ECSSL, EAI’s new hybrid program generation system, has compressed what formerly would have been a full week’s work into just three hours to get a complex, dynamic simulation “on line” with a PACER™ 600 computer. Engineers from GE’s Advanced Application Operation, Schenectady, N.Y., put ECSSL to the test at EAI’s Scientific Computation Center, programming simulation of a generator turbine. Starting at 2:00 pm one afternoon, the PACER 600 was up and running with correct solutions... including graphic displays... at 5:00 pm on the same day, ECSSL output, generated on a large scale digital machine, included complete program documentation, the HYTRAN® interpreter program for automatic set-up and check-out of the analog processor, and a run time executive for interactive program operation. In addition to the time advantage for hybrid program set-up and execution, the ECSSL compiler relieved the users from having any knowledge of the particular hybrid computer’s hardware configuration... all programming is at the problem level. ECSSL-created programs can be re-loaded and executed on a hybrid computer in less than two minutes via the HYTRAN files that are produced and stored on disc or tape. Further information on ECSSL is available from EAI field offices or from J. Bruce Mawson at West Long Branch, N.J.

An EAI MiniHYBRID computing system has been installed at the Division of Biocybernetics at Tokyo Medical and Dental University. The MiniHYBRID, in this instance consisting of an EAI 185 desktop parallel analog processor, communications interface and a PACER 100 digital computer, has several key applications. These include studies of sleep mechanisms and control, translating data from test subjects into automated techniques for sleep data analysis. Inputs from instruments such as the ECG and EEG are analog while system output... sleep stage, number of events, etc... are in digital form. In addition to this on-line data acquisition and analysis application, the system also has off-line capability for analysis of tape recorded sleep data, with playback at speeds several times greater than real time. Other uses include development of models for internal secretion control systems such as hormone regulation, study of organism responses, and model validation and optimization.

Set up time and productivity of EAI 580 and 581 analog computers can be much improved by addition of a new hybrid expansion package that’s now available from Electronic Associates. Designed for on-site installation, the package consists of a 16K word PACER 100 digital computer, dual floppy disc bulk memory, hybrid communications interface, a TTY or alphanumeric/graphic CRT terminal, and complete hybrid and digital operations software. This control and computation expansion means that all analog operating parameters can be handled automatically, with time scales, analog and logic modes, amplifiers, integrators and servo-potentiometers set and checked within seconds. Full details on the 580, 581 hybrid expansion package may be obtained from Gary Kaplan at West Long Branch, N.J. or an EAI field office.

Many problems in the design and optimum operation of diesel engines have yielded to hybrid computation techniques at Cummins Engine Company, Columbus, Indiana. Assignments for Cummins’ EAI PACERTM system include dynamic analysis of cam shaft and valve train designs, cooling systems, and various types of fuel injectors for highest operating economy consistent with mechanical limitations. The system is also used for reduction and analysis of engine test data recorded on FM tape during road test and test cell operations of Cummins’ high quality engines. Another frequent use is in providing highly reproducible control of an engine test stand employed for emission studies under a variety of speed and load conditions.

Six degree of freedom missile simulations that incorporate complex aerodynamic functions can be run at speeds in excess of ten times real time on hybrid computers equipped with the new EAI Multi-Variable Function Generators (MVFG), according to a recent study (EAI SCR 76-7). The MVFG’s are continuous, independent computational devices, like other analog computing elements. In the missile application they generate the aerodynamic coefficients, requiring many functions of two and three variables as well as many single variable functions, virtually instantaneously to relieve the digital CPU from this formerly time consuming task. The digital computer may be used for better-suited tasks and possible solution frequency is significantly increased. Set up under control of the digital computer before simulation runs, the MVFG runs as a stand-alone device with as many as 256 breakpoints per independent variable and continuous analog interpolation between each point for highest fidelity in function generation. For further data on MVFG’s, contact either J. Bruce Mawson at West Long Branch, N.J., or an EAI field office.

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