Z(NCLOS,1),Z(NPAR,1),X(NCLOS),X(NPAR),	57	3000
1X19(JSTAT,1))	57	3100
Y19(JSTAT,1)=PI INT(Y(NCLOS,1),Y(NPAR,1),X(NCLOS),X(NPAR),	57	3110
1X19(JSTAT,1))	57	3120
(	57	3200
CHECK ORDER OF NEIGHBORING STATIONS	57	3300
IF (NCLOS-NPAR) 55,56,70	57	3400
NEIGHBOR STATION IS FIRST, LAST OR DOUBLE STATION	57	3500
55 IF (NCLOS-1) 57,60,57	57	3600
57 IF (X(NCLOS)-X(NCLOS-1)) 58,60,60	57	3700
58 N1=NCLOS-1	57	3800
M1=N1	57	3900
N2=NCLOS	57	4000
N3=NPAR	57	4100
M2=N1	57	4200
GO TO 110	57	4300
60 IF (X(NPAR)-X(NPAR-1)) 61,100,65	57	4400
65 N1=NCLOS	57	4500
N2=NPAR	57	4600
M1=N2	57	4700
N3=NPAR+1	57	4800
M2=N1	57	4900
GO TO 110	57	5000
70 IF (NCLOS-NSTAT) 74,80,74	57	5100
74 IF (X(NCLOS)-X(NCLOS-1)) 77,80,77	57	5200
77 N1=NPAR	57	5300
M1=N1	57	5400
N2=NCLOS	57	5500
N3=NCLOS+1	57	5600
M2=N1	57	5700
GO TO 110	57	5800
80 IF (X(NPAR)-X(NPAR-1)) 85,90,85	57	5900
85 N1=NPAR-1	57	6000
M1=N1	57	6100
N2=NPAR	57	6200
M2=N2	57	6300
N3=NCLOS	57	6400
GO TO 110	57	6500
90 N1=NCLOS	57	6600
N2=NPAR	57	6700
GO TO 160	57	6800
100 N1=NPAR	57	6900
N2=NCLOS	57	7000
GO TO 160	57	7100
(	57	7200
C	57	7300
C	57	7400
C	57	7500
NORMAL CASE. QUADRATIC INTERPOLATION OF INTERMEDIATE OFFSETS.		
FIND FIRST POINT OF CLOSEST STATION WITH DRAFT GREATER THAN		
DRAFT OF FIRST POINTS OF BOTH NEIGHBORING STATIONS.		

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110 NPT=NP(NCLOS)
DO 120 J1ST=1,NPT
  IF (Z(INCLOS,J1ST)-Z(M1,1)) 120,120,110
115 IF (Z(INCLOS,J1ST)-Z(M2,1)) 120,120,110
120 CONTINUE
130 CALL CORP1(X(N1),X(N2),X(N3),X15(JSTAT))
  CPA=C1A
  C2B=C1B
  CPC=C1C
C
C   FOR EACH POINT ON CLOSEST STATION FIND OFFSETS OF POINTS AT
C   THE SAME DRAFT ON NEIGHBORING STATIONS.
C
C   USE THESE THREE POINTS TO INTERPOLATE AN OFFSET ON THE INTER-
C   MEDIATE CO RANIMENT STATION.
C
DO 150 JL=J1ST,NPT
  JJ=JL-J1ST+2
DO 140 ISTAT=N1,N3
  M1(ISTAT)=Z(INCLOS,JL)
140 CALL WPLAN1
  Z15(JSTAT,JJ)=Z(INCLOS,JL)
140 Y15(JSTAT,JJ)=C2A*Y1(N3)+C2B*Y1(N2)+C2C*Y1(N1)
  GO TO 210
C
C   EXCEPTIONAL CASE. ONLY TWO STATIONS AVAILABLE FOR INTERPOLA-
C   TION. USE LINEAR INTERPOLATION.
C
160 NPT=NP(NCLOS)
C
C   FIND FIRST POINT ON CLOSE STATION WITH DRAFT GT DRAFT OF FIRST
C   POINT ON DISTANT STATION.
C
DO 170 J1ST=1,NPT
  IF (Z(INCLOS,J1ST)-Z(NFAR,1)) 170,170,180
170 CONTINUE
C
C   FOR EACH POINT ON CLOSE STATION FIND OFFSET ON DISTANT STA-
C   TION USE THESE OFFSETS TO INTERPOLATE.
C
DO 200 JL=J1ST,NPT
  JJ=JL-J1ST+2
DO 190 ISTAT=N1,N2
  M1(ISTAT)=Z(INCLOS,JL)
190 CALL WPLAN1
  Z15(JSTAT,JJ)=Z(INCLOS,JL)
200 Y15(JSTAT,JJ)=PLINT(Y1(N1),Y1(N2),X(N1),X(N2),X15(JSTAT))
C
C   STORE BREAKPOINT TABLE FROM NEAREST STATION IN JBPIS
C
  JBPIS(JSTAT,1) = 1
210 DO 220 IRRK = 2,10
220 JBPIS(JSTAT,IRRK) = JBREAK(INCLOS,IRRK) - J1ST + 2
  NPIS(JSTAT) = NP(INCLOS) - J15 + 2
225 IF (ICAT=2) 230,230,240
230 ICAT=3

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SE 7600
SE 7700
SE 7800
SE 7900
SE 8000
SE 8100
SE 8130
SE 8140
SE 8150
SE 8200
SE 8300
SE 8400
SE 8500
SE 8600
SE 8700
SE 8800
SE 8900
SE 9000
SE 9100
SE 9200
SE 9300
SE 9400
SE 9500
SE 9600
SE 9700
SE 9800
SE 9900
SE 10000
SE 10100
SE 10200
SE 10300
SE 10400
SE 10500
SE 10600
SE 10700
SE 10800
SE 10900
SE 11000
SE 11100
SE 11200
SE 11300
SE 11400
SE 11500
SE 11600
SE 11700
SE 11800
SE 11900
SE 12000
SE 12100
SE 12200
SE 12210
SE 12300
SE 12400
SE 12500
SE 12600
SE 12700

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JSTAT=LBSTAT+JSTAT
KSTAT=NSTAT+KSTAT
JW=JW+NSTAT
GO TO 4
240 JSTAT=JSTAT-LBSTAT
KSTAT=KSTAT-NSTAT
ICAT=2
290 RETURN
END

SE 12800
SF 12900
SE 13000
SE 13100
SF 13200
SE 13300
SE 13400
SF 13500
SF 13600

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SUMHOUTINE STORE
DIMENSIONAL WP1(20),AHEA1S(60,29),ARFA29(40),ARFA49(20,30),HML(20),DI
10MT(20),C1ALPH(20),C1P(20),C1WP(20),C1DUPY(20),DATE(2),DISPLJ(20),DI
10WL(20),H1(60),H1COMP(20),H1MON(60),H1MAN(60),H1UUT(20),H1SAO(40),HDI
12COMP(20),1COMP(2),JHREAK(60,10),JMAX(3),KMAX(2,3),KP(8),NAME(8),NOI
1AME1S(8),NCOMP2(2,3,3),NP(60),PERM1(10),PERM1(3)
DIMENSION UNPERM2(10),NAB(5,5,10),S1(40,29),SPS(60),S19HIP(20),STATNO(0)
160),SECTIM(25),TCRIC(25),TCRS(4,5,10),TCO1S(60,29),TCO2S(60),THEY90)
1H1(10),TP1(20),THIM3(4),VCHIC(24),VCRS(4,5,10),VCO19(60,29),VCO2S(40)
10),VOLJ(20),VOLB(6),VOLIC(25),WEIGHT(24),X1(60),X1DAM(30),X1UAM2(10)
11,X1DAM6(20),X2DAM6(20),X1W(29),X2DAM(10),X2DAM2(10)
DIMENSION X2S(60),XKH3(20),XKML(20),XKMT(20),XLIUAM(30,3),XLCBIC(20)
1),XLCB3(20),XLCF3(20),XLCG1W(25),XLCG4(5),XMTI(20),Y1(60,29),Y1(60)
1,Z1(60,29),Y1INT(4,30),THEY13(5)
UIMENSION XLVH(25)
COMMON/1/ALMA,A1WP,A1WP2,AHEA1S,AHEA29,ARFA49,HML,MT,C1A,C1ALPH,C1
11H,C1C,C1P,C1DUPY,C1WP,CONST,DATE,DISPL,DISPL1,OWL,H,H1HAB,C,H1COMPDI
10HDCOMP,H1MON,H1MAN,H1UUT,H1SAO,H2MAN,H1MAN,HAMAN,H11APT,11MAL,DI
111FWD,11SYM,11WC,11WH,11WL,12WC,12WH,12WL,11HFAK,1COMP,1CHFK9,1N1TOI
11SENTL,1SERNO,1STAT,1S1OP,1TEST1,1TEST3,1Y,JHREAK
COMMON/2/JMAX,K,KK,KMAX,KP,KVOL,KW,M,MA,N1UUT,N1DISPL,N1HEFL,N1LGOO
1,N1PERM,N1THIM,NAME,NAME1S,NCOMP1,NCOMP2,N1NSTAT,NP,NSTAT,NSTAT1,NBOI
1TAT2,NSTAT3,NSTAT4,NWL,NWP,PERM,PERM1,PERM2,NAB,S,X1SHIP,SPS,S1HIPDI
1P,SPACE,STATNO,SECTIM,TCR,TCO1C,TCRS,TCO19,TCO2S,THEY1H,THEY1T,THEDI
1TAT,THEY1SH,TP1,THIM3,VCHIC,VCRS,VCO1S,VCO2S,VOL
COMMON/3/VOLIC,VOL10,VOL3,VOL9,WAVCFN,WC1INC,WEIGHT,WH1INC,WH1MUL,DI
1WL1INC,X,X1DAM,X1DAM2,X1LIM,X1M,X1W,X2DAM,X2UAM2,X2LIM,X29,X3LIM,XDI
14LIM,X11L,X11Y,XKH,XKH3,XKML,XKMT,X1DAM,XLHP,XLCB,XLCBIC,XLCB1,XLDI
1CF,XLCF3,XLCG,XLCG1W,XLCG5,XLMB1H,XLMMA,XMID,XMOM1L,XMOM3V,XMTI,YDI
1,Y1,Y1MA,Z,WAVLOC,X1DAM6,X2DAM6,XLMRPR,1AHAL
COMMON/4/ICAT,Y1INT,NJHREL,THEY13,LIMIT
DIMENSION X1H(10),Y1S(10,29),Z1S(30,29),Y1ST(2,29),Z1ST(2,29),
1ZINT(4,10),Y1INT(4,10),XBLK(4),N1INT(4),NP1S(30),JHP1S(30,10),
2JHPST(2,10),NP1ST(2)
COMMON X1S,Y1S,Z1S,XBLK,Y1INT,Z1INT,NP1S,N1INT,Y1S1,Z1ST,NP1ST,JHP1S,DI
1JHPST,1NDXJ,JSTAT,KSTAT,LSTAT,MSTAT,NBULK,LBULK,ICAT
NP1=NP(KSTAT)
NP1S(JSTAT)=NP1
DO 10 I=1,NP1
Y1H(JSTAT,I)=Y(KSTAT,I)
10 Z1S(JSTAT,I)=Z(KSTAT,I)
DO 20 I=1,10
20 JHP1S(JSTAT,I)=JHREAK(KSTAT,I)
RETURN
END

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BT	400
BT	300
BT	400
BT	600
DOI	400
DOI	300
HDI	400
HDI	600
DI	600
HDI	700
HDI	800
HDI	900
HDI	1000
DI	1100
HDI	1200
DI	1300
DI	1400
DI	1400
DI	1500
DI	1600
DI	1700
DI	1800
DI	1900
DI	2000
DI	2100
DI	2200
DI	2300
DI	2400
DI	2500
HDI	2600
DI	2700
DI	2800
DI	2900
DI	3000
HBT	3500
HBT	3600
BT	3700
BT	3800
BT	3900
BT	4000
BT	4100
BT	4200
BT	4300
HBT	4400
BT	4500
BT	4600
BT	4700
BT	4800
BT	4900
BT	5000
BT	5100
BT	5200
BT	5300
BT	5400
BT	5500
BT	5600

Line	Code	Statement	Column	Address
		SUBROUTINE STANTH		100
		DIMENSION BMOM(20)		101
		DIMENSION BMEAN(20)		102
		DIMENSION A1WP(20), AHEA1(10,24), AMFA2(10), AMFA4(20,30), BML(20), D1		103
		BM1(20), C1ALPH(20), C1P(20), C1WP(20), C1DIFT(20), UATF(2), D1SPLJ(20), D1		104
		DWL(20), M(60), M1COMP(20), M1MOD(60), M1MAH(10), M1OUT(20), M1S20(10), M1		105
		2COMP(20), 1COMP(2), JUREAK(60,10), JMAX(3), KMAX(2,3), KP(10), NAME(10), ND1		106
		NAME1(10), NCOMP(2,3,3), NP(60), PERM(10), PERM1(3)		107
		DIMENSION PERM2(10), MAG(5,5,10), S(10,24), SPB(60), S33M1P(20), STATNO(10)		108
		160), SFCTY1M(25), TC1C(25), TC1S(4,5,10), TC1P(60,24), TC1P(10), TMT1(10)		109
		M(10), TPI(20), TRIM3(6), VCH1C(24), VCHS(4,5,10), VCU1(10,24), VCP2(10)		110
		10), VOLJ(20), VOL4(4), VOL1C(25), W1(10), X(10), X1DAM(10), X1DAM2(10)		111
		1), X1DAM6(20), X2DAM(20), X1W(20), X2DAM(10), X2DAM2(10)		112
		DIMENSION X2(60), X2M3(20), X2M(20), X2MT(20), X1DAM(30,3), X1C1C(25)		113
		1), X1C1C(20), X1C1C(20), X1C1C(25), X1C1C(5), X2MT(20), Y(10,24), Y1(10)		114
		1,2(10,24), Y1INT(4,30), TMT1M(4)		115
		DIMENSION XLVR(20)		116
		COMMON/1/A1MA, A1WP, A1WP3, AHEA1, AMFA2, AMFA4, BML, BM1, C1A, C1ALPH, C1		117
		1M, C1C, C1P, C1DIFT, C1WP, CONST, DATE, D1SPL, D1SPL3, DWL, M, M1MAH, M1COMP		118
		1, M2COMP, M1MOD, M1MAH, M1OUT, M1S20, M2MAH, M2MAH, M2MAH, M2, 1APT, 1UAL, D1		119
		11PND, 11SYM, 11WC, 11WH, 11WL, 12WC, 12WH, 12WL, 1UREAK, 1COMP, 1CHK9, 1INTD1		120
		1, 1SENTL, 1SPRNO, 1STAT, 1STOP, 1TPT1, 1TPT2, 1Y, 1UREAK		121
		COMMON/2/JMAX, K, KX, KMAX, KP, KVOL, M, M1MAH, M1OUT, N1D1SPL, N1K1L, N1LCOD1		122
		1, N1PERM, N1TRIM, NAME, NAME1, NCOMP1, NCOMP2, NSTAT, NP, NSTAT, NSTAT1, NBD1		123
		1STAT2, NSTAT3, NSTAT4, NUL, NWP, PERM, PERM1, PERM2, MAG, S, S33M1P, SPB, S33M1D1		124
		1P, SPACE, STATNO, SECTION, TC1C, TC1C, TC1C, TC1C, TC1C, TC1C, TC1C, TC1C, TC1C, TC1C		125
		1T1, T1T1, T1T1, T1T1, T1T1, T1T1, T1T1, T1T1, T1T1, T1T1, T1T1, T1T1, T1T1, T1T1		126
		COMMON/3/VOL1C, VOL1D, VOL3, VOL4, WAVCPN, WC1INC, WE10HT, WH1INC, WH1ML, D1		127
		1WL1INC, X, X1DAM, X1DAM2, X1L1M, X1M, X1W, X2DAM, X2DAM2, X2L1M, X2S, X3L1M, X3D1		128
		14L1M, X3L1L, X3L1T, X3M, X3M3, X3ML, X3MT, X3DAM, X3LP, X3CR, X3C1C, X3C1C, X3D1		129
		1CF, X3CF3, X3CO, X3CO1W, X3CO5, X3M1H, X3M1DA, X3ID, X3MOM1L, X3MOM1V, X3T1, YD1		130
		1, Y1, Y1MA, Z, WAV, OC, X1DAM6, X2DAM6, X3M1H, X3M1DA, X3ID, X3MOM1L, X3MOM1V, X3T1, YD1		131
		COMMON/4/ICAT, Y1INT, N1M1L, TMT1M, LIMIT		132
7321	FORMAT(80H) THE FOLLOWING PAGES CONTAIN THE RESULTS OF LONGITUDINIST			133
	IAL STRENGTH CALCULATIONS.// 40 M THIS IS AN OUTPUT OF SUBROUTINE			134
	2 STANTH. //22 M UNITS AND DEFINITIONS //			135
	324 M BENDING MOMENT FT TONS /			136
	420 M BUOYANCY LONG TONS /			137
	531 M LOCATION FEET FROM PP)			138
7322	FORMAT(			139
	1404 SECTION MODULUS BENDING MOMENT/STRESS /			140
	224 M WEIGHT LONG TONS /			141
	3 74 M FOR DEFINITIONS OF WT ORD, BUOY ORD, BMEAN ORD, AND MOM ORD			142
	AND, SEE DOB 2400-1)			143
	WRITE (6,806) (NAME(1), 1 = 1,0), 1SPRNO, DATE(1), 1 = 1,2)			144
	WRITE (6,7321)			145
	WRITE (6,7322)			146
	WT3 = 0.0			147
	1CHK9 = 1			148
	IF (ABS(X(1)-X1W(1))-.1) 301,301,302			149
301	1CHK9 = 2			150
302	XMOM1L = 0.0			151
	DO 600 I = 1,NSTAT4			152
	WT3 = WT3 + W1(10MT(1))			153
600	XMOM31 = XMOM31 + WE10MT(1)*X1CO1W(1)			154

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      XLCN9 = XLCN
      XLCU = XMMHJL/WIJ
400 FORMAT(3H SHIP BALANCE USING LCN AS CALCULATED FROM WEIGHT INPUTS
1 WHICH IS P&2,
2 SHIPT FROM AMIDSHIPS (P FWD) )
800 FORMAT(10H SHIP-6XRA4-6X14H SERIAL NUMBER-19-6XRM DATE-2A4/)
      VOL10 = VOL10
      VOL10 = WT3*35.0
      IF(I1WC-1) 130,130.98
90      KW=1
      GO TO 99
130      KW=2
      GO TO 99
1234      KW = 1
      I1WL=1
      I1WH=1
      I1WC=1
99      DO 140 I2WC = 1,I1WC
      DO 135 I2WL = 1,I1WL
      DO 130 I2WH = 1,I1WH
      CALL WAVE
      KVOL=1
      I1AL=1
      CALL WAL
      XIW(ISTAT)=X(ISTAT)
7      IF (ABS(X(ISTAT) - XIW(ISTAT) - 1)) = .1) 9,9.7007
1007      IF (X(ISTAT) - XIW(ISTAT) - 1) 9,9.11
9      NSTAT=NSTAT+1
11      CONTINUE
C
      VOL1=0.0
      WT1=0.0
      XLCU1=0.0
      FACTR1=1000.0/VOL
      FACTR2=200.0/(VLUP*VOL/35.0)
      FACTR3=100.0*X1RP/VOL10
      KVOL=1
      CALL VOLUME
      WRITE (6,800) (NAME(I), I = 1,3), (SPRNO(I), I = 1,2)
      GO TO (1435,144,144),KW
109      WRITE (6,111)
111      FORMAT(/ 1H,
1          34H LONGITUDINAL STRENGTH CALCULATIONS , 10X
2          , 10H MOORING CONDITION )
      GO TO 113
1235      WRITE (6,1236)
1236      FORMAT(/ 1H,
1          34H LONGITUDINAL STRENGTH CALCULATIONS , 10X
2          , 10H STILL WATER )
      GO TO 115
116      WRITE (6,112)
112      FORMAT(/ 1H,
1          34H LONGITUDINAL STRENGTH CALCULATIONS , 10X
2          , 10H SAGGING CONDITION )
117      IF (KW1) 10,1A,17
16      WRITE (6,81) (MUL,WAVLOC,XLMRPR

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57 5700
 58 5800
 59 5900
 60 6000
 61 6100
 62 6200
 63 6300
 64 6400
 65 6500
 66 6600
 67 6700
 68 6800
 69 6900
 70 7000
 71 7100
 72 7200
 73 7300
 74 7400
 75 7500
 76 7600
 77 7700
 78 7800
 79 7900
 80 8000
 81 8100
 82 8200
 83 8300
 84 8400
 85 8500
 86 8600
 87 8700
 88 8800
 89 8900
 90 9000
 91 9100
 92 9200
 93 9300
 94 9400
 95 9500
 96 9600
 97 9700
 98 9800
 99 9900
 100 10000
 101 10100
 102 10200
 103 10300
 104 10400
 105 10500
 106 10600
 107 10700
 108 10800
 109 10900
 110 11000
 111 11100
 112 11200

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A  FORMAT(1H0,
1      17HWAVE HT.=1.15907*(LWP),2H*(,PB,2, 1H),BX
2      17HWAVE CENTER=,PB,2,
3      25HFT FROM AMIDSHIPS (,FWO),BX,17HWAVE LENGTH/XLWP=,PB,3)
GO TO 19
17  WRITE (6,3)WLMUL,WAVLOC,XLWP29
18  FORMAT(1H0,
1      17HWAVE HT.=LWP/20.0, 2H*(,PB,2, 1H),BX
2      17HWAVE CENTER=,PB,2,
3      25HFT FROM AMIDSHIPS (,FWO),BX,17HWAVE LENGTH/XLWP=,PB,3)
19  CONTINUE
C
WRITE (6,800)XLC0
991 CONTINUE
C
WRITE (6,3)
3  FORMAT(1H0,10H LOCATION,
10H WEIGHT ,
20H BUOY ,
30H SHEAR ,
40H BENDING MOMENT ,
50H WT. ORD ,
60H BUOY ORD ,
70H SHEAR ORD ,
80H MOM ORD ,
90H STRESS / )
C
ZERO=0.0
WRITE (6,9)X(1), ZERO,ZERO,ZERO,ZERO
5  FORMAT(1H ,P10,3,20X,
1 2P10,3,20X,2P10,3,P10,3)
C
88 DO 1 I = 1,NEK0,NSTAT4
IF(I-1)1990,1990,1991
1990 FACTR4 = XIW(I) - X(I)
GO TO 1992
1991 FACTR4 = XIW(I) - XIW(I-1)
1992 IF (ABS(WT) * WFLGHT(I)) = .00001) RA=RA+87
86 XLC0=XLC0IW(I)
GO TO 89
87 XLC0=(WT)*XLC0+WFLGHT(I)*XLC0IW(I)/(WT)*WEIGHT(I)
89 WT=WT+WFLGHT(I)
XLC02=XIW(I)-(X(I)*FWO)*XLWP/20.0-XLC01
XLC02=XIW(I)-XLC01C(I)
SHEAR= WT-VOL(C(I)/35.0
SHEAR(I)=FACTR4*SHEAR
BMOM(I)=WT*XLC02-VOL(C(I)*XLC02/20.0
BMOM=BMOM(I)*FACTR4
VOL2=(VOL(C(I))-VOL1)/35.0
VOL1=VOL(C(I)
VOL2 = FACTR4*VOL2/FACTR4
WT1ORD = FACTR4*WEIGHT(I)/FACTR4
IF (ABS(SECTM(I)) = .000001) RA3=RA3+89
889 STRESS=BMOM(I)/SECTM(I)
WRITE (6,999)WFLGHT(I), VOL2, WT1ORD, VOL2, XIW(I),SHEAR,BMOM(I),ST
1MEAR(I), BMOM,STRESS

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865 FORMAT(1H 10XZF10.3,30XZF10.2/1H F10.3,20XZF15.3,20XZF10.3,F10.3) ST 16400
GO TO 1 ST 17000
863 WRITE (6,555)W10M1(1), VOL2, W10RD, VOL4, X1W(1), SHEAR, MMOM(1) ST 17100
1. SHEAR(1), MMOM ST 17200
1 CONTINUE ST 17300
864 VOL1=VOL1/33.0 ST 17400
WRITE (6,143)W11=VOL1 ST 17500
143 FORMAT(// 7H TOTALS 4XZF10.3) ST 17600
NSTAT8 = 2 ST 17700
NSTAT9 = NSTAT8-1 ST 17800
910 DO 700 I = NSTAT8,NSTAT9 ST 17900
IF (ABS(SHEAR(1)) = .00001) 702,702,701 ST 18000
701 IF (ABS(ABS(SHEAR(1)) * ABS(SHEAR(1) * 1) - ABS(SHEAR(1) * SHEAR ST 18100
1W1(1) * 1)) = .000001) 700,700,701 ST 18200
700 CONTINUE ST 18300
GO TO 130 ST 18400
703 X7MOM=X1W(1)*(X1W(1+1)-X1W(1)) + ABS(SHEAR(1))/ABS(SHEAR(1))-SHEAR ST 18500
11(1+1)) ST 18600
70 CALLCOEF11 (X1W(1-1),X1W(1),X1W(1+1),X7MOM) ST 18700
MMOM8=PINTP2(MMOM(1),MMOM(1+1),MMOM(1-1)) ST 18800
GO TO 707 ST 18900
706 MMOM8=MMOM(1) ST 19000
X7MOM=X1W(1) ST 19100
707 WRITE (6,708)MMOM8,X7MOM ST 19200
708 FORMAT(// 22H MOMENT AT ZERO SHEAR=F14.3,10H LOCATED .F10.3, ST 19300
126H FT FROM FWD PERPENDICULAR) ST 19400
NSTAT8 = 10 ST 19500
IF (NSTAT8-NSTAT9) 910,130,130 ST 19600
130 CONTINUE ST 19700
GO TO (137,98,1234),KW ST 19800
137 XLCU = XLC09 ST 19900
RETURN ST 20000
END ST 20100

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SUMMARY TABLE

		TA	200
	DIMENSIONAL WP1(20), AREA1(10,20), AREA2(10), AREA3(20,10), BML(20), DI		200
	IMMT(20), CIALPH(20), CIP(20), CWP(20), CIPDT(20), DATE(2), DISPL3(20), DI		300
	UDWL(20), H(10), HICOMP(20), HINON(10), HIMAN(10), H1OUT(20), H1A0(10), MDI		400
	ICOMP(20), ICOMP(2), JUREAK(10,10), JMAX(2), KMAX(2,2), KP(10), NAME(10), NDI		500
	NAME1(10), NCOMP(2,2,2), NP(10), PERM1(10), PERM1(2)		600
	DIMENSION PERMP(10), MAS(10,10), S(10,20), SPS(10), S3SHIP(20), STATNO(10)		700
	100), SECTIM(20), TCRIC(20), TCHS(10,10), TCOIS(10,20), TCOIS(10), THEYSDI		800
	IM(10), TP(20), TRIM(10), VCRIC(20), VCRS(10,10), VCOIS(10,20), VCOIS(10)		900
	10), VOL1(20), VOL1(10), VOLIC(20), WEIGHT(20), X(10), X1DAM(10), X1DAM2(10)		1000
	1), X1DAM3(20), X2DAM(20), X1W(20), X2DAM(20), X2DAM2(10)		1100
	DIMENSION XPS(10), XKB3(20), XKML(20), XKMT(20), X1DAM(30,2), XLCBIC(20)		1200
	1), XLCB3(20), XLCF3(20), XLCB1W(20), XLCB1(10), XMT1(20), Y(10,20), Y1(10)		1300
	1, Z(10,20), Y1INT(10,30), THEYTH(10)		1400
	DIMENSION XLVH(20)		1490
	COMMON/1/ALMA, AWP, AWP3, AREA1, AREA2, AREA3, BML, IMMT, CIALPH, CIP		1500
	10, CIP, CIPDT, CWP, CONST, DATE, DISPL, DISPL3, UWL, H, HINASC, HICOMP		1600
	1, HSCOMP, HINON, HIMAN, H1OUT, H1A0, HPMAN, H3MAN, H4MAN, HW1, IIAFT, IIAL, DI		1700
	11, FND, IISYM, I1WC, I1WH, I1WL, I2WC, I2WH, I2WL, IUREAK, ICOMP, ICHFK, IN1TO		1800
	1, ISENT, ISEHNO, ISTAT, ISTOP, ITEST1, ITEST3, IY, JUREAK		1900
	COMMON/2/JMAX, K, KK, KMAX, KP, KVOL, KW, H, HMAN, INUTT, NINSP, NINEEL, NILCOO		2000
	1, N1PERM, N1TRIM, NAME, NAME1, NCOMP1, NCOMP2, N1STAT, NP, NSTAT, NSTAT1, NBO		2100
	1, TAT2, NSTAT3, NSTAT4, NUL, NWP, PERM1, PERM2, MAS, S, S1SHIP, SPS, S1SHI		2200
	1, P, RSPACE, STATNO, SECTIM, TCR, TCRIC, TCRH, TCOIS, TCOIS, THEYTH, THEYTY, THEO		2300
	1, TAT, THEYTH, TP1, TRIM3, VCOIC, VCRS, VCOIS, VCOIS, VOL		2400
	COMMON/3/VOLIC, VOL10, VOL3, VOL4, WAVECN, WCIINC, WEIGHT, WHINC, WH1MUL, O		2500
	1, WLINC, X, X1DAM, X1DAM2, X1LIM, X1M, X1W, X2DAM, X2DAM2, X2LIM, X2S, X2LIM, X		2600
	1, L1M, X1L, X1T, XKB, XKB3, XKML, XKMT, X1DAM, X1LP, XLCB, XLCBIC, XLCB3, XLO		2700
	1, CP, XLCF3, XLCO, XLCOW, XLCOH, XLCOH, XLCOH, X1DAM, X1DAM2, X1DAM3, X1DAM4, X1DAM5, X1DAM6, X1DAM7, X1DAM8, X1DAM9, X1DAM10, X1DAM11, X1DAM12, X1DAM13, X1DAM14, X1DAM15, X1DAM16, X1DAM17, X1DAM18, X1DAM19, X1DAM20, X1DAM21, X1DAM22, X1DAM23, X1DAM24, X1DAM25, X1DAM26, X1DAM27, X1DAM28, X1DAM29, X1DAM30, X1DAM31, X1DAM32, X1DAM33, X1DAM34, X1DAM35, X1DAM36, X1DAM37, X1DAM38, X1DAM39, X1DAM40, X1DAM41, X1DAM42, X1DAM43, X1DAM44, X1DAM45, X1DAM46, X1DAM47, X1DAM48, X1DAM49, X1DAM50, X1DAM51, X1DAM52, X1DAM53, X1DAM54, X1DAM55, X1DAM56, X1DAM57, X1DAM58, X1DAM59, X1DAM60, X1DAM61, X1DAM62, X1DAM63, X1DAM64, X1DAM65, X1DAM66, X1DAM67, X1DAM68, X1DAM69, X1DAM70, X1DAM71, X1DAM72, X1DAM73, X1DAM74, X1DAM75, X1DAM76, X1DAM77, X1DAM78, X1DAM79, X1DAM80, X1DAM81, X1DAM82, X1DAM83, X1DAM84, X1DAM85, X1DAM86, X1DAM87, X1DAM88, X1DAM89, X1DAM90, X1DAM91, X1DAM92, X1DAM93, X1DAM94, X1DAM95, X1DAM96, X1DAM97, X1DAM98, X1DAM99, X1DAM100, X1DAM101, X1DAM102, X1DAM103, X1DAM104, X1DAM105, X1DAM106, X1DAM107, X1DAM108, X1DAM109, X1DAM110, X1DAM111, X1DAM112, X1DAM113, X1DAM114, X1DAM115, X1DAM116, X1DAM117, X1DAM118, X1DAM119, X1DAM120, X1DAM121, X1DAM122, X1DAM123, X1DAM124, X1DAM125, X1DAM126, X1DAM127, X1DAM128, X1DAM129, X1DAM130, X1DAM131, X1DAM132, X1DAM133, X1DAM134, X1DAM135, X1DAM136, X1DAM137, X1DAM138, X1DAM139, X1DAM140, X1DAM141, X1DAM142, X1DAM143, X1DAM144, X1DAM145, X1DAM146, X1DAM147, X1DAM148, X1DAM149, X1DAM150, X1DAM151, X1DAM152, X1DAM153, X1DAM154, X1DAM155, X1DAM156, X1DAM157, X1DAM158, X1DAM159, X1DAM160, X1DAM161, X1DAM162, X1DAM163, X1DAM164, X1DAM165, X1DAM166, X1DAM167, X1DAM168, X1DAM169, X1DAM170, X1DAM171, X1DAM172, X1DAM173, X1DAM174, X1DAM175, X1DAM176, X1DAM177, X1DAM178, X1DAM179, X1DAM180, X1DAM181, X1DAM182, X1DAM183, X1DAM184, X1DAM185, X1DAM186, X1DAM187, X1DAM188, X1DAM189, X1DAM190, X1DAM191, X1DAM192, X1DAM193, X1DAM194, X1DAM195, X1DAM196, X1DAM197, X1DAM198, X1DAM199, X1DAM200, X1DAM201, X1DAM202, X1DAM203, X1DAM204, X1DAM205, X1DAM206, X1DAM207, X1DAM208, X1DAM209, X1DAM210, X1DAM211, X1DAM212, X1DAM213, X1DAM214, X1DAM215, X1DAM216, X1DAM217, X1DAM218, X1DAM219, X1DAM220, X1DAM221, X1DAM222, X1DAM223, X1DAM224, X1DAM225, X1DAM226, X1DAM227, X1DAM228, X1DAM229, X1DAM230, X1DAM231, X1DAM232, X1DAM233, X1DAM234, X1DAM235, X1DAM236, X1DAM237, X1DAM238, X1DAM239, X1DAM240, X1DAM241, X1DAM242, X1DAM243, X1DAM244, X1DAM245, X1DAM246, X1DAM247, X1DAM248, X1DAM249, X1DAM250, X1DAM251, X1DAM252, X1DAM253, X1DAM254, X1DAM255, X1DAM256, X1DAM257, X1DAM258, X1DAM259, X1DAM260, X1DAM261, X1DAM262, X1DAM263, X1DAM264, X1DAM265, X1DAM266, X1DAM267, X1DAM268, X1DAM269, X1DAM270, X1DAM271, X1DAM272, X1DAM273, X1DAM274, X1DAM275, X1DAM276, X1DAM277, X1DAM278, X1DAM279, X1DAM280, X1DAM281, X1DAM282, X1DAM283, X1DAM284, X1DAM285, X1DAM286, X1DAM287, X1DAM288, X1DAM289, X1DAM290, X1DAM291, X1DAM292, X1DAM293, X1DAM294, X1DAM295, X1DAM296, X1DAM297, X1DAM298, X1DAM299, X1DAM300, X1DAM301, X1DAM302, X1DAM303, X1DAM304, X1DAM305, X1DAM306, 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07/31/67

	00 TO 90		YA 9800
C		LOGIC SECTION 00	YA 9900
	10 M=1Y		YA 4000
	ITERST=0		YA 4100
	00 TO 90		YA 4200
C		LOGIC SECTION 01	YA 4300
	40 M=1Y-1		YA 4400
	ITERST=1		YA 4500
	40 CALL CORPIC		YA 4600
C		LOGIC SECTION 02	YA 4700
	CALL WETRRP		YA 4800
C		LOGIC SECTION 10	YA 4900
	MM=1Y		YA 7000
	MMM=1Y+1		YA 7100
	ITERST=0		YA 7200
	SPACE=(Z(ISTAT,MMM)-Z(ISTAT,MM))/2.0		YA 7300
	ZIM=Z(ISTAT,MM)+SPACE		YA 7400
	YIM=FINIP1(ZIM,C1A,C1M,C1C)		YA 7500
C		LOGIC SECTION 11	YA 7600
	70 AREA19(ISTAT,MMM) = (FIN(0)(Y(ISTAT,MM)+YIM+Y(ISTAT,MMM)+SPACE*2.0/	YA 7700	
	13.0) + AREA19(ISTAT,MM)	YA 7800	
	IF (AREA19(ISTAT,MMM)) 72,72,71	YA 7900	
	72 TCO19(ISTAT,MMM) = 0.0	YA 8000	
	AREA19(ISTAT,MMM) = 0.0	YA 8100	
	VC019(ISTAT,MMM) = 0.0	YA 8200	
	00 TO 00	YA 8300	
	71 TCO19(ISTAT,MMM) = (FIN(0)(Y(ISTAT,MM)+YIM+Y(ISTAT,MMM)+SPACE*2.0/	YA 8400	
	13.0) + AREA19(ISTAT,MM)+TCO19(ISTAT,MM))/AREA19(ISTAT,MMM)	YA 8500	
	VC019(ISTAT,MMM) = (FIN(0)(Y(ISTAT,MM)+YIM+Y(ISTAT,MMM)+SPACE*2.0/13.0) + AREA19(ISTAT,MM)+VC019(ISTAT,MM))/AREA19(ISTAT,MMM)	YA 8600	
	2M)/AREA19(ISTAT,MMM)	YA 8700	
C		LOGIC SECTION 12	YA 8800
	44 IF (ITERST) 90,44,10	YA 8900	
C		LOGIC SECTION 13	YA 9000
	40 ITERST=1	YA 9100	
	MMM = 1Y + 2	YA 9200	
	YIM=V(ISTAT,1Y+1)	YA 9300	
	ZIM = Z(ISTAT,1Y+1)	YA 9400	
	SPACE = ZIM-Z(ISTAT,MM)	YA 9500	
	00 TO 70	YA 9600	
C		LOGIC SECTION 14	YA 9700
	10 CONTINUE	YA 9800	
	RETURN	YA 9900	
C		LOGIC SECTION 15	YA 10000
	90 STOP 3333	YA 10100	
	END	YA 10200	
		YA 10300	

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DOCUMENT CONTROL DATA R & D

M. Rosenblatt & Son, Inc.
Naval Architects & Marine Engineers
350 Broadway, New York, N.Y. 10013

Unclassified

None

Damage Stability System for the Ship Hull Characteristics Program

None

None

May 1967

222

None

Tag 16 025 A

RSD-1718-2A

0. The following information is provided for the purpose of this report.

None

None

U. S. Coast Guard
1400 I Street NW
Washington, D. C. 20591

The Damage Stability system for the Ship Hull Characteristics Program (SDCP) consists of two major supervisor programs.

A. Subroutine COMPUSP. This program supervises the generation of compartment offsets for the compartment bulkheads and all intermediate ship stations that lie within the bounds of the compartment, based on an outline description of each bulkhead. A Compartment Data Table (CDT), similar in form to the Ship Data Table (SDT), of offsets, sectional areas, centers of area, and breddpoint, is then created and stored on the Ship Data Tape (SDTT) for later recall by Subroutine DAMAG.

B. Subroutine DAMAG. This program supervises the calculation of damage stability characteristics of the ship minus selected flooded compartments for a range of draft, trim, and heel conditions. The sequence of events for each condition of compartments, draft, trim, and heel is as follows:

1. The SDT is read from the SDTT.
2. The volumetric properties of the intact ship are calculated.
3. For each selected compartment, the associated CDT is read from the SDTT and the volumetric properties of the compartment are calculated and stored.
4. The net volumetric properties and the righting arm for the ship minus compartments, i.e., the flooded condition, is computed and output for the condition is printed out.

UNCLASSIFIED
Security Classification

SHIP NAME	SHIP A		SHIP B		SHIP C	
	NO. OF	WT	NO. OF	WT	NO. OF	WT
DAMAGE STABILITY						
SHIP'S						
HULL						
COMPUTER PROGRAM						
SHIP DESIGN						