



**IRIG STANDARD 167-95**

**DATA REDUCTION AND COMPUTER GROUP**

**IRIG STANDARD FORMAT FOR INTERRANGE  
EXCHANGE OF POST-MISSION  
TIME-SPACE-POSITION INFORMATION**

**WHITE SANDS MISSILE RANGE  
KWAJALEIN MISSILE RANGE  
YUMA PROVING GROUND  
DUGWAY PROVING GROUND  
ABERDEEN TEST CENTER**

**ATLANTIC FLEET WEAPONS TRAINING FACILITY  
NAVAL AIR WARFARE CENTER WEAPONS DIVISION  
NAVAL AIR WARFARE CENTER AIRCRAFT DIVISION  
NAVAL UNDERSEA WARFARE CENTER DIVISION, NEWPORT  
PACIFIC MISSILE RANGE FACILITY**

**30TH SPACE WING  
45TH SPACE WING  
AIR FORCE FLIGHT TEST CENTER  
AIR FORCE DEVELOPMENT TEST CENTER  
AIR FORCE WEAPONS AND TACTICS CENTER  
SPACE AND MISSILE SYSTEMS CENTER,  
SPACE TEST AND EXPERIMENTATION PROGRAM OFFICE  
ARNOLD ENGINEERING DEVELOPMENT CENTER**

**DISTRIBUTION A: APPROVED FOR PUBLIC RELEASE;  
DISTRIBUTION IS UNLIMITED**

**THIS QUALITY INSPECTED 3**

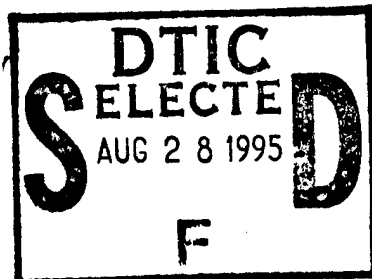
19950824 100

# REPORT DOCUMENTATION PAGE

Form Approved  
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE August 1995	3. REPORT TYPE AND DATES COVERED	
4. TITLE AND SUBTITLE IRIG STANDARD FORMAT FOR INTERRANGE EXCHANGE OF POST-MISSION TIME-SPACE-POSITION INFORMATION		5. FUNDING NUMBERS	
6. AUTHOR(S)		7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Data Reduction and Computer Group Range Commanders Council White Sands Missile Range, NM 88002-5110	
8. PERFORMING ORGANIZATION REPORT NUMBER  RCC 167-95		9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) STEWS-RCC Range Commanders Council White Sands Missile Range, NM 88002-5110	
10. SPONSORING / MONITORING AGENCY REPORT NUMBER  SAME AS BLOCK 8		11. SUPPLEMENTARY NOTES  NEW DOCUMENT.	
12a. DISTRIBUTION / AVAILABILITY STATEMENT  APPROVED FOR PUBLIC RELEASE: DISTRIBUTION IS UNLIMITED.		12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words)  This document provides a minimal data set which will provide any range user with everything necessary to use TSPI in analysis software to produce needed reports.			
14. SUBJECT TERMS  TSPI, time-space-position information		15. NUMBER OF PAGES 11	
16. PRICE CODE		17. SECURITY CLASSIFICATION OF REPORT UNCLAS	
18. SECURITY CLASSIFICATION OF THIS PAGE UNCLAS		19. SECURITY CLASSIFICATION OF ABSTRACT NONE	
20. LIMITATION OF ABSTRACT NONE			



## GENERAL INSTRUCTIONS FOR COMPLETING SF 298

The Report Documentation Page (RDP) is used in announcing and cataloging reports. It is important that this information be consistent with the rest of the report, particularly the cover and title page. Instructions for filling in each block of the form follow. It is important to *stay within the lines* to meet *optical scanning requirements*.

**Block 1. Agency Use Only (Leave blank).**

**Block 2. Report Date.** Full publication date including day, month, and year, if available (e.g. 1 Jan 88). Must cite at least the year.

**Block 3. Type of Report and Dates Covered.** State whether report is interim, final, etc. If applicable, enter inclusive report dates (e.g. 1 Jun 87 - 30 Jun 88).

**Block 4. Title and Subtitle.** A title is taken from the part of the report that provides the most meaningful and complete information. When a report is prepared in more than one volume, repeat the primary title, add volume number, and include subtitle for the specific volume. On classified documents enter the title classification in parentheses.

**Block 5. Funding Numbers.** To include contract and grant numbers; may include program element number(s), project number(s), task number(s), and work unit number(s). Use the following labels:

<b>C</b> - Contract	<b>PR</b> - Project
<b>G</b> - Grant	<b>TA</b> - Task
<b>PE</b> - Program Element	<b>WU</b> - Work Unit Accession No.

**Block 6. Author(s).** Name(s) of person(s) responsible for writing the report, performing the research, or credited with the content of the report. If editor or compiler, this should follow the name(s).

**Block 7. Performing Organization Name(s) and Address(es).** Self-explanatory.

**Block 8. Performing Organization Report Number.** Enter the unique alphanumeric report number(s) assigned by the organization performing the report.

**Block 9. Sponsoring/Monitoring Agency Name(s) and Address(es).** Self-explanatory.

**Block 10. Sponsoring/Monitoring Agency Report Number.** (If known)

**Block 11. Supplementary Notes.** Enter information not included elsewhere such as: Prepared in cooperation with...; Trans. of...; To be published in.... When a report is revised, include a statement whether the new report supersedes or supplements the older report.

**Block 12a. Distribution/Availability Statement.** Denotes public availability or limitations. Cite any availability to the public. Enter additional limitations or special markings in all capitals (e.g. NOFORN, REL, ITAR).

**DOD** - See DoDD 5230.24, "Distribution Statements on Technical Documents."

**DOE** - See authorities.

**NASA** - See Handbook NHB 2200.2.

**NTIS** - Leave blank.

**Block 12b. Distribution Code.**

**DOD** - Leave blank.

**DOE** - Enter DOE distribution categories from the Standard Distribution for Unclassified Scientific and Technical Reports.

**NASA** - Leave blank.

**NTIS** - Leave blank.

**Block 13. Abstract.** Include a brief (*Maximum 200 words*) factual summary of the most significant information contained in the report.

**Block 14. Subject Terms.** Keywords or phrases identifying major subjects in the report.

**Block 15. Number of Pages.** Enter the total number of pages.

**Block 16. Price Code.** Enter appropriate price code (*NTIS only*).

**Blocks 17 - 19. Security Classifications.** Self-explanatory. Enter U.S. Security Classification in accordance with U.S. Security Regulations (i.e., UNCLASSIFIED). If form contains classified information, stamp classification on the top and bottom of the page.

**Block 20. Limitation of Abstract.** This block must be completed to assign a limitation to the abstract. Enter either UL (unlimited) or SAR (same as report). An entry in this block is necessary if the abstract is to be limited. If blank, the abstract is assumed to be unlimited.

**IRIG STANDARD 167-95**

**IRIG STANDARD FORMAT FOR  
INTERRANGE EXCHANGE OF POST-MISSION  
TIME-SPACE POSITION INFORMATION**

**AUGUST 1995**

Accession For	
NTIS CRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification .....	
By .....	
Distribution /	
Availability Codes	
Dist	Avail and/or Special
A-1	

**Prepared by**

**Data Reduction and Computer Group  
Range Commanders Council**

**Published by**

**Secretariat  
Range Commanders Council  
White Sands Missile Range  
New Mexico 88002-5110**

## PREFACE

This standard was written to satisfy RCC Data Reduction and Computer Group task DR-18, Standard Format for Interrange Exchange of Post-Mission Time-Space-Position Information (TSPI). It describes a minimal data set which will provide any range user with everything necessary to use TSPI in analysis software to produce the needed reports. Because many customer representatives do not have enough information to know what data set should be specified to do the job, a standard providing the information to do every task is desirable. While this standard does not provide a basis for every conceivable task, it does provide a basis for all trajectory parameters commonly used in analyzing target performance. Because range users often request reports from different ranges to meet immediate needs, the required information often expands in scope as specific software developments are made to support engineering analysis. When parameter requirements are expanded as data is being analyzed, the only method of obtaining the required TSPI parameters is to retrieve the original tracking media. Original tracking media is not necessarily archived forever. Each range will retain the original data according to its own archiving practice once the customer has the data.

This standard should be presented to the range customer whenever any TSPI data is requested. Range customers usually require reports from a set of customer-selected parameters in the range's standard format. Custom-made media are certainly in order for many range data applications. It is necessary for the customer to define requirements from the beginning, because if at a later time the customer needs different data, this set of parameters will not contain the essential TSPI to complete the task the TSPI was generated for in the first place. As a result, analysis activity is then severely hampered by working around the lack of appropriate information. Although the format offered is not necessarily meaningful in every situation, it is a vehicle to aid in clarifying the essential elements of the standard. Important elements are the information included and the fact that the data transmitted is of value only if the recipient can use it.

# TABLE OF CONTENTS

	<u>Page</u>
<b>Preface</b> .....	iii
<b>1. Introduction</b> .....	1
<b>2. Applications</b> .....	1
<b>3. Parameters</b> .....	2
<b>4. Format</b> .....	2

## **1. INTRODUCTION**

Time-space-position information (TSPI) can only be produced at a small number of locations, most of which are represented in the Range Commanders Council (RCC). Each of these locations or ranges has a wide variety of customers including the Department of Defense (DOD), National Aeronautics and Space Administration (NASA), industry, and foreign countries. The RCC ranges are frequently reciprocal users of each other's facilities. As an illustration, the Navy and Air Force cruise missiles fly over the far western ranges starting somewhere over the Pacific Ocean and terminating at various inland ranges. The space shuttle has overflown every range in the world and has a requirement to consolidate TSPI data into a single form. In a similar manner, test programs often go to White Sands Missile Range to perform air-to-air tests, and some test programs from Edwards Air Force Base find appropriate range attributes at the Naval Air Warfare Center Weapons Division, China Lake. It is not known what happens in every case, but there are many cases where the program coordinators, who negotiate for TSPI data, do not quite match the later needs for data reduction and analysis. It is easy to find programs where the exchange tape was different in parameter order and frequently in actual parameters contained. From time to time, the parameters required to do the analysis do not appear on a new tape, even though they were there on the first five. When the change is tracked to its source, the TSPI provided is what was requested. It is very difficult to track down what has, or is, happening. If this standard is used (superimposed over any request for TSPI) it will not matter if the program manager requesting TSPI has a changing requirement for printed TSPI reports, because the basic standard TSPI will also always be on the magnetic media.

## **2. APPLICATIONS**

All data should be recorded in a format appropriate for exchange such as the eight-bit ASCII format. The example in this standard might be used for a nine-track magnetic tape, although other means of exchange can be used. The exchange example assumes a text file is used such as ASCII, because in many cases nothing more than a formatted read is necessary to decode the data for computer use. The data format as it appears on the tape, disk, or net is not the most important feature of this standard. The most important feature is the information being exchanged on the media.

### **3. PARAMETERS**

The parameters exchanged are a minimal set to compute all necessary trajectory-related information available from range instrumentation. The parameters used in this exchange are an Earth-axis system which originates at the Earth's center. Commonly known as the EFG-coordinate system, these parameters are time, E, F, and G axes.

Time is defined as the time of day, local or universal time code, or elapsed time recorded in the collection of the TSPI data.

E-axis is positive in the direction of the zero meridian lying in the equatorial plane.

F-axis is positive 90° east to the E-axis lying in the equatorial plane.

G-axis is positive along the axis of rotation in the direction of the North Pole.

With time and a knowledge of the Earth reference model, it is possible to compute geodetic coordinates and parameters related to the Earth's surface or the vehicle's center of gravity. A complete specification of the EFG coordinate system is provided in RCC Document 151-85, Global Coordinate System.

### **4. FORMAT**

The TSPI-file format includes several types of data records. There is general header information, so data can be properly identified from the media itself. There is important information about the data on the media regarding the Earth model used, the type and number of sensors used, level of editing taken place, and any special considerations useful to the tester. At times, one continuous time slice may not be appropriate. As a result, it is possible to make multiple separate data files based on time to be placed on a single media. Each of these data sections has a header record which applies a name to the data values which follow. It is also possible to place information in the header records to provide unique identifiers or information pertinent to any pass. The data records are fixed in form and will never have all records equal to zero. Although time can be zero, it is impossible for E, F, and G to be zero. A record of all ASCII zeros is used to identify the end of a pass. Similarly, a pass header record with all ASCII blanks will be used to identify the end of information on the media and will make it possible to control the end of media activities without depending on the compatibility of computer-generated end-of-file markers.

## 4.1 TSPI FILE FORMATS

In the first part of this section, several types of records are referenced. Each of these records is given a name and its contents described. Data words are described in several ways including the use of standard FORTRAN symbols.

### 4.1.1 TSPI-File Header

FIELD	NAME	DESCRIPTION	UNITS	FORMAT
1	VID	Vehicle ID	none	A10
2	OPNO	Operation number	none	A10
3	TESTDT	Test date (Format "DDMMYY")	none	A6
4	FILEDT	Date TSPI file written (Format "HHMMSS")	none	A6
5	FILETM	Time TSPI file written Format "HHMMSS")	hours minutes seconds	A10
6	TIMEBAS	Nomenclature for the time format in use	none	A20
7	EARMOD	Earth model	none	A10
8	RANGE	Test range	none	A10
9	CONTACT	Point of contact	none	A20
10	COMNO	Number of comments	integer	I2
11	COMMENT	Number of comments is COMNO	none	A80

**4.1.2 TSPI File Data Sections.** A TSPI File Data Section is made up of two record types. The first is a Section Header Record which contains particular details about the data contained in the TSPI File Section. This section allows for a vehicle identification, since it is possible to combine the data from a multiple vehicle track. Vehicle identifications (VID) have a special field which can be left blank or can duplicate the header field VID when only one vehicle track is included on the file. The VID in the TSPI File-Header Record is the primary vehicle being tracked and, in the event of multiple vehicle tracking, its ID will also need to appear in those TSPI File Data Section headers which contain its data.

For this special standard, a count of three is used to count the number of parameters in addition to time which are in the file, and in this case only three parameters - E, F, and G - are in the file. A special form of this record is used to end the file. End of file, in this case, is a reference to the end of all data or the end of information. The last record in a TSPI File Data Section will contain all ASCII zeroes.

#### 4.1.2.1 Section Header.

FIELD	NAME	DESCRIPTION	UNITS	FORMAT
1	SECNO	Data section	integer	I3
2	VID_S	Vehicle ID Section	none	A10
3	ST	Sensor type	none	A10
4	SID	Sensor ID	none	A10
5	COM	Data section comments	none	A20
6	NP	Number of parameters	integer	I4
7 to (NP+6)	PARNAME	Parameter names Limit 9,999	none	A10

In this application for this standard, the following values are fixed for all application:

PARNAME(1) = TIME  
 PARNAME(2) = Ebbbbbbbbb  
 PARNAME(3) = Fbbbbbbbbb  
 PARNAME(4) = Gbbbbbbbbb

Parameter names beyond PARNAME(4), that is, parameter names PARNAME(5) through PARNAME(NP) can be any names agreed to by the range providing the TSPI data and the customer receiving the data. The upper limit is NP = 9999.

#### 4.1.2.2 Data Records

FIELD	NAME	DESCRIPTION	UNITS	FORMAT
1	TIME	bb0	integer	I3
2	E	all blank	none	A10
3	F	all blank	none	A10
4	G	all blank	none	A20
5 to NP		bbb0	integer	I4

All legitimate data records will have nonzero values for at least one of the values E, F, or G, and, as a practical matter, none will ever be zero. Generally, time will not be zero. To indicate that the end of data in a particular section has been reached, a record with all zeroes will be written. This last record will be identified as the ZERO RECORD in what follows.

**4.1.2.3 Final Record.** The final data record in this standard file will be the Section Header record containing zeroes and blanks depending on its type.

FIELD	NAME	DESCRIPTION	UNITS	FORMAT
1	SECNO	BB0	integer	I3
2	ST	all blank	none	A10
3	SID	all blank	none	A10
4	COM	all blank	none	A20
5	NP	bbb0	integer	I4

## **4.2 TSPI File Format**

This part contains a display of how the typical TSPI file will appear:

TSPI FILE HEADER  
SECTION HEADER - Sec # 1  
DATA RECORD - 1  
.  
DATA RECORD - M1  
ZERO RECORD  
SECTION HEADER - # 2  
DATA RECORD - 1  
.  
DATA RECORD - M2  
ZERO RECORD  
.  
SECTION HEADER - Sec # N  
DATA RECORD - N  
.  
DATA RECORD - MN  
ZERO RECORD  
FINAL RECORD

This paragraph taken with the remainder of paragraph 4 is sufficient to produce a TSPI file which complies with the standard.