



DOCUMENT 405-96

UNDERWATER SYSTEMS GROUP

RANGE INSTRUMENTATION TAPE RECORDER SURVEY

19961029 093

**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 WARFARE CENTER
ARNOLD ENGINEERING DEVELOPMENT CENTER**

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

DTIC QUALITY INSPECTED 1

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 OCTOBER 1996	3. REPORT TYPE AND DATES COVERED	
4. TITLE AND SUBTITLE RANGE INSTRUMENTATION TAPE RECORDER SURVEY			5. FUNDING NUMBERS	
6. AUTHOR(S)				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Underwater Systems Group Range Commanders Council White Sands Missile Range, NM 88002-5110			8. PERFORMING ORGANIZATION REPORT NUMBER RCC Document 405-96	
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 Distribution Distribution is Unlimited			12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) A copy of the tape recorder survey disseminated to the T&E community represented by the Underwater Systems, Telemetry, and Data Reduction and Computer groups of the Range Commanders Council. Lack of participation suggested this initiative might not yield significant savings and there is not sufficient need or desire to common recorder standards at this time.				
14. SUBJECT TERMS recorder standards			15. NUMBER OF PAGES 12	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT none	18. SECURITY CLASSIFICATION OF THIS PAGE none	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. 10 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:

C - Contract	PR - Project
G - Grant	TA - Task
PE - Program Element	WU - 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.

DOCUMENT 405-96

RANGE INSTRUMENTATION TAPE RECORDER SURVEY

OCTOBER 1996

Prepared by

**UNDERWATER SYSTEMS GROUP
RANGE COMMANDERS COUNCIL**

Published by

**Secretariat
Range Commanders Council
U.S. Army White Sands Missile Range,
New Mexico 88002-5110**

RANGE INSTRUMENTATION TAPE RECORDER SURVEY

INTRODUCTION

The Range Instrumentation Tape Recorder Survey task was initiated with the expectation that one or several common tape recorder standards could be adopted by Navy ranges, resulting in cost savings based on improved compatibility. Ranges would be able to leverage the commonality through more effective sharing of data and equipment as well as maintenance resources. A survey questionnaire was developed and disseminated to the range community represented by the Underwater Systems, Telemetry, and Data Reduction and Computer groups of the Range Commanders Council. Only minimal response was received and follow-up phone surveys yielded little improvement to the data sampling. The lack of response suggested that this initiative might not yield significant savings and that there is not sufficient need or desire for common recorder standards at this time. Consequently, it seems to be in the best interest of the Underwater Systems Group to close out this task without recommending specific tape recorder standards. However, it is still instructive for this report to address some of the important issues identified during the tape recorder evaluation process.

RANGE TAPE RECORDER SURVEY

The survey (see appendix A) asked each respondent to identify current and planned recorder assets in terms of capability and application. It also requested salient characteristics of the ideal range recorder and the make and model if it currently exists. The viability of a central maintenance repair depot was addressed, and finally whether an appropriate standard is already (or soon to be) available elsewhere. A consensus on one or more recorders was not achieved. Some responses suggested that tape recorders would not be replaced but that current computer storage technologies would be used as appropriate for the data volume and speed required.

RANGE DATA ARCHIVING SOLUTIONS

Virtually all Navy ranges have requirements to record both analog and digital data. The data comes from a variety of sources requiring one to several hundred channels at a variety of bandwidths and dynamic range. Most analog recorders today are really digital recorders with built-in A/D converters of specific dynamic range and frequency to accommodate the signal of interest. They may also be supported by multiplexors to accommodate the number of channels required.

In strictly digital environments, a large variety of more cost effective commercial-off-the-shelf (COTS) solutions have become available from the computer sector, and range sites can readily support most of them on a variety of computer platforms.

These recording solutions include DAT, 8mm, CD-ROM, optical disk, and conventional disk to name a few. These technologies continue to improve at a rapid pace, providing economical solutions to the most demanding data archiving requirements. Furthermore, the use of local and wide area networking can all but eliminate the need for special purpose recorders to accommodate shared data files. Each site has the flexibility to use its own data storage resources via the network.

At the time of the survey, the two most popular recorders were the Metrum RSR-512 and the Racal Storeplex. These recorders use conventional VHS format tape and provide bandwidth that can be easily subdivided to support the channel requirements. For direct recording of analog signals above 20 kHz, the Metrum continues to be one of the only viable COTS recorders available.

At Naval Undersea Warfare Center Division Keyport, the Metrum RSR-512 has been selected and purchased in volume to meet analog acoustic recording requirements. A savings was realized through reduced procurement expense, common maintenance and parts substitution, common tape media, and common operator training. Over the past few years, the steadily increasing capacities of computer disk drives and tape archiving systems have allowed migration of much of our digitized analog data storage to these less expensive and more readily accessible peripherals. The Metrum recorders may eventually be replaced by portable computers augmented with peripherals to perform A/D/A conversion, multiplexing, time code generation, and data storage functions.

Appendix A: RCC Range Instrumentation Tape Recorder Survey

Background. The Underwater Systems Group, at their winter 1992 meeting, proposed conducting a survey of range instrumentation recorders to (1) determine if an ad hoc standard could be identified which would allow sharing of tape recorder assests among ranges, and (2) document existing recording conventions so that range data could be transferred among activities more easily. The Range Commanders Council has asked that this survey be extended to include the Telemetry Group and the Data Reduction and Computer Group.

1. Respondent Information:

Name: _____ Code: _____
 Activity: _____ Telephone: _____
 Address: _____ Fax: _____

What percentage of your activities assets does this response address? _____ %

2. Current Assets: Please provide information for those recorders you currently own.

MAKE	MODEL	NUMBER OF CHANNELS	QUANTITY	AGE	APPLICATION

3. Replacement/Augmentation Plans:

a. Current Year (FY-93):

MAKE	MODEL	NUMBER OF CHANNELS	QUANTITY	AGE	APPLICATION

b. Out Years (Through FY-96):

MAKE	MODEL	NUMBER OF CHANNELS	QUANTITY	AGE	APPLICATION

4. Core Data Recorder Specification: If you had the opportunity to develop a specification for a single recorder to meet the bulk of your range recording needs, what attributes would it have?

a. Total Record Time: _____

b. Direct/FM: _____

c. Maximum Bandwidth: _____

Per Channel: _____

Total Aggregate: _____

d. Maximum Size: _____

e. Maximum Weight: _____

f. Power Specification (AC/DC/Battery): _____

g. Environmental Considerations: _____

h. Media (Tape {_ inch, VHS, etc.}/Disk/RAM/Optical Disk): _____

i. Input Channels:

Analog: _____

Digital: _____

j. Output Channels:

Analog: _____

Digital: _____

k. Data Exchange Compatibility Requirements:

Wide Band Group 1: Yes: _____ No: _____

Wide Band Group 2: Yes: _____ No: _____

Intermediate: Yes: _____ No: _____

Other: _____

5. Does a Core Data Recorder Make Sense to You? Yes: _____ No: _____

6. Your Choice for a Recorder:

MAKE	MODEL	NUMBER OF CHANNELS

7. Recording Conventions: How you lay out your data collection to ensure repeatability and ease of playback and annotation.

CHANNEL NUMBER	DATA TYPE
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	

CHANNEL NUMBER	DATA TYPE
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	

ABBREVIATION CONVENTIONS:

A = Analog	FM = FM	IRIG = IRIG (Time Code)
D = Digital	Io = Io	V = Voice

Other: _____

8. Recorder Maintenance Consideration:

Would you utilize a central maintenance repair depot, if made available? Yes No

9. Core Data Recorder Considerations:

Standard already exists:

What? _____

It's coming:

From Where? _____

We Should Wait and See:

How Long? _____

Who Cares?

Name? _____

Are you really sure that you want to
put your name here??

10. CONGRATULATIONS, YOU ARE DONE!!

Please return this questionnaire (before 30 September 1993) to

**Richard R. Peel
Head, Tracking Systems Division**

Mail responses to

**Commander
NAVUNSEAWARCENDIV
ATTN: Code 572
610 Dowell Street
Keyport, WA 98345-7610**

Or fax to

(206) 396-7165