DSN Traceability and Reporting Program

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The Traceability and Reporting Program is a combination of three programs designed to coordinate and disseminate information to meet the needs of researchers, analysts, and managers for information concerning the DSN mission data record for a current and/or past mission. It also serves as a monitor or as an accounting device by providing status information relative to the generation of System, Master, and Experimenter Data Records. The program additionally functions as an index to the mission data captured on magnetic tape and microfilm retained in the DSN Operational Data Control Center.

I. Introduction

The Traceability and Reporting Program (TRP) is part of the DSN Operations and Analysis function; it is maintained and operated by the DSN Operational Data Control Center (ODC). The DSN ODC acts as the recipient and transfer point for DSN products, i.e., the System Data Record (SDR), Master Data Record (MDR), and the Experimenter Data Record (EDR). The ODC utilizes magnetic tape and microfilm as its principal information retention media; these media are also used for user reference and retrieval. The TRP supplements those retention media and functions as an information source to the DSN and its users, providing information concerning the mission data record.

Past mission operations have indicated a need for a system to provide information concerning the status and state of operational data once it has passed through real-time monitor and processing functions. The analyst or investigator of past missions, in order to determine what data had been received, its physical state (magnetic tape, disc, etc.), and its quantity and quality, would have to pursue many avenues to acquire the necessary information.

The monitor and data processing functions normally exercise direct influence over operational data from time of acquisition to 24 h after termination of a tracking

sequence. The TRP begins building its information base for a tracking period during that same period and displays status information within hours after the end of the tracking sequence. The information base is continually updated until all information concerning a data sequence has been acquired and fed into the TRP. The process of information acquisition encompasses the period from end of track up to 2 yr after the end of the mission.

The basic capability of the TRP is the coordination and abstraction of information from multiple sources into one source. The TRP delivers to the user decision making, analysis, and visibility support, covering a time period from near-real-time operational interest to long-term research analysis.

II. Function

The Traceability and Reporting Program, in three formats, provides the DSN, its users, and investigators information concerning the scientific and engineering data collected through the course of mission operations. The program provides information to effect the reconstruction or upgrading of a data record sequence for a past data day in terms of current demands.

In terms of the Information Sciences, the concept of TRP is oriented toward making more efficient use of documented data and its sources generated in the mission data record sequence.

The TRP applies discipline to the extraction of information from the real-time data stream. In essence, the TRP is based upon an eclectic principle of specifically choosing selected information elements from the data stream.

The selection criteria for specific element extraction are predetermined by analyzing the linguistic composition of an investigator's or user's subject matter with which he is concerned. The elements extracted from the data stream form the basic linguistic units which lend organization and/or structure to the investigator's subject matter.

The program has the flexibility to permit revision of its data base in light of newly reconstructed and/or upgraded data. Through its various elements, the TRP displays information for each mission in chronological sequence under each source for each data day. (A data day is defined as Goldstone set to Australia rise.)

Specifically, under format A, or the Basic User Information Catalog, all participating sources (ranging from DSIF stations to DSN system analysis areas) are represented. All types of material generated by each source are listed in alphabetical and chronological sequence.

Within the TRP, a mission sequence number is assigned to the spacecraft, source, and GMT combination. Since this combination is fixed, the TRP can list all information relative to that specific combination whenever it becomes available, thus representing a complete account of information for each source for a specific time period.

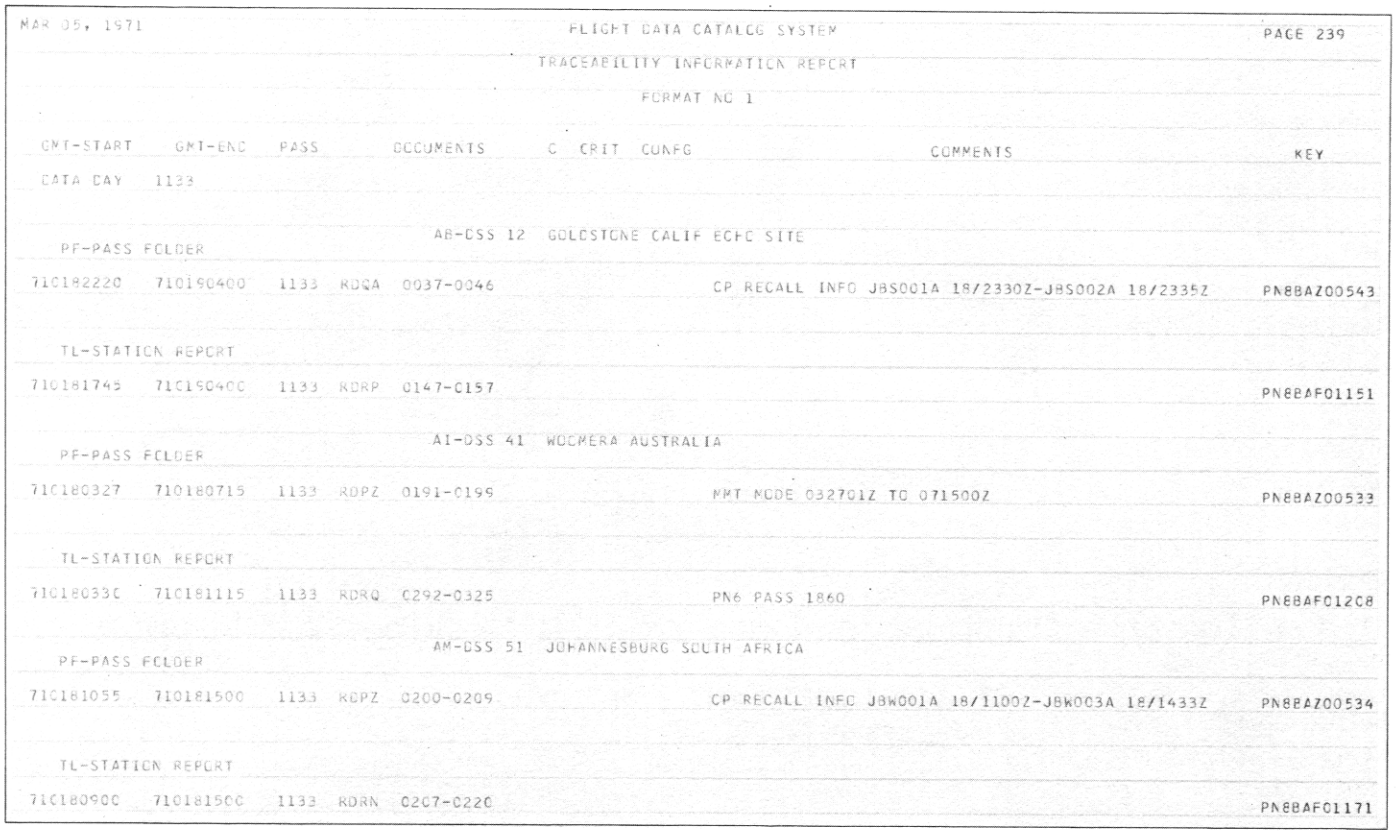
III. Elements

The Traceability and Reporting Program generates three reports: a Basic User Information Catalog, an SDR/MDR/EDR Status Report, and a Projected Sequence Report. The information content in each report is in relation to the nature of a user's request. In format A, or the basic catalog, the design criteria assumed a user would lack sufficient detailed information and therefore provides as complete as possible a representation of all available information concerning the data records for any given data day or portion thereof.

Figure 1 represents a sample page of the user catalog. It provides the user such information as mission, spacecraft identification, originating source for any data listed, GMT, data day, data processing classification (normal–critical, represented as 1–4), and data quality in actual percent. For example, in a configuration such as *Pioneer VIII*, DSS 12, GMT day 018, all information received by ODC is represented on one page. To the user, this catalog can, by any number of edit parameters, isolate a sequence of data for a specific station or for an entire data day.

In the SDR/MDR/EDR Status Report, or format B, detailed information is displayed pertaining to the status and state of each individual data record (see Fig. 2). This report will display data record status by spacecraft, GMT, percentage of good data, serial number, Original Data Record availability, reuse or degauss cycle, and data record availability, either magnetic tape or disc.

The TRP, while generating specific reports, continually updates its data base, allowing greater research and analysis of past operations. The program operates simultaneously on two levels: in operational or near-real-time and in an archival mode, defined as 48 h after the fact.



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TRACEABILITY INFORMATION REPORT

FORMAT NO 1

GMT-START	GMT-END	PASS	DOCUMENTS	C	CRIT	CONFG	COMMENTS	KEY
DATA DAY 1133								
			AB-DSS 12 GOLDSTONE CALIF ECHO SITE					
PF-PASS FOLDER								
71C182220	71C190400	1133	RDQA 0037-0046				CP RECALL INFO J8S001A 18/2330Z-J8S002A 18/2335Z	PN8BAZ00543
TL-STATION REPORT								
71C181745	71C190400	1133	RDRP 0147-0157					PN8BAF01151
			AI-DSS 41 WOOMERA AUSTRALIA					
PF-PASS FOLDER								
71C180327	71C180715	1133	RDPZ 0191-0199				MMT MODE 032701Z TO 071500Z	PN8BAZ00533
TL-STATION REPORT								
71C180330	71C181115	1133	RDRQ 0292-0325				PN6 PASS 1860	PN8BAF01208
			AM-DSS 51 JOHANNESBURG SOUTH AFRICA					
PF-PASS FOLDER								
71C181055	71C181500	1133	RDPZ 0200-0209				CP RECALL INFO J8W001A 18/1100Z-J8W003A 18/1433Z	PN8BAZ00534
TL-STATION REPORT								
71C180900	71C181500	1133	RDRN 0207-0220					PN8BAF01171

Fig. 1. Sample page of user catalog

DSN DATA RECORD STATUS REPORT

STATION 14

S C	DATA DAY	AOS	LOS
81	262	194854	211843

SYSTEM

TRACKING	TELEMETRY	COMMAND	MONITOR
	XXX		

DATA RECORD

ODR		SDR		MDR	
DISC	TAPE	DISC	TAPE	DISC	TAPE
	14762		13765	264	
	14699				

DATA QUALITY

ODR		SDR		MDR
14762	90.5	13621	95.5	
14699	77.9			

Fig. 2. Sample representation of format B

By operating the program on both levels, any past mission report may be entered into the data base and further complete the information bank for any particular mission phase. This process allows researchers, analysts, etc., to review a project and be able to reconstruct, via the information catalogs, entire phases of a mission 2 mo to 2 yr past.

IV. Conclusion

The Traceability and Reporting Program attempts to provide as broad a base as possible to allow for user inquiries that lack specific request information. It provides the user information concerning the status, state, quantity, and quality of the DSN data record in near-real-time and archival modes. The program is new and future design planning is presently working toward real-time access and display of data record information, and eventual data base integration with DSN Operations and Analysis programs.