DSN Monitor System

J. E. Maclay
DSN Engineering and Operations Office

The Deep Space Network (DSN) Monitor System is now operational. The system has been significantly changed during the process of moving into the Space Flight Operations Facility (SFOF) IBM 360/75 computers. The display capability is much greater than that available in the previous monitor system design. Additionally, SFOF and Ground Communications Facility monitoring provisions are augmented over the previous design.

I. Introduction

The purpose of the DSN Monitor System is to gather, process, and display data relative to the configuration and status of the ground data system, i.e., the DSN. DSN personnel use this monitor data to enhance the performance of the other systems (Telemetry, Tracking, and Command) by continual monitoring of conditions throughout the network.

The DSN Monitor System that has been implemented for support of *Mariner* Mars 1971 and *Pioneer F* basically differs in two ways from earlier designs: (1) the display capability has been greatly expanded, and (2) SFOF and GCF monitoring provisions have been augmented.

II. Displays

An earlier article (Ref. 1) described the DTV display formats defined as of that date. Since then, most of the 11 DTV formats described have undergone extensive redesign and some have been deleted. The changes have come as a direct result of the "learning process" attendant to implementing the changeover from the 7044/7094 to the 360/75. Nearly all users of monitor data now have a summary format of higher-level parameters backed up by several specialty formats that display monitor parameters at a detail level. When alarms occur on a summary format, the user selects the appropriate specialty format for troubleshooting. Twenty-five formats have been implemented to date, with a final count of 34 expected.

Two additional display mediums are now in use; alarms generated in the DSN monitor processor are printed out on a TTY character printer, and incoming high-speed data blocks can be printed on an IBM 1443 line printer.

Each alarm is a time-tagged mnemonic. The TTY printer is located in the monitor operations area, and will also be distributed building-wide via CCTV. Thus, this display is a form of backup in the event of the loss of DTV. Alarms are generated by the comparison of real versus predicted configuration and tolerances as defined

in a monitor criteria data set. Currently, only DSIF monitor data are processed against the predicted data.

The printing of incoming HSD blocks is initiated by the monitor chief. The print may be selected for octal, hex, or binary. The HSD block header is printed in readable form for all print options. Because of limited printer speed, the print request times out before a large queue can form. Such prints are used extensively by monitor, telemetry, and command in troubleshooting.

III. SFOF Monitor

Two of the SFOF displays described in Ref. 1 are now implemented: (1) HSD input/output status, and (2) 360/75 user device status.

The HSD input/output status identifies incoming data by source, mission, and type of data. Alarms for data stoppages, GCF error flags, and HSD block serial number skips are displayed. An indication of whether each incoming data stream is being processed or not is included. The monitoring of output HSD is limited to configuration information.

The user device display shows all 360/75 peripheral devices and identifies their current usage. An alarm, by device, is displayed for any device malfunctions or misusage (e.g., a printer with the motor turned off causes an alarm). This information requires four separate display formats due to the large number of devices:

(1) All devices in the data processing control center.

(2) All devices in the computer area.

(3) All 2260 I/O devices in the DSN and project areas.

(4) All card readers and line printers in the DSN and project areas.

IV. GCF Monitor

In addition to monitoring of the GCF HSD terminal equipment in the SFOF, a capability which has existed for several years, data from the station communications terminal are now also available. This information is returned via DSIF monitor. It is comparable to the SCT data: configuration, line, and error detection encoder–decoder (EDED) status. Comparison of status data from both ends of a high-speed data line (HSDL) is valuable in maintaining good service.

V. Conclusion

The progress described above typifies past and planned activities in the monitor system designs: improvement of existing capabilities, and expansion of monitoring functions in the SFOF and GCF to bring them on a par with the DSIF monitor.

Reference

1. Maclay, J. E., "Mission-Independent Computer-Driven Volatile Data Displays," in *The Deep Space Network,* Space Programs Summary 37-61, Vol. II, pp. 147–150. Jet Propulsion Laboratory, Pasadena, Calif., Jan. 31, 1970.