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PERSONAL FLOTATION DEVICES RESEARCH. VOLUME 3. APPENDICES.(U)

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DOT-CG-42333-A

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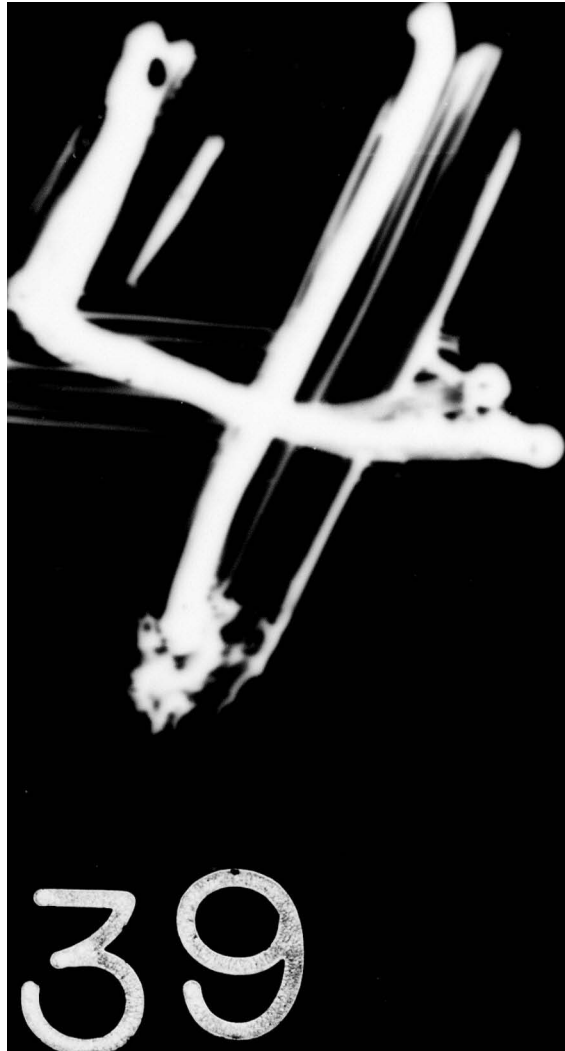
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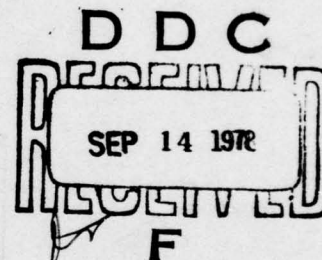
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PERSONAL FLOTATION DEVICES RESEARCH - PHASE II

VOLUME 3 - APPENDICES

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7800 Governors Drive, West
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PERSONAL FLOTATION DEVICES RESEARCH - PHASE II
VOLUME 3 - APPENDICES

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METRIC CONVERSION FACTORS

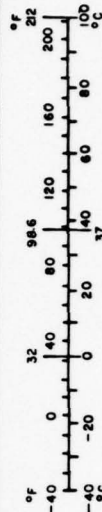
Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
in	inches	2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
AREA				
in ²	square inches	6.5	square centimeters	cm ²
ft ²	square feet	0.09	square meters	m ²
yd ²	square yards	0.8	square meters	m ²
mi ²	square miles	2.6	square kilometers	km ²
	acres	0.4	hectares	ha
MASS (weight)				
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
VOLUME				
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft ³	cubic feet	0.03	cubic meters	m ³
yd ³	cubic yards	0.76	cubic meters	m ³
TEMPERATURE (exact)				
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 m = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price \$2.25, SD Catalog No. C13.10-286.

Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
km	kilometers	1.1	yards	yd
		0.6	miles	mi
AREA				
cm ²	square centimeters	0.16	square inches	in ²
m ²	square meters	1.2	square yards	yd ²
km ²	square kilometers	0.4	square miles	mi ²
ha	hectares (10,000 m ²)	2.5	acres	
MASS (weight)				
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
VOLUME				
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m ³	cubic meters	35	cubic feet	ft ³
m ³	cubic meters	1.3	cubic yards	yd ³
TEMPERATURE (exact)				
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



(3) 4x

(3) 4x

VOLUME 3 - APPENDICES
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SECTION III - APPENDICES

DEVELOPMENT OF A TEST METHOD
AND MODEL FOR PFD
WEARABILITY AND ACCESSIBILITY

- APPENDIX III-A Variable Definitions and Codes
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 - Crosstabulation with NV 1
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APPENDIX III-A. VARIABLE DEFINITIONS AND CODES

NV 1 Proportion of time candidate PFD was worn.

<u>Code</u>	<u>NV 1</u>
1	>0.75
2	0.50 to 0.75
3	0.10 to 0.50
4	0.01 to 0.10
5	≤ 0.01

V 29 Reported customary rate of PFD wear (proportion of time)
Codes same as NV 1

NV 5 Proportion of time candidate PFD was accessible or worn.
Codes same as NV 1

NV 15 Unadjusted wearability factor score (F_W)

<u>Code</u>	<u>F_W</u>
0	<-2.75
1	-2.75 to -1.56
2	-1.56 to -0.36
3	-0.36 to 0.83
4	0.83 to 2.03
5	2.03 to 3.22
6	3.22 to 4.41
7	>4.41

NV 16 Unadjusted accessibility factor score (F_A)

<u>Code</u>	<u>F_A</u>
2	<-4.53
4	-4.53 to -2.54
6	-2.54 to -0.56
8	-0.56 to 1.43
10	>1.43

NV 8 Kind of PFDs tested - placed in one of five categories:

1. Throwables and devices intended for emergency wear only.
2. Wearable devices which are bulky and unattractive.
3. Yoke or collar type inflatable devices.
4. Vests and jackets.
5. Belt-type devices.

NV 9-NV 14 Boaters' attitudes *

<u>Code</u>	<u>NV 9, ..., NV 14</u>
1	0 to 0.333
2	0.334 to 0.666
3	0.667 to 1.0

NV 6 Boating Safety Education

<u>Code</u>	<u>NV 6</u>
0	None
1	Completed 1 or more courses

Codes for boating activities (V 54 to V 64)

<u>Code</u>	<u>Meaning</u>
1	Engaged in the activity shown
2	Did not engage in the activity

*

Attitude Dimension	Designation and Method of Computation
Positive about keeping PFDs accessible	$NV9 = 1/10(V30 + V38 - 2)$
Positive about wearing PFD in rough conditions	$NV10 = 1/20(V31 + V35 + V41 - V45 + 3)$
Believes PFDs are highly effective and reliable	$NV11 = 1/15(V32 - V37 - V42 + 11)$
Believes he/she needs a PFD in the water	$NV12 = 1/20(V33 - V44 - V46 + V52 + 10)$
Image (feels positive about wearing a PFD and others who wear PFDs)	$NV13 = 1/40(V34 - V36 + V39 - V40 + V48 - V49 - V50 - V51 + 27)$
Positive about wearing PFDs	$NV14 = 1/10(V47 - V43 + 5)$

APPENDIX III-B

Wearability/Accessibility Study
Crosstabulations

Crosstabulation with NV 1

12/19/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 12/19/77) COLL PFD

***** C R O S S T A B U L A T I O N O F *****
 NV9 ATTITUDE ON ACCESS ***** BY NV1 ***** PAGE 1 OF 1

		NV1						
COUNT		1	2	3	4	5	ROW	
ROW PCT		1	2	3	4	5	TOTAL	
COL PCT		1	2	3	4	5		
TOT PCT		1	2	3	4	5		
1.	0	1	5	3	3	1	12	
	0	8.3	41.7	25.0	25.0	1	6.9	
	0	11.1	6.9	12.5	10.7	1		
	0	.6	2.9	1.1	1.7	1		
2.	8	2	15	6	6	1	37	
	21.6	5.4	40.5	16.2	16.2	1	21.1	
	19.0	22.2	20.8	25.0	21.4	1		
	4.6	1.1	8.6	3.4	3.4	1		
3.	34	6	52	15	19	1	126	
	27.0	4.8	41.3	11.9	15.1	1	72.0	
	81.0	66.7	72.2	62.5	67.9	1		
	19.4	3.4	29.7	8.6	10.9	1		
COLUMN		42	72	24	28		175	
TOTAL		24.0	5.1	41.1	13.7	16.0	100.0	

RAW CHI SQUARE = 5.97681 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .6498

CRAMER'S V = .13068

CONTINGENCY COEFFICIENT = .18173

NUMBER OF MISSING OBSERVATIONS = 4

12/19/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 12/19/77) COLL PFD

***** CROSS TABULATION OF *****
NV10 ATTWEAR ROUGH CD BY NV1 ***** PAGE 1 OF 1

		NV1				NV10				ROW TOTAL	
		COUNT				COUNT					
		1				2					
		3				4					
		5				6					
		7				8					
		9				10					
		11				12					
		13				14					
		15				16					
		17				18					
		19				20					
		21				22					
		23				24					
		25				26					
		27				28					
		29				30					
		31				32					
		33				34					
		35				36					
		37				38					
		39				40					
		41				42					
		43				44					
		45				46					
		47				48					
		49				50					
		51				52					
		53				54					
		55				56					
		57				58					
		59				60					
		61				62					
		63				64					
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		67				68					
		69				70					
		71				72					
		73				74					
		75				76					
		77				78					
		79				80					
		81				82					
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		169				170					
		171				172					
		173				174					
		175				176					
		177				178					
		179				180					
		181				182					

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 12/19/77) COLL PFD

***** CROSS TABULATION OF *****
 NV11 ATTTT ON EFF-REL BY NV1 *****
 ***** PAGE 1 OF 1 *****

COUNT		ROW PCT		COL PCT		TOT PCT		COUNT		ROW PCT		COL PCT		TOT PCT	
1.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2.	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3.	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
COLUMN TOTAL	42	24.9	4.7	8	67	39.6	14.2	24	28	16.6	100.0				

RAW CHI SQUARE =	15.59980	WITH	8 DEGREES OF FREEDOM.	SIGNIFICANCE =	.0485
------------------	----------	------	-----------------------	----------------	-------

CRAMER'S $V = .21483$

CONTINGENCY COEFFICIENT = .29070

NUMBER OF MISSING OBSERVATIONS = 10

12/19/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 12/19/77) COLL PFD

***** CROSSTABULATION OF *****
NV12 NEED FOR PFD BY NV1 ***** PAGE 1 OF 1

		NV1								ROW TOTAL	
COUNT		1	2	3	4	5	6	7	8		
ROW PCT	COL PCT										
TOT PCT		1.1	2.1	3.1	4.1	5.1	6.1	7.1	8.1		
1.	1	16.7	8.3	33.3	33.3	16.7	8.3	16.7	8.3	12	6.9
	2	4.8	11.1	5.6	16.7	3.6	16.7	3.6	16.7	12	6.9
	3	1.1	.6	2.3	2.3	.6	2.3	.6	2.3	12	6.9
	4	1.1	.6	2.3	2.3	.6	2.3	.6	2.3	12	6.9
	5	1.1	.6	2.3	2.3	.6	2.3	.6	2.3	12	6.9
	6	1.1	.6	2.3	2.3	.6	2.3	.6	2.3	12	6.9
	7	1.1	.6	2.3	2.3	.6	2.3	.6	2.3	12	6.9
	8	1.1	.6	2.3	2.3	.6	2.3	.6	2.3	12	6.9
	9	1.1	.6	2.3	2.3	.6	2.3	.6	2.3	12	6.9
	10	1.1	.6	2.3	2.3	.6	2.3	.6	2.3	12	6.9
	11	1.1	.6	2.3	2.3	.6	2.3	.6	2.3	12	6.9
	12	1.1	.6	2.3	2.3	.6	2.3	.6	2.3	12	6.9
2.	1	18	3	30	13	9	13	9	13	73	41.7
	2	24.7	4.1	41.1	17.8	12.3	17.8	12.3	17.8	73	41.7
	3	42.9	33.3	41.7	54.2	32.1	54.2	32.1	54.2	73	41.7
	4	10.3	1.7	17.1	7.4	5.1	17.1	7.4	5.1	73	41.7
	5	1.1	.6	2.3	2.3	.6	2.3	.6	2.3	12	6.9
	6	1.1	.6	2.3	2.3	.6	2.3	.6	2.3	12	6.9
	7	1.1	.6	2.3	2.3	.6	2.3	.6	2.3	12	6.9
	8	1.1	.6	2.3	2.3	.6	2.3	.6	2.3	12	6.9
	9	1.1	.6	2.3	2.3	.6	2.3	.6	2.3	12	6.9
	10	1.1	.6	2.3	2.3	.6	2.3	.6	2.3	12	6.9
	11	1.1	.6	2.3	2.3	.6	2.3	.6	2.3	12	6.9
	12	1.1	.6	2.3	2.3	.6	2.3	.6	2.3	12	6.9
3.	1	22	5	38	7	18	7	18	7	90	51.4
	2	24.4	5.6	42.2	7.8	20.0	7.8	20.0	7.8	90	51.4
	3	52.4	55.6	52.8	29.2	64.3	29.2	64.3	29.2	90	51.4
	4	12.6	2.9	21.7	4.0	10.3	4.0	10.3	4.0	90	51.4
	5	1.1	.6	2.3	2.3	.6	2.3	.6	2.3	12	6.9
	6	1.1	.6	2.3	2.3	.6	2.3	.6	2.3	12	6.9
	7	1.1	.6	2.3	2.3	.6	2.3	.6	2.3	12	6.9
	8	1.1	.6	2.3	2.3	.6	2.3	.6	2.3	12	6.9
	9	1.1	.6	2.3	2.3	.6	2.3	.6	2.3	12	6.9
	10	1.1	.6	2.3	2.3	.6	2.3	.6	2.3	12	6.9
	11	1.1	.6	2.3	2.3	.6	2.3	.6	2.3	12	6.9
	12	1.1	.6	2.3	2.3	.6	2.3	.6	2.3	12	6.9
COLUMN TOTAL		42	9	72	24	28	24	16.0	16.0	175	100.0
		24.0	5.1	41.1	13.7	16.0	13.7	16.0	16.0	175	100.0

RAW CHI SQUARE = 9.44032 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .3065
CRAMER'S V = .16423
CONTINGENCY COEFFICIENT = .22624
NUMBER OF MISSING OBSERVATIONS = 4

(16)

(16)

12/19/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 12/19/77) COLL PFD

***** CROSSTABULATION OF *****
NV13 IMAGE BY NV1 ***** PAGE 1 OF 1

		NV1					ROW TOTAL
COUNT	I	1.1	2.1	3.1	4.1	5.1	
ROW PCT	I						
COL PCT	I						
TOT PCT	I						
1.	I	4	1	9	4	1	19
	I	21.1	5.3	47.4	21.1	5.3	11.7
	I	10.3	11.1	13.8	16.7	3.8	
	I	2.5	.6	5.5	2.5	.6	
2.	I	29	8	49	16	21	123
	I	23.6	6.5	39.8	13.0	17.1	75.5
	I	74.4	88.9	75.4	66.7	80.8	
	I	17.8	4.9	30.1	9.8	12.9	
3.	I	6	0	7	4	4	21
	I	28.6	0	33.3	19.0	19.0	12.9
	I	15.4	0	10.8	16.7	15.4	
	I	3.7	0	4.3	2.5	2.5	
COLUMN TOTAL		39	9	65	24	26	163
		23.9	5.5	39.9	14.7	16.0	100.0

RAW CHI SQUARE = 4.74445 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .7845

CRAMER'S V = .12064

CONTINGENCY COEFFICIENT = .16818

NUMBER OF MISSING OBSERVATIONS = 16

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 12/19/77) DOLL PFD

***** C R O S T A B U L A T I O N O F *****
 NV14 PFD WEAR BY NV1 ***** PAGE 1 OF 1

NV1									
COUNT	I	1.1	2.1	3.1	4.1	5.1	ROW	TOTAL	
ROW PCT	I	9	5	34	12	10	70		
COL PCT	I	12.9	7.1	48.6	17.1	14.3	41.4		
TOT PCT	I	21.4	55.6	50.0	50.0	38.5			
	I	5.3	3.0	20.1	7.1	5.9			
	I	14	4	25	9	11	63		
	I	22.2	6.3	39.7	14.3	17.5	37.3		
	I	33.3	44.4	36.8	37.5	42.3			
	I	8.3	2.4	14.8	5.3	6.5			
	I	19	0	9	3	5	36		
	I	52.8	0	25.0	8.3	13.9	21.3		
	I	45.2	0	13.2	12.5	19.2			
	I	11.2	0	5.3	1.8	3.0			
	I	42	9	68	24	26	169		
COLUMN	TOTAL	24.9	5.3	40.2	14.2	15.4	100.0		

RAW CHI SQUARE = 22.87371 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .0035

CRAMER'S V = .26014
CONTINGENCY COEFFICIENT = .34527

CONTINGENCY COEFFICIENT = .34527

NUMBER OF MISSING OBSERVATIONS = 10

12/19/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 12/19/77) COLL PFD

***** CROSSTABULATION OF *****
 V3 AGE BY NV1 ***** PAGE 1 OF 1

		NV1					ROW TOTAL	
COUNT		1.1	2.1	3.1	4.1	5.1		
ROW PCT	COL PCT							
TOT PCT								
V3								
1.0	1.0	12.1	1.1	8.1	6.1	1.1	28	
		42.9	3.6	28.6	21.4	3.6	16.7	
		29.3	12.5	11.4	25.0	4.0		
		7.1	.6	4.8	3.6	.6		
2.0	2.0	14.1	2.1	20.1	4.1	6.1	46	
		30.4	4.3	43.5	8.7	13.0	27.4	
		34.1	25.0	28.6	16.7	24.0		
		8.3	1.2	11.9	2.4	3.6		
3.0	3.0	9.1	3.1	10.1	9.1	8.1	39	
		23.1	7.7	25.6	23.1	20.5	23.2	
		22.0	37.5	14.3	37.5	32.0		
		5.4	1.8	6.0	5.4	4.8		
4.0	4.0	4.1	0.1	19.1	4.1	5.1	32	
		12.5	0.1	59.4	12.5	15.6	19.0	
		9.8	0.1	27.1	16.7	20.0		
		2.4	0.1	11.3	2.4	3.0		
5.0	5.0	2.1	2.1	13.1	1.1	5.1	23	
		8.7	8.7	56.5	4.3	21.7	13.7	
		4.9	25.0	18.6	4.2	20.0		
		1.2	1.2	7.7	.6	3.0		
COLUMN TOTAL		41	8	70	24	25	168	
		24.4	4.8	41.7	14.3	14.9	100.0	

RAW CHI SQUARE = 28.95615 WITH 16 DEGREES OF FREEDOM. SIGNIFICANCE = .0242
 CRAMER'S V = .20758
 CONTINGENCY COEFFICIENT = .38343
 NUMBER OF MISSING OBSERVATIONS = 11

(19)

(19)

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** C R O S S T A B U L A T I O N O F S E A
BY V4 ***** PAGE 1 OF 1

		COUNT		V4			
		ROW		PCT		TOTAL	
		COL		PCT		I	
		TOT		PCT		I	
		1.01		2.01			
NV1	1.	1	31	1	10	1	41
		1	75.6	1	24.4	1	23.6
		1	26.3	1	17.9	1	
		1	17.8	1	5.7	1	
		1	1	1	1	1	
2.		1	7	1	2	1	9
		1	77.8	1	22.2	1	5.2
		1	5.9	1	3.6	1	
		1	4.0	1	1.1	1	
		1	1	1	1	1	
3.		1	46	1	26	1	72
		1	63.9	1	36.1	1	41.4
		1	39.0	1	46.4	1	
		1	26.4	1	14.9	1	
		1	1	1	1	1	
4.		1	19	1	5	1	24
		1	79.2	1	20.8	1	13.8
		1	16.1	1	8.9	1	
		1	10.9	1	2.9	1	
		1	1	1	1	1	
5.		1	15	1	13	1	28
		1	53.6	1	46.4	1	16.1
		1	12.7	1	23.2	1	
		1	8.6	1	7.5	1	
		1	1	1	1	1	
COLUMN		118	56	32.2	17.4	174	
TOTAL		67.8	32.2	100.0			

RAW CHI SQUARE = 6.07880 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .1933
CRAMER'S V = .14691
CONTINGENCY COEFFICIENT = .18373
NUMBER OF MISSING OBSERVATIONS = 5

20

20

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) EULL PFD

***** C R O S S T A B U L A T I O N O F B O A T I N G S A F E T Y E D U C A T I O N *****
***** BY NV6 ***** PAGE 1 OF 1

COUNT		NV6		COMPUTED		ROW	
ROW	PCT	ROW	PCT	ROW	PCT	ROW	TOTAL
1.	1	26	16	1	1.1	42	
		61.9	38.1			24.0	
		47.3	13.3				
		14.9	9.1				
2.	1	3	6	1	1.1	9	
		33.3	66.7			5.1	
		5.5	5.0				
		1.7	3.4				
3.	1	12	60	1	1.1	72	
		16.7	83.3			41.1	
		21.8	50.0				
		6.9	34.3				
4.	1	8	16	1	1.1	24	
		33.3	66.7			13.7	
		14.5	13.3				
		4.6	9.1				
5.	1	6	22	1	1.1	28	
		21.4	78.6			16.0	
		10.9	18.3				
		3.4	12.6				
COLUMN		55	120	175			
TOTAL		31.4	68.6	100.0			

PROPORTION OF TIME CANDIDATE
PFD WAS WORN

RAW CHI SQUARE = 26.73611 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .0000
CRAMER'S V = .39087
CONTINGENCY COEFFICIENT = .36405
NUMBER OF MISSING OBSERVATIONS = 4

(21)

(21)

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** C R O S S T A B U L A T I O N O F *****
NV1 ***** HY VII ***** BOAT EXPER *****
***** PAGE 1 OF 1 *****

		COUNT				TOTAL	
		120-100	100-500	GREATER THAN 500			ROW TOTAL
		2.01	3.01	4.01			
		-----				-----	
1.	ROW PCT	6	6	30			42
	COL PCT	14.3	14.3	71.4			24.0
	TOT PCT	85.7	25.0	20.8			
		3.4	3.4	17.1			
		-----				-----	
2.	ROW PCT	1	0	8			9
	COL PCT	11.1	0	88.9			5.1
	TOT PCT	14.3	0	5.6			
		.6	0	4.6			
		-----				-----	
3.	ROW PCT	0	8	64			72
	COL PCT	0	11.1	88.9			41.1
	TOT PCT	0	33.3	44.4			
		0	4.6	36.6			
		-----				-----	
4.	ROW PCT	0	3	21			24
	COL PCT	0	12.5	87.5			13.7
	TOT PCT	0	12.5	14.6			
		0	1.7	12.0			
		-----				-----	
5.	ROW PCT	0	7	21			28
	COL PCT	0	25.0	75.0			16.0
	TOT PCT	0	29.2	14.6			
		0	4.0	12.0			
		-----				-----	
COLUMN		7	24	144			175
TOTAL		4.0	13.7	82.3			100.0

RAW CHI SQUARE = 22.72342 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .0037
CRAMER'S V = .25480
CONTINGENCY COEFFICIENT = .33901
NUMBER OF MISSING OBSERVATIONS = 4

WEARABILITY DATA ANALYSIS

01/09/78

FILE: TED (CREATION DATE = 01/09/78) COLL PFD

***** C H O S T A B U L A T I O N O F *****
 NV1 ***** BY V12 ***** LOCATION *****
 ***** PAGE 1 OF 1 *****

		V12											
		COUNT	1	2	3	4	5	6	7	8	9	10	11
		ROW PCT	RIVER	CR	SMALL	LA	WATERWAY	OCEAN			ROW		
		TOT PCT	EEK	ETC	NE	NE	NE	NE			TOTAL		
		TOT PCT	1.01	2.01	4.01	5.01	6.01	7.01	8.01	9.01	10.01		
NV1	1.	1	1	12	1	7	1	22	1	42	24.7		
		2.4	1	28.6	1	16.7	1	52.4	1				
		100.0	1	66.7	1	24.1	1	18.0	1				
		.6	1	7.1	1	4.1	1	12.9	1				
		1	1	12	1	7	1	22	1	42	24.7		
NV1	2.	0	1	0	1	2	1	6	1	8	4.7		
		0	1	0	1	25.0	1	75.0	1				
		0	1	0	1	6.9	1	4.9	1				
		0	1	0	1	1.2	1	3.5	1				
		0	1	0	1	11	1	54	1	70	41.2		
NV1	3.	0	1	5	1	15.7	1	77.1	1	23	13.5		
		0	1	7.1	1	37.9	1	44.3	1				
		0	1	27.8	1	6.5	1	31.8	1				
		0	1	2.9	1	5	1	18	1				
		0	1	0	1	21.7	1	78.3	1				
NV1	4.	0	1	0	1	17.2	1	14.8	1	27	15.9		
		0	1	0	1	2.9	1	10.0	1				
		0	1	0	1	4	1	22	1				
		0	1	3.7	1	14.8	1	61.5	1				
		0	1	5.6	1	13.8	1	18.0	1				
NV1	5.	0	1	.6	1	2.4	1	12.9	1	170	100.0		
		0	1	18	1	29	1	122	1				
		.6	1	10.6	1	17.1	1	71.8	1				
		1	1	18	1	29	1	122	1				
		1	1	18	1	29	1	122	1				

RAW CHI SQUARE = 24.88335 WITH 12 DEGREES OF FREEDOM. SIGNIFICANCE = .0154

CHAMBERS V = .22089

CONTINGENCY COEFFICIENT = .35733

NUMBER OF MISSING OBSERVATIONS = 9

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** C R O S S T A B U L A T I O N O F B O A T T Y P E *****
NVI ***** BY V13 ***** PAGE 1 OF 1

COUNT									
V13									
ROW	PCT	ICANOE	OTHER	SAIL	CPEN	POW	CABIN	NO	ROW
TOT	PCI	I	I	I	ER	ER	TORBOAT	TORBOAT	TOTAL
1.	1	12	1	2	22	1	5	1	42
		28.6	2.4	4.8	52.4	1	11.9	1	24.4
		66.7	100.0	4.5	36.7	1	10.2	1	
		7.0	.6	1.2	12.8	1	2.9	1	
2.	1	0	0	1	4	1	4	1	9
		0	0	11.1	44.4	1	44.4	1	5.2
		0	0	2.3	6.7	1	8.2	1	
		0	0	.6	2.3	1	2.3	1	
3.	1	5	0	21	20	1	25	1	71
		7.0	0	29.6	28.2	1	35.2	1	41.3
		27.8	0	47.7	33.3	1	51.0	1	
		2.9	0	12.2	11.6	1	14.5	1	
4.	1	0	0	8	7	1	8	1	23
		0	0	34.8	30.4	1	34.8	1	13.4
		0	0	18.2	11.7	1	16.3	1	
		0	0	4.7	4.1	1	4.7	1	
5.	1	1	0	12	7	1	7	1	27
		3.7	0	44.4	25.9	1	25.9	1	15.7
		5.6	0	27.3	11.7	1	14.3	1	
		.6	0	7.0	4.1	1	4.1	1	
COLUMN		18	1	44	60		49		172
TOTAL		10.5	.6	25.6	34.9		28.5		100.0

RAW CHI SQUARE = 46.34720 WITH 16 DEGREES OF FREEDOM. SIGNIFICANCE = .0001
CRAMER'S V = .25955
CONTINGENCY COEFFICIENT = .46072
NUMBER OF MISSING OBSERVATIONS = 7

01/05/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/05/78) COLL PRD

***** C H O S T A B U L A T I O N O F *****
 NVI ***** BY V14 *****
 ***** HDAI LENGTH *****
 ***** PAGE 1 OF 1 *****

		COUNT				ROW			
		V14				TOTAL			
		16-20	20-26	26-32	32-38	16-20	20-26	26-32	32-38
		1.01	2.01	3.01	4.01				
NVI									
1.	1	7	27	1	4	39			
		17.9	69.2	2.6	10.3	24.5			
		38.9	52.9	9.1	5.1				
		4.4	17.0	.6	2.5				
2.	1	0	4	0	5	9			
		0	44.4	0	55.6	5.7			
		0	7.8	0	6.3				
		0	2.5	0	3.1				
3.	1	4	15	7	39	65			
		6.2	23.1	10.8	60.0	40.9			
		22.2	29.4	63.6	49.4				
		2.5	9.4	4.4	24.5				
4.	1	2	4	1	14	21			
		9.5	19.0	4.8	66.7	13.2			
		11.1	7.8	9.1	17.7				
		1.3	2.5	.6	8.8				
5.	1	5	1	2	17	25			
		20.0	4.0	8.0	68.0	15.7			
		27.8	2.0	18.2	21.5				
		3.1	.6	1.3	10.7				
COLUMN		18	51	11	79	159			
TOTAL		11.3	32.1	6.9	49.7	100.0			

RAW CHI SQUARE = 51.73087 WITH 12 DEGREES OF FREEDOM. SIGNIFICANCE = .0000

CRAMER'S V = .32932

CONTINGENCY COEFFICIENT = .49546

NUMBER OF MISSING OBSERVATIONS = 20

WEARABILITY DATA ANALYSIS

FILE	TED	(CREATION DATE = 01/09/78)	COLL PFD

 NV1 *****
 CROSS TABULATION OF CUSTOMNY PFD WEAR
 BY V29 *****
 ***** PAGE 1 OF 1

v29

COUNT	ROW PCT	175	50-75	10-50	1-10	NEVER	TOTAL
CUL PCT							
TOT PCT							
1.	13	5	12	11.9	5	7	42
	31.0	11.9	28.6	11.9	16.7	16.7	24.0
	72.2	83.3	26.1	11.4	11.5	11.5	
	7.4	2.9	6.9	2.9	4.0	4.0	
2.	0	0	2	4	3	3	9
	0	0	22.2	44.4	33.3	33.3	5.1
	0	0	4.3	9.1	4.9	4.9	
	0	0	1.1	2.3	1.7	1.7	
3.	5	0	19	19	29	29	72
	6.9	0	26.4	26.4	40.3	40.3	41.1
	27.8	0	41.3	43.2	47.5	47.5	
	2.9	0	10.9	10.9	16.6	16.6	
4.	0	0	6	4	14	14	24
	0	0	25.0	16.7	58.3	58.3	13.7
	0	0	13.0	9.1	23.0	23.0	
	0	0	3.4	2.3	8.0	8.0	
5.	0	1	7	12	8	8	28
	0	3.6	25.0	42.9	28.6	28.6	16.0
	0	16.7	15.2	27.3	13.1	13.1	
	0	.6	4.0	6.9	4.6	4.6	
COLUMN TOTAL	18	6	46	44	61	61	175
	10.3	3.4	26.3	25.1	34.9	34.9	100.0

PRAW CHI SQUARE = 54.26970 WITH 16 DEGREES OF FREEDOM. SIGNIFICANCE = .0000

CRAMER'S V = .27844

 $\text{CONTINGENCY COEFFICIENT} = .48653$

NUMBER OF MISSING OBSERVATIONS = 4

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) CULL PFD

***** C R O S S T A B U L A T I O N O F F I S H I N G *****
 NV1 ***** BY V54 ***** PAGE 1 OF 1

		COUNT		V54		ROW	
		PCT		PCT		TOTAL	
		1.01		2.01			
NV1		1.01		2.01			
1.	1	19	1	23	1	42	
		45.2	1	54.8	1	24.0	
	1	38.8	1	18.3	1		
	1	10.9	1	13.1	1		
2.	1	4	1	5	1	9	
	1	44.4	1	55.6	1	5.1	
	1	8.2	1	4.0	1		
	1	2.3	1	2.9	1		
3.	1	21	1	51	1	72	
	1	29.2	1	70.8	1	41.1	
	1	42.9	1	40.5	1		
	1	12.0	1	29.1	1		
4.	1	4	1	20	1	24	
	1	16.7	1	83.3	1	13.7	
	1	8.2	1	15.9	1		
	1	2.3	1	11.4	1		
5.	1	1	1	27	1	28	
	1	3.6	1	96.4	1	16.0	
	1	2.0	1	21.4	1		
	1	.6	1	15.4	1		
COLUMN		49		126		175	
TOTAL		28.0		72.0		100.0	

RAW CHI SQUARE = 17.26387 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .0017
 CRAMER'S V = .31409
 CONTINGENCY COEFFICIENT = .29965
 NUMBER OF MISSING OBSERVATIONS = 4

WEARABILITY DATA ANALYSIS: 01/09/78

FILE IED (CREATION DATE = 01/09/78) COLL PFD

***** C R O S T A B U L A T I O N O F C A N O E I N G O R K A Y A K I N G ***** PAGE 1 OF 1

NV1 ***** BY V55 *****

V55			
COUNT	I		
ROW	PCI	I	
COL	PCI	I	
TOT	PCI	I	

1.	1	12	30
		28.6	71.4
		75.0	18.9
		6.9	17.1
		-----	-----
2.	1	0	9
		0	100.0
		0	5.7
		0	5.1
		-----	-----
3.	1	3	69
		4.2	95.8
		18.8	43.4
		1.7	39.4
		-----	-----
4.	1	0	24
		0	100.0
		0	15.1
		0	13.7
		-----	-----
5.	1	1	27
		3.6	96.4
		6.3	17.0
		.6	15.4
		-----	-----
COLUMN		16	159
TOTAL		9.1	90.9
			100.0

01/09/78

REANALYSIS DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PTD

***** CROSSTABULATION OF *****
 NV1 ***** BY V56 *****
 ***** SKINDIVING *****
 ***** PAGE 1 OF 1 *****

		COUNT		ROW	
		V56		TOTAL	
		ROW PCI	TOT PCI	ROW	TOT
		2.01			
NV1	1.	42	42	42	42
		100.0	100.0	24.0	24.0
		24.0	24.0		
		24.0	24.0		
		24.0	24.0		
2.		9	9	9	9
		100.0	100.0	5.1	5.1
		5.1	5.1		
		5.1	5.1		
		5.1	5.1		
3.		72	72	72	72
		100.0	100.0	41.1	41.1
		41.1	41.1		
		41.1	41.1		
		41.1	41.1		
4.		24	24	24	24
		100.0	100.0	13.7	13.7
		13.7	13.7		
		13.7	13.7		
		13.7	13.7		
5.		28	28	28	28
		100.0	100.0	16.0	16.0
		16.0	16.0		
		16.0	16.0		
		16.0	16.0		
COLUMN		175	175	175	175
TOTAL		100.0	100.0	100.0	100.0

NUMBER OF MISSING OBSERVATIONS = 4

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** C R O S S T A B U L A T I O N O F *****
NV1 BY V57 SCUBA DIVING ***** PAGE 1 OF 1

V57			
COUNT	ROW	COL	TOT
1.	1.	1.	1.
42	0	100.0	42
24.0	0	24.3	24.0
9	0	24.0	9
5.1	0	100.0	5.1
72	0	5.2	72
41.1	0	5.1	41.1
24	0	70	24
13.7	0	97.2	13.7
28	0	40.5	28
16.0	0	40.0	16.0
175	0	24	175
100.0	0	100.0	100.0
1.1	0	13.9	1.1
173	0	13.7	173
98.9	0	28	98.9
100.0	0	100.0	100.0
16.2	0	16.2	16.2
16.0	0	16.0	16.0
175	0	16.0	175
100.0	0	100.0	100.0

RAW CHI SQUARE = 2.89419 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .5757
CRAMER'S V = .12460
CONTINGENCY COEFFICIENT = .12755
NUMBER OF MISSING OBSERVATIONS = 4

30

30

WEARABILITY DATA ANALYSIS

01/09/78

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** C R O S S T A B U L A T I O N O F *****
 NV1 BY V58 SWIMMING *****
 ***** PAGE 1 OF 1

COUNT				ROW		TOTAL	
ROW PCT				TOTAL			
COL PCT							
TOT PCT				1.01	2.01		
1.	1	0	42	0	42		
	1	0	100.0	1	24.0		
	1	0	24.1	1			
	1	0	24.0	1			
2.	1	0	9	0	9		
	1	0	100.0	1	5.1		
	1	0	5.2	1			
	1	0	5.1	1			
3.	1	1	71	1	72		
	1	1.4	98.6	1	41.1		
	1	100.0	40.8	1			
	1	.6	40.6	1			
4.	1	0	24	0	24		
	1	0	100.0	1	13.7		
	1	0	13.8	1			
	1	0	13.7	1			
5.	1	0	28	0	28		
	1	0	100.0	1	16.0		
	1	0	16.1	1			
	1	0	16.0	1			
COLUMN	1	1	174	1	175		
TOTAL	.6	.6	99.4	100.0			

RAW CHI SQUARE = 1.43878 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .8374

CRAMER'S V = .09067

CONTINGENCY COEFFICIENT = .09030

NUMBER OF MISSING OBSERVATIONS = 4

(31)

(31)

WEARABILITY DATA ANALYSIS

01/09/78

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** C R O S S T A B U L A T I O N O F *****
 NV1 BY V59 CAMPING *****
 ***** PAGE 1 OF 1

COUNT		V59		ROW	
ROW PCT		COL PCT		TOTAL	
TOT PCT		2.01			
NV1	1.	42	42	42	42
		100.0	100.0	24.0	24.0
2.	9	9	9	9	9
		100.0	100.0	5.1	5.1
3.	72	72	72	72	72
		100.0	100.0	41.1	41.1
4.	24	24	24	24	24
		100.0	100.0	13.7	13.7
5.	28	28	28	28	28
		100.0	100.0	16.0	16.0
COLUMN		TOTAL		TOTAL	
		175		175	
		100.0		100.0	

NUMBER OF MISSING OBSERVATIONS = 4

WEARABILITY DATA ANALYSIS

01/09/78

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** C R O S S T A B U L A T I O N O F *****
 NV1 ***** BY V60 ***** SAILING *****
 ***** PAGE 1 OF 1 *****

		COUNT		V60		ROW TOTAL
		ROW	COL	TOT	TOT	
		PCI	PCI	PCI	PCI	
NV1		1.	2.	3.	4.	5.
1.	0	1	42	1	1	42
	0	1	100.0	1	1	24.0
	0	1	27.1	1	1	
	0	1	24.0	1	1	
	0	1	100.0	1	1	9
2.	0	1	100.0	1	1	5.1
	0	1	5.8	1	1	
	0	1	5.1	1	1	
	0	1	100.0	1	1	72
	0	1	67	1	1	41.1
3.	6.9	1	93.1	1	1	
	25.0	1	43.2	1	1	
	2.9	1	38.3	1	1	
	10	1	14	1	1	24
	41.7	1	58.3	1	1	13.7
4.	50.0	1	9.0	1	1	
	5.7	1	8.0	1	1	
	5	1	23	1	1	28
	17.9	1	82.1	1	1	16.0
	25.0	1	14.8	1	1	
5.	2.9	1	13.1	1	1	
	20	1	155	1	1	175
	11.4	1	88.6	1	1	100.0
	1	1	1	1	1	
	1	1	1	1	1	
COLUMN		TOTAL		TOTAL		

RAW CHI SQUARE = 30.83277 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .0000
 KRAMEH'S V = .41975
 CONTINGENCY COEFFICIENT = .34703
 NUMBER OF MISSING OBSERVATIONS = 4

COUNT				ROW	
I				TOTAL	
COL PCT	ROW PCT	COL PCT	ROW PCT		
TOF PCT	TOF PCT	TOF PCT	TOF PCT		
1.01	2.01	3.01	4.01		
1.	0	1	42	1	42
	0	1	100.0	1	24.0
	0	1	24.9	1	
	0	1	24.0	1	
2.	0	1	9	1	9
	0	1	100.0	1	5.1
	0	1	5.3	1	
	0	1	5.1	1	
3.	6	1	66	1	72
	8.3	1	91.7	1	41.1
	100.0	1	39.1	1	
	3.4	1	37.7	1	
4.	0	1	24	1	24
	0	1	100.0	1	13.7
	0	1	14.2	1	
	0	1	13.7	1	
5.	0	1	28	1	28
	0	1	100.0	1	16.0
	0	1	16.6	1	
	0	1	16.0	1	
COLUMN	6	169	175		
TOTAL	3.4	96.6	100.0		

MAX CHI SQUARE = 8.88607 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .0640

CHAMER'S V = .22536

CONTINGENCY COEFFICIENT = .21985

NUMBER OF MISSING OBSERVATIONS = 4

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) LULL PED

***** C R O S S T A B U L A T I O N O F P L E A S U R E C R U I S I N G *****
 NV1 BY V62 ***** PAGE 1 OF 1

		COUNT		ROW	
		ROW	PCT	TOTAL	
		COL	PCT		
		TOT	PCT		
		1.01	2.01		
NV1	1.	12	30	42	
		28.6	71.4	24.0	
		14.8	31.9		
		6.9	17.1		
		5	4	9	
2.		55.6	44.4	5.1	
		6.2	4.3		
		2.9	2.3		
		37	35	72	
		51.4	48.6	41.1	
3.		45.7	37.2		
		21.1	20.0		
4.		8	16	24	
		33.3	66.7	13.7	
		9.9	17.0		
		4.6	9.1		
5.		19	9	28	
		67.9	32.1	16.0	
		23.5	9.6		
		10.9	5.1		
		81	94	175	
COLUMN		46.3	53.7	100.0	
TOTAL					

RAW CHI SQUARE = 13.22632 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .0102

CHAMBERS V = .27492

CONTINGENCY COEFFICIENT = .26508

NUMBER OF MISSING OBSERVATIONS = 4

35

35

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PED

***** C H O S T A B U L A T I O N U F *****
***** BY V63 ***** RACING *****
***** PAGE 1 OF 1 *****

COUNT				V63			
ROW PCT				ROW			
COL PCT				TOTAL			
TOT PCT				2.01			
NV1	1.	1	42	1	42	1	42
		1	100.0	1	100.0	1	24.0
		1	24.0	1	24.0	1	
		1	24.0	1	24.0	1	
		1	24.0	1	24.0	1	
2.	1	9	9	1	9	1	9
		1	100.0	1	100.0	1	5.1
		1	5.1	1	5.1	1	
		1	5.1	1	5.1	1	
		1	5.1	1	5.1	1	
3.	1	72	72	1	72	1	72
		1	100.0	1	100.0	1	41.1
		1	41.1	1	41.1	1	
		1	41.1	1	41.1	1	
		1	41.1	1	41.1	1	
4.	1	24	24	1	24	1	24
		1	100.0	1	100.0	1	13.7
		1	13.7	1	13.7	1	
		1	13.7	1	13.7	1	
		1	13.7	1	13.7	1	
5.	1	28	28	1	28	1	28
		1	100.0	1	100.0	1	16.0
		1	16.0	1	16.0	1	
		1	16.0	1	16.0	1	
		1	16.0	1	16.0	1	
COLUMN				TOTAL			
TOTAL				TOTAL			
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01/09/78

REARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** C R O S S T A B U L A T I O N O F H U N T I N G
NV1 BY V64 ***** PAGE 1 OF 1

COUNT		ROW	
TOTAL		TOTAL	
COL PCT	TOT PCT	COL PCT	TOT PCT
1.	42	42	24.0
2.	9	9	5.1
3.	72	72	41.1
4.	24	24	13.7
5.	28	28	16.0
COLUMN	175	175	
TOTAL	100.0	100.0	

NUMBER OF MISSING OBSERVATIONS = 4

WEATHERABILITY DATA ANALYSIS

01/09/78

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** C R O S S T A B U L A T I O N O F W A T E R C O N D I T I O N S *****
***** BY V66 ***** PAGE 1 OF 1

		V66					
COUNT	ROW PCT	COL PCT	TOTAL	CHOPPY	ROUGH OR WHITE	TOTAL	ROW TOTAL
1.	1.	13	19	1	10	42	42
	2.	31.0	45.2	1	23.8	24.0	24.0
	3.	23.0	19.8	1	41.7	1	1
	4.	7.4	10.9	1	5.7	1	1
	5.	1	1	1	1	1	1
2.	1.	3	5	1	1	9	9
	2.	33.3	55.6	1	11.1	5.1	5.1
	3.	5.5	5.2	1	4.2	1	1
	4.	1.7	2.9	1	.6	1	1
	5.	1	1	1	1	1	1
3.	1.	21	44	1	7	72	72
	2.	29.2	61.1	1	9.7	41.1	41.1
	3.	38.2	45.8	1	29.2	1	1
	4.	12.0	25.1	1	4.0	1	1
	5.	1	1	1	1	1	1
4.	1.	12	8	1	4	24	24
	2.	50.0	33.3	1	16.7	13.7	13.7
	3.	21.8	8.3	1	16.7	1	1
	4.	6.9	4.6	1	2.3	1	1
	5.	1	1	1	1	1	1
5.	1.	6	20	1	2	28	28
	2.	21.4	71.4	1	7.1	16.0	16.0
	3.	10.9	20.8	1	8.3	1	1
	4.	3.4	11.4	1	1.1	1	1
	5.	1	1	1	1	1	1
COLUMN TOTAL		55	96	24	175	175	175
		31.4	54.9	13.7	100.0	100.0	100.0

RAW CHI SQUARE = 13.34280 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .1006

CRAMER'S V = .19525

CONTINGENCY COEFFICIENT = .26616

NUMBER OF MISSING OBSERVATIONS = 4

(38)

(38)

WEARABILITY DATA ANALYSIS

FILE TFD (CREATION DATE = 01/09/13) COLL PFD

***** CROSS SECTION OF *****
***** BY v_{ch} ***** AIR TEMPERATURE *****
***** NV1 ***** PAGE 1 OF 1 *****

COUNT		V67										TOTAL
ROW	COL	140	OK	L	51-60	61-70	71-80	81-90	91-100	101-110		
1.	1	0	1	2	1	16	21	3	1	42		
	1	0	1	4.8	1	38.1	1	50.0	1	24.0		
	1	0	1	50.0	1	21.1	1	25.9	1	33.3		
	1	0	1	1.1	1	9.1	1	12.0	1	1.7		
2.	1	0	1	0	1	6	1	3	1	9		
	1	0	1	0	1	66.7	1	33.3	1	5.1		
	1	0	1	0	1	7.9	1	3.7	1	0		
	1	0	1	0	1	3.4	1	1.7	1	0		
3.	1	1	2	1	28	1	36	1	5	72		
	1	1.4	1	2.8	1	38.9	1	50.0	1	41.1		
	1	20.0	1	50.0	1	36.8	1	44.4	1	55.6		
	1	.6	1	1.1	1	16.0	1	20.6	1	2.9		
4.	1	1	0	1	11	1	11	1	1	24		
	1	4.2	1	0	1	45.8	1	45.8	1	13.7		
	1	20.0	1	0	1	14.5	1	13.6	1	11.1		
	1	.6	1	0	1	6.3	1	6.3	1	.6		
5.	1	3	1	0	1	15	1	10	1	28		
	1	10.7	1	0	1	53.6	1	35.7	1	16.0		
	1	60.0	1	0	1	19.7	1	12.3	1	0		
	1	1.7	1	0	1	8.6	1	5.7	1	0		
COLUMN TOTAL		5	4	4	16	81	9	5.1	100.0	175		

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RAW CHI SQUARE = 17.29427 WITH 16 DEGREES OF FREEDOM, SIGNIFICANCE = .3668
CRAMER'S V = .15718
CONTINGENCY COEFFICIENT = .29989

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CONTINGENCY COEFFICIENT = .29989

NUMBER OF MISSING OBSERVATIONS = 4

(39)

39

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) LOLL PFD

***** C R O S S T A B U L A T I O N O F W E A T H E R *****
***** BY V68 *****
***** PAGE 1 OF 1 *****

		COUNT		V68			
		ROW	PCT	ISUNNY	CLOUDY	ROW	TOTAL
		COL	PCT	1	2	COL	PCT
		TOT	PCT	1.01	2.01	TOT	PCT
NV1	1.	1	28	1	14	42	
		1	66.7	1	33.3	24.3	
		1	20.9	1	35.9		
		1	16.2	1	8.1		
		-1	-	-	-		
2.	1	6	1	3	1	9	
	1	66.7	1	33.3	1	5.2	
	1	4.5	1	7.7	1		
3.	1	3.5	1	1.7	1		
	1	58	1	13	1	71	
	1	81.7	1	18.3	1	41.0	
4.	1	43.3	1	33.3	1		
	1	33.5	1	7.5	1		
	-1	-	-	-	-		
5.	1	19	1	4	1	23	
	1	82.6	1	17.4	1	13.3	
	1	14.2	1	10.3	1		
6.	1	11.0	1	2.3	1		
	-1	-	-	-	-		
7.	1	23	1	5	1	28	
	1	82.1	1	17.9	1	16.2	
	1	17.2	1	12.8	1		
8.	1	13.3	1	2.9	1		
	-1	-	-	-	-		
COLUMN		134	39			173	
TOTAL		77.5	22.5			100.0	

RAW CHI SQUARE = 4.83096 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .3051
CRAMER'S V = .16711
CONTINGENCY COEFFICIENT = .16482
NUMBER OF MISSING OBSERVATIONS = 6

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) LOLL PTD

***** C R O S S T A B U L A T I O N O F *****
***** BY V69 ***** PAGE 1 OF 1

		COUNT				ROW	
		COL	PCT	ICALM	Moderate Strong	TOTAL	
		TOT	PCT	1	2	3	
		1	2	3	4	5	
NV1	1.	17	21	1	1	39	
		43.6	53.8	2.6	2.6	25.7	
		37.0	21.4	12.5	1		
		11.2	13.8	.7			
		-1	-1	-1	-1	-1	
	2.	2	3	1	1	6	
		33.3	50.0	16.7	16.7	3.9	
		4.3	3.1	12.5	1		
		1.3	2.0	.7			
		-1	-1	-1	-1	-1	
	3.	14	44	4	4	62	
		22.6	71.0	6.5	6.5	40.8	
		30.4	44.9	50.0	1		
		9.2	28.9	2.6			
		-1	-1	-1	-1	-1	
	4.	9	10	0	0	19	
		47.4	52.6	0	0	12.5	
		19.6	10.2	0	0		
		5.9	6.6	0	0		
		-1	-1	-1	-1	-1	
	5.	4	20	2	2	26	
		15.4	76.9	7.7	7.7	17.1	
		8.7	20.4	25.0	1		
		2.6	13.2	1.3			
		-1	-1	-1	-1	-1	
COLUMN		46	98	8	8	152	
TOTAL		30.3	64.5	5.3	5.3	100.0	

RAW CHI SQUARE = 13.05749 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .1099

CRAMER'S V = .20725

CONTINGENCY COEFFICIENT = .28126

NUMBER OF MISSING OBSERVATIONS = 27

APPENDIX III-B
Wearability/Accessibility Study
Crosstabulations
Crosstabulations with V 29

III-B-iii/iv

(43) 44x (43) 44x

WEARABILITY DATA ANALYSIS

FILE	TED	(CREATION DATE = 12/19/77)	DOLL PFD
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***** CROSS TABULATION OF *****
 NV9 ***** ATTITUDE ON ACCESS ***** BY V29 ***** CUSTOMRY PFD WEAR *****
 ***** PAGE 1 OF 1 *****

PAGE 1 OF 1

[illegible]

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RAW CHI SQUARE = 23.05005 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .0033
CRAMER'S V = .25374
CONTINGENCY COEFFICIENT = .33776

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12/19/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 12/19/77) DOLL PFD

***** C R O S S T A B U L A T I O N O F *****
 NV10 ATTWEAR ROUGH CD BY V29 CUSTOMRY PFD WEAR *****
 ***** PAGE 1 OF 1

		V29						
		COUNT	50-75	10-50	1-10	NEVER		
ROW	PCT	I75					ROW	TOTAL
COL	PCT	I						
TOT	PCT	I	1.01	2.01	3.01	4.01	5.01	

NV10	2.	I	0	0	0	0	10	10
		I	0	0	0	0	100.0	5.6
		I	0	0	0	0	16.4	
		I	0	0	0	0	5.6	

	3.	I	18	6	47	47	51	169
		I	10.7	3.6	27.8	27.8	30.2	94.4
		I	100.0	100.0	100.0	100.0	83.6	
		I	10.1	3.4	26.3	26.3	28.5	

COLUMN	18		6	47	47	61	179	
TOTAL	10.1		3.4	26.3	26.3	34.1	100.0	

NAM CHI SQUARE = 20.48889 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .0004
 CRAMER'S V = .33832
 CONTINGENCY COEFFICIENT = .32048

(46)

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WEARABILITY DATA ANALYSIS

12/19/77

FILE TED (CREATION DATE = 12/19/77) COLL PFD

 NV11 ATTIT ON EFF-REL ***** C R O S S T A B U L A T I O N O F *****
 ***** BY V29 ***** CUSTOMRY PFD WEAR *****
 ***** PAGE 1 OF 1 *****

V29		COUNT								ROW
		PCT								TOTAL
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WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 12/19/77) COLL PFD

***** CROSS TABULATION OF *****
 ***** NEED FOR PFD *****
 NV12 ***** BY V29 *****
 ***** CUSTOMRY PFD WEAR *****
 ***** PAGE 1 OF 1 *****

COUNT		ROW		COUNT		ROW		COUNT		ROW		COUNT		ROW	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
COLUMN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
TOTAL	10.1	3.4	26.3	47	18	6	24	5.6	6.7	100.0	2.8	13.4	13.4	12.8	17.9

RAW CHI SQUARE = 17.07442 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .0293
 CRAMER'S V = .21839
 CONTINGENCY COEFFICIENT = .29510

WEARABILITY DATA ANALYSIS

12/19/77

FILE TED (CREATION DATE = 12/19/77) DOLL PFD

***** C R O S S T A B U L A T I O N O F *****
 NV13 IMAGE ***** BY V29 CUSTOMRY PFD WEAR *****
 ***** PAGE 1 OF 1

COUNT		V29						
ROW	PCT	175	50-75	10-50	1-10	NEVER	ROW	TOTAL
COL	PCT							
TOT	PCT	1	1.01	2.01	3.01	4.01	5.01	
1.	1	0	1	0	1	0	1	19
	1	0	1	0	1	6	1	11.4
	1	0	1	0	1	31.6	1	
	1	0	1	0	1	14.6	1	68.4
	1	0	1	0	1	0	1	21.3
	1	0	1	0	1	3.6	1	7.8
2.	1	6	1	6	1	23	1	127
	1	4.7	1	4.7	1	18.1	1	76.0
	1	50.0	1	100.0	1	56.1	1	
	1	3.6	1	3.6	1	13.8	1	73.8
	1	6	1	0	1	12	1	26.9
3.	1	28.6	1	0	1	57.1	1	21
	1	50.0	1	0	1	29.3	1	12.6
	1	3.6	1	0	1	7.2	1	
COLUMN	TOTAL	12	6	41	47	61	167	
		7.2	3.6	24.6	28.1	36.5	100.0	

12/19/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 12/19/77) COLL PFD

***** C R O S S T A B U L A T I O N O F *****
NV14 PFD WEAR BY V29 CUSTOMRY PFD WEAR *****
***** PAGE 1 OF 1 *****

		V29						
		COUNT	50-75	10-50	1-10	NEVER	ROW	
		ROW PCT 175					TOTAL	
		COL PCT 1						
		TOT PCT 1	1.01	2.01	3.01	4.01	5.01	
NV14	1.	1	0	0	0	18	55	73
		1	0	0	0	24.7	75.3	42.2
		1	0	0	0	38.3	90.2	
		1	0	0	0	10.4	31.8	
2.	1	1	0	0	29	29	6	64
		1	0	0	45.3	45.3	9.4	37.0
		1	0	0	70.7	61.7	9.8	
		1	0	0	16.8	16.8	3.5	
3.	1	1	18	6	12	0	0	36
		1	50.0	16.7	33.3	0	0	20.8
		1	100.0	100.0	29.3	0	0	
		1	10.4	3.5	6.9	0	0	
COLUMN		18	6	41	47	61	173	
TOTAL		10.4	3.5	23.7	27.2	35.3	100.0	

RAW CHI SQUARE = 198.48120 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = 0
CRAMER'S V = .75739
CONTINGENCY COEFFICIENT = .73096
NUMBER OF MISSING OBSERVATIONS = 6

50

50

12/19/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 12/19/77) DOLL PFD

V3 AGE ***** C R O S S T A B U L A T I O N O F ***** CUSTOMRY PFD WEAR ***** PAGE 1 OF 1

COUNT I		V29					ROW	
PCT I75		50-75	10-50	1-10	NEVER	TOTAL	TOTAL	
COL PCT I		1.01	2.01	3.01	4.01	5.01		
TOT PCT I		1.01	2.01	3.01	4.01	5.01		
V3	1.0	6	0	6	1	16	29	
	20.7	0	0	20.7	3.4	55.2	16.9	
	33.3	0	0	12.8	2.4	26.7		
	3.5	0	0	3.5	.6	9.3		
	2.0	12	0	23	6	5	46	
	26.1	0	0	50.0	13.0	10.9	26.7	
	66.7	0	0	48.9	14.6	8.3		
	7.0	0	0	13.4	3.5	2.9		
	3.0	0	6	18	5	10	39	
	0	15.4	46.2	12.8	25.6		22.7	
	0	100.0	38.3	12.2	16.7			
	0	3.5	10.5	2.9	5.8			
	4.0	0	0	0	17	18	35	
	0	0	0	0	48.6	51.4	20.3	
	0	0	0	0	41.5	30.0		
	0	0	0	0	9.9	10.5		
	5.0	0	0	0	12	11	23	
	0	0	0	0	52.2	47.8	13.4	
	0	0	0	0	29.3	18.3		
	0	0	0	0	7.0	6.4		
COLUMN	18	6	47	41	60	172		
TOTAL	10.5	3.5	27.3	23.8	34.9	100.0		

RAW CHI SQUARE = 116.12156 WITH 16 DEGREES OF FREEDOM. SIGNIFICANCE = .0000
CRAMER'S V = .41083
CONTINGENCY COEFFICIENT = .63485

NUMBER OF MISSING OBSERVATIONS = 7

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PTD

***** C R O S S T A B U L A T I O N O F S E X *****
 V29 CUSTOMRY PFD WEAR BY V4 ***** PAGE 1 OF 1

V4			
COUNT	MALE	FEMALE	TOTAL
ROW PCT	COL PCT	TOT PCT	
1.0	7	11	18
75	38.9	61.1	100.1
	5.7	19.6	
	3.9	6.2	
50-75	2.0	6	8
	100.0	0	3.4
	4.9	0	
	3.4	0	
10-50	3.0	36	47
	76.6	23.4	26.4
	29.5	19.6	
	20.2	6.2	
1-10	4.0	30	47
	63.8	36.2	26.4
	24.6	30.4	
	16.9	9.6	
NEVER	5.0	43	60
	71.7	28.3	33.7
	35.2	30.4	
	24.2	9.6	
COLUMN TOTAL	122	56	178
	68.5	31.5	100.0

RAW CHI SQUARE = 12.26325 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .0155
 CRAMER'S V = .26248
 CONTINGENCY COEFFICIENT = .25388
 NUMBER OF MISSING OBSERVATIONS = 1

52

52

01/09/79

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/79) COLL PFD

***** C R O S S T A B U L A T I O N O F *****
V29 CUSTOMRY PFD WEAR BY NV6 ***** PAGE 1 OF 1

		NV6			
		COUNT	ROW		
		PCT	PCT		
		TOT	TOT		
V29	01	1.0	12.1	6	18
75	01	66.7	33.3	10.1	
		21.4	4.9		
		6.7	3.4		
50-75	01	2.0	6	0	6
		100.0	0	0	3.4
		10.7	0		
		3.4	0		
10-50	01	3.0	12	35	47
		25.5	74.5	26.3	
		21.4	28.5		
		6.7	19.6		
1-10	01	4.0	7	40	47
		14.9	85.1	26.3	
		12.5	32.5		
		3.9	22.3		
NEVER	01	5.0	19	42	61
		31.1	68.9	34.1	
		33.9	34.1		
		10.6	23.5		
COLUMN		56	123	179	
TOTAL		31.3	68.7	100.0	

RAW CHI SQUARE = 30.25876 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .0000
CRAMER'S V = .4115
CONTINGENCY COEFFICIENT = .38026

(53) (53)

WEARABILITY DATA ANALYSIS

FILE	TED	(CREATION DATE = 01/09/76)	COLL PFD
FILE	TED	(CREATION DATE = 01/09/76)	COLL PFD

CUSTOMER PED WEAR		BY VII		OF BOAT EXAPER		PAGE 1 OF 1	
VZ9							

vii

COUNT	10-100	100-500	GREATER THAN 500	TOTAL
1.0	5	1	12	18
2.0	27.8	5.6	66.7	101
3.0	71.4	4.2	8.1	83.7
4.0	2.8	.6	6.7	10.1
5.0	0	0	6	6
6.0	0	0	100.0	100
7.0	0	0	4.1	4.1
8.0	0	0	3.4	3.4
9.0	0	12	35	47
10.0	0	25.5	74.5	100
11.0	0	50.0	23.6	73.6
12.0	0	6.7	19.6	26.3
13.0	0	7	40	47
14.0	0	14.9	85.1	100
15.0	0	29.2	27.0	56.2
16.0	0	3.9	22.3	26.3
17.0	2	4	55	61
18.0	3.3	6.6	90.2	100
19.0	28.6	16.7	37.2	82.5
20.0	1.1	2.2	30.7	34.1
21.0	7	24	148	179
22.0	3.9	13.4	82.7	100

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RAW CHI SQUARE = 40.7606 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .0000
CRAMER'S V = .3757
CONTINGENCY COEFFICIENT = .4382

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01/09/78

NEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** C R O S S T A B U L A T I O N O F L O C A T I O N B Y V I 2 ***** PAGE 1 OF 1

V12

COUNT		V12				TOTAL	
ROW	PCT	NEVER	SMALL LA	WATERWAY	OCEAN	ROW	TOTAL
TOT	PCT	1.01	2.01	4.01	5.01		
1.0	1	1	6	0	1	18	
		5.6	33.3	0	61.1	10.3	
75	1	100.0	33.3	0	8.7		
		.6	3.4	0	6.3		
2.0	1	0	5	0	0	6	
		0	100.0	0	0	3.4	
50-75	1	0	33.3	0	0		
		0	3.4	0	0		
3.0	1	0	6	0	1	47	
		0	12.8	0	87.2	27.0	
10-50	1	0	33.3	0	32.5		
		0	3.4	0	23.6		
4.0	1	0	0	7	35	42	
		0	0	16.7	83.3	24.1	
1-10	1	0	0	24.1	27.8		
		0	0	4.0	20.1		
5.0	1	0	0	22	39	61	
		0	0	36.1	63.9	35.1	
NEVER	1	0	0	75.9	31.0		
		0	0	12.6	22.4		
COLUMN	1	18	29	126	174		
TOTAL	.6	10.3	16.7	72.4	100.0		

RAW CHI SQUARE = 108.34600 WITH 12 DEGREES OF FREEDOM. SIGNIFICANCE = .0000
 SPANER'S V = .45569
 CONTINGENCY COEFFICIENT = .61955
 NUMBER OF MISSING OBSERVATIONS = 5

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

V29 CUSTOMARY PFD WEAR ***** C H O S T A B U L A T I O N O F B O A T T Y P E ***** PAGE 1 OF 1

V13									
COUNT									
ROW	PCT	ICANOE	OTHER	SAIL	OPEN	POM	CABIN	NO	ROW
COL	PCT				ER		TORBOAT		TOTAL
101	PCT	1.01	3.01	4.01	6.01	7.01			
V29									
1.0	1	6	1	0	11	0	0	1	18
		33.3	5.6	0	61.1	0	0	0	10.2
75									
1	33.3	100.0	0	0	18.0	0	0	0	
		3.4	.6	0	6.3	0	0	0	
50-75									
2.0	1	6	0	0	0	0	0	0	6
		100.0	0	0	0	0	0	0	3.4
1	33.3	0	0	0	0	0	0	0	
		3.4	0	0	0	0	0	0	
10-50									
3.0	1	6	0	11	30	0	0	0	47
		12.8	0	23.4	63.8	0	0	0	26.7
1	33.3	0	0	25.0	49.2	0	0	0	
		3.4	0	6.3	17.0	0	0	0	
1-10									
4.0	1	0	0	13	6	28			47
		0	0	27.7	12.8	59.6			26.7
1	0	0	0	29.5	9.8	53.8			
		0	0	7.4	3.4	15.9			
NEVER									
5.0	1	0	0	20	14	24			58
		0	0	34.5	24.1	41.4			33.0
1	0	0	0	45.5	23.0	46.2			
		0	0	11.4	8.0	13.6			
COLUMN									
18		1	44	61	52				176
TOTAL		10.2	.6	25.0	34.7	29.5			100.0

PAW CHI SQUARE = 148.43219 WITH 16 DEGREES OF FREEDOM. SIGNIFICANCE = .0000

CRAMER'S V = .45917

CONTINGENCY COEFFICIENT = .67640

NUMBER OF MISSING OBSERVATIONS = 3

(56)

(56)

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** CUSTOMRY PFD WEAR ***** C R O S S T A B U L A T I O N O F *****
***** BY V14 ***** BOAT LENGTH ***** PAGE 1 OF 1

		COUNT					V14					ROW TOTAL
		ROW PCT	COL PCT	TOT PCT	16	16-20	20-26	26-32	32-38	38-44		
V29	75	1.0	1	1	0	17	1	0	1	1	18	
					0	94.4	0	0	5.6	11.2		
50-75		2.0	1	1	0	32.7	1	0	1.3	1	6	
					0	10.6	0	0	.6	3.7		
10-50		3.0	1	1	6	0	0	0	0	0	47	
					100.0	0	0	0	0	0		
1-10		4.0	1	1	33.3	0	0	0	0	0	25.0	
					7.5	11.2	6.9	3.7				
NEVER		5.0	1	1	12	18	11	6	34	45	160	
					25.5	38.3	23.4	12.8	7.6	30.6		
TOTAL					66.7	34.6	100.0	7.6				
					7.5	11.2	6.9	3.7				
					0	15.0	0	85.0	43.0	21.2		
					0	11.5	0	43.0	21.2			
					0	3.7	0	21.2				
					0	11	0	38				
					0	22.4	0	77.6	48.1	23.8		
					0	21.2	0	48.1				
					0	6.9	0	23.8				
					18	52	11	79				
					11.2	32.5	6.9	49.4				

RAW CHI SQUARE = 158.87468 WITH 12 DEGREES OF FREEDOM. SIGNIFICANCE = .0000
CRAMER'S V = .57532
CONTINGENCY COEFFICIENT = .70586
NUMBER OF MISSING OBSERVATIONS = 19

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) LOLL PFD

***** C R O S S T A B U L A T I O N O F *****
 V29 CUSTOMDY PFD WEAR BY V54 FISHING *****
 ***** PAGE 1 OF 1 *****

		COUNT		ROW		TOTAL	
		ROW PCT	COL PCT	ROW PCT	COL PCT	ROW PCT	COL PCT
		TOT PCT	TOT PCT	TOT PCT	TOT PCT	TOT PCT	TOT PCT
V29	75	1.0	12	1	6	18	10.1
			66.7	1	33.3		
			24.0	1	4.7		
			6.7	1	3.4		
			-1	-1	-1		
		2.0	6	1	0	6	3.4
			100.0	1	0		
			12.0	1	0		
			3.4	1	0		
			-1	-1	-1		
		3.0	16	1	31	47	26.3
			34.0	1	66.0		
			32.0	1	24.0		
			8.9	1	17.3		
			-1	-1	-1		
		4.0	8	1	39	47	26.3
			17.0	1	83.0		
			16.0	1	30.2		
			4.5	1	21.8		
			-1	-1	-1		
		5.0	8	1	53	61	34.1
			13.1	1	86.9		
			16.0	1	41.1		
			4.5	1	29.6		
			-1	-1	-1		
		COLUMN	50	129	179		
		TOTAL	27.9	72.1	100.0		

RAW CHI SQUARE = 39.20035 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .0000
 CRAMER'S V = .46797
 CONTINGENCY COEFFICIENT = .42385

58

58

WEARABILITY DATA ANALYSIS

FILE	TED	(CREATION DATE = 01/09/78)	COLL PFD
FILE	TED	(CREATION DATE = 01/09/78)	COLL PFD

V24 CUSTOMER PFD WEAT CROSSLABULATION OF CANOEING OR KAYAKING
CUSTOMER PFD WEAT BY V55 PAGE 1 OF 1

[illegible]

RAW CHI SQUARE =	44.89708 WITH	4 DEGREES OF FREEDOM.	SIGNIFICANCE =	.0000
CRAMER'S V =	.58468			
CONTINGENCY COEFFICIENT =	.56719			

59

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

V29 CUSTOMARY PFD WEAR ***** C R O S T A B U L A T I O N O F *****
***** BY V56 SKINDIVING ***** PAGE 1 OF 1

V56			
COUNT	ROW	COL	TOT
1.0	18	1	18
100.0	1	10.1	10.1
10.1	1	10.1	10.1
10.1	1	10.1	10.1
2.0	6	1	6
100.0	1	3.4	3.4
3.4	1	3.4	3.4
3.0	47	1	47
100.0	1	26.3	26.3
26.3	1	26.3	26.3
4.0	47	1	47
100.0	1	26.3	26.3
26.3	1	26.3	26.3
5.0	61	1	61
100.0	1	34.1	34.1
34.1	1	34.1	34.1
34.1	1	34.1	34.1
COLUMN	179		179
TOTAL	100.0		100.0

(60)

(60)

WEARABILITY DATA ANALYSIS

01/09/78

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** C R O S S T A B U L A T I O N O F S C U B A D I V I N G *****
 V29 CUSTOMARY PFD WEAR BY V57 ***** PAGE 1 OF 1

		COUNT		ROW		TOTAL	
		ROW PCT	COL PCT	ROW PCT	COL PCT	ROW PCT	COL PCT
		TOT PCT	TOT PCT	TOT PCT	TOT PCT	TOT PCT	TOT PCT
V29	1.0	1.0	0	1.01	2.01	18	10.1
75	1.0	0	1	100.0	1	10.1	
50-75	2.0	0	1	100.0	6	3.4	
10-50	3.0	0	1	100.0	47	26.3	
1-10	4.0	0	1	100.0	47	26.3	
NEVER	5.0	2	1	59	61	34.1	
		3.3	1	96.7	34.1		
		100.0	1	33.3			
		1.1	1	33.0			
		-1-					
COLUMN TOTAL	2	177	179				
	1.1	98.9	100.0				

RAW CHI SQUARE = 3.91257 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .4180
 CRAMER'S V = .14784
 CONTINGENCY COEFFICIENT = .14625

(61)

(61)

WEARABILITY DATA ANALYSIS

VZ9 CUSTOMARY PFD WEAP VZ9 CUSTOMARY PFD WEAP

CROSS STABILATION OF SWIMMING BY V₅₈

PAGE 1 OF 1

	V59			
	COUNT	ROW	COL	ROW
	PCI	PCI	PCI	TOTAL
W29	1.0	0	100.0	10.1
75	1.0	0	100.0	10.1
	1.0	0	10.1	10.1
	2.0	0	6	6
50-75	1.0	0	100.0	3.4
	1.0	0	3.4	3.4
	1.0	0	3.4	3.4
10-50	3.0	1	46	47
	2.1	97.9	26.3	26.3
	100.0	25.8		
	.6	25.7		
1-10	4.0	0	47	47
	0	100.0	26.3	26.3
	0	26.4		
	0	26.3		
NEVER	5.0	0	61	61
	0	100.0	34.1	34.1
	0	34.3		
	0	34.1		
COLUMN TOTAL	1	178	179	179
	.6	99.4	100.0	100.0

RAW CHI SQUARE =	2.82429 WITH	4 DEGREES OF FREEDOM.	SIGNIFICANCE =	.5876
CRAMER'S V =	.12561			
CONTINGENCY COEFFICIENT =	.12463			

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) LOLL PFD

***** C H O S T A B U L A T I O N O F *****
 V29 CUSTOMARY PFD WEAR BY V59 CAMPING *****
 ***** PAGE 1 OF 1 *****

COUNT		ROW	
ROW PCT	TOT PCT	ROW PCT	TOT PCT
1.0	18	18	18
100.0	100.0	10.1	10.1
10.1	10.1	10.1	10.1
10.1	10.1	10.1	10.1
2.0	6	6	6
100.0	100.0	3.4	3.4
3.4	3.4	3.4	3.4
3.0	47	47	47
100.0	100.0	26.3	26.3
26.3	26.3	26.3	26.3
4.0	47	47	47
100.0	100.0	26.3	26.3
26.3	26.3	26.3	26.3
5.0	61	61	61
100.0	100.0	34.1	34.1
34.1	34.1	34.1	34.1
COLUMN TOTAL	179	COLUMN TOTAL	179
100.0	100.0	100.0	100.0

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01/09/78

RELIABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** CROSSTABULATION OF *****
 V29 CUSTOMARY PFD WEAR BY V60 SAILING *****
 ***** PAGE 1 OF 1 *****

		COUNT		ROW		TOTAL	
		ROW PCT	COL PCT	ROW PCT	COL PCT	ROW PCT	COL PCT
		TOT PCT	TOT PCT	TOT PCT	TOT PCT	TOT PCT	TOT PCT
V29	75	1.0	1.0	0	18	18	18
				0	100.0	10.1	10.1
				0	11.3		
				0	10.1		
50-75		2.0	2.0	0	6	6	6
				0	100.0	3.4	3.4
				0	3.8		
				0	3.4		
10-50		3.0	3.0	8	39	47	47
				17.0	83.0	26.3	26.3
				40.0	24.5		
				4.5	21.8		
1-10		4.0	4.0	0	41	47	47
				12.8	87.2	26.3	26.3
				30.0	25.8		
				3.4	22.9		
NEVER		5.0	5.0	0	55	61	61
				9.8	90.2	34.1	34.1
				30.0	34.6		
				3.4	30.7		
COLUMN TOTAL		20	159	179	179	100.0	100.0
		11.2	88.8				

RAW CHI SQUARE = 4.86849 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .3011
 GAMMA#5 V = .16492
 CONTINGENCY COEFFICIENT = .16272

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WEARABILITY DATA ANALYSIS

01/09/78

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** C R O S S T A B U L A T I O N U F *****
 V29 CUSTOMRY PFD WEAR BY V61 WATER SKIING *****
 ***** PAGE 1 OF 1 *****

V61			
COUNT	ROW	CUL	TOT
ROW PCT	PCT	PCT	TOTAL
TOT PCT	1.01	2.01	
V29	1.0	0	18
75	0	100.0	10.1
	0	10.4	
	0	10.1	
50-75	2.0	0	6
	0	100.0	3.4
	0	3.5	
	0	3.4	
10-50	3.0	3	44
	6.4	93.6	26.3
	50.0	25.4	
	1.7	24.6	
1-10	4.0	0	47
	0	100.0	26.3
	0	27.2	
	0	26.3	
NEVER	5.0	3	58
	4.9	95.1	34.1
	50.0	33.5	
	1.7	32.4	
COLUMN	6	173	179
TOTAL	3.4	96.6	100.0

RAW CHI SQUARE = 4.25710 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .3723
 CRAMER'S V = .15422
 CONTINGENCY COEFFICIENT = .15241

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PAGE 1 OF 1

COLL PFD

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FILE      TED      (CREATION DATE = 01/09/76 )    COLL PFD
*****
***** C R O S T A B L E ***** OF RACING ***** PAGE 1 OF 1
***** BY V43 ***** CUSTOMER DEF WEAR *****
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[illegible]

(67)

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WEARABILITY DATA ANALYSIS

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*****
FILE# TED (CREATION DATE = 01/09/78 ) COLL. PFD *****
*****
***** CUSTOMER PFD WEAR ***** C K O U S T A B U L A T I O N O F *****
***** V29 ***** BY V64 HUNTING ***** PAGE 1 OF 1 *****
*****

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[illegible]

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01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** CUSTOMARY PFD WEAR ***** C R O S T A B U L A T I O N O F ***** WATER CONDITIONS *****
***** V29 ***** BY V66 ***** PAGE 1 OF 1 *****

V66

	COUNT	ROW PCT	COL PCT	ICALM	CHOPPY	ROUGH OR WHITE	ROW TOTAL
V29	1.0	1	1	6	1	2.01	3.01
				33.3	1	44.4	1
				10.9	1	8.0	1
				3.4	1	4.5	1
50-75	2.0	1	1	3	1	3	0
				50.0	1	50.0	1
				5.5	1	3.0	1
				1.7	1	1.7	1
10-50	3.0	1	1	12	1	32	3
				25.5	1	68.1	1
				21.8	1	32.0	1
				6.7	1	17.9	1
1-10	4.0	1	1	4	1	35	8
				8.5	1	74.5	1
				7.3	1	35.0	1
				2.2	1	19.6	1
NEVER	5.0	1	1	30	1	22	9
				49.2	1	36.1	1
				54.5	1	22.0	1
				16.8	1	12.3	1
COLUMN TOTAL				55		100	24
				30.7		55.9	13.4
							100.0

RAW CHI SQUARE = 28.51111 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .0004
CRAMER'S V = .28221
CONTINGENCY COEFFICIENT = .37067

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) LULL PFD

***** C R O S S T A B U L A T I O N O F *****
 V29 CUSTOMRY PFD WEAR BY V67 AIR TEMPERATURE *****
 ***** PAGE 1 OF 1 *****

V67

COUNT	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
ROW PCT	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	19.0	20.0	21.0	22.0	23.0	24.0	25.0	26.0	27.0	28.0	29.0	30.0	31.0	32.0	33.0	34.0	35.0	36.0	37.0	38.0	39.0	40.0	41.0	42.0	43.0	44.0	45.0	46.0	47.0	48.0	49.0	50.0	51.0	52.0	53.0	54.0	55.0	56.0	57.0	58.0	59.0	60.0	61.0	62.0	63.0	64.0	65.0	66.0	67.0	68.0	69.0	70.0	71.0	72.0	73.0	74.0	75.0	76.0	77.0	78.0	79.0	80.0	81.0	82.0	83.0	84.0	85.0	86.0	87.0	88.0	89.0	90.0	91.0	92.0	93.0	94.0	95.0	96.0	97.0	98.0	99.0	100.0
CUL PCT	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	19.0	20.0	21.0	22.0	23.0	24.0	25.0	26.0	27.0	28.0	29.0	30.0	31.0	32.0	33.0	34.0	35.0	36.0	37.0	38.0	39.0	40.0	41.0	42.0	43.0	44.0	45.0	46.0	47.0	48.0	49.0	50.0	51.0	52.0	53.0	54.0	55.0	56.0	57.0	58.0	59.0	60.0	61.0	62.0	63.0	64.0	65.0	66.0	67.0	68.0	69.0	70.0	71.0	72.0	73.0	74.0	75.0	76.0	77.0	78.0	79.0	80.0	81.0	82.0	83.0	84.0	85.0	86.0	87.0	88.0	89.0	90.0	91.0	92.0	93.0	94.0	95.0	96.0	97.0	98.0	99.0	100.0
TOT PCT	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	19.0	20.0	21.0	22.0	23.0	24.0	25.0	26.0	27.0	28.0	29.0	30.0	31.0	32.0	33.0	34.0	35.0	36.0	37.0	38.0	39.0	40.0	41.0	42.0	43.0	44.0	45.0	46.0	47.0	48.0	49.0	50.0	51.0	52.0	53.0	54.0	55.0	56.0	57.0	58.0	59.0	60.0	61.0	62.0	63.0	64.0	65.0	66.0	67.0	68.0	69.0	70.0	71.0	72.0	73.0	74.0	75.0	76.0	77.0	78.0	79.0	80.0	81.0	82.0	83.0	84.0	85.0	86.0	87.0	88.0	89.0	90.0	91.0	92.0	93.0	94.0	95.0	96.0	97.0	98.0	99.0	100.0

RAW CHI SQUARE = 23.52567 WITH 16 DEGREES OF FREEDOM. SIGNIFICANCE = .1004
 CRAMER'S V = .18127
 CONTINGENCY COEFFICIENT = .34082

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01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** C H O S T A B U L A T I O N O F *****
 V29 CUSTOMARY PFD WEAR ***** BY V68 WEATHER ***** PAGE 1 OF 1

	COUNT				V68			
	ROW	PCT	ISUBNY	CL	ADJY	ROW	TOTAL	
	TOT	PCT						
V29	1.0	1	13	1	1.01	2.01		
75			72.2	1	27.8	5	18	
			9.5	1	12.5	1	10.2	
			7.3	1	2.8	1		
50-75	2.0	1	3	1	3	6		
			50.0	1	50.0	1	3.4	
			2.2	1	7.5	1		
			1.7	1	1.7	1		
10-50	3.0	1	38	1	9	47		
			80.9	1	19.1	1	26.6	
			27.7	1	22.5	1		
			21.5	1	5.1	1		
1-10	4.0	1	36	1	9	45		
			80.0	1	20.0	1	25.4	
			26.3	1	22.5	1		
			20.3	1	5.1	1		
NEVER	5.0	1	47	1	14	61		
			77.0	1	23.0	1	34.5	
			34.3	1	35.0	1		
			26.6	1	7.9	1		
COLUMN	137		40			177		
TOTAL	77.4		22.6			100.0		

RAW CHI SQUARE = 3.34934 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .5012
 GRAFFER'S V = .13756
 CONTINGENCY COEFFICIENT = .13628
 NUMBER OF MISSING OBSERVATIONS = 2

(71)

(71)

01/09/78

NEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** C R O S S T A B U L A T I O N O F W I N D *****
 V29 CUSTOMRY PFD WEAR BY V69 ***** PAGE 1 OF 1

	COUNT	IC	IC	MODERATE	STRONG	ROW
	COL PCT	IC	IC	MODERATE	STRONG	TOTAL
V29	1.0	8	1	8	1	17
75	47.1	47.1	1	47.1	5.9	10.9
	17.4	17.4	1	7.8	12.5	
	5.1	5.1	1	5.1	.6	
50-75	2.0	3	1	3	0	6
	50.0	50.0	1	50.0	0	3.8
	6.5	6.5	1	2.9	0	
	1.9	1.9	1	1.9	0	
10-50	3.0	8	1	27	3	38
	21.1	21.1	1	71.1	7.9	24.4
	17.4	17.4	1	26.5	37.5	
	5.1	5.1	1	17.3	1.9	
1-10	4.0	8	1	34	3	45
	17.8	17.8	1	75.6	6.7	28.8
	17.4	17.4	1	33.3	37.5	
	5.1	5.1	1	21.8	1.9	
NEVER	5.0	19	1	30	1	50
	38.0	38.0	1	60.0	2.0	32.1
	41.3	41.3	1	29.4	12.5	
	12.2	12.2	1	19.2	.6	
COLUMN	46	46	102	8	156	
TOTAL	29.5	29.5	65.4	5.1	100.0	

RAW CHI SQUARE = 11.14054 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .1939
 KRAMER'S V = .18496
 CONTINGENCY COEFFICIENT = .25817
 NUMBER OF MISSING OBSERVATIONS = 23

72 72

APPENDIX III-B

Wearability/Accessibility Study
Crosstabulations

Crosstabulation with NV 5

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** C H O S T A B U L A T I O N O F *****
 NVS ***** BY NV9 ***** ATTITUDE ON ACCESS *****
 ***** PAGE 1 OF 1 *****

COUNT		ROW		TOTAL	
NV9		PCT		PCT	
TOTAL		1.1		2.1	
1.	5	23	97	3.1	125
	4.0	18.4	77.6		72.3
	41.7	63.9	77.6		
	2.9	13.3	56.1		
2.	0	2	3	5	2.9
	0	40.0	60.0		
	0	5.6	2.4		
	0	1.2	1.7		
3.	1	6	15	22	12.7
	5	27.3	68.2		
	8.3	16.7	12.0		
	.6	3.5	8.7		
4.	3	2	4	9	5.2
	33.3	22.2	44.4		
	25.0	5.6	3.2		
	1.7	1.2	2.3		
5.	3	3	6	12	6.9
	25.0	25.0	50.0		
	25.0	8.3	4.8		
	1.7	1.7	3.5		
COLUMN	12	36	125	173	
TOTAL	6.9	20.8	72.3	100.0	

RAW CHI SQUARE = 20.98760 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .0072
 CHAMBERS V = .24629
 CONTINGENCY COEFFICIENT = .32892
 NUMBER OF MISSING OBSERVATIONS = 6

WEARABILITY DATA ANALYSIS

01/09/78

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** CROSSTABULATION OF *****
 NVS ***** BY NV10 ATTWEAR ROUGH CD *****
 ***** PAGE 1 OF 1

		COUNT		NV10		ROW	
		ROW PCT		COL PCT		TOTAL	
		TUT PCT		TUT PCT			
NVS	1.	5	1	120	3.1	125	
		4.0	1	96.0	72.3		
		50.0	1	73.6			
		2.9	1	69.4			
		0	0	100.0	5		
	2.	0	0	100.0	2.9		
		0	0	3.1			
		0	0	2.9			
		1	1	21	22		
		4.5	1	95.5	12.7		
	3.	10.0	1	12.9			
		.6	1	12.1			
		3	1	6	9		
		33.3	1	66.7	5.2		
		30.0	1	3.7			
	4.	1.7	1	3.5			
		1	1	11	12		
		8.3	1	91.7	6.9		
		10.0	1	6.7			
		.6	1	6.4			
COLUMN		10	163	173			
TOTAL		5.8	94.2	100.0			

PAW CHI SQUARE = 13.78484 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .0080
 CHAMBERS V = .28228
 CONTINGENCY COEFFICIENT = .27166

NUMBER OF MISSING OBSERVATIONS = 6

RELIABILITY DATA ANALYSIS

01/09/78

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** CHOS5 TABULATION OF ATTITU ON EFF-MEL *****
 NVS ***** BY NVII ***** PAGE 1 OF 1

		COUNT				ROW			
		NVII				TOTAL			
		COL PCT	ROW PCT	TOT PCT		COL PCT	ROW PCT	TOT PCT	
		1.1	2.1	3.1		1.1	2.1	3.1	
1.	1.	25	85	10	120	20.8	70.8	8.3	71.9
	2.	61.0	73.3	100.0		15.0	50.9	6.0	
	3.	3	1	0	4	75.0	25.0	0	2.4
	4.	7.3	.9	0		1.8	.6	0	
2.	1.	4	18	0	22	18.2	81.8	0	13.2
	2.	9.8	15.5	0		2.4	10.8	0	
	3.	4	5	0	9	44.4	55.6	0	5.4
	4.	9.8	4.3	0		2.4	3.0	0	
3.	1.	5	7	0	12	41.7	58.3	0	7.2
	2.	12.2	6.0	0		3.0	4.2	0	
	3.	41	116	10	167	24.6	69.5	6.0	100.0
	4.	116	69.5	6.0					

MAX CHI SQUARE = 14.10398 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .0791
 CRAMER'S V = .20549
 CONTINGENCY COEFFICIENT = .27907
 NUMBER OF MISSING OBSERVATIONS = 12

77

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WEARABILITY DATA ANALYSIS

01/09/78

FILE TED (CREATION DATE = 01/09/78) LOLL PFD

 NVS ***** CROSS TABULATION OF *****
 ***** BY NV12 ***** NEED FOR PFD *****
 ***** PAGE 1 OF 1 *****

		NV12				ROW TOTAL			
COUNT									
ROW FCT									
COL FCT									
TOT FCT		1.1	2.1	3.1					
1.	1.	6	47	72					
		4.8	37.6	57.6					
		54.5	65.3	80.0					
		3.5	27.2	41.6					
2.	1.	0	3	2					
		0	60.0	40.0					
		0	4.2	2.2					
		0	1.7	1.2					
3.	1.	1	12	9					
		4.5	54.5	40.9					
		9.1	16.7	10.0					
		.6	6.9	5.2					
4.	1.	3	5	1					
		33.3	55.6	11.1					
		27.3	6.9	1.1					
		1.7	2.9	.6					
5.	1.	1	5	6					
		8.3	41.7	50.0					
		9.1	6.9	6.7					
		.6	2.9	3.5					
COLUMN TOTAL		11	72	90					
		6.4	41.6	52.0					
				173					
				100.0					

RAW CHI SQUARE = 17.79024 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .0229
 CRAMER'S V = .22675
 CONTINGENCY COEFFICIENT = .30536
 NUMBER OF MISSING OBSERVATIONS = 6

01/09/78

RELIABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** C R O S S T A B U L A T I O N O F I M A G E *****
NVS BY NV13 ***** PAGE 1 OF 1

		NV13				ROW	
		COUNT	1	2	3	TOTAL	
NVS	ROW	PCT	1	2	3		
	TOT	PCT	1	2	3		
1.	1	15	1	82	1	115	
		13.0	1	71.3	1	71.4	
		78.9	1	67.8	1	85.7	
2.	1	9.3	1	50.9	1	11.2	
3.	1	2	1	3	1	5	
		40.0	1	60.0	1	3.1	
		10.5	1	2.5	1		
4.	1	1.2	1	1.9	1		
5.	1	1	1	19	1	22	
		4.5	1	86.4	1	9.1	
		5.3	1	15.7	1	13.7	
6.	1	.6	1	11.8	1	1.2	
7.	1	1	1	7	1	9	
		11.1	1	77.8	1	11.1	
		5.3	1	5.8	1	4.8	
8.	1	.6	1	4.3	1	.6	
9.	1	0	1	10	1	10	
		0	1	100.0	1	0	
		0	1	8.3	1	0	
10.	1	0	1	6.2	1	0	
COLUMN		19	121	21	161		
TOTAL		11.8	75.2	13.0	100.0		

RAW CHI SQUARE = 10.10739 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .2576
CRAMER'S V = .17717
CONTINGENCY COEFFICIENT = .24304
NUMBER OF MISSING OBSERVATIONS = 16

79

79

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** CROSSTABULATION OF PFD WEAR BY NV14 ***** PAGE 1 OF 1

		NV14					ROW TOTAL	
NV5	COUNT	1	2	3	4	5		
	ROW PCT	1.1	2.1	3.1	4.1	5.1		
	TOT PCT	1.1	2.1	3.1	4.1	5.1		
1.	42	44	35	121				
	34.7	36.4	28.9	72.5				
	60.9	71.0	97.2					
	25.1	26.3	21.0					
2.	3	1	1	5				
	60.0	20.0	20.0	3.0				
	4.3	1.6	2.8					
	1.8	.6	.6					
3.	16	6	0	22				
	72.7	27.3	0	13.2				
	23.2	9.7	0					
	9.6	3.6	0					
4.	4	5	0	9				
	44.4	55.6	0	5.4				
	5.8	8.1	0					
	2.4	3.0	0					
5.	4	6	0	10				
	40.0	60.0	0	6.0				
	5.8	9.7	0					
	2.4	3.6	0					
COLUMN TOTAL	69	62	36	167				
	41.3	37.1	21.6	100.0				

RAW CHI SQUARE = 22.09302 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .0047

CRAMER'S V = .25719

CONTINGENCY COEFFICIENT = .34181

NUMBER OF MISSING OBSERVATIONS = 12

80

80

01/09/78

WEARABILITY DATA ANALYSIS

FILE TCD (CREATION DATE = 01/09/78) COLL PED

***** C R O S S T A B U L A T I O N O F A G E *****
 NVS ***** BY V3 ***** PAGE 1 OF 1

		V3					ROW TOTAL	
		COUNT	1	2	3	4	5	
		ROW PCT	1	2	3	4	5	
		COL PCT	1	2	3	4	5	
		TOT PCT	1	2	3	4	5	
NVS	1.	1	20	39	31	19	15	124
			16.1	31.5	25.0	15.3	12.1	74.7
			71.4	86.7	81.6	59.4	65.2	
			12.0	23.5	18.7	11.4	9.0	
			1.2	0	1	0	1	
	2.	1	50.0	0	1	0	1	4
			7.1	0	2.6	0	1.4	2.4
			1.2	0	.6	0	.6	
			1.2	0	1	0	1	
			1.2	0	1	0	1	
	3.	1	4	2	2	8	4	20
			20.0	10.0	10.0	40.0	20.0	12.0
			14.3	4.4	5.3	25.0	17.4	
			2.4	1.2	1.2	4.8	2.4	
			2.4	1.2	1.2	4.8	2.4	
	4.	1	2	0	3	3	1	9
			22.2	0	33.3	33.3	11.1	5.4
			7.1	0	7.9	9.4	4.3	
			1.2	0	1.8	1.8	.6	
			1.2	0	1.8	1.8	.6	
	5.	1	0	4	1	2	2	9
			0	44.4	11.1	22.2	22.2	5.4
			0	8.9	2.6	6.3	8.7	
			0	2.4	.6	1.2	1.2	
			0	2.4	.6	1.2	1.2	
COLUMN TOTAL			28	45	38	32	23	166
			16.9	27.1	22.9	19.3	13.9	100.0

RAW CHI SQUARE = 23.52919 WITH 16 DEGREES OF FREEDOM. SIGNIFICANCE = .1003

CRAMER'S V = .18924

CONTINGENCY COEFFICIENT = .35234

NUMBER OF MISSING OBSERVATIONS = 13

(81)

(18)

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) LOLL PFD

***** CROSSTABULATION OF *****
NV5 BY V4 SEA ***** PAGE 1 OF 1

		COUNT		V4			
		ROW PCT	MALE	FEMALE	ROW		
		COL PCT			TOTAL		
		TOT PCT	1.01	2.01			
NV5	1.	89	35	124			
		71.8	28.2	72.1			
		76.1	63.6				
		51.7	20.3				
2.	3	60.0	40.0	5			
		2.6	3.6	2.9			
		1.7	1.2				
3.	12	10	22				
	54.5	45.5	12.8				
	10.3	18.2					
	7.0	5.8					
4.	8	1	9				
	88.9	11.1	5.2				
	6.8	1.8					
	4.7	.6					
5.	5	7	12				
	41.7	58.3	7.0				
	4.3	12.7					
	2.9	4.1					
COLUMN TOTAL		117	55	172			
		68.0	32.0	100.0			

RAW CHI SQUARE = 8.42108 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .0773
CHAMBERS V = .22127
CONTINGENCY COEFFICIENT = .21604
NUMBER OF MISSING OBSERVATIONS = 7

82

82

01/09/78

RELIABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** CROSSTABULATION OF *****
 NVS BY NV6 ***** PAGE 1 OF 1

		COUNT		ROW		TOTAL	
		ROW PCT	COL PCT	TOTAL			
		TOT PCT	TOT PCT	TOTAL			
NVS		01		1.1			
1.	1	41	84	125			
	1	32.8	67.2	72.3			
	1	74.5	71.2				
	1	23.7	48.6				
2.	1	1	4	5			
	1	20.0	80.0	2.9			
	1	1.8	3.4				
	1	.6	2.3				
3.	1	.6	16	22			
	1	27.3	72.7	12.7			
	1	10.9	13.6				
	1	3.5	9.2				
4.	1	4	5	9			
	1	44.4	55.6	5.2			
	1	7.3	4.2				
	1	2.3	2.9				
5.	1	3	9	12			
	1	25.0	75.0	6.9			
	1	5.5	7.6				
	1	1.7	5.2				
COLUMN	55	118	173				
TOTAL	31.8	68.2	100.0				

RAW CHI SQUARE = 1.50010 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .8256
 CRAMER'S V = .09330
 CONTINGENCY COEFFICIENT = .09290
 NUMBER OF MISSING OBSERVATIONS = 6

01/09/78

RELIABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PED

***** CROSSTABULATION OF *****
***** NVS ***** BY VII *****
***** PAGE 1 OF 1 *****

VII

COUNT		COL PCT				ROW PCT		TOTAL	
		120-100	100-500	GREATER THAN 500		120-100	100-500	GREATER THAN 500	
NVS		2.01	3.01	4.01		2.01	3.01	4.01	
1.	1.	0	20	99	125	4.8	16.0	79.2	12.3
		85.7	83.3	69.7		3.5	11.6	57.2	
2.	1.	1	0	4	5	20.0	0	80.0	2.9
		14.3	0	2.8		0	0	2.3	
3.	1.	0	2	20	22	0	9.1	90.9	12.7
		0	4.3	14.1		0	1.2	11.6	
4.	1.	0	0	9	9	0	0	100.0	5.2
		0	0	6.3		0	0	5.2	
5.	1.	0	2	10	12	0	16.7	83.3	6.9
		0	8.3	7.0		0	1.2	5.8	
COLUMN TOTAL		7	24	142	173	4.0	13.9	82.1	100.0

RAW CHI SQUARE = 8.53291 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .3832
CRAMER'S V = .15704
CONTINGENCY COEFFICIENT = .21681
NUMBER OF MISSING OBSERVATIONS = 6

84

84

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** C R O S S T A B U L A T I O N O F L O C A T I O N *****
NV5 ***** BY V12 ***** PAGE 1 OF 1

COUNT		V12										ROW TOTAL
I		1	2	3	4	5	6	7	8	9	10	
ROW	COL	1	2	3	4	5	6	7	8	9	10	
1.	1.	1	1	1	1	1	1	1	1	1	1	12
2.	1.	1	1	1	1	1	1	1	1	1	1	12
3.	1.	1	1	1	1	1	1	1	1	1	1	12
4.	1.	1	1	1	1	1	1	1	1	1	1	12
5.	1.	1	1	1	1	1	1	1	1	1	1	12
TOTAL		5	5	5	5	5	5	5	5	5	5	60

MAX CHI SQUARE = 11.02822 WITH 12 DEGREES OF FREEDOM. SIGNIFICANCE = .5265
CRAMER'S V = .14749
CONTINGENCY COEFFICIENT = .24750
NUMBER OF MISSING OBSERVATIONS = 10

85

85

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PTD

***** C R O S T A B U L A T I O N O F *****
***** NVS ***** BY V13 ***** HOAT TYPE *****
***** PAGE 1 OF 1 *****

V13

COUNT		I		CANOE		OTHER		SAIL		OPEN POW		CABIN MO		ROW	
ROW PCT		COL PCT		TOT PCT		1.01		3.01		4.01		6.01		7.01	
1.		18		1		1		1		22		53		28	
		14.8		.8		18.0		1		43.4		1		23.0	
		100.0		100.0		51.2		88.3		1		58.3		1	
		10.6		.6		12.9		31.2		1		16.5		1	
2.		0		0		0		2		1		1		2	
		0		0		40.0		1		20.0		1		40.0	
		0		0		4.7		1.7		1		4.2		1	
		0		0		1.2		.6		1		1.2		1	
3.		0		0		11		2		1		1		2	
		0		0		50.0		1		9.1		1		40.9	
		0		0		25.6		3.3		1		18.8		1	
		0		0		6.5		1.2		1		5.3		1	
4.		0		0		2		2		2		2		5	
		0		0		22.2		1		22.2		1		55.6	
		0		0		4.7		3.3		1		10.4		1	
		0		0		1.2		1.2		1		2.9		1	
5.		0		0		6		1		2		2		4	
		0		0		50.0		1		16.7		1		33.3	
		0		0		14.0		3.3		1		8.3		1	
		0		0		3.5		1.2		1		2.4		1	
COLUMN		18		1		43		60		48		170		100.0	
TOTAL		10.6		.6		25.3		35.3		28.2		100.0		100.0	

RAW CHI SQUARE = 32.39900 WITH 16 DEGREES OF FREEDOM. SIGNIFICANCE = .0089
CRAMER'S V = .21428
CONTINGENCY COEFFICIENT = .40009
NUMBER OF MISSING OBSERVATIONS = 9

86

86

MINI-MULTI DATA ANALYSIS

01/09/78

FILE: REP: CREATION DATE = 01/09/78) COLL: PFD

***** CROSSTABULATION OF *****
 BY V14 BOAT LENGTH *****
 NYS ***** PAGE 1 OF 1

		COUNT				BY V14				ROW TOTAL	
		16-20	20-26	26-32	32-38	16-20	20-26	26-32	32-38		
ROW	PCT					16-20	20-26	26-32	32-38		
COL	PCT					16-20	20-26	26-32	32-38		
TOT	PCT	1.01	2.01	3.01	4.01						
1.	18	47	8	40	113						
	15.9	41.6	7.1	35.4	72.0						
	100.0	92.2	80.0	51.3							
	11.5	29.9	5.1	25.5							
2.	0	1	0	4	5						
	0	20.0	0	80.0	3.2						
	0	2.0	0	5.1							
	0	.6	0	2.5							
3.	0	1	0	18	19						
	0	5.3	0	94.7	12.1						
	0	2.0	0	23.1							
	0	.6	0	11.5							
4.	0	2	0	7	9						
	0	22.2	0	77.8	5.7						
	0	3.9	0	9.0							
	0	1.3	0	4.5							
5.	0	0	2	9	11						
	0	0	18.2	81.8	7.0						
	0	0	20.0	11.5							
	0	0	1.3	5.7							
COLUMN	18	51	10	78	157						
TOTAL	11.5	32.5	6.4	49.7	100.0						

RAW CHI SQUARE = 39.94052 WITH 12 DEGREES OF FREEDOM. SIGNIFICANCE = .0001
 CRAMER'S V = .29135
 CONTINGENCY COEFFICIENT = .45052
 NUMBER OF MISSING OBSERVATIONS = 22

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FILE      TED      (CREATION DATE = 01/09/78 )   COLL PFD
*****
NVS ***** C H O S I A T I O N   O F *****
BY V29 ***** CUSTOMRY PFD WEAR *****
***** PAGE 1 OF 1
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X-SQUARE = 36.84657 WITH 16 DEGREES OF FREEDOM. SIGNIFICANCE = .0022
CRAMER'S V = .23075
CONTINGENCY COEFFICIENT = .41903
NUMBER OF MISSING OBSERVATIONS = 0

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WEARABILITY DATA ANALYSIS

01/09/78

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** C R O S S T A B U L A T I O N O F F I S H I N G *****
 NVS ***** BY V54 ***** PAGE 1 OF 1

COUNT				V54		ROW	
ROW PCT				COL PCT		TOTAL	
TOT PCT				TOT PCT		TOT PCT	
-----				-----		-----	
1.				43	82	125	
				34.4	65.6	72.3	
				89.6	65.6		
				24.9	47.4		
2.				1	4	5	
				20.0	80.0	2.9	
				2.1	3.2		
				.6	2.3		
3.				4	18	22	
				18.2	81.8	12.7	
				8.3	14.4		
				2.3	10.4		
4.				0	9	9	
				0	100.0	5.2	
				0	7.2		
				0	5.2		
5.				0	12	12	
				0	100.0	6.9	
				0	9.6		
				0	6.9		
COLUMN				48	125	173	
TOTAL				27.7	72.3	100.0	

RAW CHI SQUARE = 11.97835 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .0175
 CHAMBERS V = .26313
 CONTINGENCY COEFFICIENT = .25447
 NUMBER OF MISSING OBSERVATIONS = 6

(89)

89

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFU

***** C H O S T A B U L A T I O N O F C A N O E I N G O R K A Y A K I N G *****
***** BY V55 ***** PAGE 1 OF 1

V55			
COUNT I			
ROW PCT I			
COL PCT I			
TOT PCT I			
NV5	1.	15	110
		12.0	88.0
		100.0	69.6
		8.7	63.6
2.	1	0	5
		0	100.0
		0	3.2
		0	2.9
3.	1	0	22
		0	100.0
		0	13.9
		0	12.7
4.	1	0	9
		0	100.0
		0	5.7
		0	5.2
5.	1	0	12
		0	100.0
		0	7.6
		0	6.9
COLUMN		15	158
TOTAL		8.7	91.3
			100.0
			1/3

RAW CHI SQUARE = 6.30684 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .1774
CRAVER'S V = .19093
CONTINGENCY COEFFICIENT = .18755
NUMBER OF MISSING OBSERVATIONS = 6

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PTD

***** C R O S S T A B U L A T I O N O F S K I N D I V I D U A L S *****
NV5 ***** BY V56 ***** PAGE 1 OF 1

		COUNT		V56		ROW	
		PCT		TOTAL		TOTAL	
		TOT		PCT		PCT	
NV5	1.	125	100.0	125	72.3	2.01	
		1	72.3	1	72.3		
	2.	5	100.0	5	2.9		
		1	2.9	1	2.9		
	3.	22	100.0	22	12.7		
4.		1	12.7	1	12.7		
	4.	9	100.0	9	5.2		
		1	5.2	1	5.2		
	5.	12	100.0	12	6.9		
		1	6.9	1	6.9		
COLUMN		173	173	173	173		
TOTAL		100.0	100.0	100.0	100.0		

NUMBER OF MISSING OBSERVATIONS = 6

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** C H O S T A B U L A T I O N O F S C U B A D I V I N G *****
***** BY V57 ***** PAGE 1 OF 1

COUNT I				V57			
ROW PCT I				ROW			
COL PCT I				TOTAL			
TOT PCT I							
-----				-----			
1.				1.01	2.01		
				0	125	1	125
				0	100.0	1	72.3
				0	73.1	1	
				0	72.3	1	
2.				1	5	1	5
				0	100.0	1	2.9
				0	2.9	1	
				0	2.9	1	
3.				2	20	1	22
				9.1	90.9	1	12.7
				100.0	11.7	1	
				1.2	11.6	1	
4.				0	9	1	9
				0	100.0	1	5.2
				0	5.3	1	
				0	5.2	1	
5.				0	12	1	12
				0	100.0	1	6.9
				0	7.0	1	
				0	6.9	1	
COLUMN				2	171		173
TOTAL				1.2	98.8		100.0

RAW CHI SQUARE = 13.88783 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .0077

KRAMER'S V = .28333

CONTINGENCY COEFFICIENT = .27260

NUMBER OF MISSING OBSERVATIONS = 6

92

92

WEARABILITY DATA ANALYSIS

01/09/78

FILE TED (CREATION DATE = 01/09/78) COLL PFD

 NVS ***** CROSS TABULATION OF *****
 ***** BY V58 ***** SWIMMING *****
 ***** PAGE 1 OF 1

COUNT				V58		ROW TOTAL
ROW PCT	COL PCT	TOT PCT	TOT PCT	1.01	2.01	
NVS						
1.	1	1	124	1	1	125
	.8	1	99.2	1	1	72.3
	100.0	1	72.1	1	1	
	.6	1	71.7	1	1	
2.	1	0	5	1	1	5
	0	1	100.0	1	1	2.9
	0	1	2.9	1	1	
	0	1	2.9	1	1	
3.	1	0	22	1	1	22
	0	1	100.0	1	1	12.7
	0	1	12.8	1	1	
	0	1	12.7	1	1	
4.	1	0	9	1	1	9
	0	1	100.0	1	1	5.2
	0	1	5.2	1	1	
	0	1	5.2	1	1	
5.	1	0	12	1	1	12
	0	1	100.0	1	1	6.9
	0	1	7.0	1	1	
	0	1	6.9	1	1	
COLUMN TOTAL	1	172	173	1	1	173
	.6	99.4	100.0	1	1	100.0

RAW CHI SQUARE = .38623 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .9836
 GRAHNS V = .04725
 CONTINGENCY COEFFICIENT = .04720
 NUMBER OF MISSING OBSERVATIONS = 6

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** C R O S S T A B U L A T I O N O F *****
***** NV5 BY V59 CAMPING *****
***** PAGE 1 OF 1 *****

NV5		V59	
COUNT	I	ROW	TOTAL
ROW PCT	I		
COL PCT	I		
TOT PCT	I	2.01	
1.	I	125	125
	I	100.0	72.3
	I	72.3	
	I	72.3	
2.	I	5	5
	I	100.0	2.9
	I	2.9	
	I	2.9	
3.	I	22	22
	I	100.0	12.7
	I	12.7	
	I	12.7	
4.	I	9	9
	I	100.0	5.2
	I	5.2	
	I	5.2	
5.	I	12	12
	I	100.0	6.9
	I	6.9	
	I	6.9	
COLUMN	I	173	173
TOTAL	I	100.0	100.0

NUMBER OF MISSING OBSERVATIONS = 6

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** CROSSTABULATION OF *****
 NVS BY V60 ***** SAILING *****
 ***** PAGE 1 OF 1 *****

		COUNT		V60				ROW	
		PCT				TOTAL			

01/09/78

RELIABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** C R O S S T A B U L A T I O N O F *****
***** BY V61 ***** WATER SKIING *****
***** PAGE 1 OF 1 *****

		COUNT		V61		ROW TOTAL	
		ROW PCT	COL PCT	TOT PCT		ROW TOTAL	
NV5	1.	5	120	125	2.01	125	
		4.0	96.0	72.3		72.3	
		83.3	71.9				
		2.9	69.4				
2.		0	5	5		5	
		0	100.0	2.9		2.9	
		0	3.0				
		0	2.9				
3.		1	21	22		22	
		4.5	95.5	12.7		12.7	
		16.7	12.6				
		.6	12.1				
4.		0	9	9		9	
		0	100.0	5.2		5.2	
		0	5.4				
		0	5.2				
5.		0	12	12		12	
		0	100.0	6.9		6.9	
		0	7.2				
		0	6.9				
COLUMN TOTAL		6	167	173		173	
		3.5	96.5	100.0		100.0	

RAW CHI SQUARE = 1.11598 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .8917
CRAMER'S V = .08032
CONTINGENCY COEFFICIENT = .04006
NUMBER OF MISSING OBSERVATIONS = 6

96

96

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

NV5 ***** C R O S T A B U L A T I O N U F P L E A S U R E C R U I S I N G *****
***** BY V62 ***** PAGE 1 OF 1

COUNT				V62		HOW	
ROW PCT				COL PCT		TOTAL	
TOT PCT				1.01	2.01		
NV5	1.	56	69	125			
		44.8	55.2	72.3			
		69.1	75.0				
		32.4	39.9				
2.	4	1	1	5			
	80.0	20.0	2.9				
	4.9	1.1					
	2.3	.6					
3.	10	12	22				
	45.5	54.5	12.7				
	12.3	13.0					
	5.8	6.9					
4.	3	6	9				
	33.3	66.7	5.2				
	3.7	6.5					
	1.7	3.5					
5.	8	4	12				
	66.7	33.3	6.9				
	9.9	4.3					
	4.6	2.3					
COLUMN				81	92	173	
TOTAL				46.8	53.2	100.0	

RAW CHI SQUARE = 4.98790 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .2885
CRAMER'S V = .16980
CONTINGENCY COEFFICIENT = .16740
NUMBER OF MISSING OBSERVATIONS = 0

99

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WEARABILITY DATA ANALYSIS

01/09/78

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** C R O S S T A B U L A T I O N O F *****
NV5 BY V63 H A C I N G *****
***** PAGE 1 OF 1 *****

COUNT		ROW	
COL PCT	TOT PCT	COL PCT	TOT PCT
NV5			
1.	125	125	125
	100.0	72.3	72.3
	72.3		
	72.3		
2.	5	5	5
	100.0	2.9	2.9
	2.9		
	2.9		
3.	22	22	22
	100.0	12.7	12.7
	12.7		
	12.7		
4.	9	9	9
	100.0	5.2	5.2
	5.2		
	5.2		
5.	12	12	12
	100.0	6.9	6.9
	6.9		
	6.9		
COLUMN	173	173	173
TOTAL	100.0	100.0	100.0

NUMBER OF MISSING OBSERVATIONS = 6

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PTD

***** C R O S S T A B U L A T I O N O F HUNTING *****
***** BY V64 ***** PAGE 1 OF 1

COUNT				V64			
ROW PCT				ROW			
COL PCT				TOTAL			
TOT PCT				2.01			
NV5	1.	1	125	1	125		
		1	100.0	1	72.3		
		1	72.3	1			
		1	72.3	1			
		1	72.3	1			
2.		1	5	1	5		
		1	100.0	1	2.9		
		1	2.9	1			
		1	2.9	1			
		1	2.9	1			
3.		1	22	1	22		
		1	100.0	1	12.7		
		1	12.7	1			
		1	12.7	1			
		1	12.7	1			
4.		1	9	1	9		
		1	100.0	1	5.2		
		1	5.2	1			
		1	5.2	1			
		1	5.2	1			
5.		1	12	1	12		
		1	100.0	1	6.9		
		1	6.9	1			
		1	6.9	1			
		1	6.9	1			
COLUMN				TOTAL			
TOTAL				173			
				100.0			
				100.0			

NUMBER OF MISSING OBSERVATIONS = 6

FILE TED (CREATION DATE = 01/09/78) COLL PFD

NV5
 NV6
 CROSS TABULATION OF WATER CONDITIONS
 BY V_{N6}
 PAGE 1 OF 1

COUNT		ICALM	CHOPPY	ROUGH OR WHITE	ROW TOTAL
ROW	COL	ICALM	CHOPPY	ROUGH OR WHITE	TOTAL
1.	1.	37	70	18	125
		29.6	56.0	14.4	72.3
		67.3	74.5	75.0	
		21.4	40.5	10.4	
2.	1.	3	2	0	5
		60.0	40.0	0	2.9
		5.5	2.1	0	
		1.7	1.2	0	
3.	1.	9	9	4	22
		40.9	40.9	19.2	12.7
		16.4	9.6	16.7	
		5.2	5.2	2.3	
4.	1.	4	4	1	9
		44.4	44.4	11.1	5.2
		7.3	4.3	4.2	
		2.3	2.3	.6	
5.	1.	2	9	1	12
		16.7	75.0	8.3	6.9
		3.6	9.6	4.2	
		1.2	5.2	.6	
COLUMN TOTAL		55	94	24	173
		31.8	54.3	13.9	100.0

RAW CHI SQUARE =	6.74815 WITH	8 DEGREES OF FREEDOM.	SIGNIFICANCE =
			.5640

CKAMER#5 V = .13965

CONTINGENCY COEFFICIENT = .19376

NUMBER OF MISSING OBSERVATIONS =

6

AD-A058 739

WYLE LABS HUNTSVILLE ALA

F/G 6/7

PERSONAL FLOTATION DEVICES RESEARCH. VOLUME 3. APPENDICES.(U)

JAN 78 T DOLL, M PFAUTH, J GLEASON, S COHEN

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USCG-D-41-78-VOL-3

NL

2 OF 4
AD
A058739





01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** C H O S T A B U L A T I O N O F A I R T E M P E R A T U R E *****
***** BY V67 ***** PAGE 1 OF 1

		V67										ROW TOTAL
		COUNT	1-0	0-1	1-0	0-1	1-0	0-1	1-0	0-1	1-0	
ROW		PCI	1-0	0-1	1-0	0-1	1-0	0-1	1-0	0-1	1-0	TOTAL
COL		PCI	1-0	0-1	1-0	0-1	1-0	0-1	1-0	0-1	1-0	
TOT		PCI	1-0	0-1	1-0	0-1	1-0	0-1	1-0	0-1	1-0	TOTAL
1.		1	3	1	4	1	50	1	59	1	9	125
			2.4	1	3.2	1	40.0	1	47.2	1	7.2	72.3
			60.0	1	100.0	1	66.7	1	73.7	1	100.0	
			1.7	1	2.3	1	28.9	1	34.1	1	5.2	
2.		1	0	1	0	1	4	1	1	1	0	5
			0	1	0	1	80.0	1	20.0	1	0	2.9
			0	1	0	1	5.3	1	1.2	1	0	
			0	1	0	1	2.3	1	.6	1	0	
3.		1	1	1	0	1	11	1	10	1	0	22
			4.5	1	0	1	50.0	1	45.5	1	0	12.7
			20.0	1	0	1	14.7	1	12.5	1	0	
			.6	1	0	1	6.4	1	5.8	1	0	
4.		1	0	1	0	1	4	1	5	1	0	9
			0	1	0	1	44.4	1	55.6	1	0	5.2
			0	1	0	1	5.3	1	6.3	1	0	
			0	1	0	1	2.3	1	2.9	1	0	
5.		1	1	1	0	1	6	1	5	1	0	12
			8.3	1	0	1	50.0	1	41.7	1	0	6.9
			20.0	1	0	1	8.0	1	6.3	1	0	
			.6	1	0	1	3.5	1	2.9	1	0	
COLUMN		TOTAL	5	4	7	5	43.4	46.2	80	5.2	173	100.0

RAW CHI SQUARE = 10.15683 WITH 16 DEGREES OF FREEDOM. SIGNIFICANCE = .H583
CHAMBERS V = .12115
CONTINGENCY COEFFICIENT = .23549
NUMBER OF MISSING OBSERVATIONS = 6

101

101

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** C R O S S T A B U L A T I O N O F W E A T H E R *****
 NVS BY V68 ***** PAGE 1 OF 1

V68					COUNT		ROW	
					ROW PCT	ISUNNY	CLOUDY	TOTAL
					COL PCT			
					TOT PCT	1.01	2.01	
NV5	1.	1	92	32	1			124
		1	74.2	25.8	1			72.5
		1	69.7	82.1	1			
		1	53.8	18.7	1			
		-	-	-	-	-	-	-
	2.	1	4	1	1			5
		1	80.0	20.0	1			2.9
		1	3.0	2.6	1			
		1	2.3	.6	1			
		-	-	-	-	-	-	-
	3.	1	19	3	1			22
		1	86.4	13.6	1			12.9
		1	14.4	7.7	1			
		1	11.1	1.8	1			
		-	-	-	-	-	-	-
	4.	1	7	1	1			8
		1	87.5	12.5	1			4.7
		1	5.3	2.6	1			
		1	4.1	.6	1			
		-	-	-	-	-	-	-
	5.	1	10	2	1			12
		1	83.3	16.7	1			7.0
		1	7.6	5.1	1			
		1	5.8	1.2	1			
		-	-	-	-	-	-	-
COLUMN					132	39		171
TOTAL					77.2	22.8		100.0

RAW CHI SQUARE = 2.44670 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .6542

CRAMER'S V = .11962

CONTINGENCY COEFFICIENT = .11877

NUMBER OF MISSING OBSERVATIONS = 8

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** C R O S S T A B U L A T I O N O F *****
NVS ***** BY V69 ***** WIND *****
***** PAGE 1 OF 1 *****

COUNT		V69		MODERATE		STRONG		ROW	
ROW	PCT	IC	ALM	1.01	2.01	3.01	TOTAL	ROW	TOTAL
COL	PCT	1	2	3	4	5			
TOT	PCT	1	2	3	4	5			
1.	1	33	1	73	1	4	110		
		30.0		66.4		3.6	73.3		
		71.7		76.0		50.0			
		22.0		48.7		2.7			
2.	1	4	1	0	1	1	5		
		80.0		0		20.0	3.3		
		8.7		0		12.5			
		2.7		0		.7			
3.	1	7	1	12	1	1	20		
		35.0		60.0		5.0	13.3		
		15.2		12.5		12.5			
		4.7		8.0		.7			
4.	1	1	1	4	0	0	5		
		20.0		80.0		0	3.3		
		2.2		4.2		0			
		.7		2.7		0			
5.	1	1	1	7	2	1	10		
		10.0		70.0		20.0	6.7		
		2.2		7.3		25.0			
		.7		4.7		1.3			
COLUMN		46		96		8	150		
TOTAL		30.7		64.0		5.3	100.0		

RAW CHI SQUARE = 16.20183 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .0396
CRAMER'S V = .23239
CONTINGENCY COEFFICIENT = .31222
NUMBER OF MISSING OBSERVATIONS = 29

103
104X
103
104X

APPENDIX III-B

Wearability/Accessibility Study
Crosstabulations

Crosstabulation with NV 15

01/09/78

RELIABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** CROSS TABULATION OF *****
 NV15 ***** BY NV9 ***** ALTITUDE ON ACCESS *****
 ***** PAGE 1 OF 1 *****

		COUNT				ROW	
		NV9				TOTAL	
		COL PCT	COL PCT	TOT PCT	ROW PCT		
		1.1	2.1	3.1	4.1		
NV15	0	4	7	31	42		
		9.5	16.7	73.8	23.5		
		33.3	18.9	23.8			
		2.2	3.9	17.3			
ZERO	1.	0	8	11	19		
		0	42.1	57.9	10.6		
		0	21.6	8.5			
		0	4.5	6.1			
UP 10 10 PCT	2.	1	7	14	22		
		4.5	31.8	63.6	12.3		
		8.3	18.9	10.8			
		.6	3.9	7.8			
10-20 PCT	3.	1	3	14	18		
		5.6	16.7	77.8	10.1		
		8.3	8.1	10.8			
		.6	1.7	7.8			
20-30 PCT	4.	1	3	10	14		
		7.1	21.4	71.4	7.8		
		8.3	8.1	7.7			
		.6	1.7	5.6			
30-40 PCT	5.	1	3	16	20		
		5.0	15.0	80.0	11.2		
		8.3	8.1	12.3			
		.6	1.7	8.9			
40-50 PCT	6.	2	1	6	9		
		22.2	11.1	66.7	5.0		
		16.7	2.7	4.6			
		1.1	.6	3.4			
50-60 PCT	7.	2	5	28	35		
		5.7	14.3	80.0	19.6		
		16.7	13.5	21.5			
		1.1	2.8	15.6			
60-70 PCT							
COLUMN		12	37	130	179		
TOTAL		6.7	20.7	72.6	100.0		

RAW CHI SQUARE = 14.09426 WITH 14 DEGREES OF FREEDOM. SIGNIFICANCE = .4427
 Cramer's V = .19842
 CONTINGENCY COEFFICIENT = .27017

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01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** CHOS F A B U L A T I O N O F *****
 NV15 ***** BY NV10 ***** ATT:EAR ROUGH CD *****
 ***** PAGE 1 OF 1 *****

		COUNT		NV10		HOM	
		ROW PCT	COL PCT	TOT PCT	TOT PCT	TOT PCT	TOT PCT
NV15	ZERO	0	7	35	2.1	3.1	42
		16.7	83.3	20.7	10.6	23.5	
UP TO 10 PCT	1.	0	0	100.0	10.6	19	10.6
		0	0	11.2	10.6	10.6	
10-20 PCT	2.	0	0	100.0	12.3	22	12.3
		0	0	13.0	12.3	10.1	
20-30 PCT	3.	1	17	94.4	9.5	14	7.8
		5.6	10.0	10.1	7.3	20	11.2
30-40 PCT	4.	1	13	92.9	7.3	9	5.0
		7.1	10.0	7.7	5.0	35	19.6
40-50 PCT	5.	1	19	95.0	11.2	179	100.0
		5.0	10.0	11.2	10.6	100.0	
50-60 PCT	6.	0	9	100.0	5.3	100.0	
		0	0	5.3	5.0	100.0	
60-70 PCT	7.	0	35	100.0	19.6	100.0	
		0	0	20.7	19.6	100.0	
COLUMN TOTAL		10	169	94.4	100.0	100.0	

PAW CHI SQUARE = 14.88279 WITH 7 DEGREES OF FREEDOM. SIGNIFICANCE = .0375
 CRAMER'S V = .2835
 CONTINGENCY COEFFICIENT = .27706

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01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFU

***** CROSS TABULATION OF *****
 NV15 ***** ATTITU ON EFF-MEL *****
 ***** BY NV11 ***** PAGE 1 OF 1

		COUNT				ROW				COL				TOT				ROW			
		NV15				NV11				TOTAL				TOTAL				TOTAL			
		0				1				2				3							
		16				23				2				41							
		39.0				56.1				4.9				23.7							
		38.1				19.0				20.0											
		9.2				13.3				1.2											
		6				12				1				19							
		31.6				63.2				5.3				11.0							
		14.3				9.9				10.0											
		3.5				6.9				.6											
		5				13				0				18							
		27.8				72.2				0				10.4							
		11.9				10.7				0											
		2.9				7.5				0											
		2				16				0				18							
		11.1				88.9				0				10.4							
		4.8				13.2				0											
		1.2				9.2				0											
		2				10				1				13							
		15.4				76.9				7.7				7.5							
		4.8				8.3				10.0											
		1.2				5.8				.6											
		2				17				1				20							
		10.0				85.0				5.0				11.6							
		4.8				14.0				10.0											
		1.2				9.8				.6											
		5				3				1				9							
		55.6				33.3				11.1				5.2							
		11.9				2.5				10.0											
		2.9				1.7				.6											
		4				27				4				35							
		11.4				77.1				11.4				20.2							
		9.5				22.3				40.0											
		2.3				15.6				2.3											
		42				121				10				173							
		24.3				69.9				5.8				100.0							

RAW CHI SQUARE = 23.10938 WITH 14 DEGREES OF FREEDOM. SIGNIFICANCE = .0585
 CRAMER'S V = .25444
 CONTINGENCY COEFFICIENT = .34328

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01/09/78

RELIABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) CELL F40

***** C R O S S T A B U L A T I O N O F *****
 ***** BY NV12 ***** NEED FOR PFD *****
 ***** PAGE 1 OF 1 *****

QW12									
		COUNT		ROW		COL		TOTAL	
		PCT		PCT		PCT		PCT	
		1.1		2.1		3.1		4.1	
		5.1		6.1		7.1		8.1	
		9.1		10.1		11.1		12.1	
		13.1		14.1		15.1		16.1	
		17.1		18.1		19.1		20.1	
		21.1		22.1		23.1		24.1	
		25.1		26.1		27.1		28.1	
		29.1		30.1		31.1		32.1	
		33.1		34.1		35.1		36.1	
		37.1		38.1		39.1		40.1	
		41.1		42.1		43.1		44.1	
		45.1		46.1		47.1		48.1	
		49.1		50.1		51.1		52.1	
		53.1		54.1		55.1		56.1	
		57.1		58.1		59.1		60.1	
		61.1		62.1		63.1		64.1	
		65.1		66.1		67.1		68.1	
		69.1		70.1		71.1		72.1	
		73.1		74.1		75.1		76.1	
		77.1		78.1		79.1		80.1	
		81.1		82.1		83.1		84.1	
		85.1		86.1		87.1		88.1	
		89.1		90.1		91.1		92.1	
		93.1		94.1		95.1		96.1	
		97.1		98.1		99.1		100.1	
		101.1		102.1		103.1		104.1	
		105.1		106.1		107.1		108.1	
		109.1		110.1		111.1		112.1	
		113.1		114.1		115.1		116.1	
		117.1		118.1		119.1		120.1	
		121.1		122.1		123.1		124.1	
		125.1		126.1		127.1		128.1	
		129.1		130.1		131.1		132.1	
		133.1		134.1		135.1		136.1	
		137.1		138.1		139.1		140.1	
		141.1		142.1		143.1		144.1	
		145.1		146.1		147.1		148.1	
		149.1		150.1		151.1		152.1	
		153.1		154.1		155.1		156.1	
		157.1		158.1		159.1		160.1	
		161.1		162.1		163.1		164.1	
		165.1		166.1		167.1		168.1	
		169.1		170.1		171.1		172.1	
		173.1		174.1		175.1		176.1	
		177.1		178.1		179.1		180.1	
		181.1		182.1		183.1		184.1	
		185.1		186.1		187.1		188.1	
		189.1		190.1		191.1		192.1	
		193.1		194.1		195.1		196.1	
		197.1		198.1		199.1		200.1	
		201.1		202.1		203.1		204.1	
		205.1		206.1		207.1		208.1	
		209.1		210.1		211.1		212.1	
		213.1		214.1		215.1		216.1	
		217.1		218.1		219.1		220.1	
		221.1		222.1		223.1		224.1	
		225.1		226.1		227.1		228.1	
		229.1		230.1		231.1		232.1	
		233.1		234.1		235.1		236.1	
		237.1		238.1		239.1		240.1	
		241.1		242.1		243.1		244.1	
		245.1		246.1		247.1		248.1	
		249.1		250.1		251.1		252.1	
		253.1		254.1		255.1		256.1	
		257.1		258.1		259.1		260.1	
		261.1		262.1		263.1		264.1	
		265.1		266.1		267.1		268.1	
		269.1		270.1		271.1		272.1	
		273.1		274.1		275.1		276.1	
		277.1		278.1		279.1		280.1	
		281.1		282.1		283.1		284.1	
		285.1		286.1		287.1		288.1	
		289.1		290.1		291.1		292.1	
		293.1		294.1		295.1		296.1	
		297.1		298.1		299.1		300.1	
		301.1		302.1		303.1		304.1	
		305.1		306.1		307.1		308.1	
		309.1		310.1		311.1		312.1	
		313.1		314.1		315.1		316.1	
		317.1		318.1		319.1		320.1	
		321.1		322.1		323.1		324.1	
		325.1		326.1		327.1		328.1	
		329.1		330.1		331.1		332.1	
		333.1		334.1		335.1		336.1	
		337.1		338.1		339.1		340.1	
		341.1		342.1		343.1		344.1	
		345.1		346.1		347.1		348.1	
		349.1		350.1		351.1		352.1	
		353.1		354.1		355.1		356.1	
		357.1		358.1		359.1		360.1	
		361.1		362.1		363.1		364.1	
		365.1		366.1		367.1		368.1	
		369.1		370.1		371.1		372.1	
		373.1		374.1		375.1		376.1	
		377.1		378.1		379.1		380.1	
		381.1		382.1		383.1		384.1	
		385.1		386.1		387.1		388.1	
		389.1		390.1		391.1		392.1	
		393.1		394.1		395.1		396.1	
		397.1		398.1		399.1		400.1	
		401.1		402.1		403.1		404.1	
		405.1		406.1		407.1		408.1	
		409.1		410.1		411.1		412.1	
		413.1		414.1		415.1		416.1	
		417.1		418.1		419.1		420.1	
		421.1		422.1		423.1		424.1	
		425.1		426.1		427.1		428.1	
		429.1		430.1		431.1		432.1	
		433.1		434.1		435.1		436.1	
		437.1		438.1		439.1		440.1	
		441.1		442.1		443.1		444.1	
		445.1		446.1		447.1		448.1	
		449.1		450.1		451.1		452.1	
		453.1		454.1		455.1		456.1	
		457.1		458.1		459.1		460.1	
		461.1		462.1		463.1		464.1	
		465.1		466.1		467.1		468.1	
		469.1		470.1		471.1		472.1	
		473.1		474.1		475.1		476.1	
		477.1		478.1		479.1		480.1	
		481.1		482.1		483.1		484.1	
		485.1		486.1		487.1		488.1	
		489.1		490.1		491.1		492.1	
		493.1		494.1		495.1		496.1	
		497.1		498.1		499.1		500.1	
		501.1		502.1		503.1		504.1	
		505.1		506.1		507.1		508.1	
		509.1		510.1		511.1		512.1	
		513.1		514.1		515.1		516.1	
		517.1		518.1		519.1		520.1	
		521.1		522.1		523.1		524.1	
		525.1		526.1		527.1		528.1	
		529.1		530.1		531.1		532.1	
		533.1		534.1		535.1		536.1	
		537.1		538.1		539.1		540.1	
		541.1		542.1		543.1		544.1	
		545.1		546.1		547.1		548.1	
		549.1		550.1		551.1		552.1	
		553.1		554.1		555.1		556.1	
		557.1		558.1		559.1		560.1	
		561.1		562.1		563.1		564.1	
		565.1		566.1		567.1		568.1	
		569.1		570.1		571.1		572.1	
		573.1		574.1		575.1		576.1	
		577.1		578.1		579.1		580.1	
		581.1		582.1		583.1		584.1	
		585.1		586.1		587.1		588.1	
		589.1		590.1		591.1		592.1	
		593.1		594.1		595.1		596.1	
		597.1		598.1		599.1		600.1	
		601.1		602.1		603.1		604.1	
		605.1		606.1		607.1		608.1	
		609.1		610.1		611.1		612.1	
		613.1		614.1		615.1		616.1	
		617.1		618.1		619.1		620.1	
		621.1		622.1		623.1		624.1	
		625.1		626.1		627.1		628.1	
		629.1		630.1		631.1		632.1	
		633.1		634.1		635.1		636.1	
		637.1		638.1		639.1		640.1	
		641.1		642.1		643.1		644.1	
		645.1		646.1		647.1		648.1	
		649.1		650.1		651.1		652.1	
		653.1		654.1		655.1		656.1	
		657.1		658.1		659.1		660.1	
		661.1		662.1		663.1		664.1	
		665.1		666.1		667.1		668.1	
		669.1		670.1		671.1		672.1	
		673.1		674.1		675.1		676.1	
		677.1		678.1		679.1		680.1	
		681.1		682.1		683.1		684.1	
		685.1		686.1		687.1		688.1	
		689.1		690.1		691.1		692.1	
		693.1		694.1		695.1		696.1	
		697.1		698.1		699.1		700.1	
		701.1		702.1		703.1		704.1	
		705.1		706.1		707.1		708.1	
		709.1		710.1		711.1		712.1	
		713.1		714.1		715.1		716.1	
		717.1		718.1		719.1		720.1	
		721.1		722.1		723.1		724.1	
		725.1		726.1		727.1		728.1	
		729.1		730.1		731.1		732.1	
		733.1		734.1		735.1		736.1	
		737.1		738.1		739.1		740.1	
		741.1		742.1		743.1		744.1	
		745.1		746.1		747.1		748.1	
		749.1		750.1		751.1		752.1	
		753.1		754.1		755.1		756.1	
		757.1		758.1		759.1		760.1	
		761.1		762.1		763.1		764.1	
		765.1		766.1		767.1		768.1	
		769.1		770.1		771.1		772.1	
		773.1		774.1		775.1		776.1	
		777.1		778.1		779.1		780.1	
		781.1		782.1		783.1		784.1	
		785.1							

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) LUL PFD

***** CROSS TABULATION OF *****
 NV15 ***** BY NV13 ***** PAGE 1 OF 1

		NV13				ROW TOTAL
		COUNT	1.1	2.1	3.1	
NV15	ROW PCT	COL PCT				TOTAL
	TOT PCT					
ZERO	0	5	28	7	40	
	1	12.5	70.0	17.5	24.0	
	2	26.3	22.0	33.3		
UP TO 10 PCT	1	3.0	16.8	4.2	19	
	2	10.5	68.4	21.1	11.4	
	3	10.5	10.2	19.0		
10-20 PCT	1	1.2	7.8	2.4	21	
	2	14.3	81.0	4.8	12.6	
	3	15.8	13.4	4.8		
20-30 PCT	1	1.8	10.2	.6	16	
	2	3	13	0	9.6	
	3	18.8	81.3	0		
30-40 PCT	1	15.6	10.2	0	14	
	2	1.8	7.8	0	8.4	
	3	0	14	0		
40-50 PCT	1	0	100.0	0	19	
	2	21.1	57.9	21.1	11.4	
	3	21.1	8.7	19.0		
50-60 PCT	1	2.4	6.6	2.4	7	
	2	1	5	1	4.2	
	3	14.3	71.4	14.3		
60-70 PCT	1	5.3	3.9	4.8	31	
	2	.6	3.0	.6	18.6	
	3	1	26	4		
TOTAL	1	3.2	83.9	12.9	167	
	2	5.3	20.5	19.0	100.0	
	3	.6	15.6	2.4		
COLUMNS		19	127	21		
TOTAL		11.4	76.0	12.6		

RAW CHI SQUARE = 16.35969 WITH 14 DEGREES OF FREEDOM. SIGNIFICANCE = .2919
 GRAMER'S V = .22132
 CONTINGENCY COEFFICIENT = .29870

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL #10

***** C R O S S T A B U L A T I O N O F P F D W E A R *****
 NV15 BY NV14 ***** PAGE 1 OF 1

		COUNT				ROW				COL				TOTAL			
		NV14				PCI				PCI				TOTAL			
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2
		41.5	39.0	19.5	23.7	25.0	22.2	9.2	4.6	1.1	2.1	3.1	1.1	2.1	3.1	1.1	2.1
		9.8	9.2	4.6	1.1	2.1	3.1	1.1	2.1	3.1	1.1	2.1	3.1	1.1	2.1	3.1	1.1
		9	6	4	1	2	3	1	2	3	1	2	3	1	2	3	1
		47.4	31.6	21.1	11.0	12.3	9.4	11.1	2.3	5.2	3.5	2.3	1.1	2.1	3.1	1.1	2.1
		5.2	3.5	2.3	1.1	2.1	3.1	1.1	2.1	3.1	1.1	2.1	3.1	1.1	2.1	3.1	1.1
		11	9	1	2	3	1	2	3	1	2	3	1	2	3	1	2
		52.4	42.9	4.8	12.1	15.1	14.1	2.8	.6	6.4	5.2	.6	1.1	2.1	3.1	1.1	2.1
		6.4	5.2	.6	1.1	2.1	3.1	1.1	2.1	3.1	1.1	2.1	3.1	1.1	2.1	3.1	1.1
		5	8	5	18	27.8	44.4	27.8	5	2.9	4.6	2.9	1.1	2.1	3.1	1.1	2.1
		6.8	12.5	13.9	10.4	2.9	4.6	2.9	1.1	2.1	3.1	1.1	2.1	3.1	1.1	2.1	3.1
		8	6	0	14	57.1	42.9	0	8.1	11.0	9.4	0	4.6	3.5	0	1.1	2.1
		4.6	3.5	0	1.1	2.1	3.1	1.1	2.1	3.1	1.1	2.1	3.1	1.1	2.1	3.1	1.1
		9	8	3	20	45.0	40.0	15.0	11.6	12.3	12.5	8.3	5.2	4.6	1.7	1.1	2.1
		2	1	4	7	28.6	14.3	57.1	4.0	1.2	.6	2.3	1.1	2.1	3.1	1.1	2.1
		12	10	11	33	36.4	30.3	33.3	19.1	16.4	15.6	30.6	6.9	5.8	6.4	1.1	2.1
		6.9	5.8	6.4	1.1	2.1	3.1	1.1	2.1	3.1	1.1	2.1	3.1	1.1	2.1	3.1	1.1
		73	64	36	173	42.2	37.0	20.8	100.0	42.2	37.0	20.8	100.0	42.2	37.0	20.8	100.0

RAW CHI SQUARE = 18.31508 WITH 14 DEGREES OF FREEDOM. SIGNIFICANCE = .1928
 CRAMER'S V = .23007
 CONTINGENCY COEFFICIENT = .30941

(112)

III-B-94

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WEARABILITY DATA ANALYSIS

01/05/78

FILE TED (CREATION DATE = 01/09/78) COLL PID

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*****
NV15 ***** C M O S T A B U L A T I O N   O F   A G E
      BY V4 *****
***** PAGE 1 OF 1 *****

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Page 1 of 1

	COUNT	VJ								ROW TOTAL
	ROW PCT									
	COL PCT									
	TOT PCT									
NV15	0	1.01	2.01	3.01	4.01	5.01				
LEH0	5	8	13		5	7				38
	13.2	21.1	34.2		13.2	16.4				22.1
	17.2	17.4	33.3		14.3	30.4				
	2.9		7.6		2.9	4.1				
UP TO 10 PCT	1.									19
	4	6	1		6	2				
	21.1	31.6	5.3		31.6	10.5				11.0
	13.8	13.0	2.6		17.1	8.7				
	2.3	3.5	.6		3.5	1.2				
10-20 PCT	2.									22
	3	6	4		4	5				
	13.6	27.3	16.2		18.2	22.7				12.8
	10.3	13.0	10.3		11.4	21.7				
	1.7	3.5	2.3		2.3	2.9				
20-30 PCT	3.									18
	4	6	1		4	3				
	22.2	33.3	5.6		22.2	16.7				10.5
	13.8	13.0	2.6		11.4	13.0				
	2.3	3.5	.6		2.3	1.7				
30-40 PCT	4.									12
	0	2	3		4	3				
	0	16.7	25.0		33.3	25.0				7.0
	0	4.3	7.7		11.4	13.0				
	0	1.2	1.7		2.3	1.7				
40-50 PCT	5.									19
	7	5	4		2	1				
	36.8	26.3	21.1		10.5	5.3				11.0
	24.1	10.9	10.3		5.7	4.3				
	4.1	2.9	2.3		1.2	.6				
50-60 PCT	6.									9
	2	2	3		2	0				
	22.2	22.2	33.3		22.2	0				5.2
	6.9	4.3	7.7		5.7	0				
	1.2	1.2	1.7		1.2	0				
60-70 PCT	7.									35
	4	11	10		8	2				
	11.4	31.4	28.6		22.9	5.7				20.3
	13.8	23.9	25.6		22.9	8.7				
	2.3	5.4	5.8		4.7	1.2				
COLUMN TOTAL	29	46	39		35	23				172
	16.9	26.7	22.7		20.3	13.4				100.0

$\text{HAW CHI SQUARE} = 29.95846$ WITH 28 DEGREES OF FREEDOM. SIGNIFICANCE = .3700
 $\text{CRAMER'S V} = .2032$
 $\text{CONTINGENCY COEFFICIENT} = .3869$

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• 38465

ATTACHMENT DATA ANALYSIS

11/06/77

FILE TPD (CREATION DATE = 11/06/77) COLL PTD

 NV15

 SEX

 PAGE 1 OF 1

	COUNT	MALE	FEMALE	TOTAL
UP TO 10 PCT	1.	16	3	19
10-20 PCT	2.	12	10	22
20-30 PCT	3.	9	9	18
30-40 PCT	4.	7	6	13
40-50 PCT	5.	16	4	20
50-60 PCT	6.	8	1	9
60-70 PCT	7.	18	3	21
COLUMN TOTAL		110	54	164
		67.1	32.9	100.0

RAW CHI SQUARE = 16.12786 WITH 1 DEGREES OF FREEDOM, SIGNIFICANCE = .0240
 CRAMER'S V = .31359
 CONTINGENCY COEFFICIENT = .29923

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11/04/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) (COLL PFO

***** C R O S S T A B U L A T I O N O F *****
 NVIS BY NV6 - BOATING SAFETY EDUCATION *****
 ***** PAGE 1 OF 1 *****

	COUNT	avg on	row
	ROW PCT	COL PCT	TOTAL
	COL PCT	01	1.1
	TOT PCT	01	1.1
NVIS	0	11	31
		26.2	73.8
ZERO		20.4	27.9
		6.7	14.8
UP TO 10 PCT	1.	6	13
		31.6	68.4
		11.1	11.7
		3.6	7.9
10-20 PCT	2.	2	20
		9.1	90.9
		3.7	18.0
		1.2	12.1
20-30 PCT	3.	7	11
		38.9	61.1
		13.0	9.9
		4.2	6.7
30-40 PCT	4.	3	11
		21.4	78.6
		5.6	9.9
		1.8	6.7
40-50 PCT	5.	11	9
		55.0	45.0
		20.4	8.1
		6.7	5.5
50-60 PCT	6.	2	7
		22.2	77.8
		3.7	6.3
		1.2	4.2
60-70 PCT	7.	12	9
		57.1	42.9
		22.2	8.1
		1.3	5.5
COLUMN		54	111
TOTAL		32.7	67.3
			100.0

RAW CHI SQUARE = 18.17474 #11H / DEGREES OF FREEDOM. SIGNIFICANCE = .0112
 CRAMER'S V = .33189
 CONTINGENCY COEFFICIENT = .31494

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11/04/77

WEAPABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COL P10

 NV15 ***** CROSS TABULATION OF *****
 ***** BY VII ***** BOAT EXPER *****
 ***** PAGE 1 OF 1 *****

VII						
COUNT	ROW PCT	100-100	100-500	GREATER	ROW	
COL PCT	COL PCT	TOT PCT	TOT PCT	THEN 500	TOTAL	
0	0	0	10	32	42	
	0	0	23.8	76.2	25.5	
	0	0	45.5	54.5		
	0	0	6.1	19.4		
1.	0	0	0	19	19	
	0	0	0	100.0	11.5	
	0	0	0	14.0		
	0	0	0	11.5		
2.	1	1	1	20	22	
	4.5	4.5	4.5	50.9	13.3	
	14.3	4.5	14.7			
	.6	.6	12.1			
3.	3	3	3	12	18	
	16.7	16.7	60.7		10.9	
	42.9	13.6	8.8			
	1.8	1.8	7.3			
4.	0	0	2	12	14	
	0	0	14.3	85.7	8.5	
	0	0	9.1	8.8		
	0	0	1.2	7.3		
5.	2	2	3	15	20	
	10.0	15.0	75.0		12.1	
	28.6	13.6	11.0			
	1.2	1.8	9.1			
6.	0	0	2	7	9	
	0	0	22.2	77.8	5.5	
	0	0	9.1	5.1		
	0	0	1.2	4.2		
7.	1	1	1	19	21	
	4.8	4.8	50.5		12.7	
	14.3	4.5	14.0			
	.6	.6	11.5			
COLUMN	7	22	136		165	
TOTAL	4.2	13.3	82.4		100.0	

RAW CHI SQUARE = 22.83564 WITH 14 DEGREES OF FREEDOM. SIGNIFICANCE = .0030
 CHAMBERS V = .26305
 CONTINGENCY COEFFICIENT = .34867

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WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) TOLL PED

***** C R O S S T A B U L A T I O N O F *****
 NV15 BY V14 HOAI LENGTH ***** PAGE 1 OF 1

		COUNT							V14				ROW													
		ROW PCT	COL PCT	TOT PCT	16-20	20-26	30-36	40-46	50-56	60-66	70-76	80-86	TOTAL													
NV15		0	0	0	1.01	2.01	3.01	4.01						38												
ZERO		15.8	21.1	2.6	1	2.6	60.5	25.3																		
		35.3	16.0	10.0	31.5	15.3																				
		4.0	5.3	7																						
UP TO 10 PCT		1	6	2	9									18												
		5.6	33.3	11.1	50.0									12.0												
		5.9	12.0	20.0	12.3																					
		7	4.0	1.3	6.0																					
10-20 PCT		1	3	3	14									21												
		4.8	14.3	14.3	66.7									14.0												
		5.9	6.0	30.0	19.2																					
		7	2.0	2.0	9.3																					
20-30 PCT		0	8	1	7									16												
		0	50.0	6.3	43.8									10.7												
		0	16.0	10.0	9.6																					
		0	5.3	7	4.7																					
30-40 PCT		0	2	0	11									13												
		0	15.4	0	84.6									8.7												
		0	4.0	0	15.1																					
		0	1.3	0	7.3																					
40-50 PCT		2	9	0	5									16												
		12.5	56.3	0	31.3									10.7												
		11.8	18.0	0	6.8																					
		1.3	6.0	0	3.3																					
50-60 PCT		2	1	2	3									8												
		25.0	12.5	25.0	37.5									5.3												
		11.8	2.0	20.0	4.1																					
		1.3	7	1.3	2.0																					
60-70 PCT		5	13	1	1									20												
		25.0	65.0	5.0	5.0									13.3												
		24.4	26.0	10.0	1.4																					
		3.3	8.7	7	7																					
COLUMN TOTAL		17	50	10	73									150												
		11.3	33.3	6.7	48.7									100.0												

RAW CHI SQUARE = 50.50738 WITH 21 DEGREES OF FREEDOM. SIGNIFICANCE = .0003
 CHAMBERS V = .33502
 CONTINGENCY COEFFICIENT = .50149

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WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PTD

***** CROSSTABULATION OF *****
 NV15 BY V54 FISHING *****
 ***** PAGE 1 OF 1 *****

		COUNT		YES		NO		ROW TOTAL	
		ROW PCT	COL PCT						
		TOT PCT		1.01	2.01				
NV15	ZERO	0		4	38			42	
				9.5	90.5			25.5	
UP TO 10 PCT	1.			7	12			19	
				36.8	63.2			11.5	
10-20 PCT	2.			6	16			22	
				27.3	72.7			13.3	
20-30 PCT	3.			8	10			18	
				44.4	55.6			10.9	
30-40 PCT	4.			3	11			14	
				21.4	78.6			8.5	
40-50 PCT	5.			7	13			20	
				35.0	65.0			12.1	
50-60 PCT	6.			1	8			9	
				11.1	88.9			5.5	
60-70 PCT	7.			11	10			21	
				52.4	47.6			12.7	
COLUMN TOTAL		47	118	26.5	71.5			165	
								100.0	

RA4 CHI SQUARE = 18.30944 WITH 7 DEGREES OF FREEDOM. SIGNIFICANCE = .0107
 GAMERAS V = .3312
 CONTINGENCY COEFFICIENT = .31604

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WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) LGL PTD

***** C R O S S T A B U L A T I O N O F C A N O E I N G O R K A Y A K I N G *****
 NVIS BY V55 ***** PAGE 1 OF 1

		COUNT		ROW	
		ROW PCT	COL PCT	ROW	TOTAL
		TOT PCT	TOT PCT		
NVIS	0	0	0	42	42
		0	0	100.0	25.5
ZERO	1	0	0	28.2	
		0	0	25.5	
UP TO 10 PCT	1	5	14	19	
		26.3	73.7	11.5	
10-20 PCT	2	1	21	22	
		4.5	95.5	13.3	
20-30 PCT	3	0	18	18	
		0	100.0	10.9	
30-40 PCT	4	0	14	14	
		0	100.0	8.5	
40-50 PCT	5	2	18	20	
		10.0	90.0	12.1	
50-60 PCT	6	1	8	9	
		11.1	88.9	5.5	
60-70 PCT	7	7	14	21	
		33.3	66.7	12.7	
COLUMN TOTAL		16	149	165	
		9.7	90.3	100.0	

RAW CHI SQUARE = 28.02637 WITH 1 DEGREES OF FREEDOM. SIGNIFICANCE = .0002
 CRAMER'S V = .41214
 CONTINGENCY COEFFICIENT = .38104

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RELIABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PTD

***** C R O S S T A B U L A T I O N O F S K I N D I V I N G *****
***** BY V56 ***** PAGE 1 OF 1

		COUNT		ROW	
		ROW PCT	COL PCT	TOT PCT	TOTAL
V56				2.01	
NV15	0	42	100.0	42	42
ZERO		25.5	25.5	25.5	25.5
UP TO 10 PCT		19	100.0	19	19
		11.5	11.5	11.5	11.5
10-20 PCT		22	100.0	22	22
		13.3	13.3	13.3	13.3
20-30 PCT		18	100.0	18	18
		10.9	10.9	10.9	10.9
30-40 PCT		14	100.0	14	14
		8.5	8.5	8.5	8.5
40-50 PCT		20	100.0	20	20
		12.1	12.1	12.1	12.1
50-60 PCT		9	100.0	9	9
		5.5	5.5	5.5	5.5
60-70 PCT		21	100.0	21	21
		12.7	12.7	12.7	12.7
COLUMN TOTAL		165	100.0	165	165

NUMBER OF MISSING OBSERVATIONS = 14

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WEARABILITY DATA ANALYSIS

FILE TFD (CREATION DATE = 11/04/77) COLL PFD

***** NVIS ***** C O N S I D E R A T I O N U F S C U B A D I V I N G ***** PAGE 1 OF 1 *****

		COUNT		ROW	
		ROW PCT	COL PCT	TOT PCT	TOTAL
NVIS		0	1	41	42
ZERO		2.4	97.6	25.5	
		50.0	25.2		
		.6	24.8		
UP TO 10 PCT		1.	0	19	19
			0	100.0	11.5
			0	11.7	
			0	11.5	
10-20 PCT		2.	0	22	22
			0	100.0	13.3
			0	13.5	
			0	13.3	
20-30 PCT		3.	1	17	18
			5.6	94.4	10.9
			50.0	10.4	
			.6	10.3	
30-40 PCT		4.	0	14	14
			0	100.0	8.5
			0	8.6	
			0	8.5	
40-50 PCT		5.	0	20	20
			0	100.0	12.1
			0	12.3	
			0	12.1	
50-60 PCT		6.	0	9	9
			0	100.0	5.5
			0	5.5	
			0	5.5	
60-70 PCT		7.	0	21	21
			0	100.0	12.7
			0	12.9	
			0	12.7	
COLUMN TOTAL		2	163	165	
		1.2	98.8	100.0	

RAW CHI SQUARE = 4.60342 WITH 1 DEGREES OF FREEDOM. SIGNIFICANCE = .0082
 CRAMER'S V = .16703
 CONTINGENCY COEFFICIENT = .16475

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WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFD

***** CROSS TABULATION OF *****
 NV15 BY V58 SWIMMING *****
 ***** PAGE 1 OF 1 *****

		COUNT		VSD		ROW TOTAL	
		ROW PCT	TOT PCT	1.00	2.00	ROW	TOTAL
WVLS	0	0	0	0	42	42	
ZERO		0	0	0	100.0	100.0	25.5
		0	0	0	25.6	25.6	
		0	0	0	25.5	25.5	
UP TO 10 PCT	1.	0	0	0	19	19	
		0	0	0	100.0	100.0	11.5
		0	0	0	11.6	11.6	
		0	0	0	11.5	11.5	
10-20 PCT	2.	0	0	0	22	22	
		0	0	0	100.0	100.0	13.3
		0	0	0	13.4	13.4	
		0	0	0	13.3	13.3	
20-30 PCT	3.	5.6	5.6	5.6	17	18	
		100.0	100.0	100.0	94.4	109.9	
		0	0	0	10.4	10.4	
		0	0	0	10.3	10.3	
30-40 PCT	4.	0	0	0	14	14	
		0	0	0	100.0	85.0	
		0	0	0	8.5	8.5	
		0	0	0	8.5	8.5	
40-50 PCT	5.	0	0	0	20	20	
		0	0	0	100.0	12.1	
		0	0	0	12.2	12.2	
		0	0	0	12.1	12.1	
50-60 PCT	6.	0	0	0	5	5	
		0	0	0	100.0	5.5	
		0	0	0	5.5	5.5	
		0	0	0	5.5	5.5	
60-70 PCT	7.	0	0	0	21	21	
		0	0	0	100.0	12.7	
		0	0	0	12.8	12.8	
		0	0	0	12.7	12.7	
COLUMN TOTAL		1	1	1	164	165	
					99.4	109.0	

PIRRAW CHI SQUARE =	8.21866 WITH	1 DEGREES OF FREEDOM, SIGNIFICANCE =	.3139
CHAMBERS V =	.22315		
CONTINGENCY COEFFICIENT =	.21779		

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REPRODUCIBILITY DATA ANALYSIS

FILE	TED	(CREATION DATE = 11/04/77)	COLL PFD
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 NV15 *****
 C R O S S I A B U L I O N O F C A M P I N G
 HY V59 *****
 ***** PAGE 1 OF 1 *****

COUNT		ROW PCT	COL PCT	TOT PCT	POW TOTAL
0	42	100.0	25.5	25.5	42
1	19	100.0	11.5	11.5	19
2	22	100.0	13.3	13.3	22
3	18	100.0	10.9	10.9	18
4	14	100.0	8.5	8.5	14
5	20	100.0	12.1	12.1	20
6	9	100.0	5.5	5.5	9
7	21	100.0	12.7	12.7	21
COLUMN TOTAL	165	100.0			165

NUMBER OF MISSING OBSERVATIONS = 14

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WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFD

***** CROSS TABULATION OF *****
 NVIS BY V60 SAILING ***** PAGE 1 OF 1

		V60		COUNT		ROW PCT		COL PCT		TOTAL					
				TOT PCT											
NVIS	ZERO	0	7	1.01	2.01	35	42								
		16.7	83.3	25.5											
	UP TO 10 PCT	36.9	23.8	21.2											
		4.2	18	11.5											
	10-20 PCT	5.3	94.7	11.5											
		5.6	12.2	10.9											
	20-30 PCT	1.8	11.5	13.3											
		16.7	83.3	10.9											
	30-40 PCT	1.8	9.1	14											
		14.3	85.7	8.5											
	40-50 PCT	1.2	7.3	20											
		5.0	95.0	12.1											
	50-60 PCT	1.1	8.9	9											
		5.6	5.4	5.5											
	60-70 PCT	0	21	21											
		0	14.3	12.7											
COLUMN TOTAL		18	147	165											
		10.9	89.1	100.0											

RAW CHI SQUARE = 6.29260 WITH / DEGREES OF FREEDOM. SIGNIFICANCE = .5060
 CRAMER'S V = .19529
 CONTINGENCY COEFFICIENT = .19167

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WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFD

 NV15 ***** CROSS TABULATION OF *****
 ***** BY VCL WATER SKIING *****
 ***** PAGE 1 OF 1 *****

		COUNT				ROW	
		COL PCT	ROW PCT	TOT PCT	TOT PCT	TOTAL	
NV15	ZERO	0	1	1.01	2.01	42	
		2.4	97.6	25.6	25.6		
UP TO 10 PCT	1.	2	17	1.01	17.0	19	
		10.5	89.5	10.6	11.5		
10-20 PCT	2.	0	22	0	22.0	22	
		0	100.0	13.7	13.3	13.3	
20-30 PCT	3.	1	17	1	17.0	18	
		5.6	94.4	10.6	10.9		
30-40 PCT	4.	0	14	0	14.0	14	
		0	100.0	8.5	8.5		
40-50 PCT	5.	1	19	1	19.0	20	
		5.0	95.0	11.9	12.1		
50-60 PCT	6.	0	9	0	9.0	9	
		0	100.0	5.6	5.5	5.5	
60-70 PCT	7.	0	21	0	21.0	21	
		0	100.0	13.1	12.7	12.7	
COLUMN TOTAL		5	160	3.0	97.0	165	
						100.0	

RAW CHI SQUARE = 6.41068 WITH 7 DEGREES OF FREEDOM. SIGNIFICANCE = .4927
 CRAMER'S V = .19711
 CONTINGENCY COEFFICIENT = .19339

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WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) LOLL PFD

***** CHOS T A B U L A T I O N O F P L E A S U R E C R U I S I N G *****
 NV15 HY V62 ***** PAGE 1 OF 1

		COUNT		v62		ROW	
		ROW PCT	COL PCT	TOT PCT	TOT PCT	TOT PCT	TOT PCT
NV15	ZERO	0	27	15	42	25.5	
		64.3	35.7	17.0	16.4	9.1	
UP TO 10 PCT	1.	3	16	19	11.5		
		15.8	84.2	3.9	18.2	1.8	9.7
10-20 PCT	2.	14	8	22	13.3		
		63.6	36.4	18.2	9.1	8.5	4.8
20-30 PCT	3.	7	11	18	10.9		
		38.9	61.1	9.1	12.5	4.2	6.7
30-40 PCT	4.	6	8	14	8.5		
		42.9	57.1	7.8	9.1	3.6	4.8
40-50 PCT	5.	6	14	20	12.1		
		30.0	70.0	7.8	15.9	3.6	8.5
50-60 PCT	6.	4	5	9	5.5		
		44.4	55.6	5.2	5.7	2.4	3.0
60-70 PCT	7.	10	11	21	12.7		
		47.6	52.4	13.0	12.5	6.1	6.7
COLUMN TOTAL		77	88	165	100.0		

RAW CHI SQUARE = 17.3896 WITH 7 DEGREES OF FREEDOM. SIGNIFICANCE = .0127
 CRAMER'S V = .32441
 CONTINGENCY COEFFICIENT = .31236

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WEARABILITY DATA ANALYSIS

FILE TEP (CREATION DATE = 11/04/77) COLL STD

***** C R O S S T A B U L A T I O N O F R A C I N G
 NV15 BY V03 ***** PAGE 1 OF 1

		COUNT		POW	
		ROW PCT	COL PCT	TOTAL	
		101 PCT	2.01		
NV15	ZERO	0	42	42	
			100.0	25.5	
			25.5		
			25.5		
UP TO 10 PCT	1.	19	19	19	
		100.0	11.5	11.5	
			11.5		
			11.5		
10-20 PCT	2.	22	22	22	
		100.0	13.3	13.3	
			13.3		
			13.3		
20-30 PCT	3.	18	18	18	
		100.0	10.9	10.9	
			10.9		
			10.9		
30-40 PCT	4.	14	14	14	
		100.0	8.5	8.5	
			8.5		
			8.5		
40-50 PCT	5.	20	20	20	
		100.0	12.1	12.1	
			12.1		
			12.1		
50-60 PCT	6.	9	9	9	
		100.0	5.5	5.5	
			5.5		
			5.5		
60-70 PCT	7.	21	21	21	
		100.0	12.7	12.7	
			12.7		
			12.7		
COLUMN		165	165	165	
TOTAL		100.0	100.0	100.0	

NUMBER OF MISSING OBSERVATIONS = 14

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WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) EOLL PFD

***** C R O S S T A B U L A T I O N O F *****
 NV15 ***** BY V64 ***** HUNTING *****
 ***** PAGE 1 OF 1 *****

V64			
	COUNT	ROW PCT	COL PCT
	ROW PCT	COL PCT	TOT PCT
	TOT PCT		
NV15	0	42	2.01
	100.0	42	
ZERO	42	25.5	
	25.5		
UP TO 10 PCT	19	11.5	
	100.0	11.5	
	11.5		
10-20 PCT	22	13.3	
	100.0	13.3	
	13.3		
20-30 PCT	18	10.9	
	100.0	10.9	
	10.9		
30-40 PCT	14	8.5	
	100.0	8.5	
	8.5		
40-50 PCT	20	12.1	
	100.0	12.1	
	12.1		
50-60 PCT	9	5.5	
	100.0	5.5	
	5.5		
60-70 PCT	21	12.7	
	100.0	12.7	
	12.7		
COLUMN TOTAL	165	100.0	100.0

NUMBER OF MISSING OBSERVATIONS = 14

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WEARABILITY DATA ANALYSIS

WEAPABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) TOLL PFED

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 NVIS ***** CROSS TABULATION OF ***** WATER CONDITIONS *****
 ***** BY V66 ***** PAGE 1 OF 1 *****

COUNT		ROW PCT	TOTAL	CHOPPY	ROUGH OR WHITE	ROW TOTAL
ROW PCT	TOTAL					
0	17	40.5	52.4	7.1	3.01	42
1	31.5	25.0	13.0	1.8		25.5
2	10.3	13.3				
1.	8	9	10.5	8.7	1.2	19
UP TO 10 PCT	42.1	47.4	10.2	10.5		11.5
1	14.8	10.2	8.7			
2.	6	13	13.6	3		22
10-20 PCT	27.3	59.1	13.6	13.3		13.3
1	11.1	14.8	13.0			
3.	3.6	7.9	1.8			18
20-30 PCT	22.2	72.2	5.6	10.9		10.9
1	7.4	14.8	4.3			
4.	3	6	5			14
30-40 PCT	21.4	42.9	35.7	8.5		8.5
1	5.6	6.8	21.7			
5.	1.8	3.6	3.0			20
40-50 PCT	6	10	4			12.1
1	30.0	50.0	20.0			
6.	11.1	11.4	17.4			9
50-60 PCT	3.6	6.1	2.4			5.5
1	2	5	2			
60-70 PCT	22.2	55.6	22.2			21
1	3.7	5.7	8.7			12.7
7.	1.2	3.0	1.2			
1	8	10	3			
COLUMN TOTAL	54	88	23			163
	32.7	53.3	13.9			100.0

RAW CHI SQUARE = 13.30306 WITH 14 DEGREES OF FREEDOM. SIGNIFICANCE = .5028
CRAMER'S V = .20078
CONTINGENCY COEFFICIENT = .27315

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WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFD

***** C R O S S T A B U L A T I O N O F A I R T E M P E R A T U R E *****
 NVIS BY V67 ***** PAGE 1 OF 1

V67

COUNT		140 OR L		51-60		61-70		71-80		81-90		ROW TOTAL
ROW PCT	COL PCT	1.01	3.01	4.01	5.01	6.01	7.01	8.01	9.01	10.01	11.01	
NVIS		0	2	18	18	18	18	18	18	18	18	42
ZERO		4.8	4.8	42.9	42.9	42.9	42.9	42.9	42.9	42.9	42.9	25.5
		50.0	50.0	25.0	25.0	23.7	23.7	22.2	22.2	22.2	22.2	
		1.2	1.2	10.9	10.9	10.9	10.9	1.2	1.2	1.2	1.2	
UP TO 10 PCT		1	0	7	7	9	9	3	3	3	3	19
		0	0	0	0	36.8	47.4	15.8	15.8	15.8	15.8	11.5
		0	0	0	0	9.7	11.8	33.3	33.3	33.3	33.3	
		0	0	0	0	4.2	5.5	1.8	1.8	1.8	1.8	
10-20 PCT		1	0	13	13	8	8	0	0	0	0	22
		4.5	0	59.1	59.1	36.4	36.4	0	0	0	0	13.3
		25.0	0	18.1	18.1	10.5	10.5	0	0	0	0	
		.6	0	7.9	7.9	4.8	4.8	0	0	0	0	
20-30 PCT		0	0	8	8	9	9	1	1	1	1	18
		0	0	44.4	44.4	50.0	50.0	5.6	5.6	5.6	5.6	10.9
		0	0	11.1	11.1	11.8	11.8	11.1	11.1	11.1	11.1	
		0	0	4.8	4.8	5.5	5.5	.6	.6	.6	.6	
30-40 PCT		0	0	9	9	5	5	0	0	0	0	14
		0	0	64.3	64.3	35.7	35.7	0	0	0	0	8.5
		0	0	12.5	12.5	6.6	6.6	0	0	0	0	
		0	0	5.5	5.5	3.0	3.0	0	0	0	0	
40-50 PCT		1	0	7	7	10	10	2	2	2	2	20
		5.0	0	35.0	35.0	50.0	50.0	10.0	10.0	10.0	10.0	12.1
		25.0	0	9.7	9.7	13.2	13.2	22.2	22.2	22.2	22.2	
		.6	0	4.2	4.2	6.1	6.1	1.2	1.2	1.2	1.2	
50-60 PCT		0	1	2	2	5	5	1	1	1	1	9
		0	11.1	22.2	22.2	55.6	55.6	11.1	11.1	11.1	11.1	5.5
		0	25.0	2.8	2.8	6.6	6.6	11.1	11.1	11.1	11.1	
		0	.6	1.2	1.2	3.0	3.0	.6	.6	.6	.6	
60-70 PCT		0	1	8	8	12	12	0	0	0	0	21
		0	4.8	38.1	38.1	57.1	57.1	0	0	0	0	12.7
		0	25.0	11.1	11.1	15.8	15.8	0	0	0	0	
		0	.6	4.8	4.8	7.3	7.3	0	0	0	0	
COLUMN TOTAL		4	4	72	72	76	76	9	9	9	9	165
		2.4	2.4	43.6	43.6	46.1	46.1	5.5	5.5	5.5	5.5	100.0

RAW CHI SQUARE = 24.45111 WITH 24 DEGREES OF FREEDOM. SIGNIFICANCE = .6575
 CRAMER'S V = .19248
 CONTINGENCY COEFFICIENT = .35925

III-E-115

133

133

WEARABILITY DATA ANALYSIS

11/04/77

FILE TED (CREATION DATE = 11/04/77) COLL PTD

***** C R O S S T A B U L A T I O N O F W E A T H E R *****
***** BY V.B. ***** PAGE 1 OF 1

		COUNT		V6A			
		ROW		CLOUDY		ROW	
		PCT		SUNNY		TOTAL	
		TOT		PCT		TOT	
		1		1.01		2.01	
NVIS	0	1	35	1	6	41	
							25.2
ZERO	1	85.4	14.6	1	1		
UP TO 10 PCT	1	27.6	16.7	1	1		
	1	21.5	3.7	1	1		
	1	15	4	1	1	19	
							11.7
	1	78.9	21.1	1	1		
	1	11.8	11.1	1	1		
	1	9.2	2.5	1	1		
10-20 PCT	2	19	3	1	1	22	
							13.5
	1	86.4	13.6	1	1		
	1	15.0	8.3	1	1		
	1	11.7	1.8	1	1		
20-30 PCT	3	12	6	1	1	18	
							11.0
	1	66.7	33.3	1	1		
	1	9.4	16.7	1	1		
	1	7.4	3.7	1	1		
30-40 PCT	4	11	2	1	1	13	
							8.0
	1	84.6	15.4	1	1		
	1	8.7	5.6	1	1		
	1	6.7	1.2	1	1		
40-50 PCT	5	13	7	1	1	20	
							12.3
	1	65.0	35.0	1	1		
	1	10.2	19.4	1	1		
	1	8.0	4.3	1	1		
50-60 PCT	6	9	0	1	1	9	
							5.5
	1	100.0	0	1	1		
	1	7.1	0	1	1		
	1	5.5	0	1	1		
60-70 PCT	7	13	8	1	1	21	
							12.9
	1	61.9	38.1	1	1		
	1	10.2	22.2	1	1		
	1	8.0	4.9	1	1		
COLUMN		127	36			163	
TOTAL		77.9	22.1			100.0	

RAW CHI SQUARE = 11.52739 WITH 7 DEGREES OF FREEDOM. SIGNIFICANCE = .1172
GRAMER'S V = .26593
CONTINGENCY COEFFICIENT = .25700

11/04/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFD

***** CROSS TABULATION OF *****
 NVIS ***** BY V69 ***** PAGE 1 OF 1

	COUNT	ROW PCT	COL PCT	TOT PCT	MODERATE	STRONG	HOW TOTAL
		ICALM			1.01	2.01	3.01
NVIS	0	13	36.1	58.3	21	2	36
ZERO		28.9	23.6	25.0	14.8	1.4	25.4
		9.2	14.8	1.4			
UP 10 10 PCT	1.	6	11	0			17
		35.3	64.7	0			12.0
		13.3	12.4	0			
		4.2	7.7	0			
10-20 PCT	2.	4	14	1			19
		21.1	73.7	5.3			13.4
		8.9	15.7	12.5			
		2.8	9.9	.7			
20-30 PCT	3.	2	11	0			13
		15.4	84.6	0			9.2
		4.4	12.4	0			
		1.4	7.7	0			
30-40 PCT	4.	2	8	1			11
		18.2	72.7	9.1			7.7
		4.4	9.0	12.5			
		1.4	5.6	.7			
40-50 PCT	5.	7	9	1			17
		41.2	52.9	5.9			12.0
		15.6	10.1	12.5			
		4.9	6.3	.7			
50-60 PCT	6.	3	3	3			9
		33.3	33.3	33.3			6.3
		6.7	3.4	37.5			
		2.1	2.1	2.1			
60-70 PCT	7.	8	12	0			20
		40.0	60.0	0			14.1
		17.8	13.5	0			
		5.6	8.5	0			
COLUMN TOTAL	45	89	8	142			
	31.7	62.7	5.6	100.0			

MAN CHI SQUARE = 22.11337 WITH 14 DEGREES OF FREEDOM. SIGNIFICANCE = .0763
 CRAWFORD'S V = .27904
 CONTINGENCY COEFFICIENT = .36708

III-B-117/118

(135) 136x

(135)
 136x

APPENDIX III-B

Wearability/Accessibility Study
Crosstabulations

Crosstabulation with NV 16

III-B-ix/x

(137)
138 x

(137)

138 x

WEAPABILITY DATA ANALYSIS

01/09/78

FILE TED (CREATION DATE = 01/09/78) COLL PFD

 NV16 ***** C H O S T A B U L A T I O N O F *****
 ***** BY NV9 ***** ATTITUDE ON ACCESS *****
 ***** PAGE 1 OF 1 *****

		COUNT				NV9					
		ROW		COL		TOT		PCT		TOTAL	
		PCT		PCT		PCT		PCT		PCT	
NV16		0-20		20-40		40-60		60-80		80-100	
		2.	1	3	1	1.1	2.1	3.1			
		37.5	12.5	50.0	1	4					
		25.0	2.7	3.1	1						
		1.7	.6	2.2	1						
		4.	1	4	1	8	4	1	16		
		25.0	50.0	25.0	1				8.9		
		33.3	21.6	3.1	1						
		2.2	4.5	2.2	1						
		6.	3	1	8	23	1	34			
		8.8	23.5	67.6	1			19.0			
		25.0	21.6	17.7	1						
		1.7	4.5	12.8	1						
		8.	2	17	1	46	1	65			
		3.1	26.2	70.8	1			36.3			
		16.7	45.9	35.4	1						
		1.1	9.5	25.7	1						
		10.	0	3	1	53	1	56			
			5.4	54.6	1			31.3			
			0	8.1	1	40.8	1				
			0	1.7	1	29.6	1				
COLUMN		12	37	130				179			
TOTAL		6.7	20.7	72.6				100.0			

RAW CHI SQUARE = 48.35993 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .0000
 CRAMER'S V = .36754
 CONTINGENCY COEFFICIENT = .46120

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** CROSS TABULATION OF *****
 NV16 ***** BY NV10 *****
 ***** AIRWEAR ROUGH CD *****
 ***** PAGE 1 OF 1 *****

		COUNT		ROW		TOTAL	
		ROW PCT	CUL PCT	ROW PCT	CUL PCT	ROW PCT	CUL PCT
		TOT PCT	TOT PCT	TOT PCT	TOT PCT	TOT PCT	TOT PCT
NV16		NV10					
0-20 PCT	2.	2	2	2	2	2	2
		25.0	75.0	75.0	75.0	75.0	75.0
		20.0	3.6	3.6	3.6	3.6	3.6
20-40 PCT	4.	2	2	2	2	2	2
		12.5	87.5	87.5	87.5	87.5	87.5
		20.0	8.3	8.3	8.3	8.3	8.3
40-60 PCT	6.	2	2	2	2	2	2
		5.9	94.1	94.1	94.1	94.1	94.1
		20.0	18.9	18.9	18.9	18.9	18.9
60-80 PCT	8.	3	3	3	3	3	3
		4.6	95.4	95.4	95.4	95.4	95.4
		30.0	36.7	36.7	36.7	36.7	36.7
80-100 PCT	10.	1	1	1	1	1	1
		1.8	98.2	98.2	98.2	98.2	98.2
		10.0	32.5	32.5	32.5	32.5	32.5
COLUMN TOTAL		10	169	169	169	169	169
		5.6	94.4	94.4	94.4	94.4	94.4
		100.0	100.0	100.0	100.0	100.0	100.0

RAW CHI SQUARE = 8.82183 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .0657
 CHAMBERS V = .2220
 CONTINGENCY COEFFICIENT = .21672

WEARABILITY DATA ANALYSIS

01/09/78

FILE TED (CREATION DATE = 01/09/78) COLL PFD

 NV16 ***** CROSS TABULATION OF ATTITU ON EFF-MEL *****
 BY NV11 ***** PAGE 1 OF 1

		COUNT				ROW			
		PCT				TOTAL			
		TOT				PCT			
		1.1				2.1			
		3.1				4.1			
		5.1				6.1			
		7.1				8.1			
		9.1				10.1			
		11.1				12.1			
		13.1				14.1			
		15.1				16.1			
		17.1				18.1			
		19.1				20.1			
		21.1				22.1			
		23.1				24.1			
		25.1				26.1			
		27.1				28.1			
		29.1				30.1			
		31.1				32.1			
		33.1				34.1			
		35.1				36.1			
		37.1				38.1			
		39.1				40.1			
		41.1				42.1			
		43.1				44.1			
		45.1				46.1			
		47.1				48.1			
		49.1				50.1			
		51.1				52.1			
		53.1				54.1			
		55.1				56.1			
		57.1				58.1			
		59.1				60.1			
		61.1				62.1			
		63.1				64.1			
		65.1				66.1			
		67.1				68.1			
		69.1				70.1			
		71.1				72.1			
		73.1				74.1			
		75.1				76.1			
		77.1				78.1			
		79.1				80.1			
		81.1				82.1			
		83.1				84.1			
		85.1				86.1			
		87.1				88.1			
		89.1				90.1			
		91.1				92.1			
		93.1				94.1			
		95.1				96.1			
		97.1				98.1			
		99.1				100.1			
		101.1				102.1			
		103.1				104.1			
		105.1				106.1			
		107.1				108.1			
		109.1				110.1			
		111.1				112.1			
		113.1				114.1			
		115.1				116.1			
		117.1				118.1			
		119.1				120.1			
		121.1				122.1			
		123.1				124.1			
		125.1				126.1			
		127.1				128.1			
		129.1				130.1			
		131.1				132.1			
		133.1				134.1			
		135.1				136.1			
		137.1				138.1			
		139.1				140.1			
		141.1				142.1			
		143.1				144.1			
		145.1				146.1			
		147.1				148.1			
		149.1				150.1			
		151.1				152.1			
		153.1				154.1			
		155.1				156.1			
		157.1				158.1			
		159.1				160.1			
		161.1				162.1			
		163.1				164.1			
		165.1				166.1			
		167.1				168.1			
		169.1				170.1			
		171.1				172.1			
		173.1				174.1			
		175.1				176.1			
		177.1				178.1			
		179.1				180.1			
		181.1				182.1			
		183.1				184.1			
		185.1				186.1			
		187.1				188.1			
		189.1				190.1			
		191.1				192.1			
		193.1				194.1			
		195.1				196.1			
		197.1				198.1			
		199.1				200.1			
		201.1				202.1			
		203.1				204.1			
		205.1				206.1			

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** C H O S S I A B U L A T I O N O F *****
 NV16 ***** BY NV12 ***** NEED FOR PFD *****
 ***** PAGE 1 OF 1 *****

NV12									
COUNT									
ROW PCT									
COL PCT									
TOT PCT									
NV16									
0-20 PCT									
2.	2	25.0	1	50.0	1	25.0	1	25.0	8
	1	16.7	1	5.2	1	2.2	1	2.2	4.5
	1	1.1	1	2.2	1	1.1	1	1.1	
20-40 PCT									
4.	3	18.8	1	8	1	5	1	5	16
	1	25.0	1	50.0	1	31.3	1	31.3	8.9
	1	1.7	1	10.4	1	5.6	1	5.6	
	1	1.7	1	4.5	1	2.8	1	2.8	
40-60 PCT									
6.	1	19	1	14	1	14	1	14	34
	1	2.9	1	55.9	1	41.2	1	41.2	19.0
	1	8.3	1	24.7	1	15.6	1	15.6	
	1	.6	1	10.6	1	7.8	1	7.8	
60-80 PCT									
8.	4	32	1	29	1	29	1	29	65
	1	6.2	1	49.2	1	44.6	1	44.6	36.3
	1	33.3	1	41.6	1	32.2	1	32.2	
	1	2.2	1	17.9	1	16.2	1	16.2	
80-100 PCT									
10.	2	14	1	40	1	40	1	40	56
	1	3.6	1	25.0	1	71.4	1	71.4	31.3
	1	16.7	1	18.2	1	44.4	1	44.4	
	1	1.1	1	7.8	1	22.3	1	22.3	
COLUMN TOTAL									
	12	77	90	50.3	100.0				
	6.7	43.0	50.3						

RAW CHI SQUARE = 23.54053 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .0027
 CHAMBERS V = .25643
 CONTINGENCY COEFFICIENT = .34092

(142) (142)

WEARABILITY DATA ANALYSIS

01/09/78

FILE TED (CREATION DATE = 01/09/78) COLL PED

***** C R O S S T A B U L A T I O N O F I M A G E *****
NV16 ***** BY NV13 ***** PAGE 1 OF 1

		COUNT				ROW			
		NV13				TOTAL			
		ROW PCT	COL PCT	TOT PCT		ROW PCT	COL PCT	TOT PCT	
NV16		1.1	2.1	3.1		1.1	2.1	3.1	
0-20 PCT	2.	1	6	0	7	1	6	0	7
		14.3	85.7	0	4.2	14.3	85.7	0	4.2
		5.3	4.7	0		5.3	4.7	0	
20-40 PCT	4.	2	10	2	14	2	10	2	14
		14.3	71.4	14.3	8.4	14.3	71.4	14.3	8.4
		10.5	7.9	9.5		10.5	7.9	9.5	
40-60 PCT	6.	4	25	3	32	4	25	3	32
		12.5	78.1	9.4	19.2	12.5	78.1	9.4	19.2
		21.1	19.7	14.3		21.1	19.7	14.3	
60-80 PCT	8.	5	51	6	62	5	51	6	62
		8.1	82.3	9.7	37.1	8.1	82.3	9.7	37.1
		26.3	40.2	28.0		26.3	40.2	28.0	
80-100 PCT	10.	7	35	10	52	7	35	10	52
		13.5	67.3	19.2	31.1	13.5	67.3	19.2	31.1
		36.8	27.6	47.6		36.8	27.6	47.6	
COLUMN TOTAL		19	127	21	167	19	127	21	167
TOTAL		11.4	76.0	12.6	100.0	11.4	76.0	12.6	100.0

KAW CHI SQUARE = 5.38767 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .7155

CRAMER'S V = .12701

CONTINGENCY COEFFICIENT = .17679

NUMBER OF MISSING OBSERVATIONS = 12

(143)

143

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** CROSSTABULATION OF *****
 NV16 BY NV14 PFD WEAR *****
 ***** PAGE 1 OF 1 *****

		NV14				ROW TOTAL	
		COUNT	1	2	3	4	
		ROW PCT	1.1	2.1	3.1	4.1	
		COL PCT	1.1	2.1	3.1	4.1	
		TOT PCT	1.1	2.1	3.1	4.1	
NV16	0-20 PCT	2.	3	4	0	7	
			42.9	57.1	0	4.0	
			4.1	6.3	0		
			1.7	2.3	0		
20-40 PCT		4.	7	7	0	14	
			50.0	50.0	0	8.1	
			9.6	10.9	0		
			4.0	4.0	0		
40-60 PCT		6.	15	11	6	32	
			46.9	34.4	18.8	18.5	
			20.5	17.2	16.7		
			8.7	6.4	3.5		
60-80 PCT		8.	29	18	17	64	
			45.3	28.1	26.6	37.0	
			39.7	28.1	47.2		
			16.8	10.4	9.8		
80-100 PCT		10.	19	24	13	56	
			33.9	42.9	23.2	32.4	
			26.0	37.5	36.1		
			11.0	13.9	7.5		
COLUMN TOTAL		73	64	36	173		
			42.2	37.0	20.8	100.0	

RAW CHI SQUARE = 10.38088 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .2393

CRAMER'S V = .17321

CONTINGENCY COEFFICIENT = .23792

NUMBER OF MISSING OBSERVATIONS = 6

194

144

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** C R O S S T A B U L A T I O N O F AGE *****
***** BY V3 ***** PAGE 1 OF 1

V3									
COUNT									
ROW PCT									
COL PCT									
TOT PCT									

V3									

COUNT									
ROW PCT									
COL PCT									
TOT PCT									

V3									

COUNT									
ROW PCT									
COL PCT									
TOT PCT									

V3									

COUNT									
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COL PCT									
TOT PCT									

V3									

COUNT									
ROW PCT									
COL PCT									
TOT PCT									

V3									

COUNT									
ROW PCT									
COL PCT									
TOT PCT									

V3									

COUNT									
ROW PCT									
COL PCT									
TOT PCT									

V3									

COUNT									
ROW PCT									
COL PCT									
TOT PCT									

V3									

COUNT									
ROW PCT									
COL PCT									
TOT PCT									

V3									

COUNT									
ROW PCT									
COL PCT									
TOT PCT									

V3									

COUNT									
ROW PCT									
COL PCT									
TOT PCT									

V3									

COUNT									
ROW PCT									
COL PCT									
TOT PCT									

V3									

COUNT									
ROW PCT									
COL PCT									
TOT PCT									

V3									

COUNT									
ROW PCT									
COL PCT									
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WEARABILITY DATA ANALYSIS

FILED (CREATION DATE = 11/04/77) COLL PRD

***** NV16 ***** CROSS TABULATION OF ***** SEX *****
***** BY V4 ***** PAGE 1 OF 1 *****

COUNT		MALE		FEMALE		TOTAL
ROW	COL	CT	PCT	CT	PCT	
2.	1	75.0	1	25.0	1	4.8
3.	1	5.4	1	3.7	1	0.2
4.	1	3.6	1	1.2	1	0.2
5.	1	8.0	1	50.0	1	9.6
6.	1	7.1	1	14.8	1	1.6
7.	1	4.8	1	4.8	1	0.8
8.	1	22.0	1	35.3	1	20.5
9.	1	19.6	1	22.2	1	1.6
10.	1	13.3	1	7.2	1	0.8
11.	1	47.0	1	18.0	1	65.0
12.	1	72.3	1	27.7	1	39.2
13.	1	42.0	1	33.3	1	1.6
14.	1	28.3	1	10.8	1	0.8
15.	1	29.0	1	14.0	1	43.0
16.	1	67.4	1	32.6	1	25.9
17.	1	25.9	1	25.9	1	1.6
18.	1	17.5	1	8.4	1	0.8
19.	1	112.0	1	54.0	1	166.0
20.	1	67.5	1	32.5	1	100.0

RAW CHI SQUARE = 3.24304 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .5180

RAW CHI SQUARE = 3.24504 WITH
CRAMER'S V = .13977

$$\text{CONTINGENCY COEFFICIENT} = .13843$$

NUMBER OF MISSING OBSERVATIONS = 13

(146)

146

11/04/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFD

NV16 ***** CROSS TABULATION OF *****
***** BY NV6 ***** BOATING SAFETY EDUCATION *****
***** PAGE 1 OF 1 *****

		NV6		ONE OR MORE COURSES		ROW TOTAL	
		COUNT	ANNE	01	1.1		
		ROW PCT	COL PCT	TOT PCT			
NV16	0-20 PCT	2.	25.0	2	6	8	4.8
			3.6	1.2	5.4		
20-40 PCT		4.	37.5	6	10	16	9.6
			10.9	3.6	8.9		
40-60 PCT		6.	44.1	15	19	34	20.4
			27.3	9.0	11.4		
60-80 PCT		8.	33.8	22	43	65	38.9
			40.0	13.2	25.7		
80-100 PCT		10.	10	10	34	44	26.3
			22.7	6.0	20.4		
COLUMN TOTAL			55	32.9	112	167	100.0

RAW CHI SQUARE = 4.40409 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .3541
KRAMER'S V = .16239
CONTINGENCY COEFFICIENT = .16029
NUMBER OF MISSING OBSERVATIONS = 12

(147)

(147)

11/04/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFD

***** C H O S T A B U L A T I O N O F *****
 NV16 BY VII HOAT EXPE *****
 ***** PAGE 1 OF 1

VII					
COUNT	1	120-100	100-500	GREATER THAN 500	ROW TOTAL
ROW PCT	COL PCT	TOT PCT	TOT PCT	TOT PCT	TOT PCT
0-20 PCT	2.	0	0	0	8
		0	0	100.0	4.8
		0	0	5.8	
		0	0	4.8	
20-40 PCT	4.	0	2	14	16
		0	12.5	87.5	9.6
		0	8.7	10.2	
		0	1.2	8.4	
40-60 PCT	6.	4	4	26	34
		11.8	11.8	76.5	20.4
		57.1	17.4	19.0	
		2.4	2.4	15.6	
60-80 PCT	8.	3	9	53	65
		4.6	13.8	81.5	38.9
		42.9	39.1	38.7	
		1.8	5.4	31.7	
80-100 PCT	10.	0	8	36	44
		0	18.2	81.8	26.3
		0	34.8	26.3	
		0	4.8	21.6	
COLUMN TOTAL	7	23	137	167	167
	4.2	13.8	82.0	100.0	

RAW CHI SQUARE = 9.87522 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .2739
 GRAMER'S V = .17195
 CONTINGENCY COEFFICIENT = .23629
 NUMBER OF MISSING OBSERVATIONS = 12

148

148

11/04/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFD

 NV16 ***** C K O S T A B U L A T I O N O F LOCATION *****
 ***** BY V12 ***** PAGE 1 OF 1

V12									
COUNT									
ROW	PCT	IRIVER	CR	SMALL	LA	WATERWAY	OCEAN	ROW	TOTAL
COL	PCT	IEEK	EJC	KE		BAY	FTC		
TOT	PCT	1.01	2.01	4.01	5.01				
NV16									
0-20	PCT	2.	0	0	0	2	6	8	
			0	0	0	25.0	75.0	4.9	
			0	0	0	7.1	5.2		
			0	0	0	1.2	3.7		
20-40	PCT	4.	0	0	0	1	15	16	
			0	0	0	6.3	93.8	9.8	
			0	0	0	3.6	12.9		
			0	0	0	.6	9.2		
40-60	PCT	6.	0	0	0	3	26	34	
			0	0	0	8.8	14.7	20.9	
			0	0	0	16.7	17.9		
			0	0	0	3.1	16.0		
60-80	PCT	8.	1	7	16	37	61	61	
			1.6	11.5	26.2	60.7	37.4		
			100.0	38.9	57.1	31.9			
			.6	4.3	9.8	22.7			
80-100	PCT	10.	0	8	4	32	44	44	
			0	18.2	9.1	72.7	27.0		
			0	44.4	14.3	27.6			
			0	4.9	2.5	19.6			
COLUMN			1	18	28	116	163		
TOTAL			.6	11.0	17.2	71.2	100.0		

RAW CHI SQUARE = 14.87745 WITH 12 DEGREES OF FREEDOM. SIGNIFICANCE = .2482
 CRAMER'S V = .17443
 CONTINGENCY COEFFICIENT = .28920
 NUMBER OF MISSING OBSERVATIONS = 16

(149)

149

11/04/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFD

***** C R O S S T A B U L A T I O N O F *****
 NV16 BY V13 BOAT TYPE *****
 ***** PAGE 1 OF 1 *****

V13									
COUNT	ROW PCT	ICANOE	OTHER	SAIL	OPEN	POW	CABIN	MO	ROW
COL PCT	COL PCT	COL PCT	COL PCT	COL PCT	COL PCT	COL PCT	COL PCT	COL PCT	COL PCT
TOT PCT	TOT PCT	TOT PCT	TOT PCT	TOT PCT	TOT PCT	TOT PCT	TOT PCT	TOT PCT	TOT PCT
2.	0	0	0	2	2	2	4	4	8
0-20 PCT	0	0	0	25.0	25.0	25.0	50.0	50.0	4.9
	0	0	0	5.0	3.4	3.4	8.5	8.5	
	0	0	0	1.2	1.2	1.2	2.4	2.4	
4.	0	0	0	8	2	2	6	6	16
20-40 PCT	0	0	0	50.0	12.5	12.5	37.5	37.5	9.8
	0	0	0	20.0	3.4	3.4	12.8	12.8	
	0	0	0	4.9	1.2	1.2	3.7	3.7	
6.	3	1	0	8	13	13	10	10	34
40-60 PCT	8.8	1	0	23.5	38.2	38.2	29.4	29.4	20.7
	16.7	1	0	20.0	22.4	22.4	21.3	21.3	
	1.8	1	0	4.9	7.9	7.9	6.1	6.1	
8.	7	1	1	17	20	20	19	19	64
60-80 PCT	10.9	1.6	1	26.6	31.3	31.3	29.7	29.7	39.0
	38.9	100.0	1	42.5	34.5	34.5	40.4	40.4	
	4.3	.6	1	10.4	12.2	12.2	11.6	11.6	
10.	8	1	0	5	21	21	8	8	42
80-100 PCT	19.0	1	0	11.9	50.0	50.0	19.0	19.0	25.6
	44.4	1	0	12.5	36.2	36.2	17.0	17.0	
	4.9	1	0	3.0	12.8	12.8	4.9	4.9	
COLUMN	18	1	1	40	58	58	47	47	164
TOTAL	11.0	.6	.6	24.4	35.4	35.4	28.7	28.7	100.0

RAW CHI SQUARE = 22.58519 WITH 16 DEGREES OF FREEDOM. SIGNIFICANCE = .1253

CRAMER'S V = .18555

CONTINGENCY COEFFICIENT = .34792

NUMBER OF MISSING OBSERVATIONS = 15

150

150

11/04/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFD

***** C R O S S T A B U L A T I O N O F B O A T L E N G T H *****
NV16 BY V14 ***** PAGE 1 OF 1

		V14					ROW TOTAL	
COUNT		16-20	20-26	26-32	32-38	38-44		
ROW PCT	COL PCT							
TOT PCT		1.01	2.01	3.01	4.01			
NV16								
0-20 PCT	2.	0	1	1	6		8	
		0	12.5	12.5	75.0		5.3	
		0	2.0	10.0	8.0			
		0	.7	.7	3.9			
20-40 PCT								
	4.	0	0	3	13		16	
		0	0	18.8	81.3		10.5	
		0	0	30.0	17.3			
		0	0	2.0	8.6			
40-60 PCT								
	6.	0	13	2	16		31	
		0	41.9	6.5	51.6		20.4	
		0	26.0	20.0	21.3			
		0	8.6	1.3	10.5			
60-80 PCT								
	8.	4	21	3	30		58	
		6.9	36.2	5.2	51.7		38.2	
		23.5	42.0	30.0	40.0			
		2.6	13.8	2.0	19.7			
80-100 PCT								
	10.	13	15	1	10		39	
		33.3	38.5	2.6	25.6		25.7	
		76.5	30.0	10.0	13.3			
		8.6	9.9	.7	6.6			
COLUMN TOTAL		17	50	10	75		152	
		11.2	32.9	6.6	49.3		100.0	

RAW CHI SQUARE = 45.88500 WITH 12 DEGREES OF FREEDOM. SIGNIFICANCE = .0000
CRAMER'S V = .31721
CONTINGENCY COEFFICIENT = .48154
NUMBER OF MISSING OBSERVATIONS = 27

(151)

(151)

11/04/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFD

***** C R O S S T A B U L A T I O N O F C U S T O M E R P F D W E A R *****
 NV16 BY V29 ***** PAGE 1 OF 1

V29										
COUNT	ROW	COL	TOT	1-75	50-75	10-50	1-10	NEVER	ROW	TOTAL
ROW PCT	COL PCT	TOT PCT	1-75	50-75	10-50	1-10	NEVER	TOTAL	ROW	TOTAL
2.	1	0	1	0	1	1	2	5	8	
0-20 PCT	1	0	1	0	12.5	25.0	62.5	4.8		
	1	0	1	0	2.3	4.7	8.8			
	1	0	1	0	.6	1.2	3.0			
4.	1	0	1	0	3	4	9	16		
20-40 PCT	1	0	1	0	18.8	25.0	56.3	9.6		
	1	0	1	0	7.0	9.3	15.8			
	1	0	1	0	1.8	2.4	5.4			
6.	1	6	1	0	6	10	12	34		
40-60 PCT	1	17.6	1	0	17.6	29.4	35.3	20.4		
	1	33.3	1	0	14.0	23.3	21.1			
	1	3.6	1	0	3.6	6.0	7.2			
8.	1	8	1	2	14	21	20	65		
60-80 PCT	1	12.3	1	3.1	21.5	32.3	30.8	38.9		
	1	44.4	1	33.3	32.6	48.8	35.1			
	1	4.8	1	1.2	8.4	12.6	12.0			
10.	1	4	1	4	19	6	11	44		
80-100 PCT	1	9.1	1	9.1	43.2	13.6	25.0	26.3		
	1	22.2	1	65.7	44.2	14.0	19.3			
	1	2.4	1	2.4	11.4	3.6	6.6			
COLUMN TOTAL	18	10.8	6	3.6	43	34.1	57	167		
								100.0		

RAW CHI SQUARE = 26.78240 WITH 16 DEGREES OF FREEDOM. SIGNIFICANCE = .0440
 CHAMBERS V = .2023
 CONTINGENCY COEFFICIENT = .37176
 NUMBER OF MISSING OBSERVATIONS = 12

152

152

WEARABILITY DATA ANALYSIS

FILE	TED	(CREATION DATE = 11/04/77)	COLL PFD
FILE	TED	(CREATION DATE = 11/04/77)	COLL PFD

***** CROSS TABULATION OF FISHING *****
 NV16 BY V54 ***** PAGE 1 OF 1 *****

V54			
COUNT	ROW	COL	TOT
CT	PC	PC	PC
2.	0	0	0
4.	2	12.5	14
6.	12	35.3	47
8.	16	24.6	40.6
10.	17	38.6	55.6
COLUMN	47	29.1	120
TOTAL	29.1	71.9	100.0

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RAW CHI SQUARE = 8.72467 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .0684
CRAMER'S V = .2287
CONTINGENCY COEFFICIENT = .2282

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NUMBER OF MISSING OBSERVATIONS = 12

(153)

153

11/04/77

NEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) LOLL PFD

***** C H O S T A B U L A T I O N O F C A N O E I N G O R K A Y A K I N G *****
 NV16 BY V55 ***** PAGE 1 OF 1

		COUNT		V55		ROW	
		ROW PCT	COL PCT	TOT PCT	TOT PCT	TOT PCT	TOT PCT
NV16				1.01	2.01		
0-20 PCT		2.	0	0	100.0	8	4.8
20-40 PCT		4.	6.3	6.7	93.8	16	9.6
40-60 PCT		6.	13.3	1.2	19.2	34	20.4
60-80 PCT		8.	9.2	40.0	38.8	65	38.9
80-100 PCT		10.	6	3.6	35.3	44	26.3
COLUMN TOTAL		15	9.0	152	91.0	167	100.0

RAW CHI SQUARE = 2.50597 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .6436
 CRAMER'S V = .12250
 CONTINGENCY COEFFICIENT = .12159
 NUMBER OF MISSING OBSERVATIONS = 12

(154) (154)

11/04/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFD

***** C R O S S T A B U L A T I O N O F S K I N D I V I D I N G *****
***** NV16 BY V56 ***** PAGE 1 OF 1

COUNT				V56			
ROW PCT				ROW			
COL PCT				TOTAL			
TOT PCT				2.01			
NV16				-			
0-20 PCI				2.	8	1	8
					100.0	1	4.8
					4.8	1	
					4.8	1	
					100.0	1	16
20-40 PCI				4.	16	1	9.6
					100.0	1	
					9.6	1	
					9.6	1	
					100.0	1	34
40-60 PCI				6.	34	1	20.4
					100.0	1	
					20.4	1	
					20.4	1	
					100.0	1	65
60-80 PCI				8.	65	1	38.9
					100.0	1	
					38.9	1	
					38.9	1	
					100.0	1	44
80-100 PCI				10.	44	1	26.3
					100.0	1	
					26.3	1	
					26.3	1	
					100.0	1	167
COLUMN					167		100.0
TOTAL					100.0		

NUMBER OF MISSING OBSERVATIONS = 12

11/04/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFD

***** C R O S S T A B U L A T I O N O F S C U B A D I V I N G
 NV16 BY V57 ***** PAGE 1 OF 1

		COUNT		V57		ROW TOTAL	
		ROW PCT	COL PCT	TOT PCT			
NV16					1.01	2.01	
0-20 PCT	2.	12.5	1	7			4.8
		50.0	1	4.2			
20-40 PCT	4.	0	1	16			16
		0	1	100.0			9.6
40-60 PCT	6.	2.9	1	33			34
		50.0	1	97.1			20.4
60-80 PCT	8.	0	1	65			65
		0	1	100.0			38.9
80-100 PCT	10.	0	1	44			44
		0	1	100.0			26.3
COLUMN TOTAL		2	165				167
		1.2	94.8				100.0

NAI CHI SQUARE = 11.02542 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .0263
 CRAMER'S V = .25094
 CONTINGENCY COEFFICIENT = .24886
 NUMBER OF MISSING OBSERVATIONS = 12

156

156

11/04/77

WEAPABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFD

***** C R O S S T A B U L A T I O N O F S W I M M I N G *****
 NV16 BY V58 ***** PAGE 1 OF 1

	COUNT	ROW PCT	COL PCT	TOT PCT	1.01	2.01	ROW TOTAL
NV16	2.	1	0	1	100.0	4.8	4.8
0-20 PCT	4.	1	0	1	100.0	16	16
20-40 PCT	6.	1	0	1	100.0	9.6	9.6
40-60 PCT	8.	1	0	1	100.0	34	34
60-80 PCT	10.	1	0	1	100.0	38.9	38.9
80-100 PCT	167	1	0	1	100.0	26.3	26.3
COLUMN TOTAL	167	1	0	1	100.0	100.0	100.0

RAW CHI SQUARE = 2.81229 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .5897
 GRAMER'S V = .12977
 CONTINGENCY COEFFICIENT = .12869
 NUMBER OF MISSING OBSERVATIONS = 12

(157)

(157)

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFD

***** CHOSSTABULATION OF *****
 NV16 BY V59 CAMPING *****
 ***** PAGE 1 OF 1

		COUNT		ROW		TOTAL	
		ROW	PCT	COL	PCT	TOT	PCT
		TOT	PCT	TOT	PCT	TOT	PCT
NV16		2.01					
0-20 PCT		2.	100.0	4.	100.0	8	4.8
20-40 PCT		4.	100.0	16	100.0	16	9.6
40-60 PCT		6.	100.0	34	100.0	34	20.4
60-80 PCT		8.	100.0	65	100.0	65	38.9
80-100 PCT		10.	100.0	44	100.0	44	26.3
COLUMN		167	100.0	167	100.0	167	100.0

NUMBER OF MISSING OBSERVATIONS = 12

158

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11/04/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFD

***** C R O S S T A B U L A T I O N O F *****
***** NV16 BY V60 SAILING *****
***** PAGE 1 OF 1 *****

		COUNT		V60		ROW	
		ROW PCT	COL PCT	TOT PCT	ROW PCT	COL PCT	TOT PCT
		1.01	2.01	3.01	4.01	5.01	6.01
NV16		2.	2.	6.	8.	10.	16.
0-20 PCT		25.0	75.0	4.8	10.0	4.1	14.1
		1.2	3.6	4.8	1.2	3.6	4.8
20-40 PCT		4.	4.	12.	16.	16.	32.
		25.0	75.0	9.6	20.0	8.2	28.2
		2.4	7.2	9.6	2.4	7.2	9.6
40-60 PCT		6.	4.	30.	34.	20.4	54.4
		11.8	88.2	20.4	20.0	20.4	40.4
		2.4	18.0	20.4	2.4	18.0	20.4
60-80 PCT		8.	8.	57.	65.	38.9	103.9
		12.3	87.7	38.9	40.0	38.8	78.8
		4.8	34.1	38.9	4.8	34.1	38.9
80-100 PCT		10.	2.	42.	44.	26.3	70.3
		4.5	95.5	26.3	10.0	28.6	38.6
		1.2	25.1	26.3	1.2	25.1	26.3
TOTAL		20	147	167	167	100.0	167
		12.0	88.0	100.0	12.0	88.0	100.0

RAW CHI SQUARE = 6.17450 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .1865
CRAMER'S V = .19228
CONTINGENCY COEFFICIENT = .18882
NUMBER OF MISSING OBSERVATIONS = 12

159

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11/04/77

WEARABILITY DATA ANALYSIS

FILE TFD (CREATION DATE = 11/04/77) COLL PFD

***** C H O S S T A B U L A T I O N O F W A T E R S K I I N G *****
 NV16 BY V61 ***** PAGE 1 OF 1

		COUNT		V61		ROW		TOTAL	
		ROW	COL	TOT	PCI	ROW	COL	TOT	PCI
NV16		2.		4.		6.		8.	
		0-20		20-40		40-60		60-80	
		PCT		PCT		PCT		PCT	
		1.01		2.01		3.01		4.01	
		0		0		0		0	
		100.0		100.0		100.0		100.0	
		4.9		4.9		4.9		4.9	
		4.8		4.8		4.8		4.8	
		16		16		16		16	
		9.6		9.6		9.6		9.6	
		34		34		34		34	
		20.4		20.4		20.4		20.4	
		65		65		65		65	
		38.9		38.9		38.9		38.9	
		44		44		44		44	
		26.3		26.3		26.3		26.3	
COLUMN		5		162		167		167	
TOTAL		3.0		97.0		100.0		100.0	

RAW CHI SQUARE = 3.43073 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .4885
 CRAMER'S V = .14333
 CONTINGENCY COEFFICIENT = .14188
 NUMBER OF MISSING OBSERVATIONS = 12

(160)

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WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFD

NV16
 C R O S S T A B U L A T I O N
 BY V62
 OF
 PLEASURE CRUISING
 PAGE 1 OF 1

PAGE 1 OF 1

COUNT		ROW	COL	TOT	ROW	COL	TOT
1	2	1	2	1	1	2	1
0-20	2.	1	62.5	5	1	3	8
		1	37.5	1	1	4.8	
		1	3.4	1	1		
		1	3.0	1	1	1.8	
		1	1.8	1	1		
20-40	4.	1	56.3	9	1	7	16
		1	43.8	1	1	9.6	
		1	7.9	1	1		
		1	4.2	1	1		
40-60	6.	1	32.4	11	1	23	34
		1	67.6	1	1	20.4	
		1	25.8	1	1		
		1	13.8	1	1		
60-80	8.	1	33	33	1	32	65
		1	49.2	1	1	38.9	
		1	36.0	1	1		
		1	19.2	1	1		
80-100	10.	1	20	20	1	24	44
		1	54.5	1	1	26.3	
		1	27.0	1	1		
		1	14.4	1	1		
COLUMN			7H			89	167
TOTAL			46.7			53.3	100.0

RAW CHI SQUARE = 4.65998 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .3240

CRAMER#S V = .16705

$$\text{CONTINGENCY COEFFICIENT} = .16476$$

NUMBER OF MISSING OBSERVATIONS =	12
1	1
2	1
3	1
4	1
5	1
6	1
7	1
8	1
9	1
10	1
11	1
12	1
13	1
14	1
15	1
16	1
17	1
18	1
19	1
20	1
21	1
22	1
23	1
24	1
25	1
26	1
27	1
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29	1
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34	1
35	1
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80	1
81	1
82	1
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84	1
85	1
86	1
87	1
88	1
89	1
90	1
91	1
92	1
93	1
94	1
95	1
96	1
97	1
98	1
99	1
100	1

11/04/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFD

NV16 ***** C R O S S T A B U L A T I O N O F *****
***** HY V63 RACING *****
***** PAGE 1 OF 1 *****

		V63	
		COUNT	ROW
		ROW PCT	TOTAL
		COL PCT	
		TOT PCT	2.01
NV16			
0-20 PCT	2.	8	8
		100.0	4.8
		4.8	
		4.8	
20-40 PCT	4.	16	16
		100.0	9.6
		9.6	
		9.6	
40-60 PCT	6.	34	34
		100.0	20.4
		20.4	
		20.4	
60-80 PCT	8.	65	65
		100.0	38.9
		38.9	
		38.9	
80-100 PCT	10.	44	44
		100.0	26.3
		26.3	
		26.3	
COLUMN		167	167
TOTAL		100.0	100.0

NUMBER OF MISSING OBSERVATIONS = 12

11/04/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFD

***** C R O S S T A B U L A T I O N O F H U N T I N G *****
***** NV16 BY V64 ***** PAGE 1 OF 1

		COUNT		ROW	
		ROW PCT	COL PCT	TOT PCT	TOTAL
NV16		-----		2.01	
0-20 PCT		2.	100.0	8	4.8
20-40 PCT		4.	100.0	16	9.6
40-60 PCT		6.	100.0	34	20.4
60-80 PCT		8.	100.0	65	38.9
80-100 PCT		10.	100.0	44	26.3
COLUMN TOTAL				167	100.0

NUMBER OF MISSING OBSERVATIONS = 12

(163)

(163)

11/04/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFD

***** CROSS TABULATION OF WATER CONDITIONS *****
 NV16 BY V66 ***** PAGE 1 OF 1

V66									
	COUNT	ROW	PCT	ICALM	CHOPPY	ROUGH OR	WHITE	ROW	TOTAL
	COL	PCT							
	TOT	PCT		1.01	2.01		3.01		
NV16									
	2.	1	4	1	4	1	0	1	8
0-20 PCT		1	50.0	1	50.0	1	0	1	4.8
		1	7.3	1	4.5	1	0	1	
		1	2.4	1	2.4	1	0	1	
		-							
	4.	1	5	1	9	1	2	1	16
20-40 PCT		1	31.3	1	56.3	1	12.5	1	9.6
		1	9.1	1	10.1	1	8.7	1	
		1	3.0	1	5.4	1	1.2	1	
		-							
	6.	1	13	1	19	1	2	1	34
40-60 PCT		1	38.2	1	55.9	1	5.9	1	20.4
		1	23.6	1	21.3	1	8.7	1	
		1	7.8	1	11.4	1	1.2	1	
		-							
	8.	1	21	1	31	1	13	1	65
60-80 PCT		1	32.3	1	47.7	1	20.0	1	38.9
		1	38.2	1	34.8	1	56.5	1	
		1	12.6	1	18.6	1	7.8	1	
		-							
	10.	1	12	1	26	1	6	1	44
80-100 PCT		1	27.3	1	59.1	1	13.6	1	26.3
		1	21.8	1	29.2	1	26.1	1	
		1	7.2	1	15.6	1	3.6	1	
		-							
COLUMN			55	89	23				167
TOTAL			32.9	53.3	13.8				100.0

RAW CHI SQUARE = 6.68114 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .5714
 CRAMER'S V = .14143
 CONTINGENCY COEFFICIENT = .19613
 NUMBER OF MISSING OBSERVATIONS = 12

164

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11/04/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PTD

***** C R O S S T A B U L A T I O N O F A I R T E M P E R A T U R E *****
***** BY V67 ***** PAGE 1 OF 1

		COUNT										ROW	
		V67										TOTAL	
		ROW	COL	140	OR	L	51-60	61-70	71-80	81-90			
		PCT	PCT	PCT	PCT	PCT	PCT	PCT	PCT	PCT	PCT		
		TOT	PCT	PCT	PCT	PCT	PCT	PCT	PCT	PCT	PCT		
NV16		2.	1	0	1	0	1	0	1	0	1	8	
0-20 PCT			0	1	0	1	62.5	1	37.5	1	0	4.8	
			1	0	1	0	6.8	1	3.9	1	0		
			1	0	1	0	3.0	1	1.8	1	0		
20-40 PCT		4.	1	1	0	1	6	1	7	1	2	16	
			6.3	1	0	1	37.5	1	43.8	1	12.5	9.6	
			20.0	1	0	1	8.2	1	9.2	1	22.2		
			.6	1	0	1	3.6	1	4.2	1	1.2		
40-60 PCT		6.	1	1	1	1	20	1	10	1	2	34	
			2.9	1	2.9	1	58.8	1	29.4	1	5.9	20.4	
			20.0	1	25.0	1	27.4	1	13.2	1	22.2		
			.6	1	.6	1	12.0	1	6.0	1	1.2		
60-80 PCT		8.	3	1	3	1	25	1	32	1	2	65	
			4.6	1	4.6	1	38.5	1	49.2	1	3.1	38.9	
			60.0	1	75.0	1	34.2	1	42.1	1	22.2		
			1.8	1	1.8	1	15.0	1	19.2	1	1.2		
80-100 PCT		10.	0	1	0	1	17	1	24	1	3	44	
			0	1	0	1	38.6	1	54.5	1	6.8	26.3	
			0	1	0	1	23.3	1	31.6	1	33.3		
			0	1	0	1	10.2	1	14.4	1	1.8		
COLUMN TOTAL			5	4	4	4	73	1	76	1	9	167	
			3.0	2.4	2.4	43.7	45.5	5.4	100.0				

RAW CHI SQUARE = 14.74198 WITH 16 DEGREES OF FREEDOM. SIGNIFICANCE = .5436
CHAMBERS V = .14956
CONTINGENCY COEFFICIENT = .28481
NUMBER OF MISSING OBSERVATIONS = 12

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11/04/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFD

 NV16 ***** C R O S S T A B U L A T I O N O F WEATHER
 BY V68 ***** PAGE 1 OF 1

		V68			
		COUNT	ISUNNY	CLOUDY	ROW
		ROW PCT	COL PCT	TOT PCT	TOTAL
NV16		2.	7	1.01	2.01
0-20 PCT		1	87.5	12.5	8
		1	5.4	2.8	4.8
		1	4.2	.6	
20-40 PCT		4.	14	2	16
		1	87.5	12.5	9.7
		1	10.9	5.6	
		1	8.5	1.2	
40-60 PCT		6.	24	9	33
		1	72.7	27.3	20.0
		1	18.6	25.0	
		1	14.5	5.5	
60-80 PCT		8.	48	16	64
		1	75.0	25.0	38.8
		1	37.2	44.4	
		1	29.1	9.7	
80-100 PCT		10.	36	8	44
		1	81.8	18.2	26.7
		1	27.9	22.2	
		1	21.8	4.8	
COLUMN		129	36		165
TOTAL		78.2	21.8		100.0

RAW CHI SQUARE = 2.51817 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .6414

CRAMER'S V = .12354

CONTINGENCY COEFFICIENT = .12261

NUMBER OF MISSING OBSERVATIONS = 14

11/04/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFD

 NV16 ***** C R O S S T A B U L A T I O N O F W I N D *****
 ***** BY V69 ***** PAGE 1 OF 1

		V69					
		COUNT	ICALM	MODERATE	STRONG	ROW	TOTAL
		ROW PCT	COL PCT	TOT PCT	TOT PCT		
NV16	0-20 PCT	2.	1	2	2	2	6
		33.3	33.3	33.3	33.3	4.2	
		4.3	2.2	2.2	25.0		
	20-40 PCT	4.	1	1.4	1.4	1.4	13
		15.4	76.9	10	7.7	9.0	
		4.3	11.1	12.5	.7		
	40-60 PCT	6.	1	12	15	3	30
		40.0	50.0	10.0	37.5	20.8	
		26.1	16.7	2.1			
	60-80 PCT	8.	1	20	36	1	57
		35.1	63.2	1.8	12.5	39.6	
		43.5	40.0	.7			
	80-100 PCT	10.	1	10	27	1	38
		26.3	71.1	2.6	12.5	26.4	
		21.7	30.0	.7			
		COLUMN	46	90	8	144	
		TOTAL	31.9	62.5	5.6	100.0	

RAW CHI SQUARE = 16.30434 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .0382
 CRAMER'S V = .23793
 CONTINGENCY COEFFICIENT = .31892
 NUMBER OF MISSING OBSERVATIONS = 35

(16) 168x (167) 168x

APPENDIX III-B

Wearability/Accessibility Study
Crosstabulations

Crosstabulation with NV 8

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** CH O S S I A H U L A I I O N O F ***** ATTITUDE ON ACES
 NVB BY NVY ***** PAGE 1 OF 1

COUNT		NV9		ROW	
ROW	PCT	COL	PCT	TOT	TOT

NVB		1.1	2.1	3.1	
1.	3	3	3	20	26
THRW AND EMRG NR	11.5	11.5	11.5	76.9	14.5
	25.0	8.1	15.4		
	1.7	1.7	11.2		

2.	2	10	24		36
WRBL BUT RLKY UN	5.6	27.8	66.7		20.1
	16.7	27.0	18.5		
	1.1	5.6	13.4		

3.	3	2	14		19
YOKE TYP INFLBL	15.8	10.5	73.7		10.6
	25.0	5.4	10.8		
	1.7	1.1	7.8		

4.	3	17	55		75
VEST AND JACKETS	4.0	22.7	73.3		41.9
	25.0	45.9	42.3		
	1.7	9.5	30.7		

5.	1	5	17		23
BELT TYP	4.3	21.7	73.9		12.8
	8.3	13.5	13.1		
	.6	2.8	9.5		

COLUMN	12	37	130		179
TOTAL	6.7	20.7	72.6		100.0

MAX CHI SQUARE = 7.61258 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .4722
 CRAMER'S V = .14582
 CONTINGENCY COEFFICIENT = .20197

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** C R O S S T A B U L A T I O N O F *****
 NVB BY NV10 ATTWEAR ROUGH CD *****
 ***** PAGE 1 OF 1 *****

		NV10		HOW	
COUNT	I			TOTAL	
ROW PCT	I				
COL PCT	I				
TOT PCT	I	2.1	3.1		

NVB					
1.	1	2	24	26	
THRW AND EMRG WR	I	7.7	92.3	14.5	
	I	20.0	14.2		
	I	1.1	13.4		
	I	1			
2.	1	1	35	36	
WRBL BUT SLKY UN	I	2.8	97.2	20.1	
	I	10.0	20.7		
	I	.6	19.6		
	I	1			
	I	1			
3.	1	3	16	19	
YOKE TYP INFLTBL	I	15.8	84.2	10.6	
	I	30.0	9.5		
	I	1.7	8.9		
	I	1			
4.	1	3	72	75	
VEST AND JACKETS	I	4.0	96.0	41.9	
	I	30.0	42.6		
	I	1.7	40.2		
	I	1			
5.	1	1	22	23	
BELT TYP	I	4.3	95.7	12.8	
	I	10.0	13.0		
	I	.6	12.3		
	I	1			
COLUMN		10	169	179	
TOTAL		5.6	94.4	100.0	

RAW CHI SQUARE = 4.93180 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .2944
 CRAMER'S V = .16599
 CONTINGENCY COEFFICIENT = .16375

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** CROSS TABULATION OF *****
NVS ***** ATTITU ON EFF-REL *****
***** BY NV11 ***** PAGE 1 OF 1

		NV11				ROW TOTAL	
		COUNT	1	2	3	4	TOTAL
		ROW PCT	1.1	2.1	3.1	4.1	
		COL PCT	1.1	2.1	3.1	4.1	
		TOT PCT	1.1	2.1	3.1	4.1	
NVS	1.	7	16	2	25		
	THRW AND EMRG WR	28.0	64.0	8.0	14.5		
	1	16.7	13.2	20.0			
	1	4.0	9.2	1.2			
WRBL BUT BLKY UN	2.	8	26	1	35		
	1	22.9	74.3	2.9	20.2		
	1	19.0	21.5	10.0			
	1	4.6	15.0	.6			
YOK TYP INFLIBL	3.	5	12	1	18		
	1	27.8	66.7	5.6	10.4		
	1	11.9	9.9	10.0			
	1	2.9	6.9	.6			
VEST AND JACKETS	4.	17	52	4	73		
	1	23.3	71.2	5.5	42.2		
	1	40.5	43.0	40.0			
	1	9.8	30.1	2.3			
BELT TYP	5.	5	15	2	22		
	1	22.7	68.2	9.1	12.7		
	1	11.9	12.4	20.0			
	1	2.9	8.7	1.2			
COLUMN TOTAL		42	121	10	173		
		24.3	69.9	5.8	100.0		

RAW CHI SQUARE = 1.74985 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .9877
GRAMEK'S V = .07112
CONTINGENCY COEFFICIENT = .10007
NUMBER OF MISSING OBSERVATIONS = 0

(173)

(173)

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** C R O S S T A B U L A T I O N U F *****
 NV3 ***** NEED FOR PFU *****
 NV12 ***** BY NV12 *****
 ***** PAGE 1 OF 1 *****

2142

[illegible]

RAW CHI SQUARE = 1.65459 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .9898
 CRAMER'S V = .06798
 CONTINGENCY COEFFICIENT = .09570

04570

174

174

WEARABILITY DATA ANALYSIS

01/09/78

FILE IED (CREATION DATE = 01/09/78) LOLL PPD

***** C R O S S T A B U L A T I O N O F I M A G E *****
 NVB BY NV13 ***** PAGE 1 OF 1

NV13					COUNT		ROW	
					ROW	PCT	PCT	TOTAL
					COL	PCT	PCT	
					TOT	PCT	PCT	
					1.1	2.1	3.1	
1. THRW AND EMRG WR					3	17	2	22
					13.6	77.3	9.1	13.2
					15.8	13.4	9.5	
					1.8	10.2	1.2	
2. WRBL BUT BLKY UN					2	26	7	35
					5.7	74.3	20.0	21.0
					10.5	20.5	33.3	
					1.2	15.6	4.2	
3. YOKE TYP INFLTBL					2	12	3	17
					11.8	70.6	17.6	10.2
					10.5	9.4	14.3	
					1.2	7.2	1.8	
4. VEST AND JACKETS					10	53	8	71
					14.1	74.6	11.3	42.5
					52.6	41.7	38.1	
					6.0	31.7	4.8	
5. BELT TYP					2	19	1	22
					9.1	86.4	4.5	13.2
					10.5	15.0	4.8	
					1.2	11.4	.6	
COLUMN TOTAL					19	127	21	167
					11.4	76.0	12.6	100.0

RAW CHI SQUARE = 5.37648 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .7167

CRAMER'S V = .12687

CONTINGENCY COEFFICIENT = .17661

NUMBER OF MISSING OBSERVATIONS = 12

01/09/78

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** C R O S S T A B U L A T I O N O F *****
 NVB ***** HY NV14 ***** PFD WEAR *****
 ***** PAGE 1 OF 1 *****

NV14									
COUNT		ROW		COL		TOT		ROW	
PCT		PCT		PCT		PCT		TOTAL	
1.		2.		3.		4.		5.	
1.		11		9		16.7		13.9	
THW AND EMRG WR		45.8		37.5		11.1		2.3	
1.		15.1		14.1		5.2		2.3	
2.		14		13		8		35	
WRBL HUT BLKY UN		40.0		37.1		22.9		20.2	
1.		19.2		20.3		22.2		17	
3.		8.1		7.5		4.6		9.8	
YOKE TYP INFLIBL		10		4		3		74	
1.		58.8		23.5		17.6		42.8	
1.		13.7		6.3		8.3		17	
1.		5.8		2.3		1.7		74	
4.		28		30		16		42.8	
VEST AND JACKETS		37.8		40.5		21.6		23	
1.		38.4		46.9		44.4		13.3	
1.		16.2		17.3		9.2		13.3	
5.		10		8		5		173	
HELT TYP		43.5		34.8		21.7		100.0	
1.		13.7		12.5		13.9		173	
1.		5.8		4.6		2.9		100.0	
COLUMN		73		64		36		173	
TOTAL		42.2		37.0		20.8		100.0	

RAW CHI SQUARE = 3.07131 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .9298
 CRAMER'S V = .09422
 CONTINGENCY COEFFICIENT = .13207
 NUMBER OF MISSING OBSERVATIONS = 6

01/09/78

RELIABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 01/09/78) COLL PFD

***** C R O S S T A B U L A T I O N O F AGE ***** PAGE 1 OF 1

		V3										ROW TOTAL
COUNT	ROW PCT	1.01	2.01	3.01	4.01	5.01						
COL PCT	TOT PCT	4	6	5	5	5						
1.		16.0	24.0	20.0	20.0	20.0	1	20.0	1	20.0	1	25
THR AND EMRG WH		13.8	13.0	12.8	14.3	14.3	1	14.3	1	21.7	1	14.5
		2.3	3.5	2.9	2.9	2.9	1	2.9	1	2.9	1	
2.		3	10	9	8	5						35
WRBL HUT BLKY UN		8.6	28.6	25.7	22.9	14.3	1	22.9	1	14.3	1	20.3
		10.3	21.7	23.1	22.9	21.7	1	22.9	1	21.7	1	
		1.7	5.8	5.2	4.7	2.9	1	4.7	1	2.9	1	
3.		5	5	4	3	2						19
YOKE TYP INFLTBL		26.3	26.3	21.1	15.8	10.5	1	15.8	1	10.5	1	11.0
		17.2	10.9	10.3	8.6	8.7	1	8.6	1	8.7	1	
		2.9	2.9	2.3	1.7	1.2	1	1.7	1	1.2	1	
4.		13	21	15	12	9						70
VEST AND JACKETS		18.6	30.0	21.4	17.1	12.9	1	17.1	1	12.9	1	40.7
		44.8	45.7	38.5	34.3	39.1	1	34.3	1	39.1	1	
		7.6	12.2	8.7	7.0	5.2	1	7.0	1	5.2	1	
5.		4	4	6	7	2						23
BELT TYP		17.4	17.4	26.1	30.4	8.7	1	30.4	1	8.7	1	13.4
		13.8	8.7	15.4	20.0	8.7	1	20.0	1	8.7	1	
		2.3	2.3	3.5	4.1	1.2	1	4.1	1	1.2	1	
COLUMN TOTAL		29	46	39	35	23						172
		16.9	26.7	22.7	20.3	13.4						100.0

RAW CHI SQUARE = 7.28026 WITH 16 DEGREES OF FREEDOM. SIGNIFICANCE = .9675

KRAMER'S V = .10287

CONTINGENCY COEFFICIENT = .20151

NUMBER OF MISSING OBSERVATIONS = 7

(77)

177

11/04/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PED

***** C R O S S T A B U L A T I O N O F S E X *****
 NV8 BY V4 ***** PAGE 1 OF 1

		COUNT		V4		FEMALE		ROW	
		ROW	PCT	MALE		1.01	2.01	TOTAL	
		COL	PCT						
		TOT	PCT						
NV8									
1.		18		7				25	
THRW AND EMRG WR		72.0		24.0				14.1	
		14.9		12.5					
		10.2		4.0					
2.		23		13				36	
WRHL BUT BLKY UN		63.9		36.1				20.3	
		19.0		23.2					
		13.0		7.3					
3.		12		7				19	
YOKE TYP INFLTHL		63.2		36.8				10.7	
		9.9		12.5					
		6.8		4.0					
4.		53		21				74	
VEST AND JACKETS		71.6		28.4				41.8	
		43.8		37.5					
		29.9		11.9					
5.		15		8				23	
BELT TYP		65.2		34.8				13.0	
		12.4		14.3					
		8.5		4.5					
COLUMN		121		56				177	
TOTAL		68.4		31.6				100.0	

RAW CHI SQUARE = 1.19262 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .8793

CRAMER'S V = .08209

CONTINGENCY COEFFICIENT = .04181

NUMBER OF MISSING OBSERVATIONS = 2

122 57

FEMALE EVALUATIONS
 60 - 3 = 57
 deleted

11/04/77

WEARABILITY DATA ANALYSIS

FILE TFD (CREATION DATE = 11/04/77) COLL PFD

***** CROSSTABULATION OF BOATING SAFETY EDUCATION BY NV6 ***** PAGE 1 OF 1

	COUNT		NV6		ONE OR MORE COURSES	ROW TOTAL
	COL PCT	ROW PCT	NONE			
NVB	TOT PCT		01	1.1		
THRW AND EMRG WR	1.	4	21		25	
			16.0	84.0	14.0	
			7.1	17.2		
			2.2	11.8		
WRHL BUT BLKY UN	2.	10	26		36	
			27.8	72.2	20.2	
			17.9	21.3		
			5.6	14.6		
YOKE TYP INFLIBL	3.	7	12		19	
			36.8	63.2	10.7	
			12.5	9.8		
			3.9	6.7		
VEST AND JACKETS	4.	29	46		75	
			38.7	61.3	42.1	
			51.8	37.7		
			16.3	25.8		
BELT TYP	5.	6	17		23	
			26.1	73.9	12.9	
			10.7	13.9		
			3.4	9.6		
COLUMN TOTAL		56	122		178	
		31.5	68.5		100.0	

RAW CHI SQUARE = 5.36707 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .2517
 GAMER'S V = .17364
 CONTINGENCY COEFFICIENT = .17104
 NUMBER OF MISSING OBSERVATIONS = 1

179

179

11/04/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFD

***** C R O S S T A B U L A T I O N O F *****
 NVB ***** BY VII ***** BOAT EXPER *****
 ***** PAGE 1 OF 1 *****

VII						
COUNT	120-100	100-500	GREATER	ROW		
ROW PCT	COL PCT	TOT PCT	THEN 500	TOTAL		
1.	2.01	3.01	4.01	25		
THRW AND ENRG WR	0	2	23	14.0		
	0	8.0	92.0			
	0	8.3	15.6			
	0	1.1	12.9			
2.	1	6	29	36		
WRBL BUT BLKY UN	2.8	16.7	80.6	20.2		
	14.3	25.0	19.7			
	.6	3.4	16.3			
3.	3	3	13	19		
YOKE TYP INFLIBL	15.8	15.8	68.4	10.7		
	42.9	12.5	8.8			
	1.7	1.7	7.3			
4.	11	11	62	75		
VEST AND JACKETS	2.7	14.7	82.7	42.1		
	28.6	45.8	42.2			
	1.1	6.2	34.8			
5.	1	2	20	23		
BELT TYP	4.3	8.7	87.0	12.9		
	14.3	8.3	13.6			
	.6	1.1	11.2			
COLUMN	7	24	147	178		
TOTAL	3.9	13.5	82.6	100.0		

RAW CHI SQUARE = 10.38628 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .2390

CHAMBERS V = .17081

CONTINGENCY COEFFICIENT = .23480

NUMBER OF MISSING OBSERVATIONS = 1

11/04/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PED

***** CHOSSTABULAIION OF ***** LOCATION *****
 NVB ***** BY V12 ***** PAGE 1 OF 1

V12									
COUNT	ROW PCT	IRIVER*CR	SMALL LA	WATERWAY	OCEAN	ROW			
COL PCT	IFER*ETC	KE	*DAY*ETC						
TOT PCT	1.01	2.01	4.01	5.01					
NVB									
1.	0	1	0	5	20	25			
THR AND EMRG WR	0	1	0	20.0	80.0	14.5			
	0	1	0	17.2	16.0				
	0	1	0	2.9	11.6				
2.	0	1	4	2	29	35			
WRBL HUT BLKY UN	0	11.4	5.7	82.9	20.2				
	0	22.2	6.9	23.2					
	0	2.3	1.2	16.8					
3.	0	1	0	4	14	18			
YOKE TYP INFLTBL	0	1	0	22.2	77.8	10.4			
	0	1	0	13.8	11.2				
	0	1	0	2.3	8.1				
4.	1	13	14	45	73				
VEST AND JACKETS	1.4	17.8	19.2	61.6	42.2				
	100.0	72.2	48.3	36.0					
	.6	7.5	8.1	26.0					
5.	0	1	4	17	22				
BELT TYP	0	4.5	18.2	77.3	12.7				
	0	5.6	13.8	13.6					
	0	.6	2.3	9.8					
COLUMN	1	18	29	125	173				
TOTAL	.6	10.4	16.8	72.3	100.0				

RAW CHI SQUARE = 15.79857 WITH 12 DEGREES OF FREEDOM. SIGNIFICANCE = .2006
 CRAMER'S V = .17447
 CONTINGENCY COEFFICIENT = .23927
 NUMBER OF MISSING OBSERVATIONS = 6

181

181

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFU

***** C R O S S T A B U L A T I O N O F *****
 NVR BY V13 BOAT TYPE ***** PAGE 1 OF 1

v13

COUNT	ICANOE	OTHER	SAIL	OPEN POW ER	CABIN NO TORBOAT	ROW TOTAL
1. THRW AND EMKG WR	1.01	3.01	4.01	6.01	7.01	24 13.7
2. WRBL BUT BLKY UN	4	0	13	7	12	36 20.6
3. YOKE TYP INFLIBL	11.1	0	36.1	19.4	33.3	18 10.3
4. VEST AND JACKETS	17.6	1.4	25.7	31.1	24.3	74 42.3
5. BELT TYP	72.2	100.0	43.2	38.3	34.6	23 13.1
COLUMN TOTAL	18	1	44	60	52	175 100.0

RAW CHI SQUARE = 21.00227 WITH 16 DEGREES OF FREEDOM. SIGNIFICANCE = .1784

CRAMER'S V = .17321

CONTINGENCY COEFFICIENT = .32734

NUMBER OF MISSING OBSERVATIONS = 4

(182)

182

11/04/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFD

***** CROSSTABULATION OF *****
 NVB ***** BY V14 *****
 ***** HOAT LENGTH *****
 ***** PAGE 1 OF 1 *****

V14									
COUNT	1	2	3	4	5	6	7	8	9
ROW PCT	16	16-20	20-26	26	26	26	26	26	26
COL PCT	1	1.01	2.01	3.01	4.01	4.01	4.01	4.01	4.01
TOT PCT	1	1.01	2.01	3.01	4.01	4.01	4.01	4.01	4.01
NVB									
1.	21	13.2							
THRM AND EMRG NR	1	9.5	28.6	9.5	52.4	13.2			
	1	11.1	11.8	18.2	13.9				
	1	1.3	3.8	1.3	6.9				
2.	33	20.8							
WRBL BUT BLKY UN	1	5	5	3	20				
	1	15.2	15.2	9.1	60.6	20.8			
	1	27.8	9.8	27.3	25.3				
	1	3.1	3.1	1.9	12.6				
3.	16	10.1							
YOKE TYP INFLTL	1	2	6	2	6				
	1	12.5	37.5	12.5	37.5	10.1			
	1	11.1	11.8	18.2	7.6				
	1	1.3	3.8	1.3	3.8				
4.	69	43.4							
VEST AND JACKETS	1	7	27	3	32				
	1	10.1	39.1	4.3	46.4	43.4			
	1	39.9	52.9	27.3	40.5				
	1	4.4	17.0	1.9	20.1				
5.	20	12.6							
BELT TYP	1	2	7	1	10				
	1	10.0	35.0	5.0	50.0	12.6			
	1	11.1	13.7	9.1	12.7				
	1	1.3	4.4	.6	6.3				
COLUMN	18	51	11	79	159				
TOTAL	11.3	32.1	6.9	49.7	100.0				

RAW CHI SQUARE = 8.29086 WITH 12 DEGREES OF FREEDOM. SIGNIFICANCE = .7620
 CRAMER'S V = .13184
 CONTINGENCY COEFFICIENT = .22662
 NUMBER OF MISSING OBSERVATIONS = 20

(183)

(183)

11/04/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFD

***** C R O S S T A B U L A T I O N O F C U S T O M E R P F D W E A R *****
 NVB BY V29 ***** PAGE 1 OF 1

		V29						
		COUNT	50-75	10-50	1-10	NEVER	ROW	TOTAL
		ROW PCT 175	1.01	2.01	3.01	4.01	5.01	
		COL PCT	1.01	2.01	3.01	4.01	5.01	
		TOT PCT	1.01	2.01	3.01	4.01	5.01	
NVR		1.	2	0	6	7	10	25
THR AND EMRG WR		8.0	0	24.0	28.0	40.0	14.0	14.0
		11.1	0	13.0	14.9	16.4		
		1.1	0	3.4	3.9	5.6		
WRBL HUT BLKY UN		8.3	1	11	11	10	36	20.2
		16.7	16.7	23.9	23.4	16.4		
		1.7	.6	6.2	6.2	5.6		
YOKE TYP INFLIBL		10.5	2	0	5	3	9	19
		11.1	0	26.3	15.8	47.4	10.7	
		1.1	0	10.9	6.4	14.8		
		1.1	0	2.8	1.7	5.1		
VEST AND JACKETS		12.0	9	4	19	24	75	42.1
		50.0	5.3	25.3	25.3	32.0		
		5.1	66.7	41.3	40.4	39.3		
		2.2	2.2	10.7	10.7	13.5		
BELT TYP		8.7	2	1	5	7	23	12.9
		11.1	4.3	21.7	30.4	34.8		
		1.1	16.7	10.9	14.9	13.1		
		1.1	.6	2.8	3.9	4.5		
COLUMN TOTAL		18	6	46	47	61	178	
		10.1	3.4	25.8	26.4	34.3	100.0	

RAW CHI SQUARE = 6.47221 WITH 16 DEGREES OF FREEDOM. SIGNIFICANCE = .9821
 CRAMER'S V = .09534
 CONTINGENCY COEFFICIENT = .18731
 NUMBER OF MISSING OBSERVATIONS = 1

184

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11/04/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PTD

***** C R O S S T A B U L A T I O N O F F I S H I N G *****
 NVB ***** BY V54 ***** PAGE 1 OF 1

V54

COUNT				NO		ROW TOTAL
ROW	PCT	COL	PCT	1.01	2.01	
TOT	PCT					
1.						
THRW AND EMRG WR	5	20	1	25		
	20.0	80.0	1	14.0		
	10.2	15.5	1			
	2.8	11.2	1			
2.						
WRBL BUT BLKY UN	7	29	1	36		
	19.4	80.6	1	20.2		
	14.3	22.5	1			
	3.9	16.3	1			
3.						
YOKE TYP INFLTHL	4	15	1	19		
	21.1	78.9	1	10.7		
	8.2	11.6	1			
	2.2	8.4	1			
4.						
VEST AND JACKETS	25	50	1	75		
	33.3	66.7	1	42.1		
	51.0	38.8	1			
	14.0	28.1	1			
5.						
BELT TYP	8	15	1	23		
	34.8	65.2	1	12.9		
	16.3	11.6	1			
	4.5	8.4	1			
COLUMN	49	129	1	178		
TOTAL	27.5	72.5	1	100.0		

RAW CHI SQUARE = 4.16235 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .3845
 CRAMER'S V = .15292
 CONTINGENCY COEFFICIENT = .15116
 NUMBER OF MISSING OBSERVATIONS = 1

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11/04/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFD

***** C R O S S T A B U L A T I O N O F C A N O E I N G O R K A Y A K I N G *****
 NVB BY V55 ***** PAGE 1 OF 1

V55			
COUNT	1	2	3
ROW PCT	1	1	1
COL PCT	1	1	1
TOT PCT	1.01	2.01	2.01
NVB	1.	1.	1.
THRW AND EMRG WR	0	25	25
	0	100.0	14.0
	0	15.4	1
	0	14.0	1
WRBL BUT BLKY UN	4	32	36
	11.1	88.9	20.2
	25.0	19.8	1
	2.2	18.0	1
YOKE TYP INFLTBL	0	19	19
	0	100.0	10.7
	0	11.7	1
	0	10.7	1
VEST AND JACKETS	10	65	75
	13.3	86.7	42.1
	62.5	40.1	1
	5.6	36.5	1
BELT TYP	2	21	23
	8.7	91.3	12.9
	12.5	13.0	1
	1.1	11.8	1
COLUMN TOTAL	16	162	178
	9.0	91.0	100.0

RAW CHI SQUARE = 6.27676 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .1794
 CRAMER'S V = .18778
 CONTINGENCY COEFFICIENT = .18456
 NUMBER OF MISSING OBSERVATIONS = 1

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11/04/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFD

***** C R O S S T A B U L A T I O N O F S K I N D I V I N G *****
 NV8 ***** BY V56 ***** PAGE 1 OF 1

COUNT				V56			
ROW	PCT	ROW	PCT	ROW	PCT	ROW	PCT
TOT	PCT	TOT	PCT	TOT	PCT	TOT	PCT
-----				-----			
1.	25	1	25	1.	25	1	25
THRW AND EMRG WR	100.0	1	14.0	THRW AND EMRG WR	100.0	1	14.0
2.	36	1	36	2.	36	1	36
WRBL BUT BLKY UN	100.0	1	20.2	WRBL BUT BLKY UN	100.0	1	20.2
3.	19	1	19	3.	19	1	19
YOKE TYP INFLTHL	100.0	1	10.7	YOKE TYP INFLTHL	100.0	1	10.7
4.	75	1	75	4.	75	1	75
VEST AND JACKETS	100.0	1	42.1	VEST AND JACKETS	100.0	1	42.1
5.	23	1	23	5.	23	1	23
BELT TYP	100.0	1	12.9	BELT TYP	100.0	1	12.9
COLUMN	178	1	178	COLUMN	178	1	178
TOTAL	100.0	1	100.0	TOTAL	100.0	1	100.0

NUMBER OF MISSING OBSERVATIONS = 1

(187)

(187)

11/04/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFD

***** C R O S S T A B U L A T I O N O F S C U B A D I V I N G
 NV8 BY V57 ***** PAGE 1 OF 1

COUNT				ROW			
V57				TOTAL			
ROW	PCT	COL	PCT	TOT	PCT	TOT	PCT
NV8				1.01	2.01		
1.	0	1	25			25	
THR AND EMRG WR	0	1	100.0			14.0	
	0	1	14.2				
	0	1	14.0				
2.	1	1	35			36	
WRBL HUT BLKY UN	2.8	1	97.2			20.2	
	50.0	1	19.9				
	.6	1	19.7				
3.	1	1	18			19	
YUKE TYP INFLTBL	5.3	1	94.7			10.7	
	50.0	1	10.2				
	.6	1	10.1				
4.	0	1	75			75	
VEST AND JACKETS	0	1	100.0			42.1	
	0	1	42.6				
	0	1	42.1				
5.	0	1	23			23	
BELT TYP	0	1	100.0			12.9	
	0	1	13.1				
	0	1	12.9				
COLUMN	2	176				178	
TOTAL	1.1	98.9				100.0	

RAW CHI SQUARE = 5.21503 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .2659
 CRAMER'S V = .17117
 CONTINGENCY COEFFICIENT = .16871
 NUMBER OF MISSING OBSERVATIONS = 1

11/04/77

RESEARCH DATA ANALYSIS

FILE: TED CREATION DATE = 11/04/77) COLL: PFD

CROSS TABULATION OF SWIMMING BY V58 ***** PAGE 1 OF 1

V58		COUNT		ROW	
		ROW PCT	COL PCT	TOTAL	
		TOT PCT	TOT PCT		
1.	FINN AND EMRG NR	0	1	25	25
		0	1	100.0	14.0
		0	1	14.1	
		0	1	14.0	
2.	MRBL HUT BLKY UN	0	1	36	36
		0	1	100.0	20.2
		0	1	20.3	
		0	1	20.2	
3.	YUKE TYP INFLTBL	0	1	19	19
		0	1	100.0	10.7
		0	1	10.7	
		0	1	10.7	
4.	VEST AND JACKETS	1	1	74	75
		1.3	1	98.7	42.1
		100.0	1	41.8	
		.6	1	41.6	
5.	BELT TYP	0	1	23	23
		0	1	100.0	12.9
		0	1	13.0	
		0	1	12.9	
COLUMN TOTAL		1	177	174	
		.6	99.4	100.0	

RAW CHI SQUARE = 1.38109 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .8475
 CRAMER'S V = .08408
 CONTINGENCY COEFFICIENT = .08775
 NUMBER OF MISSING OBSERVATIONS = 1

11/04/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFD

***** C R O S S T A B U L A T I O N O F C A M P I N G *****
 NV8 BY V59 ***** PAGE 1 OF 1

COUNT		ROW	
ROW	PCT	TOT	TOTAL
NVR			
1.	25	2.01	25
THRM AND EMRG WR	100.0	1	14.0
	14.0	1	
	14.0	1	
2.	36	36	36
WRBL RUT BLKY UN	100.0	1	20.2
	20.2	1	
	20.2	1	
3.	19	19	19
YOKE TYP INFLTHL	100.0	1	10.7
	10.7	1	
	10.7	1	
4.	75	75	75
VEST AND JACKETS	100.0	1	42.1
	42.1	1	
	42.1	1	
5.	23	23	23
BELT TYP	100.0	1	12.9
	12.9	1	
	12.9	1	
COLUMN	178	178	178
TOTAL	100.0	100.0	100.0

(NUMBER OF MISSING OBSERVATIONS = 1)

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11/04/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFU

***** C H R O S S T A B U L A T I O N O F S A I L I N G
 NV8 BY V60 ***** PAGE 1 OF 1

v60		COUNT		ROW	
		TOT PCT		TOTAL	
NV8		1.01		2.01	
1.		1		24	
THRW AND EMRG WR		4.0		96.0	
		5.0		15.2	
		.6		13.5	
2.		8		28	
WRHL BUT BLKY UN		22.2		77.8	
		40.0		17.7	
		4.5		15.7	
3.		2		17	
YOKE TYP INFLTHL		10.5		89.5	
		10.0		10.8	
		1.1		9.6	
4.		7		68	
VEST AND JACKETS		9.3		90.7	
		35.0		43.0	
		3.9		38.2	
5.		2		21	
BELT TYP		8.7		91.3	
		10.0		13.3	
		1.1		11.8	
COLUMN		20		158	
TOTAL		11.2		88.8	
				178	
				100.0	

RAW CHI SQUARE = 6.09977 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .1918

CRAMER'S V = .18512

CONTINGENCY COEFFICIENT = .18202

NUMBER OF MISSING OBSERVATIONS = 1

11/04/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFD

***** C R O S S T A B U L A T I O N O F *****
 NVB BY V61 WATER SKIING *****
 ***** PAGE 1 OF 1 *****

		V61							
		COUNT	ROW						
		ROW PCT	COL PCT						
		TOT PCT	TOT PCT						
		1.01	2.01						
NVB									
1.		0	25						
THR W AND EMRG WR		0	100.0						
		0	14.5						
		0	14.0						
2.		2	34						
WRBL BUT BLKY UN		5.6	94.4						
		33.3	19.8						
		1.1	19.1						
3.		0	19						
YOKE TYP INFLTBL		0	100.0						
		0	11.0						
		0	10.7						
4.		3	72						
VEST AND JACKETS		4.0	96.0						
		50.0	41.9						
		1.7	40.4						
5.		1	22						
BELT TYP		4.3	95.7						
		16.7	12.8						
		.6	12.4						
COLUMN		6	172						
TOTAL		3.4	96.6						
			178						
			100.0						

RAW CHI SQUARE = 2.22102 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .6952

CRAMER'S V = .11170

CONTINGENCY COEFFICIENT = .11101

NUMBER OF MISSING OBSERVATIONS = 1

192

192

11/04/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFD

***** C R O S S T A B U L A T I O N O F P L E A S U R E C R U I S I N G *****
 NV8 BY V62 ***** PAGE 1 OF 1

		COUNT		ROW	
		ROW	PCT	TOT	TOTAL
		COL	PCT		
		TOT	PCT	1.01	2.01
NV8					
1. THRW AND EMRG WR		15	10		25
		60.0	40.0		14.0
		18.5	10.3		
		8.4	5.6		
2. WRBL BUT BLKY UN		16	20		36
		44.4	55.6		20.2
		19.8	20.6		
		9.0	11.2		
3. YOKE TYP INFLTBL		10	9		19
		52.6	47.4		10.7
		12.3	9.3		
		5.6	5.1		
4. VEST AND JACKETS		30	45		75
		40.0	60.0		42.1
		37.0	46.4		
		16.9	25.3		
5. BELT TYP		10	13		23
		43.5	56.5		12.9
		12.3	14.4		
		5.6	7.3		
COLUMN TOTAL		81	97		178
		45.5	54.5		100.0

RAW CHI SQUARE = 3.47828 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .4812
 CRAMER'S V = .13979
 CONTINGENCY COEFFICIENT = .13844
 NUMBER OF MISSING OBSERVATIONS = 1

11/04/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFD

***** C R O S S T A B U L A T I O N O F *****
 NVB BY V63 RACING *****
 ***** PAGE 1 OF 1 *****

COUNT		ROW	
COL PCT	TOT PCT	COL PCT	TOT PCT
V63			
1.	25	25	25
THR AND EMRG NR	100.0	14.0	14.0
	14.0	14.0	14.0
	14.0		
2.	36	36	36
WRBL BUT BLKY UN	100.0	20.2	20.2
	20.2	20.2	20.2
	20.2		
3.	19	19	19
YOKE TYP INFLIBL	100.0	10.7	10.7
	10.7	10.7	10.7
	10.7		
4.	75	75	75
VEST AND JACKETS	100.0	42.1	42.1
	42.1	42.1	42.1
	42.1		
5.	23	23	23
BELT TYP	100.0	12.9	12.9
	12.9	12.9	12.9
	12.9		
COLUMN	178	178	178
TOTAL	100.0	100.0	100.0

NUMBER OF MISSING OBSERVATIONS = 1

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11/04/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFD

***** C R O S S T A B U L A T I O N O F H U N T I N G *****
 NVB BY V64 ***** PAGE 1 OF 1

COUNT		ROW	
ROW	PCT	TOT	TOTAL

1.	25	25	14.0
THR AND EMRG WR	100.0	1	14.0
	14.0	1	14.0
	14.0	1	14.0

2.	36	36	20.2
WRHL HUT BLKY UN	100.0	1	20.2
	20.2	1	20.2
	20.2	1	20.2

3.	19	19	10.7
YOKE TYP INFLTBL	100.0	1	10.7
	10.7	1	10.7
	10.7	1	10.7

4.	75	75	42.1
VEST AND JACKETS	100.0	1	42.1
	42.1	1	42.1
	42.1	1	42.1

5.	23	23	12.9
BELT TYP	100.0	1	12.9
	12.9	1	12.9
	12.9	1	12.9

COLUMN	178	178	100.0
TOTAL	100.0	100.0	100.0

NUMBER OF MISSING OBSERVATIONS = 1

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11/04/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFD

***** C R O S S T A B U L A T I O N O F W A T E R C O N D I T I O N S *****
NVR BY V66 ***** PAGE 1 OF 1

V66					
COUNT	CHOPPY	ROUGH OR	HOW		
ROW PCT	ICALM	WHITE	TOTAL		
COL PCT					
TOT PCT	1.01	2.01	3.01		
1.	8	16	1	25	
THRW AND EMRG WR	32.0	64.0	4.0	14.0	
	14.8	16.0	4.2		
	4.5	9.0	.6		
2.	10	22	4	36	
WRBL BUT BLKY UN	27.8	61.1	11.1	20.2	
	18.5	22.0	16.7		
	5.6	12.4	2.2		
3.	4	10	5	19	
YOKE TYP INFLIBL	21.1	52.6	26.3	10.7	
	7.4	10.0	20.8		
	2.2	5.6	2.8		
4.	22	41	12	75	
VEST AND JACKETS	29.3	54.7	16.0	42.1	
	40.7	41.0	50.0		
	12.4	23.0	6.7		
5.	10	11	2	23	
BELT TYP	43.5	47.8	8.7	12.9	
	18.5	11.0	8.3		
	5.6	6.2	1.1		
COLUMN	54	100	24	178	
TOTAL	30.3	56.2	13.5	100.0	

RAW CHI SQUARE = 7.64295 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .4691

CRAMER'S V = .14652

CONTINGENCY COEFFICIENT = .20290

NUMBER OF MISSING OBSERVATIONS = 1

WEARABILITY DATA ANALYSIS

11/04/77

FILE TED (CREATION DATE = 11/04/77) COLL PFD

***** C H O S S I A B U L A T I O N O F *****
 NVB BY V67 AIR TEMPERATURE *****
 ***** PAGE 1 OF 1

COUNT		V67							ROW TOTAL
ROW	PCT	I-40	OR L	51-60	61-70	71-80	81-90		
COL PCT		TOTAL							
TOT PCT		1-01	3-01	4-01	5-01	6-01			
1.		0	1	13	10	1	1	25	
THR AND ENRG WR		0	4.0	52.0	40.0	4.0	4.0	14.0	
I		0	25.0	16.9	12.0	11.1	11.1		
I		0	.6	7.3	5.6	.6	.6		
2.		1	1	18	15	1	1	36	
WRBL BUT BLKY UN		2.8	2.8	50.0	41.7	2.8	2.8	20.2	
I		20.0	25.0	23.4	18.1	11.1	11.1		
I		.6	.6	10.1	8.4	.6	.6		
3.		1	0	9	9	0	0	19	
YOKE TYP INFLIBL		5.3	0	47.4	47.4	0	0	10.7	
I		20.0	0	11.7	10.8	0	0		
I		.6	0	5.1	5.1	0	0		
4.		2	2	29	36	6	6	75	
VEST AND JACKETS		2.7	2.7	38.7	48.0	8.0	8.0	42.1	
I		40.0	50.0	37.7	43.4	66.7	66.7		
I		1.1	1.1	16.3	20.2	3.4	3.4		
5.		1	0	8	13	1	1	23	
BELT TYP		4.3	0	34.8	56.5	4.3	4.3	12.9	
I		20.0	0	10.4	15.7	11.1	11.1		
I		.6	0	4.5	7.3	.6	.6		
COLUMN		5	4	77	83	9	9	178	
TOTAL		2.8	2.2	43.3	46.6	5.1	5.1	100.0	

RAW CHI SQUARE = 7.97470 WITH 16 DEGREES OF FREEDOM. SIGNIFICANCE = .9496

CRAMER'S V = .10583

CONTINGENCY COEFFICIENT = .20708

NUMBER OF MISSING OBSERVATIONS = 1

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11/04/77

WEARABILITY DATA ANALYSIS

FILE TED (CREATION DATE = 11/04/77) COLL PFD

***** C R O S S T A B U L A T I O N O F W E A T H E R *****
 NVB BY V68 ***** PAGE 1 OF 1

V68					ROW
COUNT	I	SUNNY	CLOUDY	TOTAL	
ROW	PCT				
COL	PCT				
TOT	PCT	1.01	2.01		
NVB					
1.	18	7	25		
THR AND EMRG WR	72.0	28.0	14.2		
	13.2	17.5			
	10.2	4.0			
2.	30	5	35		
WRBL BUT BLKY UN	85.7	14.3	19.9		
	22.1	12.5			
	17.0	2.8			
3.	15	4	19		
YOKE TYP INFLTL	78.9	21.1	10.8		
	11.0	10.0			
	8.5	2.3			
4.	55	19	74		
VEST AND JACKETS	74.3	25.7	42.0		
	40.4	47.5			
	31.3	10.8			
5.	18	5	23		
BELT TYP	78.3	21.7	13.1		
	13.2	12.5			
	10.2	2.8			
COLUMN	136	40	176		
TOTAL	77.3	22.7	100.0		

RAW CHI SQUARE = 2.22536 WITH 4 DEGREES OF FREEDOM. SIGNIFICANCE = .6944

CRAMER'S V = .11245

CONTINGENCY COEFFICIENT = .11174

NUMBER OF MISSING OBSERVATIONS = 3

WEARABILITY DATA ANALYSIS

11/04/77

FILE TED (CREATION DATE = 11/04/77) COLL PFD

 NVB ***** CROSSTABULATION OF WIND
 ***** BY V69 ***** PAGE 1 OF 1

		V69					
		COUNT		MODERATE STRONG		ROW	
		ROW PCT	ICALM	MODERATE	STRONG	TOTAL	
		COL PCT	ICALM	MODERATE	STRONG		
		TOT PCT	ICALM	MODERATE	STRONG		
NVB		1.01	2.01	3.01			
THRW AND EMRG WR	1.	5	15	2	22		
		22.7	68.2	9.1	14.1		
		10.9	14.7	25.0			
WRBL BUT BLKY UN	2.	10	21	1	32		
		31.3	65.6	3.1	20.5		
		21.7	20.6	12.5			
YOKE TYP INFLIBL	3.	4	11	3	18		
		22.2	61.1	16.7	11.5		
		8.7	10.8	37.5			
VEST AND JACKETS	4.	19	42	2	63		
		30.2	66.7	3.2	40.4		
		41.3	41.2	25.0			
BELT TYP	5.	8	13	0	21		
		38.1	61.9	0	13.5		
		17.4	12.7	0			
COLUMN		46	102	8	156		
TOTAL		29.5	65.4	5.1	100.0		

PAW CHI SQUARE = 8.50873 WITH 8 DEGREES OF FREEDOM. SIGNIFICANCE = .3854
 CRAMER'S V = .16514

CONTINGENCY COEFFICIENT = .22742

NUMBER OF MISSING OBSERVATIONS = 23

199 199
 200X 200X

SECTION V - APPENDICES

DEVELOPMENT OF RELIABILITY TEST METHODOLOGY FOR PFDS

- APPENDIX V(A)-A Review of Factors Relevant to Establishing
A Methodology for Determining The Reliability
of PFDS
- APPENDIX V(A)-B Plans, Procedures, and Techniques for
Accelerated Aging and Reliability Assessment
of Inherently Buoyant PFDS
- APPENDIX V(A)-C Factors Affecting PFD Buoyancy

APPENDIX V(A)-A

WYLE LABORATORIES
MARINE TECHNOLOGY STAFF
TECHNICAL BRIEF 77-03

REVIEW OF FACTORS
RELEVANT TO ESTABLISHING A METHODOLOGY
FOR DETERMINING THE RELIABILITY OF PFDs

By

Michael J. Pfauth

February 1977

Work Performed Under Contract DOT-CG-42333-A

Delivery Order No. DOT-CG-70529-A

V(A)-A-1

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WYLE LABS HUNTSVILLE ALA

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PERSONAL FLOTATION DEVICES RESEARCH. VOLUME 3. APPENDICES.(U)

JAN 78 T DOLL, M PFAUTH, J GLEASON, S COHEN

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REVIEW OF FACTORS RELEVANT TO ESTABLISHING
A METHODOLOGY FOR DETERMINING THE RELIABILITY OF PFDs

1. INTRODUCTION AND OUTLINE OF RELIABILITY PROBLEMS

The development of reliability engineering as a separate discipline has increased rapidly in recent years. The development of this discipline was necessary in order to obtain the high degree of reliability required by space-age systems. Most work in the area of reliability has centered on determining the reliability of hardware systems. It is our intent to apply the techniques and methodology developed by reliability engineering to the problem of reliability of PFDs.

The problem of determining the reliability of a PFD is an extremely complex one. The issue is complicated by a multitude of factors. The major ones are outlined as follows:

1. Current requirements for PFDs are not defined in terms of the intended mission of the PFD. PFDs are now required to provide 15.5 lb (7.03 kg) of buoyancy (Type IIs and IIIs) for a period of 24 hours (48 hours for fibrous buoyant materials). Little justification could be found for these requirements nor could a consensus be found among other users of PFDs (FAA and foreign countries) as to what are justifiable requirements for a PFD. In order for an accurate prediction of the reliability of a PFD to be made, the intended mission of the PFD must be accurately defined.
2. The definition of a PFD failure should be as consistent as possible with the definition of what constitutes a reliable PFD. The criteria for designing a reliable PFD should be able to reflect the PFD reliability definition. Some results on the testing of kapok PFDs (References 9 and 15) have suggested some design guidelines for kapok PFDs.

3. Any program for developing a reliability methodology must take into account the large number of factors. For instance, the design of a methodology for predicting the reliability of a PFD using foam as a buoyancy medium could be noticeably different from the methodology used for kapok PFDs. This would be due not only to the construction and material differences but to the different types of usage each might receive. In order to be meaningful, reliability tests must reflect normal use conditions and characteristics of that particular PFD. In order to do this, it is necessary to define the requirements of the PFD in terms of mission and useful life criteria and then design the reliability tests accordingly. This view is supported by W. Yurkowsky, an expert in the field of reliability engineering.

"Stresses that will not be experienced during actual use or which will change the physical state of a product's materials could but will not likely yield meaningful results." (Reference 1)

4. In order for test procedures to be used to qualify a product for reliability, these test procedures must be able to predict the performance of a product after a period of usage. Quality control testing is designed to determine whether a product meets a set of specifications. It is not intended to be used to predict the reliability of a product. A clear distinction must be made between these two concepts.

5. Very little information could be found on the subject of accelerated aging of PFDs. The information discovered was found to be weak in types of tests used and in the development of correlations with normal aging. The importance of having valid engineering assumptions in accelerated aging is underscored again by Yurkowsky.

"Sound engineering assumptions are required in order to select stresses and stress levels which will most likely result in the specification of a valid accelerated test method." (Reference 1)

2.0 OBJECTIVES

The objective of this literature review is to provide a background on which to build a reliability program for PFDs. The long-term goal for reliability is in being able to provide a criteria and methodology that will be used by manufacturers in providing the recreational boating public with a safe and effective PFD. A number of areas are to be reviewed for relevant information. These areas can be defined as follows:

1. An extensive review of possible PFD reliability definitions and information relevant to these definitions in order to arrive at a consensus as to the definition of a reliable PFD.
2. A review of past work to determine the important stressors on PFDs and the subsequent PFD failure modes.
3. A review of currently used reliability test procedures in an attempt to evaluate the validity of these tests.
4. A review of any PFD accelerated aging that has been done previously, an evaluation of the validity of this work, and the application of any meaningful results to Wyle's accelerated aging program.
5. A review of accelerated aging methodologies currently available for possible use in Wyle's accelerated aging program.

Figure 1 shows how this information will feed into the reliability program.

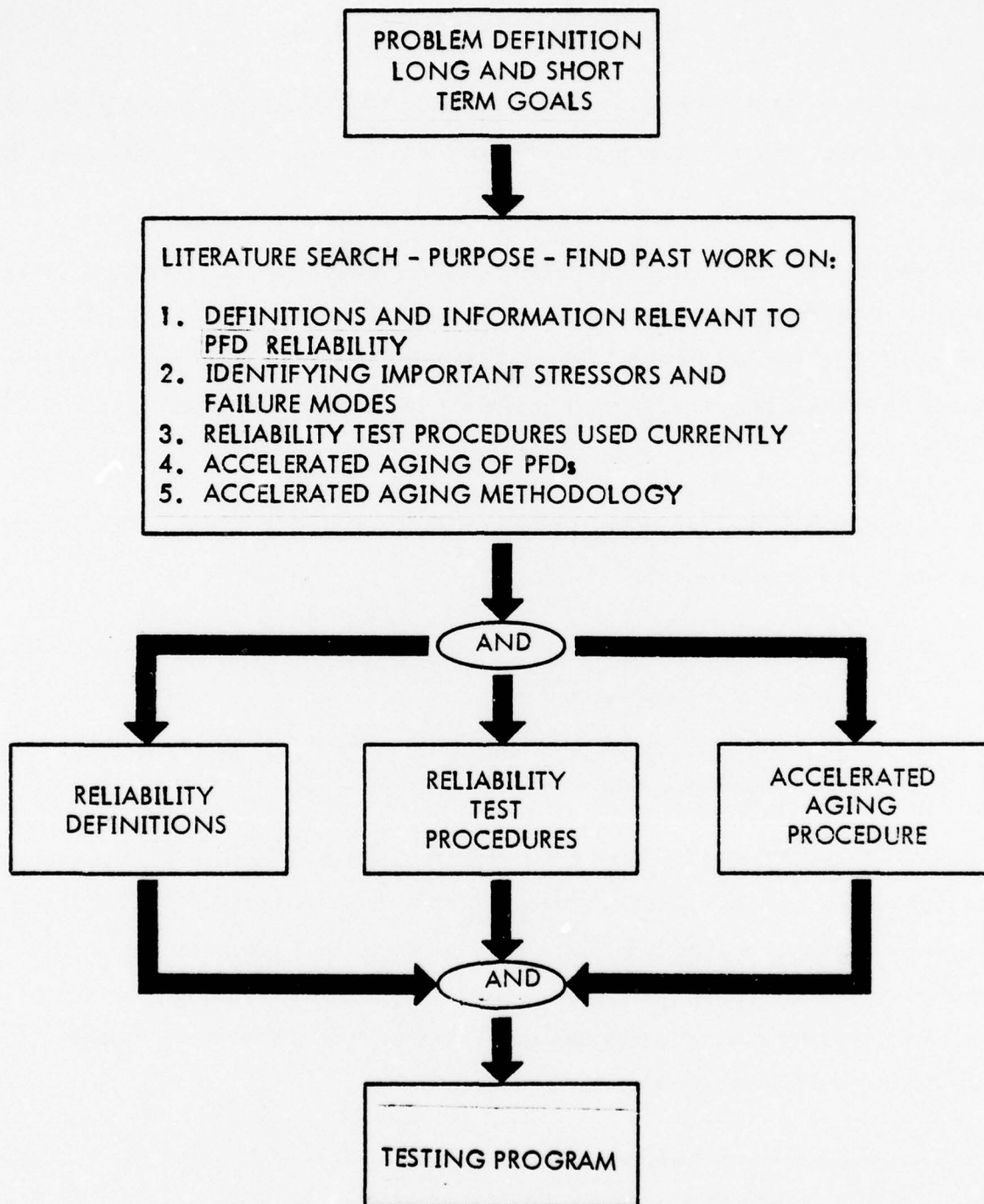


FIGURE 1. PFD RELIABILITY INFORMATION INPUT.

3.0 PFD RELIABILITY DEFINITION

In general, the reliability of a device is the probability that it will operate successfully for a specified period of time and under specified conditions when used in the manner and for the purpose intended.

A more specific definition * of PFD reliability can be derived from this general definition. Reliability of a PFD is the probability that the PFD will provide sufficient buoyancy (TBD ** pounds of buoyancy) to support 95% of the male population, fully clothed, under less than ideal conditions for a period of ten hours and be able to provide such support for a minimum of TBD years.

From this definition, it can be seen that several areas need to be considered. Three questions in particular need to be answered:

1. How much minimum buoyancy is required of a PFD to protect a certain percentage of the population?
2. For how long should the PFD provide this buoyancy (mission requirement)?
3. What should the useful life of the PFD be?

The current buoyancy requirement of 15.5 lb (7.03 kg) for Type II and III PFDs has evolved as a result of various trade-offs between wearability and effectiveness of a PFD. The Type II PFD was derived from the Type I PFD by decreasing the buoyancy requirement in order to increase wearability. In order to formulate a useful definition of reliability, the minimum buoyancy requirement must be based upon a consideration of PFD effectiveness alone, rather than a compromise between effectiveness and wearability.

The buoyancy requirements necessary to support various portions of the population are reported in Booz and Allen (1968) (Reference 2). While this data has been cited in Booz and Allen (1968),

* This report will deal with the reliability of adult PFDs only (> 90 lb (40.82 kg)). Even though medium and child size PFDs are not dealt with in this report, the logic for deriving the reliability of smaller size PFDs would be virtually the same.

** To Be Determined

it was taken from a 1946 study performed by Mellon Institute of Industrial Research (Fellowship No. 316B-1). Figure 2 shows the buoyancy requirements for various percentages of the adult male population. The adult male population was chosen as this represents the "worst case condition." In Figure 2, the two lines represent necessary buoyancy requirements for two conditions; the basic requirement for a non-clothed individual under ideal conditions (non-stressful) and the requirements for a clothed individual under less than ideal conditions. Booz and Allen recommend that an additional five pounds (2.27 kg) of buoyancy be required to account for clothing and that an additional one to two and one-half pounds (0.45-1.13 kg) buoyancy be added to account for the effects of increased exhalation due to panic or exertion.

As can be seen from this figure, the current Coast Guard requirement of 15.5 lb (7.03 kg) of buoyancy supports 95% of the adult male population under non-clothed and ideal conditions. If, however, less than ideal conditions are encountered by an individual, the percentage of population covered by this 15.5 lb (7.03 kg) requirement drops to 25%. In order for a PFD to support 95% of the adult male population in less than ideal conditions, the buoyancy requirement rises to 22.5 lb (10.20 kg).

The problem of determining the required buoyancy for a reliable PFD will also be addressed during Phase II of the physical effectiveness portion of Wyle's PFD research. Using the results from this current research combined with the above mentioned previous research, a recommendation will be made by Wyle Laboratories as to a proper buoyancy requirement.

Besides setting a buoyancy requirement for PFDs, it is necessary to define the time that a PFD will be required to provide this buoyancy. Current Coast Guard requirements specify that a PFD shall still provide the required buoyancy after 24 hours submergence (24 hours for non-fibrous buoyant materials and 48 hours for fibrous buoyant materials). This time requirement needs to be reviewed and redefined in terms of the reliability definition. In order for the reliability definition to be valid, the time requirement must reflect the intended use of the PFD. The intended use of the various types of PFDs has been defined recently by Rear Admiral D.F. Lauth, Chief of the Office of Boating Safety. Admiral Lauth states that:

"The Type II and III devices are recommended for use where there is a probability of quick rescue, such as areas where boating, fishing and other water activities are likely to occur." (Reference 3)

(TAKEN FROM BOOZ-ALLEN REPORT 1968)

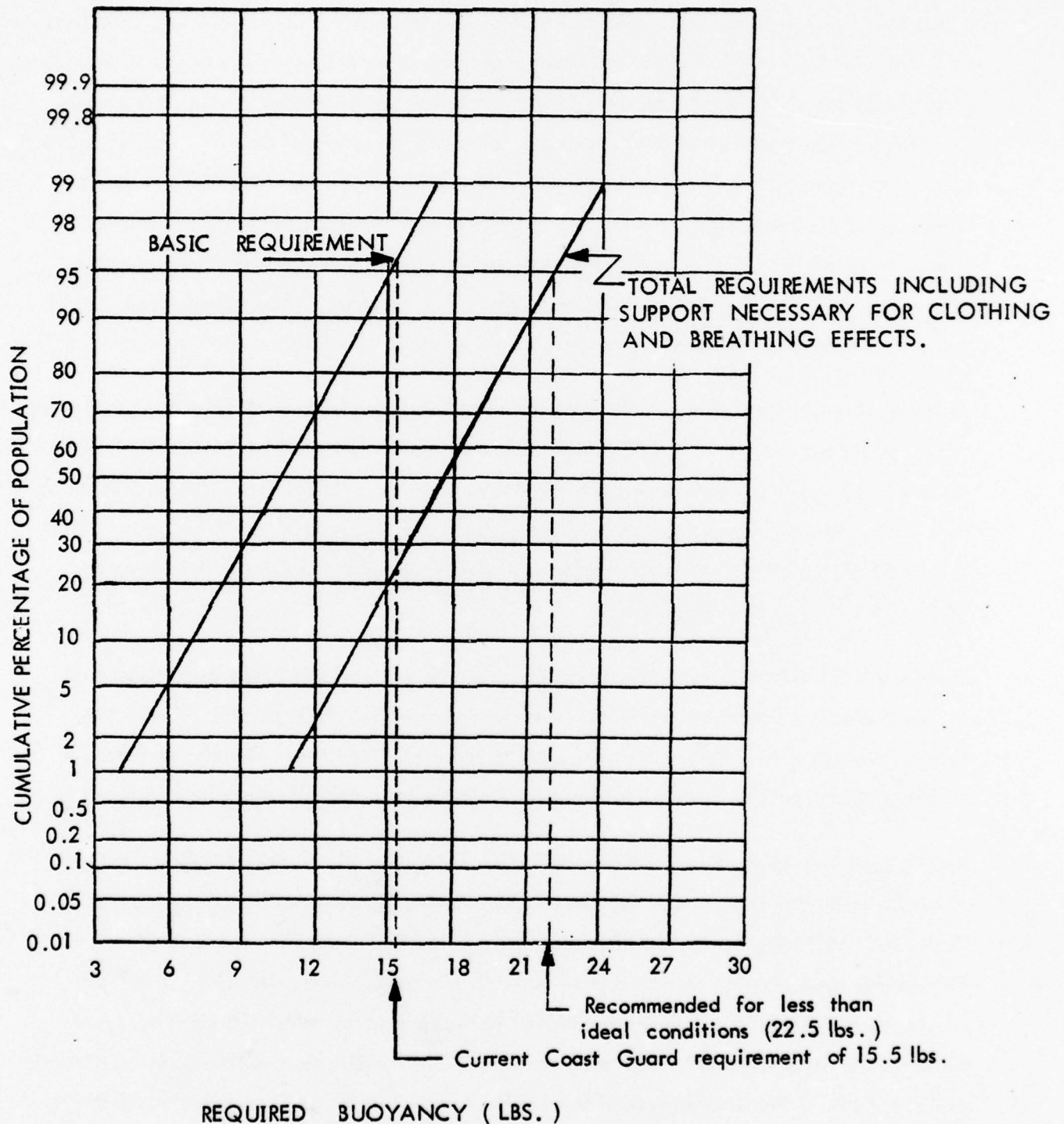


FIGURE 2. BUOYANCY REQUIREMENTS FOR PFD RELIABILITY

V(A)-A-12

(21A)

214

In order to quantify the phrase 'probability of quick rescue,' it was necessary to find out how long a person normally spends in the water due to an accident. This data was available from ARM₄ (Reference 4). Figure 3 gives an analysis of accident recovery victims in terms of the percentage of people recovered in "X" minutes or less. The graph shows that almost 95% of accident victims are recovered within 600 minutes (10 hours) or less. Therefore, it is recommended that the length of time a PFD must perform in the water (mission requirement) be limited to ten hours.

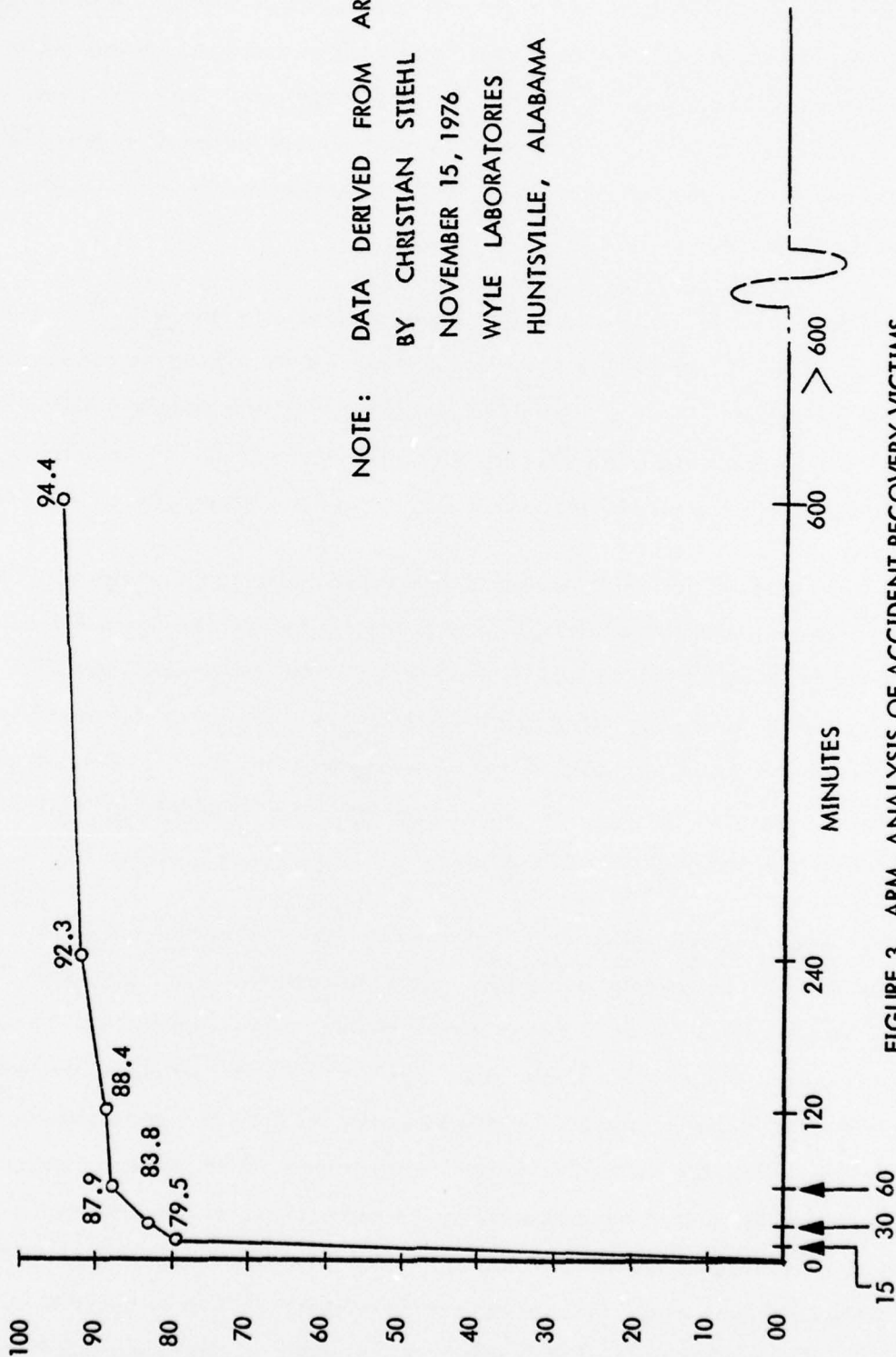
The last part of the reliability definition is that dealing with the useful life of the PFD. The useful life of the PFD shall be defined by the Coast Guard. Using the accelerated aging program developed, it will be possible to determine whether a manufacturer's PFDs are conforming to the Coast Guard's requirement for the useful life of the PFD. This requirement combined with manufacturer's quality control procedures would provide a meaningful criteria for evaluating PFDs.

A two step procedure is recommended to determine whether a PFD meets both quality control standards and a useful life criteria. This procedure is outlined in Figure 4 and 5. Test one would involve determining the quality of a randomly selected group of new PFDs from the manufacturer by testing for initial quality control (i.e., providing TBD pounds of buoyancy for ten hours) and determining a percentage passing. If the percentage passing this initial test is greater than some minimum percentage established by the Coast Guard, then the PFDs would pass the quality control phase.

Test two would involve testing PFDs to determine whether they pass the Coast Guard's requirement of minimum acceptable usable life. From the accelerated aging program (Reference 5), it will be possible to determine how much accelerated wear (y cycles) will correspond to normal usage (n years). Thus, if the Coast Guard specifies that a PFD should on the average last n years, the PFD manufacturer will be able to expose his PFDs to a corresponding y cycles in accelerated aging to simulate this natural aging process. After the aging process, the PFDs will be tested for mission requirements. If the percentage that pass this second test is less than some minimum requirement set by the Coast Guard, then this manufacturer's PFDs would fail the approval process also. In order for a manufacturer's PFDs to be acceptable, it would be recommended that his group of PFDs pass both the quality control and usable life requirements.

CUMULATIVE PERCENTAGE OF PEOPLE RECOVERED IN "X" MIN. OR LESS

V(A)-A-14



NOTE: DATA DERIVED FROM ARM₄
BY CHRISTIAN STIEHL
NOVEMBER 15, 1976
WYLE LABORATORIES
HUNTSVILLE, ALABAMA

FIGURE 3. ARM₄ ANALYSIS OF ACCIDENT RECOVERY VICTIMS

(216)

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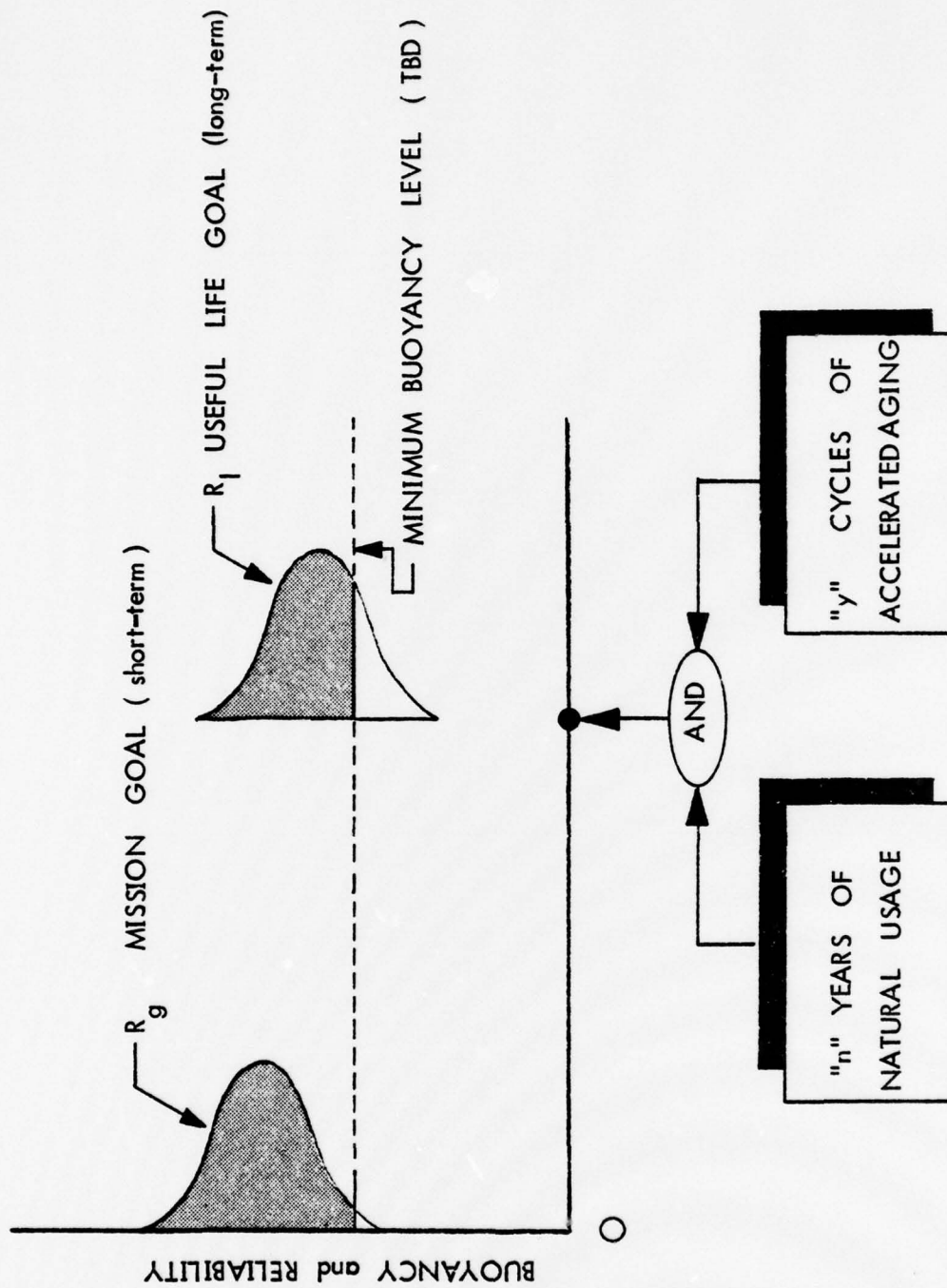


FIGURE 4. SHORT-TERM AND LONG-TERM RELIABILITY PERFORMANCE STANDARDS

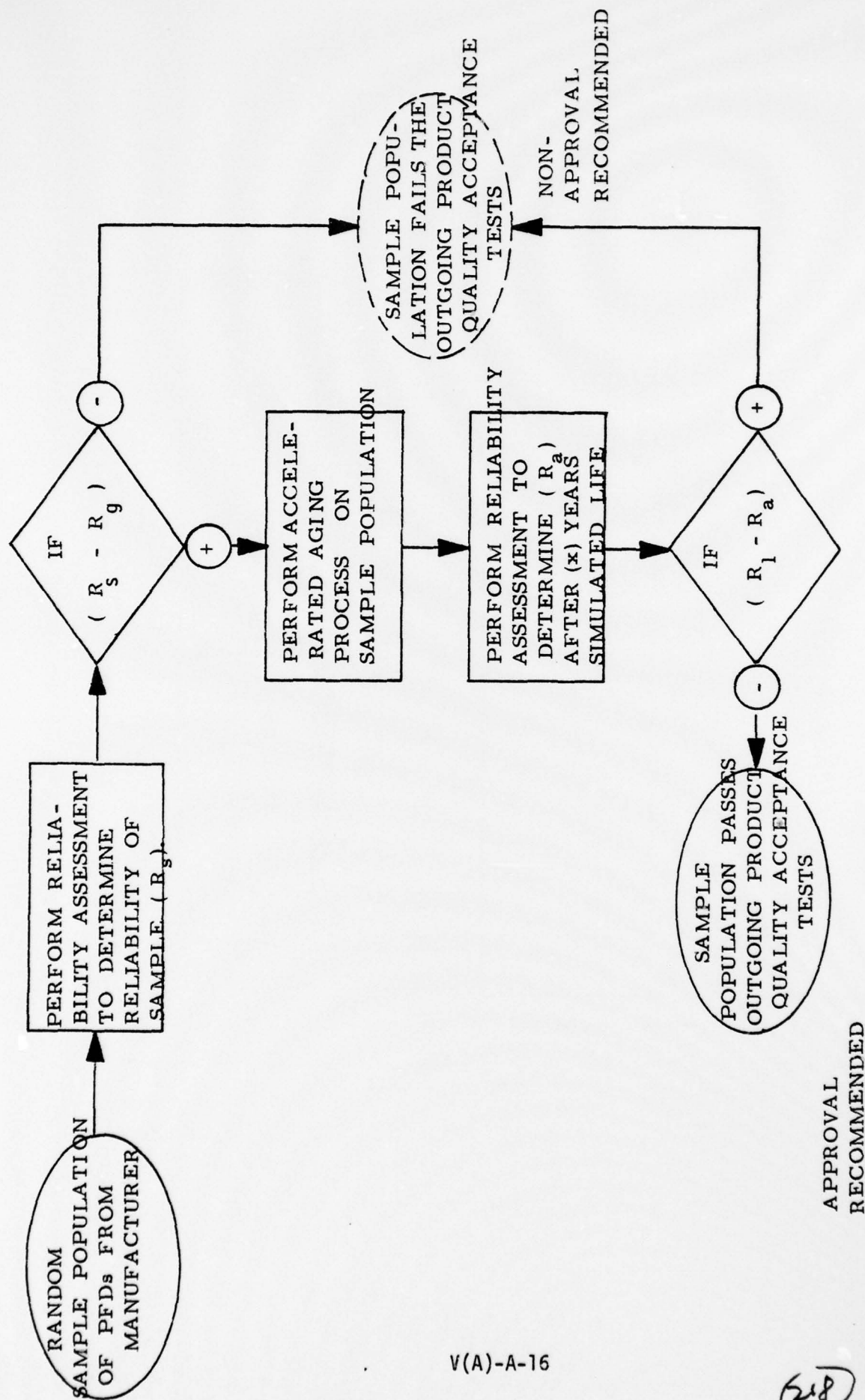


FIGURE 5. PERFORMANCE STANDARDS APPROVAL PROCESS

4.0 REVIEW OF PAST WORK ON THE EFFECT OF STRESSORS ON BUOYANT MATERIALS AND PFDs

The following is a summary of the various buoyant materials used in PFDs and the effects of any stressors that have been observed or tested for.

Kapok

Kapok, a cellular material fiber with inherent buoyancy characteristics, is one of the oldest of the buoyant materials used in PFDs and thus the most extensively observed and tested of currently used buoyant mediums. The kapok used in PFDs now is enclosed in a flexible vinyl plastic covering to protect it from harmful stressors.

The oldest study found was performed by the U.S. Coast Guard (Reference 6) to determine the effects on buoyancy of exposure of kapok life jackets to various periods of simulated tropical and temperate stowage conditions. The results showed that life jackets with kapok enclosed in vinyl envelopes lost on the average 46% of their original buoyancy after only six months exposure to "simulated" tropical stowage conditions. Exposure to temperate stowage conditions showed losses of 5% of their original buoyancy. The reasons for this loss of buoyancy were attributed to both loss of volume of the vinyl envelopes and the wadding and packing of the kapok within the envelopes. No relationship was established between these simulated tropical stowage conditions and actual tropical stowage conditions.

A study was also performed by the Coast Guard (Reference 7) to determine the effects of exposure of new and used kapok filled life preservers (without plastic liners) to agitation in water, water and oil, and water and gas mixtures. The resultant losses in buoyancy of the life preservers due to exposure to these conditions were measured. The results showed that exposure of new and used kapok PFDs to water agitation for a twelve hour period resulted in losses of buoyancy averaging 19% of their original buoyancy. The used life jackets showed a buoyancy loss of 2-3 lb (0.91-1.36 kg) greater than the new jackets. Exposure of used kapok PFDs to mixtures of water and gas and water and oil resulted in much greater losses averaging almost 69% of their original buoyancy. Earlier results had indicated that new PFDs did not experience as great a loss as the used ones.

These results suggest that: 1) New PFDs survived the exposure conditions better than the used ones. This result can probably be attributed to decrease in the effectiveness of the cover fabric repellent chemical. Since the histories of the used jackets were not documented, it was impossible to attribute the loss to any particular type of stowage or usage. 2) The exposure of kapok to oil and gas will accelerate the loss of buoyancy of the kapok.

An informal examination of kapok life jackets was made recently by a Canadian Committee on Life Jackets (Reference 8). The committee collected a group of life jackets whose age was in excess of ten years and examined them for possible failure modes. The committee pointed out several areas that could contribute to loss of buoyancy:

1. Severe deterioration of the covering fabric and splitting and cracking of the vinyl envelopes.
2. Possible mildew attack on the kapok.
3. Possibility of an interaction between the vinyl plastic and kapok contributing to deterioration of both.

The committee also pointed out, however, that "there was no evidence of any breakdown of the kapok fibers under these conditions."

A brief investigation was performed by Wyle researchers (Reference 9) to determine the effect on buoyancy of puncture of the vinyl envelope. A sample of Type IV PFDs that had been failed by local Coast Guard units were selected for analysis. The cushions were cut open and the vinyl envelopes of kapok removed. Buoyancy measurements were taken of the envelopes in a dry state and then the envelopes were slit and soaked in water for ten hours. The subsequent measurements revealed an average loss of buoyancy of 25% from the dry uncut stage. The usefulness of this result from a design and manufacturing standpoint are discussed.

Fibrous Glass

Fibrous glass is similar to kapok in that both are usually enclosed within vinyl plastic bags. Therefore, many of the problems mentioned before with kapok PFDs would possibly apply to

fibrous glass PFDs. The one study (Reference 6) found suggests that the loss of buoyancy after exposure is not quite as severe as in kapok. The results of tests showed that exposure of the fibrous glass PFDs to "simulated" tropical stowage conditions for a period of up to one year resulted in losses of buoyancy of between 6-16% of their original buoyancy. More extensive testing is needed.

Foam Filled PFDs

Of the various foam products on the market, polyvinyl chloride (PVC) and polyethylene are the two showing the most extensive use for flotation purposes today.

Vinyl Foams

Vinyl foams vary extensively in their physical properties. Vinyl foams can be made into a soft, closed-cell form which has excellent properties as a buoyant medium. The most popular of these is polyvinyl chloride (PVC).

The three classifications of PVC foams are Types A, B, and C. Type A PVC foam can be used on all PFD types. Type B PVC foam is restricted for use on Type II and III PFDs. Type C PVC foam is intended for use only on Type IV PFDs. The major difference between these foams is in their fire retardant ability. The major manufacturers of these foams are listed in Appendix A.

The earliest known study done on PVC (the exact type was not specified) was the Coast Guard's study on the effects of tropical stowage of life jackets (Reference 6). After one year's exposure under "simulated" tropical stowage conditions, the average percentage loss in buoyancy was almost 9%. After one year's exposure under temperate stowage conditions, the average percentage loss in buoyancy was almost 6%. It appears that most of the loss in buoyancy for both conditions occurred during the first six months.

In 1965, sample lots of B.F. Goodrich's Type A, B, and C foams were tested for compliance with Subpart 164.015 dated September 8, 1965, of 46 CRF, Specification for Plastic Foam, Unicellular Buoyant, Sheet and Molded Shapes (References 10 and 11). The results showed that the Type B foam failed the test for volume loss on heat aging.

Though this test was never directly related to loss of buoyancy, this indicates that further testing is warranted to determine the relationship that actually exists between heat exposure and loss of buoyancy.

In addition to the literature search performed, major manufacturers of flotation materials were contacted to find out the effects of environmental stressors on their product and the type of testing used (see Appendix A for a complete list of manufacturers contacted). All manufacturers of PVC foams reported limited testing of their foams for effects of environmental stressors.

Polyethylene

Polyethylene is the other flotation foam that has received wide acceptance as a buoyant material for personnel flotation devices. Of the various polyethylene foams available, the low-density foam was found to have acceptable physical properties for use in PFDs. The major types of polyethylene foams found in use are: Dow's Ethafoam, Voltek's Volara A and E and Minicell, and Gilman's Surlyn.

In 1962, the Coast Guard sponsored a study of the effects of two usage environments on the buoyancy of Dow's Ethafoam (Reference 12). The study consisted of taking initial buoyancy measurements on twelve PFDs, storing two under a controlled air-conditioned situation, and distributing five each for a year's use by Coast Guard units in New York and Miami. The results showed the average loss of buoyancy for PFDs in New York at 4.1% of the original buoyancy; in Miami at 3.9% of the original buoyancy. The loss of buoyancy for PFDs stored in the control environment was 2.5% of the original buoyancy. No relationship was demonstrated between service and exposure and loss of buoyancy.

The only other testing found on the effects of environmental stressors on polyethylene was a weatherometer test of Voltek's Volara flotation material (Reference 13). This test was performed by University of Lowell, Lowell, Massachusetts, using an Atlas Weatherometer. Various types of Voltek's flotation material and a PVC foam were

exposed to combinations of light and spray for varying periods of time. Tests were made for characteristics such as tensile strength, elongation and tear resistance. The polyethylene showed much less wear (cracking) than the PVC foam. No tests were performed for loss of buoyancy. Also, no correlation was demonstrated or implied between this accelerated aging method and natural aging.

These results can best be used to point up problem areas in flotation materials. However, more systematic and statistically significant results must be gathered in order to develop effective and valid reliability test methods.

5.0 REVIEW OF CURRENT TEST METHODS

The purpose of this section is to review the methods currently used in testing PFDs for reliability and to review any accelerated aging methodology that would be useful.

Contact was made with Canadian and Australian governments and two German testing organizations to assess the state of their PFD reliability program (Appendix A). The Australian testing program provided tests for resistance to corrosion, crushing, heat, petroleum products and flame. While several of these tests were related to percentage loss of buoyancy, no justification could be found for the use of these tests as they relate to the recreational boating environment. The heat test of $60^{\circ} \pm 2^{\circ}\text{C}$ for 168 hours is similar to that recommended by ASTM standards.

Canadian standards use tests for breaking strength and elongation, tear resistance and buoyancy after heat aging. The buoyancy after heat aging test is similar to the Australian and ASTM standards in that both an initial buoyancy and then a percentage loss of buoyancy after exposure to $60^{\circ} \pm 3^{\circ}\text{C}$ for 168 hours is determined. No justification in terms of representative conditions found in recreational boating could be found for these tests either.

In addition to the Canadian and Australian governments contacted, two German testing groups were contacted (see Appendix A). Responses were received from these organizations, but a review of their recommended references showed nothing that would be of interest.

Several manufacturers of buoyant foams reported that ASTM testing methods are used in testing their products. These were reviewed for relevant material:

ASTM D-1667-70 - This specification lists several general tests that are recommended for closed-cell polyvinyl chloride foams. General methods for determining compression deflection, compression set under constant deflection, volume change on heat aging, low temperature test, water absorption and density are outlined.

ASTM D-1056-73 - This specification covers some tests for flexible cellular materials - sponge or expanded rubber. Tests included are general physical test requirement, aging test, compression set, fluid immersion and low temperature test.

ASTM G-23 through G-27 - These are recommended practices that cover basic principles and standard operating procedures for light and water exposure apparatus.

These tests may provide a useful index of the general characteristics and quality of the tested material; however, they are of little use in developing test methods to predict the reliability of PFDs under recreational boating conditions. These tests are only useful when used in conjunction with test results from natural aging, otherwise they correlate to nothing and thus mean nothing. ASTM recognizes this and says, "...While useful for other purposes, results obtained by the use of this recommended practice should not be represented as equivalent to those of any natural weathering test or tests until the degree of such correlation, if any, has been established for each material."

Another source of information on general and accelerated testing were Military Test Procedure (MTP) 6-2-532-Sunshine Test and MIL-STD-810-Environmental Test Methods. These methods are again quite general and thus preclude detailed coverage of any specific item. These methods make no attempt to correlate to any natural aging.

In 1946 (Reference 14), the Coast Guard developed an apparatus for accelerating wear of life jackets. The device, called the Lucas Life Jacket Testing Machine, drags life jacket clad dummies through an obstacle course to simulate wear conditions that jackets might meet in actual conditions. However, the problem was again found to be "...no correlation has been demonstrated between the accelerated wear given in the Lucas Machine to actual ship-board wear."

As was mentioned before, a more recent study (Reference 13) was sponsored by Voltek to test flotation materials in an accelerated weathering apparatus called the Atlas Weatherometer. The accelerated weathering consisted of various cycles of light and spray. After exposure to this weathering for different durations, the flotation material was tested for elongation, tensile and tear resistance. The problems with this test were: 1) no attempt was made to measure loss of buoyancy with aging, and 2) no attempt was made to correlate the accelerometer aging with natural aging.

Underwriter's Laboratories has recently published U.L. 1191 — Specifications for Buoyant Materials. This standard recommends that testing for the effect on buoyancy of heat aging, compression, and oil immersion be performed. The standard also recommends tests for tensile strength and flexibility. The problem with U.L. 1191 is similar to those discussed previously. Apparently, no attempt was made to determine whether the tests are representative of natural conditions.

6.0 CONCLUSIONS

The review of testing done on flotation materials and PFDs revealed that most tests were of an observational and qualitative nature. That testing which did produce quantitative results was not organized and performed in a manner which led to statistically reliable or representative findings. Therefore, previous testing on flotation materials and PFDs can only be taken as an indication of problem areas.

The results of the studies on the use of kapok as a flotation material have indicated that failures (loss of buoyancy) may occur as a result of either loss of the water-tight vinyl envelope or loss of the inherent buoyancy of the kapok. Loss of the water-tight vinyl envelope could be caused by puncture, repeated compression, drying and cracking of the envelope or a combination of these factors. Loss of the inherent buoyancy of the kapok could be caused by breakdown of kapok fibers, mildew, wadding of the kapok, and possible interaction of vinyl and kapok. Current evidence suggests that the breakdown of the vinyl envelope is a greater problem than the loss of the inherent buoyancy of the kapok. If this is the case, design strategies can be applied to solve the problem (Reference 9). Research is needed to pinpoint the problem.

Fibrous glass presents a problem similar to kapok PFDs in that the fibrous glass is also enclosed within a vinyl envelope. Very little is known on factors affecting the inherent buoyancy of fibrous glass. The methodology employed to improve the design of kapok PFDs could also be used on fibrous glass PFDs.

The results of the review of studies on polyvinyl chloride (PVC) foams suggest that heat and light could have a degrading effect on the foam material. Testing is needed to determine the effects of these stressors on buoyancy.

Preliminary testing on the use of polyethylene foam PFDs under one year's actual use showed that the PFDs demonstrated very little loss in buoyancy. Further testing is also needed here.

Due to the lack of information on stressors that contribute to the failure of PFDs, it is necessary to design experiments that will point out the environmental stressors and any interactions of stressors that degrade PFDs. The information from these experiments is necessary in order to make sound engineering judgments as to the type and level of stressors to be used in developing the accelerated aging program.

The results of the literature search on PFD testing revealed two main problems with previous testing:

1. The type of tests used on PFDs failed to test for conditions representative of what a PFD would normally be exposed to.
2. The accelerated tests failed to reflect the total spectrum of environmental and usage stressors that a PFD might be exposed to nor did they attempt to relate accelerated stressors to normal stressors (aging).

In order for a program on reliability to produce meaningful and useful results, these two problems must be remedied. Failure to remedy the above problems would produce meaningless and useless results because the question of how the PFD stands up to "real-world" environmental and usage stressors will not have been answered. The use of tests that do not address these problems will only increase the cost of the PFD through unnecessary testing and design requirements. The application of the principles outlined in this report could result in testing requirements for PFDs which are less stringent and less complicated than current test procedures.

REFERENCES

1. Yurkowsky, W. and D.W. Fulton. An Assessment of Accelerated Testing. Director, Reliability and Value Analysis, Bell Aerospace Company. Buffalo, New York.
2. Booz-Allen Applied Research, Inc. Study of Personnel Flotation Devices. Final Report. Booz-Allen Applied Research, Inc., for the U.S. Coast Guard. November, 1968. NTIS No. AD-787-023.
3. Lauth, D.F., Rear Admiral, U.S. Coast Guard, Chief, Office of Boating Safety. Federal Register, Vol. 41, No. 245, Monday, December 20, 1976. "Comments on PFD Information Pamphlet."
4. Doll, T., C. Stiehl, M. Pfauth, and R. MacNeill. Personal Flotation Devices Research, Phase I. Final Report. Wyle Laboratories, Huntsville, Alabama, for the U.S. Coast Guard. July, 1976.
5. Giuntini, Ronald, E. Plans, Procedures, and Techniques for Accelerated Aging and Reliability Assessment of Inherently Buoyant PFDs. Tech Brief 77-01. Wyle Laboratories, Huntsville, Alabama. January, 1977.
6. Field Testing and Development Unit, Project CGTD J28-3/3-S-5. Effects on Life Preservers of Exposure to Tropical Climatic Conditions. U.S. Coast Guard Yard, Curtis Bay, Baltimore, Maryland. June, 1960. NTIS No. AD-238-446L.
7. Field Testing and Development Unit, Project CGTD J28-3/3-1-2(d). Additional Tests to Determine Effects of Gasoline and Oil on Approved Kapok Life Preservers. U.S. Coast Guard Yard, Curtis Bay, Baltimore, Maryland. August, 1959. NTIS No. AD-225-804L.
8. Committee on Life Jackets. Minutes of the Third Meeting of the Working Group on Use of Kapok for Life Jackets, Held at Ottawa on October 25, 1976. Not Published.
9. Giuntini, Ronald E. and Michael J. Pfauth. Some Experimental Results Regarding the Reliability of PFDs Containing Kapok Flotation Material. Tech Brief 77-02. Wyle Laboratories, Huntsville, Alabama. January, 1977.
10. Field Testing and Development Center, Project CGTD 3985/01/09. Compliance Test of B.F. Goodrich Foam, Proposed Subpart 164.015. U.S. Coast Guard Office of Engineering. Report No. 414. March, 1965.
11. Field Testing and Development Center, Project 3985/01/15. Retest of B.F. Goodrich Unicellular Foam. U.S. Coast Guard Office of Engineering. Report No. 450. November, 1966.
12. Field Testing and Development Unit, Project CGTD J28-3/3-6. Polyethylene Foam Filled Buoyant Vests. U.S. Coast Guard Office of Engineering. Report No. 315. November, 1962.
13. Voltek, Inc., Sponsor. Work Performed by University of Lowell, Lowell, Massachusetts. Technical Report on Testing with Atlas Weatherometer. Not Published.

REFERENCES (concluded)

14. Field Testing and Development Unit, Project No. CGTD J28-3/3-S-1. Accelerated Wear Test to Life Jackets. U.S. Coast Guard Office of Engineering, Coast Guard Yard, Curtis Bay, Maryland. October, 1946.
15. Pfauth, M. J., Additional Results from Testing of New Kapok PFDs, Wyle Wyle Laboratories Technical Brief 77-04.

BIBLIOGRAPHY

1. Loch, Leona M., Grace C. Frank, and J.R. Stevens. "A Study of Some Factors Affecting the Photodegradation of Textile Yarns - Part I: The Spectral Distributions of Sun-Sky and Xenon-Arc Radiation," Textile Research Journal. August, 1973. pp. 483-488.
2. Army Test and Evaluation Command Aberdeen Proving Ground, Maryland. U.S. Army Test and Evaluation Command Material Test Procedure 6-2-532, Engineering Test Procedure. Sunshine Test. Final Report on Material Test Procedure. November, 1969.
3. Griesser, E.E. and W.T. Higgins. "Development of Weather-Resistant Vinyl Jackets." A Speech to the Fourth Annual Signal Corps Wire and Cable Symposium. Asbury Park, New Jersey. December, 1955.
4. Wright, J. Outdoor and Accelerated Weathering of Elastomers and Plastics: The Assessment of an Accelerated Weathering Test Chamber. Ministry of Defense, Explosives Research and Development Establishment (England). Technical Report No. 107. March, 1972.
5. Readdy, A.F. and R.B. Bonk. Resistance of Plastics to Outdoor Weathering. Picatinny Arsenal, Dover, New Jersey. November, 1970.
6. Hindson, W.R. Accelerated Weathering and Outdoor Exposure of Textile. Commonwealth Defense. Conference on Clothing and General Stores (9th), Nairobi (Kenya). 1969. Commonwealth of Australia.
7. Thomas, D.K. and B. Moore. The Prediction of Shelf-Storage Life in Rubbers from Accelerated Heat Aging Tests. Part 2 - Stress - Relaxation Tests. Royal Aircraft Establishment, Farnborough (England). Technical Report. January, 1968.
8. Barlow, Richard E. and Ernest M. Scheuer. Estimation from Accelerated Life Tests. Rand Corporation, Santa Monica, California. September, 1968.
9. Thomas, D.K. and R. Sinnott. The Prediction of Shelf-Storage Life in Rubbers from Accelerated Heat Aging Tests. Part 1 - Accelerated Oven Aging. Royal Aircraft Establishment, Farnborough (England). Technical Report. May, 1967.
10. Army Tropic Test Center, APO, New York 09827. Material Testing in the Tropics, Fifth Edition. February, 1976.
11. Singpurwalla, Nozer D. and Faix A. Alkhayyal. Inference from Accelerated Life Tests Using the Inverse Power Law Model. Scientific Report. George Washington University, Washington, D.C. Institute for Management Science and Engineering. June, 1975.
12. Wojciechowski, Frank X. and James C. Gongwer. Accelerated Test Technology/ Test Program. Hughes Aircraft Company, Fullerton, California, Ground Systems Group. Final Technical Report. July, 1969.
13. Bain, Lee J., et al. A Study of Life-Testing Models and Statistical Analyses for the Logistic Distribution. Missouri University, Rolla, Missouri. February, 1973.

BIBLIOGRAPHY (concluded)

14. Zimmer, W.J., et al. Estimation of Acceleration and Aging Functions. New Mexico University. November, 1972.
15. Dubey, Satya D. Statistical Treatment of Certain Life Testing and Reliability Problems. New York University. December, 1973.
16. Lewycky, Jules Z. Environmental Testing of Commercial Automatic Inflators. Report Presented to Survival and Flight Equipment Association, Thirteenth Annual Conference and Trade Exhibit. September 21-25, 1975.
17. Colacicco, E.J. Development of Improved Tube Fabrics for MIL-L8664A (AER) Life Rafts, Inflatable, One Man, for Aircraft Use, and Development of AML Facilities to Conduct Coated Fabric Research. Naval Air Engineering Center, Philadelphia, Pennsylvania. Aeronautical Materials Lab. June, 1963.
18. Army Armor Board, Fort Knox, Kentucky. Test of Trapped Air Life Preservers. March, 1960.
19. Naval Air Test Center, Patuxent River, Maryland. MK-3C Life Preserver, Test and Evaluation. October, 1957.
20. Rhyner, D.A., Byrant A. Murray, Alan R. Brown, and Michael E. Sexton. Thin Underarm Aircrew Life Preserver. Tactical Air Warfare Center, Eglin AFB, Florida. March, 1971.
21. Yurkowsky, W., et al. Accelerated Testing Technology. RADC Technical Report 67-420, Volume I. Rome Air Development Center, Griffiss Air Force Base, New York. November, 1967.
22. Yurkowsky, W., et al. Handbook of Accelerated Life Testing Methods. RADC Technical Report 67-420, Volume II. Rome Air Development Center, Griffiss Air Force Base, New York. November, 1967.

APPENDIX A. LIST OF MANUFACTURERS AND TESTING GROUPS CONTACTED

<u>Organization</u>	<u>Product</u>	<u>Comments</u>
Airex, A.G.	PVC Foam Type S30.5	No Response to Letter
Dow Chemical Company	Polyethylene Foam - Ethafom	Letter and Telephone Contact
Gentex Corporation	Type A Foam	Telephone Contact
Gilman Corporation	Polyethylene Sheet - Surlyn	Telephone Contact
Housatonic Everfloat Company	Type A and C PVC Foam	Telephone Contact
Inmont Corporation	PVC Foam	Telephone Contact
Marine Flotation Products, Incorporated	Type A, B, and C PVC Foam	Telephone Contact
Rubatex Corporation	Type A Foam	Telephone Contact
Voltek, Incorporated	Polyethylene - Volara A, Volara E, Minicell	Telephone Contact
Uniroyal, Incorporated	Type A PVC Foam - Ensolute	Telephone and Letter Contact
Bernhard-Nocht-Institute (West Germany)	Testing	Letter Response
Isitut Fur Warenprufung Und Qualitutsuberwachung (West Germany)	Testing	Letter Response

APPENDIX V(A)-B

WYLE LABORATORIES
MARINE TECHNOLOGY STAFF
TECHNICAL BRIEF 77-01

PLANS, PROCEDURES, AND TECHNIQUES
FOR ACCELERATED AGING
AND RELIABILITY ASSESSMENT
OF INHERENTLY BUOYANT PFDs

by

Ronald E. Giuntini

January 1977

Work Performed Under Contract DOT-CG-42333-A

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V(A)-B-1

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PREFACE

The purpose of this Technical Brief is to provide G-DSA with an outline of Wyle's approach and methodology for assessing the reliability of new and/or existing PFDs and for predicting their reliability due to aging.

An extensive literature search was performed by Mr. Michael Pfauth and will be presented in a forthcoming companion Technical Brief. Through Mr. Pfauth's analysis of the purpose and intent of the aging plan, outlined herein, the Environmental Profile Data Sheet was derived to provide a vehicle for gathering and recording relevant environmental and usage data. This is a key item in the sample population screening.

PLANS, PROCEDURES, AND TECHNIQUES FOR
ACCELERATED AGING AND RELIABILITY ASSESSMENT
OF INHERENTLY BUOYANT PFDs

1.0 INTRODUCTION

The problem of determining the reliability of PFDs is a complex one because of the following complications:

1. Many different types of flotation materials are used for a given PFD type.
2. There are many manufacturers employing different manufacturing techniques with varying degrees of quality control.
3. Buoyancy requirements (i.e. 15.5 lb) to which a PFD type is designed and manufactured presently represent a compromise (trade-off) between buoyancy and wearability. These buoyancy requirements are, therefore, inconsistent in their relationship to a given percentage of the population, thus forcing a very flexible definition of what constitutes a reliable PFD.
4. Previous and current testing of PFDs has had no significant relationship to real world usage and environmental effects and subsequently little to do with product outgoing quality acceptance tests and their relationship with the product reliability.

Before getting into the purpose of this Technical Brief, which is to present a rationale and a methodology for accelerated aging of inherently buoyant PFDs, a few background ideas and definitions are in order.

Definition of PFD Reliability

In general, reliability of a device is the probability that it will operate successfully for a specified period of time and under specified conditions when used in the manner and for the purpose intended.

A more specific definition of reliability as applied to PFDs was derived. Reliability of a PFD is the probability that the PFD will provide sufficient buoyancy to support 95% of the male population fully clothed (___* pounds of buoyancy) for a period of 10 hours** and be able to provide such support for a minimum of ___*** years.

The buoyancy required to support 95% of the fully clothed male population is approximately 22.5 pounds while that required to support 99% is 24 pounds (Reference 1). While this data has been cited in Reference 1, it was taken from a 1946 study performed by Mellon Institute of Industrial Research (Fellowship Number 316B-1) and will be verified in the physical effectiveness portion of the PFD study.

There are three implications that can be derived from the above definition as follows:

- A failure occurs when the PFD does not have the capability of supporting 95% of the fully clothed male population or, in other words, providing (TBD) pounds of buoyancy for 10 hours.
- Maltreatment of a PFD beyond the designed purpose and intent could result in the PFD's inability to perform its function. Occurrences of such treatment should not constitute failures as these random-type events are independent of quality of manufacturing, materials, design specifications, environmental factors, and normal usage and degradation.
- Sufficient buoyancy must be provided initially to accommodate buoyancy loss due to degradation with age so that the minimum buoyancy remains for (TBD) years of useful life.

With most hardware items, components, and systems, the definition of a failure is less subjective and is often recognized by a discrete event such as inadvertent termination of operation. Also, it is often a binary situation where the device either functions or does not function. However, in other cases, total cessation of operation is not essential for the item to be

* To be determined.

** The 10 hours was derived by Mr. C. Stiehl and Dr. T. Doll of Wyle Laboratories from ARM₄ data.

*** To be determined.

defined as having failed but rather a sufficient amount of degradation in its performance can signify a failure. PFDs resemble the latter case in that a minimum effective buoyancy (TBD) is required for a minimum number of years (TBD). The definition of reliability for PFDs has been carefully constructed so that it encompasses both the mission reliability (short term) of providing * pounds of buoyancy for 10 hours and the required life (long term) in years for which the PFD will have to be able to provide that mission reliability.

* To be determined.

REFERENCES

1. Booz-Allen Applied Research, Inc. "Study of Personnel Flotation Devices," Final Report. Booz-Allen Applied Research, Inc., for the U.S. Coast Guard, November 1968. NTIS No. AD-787-023.

2.0 STRESSOR MODELING

The environmental stressor modeling, designated as Phase I* for work breakdown purposes, involves eight major steps. Figure 1 is a flowchart showing the sequence of the major activities. Each of the eight steps will be discussed in the following sections.

Step 1 — Selection Criteria

The intent of this step is to narrow down the scope of the analysis to a manageable size by a screening process. Figure 2 shows that within the conventional categories by type, there are many similarities based on the flotation materials used. A particular flotation material may be found in all four types of PFDs. Another important factor in the selection process involves possible differences in a PFD's performance due to manufacturing techniques. It is felt that this variance can be minimized by testing only a particular brand within a given type/style/flotation material grouping at a time. If one manufacturer's products are more prone to failure than another, it will become apparent.

Step 2 — Stressors Identification

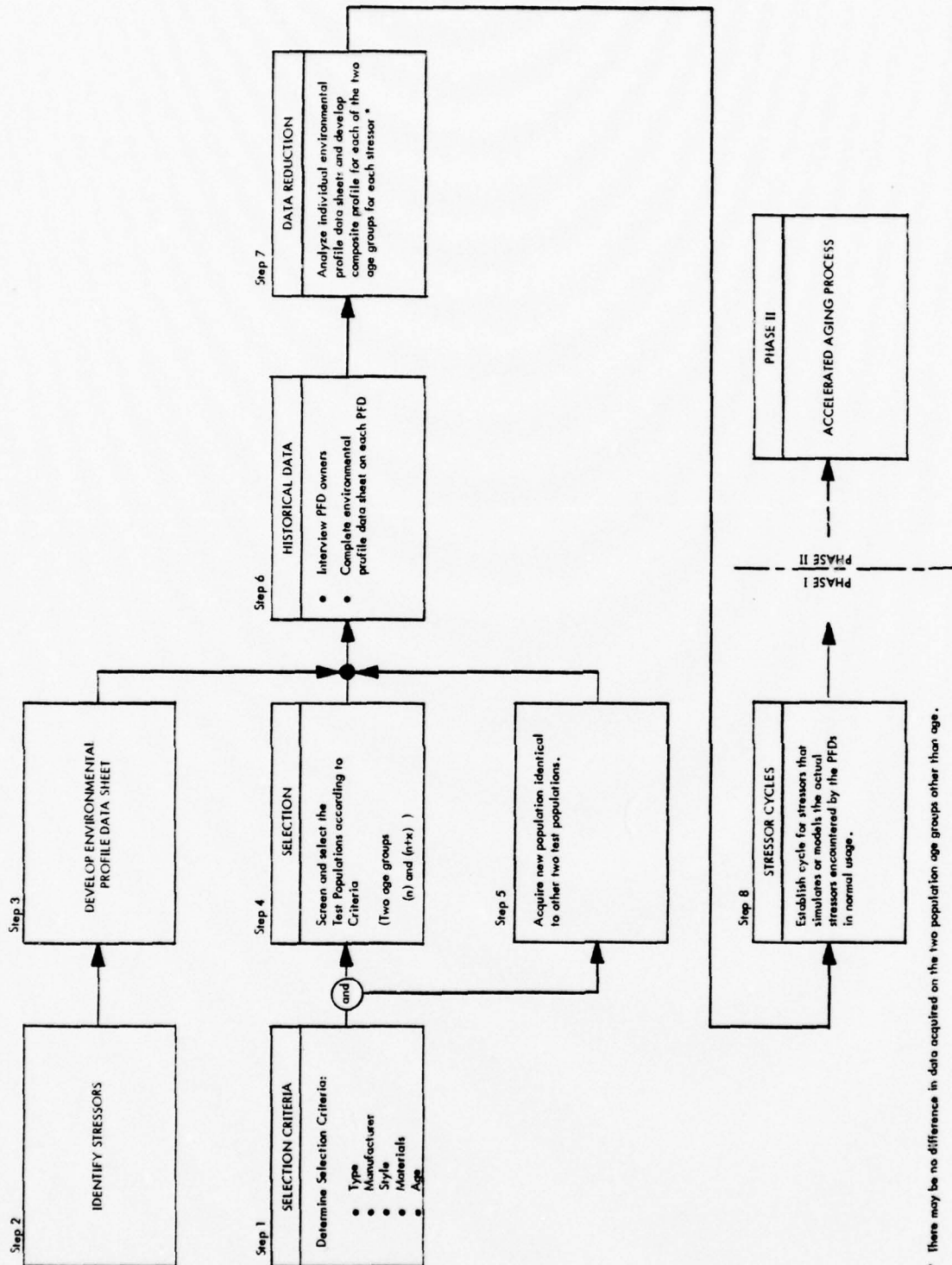
The most apparent and obvious stressors that potentially have an effect on the degradation of PFDs and subsequently their reliability are the following:

- a. Solar radiation (primarily ultraviolet light)
- b. Temperature (high and low geographic regional excursions)
- c. Humidity
- d. Salt spray
- e. Water/moisture (wetting and drying cycles)
- f. Other factors (possibly mildew)

Step 3 — Environmental Profile Data Sheet

This is a very crucial step in the stressor modeling process. The development of this item requires a thorough analysis of a large number of possible situations and tentative answers

*Phase I (and also Phase II) as used in this Technical Brief have reference to the scope of the activities defined and discussed herein and should not be mistaken for the Phase I PFD study which was completed in July 1976.

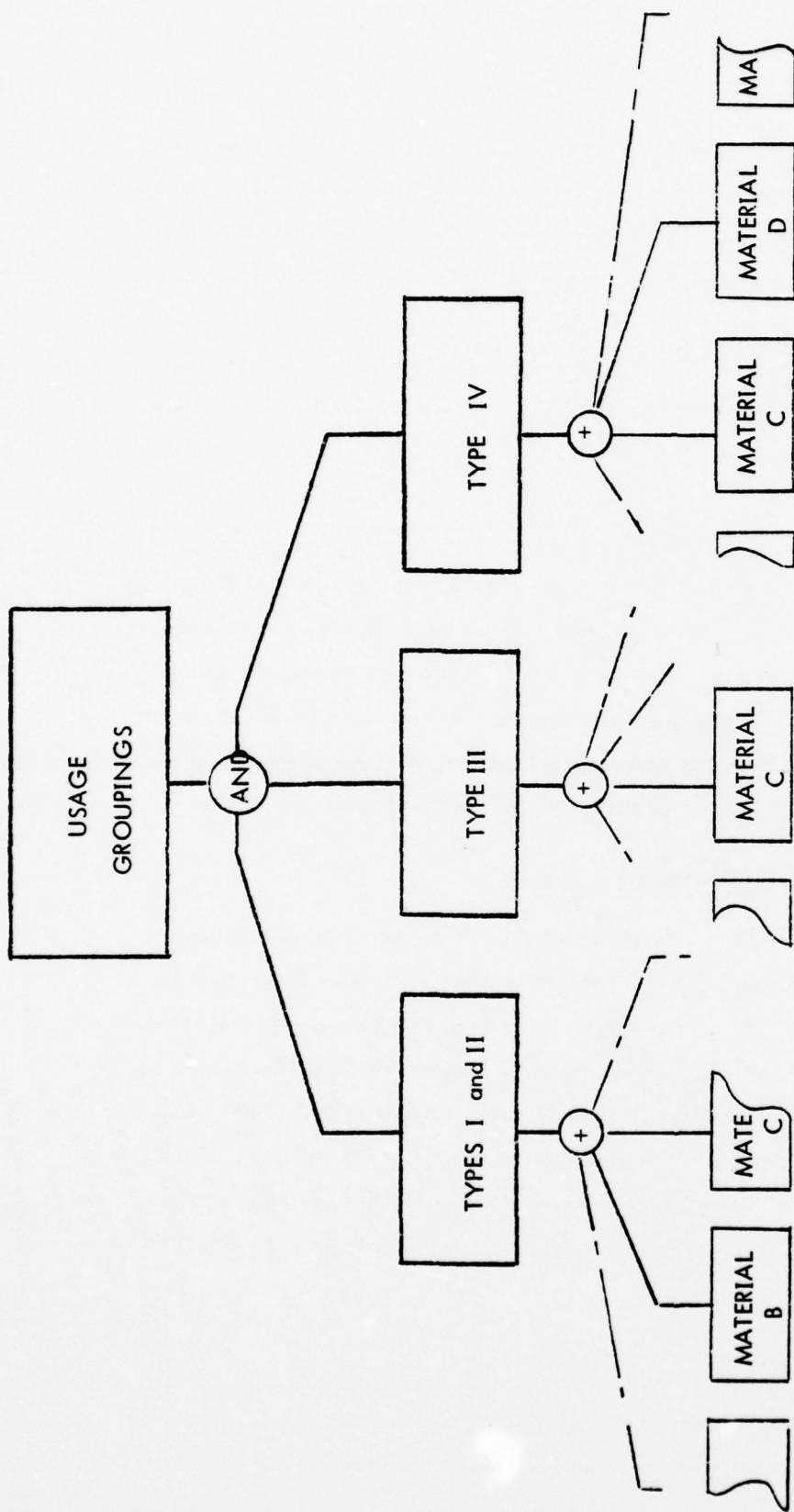


* There may be no difference in data acquired on the two population age groups other than age.

FIGURE 1. ENVIRONMENTAL STRESSOR MODELING (PHASE I)

V(A)-B-11/12

(245) 246x (245) 246X



V(A)-B-13

FIGURE 2. POSSIBLE TESTING CATEGORIZATION BASED UPON TYPE OF FLOTATION MATERIAL

(242)

(247)

or solutions in the event of their occurrences. It represents the basic scheme for gathering essential data on individual environmental stressor history for a particular PFD and data consolidation for the sample population. Since the primary purpose of the data sheet is to provide a vehicle for assuring that the essential details for environmental stressors are not neglected, it must have sufficient depth to enable a realistic simulation of the environment to be obtained. Many of the data cells on the data sheet are mutually exclusive thereby reducing or, in some cases, eliminating certain data cells. The Environmental Profile Data Sheet is exhibited in Figure 3.

Step 4 — Selection

In this step of the environmental stressor modeling flow, a segment of the overall PFD population is screened and selected. The individual units of this sample population of a specific type, style, manufacturer, and flotation material must be the same age and experience somewhat the same environmental factors and usage factors. Such a sample population will provide a data point on a reliability versus time plot. At least two such sample age groups will be required for the analysis. One group of age (n) and the second of age (n+x).

Step 5 — New Population

For purposes of the reliability analysis, it is apparent that this population must be identical to the two sample populations of ages (n) and (n+x) years. That is, it must be of the same type, manufacturer, style, and flotation material. This sample population will enable the reliability to be determined for a new population. A degradation-with-age function, thus, can be constructed from the three age group samples (0-years, n-years, and (n+x)-years). Such a function would resemble the one illustrated in Figure 4. This step (Step 5, Phase I) does not require the buoyancy measurement nor a reliability assessment of the three sample populations. These are required in Step 6 of Phase II, the accelerated aging process, and both will be discussed there.

Step 6 — Historical Data

This is a key step in environmental stressor modeling process. As stated in Step 3, the data sheet provides a measure of assurance that the engineer/analyst will not neglect specific

MONTHS	USAGE STRESSORS										STORAGE STRESSORS		SIBIRICHI EXPOSURE	WATER EXPOSURE				TEMPERATURE EXPOSURE	HUMIDITY EXPOSURE							
	ESTIMATED DAYS OF USAGE OF PPD PER MONTH	AVERAGE LENGTH OF OUTING	AVERAGE HRS/MONTH	WEAR (DOES IT GET WET USUALLY?)	WATER SPOILING	SITTING ON	DIRECT EXPOSURE	INDIRECT EXPOSURE	NON-EXPOSURE	NON-USE	MONTHLY HRS OF SOLAR RADIATION (SHADE AND SHADE)	MONTHLY HRS OF SOLAR RADIATION		DAYS OF RAIN	ESTIMATED NO. OF DAYS WET	NO. OF DAYS WET	ESTIMATED NO. OF OTHER WETTING			AVG. NO. OF MONTHLY WETTING/DRYING CYCLES	TOTAL NO. OF MONTHLY WETTING/DRYING CYCLES	AVG. MONTHLY TEMPERATURE	AVERAGE NO. OF HRS EXPOSURE	TOTAL NO. OF HRS EXPOSURE	AVERAGE RELATIVE HUMIDITY	AVERAGE NO. OF HRS EXPOSURE
NOVEMBER																										
DECEMBER																										
JANUARY																										
FEBRUARY																										
MARCH																										
APRIL																										
MAY																										
JUNE																										
JULY																										
AUGUST																										
SEPTEMBER																										
OCTOBER																										
NOVEMBER																										
TOTALS																										

NOTES:

ENGINEER/ANALYST: _____
DATE: _____
LOCATION/AREA: _____

WVIE LABORATORIES
WVIE LABORATORIES, INC. 10000 W. 10TH AVE. SUITE 1000 DENVER, CO 80202

ENVIRONMENTAL PROFILE DATA SHEET

FIGURE 3. ENVIRONMENTAL PROFILE DATA SHEET

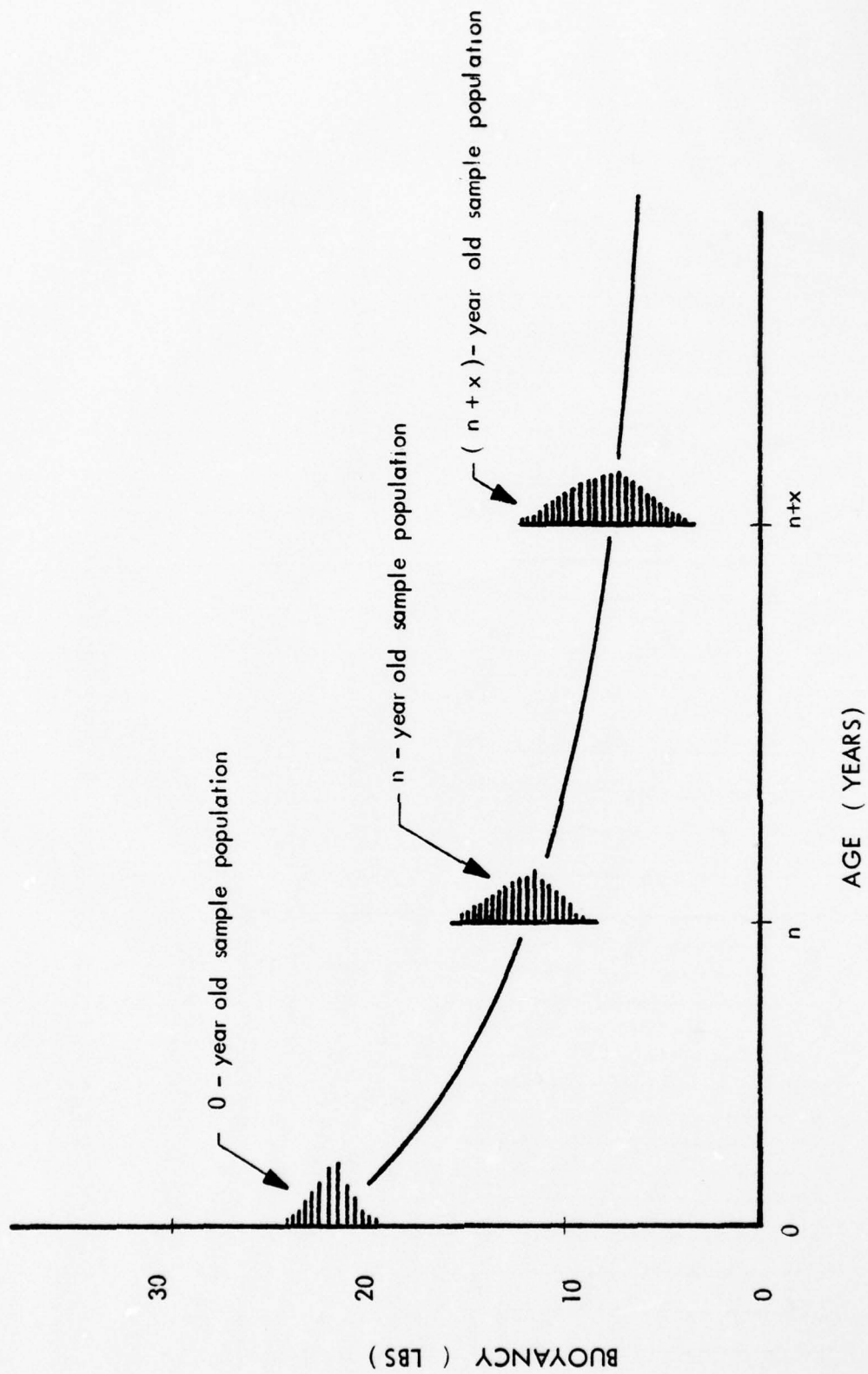


FIGURE 4. BUOYANCY AS A FUNCTION OF AGE

crucial stressors and factors that are essential to the environmental stressor modeling during the interviews. Once a PFD has been screened by the engineer as to its type, style, manufacturer, and flotation material, the age must be determined. If the age is either (n), or (n+x) (e.g. $n = 4$, $(n+x) = 9$), some predetermined age groupings, the interview will be continued. The engineer must be able to acquire reasonable estimates of various environmental and usage exposures from the interviewee. Other data will be extracted from the Local Climatological Data (LCD) prepared by the Environmental Data Service, National Oceanic and Atmospheric Administration. The LCD will provide the monthly hours of solar radiation, days of rain, average monthly temperature, and average relative humidity. Abusive usage or other abnormal exposure of a PFD to certain stressors would be grounds for exclusion from the sample population as being atypical and not representative. The actual mechanics employed in interviewing, in gathering and recording relevant information on a single PFD can become a time consuming and burdensome task.

Step 7 — Data Reduction

In this step a composite environmental profile for the sample population will be derived from the individual environmental profile data. It should represent the environmental and usage stressors to which a typical PFD of n-year sample population experienced in a specific geographical region. This is depicted in Figure 5, Stressor Modeling Process. The diagram shows that a composite environmental profile data sheet, which represents the mean environmental profile for the sample population, will be further reduced to individual stressor models for solar radiation, temperature, etc.

Step 8 — Stressor Cycles

Finally, a schedule will be constructed from the individual stressor models that show discrete stressor cycling that will simulate the actual field exposure. The purpose of such a schedule is to enable the usage of various pieces of test equipment. In such a schedule, no attempt is made to accelerate the stressors, that is to shorten the time exposure to a stressor by increasing the level of the stressor above that which would normally occur in usage.

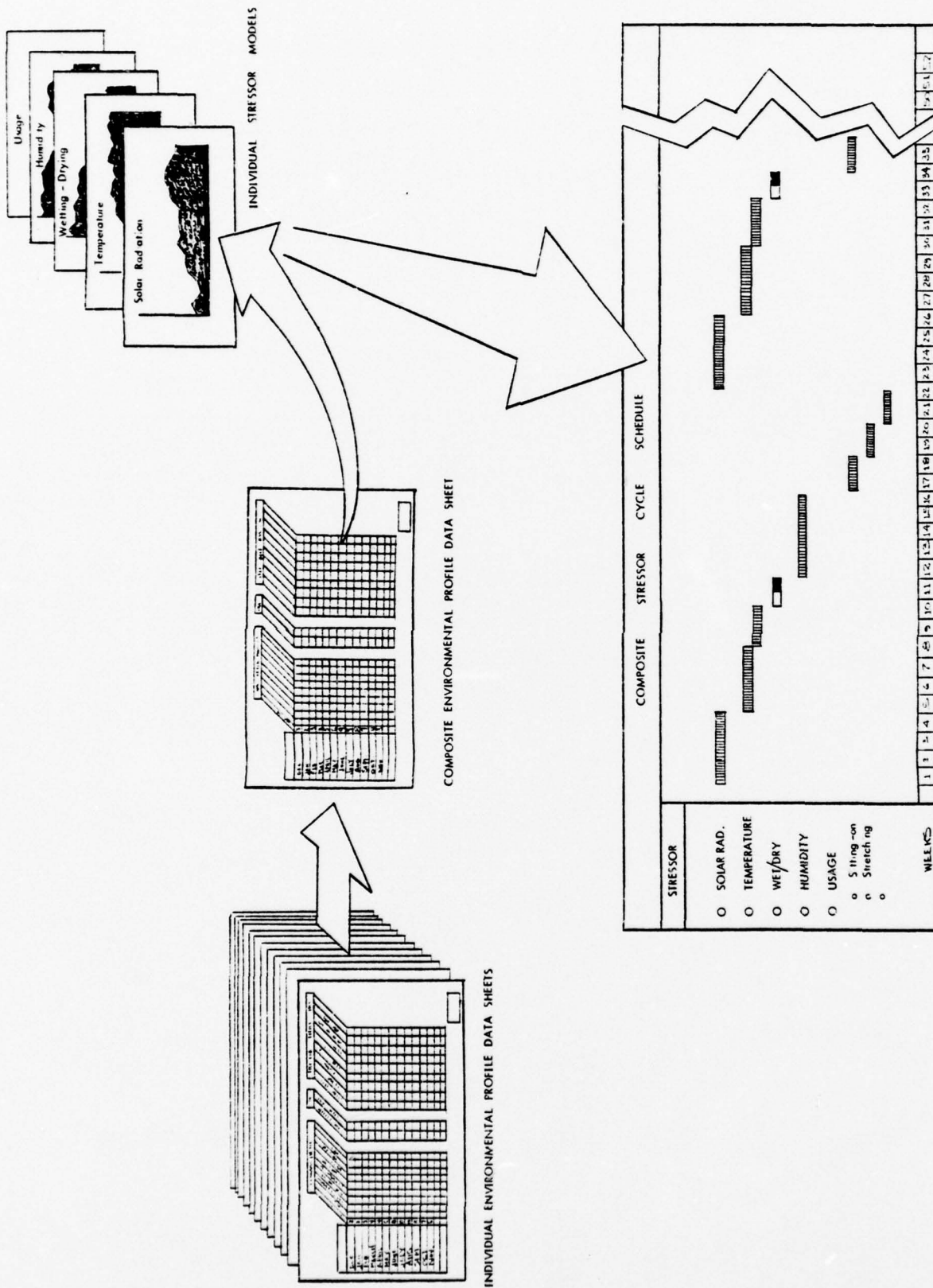


FIGURE 5. STRESSOR MODELING PROCESS

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253
254+ 253
254X

3.0 ACCELERATED AGING

The accelerated aging process is designated as Phase II and is presented in Figure 6. It is a flowchart of sequential events and activities required to accelerate the aging and assess the reliability of sample populations. Although ten steps are shown, the actual process may involve repetition of some steps. It is an iterative procedure with feedback and control looping until the desired results are obtained. Each of the ten steps will be briefly discussed.

Step 1 — Overstress Experiments

Thus far all concepts discussed that pertain to environmental modeling have been only concerned with nominal stress levels. Such simulated stressing attempts to match the expected stressors on a one-for-one basis (e.g. the level of stressors is not increased). This type of modeling, however, requires an extraordinary amount of time and, therefore, is not feasible within the short turnaround time of this project. Therefore, in order to shorten the aging (test) time to something within the realm of feasibility, overstressing (accelerating the stressors) must be performed. Accelerated testing is extrapolatory in nature in that inferences are made from actual happenings in a time compressed situation and compared to supposed happenings if the stressors were normalized and a longer test time used. Overstressing must be confined to some limiting envelope. For example, in buoyancy versus temperature, there is a limit on the independent variable of temperature beyond which the predictability of the independent variable of buoyancy is meaningless. This step of the flow will establish some basic parametric experiments that will be conducted on small sample of PFDs of particular flotation materials. The objective of the experiments will be to determine which parameters (stressors) are significant to buoyance degradation and the range of overstress (stress level limits) for reasonable predictability. A simplified example of buoyance behavior under increasing levels of stress is exhibited in Figure 7. This figure shows the anticipated degradation of buoyance with stress and assumes a given test duration time. It is, also, expected that as the test duration increases, holding the stressor(s) at a constant level, the buoyancy will decrease. This concept is shown in Figures 8 and 9. The former depicts a response surface for buoyancy as a function of the test duration time and temperature. The latter shows a response surface for buoyancy as a function solar radiation level and test duration. The purpose of these experiments is to determine buoyance behavior characteristics

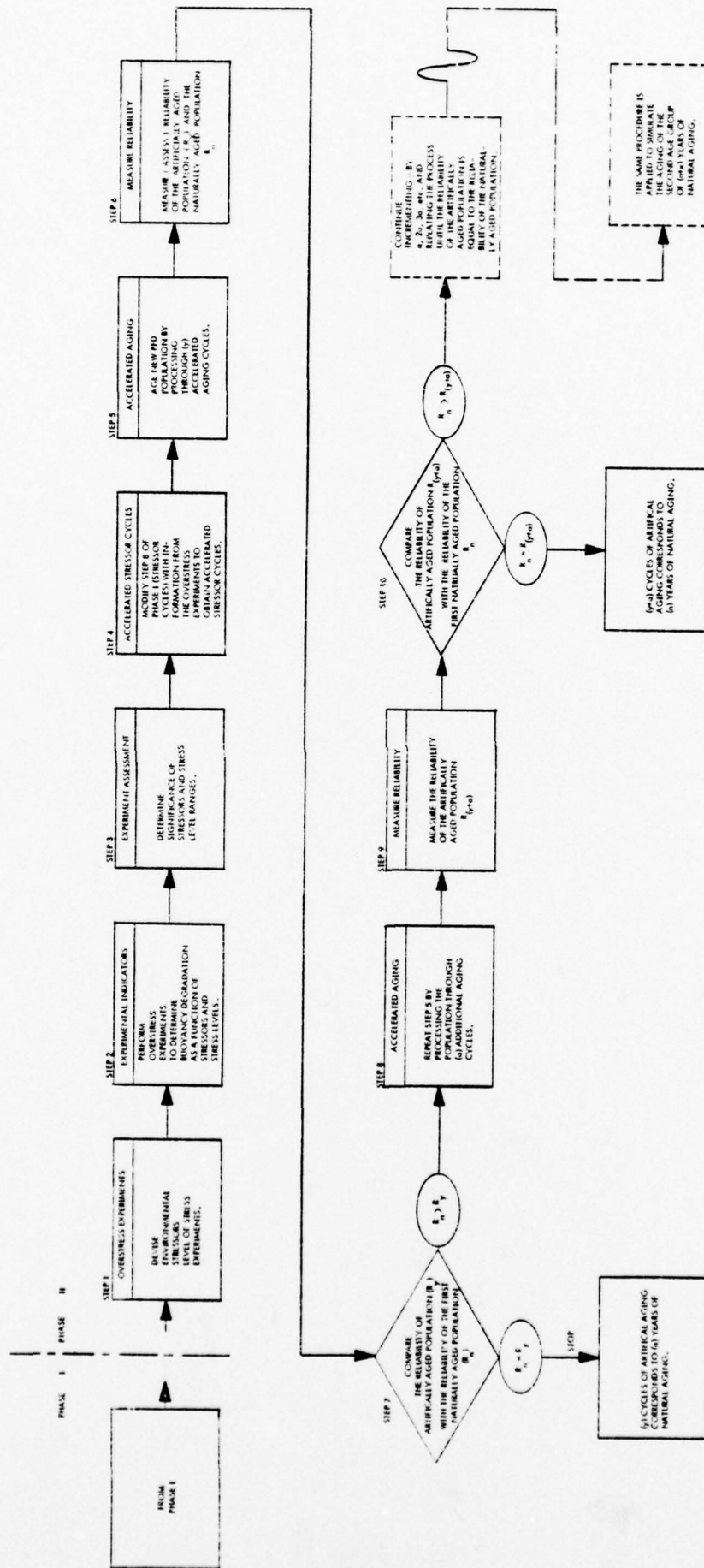


FIGURE 6. ACCELERATED AGING PROCESS (PHASE II)

V(A)-B-23/24

257
258x
257
258x

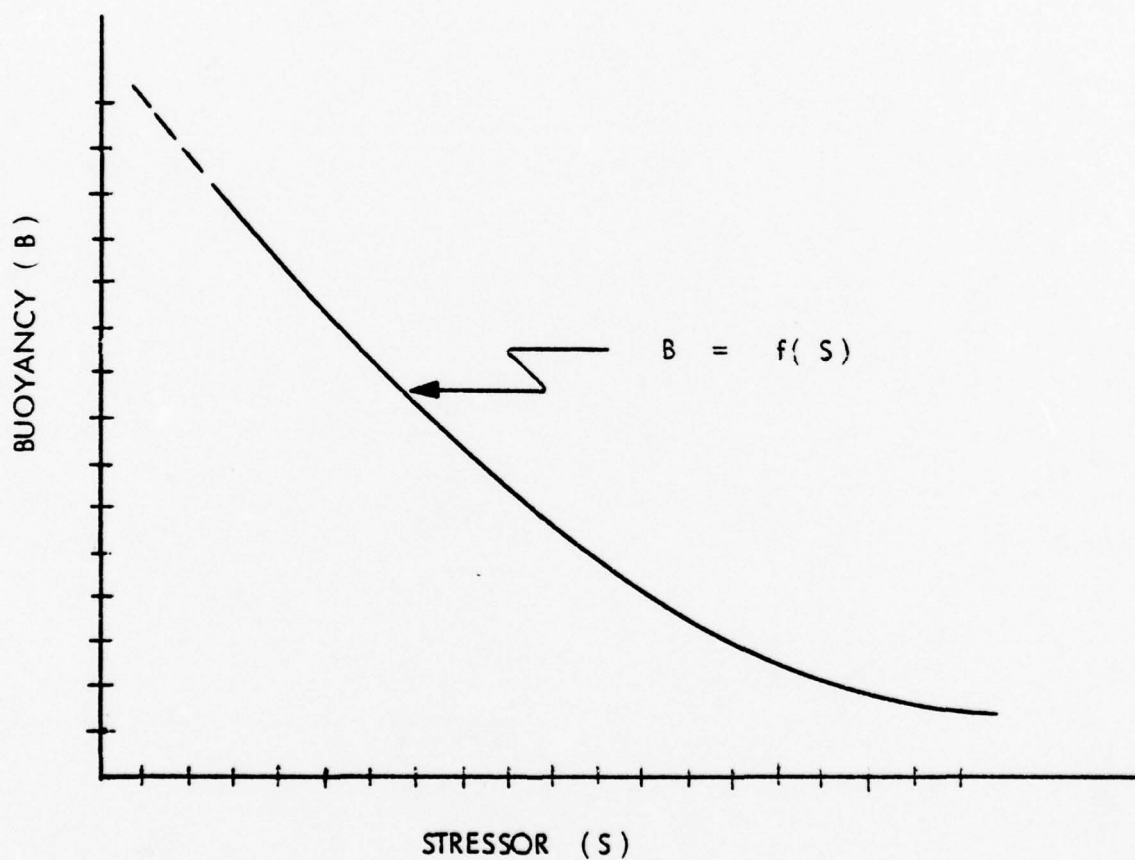


FIGURE 7. DEGRADATION OF BUOYANCY AS A FUNCTION OF INCREASING LEVEL OF STRESS

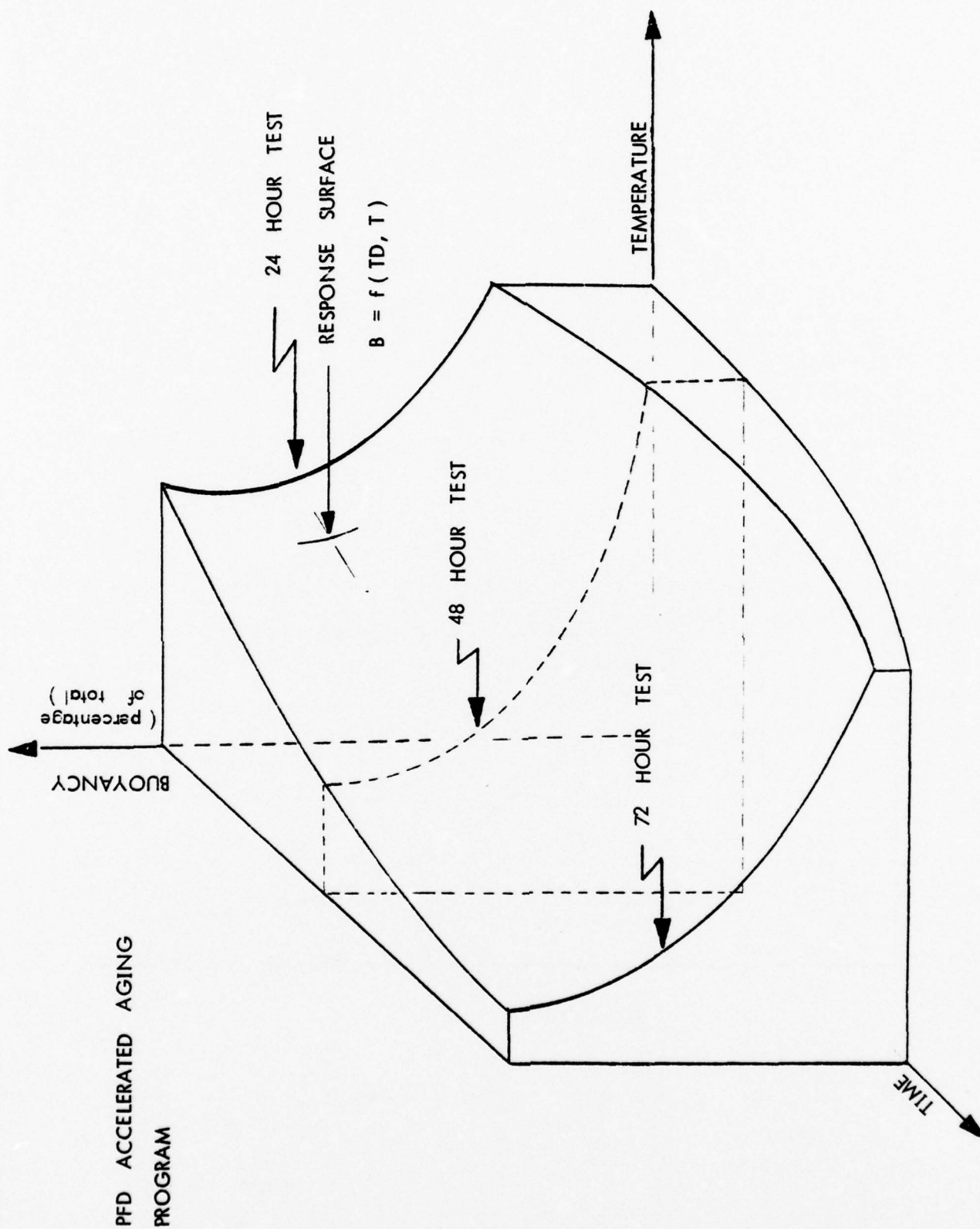


FIGURE 8. BUOYANCY AS A FUNCTION OF TEMPERATURE AND TEST DURATION

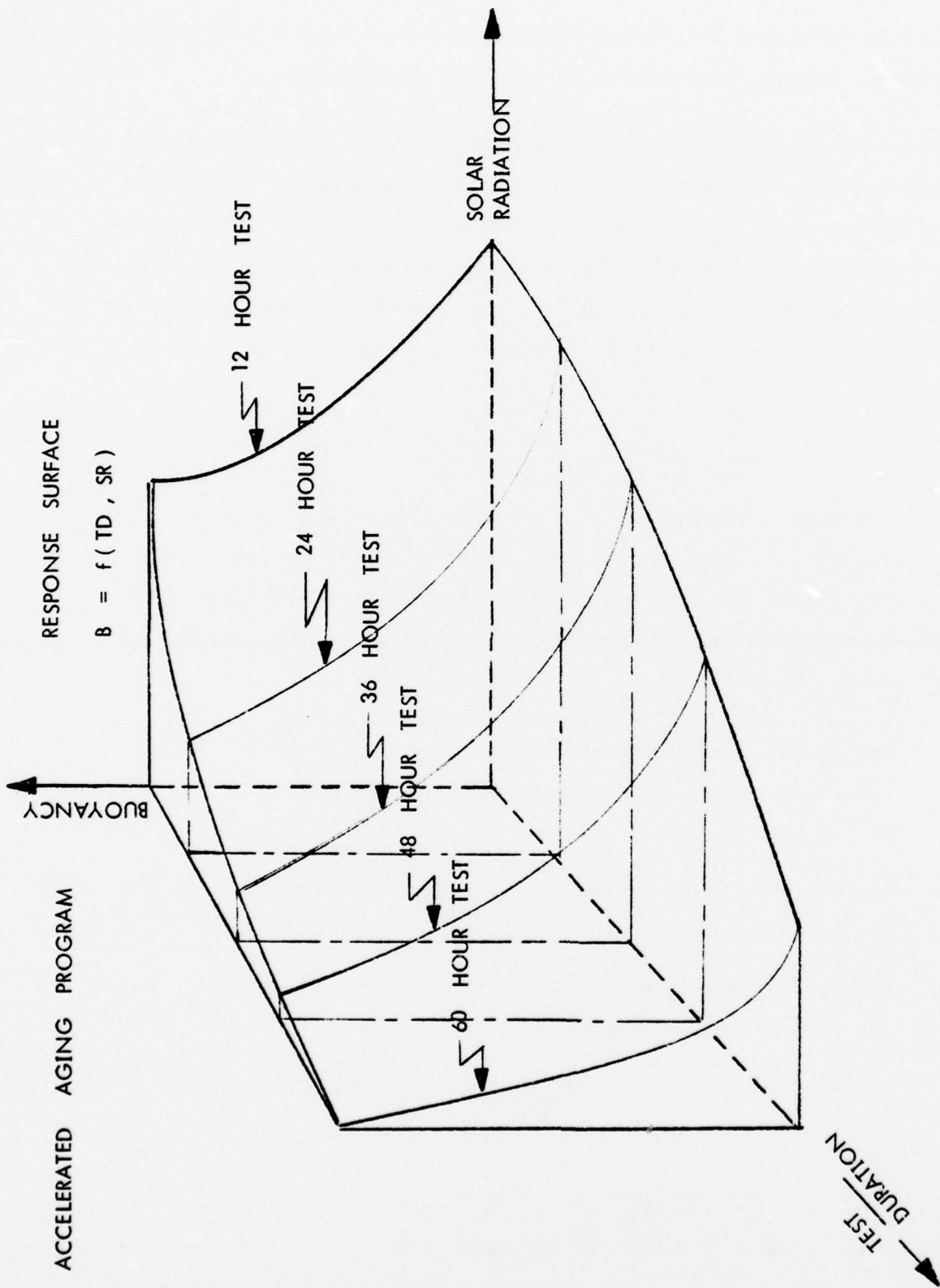


FIGURE 9. BUOYANCY AS A FUNCTION OF SOLAR RADIATION LEVEL AND TEST DURATION

under various stress conditions. The response surfaces are shown in slices taken at various test duration times. Behavior trend data can be derived from selected slices.

It is desirable to combine as many environmental stressors in the accelerated testing as the "real conditions" dictate. The stressor profiles will help in devising applicable combinations. It may be that induced buoyancy degradation due to two independent stressors taken sequentially is entirely different from the effect of their simultaneous application. Figure 10 shows a response surface of buoyancy as a function of temperature and solar radiation. In this example the interaction effects of the two stressors can be noted. Test duration time was held constant in Figure 10.

Step 2 — Experimental Indicators

The previous step explained the rationale and general logic involved in the overstress experiments as discussed and the measurement of buoyancy degradation of the experiment sample due to the various stressors. Figure 11, Buoyancy Test and Procedural Flow, illustrates the fundamental breakdown of the procedure and logic involved. The first four operations are part of Step 2 and these are as follows:

1. Submerge experiment sample PFDs for a 10-hour time period.
This follows from the basic definition of reliability as explained in the introduction.
2. Measure the buoyancy of each new (not stressed) PFD and record, B_{N_i} , ($i = 1$ through n of the sample size).
3. Perform overstress experiments on PFDs in accordance with Step 1, previously discussed in detail.
4. Measure buoyancy of each overstressed specimen PFD and record, B_{O_i} .

Step 3 — Experiment Assessment

The first decision box of Figure 11 initiates the beginning of Step 3. The objective of the comparison test is to determine the importance of various stressors to the aging process. If

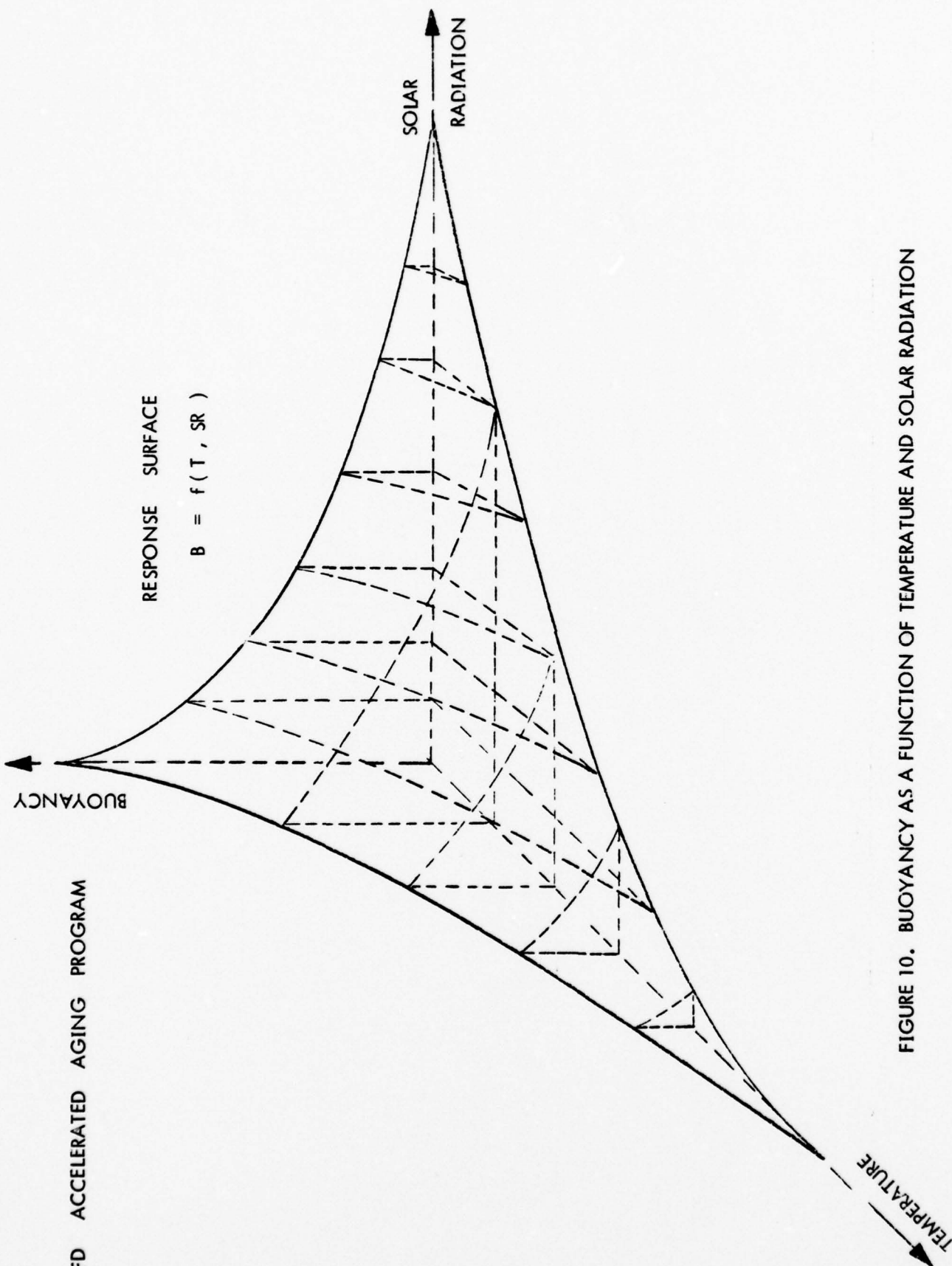


FIGURE 10. BUOYANCY AS A FUNCTION OF TEMPERATURE AND SOLAR RADIATION

(263)
264*

(263)
264X

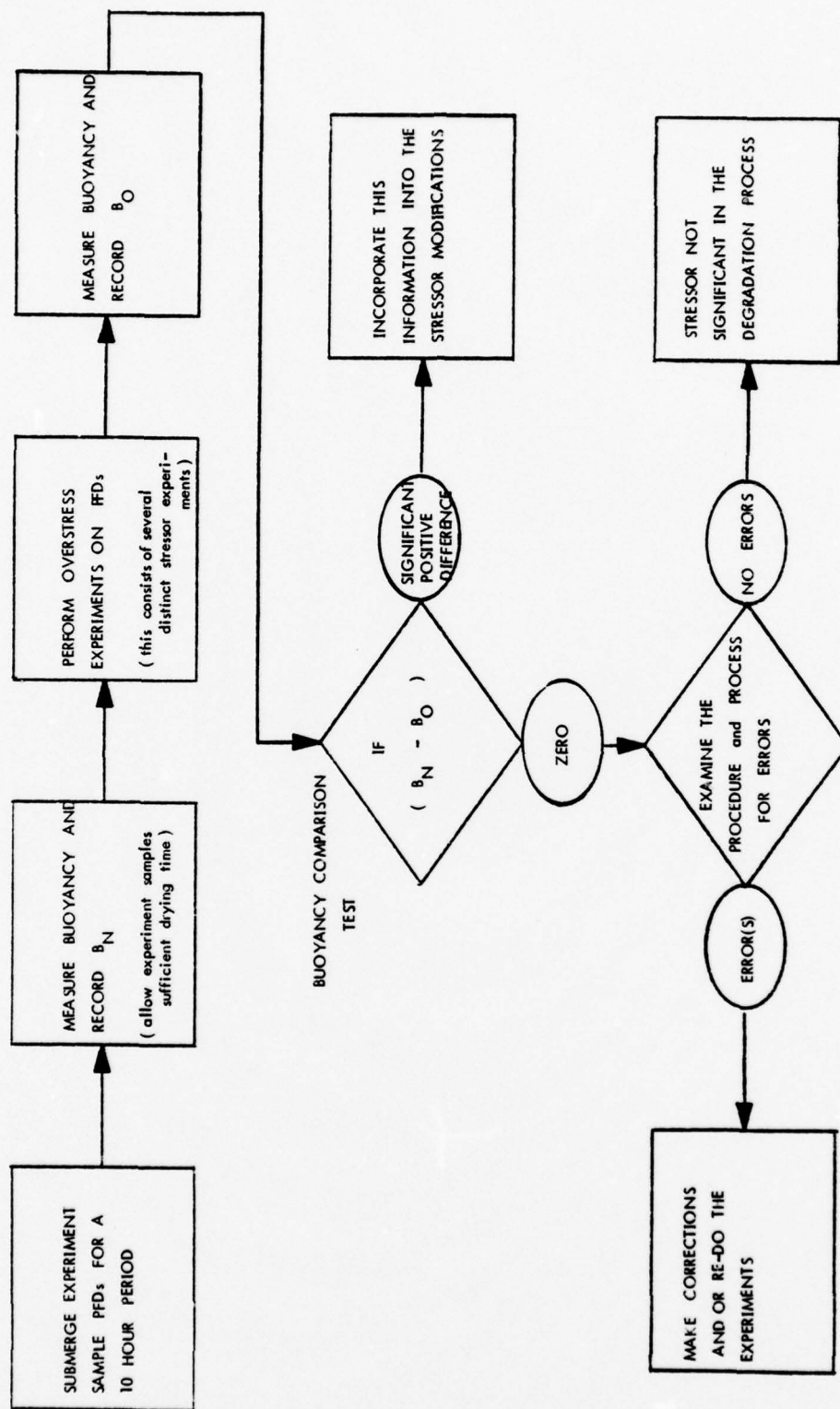


FIGURE 11. BUOYANCY TEST AND PROCEDURAL FLOW

V(A)-B-31/32

265
266x 265
266x

it is indicated that a particular stressor has no significance, the test process will be examined to assure no errors were introduced that could account for this occurrence.

Step 4 — Accelerated Stressor Cycles

The information derived from the overstress experiments will be fed back to Step 8 of Phase I of this plan. If necessary, the stressor cycles will be modified to reflect the learnings from the experiments. Some stressors may be dropped altogether as having no significant effects, while the level range of effectivity of other stressors may be altered.

Step 5 — Accelerated Aging

This step is the beginning of the accelerated aging (overstressing) on the sample population. Previous overstressing experiments were a prelude to this step and should not be confused with it. In this operation the new PFD sample population is processed through some (y) number of artificial or simulated aging cycles such as presented in Step 8, Phase I. The number (y) is an arbitrary number but, with engineering judgment that will be accrued at the time of the test, should be a fairly close approximation of the actual aging process under normal environmental and usage conditions.

Step 6 — Measurement of Reliability (Assessment)

The sample population that was aged (y) cycles in Step 5 now will be tested to determine its reliability, R_y . The reliability assessment is relative to some lower boundary limit of buoyance (TBD in the physical effectiveness portion of the PFD study). Figure 12 indicates the reliability assessment for the new population, R_o , and after artificially aging through (y) and ($y+a$) aging cycles. The numbers shown are for illustration purposes only. In addition to assessment of the reliability of the artificially aged population, the reliability of the naturally aged population must, also, be assessed.

Step 7 — Natural Aging/Artificial Aging Comparison

The purpose of the comparison is to determine when to cease the aging cycle. This is essentially a trial-and-error process using feedback and control logic. The process is illustrated in Figure 13. A sample population, naturally aged for (n) years represents the target

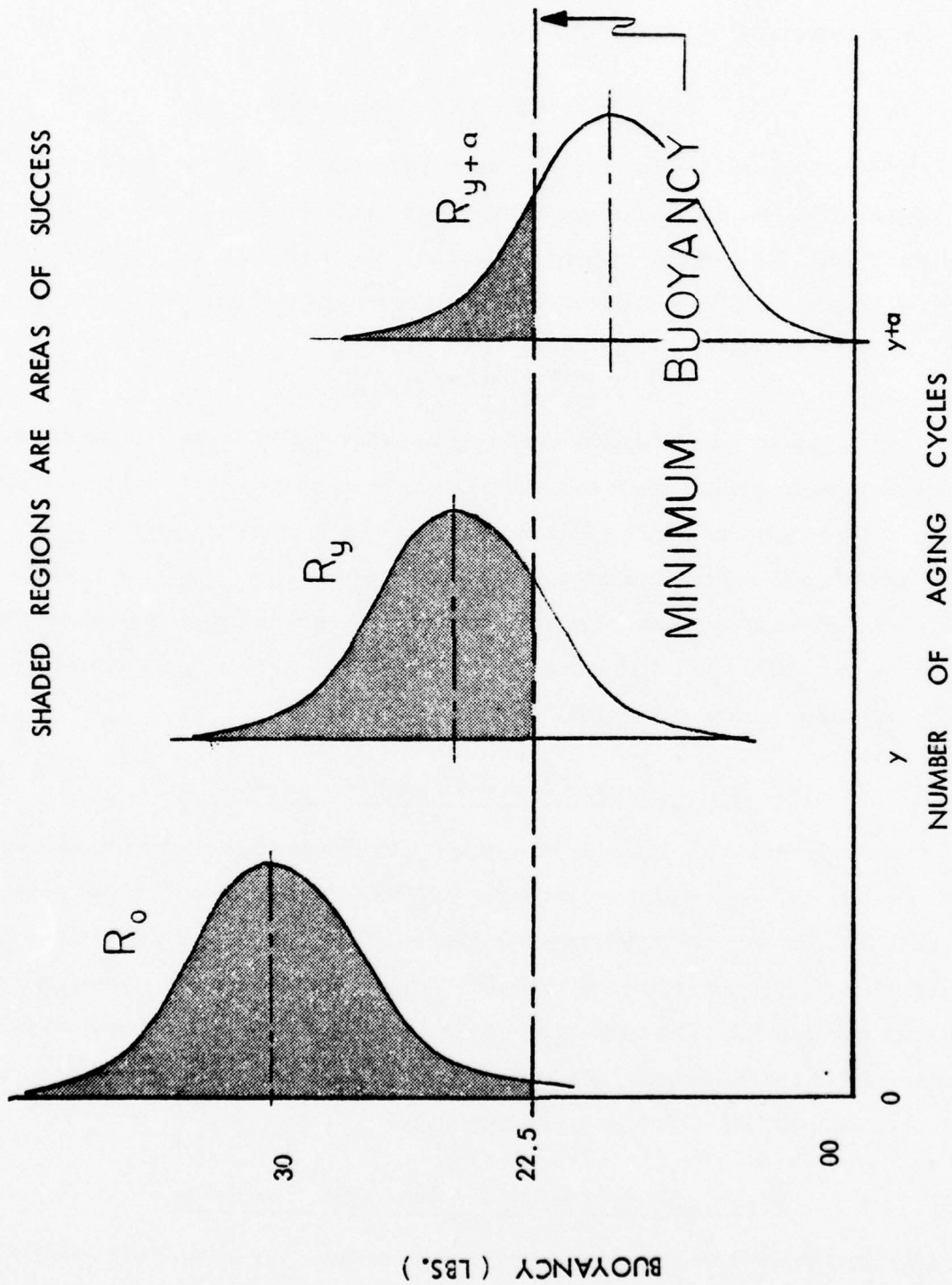


FIGURE 12. RELIABILITY ASSESSMENT

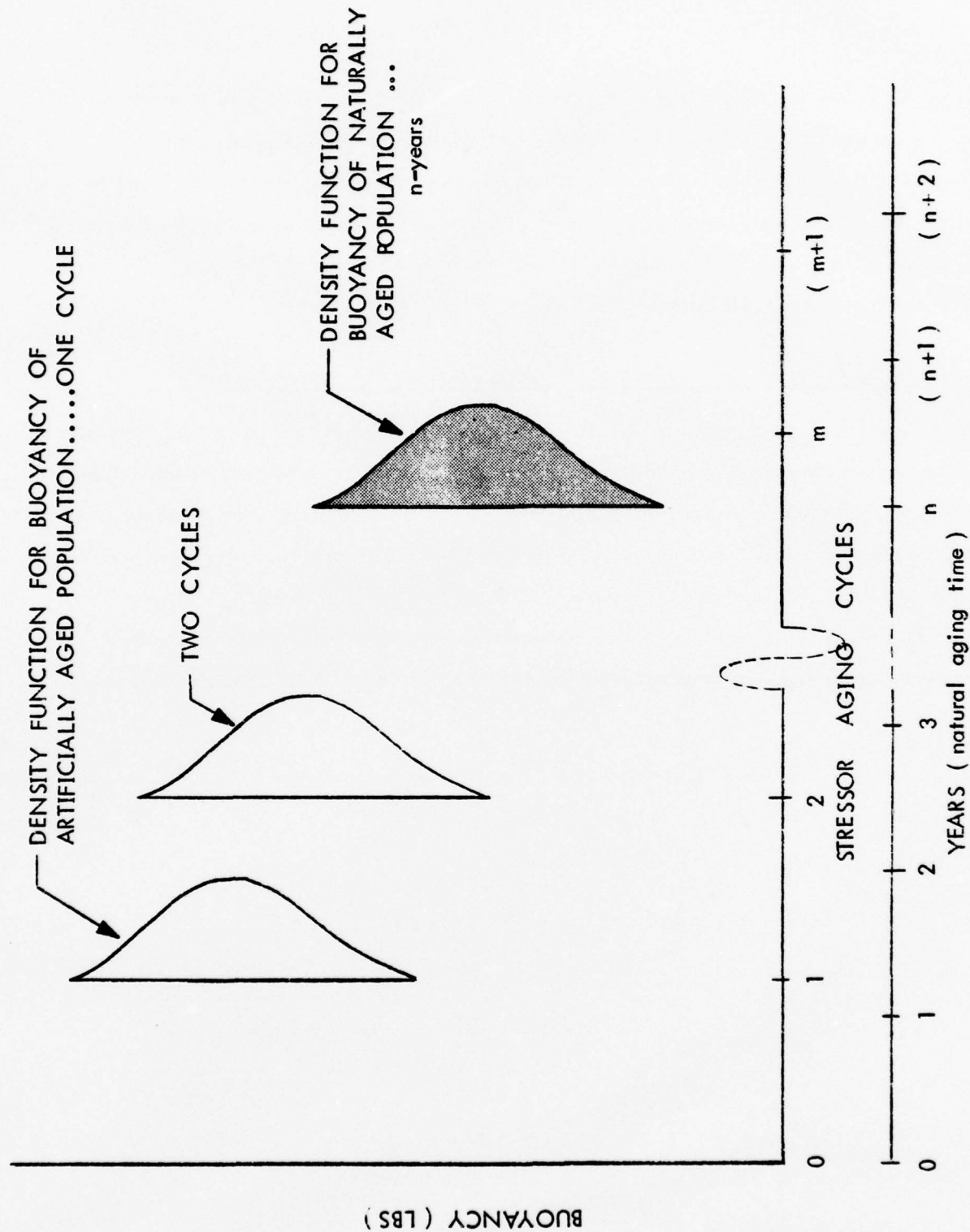
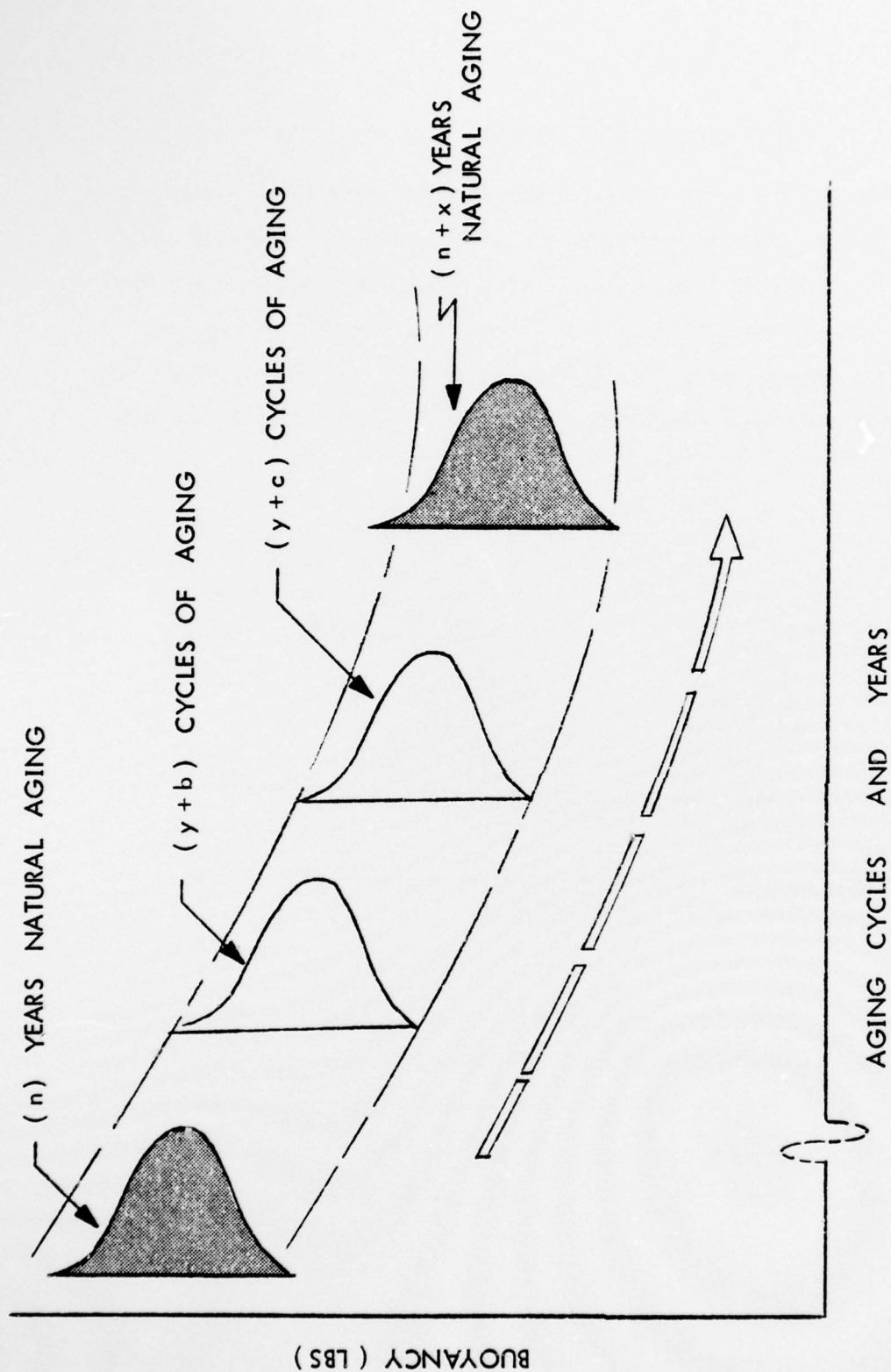


FIGURE 13. RELIABILITY ASSESSMENT AND COMPARISON OF ACCELERATED AGING WITH NATURAL AGING

buoyancy/reliability for the stressor aging cycles. The figure shows a density function for buoyancy after one aging cycle and the density function for the same sample population after two cycles. The process is iterative in that it will be repeated until the test populations's density function approximates that of the naturally aged population. Note that in Step 7, when $R_n = R_y$, the process will be ceased and it will be concluded that (y) cycles of artificial aging corresponds to (n) years of natural aging.

Steps 8, 9, and 10 — Additional Aging, Measurement, and Comparison

From Step 7, when $R_n > R_y$, (y) will be incremented by some number (a) of aging cycles and, again, the population will be assessed and compared. The process is methodical and repetitious but provides good assurance of results. The last item on Figure 6 states that the same procedure would be utilized to simulate the aging of the second naturally aged population of (n+x) years. Figure 14 shows the trend in degradation with increasing cycles of stressor aging. Again, the cycling will be ceased when the reliability of the test sample population is approximately the same as that of the naturally aged population of (n+x) years.



V(A)-B-37

FIGURE 14. FUNCTIONAL RELATIONSHIP BETWEEN STRESSOR AGING AND NATURAL AGING

(271)

271

4.0 OVERSTRESS TESTING

Let us make the assumption that if a PFD will be expected to perform in an environment of stress, x , that it will be designed and constructed with some strength, y , such that $y > x$. In this case the reliability would be 1.00. However, due to imperfections and nonuniformity in materials and processes, the strengths of a group of PFDs are statistically distributed. Also, the stressor factors operating on a given PFD population will, from time to time, vary and, therefore, could be considered a random variable. Figure 15 illustrates this situation.

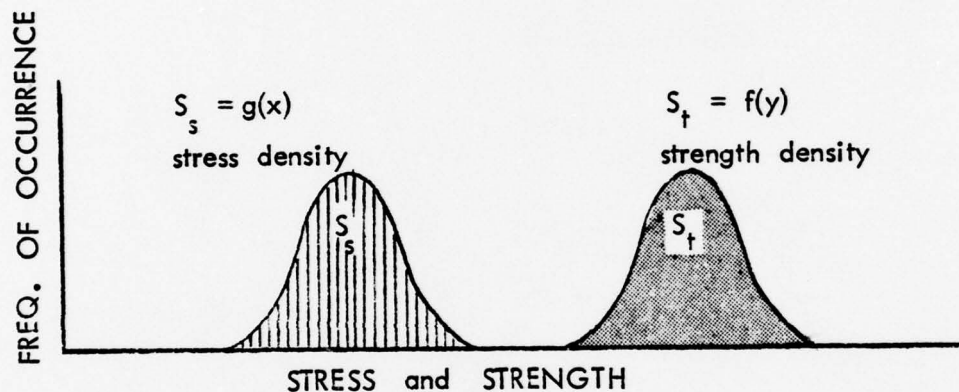


FIGURE 15 , STRESS AND STRENGTH DENSITY FUNCTIONS UNDER NORMAL STRESS CONDITIONS

In overstressing, higher than normally designed for stresses will be applied to the specimen PFDs. Essentially this moves the stress density into the region of the strength density as shown in Figure 16. At this point, the reliability of the sample population will be less than one (e.g. $R < 1.00$). In an extreme case of overstressing, as shown in Figure 17 where the stress density exceeds the strength density, the reliability of the sample population will be zero.

In Figures 15, 16, and 17, it was assumed that the testing was nondestructive since the stressor levels were shown to be increasing and the strength density was relatively constant. In reality, the strength will be degrading with the various environmental stressors, as shown in Figure 18. It is, in fact, this characteristic that is the subject of the analysis. Figure 18 also represents the shift in strength that takes place under wear in normal usage.

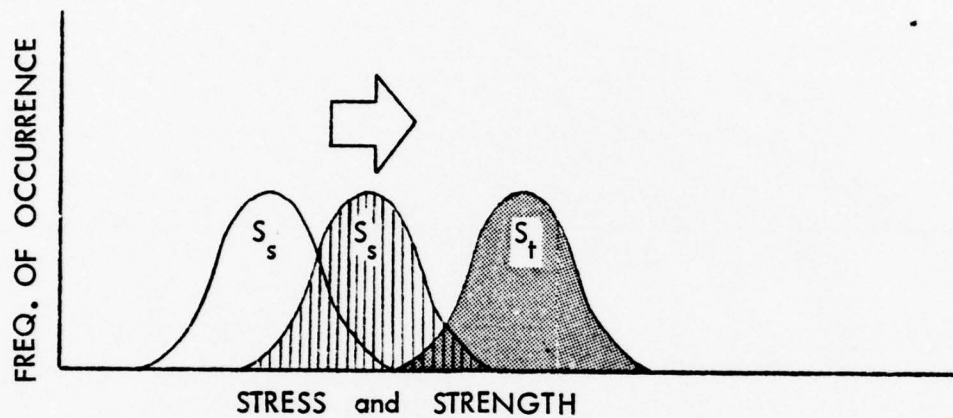


FIGURE 16. STRESS AND STRENGTH DENSITY FUNCTIONS UNDER CONDITIONS OF INCREASING STRESS

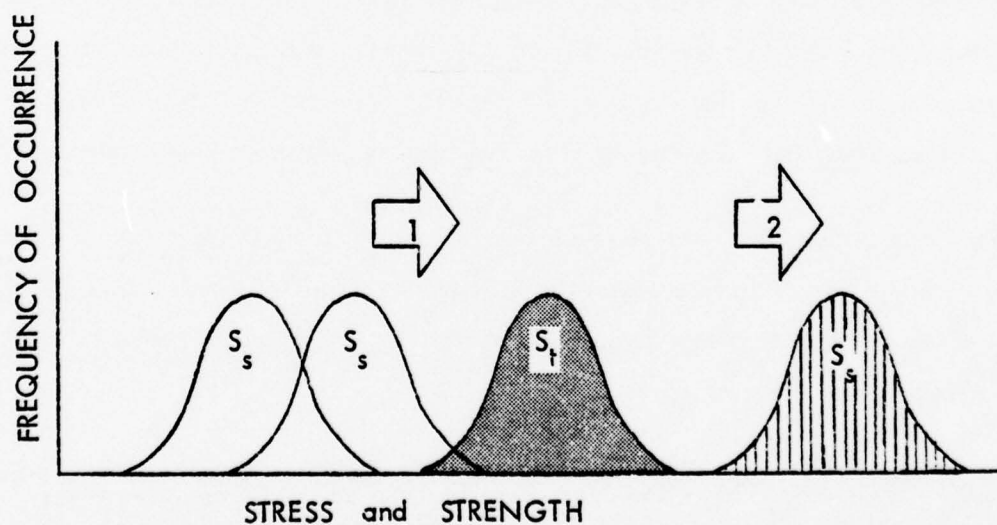


FIGURE 17. STRESS AND STRENGTH DENSITY FUNCTIONS WHERE STRESS EXCEEDS STRENGTH

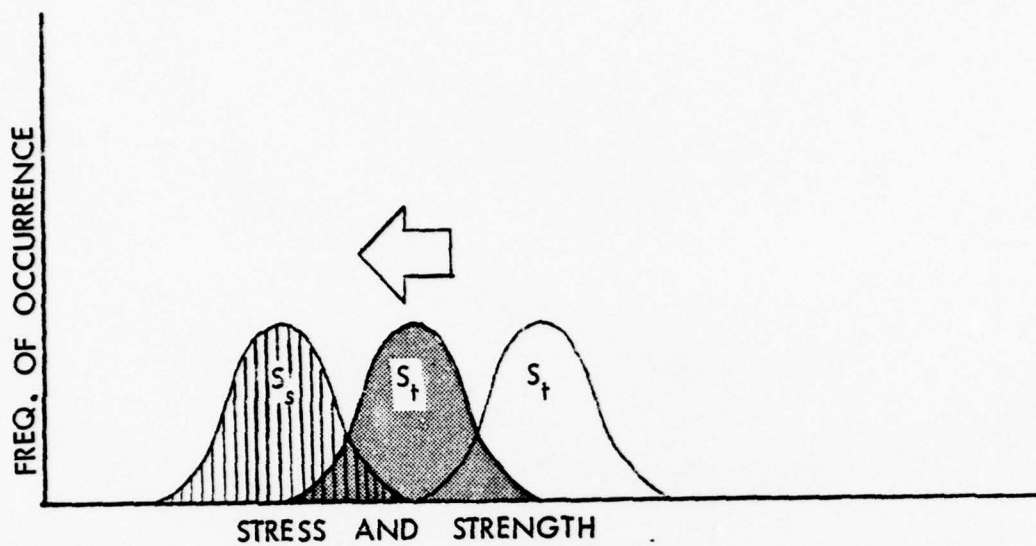


FIGURE 18. STRESS AND STRENGTH DENSITY FUNCTIONS
WHERE STRENGTH IS DEGRADING

In accelerated aging, the relationship between the relative movement of the stress (various stressor) density and strength density functions is sought as a predictor of how overstressing in a compressed time frame correlates with normal stressing in a normal time frame. In the Accelerating Aging Process presented in Figure 6, buoyancy as a function of the stressor levels was discussed. Since this is a crucial facet of PFD reliability task, the key idea of aging the new sample population through iterative cycling will be briefly summarized.

Figure 19 shows a comparison between the buoyancy density function of a sample population of (n) years old with a new sample population's buoyancy densities for various aging cycles. It shows that the simulated aging will be terminated after (3y) aging cycles as this corresponds to (n) years of natural aging.

A minimum of two sample populations are essential. Figure 20 depicts the same process for two age groups. In this example (7y) cycles of simulated aging corresponds to (n+5) years of natural aging.

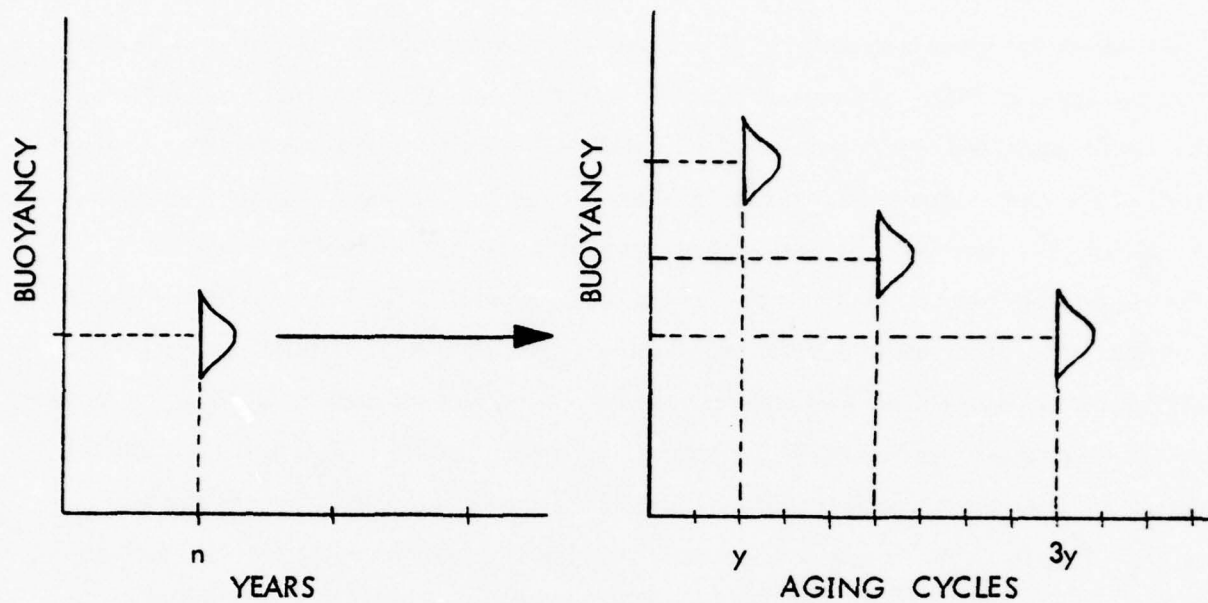


FIGURE 19. RELATING YEARS TO CYCLES (ONE SAMPLE POPULATION)

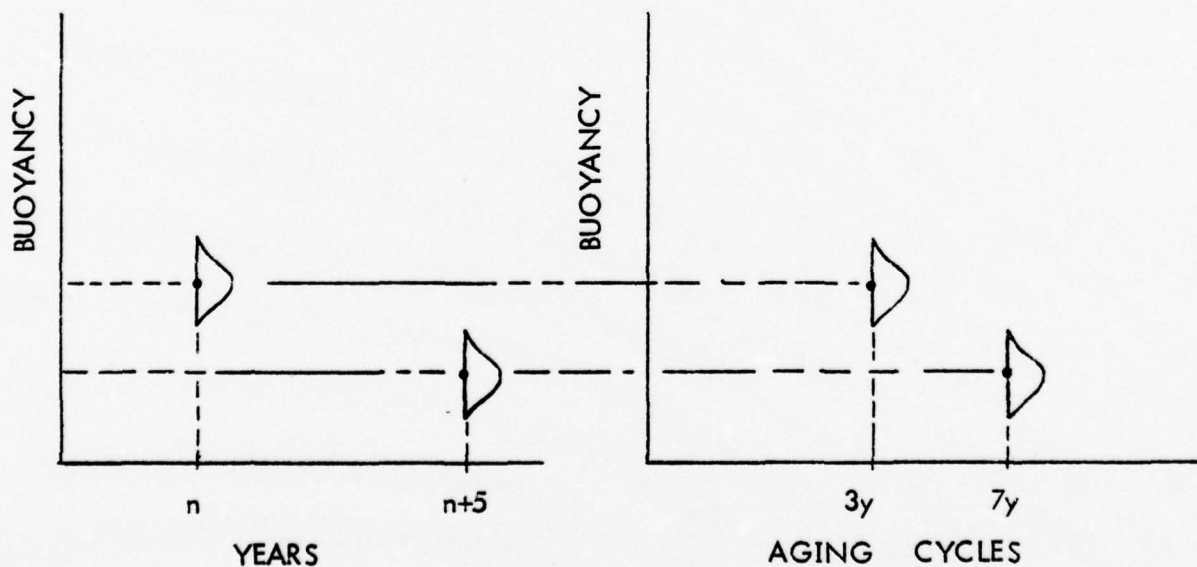


FIGURE 20. RELATING YEARS TO CYCLES (TWO SAMPLE POPULATIONS)

It is expected that an accelerated aging to "real world" aging correlation will be obtained for various types of PFDs and various flotation materials such that the life of any particular make can be predicted by subjecting a sample population to the aging process (Step 8 of Phase I of the current contract). Assuming a goal or standard of useful life can be decided upon (U.S.C.G. decision), for inherently buoyant PFDs, a performance standard for reliability can be obtained both in terms of mission (short-term reliability) and useful life (long-term reliability). This concept is shown in Figure 21. R_g is a short-term or mission goal for the reliability of new PFDs. This is a control of outgoing product quality (acceptance sampling). If the measured reliability of the sample, R_s , is less than R_g , ($R_s < R_g$), then the "make/brand" should not be approved. If the reliability of the sample exceeds the goal (e.g. $R_s > R_g$), but after the sample has undergone the accelerated aging process (derived from this study), fails the life goal, R_l , then the "make/brand" should, again, not be approved. The logic of this process is illustrated in Figure 22.

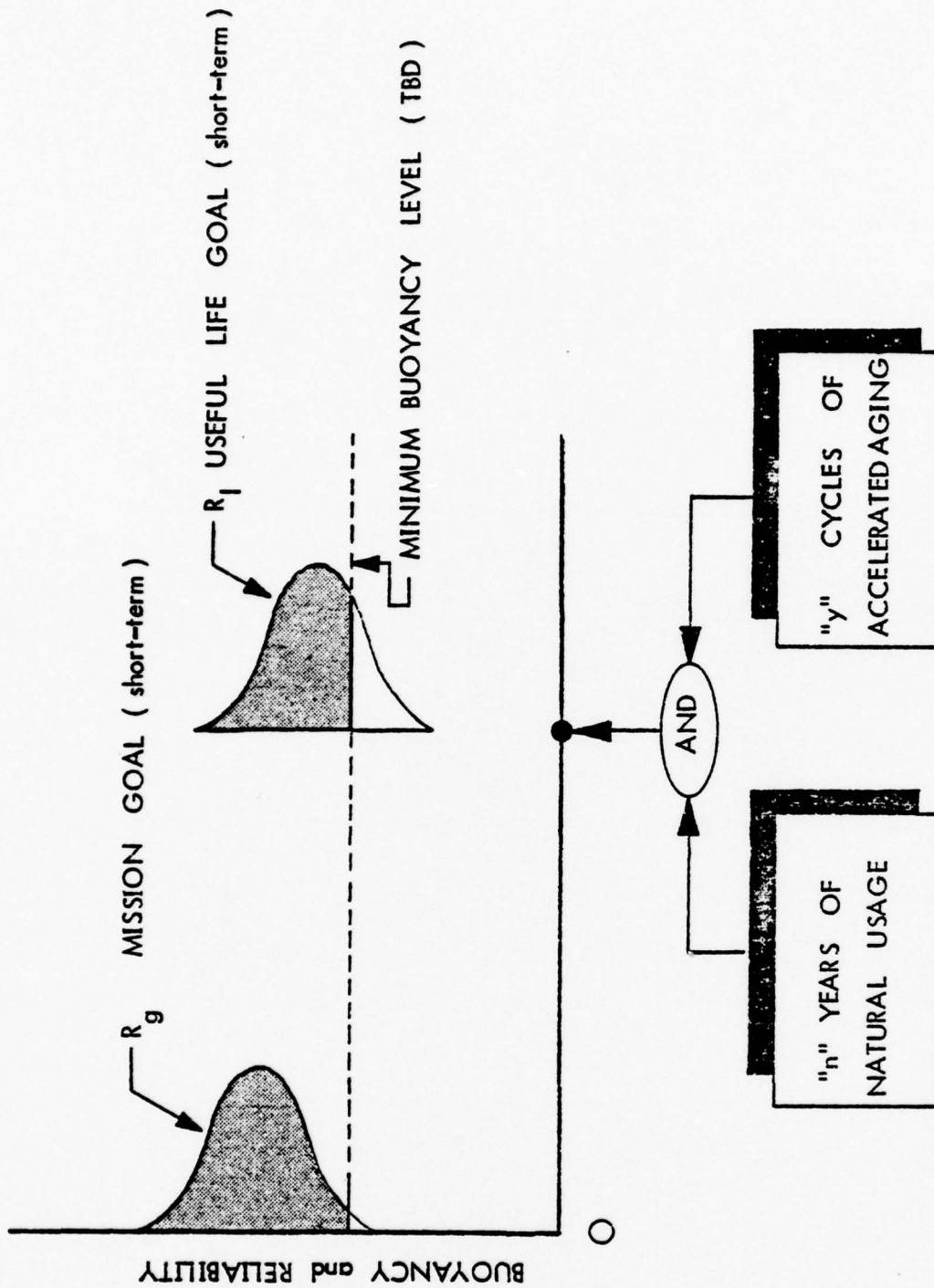


FIGURE 21. SHORT-TERM AND LONG-TERM RELIABILITY PERFORMANCE STANDARDS

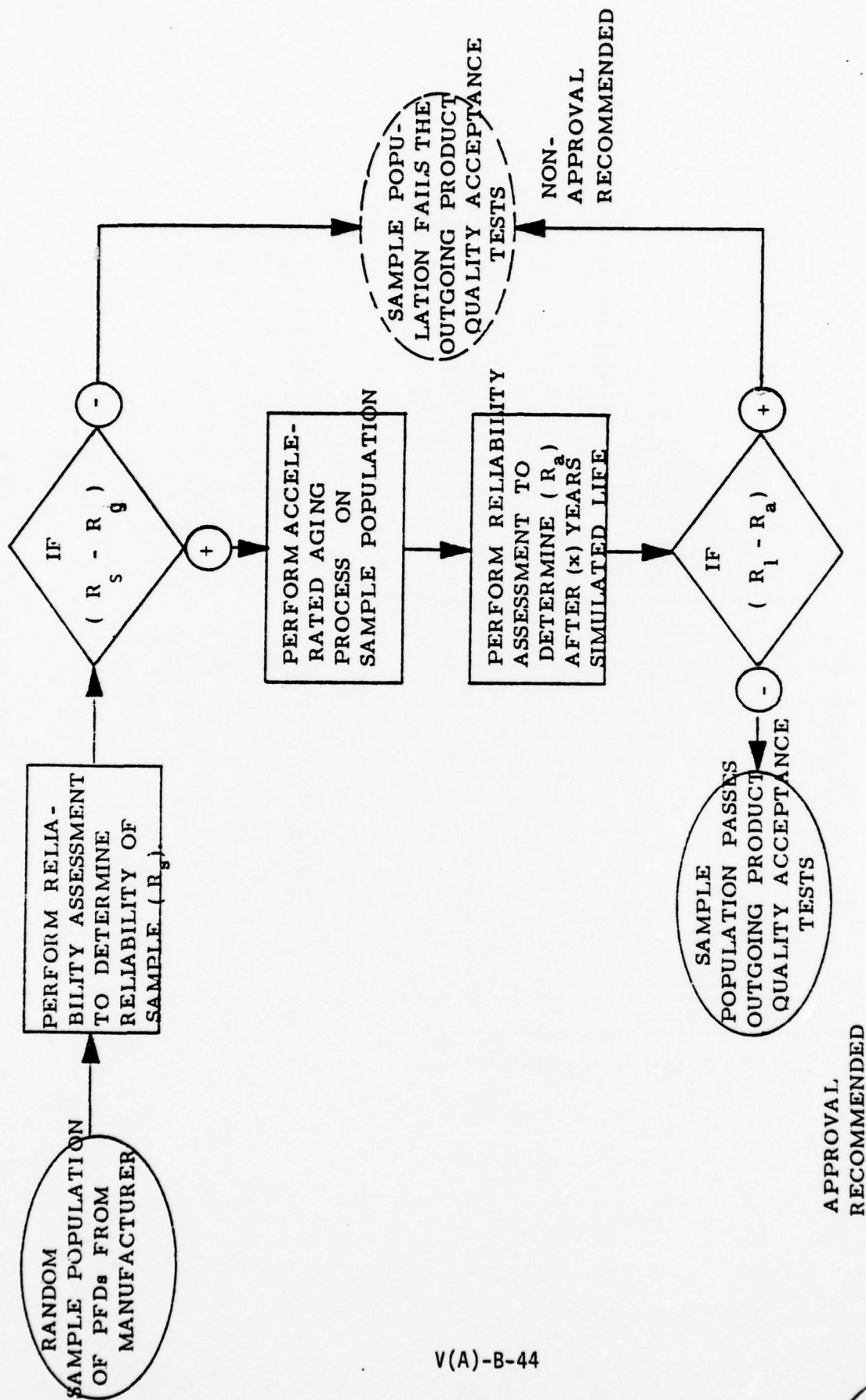


FIGURE 22. PERFORMANCE STANDARDS APPROVAL PROCESS

APPENDIX V(A)-C - FACTORS AFFECTING PFD BUOYANCY

As a result of various research efforts by Wyle Laboratories, Underwriters' Laboratories, and several manufacturers, several factors besides normal degradation have been found to influence the buoyancy of PFDs. The factors of water temperature, atmospheric pressure, and soak time have all been found to affect the buoyancy of certain PFDs. A discussion of the available information is presented below.

Water Temperature and Atmospheric Pressure

The results from the testing of various foam materials by Underwriter's Laboratories, Wyle Laboratories and various manufacturers have shown that in some instances temperature, pressure and possibly humidity will affect the buoyancy readings obtained. Data was obtained from one manufacturer of a PVC foam on the readings of water temperature and atmospheric pressure at the time buoyancy readings were made. These results were analyzed to determine whether a relationship exists between the two independent variables of temperature and pressure and the dependent variable of buoyancy. The results showed that there existed no significant relationship between the independent and dependent variables when a multiple linear regression was performed.

Contact was also made with a second manufacturer of a PVC foam. The manufacturer of this foam indicated that he had performed a similar experiment and analysis on the effects of temperature and pressure on buoyancy readings. The results indicated that some sort of relationship did exist; however, the relationship did not follow the ideal gas law.

Recently, contact was made with Mr. Samuel Wehr of the office of Merchant Marine Safety on results of temperature and pressure experiments on buoyancy readings of kapok PFDs. He indicated that he had found a relationship between temperature/pressure and buoyancy and that the relationship followed the ideal gas law.

The above results show a wide range of responses of buoyancy mediums to temperature and pressure. This suggests that the effects of temperature and pressure on PFD buoyancy cannot be ignored in many cases if consistently reproducible results are to be obtained. Two methods are available for handling the problem: 1) Establish

standard conditions for any factors found to influence PFD buoyancy, and 2) Establish correction factors for buoyancy readings taken under non-standard conditions.

The major problem with method 1, of course, lies with the difficulty of controlling all influencing factors. This difficulty can be alleviated if correction factors can be derived for the non-standard conditions. Underwriters' Laboratories has established in UL 1191 a method for calculating a correction factor for temperature and pressure variations from standard conditions. This correction factor, however, was derived to reflect conditions under the ideal gas law. As reported earlier, the empirical evidence obtained does not support the assumptions found in the ideal gas law. If a correction factor is to be used for correcting to standard temperatures and pressures when measuring buoyancy, the correction factor must be derived to reflect the characteristics of that particular buoyancy medium and not be based purely on theoretical considerations.

Soak Time

The effect of soaking a particular type of PVC foam for a period of 24 hours was examined. Both used and new PFDs were measured for buoyancy prior to and after a 24 hour soak period. The results showed that new PFDs exhibited between 0.1 and 0.2 lbs of buoyancy loss after a 24 hour soak period. The results from the testing of used PFDs that ranged in age from 2 years to 5 years old showed the loss in buoyancy after a 24 hour soak period rose to only 0.3 lbs of buoyancy. No difference was found between those at two years and those at five years.

approximately 3.6 million adult devices could be expected to be sold. Thus, we would have an annual increase in cost of 3.6 million x 14.50 dollars - 52.5 million dollars. This is 52.2 million dollars divided by 105 lives per year, or a cost per life saved of \$497 thousand. The latter figure is higher than costs usually accepted by regulatory agencies for safety programs.

TABLE VII-A1. DEVICE COSTS AND MARKET SHARE

Type of PFD	Cost	Estimate of Percent of Approved or Certified PFDs on Board Recreational Boats	
		Currently	20 Yrs After Implementation with Minimum LSI = 0.23
AK-1	\$ 7.00	49.5	0.0
Type III Vests	25.00	16.0	45.2
Type III Flotation Jacket	40.00	1.3	3.8
Type IV Rings/Horseshoes	30.00	6.5	0.0
Type IV Cushions	8.00	26.7	0.0
Belt Type Inflatable	20.00	0.0	
Hybrid Vest with about 15 lbs inherent buoyancy	32.50	0.0	50.0
Hybrid Vest with about 10 lbs inherent buoyancy	30.00	0.0	
TOTAL		100.0	100.0
Average Device Cost		\$12.07	\$26.57
Average Device LSI		0.14	0.26

APPENDIX VII-A. COST BENEFIT FOR MINIMUM LSI APPLIED TO ALL DEVICES

This appendix presents the cost and benefit calculation for setting a minimum LSI of 0.23 and allowing existing devices to remain in service until they expire.

The benefit derived from the LSI depends upon how it is applied. If the minimum LSI is set so low that all the currently approved PFDs remain approved or certified, then the benefit will be small. Inspecting the overall LSIs for various types of PFDs in Table VII-A1, we see that the LSI for AK-1s (0.11) is appreciably lower than the others. In order to illustrate the potential benefits of the LPM, we will first assume that the minimum LSI is set at 0.23. This value is used for purposes of illustration only. The determination of the minimum LSI and similar criteria is a policy decision which must be made by the Coast Guard. The purpose of this discussion is simply to illustrate a tool which the Coast Guard can use to evaluate alternative programs. Assuming that the minimum LSI is set at 0.23, AK-1s and Type IVs would no longer be approved or certified.

The percent of various kinds of PFDs on board at 20 years after (assuming all PFDs presently in use but not having LSIs of at least 0.23 are phased out over 20 years) implementation assuming a minimum LSI of 0.23 are shown in Table VII-2. The average overall LSI 20 years after implementation was calculated as discussed earlier for the current population of PFDs on board and equals 0.26.

The maximum benefit of the LSI system is approached 20 years after implementation. At that point, estimated annual benefit as compared to the current PFD approved system is 105 lives per year (see equation in Section VI) for 0.12 change in the LSI.

On the cost side, Table VII-A1 provides cost estimates, in 1975 dollars, for the device types and the market share of those devices in 1975 and after 20 years from Table VII-A1. Table VII-A1 also shows the average device cost in 1975 and 20 years after implementation. Using 1975 as a base year, the average increase in device cost is \$14.50, and approximately 7.2 million devices could be expected to be sold (see Figure VII-15) if the devices had the same expected life as the devices sold in 1975. Assuming a 50% increase in expected life occurs as a result of better device design and that 75% of the total device market is adult devices,

SECTION VII - APPENDICES
ANALYSIS OF THE LIFE-SAVING
INDEX (LSI) SYSTEM

- APPENDIX VII-A Cost Benefit for Minimum LSI Applied to All Devices

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** PFD DAY **
 ** PFD AVAILABLE-USED **
 ** C O N S I D E R A T I O N O F H O D Y O F W A I K **
 ** BY HOW **
 ** P A G E 1 O F 1 **

COUNT	SW						ROW TOTAL
	RIVER-CR	LAKE-SWA	GREAT LA	COASTAL	OCEAN		
COUL PCT	1.01	2.01	3.01	4.01	5.01		
TOT PCT	1.01	2.01	3.01	4.01	5.01		
USED	1.01	2.01	3.01	4.01	5.01		
NOT USED	1.01	2.01	3.01	4.01	5.01		
COLUMN TOTAL	444891	473417	67986	364376	90230	1447300	
TOTAL	444891	473417	67986	364376	90230	1447300	

$$\text{Adjusted } \chi^2_4 = 109.66 \times \frac{1}{100} \times (0.0778) = 8.53$$

R ² OF ESTIMATE = .7696	F-STAT OF F.E.D.M. = 0
CONSTANT COEFFICIENT = .08672	
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = .00839 WITH PFDAD	DEPENDENT.
NUMBER OF ALTERNATIVE OBSERVATIONS = 534.003	= .00263 WITH BDM

(312)

3/2

FILE DEFINITION RUN FOR ARM DATA

FILE ARM CREATION DATE = 12/05/77 DATA

***** C O N S I D E R A T I O N O F W A T E R C O N D I T I O N *****
 P F D A J P F D A V A I L A B L E - U S E D B Y W C P A G E 1 O F 1

		COUNT				ROW	
		WC				TOTAL	
		1.01	2.01	3.01	4.01		
PFDAD	ROW PCI						
	COL PCI						
	TOT PCI						
	USED						
NOT	ROW PCI						
	COL PCI						
	TOT PCI						
	USED						
COLUMN TOTAL		127005	545376	116402	50437	1447300	100.0
		50.2	37.1	0.2	3.9		

RAW CHI SQUARE = 44017.34026 WITH 3 DEGREES OF FREEDOM. SIGNIFICANCE = 0
 CONTINGENCY COEFFICIENT = .18062
 UNCERTAINTY COEFFICIENT (ASYMMETRIC) = .04114 WITH PFDAD DEPENDENT. = .01729 WITH WC DEPENDENT.
 NUMBER OF MISSING OBSERVATIONS = 534003

Adjusted $\chi^2 = 48807 \times \frac{1}{100} \times (0.0978)$
 $= 37.97$
 $p = 10^{-7}$

(311)

(311)

FILE DEF INITION FOR DATA

OPERATION DATE = 12/05/77 DATA

***** C H O S T A U L A T I O N O F *****
 PFDAJ PFD AVAILABLE-USED ***** BODY OF WATER *****
 ***** PAGE 1 OF 1 *****

COUNT									
ROW	PCT	RIVER-CR	LAKE-SWA	GREAT	COASTAL	OCEAN	ROW	TOTAL	
COL	PCT	ICEF	MP	AE	WATERS				
TOT	PCT	1.01	2.01	3.01	4.01	5.01			
PFDAJ									
USED									
1	41.58	1.01	1.131	1.050	1	44452	12437	231128	
2	35.4	1	1.5	1.5	1	15.2	1	5.4	16.0
3	18.4	1	15.9	1	25.4	1	12.2	1	
4	5.7	1	5.2	1	1.2	1	3.1	1	5.9
NOT USED									
5	10.3033	1	1.0106	1	50.36	1	11924	1	812161
6	29.9	1	1.0	1	4.2	1	20.3	1	84.0
7	11.0	1	10.1	1	14.6	1	37.0	1	37.1
8	25.1	1	21.5	1	3.5	1	22.1	1	5.8
COLUMN									
9	444891	413417	61986	364370	90230	1447300			
TOTAL	30.7	32.7	4.7	25.2	6.6	100.0			

Adjusted $\chi^2 = 10966 \times \frac{1}{100} \times (0.078)$
 $= 8.53$
 $0.01 < p < 0.09$

READ CMT SUPPARE = 10966.31491 RFTT + DEFENDERS OF FREEDOM. SIGNIFICANCE = 0
 CONTINGENCY COEFFICIENT = .08672
 UNCERTAINTY COEFFICIENT (ASYMMETRIC) = .00839 WITH PFDAJ DEPENDENT. = .00263 WITH BDW DEPENDENT.
 NUMBER OF MISSING OBSERVATIONS = 534633

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APPENDIX VI-C
EXAMPLE CONTINGENCY TABLES USED IN SELECTING C-VARIABLES
FOR USE IN MULTISTATE BENEFIT CALCULATIONS

The following three tables are just a few of the hundreds of crosstabulations used in selecting the C-state variables which were used in multistate benefit estimations.

The counts represent victim populations multiplied by a factor of one hundred. As described elsewhere in the report, this factor was required in order for the SPSS computer program to properly weight the ARM sample victim frequencies. Each raw chi-square value was adjusted for this factor by multiplying it by $(\frac{1}{100})$. A second factor was also used to adjust for the victim weighting. In the case of the PFD use benefit estimations, this factor was 0.0778, the ratio of the (unweighted) ARM sample size for when PFD use was known (1126) to the corresponding weighted population size (14,473). No adjustment was needed for the uncertainty coefficients as these statistics are independent of sample size. Note that the uncertainty coefficients "With PFDAU Dependent" were the ones applicable to our analyses.

single variable $0 = E_H = E_W = E$) and brought outside the brackets. In that case, there would be no way to compensate, and the LSI would have to be low. Likewise, if wearability and accessibility were both very low, there would be no way to avoid a low LSI.

In fact, reliability tests for existing devices, and data from the Accident Recovery Model (see Section VI) indicate that reliability is typically very high (0.97 or greater) for inflatables and fixed flotation PFDs. This is based upon a definition of reliability in terms of minimum effectiveness and design standards. For example, a PFD which was designed to give only five pounds of buoyancy and gave five pounds, would not have a high reliability, since five pounds of buoyancy is not sufficient for most of the boating population (i.e., it does not meet minimum standards).

Since the available data on reliability indicate that it tends to be high, this allows the manufacturer to change the parameters of effectiveness, accessibility, and wearability of his device to increase the LSI value for his PFD. If his device is designed to be held, for example, he can improve the LSI value for his device by making it accessible, very effective when held and making it easy to hold. He thereby forces much of the burden in the LSI calculation on the third term within the brackets of the LSI formula, where I_{AC} , P_H , and E_H have been improved. Another option to the same manufacturer would be to increase the effectiveness of his device when worn, and/or increase its wearability. He may choose to exercise both options.

Once the LSI parameter values for a given PFD were determined, the areas within the LSI function which would provide the greatest opportunity for improving the life saving capability of the device (and its LSI value) could be determined. Then a manufacturer could choose to work to improve his device in those areas.

- 1) $R = 1.0$
- 2) $I_W + I_{AC} = 1.0$
- 3) $E_W = 1.0$ and/or $E_H = 1.0$ (NOTE: If $I_{AC} > 0$ and $P_H > 0$, then E_W and E_H must = 1.0 for LSI to equal 1.0; otherwise only E_W must = 1.0 for LSI to equal 1.0 when $I_{AC} = 0$ or $P_H = 0$, and only E_H must = 1.0 when $I_{AC} = 1.0$ and $P_H = 1.$)

Thus, when $LSI = 1.0$, reliability and effectiveness must be at their maximal values. Wearability and accessibility are free to vary, so long as any device which is not worn is accessible. The probability that a device is donned in the water is not constrained. The probability of holding must be 0.0 when $I_{AC} > 0$ and $E_H < 1.0$ in order for $LSI = 1.0$.

In the case where there are no benefits from PFDs, an $LSI = 0$ assumption was made. As with the maximal benefit assumption ($LSI = 1.0$), the LSI can be made to equal 0 in many ways. If reliability equals zero, then LSI equals zero, regardless of the values of the other parameters. If $R > 0$, then each of the three parts of the sum inside the brackets of the LSI equation must equal zero in order for the LSI to equal zero. These three parts of the sum inside the brackets will each be zero if the effectiveness parameters are zero (E_W and E_H). If the index of accessibility (I_{AC}) is zero, or the probability of donning (P_D) is one, then $E_W = 0$ is sufficient to cause $LSI = 0$. Likewise, if $P_D = 0$ and $I_{AC} = 1$, then $E_H = 0$ is sufficient to cause $LSI = 0$. When the effectiveness parameters are not zero, I_W must be 0 (assuming $E_W > 0$), and/or I_{AC} must be 0 (assuming $E_H > 0$).

What we have shown in this discussion, is that the LSI is very sensitive to large changes in reliability. If reliability is very low, there is no way to compensate for that in the formula. The maximum value of the sum in the brackets in the LSI formula can be shown to be 1.0. Thus, when reliability is very low, the LSI is forced to be low. This is not (theoretically) true for other parameters. If wearability is very low, this can be compensated for by making effectiveness, accessibility, and reliability very high. Similarly, if effectiveness is low when the device is worn, then the LSI can be increased by improving: effectiveness when held, reliability, and accessibility. Of course, if the effectiveness when worn or held is very low, then the effectiveness terms can be treated as a

APPENDIX VI-B. THEORETICAL EXPLORATION OF EXTREME LSI VALUES

For one of the benefit estimation problems in Section VI (relating benefits to average LSI), values of zero and one were used to determine extreme relationships for the LSI. The discussion that follows explores the theoretical possibilities that could generate such extreme values on the LSI. This discussion is not meant to reflect actual parameter values. It is aimed at a working understanding of the LSI formula and its sensitivity to changes in PFD parameters.

As defined previously,

$$LSI = [I_W \cdot E_W + I_{AC} \cdot P_D \cdot E_W + I_{AC} \cdot P_H \cdot E_H] \cdot R$$

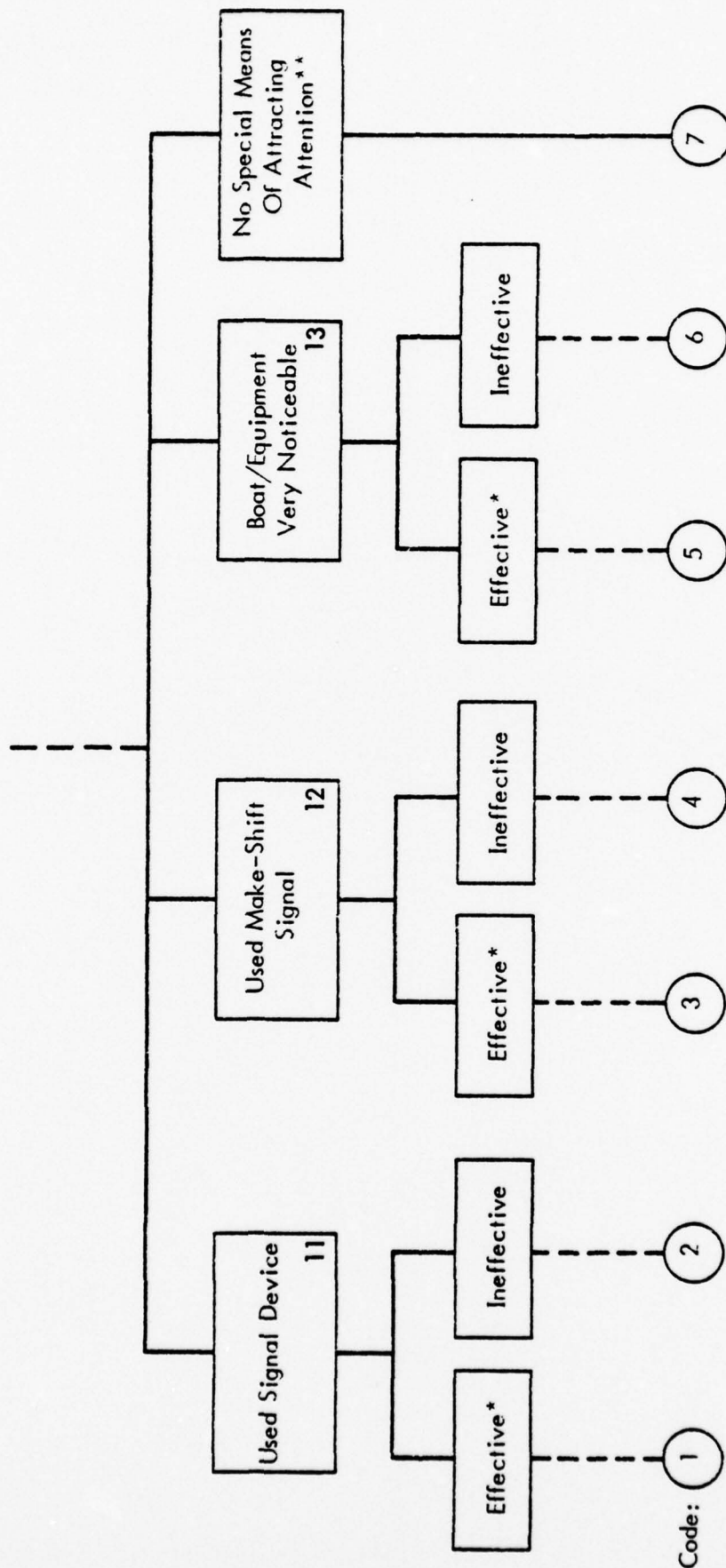
where

- I_W = The probability that the PFD is worn immediately prior to entering the water in an accident.
- I_{AC} = The probability that the PFD is accessible to a boater but not worn immediately after entering the water in an accident.
- P_D = The probability that the accident victim dons the PFD in the water.
- P_H = The probability that the accident victim holds or lies upon the PFD in the water
- E_W = The physical effectiveness of the PFD when worn.
- E_H = The physical effectiveness of the PFD when held.
- R = The index of reliability; i.e., the probability that the PFD performs up to minimum design standards.

In the case of estimating the maximum possible benefits from PFDs, an average LSI of 1.0 was assumed. Obviously, this can only be obtained when $R = 1.0$, and the average device is extremely reliable. Currently approved PFDs are not too far from attaining this value.

From this point on, the analysis could go in many directions, since there are many ways that the total inside the brackets of the equation could be 1.0.

Let us assume, for the moment, that a perfectly wearable device was designed. Then $I_W = 1$ and $I_{AC} = 0$. Thus, E_W would have to be 1.0, and the device would have to be perfectly effective. In fact, by inspection of the equation, it can be seen that, in order for LSI to equal 1.0, under any circumstances:



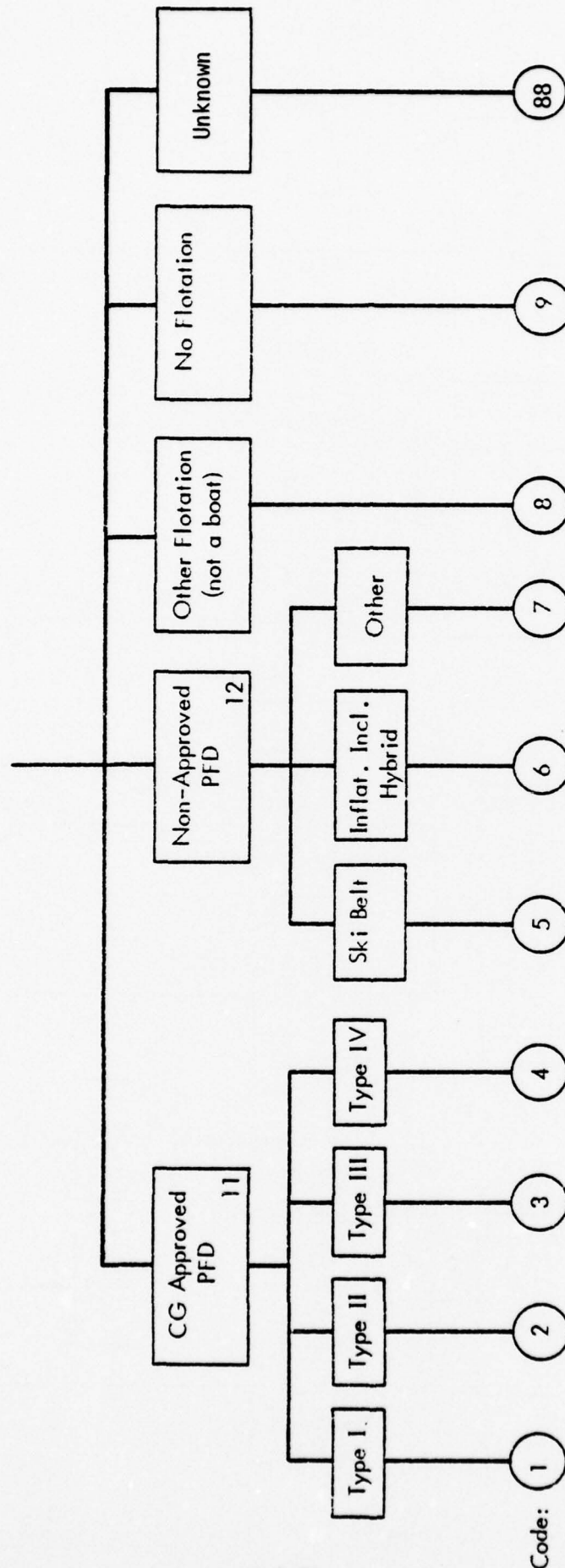
VI-A-21/22

* A signal is considered effective if anyone recognizes it as a sign of distress.

** Hand-waving, shouting, waving a piece of clothing or PFD should be coded "7."

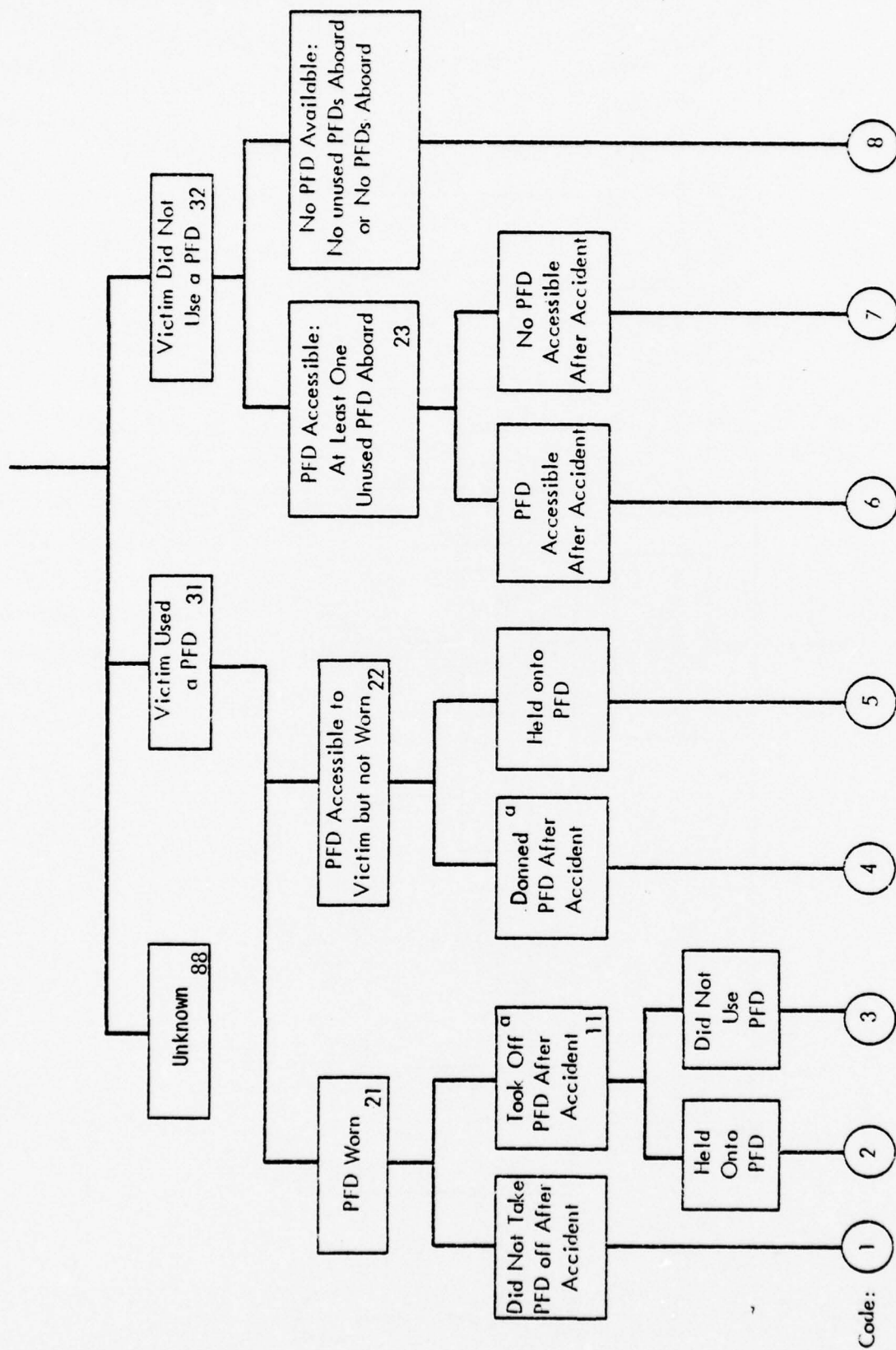
DISTRESS NOTIFICATION (VARIABLE 36)

303
304X
304X



Code:

TYPE OF PFD, IF ANY, USED BY VICTIM (VARIABLE 33)



a - Code time until PFD was donned or taken off as variable 31.

PFD AVAILABILITY AND USE (VARIABLE 30)

APPENDIX VI-A
A.R.M. ANALYST'S GUIDE

The pages that follow contain much of the information that you will need to analyze accidents for ARM and fill out the code sheets.

The first four pages contain general information about ARM (its intent and purpose). These pages are followed by a sample coding sheet from 1976. You will be filling out coding sheets very much like this one, with a few more columns at the end for additional information. Read these pages and examine the coding sheet. Additional helpful information can be found on the pages immediately following the coding instructions.

The remaining pages show you exactly how to code all of the information required by ARM. A row on the coding sheet is to be completely filled out for each accident victim that is coded into ARM.

The flowchart that is attached indicates precisely what you are to do.

1. Select a Boating Accident Report from the "batch" given to you. Keep these in order and process them in order.
2. Decide whether the accident involved all of the people on board or a subset of those people. Capsizings, swampings, sinkings, collisions, fires, explosions, and some "others" typically involve all of the POB. Falls overboard, hit by the prop, and some "others" typically involve only one or two of the people on board. In ARM, we want to code information only for those people who actually were involved in an accident.
3. Record (code) the data - more on this later.
4. Eventually both coders will have completed a batch. You will both be coding the same accidents. When a batch is completed, you will get together and compare codings. Any disagreements will be ironed out at that time. When a consensus is reached, present the coded batch to the project analyst and pick up the next batch.

ACCIDENT RECOVERY MODEL

Introduction

Research sponsored by the U. S. Coast Guard has examined a variety of problems related to accident prevention and recovery in recreational boating. For example, extensive investigations have been made concerning collisions, fires and explosions, flotation, boat stability, and the use and functioning of personal flotation devices (PFDs).

These investigations have revealed some of the more subtle problems and relationships involved in accident recovery and prevention. It has become increasingly clear that the occurrence of an accident, and recovery or fatality after an accident, are the results of a complex system of events and conditions. Some of the elements in the system are physical; others are psychological, physiological, economic, or social. For example, the factors which determine whether an accident results in recovery or a fatality can be categorized as follows:

- Accident dynamics, i.e., the type of accident, how quickly it occurs, etc.
- Physiological state of the victims, i.e., the presence of injury, shock etc, obviously have a great bearing on the probability of recovery.
- Behavior of the victims, e.g., use or non-use of PFDs.
- Environment, e.g., water temperature, water conditions.
- Rescue facilities - there are a variety of possible modes of rescue, including self-rescue, rescue by another boater on the scene, or rescue by the Coast Guard or other agency.
- Equipment - includes types of PFDs available, signalling devices, etc.

The recognition of the complexity of the factors determining accident occurrence and recovery or fatality has led to a desire for better understanding of these systems. It has occurred to workers in this area that there may be effective

ways of reducing accidents or promoting more favorable outcomes which have gone unrecognized. There is also a growing realization that actions which superficially would be expected to produce benefits could have unexpected and undesirable ramifications. For example, improving the stability of small boats could result in a tendency for boaters to use them under conditions they would have otherwise avoided, thus possibly increasing the probability of an accident.

The work has taken the form of an Accident Recovery Model (ARM). This model describes the functioning and interrelationships of the elements of the accident recovery system. Some of these elements include: PFDs, boat flotation, rescue facilities, signalling devices, boaters' behavior, injury and other physiological conditions, and emergency treatment.

ARM is used to generate quantitative estimates of the benefits associated with proposed or existing regulatory or educational programs. For example, ARM can help to provide answers to the following questions:

- 1) Would it be beneficial to modify PFD design in the direction of greater "wearability" (e.g., comfort, attractiveness, etc) even if this dictates a decrease in their physical effectiveness?
- 2) Would increased accessibility of PFDs help to compensate for the low rate of PFD wear?
- 3) Should PFDs provide greater protection against hypothermia?
- 4) Should PFDs be designed so that they are easy to don after the victim is in the water?
- 5) How might education increase recovery? For example, is the maxim "stay with your boat" always the best course of action?
- 6) How will improved boat flotation affect the role of PFDs in accident recovery?

During the formulation of ARM, three general methodological principles or objectives emerged. These three principles gave direction to the development of the model and helped to insure that the final product was useful.

The first of these principles was that the model must be empirical. It is based upon documented cases of recovery or fatality in recreational boating accidents rather than assumption or expert opinion. By building the model on an empirical base, one can have greater confidence that the result is a valid representation of the way recoveries and fatalities occur. ARM involves relatively few assumptions. Furthermore, these assumptions were checked and modified, as needed, as the additional data were gathered. ARM changed and grew to fit the data. In fact, ARM can be regarded as a structured summary of boating accident recovery data.

A second principle was that ARM must summarize the common elements in accident recovery, while at the same time not sacrificing important relationships. In any type of modelling or analysis problem, there is a trade-off between summarization and representing detail. At one extreme, the average number of fatalities per accident could be regarded as a model. Obviously, this method sacrifices too much detail for an overall summary. The other extreme would be a detailed account of each of the accidents which occurred, say, in 1974. This alternative doesn't sacrifice any details, but fails to point out commonalities among accident recoveries or fatalities. The model was developed in such a way as to capture important relationships among elements of the accident recovery system that are common to many accidents.

The third criterion for ARM was that it must be in a form which is usable by the Coast Guard. This means that events or conditions which the Coast Guard can control by regulation, standards, or education must appear as elements of the model. This criterion also implies that the model must make use of existing accident data, even though such data is often incomplete and not representative of the population of boating accidents to be modeled.

ARM consists of a coding sheet and decision trees which treat six different portions of the recovery problem. Each row on the coding sheet summarizes the information for a single individual, or "victim", involved in a boating accident. After a sufficiently large number of victims are coded, the information can be punched on cards and processed by computer.

The numbers along the top of the coding form represent variable numbers. There are three types of variables: Variables numbered 1 - 7 contain file information which serves to locate the source in Wyle or Coast Guard files. Variables 8 - 23 provide miscellaneous recovery-related information and the information which will be needed to scale ARM data to reflect the population of boating accidents at large. The last group of variables (24 - 51) contain the major recovery-related information. The values to be coded for variables numbered 24, 26, 28, 30, 33 and 36 are obtained from the accompanying decision trees.

It should be noted that the conditions represented in each of the ARM decision trees were not chosen arbitrarily. The combinations of conditons shown in each tree are (or should be interpreted as) mutually exclusive possibilities. In other words, only one set of conditions in a given decision tree can apply to any one victim.

1	Wyle or BAR Number
2	Coded by
3	Verified by
4	ARM Boat Number
5	ARM Victim Number
6	State
7	Month
8	Year
9	Time
10	Boat Length Ft.
11	Number P.O.B.
12	Number PFDs on board
13	Jurisdiction 1 = state only
14	Jurisdiction 2 = joint
15	Boat type
16	Activity
17	Body of water
18	Distance to shore/vessel
19	Victim's sex M=F
20	Age A=1 F=2 C=3
21	Final Boat Configuration
22	Level 1 flotation boat? Y=1 N=2
23	Victim's Condition
24	Health
25	Behavior/Circumstances
26	Time In/With Boat
27	PFD Available/use
28	Time T111 PFD Donned/removed
29	Sufficient PFDs on board Y=1
30	PFD Type (No "99.5" here, use 99)
31	PFD Malfunction? Y=1 N=2
32	Improper PFD Use? Y=1 N=2
33	Distress Notification
34	Water Temperature
35	Time in water
36	Water Condition
37	Outcome R=1 F=2
38	Year of Manuf. (last 2 digits)
39	No. of type I PFDs aboard
40	No. of type II PFDs aboard
41	No. of type III PFDs aboard
42	No. of type IV PFDs aboard
43	No. of type V PFDs aboard
44	No. of unapproved PFDs aboard
45	No. of PFDs of unk. type aboard
46	Alcohol
47	
48	
49	
50	
51	

1. Wyle or BAR Number.

This is the number used to relocate the BAR (if needed again in the future). For the 1977 data, this number is 77xxxx, where the "77" indicates it was part of the data put into ARM in 1977, the first "x" is the batch number, and the last three "x's" are the accident number within the 1977 sample. Thus, 772029 would be the 29th accident report used in the 1977 sample, and it was processed as part of the second batch.

2. Coded by:

1 = Stuart Bernell;	2 = Benny Smith;	3 = Chris Stiehl
11 = Mark Perry;	12 = Anne Baune;	13 = Gay Parrott
14 = Olivia Corder		

3. Verified by:

Verification is the process by which one coder inspects the coded work of another to determine if he agrees with those codes. Once the coders agree, and have verified each other's work, then one of the codes listed under #2 above is used here to indicate this verification.

4. Leave blank; this variable is going to be deleted.

5. ARM boat number:

This is the boat number in this accident. For almost all accidents except collisions, this will be "01." For collisions, this variable allows us to separate victims from each vessel, so when you start coding victims from the second vessel, enter "02" in this variable. For additional vessels in the same accident, use "03," etc.

6. ARM victim number:

This is the number of the victim within this vessel. When you move on to the next vessel (accident), start renumbering victims.

7. Leave blank; this variable will be deleted.

8. State:

Alabama	01	Alaska	02	Arizona	04
Arkansas	05	California	06	Colorado	08
Colorado	08	Connecticut	09	Delaware	10
Dist. of Columbia	11	Florida	12	Georgia	13
Hawaii	15	Idaho	16	Illinois	17
Indiana	18	Iowa	19	Kansas	20
Kentucky	21	Louisiana	22	Maine	23
Maryland	24	Massachusetts	25	Michigan	26
Minnesota	27	Mississippi	28	Missouri	29
Montana	30	Nebraska	31	Nevada	32
New Hampshire	33	New Jersey	34	New Mexico	35
New York	36	North Carolina	37	North Dakota	38
Ohio	39	Oklahoma	40	Oregon	41
Pennsylvania	42	Rhode Island	44	South Carolina	45
South Dakota	46	Tennessee	47	Texas	48
Utah	49	Vermont	50	Virginia	51
Washington	53	West Virginia	54	Wisconsin	55
Wyoming	56				

NOTE: FOR ALL VARIABLES, UNKNOWN IS CODED AS 8 (1-digit variable) OR 88 (2-digit variable). ALWAYS RIGHT-HAND JUSTIFY THE CODES.

9. Month: January = 01; February = 02, etc. Unknown = 88
10. Year: Code the last two digits of the year. Unknown = 88
11. Time: Code two digits (in military time: i.e., 00-24 hours) corresponding to the time that the accident began. Code the time of the capsizing, for example, when a boat capsized and the people are not recovered for 10 hours, code it at 10 hours. Round the time up on or past the half hour, i.e., if the accident happened at 9:30 p.m., code it 22; 9:35 p.m. = 22 also. Unknown = 88.
12. Boat Length:
- Code the boat length as a two-digit number, to the nearest foot. If the length of the boat is given as 14' 6", code it as 15'. Round up to the nearest foot. Anything over 6" is also rounded up to the next nearest foot. NOTE: For accidents where the only person (people) actually involved in the accident was not aboard a boat, code for the appropriate boat. For falls overboard, this would be the boat that they left. For hit by the boat or prop, this would be for the boat that did the hitting, whether this victim had anything to do with that boat before he was hit or not. The same logic applies to all "boat data." Code unknown = 88.
13. Number of P.O.B. (people on board):
- Code the number of people on board the appropriate boat as a two-digit number. For accidents involving only a person in the act of water skiing, code only the skier. List the number of POB as the total people on board that boat (including the skier(s)). When the accident type is "struck by the boat or prop," or some "others," and the person that was struck (involved) was not a passenger on the striking boat (involved boat), code the POB as "99" for this person. If any additional people are involved in the accident (e.g. the people on the striking boat), then code the POB for the boat that corresponds to each individual. Code unknown = 88.
14. Number of PFDs on board:
- Code this as a two-digit number for the appropriate boat. Code unknown = 88.
15. Jurisdiction:
- 1 = state only; 2 = joint jurisdiction
If jurisdiction is not stated, and the BAR is a Coast Guard BAR or on Coast Guard letterhead, code 02. If the BAR is not an official CG BAR or on Coast Guard letterhead, code 01.
16. Accident Type:
- Code the primary (first) accident type. For example, if there is a collision, causing someone to fall out of the boat, that person is coded as a victim of

a collision, not a fall overboard. Similarly, if a person on a johnboat falls overboard, causing the boat to capsize, throwing another person into the water, both victims are coded as falls overboard, since that was the primary cause of the accident. Sometimes more than one accident happens consecutively in time. For example, a person could fall overboard and another person coming to his aid might be hit by a boat or prop. In this case, the second victim would be coded as hit by the boat or prop and the two individuals would be coded as victims of separate accident types under the same accident number. Many of these types of accidents will require judgment, and the other analysts should be consulted if there is any doubt.

- 1 = Collisions/groundings
- 2 = Swampings/capsizings/floodings/sinkings
- 3 = Fires and explosions
- 4 = Falls overboard
- 5 = Struck by boat or propeller
- 6 = Other
- 8 = Unknown

17. Boat Type:

- 1 = Open/manual (not canoe)
- 2 = Open/power
- 3 = Cabin motorboat
- 4 = Sail + auxiliary sail
- 5 = Canoe and kayak
- 6 = Houseboat
- 7 = Inflatable
- 8 = Other
- 9 = Unknown

18. Activity:

This is the activity at the time of the accident. Water skiing includes the boat, skier, maneuvering to pick up the skier, etc.

- 1 = Pleasure cruising
- 2 = Fishing
- 3 = Hunting
- 4 = Water skiing
- 5 = Skin diving or swimming (not underway)
- 6 = Stopped, reason unknown or not one of the above
- 7 = Racing
- 8 = Unknown
- 0 = Other (docking, etc.)

19. Body of Water:

- 1 = River, creek, etc.
- 2 = Lake (other than GL), swamp, etc.
- 3 = Great Lake
- 4 = Coastal bay, inlet, sound, harbor, waterway, etc.
- 5 = Ocean
- 8 = Unknown

20. Distance to Shore or Another Vessel:

Code for whichever distance is shorter (to shore, or to the nearest vessel). For a collision (or any other accident) code the distance to the nearest other boat (one not involved in the accident) if it is shorter than the distance to shore.

- 1 = 0 - 5 yards
- 2 = 5 - 300 yards (1/6 mi)
- 3 = 300 yards (1/6 mi) - 1/2 mi
- 4 = 1/2 mi - 2 mi
- 5 = Greater than 2 miles
- 8 = Unknown

21. Assisting Party:

- 1 = Boater from same boat
- 2 = Boater from another boat
- 3 = USCG
- 4 = CG Auxiliary
- 5 = State or local officials
- 6 = No one
- 7 = Other
- 8 = Unknown

22. Victim's Sex: 1 = male; 2 = female; 8 = Unknown

23. Age: 1 = Adult (over 18); 2 = Teenager (12-18); 3 = Child (under 12)

If the age is unknown, but the BAR infers that the person is an adult, i.e., married, Mr., Mrs., etc., code as an adult. Use the same logic for teenagers and children.

24. Final Boat Configuration:

Use the decision tree for this variable to find the appropriate code. Read down the tree as far as the information available will allow. For example, if the final configuration was known to be upright and not swamped, but it was not known if the boat was still propelled, code "21." A sailboat that can still sail is coded "1."

For boats which were swamped, capsized, or flooded, presume that the boat was NOT level unless stated otherwise. "Propelled" means actually underway, NOT "propellable."

25. Level Flotation Boat: 1 = Yes; 2 = No

This question does not refer to whether the boat actually floated level or not, but to whether it was level flotation equipped. If not mentioned, it should be coded "NO;" this variable should never be coded "unknown."

26. Victim's Condition:

Use the decision tree for this variable to find the appropriate code. As before, read down the tree as far as the available information will permit and enter the corresponding code. A "swimmer" is anyone who can swim at all. If the emergency treatment that is given is equivalent to, or better than, that that would be given by someone who had had one course in first aid (high school, etc.), then it is considered "adequate." If the treatment is less than that, or none at all, then it is "inadequate."

If there is no evidence of ill health or injury during the accident, use the "not seriously injured" branch. Adequate emergency treatment means that which could be administered by a graduate of the standard short course given by the Red Cross.

27. Health:

- 1=Good health (use this if unknown)
- 2=History of heart trouble or known to have occurred in this accident
- 3=Other poor health

28. Behavior/Circumstances:

Use the decision tree to find the appropriate code. Again, proceed through the tree only as far as the information allows, and write the corresponding code. Note that a victim who falls out of a boat and re-enters it is NOT coded under "in boat," but under "in water not trapped or entangled." Although his eventual position is in the boat, the code "4" more accurately described his behavior. Therefore review the entire chart once you have chosen your code, to make sure that you have chosen the best descriptor. For this decision tree, moving down the tree corresponds to moving forward in time through the events and actions of the accident. The boxes on the path of the tree that have been chosen should describe the victim's behavior and circumstances in sequence.

- Falls Overboard - Starts in the water
- Capsizing - Starts in the water
- Collision - Starts in the boat (unless the victim is thrown out of the boat immediately upon impact. If this occurs, start the victim in water.)
- Swamping - Starts in the boat

If the victim winds up in neither the boat nor the water (on shore, on a dock, etc.) then code "99." Presume that the victim remained in the water (22) if the available information does not indicate that he re-entered the boat. Presume that the victim "fell or was thrown out, etc." (10) or "abandoned boat due to fire, etc." (3) if it is not known or mentioned that he swam for shore or another source of flotation, but it is known that he (she) was separated from the boat.

29. Time In/With Boat:

31. Time Until PFD Donned or Removed: (if unknown if victim used a PFD code 88=UK).

38. Time in Water:

For each of these variables, use the codes listed below. All of these times are the total time from the beginning of the accident until recovery or death (variables 29 and 38), or until the PFD is donned or removed (variable 31). For any of these, if the variable is not applicable to the person (time to donning, for example, is not applicable if the person never dons a PFD), then use "99" = not applicable. If a victim exited and re-entered the boat several times, time in or with the boat is the sum of these separate times. Similarly, time in water is summed.

- 1 = 0 - 2 min.
- 2 = 2 - 5 min.
- 3 = 5 - 15 min.
- 4 = 1/4 - 1/2 hr.
- 5 = 1/2 - 1 hr.
- 6 = 1 - 1½ hr.
- 7 = 1½ - 2 hr.
- 8 = 2 - 3 hr.
- 9 = 3 - 4 hr.
- 10 = 4 - 5 hr.
- 11 = 5 - 10 hr.
- 12 = > 10 hr.
- 88 = Unknown

30. PFD Availability and Use:

Use the decision tree to find the appropriate code, reading down the tree as far as the available information permits. Note the codes for people who have an accident and then remove or don a PFD after the accident has begun or happened. In these cases, the time to removal or donning should also be recorded as variable 31.

"Took PFD off..." (11) refers only to voluntary acts. If the victim slipped out of the PFD, or the waves ripped it off of him (her), it should be coded as "Did not take PFD off" (1). If unknown if victim used PFD, code 88 = unknown.

31. See 29 above.

32. Sufficient PFDs on Board:

This question refers to any time of PFD. If the question concerning sufficient CG approved PFDs is checked "yes" on the BAR, then this should be coded 1 = "yes" for ARM. It should also be coded "1" if there were sufficient PFDs aboard, even though some of them may not have been CG approved.

33. PFD Type:

Code PFD type for each victim. Use the decision tree to find the appropriate code. Note that those victims without any type of flotation aid are coded as "09" and unknowns are "88".

34. PFD Malfunction:

Code a "1" = yes if the PFD did not perform properly. If it is an inflatable, it may have had a leak, or not inflated. If a buckle didn't work, or a strap broke on a PFD, that would be a malfunction, etc. If unknown if victim used a PFD, code 88 = unknown.

If victim used PFD and no malfunction is mentioned, assumed no (02). If you know he did not have one on (or use one), then code = 99.

35. Improper PFD Use:

Code a "1" - yes if the person used the PFD improperly. For example, if a cushion was worn on a person's back, that would be improper use. Again, suspicion = 88. Unknown = "no" - assume proper use unless stated otherwise. If you know he did not have one on (or use one), then code = 99. No = 02.

43. Number of PFDs Aboard of Type I _____ - 0 = None
 44. Number of PFDs Aboard of Type II _____
 45. Number of PFDs Aboard of Type III _____
 46. Number of PFDs Aboard of Type IV _____
 47. Number of PFDs Aboard of Type V _____
 48. Number of Unapproved PFDs Aboard _____ - 0 = None
 49. Number of Unknown Type PFDs Aboard _____ - 0 = None

Code the number of PFDs aboard of each type, in the order specified on the coding sheet. The "8" for unknown, and use "9" for eight or more PFDs.

50. Type of Power:

- 0 = Other
- 1 = Outboard
- 2 = I/O
- 3 = Inboard
- 4 = Sail only
- 5 = Auxiliary sail
- 6 = Sail, but unknown if auxiliary
- 7 = Jet drive
- 8 = Unknown
- 9 = Manual

51. Alcohol:

- 1 = This person was known to have been drunk (autopsy, etc).
- 2 = This person was known to have been drinking
- 3 = Drinking suspected (some evidence, other person said so, etc)
- 4 = Known that this person wasn't drinking (autopsy, etc)
- 5 = No mention of alcohol, or unknown
- 6 = Other drug definitely present (autopsy, etc)

FINAL NOTES:

Be sure to right justify all codes. A "9" is coded "09" for a two-digit variable, etc.

IF YOU CODE ANYTHING AS "UNKNOWN" or "NOT APPLICABLE," BE SURE TO READ THIS:

The code corresponding to UNKNOWN is NOT PERMITTED for the following variables:

25 26 27 36

The code corresponding to NOT APPLICABLE is permitted ONLY for the following variables:

13 28 31 34 35 36 38

36. Distress Notification:

Use the decision tree to find the proper code. Be sure to note the definitions on the same sheet as the tree.

Code 13 is used if the boat and equipment is observed after the accident by someone other than the victims.

Code 12 is used when the victims use a makeshift signal device, e.g., PFD tied to boat paddle, smoke signals.

Code 11 is used when signal is made by radio communications, flare gun, signal flag, flashlight, etc.

99 - is used when no distress signal is necessary, e.g. partially swamped boat is evacuated of water and resumes normal operation, and hit and "runners" are examples. Coder must obtain approval from N. Whatley or C. Stiehl before using code 99.

37. Water Temperature:

Code the two digits most closely corresponding to the water temperature in °F. For water temperatures of 87 or more, use "87," and don't use any codes above 87 except "88" for unknown.

38. See #29 on previous page.

39. Water Condition:

1 = Calm

2 = Choppy/Rough

3 = Swift Current

8 = Unknown - if water conditions are unknown but BAR states that water conditions are not a factor in this accident, assume calm.

40. Outcome:

If the victim survived the accident, he/she is a recovery = "1." Otherwise, use "2" for victims who die and "8" if the outcome is unknown.

41. Hull Identification Number:

If the HIN is known, or if the Federal Boat Documentation Number is known, code "1," code "8" otherwise. (If the HIN does not contain 12 consequent digits, reference FR 181.25, then code 8.)

42. Year of Manufacture:

Code the last two digits of the year that the boat was manufactured (model year). 88 = unknown

§ 181.25 Hull identification number format.

Each hull identification number required by § 181.23 must consist of 12 characters as follows:

(a) The first three characters must consist of a manufacturer identification assigned under § 181.31.

(b) Characters 4 through 8 must be assigned by the manufacturer and must be letters of the English alphabet or Arabic numerals or both, except the letters I, O, and Q.

(c) Characters 9 through 12 must indicate the date of certification. The characters must be either—

(1) Arabic numerals with characters 9 and 10 indicating the month and characters 11 and 12 indicating the last two numerals of the year; or

(2) A combination of Arabic numerals and letters of the English alphabet with character 9 indicated as "M," characters 10 and 11 the last two numerals of the model year, and character 12 the month of the model year. The first month of the model year, August, must be designated by the letter "A," the second month, September, by the letter "B," and so on until the last month of the model year, July.

§ 181.27 Additional characters in hull identification number.

A manufacturer may display additional characters after the 12 characters required by § 181.25 if they are separated from the hull identification number by a hyphen.

§ 181.29 Hull identification number display.

(a) The hull identification number must be carved, burned, stamped, embossed, or otherwise permanently affixed to the outboard side of the transom or, if there is no transom, to the outermost starboard side at the end of the hull that bears the rudder or other steering mechanism, above the waterline of the boat in such a way that alteration, removal, or replacement would be obvious and evident.

(b) The characters of the hull identification number must be no less than one-fourth of an inch in height.

§ 181.31 Manufacturer identification assigned.

(a) Each person required by § 181.23 to affix a hull identification number may request a manufacturer identification from the Commandant (GBBC), 400 Seventh Street SW., Washington, DC 20590. There is no charge for the assignment.

Effective date. This amendment shall become effective on November 1, 1972.

Dated: July 27, 1972.

Types of Personal Flotation Devices

Type I—

A Type I PFD is any approved wearable device designed to turn an unconscious person in the water from a face down position to a vertical or slightly backward position, and to have more than 20 pounds of buoyancy. Recommended for offshore cruising.

Type II—

A Type II PFD is any approved wearable device designed to turn an unconscious person from a face down position to a vertical or slightly backward position and to have at least 15.5 pounds of buoyancy. Recommended for closer inshore cruising.

Type III—

A Type III PFD is any approved wearable device designed to keep a conscious person in a vertical or slightly backward position and to have at least 15.5 pounds of buoyancy. While the Type III has the same buoyancy as the Type II PFD, it has a less turning moment. It does, however, allow greater wearing comfort and is particularly useful when water skiing, sailing, hunting, or engaged in other such water sports. It is recommended for use on lakes, impoundments, and close inshore operation.

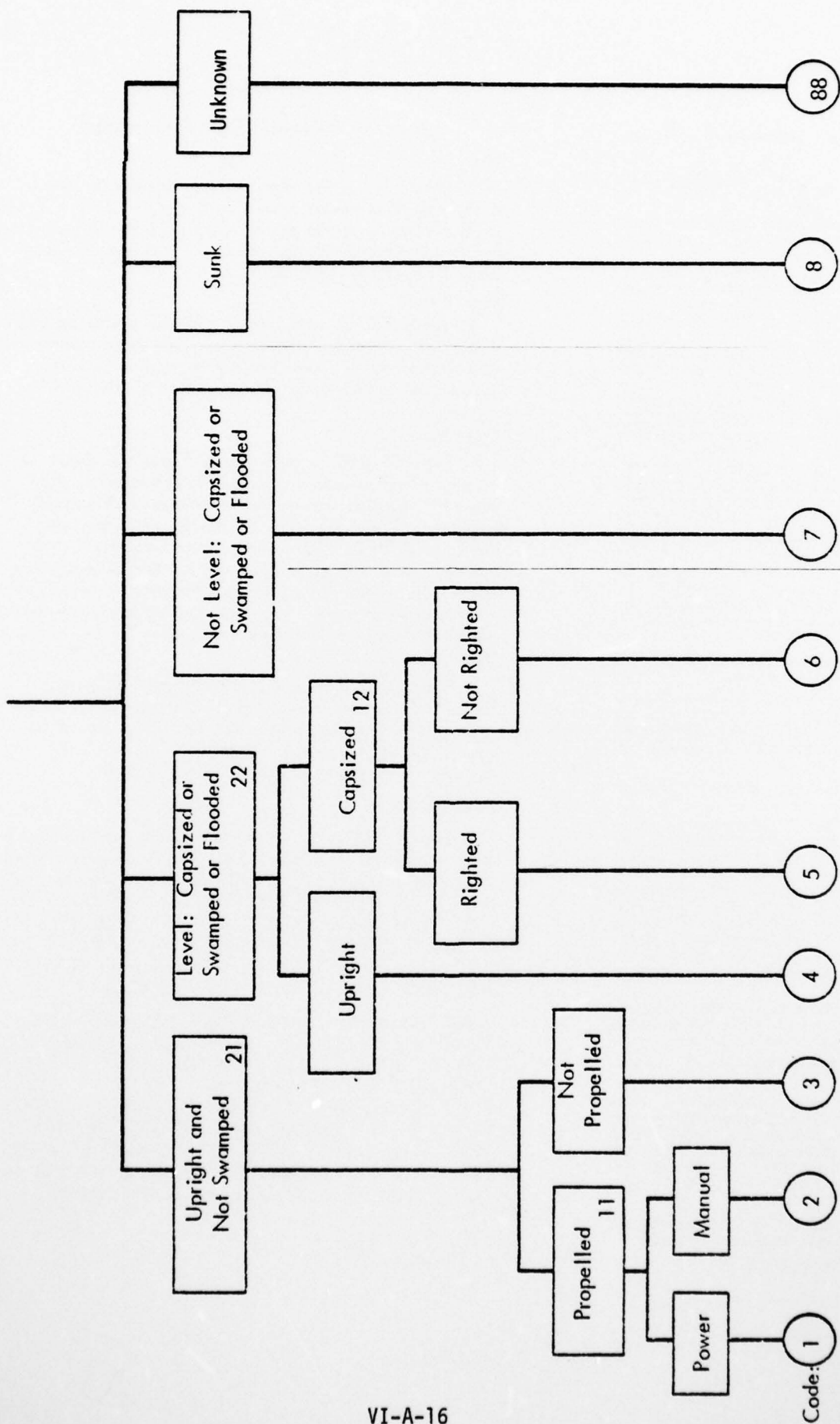
Type IV—

A Type IV PFD is any approved device designed to be thrown to a person in the water. It is not designed to be worn. It is designed to have at least 16.5 pounds of buoyancy. The most common Type IV device is a buoyant cushion. A ring buoy is also a Type IV device.

Type V—

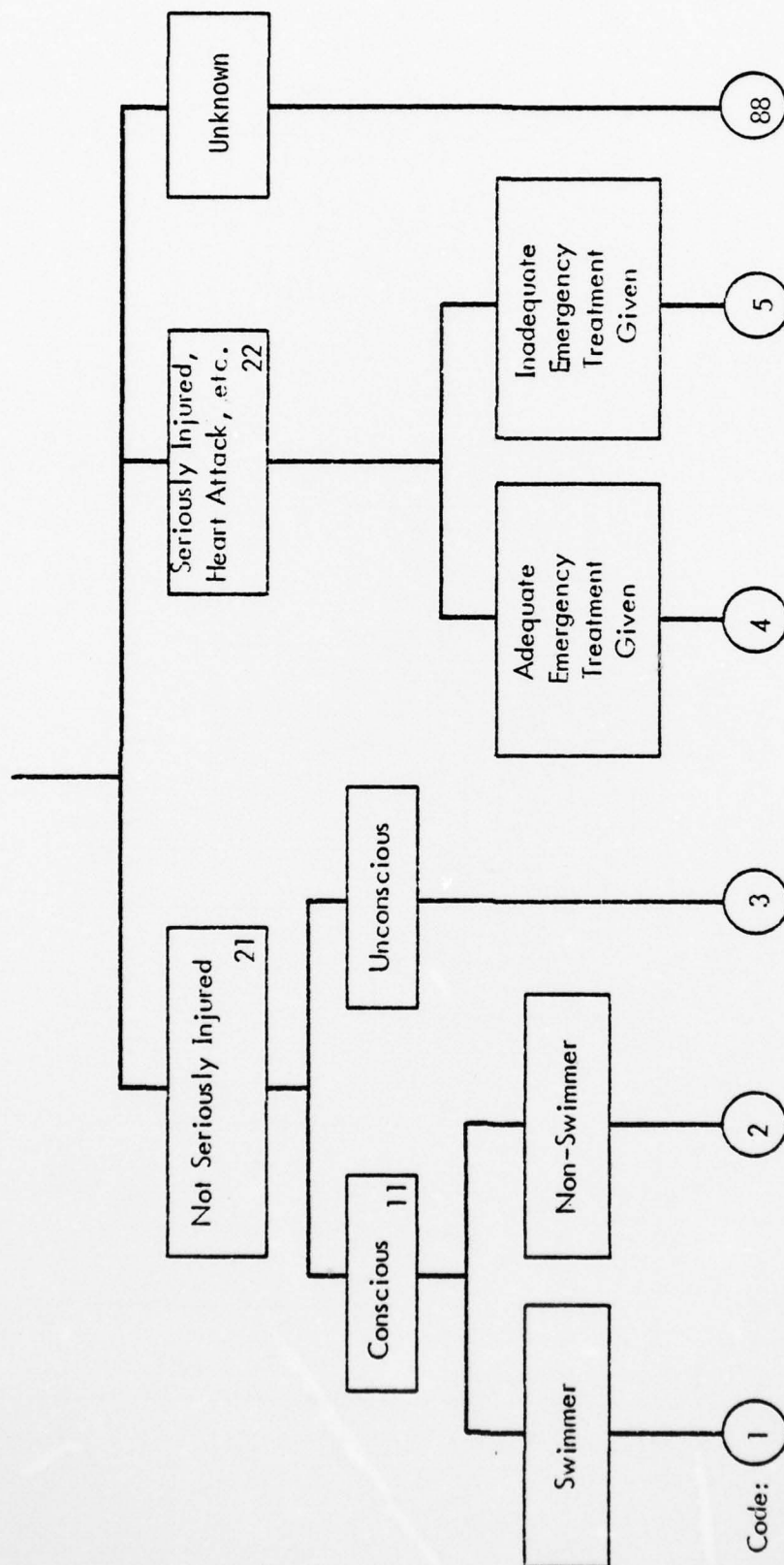
A Type V PFD is any approved wearable device designed for a specific and restricted use. The exact specifications and performance of a Type V PFD will vary somewhat with each device. THE ONLY PRESENTLY APPROVED DEVICE THAT FALLS INTO THE TYPE V DESIGNATION IS THE "WORK VEST". THIS IS A DEVICE DESIGNED AND MARKED SPECIFICALLY FOR USE BY PERSONS WORKING AROUND MERCHANT VESSELS.

ALL PERSONAL FLOTATION DEVICES (PFD'S) THAT ARE PRESENTLY ACCEPTABLE ON RECREATIONAL BOATS FALL INTO ONE OF THE FIRST FOUR TYPE DESIGNATIONS. ALL WEARABLE PFD'S SHALL BE U.S. COAST GUARD APPROVED, READILY ACCESSIBLE, IN SERVICEABLE CONDITION, AND OF AN APPROPRIATE SIZE FOR THE PERSON WHO INTENDS TO WEAR IT. TYPE IV DEVICES MUST BE IMMEDIATELY AVAILABLE.

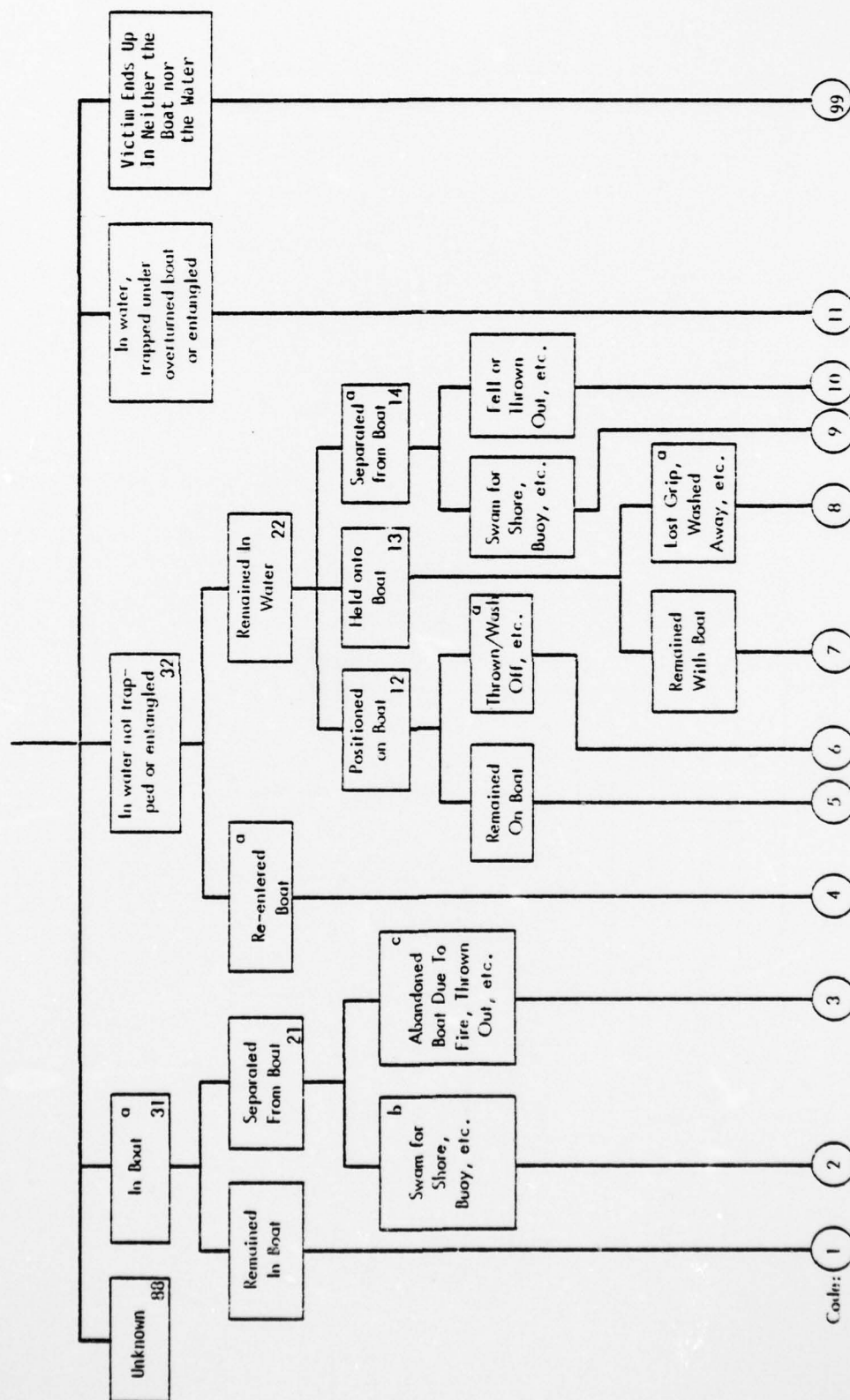


ARM DECISION TREE FOR FINAL CONFIGURATION OF BOAT (VARIABLE 24)

(298) 298



VICTIM'S CONDITION (VARIABLE 26)



a - Code in or with boat after accident as variable 29. b - voluntarily left boat. c - involuntarily left boat.

VICTIM'S BEHAVIOR AND CIRCUMSTANCES (VARIABLE 28)

(300)

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PERSONAL FLOTATION DEVICES RESEARCH. VOLUME 3. APPENDICES.(U)

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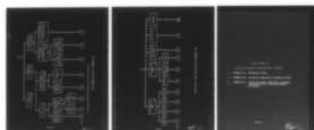
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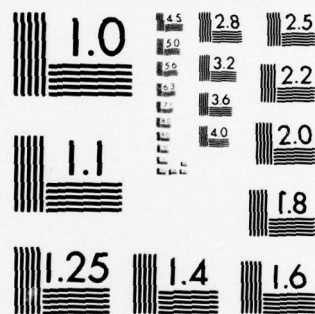
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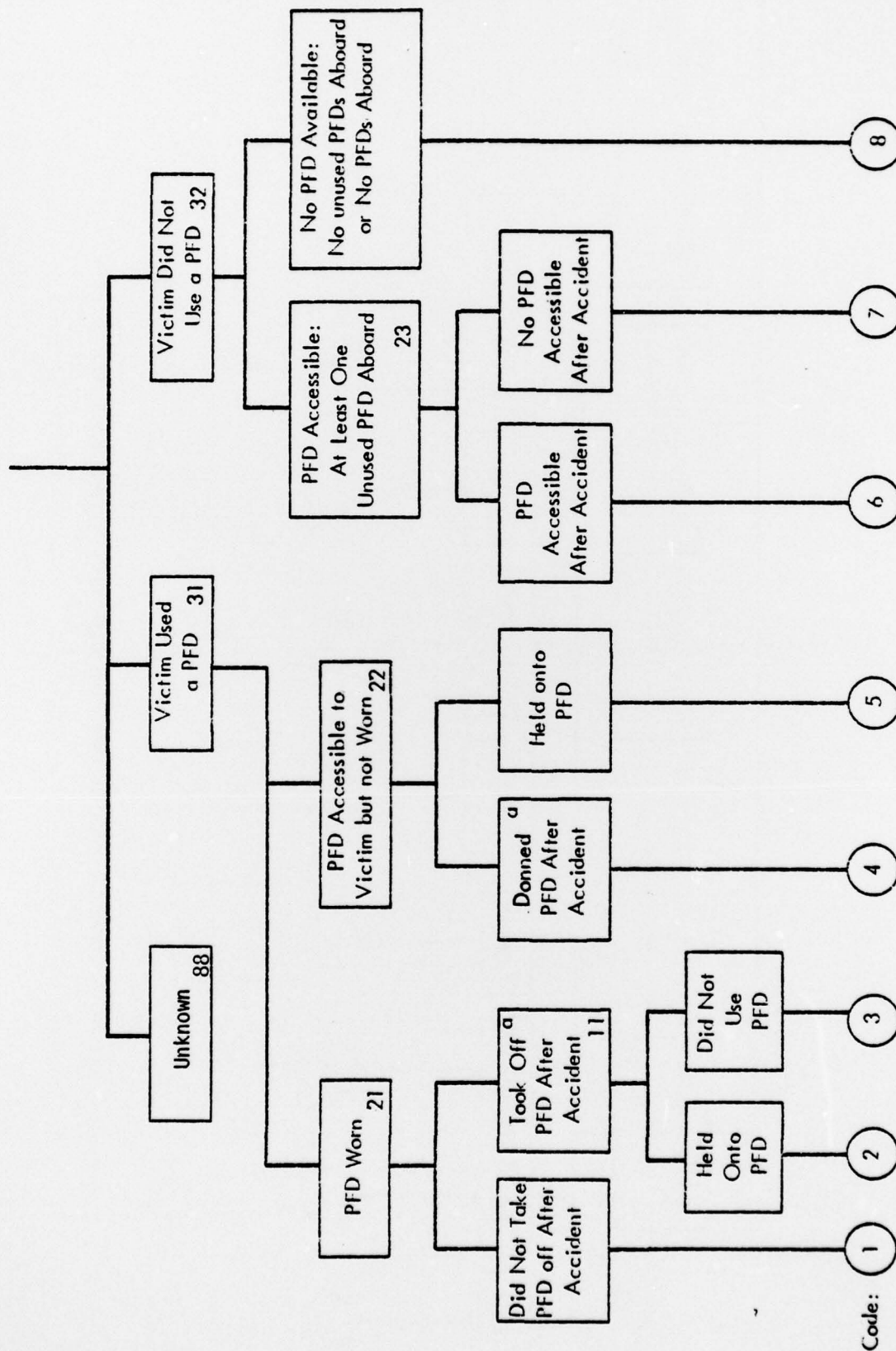


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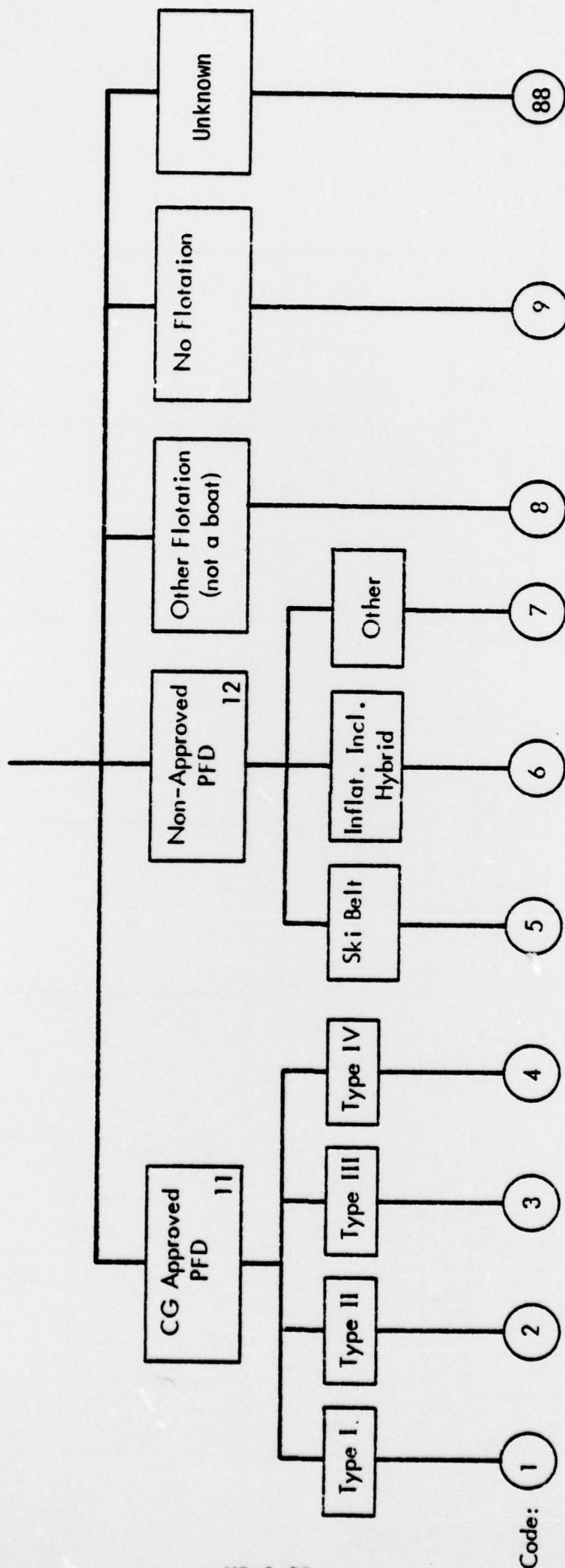
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a - Code time until PFD was donned or taken off as variable 31.

PFD AVAILABILITY AND USE (VARIABLE 30)



VI-A-20

TYPE OF PFD, IF ANY, USED BY VICTIM (VARIABLE 33)

302

302

SECTION VI

THE ACCIDENT RECOVERY MODEL

- APPENDIX VI-A. ARM Analyst's Guide
- APPENDIX VI-B. Theoretical Exploration of Extreme LSI Values
- APPENDIX VI-C. Example Contingency Tables Used in Selecting C-Variables for Use in Multistate Benefit Calculations