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COMPUTERIZED DATA CATALOG AND RETRIEVAL SYSTEM FOR DEPLOYABLE AERODYNAMIC DECELERATORS

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TECHNOLOGY INCORPORATED

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AIR FORCE FLIGHT DYNAMICS LABORATORY
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FOREWORD

This final report, "Computerized Data Catalog and Data Retrieval System for Deployable Aerodynamic Decelerators," was prepared by Technology Incorporated, Dayton, Ohio. The study was authorized under Air Force Contract F33615-67-C-1232 and extended from 15 December 1966 to 15 June 1967. The program was initiated by the Air Force Systems Command, Directorate of Laboratories, Air Force Flight Dynamics Laboratory, Wright-Patterson Air Force Base, Ohio. Mr. Lawrence L. Watson of the Recovery and Crew Stations Branch, Air Force Flight Dynamics Laboratory, was the Air Force project monitor.

The key personnel of Technology Incorporated engaged in the program were Mr. Thomas J. Hogan, Jr., senior system analyst, who was the project engineer; and Dr. John J. Schauer, associate principal research engineer.

The authors gratefully acknowledge the assistance given by personnel of the Air Force Flight Dynamics Laboratory and of Technology Incorporated, particularly Messrs. George T. Bogrees and Brian E. Arment.

This report was released by the authors in June 1967.

This technical report has been reviewed and is approved.

GEORGE A. SOLT
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ABSTRACT

In the development of a computerized data catalog and data retrieval system for deployable aerodynamic decelerators, the results were twofold: (1) a list of parameters which completely define the information pertinent to these decelerators; and (2) a data base (the structure to arrange the data elements making up a unit of information) and the computer programs to manipulate the data base. The combination of these results constitutes a system to store and retrieve by computer techniques all data related to deployable aerodynamic decelerators.

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1. Introduction

Culling pertinent facts from available empirical and computed data on deployable aerodynamic decelerators has become increasingly difficult because of the vast amount of information acquired in recent years. Moreover, the rate of data increase is expected to mount rapidly in the near future because of the rapidly expanding use of these decelerators. As a consequence, the Air Force Flight Dynamics Laboratory sponsored a program to develop a computerized data catalog and data retrieval system for information on deployable aerodynamic decelerators. To this end, Technology Incorporated first defined all related parameters and then designed and implemented a digital computer program capable of storing and retrieving the parameters in the most expeditious manner.

In the development of this effort, Technology Incorporated judged that the problem should be considered from the aspect of data processing rather than that of aerodynamics. This judgment is reflected throughout the body of this report which consists of two parts: (1) the criteria used in selecting the parameters to be stored, and (2) the concept and description of the data storage and retrieval system.

2. Discussion

2.1 Determination of Parameters

Parameters in many categories are applicable to the design and performance of deployable aerodynamic decelerators. These categories include the following: (1) decelerator type, (2) test method, (3) speed regime, (4) deployment timing, (5) atmospheric conditions, (6) fabrication techniques, and (7) material specifications. To define the pertinent parameters in these categories for ready use in the data catalog and retrieval system, each was assigned a number for computer detection and a name or symbol for user recognition. Any system of definitions must be sufficiently flexible to permit adding any other parameter data found pertinent.

In the search of the literature to establish a complete list of parameters pertinent to all deployable aerodynamic decelerators, that is, parachutes, balloons, ballutes, and rotors, seven sources were selected. These sources, listed in References 1 through 7, cover either all or specific decelerators included in the foregoing enumeration. In preparing the list of parameters, based primarily on these sources, the parameters were logically arranged to facilitate their ready association with the assigned numbers. This arrangement is indicated in Table I which summarizes the complete list of parameters presented in the Appendix. This table outlines the organization of parameter categories and gives the number of parameters in each category.

TABLE I

Parameter Arrangement

Attribute Categories	No. of Attributes
1. General Attributes	18
2. Operational and Test Attributes	
2. 1 Forces, accelerations, stresses, and related coefficients	61
2. 2 Velocities, pressures, fuel rates and related coefficients	40
2. 3 Location, position, and oscillations	25
2. 4 Temperatures	6
2. 5 Environmental	14
3. Deployment System Attributes	
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Notice that the parameter is termed an "attribute," which is defined in the next section. The 18 attributes in the category of General Attributes are the first 18 listed in the Appendix. These attributes are recommended for incorporation in any data stored in the system. Through the storage of these attributes, a data retrieval can be selective in eliminating unwanted data and yet cannot overlook any data because of an absent attribute. The storage of the other attributes, however, may be at the discretion of the system user.

2.2 Information Storage and Retrieval System

The first and most important essential in the development of an information storage and retrieval system is the selection and definition of the data base, that is, the structure which arranges the data elements to be stored and retrieved as units of information. In this study, the data elements are called "attributes." An attribute may be an item of empirical, historical, or computed data. When the data base structures specific attributes, the resultant entity is known as a "Test."

For an understanding of the ultimately selected data base, the attributes may be initially limited to the following six which were arbitrarily chosen:

Attribute Number	Attribute Name
1	Test number
2	Decelerator Type
3	Test method
4	Decelerator weight
5	Decelerator volume
6	Filling time

An arbitrary or actual value is assigned to each of these attributes as follows:

Attribute 1 (Test number)—any integer between 1 and 999.

Attribute 2 (Decelerator type)—the integer 1, 2, 3, or 4 corresponding to parachutes, ballutes, balloons, and rotors, respectively.

Attribute 3 (Test method)—the integer 1, 2, 3, 4, 5, or 6 corresponding to wind tunnel, rocket sled, free flight, drop, whirl tower, and shallow water table tests, respectively.

Attribute 4 (Decelerator weight)—the decelerator weight

Attribute 5 (Decelerator volume)—the decelerator volume

Attribute 6 (Filling time)—the decelerator filling time

Given these attributes, the most simply structured data base which lends itself to computer processing would be a structure consisting of fixed-length position-oriented attributes, such as illustrated in Figure 1. Such a data base has a fixed length because it can contain the values of only six attributes, and the data base is position oriented because its position 1 always contains the value of attribute 1; position 2, the value of attribute 2; and so on. For example, if test No. 363 involves a free-flight test of a parachute that has a 10-pound weight, a 1-cubic-foot volume, and a 0.5-second filling time, it would be coded as shown in Figure 2. In this figure, the two entries after the test number denote in turn the type of decelerator (1 represents parachute) and the test method (3 denotes free flight); and the last three entries are the parameter values cited above.

1	2	3	4	5	6

Figure 1. Fixed-Length Position-Oriented-Attribute Data Base

363	1	3	10.	1.	.5

Figure 2. Parachute Test Coded by Fixed-Length Position-Oriented-Attribute Data Base

If the selected data base were to be structured as above, two problems would arise, for example, with a rotor type of deployabie decelerator: (1) no provision would exist for storing the rotor advance ratio, and (2) attribute No. 6 (filling time) would be meaningless. The obvious solution of putting the rotor advance ratio in the attribute No. 6 position and programming the computer to recognize this rearrangement would be undesirable. For such a solution would be only temporary since the likely development of some new type of deployable decelerator or the likely desirability of researching other pertinent parameters in the near future would require further program modification.

The ideal solution to this problem would have the computer program function independently of the type of data stored. With such a solution in mind, Technology Incorporated chose as the data base a structure consisting of variable-length paired attributes, as illustrated in Figure 3. Such a data base has a variable length because only those attributes with meaning for a particular Test are included, and the data base contains "paired attributes" because the attribute number and the value of each attribute are grouped together. Although the structure of this data base is slightly more difficult to machine than that of the previous data base, its flexibility greatly outweighs this disadvantage.

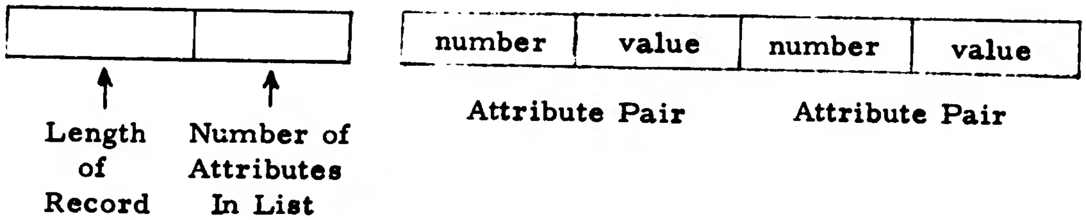

Figure 3. Variable-Length Paired-Attribute Data Base

Figure 4 shows how the information given in Figure 1 appears in the structure of the variable-length paired-attribute data base. If the Test involved a rotor type of deployable decelerator where the decelerator volume, for example, is not of interest and the filling time is, of course, extraneous, the requirement would be the deletion of the attribute pairs for position Nos. 5 (decelerator volume) and 6 (decelerator filling time) and the addition of an attribute pair for a new position No. 7 (rotor advance ratio). For example, given test No. 406 of a 0.75-kilogram rotor type of decelerator whose advance ratio is 0.1, the attributes would be coded as shown in Figure 5. In this figure, the attribute pairs are as follows: in position No. 1, the 406 denotes the test number; in position No. 2, the 4 signifies rotor as the decelerator type; in position No. 3, the 1 represents a wind tunnel test; in position No. 4, the .75 indicates a decelerator weight of 0.75 kilograms; and in position No. 7, the 1 denotes the rotor advance ratio of 0.1.

14	6

1	363	2	1	3	3	4	10.	5	1.	6	.5

Figure 4. Parachute Test Coded by Variable-Length Paired-Attribute Data Base

12	5

1	406	2	4	3	1	4	.75	7	.1

Figure 5. Rotor Test Coded by Variable-Length Paired-Attribute Data Base

With the variable-length paired-parameter structure chosen as the data base, the following sections describe the data base in detail and define the software to manipulate it.

2.2.1 General Descriptions

2.2.1.1 Test: General Description

Word No.	Bits	Description
1	0 - 35	Excluding word No. 1, total length of test (integer)
2	0 - 17	Test number (integer)
	18 - 35	Number of attributes
3 thru n		Attribute pairs

2.2.1.2 Attribute: General Description

An attribute consists of one or more words; the first word is always a control word.

Word No.	Bits	Description
1	0	=1 (indicates that attribute exists but is not contained in this file)
	1 - 17	Attribute number ≤ $2^{17} - 1$
	18 - 20	Attribute type 1) Floating point (001) 2) Logical (010) 3) Fixed point (011) 4) Hollerith (100) 5) Tabular (101)
	21 - 35	Excluding control word length, attribute length in words, L
2 thru 2+L-1		Attribute value

2.2.1.2.1 Floating Point Attribute

Example: The attribute numbered 407 has a value of 3.14159.

Word No.	Bits	Description
1	0	=0 (indicates that attribute exists and is contained in this file)
	1 - 17	=407 (attribute number)
	18 - 20	=1 (indicates floating point attribute)
	21 - 35	=1 (length of attribute in words)
2	0 - 35	3.14159

2.2.1.2.2 Logical Attribute

Example: The attribute numbered 14267 has a value of "TRUE"

Word No.	Bits	Description
1	0	=0
	1 - 17	=14267 (attribute number)
	18 - 20	=2 (indicates logical attribute)
	21 - 35	=1 (length of attribute in words)
2	0 - 35	"TRUE☐☐"

2.2.1.2.3 Fixed Point Attribute

Example: The attribute numbered 314 has a value of 3

Word No.	Bits	Description
1	0	=0
	1 - 17	=314 (attribute number)
	18 - 20	=3 (indicates fixed point attribute)
	21 - 35	=1 (length of attribute in words)
2	0 - 35	3

2.2.1.2.4 Hollerith Attribute

Example: The attribute numbered 706 has the value:

"AROUND, ☐AROUND☐THE☐SUN☐WE☐GO"

Word No.	Bits	Description
1	0	=0
	1 - 17	=706 (attribute number)
	18 - 20	=4 (indicates Hollerith attribute)
	21 - 35	=5 (length of attribute in words)
2	0 - 35	AROUND
3	0 - 35	,☐AROU
4	0 - 35	ND☐THE
5	0 - 35	☐SUN☐W
6	0 - 35	E☐GO.☐

2.2.1.2.5 Tabular Attribute (Complete File)

Example 1: The attribute numbered 1426 is a table of five points:

X	Y
17.	1.41416
26.2	3.129
27.94	178.62
31.1	114.91
32.0	112.0

Word No.	Bits	Description
1	0	=0 (indicates that attribute exists and is contained in this file)
	1 - 17	=1426 (attribute number)
	18 - 20	=5 (indicates tabular attribute)
	21 - 35	=10 (length of attribute)
2	0 - 35	17.
3	0 - 35	1.41416
4	0 - 35	26.2
5	0 - 35	3.129
6	0 - 35	27.94
7	0 - 35	178.62
8	0 - 35	31.1
9	0 - 35	113.91
10	0 - 35	32.0
11	0 - 35	112.0

Example 2: This example is the same as the preceding Example 1 except that the table is not contained in this file.

Word No.	Bits	Description
1	0	=1 (indicates that attribute exists but is not in this file)
	1 - 17	=1426 (attribute number)
	18 - 20	=5 (indicates tabular attribute)
	21 - 35	=10 (length of attribute)

2.2.2 Output From a Single Retrieval Request

(a) A Listing of the retrieval requests.

(b) Full printout of all tests satisfying the constraints of the retrieval requests. Alternately, only selected attributes are printed.

2.2.3 Format for Retrieval Request

BEGIN REQUEST
$A_1\ (L_1, U_1),\ A_2(L_2, U_2), A_3(L_3, U_3)$/PRINT (A_1', A_2', A_3')
END REQUEST

where

A_i is an attribute number
L_i is a lower limit
U_i is an upper limit

The constraint $A_i(L_i, U_i)$ is satisfied for a particular test when attribute i of that test has a value "a" such that $L_i \leq a \leq U_i$. If attribute i does not exist for a particular test, the constraint $A_i(L_i, U_i)$ is not satisfied. If all constraints are satisfied by a particular test, that test is retrieved. If it is desirable to constrain an attribute to a single value "b," the constraint may be written $A_i(b, b)$ or alternately $A_i(b)$. Logical attributes are constrained by writing

$$A_i(\text{TRUE}) \text{ or } A_i(\text{FALSE})$$

Tabular attributes cannot be constrained.

The printout is determined by the /PRINT field of the retrieval request. If the /PRINT field and its associated list exists, only the attributes A_i' are printed. If this field does not exist, the entire test is printed.

2.2.4 Necessary Software

2.2.4.1 Insertion System

The function of the insertion system is to maintain the master files. These files are denoted as:

FAD (Fast and Dirty). This file consists of all information with the exception of tabular data.

CMF (Complete Master File). This file consists of all test information, including tabular data.

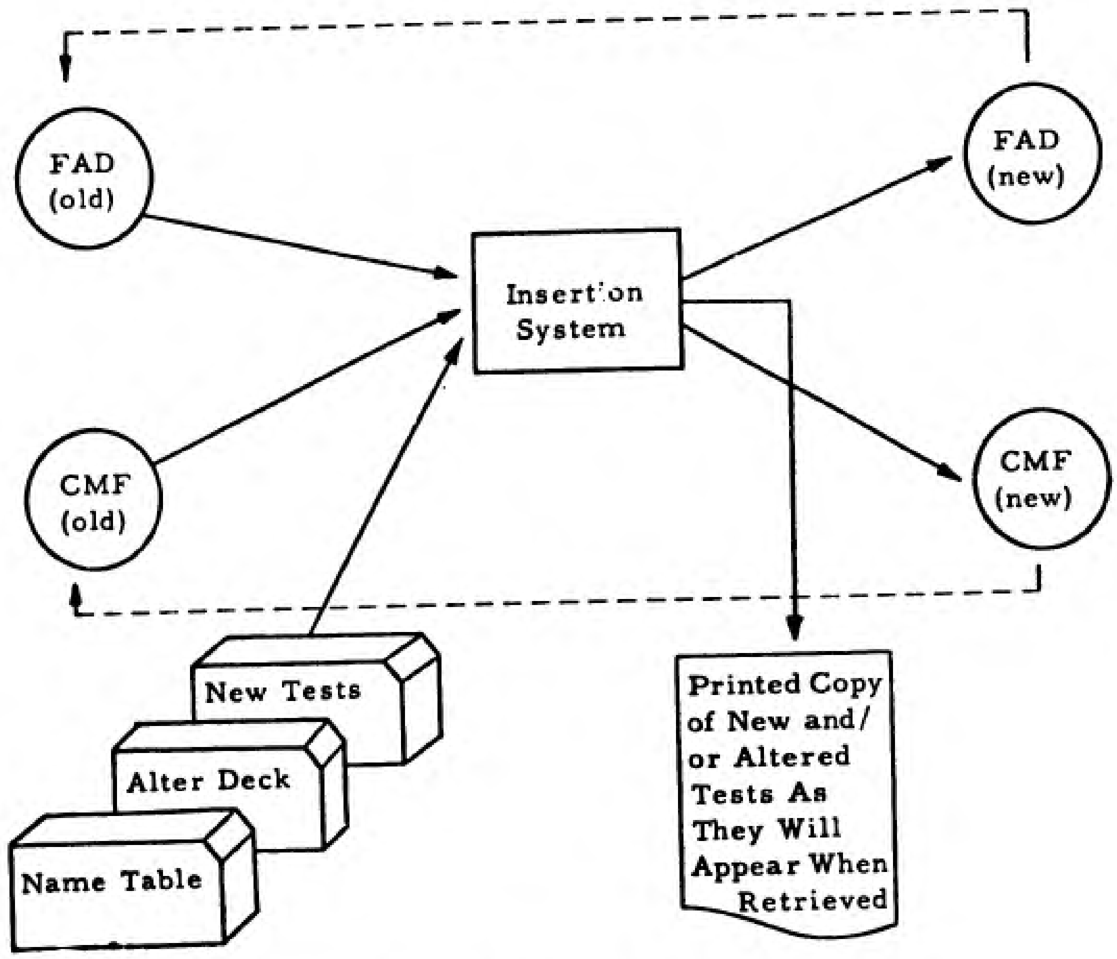

Figure 6. Block Diagram of Insertion System

2.2.4.1.1 Necessary Requirements

The insertion system is able to perform the following:

(a) Insert new tests into the FAD and CMF files.

(b) Purge entire tests from the FAD and CMF files.

(c) Alter individual test by inserting attributes, deleting attributes, and replacing attributes.

2.2.4.2 Retrieval System

The function of the retrieval system is to retrieve all tests whose attributes satisfy the constraints of a retrieval request.

2.2.4.2.1 Necessary Requirements

The retrieval system is able to perform the following:

(a) Search either the FAD or CMF file; for the FAD file, indicate what, if any, additional information is to be found in the CMF file.

(b) Print all retrieved information.

(c) Process five retrieval requests during one master file search.

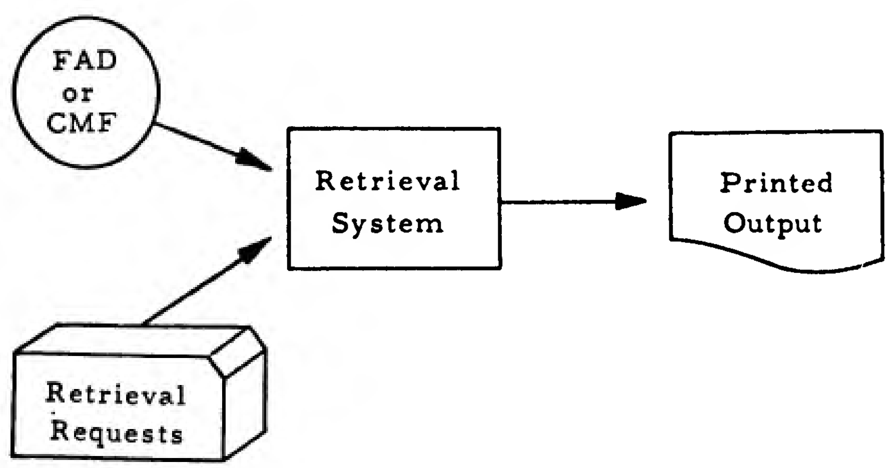

Figure 7. Block Diagram of Retrieval System

3. System Checkout

To test the capability, flexibility, and validity of the computerized data storage and retrieval system, considerable data from Reference 7 covering 63 parachute drop tests were inserted and retrieved. Data punched in more than 2000 IBM cards included details of 11 drops each with approximately the same deployment velocity, a summary of the 11 drops, a summary of the three launch altitudes involved, and a summary of the 63 drops taken together.

The simplicity of the computer input formats perm inexperienced personnel to prepare the cards, and the system flexib d introducing several additional attributes to generate a summary t ich had not been anticipated before the checkout. The completely results confirmed the system efficacy.

4. Summary

From mainly seven sources found in a search of the available literature, parameters pertinent to the following deployable aerodynamic decelerators were selected: parachutes, balloons, ballutes, and rotors. Then, preparatory to listing these parameters, they were arranged logically in parameter categories and each was assigned a number for computer detection and a name or symbol for user recognition. Provision was made for the insertion in logical order of additional parameters later found pertinent.

Then for the storage and retrieval of these parameters, called "attributes" in this study, a data base to structure the attributes was defined. When this data base structures specific attributes, the resultant entity is known as a "Test." To have the computer program function independently of the type of data stored, the selected data base was a structure consisting of variable-length paired attributes. This data base has a variable length because only those attributes with meaning for a particular Test are included, and the data base contains paired attributes because the attribute number and the value of each attribute are grouped together. The flexibility of this data base makes it especially preferable to any other type.

In a checkout of the resultant computerized data storage and retrieval system, more than 2000 IBM cards with data from 63 parachute drop tests were processed through the system. The test completely confirmed the capability, flexibility, and validity of the system. While the Appendix contains the list of parameters, the computer programs and their documentation exist under separate cover.

APPENDIX

LIST OF DEPLOYABLE DECELERATOR PARAMETERS

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ATTRIBUTE NUMBER	18 CHARACTER REPRESENTATION	DEFINITION
6	TEST REPORT TIT H	Title of the Report
7	TEST ABSTRACT H	Short write-up on test objectives and results.
8	TEST LOCATION H	Test site location.
9	TEST REPORT YEAR	Year test took place (ex. 1964).
10	TEST REPORT MO	Month that test took place; 1 for Jan., 2 for Feb., etc.
11	TYPE DECELERATOR C	Coded Parameter numbering from 1 to 4 corresponding to different types of decelerators. 1 denotes parachute; 2 denotes balloon; 3 denotes ballute; 4 denotes rotor; and 5 denotes rocket.
12	TYPE TEST PROCED C	Coded parameter numbering from 1 to 9 corresponding to different types of tests. 1 denotes wind tunnel tests, infinite mass; 2 denotes wind tunnel tests, finite mass; 3 denotes rocket sled tests; 4 denotes free-flight, missile propelled tests; 5 denotes drop tests, from aircraft; 6 denotes whirl tower tests; 7 denotes shallow water table tests; 8 denotes deep water tests; and 9 denotes tower or hanger drop tests.
13	DATA COLLECT MET H	Description of the type instrumentation and the methods used in collecting data
14	DAMAGE OCCURRED TF	True or false statement as to whether there was any damage or not

ATTRIBUTE NUMBER	18 CHARACTER REPRESENTATION	DEFINITION
15	DAMAGE EXTENT H	Description of the damage which occurred, if any.
16	TYPE DEPLOYMENT C	Coded parameter corresponding to **different type of deployment.** 0 denotes not applicable; 1 denotes static line 2 denotes pilot chutes 3 denotes gun 4 denotes explosive bolts 5 6 7
17	DEPLOY DESCRIP H	Description of the type of deployment.
18	FULL SCALE TF	Whether the model was full scale or not-true or false.
19	VELOCITY RANGE C	This is a coded parameter numbering from 1 to 4 and corresponding to different velocity ranges. 1 denotes subsonic; and 2 denotes supersonic
20	CHUTE TYPE C	This is a coded parameter corresponding to different types of parachutes. 0 Not applicable 1 denotes solid; 2 denotes ribbon; 3 denotes ring-slot; 4 denotes steerable; 5 denotes high lift to drag; **6 denotes 14% extended skirt** 7 8
21	NO CHUTES IN CLU C	Coded parameter with numbers corresponding to different numbers of chutes. Zero denotes that this is not applicable. Any other number denotes the number of chutes in the cluster.

ATTRIBUTE NUMBER	18 CHARACTER REPRESENTATION	DEFINITION
22	SUMMARY DATA TF	True implies that this test contains data from more than one drop.
25	SUMMARY TABLE T	Table containing parameters pertaining to more than one drop.
32	WW LOAD WEIGHT	Weight of the load; lbm.
35	G ACCEL GRAV FT/S^2	Acceleration of gravity; ft/sec.^{2}
36	A(T) AXIAL ACCEL T	Axial acceleration of the decelerator versus time; g's vs. sec.
37	AX(T) X ACCEL T	Acceleration of the decelerator in the X direction versus time; g's vs. sec.
38	AY(T) Y ACCEL T	Acceleration of the decelerator in the Y direction versus time; g's vs. sec.
39	AZ(T) Z ACCEL T	Acceleration of the decelerator in the Z direction versus time; g's vs. sec.
44	D(T) DRAG LB T	Drag force versus time; lbf. vs sec.
45	L(T) LIFT LB T	Lift force versus time; lbf. vs. sec.
46	L/D (T) LIFT/DRAG T	Ratio of lift to drag versus time; dimensionless vs. sec.
47	F(T) AXIAL FORCE T	Axial force of decelerator versus time; lbf. vs. sec.
48	F(TT) AXIAL FRCE T	Axial force of decelerator versus a normalized time; lbf. vs. dimensionless
49	FM PEAK AX FORCE	Maximum axial force on decelerator; lbf.
50	FS Snatch Force LB	Force on parachute occurring at snatch; lbf.

ATTRIBUTE NUMBER	18 CHARACTER REPRESENTATION	DEFINITION
51	FRO REEF OPEN F I B	Maximum opening force while parachute is reefed; lbf.
52	FO PEAK OPEN FORCE	Maximum force during parachute opening; lbf.
53	OPEN-SK FACT(TT) T	Opening shock factor vs. dimensionless time; dimensionless
54	FO VS FILL T T	Peak opening force vs. inflation time; lbf. vs. sec.
55	FO VS QS T	Peak opening force vs. dynamic pressure at snatch; lbf vs. lbf./ft^2
56	FO VS VS T	Peak opening force vs. velocity at snatch; lbf. vs. ft/sec.
58 : 75	FR 1 RISER 1 PEAK : FR 18 RISER 18 PEAK	Maximum force on corresponding riser—for example, FR1 is the maximum force on riser 1; lbf.
80	FCB(T) ROT CENT T	Centrifugal force on rotor blade versus time; lbf. vs. sec.
81	RCA(T) FCB/F ROT T	Ratio of the centrifugal force on the rotor blade to the axial force of the rotor vs. time; dimensionless vs. sec.
86	WW/DRAG STDY ST	Ratio of the total weight of the decelerator to the total drag of the decelerator at steady state; dimensionless.
87	MR MASS RATIO SS	Mass of decelerator material over the mass of the entrained air; dimensionless
92	FBB BAL BUOY FORCE	Buoyant force of balloon; lbf.
93	FSR SLED FRIC FORC	Friction force occurring between the rocket sled test vehicle and the rails along which it travels; lbf.
94	TR(T) ROK SLED F T	Thrust of rocket sled versus time; lbf. vs. sec.

ATTRIBUTE NUMBER	17 CHARACTER REPRESENTATION	DEFINITION
101	CDO COF DRAG NOM D	Coefficient of drag with respect to the nominal diameter; dimensionless
102	COP COF DRAG PRO D	Coefficient of drag with respect to the projected diameter; dimensionless
103	CDS DRAG AREA SS	Steady state drag area of decelerator; $ft.^2$
104	CDS(T) DRAG AREA T	Drag area of decelerator versus time; $ft.^2$ vs. sec.
105	CDS(TT) DRAG AREA T	Drag area of decelerator versus a normalized time; $ft.^2$ vs. dimensionless
106	CDSC DRAG AREA CAN	Steady State drag area of canopy; $ft.^2$
107	CDSF FORBDY D AREA	Drag area of forebody; $ft.^2$
108	CL COF LIFT	Coefficient of lift; dimensionless
109	CLR ROLL MOM COF	Coefficient of rolling moment; dimensionless
110	CM PITCH MOM COF	Coefficient of pitching moment; dimensionless
111	CN YAW MOM COF	Coefficient of Yawing moment; dimensionless
112	CY SIDE FORCE COF	Coefficient of the side force; dimensionless
113	CDS(TT)/CDS MAX T	Canopy drag area ratio versus time ratio; dimensionless
130	SBGB LONG ROT BD S	Peak bending stress of rotor blade in longitudinal direction; lbf.
131	SBGT LAT ROT BD S	Peak bending stress of rotor blade in latitudinal direction; lbf.
132	ST(X/Y) TAN CAN T	Stress on the canopy in the tangential direction versus the ratio of coordinates of the point under consideration; lbf./in. vs. dimensionless

ATTRIBUTE NUMBER	18 CHARACTER REPRESENTATION	DEFINITION
133	SR(X/Y) RAD CAN T	Stress on the canopy in the radial direction versus the coordinates of the point under consideration; lbf./in. vs. dimensionless
145	SP(T) PROJ AREA T	Projected area of the decelerator versus time; ft.^{2} vs. sec.
146	SP(TT)/SO AREA RT	Ratio of the projected area of the decelerator over the nominal area of the decelerator versus a normalized time; dimensionless versus dimensionless
147	DP(T) PROJ DIA T	Prjected diameter of the decelerator versus time; ft. vs. sec.
148	FILL TIME EQUAT H	Equation describing the ratio of the projected area of the decelerator over the nominal area of the decelerator versus a normalized time
149	OPEN F VS SN VEL T	Maximum opening force of the parachute versus snatch velocity; lbf. vs. ft./sec.
150	SM(T) MOUTH AREA T	Mouth area of the parachute canopy versus time; ft.^{2} vs. sec.
151	SD(T) ROT DISC A T	Rotor disk area versus time; ft.^{2} vs. sec.
152	WIND TUN AREA RAT	Ratio of wind tunnel model projected area to the test section area; dimensionless
163	PERCENT CANOPY DAM	Percentage of total canopy area which was damaged; dimensionless
164	PERCENT LINE DAMAG	Percentage of total number of suspension lines which were damaged; dimensionless
200	C EFF POROSITY	Ratio of the average velocity through the porous surface to the free stream velocity; dimensionless
201	FR (T) FROUDE NO	Froude number versus time; dimensionless vs. sec.

ATTRIBUTE NUMBER	18 CHARACTER REPRESENTATION	DEFINITION
202	M(T) MACH NO	Mach number versus time; dimensionless vs. sec.
203	RE(T) REYNOLDS N T	Reynolds number versus time; dimensionless vs. sec.
208	Q(T) DYN PRESS T	Dynamic pressure versus time; lbf./ $ft.^2$ vs. sec.
209	CPD(Y/X) C DIF P T	Coefficient of differential pressure of the canopy versus the ratio of the Y to X coordinates of the point under consideration; dimensionless vs. dimensionless
210	CPE(Y/X) C EXT P T	Coefficient of external pressure of the canopy versus the ratio of the Y to X coordinates of the point under consideration; dimensionless vs. dimensionless
211	CPI(Y/X) C INT P T	Coefficient of internal pressure of the canopy versus the ratio of the Y to X coordinates of the point under consideration; dimensionless vs. dimensionless
212	PF(T) FUEL PRESS T	Fuel pressure versus time; lbf./ft^2 vs. sec.
217	U(T) X VEL FT/S T	Velocity of the decelerator in the X direction versus time; ft./sec. vs. sec.
218	V(T) Y VEL FT/S T	Velocity of the decelerator in the Y direction versus time; ft./sec. vs. sec.
219	W(T) Z VEL FT/S T	Velocity of the decelerator in the Z direction versus time; ft./sec. vs. sec.
220	VV(T) FREE S VEL T	Free stream velocity versus time; ft./sec. vs. sec.
221	VVT(TT) FRE S VEL T	Free stream velocity versus a normalized time; ft./sec.vs. dimensionless

ATTRIBUTE NUMBER	18 CHARACTER REPRESENTATION	DEFINITION
222	VL LAUNCH VEL FT/S	Launch velocity of decelerator; ft./sec.
223	VS SNATCH VEL FT/S	Velocity of forebody of parachute system when snatch occurs; ft./sec.
224	VV(T)/VS PERC VEL	Ratio the free stream velocity to the velocity at snatch versus time; dimensionless vs. sec.
225	VT(T) ROT TIP V T	Tip speed of rotor blades; ft./sec.
226	VA(T) AXIAL VEL T	Axial velocity of decelerator versus time; ft./ sec. vs sec.
227	VST VE STAT LN EXT	Velocity of parachute and forebody at static line extension; ft./sec.
228	VSU VEL SUS LN EXT	Velocity of forebody of parachute system at suspension line extension; ft./sec.
232	VA/VT(T) DES ADV T	Descent advance ratio of rotor which is the axial flight velocity divided by the rotor tip speed, versus time; dimensionless vs. sec.
233	R T(T) GL ADV R T	Rotor glide advance ratio, which is the horizontal component of the free stream velocity divided by the rotor tip speed versus time; dimensionless vs. sec.
235	OMEG (T) ROT ANG T	Angular velocity of rotors; rad./sec.
236	OMEGW WHIRL ANG V	Angular velocity of the whirling arm of a whirl tower; rad./sec.
239	RF EQILB FUEL RATE	Fuel rate required to maintain buoyancy of balloon or ballute; gal./min.
240	RFC(T) FUEL RATE T	Fuel consumption rate; gal./min.

ATTRIBUTE NUMBER	18 CHARACTER REPRESENTATION	DEFINITIONS
241	RHO BAL(T) INT D T	Density of air inside balloon; lbm./$ft.^3$
242	VOL(T) AIR INCLD T	Volume of air enclosed; $ft.^3$ vs. sec.
243	VOL(TT)/VOL MAX T	Ratio of the included air volume versus time ratio; dimensionless
250	X(T) H POS COORD T	Coordinate of the decelerator in the horizontal plane in the direction of launch; ft. vs. sec.
251	Y(T) H POS COORD T	Coordinate of the decelerator in the horizontal plane perpendicular to the direction of launch; ft. vs. sec.
252	Z(T) V POS COORD T	Vertical coordinate of the decelerator; ft. vs. sec.
253	XO INITIAL X	Initial value of the X coordinate; ft.
254	YO INITIAL Y	Initial value of the Y coordinate; ft.
255	ZO INITIAL Z	Initial value of the Z coordinate; ft.
261	HDG DIR GYRO HEAD	Directional gyro heading; deg.
26[illegible]	ALPH(T) ANG ATK T	Angle of attack of decelerator versus time; deg. vs. sec.
263	ALPAF(T) FORB AA T	Angle of attack of decelerator forebody versus time; deg. vs. sec.
264	GAM(T) FLT PATH T	Flight path angle with respect to the horizontal versus time; deg. vs. sec
265	GAML LAUNCH ANGLE	Launch attitude with respect to the horizontal; deg.
266	GAME REENTRY ANGLE	Angle of entry into the atmosphere; deg.

ATTRIBUTE NUMBER	18 CHARACTER REPRESENTATION	DEFINITION
267	OSCIL ANGLE MAXIM	Maximum oscillation of a parachute suspended load which describes a pendulum-like motion; deg.
268	THETA(T) PITCH T	Angle of pitch of the decelerator versus time; deg. vs. sec.
269	PHI(T) ROLL ANG T	Angle of roll of the decelerator versus time; deg. vs. sec.
270	PSI(T) YAW ANG	Angle of yaw of the decelerator versus time; deg. vs. sec.
274	QQ(T) PITCH RATE T	Rate of pitch of the decelerator versus time; deg./sec. vs. sec.
275	PP(T) ROLL RATE T	Rate of roll of the deceleration versus time; deg./sec. vs. sec.
276	RR(T) YAW RATE T	Rate of yaw of the decelerator versus time; deg./sec. vs. sec.
280	ROT FLT MOD TYPE H	Type of rotor axial flight mode-either "spiral" mode or "wobble" mode;
281	ROT COLL FLARE TF	Whether a type of maneuver designated a collective flare is used, true or false.
282	ROT CYCL FLARE TF	Whether a type of maneuver designated a cyclic flare is used, true or false.
283	ROT ENTRY MODUL H	Type of reentry phase used for entering the earth's atmosphere -- either modulated or non-modulated.
286	ROT CONE ANG(T) T	Coding angle of rotor blades; deg. vs. sec.
287	ROT TILT ANG(T) T	Angle of rotor hub tilt with respect to the horizontal; deg. vs. sec.
300	TSE(T) EXT SUR T	Temperature of external surface of balloon or ballute; °F vs. sec.

ATTRIBUTE NUMBER	18 CHARACTER REPRESENTATION	DEFINITION
301	TSI(T) INT SUR T T	Temperature of internal surtace of balloon or ballute; °F vs. sec.
302	TIA(T) INT AIR T T	Temperature of internal air of balloon or ballute; °F. vs. sec.
303	TSM MAX SURF TEMP	Maximum surface temperature of balloon or ballute; °F.
311	H H HEAT TRANSF CO	Overall heat transter coefficient for balloons or ballutes; BTU °F ft.^{2} hr.
312	HTL(T) HEAT LOSS T	Heat loss through the surface of a balloon or ballute; Btu./hr.
320	ENVIROMENT DESCR H	Description of environmental conditions during test.
341	N2 ATM PERCENT NIT	Percent of nitrogen in the atmosphere; dimmensionless
342	O2 ATM PERCENT OXY	Percent of oxygen in the atmosphere; dimensionless
343	CO2 ATM PERCENT	Percent of water vapor in the atmosphere; dimensionless
344	H2O ATM PERCENT	Percent of water vapor in the atmosphere; dimensionless
351	MU(Z) VISCOSITY T	Viscosity of the atmosphere versus altitude; lbm/sec.-ft. vs. ft.
352	NU(Z) KIN VISCOS T	Kinematic viscosity of the atmosphere versus altitude; ft.^{2}/sec. vs. ft.
357	RHO(Z) DENSITY T	Density of atmosphere versus altitude; lbm./ft.^{3} vs. ft.
360	KK RATIO SP HEAT	Ratio of specific of atmosphere at constant pressure to specific heat of atmosphere at constant volume; dimensionless

ATTRIBUTE NUMBER	18 CHARACTER REPRESENTATION	DEFINITION
364	PS(Z) ST PRESS T	Static pressure of the atmosphere versus altitude; lbf./in.^{2} vs. ft.
365	TA(Z) AMP TEMP T	Ambient temperature of the atmosphere versus altitude; °F vs. ft.
366	TA AMB TEMP	Ambient temperature of the atmosphere; °F
368	IT(Z) TURB INTEN T	Intensity of turbulence in the atmosphere which is the ratio of the fluctuating component of the free stream velocity to the time average free stream velocity at that altitude, versus altitude; dimensionless vs. ft.
370	WS VEL SURF WIND	Velocity of surface winds; knots
400	TS TIME TO LN STRH	Time from launch of parachute to suspension line stretch; sec.
401	TF FILL TIME SEC	Time from suspension line extension to time when canopy is fully inflated; sec.
402	T TIM AFTER LAUNCH	Time after launch of decelerator; sec.
403	TO OPENING TIME	Time from launch to when the canopy is fully inflated; sec.
404	TP TIME TO F PEAK	Time after launch when peak opening force occurs; sec.
405	TR REEFED TIME	Time from suspension line extension to when reefing of the canopy is terminated; sec.
406	TB ROCKT BURN TIME	Burning time of booster in ground rocket launching tests; sec.
407	TFL T TO ROT FLARE	Time from start of rotor test to when flaring occurs; sec.

ATTRIBUTE NUMBER	18 CHARACTER REPRESENTATION	DEFINITION
408	TI TIME TO IMPACT	Time from launch of decelerator to impact of fore-with ground; sec.
409	TT(T-TS)/(TO-TS)	Normalized time, which is the time after launch minus the time tc suspension line stretch divided by the opening time minus the time to suspension line stretch; dimensionless
411	TE TIM TO LN EXTNA	Time from launch to suspension line extension; sec.
412	TBS T BAG APEX SEP	Time from launch for the deployment bag to separate from the apex; sec.
413	TSE T STAT LN EXT	Time from launch to when the static line is extended fully; sec.
414	TBS TE - TSE	Time for forebody and deceleratior. to separate a distance equal to the length of the suspension lines which is TE-TSE; Sec.
415	TF(VS) FILL TIME T	Fill time versus snatch velocity; sec. vs. ft./sec.
416	TF(VS) EQUATION H	Equation for fill time as a function of snatch velocity.
420	DEPLOY SYS DESC H	Description of the deployment system used in decelerator testings.
421	REEF CUT USED TF	Whether or not a reefing cutter is used - true or false.
422	TYPE REEF CUTTER H	Type of reefing cutter used.
423	DYN PRESS SW U TF	Whether or not a dynamic pressure switch is used - true or false.
424	TYPE DYN PR SW H	Type of dynamic pressure switch
425	G SWITCH USED TF	Whether or not a g - switch is used - true or false.

ATTRIBUTE NUMBER	18 CHARACTER REPRESENTATION	DEFINITION
426	TYPE G SWITCH H	Type of g-switch used.
427	DELAY DEVICE U TF	Whether or not a delay device is used - true or false.
428	TYPE DELAY DEV H	Type of delay device used
429	TIMER USED TF	Whether or not a timer is used - true or false.
430	TYPE TIMER H	Type of timer used.
431	TIMER SWITCH U TF	Whether or not a timer switch is used - true or false.
432	TYPE TIMER SW H	Type of timer switch used.
440	DOP PIL CHU NOM D	Nominal diameter of pilot chute; ft.
441	DPP PIL CHU PRJ D	Project diameter of pilot chute; ft.
446	NO PILOT CHUTES	Number of pilot chutes; dimensionless
447	TYPE PILOT CHUTE C	Coded corresponding to different types of pilot chutes; 1 denotes solid, 2 denotes ribbon 3 denotes ring-slot 4 denotes steerable 5 high lift to drag 6 7 8
448	LENGTH STATIC LINE	Length of static line: ft.
449	DRR REEF SKIRT DIA	Skirt diameter of the reefed decelerator canopy; ft.
450	RRO NOM REEF RATIO	Ratio of the reefed mouth diameter to the nominal canopy diameter; dimensionless

ATTRIBUTE NUMBER	18 CHARACTER REPRESENTATION	DEFINITION
451	RRP PRJ REEF RATIO	Ratio of the reefed mouth diameter to the projected canopy diameter; dimensionless
452	MIDGORE REEFING TF	Whether or not midgore reefing is used - true or false.
453	REEF RING USED TF	Whether or not a reefing ring is used - true or false.
454	LENG REEF CONTR LN	Length of the reefing control line; ft.
455	TYPE REEF CUTTER H	Type of reefing line cutter
460	CDSP DRAG AREA PIL	Drag area of pilot chute; $ft.^2$
461	CD SP/ CDS STED STA	Ratio of the drag area of the pilot chute to the drag of the main canopy at steady state conditions; dimensionless
462	CDREEF/CDS ST	Ratio of the reefed drag area of the main canopy to the drag area of the main canopy at full open, steady-state conditions; dimensionless
463	CDSDB DR A DEP BAG	Drag area of the deployment bag; ft^2
464	QM MIN OPEN DYN PR	Minimum opening dynamic pressure of the main parachute canopy; $lbf./ft.^2$
465	PACK VDL FT 3	Packing volume of the parachute deployment gag; $ft.^3$
466	PACK DENSITY	Pack density which is the ratio of the packed weight of the deployment bag to the packed volume of the bag; $lbm./ft.^3$
467	PACK EFFICIENCY	Ratio of the volume of the parachute canopy to the actual volume of material; dimensionless
468	WTF TOTAL FUEL WT	Total weight of fuel; lbs.

ATTRIBUTE NUMBER	18 CHARACTER REPRESENTATION	DEFINITION
469	TANDEM DROGUE U TF	Whether or not a drogue chute is used in a tandem arrangement with the pilot chute to help deploy the main chute - true or false
470	BLAST BAG USED TF	Whether or not a blast is used - true or false.
471	TYPE BLAST BAG H	Type of blast bag is used.
472	TYPE BLAST PWDR H	Type of blast powder used.
473	PRIMACORD DEPL T F	Whether or not primacord is used in deployment - true or false.
474	TYPE DEPL BAG H	Type of deployment bag.
475	DEPL BAG BRIDLE T F	Whether or not a deployment bridle is used - true or false.
476	LENG DE BAG BRIDLE	Length of the deployment bag bridle.
477	D BAG LOCK LOOP TF	Whether or not a deployment bag lock loop is used - true or false.
478	LENG MORT APEX LIN	Length of apex line which is used to pull pilot chute from its mortar upon release of the drogue chute; ft.
479	WIA WT INT AIR	Weight of intake air of ballute or balloon; lbm.
480	PM PERCENT MOD ROT	Percent of modulation of rotor system; dimensionless
481	VEHICLE DESCRIP H	Description of test vehicle
500	DO NOM DIA FT	Nominal diameter of the decelerator; ft.
501	DF PROJ DIA FOREBD	Projected diameter of the forebody of the decelerator; ft.
502	SO NOM AREA FT2	Reference area of the decelerator related to the nominal diameter; $ft.^2$

ATTRIBUTE NUMBER	18 CHARACTER REPRESENTATION	DEFINITION
503	LS LENG SUSP LINES	Length of the suspension lines; ft.
504	RLD LS/DO RATIO	Ratio of the suspension line length to the nominal diameter of the decelerator; dimensionless
505	XXX/DF TRAIL DIST	Distance separating the decelerator and its forebody divided by the forebody diameter; dimensionless
506	REB(T) DF/DP(T) T	Ratio of the diameter of the forebody to the projected diameter of the decelerator versus time; dimensionless vs. sec.
507	RSB STING DIA/DO	Ratio of the sting diameter to the nominal diameter of the decelerator; dimensionless
526	WD TOT WT DECL SYS	Total weight of the decelerator system; lbm.
528	RWV WD/VOL	Ratio of the total weight of the decelerator system to the total volume of the decelerator system; $lbm/ft.^3$
529	WD/CDS STUDY STATE	Ratio of the total weight of the decelerator system to the drag area of the decelerator at steady state; $lbm/ft.^2$
530	NUW DRAG EFFICIENC	Canopy drag efficiency which is the ratio of the drag surface to the total weight of the parachute canopy; $ft.^2/lbm.$
536	NF NO FORE BD FIN	Number of fins on the forebody; dimensionless
537	NSL NO SUSP LINES	Number of suspension lines; dimensionless
538	NRIS NO RISERS	Number of risers; dimensionless

ATTRIBUTE NUMBER	18 CHARACTER REPRESENTATION	DEFINITION
545	BRK ST RISERS LBS	Breaking strength of risers; lbf.
546	BRK ST SUSP LINES	Breaking strengtn ot strength of suspension lines; lbf.
547	BRK ST BRIDLE LEGS	Breaking strengtl of bridle legs; lbf.
548	BRK ST APEX LINE	Breaking strength of apex line;
549	BRK ST CARGO SLING	Breaking strengt. of cargo sling; lbf.
556	CONVG ANG SUSP LNS	Angle of convergence of the suspension lines; deg.
557	UUU S LN CON DES F	Design factor involving the strength loss at tne connection of suspension line and drag producing surface; dimensionless
558	CCC CONVG ANG DE F	Design factor related to suspension line convergence angle; dimensionless
562	J DESIGN SAFY FAC	Design safety factor relating to breaking strength in suspension lines; dimensionless
563	DA H2O SUSP LN D F	Design factor related to strength loss in material from water and water vapor absorption in suspension lines; dimensionless
564	OD H2O RIS DES FAC	Design factor related to strength loss in material from water and water vapor absorption pin risers; dimensionless
565	ER PERC RISER ELON	Percent of elongation of riser; dimensionless
566	ES PERC SU LN ELON	Percent of elongation of suspension line; dimensionless
570	KEEPER USED TF	Whether or not a keeper is used - true or false.

ATTRIBUTE NUMBER	18 CHARACTER REPRESENTATION	DEFINITION
571	BRIDLE LEGS USE TF	Whether or not bridle legs are used - true or false.
572	ON BOARD INST TF	Whether or not on-board instruments are used - true or false.
573	TYPE FORCE SENSR H	Type of force sensors used.
574	TYPE LOAD DISCON H	Type of release which disconnects the parachute canopy from the load
600	SHRINK PERC FILL D	Percent of cloth shrinkage in the fill direction; dimensionless
601	SHRINK PERC WARP D	Percent of cloth shrinkage in the warp direction; dimensionless
602	PERC ELON FILL DIR	Percent of cloth elongation in the fill directions; dimensionless
603	PERC ELON WARP DIR	Percent of cloth elongation in the warp direction; dimensionless
604	PERC CAN TAPE ELON	Percent of elongat of canopy tape; dimensionless
609	WT CANOPY TAPE LB	Weight of canopy tape; lbm/ft.
610	OB H2O RIBBON DE F	Design factor related to strength loss in material from water and water vapor absorption in ribbons; dimensionless
614	OC H2O TAPE DES FC	Design factor related to strength loss in material from water and water vapor absorption in canopy tape; dimensionless
625	BRK ST CLOTH FILL	Breaking strength of cloth in fill direction; lbf.
626	BRK ST CLOTH WARP	Breaking strength of cloth in the warp direction; lbf.
627	BRK ST CLOTH BIAS	Breaking strength of cloth in the bias direction; lbf.

ATTRIBUTE NUMBER	18 CHARACTER REPRESENTATION	DEFINITION
628	BRK ST PROC BD CL	Breaking strength of pocket band cloth in the fill direction; lbf.
629	BRK ST POC BD CL W	Breaking strength of pocket band cloth in the warp direction; lbf.
630	BRK ST CHUTE TIES	Breaking strength of the ties of the pilot chute; lbf.
631	BRK ST CANOPY TAPE	Breaking strength of the canopy tape; lbf.
632	BRK ST KEEP WEEBNG	Breaking strength of the parachute keeper webbing; lbf.
633	BRK ST HARNESS WEB	Breaking strength of the harness webbing; lbf.
646	TEAR ST CLOTH FL D	Tear strength of cloth in the fill direction; lbf.
647	TEAR ST CLOTH WP D	Tear strength of cloth in the warp direction; lbf.
648	TEAR ST POCK BD FL	Tear strength of the pocket band cloth in the fill direction; lbf.
649	TEAR ST POCK BD WP	Tear strength of the pocket band cloth in the warp direction; lbf.
656	TYPE CANOPY CLTH H	Type of canopy cloth.
657	TYPE CANOPY TAPE H	Type of canopy tape.
658	TYPE RIBBON CLTH H	Type of ribbon cloth.
665	LAMM MECH POROSITY	Mechanical porosity of canopy fabric; dimensionless
666	LAMR RIBN PERMEABL	Permeability of canopy ribbons which is defined at a constant pressure differential equal to one half inch of water; $ft.^3/(min.ft.^2)$.

ATTRIBUTE NUMBER	18 CHARACTER REPRESENTATION	DEFINITION
668	WT PILOT CHUTE	Total weight of the pilot chute; lbm.
669	WT ACCESSORIES	Weight of the accessories of the decelerator system; lbm.
700	DC CONSTRUCTED DIA	Constructed diameter of parachute; ft.
701	DCN DC/NO GORES	Constructed diameter of the parachute divided by the number of gores; ft.
702	DDR DP/DC STDY ST	Ratio of the projected diameter of the parachute to its constructed diameter at steady state; dimensionless
703	DV VENT DIAMETER	Vent diameter of the parachute; ft.
710	NG NO GORES	Number of gores; dimensionless.
711	NGL NO GORE LOBES	Number of gore lobes; dimensionless
712	NHR NO HORIZ RIBN	Number of horizontal ribbons; dimensionless.
713	NPB NO POCK BANDS	Number of pocket bands; dimensionless
714	NRB NO RIBS	Number of ribs; dimensionless
715	NRR NO RADAL RIBN	Number of radial ribbons; dimensionless
716	NV NO VENTS	Number of vents; dimensionless.
717	NVT NO VERT TAP P	Number of vertical tapes; dimensionless
718	NO NO ORIFICES	Number of orifices; dimensionless
737	ORIFICE SHAPE H	Shape of orifice of decelerator canopy; dimensionless.
738	LENG POCKET BAND	Length of pocket band; ft.
739	LENG POC BD INTERC	Length of pocket band intercept on the canopy skirt; ft.
745	CANOPY TAPE THICKN	Canopy tape thickness; in.

ATTRIBUTE NUMBER	18 CHARACTER REPRESENTATION	DEFINITION
746	GORE PATTERN H	Description of the canopy gore pattern.
747	GORE WDH AT SKIRT	Gore width at the canopy skirt; ft.
748	SKIRT EXT GEOMET H	Description of the geometry of the skirt extension.
749	WTE WIDTH TAPE IN	Width of tape; in.
750	WWB WIDTH WEBBING	Width of webbing; in.
751	WR WIDTH RIBBON IN	Width of ribbon; in.
752	WS WIDTH SLOT	Width of slot in canopy; in.
753	WR/WS RIBN/SLOT WD	Ratio of the ribbon width to the slot width; dimensionless
761	STO TOT ORIF AREA	Total orifice area of canopy; ft^2
762	SS TOT SLOT AREA	Total slot area of canopy; ft^2
768	SSG SLOT A PER GOR	Total slot area per gore of canopy; ft^2
769	LAMD(X/Y) PER PO T	Porosity distribution, which is percent porosity versus the X and Y coordinates of the point under consideration; dimensionless vs. dimensionless.
770	LAM G GEOMETRIC PO	Geometric porosity of parachute canopy; dimensionless
771	LAMT TOT POROSITY	Total porosity, which is the mechanical porosity plus the geometric porosity; dimensionless
800	BAL SKIN MTL/H	Description of balloon skin material
801	WBF WT BAL FABRIC	Weight of balloon
802	BRK ST BAL FABRIC	Breaking strength of the balloon fabric; lbs.

ATTRIBUTE NUMBER	18 CHARACTER REPRESENTATION	DEFINITION
803	FILM SEALANT U TF	Whether or not a high temperature film is used as sealant for the balloons - true or false.
810	VB VOL BAL FT3	Balloon volume; $ft.^3$
813	SEPR FENCE USED TF	Whether or not a separation fence is used on a balloon or ballute - true or false.
814	RADIUS BALU FT	Radius of the ballute excluding the burble fence height; ft.
815	BURB FENCE USED TF	Whether or not a burble fence is used on a ballute - true or false.
816	RBB BURB HT/RB	Ratio of the burble fence height to the basic ballute diameter; dimensionless
820	NOB NO BAL OPEN	Number of openings in balloon; dimensionless
821	NAI NO BALU INLET	Number of air inlets on ballute; dimensionless
822	DOB DIA BAL OPEN	Diameter of openings in balloon; ft.
826	BURNER SYS USED TF	Whether or not a balloon burner system for heating air inside the balloon is used - true or false
827	WBB WT BURNER SYS	Weight of the balloon burner system; lbm.
828	RHOF FUEL DENSITY	Density of fuel; $lbm./ft.^3$
851	NB NO ROT BLDS	Number of rotor blades; dimensionless
852	S SOLIDITY ROT BLD	Solidity, which is the ratio of the total blade area to the disk area of the rotor; dimensionless
853	LRB ROT SPAN	Rotor blade span, which is the distance between the center of gravity and the body aero-dynamic center; ft.

ATTRIBUTE NUMBER	18 CHARACTER REPRESENTATION	DEFINITION
854	LB LENG ROT BLADE	Length of rotor blade; ft.
855	IR(ROT CON ANG) T	Moment of inertia of rotor around its axis of revolution as a function of the rotor coning angle; slug vs. deg.
856	WRB WT ROT BLD	Weight of rotor blade; lbm.
857	WB WIDTH ROT BLADE	Width of rotor blade; ft.
863	DIS HINGE TO BD CG	Distance from blade hinge to blade center of gravity; ft.
869	ROT BRAKE USED TF	Whether or not a rotor brake is used - true or false.
870	ROT GOVERN USED TF	Whether or not a rotor governor is used - true or false.
876	COLL FLAR ROD U TF	Whether or not a rotor collective flare rod assembly is used - true or false .
877	LCF LENG COLL FL R	Length of the rotor collective flare rod assembly; ft.

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13 ABSTRACT

In the development of a computerized data catalog and data retrieval system for deployable aerodynamic decelerators, the results were twofold: (1) a list of parameters which completely define the information pertinent to these decelerators; and (2) a data base (the structure to arrange the data elements making up a unit of information) and the computer program to manipulate the data base. The combination of these results constitutes a system to store and retrieve by computer techniques all data related to deployable aerodynamic decelerators.

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