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**INTERACTIVE MIDSHIP SECTION
ANALYSIS PROGRAM UTILIZING
BOTH GRAPHICS AND
DIGITIZER INPUT
SPIRAL MODULE MIDSHIP
User's Manual**

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**THE UNIVERSITY OF MICHIGAN
COLLEGE OF ENGINEERING**

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Interactive Midship
Section Analysis Program
Utilizing Both Graphics
and Digitizer Input

SPIRAL MODULE MIDSHIP

User's Manual

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ABSTRACT

This module will analyze the structural midship section of a vessel once the user has inputted all flat and curved plate sections along with all longitudinal stiffeners. Input is done by utilizing the graphics terminal and/or the digitizer. Along with the calculation of the following section properties: half section cross sectional area, section neutral axis location, section moment of inertia, and the section modulus of any point on the section, the module will also calculate the A.B.S. required section modulus.

Introduction

This module is designed to provide the naval architect with a fast and convenient method for analyzing the longitudinal structural midship section of a vessel.

Operation of the module allows the user to specify all structural members by using the graphics terminal and/or the digitizer. If necessary, the midship section can be edited in many ways to allow for corrections or modification. Once the midship section is specified the program can then be prompted to calculate the section moment of inertia and section modulus at any point of the section along with other structural properties. The module will also calculate the A.B.S. required section modulus.

Output from the program is of two forms. Calcomp plots of the midship section are the first type of output. The second type is terminal or line printer listings of all input data and calculation results.

The module will allow the user to store all data of the midship section in a database for later use.

The user should follow all prompts of the program since they were designed to allow an unfamiliar user to readily utilize this module. These prompting messages will be displayed at the top of the screen, in general, but during data input additional instructions will be printed at the bottom of the screen.

Running the Module

This program is run by beginning the SPIRAL module MIDSHIP. This is done with the following commands:

```
RUN XXXX:SPIRAL T=4      (Where XXXX is the account ID - something that
                          may be changed occasionally)
-then when prompted for an item
    from DEX.MAIN
&BEGIN MIDSHIP
```

The program will now ask if the user is on a graphics terminal. This program should be run on a graphics terminal, if the user is not on a graphics terminal the program will allow only limited menu selection. Next the program will prompt the user for an item from the standard SPIRAL MOD.MAIN menu. A description of all menu choices will follow this discussion. The user should refer to the figures 1-4 where all module menus are listed.

An important aspect of the program is the screen display shown in figure 2 and described below.

Screen Display

The graphics terminal is used to display all input and most of the output information. The screen display used by the program is divided into six regions as shown in figure 2. These regions are described below:

- 1) Drawing Region - This region utilizes a major portion of the display. The users midship section will be drawn and/or displayed in this space. A pair of labeled drawing axes will be kept in this region to aid the user in drawing his section to scale.
- 2) Menu Region - A drawing menu occupies the upper right portion of the display. This menu provides the user with a list of functions to select from while doing graphic input. A selection from this menu is made by placing the terminal cursors over the box opposite the desired menu item and hitting the return key twice.

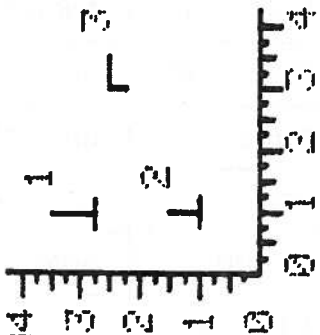
- 3) Prompting Region - This space is reserved for prompting messages and for output information. Additional prompting cues may be displayed in the drawing region.
- 4) Section Store - If the user needs to reproduce a longitudinal section shape on the midship drawing, he may use this region to store the different longitudinal shapes, and recall them later for placement on the midship section. The section store includes a set of labeled axes to assist the user in accurately scaling his sections.
- 5) Title Region - This space is reserved for the drawing title which the user will be prompted for by the program.
- 6) Scale Region - The drawing scaled is printed in this space corresponding to the user's choice of drawing axes scale.

```
&display mod continue
&
+-----+-----+-----+-----+-----+-----+
&  + MENU   + MENU   + MENU   + MENU   + MENU   + MENU   +
&  + ANSWER + MOD.MAIN + INPUT  + MODIFY  + TYPE   + COMPUTE +
&  +-----+-----+-----+-----+-----+-----+
&  1 + YES    + ENTER-DB + ALL    + YES    + GRAPHIC + ALL    +
&  +-----+-----+-----+-----+-----+-----+
&  2 + NO     + INPUT   + GRAPHIC + NO     + DIGITAL + INERTIA +
&  +-----+-----+-----+-----+-----+-----+
&  3 +       + DEFAULT + DIGITAL +       +       + SECMOD  +
&  +-----+-----+-----+-----+-----+-----+
&  4 +       + COMPUTE + DONE   +       +       + REQ.SM  +
&  +-----+-----+-----+-----+-----+-----+
&  5 +       + FILL-DB +       +       +       +       +
&  +-----+-----+-----+-----+-----+-----+
&  6 +       + PRINT  +       +       +       +       +
&  +-----+-----+-----+-----+-----+-----+
&  7 +       + SEND   +       +       +       +       +
&  +-----+-----+-----+-----+-----+-----+
&  8 +       + DRAW   +       +       +       +       +
&  +-----+-----+-----+-----+-----+-----+
&  9 +       + SAVE   +       +       +       +       +
&  +-----+-----+-----+-----+-----+-----+
& 10 +       + STOP   +       +       +       +       +
&  +-----+-----+-----+-----+-----+-----+
&  +-----+-----+
&  + MENU   +
&  + PRINT  +
&  +-----+-----+
&  1 + ALL    +
&  +-----+-----+
&  2 + RESULTS +
&  +-----+-----+
&  3 + LISTING +
&  +-----+-----+
&  4 + SECMOD  +
&  +-----+-----+
&  5 + INERTIA +
&  +-----+-----+
&  6 + REQ.SM  +
&  +-----+-----+
?
?Enter item from menu: MOD.MAIN
?
```

Fig. No. 1 - Listing of All SPIRAL menus.

DRAWING MENU
 EDIT
 GO TO COOR
 WHERE AM I?
 REDRAW
 FLAT PLATE
 CURVE PLATE
 STORE
 RECALL
 TRANSFER

DONE
 SECTION STORE

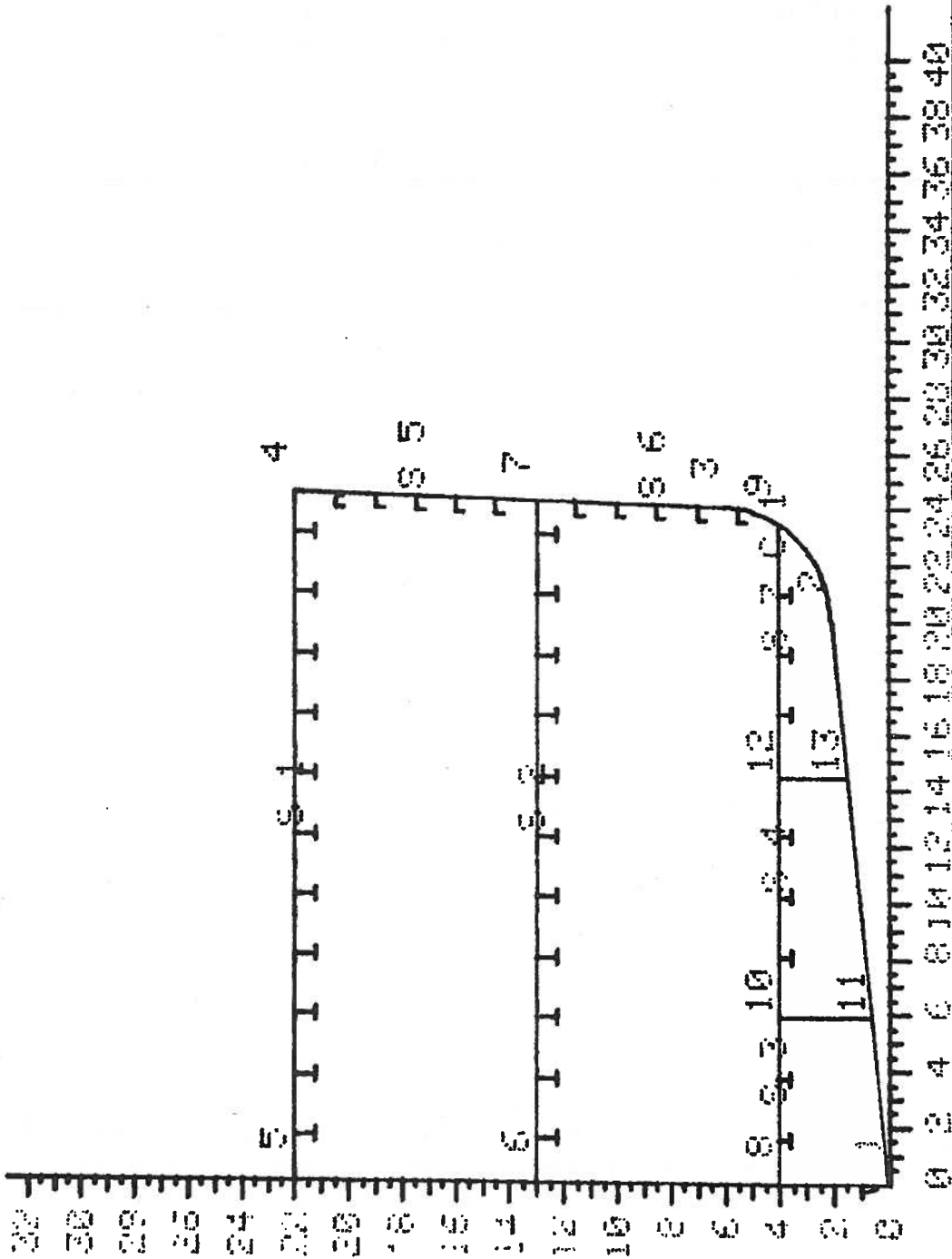


SCALE

1" = 8FT. - 9"

TITLE

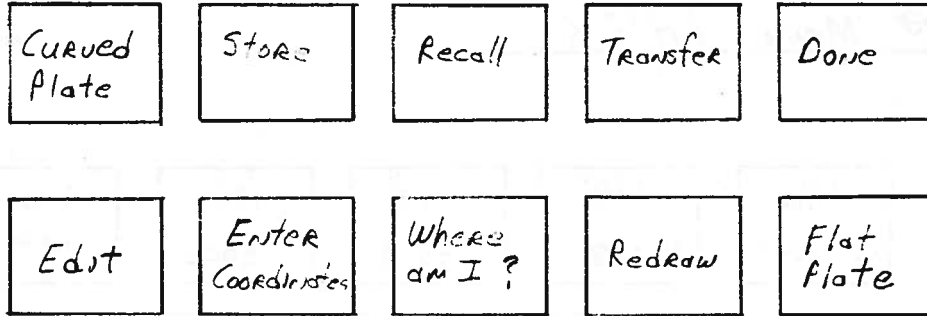
EXAMPLE SHIP



MAKE A SELECTION FROM MENU GRAPHICS
 HIT RETURN TWICE WHEN MAKING DRAWING MENU SELECTIONS.

Fig.No. 2 - Graphics Menu & Screen Display

① Menu: DIGITIZE



② Menu: INTEGER

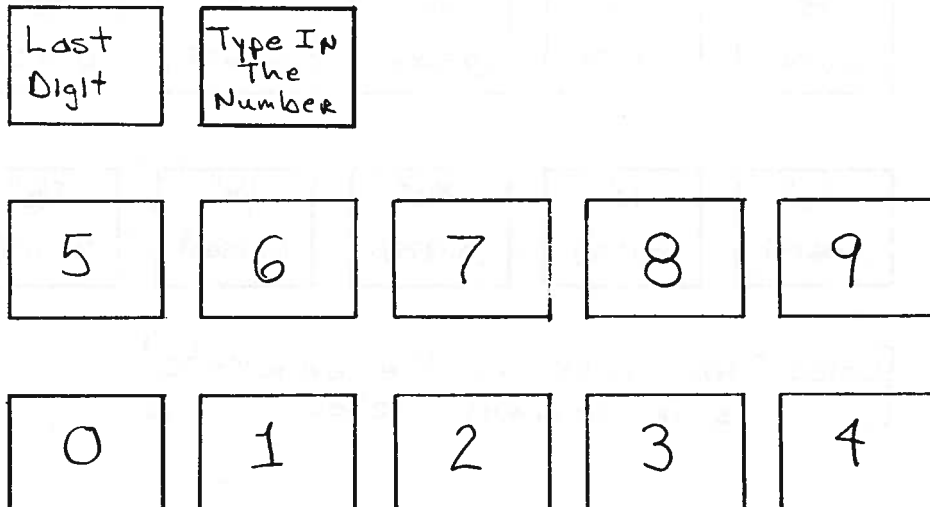


Fig. No. 3 - DIGITIZE and INTEGER menus.

3 Menu: THICK

1 5/16" (1.3125)	1 3/8" (1.3750)	1 7/16" (1.4375)	1 1/2" (1.5000)	other thickness
1" (1.000)	1 1/16" (1.0625)	1 1/8" (1.1250)	1 3/16" (1.1875)	1 1/4" (1.1250)
1 1/16" (0.6875)	3/4" (0.7500)	13/16" (0.8125)	7/8" (0.8750)	15/16" (0.9375)
3/8" (0.3750)	7/16" (0.4375)	1/2" (0.5000)	9/16" (0.5625)	5/8" (0.6250)
1/16" (0.0625)	1/8" (0.1250)	3/16" (0.1875)	1/4" (0.2500)	5/16" (0.3125)

[Note: Thickness in the brackets
is in decimal inches.]

Fig. No. 4 - THICKNESS menu.

MOD.MAIN Menu Descriptions and Functions

Menu Input

The input option will allow the user to input all midship structural data by using a graphics terminal and/or a digitizer. This data can also be edited or changed by using this option. Input units are English units as specified.

When prompted the user should answer the question (yes or no) as to whether he is modifying an existing midship section.

ALL - Prompts the user for a choice from menu TYPE:GRAPHIC or DIGITAL input.

GRAPHIC - Routes the program to the graphics terminal input routines. (See description to follow).

DIGITAL - Routes the program to the digitizer input routines. (See description to follow).

DONE - Transfers control back to the MOD.MAIN menu.

Menu GRAPHIC

The GRAPHIC option allow the user to input flat plate, curved plate, stiffeners and stiffner sets using the graphics terminal.

For a new midship section the user will be prompted for a drawing title as shown in figure 5. The user may type in a title followed by hitting the return key. If no title is desired, the user may just hit the return key. The title must not be longer than 14 characters. The user may however wish to center his title within a 14-character space. Next the display will prompt the user for his choice of axes scaling as shown in figure 6. He may choose from one of the four following axes scales:

DRAWING MENU

SECTION STORE

SCALE

TITLE

TYPE IN THE TITLE OF YOUR DRAWING
IN 14 CHARACTERS OR LESS

Fig. No. 5 - Prompting Message for Title Input

DRAWING MENU

SECTION STORE

SCALE

TITLE

EXAMPLE SHIP

WHAT LENGTH DO YOU WANT
 THE X-AXIS TO REPRESENT?

20FT.
 40FT.
 80FT.
 120FT.

Fig. No. 6 - Prompting Message for Scale Selection.

<u>choice</u>	<u>x-axis</u>	<u>y-axis</u>	<u>scale</u>
1	0-20 feet	0-16 feet	1"=4'
2	0-40 "	0-32 "	1"=8'
3	0-80 "	0-64 "	1"=16'
4	0-120 "	0-96 "	1"=24'

(Note: With choice 4, only the 0-96 feet labels will be printed on the screen.) Note that if the user is modifying an existing section, he will not be prompted for title input and scale selection.

After the title has been inputted and the scale selected (if necessary), the user will be prompted for a menu choice as shown in figure 7. A menu choice is made by locating the graphics terminal cursors over the pickbox of the appropriate selection on the drawing menu and hitting the return key twice. The prompting message at the bottom of the screen (see figure 7) will be printed after completion of a menu choice task. Descriptions of each menu selection follows.

Data Input Menu Selections

FLAT PLATE

Allows the user to input, using the graphics terminal, flat plate sections by specifying their endpoints and thickness.

The user inputs a plate section by placing the terminal cursors at one endpoint of the plate and hitting the "1" key. Then he locates the cursor at the other end point and hits the "2" key. A line is drawn between the two endpoints and the user is prompted to type in the plate thickness in inches. After doing so, the user hits the return key and may start drawing the next plate (see figure 9). In this mode of drawing, any time the user hits the "1" key, he is telling the program that the present location of the cursor represents the start of a plate. Similarly, when he hits the "2" key, he is telling the program that a plate is defined between the present location of the cursor and the last point entered, whether the last point was entered with a "1" or a "2" keystroke. Therefore, if the user wants to draw a plate extending from the last plate endpoint drawn to a new endpoint, he need only use the cursor to locate the new endpoint and hit the "2" key followed by typing in the plate thickness. The prompting message for this menu option is shown

32
30
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0

DRAWING MENU
EDIT
GO TO COOR
WHERE AM I?
REDRAW
FLAT PLATE
CURVE PLATE
STORE
RECALL

TRANSFER

DONE
SECTION STORE
4
3
2
1
0

SCALE

1" = 8FT. - 0"

TITLE

EXAMPLE SHIP

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40

MAKE A SELECTION FROM MENU GRAPHICS.
HIT RETURN TWICE WHEN MAKING DRAWING MENU SELECTIONS.

Fig. No. 7 - Prompting Message for Graphics Menu Selection.

```

DRAWING MENU
EDIT
GO TO COOR
WHERE AM I?
REDRAW
FLAT PLATE
CURVE PLATE
STORE
RECALL

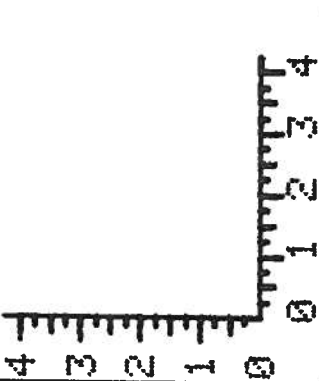
TRANSFER

```

```

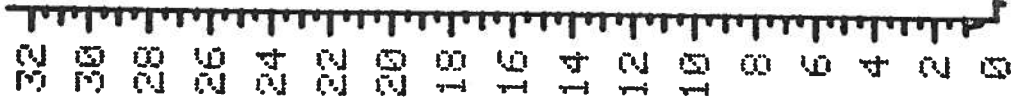
DONE
SECTION STORE

```



SCALE
1" = 8FT. - 0"

TITLE
EXAMPLE SHIP

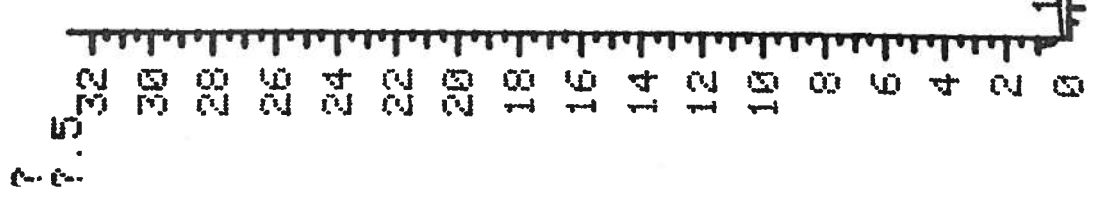


0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40

RETURN WITH A "1" TO SIGNIFY THE START OF A PLATE SECTION.
RETURN WITH A "2" TO SIGNIFY THE END OF A PLATE SECTION.
RETURN WITH A "3" TO SIGNIFY NO MORE PLATES.

Fig. No. 8 - Prompting Message for Plate Input.

THICKNESS?

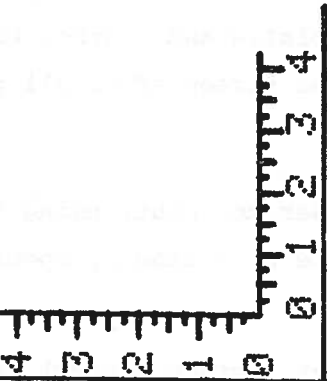


0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40

RETURN WITH A "1" TO SIGNIFY THE START OF A PLATE SECTION.
 RETURN WITH A "2" TO SIGNIFY THE END OF A PLATE SECTION.
 RETURN WITH A "3" TO SIGNIFY NO MORE PLATES.

DRAWING MENU
 EDIT
 GO TO COOR
 WHERE AM I?
 REDRAW
 FLAT PLATE
 CURVE PLATE
 STORE
 RECALL
 TRANSFER

DONE
 SECTION STORE



SCALE

1" = 8FT. - 0"

TITLE

EXAMPLE SHIP

Fig. No. 9 - Screen Showing One Plate Drawn & Thickness Prompt.

in figure 8. When done with this option the user should hit the "3" key to indicate no more plates and control will be returned to the GRAPHIC menu. Figure 11 shows the screen after all plates have been drawn.

CURVE PLATE

Allows the user to input, using the graphics terminal, one circular arc (curved) plate at a time by specifying the curve endpoints, radius and thickness.

To input a circular section (curve), the user will be prompted as shown in figure 10. The user will be prompted for the endpoints of the curve such that it will be drawn in a counterclockwise direction from the first endpoint to the second. To specify an endpoint, the user must locate the terminal cursor at the coordinates of the point and hit the return key. After the endpoints are entered, the user is asked to specify the radius of the circular section in feet, and the thickness of the section in inches. These are entered by typing in the appropriate values when asked for, followed by hitting the return key. After this information is entered, the program will return control to the GRAPHIC menu and draw the curve on the screen as shown in figure 11. There are two restrictions on the type of curve that may be drawn:

- 1) The curve cannot span more than an 180 degree arc.
- 2) The section endpoints may not share the same X-coordinate, nor the same Y-coordinate.

Each circular section drawn will be labeled with a "C" followed by a successively increasing integer value (the curve's reference number).

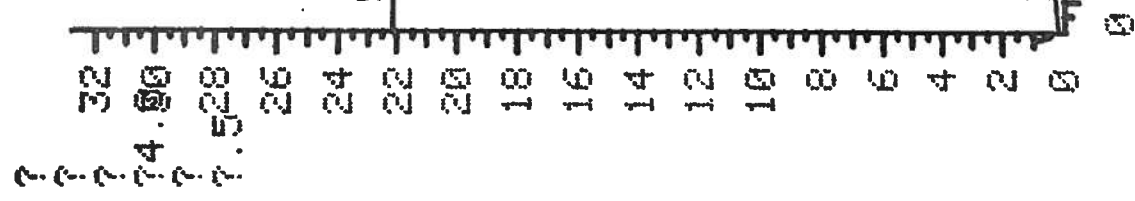
STORE

Allows the user to store, using the graphics terminal, longitudinal sections for later distribution on the midship section. The section is specified by a method like that used in flat plate input.

To store a longitudinal shape, the user will be prompted to draw the longitudinal in the store space (see figure 12). The longitudinal is drawn in the same manner as the midship section plates; that is, the terminal cursor is used to define "plate" endpoints. Returning with the "1" key specifies the start of a new plate and returning with a "2" specifies that a plate is defined between the current position of the cursor and the last endpoint. The thickness of each plate section should be typed in by the user when asked for. The longitudinal

USE THE CURSOR TO SPECIFY THE FIRST ENDPPOINT.
USE THE CURSOR TO SPECIFY THE SECOND ENDPPOINT.
WHAT IS THE SECTION RADIUS?

SECTION THICKNESS?



DRAWING MENU

EDIT

GO TO COOR

WHERE AM I?

REDRAW

FLAT PLATE

CURVE PLATE

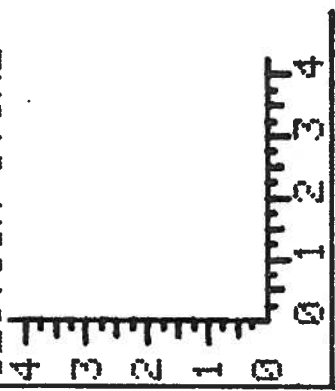
STORE

RECALL

TRANSFER

DONE

SECTION STORE



SCALE

1" = 8FT. - 0"

TITLE

EXAMPLE SHIP

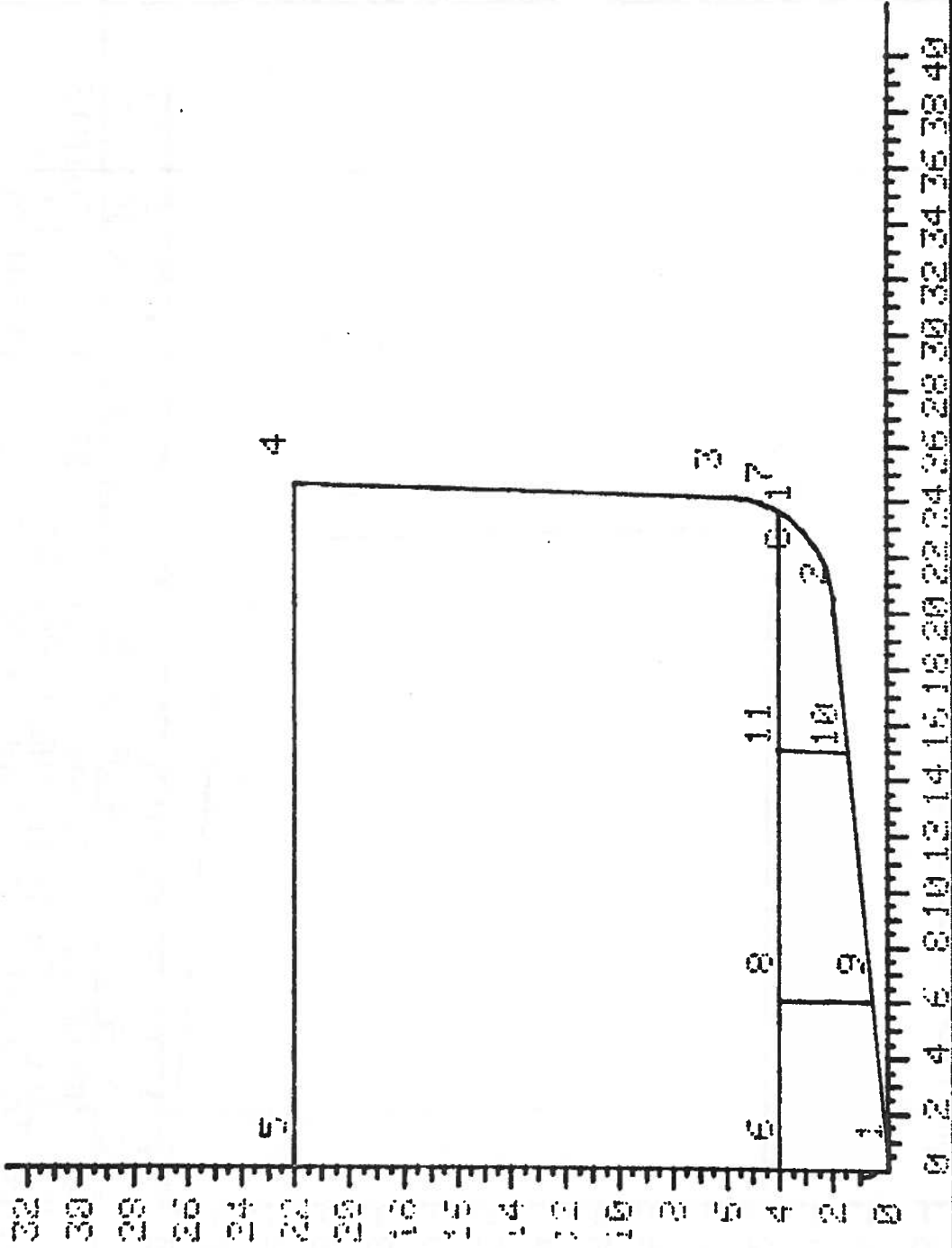
USE THE CURSOR AND RETURN KEY TO SPECIFY THE ENDPPOINTS
OF THE CURVE SUCH THAT THE CURVE WILL BE DRAWN IN A
COUNTERCLOCKWISE DIRECTION FROM THE FIRST POINT TO
THE SECOND. ALSO SPECIFY THE RADIUS AND THICKNESS.

Fig. No. 10 - Curved plate Input Instructions & Prompting Messages.

DRAWING MENU
 EDIT
 GO TO COOR
 WHERE AM I?
 REDRAW
 FLAT PLATE
 CURVE PLATE
 STORE
 RECALL
 TRANSFER

DONE
 SECTION STORE

SCALE
 1" = 8FT. - 0"
 TITLE
 EXAMPLE SHIP



MAKE A SELECTION FROM MENU GRAPHICS
 HIT RETURN TWICE WHEN MAKING DRAWING MENU SELECTIONS.

Fig. No. 11 - Screen Showing All Plates Drawn.

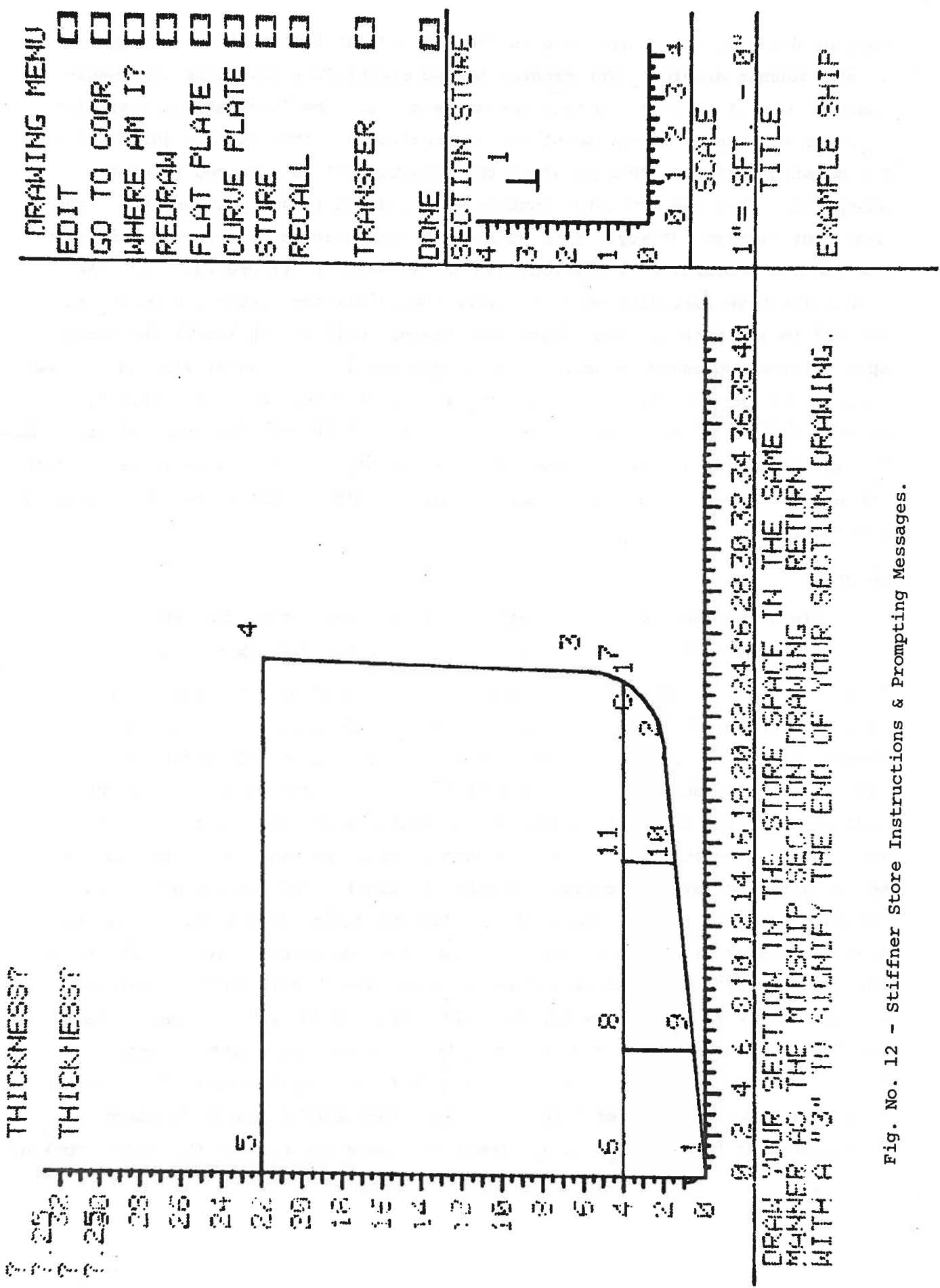


Fig. No. 12 - Stiffner Store Instructions & Prompting Messages.

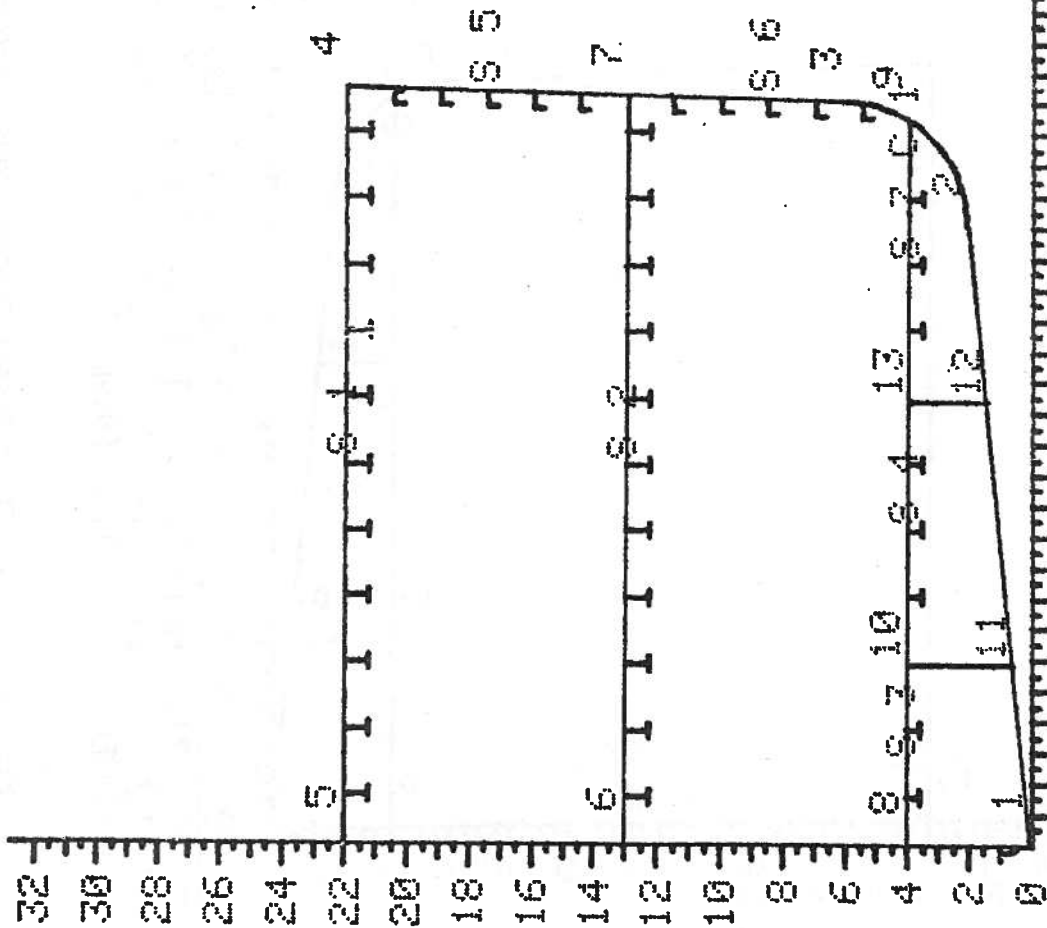
must be drawn in the store space in the same orientation that it will appear in the midship drawing. The program has no capability to rotate the longitudinal when it is recalled from the store space. The longitudinal must also be drawn starting with the point on the longitudinal that will be joined with the midship section. This point on the longitudinal is referred to as the basepoint. When the complete longitudinal is drawn in the section store, the user must hit the "3" key. This will cue the program to calculate and display the section properties of the longitudinal as shown in figure 13. Once the properties have been displayed, the user should hit the return key to return control to the GRAPHIC menu. Each longitudinal will be labeled in the store space with a successively increasing integer value. This label will be printed opposite the base point, for future reference. A 4 foot by 4 foot pair of drawing axes is provided to assist the user in drawing the longitudinals to scale. If many longitudinals will be stored, it is highly recommended that the limited space available in the section store be used as efficiently as possible to avoid overcrowding.

RECALL

Allows the user to recall longitudinal stiffner shapes from the section store and reproduce them in any quantity on the midship section drawing.

To recall a longitudinal stiffner shape from the section store and distribute it on the midship section drawing, the user will be prompted, as shown in figure 14, for the stiffner shape number and the quantity of stiffners to reproduce in the set. Also as shown in figure 14, the program will prompt the user to place the terminal cursors at the points where the first and last longitudinal sections will join the midship structure (the return key should be hit with the terminal cursors at each location). The program will then return control to the GRAPHIC menu and draw the distributed longitudinals on the screen along a straight line connecting the two points entered (see figure 15). Each set of longitudinals drawn will be labeled with an "S", followed by a successively increasing integer value (this is the set reference number). Remember that the stored shape may only be recalled in the same orientation that it appears in the section store, and that the longitudinal will be joined at its base point to the midship structure. Each set of longitudinals to be distributed on the midship section requires a separate call to the RECALL option.

?HIT RETURN TO CONTINUE



SHAPE NO. 4
 SECTION AREA= 3.61 IN.*#2
 SECTION NEUTRAL AXIS FROM BASE PT.= -4.413 IN.
 SECTION "I" ABOUT NEUTRAL AXIS= 15.333 IN.*#4

DRAWING MENU
 EDIT
 GO TO COOR
 WHERE AM I?
 REDRAW
 FLAT PLATE
 CURVE PLATE
 STORE
 RECALL
 TRANSFER

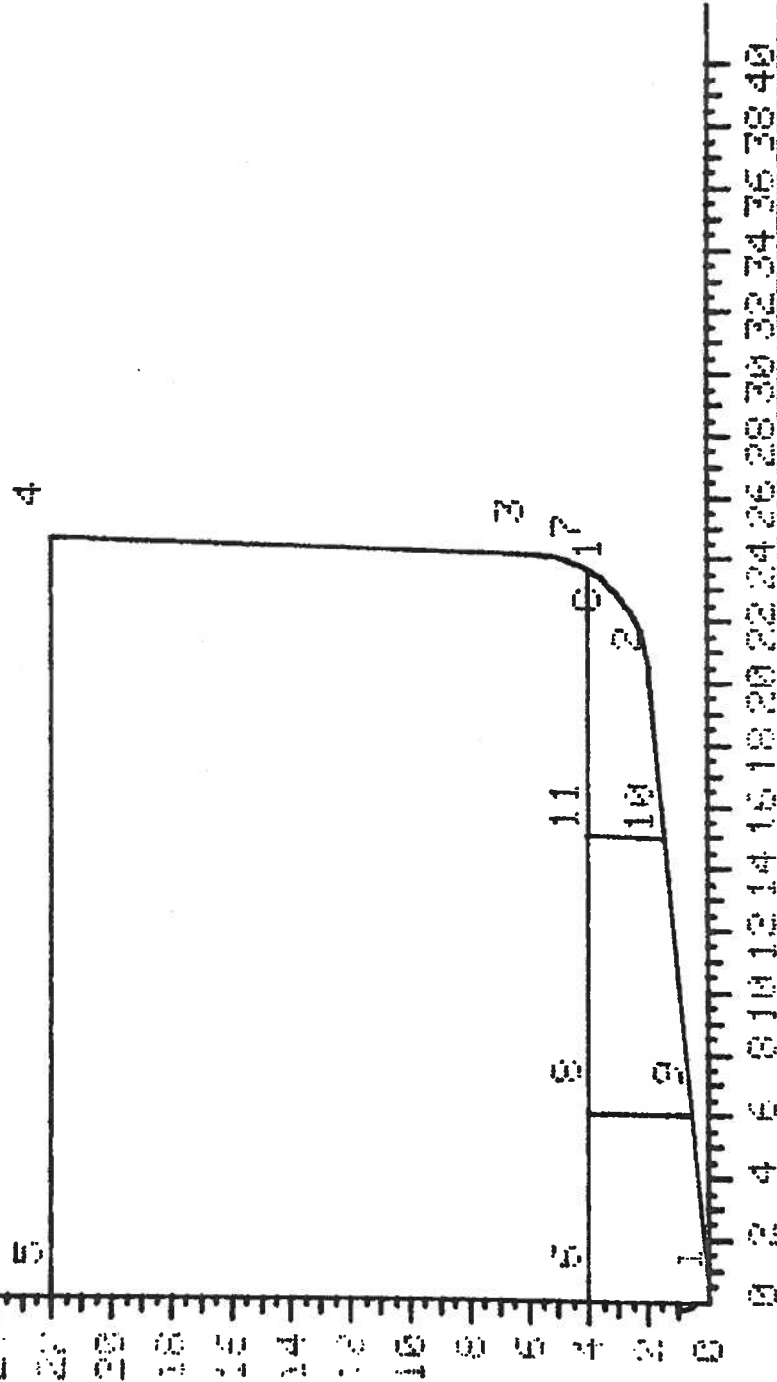
DONE
 SECTION STORE

SCALE
 1" = 8FT. - 0"

TITLE
 EXAMPLE SHIP

Fig. No. 13 - Stiffner Section Drawn in Store Space & Properties Displayed

SECTION NO. ?
 NUMBER OF SECTIONS TO REPRODUCE?
 USE THE CURSOR TO IDENTIFY THE ENDPONTS OF THE
 LINE ON WHICH YOU WANT TO DISTRIBUTE THE SECTIONS.



SPECIFY THE NUMBER OF THE STORED SECTION YOU
 WANT TO RECALL, AND THE NUMBER OF SECTIONS YOU WISH
 TO REPRODUCE ON THE DRAWING.

DRAWING MENU
 EDIT
 GO TO COOR
 WHERE AM I?
 REDRAW
 FLAT PLATE
 CURVE PLATE
 STORE
 RECALL
 TRANSFER

DOME
 SECTION STORE
 4
 3
 2
 1
 0
 0 1 2 3 4
 SCALE

1" = 8FT. - 0"

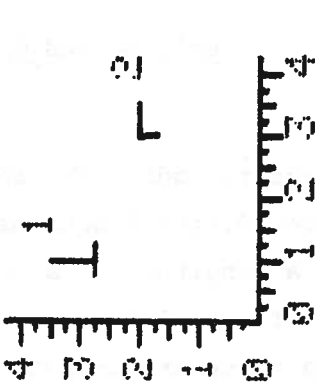
TITLE

EXAMPLE SHIP

Fig. No. 14 - Stiffner Recall Instructions & Prompting Messages.

DRAWING MENU
 EDIT
 GO TO COOR
 WHERE AM I?
 REDRAW
 FLAT PLATE
 CURVE PLATE
 STORE
 RECALL
 TRANSFER

DONE
 SECTION STORE

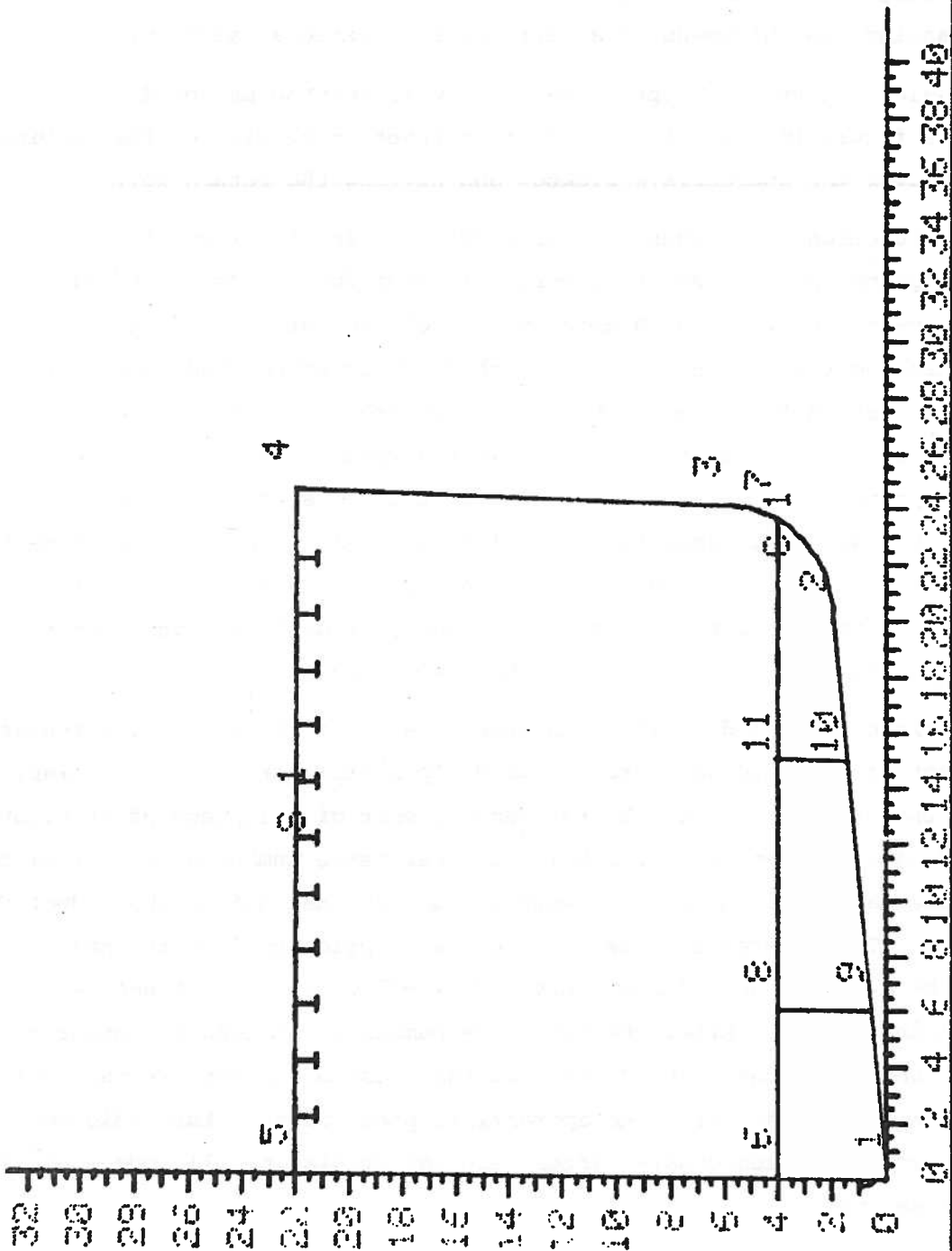


SCALE

1" = 9FT. - 0"

TITLE

EXAMPLE SHIP



MAKE A SELECTION FROM MENU GRAPHICS
 HIT RETURN TWICE WHEN MAKING DRAWING MENU SELECTIONS.

Fig. No. 15 - Screen Showing the Stiffner Set Drawn.

Editing and Other Menu Selections

EDIT

Allows the user to modify the inputted midship section data.

There are five editing functions.

- 1) Changing a longitudinal's section data.
- 2) Erasing a flate plate section.
- 3) Erasing a circular section.
- 4) Erasing a longitudinal set.
- 5) Changing the thickness of a flat plate or circular section.

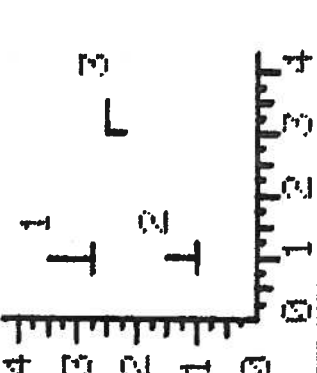
After selecting the EDIT option the user will then be prompted, as shown in figure 16, to select an editing function by placing the terminal cursors over the appropriate pickbox and hitting the return key.

With editing function 1, to change a longitudinal's section properties, the user will be prompted to enter the reference number for the stored section shape he wishes to edit. This is done, when prompted for, by typing in the number and hitting the return key. After this number is entered, the user should type in (and hit the return key) each new property after the old property has been printed at the bottom of the screen as shown in figure 17. If a section property is to be left unchanged, the old section property must be entered. Changing the properties of a longitudinal in the section store has no effect on the properties of any longitudinal already distributed on the midship section. After the last new section property is displayed the user should hit the return key to return control to the GRAPHIC menu.

Editing functions 2, 3, and 4 allow the user to erase a flate plate, circular section or set of longitudinals from the midship section drawing. The display will prompt the user to type in the reference number of the piece of structure to be erased (see figures 18, 19, & 20). The reference number of a flat plate section is the larger of the two consecutive numbers that define the endpoints of that plate. The reference number of a curved section or longitudinal set is preceded by a "C" or an "S" respectively. The "C" or "S" must not be entered with the number. After the reference number is entered the program will return control to the GRAPHIC menu and the midship section drawing will be displayed on the screen with the appropriate piece of structure deleted. Figure 21 shows the screen display after deletion of plat no. 11, curve no. 1 and stiffner set no. 2.

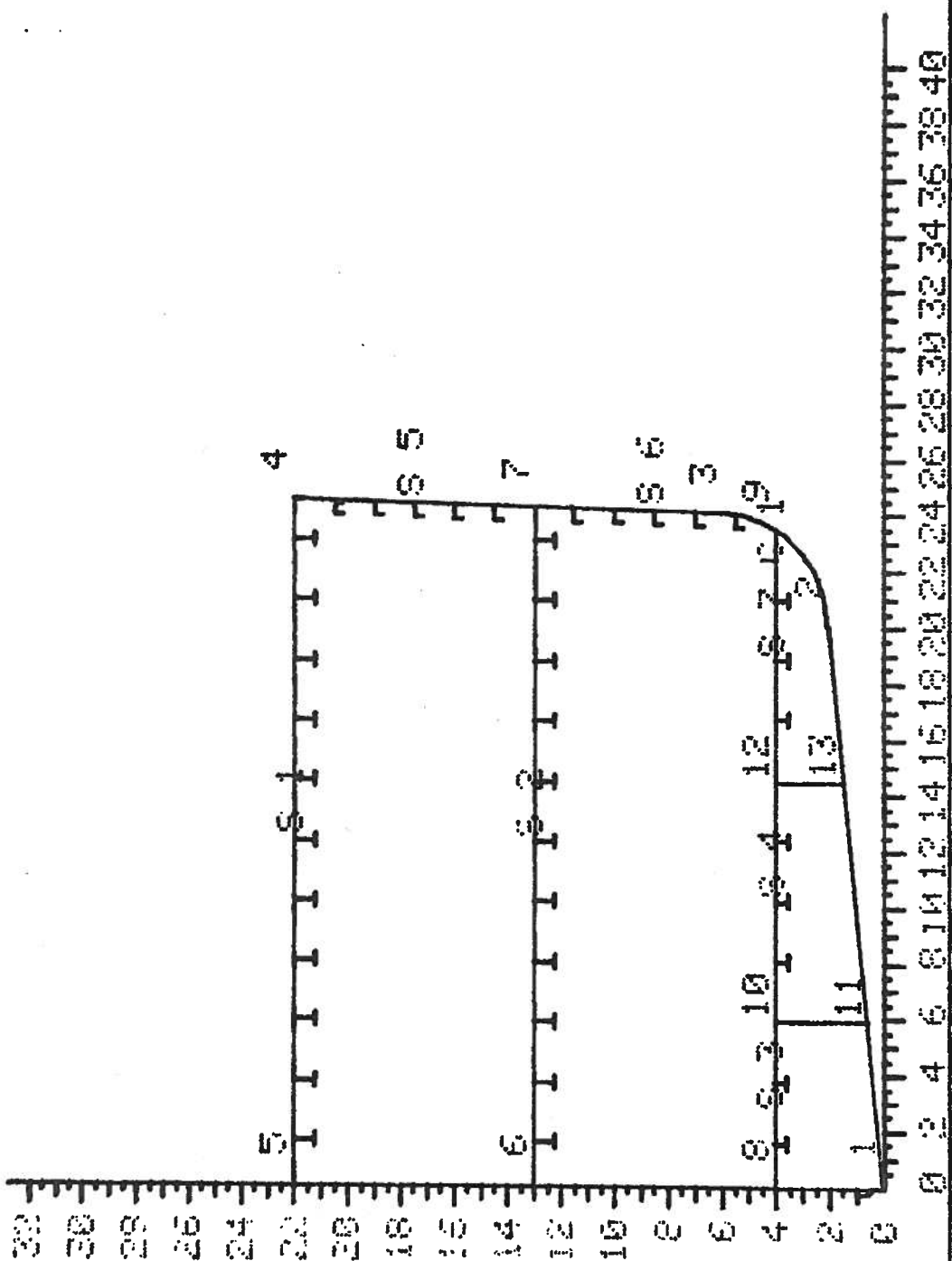
DRAWING MENU
 EDIT
 GO TO COOR
 WHERE AM I?
 REDRAW
 FLAT PLATE
 CURVE PLATE
 STORE
 RECALL
 TRANSFER

DONE
 SECTION STORE



SCALE
 1" = 8FT. - 0"

TITLE
 EXAMPLE SHIP



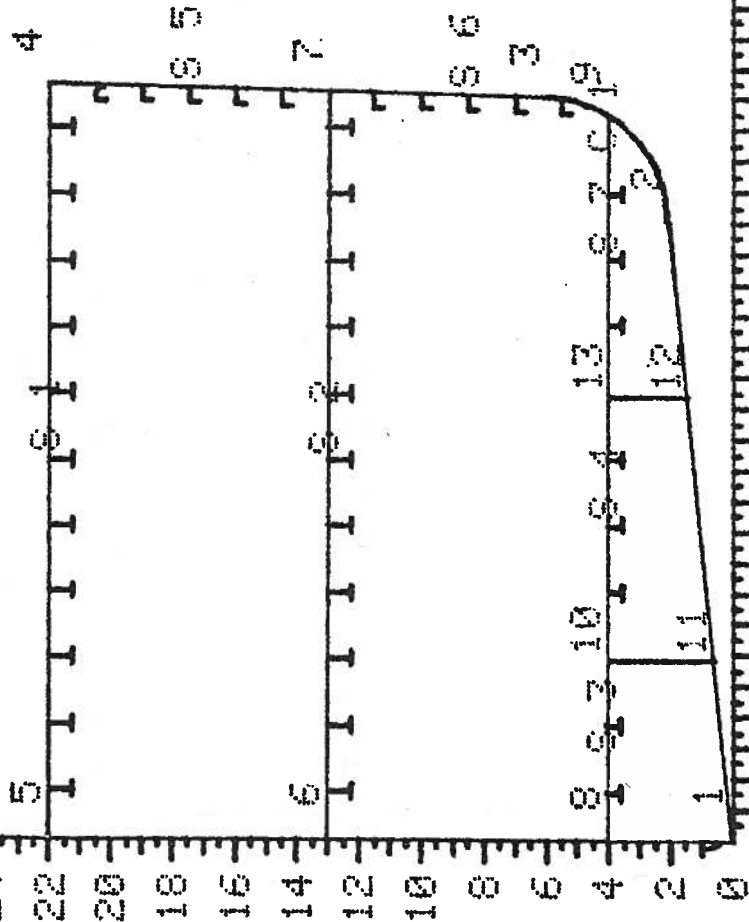
WHAT DO YOU WANT TO EDIT?
 LONG. SECTION DATA
 FLATE SECTION
 CIRCULAR SECTION
 SET UP LONGS.
 THICKNESS

Fig. No. 16 - Editing Selection Prompt

WHAT NUMBERED SECTION SHAPE DO YOU WANT TO EDIT?

? 1 26
? 3 25
? 6 24
? 2 22
?

HIT RETURN TO CONTINUE



0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40

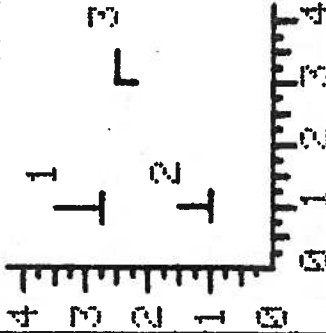
SHAPE NO. 1 ENTER NEW SECTION PROPERTIES:
 OLD SECTION AREA= 3.64 IN.**2 NEW AREA= 3.65
 OLD DISTANCE TO B.P.= -6.177 IN. NEW DIST.= -6.125
 OLD INERTIA= 31.736 IN.**4 NEW INERTIA= 32.000

DRAWING MENU
 EDIT
 GO TO COOR
 WHERE AM I?
 REDRAW
 FLAT PLATE
 CURVE PLATE
 STORE
 RECALL

TRANSFER

DONE

SECTION STORE



SCALE

1" = 8FT. - 0"

TITLE

EXAMPLE SHIP

Fig. No. 17 - Stiffener Section Data Change Instructions & Prompting Messages.

DRAWING MENU EDIT <input type="checkbox"/> GO TO COOR <input type="checkbox"/> WHERE AM I? <input type="checkbox"/> REDRAW <input type="checkbox"/> FLAT PLATE <input type="checkbox"/> CURVE PLATE <input type="checkbox"/> STORE <input type="checkbox"/> RECALL <input type="checkbox"/> TRANSFER <input type="checkbox"/>	DONE <input type="checkbox"/> SECTION STORE
--	--

	SCALE 1" = 8FT. - 0" TITLE EXAMPLE SHIP
--	--

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 SPECIFY THE LARGER OF THE TWO NUMBERS THAT DEFINE THE PLATE YOU WANT TO ERASE:
--

Fig. No. 18 - Prompting Message for Flat Plate Deletion.

- DRAWING MENU
- EDIT
- GO TO COOR
- WHERE AM I?
- REDRAW
- FLAT PLATE
- CURVE PLATE
- STORE
- RECALL
- TRANSFER

DONE

SECTION STORE

SCALE

1" = 8FT. - 0"

TITLE

EXAMPLE SHIP

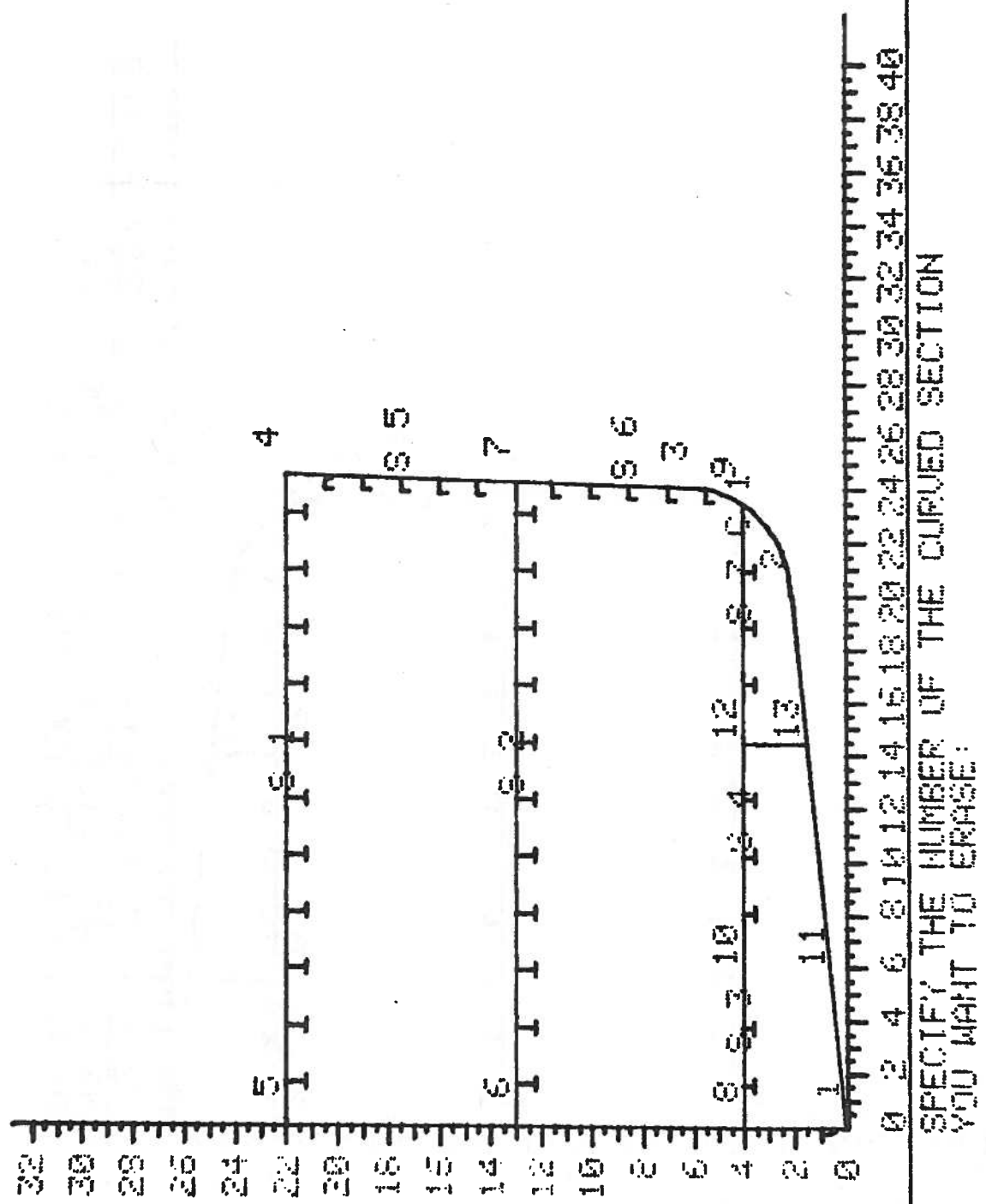
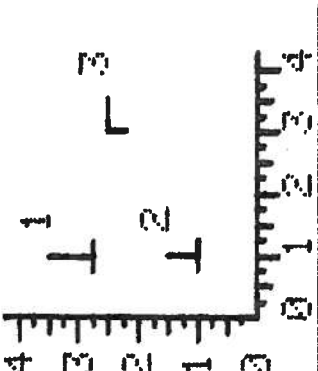


Fig. No. 19 - Prompting Message for Curved Plate Deletion.

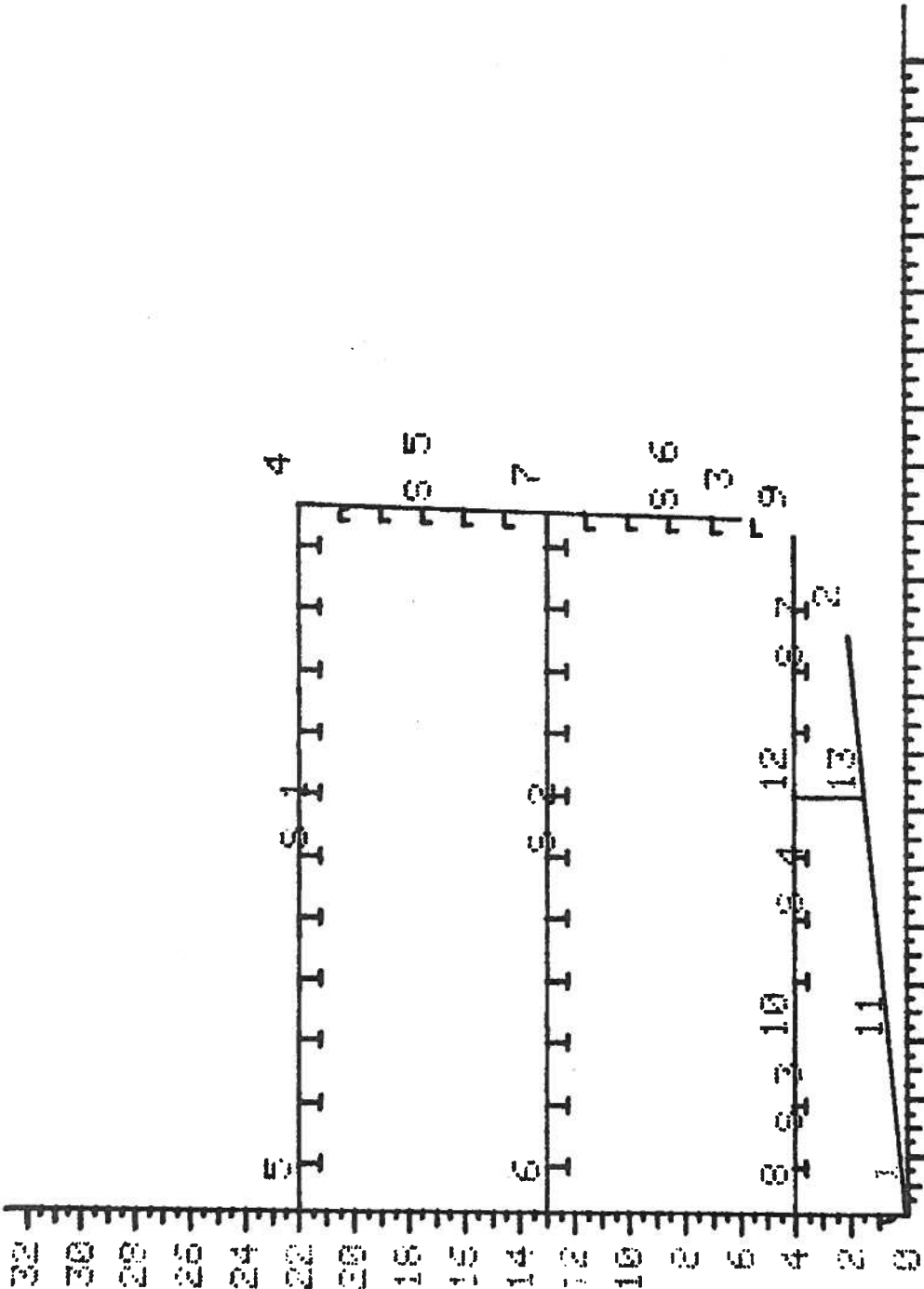
DRAWING MENU
 EDIT
 GO TO COOR
 WHERE AM I?
 REDRAW
 FLAT PLATE
 CURVE PLATE
 STORE
 RECALL
 TRANSFER

DONE
 SECTION STORE



SCALE
 1" = 8FT. - 0"

TITLE
 EXAMPLE SHIP



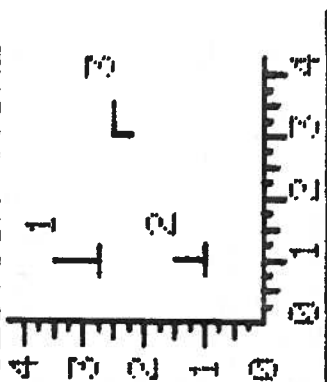
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40

SPECIFY THE NUMBER OF THE LONGITUDINAL SET
 YOU WANT TO ERASE:

Fig. No. 20 - Prompting Message for Longitudinal Stiffener Set Deletion.

DRAWING MENU
 EDIT
 GO TO COOR
 WHERE AM I?
 REDRAW
 FLAT PLATE
 CURVE PLATE
 STORE
 RECALL
 TRANSFER

DONE
 SECTION STORE

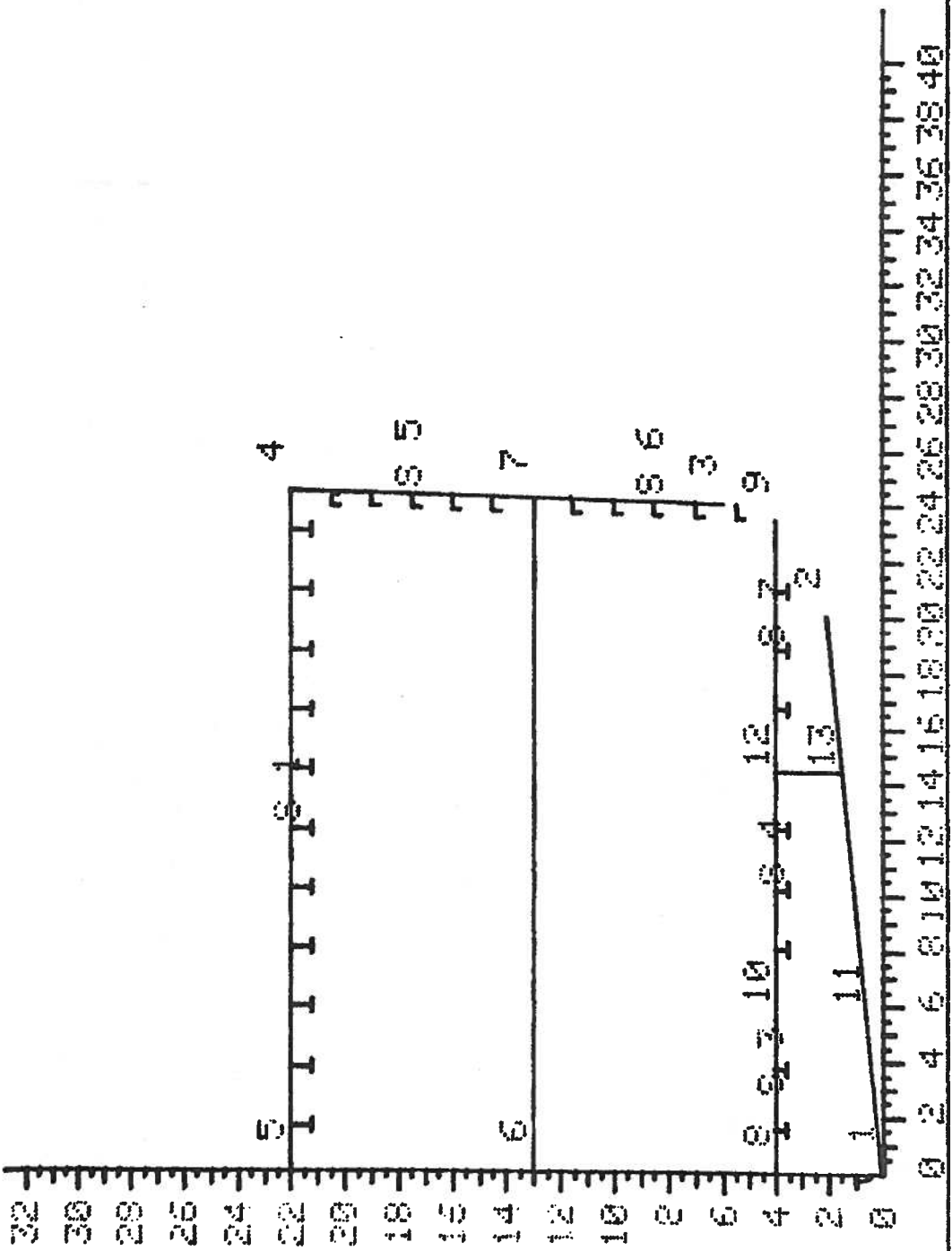


SCALE

1" = 8FT. - 0"

TITLE

EXAMPLE SHIP



MAKE A SELECTION FROM MENU GRAPHICS.
 HIT RETURN TWICE WHEN MAKING DRAWING MENU SELECTIONS.

Fig. No. 21 - Screen Display After the Specified Flat Plate, Curved Plate and Stiffner Set Have Been Deleted.

After selecting editing function 5 the user will be prompted, as shown in figure 22, to select either a flat plate or curve plate thickness to be changed. This selection is done by placing the terminal cursors over the appropriate pickbox and hitting the return key. The program will then prompt the user to enter the appropriate plate or curve reference number. The old thickness will appear on the screen as in figures 23 & 24. After the new thickness is displayed at the bottom of the screen (see figure 24), the user should hit the return key to return control to the GRAPHIC menu.

REDRAW

Will redraw the midship section drawing on the graphics screen.

GO TO COOR

Will prompt the user for X and Y coordinates as shown in figure 25 and then place an "X" at this point on the screen. Once the "X" has been drawn the user should hit the return key to return control to the GRAPHIC menu.

WHERE AM I?

Allows the user to determine a location on the midship section drawing by using the terminal cursors. The user will be prompted as in figure 26 and the X and Y coordinates of the location will also be printed as shown. To return control to the GRAPHICS menu the user should hit the return key when prompted.

TRANSFER

Allows the user to transfer directly to the DIGITIZE menu and the digitizer input routines.

DONE

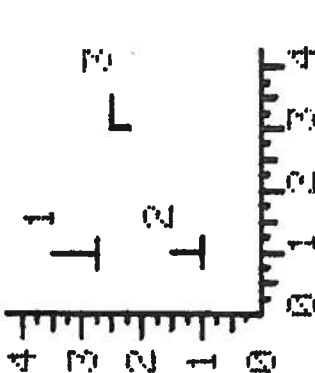
Returns control to the input control routine and the INPUT menu.

Menu DIGITIZE

The DIGITIZE option allows the user to input flat plate, curved plate, stiffeners and stiffener sets by using a digitizer tablet.

DRAWING MENU
 EDIT
 GO TO COOR
 WHERE AM I?
 REDRAW
 FLAT PLATE
 CURVE PLATE
 STORE
 RECALL
 TRANSFER

DONE
 SECTION STORE

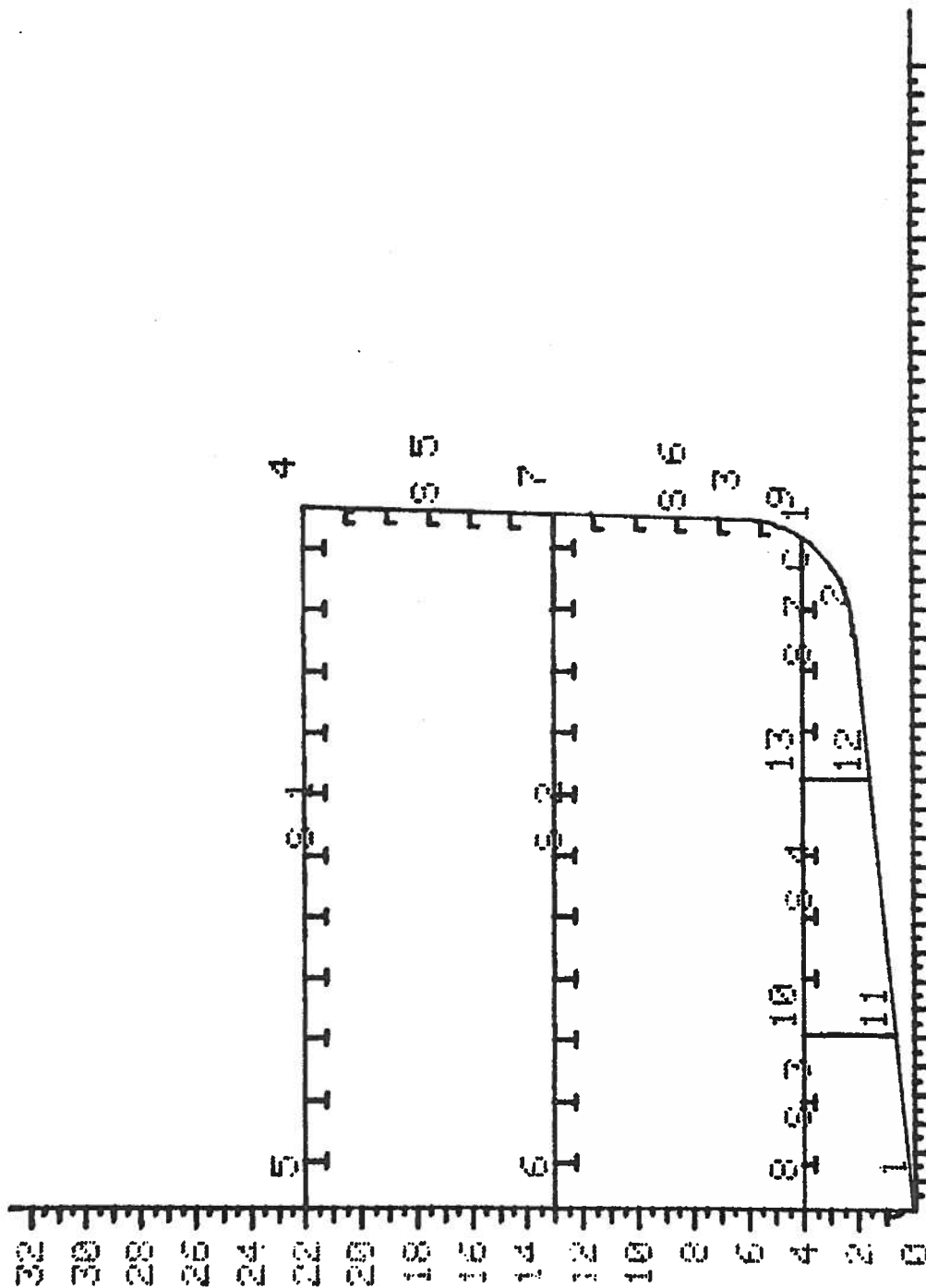


SCALE

1" = 8FT. - 0"

TITLE

EXAMPLE SHIP



0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40

WHICH DO YOU WANT TO CHANGE? A PLATE THICKNESS

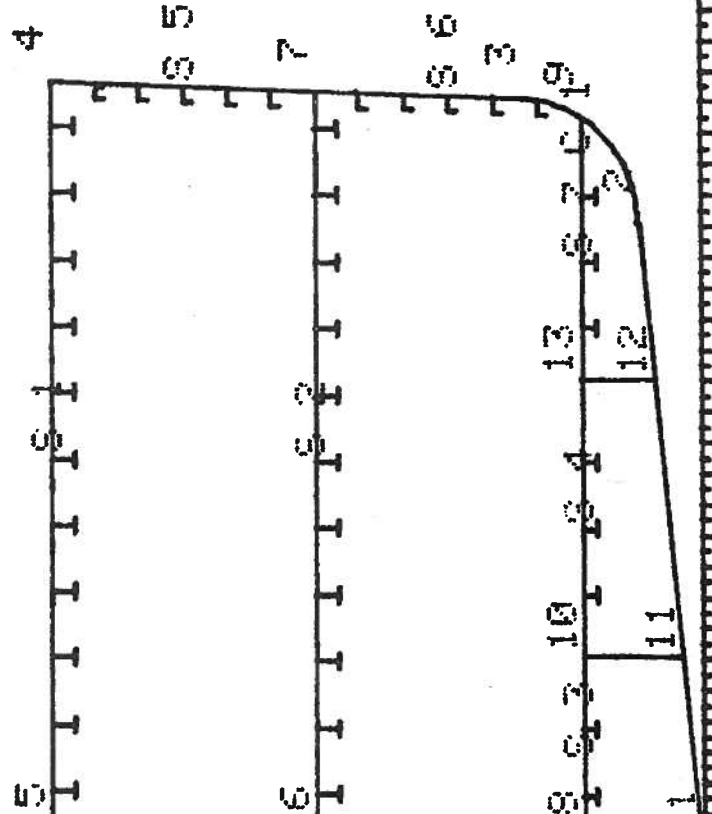
A CURVE THICKNESS

Fig. No. 22 - Thickness Change Selection Prompt.

PLATE REFERENCE NUMBER?

OLD THICKNESS OF PLATE=0.425
WHAT DO YOU WANT THE THICKNESS TO BE?

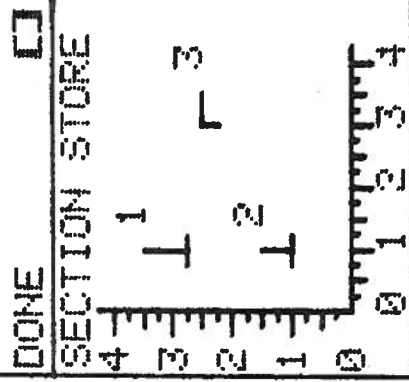
0.15
0.32
0.30
0.40
0.50
0.20
0.24
0.22
0.00
0.18
0.15
0.14
0.12
0.10
0.00
0.04
0.02
0.00



0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40

TYPE IN THE LARGER OF THE TWO ENDPOINTS THAT DEFINES THE PLATE SECTION YOU ARE INTERESTED IN.

- DRAWING MENU
- EDIT
- GO TO COOR
- WHERE AM I?
- REDRAW
- FLAT PLATE
- CURVE PLATE
- STORE
- RECALL
- TRANSFER



1" = 8FT - 0"
TITLE

EXAMPLE SHIP

Fig. No. 23 - Flat Plate Thickness Change Instructions & Prompting Message.

CURVE REFERENCE NUMBER?

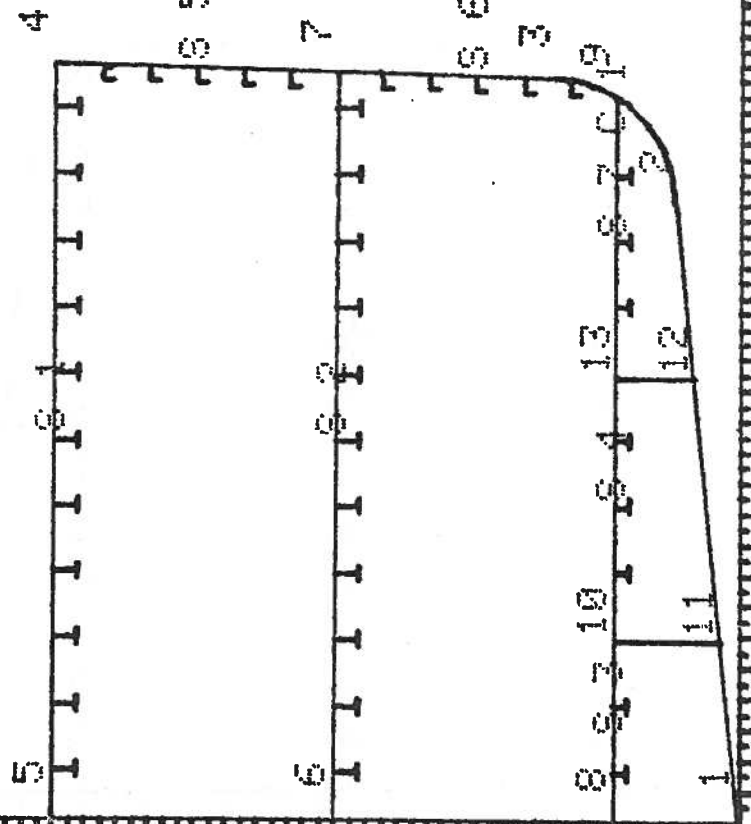
OLD THICKNESS OF CURVE=0.500

WHAT DO YOU WANT THE THICKNESS TO BE?

HIT RETURN TO CONTINUE

?
?1
?
?
?
?
?

32
30
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0

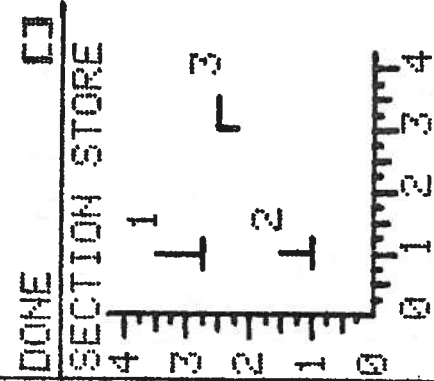


0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40

TYPE IN THE NUMBER OF THE CURVE SECTION YOU ARE INTERESTED IN.

CURVE NO. = 1 NEW THICKNESS = 0.525

- DRAWING MENU
- EDIT
- GO TO COOR
- WHERE AM I?
- REDRAW
- FLAT PLATE
- CURVE PLATE
- STORE
- RECALL
- TRANSFER



SCALE

1" = 8FT. - 0"

TITLE

EXAMPLE SHIP

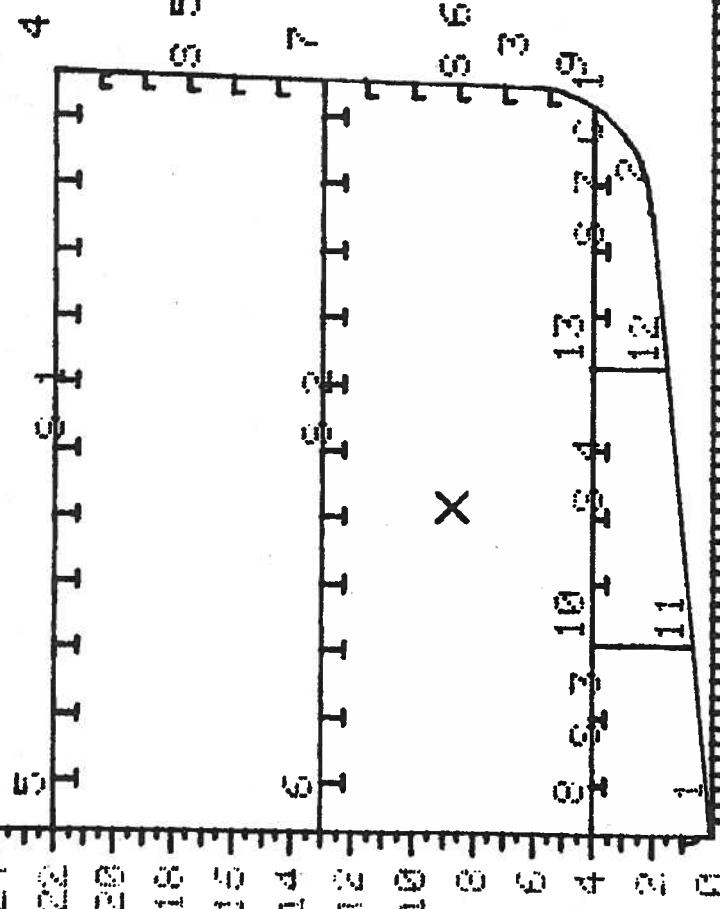
Fig. No. 24 - Curved Plate Thickness Change Instructions & Prompting Messages.

X-COORDINATE?

Y-COORDINATE?

HIT RETURN TO CONTINUE

21.5
19.3
18.3
18



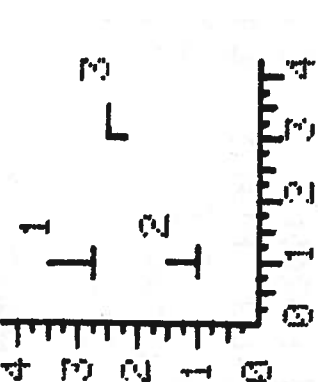
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40

ENTER X-COORDINATE, HIT RETURN.
THEN ENTER Y-COORDINATE, HIT RETURN.
YOUR POINT WILL BE MARKED WITH A CROSS.

- DRAWING MENU
- EDIT
- GO TO COOR
- WHERE AM I?
- REDRAW
- FLAT PLATE
- CURVE PLATE
- STORE
- RECALL
- TRANSFER

DONE

SECTION STORE



SCALE

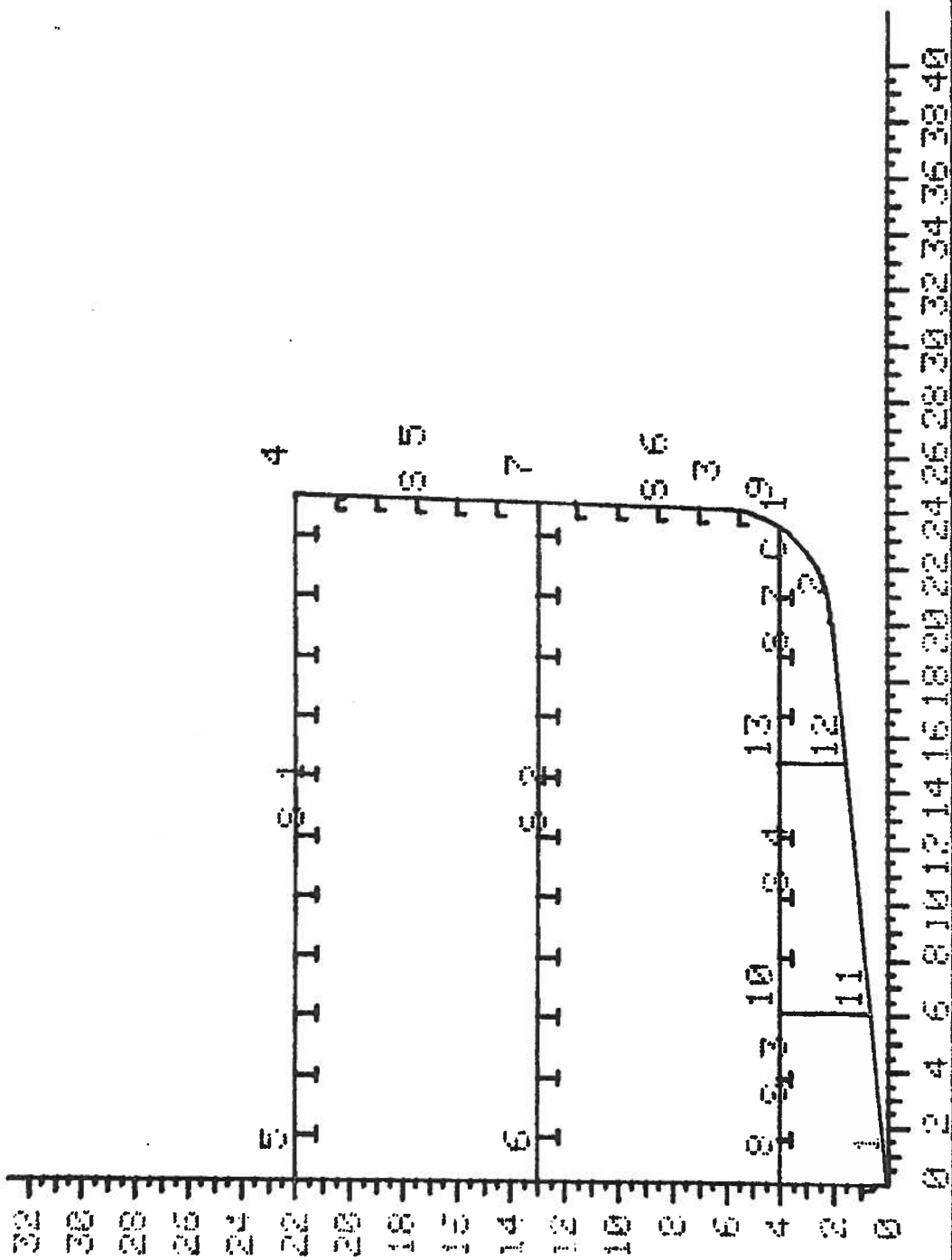
1" = 8FT. - 0"

TITLE

EXAMPLE SHIP

Fig. No. 25 - GO TO COOR Instructions & Prompting Messages.

THIT RETURN TO CONTINUE

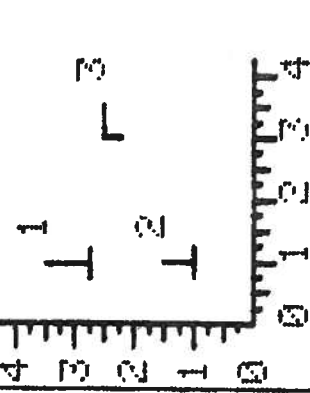


USE CURSOR TO SPECIFY YOUR LOCATION AND HIT RETURN. YOUR COORDINATES WILL BE GIVEN.

X-COORDINATE=24.443
Y-COORDINATE=29.027

- DRAWING MENU
- EDIT
- GO TO COOR
- WHERE AM I?
- REDRAW
- FLAT PLATE
- CURVE PLATE
- STORE
- RECALL
- TRANSFER

DONE
SECTION STORE



SCALE
1" = 8FT. - 0"

TITLE
EXAMPLE SHIP

Fig. No. 26 - WHERE AM I? Instructions & Prompting Messages.

With the first selection of the DIGITIZE option, the program will ask the user if a digitizer tablet is available for use. The user should answer this question yes or no. If necessary, the program will prompt the user for the drawing title and scale as discussed in the previous section on GRAPHIC operations. The user should note that this scale is for the screen display and not the users digitizer drawing scale. Also the user should be careful in the selection of screen display scale so that his midship section will be properly displayed on the terminal screen. Next the user will be prompted to generate the three digitizer menus. These are shown in figures 3 & 4 and they are generated by specifying with the digitizer cursor the lower left and lower right corners of each menu in the order, DIGITIZE, INTEGER, and THICKNESS.

After menu generation the program will prompt the user for the scale, in decimal inches per foot, of his digitizer tablet midship section drawing. Then the user, when prompted, should locate his midship section drawing by giving the baseline-centerline intersection and a point on the baseline. This digitizer tablet drawing should be similar in form to the program screen display in that only 1/2 of the midship section should be specified. All of the above set up operations will be done only with the first selection of the DIGITIZE option. With the set up operations complete, the user will then be prompted to select an option from the DIGITIZE menu. Menu selection is accomplished by locating the digitizer cursor over the appropriate box on the DIGITIZE menu sheet (figure 3). Everytime the user is to make a DIGITIZE menu selection the current midship section drawing will be displayed on the graphics terminal screen. The DIGITIZE menu has the same options as the GRAPHIC menu. These options have the same functions but their operations differ as described below.

Data Input Menu Selections

FLAT PLATE

Allows the user to input, using the digitizer, flat plate sections by specifying their endpoints and thickness.

This option works in the same manner as the GRAPHIC option FLAT PLATE described previously. The digitizer cursor is used to specify the plate endpoints by hitting either the "1" or "2" button on the cursor. After a "2" hit, the user will be prompted to select a thickness from those on the THICK menu sheet. This is done by locating the digitizer cursor over the appropriate box and hitting any button on the cursor. For a thickness other than one on the menu the user should select "other thickness" with the digitizer cursor and the program will prompt him to enter the thickness at the terminal. After a "1" hit or a thickness selection the user will be prompted to enter another point. If a user wishes to delete the last point entered he may do so when prompted for a point by hitting the "Z" button on the cursor and re-entering the point when prompted to do so. When done with this option the user should hit the "3" button on the digitizer cursor and control will be returned to the DIGITIZER menu.

CURVED PLATE

Allows the user to input, using the digitizer tablet, one circular arc (curved) plate at a time by specifying the curve endpoints, radius and thickness.

This option works in the same manner as the GRAPHIC option CURVE PLATE described previously. When prompted the user should use the digitizer cursor and the "Z" button to specify the curve endpoints. Next the program will prompt the user for the section radius. This is entered as a distance between two points on the drawing (recommended to use the arc center and one of the end points) or if zero radius is specified the user will be prompted to type in the radius at the terminal. The program will then prompt the user for the section thickness. This is specified by making a selection from menu THICK as described above. Once the thickness has been selected control will be returned to the DIGITIZE menu.

STORE

Allows the user to store, using the digitizer tablet, longitudinal sections for later distribution on the midship section. The section is specified by a method like that used in flat plate input.

This option works in the same manner as the GRAPHIC option STORE described previously. The user will be prompted to generate the digitizer section store drawing by typing in the drawing scale, in decimal inches per foot, and locating

the drawing by specifying the origin and a point on the X-axis. The user will be prompted to generate the section store drawing only with the first selection of the STORE option. The digitizer section store drawing should be of the same form as its graphics terminal screen counterpart. Note that all stiffner shapes stored with this option will be drawn in the graphics terminal section store for easy user referral. The remaining operations of this option follow those of the GRAPHIC menu STORE option with the graphics cursor used to specify plate endpoints and thicknesses specified by a THICK menu selection. The last point entered can be deleted by using the "Z" button as described above in the DIGITIZE option FLAT PLATE. When the complete longitudinal is specified the user should hit the "3" button. This will cue the program, as in the GRAPHIC option STORE, to display the longitudinal section properties. Once the properties have been displayed the user should hit the "Z " button, when prompted, to return control to the DIGITIZE menu.

RECALL

Allows the user to recall longitudinal stiffner shapes from the section store and reproduce them in any quantity on the midship section drawing.

This option works in the same manner as the GRAPHIC option RECALL previously described. The program will prompt the user for the stiffner section number and the quantity to be reproduced. These numbers are entered by using the INTEGER menu. A number is entered using this menu by locating the digitizer cursor over the appropriate digits in order till all are entered, then one hit on the "last digit" box will que the specified number to be entered. For example to enter the number 12, the user first selects the "1" digit, then the "2" digit and finally selects the "last digit" box. Any button on the cursor can be pushed to register a selection. If the user wishes to type the number in at the terminal, he should select the "type in the number" box. Once the user has entered the section number and quantity the program will prompt the user to specify, using the digitizer cursor, the endpoints of the line on which the longitudinal sections are to be distributed. After the second endpoint is specified control will be returned to the DIGITIZE menu. To help the user in recalling sections the midship drawing display will appear on the screen. If the user selects either a non-existent section number or zero sections to be reproduced, the program will print an error message and return control to the DIGITIZE menu without prompting the user for the distribution end points.

Editing and Other Menu Selections

EDIT

This option has the same function and operating procedures as that described previously as a selection of the GRAPHIC operation. The only difference between the two is that after completion of an editing function control is returned to the menu DIGITIZE in this case whereas when selected under the GRAPHIC menu control is returned to that menu. So the user should refer back in this manual for operating procedures.

REDRAW

Will redraw the midship section drawing on the graphics screen and then return control to the DIGITIZE menu.

GO TO COOR

The user should refer to the GRAPHIC option GO TO COOR for the operation of this selection. After completion of this option control will return to the DIGITIZE menu.

WHERE AM I?

Allows the user to determine a location on the digitizer midship section drawing by using the digitizer cursor. Prompts and screen display are the same as the GRAPHIC option WHERE AM I?. After option completion control will return to the DIGITIZE menu.

TRANSFER

Allows the user to transfer directly to the GRAPHIC menu and the graphic input routines.

DONE

Returns control to the input control routine and the INPUT menu.

Comments on Input Operations

The various input operations have been designed so that digitizer and graphics terminal operations are totally compatible. This allows the user to perform, for example, the input of side shell, deck and bottom plating with the digitizer and then input intermediate deck plating with the graphics terminal. Another example is to perform the input of stiffener shapes with the graphics terminal

and then distribute them with the digitizer. Possible operations between the two types of input are unlimited.

The instructions and prompts of the various input operations should be read and followed since they have been written to improve and ease program input operations.

The recommended order of input operations is the following:

- 1) Input all flat plate sections.
- 2) Input all circular sections.
- 3) Store a longitudinal shape.
- 4) Modify the properties of the longitudinal to agree with tabulated or user calculated properties.
- 5) Distribute the longitudinal shape on the midship Section.
- 6) Repeat steps 3, 4 and 5 till all longitudinals are located on the midship section.
- 7) Return to MOD.MAIN for other operations.

The user should note that if the program encounters a data error, control will in general, be returned to the respective input menu. No data for the input operation will be stored, so the midship section data will be as it was before selection of the aborted input operation.

Also note that the digitizer operations should not be selected if a digitizer is not available, also no input operations should be attempted without a graphics terminal.

Constraints on Input

Only specify structural members in the drawing region of the terminal screen display.

The following numerical limits are in effect for the program:

- Up to 100 plate section endpoints.
- Up to 10 circular sections.
- Up to 30 stored stiffner shapes with a limit of 10 points per shape
- Up to 30 sets of stiffners (no limit on the number of stiffners per set)

DEFAULT

This menu option has no function.

Database

The following items will be retrieved from the users database with the menu choice ENTER-DB or filled into the users database by the menu choice FILL-DB.

- SCALE - the drawing scale
- TITLE - array containing the drawing title
- NUMPL - the plate index number
- PLXIN - array of plate endpoints X-coordinate
- PLYIN - array of plate endpoints Y-coordinate
- PLECOD - array of plate endpoint end codes
- PLTHIC - array of plate thicknesses (in.)
- PLSUM1 - the sum of all plate cross sectional areas (in.²)
- PLSUM2 - the sum of all plate area times distance from the baseline (ft.-in.²)
- PLSUM3 - the sum of all plate area times distance squared from the baseline (ft.²-in.²)
- PLSUM4 - the sum of all plate moment of inertias about their own axes (ft.²-in.²)
- NUMCRV - the curve index number
- CRVX1 - array of curve 1st end points X-coordinate
- CRVX2 - array of curve 2nd endpoints X-coordinate
- CRVY1 - array of curve 1st endpoints Y-coordinate
- CRVY2 - array of curve 2nd endpoints Y-coordinate
- CRVCR - array of curve radii (ft.)
- CRVTHIC - array of curve thicknesses (in.)
- CRVEND - array of the number of curve arc drawing sections
- CRVXO - array of curve arc centers X-coordinate
- CRVYO - array of curve arc centers Y-coordinate
- CRVRR - array of curve radii for use by the graphics terminal
- BETA - array of curve starting arc angle
- THETA - array of curve arc section increment angles
- CSAV1 - array of curve cross sectional areas (in.²)
- CSAV2 - array of curve area times distance from the baseline (ft.-in.²)
- CSAV3 - array of curve area times distance squared from baseline (ft.²-in.²)
- CSAV4 - array of curve moments of inertias about their own neutral axes (ft.²-in.²)

CRVSUM1 - sum of all curve areas (in.²)
CRVSUM2 - sum of all curve areas times distance from the baseline (ft.-in.²)
CRVSUM3 - sum of all curve areas times distance squared from the baseline
(ft.²-in.²)
CRVSUM4 - sum of all curve moment of inertias about their own neutral axes
(ft.²-in.²)
NUMSTF - the number of stored stiffner sections
SHAX - array of X-coordinates which define a stored stiffner section
SHAY - array of Y-coordinates which define a stored stiffner section
SHECOD - array of endpoint indicators for each point describing the stored
stiffner section
SHTHIC - array of thicknesses for each section of a stored stiffner (in.)
SHAREA - array of stiffner cross sectional areas (in.²)
SHINER -array of stiffner moment of inertias about their own neutral axes
(ft.²-in.²)
SHAXIS - array of distance from the section basepoint to its neutral axis(ft.)
NUMSET - the stiffner set index number
SETX1 - array of the stiffner set 1st distribution points X-coordinate
SETY1 - array of the stiffner set 1st distribution points Y-coordinate
SETX2 - array of the stiffner set 2nd distribution points X-coordinate
SETY2 - array of the stiffner set 2nd distribution points Y-coordinate
SHNO - array of the stored section number used for each set.
SHQU - array of the number of stiffners in each set
SSAV1 - array of the total cross sectional area of each set (in.²)
SSAV2 - array of the total set area times the distance from the base
line for each set (ft.-in.²)
SSAV3 - array of the total set area times the distance squared from the
baseline for each set (ft.²-in.²)
SSAV4 - array of the moment of inertia total for each set (ft.²-in.²)
SETSUM1 - sum of all total set areas (in.²)
SETSUM2 - sum of all total set area times the distance from the baseline
(ft.-in.²)
SETSUM3 - sum of all total set area times the distance squared from the
baseline (ft.²-in.²)

ICINT - the moment of inertia calculation indicator

ICSM - the section modulus calculation indicator

ICREQ - the A.B.S. required section modulus calculation indicator

SECINT - the section moment of inertia about the section neutral axis
(ft.²-in.²)

NAXIS - the distance of the section neutral axis from the baseline (ft.)

HSAREA - the half section area of the midship section (in.²)

NSMPT - the number of points for which the section modulus has been calculated

SM - array of calculated section moduli (ft.-in.²)

YABS - array of the distance from the baseline to each point where the
section modulus has been calculated (ft.)

YDIST - array of the distance from the neutral axis to each point where
the section modulus has been calculated (ft.)

LBP - the vessel length between perpendiculars (ft.)

BEAM - the vessel maximum beam (ft.)

CB - the vessel block coefficient

BM - the calculated A.B.S. total bending moment (ft.-tons)

MSW - the calculated A.B.S. still water bending moment (ft.-tons)

MW - the calculated A.B.S. wave bending moment (ft.-tons)

SMREQ - the calculated A.B.S. required section modulus (ft.-in.²)

SIGPM - the calculated A.B.S. permissible bending stress (tons/in.²)

SECMIN - the calculated A.B.S. minimum section modulus (ft.-in.²)

Menu Compute

INERTIA - the section neutral axis, the section moment of inertia about this axis and the half section area will be calculated by this option.

SECMOD - will perform the calculations done by the INERTIA option above and additionally allow the user to select points where the section modulus will be calculated (up to a maximum of 10 points).

The user will first be prompted for the number of points for which the section modulus is to be calculated. Then the midship section drawing will appear on the screen with the properties calculated by the INERTIA option listed at the bottom of the screen (see fig. 27). Note that this image is saved for later use in the temporary file -PLOTTEMP1. The user should then hit the return key to get the section modulus. When prompted the user should place the screen cursor at the point of interest. The distance from the baseline, distance from the neutral axis and section modulus of the point will be printed at the bottom of the screen. To calculate the section moduli of the other points the user should hit the return key and wait for the prompt to locate the screen cursors. Hitting the return key after the calculation has been done at the last point will return the user to the menu MOD.MAIN (see figures 28 & 29).

REQ.SM - will calculate the following by using Section 6 of the 1978 American Bureau of Shipping Rules for Building and Classing Steel Vessels: the total bending moment, still water bending moment, wave bending moment, nominal permissible bending stress, minimum section modulus and required section modulus.

The user will be prompted for the following vessel characteristics: length between perpendiculars (ft.), maximum beam (ft.) and block coefficient. Once entered the calculations will be performed.

ALL - will perform all of the calculations done by the INERTIA, SECMOD and REQ.SM options above

All user prompts will be as described for the options above.

DRAWING MENU
 EDIT
 GO TO COOR
 WHERE AM I?
 REDRAW
 FLAT PLATE
 CURVE PLATE
 STORE
 RECALL
 TRANSFER

DDONE
 SECTION STORE

SCALE
 1" = 8FT. - 0"

TITLE
 EXAMPLE SHIP

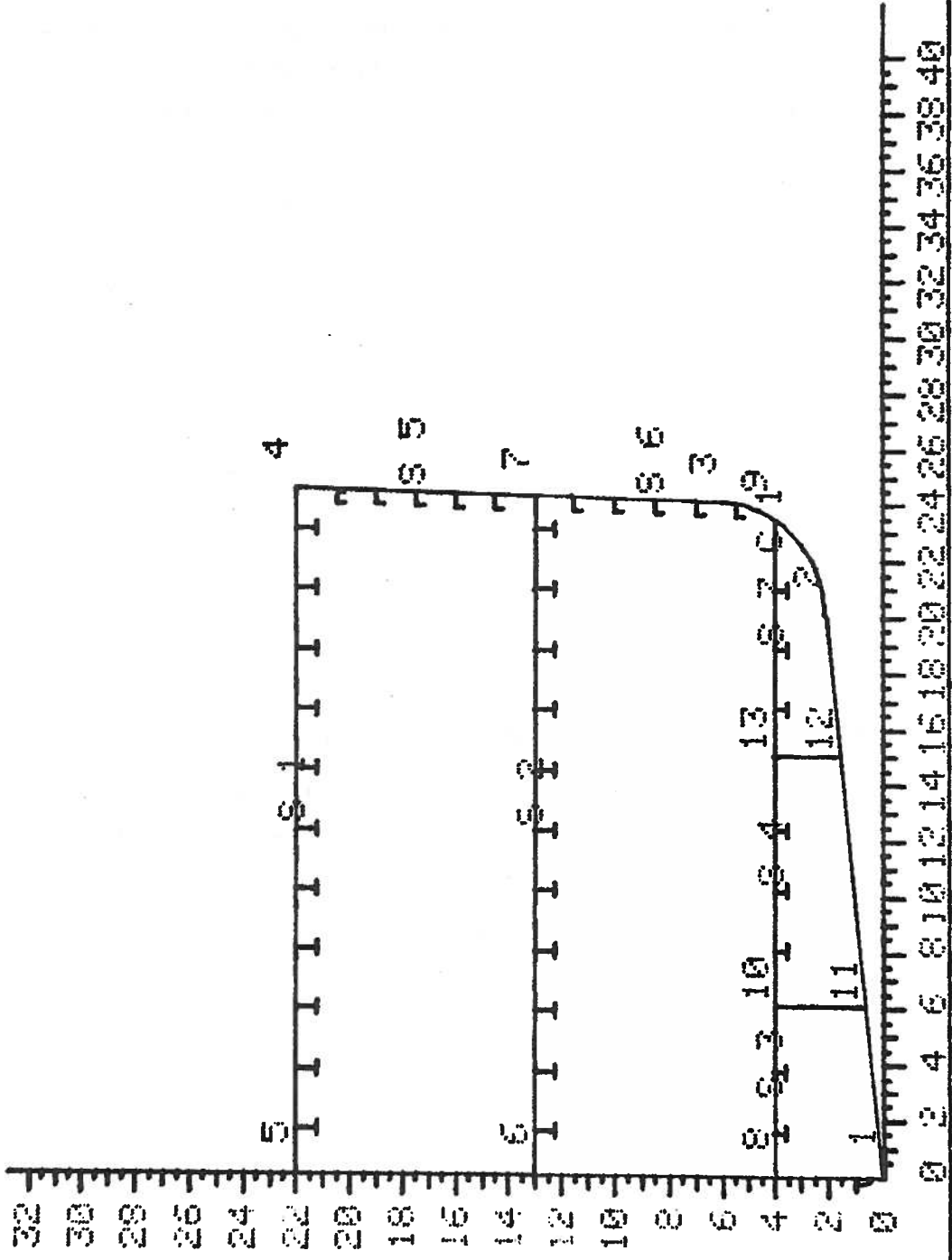
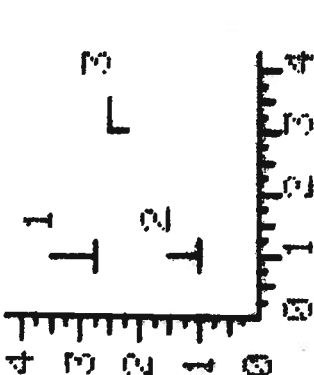


Fig. No. 27 - Screen Display After Inertia Calculation with Option SECMOD.

DRAWING MENU
 EDIT
 GO TO COOR
 WHERE AM I?
 REDRAW
 FLAT PLATE
 CURVE PLATE
 STORE
 RECALL
 TRANSFER

DONE

SECTION STORE

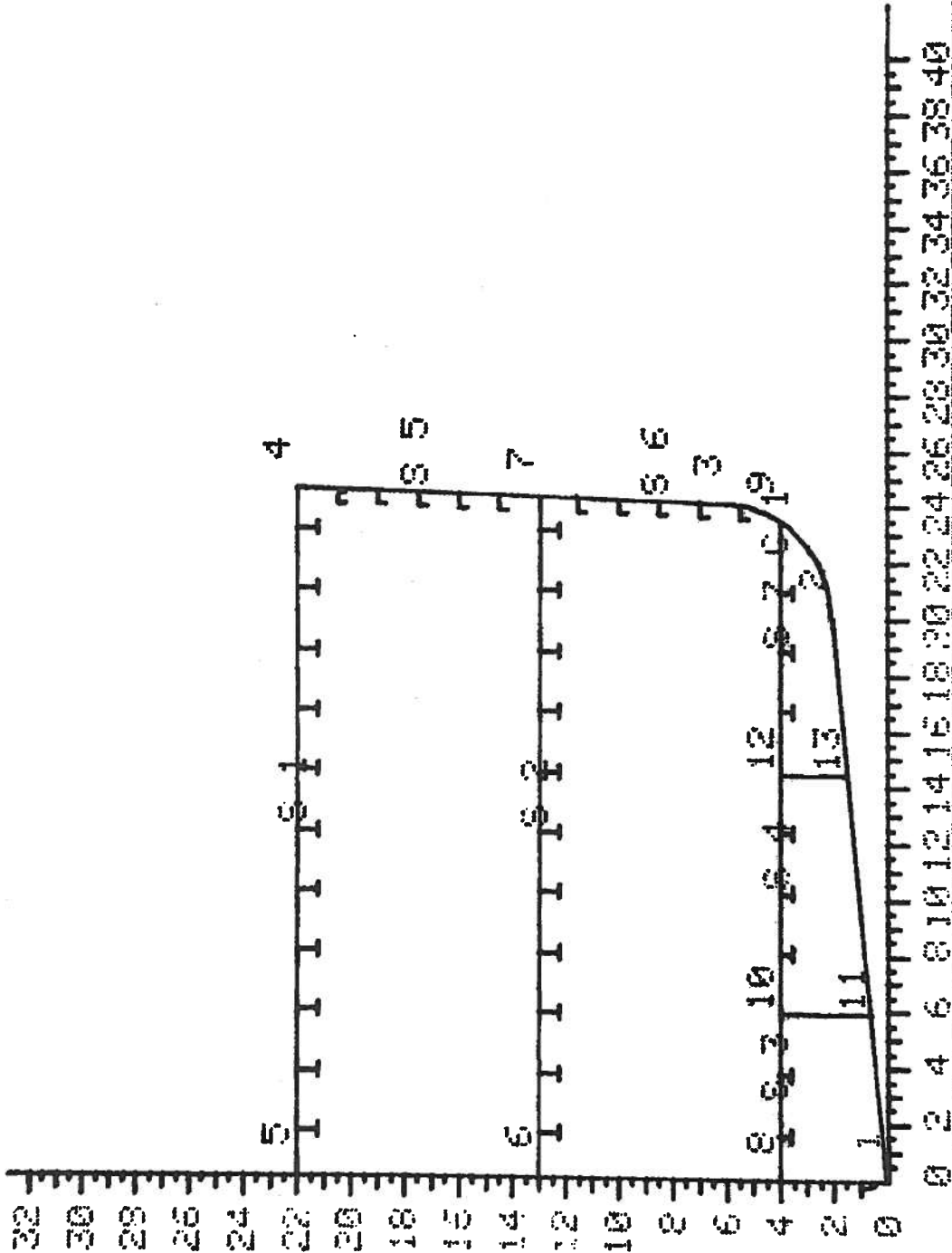


SCALE

1" = 8FT. - 0"

TITLE

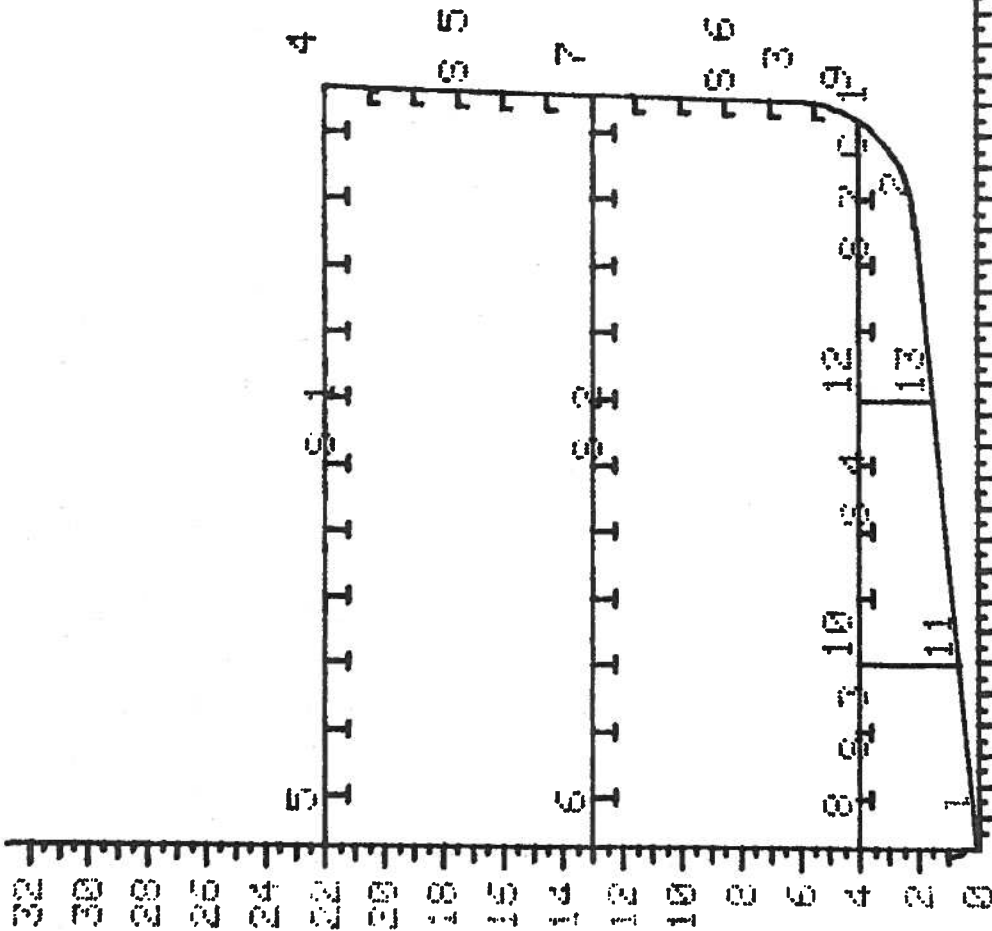
EXAMPLE SHIP



PLACE CURSOR AT DESIRED LOCATION FOR SECTION MODULUS AND HIT RETURN.

Fig. No. 28 - Prompt for Section Modulus Calculation.

?HIT RETURN TO CONTINUE.



0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40

PLACE CURSOR AT DESIRED LOCATION FOR
 SECTION MODULUS AND HIT RETURN.
 DISTANCE FROM BASELINE= -0.01 FT
 DISTANCE FROM AXIS= -10.98 FT
 SECTION MODULUS= 9070.93 INKIP2-FT

Fig. No.29 - Screen Display After Section Modulus Calculation.

- DRAWING MENU
- EDIT
- GO TO COOR
- WHERE AM I?
- REDRAW
- FLAT PLATE
- CURVE PLATE
- STORE
- RECALL
- TRANSFER

DONE

SECTION STORE

SCALE

1" = 8FT. - 0"

TITLE

EXAMPLE SHIP

Menu PRINT

LISTING - will print a listing of all plate, curve, stiffner and stiffner set locations and properties along with the sum of properties for each member type and the total for the midship section.

SECMOD - will print out the point number, distance from the baseline, distance from the neutral axis and section modulus for each point for which the section modulus calculation has been performed.

INERTIA - will print out the half section area, distance from the baseline to the section neutral axis and the section moment of inertia about this axis.

REQ.SM - will print out the following related to the A.B.S. required section modulus calculation: length between perpendiculars, maximum beam, block coefficient, total bending moment, still water bending moment, wave bending moment, nominal permissible bending stress, minimum section modulus, and required section modulus.

RESULTS - will print out everything listed under the SECMOD, INERTIA and REQ.SM options listed above.

ALL - will print out a data listing as per option LISTING in addition to everything printed by the RESULTS option above.

SEND

The user will first be prompted for an item from menu PRINT and when will be asked where the print out is to be sent, either a file or device (such as *PRINT*).

DRAW

Option DRAW will draw the midship section image on the screen.

SAVE

Option SAVE will draw the midship section image on the screen and prompt the user for the plot scaling factor (use 1 for an 8 1/2" X 11" plot, 2 for double this size, etc. up to a maximum of 3.5) and the name of the users plotfile, which can be either a permanent or temporary file. The midship section drawing image will then be saved for later use in the users plotfile.

STOP

Will return control to DEX.

Recommended Order of Operations

For a New Midship Section

- 1) INPUT ALL midship section data (see the comments on input at the end of the menu INPUT description.)
- 2) COMPUTE ALL. Calculate the section modulus at the keel and main deck (or upper structural deck) and compare these with the calculated A.B.S. required section modulus or with the values you have calculated as being needed.
- 3) If you are satisfied with your result go to Step 4. If you are not, edit, as necessary, the midship section by using the editing routines under the Input menus. Now repeat Steps 2 and 3.
- 4) Save your midship section in a database by using the FILL-DB option.
- 5) SEND ALL to *PRINT* or a file for later print out.
- 6) SAVE the midship drawing in your plotfile. Scale the plot according to your needs. Recommend that scaling factor of 1 be used for the plot to be used in a notebook and between 2.5 and 3.5 for presentation purposes.
- 7) STOP the module and return to DEX.
- 8) When done with SPIRAL/DEX perform any of the post-program operations described below.

To Modify an Existing Midship Section

- 1) Enter your stored data with the ENTER-DB option.
- 2) Perform steps 2, 3, 4, 5, 6, 7 and 8 above as needed or wanted.

Program Helpful Hints

Do's

- 1) Read over the user's manual before running the program.
- 2) Follow the program instructions and prompts as they appear.
- 3) Prepare your input data (i.e. sketches, drawings, thicknesses, stiffener properties) before hand.
- 4) Use temporary files if you are unsure of the file sizes, then change them to permanent ones after running the program.
- 5) If the terminal cursor hairlines do not appear on the screen when they are supposed to, use the space bar, not the return key, to bring them to the screen.
- 6) In most cases, if your menu selection is wrong hit the control and "C" key together to return to the menu selection point again. Note that this is not the case with the GRAPHIC and DIGITIZE menus.

Do not's

- 1) Don't draw any structural member with "zero" length by defining the the first and last endpoints at the exact same location.
- 2) Don't cue a new menu function while another function is in operation.
- 3) Don't have the section modulus calculated at the neutral axis.
- 4) Don't PRINT a LISTING on the graphics terminal, its too large for the screen.
- 5) Don't select the DIGITAL input option if a digitizer is not available.
- 6) Don't run the program on a non-graphics terminal. The exception to this is if you only wish to use the following menu options of MOD.MAIN:
 - ENTER-DB to recall the stored data
 - PRINT ALL to print out all data and results of the calculation.
 - COMPUTE REQ.SM to calculate the A.B.S. required section modulus.
- 7) Don't rush thru the program operations, because it will probably take longer to run the program than if you didn't rush.

- 8) When using the digitizer cursor do not do the next hit of the cursor unless you have heard the terminal bell ring for the current hit.

The final hint is to refer to the Principles of Naval Architecture, pp. 182-184 and the American Bureau of Shipping Rules for Building and Classing Steel Vessels, Section 6 if you are unfamiliar with any of the program calculations.

Post-Program Operations

The following is a summary of some computer operations to be performed after the program has been run.

Transfer the database information to a permanent file for later use. A file size of 8-10 pages is adequate for storage of the database information. To copy a database file (-DB1) to another file (DB2), use the MTS command:

```
$COPY -DBI@-IC to DB@I
```

An alternate method to put the database information into a permanent file is by using the MTS command:

```
$RENAME -DB1 DB2 OK
```

This makes your temporary file a permanent one.

Print output stored previously in a file to the line printer by using the following MTS command:

```
$COPY filename to *PRINT*
```

A receipt number will then be printed for the lineprinter output.

Plotfile manipulation is the third operation which can be done after the program is run. The user can view a plotfile at the graphics terminal by using the following MTS command:


```
$RUN *PLOTSEE PAR=Plotfile
```

where Plotfile is the name of the users own plotfile. If the user wishes to modify the contents of a plotfile he can do so by using the *PLOTSYS system which is described in MTS Volume 11, particularly reference pp. 145-164. The final plotfile manipulation is to generate a Calcomp plot of the images stored in the users plotfile. This is done with the following MTS command:

```
$RUN *CCQUEUE PAR=Plotfile
```

Where plotfile is the name of the users own plotfile which must be a permanent file. In general 8 - 10 pages of filespace is required for each drawing in a plotfile. Note that a receipt number is also printed out for the above generated Calcomp plots.

If the user has any questions on any of the above operations he should refer to the SPIRAL User's Guide and to the MTS Volumes particularly Volumes 1, 2 and 11.

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