GCF Television Assembly Design for the Systems Development Laboratory

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The newly constructed Systems Development Laboratory (SDL) at the Jet Propulsion Laboratory will serve as an extension of the Space Flight Operations Facility (SFOF). The Pioneer Project will utilize the SDL for conducting the operations of the Pioneer F and G missions. The Ground Communications Facility (GCF) provides intercommunication between the SDL and the SFOF. One of the communication media is television. This article defines the requirements and the resulting design of the GCF Television Assembly in the SDL.

I. Introduction

A new building is being constructed at the Jet Propulsion Laboratory which will serve as an extension of the Space Flight Operations Facility (SFOF). It is known as the Systems Development Laboratory (SDL) and it will be utilized by the *Pioneer* Project for missions *F* and *G*. As the SDL is a part of the Deep Space Network (DSN), it is the responsibility of the Ground Communications Facility (GCF) to provide for intercommunication capabilities between the SFOF and SDL. The Television Assembly (TVSA) to be installed in the SDL is a part of the Wideband System and is considered a constituent of the SFOF Internal Communications Subsystem (SICS). (See Ref. 1.) This article defines the requirements and the resulting design of the GCF TVSA in the SDL.

II. Requirements

The TVSA in the SDL makes available, to specified users in the SDL, television presentations that originate in the SFOF. Some TV monitors will display predetermined (hardwire-interconnected) channels while others will be programmed (keyboard-switched) by the individual users.

III. Design

Figure 1 is a functional block diagram of the SDL TVSA. A number of factors were considered in the design and the following technical decisions were made.

A. Interface

The SDL TVSA will interface the SFOF TVSA (and become a part of SICS) via balanced shielded video pairs. This type of transmission is selected in order to minimize noise and hum pickup along the path over which the cable must run and reduce the effect of ground potential differences between buildings.

B. Synchronization

The SDL TVSA will receive its master sync signal from the SFOF TVSA. The composite sync signal will be

added to the video signal after it has emerged from the switcher and is enroute to a monitor. This will be done in a distribution amplifier.

C. Number of Video Inputs

The SDL TVSA will have an input capacity of 40 video channels. All of these channels will originate in the SFOF.

D. Number of Fixed and Switchable TV Monitors

All of the monitors with fixed presentations will have 58.4-cm (23-inch) screens. There will be 18 of this type. The monitors with switchable presentations will have either 22.9- or 35.6-cm (9- or 14-inch) screens. They will number 44 and 11, respectively.

E. Switcher Matrix Capacity

The switcher is that part of the TVSA which responds to the user push-buttons by routing selected video signals to the appropriate monitors. This one will be equipped to switch a matrix size of 5 × 20, meaning that switchable monitors will be grouped in fives to select from the same set of 20 possible video channels.

F. Cost Factor

The cost factor is an inseparable part of all the above considerations. The more important decisions relating to cost reduction are those of (1) allowing video to be transmitted in one direction (SFOF to SDL) only, and (2) restricting the selection capacity of the switchable monitors to 20 channels. These decisions relate directly to synchronization (Item B) and matrix capacity (Item E), respectively. The equipment to be used in implementing the SDL TVSA will match (as closely as is practicable) the constituent equipment of the SFOF TVSA. This reduces spares requirements, personnel training, documentation, etc.

IV. Conclusion

The capability for meeting *Pioneer* television display requirements will be provided in the SDL. The SDL TVSA is capable of being expanded to meet more demanding requirements of future DSN missions (e.g., processing of SDL-originated video signals, increased matrix size, and bidirectional video transmission between the SFOF and SDL). Fabrication of the SDL TVSA, as described herein, is now underway.

Reference

1. Hanselman, R., "Wideband Digital Data System Terminal Configuration," in *The Deep Space Network*, Space Programs Summary 37-66, Vol. II, pp. 107–110. Jet Propulsion Laboratory, Pasadena, Calif., Nov. 30, 1970.

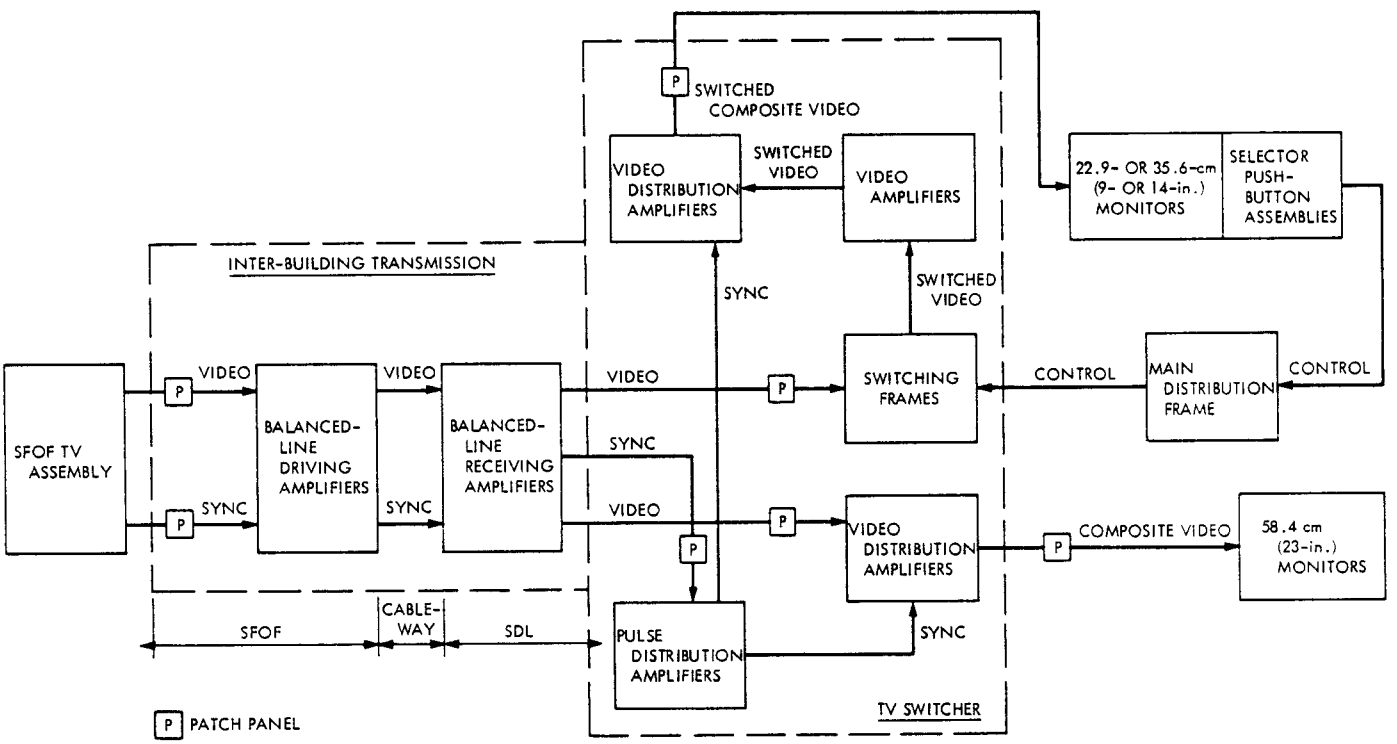

Fig. 1. SDL TVSA functional block diagram