Availability predictions based on constant failure rate models for ground segment equipment are found to be optimistic and show low correlation with operational data. New Weibull reliability models are applied to the ground segment equipment which result in excellent correlation with operational availability. These new representative models are used for realistic reliability analyses, corrective actions and future projections.

Availability tradeoffs are also studied to evaluate the levels of maintainability required to support the availability objectives for different types of satellite ground stations. Also spares provisioning is evaluated to establish the effective utilization of spares for the required availability.

Optimal number of failures before replacement time. TOSHIO NAKAGAWA. *IEEE Trans. Reliab.* **R-32** (1), 115 (1983). This paper considers a model for determining the optimal number of failures before replacement time, in which a failed unit undergoes minimal repair between replacements. The optimal number N^* to minimize the mean cost rate is discussed when the scheduled replacement time T is specified.

A moments compiler for computing Bayes intervals for complex systems. WILLIAM A. METLER and DUANE DIETRICH. *IEEE Trans. Reliab.* **R-32** (1), 111 (1983). This paper develops algorithms and computer processable expressions for the practical computation of the moments of system reliability from the moments of the individual components. The linear (de)composition of structures is extended to an hierarchical (de)composition of reliability functions and moments. A computer processable expression of the system structure is presented for defining an arbitrary configuration of any size of multiple series, parallel, complete, and partial k-out-of-n:G modules.

Quality assurance for computer programs. R. H. DUNN and R. S. ULLMAN. *Electl Commun.* **57** (4), 301 (1983). The consequences of programming defects are becoming increasingly serious as programs become more sophisticated. Quality assurance groups working with program developers can dramatically cut the incidence of such defects.

Optimal sequencing of items in a consecutive-2-out-of-*n* system. V. K. WEI, F. K. HWANG and V. T. SOS. *IEEE Trans. Reliab.* **R-32** (1), 30 (1983). A *consecutive-2-out-of-n system* is an array of n items in a line such that the system fails if and only if two consecutive items both fail. Suppose that the items have different probabilities of failing and that the system can be arranged into any sequence of the n items. Which sequence minimizes the probability of a system failure? It has been conjectured that the best sequence is one which essentially interlaces the more reliable items with the less reliable items. This paper partially supports the conjecture by proving it for the case that: (a) the n probabilities take on only two distinct values, and (b) the n probabilities take on only three distinct values, including either a zero or a one.

Reliability prediction for microelectronic systems. PATRICK D. T. O'CONNOR, MICHAEL G. HEAD and MALCOLM JOY. *Proc. A. Reliab. Maintainab. Symp.* 452 (1983). The paper discusses the limitations of the MIL-HDBK-217D method for predicting the failure rate of digital microelectronic systems. It proposes an alternative method to assess reliability at two levels. The level 1 reliability prediction provides system level forecasts for logistics and cost planning purposes, using a simpler approach than that of MH-217D. The level 2 approach would be applicable to evaluation of critical system functions, and LSI device design. The level 2 reliability prediction is based on failure mode, effect and criticality analysis (FMECA) applied at the functional element level within microelectronic devices, taking account of how these are driven by the system software.

An example of the level 2 approach applied to a simple microprocessor operation is given.

Finding faults—a dilemma for statisticians. MARTIN A. METH and THOMAS A. MUSSON. *Proc. A. Reliab. Maintainab. Symp.* 351 (1983). Today most complex systems are using forms of automated diagnostics such as built-in-test (BIT). The automated diagnostics are developed as an integral part of the system design process and validated as part of the system test and evaluation. Recent experience with Department of Defense systems is that the resulting diagnostic capability is far less than the user expected. This paper characterizes the statistical and engineering view of the automated diagnostics development process. Assumptions that are made in the current process are analysed. Potential problems in the area of test design will also be discussed. The authors hope that this paper will encourage others to examine these issues, to perform studies to further illuminate these problems and develop potential solutions to help in the acquisition of future automated diagnostic systems.

Sparing for repairable, redundant systems. HAROLD L. PLATZER. *Proc. A. Reliab. Maintainab. Symp.* 394 (1983). A spares kit is usually selected to maximize reliability. This paper considers repairable systems in which spares are selected to maximize availability. A brief review of conventional sparing theory is followed by a discussion of the modifications required for selection of a spares inventory to maximize availability. Stock, or inventory for a depot is discussed. Finally, an analysis is given of the spares requirements for a redundant system.

Failure rate calculations using a programmable calculator. DONALD L. DENTON. *IEEE Trans. Reliab.* **R-31** (4), 324 (1982). This paper describes a TI 59 program which calculates the acceleration factor between any two temperatures, equivalent unit-hours at one temperature based on actual test hours at a second temperature, the x^2 approximation at any of seven s-confidence levels, and the s-confidence limit failure rate estimate in both %/1000 hr and FITs. The program allows numerous entries of separate sample results which the calculator stores and then performs a single failure rate estimate calculation. Required inputs are test temperature, temperature at which the failure rate estimate is desired, the activation energy, and the number of failures during the test. The equations for the program are reviewed and tables are included showing all labels and memories used, and the 355 program steps listing.

On the survivor function of a mixture in life testing. RAMESH C. GUPTA. *IEEE Trans. Reliab.* **R-32** (1), 34 (1983). In reliability studies the survivor function plays a very important role. This paper considers the class of exponential type distributions and indicates a method for obtaining the survivor function of its mixture. Two examples are provided as illustrations from which some well known results follow trivially.

Testability/fault isolation by adaptive strategy. HAROLD S. BALABAN and WILLIAM R. SIMPSON. *Proc. A. Reliab. Maintainab. Symp.* 344 (1983). STAMP is a computer-aided testability design and fault diagnosis system. Through dependency analysis, STAMP generates all higher order dependencies and their implications. This allows for both testability assessment and fault isolation. Fault isolation details are discussed in this paper, including a new information theoretic approach (adaptive) that offers significant improvement over other search strategies. The adaptive method may also be weighted for specific isolation objectives such as minimum cost or time. Examples are presented for a sample system, including fault tree development.

Comparison of memory chip organizations vs reliability in virtual memories. RICHARD E. MATICK. *IEEE Trans. Reliab.* **R-32** (1), 48 (1983). Random access memory organizations typically are chosen for maximum reliability, based on the