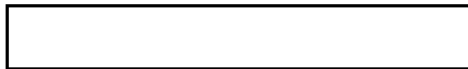


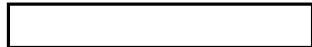
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Declass Review by NGA.

DIA XX4
The Pentagon
Washington, D. C.

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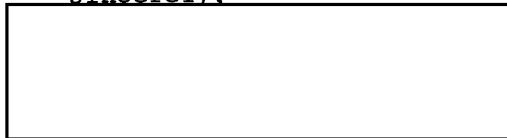
I am forwarding for your review and use descriptive material on the Spacecraft Television Ground Data Handling System Link is developing for NASA-JPL. If you have any questions concerning this information, please feel free to call me.

Regarding your interest in the Automatic Point Transfer Instrument Link is developing for GIMRADA, I will contact you in late April concerning a meeting with 

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Thank you for your interest in Link.

Sincerely,



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Washington District Manager

JDS/jb

Enclosure

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SPACECRAFT TELEVISION GROUND DATA HANDLING SYSTEM

SYSTEM OBJECTIVES AND REQUIREMENTS

The primary purpose of the Spacecraft Television (SCTV) System is to support scientific investigations of the moon and the planets by providing visual observations of their surfaces. These scientific investigations are directed generally towards a better scientific understanding of the moon and planets and specifically towards providing the manned space program with some of the information it needs about the lunar environment. The Spacecraft Television System is composed of two major elements: a Spacecraft Television Spacecraft (SCTV-SC) System and the Spacecraft Television Ground Data Handling (SCTV-GDH) System. The boundary between these systems is located at the input to the ground receiving antenna.

The purpose of the Spacecraft Television Ground Data Handling System is to support space flight operations by handling a spacecraft television data (S/C TV data) and to produce accurate image material for the scientific community from Spacecraft Television Spacecraft System transmissions. S/C TV data is "all data transmitted from a Spacecraft Television Spacecraft System plus data added to these transmissions on the ground for the purpose of aiding in future identification of the transmission or in establishing the configuration and calibration conditions of the SCTV-GDH for correlation with the image at a later time. S/C TV data includes spacecraft television camera, parameter settings, camera engineering measurements, DSS identification, mission number, time, etc., as well as image data.

Secondary purposes, in the order of their priority, are: (a) to support the efforts of NASA experimenters and JPL scientists engaged in image analysis, (b) to support JPL efforts in Spacecraft Television Spacecraft System design and analysis, and (c) to provide experience and knowledge which will contribute to the technology of spacecraft television ground data handling.

The Spacecraft Television Ground Data Handling System must be capable of supporting all JPL spacecraft projects which include among their objectives television observations of the surface of the moon or planets. The S/C TV Ground System is a major element within the JPL Space Flight Operations Complex (SFOC). As such, it must ensure that the requirements of the SFOC related to the handling of spacecraft television data are satisfied.

The Space Flight Operations Complex (SFOC) is the overall complex of earth-based facilities and personnel required for the conduct of space flight operations and some spacecraft tests.

The Spacecraft Television Ground Data Handling portion of SFOC is a centralized system capable of supporting the spacecraft television objectives of the Surveyor Lander Project, the Mariner C Project, and the Ranger Project beginning with Ranger Block V. In general,

the requirements of the system are generated by the Surveyor Lander Project, and the needs of the other projects can be satisfied by selection from the capability configured in response to the Surveyor needs.

In summary, the principal objectives of the system are to record S/C TV data with the highest reasonable quality and to ensure the continued availability of these recordings by providing for their storage and retrieval.

Major System requirements are:

a. Data Acquisition

The Spacecraft Television Ground Data Handling System acquires the spacecraft television data contained in spacecraft transmission at each DSIF station committed to the support of Surveyor Lander. The system also provides the DSIF Station with a display of critically needed S/C TV data in order to permit evaluation of the operation of the acquisition equipment, operation of the station, and general cognizance of spaceflight operation progress.

(2) b. Data Communication on the Ground

All spacecraft television data acquired by the Goldstone Deep Space Stations (DSS) is retransmitted to the Space Flight Operations Facility (SFOF), including selected non-image spacecraft television data each as camera parameter settings, camera engineering measurements, time, etc.

(2) c. Data Recording

Spacecraft television data received at the SFOF and each DSS is recorded to assure no significant loss of information from either the image or non-image data.

Identification information is added to the received spacecraft transmissions in order to unequivocally establish the image-taking configuration and to uniquely identify each image.

(1) d. Operational Display

The capability for real time display of selected spacecraft television data is required in the SFOF in order to support the operation of spacecraft television experiments and to support other scientific experiments which require observations by a Spacecraft Television Spacecraft System. This includes sufficient data to reveal both S/C System status and progress with respect to the space flight plan.

(1) 1. Immediate Image Display

Immediate presentation at the SFOF of the image currently being received by the Goldstone DSS reveals the status of and supports engineering analysis of the SCTV-SC System.

(1) 2. Real Time Image Display

There is capability for display at the SFOF of each image received by the Goldstone DSS within one minute of receipt, of sufficient quality to support limited scientific analysis and attitude stabilized with respect to a standard frame of reference.

(1) 3. Real Time Non-Image Display

Such displays facilitate subsequent reference to images observed in real time as well as rapid identification of the scene shown by and exposure conditions of that image.

(1) 4. Operational Photographs

Positive photographs are available within ten minutes of receipt.

(1) 5. Stereoscopic Image Viewing

There is capability to utilize the stereopsis present in a pair of operational photographs for three dimensional viewing by one person. The viewing mechanism is capable of removing scale difference between the photographs.

(1) 6. Group Image Display

The system provides for the viewing of selected images by groups of up to 30 persons within thirty minutes of receipt of the images in the SFOF.

e. Photograph Production

Photographs of the images contained in the spacecraft television data are also prepared in several categories as follows:

(1) 1. Photographs from Non-Image Recording Media

There is a capability to produce photographs in the SFOF from non-imaging recording media. If this type of media represents the prime recording, such photographs can be produced at the average rate of 5000 images in 24 hours. If this type of media represents backup to the prime recording which is of the imaging type, such photographs can be produced at the average rate of 500 images in 24 hours.

(1) 2. Public Information (briefing prints)

A few selected images can be for distribution for public information purposes.

(2) 3. Photograph Distribution

The system provides for adequate and timely distribution of spacecraft television data to authorized personnel of the

scientific and engineering communities who are not actively engaged in space flight operations. This capability consists of the production of an average of 100 photographs per day from any of the data which is stored by the system (without disruption of space flight operations).

4. General

The capability exists to produce photographs from 20,000 images received by the SFOF either in real time or otherwise within one month of real time.

All photographs produced by the system starting with the first permanent copy and thereafter include a sufficient non-image identification to reveal the conditions of the SCTV System when the image was recorded.

(2) f. Focus Analysis

There is capability within the system to derive information relative to the focus of the cameras of a Spacecraft Television System by utilization of the stereoscopic information contained in a pair of operational photographs. This capability is used to assist in the formulation of succeeding picture taking sequences and, hence is compatible with both an operational environment and focus syntheses as well as analysis.

(1) g. Storage and Retrieval

The system provides for the storage and retrieval of all spacecraft television data received by the system. The first image of a requested series is available within one hour of a request and that others follow at the rate of one per 15 minutes thereafter.

Access to spacecraft television data is indexed and cross-indexed. The system provides for selection of images from storage according to a flexible, selected list of descriptors.

It is permissible for a delay of up to 30 minutes to exist between receipt of data for storage and availability of the data for retrieval.

(1) h. Spacecraft Television Analysis Area

The Spacecraft Television Analysis Area is for the display, analysis, and interpretation of S/C TV data during space flight operations and some postflight analysis of spacecraft television data, as well as a general display of the status of a Spacecraft Television System and the Spacecraft Television Ground Data Handling System.

(1) i. Photomosaics

This system provides the capability to produce uncontrolled photomosaics of limited quality suitable for viewing by five observers. These can be compiled at a rate of 5 hours for a mosaic of up to 70 images and 24 hours for a mosaic of up to 450 images or simultaneous preparation of two such mosaics.

The system shall also permit a limited number of copies of photomosaics to be prepared and distributed.

NOTES:

Additional potential complexities affecting the Plans and Development Staff Data Link Development Program budgetary estimate.

1. P.I. Adaptations. Specific component design keyed to the reconnaissance exploitation effort.

2. Higher Performance. Increased bandwidth and signal-to-noise ratio; and possibly color.

4. Fundamental Changes. The probability that techniques for the transmission of images will undergo fundamental changes within the next five years; such as, holography.

5. Security. Receiving equipment will have to be modified and more autonomy at the exploitation sites will be required.

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