

APPLICATION OF A RELATIONAL DATA BASE FOR DOCUMENTING  
THE GROUND TEST ACCELERATOR CABLE ROUTING AND WIRING INTERCONNECTIONS\*

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### Abstract

The Ground Test Accelerator (GTA) has many different types of equipment and interconnections to support the operation. Various functions are performed by these equipments such as signal generation, instrument control, and diagnostics. All of the thousands of signals must be routed from the protected tunnel area into the operational control area of the building. Tabulating the routing of these cables, interconnections, terminations, and even the installation status, results in an enormous amount of data collection and maintenance. A relational data base program called Wireflex was written to allow real-time storage, instant recall, and reporting of this information. The operational environment is the VAX network with password security to protect the integrity of the stored data. The format of the program data bases, with the relationships and interchange of information, will be described. Examples of input forms will show the type of information being stored and the indexing for searching specific entries. Reports will also be included displaying the flexibility of types as well as the ability to recover specific entries or ranges of information.

### Introduction

The Ground Test Accelerator (GTA) is situated in a tunnel to provide personnel and sensitive equipment protection from the effects of radiation. All of the necessary control signals for initiating functions, electro-mechanical actuator, and drive-signal control, as well as signal sampling and diagnostics, must be routed between the tunnel and the adjacent control building. Diagnostic signals are typically low level compared to control signals, and this requires routing cables in different conduits and cable trays for physical separation to reduce the potential for interference. Many junction boxes and connectors are utilized for interconnecting these cables. All of the cable identifications, interconnections, signal paths, and signal types must be documented. The completed, operating GTA will have upwards of 100,000 cable pairs, triads, co-ax's, etc., with probably 1,000,000 connections handling dozens of signal types. The Wireflex program was written to provide the data bases for documenting all of this diverse information and to allow on-screen searches as well as many printed reports.

### Information Requirements

The first requirement in setting up any data base program is to outline the kinds of information that will be stored with their categories. This allows an overview of the various types of information and how they are related. For example, signals are directly related to the wires that they

connect to, and wires are directly related to the cable in which they are grouped. This cable is then directly related to its termination points in the facility. Having this knowledge and understanding is vital to the proper set up of a data base. Tabulating and storing this information in a relational data base is then easier, because similar information is not duplicated throughout the data storage. For example, there are many cables of the same type from the same manufacturer in the cable file, but the manufacturer's part number and specifications do not need to be stored with every cable of that type. Only a cable-type number needs to be stored in the cable file to identify what type of cable it is and relate it to all of the cable specifications that are stored in the cable-type file. By the same token, the manufacturer's name, address, etc., do not need to be stored with all of his cable information, because it is stored once in the vendors file.

The second consideration is the interrelationship of this information between files. All files can be "related to," providing access between them when searching or reporting, and allowing the required information to be presented. To give an example, each block of information about a specific cable is a "record" and each bit of information about that specific cable is in a "field." Cable number, type, number of conductors, length, etc., are each a field in the record about this cable. Fields that need to be related to other files can be set up. Additionally, fields that require finding a specific cable record by a particular bit of information in a field can be indexed. Indexing is the directory for finding a particular record. For example, cables can be searched in "cable-type" order to find all cables of a certain type. Information that must be pulled from another file for a specific report, such as the manufacturer's part number of a cable to be in a cable report, can be matched to each cable as it is printed in the report.

The third most important thing that needs to be defined in the beginning is the types of on-screen searches and printed reports that will be desired. This is vital to clarify the grouping of information that will be required in the particular searches and reports. The key to finding information is the indexing that is set up. This must be carefully considered because more indexes and more fields that are indexed will take more data storage space. Setting out report requirements also points out the additional relations between data bases that will be required to provide the necessary information for the report. Any information can be found in any record once a relationship is established.

### The Wireflex Program

The Wireflex program was written in the Dataflex data-base format from Data Access Corp., operating on the VAX network in the facility. It is made up of several sections with the "cable" and "wire" as the two main data files. The other five are for the "cable types," "connector types," "system

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### Summary

The Wireflex relational data base for documenting the necessary information about the GTA has been invaluable. As soon as the wiring requirements are identified, the cable, wire, and connector assignments are made and entered into the data bases. Then, a Wiring Installation Specification is printed that gives the Scope Of The Job, other building drawings to be referenced, General Notes applicable to all wiring installations, and Special Notes that are pertinent to this particular task. This is followed by a full listing of the cables to be installed and the type, length, source, destination,

and total footage of each type of cable. The final pages are a computer printout that is a drawing of the cable (Fig. 5) showing conductors, pin connections, source, destination, wire color, and shield connections and is identified with a drawing number that includes the cable number. This program has not only simplified the record keeping of vast amounts of data but also meets the requirements of full documentation. Anyone can access the data base for information retrieval, but only authorized people have the password to get into the portions of the program where data is entered or changed, thus, maintaining secure data storage.