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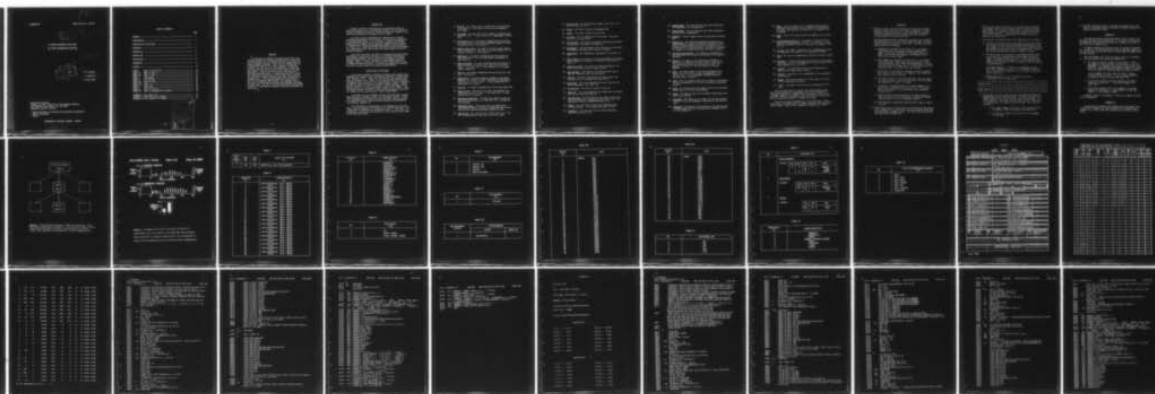
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A DOPPLER ULTRASONIC DATA BANK FOR DIVER DECOMPRESSION ANALYSIS--ETC(U)
AUG 79 K E KISMAN , G MASUREL , R GUILLEPM

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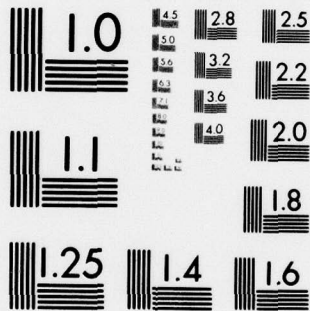
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A DOPPLER ULTRASONIC DATA BANK
FOR DIVER DECOMPRESSION ANALYSIS

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ABSTRACT

↓ A data bank for Doppler ultrasonic bubble flow data obtained during and following decompression of divers has been established for the purpose of data storage and subsequent computer analysis. Each dive is characterized by 52 parameters selected for future computer correlation studies. For each of 12 of the parameters, a table has been provided into which entries may be made as the data bank grows. Data are entered into the data bank via a specified Data Bank Form. A program entitled DEV is used for listing and verification of data bank files; another entitled SEV is used to calculate an index of severity of decompression. A listing and example are provided for each of the programs, SEV and DEV. The program, SEV, is the first of many possible applications programs utilizing the data bank. The use of the data bank and the application of SEV in an experimental program involving 80 man-dives is described.

↖

INTRODUCTION

Doppler ultrasonic monitoring of the precordial region of divers has proven to be of considerable benefit for the evaluation of diver decompression stress in subsaturation dives (Lagruet al, 1978) and saturation dives (Masurel et al, 1978).

In order to better understand the significance of Doppler ultrasonic measurements and the effect of various dive parameters on decompression stress, it is necessary to perform correlation studies of the Doppler results with such parameters as incidence of decompression sickness, decompression models, characteristics of divers, etc. These studies are facilitated by the establishment of a computerized data bank suitable for data storage as well as computer analysis.

This report describes the Doppler Ultrasonic Data Bank (DUDB) established at the Centre d'Etudes et de Recherches Techniques Sous-Marines (CERTSM), France, during the posting of Dr. Kisman from the Defence and Civil Institute of Environmental Medicine (DCIEM), Canada. A joint data base has been established for use by CERTSM and DCIEM personnel to increase the amount of accessible data and to better exploit the inherent possibilities.

DESCRIPTION OF DATA BANK

It has been customary to monitor ultrasonic data aurally with headphones and assign a grade according to Spencer's classification code (Spencer, 1974). A new code, the KM code, has recently come into use (Kisman et al, 1978a). This code provides more detailed information about the bubble flow; furthermore, it may be evaluated by means of aural monitoring or computer signal analysis. Bubble grades equivalent to those in Spencer's code are provided for the KM code values in a correlation table (Kisman et al, 1978a). Hence precordial Doppler ultrasonic results may be expressed in the form of 3 digit KM code values and/or 1 digit bubble grades.

In addition to the ultrasonic results, the data bank contains many other dive parameters useful for correlation studies. Before these parameters are entered into the data bank, they are written on a Data Bank Form by diving personnel during the decompression (see example, Appendix I).

The following is a description of all parameters in the data bank. They are numbered and ordered as in the Data Bank Form. The classification hierarchy is illustrated in Fig. 1. For each of 12 parameters, a table has been provided in which entries may be added as the data bank grows.

- 1) File No: The number used to identify the files (see Fig. 1 and Table I). Each diver in each dive is assigned a file number.
- 2) File Name: The name used by the computer to identify and access the file. It must consist of 5 alphanumeric characters.
- 3) No of Dive Series: The number designating the collection of related dives which have been grouped together to form a series (see Fig. 1 and Table I).
- 4) Name of Dive Series: The name of the dive series identified by parameter #3 (used only as aid for reader, not for computer accessing -- see Table I).
- 5) Profile No: The number designating the dive profile or table followed for the dive identified by parameter #7 (see Table II).
- 6) Name of Profile: The name describing the dive profile or table identified by parameter #5 (used only as aid for reader -- see Table II). It may contain up to 45 alphanumeric characters.
- 7) Dive No: The number designating the particular dive (see Fig. 1 and Table I).
- 8) Name of Dive: The name normally assigned by the diving personnel to describe the dive identified by parameter #7 (used only as aid for reader). It may contain up to 45 alphanumeric characters.
- 9) Diver No: The number designating the diver (see Table III).
- 10) Name of Diver: The name of the diver with surname first (used only as aid for reader -- see Table III). It may contain up to 45 letters.
- 11) Associated DUBB Files: The DUBB file names for other divers who participated in the same dive (i.e., having the same Dive No).
- 12) Auxilliary Files: Other data files (not DUBB files) containing pertinent, auxilliary information such as pressure and gas composition measured during the dive.
- 13) Time of Day: The time of day in "hours, min" (e.g., "18, 36") corresponding to time zero of the dive timer.

- 14) Date of Dive: Has the form "day, month, year" (e.g., "4, 1, 78" or "24, 10, 77").
- 15) Weight: The diver's weight in kilograms (kg).
- 16) Height: The diver's height in meters (m).
- 17) Fat Comp: The fat composition of the diver. The scale has yet to be established.
- 18) Type of Dive: The type of dive may be classified according to existing or new entries in Table IV.
- 19) Environment: The environment of the dive may be classified according to existing or new entries in Table V.
- 20) Temperature: The temperature experienced by the diver (in °C).
- 21) Type of Work: The nature of the work performed by the diver may be identified according to existing or new entries in Table VI.
- 22) Quantity of Work: The quantity of work performed by the diver at the bottom depth (in kwatt-hours).
- 23) Tape Recorder: The number of the tape recorder used to tape the ultrasonic data (see Table VII).
- 24) Tape No: The number designating the tape on which the ultrasonic data is recorded (see Table VIII).
- 25) Depth Code: The code designating the units used for all depth measurements (see Table IX).
- 26) Bottom Depth: The depth at bottom of the dive.
- 27) Time Code: The code designating the format used to express time in all cases (see Table X).
- 28) Time Prof Alt: The time from the dive timer at which the profile designated by Profile No. was altered due to decompression sickness, excessive bubbles, etc.
- 29) T(Beg): The time from the dive timer indicating when the dive started. It is normally set equal to zero.
- 30) T(Arrival): The time from the dive timer indicating arrival at bottom of dive.

- 31) T(Beg Decomp): The time from the dive timer indicating the beginning of the decompression.
- 32) T(End Decomp): The time from the dive timer indicating the end of the decompression.
- 33) Comments: Special comments about the dive may be entered here.
- 34) Monitor Nos: The numbers designating the monitors who acquisitioned the ultrasonic data and evaluated the code values or bubble grades in the list of results on the second page of the Data Bank Form. The order of the monitor numbers is the same as used in the list of results.
- 35) Total No of Evaluations: The number of evaluations in the following list of results multiplied by the number of monitors.
- 36) Eval No: The number of the evaluation performed by a monitor for a particular section of data. When all of the evaluations made by one monitor are listed, the Eval No. is reset to 1 for the results of the next monitor.
- 37) D(R): The bubble grade or code value assigned by the monitor for the section of data corresponding to the diver at rest. If no assignment was made because of bad data, 999 is entered.
- 38) D(M): This is the same as D(R) but is used for the section of data corresponding to the diver performing a specified movement.
- 39) Time: The time from the dive timer at which the ultrasonic monitoring of the diver was performed.
- 40) Depth: The depth at which the ultrasonic monitoring of the diver was performed.
- 41) Tape Rest: The number on the counter of the tape recorder at which occurs the beginning of the data for the diver at rest.
- 42) Tape Move: The numbers on the counter of the tape recorder at which begins the data following diver movement (for up to three movements).

- 43) WD(R): A whole between 0 and 4 (maximum weight) which is determined by the monitor as the weight to be assigned to the result D(R) based on the quality of the signal on the recording.
- 44) WD(M): This is the same as WD(R) but applies to the result D(M).
- 45) No of Incidences of D.S.: The number of times the diver experiences decompression sickness. If no report is available as to whether or not D.S. occurred, this number is set at "-1".
- 46) D.S. No: The number, starting at "1", designating in order of appearance the incidence of decompression sickness.
- 47) Type: The type of decompression sickness as listed in Table XII.
- 48) Severity: A number describing the severity of the sickness. The scale is yet to be determined but it must consist of integer numbers (e.g., 0 to 10).
- 49) T(Start): The time from the dive timer indicating the start of the decompression sickness.
- 50) P(Start): The depth of the commencement of the decompression sickness.
- 51) T(End): The time according to the dive timer of the end of the decompression sickness.
- 52) P(End): The depth of the end of the decompression sickness.

This data bank does not contain the actual pressure versus time and gas composition measurements that may be obtained in other data banks such as CANDID (Kuehn and Sweeney, 1973) in use at DCIEM. However, the profile or dive table used to control the dive is identified in DUDB by a number and a name.

There are currently 80 DUDB files in the data bank. These files, which have names D0001 to D0080, constitute the dive series "Doris France - Amer Profile Comparison" (Lagrue et al, 1978).

PROCEDURE

- A) During the dive, the diving personnel fill out the Data Bank Form in a manner similar to that shown in Appendix I. Where necessary, the bubble grades or code values may be evaluated (from the recording of the ultrasonic data) and entered in the Data Bank Form following the dive.

The Data Bank Form shown in Appendix I contains, as an example, the data entered for the first file, D0001, in DUDB. The data format required is indicated on the Form. The rules for entering the data are as follows:

- a) Integers are indicated by the letter "I". For example, "3I3" means that three integer numbers (separated by commas) containing a maximum of 3 characters each may be used. For the PDP-11/10 computer the maximum value is 32767 for an integer number.
 - b) Real numbers are indicated by the letter F. For example, "F7.2" means that a real number must be used (i.e., containing a decimal point), that the maximum number of characters including the decimal point is 7, and that at most two characters after the decimal point may be used.
 - c) The letter "A" indicates that numbers, letters or symbols may be used in free format. For example, "5A1" means that five characters may be entered.
 - d) For items 11 and 12 on the Data Bank Form, only one character can be entered in each space provided. The file names are separated by a space or a comma.
 - e) If there is no data available for a given parameter, one enters 0 for a parameter of the form "I", 0. for a parameter of the form "F", and blank spaces for a parameter of the form "A".
 - f) After the data has been entered for the first monitor in items 36 to 44, it is not necessary to repeat the information in items 39 to 42 for subsequent monitors.
 - g) When necessary, appropriate additions may be made to Tables I to XII.
- B) Following the dive, the data from the Data Bank Form are entered into a computer via a teletype and stored on computer media such as floppy disks or magnetic tapes. The data from one Data Bank Form constitute one DUDB file.

Currently, the data are entered via a teletype into a DEC PDP-11/10 computer and stored on floppy disks in a DEC RX-01 floppy disk system. The operating software used is DEC RT-11 and the EDIT program provided with this software is used for the creation of the DUDB files. Approximately 240 DUDB files can be stored on one floppy disk.

The rules for entering the data into a DUDB file are as follows:

- a) The data are entered line by line using the data type indicated on the Data Bank Form and separating each item on a line with commas. For the first five lines on the Data Bank Form, the second item must be entered on a separate line. Items 11 and 12 may be separated by either a blank or a comma.
- b) The EDIT program in the DEC RT-11 operating software allows one to enter an integer number without regard to location within the field allocated even if it is not followed by a comma. For example, the number "4" to be entered for parameter #35 may be typed in the first space on the line without a following comma.

Two commas together ".,," mean 0 for a parameter of type I or 0. for a parameter of type F. If following an item on a line the rest of the items are 0 or 0. the rest of the line may be left blank.

- c) Bubble grades with "+" or "-" symbols are entered according to the following table:

Bubble grade	0	1-	1	1+	2-	2	2+	3-	3	3+	4-	4	4+
Data entered	0	10	1	11	20	2	21	30	3	31	40	4	41

- C) The contents of the new DUDB file may be verified by running the program DEV which is described below. With DEV, one may list a single DUDB file or a series of files one after the other. To list a series of DUDB files, another type of file, a "file file" is created using, once again, the EDIT program. The file file consists of
 - a) an integer number, on the first line, which indicates the number of DUDB file names in the file file.
 - b) the DUDB file names (one per line) up to a maximum of 100 lines.

- D) The DUDB files may be used in application programs such as SEV (which is described below) to calculate the index of severity or perform correlation studies.

PROGRAM DEV

The computer program for data evaluation, DEV, is used to list and verify the data in the DUDB files. It is written in Fortran to be compatible with scientific applications programs (see below) for which Fortran is commonly used.

An example showing how DEV may be used is provided in Appendix II. In Part a), the data are shown exactly as they were typed in on the teletype from the Data Bank Form to create DUDB File D0001 using the EDIT program.

Then the program, DEV, is run as shown in Part b) of Appendix II. The instructions for running the program are:

- a) The computer requests "Number of file files?". This is the number of file files which are described in Part C of PROCEDURE. For example, one may wish to use one file file named FF1 containing DUDB Files D0001 to D0100 and a second file file named FF2 containing DUDB Files D0101 to D0140.

In this example, one would type "2+" where "+" means teletype carriage "return". If only a single DUDB file is required, no entry is made (one types "+").

- b) If an entry is made to the first question, the second question is "FILE FILE". In the above example, one types "FF1+".
- c) If no entry is made to the first question, the second question is "DIVE FILE:". As an example, one may type "D0001+" to list DUDB File D0001.

Finally, in Part c of Appendix II, there is a complete listing of the program DEV.

PROGRAM SEV

An applications program, SEV (S evaluation), has been written in Fortran to evaluate the index of severity of decompression, S (Kisman et al, 1978), using the ultrasonic data stored in a DUDB file.

The general expression for the index of severity is

$$S_Y(\alpha, f) = \frac{1}{(0.02)(4^\alpha)(t_j - t_0)} \sum_{i=1}^j \{ (d_{Y,i}^\alpha + d_{Y,i-1}^\alpha)(t_i - t_{i-1})f(p_i, p_{i-1}) \}$$

where the index i represents the measurement number for the measurements of bubble grade, $d_{Y,i}$ ($i = 0$ indicates the beginning of decompression, $i = j$ indicates the final measurement),

$d_{Y,i}$ is the bubble grade measured (for $\gamma = r$, the diver is at rest during the measurement, for $\gamma = m$ the diver performs a specified movement),

t_i is the time at which measurement number i was made, and

p_i is the depth at which measurement number i was made.

This equation represents the integration over time of the bubble grades d (having exponent α as an experimentally determined parameter). The denominator is a normalization factor. The factor, $f(p_i, p_{i-1})$, takes into account the fact that the significance of the bubble grades may be functions of the depth at which they are measured. Experimental evidence (Kisman et al, 1978) indicates that the factor f may be set equal to 1 for air dives so that $S_Y(\alpha, f) \equiv S_Y(\alpha)$.

As an illustration of the use of SEV for computing the index of severity, $S_Y(\alpha)$, an example of its use and a complete listing of SEV have been provided in Appendix III. In Para a) of Appendix III, SEV is run using the DUBB File D0001. The computer output is in the form of $S(R, \alpha)$ or $S(M, \alpha)$ where $\gamma = R$ defines the situation where the diver is at rest and $\gamma = M$ indicates that the diver has performed a specified movement. A complete set of results for which the parameter α varies between 1 and 7 is provided for each monitor. Instructions for the use of SEV are as follows:

- a) In response to the first question, "type 1 for data listing:", one types "1+" to obtain a data listing in a format identical to that obtained with the program, DEV. One types " " if no data listing is desired.
- b) The second number required is the time code as defined in Table X which designates the format used for the second number, the time range. The time range is the maximum time after the beginning of decompression within which the ultrasonic data in the DUBB file are used to calculate S .
- c) The subsequent questions are identical to those posed in DEV.

The DUDB data bank and the program, SEV, were used in an experimental program to compare bounce dive tables of the Ministère Français du Travail with corresponding American surface decompression tables having the same bottom depth and time at bottom (Lagrué et al, 1978). Seventy-two man-dives for 18 French and 18 corresponding American profiles were performed and the data were entered into 72 files of the DUDB data bank. The ultrasonic data for one diver, DA, diving to 33 m for 40 min are shown in Fig. 2 for the French profile A and the American profile B. All of the bubble grade measurements made during and following the decompression were used by the program SEV to compute the index of severity $S_r(3)$. Statistical comparisons of $S_r(3)$ were made for the two series of profiles. The general result of this study is that there is no statistically significant difference in decompression stress in the two series even though the American profile briefly produces a high pressure gradient in the tissues of the divers at the beginning of the decompression. Hence, because surface decompression is safer operationally, the American series is the preferred one.

CONCLUSIONS

A Doppler ultrasonic data bank has been established. All of the parameters included in the data bank have been fully described and for each of twelve parameters, a table has been provided in which entries may be added as the data bank grows. The procedure for entry of data (including a copy of the Data Bank Form used), the verification of, and use of the data have been outlined. The program, DEV, which is used for listing and verification of DUDB files has been listed and an example of its use provided. The program, SEV, which is used to calculate the index of severity of decompression has been listed and an example of its use provided. The program, SEV, is the first of many possible applications programs which will make use of the information stored in DUDB files. The DUDB data bank and the program, SEV, were employed to compute the index of severity, $S_r(3)$, in order to compare a series of French and corresponding American dive profiles in an experimental program involving 72 man-dives.

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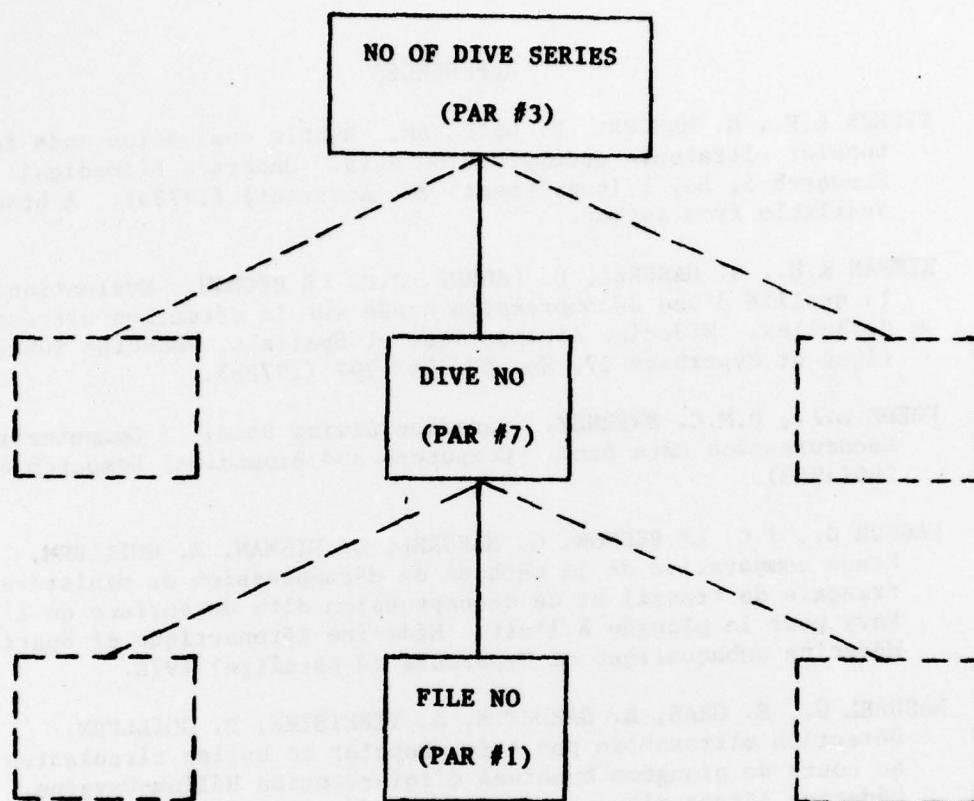


Figure 1: Classification hierarchy of DUDB dive parameters. Each dive series (identified by parameter #3) may involve a number of dives (identified by parameter #7) each of which involves one or more divers. Each man-dive is identified by a file no. (parameter #1).

Dive: DORIS, 33m - 40 min

Diver: D.A.

Data: AT REST

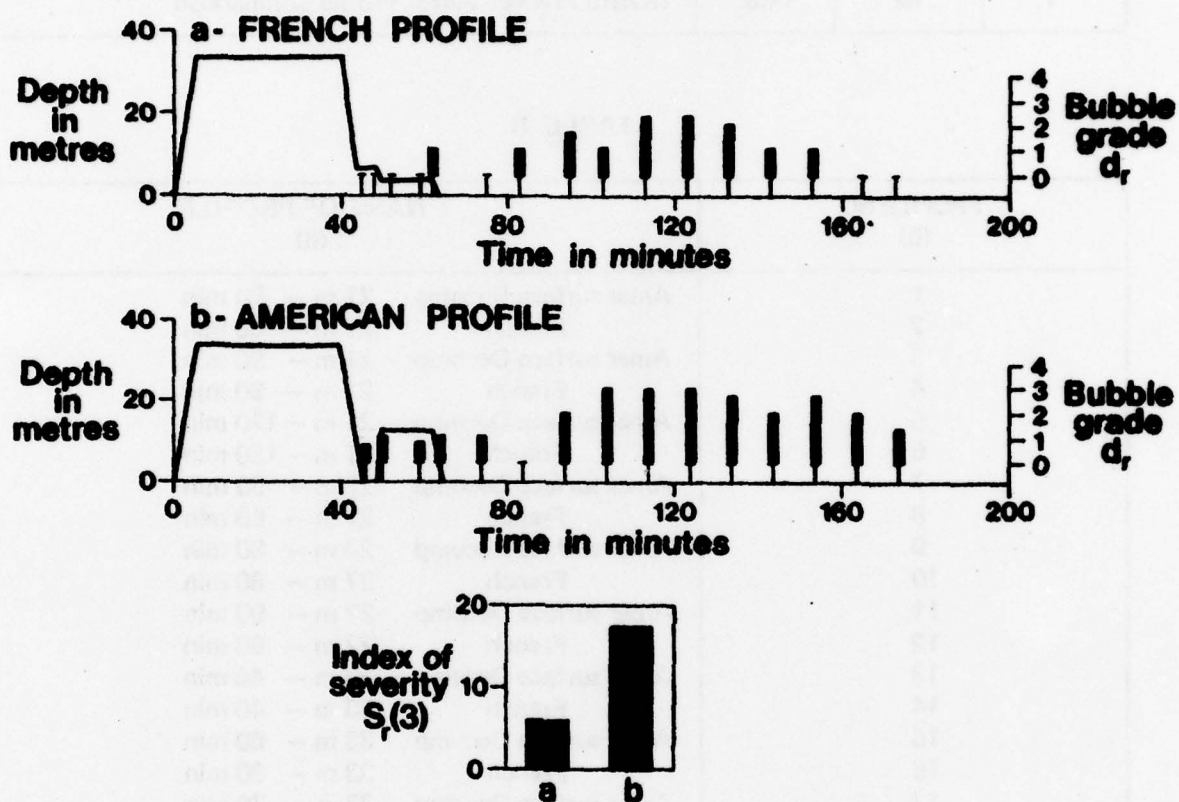


Figure 2: An example of the use of the index of severity of decompression $S_\gamma(\alpha)$ calculated by the program SEV using ultrasonic bubble grade data to compare a French profile (of the Ministère du Travail) with an American profile (involving surface decompression).

TABLE I

NO OF DIVE SERIES (3)	DIVE NOS (7)	FILE NOS (1)	NAME OF DIVE SERIES (4)
1	1-42	1-80	DORIS France - Amer Profile Comparison

TABLE II

PROFILE NO (5)	NAME OF PROFILE (6)
1	Amer surface Decomp 21 m - 50 min
2	French 21 m - 50 min
3	Amer surface Decomp 21 m - 90 min
4	French 21 m - 90 min
5	Amer surface Decomp 21 m - 120 min
6	French 21 m - 120 min
7	Amer surface Decomp 27 m - 60 min
8	French 27 m - 60 min
9	Amer surface Decomp 27 m - 80 min
10	French 27 m - 80 min
11	Amer surface Decomp 27 m - 90 min
12	French 27 m - 90 min
13	Amer surface Decomp 33 m - 40 min
14	French 33 m - 40 min
15	Amer surface Decomp 33 m - 60 min
16	French 33 m - 60 min
17	Amer surface Decomp 33 m - 70 min
18	French 33 m - 70 min
19	Amer surface Decomp 39 m - 30 min
20	French 39 m - 30 min
21	Amer surface Decomp 39 m - 40 min
22	French 39 m - 40 min
23	Amer surface Decomp 39 m - 60 min
24	French 39 m - 60 min
25	Amer surface Decomp 45 m - 25 min
26	French 45 m - 25 min
27	Amer surface Decomp 45 m - 40 min
28	French 45 m - 40 min
29	Amer surface Decomp 45 m - 50 min
30	French 45 m - 50 min
31	Amer surface Decomp 51 m - 20 min
32	French 51 m - 20 min
33	Amer surface Decomp 51 m - 30 min
34	French 51 m - 30 min
35	Amer surface Decomp 51 m - 40 min
36	French 51 m - 40 min

TABLE III

DIVER NO (9)	NAME OF DIVER (10)
1	DAUMAS, B.
2	PERON, M.
3	ADALBERT, P.
4	CHEVALLIER, Y.
5	CADOUX, F.
6	SCHMALTZ, J.C.
7	FOURCADE, M.
8	DAVID, B.
9	SERNANDE, E.
10	LEFEVRE, P.
11	FAURAT, A.
12	GEANT, C.
13	MERLOT, P.
14	BARON, L.
15	MICHAULT, C.
16	BEARD, P.
17	BUSNEL, J.F.
18	CANNAVACCINOLO, J.
19	TARNEE, O.
20	PRIETO, J.J.
21	MARTINEZ, R.

TABLE IV

NO	TYPE OF DIVE (18)
1	Air
2	Helium - Oxygen
3	Helium - Nitrogen - Oxygen

TABLE V

NO	ENVIRONMENT (19)
1	Chamber — Dry
2	Chamber — Wet
3	Open sea
4	Body of Fresh Water

TABLE VI

NO	TYPE OF WORK (21)
1	CYCLING

TABLE VII

TAPE RECORDER NO (23)	TAPE RECORDER	
	MODEL	SERIAL NO
1	PHILIPS N4419	

TABLE VIII

TAPE NO (24)	TAPE
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	DORIS B1B B3A A3A B3B A3B B5A A5A B4B B2B B4A B2A B8B A8B B6A A6A B6B A6B B8A A8A A16A B14A B14A A16B B14B A14A B16A A14B A17A B17A A18A B18A A18B B18B A20A B20A A21A B21A A19A B19A A21B B21B A19B B19B A19A B20B A15A B15A A15B

TABLE VIII

TAPE NO (24)	TAPE
49	DORIS B15B
50	A17B
51	B17B
52	A22A
53	A22A
54	A21B
55	B22B
56	A1B
57	A7A
58	B7A
59	A13A
60	B13A
61	A13B
62	B13B
63	A10A
64	B10A
65	B10B
66	A10B
67	A12A
68	B12A
69	A12B
70	B12B
71	A11B
72	B11B
73	A11A
74	B11A
75	A9B
76	B9B
77	A9A
78	B9A
79	B7B
80	A7B

TABLE IX

NO	DEPTH CODE (25)
1	msw
2	fsu
3	mfu
4	ffu
5	ATA
6	ATG

TABLE X

19

NO	TIME CODE (27)																				
1	<u>Days-Hours-Min-Sec</u> Examples : <table><tr><th>Days</th><th>Hours</th><th>Min</th><th>Sec</th><th>Code</th></tr><tr><td>4</td><td>3</td><td>25</td><td>15</td><td>40325.15</td></tr><tr><td></td><td></td><td>30</td><td></td><td>30.00</td></tr><tr><td></td><td>23</td><td>0</td><td>5</td><td>2300.05</td></tr></table>	Days	Hours	Min	Sec	Code	4	3	25	15	40325.15			30		30.00		23	0	5	2300.05
Days	Hours	Min	Sec	Code																	
4	3	25	15	40325.15																	
		30		30.00																	
	23	0	5	2300.05																	
2	<u>Hours-Min-Sec</u> Examples : <table><tr><th>Hours</th><th>Min</th><th>Sec</th><th>Code</th></tr><tr><td>146</td><td>32</td><td>5</td><td>14632.05</td></tr><tr><td></td><td>5</td><td></td><td>5.00</td></tr></table>	Hours	Min	Sec	Code	146	32	5	14632.05		5		5.00								
Hours	Min	Sec	Code																		
146	32	5	14632.05																		
	5		5.00																		
3	<u>Min-Sec</u> Examples : <table><tr><th>Min</th><th>Sec</th><th>Code</th></tr><tr><td>244</td><td>30</td><td>244.30</td></tr><tr><td>5</td><td></td><td>5.</td></tr></table>	Min	Sec	Code	244	30	244.30	5		5.											
Min	Sec	Code																			
244	30	244.30																			
5		5.																			

TABLE XI

MONITOR NO (34)	NAME OF MONITORS
1	KISMAN, K.
2	MASUREL, G.
3	DORIS
4	KISMAN + MASUREL (CERTSM)
5	GRAS
6	FRANCOISE
7	J. PAUL
8	DIDIER

TABLE XII

NO	TYPE OF DECOMPRESSION SICKNESS (47)
1	Bends
2	Bend - Knee
3	Bend - Elbow
4	Bend - Shoulder
5	Bend - Hip
6	Bend - Vestibular
7	Articular Pain

DATA BANK FORM

① FILE NO(15):		1		② FILE NAME(5A1):		D0001	
③ NO OF DIVE SERIES(16):		1		④ NAME OF DIVE SERIES (45A1):			
				DORIS FRANCO-AMER PROFILE COMPARISON			
⑤ PROFILE NO(16):		14		⑥ NAME OF PROFILE (45A1):			
				FRENCH 33m - 40 min.			
⑦ DIVE NO (16):		1		⑧ NAME OF DIVE (45A1):			
				FRENCH NO. 10 BIB			
⑨ DIVER NO (16):		1		⑩ NAME OF DIVER (45A1):			
				DAUMAS B.			
⑪ ASSOCIATED DUOB FILES (7(5A1,1X)):							
D 0 0 0 5 1 6							
⑫ AUXILIARY FILES (4(5A1,1X))							
⑬ TIME OF DAY (F7.2):		0.		⑭ DATE OF DIVE (313):		23.8.77	
⑮ WEIGHT (F6.2):		0.		⑯ HEIGHT (F6.2):		0.	
⑰ FAT COMR(F6.2):		0.		⑱ TYPE OF DIVE(14):		1	
⑲ ENVIRONMENT(14):		1		⑳ TEMPERATURE(F61):		0.	
㉑ TYPE OF WORK(14):		0		㉒ QUANTITY OF WORK(F61):		0.	
㉓ TAPE RECORDER(16):		1		㉔ TAPE NO (16):		1	
㉕ DEPTH CODE (14):		1		㉖ BOTTOM DEPTH(F6.1):		33.	
㉗ TIME CODE (14):		3		㉘ TIME PROF ALT (F10.2):		0.	
㉙ T(BEG) (F10.2)		0.		㉚ T(ARRIVAL) (F10.2)		5.	
				㉛ T(BEG DECOMP) (F10.2)		40.3	
				㉜ T(END DECOMP) (F10.2)		63.	
㉝ COMMENTS(71A1)							
㉞ MONITOR NOS (41S):							
		3					

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35 TOTAL No. OF EVALUATIONS (16) :	32
---	----

36 EVAL No (14)	37 DR) (14)	38 D(M) (14)	39 TIME (F9.2)	40 DEPTH (F9.2)	41 TAPE REST (15)	TAPE 42 MOVE			43 WD(R) (F6.2)	44 WDM) (F6.2)
						A (15)	B (15)	C (15)		
1	0	0	45.	3.	7.	15				
2	0	0	48.	3.	24					
3	0	0	52.	3.	42	47				
4	0	0	59.	3.	56	63				
5	0	0	62.	0	71	76				
6	112	112	75.	0	85	93				
7	112	112	83.	0	100	108				
8	112	112	95.	0	118	127				
9	112	0	103.	0	142	150				
10	232	343	113.	0	160	168				
11	232	232	123.	0	180	189				
12	0	0	133.	0	204	215				
13	112	112	143.	0	228	241				
14	0	212	153.	0	255	268				
15	112	112	165.	0	279	297				
16	0	0	173.	0	316	331				
1	0	0								
2	0	0								
3	0	0								
4	0	0								
5	1	0								
6	0	0								
7	1	1								
8	20	1								
9	1	1								
10	21	3								
11	21	3								
12	2	2								
13	999	1								
14	999	2								
15	0	2								
16	0	1								

APPENDIX II

```

(a) .R EDIT
*EWDK1:D0001.PARSS
*11
D0001
1
DORIS FRANCO-AMER PROFILE COMPARISON
14
FRENCH 33 M - 40 MIN
1
FRENCH NO. 10 BIB
1
DAUMAS B.
D0056

0.,23,8,77
0.,0.
0.,1
1,0.
0,0.
1,1
1,33.
3,0.
0.,5.,40.3,63.

1,3,0,0
32
1,0,0,45.,3.,7,15
2,0,0,48.,3.,24
3,0,0,52.,3.,42,47
4,0,0,59.,3.,56,63
5,0,0,62.,0.,71,76
6,112,112,75.,0.,85,93
7,112,112,83.,0.,100,108
8,112,112,95.,0.,118,127
9,112,0,103.,0.,142,150
10,232,343,113.,0.,160,168
11,232,332,123.,0.,180,189
12,0,0,133.,0.,204,215
13,112,112,143.,0.,228,241
14,0,212,153.,0.,255,268
15,112,112,165.,0.,279,297
16,0,0,173.,0.,316,331
1,0,0
2,0,0
3,0,0
4,0,0
5,1,0
6,0,0
7,1,1
8,20,1
9,1,1
10,21,3
11,21,3
12,2,2
13,999,1
14,999,2
15,0,2
16,0,1
0
85
*EXSS

```

(b)

25

•RUN DX1:DEV

NUMBER OF FILE FILES ?

DIVE FILE : D0001

FILE:..... # 1, D0001

DIVE SERIES: # 1, DORIS FRANCO-AMER PROFILE COMPARISON

PROFILE:.... # 14, FRENCH 33 M - 40 MIN

DIVE:..... # 1, FRENCH NO. 10 B1B

DIVER:..... # 1, DAUMAS B.

ASSOCIATED DUBB FILES: D0056

AUXILLIARY FILES:

TIME OF DAY:.....	0.00	DATE OF DIVE:....	23	8	77
WEIGHT:.....	0.00	HEIGHT:.....		0.00	
FAT COMPOSITION:..	0.00	TYPE OF DIVE:....		1	
ENVIRONMENT:.....	1	TEMPERATURE:.....		0.0	
TYPE OF WORK:.....	0	QUANTITY OF WORK:		0.0	
TAPE RECORDER NO:	1	TAPE NO:.....		1	
DEPTH CODE:.....	1	BOTTOM DEPTH:....		33.0	
TIME CODE:.....	3	TIME OF PROF ALT:		0.00	

T(BEG):.....	0.00
T(ARRIVAL):...	5.00
T(BEG DECOMP):	40.30
T(END DECOMP):	63.00

MONITOR NOS: 1 3 0 0

TOTAL NO OF EVAL: 32

EVAL NO	D(R), D(M)	TIME,	DEPTH,	TAPE: REST,	TAPE: MOVE,	WD(R), WD(M)
				A B C		
1	0 0	45.00	3.0	7 15	0 0	0.00 0.00
2	0 0	48.00	3.0	24 0	0 0	0.00 0.00
3	0 0	52.00	3.0	42 47	0 0	0.00 0.00
4	0 0	59.00	3.0	56 63	0 0	0.00 0.00
5	0 0	62.00	0.0	71 76	0 0	0.00 0.00
6	112 112	75.00	0.0	85 93	0 0	0.00 0.00

7	112	112	83.00	0.0	100	108	0	0	0.00	0.00
8	112	112	95.00	0.0	118	127	0	0	0.00	0.00
9	112	0	103.00	0.0	142	150	0	0	0.00	0.00
10	232	343	113.00	0.0	160	168	0	0	0.00	0.00
11	232	332	123.00	0.0	180	189	0	0	0.00	0.00
12	0	0	133.00	0.0	204	215	0	0	0.00	0.00
13	112	112	143.00	0.0	228	241	0	0	0.00	0.00
14	0	212	153.00	0.0	255	268	0	0	0.00	0.00
15	112	112	165.00	0.0	279	297	0	0	0.00	0.00
16	0	0	173.00	0.0	316	331	0	0	0.00	0.00
1	0	0	0.00	0.0	0	0	0	0	0.00	0.00
2	0	0	0.00	0.0	0	0	0	0	0.00	0.00
3	0	0	0.00	0.0	0	0	0	0	0.00	0.00
4	0	0	0.00	0.0	0	0	0	0	0.00	0.00
5	1	0	0.00	0.0	0	0	0	0	0.00	0.00
6	0	0	0.00	0.0	0	0	0	0	0.00	0.00
7	1	1	0.00	0.0	0	0	0	0	0.00	0.00
8	20	1	0.00	0.0	0	0	0	0	0.00	0.00
9	1	1	0.00	0.0	0	0	0	0	0.00	0.00
10	21	3	0.00	0.0	0	0	0	0	0.00	0.00
11	21	3	0.00	0.0	0	0	0	0	0.00	0.00
12	2	2	0.00	0.0	0	0	0	0	0.00	0.00
13	999	1	0.00	0.0	0	0	0	0	0.00	0.00
14	999	2	0.00	0.0	0	0	0	0	0.00	0.00
15	0	2	0.00	0.0	0	0	0	0	0.00	0.00
16	0	1	0.00	0.0	0	0	0	0	0.00	0.00

NO OF INCIDENCES OF D.S.: 0

R FORTRAN

*DX1:DEV,TT:=DX1:DEV/L:1/W

RT-11 FORTRAN IV

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```

0001      LOGICAL*1 BUFLAG(80),FILNAM(14),EXT(4),CC(45),EE(45),FF1(5)
0002      LOGICAL*1 FF2(5),FF3(5),FF4(5),FF6(5),FF7(5),GG1(5)
0003      LOGICAL*1 GG2(5),GG3(5),GG4(5),II(45),EEE(71),NFILN(100,5)
0004      LOGICAL*1 TN(5),TNX(5),AAA(5),FN(45)
0005      INTEGER*2 IN(3),IFF(4),I1(200),I2(200),I3(200),I6(200)
0006      INTEGER*2 I7(200),I8(200),I9(200),I20(10),I21(10),I22(10)
0007      INTEGER*2 MCH(50)
0008      REAL*4 F4(200),F5(200),F10(200),F11(200),F23(10),F24(10)
0009      REAL*4 F25(10),F26(10)
0010      DATA FILNAM/'D','X','I',':','10*' '','','EXT/',' ','P','A','R'/
0011      DATA TNX/5*' ' /

```

C

```

0012      NN = 0
0013      80 TYPE 210
0014      ACCEPT 211, NON
0015      IF (NON.EQ.0) GO TO 1
0017      87 NN = NN+1
0018      TYPE 217
0019      TYPE 213
0020      84 ACCEPT 101,NCH,(BUFLAG(1),I=1,NCH)
0021      TYPE 217
0022      IF (NCH.EQ.0.OR.NCH.GT.6) GO TO 84
0024      DO 81 I=1,NCH
0025      81 FILNAM(I+4) = BUFLAG(I)
0026      DO 82 I=1,4
0027      82 FILNAM(I+NCH+4) = EXT(I)
0028      CALL ASSIGN(2,FILNAM,NCH+8,'OLD')
0029      READ (2,211) KEND
0030      DO 83 IPK=1,KEND
0031      83 READ (2,101) MCH(IPK),(NFILN(IPK,IPL), IPL=1,MCH(IPK))
0032      CALL CLOSE (2)
0033      DO 90 N=1,KEND
0034      DO 91 INA=1,6
0035      91 TN(INA) = TNX(INA)
0036      DO 85 IY=1,MCH(N)
0037      TN(IY) = NFILN(N,IY)
0038      85 FILNAM(IY+4) = NFILN(N,IY)
0039      DO 86 IZ=1,4
0040      86 FILNAM(IZ+MCH(N)+4) = EXT(IZ)
0041      TYPE 216
0042      TYPE 214
0043      TYPE 215, TN
0044      TYPE 214
0045      CALL ASSIGN (2,FILNAM,MCH(N)+8,'OLD')
0046      GO TO 88
0047      1 TYPE 214
0048      TYPE 100
0049      ACCEPT 101, NCH,(BUFLAG(1), I=1,NCH)
0050      TYPE 214
0051      IF(NCH.EQ.0.OR.NCH.GT.6) GO TO 1
0053      DO 2 I = 1,NCH
0054      2 FILNAM(I+4) = BUFLAG(I)
0055      DO 3 I = 1,4
0056      3 FILNAM(I+NCH+4) = EXT(I)
0057      CALL ASSIGN (2,FILNAM,NCH+8,'OLD')
0058      88 CONTINUE

```

C

```

0059      READ (2,300) IAAA,AAA
0060      READ (2,301) IB,CC
0061      READ (2,301) IFN,FN
0062      READ (2,301) ID,EE
0063      READ (2,301) IH,II
0064      READ (2,302) FF1,FF2,FF3,FF4,FF5,FF6,FF7
0065      READ (2,303) GG1,GG2,GG3,GG4
0066      READ (2,304) FX,IN
0067      READ (2,305) FJ,FK
0068      READ (2,306) FL,IM
0069      READ (2,307) IO,FP
0070      READ (2,307) IQ,FR
0071      READ (2,308) IS,IT
0072      READ (2,307) IU,FV
0073      READ (2,309) IW,PPP
0074      READ (2,310) FAA,FBB,FCC,FDD
0075      READ (2,311) EEE
0076      READ (2,312) IFF
0077      READ (2,313) IGG
0078      READ (2,115) (I1(I),I2(I),I3(I),F4(I),F5(I),I6(I),I7(I),
118(I),I9(I),F10(I),F11(I), I=1,IGG)
0079      READ (2,313) IHH
0080      IF (IHH.EQ.0) GO TO 14
0082      READ (2,116) (I20(J),I21(J),I22(J),F23(J),F24(J),F25(J),
1F26(J), J=1,IHH)

C
0083 14  CONTINUE
C
0084      CALL CLOSE (2)
C

0085      TYPE 400,IAAA,AAA
0086      TYPE 401,IB,CC
0087      TYPE 402,IFN,FN
0088      TYPE 403,ID,EE
0089      TYPE 404,IH,II
0090      TYPE 405,FF1,FF2,FF3,FF4,FF5,FF6,FF7
0091      TYPE 406,GG1,GG2,GG3,GG4
0092      TYPE 407,FX,IN
0093      TYPE 408,FJ,FK
0094      TYPE 409,FL,IM
0095      TYPE 410,IO,FP
0096      TYPE 411,IQ,FR
0097      TYPE 412,IS,IT
0098      TYPE 413,IU,FV
0099      TYPE 414,IW,PPP
0100      TYPE 415,FAA,FBB,FCC,FDD
0101      TYPE 416,EEE
0102      TYPE 417,IFF
0103      TYPE 418,IGG
0104      TYPE 125
0105      TYPE 126, (I1(I),I2(I),I3(I),F4(I),F5(I),I6(I),I7(I),I8(I),
119(I),F10(I),F11(I), I=1,IGG)
0106      TYPE 129, IHH
0107      IF(IHH) 11,11,10
0108 10  TYPE 127
0109      TYPE 128, (I20(J),I21(J),I22(J),F23(J),F24(J),F25(J),
1F26(J), J=1,IHH)

```

```

C
0110 11 CONTINUE
0111 90 CONTINUE
0112 IF (NN.LT.NON) GO TO 87
0114 TYPE 216

C
0115 100 FORMAT(/'SDIVE FILE : ')
0116 101 FORMAT(Q,80A1)
0117 115 FORMAT(3I4,2F9.2,4I5,2F6.2)
0118 116 FORMAT(3I4,4F10.2)
0119 125 FORMAT(' EVAL', ' D(R), D(M), TIME, DEPTH, TAPE: REST,',
1 ' TAPE: MOVE, VD(R), VD(M)', '/' NO', 44X, 'A B C', '/')
0120 126 FORMAT(1X, 13, 3X, 13, 3X, 13, F11.2, F8.1, 2I7, 2I5, 2F6.2, '/')
0121 127 FORMAT(// ' D.S. NO, TYPE, SEVERITY, T(START), P(START)',
1 ' T(END), P(END)', '/')
0122 128 FORMAT(15, 17, 19, 2F12.2, 2F11.2, '/')
0123 129 FORMAT(' NO OF INCIDENCES OF D.S.: ', 16, '/')
0124 210 FORMAT (/ ' $NUMBER OF FILE FILES ? ')
0125 211 FORMAT (14)
0126 213 FORMAT (// ' $FILE FILE : ')
0127 214 FORMAT (// ' *****')
0128 215 FORMAT (/ ' DIVE FILE : ', 6A1)
0129 216 FORMAT (//////)
0130 217 FORMAT (// ' !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!')
0131 300 FORMAT(15, /, 5A1)
0132 301 FORMAT(16, /, 45A1)
0133 302 FORMAT(7(5A1, 1X))
0134 303 FORMAT(4(5A1, 1X))
0135 304 FORMAT(F7.2, 3I3)
0136 305 FORMAT(2F6.2)
0137 306 FORMAT(F6.2, 14)
0138 307 FORMAT(14, F6.1)
0139 308 FORMAT(2I6)
0140 309 FORMAT(14, F10.2)
0141 310 FORMAT(4F10.2)
0142 311 FORMAT(7I1A1)
0143 312 FORMAT(4I6)
0144 313 FORMAT(16)
0145 400 FORMAT(/ ' FILE:..... ', '#', 16, ', ', 5A1/)
0146 401 FORMAT(' DIVE SERIES: ', 1X, '#', 16, ', ', 45A1,/)
0147 402 FORMAT(' PROFILE:.... ', '#', 16, ', ', 45A1,/)
0148 403 FORMAT(' DIVE:..... ', '#', 16, ', ', 45A1,/)
0149 404 FORMAT(' DIVER:..... ', '#', 16, ', ', 45A1,/)
0150 405 FORMAT(' ASSOCIATED DUBB FILES: ', 7(1X, 5A1))
0151 406 FORMAT(' AUXILLIARY FILES: ', 5X, 4(1X, 5A1)/)
0152 407 FORMAT(' TIME OF DAY:..... ', F7.2, 5X,
1 'DATE OF DIVE:.... ', 3(1X, 12))
0153 408 FORMAT(' WEIGHT:..... ', F6.2, 5X,
1 'HEIGHT:..... ', F6.2)
0154 409 FORMAT(' FAT COMPOSITION:.. ', F6.2, 5X,
1 'TYPE OF DIVE:.... ', 6X, 14)
0155 410 FORMAT(' ENVIRONMENT:..... ', 14, 5X,
1 'TEMPERATURE:..... ', 4X, F6.1)
0156 411 FORMAT(' TYPE OF WORK:..... ', 14, 5X,
1 'QUANTITY OF WORK: ', 4X, F6.1)
0157 412 FORMAT(' TAPE RECORDER NO: ', 16, 5X,
1 'TAPE NO:..... ', 4X, 16)

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```
0158 413 FORMAT(' DEPTH CODE:..... ',14,5X,  
1'BOTTOM DEPTH:....',4X,F6.1)  
0159 414 FORMAT(' TIME CODE:..... ',14,5X,  
1'TIME OF PROF ALT:',F10.2,/)   
0160 415 FORMAT(' T(BEG):.....',F10.2,/' T(ARRIVAL):... ',F10.2,  
1/' T(BEG DECOMP):',F10.2/' T(END DECOMP):',F10.2,/)   
0161 416 FORMAT(IX,71A1,/)   
0162 417 FORMAT(' MONITOR NOS:',4(IX,16),/)   
0163 418 FORMAT(' TOTAL NO OF EVAL:',16,/)   
0164      END
```

*

APPENDIX III

(a)

RUN DX1:SEV

TYPE 1 FOR DATA LISTING :

TYPE CODE, TIME RANGE : 3,136.1

NUMBER OF FILE FILES ?

DIVE FILE : D0001

MONITOR NO. 1

S(R,1) = 21.29

S(M,1) = 23.55

S(R,2) = 9.52

S(M,2) = 12.39

S(R,3) = 5.17

S(M,3) = 8.28

S(R,4) = 3.16

S(M,4) = 6.21

S(R,5) = 2.03

S(M,5) = 4.87

S(R,6) = 1.34

S(M,6) = 3.88

S(R,7) = 0.89

S(M,7) = 3.12

MONITOR NO. 3

S(R,1) = 24.97

S(M,1) = 31.13

S(R,2) = 11.68

S(M,2) = 16.37

S(R,3) = 5.84

S(M,3) = 9.80

S(R,4) = 3.05

S(M,4) = 6.36

S(R,5) = 1.63

S(M,5) = 4.34

S(R,6) = 0.89

S(M,6) = 3.06

S(R,7) = 0.49

S(M,7) = 2.20

(b)

32

•R FORTRAN

*DX1:SEV,TT:=DX1:SEV/L:1/W

RT-11 FORTRAN IV

V01B-08

MON 28-AUG-78 01:17:38

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```
0001 LOGICAL*1 BUFLAG(80),FILNAM(14),EXT(4),CC(45),EE(45),FF(5)
0002 LOGICAL*1 FF2(5),FF3(5),FF4(5),FF5(5),FF6(5),FF7(5),GG1(5)
0003 LOGICAL*1 GG2(5),GG3(5),GG4(5),II(45),EEE(71),NFILN(100,5)
0004 LOGICAL*1 TN(5),TNX(5),AAA(5),FN(45)
0005 INTEGER*2 IN(3),IX(2),IFF(4),I1(200),I2(200),I3(200),I6(200)
0006 INTEGER*2 I7(200),I8(200),I9(200),I20(10),I21(10),I22(10)
0007 INTEGER*2 ASSD(64),ASSC(64),RES(13),MCH(50)
0008 REAL*4 F4(200),F5(200),F10(200),F11(200),F23(10),F24(10)
0009 REAL*4 F25(10),F26(10),F45(200),F235(10),F255(10),DEG(13)
0010 REAL*8 SR(7),SM(7)
0011 DATA FILNAM/'D','X','I','I','10*' '.,/EXT/'.'','P','A','R'/
0012 DATA ASSD/10,1,1,1,1,1,2,2,2,2,2,30,30,2,30,3,3,
110,1,20,20,20,2,21,21,2,30,3,3,30,3,3,31,
21,20,2,2,2,21,30,3,30,3,3,31,3,31,31,40,
320,2,21,30,30,3,3,3,31,40,4,31,4,4,41/
0013 DATA ASSC/111,112,113,114,121,122,123,124,131,132,133,134,
1141,142,143,144,211,212,213,214,221,222,223,224,231,232,
2233,234,241,242,243,244,311,312,313,314,321,322,323,324,
3331,332,333,334,341,342,343,344,411,412,413,414,421,422,
4423,424,431,432,433,434,441,442,443,444/
0014 DATA DEG/0.,0.6666667,1.,1.3333333,1.6666667,2.,
12.3333333,2.6666667,3.,3.3333333,3.6666667,4.,4./
0015 DATA RES/0,10,1,11,20,2,21,30,3,31,40,4,41/
0016 DATA TNX/5*' ' /
```

C

```
0017 TYPE 200
0018 ACCEPT 201,1DATA
0019 TYPE 202
0020 ACCEPT 203,1COD,TJ
0021 NN = 0
0022 80 TYPE 210
0023 ACCEPT 211, NON
0024 IF (NON.EQ.0) GO TO 1
0026 87 NN = NN+1
0027 TYPE 217
0028 TYPE 213
0029 84 ACCEPT 101,NCH,(BUFLAG(I),I=1,NCH)
0030 TYPE 217
0031 IF (NCH.EQ.0.OR.NCH.GT.6) GO TO 84
0033 DO 81 I=1,NCH
0034 81 FILNAM(I+4) = BUFLAG(I)
0035 DO 82 I=1,4
0036 82 FILNAM(I+NCH+4) = EXT(I)
0037 CALL ASSIGN(2,FILNAM,NCH+8,'OLD')
0038 READ (2,211) KEND
0039 DO 83 IPK=1,KEND
0040 83 READ (2,101) MCH(IPK),(NFILN(IPK,IPL), IPL=1,MCH(IPK))
0041 CALL CLOSE (2)
0042 DO 90 N=1,KEND
0043 DO 91 INA=1,6
0044 91 TN(INA) = TNX(INA)
0045 DO 85 IY=1,MCH(N)
0046 TN(IY) = NFILN(N,IY)
0047 85 FILNAM(IY+4) = NFILN(N,IY)
0048 DO 86 IZ=1,4
0049 86 FILNAM(IZ+MCH(N)+4) = EXT(IZ)
0050 TYPE 216
```

```
0051      TYPE 214
0052      TYPE 215, TN
0053      TYPE 214
0054      CALL ASSIGN (2,FILNAM,MCH(N)+8,'OLD')
0055      GO TO 88
0056      1  TYPE 214
0057      TYPE 100
0058      ACCEPT 101, NCH,(BUFLAG(1), I=1,NCH)
0059      TYPE 214
0060      IF(NCH.EQ.0.OR.NCH.GT.6) GO TO 1
0062      DO 2 I = 1,NCH
0063      2  FILNAM(I+4) = BUFLAG(I)
0064      DO 3 I = 1,4
0065      3  FILNAM(I+NCH+4) = EXT(I)
0066      CALL ASSIGN (2,FILNAM,NCH+8,'OLD')
C
0067      88  CONTINUE
0068      READ (2,300) IAAA,AAA
0069      READ (2,301) IB,CC
0070      READ (2,301) IFN,FN
0071      READ (2,301) ID,EE
0072      READ (2,301) IH,II
0073      READ (2,302) FF1,FF2,FF3,FF4,FF5,FF6,FF7
0074      READ (2,303) GG1,GG2,GG3,GG4
0075      READ (2,304) FX,IN
0076      READ (2,305) FJ,FK
0077      READ (2,306) FL,IM
0078      READ (2,307) IO,FP
0079      READ (2,307) IQ,FR
0080      READ (2,308) IS,IT
0081      READ (2,307) IU,FV
0082      READ (2,309) IW,PPP
0083      READ (2,310) FAA,FBB,FCC,FDD
0084      READ (2,311) EEE
0085      READ (2,312) IFF
0086      READ (2,313) IGG
0087      READ (2,115) (I1(1),I2(1),I3(1),F4(1),F5(1),I6(1),I7(1),
118(1),I9(1),F10(1),F11(1), I=1,IGG)
0088      READ (2,313) IHH
0089      IF(IHH.EQ.0) GO TO 14
0091      READ (2,116) (I20(J),I21(J),I22(J),F23(J),F24(J),F25(J),
11F26(J), J=1,IHH)
0092      14  CONTINUE
C
0093      CALL CLOSE (2)
C
0094      IWV = IW
0095      KIT = IGG+IHH*2+5
0096      DO 70 KI=1,KIT
0097      IF(KI.EQ.1) TX=FAA
0099      IF(KI.EQ.2) TX=FBB
0101      IF(KI.EQ.3) TX=FCC
0103      IF(KI.EQ.4) TX=FDD
0105      IF(KI.GT.4.AND.KI.LE.(4+IGG)) TX=F4(KI-4)
0107      IF(KI.GT.(4+IGG).AND.KI.LE.(4+IGG+IHH)) TX=F23(KI-4-IGG)
0109      IF(KI.GT.(4+IGG+IHH).AND.KI.LE.(4+IGG+IHH*2)) TX=F25(KI-4
1-IGG-IHH)
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0111      IF(KI.NE.(IGG+IHH*2+5)) GO TO 50
0113      TX = TJ
0114      IW = ICOD
0115      50 KA = TX
0116      TRA = (TX-KA)*100.
0117      KB = TX/100.
0118      TRB = (KA/100.-KB)*6000.
0119      KC = TX/10000.
0120      IF(IW.EQ.3) TRC=(KB/100.-KC)*600000.
0122      IF(IW.LT.3) TRC=(KB/100.-KC)*360000.
0124      IF(IW.GT.1) TX=TRA+TRB+TRC+KC*360000.
0126      IF(IW.EQ.1) TX=TRA+TRB+TRC+KC*86400.
0128      IF(KI.EQ.1) FAAS=TX
0130      IF(KI.EQ.2) FBBS=TX
0132      IF(KI.EQ.3) FCCS=TX
0134      IF(KI.EQ.4) FDDS=TX
0136      IF(KI.GT.4.AND.KI.LE.(IGG+4)) F4S(KI-4)=TX
0138      IF(KI.GT.(4+IGG).AND.KI.LE.(4+IGG+IHH)) F23S(KI-4-IGG)=TX
0140      IF(KI.GT.(4+IGG+IHH).AND.KI.LE.(4+IGG+IHH*2)) F25S(KI-4-IGG
1-IHH)=TX
0142      IF(KI.EQ.(5+IGG+IHH*2)) TJS=TX
0144      70 CONTINUE
0145      NIY = 0
0146      NIZ = 0
0147      MG = 0
0148      71 CONTINUE
0149      MG = MG+1

C
0150      DO 51 JIM=1,7
0151      SR(JIM) = 0.
0152      51 SM(JIM) = 0.
0153      XRI = 0.
0154      XMI = 0.
0155      IFLAG = 0
0156      ICK = 0
0157      F4SXR = 0.
0158      F4SXM = 0.

C
0159      DO 20 NI=1,IGG
0160      IF(ICK.EQ.1) GO TO 18
0162      NIX = NI+NIY
0163      JR2 = I2(NIX)
0164      IF(JR2.EQ.999) GO TO 57
0166      IF(JR2.LT.100) GO TO 29
0168      DO 22 MI=1,64
0169      IF(JR2.EQ.ASSC(MI)) GO TO 23
0171      22 CONTINUE
0172      TYPE 131
0173      23 JR2 = ASSD(MI)
0174      29 CONTINUE
0175      DO 44 IIK=1,13
0176      IF(JR2.EQ.RES(IIK)) GO TO 45
0178      44 CONTINUE
0179      TYPE 131
0180      45 XR2 = DEG(IIK)
0181      DO 31 JAL=1,7
0182      SR(JAL) = SR(JAL) + (XR2**JAL+XRI**JAL)*(F4S(NI)-F4SXR)

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0183 31 CONTINUE
0184 F4SXR = F4S(NI)
0185 XR1 = XR2
C
0186 57 JM2 = I3(NIX)
0187 IF(JM2.EQ.999) GO TO 18
0189 IF(JM2.LT.100) GO TO 24
0191 DO 25 IONK=1,64
0192 IF(JM2.EQ.ASSC(IONK)) GO TO 26
0194 25 CONTINUE
0195 TYPE 131
0196 26 JM2 = ASSD(IONK)
0197 24 CONTINUE
0198 DO 46 IAK=1,13
0199 IF(JM2.EQ.RES(IAK)) GO TO 47
0201 46 CONTINUE
0202 TYPE 131
0203 47 XM2 = DEG(IAK)
0204 DO 30 JAL=1,7
0205 30 SM(JAL) = SM(JAL) + (XM2**JAL+XM1**JAL)*(F4S(NI)-F4SXM)
0206 F4SXM = F4S(NI)
0207 XM1 = XM2
C
0208 18 IF((NI+NIY).EQ.1GG) GO TO 40
0210 15 IF(I1(NI+NIY+1).NE.1) GO TO 21
0212 IFLAG = 1
0213 NIY = NIY + NI
0214 GO TO 40
0215 21 IF((F4S(NI+1)-FCCS).GT.TJS) ICK = 1
0217 20 CONTINUE
0218 40 CONTINUE
0219 DO 41 JON=1,7
0220 SR(JON) = SR(JON)/(2*(F4S(NI)-FCCS)*4**JON*.01)
0221 41 SM(JON) = SM(JON)/(2*(F4S(NI)-FCCS)*4**JON*.01)
0222 IF(IDATA.NE.1) GO TO 11
0224 IF(NIZ.NE.0) GO TO 11
0226 NIZ = NIZ+1
0227 TYPE 400,IAAA,AAA
0228 TYPE 401,IB,CC
0229 TYPE 402,IFN,FN
0230 TYPE 403,ID,EE
0231 TYPE 404,IH,II
0232 TYPE 405,FF1,FF2,FF3,FF4,FF5,FF6,FF7
0233 TYPE 406,GG1,GG2,GG3,GG4
0234 TYPE 407,FX,IN
0235 TYPE 408,FJ,FK
0236 TYPE 409,FL,IM
0237 TYPE 410,IO,FP
0238 TYPE 411,IQ,FR
0239 TYPE 412,IS,IT
0240 TYPE 413,IU,FV
0241 TYPE 414,IW,PPP
0242 TYPE 415,FAA,FBB,FCC,FDD
0243 TYPE 416,EEE
0244 TYPE 417,IFF
0245 TYPE 418,IGG
0246 TYPE 125

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0247      TYPE 26, (I1(I), I2(I), I3(I), F4(I), F5(I), I6(I), I7(I), I8(I),  

        I9(I), F10(I), F11(I), I=1, NI)  

0248      IF(NI.EQ.IGG) GO TO 12  

0250      TYPE 140, (I1(I), I2(I), I3(I), F10(I), F11(I), I=(NI+1), IGG)  

0251      TYPE 129, IHH  

0252      12   IF(IHH) I1, I1, I0  

0253      10   TYPE 127  

0254      TYPE 128, (I20(J), I21(J), I22(J), F23(J), F24(J), F25(J),  

        IF26(J), J=1, IHH)  

0255      11   CONTINUE  

0256      TYPE 204, IFF(MG)  

0257      TYPE 205, (JON, SR(JON), JON, SM(JON), JON=1, 7)  

0258      IF(IFLAG.EQ.1) GO TO 71  

0260      90   CONTINUE  

0261      IF (NN.LT.NON) GO TO 87  

0263      TYPE 216  

C  

0264      100  FORMAT(/'SDIVE FILE : '  

0265      101  FORMAT(Q, 80A1)  

0266      115  FORMAT(3I4, 2F9.2, 4I5, 2F6.2)  

0267      116  FORMAT(3I4, 4F10.2)  

0268      125  FORMAT(' EVAL', ' D(R), D(M), TIME, DEPTH, TAPE, REST,',  

        1'TAPE: MOVE, WD(R), WD(M)', /' NO', 44X, 'A B C', /)  

0269      126  FORMAT(IX, I3, 3X, I3, 3X, I3, F11.2, F8.1, 2I7, 2I5, 2F6.2, /)  

0270      127  FORMAT(/' D.S. NO, TYPE, SEVERITY, T(START), P(START),',  

        1' T(END), P(END)', /)  

0271      128  FORMAT(15, 17, 19, 2F12.2, 2F11.2, /)  

0272      129  FORMAT(' NO OF INCIDENCES OF D.S.: ', 16, /)  

0273      200  FORMAT('/$TYPE 1 FOR DATA LISTING : '  

0274      201  FORMAT(12)  

0275      202  FORMAT(/$TYPE CODE, TIME RANGE : '  

0276      204  FORMAT(/'/, 17X, ' MONITOR NO.', 15, /)  

0277      205  FORMAT(/' S(R, 'I1, ') =', F7.2, 21X, 'S(M, 'I1, ') =', F7.2)  

0278      203  FORMAT(16, F12.2)  

0279      131  FORMAT(///20X, 'INVALID DATA', ///)  

0280      140  FORMAT(IX, I3, 3X, I3, 3X, I3, 43X, 2F6.2, /)  

0281      210  FORMAT (/ '$NUMBER OF FILE FILES ? '  

0282      211  FORMAT (14)  

0283      212  FORMAT (//////////'$NEXT FILE ? '  

0284      213  FORMAT (///'$FILE FILE : '  

0285      214  FORMAT(/'*****')  

0286      215  FORMAT(/' DIVE FILE : ', 6A1)  

0287      216  FORMAT (7/////////  

0288      217  FORMAT (/'|'|||||')  

0289      300  FORMAT(15, 7, 5A1)  

0290      301  FORMAT(16, /, 45A1)  

0291      302  FORMAT(7(5A1, IX))  

0292      303  FORMAT(4(5A1, IX))  

0293      304  FORMAT(F7.2, 3I3)  

0294      305  FORMAT(2F6.2)  

0295      306  FORMAT(F6.2, 14)  

0296      307  FORMAT(14, F6.1)  

0297      308  FORMAT(2I6)  

0298      309  FORMAT(14, F10.2)  

0299      310  FORMAT(4F10.2)  

0300      311  FORMAT(7I1A1)  

0301      312  FORMAT(4I6)

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0302 313 FORMAT(I6)
0303 400 FORMAT(/' FILE:..... ',I6,', ',5A1/)
0304 401 FORMAT(' DIVE SERIES: ',IX,I6,', ',45A1,/)
0305 402 FORMAT(' PROFILE:.... ',I6,', ',45A1,/)
0306 403 FORMAT(' DIVE:..... ',I6,', ',45A1,/)
0307 404 FORMAT(' DIVER:..... ',I6,', ',45A1,/)
0308 405 FORMAT(' ASSOCIATED DUDB FILES: ',7(IX,5A1))
0309 406 FORMAT(' AUXILLIARY FILES: ',5X,4(IX,5A1)/)
0310 407 FORMAT(' TIME OF DAY:.....',F7.2,5X,
1'DATE OF DIVE:.... ',3(IX,12))
0311 408 FORMAT(' WEIGHT:..... ',F6.2,5X,
1'HEIGHT:..... ',F6.2)
0312 409 FORMAT(' FAT COMPOSITION:.. ',F6.2,5X,
1'TYPE OF DIVE:.... ',6X,14)
0313 410 FORMAT(' ENVIRONMENT:..... ',14,5X,
1'TEMPERATURE:.....',4X,F6.1)
0314 411 FORMAT(' TYPE OF WORK:.... ',14,5X,
1'QUANTITY OF WORK:',4X,F6.1)
0315 412 FORMA (' TAPE RECORDER NO: ',16,5X,
1'TAPE NO:.....',4X,16)
0316 413 FORMAT(' DEPTH CODE:..... ',14,5X,
1'BOTTOM DEPTH:....',4X,F6.1)
0317 414 FORMAT(' TIME CODE:..... ',14,5X,
1'TIME OF PROF ALT:',F10.2,/)
0318 415 FORMAT(' T(BEG):.....',F10.2,/' T(ARRIVAL):....',F10.2,
1/' T(BEG DECOMP):',F10.2/' T(END DECOMP):',F10.2,/)
0319 416 FORMAT(IX,71A1,/)
0320 417 FORMAT(' MONITOR NOS:',4(IX,16),/)
0321 418 FORMAT(' TOTAL NO OF EVAL:',16,/)
0322      END

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