

SHIP PRODUCTION COMMITTEE
FACILITIES AND ENVIRONMENTAL EFFECTS
SURFACE PREPARATION AND COATINGS
DESIGN/PRODUCTION INTEGRATION
HUMAN RESOURCE INNOVATION
MARINE INDUSTRY STANDARDS
WELDING
INDUSTRIAL ENGINEERING
EDUCATION AND TRAINING

June 1978
NSRP 0005

THE NATIONAL SHIPBUILDING RESEARCH PROGRAM

REAPS 5th Annual Technical Symposium Proceedings

Paper No. 9: The SPADES Ship Production and Control (SPAC) Module

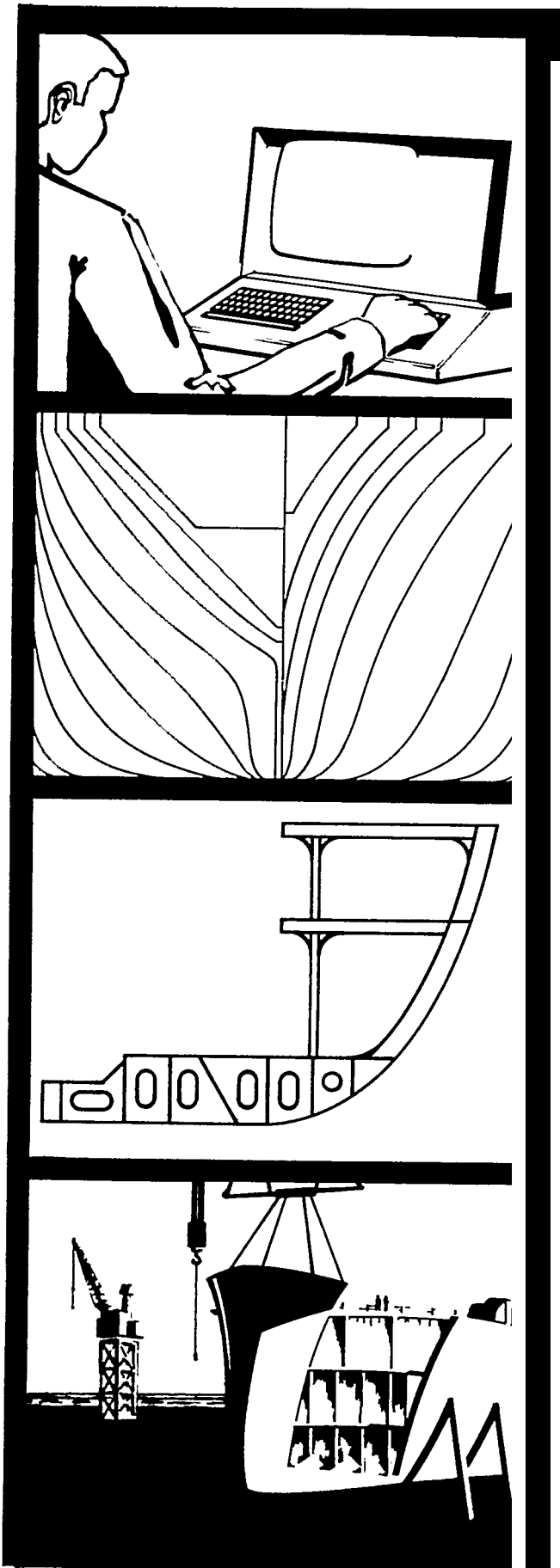
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THE SPADES SHIP PRODUCTION AND CONTROL (SPAC) MODULE

Filippo Cali
Cali and Associates, Inc.
Metairie, Louisiana

Since the founding of Cali and Associates, Mr. Cali has directed the continuous development of the SPADES system and expanded the company to provide complete N/C lofting services to the shipbuilding industry. He has 30 years of experience in all phases of shipbuilding.

Mr. Cali has a degree in engineering 'from the Italian Naval Academy.

GENERAL COMMENTS AND INTRODUCTION

The purpose of this writing is to report the present status of development and implementation of the 'SPAC' Module.

The 'SPAC' Module was originally conceived two years ago, and the justification for its development is just as valid today as it was then. Actually, our increasing experience in operating a service center for N/C Lofting has provided additional reasons for generating other computer outputs not conceived originally to reduce lofting man-hours and better control schedules, as shown later.

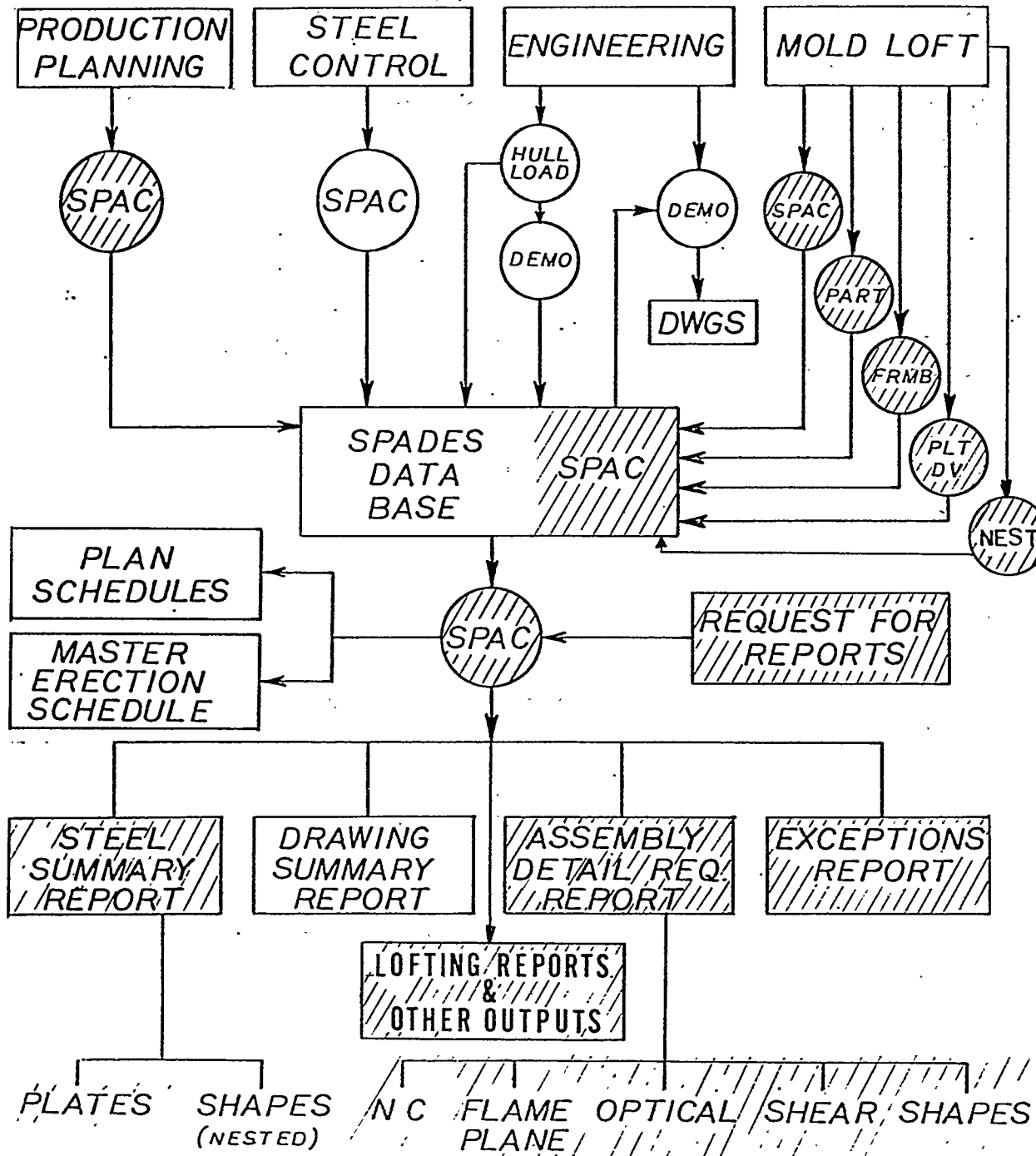
It should be mentioned at this point that the labeling capabilities added to the 'SPADES' System in general because of the 'SPAC' Module will make it desirable to upgrade the hardware used in the loft and in the shop. A fast drafting machine should be used in those shops with a high work load, and a 'DNC' mode of operation will allow not to punch a high volume of paper tape.

Provisions have also been made for transferring all applicable labeling and lofting markings to the burning machine. To do so today for all tapes will probably overload the burning machine. I feel that the use of this feature is justifiable at the present only when using the burning machine for cutting templates from light gauge sheet metal or aluminum, since this operation will represent only a small percentage of the total work load. Total use of it will probably have to wait until better marking systems are available, although some shipyards with surplus N/C cutting capability might find it desirable, even with today's hardware. The zinc oxide marker is probably the best tool to use at the present for this purpose

SPADES SYSTEM

Figure 1

DATA FLOW FOR SHIP PRODUCTION AND CONTROL MODULE



STATUS REPORT

Figure 1 is a copy of the 'data flow' conceived for 'SPAC' originally; and since no major changes have occurred during the 'development, it is used to report on the present status.

The status as reported herein is not in terms of coding done yet to be tested. The shaded areas represent the actual extent of 'SPAC' as presently in production use by our N/C Lofting Department.

Implementation was started last October, and the various examples shown later are working documents for a notch tug we are in process of lofting for Atlantic Marine, Inc., in Jacksonville, Florida.

The detail status report is as follows:

A. Data Base

Expansion of the data base to accommodate all records requirements for 'SPAC' has been completed. Proper provisions have also been made for all other ship systems other than steel, such as: piping, HVAC, outfitting, etc. It is expected that some new handling routines will become necessary as the development continues.

B. 'SPAC' Program

At the present,. this program allows the loft and production planning to communicate with the data base for initial loading of assembly (unit) breakdown; to assign schedules and personel and enter data.. such as validation of individual items. It is also used to request all reports except those generated automatically by the system when applicable.

As the experience in the use of 'SPAC' increases, it is inevitable that changes and additions will be incorporated.

C. 'PARTGEN', Framebending, Plate Development and Nesting

The necessary modifications in these modules to integrate with 'SPAC' have been completed and no further changes for this purpose are expected.

I am pleased to report that the additional input requirements in these modules is very minimal and very simple. Furthermore, it has been structured in such a way, not to require any modification of past input.

D. ' S P A C ' R e p o r t s

All reports shown shaded in Figure 1 are complete and available to the user. I am sure that format changes and added information will be requested by the 'SPADES' users other than ourselves to better suit the practices of the various shipyards. Under the guidance and with the approval of the 'SPADES' Users' Steering Committee, we will incorporate such changes,

E. Lofting Reports and Other Outputs

These reports have been added during the development to aid the loft in tracking the work in progress, and to minimize clerical errors of identification, such as mislabeling a part, or showing the thickness throw on the wrong side of the molded line. The latter will prove very valuable in reducing man-hours and turn around time associated with design and production changes, or with rework due to errors.

F. On-Going Development

The various records presently stored in the data base contain more information than is utilized by the various 'reports. One good example is the three-dimensional center of gravity associated with each piece. High on the list of priorities is the generation of the weight and center of gravity by assembly and for the entire ship.

Within the practical space limitations of this paper, it would be difficult to include a full, complete 'SPAC' report for an entire module. For a better understanding, Pages 7 through 40 have been collected to give the interested reader a quick walk through the lofting process and its tie-in with the 'SPAC' Module.

Frame Bending Module

Page 7 is part of a drawing showing a shell longitudinal (L- 12) terminating at Fr. 54. The longitudinal belongs to Module 1 and is contained in Drawing 777. The Pc. Mk. is 1-777LI20540P. Page 8 shows the input coding (from Longitudinal L-7 to L-12). Pages 9 and 10 are the

end-cut templates at the forward end of the beam. Page 11 is a tabulation of the developed curvature to enable the making of a full state template. Page 12 is a typical summary printed for „ each beam.

Page 13 (Line 61) is a page of the 'SPAC' Report for Module 1, showing all data needed and templates to be used to fabricate and bend the longitudinal in the shop.

Plate (Shell) Development Module

Page 14 is portion of the shell expansion drawing (777) showing Shell Plate C -2. The Pc. Mk. is 1-777C 2: S. Page 15 is the input for this plate and three other plates. The same input is used for the roll sets. Page 16 is the plot of the developed part. Page 17 shows the corresponding roll sets. Page 18 is part of the nested tape to cut the roll sets from surplus material. Pages 19 and 20 are the title block and plot location of the templates within the nested Tape No. -741011, Rev. 2. The digit '4' in this number indicates that these are templates and not parts. Page 21 (Line 21) lists tape and template needed to cut and roll the plate. Page 22 (Line 55) shows that Template 8023-401 is nested within Tape No. 741011 and is to be used for Pc. Mk. 777. C 2 S.

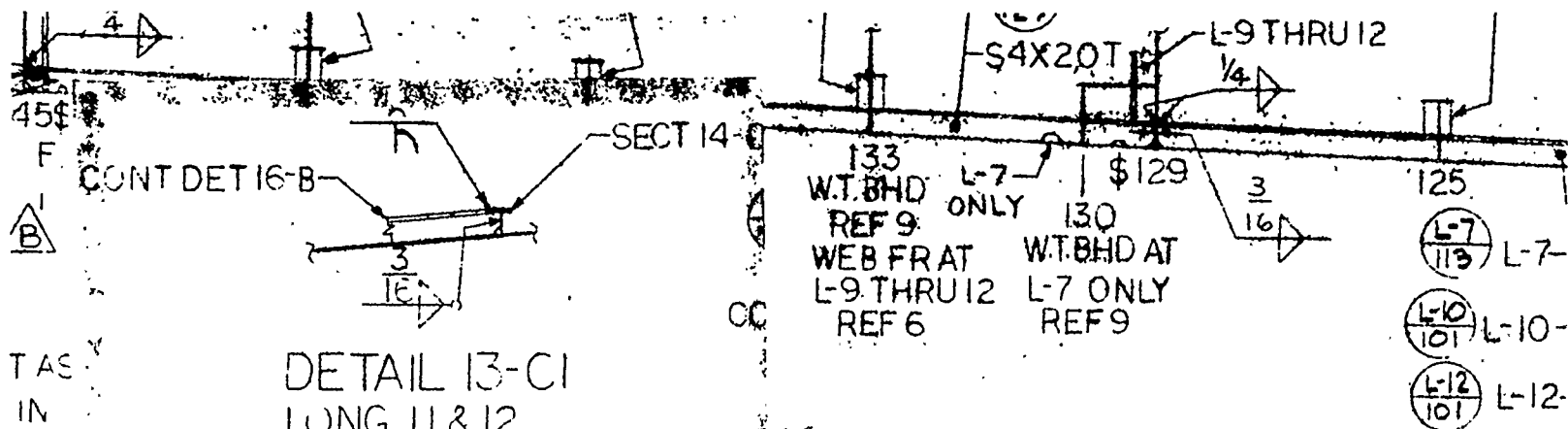
Part Generation Module

Page 23 (Dwg. 786) shows a transverse bulkhead (Pc. 174) and associated vertical stiffness within Module 2.07. The bulkhead Pc. Mk. is 2. 0.7-786085017.4C. The stiffener shown (172) has Pc. Mk. 1-78.61720850 S. Page 24 is the input coding. Page 25 is the tabulation of the part geometry. Page 26 is the plot of the part (Note the thk. throw from the molded line plotted by the drafting machine). Page. 27 is the input for all stiffeners on the bulkhead. The four lines for 2.0.7-7861720850 S are bracketed. Pages 28 to 31 are the end-cut templates. Page 32 (Line 20) shows cut length, other data and template associated with the stiffener.

Nesting Module

Page 33 is the input for Nest Tape No. 710039 calling for the above bulkhead. Pages 34, 35 and 36 are title block, plot location of parts, and summary report for the tape. On Page 35, the bulkhead, (Pc. Mk. 2. 07-786850174 C) is Item No. 9. Page 37 (part of the plot of the tape) shows the piece marked . Page 38 is the proof drawing we deliver with each tape.

Page 39 lists the plates and tapes needed for Module 2.07, and Page 40 shows the tape number to be used to cut the bulkhead.



253

7

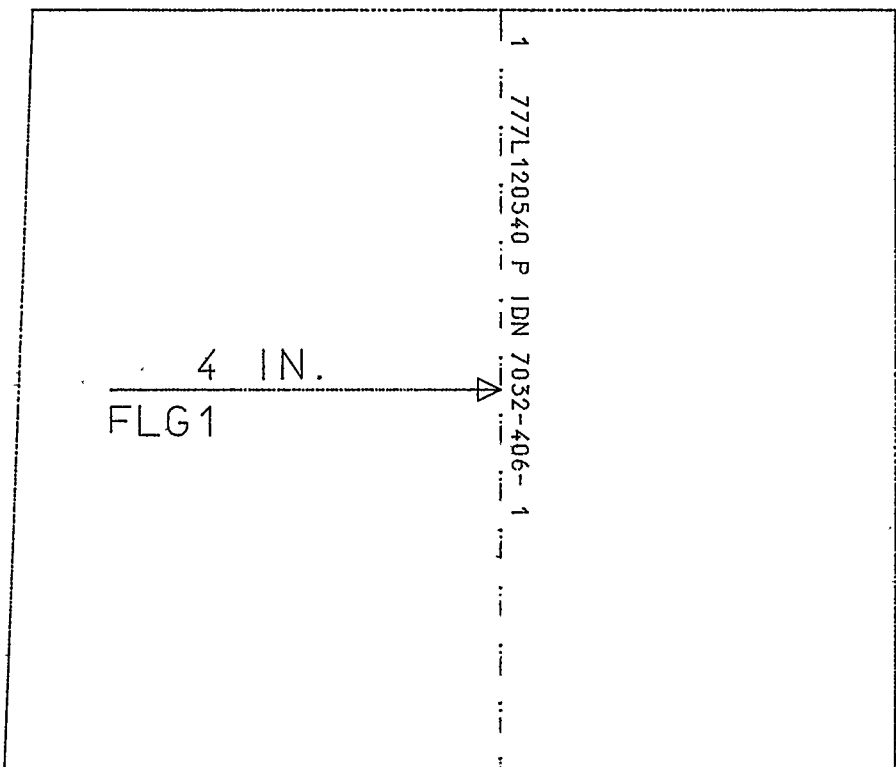
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1234567890123456789012345678901234567890123456789012345678901234567890

INPUT EXECUTE DATE 05/29/78 TIME 22/24/58 RUN NO. 5
JOB P801 PROG. MAID FRBD INPUT 0032 REV. NO. 4 PAGE 1

INPS	N	32						7800320004
RMKS	JESSE							7800320008
MODL	1							7800320012
DRWG	777	16-B						7800320016
LONG			M	S L7	S L12			7800320120
NADT	S4X2.0T		N	904				7800320124
PCMK	777L 70470 P		S L7					7800320128
	777L 80470 P		S L8					7800320132
	777L 90470 P		S L9					7800320136
	777L100470 P		S L10					7800320140
	777L110470 P		S L11					7800320144
	777L120540 P		S L12					7800320148
BUTT		F 47	Z1	.324	F 73.	Z	2 0	7800320152
ECUT		A*	S	1 8	A*	S	1 8	7800320156
OPTN	FLG1FLG2TABL							7800320176
MARK	ALL							7800320180
DEFN			S L8					7800320252
BUTT		F 47.	Z1	.324	F 69.			7800320256
DEFN			S L9					7800320257
BUTT		F 47.	Z1	.324	F 73.	Z	2 0	7800320259
DEFN			S L12					7800320260
BUTT		F 54	Z1	.188	F 73.	Z	2 0	7800320264
ECUT		A*	S	1 8	A*	S	1 8	7800320268
OPTN	FLG1FLG2TABL	I	1.406					7800320272
INPE								7800329999

1 2 3 4 5 6 7 8
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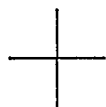
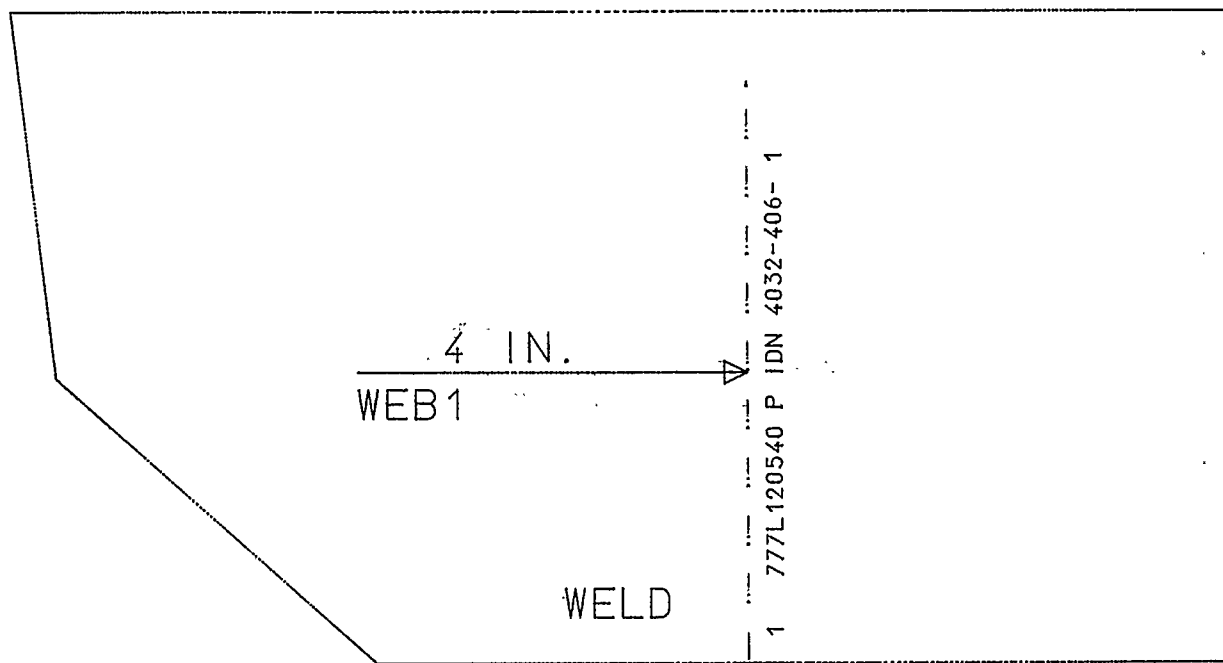
INPUT IS EXECUTABLE FROM WITH REV. 4



+

TAPE NO. 787032-406- 1

256



TAPE NO. 784032-406- 1

DATE 04/24/78
YARD JOB NO. 7005P001
O.B. NAME P001
O.B. JOB NO. 1

SEAFLEX SYSTEM

PAGE 1

UTILITY MODULE - 0101

PIECE 100. 0052-006 REV. 1 (FRAME FEED. TABLE) PCMT. 1 177L120540 P DMC. 777 16-b

S 422.0 T AL5086 LONG FRAME S L12 P ON SHIP'S SURFACE F F

TABLE OF OFFSETS

DISTANCE (Y) OF THE TRACE FROM THE CHORD AT LOCATION (X) IN F1-1K-16

MARK		K FWD				F 57.000				F 59.050		
X	0- 0- 0	0- 3- 7	1- 0- 0	2- 0- 0	3- 0- 1	3- 0- 1	4- 0- 0	5- 0- 0	5- 0- 4	6- 0- 0		
Y	0- 0- 0	0- 0- 1	0- 0- 3	0- 0- 5	0- 0- 8	0- 0- 8	0- 0- 10	0- 0- 12	0- 0- 12	0- 0- 13		
MARK		F 61.000				F 63.050				F 65.000		
X	7- 0- 0	7- 0- 7	8- 0- 0	9- 0- 0	9- 0- 10	10- 0- 0	11- 0- 0	11- 0- 13	12- 0- 0	13- 0- 0		
Y	0- 0- 14	0- 0- 14	0- 0- 15	0- 1- 0	0- 1- 0	0- 1- 1	0- 1- 1	0- 1- 1	0- 1- 0	0- 1- 0		
MARK		F 67.000				F 69.000				F 71.050		
X	14- 0- 15	14- 0- 0	15- 0- 0	15- 1- 2	16- 0- 0	17- 0- 0	17- 1- 4	18- 0- 0	18- 7- 6	18- 11- 7	K AF1	
Y	0- 0- 1- 0	0- 0- 14	0- 0- 13	0- 0- 13	0- 0- 11	0- 0- 8	0- 0- 8	0- 0- 5	0- 0- 3	0- 0- 1		
MARK		F 73.000										
X	19- 0- 0	19- 1- 6	19- 3- 7									
Y	0- 0- 1	0- 0- 1	0- 0- 0									

DATE 06/07/78
YARD JOB NO. 7005PB01
D.B. NAME PB01
D.B. JOB NO. 7

S P A D E S S Y S T E M
PRODUCTION AIDS MODULE-FRAME BENDING PROGRAM

INDIVIDUAL BEAM SUMMARY REPORT

PIECE NO. 401 WITHIN INPUT DECK NO. 102 - RUN NO. 4

3.08/78 41500 P TRSV FRAME F 150000P ON SHIP'S SURFACE L 64A P

PHYSICAL PROPERTIES:

SIZE S 6X3.0 T AL5086
NEUTRAL AXIS 4.356 INCHES
DEPTH OF WEB 6.000 INCHES

INPUT DEFINITION OF BUTTS AND END-CUTS :

BUTT FORG X 15 0 PEND X -5 0
ECUT S0C1S0C1S0C1 X 15 1 8

MINIMUM CUT-LENGTH REQUIRED : 2/ 07/11 FT/IN/16

1ST. END-CUT REFERENCE MARK : 0/ 4/ 0 FT/IN/16 FROM END OF BEAM
1/ 8/11 FT/IN/16 FROM THE OPPOSITE END
2ND. END-CUT IS SQUARE - NO REF. MARK GIVEN

***** OUTPUT OPTIONS *****

OPTION	EXECUTED	STORED	DB.NO. AND REV.
WEB1	YES	YES	6 4102-401- 2
TABL	YES	YES	6102-401- 2

REPORT DATE : 06/15/74

S P A C E S T S I T E

PAGE NO. 3. 6

D.D.NAME : P801 7005P001

SHIP PROJECTION AND CONTROL MODEL

MODULE/UNIT: 1

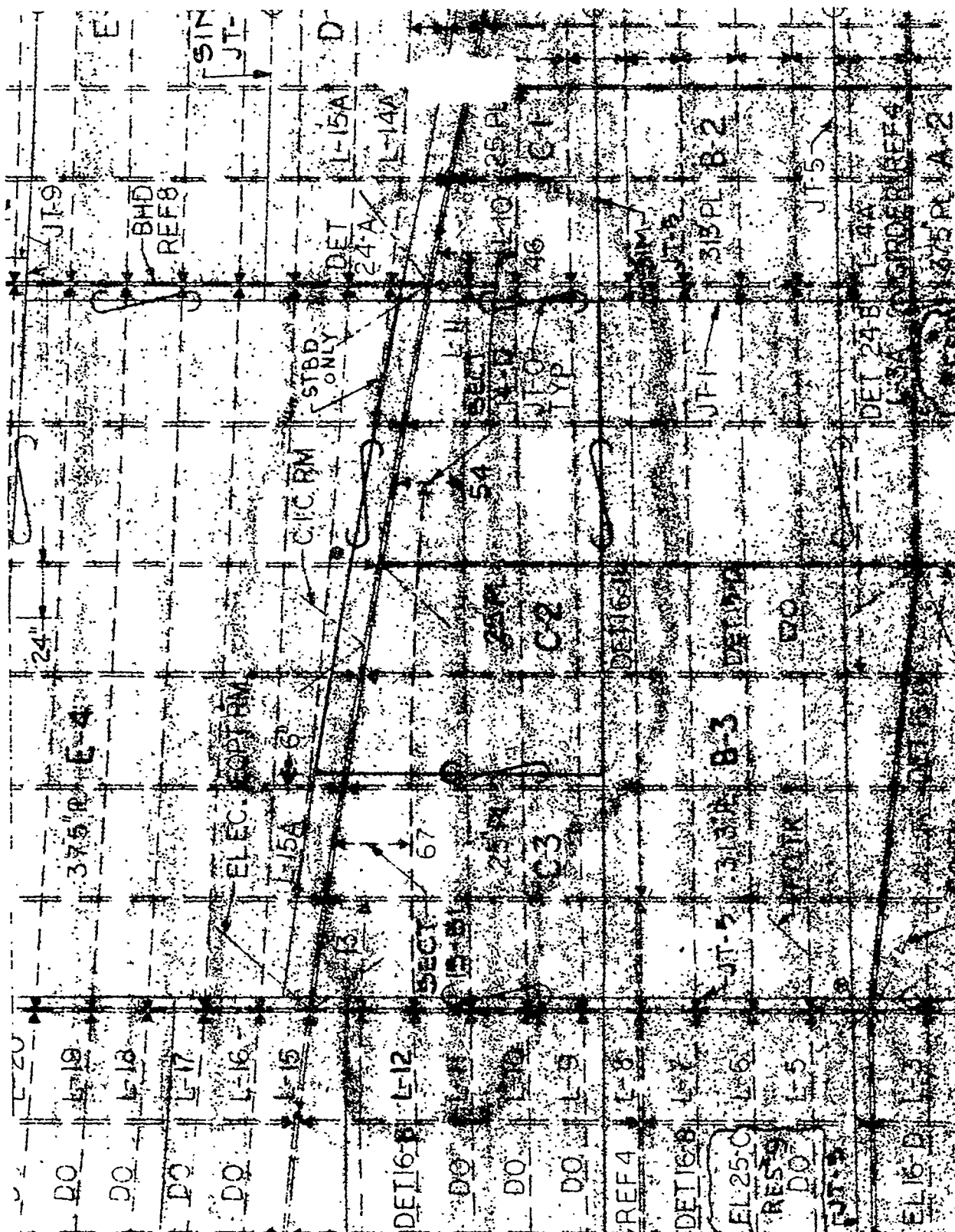
VESSEL : GUNBOAT (PFB 1)

REPORT REV. 16

PIECES PROPOSED FROM SHAPES

LINE-REV	PIECE MARK/	QTY/	AGT.	MAT'L	LENGTH	SIN	'A'	'B'	'C'	N/C ID	WEB 1 FLANGE 1	WEB 2 FLANGE 2	OTHER	N/C	AIDS
	DRAWING NO.	LOC.													
56-	8 777L100470 S 777	1 16-B	53	85	904	26-04-04	25-08-04	4	4	6032-404- 2M	F4032-404- 2 7032-404- 2	A5032-404- 2 9032-404- 2	0		0 LONG.FR. FR.47
57-	0 777L110460 P 777	1 16-B	2	85	904	1-00-08	- 4-08	4	4	6033-405- 1	F4033-405- 1 7033-405- 1	A5033-405- 1 9033-405- 1	0		0 LONG.FR. FR.46
58-	7 777L110460 S 777	1 15-B	2	85	904	1-00-08	- 4-08	4	4	6033-405- 1M	F4033-405- 1 7033-405- 1	A5033-405- 1 9033-405- 1	0		0 LONG.FR. FR.46
59-	7 777L110470 P 777	1 16-B	53	85	904	26-04-08	25-08-08	4	4	6032-405- 2	F4032-405- 2 7032-405- 2	A5032-405- 2 9032-405- 2	0		0 LONG.FR. FR.47
60-	8 777L110470 S 777	1 16-B	53	85	904	26-04-08	25-08-08	4	4	6032-405- 2M	F4032-405- 2 7032-405- 2	A5032-405- 2 9032-405- 2	0		0 LONG.FR. FR.47
61-	5 777L120540 P 777	1 16-B	39	85	904	19-03-14	18-07-14	4	4	6032-406- 1	F4032-406- 1 7032-406- 1	A5032-406- 1 9032-406- 1	0		0 LONG.FR. FR.54
62-	7 777L120540 S 777	1 16-B	39	85	904	19-03-14	18-07-14	4	4	6032-406- 1M	F4032-406- 1 7032-406- 1	A5032-406- 1 9032-406- 1	0		0 LONG.FR. FR.54
63-	5 777L130690 P 777	1 15-B	6	85	903	4-02-05	3-06-05	4	4	6040-401- 3	F4040-401- 3 7040-401- 3	A5040-401- 3 9040-401- 3	0		0 LONG.FR. FR.69
64-	7 777L130690 S 777	1 15-B	6	85	903	4-02-05	3-06-05	4	4	6040-401- 3M	F4040-401- 3 7040-401- 3	A5040-401- 3 9040-401- 3	0		0 LONG.FR. FR.69
65-	11 782 20120 C 782	1 4-A	20	8F5-00		4-06-08				0			0		0
					X -12										
66-	11 782 70520 P 782	1 3-B	22	8F5-00		5-06-04				0			0		0 FC.FLT.FR.51
					X -12										

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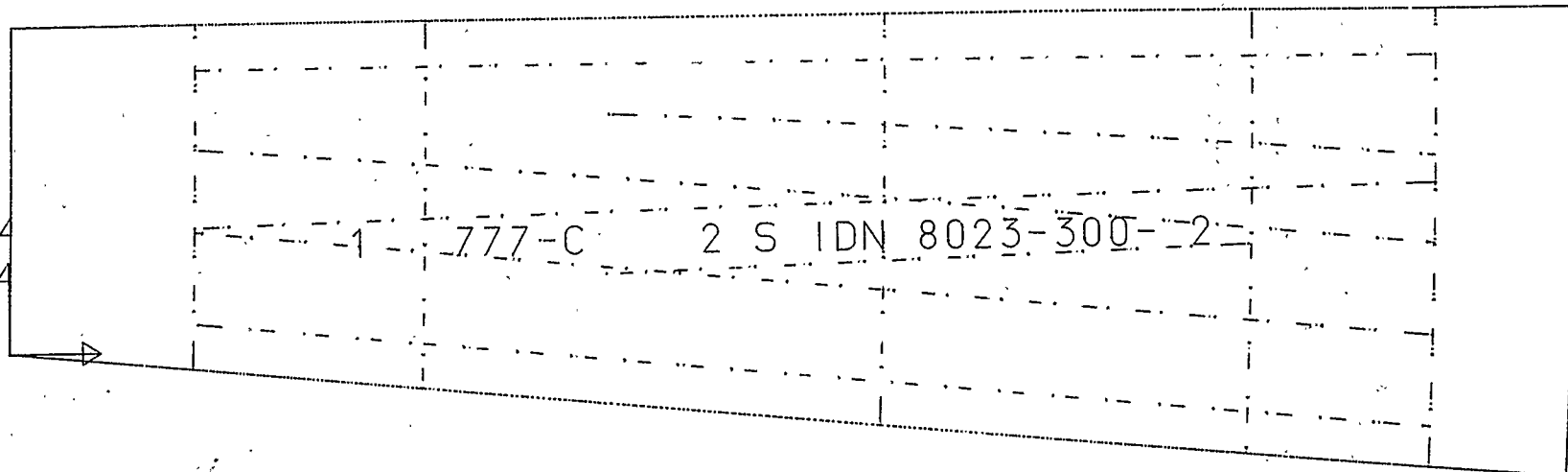
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JOB P801 PROG. PL10 PL10 INPUT 8020 REV. NO. 3 PAGE 1

INPS	N	8020	570	1329	7580200004
RMKS	JESSE	5-6-78			7580200008
MODL	1				7580200012
DRWG	777	5-B			7580200016
BULL		J FWD	F 47.	6 0	7580200120
		J AFI	F 73.	- 6 0	7580200124
		J AF2	F 65.	- 6 0	7580200128
LWSM		J A			7580200132
UPSM		J D1			7580200136
PART	777-A3 S	N	1		7580200140
SEAM	IRGL	J FWD	J A	J AFI	7580200144
REFL BULK		2 0 0			7580200148
PSTK				2 0	7580200152
MARK EXCL		F 54.	F 67.		7580200154
PLTE		81	.375		7580200156
PART	777-B3 S	N	2		7580200160
SEAM	IRGL	J FWD	J B	J AFI	7580200164
REFL BULK		6 0 0			7580200168
PSTK				2 0	7580200172
MARK EXCL		F 54.	F 67.		7580200174
PLTE		81	.313		7580200176
PART	777-C2 S	N	3		7580200180
SEAM	IRGL	J FWD	J C	J AF2	7580200184
REFL WLINE		6 0 0			7580200188
MARK EXCL		F 54.			7580200190
PLTE		81	.25		7580200192
PART	777-C3 S	N	4		7580200200
SEAM	IRGL	J AF2	J C	J AFI	7580200204
PSTK				2 0	7580200208
REFL WLINE		6 0 0			7580200212
MARK EXCL		F 67.			7580200214
PLTE		81	.25		7580200216
INPE					7580209999

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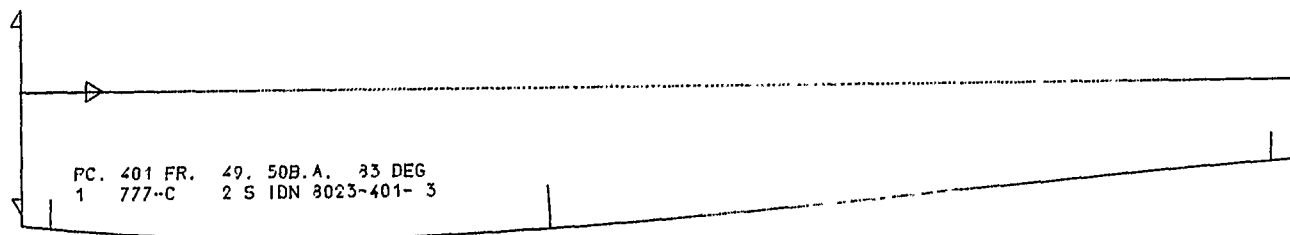
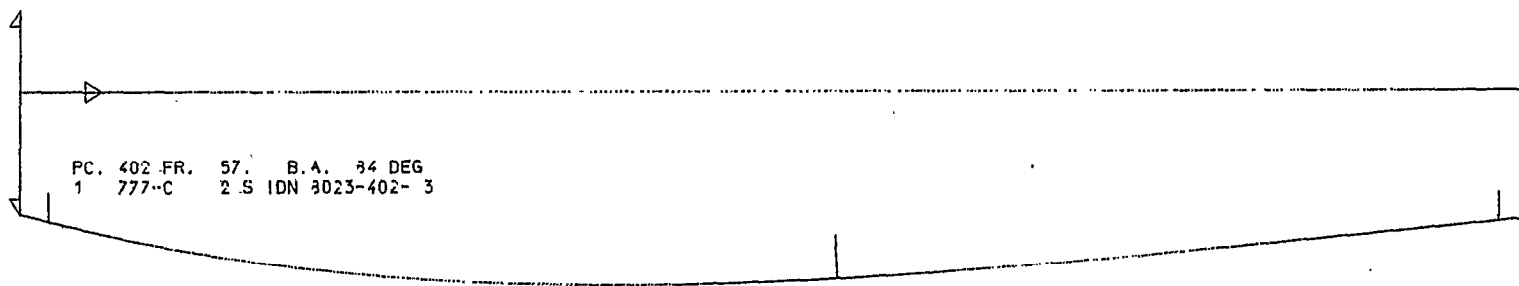
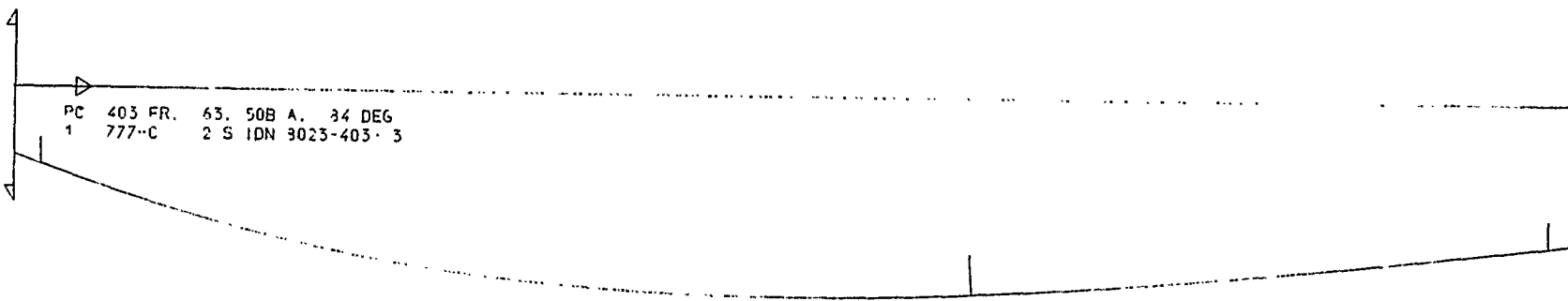
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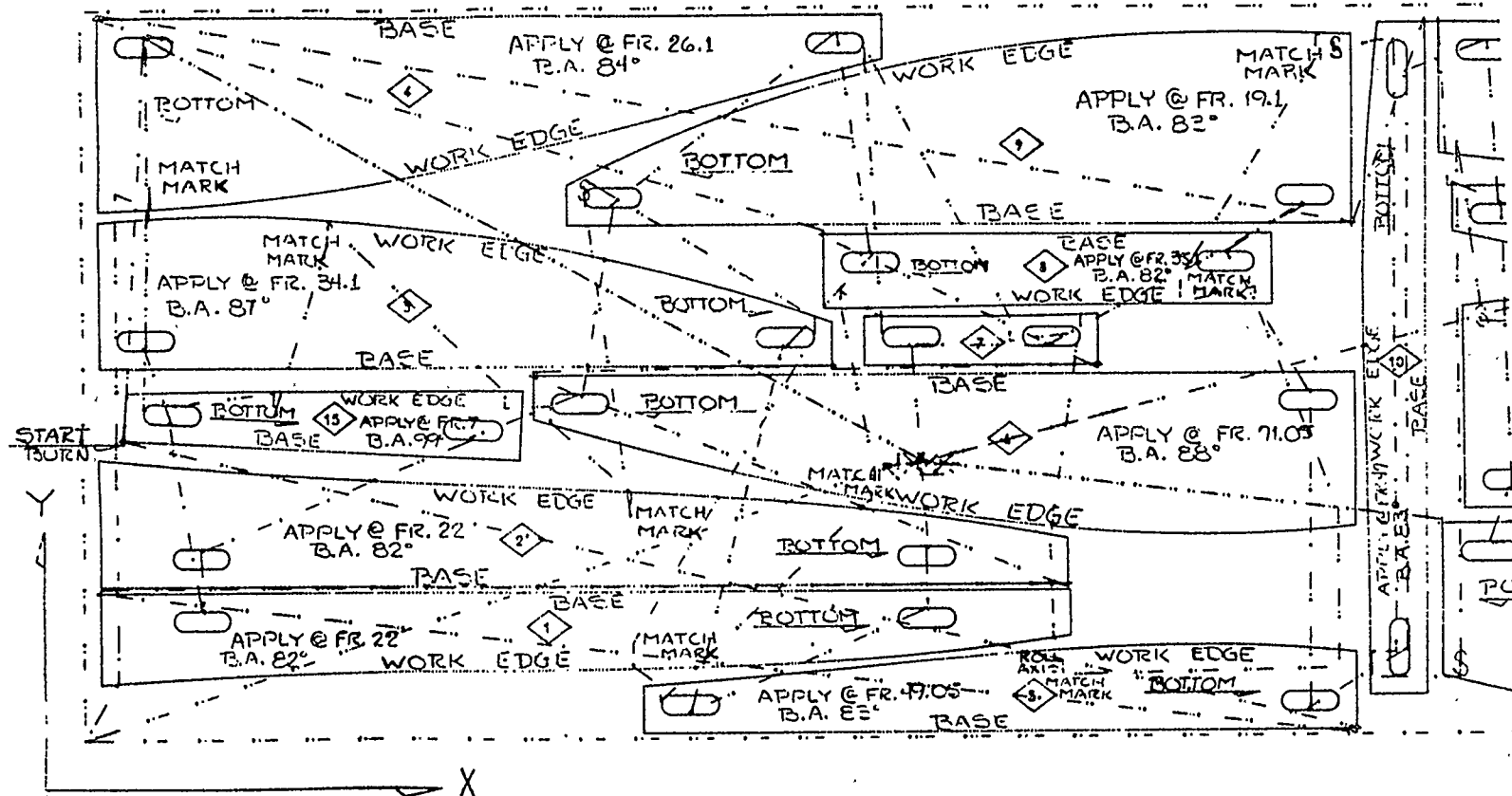


262



TAPE NO. 758023-300- 2





TAPE NO. 741011

- 2

P E T E R S O N B U I L D E R S I N C .

19

P G G 5 1 1 C L A S S - G U N B O A T

NO.PLATES LIKEWISE = 1 NO.PLATES MIRROR IMAGE= 0 TOTAL NO. PLATES = 1

PLATE SIZE = 14400X 4800X 25 STOCK NO.= MIL.= AL. 5456

P A R T T E M P L A T E S N E S T E D I N T H I S T A P E

PART NO.				QTY.	PART NO.				QTY.	PART NO.				QTY.
1	777-B	1	P	1	1	777-B	1	S	1	1	777-A	2	S	1
1	777-B	2	S	1	1	777-C	2	S	1	1	777-B	3	S	1
1	777-C	1	S	1	1	777-C	1	S	1	1	777-A	1	P	1
1	777-C	1	S	1	1	777-P	2	S	1	1	777-B	2	S	1
1	777-A	1	P	1	1	777-A	1	P	1	1	777-B	1	AP	1

R E V I S I O N S

REV	DESCRIPTION	BY	DATE

PREPARED BY

C A L I & A S S O C I A T E S , I N C .

CHECKED BY:

VALIDATED BY:

JOB NO.7005PB01

NEST TAPE NO. 741011- 2 /

S P A D E S S Y S T E M

DATE 06/12/76

IDENTIFICATION & PLOT LOCATION OF PARTS
FOR TAPE NO. 741011- 2

PLOT REF.	DRWG. & LOC.	N/C ID & MODE	LIKE PLATE MODULE & PCMK.	MIRR. PLATE MODULE & PCMK.
1	777 4-A	* 8031-403- 3 L	* 1 777-B 1 P	*
2	777 4-A	* 8041-403- 3 L	* 1 777-B 1 S	*
3	777 4-B	* 8011-402- 3 L	* 1 777-A 2 S	*
4	777 4-B	* 8012-401- 3 L	* 1 777-B 2 S	*
5	777 5-B	* 8023-401- 3 L	* 1 777-C 2 S	*
6	777 5-B	* 8022-403- 3 L	* 1 777-B 3 S	*
7	777 4-B	* 8013-401- 3 L	* 1 777-C 1 S	*
8	777 4-B	* 8013-402- 3 L	* 1 777-C 1 S	*
9	777 9-B	* 8071-403- 1 L	* 1 777-A 1 P	*
10	777 4-B	* 8013-403- 3 L	* 1 777-C 1 S	*
11	777 4-B	* 8012-403- 3 L	* 1 777-B 2 S	*
12	777 4-B	* 8012-402- 3 L	* 1 777-B 2 S	*
13	777 9-B	* 8071-401- 1 L	* 1 777-A 1 P	*
14	777 9-B	* 8071-402- 1 L	* 1 777-A 1 P	*
15	777 9-B	* 8102-403- 1 L	* 1 777-B 1AP	*

REPORT DATE : 06/15/78

S F A L E S S Y S T E M

PAGE NO. 7. 3

D.B.NAME : P801 /00SP801

SHIP PRODUCTION AND CONTROL MODULE

MODULE/UNIT: 1

VESSEL : GUYANAAT (PPG 1)

REPORT REV. 16

PIECES PRODUCED THROUGH N/C CUTTING

LINE-REV	PIECE MARK	DRAWING NO.	LOC.	QTY.	%T.	MAT.	THK.	STK	N/C ID.	NEST TAPES	TEMPLATES	PROCESS 1ST 2ND	DESCRIPTION
21- 13	777-C	2 S	777	5-B	1	257	8	.25	8023-300- 2	10045- 3	8023-401- 3 8023-402- 3 8023-403- 3		WELLPLTG FR.47
22- 13	777-C	3 P	777	5-B	1	150	8	.25 A	8024-300- 2M	10045- 3	8024-401- 1 8024-402- 1 8024-403- 1		WELLPLTG FR.65
23- 13	777-C	3 S	777	5-B	1	150	8	.25 A	8024-300- 2	10045- 3	8024-401- 3 8024-402- 3 8024-403- 3		WELLPLTG FR.65
24- 13	777-FK	1 C	777	5-A	1	173	8	.50	8061-300- 4	10046- 2			FLATKEEL FR.22
25- 13	777-FK	2 C	777	5-A	1	173	8	.50 A	8062-300- 3	10046- 2			FLATKEEL FR.47
26- 12	782 120004	C	782	4-A	1	18	8	.50	0160- 1- 3	0160- 1- 1			RRKT,PLT. FR.12
27- 13	782 520006	P	782	3-E	1	44	8	.44	0163- 1- 3	10038- 3			RRKT,PLT.FR.51
28- 13	782 520006	S	782	3-E	1	44	8	.44	0163- 1- 3M	10038- 3			RRKT,PLT.FR.51
29- 12	782 570057	P	782	3-C	1	1	8	.75	0164- 1- 1	0164- 1- 1			CHOCK PLT FR.57
30- 13	782 570057	S	782	3-C	1	1	8	.75	0164- 1- 1L		0164- 1- 1		CHUCK PL1 FR.57
31- 12	783 231001	P	783	3A	1	1	8	.25	0065- 1- 3	10007- 5			INTC.FR. FR.23.1
32- 12	783 231001	S	783	3A	1	1	8	.25	0065- 1- 3M	10007- 5			INTC.FR. FR.23.1
33- 12	783 231002	P	783	3A	1	5	8	.25	0066- 1- 1	10007- 5			INCL.PCS.2-9
34- 12	783 231002	S	783	3A	1	5	8	.25	0066- 1- 1M	10007- 5			INCL.PCS.2-9

PAGE NO. 15. 4
MODULE/UNIT: 1
REPORT REV. 16

REPORT DATE : 06/14/74
O.B. NAME : PR01 7005501
VESSEL : GUNHAI (PRG 1)

S P A C E S Y S T E M

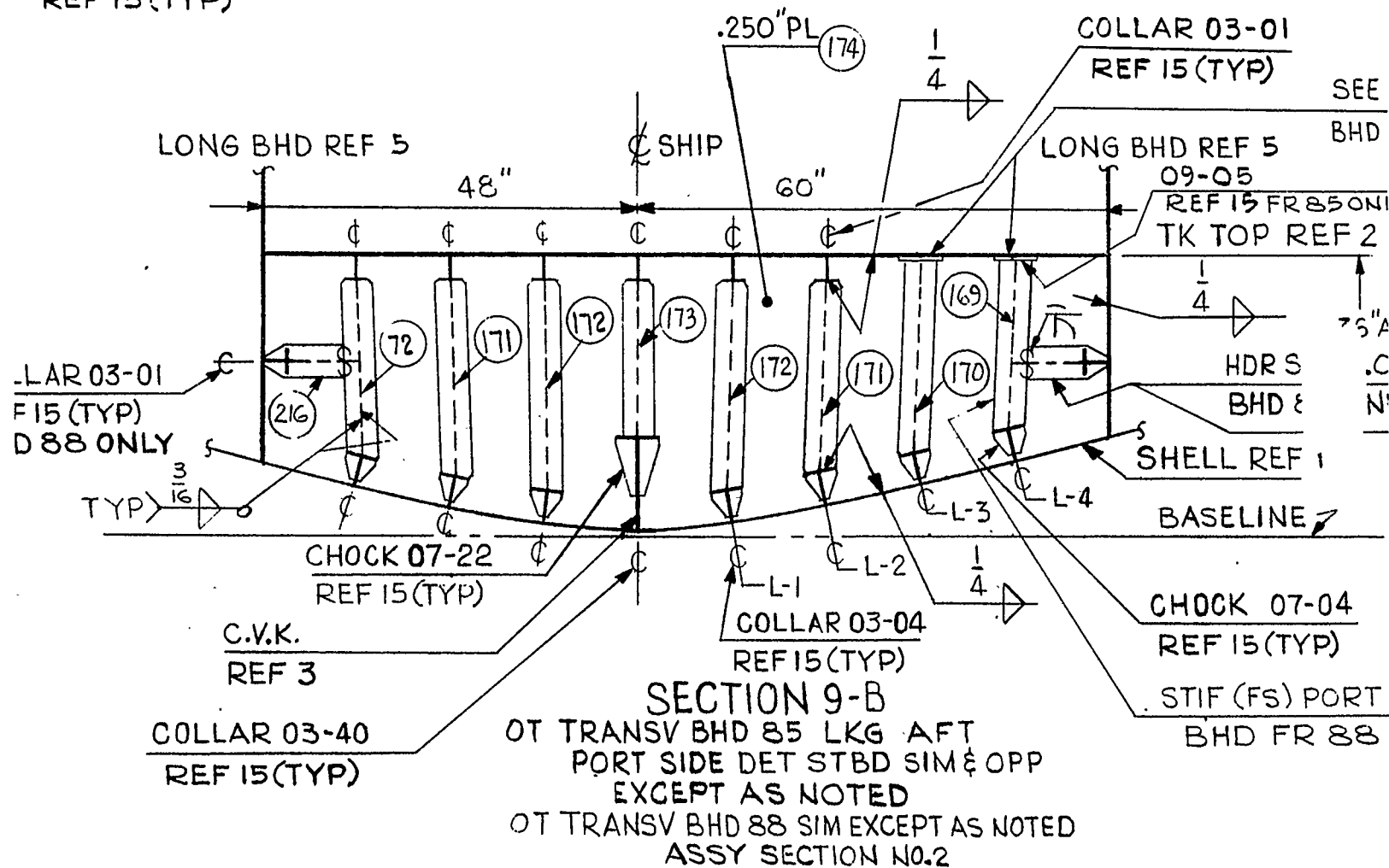
SHIP PRODUCTION AND CONTROL REPORT

LIST OF TEMPLATES REQUIRED FOR PLATES

LINE TEMPLATE RESI TAPE FILEMARKS

52	0022-403- 1	741011	777-B	3 P
53	0022-403- 3	741011	777-B	3 S
54	0023-401- 1	741011	777-C	2 P
55	0023-401- 3	741011	777-C	2 S
56	0023-402- 1		777-C	2 P
57	0023-402- 3		777-C	2 S
58	0023-403- 1		777-C	2 P
59	0023-403- 3		777-C	2 S
60	0024-401- 1		777-C	3 P
61	0024-401- 3		777-C	3 S
62	0024-402- 1		777-C	3 P
63	0024-402- 3		777-C	3 S
64	0024-403- 1		777-C	3 P
65	0024-403- 3		777-C	3 S
66	0031-401- 1		777-B	1 P
67	0031-402- 3		777-B	1 P
68	0031-403- 3	741011	777-B	1 P

COLLAR 03-04
REF 15 (TYP)



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INPUT UPDATING DATE 05/02/78 TIME 21/05/47 RUN NO. 3
JOB P801 PROG. PART INPUT 0052 REV. NO. 2 PAGE: 1

INPS		N	0052			625	7000520004
WRIT JRP				A	90	1 0	7000520006
ORWG 786	9-R						7000520008
MODL 2.07							7000520012
IRSV	AFT	F	85000				7000520016
MOVE2			6 0		6 0 0		7000520020
ADDP		DTT		PLRG		-6 0 1	7000520024
LINE FAST		P	1				7000520028
PART 7860850174 C							7000520032C
OUTP							7000520036
CNTR DOWN							7000520040
LBHD	S-	LB4	S				7000520044
SHFT			04		ANY-		7000520048
			04		ANY-		7000520052
SAVE						1	7000520056
LINK	NEW						7000520060
LBHD		P+	LB5	P			7000520064
SHFT			04		ANY+		7000520068
			04		ANY+		7000520072
SAVE						2	7000520076
LINK	NEW						7000520080
UECK2		DTT		SL1	P PEND S		7000520084
LINK	INT					2	7000520088
CALL						1	7000520092
LINK	INT EXT0					3	7000520096
SHEL2		M		LB4	S LB5 P		7000520100
LINK	INT	EXT0				4	7000520104
CALL						2	7000520108
LINK	INT					5	7000520112
UECK		P-	DTT				7000520116
CTRE							7000520120
CUTI		YY	1				7000520124
PTNO		F	300				7000520128
MION		DTT					7000520132
RNGE		SCL	C	SL3	S	4 0	7000520136
RATH2		P	2S		08 A	45	7000520140
STOL			3 0				7000520144
MION		LB4	S				7000520148
CCUT		SL2	S		4 0 A*		7000520152
CCUT		SL2	S		A*		7000520156
RNGE		DTT	S	PLRG	\$	4 0	7000520160
RATH2		P	3S		08 A -45		7000520164
MION		M					7000520168
RNGE		SL3	S	SL4B	P	4 0	7000520172
RATH2		P	4S		08 A	45	7000520176
MION		LB5	P				7000520180
PTNO		P	310				7000520184
CCUT		SL2	P		4 0 A*		7000520188
		SL2	P		A*		7000520192
RATH2		P	5S		08 A -45		7000520196
MION		DTT					7000520200

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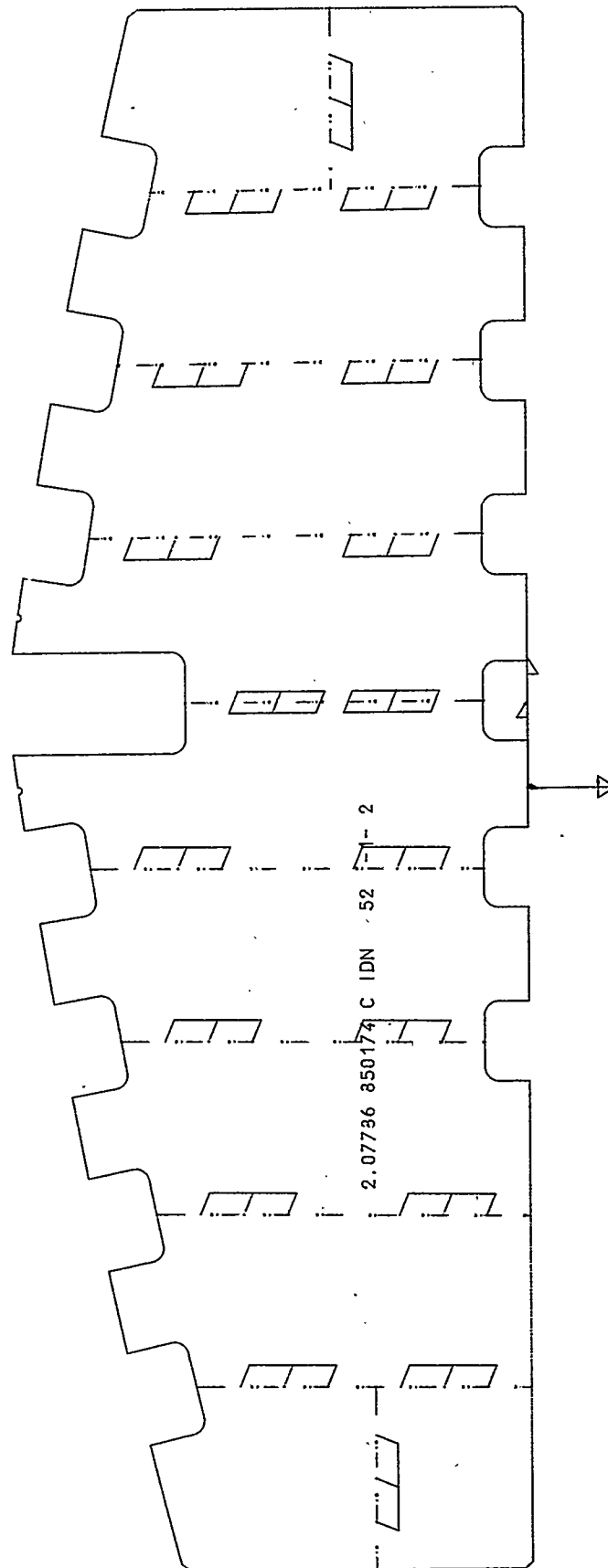
PART GEOMETRICAL DATA FOR TESTING REFERENCE DATE 05/02/78 TIME 21/06/02
 JOB 7005PH01 SHIP P801 PART NO. 52 - 1 - 2 PAGE 1
 VDJL-PCWK 2.07786 850174 C DRG-LGC 786 9-B REMARKS
 MATERIAL CODE K THICKNESS 0.250

DIMENSIONS IN DECF

SHRINKAGE FACTORS USED: X = 1.000000 Y = 1.001040
 STARTING POINT OF PART X = 3.000 Y = -0.500

*****PIECE NESTED ON TAPE NUMBER(S) 10039

SEQ. NO.	STARTING POINT X	Y	TYPE	VFL	KENF	MOVEMENT DX	WITH DY	CENTER UXC	LOCATION LYC	ROT
1	0.0	0.0	OUT	CT	K	0.0	0.271			
2	0.0	0.271	OUT	CT	K	-0.172	0.0			
3	-0.172	0.271	OUT	CT	K	-0.083	0.083	0.0	0.083	-
4	-0.255	0.355	OUT	CT	K	0.0	0.146			
5	-0.255	0.501	OUT	CT	K	0.0	0.146			
6	-0.255	0.647	OUT	CT	K	0.083	0.083	0.083	0.0	-
7	-0.172	0.730	OUT	CT	K	0.172	-0.000			
8	0.0	0.730	OUT	CT	K	0.0	0.496			
9	0.0	1.226	OUT	CT	K	-0.172	0.000			
10	-0.172	1.226	OUT	CT	K	-0.083	0.083	0.000	0.083	-
11	-0.255	1.310	OUT	CT	K	0.0	0.154			
12	-0.255	1.464	OUT	CT	K	0.0	0.138			
13	-0.255	1.602	OUT	CT	K	0.083	0.083	0.083	0.0	-
14	-0.172	1.685	OUT	CT	K	0.172	-0.000			
15	0.0	1.685	OUT	CT	K	0.0	0.539			
16	0.0	2.224	OUT	CT	K	-0.172	0.0			
17	-0.172	2.224	OUT	CT	K	-0.083	0.083	0.000	0.083	-
18	-0.255	2.308	OUT	CT	K	0.0	0.154			
19	-0.255	2.462	OUT	CT	K	0.0	0.138			
20	-0.255	2.600	OUT	CT	K	0.083	0.083	0.083	0.0	-
21	-0.172	2.683	OUT	CT	K	0.172	-0.000			
22	0.0	2.683	OUT	CT	K	0.0	0.539			
23	0.0	3.222	OUT	CT	K	-0.172	0.0			
24	-0.172	3.222	OUT	CT	K	-0.083	0.083	0.000	0.083	-
25	-0.255	3.306	OUT	CT	K	0.0	0.154			
26	-0.255	3.460	OUT	CT	K	0.0	0.138			
27	-0.255	3.598	OUT	CT	K	0.083	0.083	0.083	0.0	-
28	-0.172	3.681	OUT	CT	K	0.172	-0.000			
29	0.0	3.681	OUT	CT	K	0.0	0.761			
30	0.0	4.442	OUT	CT	K	-0.042	0.042			
31	-0.042	4.484	OUT	CT	K	-2.165	0.000			
32	-2.206	4.484	OUT	CT	K	-0.051	-0.041			
33	-2.258	4.443	OUT	CT	K	-0.069	-0.292	36.417	-8.692	+
34	-2.324	4.151	OUT	CT	K	-0.086	-0.390	40.820	-9.226	+
35	-2.412	3.761	OUT	CT	K	0.249	-0.052			
36	-2.163	3.709	OUT	CT	K	0.065	-0.099	-0.017	-0.082	-
37	-2.099	3.610	OUT	CT	K	-0.037	-0.176			
38	-2.136	3.434	OUT	CT	K	-0.040	-0.191			
39	-2.174	3.243	OUT	CT	K	-0.099	-0.065	-0.082	0.017	-
40	-2.274	3.178	OUT	CT	K	-0.249	0.052			
41	-2.523	3.231	OUT	CT	K	-0.092	-0.470	41.017	-8.306	+
42	-2.615	2.760	OUT	CT	K	0.250	-0.046			
43	-2.365	2.714	OUT	CT	K	0.067	-0.097	-0.015	-0.082	-
44	-2.298	2.617	OUT	CT	K	-0.032	-0.177			

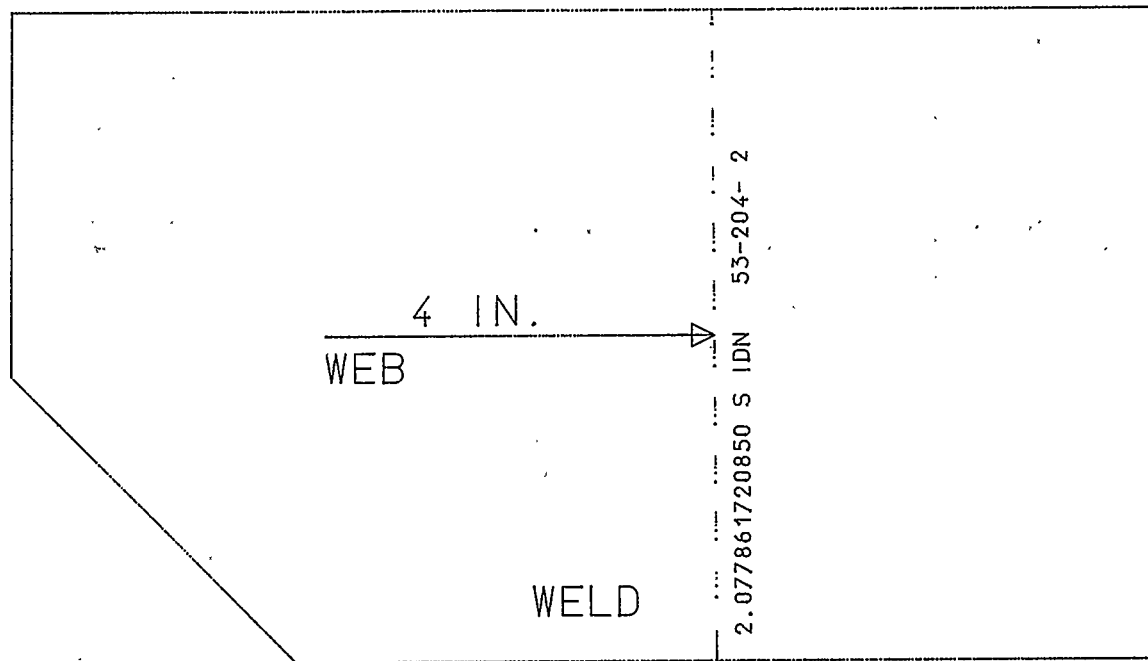


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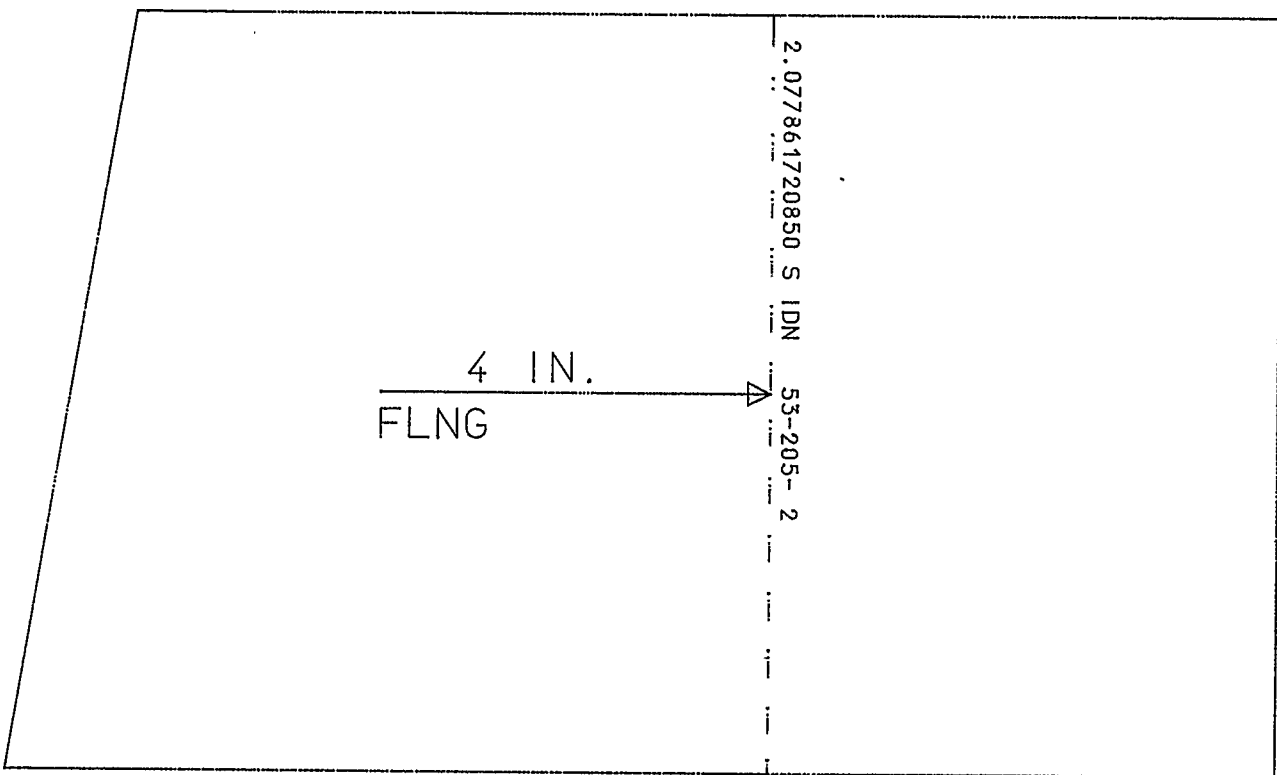
INPUT UPDATING DATE 05/17/78 TIME 08/52/41 RUN NO. 5
JOB PH01 PROG. PART SPAC INPUT 0053 REV. NO. 4 PAGE 1

INPS	RKKS	JMP	AF1	F	AS000	DTT	SCL	C	A*	904	20	7000530004
DRAG 136	9-B											7000530008
MODL 2.07												7000530012
IRSV												7000530016
ADDP												7000530020
DBTP 7861730250 C												7000530024
												7000530028
												7000530032
												7000530036
DBTP 7861720250 S												7000530040
												7000530044
												7000530048
												7000530052
DBTP 7861710250 S												7000530056
												7000530060
												7000530064
DBTP 7860720250 S												7000530068
												7000530072
												7000530076
												7000530080
												7000530084
CNTR	CALC											7000530088
DECK												7000530092
CTRE												7000530096
MIOW												7000530100
STOL												7000530104
CCUT												7000530108
CCUT												7000530112
												7000530116
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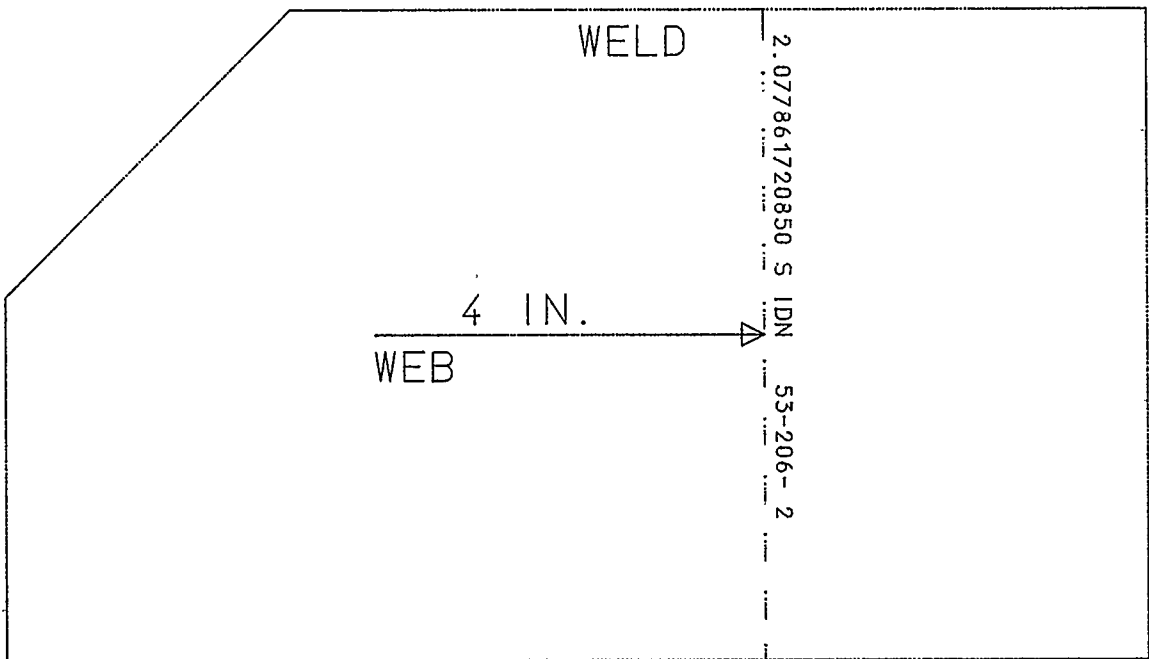
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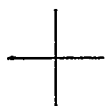
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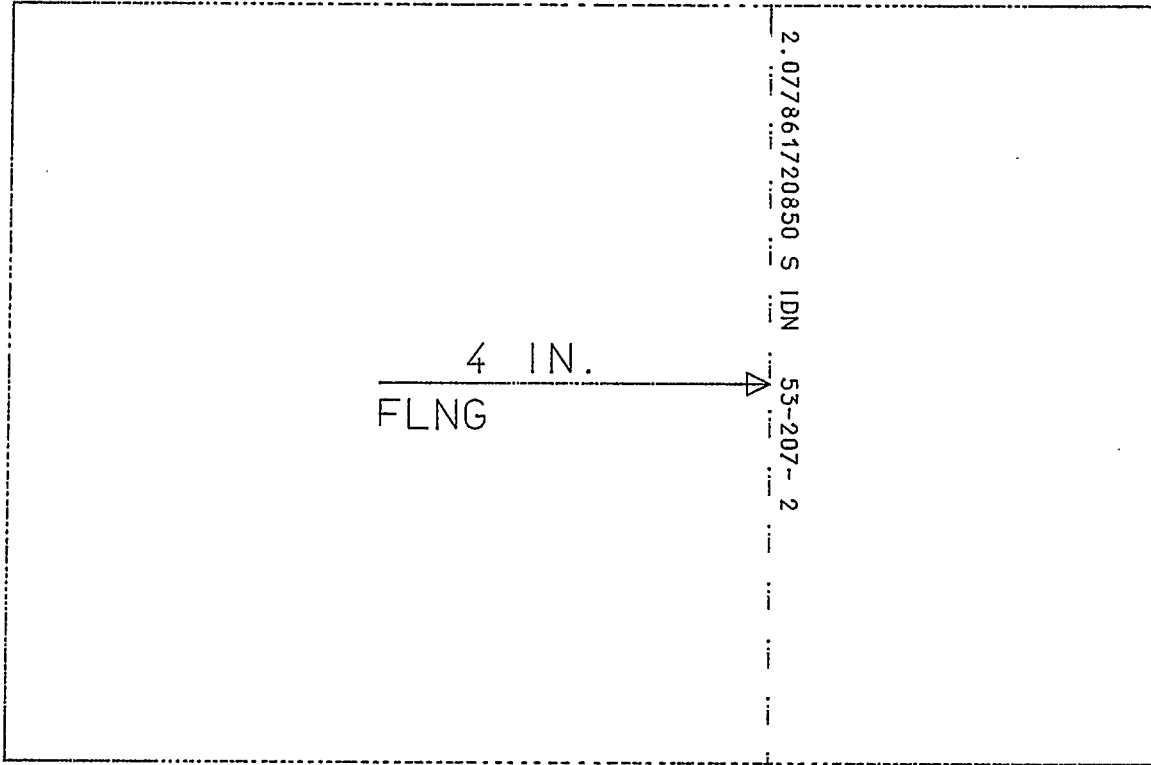
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TAPE NO. 780053-206- 2



TAPE NO. 780053-207- 2



REPORT DATE : 06/14/78

S P A C E S Y S T E M

PAGE NO. 3. 2

U.S. NAME : PB01 7005PE01

SHIP PRODUCTION AND CONTROL RECORD

MODULE/CELL: 2.07

VESSEL : GUNBOAT (PPG 1)

REPORT REV. 6

PIECES PRODUCED FROM SHAPES

LINE-REV	PIECE MARK/ DRAWING NO.	QTY/ LUC.	WGT.	MAT'L	LENGTH	STR	'A'	'B'	'C'	N/C	10	WEB 1 FLANGE 1	WEB 2 FLANGE 2	OTHER	N/C	AIDS
12-	3 7861700850 P 786	1 9-B	4	85 904	2-01-12		1-05-12	4	4	0		80053-216- 4 0053-217- 4	10053-218- 4 0053-219- 4	0		0 BHD,STIFF, FR.85
13-	6 7861710850 P 786	1 9-B	4	85 904	2-01-06		1-05-06	4	4	0		L 80053-208- 2 0053-209- 2	10053-210- 2 0053-211- 2	0		0 BHD,STIFF, FR.85
14-	3 7861710850 S 786	1 9-B	4	85 904	2-01-06		1-05-06	4	4	0		00053-206- 2 0053-209- 2	10053-210- 2 0053-211- 2	0		0 BHD,STIFF, FR.85
15-	3 7861710861 P 786	1 9-B	4	85 904	2-01-11		1-05-11	4	4	0		00553-208- 1 0353-209- 1	10353-210- 1 0353-211- 1	0		0 BHD,STIFF,FR.86.1
16-	6 7861710861 S 786	1 9-B	4	85 904	2-01-11		1-05-11	4	4	0		L 00553-208- 1 0353-209- 1	10353-210- 1 0353-211- 1	0		0 BHD,STIFF,FR.86.1
17-	3 7861710880 P 786	1 9-B	4	85 904	2-01-13		1-05-13	4	4	0000-	0- 10	00354-208- 1 0354-209- 1	10354-210- 1 0354-211- 1	0		0 BHD,STIFF, FR.86
18-	3 7861710880 S 786	1 9-B	4	85 904	2-01-13		1-05-13	4	4	0		00354-208- 1 0354-209- 1	10354-210- 1 0354-211- 1	0		0 BHD,STIFF, FR.86
19-	6 7861720850 P 786	1 9-B	5	85 904	2-03-06		1-07-06	4	4	0		L 80053-204- 2 0053-205- 2	10053-206- 2 0053-207- 2	0		0 BHD,STIFF, FR.85
20-	3 7861720850 S 786	1 9-B	5	85 904	2-03-06		1-07-06	4	4	0		80053-204- 2 0053-205- 2	10053-206- 2 0053-207- 2	0		0 BHD,STIFF, FR.85
21-	3 7861720861 P 786	1 9-B	5	85 904	2-03-10		1-07-10	4	4	0		80353-204- 1 0353-205- 1	10353-206- 1 0353-207- 1	0		0 BHD,STIFF,FR.86.1
22-	6 7861720861 S 786	1 9-B	5	85 904	2-03-10		1-07-10	4	4	0		L 80353-204- 1 0353-205- 1	10353-206- 1 0353-207- 1	0		0 BHD,STIFF,FR.86.1

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INPUT UPDATING DATE 05/29/78 TIME 08/59/54 RUN NO. 4
JOB P801 PRNG. NEST INPUT 0039 REV. NO. 3 PAGE 1

INPS STARTAPEDECF2-AX N	39						7100390104
PSPR ESIIPLSMEVEN PN	1KN	1					7100390108
RMKS D.N.							7100390112
PLTE	8H	4		22.5	1	84.	7100390116
PIEC ASSL	0130	1	4		6		7100390120
	.1		.05	A	90.		7100390124
2	0350	1	3		30		7100390128
2	0130	1			2		7100390132
2	.14			A	-90.		7100390136
2	0351	1	2		106		7100390140
2	0350	1			99		7100390144
2	.17			A	-90.		7100390148
PIEC ASSL	0375	2	2		2	5	7100390152
1521130005 P2.08	20.49		.35	20.49		2.25	7100390156C
REPT ASSL	0375	99			5	2	7100390160
1521130005 S2.08	20.45		2.4	22.4		2.4	7100390164
PIEC ASSL	0376	2	1		5	2	7100390168
1521210005 F2.08	22.42		.2	22.42		2.16	7100390172
REPT ASSL	0376	88			2	5	7100390176
1521210005 S2.08	20.47		.05	22.4		.05	7100390180
PIEC ASSL	0130	2	2		2		7100390184
	2.4		5.3	A	180.		7100390188
PIEC2	0052	1	2		31		7100390188
2	0130	2			3		7100390192
2	.1		.199	A	90.		7100390196
OPTN DIST	H						7100390200
DIST	0130	1	5		6		7100390204
MARK CKPT	16.		1.5				7100390208C
AUTU							7100390212
OUTC CKPT							7100390216
BURN TCUP	RVRS	0375	2	1	2	.04	7100390220
	RVRS	0351	1	30	31	.04	7100390226
	RVRS	0376	2	3	4	.04	7100390232
		0375	99	4	5	.04	7100390236
		0376	88	2	1	.04	7100390240
		0350	1	99	98	.04	7100390244
	RVRS	0130	1	1	2	.04	7100390246
		0130	2	6	5	.04	7100390252
	RVRS	0052	1	30	31	.04	7100390256
INPE CKPT							7100399999

1 2 3 4 5 6 7 8
1234567890123456789012345678901234567890123456789012345678901234567890

SEVERITY = 0 INFLT IS STORED WITH REV. = 4

INPUT IS EXECUTABLE

S P A D E S S Y S T E M

DATE 05/29/78

IDENTIFICATION & PLOT LOCATION OF PARTS FOR TAPE NO. 710039- 2

PLOT REF.	DRWG. & LOC.	N/C ID & MODE	LIKE PLATE MODULE & PCMK.	MIRR. PLATE MODULE & PCMK.
*	*	*	*	*
1	* 786	* 0130- 1- 4 L	* 2.077861010189 S	*
*	*	*	*	*
2	* 786 9-A	* 0350- 1- 3 L	* 2.07786 861174 C	*
*	*	*	*	*
3	* 786 9-B	* 0351- 1- 2 L	* 2.07786 880174 C	*
*	*	*	*	*
4	* 152 7A	* 0375- 2- 2 L	* 2.081521130005 P	*
*	*	*	*	*
5	*	* M	* 2.081521130005 S	*
*	*	*	*	*
6	* 152 9A	* 0376- 2- 1 L	* 2.081521210005 P	*
*	*	*	*	*
7	*	* M	* 2.081521210005 S	*
*	*	*	*	*
8	* 786	* 0130- 2- 2 L	* 2.077861010177 P	*
*	*	*	*	*
9	* 786 9-B	* 0052- 1- 2 L	* 2.07786 850174 C	*

S P A D E S S Y S T E M

DATE 05/29/78

SUMMARY REPORT OF BURNING TAPE NO.

710039 - 2

PIERCING TIME 0.9 (PIERCING ALLOWANCE 0.1/ 0.1 MIN.)
RAPID TRAVERSE TIME 7.1 (ASSUMED SPEED 20.00 FT./MIN.)
CENTER PUNCHING TIME 3.2 (ASSUMED SPEED 20.00 FT./MIN.)
BURNING TIME 11.2 (ASSUMED SPEED 12.50 FT./MIN.)
TOTAL PROCESSING TIME 22.4 MINUTES

POST PROCESSOR OPTIONS USED FOR TAPE :

FORMAT : ESI1

CUTTING PROCESS : PLSM

PAPER TAPE PARITY : EVEN

PLATE OUTLINED BY : B.M.

KERF COMPENSATED BY GEOMETRY.

MATERIAL UTILIZATION DATA

PLATE UTILIZATION = 53.0 PERCENT

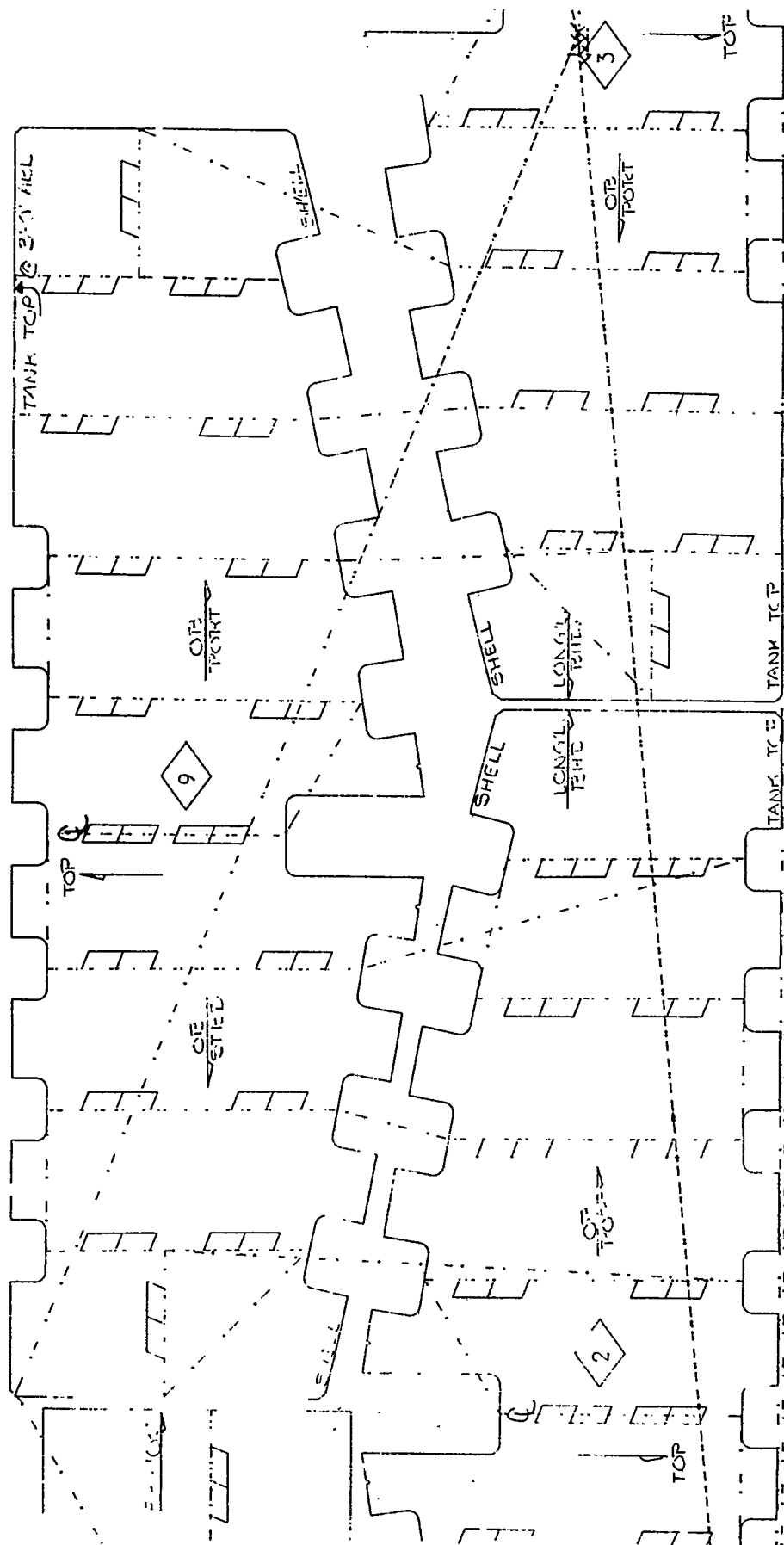
SCRAP WEIGHT = 255.8 POUNDS

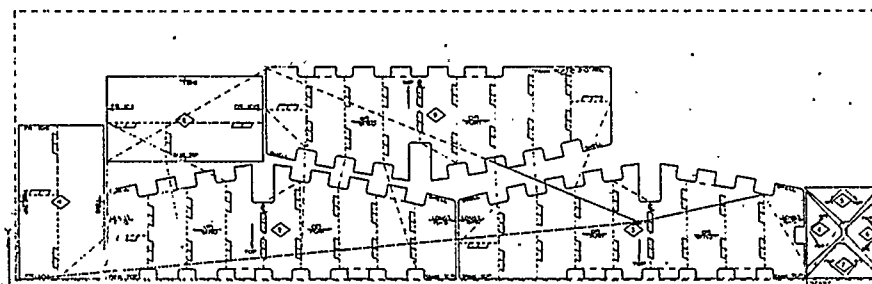
TYPE OF MATERIAL AL. 5086

NO ERRORS DETECTED IN THIS RUN

PAPER TAPE IMAGE HAS BEEN STORED IN THE DATABASE

PAPER TAPE IMAGE EXISTS IN THE D.B. UNDER REV. 2 - STATUS = 0.



[illegible][illegible]

TAPE NO. 11139 - 2

[illegible]

REPORT DATE : 06/14/75

S P A C E S S Y S T E M

PAGE NO. 6. 1

D.B.NAME : P001 /005P001

SHIP PRODUCTION AND CONTROL MODULE

MODULE/UNIT: 2.07

VESSEL : GUNBOAT (PPG 1)

REPORT REV. 6

PLATE MATERIAL LIST

LINE	STOCK NO.	GRADE	SIZE	QTY.	N/C-TAPE NO.	PRC.TIME	LOC.	NOTES:
1		AL. 5086	27000X 8400X 25	1	710039- 2	22.4		
2		AL. 5086	28600X 6000X 25	1	710049- 2	20.7		
		TOTAL PLATE WEIGHT	958.8 LBS					
		TOTAL SCRAP WEIGHT	395.7 LBS					

REPORT DATE : 06/14/78

S P A C E S S Y S T E M

PAGE NO. 7. 1

D.B. NAME : P801 7005P801

SHIP PRODUCTION AND CONTROL MODULE

MODULE/UNIT: 2.07

VESSEL : GUNBOAT (PPG 1)

REPORT REV. 6

PIECES PRODUCED THROUGH N/C CUTTING

LINE-REV	PIECE MARK	DRAWING NO.	LOC.	QTY.	WGT.	MAT.	THK.	STK	N/C ID.	NEST TAPES	TEMPLATES	PROCESS 1ST 2ND	DESCRIPTION
1-	4	786 850174 C 786	9-B	1	71	8	.25	0052-	1- 2	10039- 2			BFD.PLTNG.FR.85
2-	4	786 861174 C 786	9-A	1	71	8	.25	0350-	1- 3	10039- 2			BHD.PLTG.FR.86.1
3-	4	786 860174 C 786	9-B	1	72	8	.25	0351-	1- 2	10039- 2			BFD.PLTNG. FR.88
4-	4	7861010177 P 786		0	30	8	.25	0130-	2- 2	10039- 2			
5-	4	7861010189 S 786		0	30	8	.25	0130-	1- 4	10039- 2			
6-	6	7861050146 P 786		0	2	8	.25	0139-	1- 2				
7-	6	7861050176 C 786	10-C	1	172	8	.25	0127-	1- 3	10049- 2			BHD.PLTNG.FR.105

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