USE OF COMPUTER NETWORK TO ACHIEVE TESTING FLEXIBILITY

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Introduction

Powerplex Technologies, a joint venture between Magna International, a large North American auto parts supplier, and Brown, Boveri & Cie, of Mannheim, West Germany, has recently established sodium–sulphur battery and module test capability. The test system is based on a network of computerized battery test stations. These test stations, described in more detail below, are capable of cycling and characterizing batteries consisting of 187 V strings or battery submodules made up of 2 - 50 V strings.

The system has been designed to minimize the need for operator training. Operator commands are entered by means of touch screen terminals. The networked stations allow the flexibility required by both development and manufacturing. Additional test stations can easily be added as required while maintaining central storage of all test results. The test information handled by this system includes amp hour capacities, cell impedance, voltage, and temperature characteristics.

System description

The system selected was H.P's SRM network. This is an off the shelf system complete with all communication hardware and software, central data file storage, and operating system support in each networked station. This operating system support includes high level languages — specifically an interpreted basic and a compiled pascal. The individual test stations each contain a computer linked to this network acting as a controller for an instrument cluster. These test stations are independent of the network except for the transfer of data. The program code is loaded from the network on power up and leaves this test station computer free from any delicate mass storage hardware. This ruggedness is essential, since these units will be integrated into the production process on the plant floor as pilot production commences.

Since all the test data are available on the central disc, any analysis needed can be done by the station dedicated to analysis. More such stations can be added on demand. At present, there is one data analysis station that doubles as a software development station. A diagram of the station network is shown in Fig. 1.

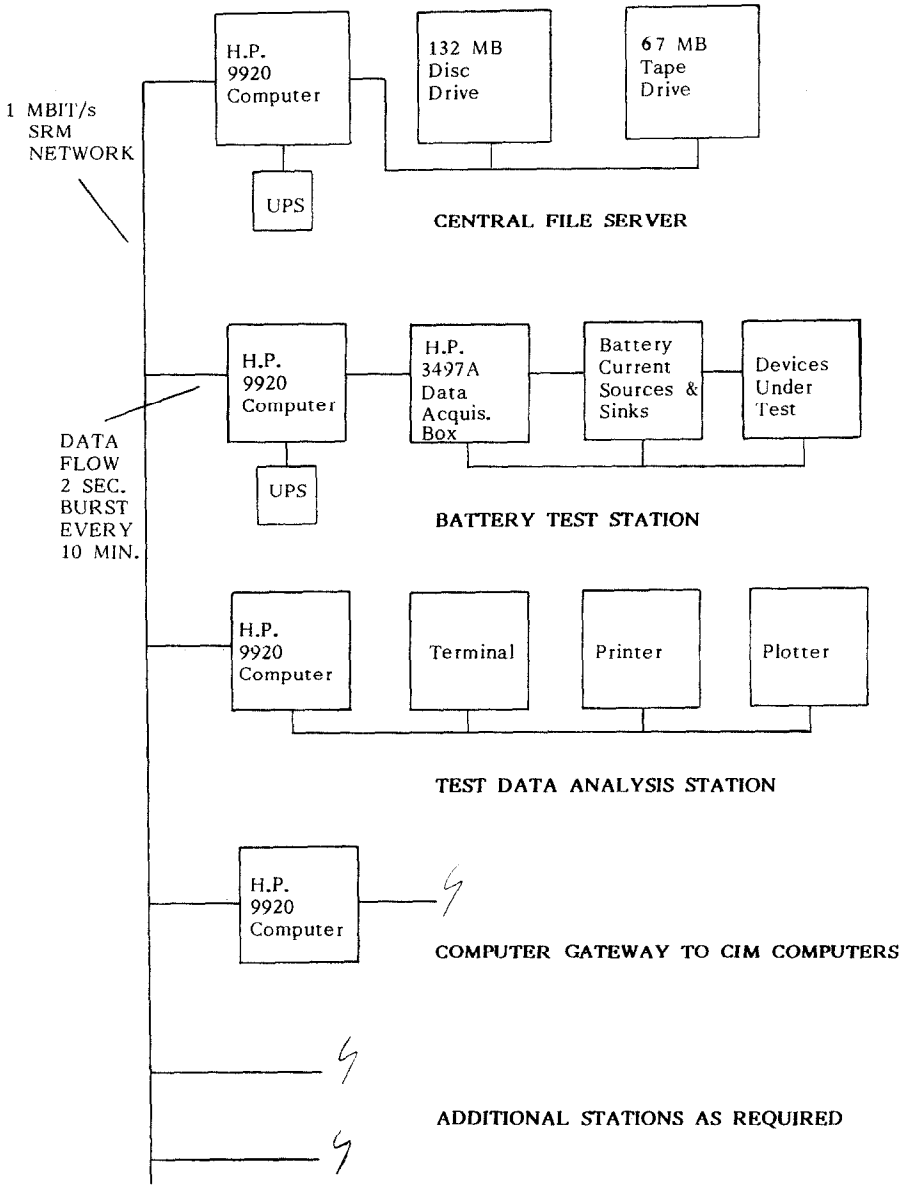

Fig. 1. Test station network.

The individual battery test stations are built around battery cycling devices. These are SCR controlled d.c. sources and sinks used in constant current mode. The current is set by D/A converter hardware that is in an H.P. data acquisition product called a 3497A. This same data acquisition product contains the system DVM and scanning cards used to read all the voltages at the test station including current shunt voltages and thermo-

couple voltages. Dry reed relay scanners are being used but may be replaced by mercury wetted relays if relay life becomes a problem. As a contact saving technique, the scanners are arranged and driven by software to step up the ladder of cells in a string and then down again in order to minimize contact damage.

System rationale

The advantages of building the network using an off the shelf system, rather than using less expensive hardware and adding special file transferring software, are project completion speed and cost. In this system the cost of the large power supplies, data acquisition hardware, and test fixtures significantly exceed that of the computer network. The additional up-front cost associated with the greater capability system is more than offset by the time saved. Many projects and companies have been held back in the past by underestimating software development time.

Once production commences, this concept of independent stations will allow linking of test data to a manufacturing computer system that controls part processing in all plant areas. In this way process capability data are compiled and used to control the manufacturing process. This communication would be accomplished by network stations acting as gateways whose function is to transfer files between the SRM system on which they are resident and the host system to which they are linked via communication lines.

Conclusion

The ease with which such a network has been assembled and utilized promises success not only during the product development phase of the program but also in the manufacturing phase where the network can be employed for process control. For these reasons, it is obvious that this is the direction in which system architecture is heading in testing and factory automation environments.