
Software Directory



September 1983

**CYBERNET®
SERVICES**

**software
directory**

SEPTEMBER 1983

CYBERNET Applications to Help You Do Your Design, Engineering or Management Job Better and Faster

This directory provides a brief reference to application programs available through CYBERNET Services, Control Data's worldwide remote computing service. These applications can help you meet the challenges facing you today—whether they are in construction, manufacturing, electronics, petroleum, mining, energy or government. CYBERNET applications can help engineers improve and reduce costs while improving productivity and reducing lead times. Managers can use CYBERNET applications to plan and administer projects, obtain better management information, make better use of capital, budget and forecast more accurately, and much more.

Data sheets on each CYBERNET application provide detailed descriptions of capabilities and support. Brochures tell how CYBERNET applications solve specific industry and engineering problems. User manuals describe program methodology and how to use the program. For more information contact the Control Data sales office nearest you or write:

Control Data Corporation
CYBERNET Services
HQW05H
P.O. Box 0
Minneapolis, MN 55440

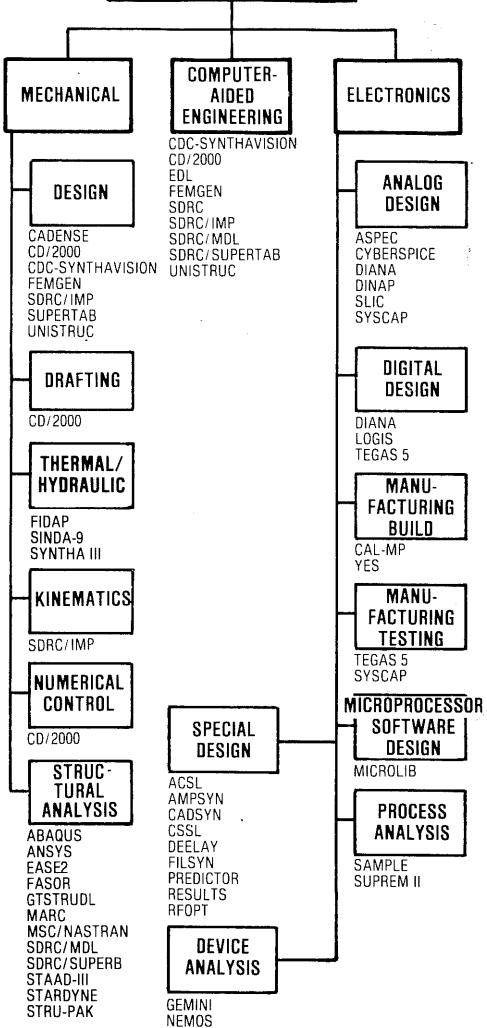
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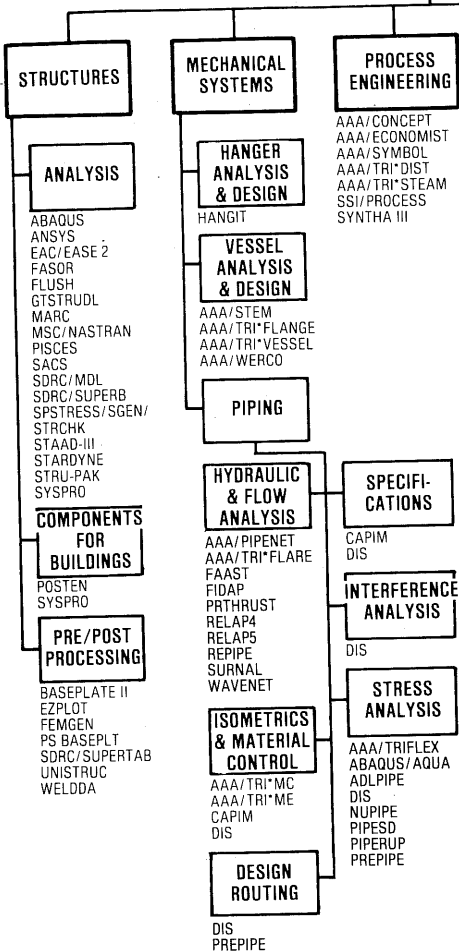
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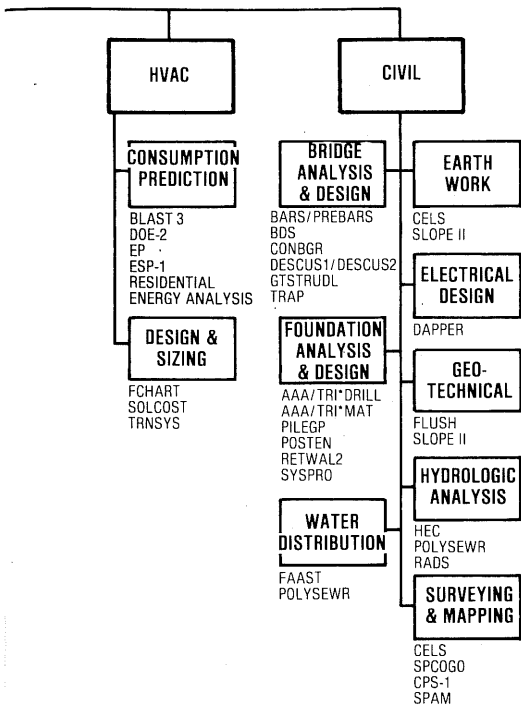
CYBERNET Services specializes in meeting the needs of high technology industries—manufacturing, construction, electric utilities, petroleum, and mining. We provide the computing resources, the in-depth understanding, and the high level of support required by these industries. The following charts show some of the application capabilities we offer to solve specific problems.

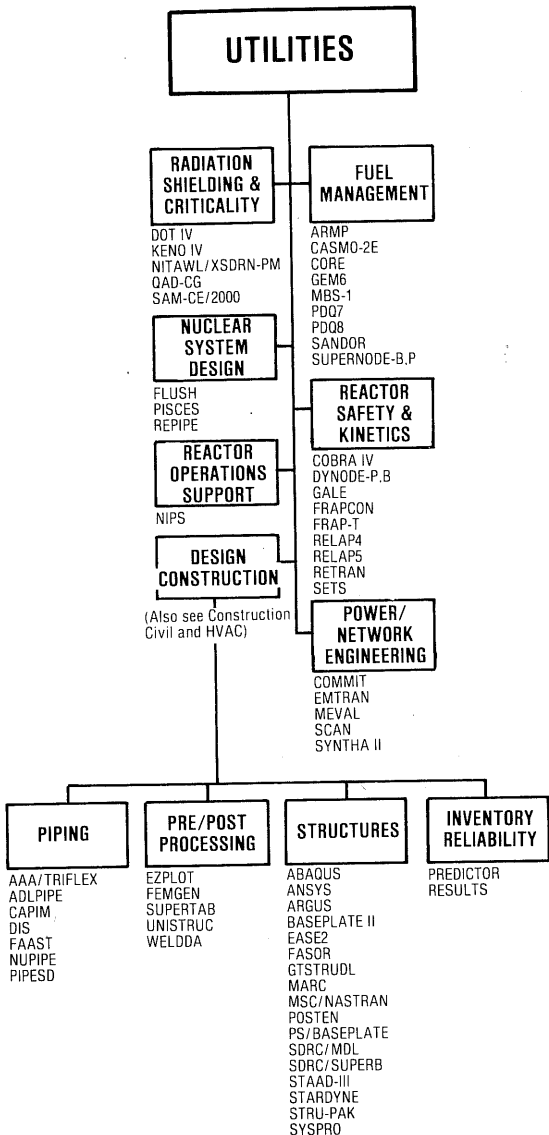
MANUFACTURING



CONSTRUCTION







MINING

EXPLORATION

CPS-1
MEGAS
MINECAN
MINEVAL
POLYGON
SACM
URANIUM
XPLOR

ENGINEERING/ PRODUCTION

CPS-1
MINEVAL
MITIS
MIVENDES
MSCDES
POLYGON
SACM
SEAMSYS

STRUCTURE SOIL ANALYSIS

ABAQUS
ANSYS
FLUSH
MARC
PISCES
SLOPE II

PETROLEUM

MAPPING/ PLOTING

CPS-1
SACM
SURFACE MAP

REFINING, PROCESS ENGINEERING

AAA/CONCEPT
FAAST
SSI/PROCESS
SYNTHA III
(Also see Construction)

MATERIAL CONTROL

AAA/TRI*MC
AAA/TRI*ME
CAPI'M
DIS

OFFSHORE ANALYSIS

ABAQUS/AQUA
OSCAR
SACS

EXPLORATION PRODUCTION

COMEX
IPA
MAGEV
MVIP
VIP
XPLOR

DESIGN CONSTRUCTION

PIPING

AAA/TRIFLEX
ADLPIPE
CAPIM
DIS
HANGIT
PIPEDS
(Also see Construction)

PRE/POST PROCESSORS

FEMGEN
SUPERTAB
UNISTRUC

STRUCTURES

ABAQUS
ABAQUS/AQUA
ANSYS
BASEPLATE II
EASE2
FASOR
FLUSH
GTSTRUDL
MARC
MSC/NASTRAN
PS/BASEPLATE
SDRC/MDL
SDRC/SUPERB
STAAD-III
STARDYNE
STRU-PAK
SYSPRO

MANAGEMENT

**BUSINESS
PLANNING**

IFPS
SORITEC

**BUSINESS
PLANNING
DATA BASES**

TECHNOTEC

**BUSINESS
PLANNING
GRAPHICS**

PLOTPAC

**DATA BASE
MANAGEMENT**

BASIS
IPF
SYSTEM 2000
TOTAL

GRAPHICS

CPS-1
DISSPLA
PERSPECTIVE
PLOT-10
SACM
SPAM
SURFACE-MAP
TIGS
UNIPLLOT

OPTIMIZATION

APEX IV
PDS/MaGen

**PATTERN
ANALYSIS**

IPA

**PROJECT
MANAGEMENT**

EZPERT
FEPP
MITIS
ORR
PROPLAN

**PROJECT
PLANNING**

EZPERT
FEPP
ORR
PROPLAN

SIMULATION

GPSS V
SIMSCRIPT II.5

**STATISTICS/
MATH**

BMDP
EISPACK
IMSL
LINPACK
MAGEV
MINPACK
P-STAT
SIR
SPSS

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data management tools

- **Data Base Management**
- **Graphics**

Data Base Management

BASIS

Information storage, retrieval and analysis. BASIS is used to search data bases containing textual or numeric data. Searches are done by keyword, subject area, numeric value, range of numeric value or Boolean logic. It adds document retrieval to the data management capabilities available from CYBERNET Services. It is best suited to problems where the user needs a small set of documents or textual data from a large body of data. Interactive.

DSS

Decision Support System integrates IPF2 and IFPS. DSS users can gather and organize large volumes of data from multiple sources, select and consolidate information. Models can be constructed to describe plans or analyze trends, simulate different business conditions and explore decision alternatives.

IPF™ INFORMATION PROCESSING FAMILY

A family of interactive data handling programs designed to interface with standard sequential or indexed sequential data files. These files can be part of existing applications or can be newly created within the IPF system. The Update module allows users to create and maintain data bases. The Query module allows the user to browse through data files, satisfying *ad hoc* requirements for information. Formal reports can be created with a few simple commands in the Report Writer module. IPF is designed for the nontechnical user as well as for application developers. The Transform module enables application developers to quickly and easily specify required data transformation processes.

SIR

A data base management preprocessor for the SPSS statistical analysis program. SIR is designed specifically for large or hierarchical statistical data bases. Selective retrieval of data elements, coding of missing values and communication via SPSS internal files are supported. A report writer is also available. Batch and interactive.

SYSTEM 2000

Powerful and sophisticated hierarchical data management system used to create, maintain and retrieve information from large data bases. SYSTEM 2000 can answer almost any kind of ad hoc query through use of its English-like language; if information is contained in the data base the user can access it in any combination or with any specified restraints. Users need not be concerned with records, files or characters but can relate to the data in terms used in their business. For repetitive tasks, a FORTRAN or COBOL program can be linked to the system. Batch and interactive.

TECHNOTEC™ Technology Exchange Service

Interactive technology exchange service. TECHNOTEC facilitates the exchange of technology between industrialized and developing nations, between industries, within a diversified corporation and within centrally planned economic systems. Three major data bases are stored on the system: (1) offers of technology; (2) descriptions of unsolved problems and requests for technology; (3) a file of experts offering consulting. Subscribers are charged for input and storage. Persons searching the data base are charged only for time spent at an interactive terminal plus a surcharge if a contact is requested. Interactive.

TOTAL

A network-oriented data base management system which provides an interface between a user's applications and data files. TOTAL's modular, evolutionary structure allows a user to start with a basic data base, add new records and data sets, and establish new data relationships without impact to existing applications. Batch.

Graphics

CPS-1

Contour Plotting System. A general-purpose contouring package with exceptional capabilities. Typical input to CPS-1 is a set of irregularly spaced (x, y, z) samples of a smooth continuous or faulted surface. Using this data and an assortment of gridding algorithms, the program maps a best-estimate surface. In addition, CPS-1 can produce a variety of graphic displays including contour plots, several types of isometric surface projections, cross-section or profile plots, gradient vector slope plots, and annotated posted base maps. CPS-1 also provides surface operations, including measurement of areas and volumes, logical and algebraic surface-to-surface computations, surface differentiation, and inverse sampling. Batch.

DISSPLA

Publication quality software capable of producing virtually any graphic data display including business graphs, data presentation, three-dimensional models, maps and contour plots. DISSPLA includes the axis systems used most often: linear, month, calendar, user-labeled, logarithmic, and polar. Pie charts and bar charts drawn with DISSPLA may have their respective segments/bars optionally filled with a variety of shade patterns. Line graph users can elect to use a variety of line styles, thickened curves, smoothed curves, or shading below or between curves. When labeling graphs, users have a choice of 13 different alphabets in 10 different styles. Three-dimensional surfaces can be drawn with or without hidden lines removed and viewed from an arbitrary point in space. Mapping users can use one of 16 different map projections and have access to data files containing world coastline and political boundaries. Batch and interactive.

PERSPECTIVE

A graphics program that produces pictorial renditions based on three-dimensional data described by the user. The pictures are accurate visual simulations of the objects as they would appear from any selected observation point. The observer can be located at any position or sequence of positions. Successive pictures can be produced which show how the picture data would look if the observer were to zoom in, walk around or walk through the data. The observer can be located in any empty space, on a surface, on a structure or even within a structure. Perspective, isometric, orthographic and stereo-graphic drawings can be produced. Batch.

PLOTPAC™

A business graphics program that produces time plots, bar charts, and scatter diagrams on inexpensive time-sharing terminals. Data can be entered from a terminal or it can be from IFPS (Interactive Financial Planning System) files or output files of FORTRAN, COBOL, BASIC or APL applications. The command language is simple and easy to use; a basic graph can be created with a single command. PLOTPAC is a module of the ASCENT financial management system and is compatible with IPF, Citibank Economic Data Base, IFPS and SIBYL/RUNNER. Interactive.

PLOT-10

Family of Tektronix 401X-compatible software with nine discrete packages. PLOT-10 allows users to draw line graphs, bar charts, pie charts, and time series plots. Linear, semi-log, log-log, and polar scaling are available. Two of the packages, Interactive Graphing Package and Easy Graphing, draw business graphs without requiring FORTRAN programming. Easy Graphing is also interfaced to UNIPLOT and can draw on a variety of graphics hardware. Interactive Graphics Library (IGL), newest addition to the PLOT-10 family, is a SIGGRAPH core graphics system compatible subroutine library supporting the entire Tektronix hardware product line. IGL offers a user device independence, color support, 3-D support, choice of fonts, panel fill/emulation, and segmentation. Interactive.

SACM

Surface Approximation and Contour Mapping. SACM approximates continuous surfaces from random data points with optional detection of or user defined discontinuities. SACM performs surface contour plotting, volume and surface area calculation, elevation calculation and true three-dimensional representation of a surface. SACM can be used to evaluate geologic data, calculate surface contours and determine strata depths and volumes. The program provides easy-to-use free-form input which can be preprocessed for verification prior to execution. Batch and interactive.

SURFACE-MAP

Creates contour maps and cross-section plots of a surface. Surface data is specified by the user as a group of points from which SURFACE-MAP calculates analytical expressions representing a continuous surface. It provides extensive capabilities for specifying how the surface expressions are calculated, how the display data is drawn and what additional descriptive information is added to the plot. Batch.

TIGS

Terminal Independent Graphics System. TIGS supports a variety of interactive graphics terminals while providing application program independence from terminal characteristics. Two- and three-dimensional software routines include primitives (lines, dots, arcs, text, plotting symbols), picture and segment operations, window and viewport routines, transformations, geometric utilities and terminal control functions. Interactive.

UNILOT™

Universal Plotting Interface. An interface that creates display or plots of output from a batch program. UNILOT links an application to virtually any graphics device, including pen plotters, display tubes, refresh scopes and microfilm plotters. UNILOT standardizes the CYBERNET plotting capability and allows a user to preview a plot on a display device, delay selection of a plotting device until plot time, then run the plot without rerunning the application. Batch and interactive.

XPLOR

A group of programs that provides automatic processing of digital imagery (such as LANDSAT, aerial, and radar imagery) and collateral data to aid in exploration for oil and minerals. Photo-geological mapping functions are performed in areas of structural mapping, identification of rock types, and geomorphic analysis. Batch.

energy engineering

- **Nuclear Power**
- **Civil Engineering**
- **Geoscience**
- **Thermal Hydraulics**
- **Energy Analysis**

Nuclear Power

ARMP

Nuclear core and fuel analysis programs developed by Control Data and Nuclear Associates International (a wholly owned subsidiary of Control Data) for the Electric Power Research Institute. These programs are used for reactor operations monitoring and performance evaluations, with special emphasis on plutonium recycling. The main difference between ARMP and similar packages is in the two programs, EPRICELL and CPM, which allow the analysis of plutonium recycling. ARMP is offered through CYBERNET Services but support and documentation should be obtained from Nuclear Associates International, 6003 Executive Boulevard, Rockville, MD 20852; telephone (301) 468-8250. Batch, U.S. only.

CASMO-2E

Advanced nuclear fuel management application program for the analysis of Light Water Reactor (LWR) fuel assemblies. CASMO-2E (E-Extended) is capable of generating PDQ-7/8, MBS and nodal application input data (for example, SUPERNODE). Important new improvements of the -2E version over the previous version is the capability to handle full nonsymmetric 18 X 18 PWR fuel bundles, high weight percent gadolinia using MICBURN-2, and the new ASEA BWR fuel assemblies. Control Data supports linking application products which automatically link CASMO-2E files to PDQ-7/8, MBS and SUPERNODE to provide ease of use and QA reliability.

CONTEMPT-LT

Containment analysis. CONTEMPT-LT computes long-term containment response to a loss-of-coolant accident, including the effects of pressure suppression systems such as sprays, fans and coolers. Because long term may mean many hours, CONTEMPT-LT is of necessity faster and has less complex geometry than the RELAP programs. CONTEMPT-LT is an accepted method for calculating the long-term reactor building pressure response for both loss of coolant and steam line break occurrences. Batch.

CORE

Designed for Pressurized Water Reactors (PWR) with in-core flux monitoring systems, CORE analyzes nuclear reactor operational data. DETECTOR provides a "best estimate" for core power distribution. Associated parameters are determined that can be used by the operating utility: heat-flux peaking factor, enthalpy-rise peaking factor, axial offset ratio, quadrant power tilt ratios and comparisons with plant technical specification limits. Special features include: Technical specification compliance analysis, calculational options, uncertainty analysis, data reduction and error analysis, output edit options. Auxiliary programs in the CORE package are BURNUP, THERMOCOUPLE, and REACTIVITY.

DOT IV

DOT IV takes advantage of the vector processing and large memory space available on the CYBER 200 to efficiently solve problems too large for other computers. Features new to DOT IV include variable space mesh, variable directional quadrature specifications and an improved weighted-difference model to ensure positive fluxes for deep penetration problems and various diffusion theory options. Batch on CYBER 200 service.

DYNODE-P,B

Yields major NSSS parameters such as core power and heat flux, loop temperatures and pressure resulting from specified perturbations to the NSSS. DYNODE simulates transients resulting from perturbations such as control malfunctions, rod drop and withdrawal, moderator temperature and density changes, inadvertent main steam system valve operations, main steam isolation valve closure, opening of main steam dump valves, loss of coolant flow and locked rotor. The results from DYNODE-2 can be used by the thermal-hydraulic programs such as COBRA, to calculate margins to specified acceptable fuel design limits. Pressurized water reactor (PWR) and boiling water reactor (BWR) versions of DYNODE are available. Batch.

FRAPCON

Predicts the steady-state, long-term burnup response of oxide fuel rods in a light water reactor (LWR). FRAPCON also generates the initial conditions for transient fuel rod accident analysis. FRAPCON calculates the interrelated effects of fuel and cladding temperature, rod internal pressure, fuel and cladding deformation, release of fission product gases, fuel swelling and densification, cladding thermal expansion and irradiation-induced growth, cladding corrosion, and crud deposition as functions of time and specific power. Batch.

FRAP-T

Predicts the thermal, mechanical and internal gas pressure response of a water-cooled, zircaloy-clad, oxide fuel rod during a loss-of-coolant accident (LOCA), power-coolant mismatch (PCM), or flow blockage accident. Batch.

KENO-IV

A multigroup Monte Carlo criticality program. The principal result provided by KENO-IV is the K-effective of the system under consideration. Other results include the life time, generation time, matrix K-effective, leakage, absorptions, fluxes and fission densities. KENO-IV can perform criticality searches on unit dimensions or the number of units in an array. Special geometry routines to model complicated configurations are used. Batch.

MBS

MBS-1 is an advanced 2-dimensional diffusion theory application for the analysis of quarter core depletion analysis. MBS has many similarities to PDQ-7 and uses CASMO cross-section data for input. Unique features include the generation of PWR "INCORE" or "CORE" data, advanced diffusion theory techniques, and automatic linking of input data from CASMO-2E.

MEKIN-B

Three-dimensional transient kinetics program with coupled nuclear/thermal hydraulics for light water reactors. Coupled with the COBRA-III-C thermal-hydraulics program, MEKIN-B solves steady-state and time-dependent neutron diffusion equations. MEKIN-B is an advanced version of the MEKIN program available from the Electric Power Research Institute. Improvements of MEKIN-B over other versions include:

- Refined feedback model
- DNBR/thermal margin
- Temperature-dependent thermal conductivity and specific calculations
- Fuel enthalpy calculation
- Acceleration in the nuclear-thermal-hydraulic coupling

Batch.

PATH

Gamma shielding and dose rate calculation program based upon point kernel integration. PATH can be used for gamma shielding design and analysis for a complex source-shield configuration. Various source types and source term options are available. Provides result of the total dose rate at a specified dose point as well as contributions from individual sources to the total dose rate. Can also identify major contributors to the dose rate by nuclide.

PDQ7V2

Multi-group diffusion/depletion analysis that solves the neutron diffusion equations in one, two or three dimensions. Steady-state solution of the flux, power distributions and the reactivity are obtained. A specified interval of depletion may be input, resulting in the prediction of nuclide concentrations via the depletion equations. Detailed fuel burnup, reactivity and power peaking during nuclear operation can be predicted. PDQ7V2 is complemented by a set of auxiliary programs. SHUFFLE—shuffles and replaces fuel assemblies; INTEGRAL—performs flux and power edits; EXPAND—expands a concentration file to a quarter-core, half-core or full-core geometry; PREFIT—processes the integral file and prepares input; MODEL PROGRAMS—manages data files created by PDQ7. Batch, U.S. (restricted to use by U.S. citizens who have signed a U.S. Naval Reactors Agreement).

PDQ8CDC

Nuclear fuel management analysis program for light water reactors (LWRs). PDQ8CDC solves the multigroup neutron diffusion theory equation in one, two, or three dimensions and performs burnup calculations using block depletion. Steady-state solutions provide detailed flux and power distributions, reactivity and nuclide concentrations. Complementary programs include: PDQCNV — converts PDQ7 concentration files to PDQ8 format; INTEGRAL — performs flux and power edits; MODEL II — manages the PDQ8CDC data files. Batch 176 NOS only (restricted to use by U.S. citizens who have signed a U.S. Naval Reactor Agreement supplied by Control Data Corporation).

RELAP4

Reactor Loss-of-Coolant Accident Program. Calculates one-dimensional, unsteady multiphase flow in complex pipe networks. Developed for analyzing large-break loss-of-coolant accidents, RELAP4 simulates the effects of hardware, such as pumps and valves, nonadiabatic surfaces, and the reactor core on the fluid behavior. A link to the REPIPE program is also available. Interactive.

RELAP5

Reactor Transient Analysis Program. An advanced thermal-hydraulics program for analyzing complex transients in nuclear reactors and piping networks. One-dimensional methodology calculates unsteady steam and/or water flow. The equations can calculate nonhomogeneous, nonequilibrium conditions between steam and liquid phases. Models simulate hardware such as pumps and valves, nonadiabatic walls, and reactor control systems. RELAP5 can analyze most operational transients required for reactor analysis as well as small- and large-break accidents. A link with REPIPE also is available. Interactive.

REPIPE

Piping hydraulic transient analysis. REPIPE, coupled with either RELAP4 or RELAP5, computes time history fluid reaction forces in a system for use in structural piping analysis programs. The program calculates one-dimensional, unsteady multiphase flow with and without adiabatic walls, and investigates piping transients under a variety of plant conditions. Typical problems that can be simulated include detailed analysis of a pressurizer relief valve line including quenching; pressure and temperature histories following the rapid interruption of steam flow in a steam line and pressure wave propagations (water hammer) following closing of a feedwater isolation valve. The program has four forms of the conservation of momentum equation to cover virtually all configurations. Both printed output and punched cards are produced in the input formats for a number of piping stress analysis codes. Batch.

RETRAN-2/MOD-2

Advanced thermal-hydraulics program designed to analyze the transient behavior of a light water reactor subjected to anticipated operational transients and normal start-up and shutdown maneuvers. RETRAN employs a generalized nodal scheme to calculate the transfer of steam/water within the reactor system. Appropriate models for things such as the reactor core, pumps, and valves, are available. This program is available only to users who have obtained a license from the Electric Power Research Institute (EPRI). Batch, U.S., NOS 176.

SAM-CE/2000

Provides a solution to complex three-dimensional criticality and shielding problems. Solves time-dependent neutron and gamma ray transport equations for combinatorial, complex combinatorial and special reactor geometry. The system consists of SAM-F (Monte Carlo), SAM-LIB (ENDF-B/IV-V Libraries), SAM-X (Cross-section generator) and SLICER (Geometry verification). Batch.

SETS

Probabilistic Risk Assessment (PRA) application product for the analysis of fault tree and event tree problems for nuclear power plants. SETS can handle exceptionally large fault trees not handleable by other similar applications. Auxiliary products include SEP, IMPORTANCE and PLOTST. IMPORTANCE computes various measures of system performance for model in terms of fault tree with a top event. SEP permits the user to manipulate and evaluate reduced fault tree equations and identify the probability of occurrence of any desired event and generates a ranking. PLOTST, the fault tree drawing program, produces plots of SETS input.

SUPERNODE-P/-B

Advanced, highly efficient, 3-dimensional nodal analysis application product for nuclear fuel management. Based on the methodology of EPRI-NODE-P/-B, SUPERNODE takes advantage of CYBER computers to give a significant cost advantage over similar applications. SUPERNODE-P is for pressurized water reactors and SUPERNODE-B is for boiling water reactors.

Civil Engineering

CELS

Civil Engineering and Land Surveying applications for design of roads, highways and water distribution. CELS is a series of 15 programs that determines cut and fill requirements for grading streets, analyzing culvert capacity, estimating earthwork quantities, calculating water runoff from streams and calculating flows of channels. The principal capability of CELS is coordinate geometry mapping. The program can be used in combination with SPAM (a subdivision and parcel mapping application). Interactive.

HEC

Hydrologic Engineering Center programs are a series of independent, interrelated applications for the simulating and modeling streams, rivers and watershed regions. Interactive.

POLYSEWR

Four programs for design and analysis of storm and sanitary sewers: POLYSAN — sanitary sewer design, POLYSTRM — storm sewer design, POLYREVV — sanitary sewer review, and POLY/REVWS — storm sewer review. The library has capabilities for flow accumulation, pipe design and analysis, hydraulic analysis, cost estimating, and a variety of other special purpose reports. Batch.

RADS

Rainfall and Drainage Simulator. Simulates hydraulic performance of both urban and undeveloped drainage areas, including flow of water across the surface of a study area and through networks of storm sewers and channels. Batch and interactive.

SLOPE II

Calculates earth slope factor of safety so angles can be safely increased, thus maximizing return on investment in mining operations and reducing costs on civil construction projects. Uses limit equilibrium methods of analysis to determine optimum design parameters for a slope. Provides seven methods of analysis, and dual failure mode analysis for each method. Produces output files compatible with a variety of plotting programs. Batch and interactive.

Geoscience

COMEX

Series of programs to aid integrated geophysical interpretation. Seismic and Map Digitizing—Events can be digitized from seismic sections, velocities from either velocity profiles or velocity surveys and locations from seismic base maps.

Well Log—Captures geologic data in the form of digitized well logs.

Modeling Program—Aids in simple or complex stratigraphic modeling or complex structural modeling.

Seismic Inversion (ROVEL)—Produces acoustic impedance logs from seismic data and provides diagnostic options useful in interpretation. Batch.

FCONE

Open-Pit Optimization System. Examines various combinations of ore blocks considered for removal, in order to determine the "ultimate pit." Besides defining the optimum economic open pit mining limits, it may also be used as a rough scheduler to produce maximum cash flow.

IPA

Interactive Pattern Analysis. Classifies patterns into categories or classes for oil and gas exploration, among other uses. IPA is used to construct, verify and apply recognition models in any discipline where patterns can be represented by numbers.

Advanced computational techniques include: Extensive library of classical and new feature generation methods, feature reduction and modification, simultaneous structural and transform elements in feature vectors and different decision functions and feature generation logic at each node. Comprehensive graphic displays allow modification and enhancement.

MAGEV

Math-Geophysical Vector Library is a collection of highly-optimized FORTRAN-callable subroutines for the CDC® CYBER 205. Subroutines are high-performance vector kernels and solvers frequently encountered in signal processing and geophysical applications. Provide transition from scalar to vector performance for large applications codes such as seismic migration and reservoir engineering.

MEGAS

Integrated, geochemical analysis system used to evaluate geochemical data. Incorporates geochemistry, mineralogy and statistical knowledge. For single elements, MEGAS helps identify truly anomalous sample points and regions by preparing cumulative logarithmic probability distributions, showing cumulative deviation of sample points from a best-fit normal distribution. Multiple-element analysis computes a matrix of all inter-element linear correlation coefficients. Interactive.

MINEVAL

Mineral Evaluation System. Three-dimensional matrix of blocks evaluates deposits of massive, homogeneous or thickly layered commodities such as copper, molybdenum, iron, gold, alunite, asbestos, limestone or uranium. The system is divided into sections for intermediate study and analysis, data preparation and display, data interpretation and statistical analysis, and deposit model construction and display. Batch.

MIVENDES

A flexible system for testing and projecting ventilation networks in mines, tunnels and ducts. It differs from conventional analog and digital programs for airflow distributions by employing the cross-interaction method of balancing pressures around loops. Network calculations are based on mass flow rates to detect genuine air leakage currents and to obtain correct energy balances. Options include execute altimeter, face ventilation indexes, and combined or separate network, temperature and concentration calculations.

Input data requirements generally consist of anemometer and altimeter or magnehelix readings, with height, width and length measurements. Additionally, temperatures, humidities, methanometer, other gas and respirable dust percentages or concentrations and elevations can be incorporated.

MIVENDES can be used for:

- Coal mines including gob, bleeder and escapeway analyses
- Multilevel shafts, drifts, raises and stopes with auxiliary and booster fans
- Problems arising from methane and dust, thermal gradients, fire, interchanges between abandoned and open areas, temperature and air composition changes and ventilation forces resulting from these. Batch.

MSCDES

Multi-Seam Coal Deposit Evaluation System. For layered deposits such as coal, borate and phosphate. Formulates data gathered from geological surveys, adds topographic data and constructs a detailed mathematical model. Coal seam top and bottom elevations are estimated and adjusted. Number of partings of the seam, thicknesses of internal waste and up to 25 quality values are carried into the model. Detailed thicknesses are obtained. Contour maps and vertical and horizontal cross sections are produced. Batch.

MVIP

Miscible Vectorized Implicit Program. Numerically models the secondary or tertiary recovery of oil by means of miscible displacement. Underground flow of oil, gas, solvent, and water are calculated with finite difference methods using one-, two-, or three-dimensional grids. Rectangular or cylindrical grid networks allows solution of single well and field-scale production problems.

POLYGON

Performs mine design and ore reserve analysis. Each polygon can contain a variety of information, such as cutoff grades, minable ore and rock type, pertaining to its associated drillhole. In-place geological ore reserves reports may be generated immediately after construction of the deposit model. Waste and ore tonnages are distributed into a number of grade cutoff categories by rock or material type, associated secondary grades, and various grade and tonnage accumulations. These reserves are reported by bench and for total reserves. An economic analysis program calculates cost and potential profit on a hole-by-hole basis. Batch.

SEAMSYS

Seam System. For layered deposits such as coal. Composites exploratory drillhole data, incorporates topographic information, and constructs a gridded, three-dimensional deposit model. An unlimited number of drillholes may be considered. Seam top and bottom elevations are estimated and validated. Number of seam partings, thickness of waste between seams, and up to 300 quality values are carried into the model. Washability data may be included. Contour maps, vertical cross sections, and reserve reports are produced.

SPAM

Subdivision and parcel mapping. SPAM creates maps from files used by and created from the CELS (Civil Engineering and Land Surveying) programs POGOV1/BIGPOGO. SPAM-generated maps are fully annotated and include all line bearings and distances, survey points with numbers, all arc or curve data, traverse points and street center lines. The program provides a graphic presentation of the subdivision planning activities generated by the CELS program. Batch.

SPCOGO

SPCOGO is a language for specifying plane geometry calculations and a computer program for performing those calculations. Enhanced, easy-to-use version of the original COGO. Designed for surveyors and engineers without previous computer experience.

URANIUM

Helps solve complex problems of evaluation, development and production for mine modeling systems and ore reserve evaluation techniques, plus extra features especially tailored for processing and displaying uranium data.

VIP

Vectorized Implicit Program is a numerical reservoir simulator for vector processing computers. A reservoir engineer can predict the response of an oil- and gas-producing property to a variety of operating conditions or development plans. Underground flows of oil, gas, and water are calculated with finite difference methods using one-, two-, and three-dimensional grids. Single well and field-scale production problems can be solved, because rectangular or cylindrical grid networks can be used.

WAVES

Interactive wavelet estimation and shaping program used for seismic data processing; allows users to plot wavelets on a Tektronix terminal. WAVES corrects distortions caused by variation of near surface conditions, compaction differences, shot size and depth. It extracts the seismic source signature from the field record statistically, if not recorded, and designs wavelet shape correction operator from recorded or extracted wavelets to correct the recorded seismic data.

Thermal Hydraulics

COBRA-4

Code to calculate the transient and steady-state thermal-hydraulic response to accidents and off-design conditions. Batch.

FAAST

Fluid flow analysis for steady state and time simulation in closed fluid systems such as municipal water distribution, industrial process piping, fire protection sprinklers and agricultural irrigation systems. Allowable fluids include fresh and salt water, oils, chemicals, gases and slurries. FAAST models the system by means of flow-conducting elements of finite properties, conducting fluid between points of the system with known constraint values. Equations that relate the known and unknown conditions of the points are formed and solved, determining both the unknown conditions and the values of flow in all of the system elements. Batch and interactive.

FIDAP

Fluid Dynamics Analysis Package. Uses finite element method to simulate many classes of incompressible fluid flows. Two-dimensional, axisymmetric and three-dimensional steady-state or transient simulations in complex geometries. Includes FIPOST, a graphics post-processing program, and FIMESH, a general purpose mesh generator specifically designed for generating 2- or 3-D meshes for FIDAP.

HEXTRAN

Synthesis and optimization of heat exchange networks. Determines maximum theoretical heat recovery possible with available hot and cold streams, optimal heat exchange network configuration to achieve heat recovery desired, optimum exchanger area distribution in network, and existing exchangers performance with hot and cold feeds.

MITAS II

Heat-transfer analysis for calculation of thermal stresses on bridges, buildings and other structures; cooling requirements for electronic circuits; properties of thermal systems such as nuclear reactors and automobile engines. MITAS II performs steady-state and transient analysis of thermal analog models defined in a network format. Subroutines handle such interrelated complex phenomena as sublimation, diffuse radiation within enclosures and simultaneous one-dimension incompressible fluid flow. Batch.

SINDA-9

Systems Improved Numerical Differencing Analyzer. SINDA is primarily intended for analyzing thermal-fluid systems represented in lumped parameter form. The program can handle conduction, convection and radiation, and can be used to model applied heat sources or sinks, varying boundary conditions and nonlinear material properties. The thermal network can be coupled with a fluid network to permit the mutual influences of thermal and fluid problems to be included in the analysis of systems containing flowing fluids, fluid system controls and heat exchanges. A variety of solution techniques are provided for both steady state and transient problems. Batch.

SSI/PROCESS

Performs rigorous mass and energy balances. Unit operation modules are incorporated for the simulation of all process units typically encountered in the hydrocarbon, chemical and petrochemical industries. These can be combined and ordered to simulate processes of any degree of complexity. PROCESS encompasses the full spectrum of thermodynamic correlations, with proven accuracy over the full range of temperature and pressure, and includes state-of-the-art methods for computing phase equilibria in nonideal chemical systems. Data bank has fully detailed physical properties for more than 600 components. Batch.

SURNAL

Surge Network Analysis. SURNAL models pressure surges in hydraulic networks. It calculates maximum and minimum pressures of the liquid under the transient conditions and enables the user to ascertain the cause of surges. Furthermore, as it mathematically describes the operating characteristics of a wide range of surge-arresting devices, these can be accurately sized and evaluated for effectiveness. It can be used in the design of municipal and industrial water supply networks, oil pipelines, airport refueling systems, piping for nuclear reactors, and in the transient analysis of the conveyance of any liquid by a pipe network of arbitrary complexity. Batch.

SYNTHA II

Power plant design and performance analysis of operating plants. SYNTHA II assists utilities to achieve substantially higher thermodynamic performance with minimum fuel consumption. The program determines performance for any configuration of equipment that exists in fossil steam, nuclear steam or combined cycle electric power stations, and for coal gasification plants. The program can be used to study new designs, monitor performance of operating plants and evaluate alternatives to improve performance/output under nonideal component performance or thermodynamic restraints. Batch, U.S.

THERMAL

Heat transfer analysis. THERMAL provides solutions to 600 most frequently encountered thermal problems. The program analyzes conduction, natural and forced convection, boiling, condensation, radiation and combined heat transfer modes. Typical applications are found in design of electronic equipment, energy collection systems and heat transfer in manufacturing processes. Batch and interactive.

WAVENET

A package for the solution of wave transmission (fluid vibration) problems in complex networks of pipes or ducts. The program is applicable to a variety of problems including regular pulsation in gas or liquid piping systems, transient pulses in gas or liquid networks, and wave systems caused by radiation from turbulent flow. In addition to detailed information on local pressures and velocities throughout the system, the program develops exhaustive information on pressure-induced and momentum-induced structural forces (at valves, bends and junctions) for input to structural analysis programs. Batch.

Energy Analysis

BLAST

A comprehensive energy-analysis program for estimating hourly space heating and cooling requirements; hourly performance of fan systems; and hourly performance of conventional heating and cooling plants, total energy plants and/or solar energy systems. Advantages over similar programs include improved algorithms, English-language input, default equipment performance parameters, and ready availability for inspection. BLAST predicts space load for building zones, performing both hourly energy analysis and design day analysis. Batch and interactive.

DOE-2

Energy analysis of new or existing buildings, DOE-2 provides a comprehensive, flexible tool for building research and design and for code-compliance evaluation. It provides an hour-by-hour calculation of heating and cooling loads, simulation of the heating and cooling distribution systems, simulation of the primary energy-conversion plant equipment and the calculation of life-cycle fuel and operating costs. DOE 2.1 is the national standards program for the Building Energy Performance Standards (BEPS) proposed by the Department of Energy. Batch and interactive.

EP

Analyzes energy consumption in new or existing buildings. EP allows the mechanical engineer to calculate heating and cooling loads and to perform system simulation energy analysis. The basic calculations and reset guidelines conform to standard engineering practice and are consistent with publications of ASHRAE. Batch and interactive.

ESP-I

Simulation of heating and cooling operations of buildings to determine and optimize energy consumption and the energy dynamics of proposed or existing structures. Using data on weather conditions outside a building, ESP-I calculates the effects on roofs, ceilings and walls and other thermal characteristics. Hour-by-hour heat-load information is converted into energy consumption. Interactive.

FCHART

A fast, efficient method of designing solar heating systems. The method is based on standard system configurations using liquid or air as the heat transfer medium. The economic optimum collector area can be found by calculating the present value of future costs of the solar system and of the conventional system (including the effects of escalating fuel prices, property and income taxes, interest, depreciation, insurance and maintenance). The program has the appropriate meteorological data for 266 stations in North America, enabling users to select the station most representative of their location. Interactive.

Residential Energy Analyst

An application to support an extensive home energy audit program as required by the National Energy Act Residential Conservation Service Program. Based on data supplied either by the homeowner or a trained technician, the program will print a report outlining the home's heat loss characteristics, estimating the annual fuel consumption for space heating and domestic hot water and recommending conservation measures. The estimated annual savings, the cost and any applicable tax credit are printed for each conservation measure. Batch and interactive.

SOLCOST

Solar Energy Analysis Program. SOLCOST estimates thermal performance and the resulting payback or rate of return from a solar energy project. The output consists of a prediction of the annual fraction of heating load provided by the solar system, the optimum collector area and tilt angle for the installation, and a detailed cash flow summary including payback and rate of return for the optimum collector. Several types of solar systems can be evaluated, including hot water and space heating systems using liquid collectors. Interactive.

TRNSYS

A rigorous solar analysis program for component modeling of heating, cooling and domestic hot water solar systems. TRNSYS models systems by collectively simulating the performance of the interconnected components. This approach reduces larger problems into smaller ones that can be solved more easily. Each component of a system is identified, and a mathematical description of each is formulated. Batch.

electronic/ electrical engineering

- **Electronic Engineering**
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Electronic Engineering

AMPSYN

A direct-synthesis computer-aided design program, AMPSYN is used in designing high frequency and microwave matching networks, including amplifier input, output and interstage circuits. The program synthesizes lump elements matching networks and provides transformation of the lumped design to approximate transmission line equivalents. AMPSYN allows the user to select the necessary topology to absorb the parasitic elements. Impedance transformations are implemented by the program to provide the proper networks for the specified terminating impedance levels. Because the networks are the result of exact calculations, they provide excellent initial values for multistage amplifier circuits. Batch and interactive.

ASPEC

General-purpose circuit simulation program designed specifically for the needs of the LSI/VLSI integrated circuit design engineer. ASPEC will perform nonlinear dc, nonlinear transient, or linear small-signal ac analysis. Accuracy is due to its transistor models and unique convergence algorithms. Batch, U.S., ISD network.

CADSYN

Interactive distributed (transmission line) network synthesis program primarily developed for designing matching networks for microwave amplifiers. CADSYN is also useful in matching other high frequency devices and loads, and can be used to synthesize microwave transformers and filters. The program provides commensurate networks consisting of series and parallel stubs and cascade lines that can be internally transformed by Kuroda identities and Norton transformations. CADSYN simplifies amplifier design by performing exact distributed synthesis without approximation. User selection of network topology, gain, slope, ripple, line length, frequency, and insertion loss provides the flexibility needed to match the wide variety of devices commercially available. Batch and interactive.

CAL-MP

Automatically designs a set of masks for MOS circuits. The user is required to define a cell library geometric configuration and a description of the required network.

The output of CAL-MP is a magnetic tape that can be used on an Applicon graphics system or a general-use magnetic tape. This output may then be used to edit the final MOS design, to make a quick checkplot on a Calcomp plotter, and to produce the final artwork on rubyolith. Interactive.

CYBERSPICE

Circuit simulation program for the designers of integrated circuitry. The features needed by the LSI/VLSI industry have been incorporated in modeling, AC analysis, DC analysis, transient analysis, and total interactive and graphics capabilities. The program is based on Berkeley SPICE2, with added interactive capabilities in plotting, printing, on-line help, modeling, save and display, worst case, and large circuit evaluations. For large runs, the program may be deferred via an interactive terminal to a batch run, using the same interactive control statements, resulting in lower operating costs. Batch and interactive.

DEELAY

An interactive circuit-design program that provides group delay equalizer networks to compensate the delay distortion of filters. DEELAY provides component values for first- and second-order, all-pass equalizer sections. All-pass networks have constant insertion loss and constant input/output impedances at all frequencies. Interactive.

DIANA

A digital/analog, or mixed simulator. Primitives for high level simulation of switched capacitor systems, circuit simulation, timing simulation and logic simulation.

Signed paths defined by timing elements, logic elements or external input are called digital nodes, while signal paths connecting network elements are called analog nodes.

A pseudo-transient analysis is always performed to find a DC solution. The transient analysis is controlled by interpolation and integration rule control algorithm. Interactive.

DINAP

Special-purpose electronic circuit simulation program intended for use in simulating single-input/single-output digital filter networks composed of digital adders, delay units and multipliers. Typical simulations of digital filter networks may include any combination of the following types of analysis:

- Frequency response analysis computes the sinusoidal steady-state response of the network to a single input excitation. For frequency response analysis, all network elements are assumed to be linear.
- Frequency domain noise analysis computes both an approximation to the spectral density of noise observed at the output port of selected multipliers and the input quantization noise.
- Transient analysis computes the observed signals found at various nodes of the digital filter network. These output signals are calculated based upon the initial conditions of the filter network and a user-specified sample input excitation.
- Transient noise analysis computes both a full (single) precision transient response and finite precision transient response for the given network.

Batch, U.S., ISD network.

DRC

Design Rules Check is a modular subsystem within the NCA Design Automation software. DRC verifies compliance of physical layout of integrated circuits with user-specified geometric design rules. Provides several logical operations for deriving new layers from combinations of original layout data, allowing application of arbitrarily complex design rules.

ERC

Electrical Rules Check is a modular subsystem within NCA Design Automation software. Checks basic electrical rules obeyed by any integrated circuit as well as technology-specific and user-specified rules. Errors detected include missing transistors and internal shorts.

FILSYN

Filter Synthesis. A general purpose program for efficient design of all types of passive, active and digital filters. It offers superior flexibility and a large range of options. Conversational interactive operation enables the user to design the ultimate in filter structure, without advanced theoretical knowledge, or using filter tables. Filter design available with FILSYN includes lowpass, linear-phase lowpass, highpass, and bandpass. All of these can be designed with maximally flat or equal ripple-type passband, monotonic, equal minima or arbitrary stopband, arbitrary terminations and many others. Batch and interactive.

GEMINI

Device simulation program capable of analyzing the operation of a variety of two-dimensional insulated-gate semiconductor device structures. Provides the process development engineer, the device designer, or the circuit designer with extensive insight into the fundamental basis for the operation of a device. In many cases, electrical device characteristics can be predicted prior to actual device fabrication, thereby reducing the number of required fabrication cycles during the development of an optimum fabrication process. The sensitivity of electrical device characteristics to process variations can be determined, yielding valuable information that is difficult or impossible to obtain through laboratory experimentation. GEMINI is an efficient and cost-effective tool which aids the design of processes and devices. GEMINI simulations are performed by solving Poisson's equations. Batch, U.S., ISD network.

LOGIS

General purpose logic simulator specifically designed to simulate MOS/LSI integrated circuits while also capable of simulating conventional gate level logic networks. LOGIS is capable of handling 15 logical states, and has introduced several new logic design concepts to accomplish this:

- Logic states and levels based on quantity and rate of flow of charge
- Bidirectional signed flow (propagation) in gates and elements
- Implicit and explicit wired-or capability
- Ability to simulate dynamic logic
- Transistor level logic simulation

Batch, U.S., ISD network.

MDP

Mask Data Preparation is a modular subsystem within NCA Design Automation software. Compensates and modifies integrated circuit mask data and produces pattern generator input tapes for IC masks. Compensates data for line-width distortions caused by photochemical processes. Reduces and organizes number of flashes to minimize mask generation times.

MICROLIB (Microprocessor Support Software)

Assemblers and simulators for programming major microprocessors. Assemblers translate instructions provided by the programmer into machine language, enabling programming at an instruction level higher than machine language. Simulators simulate the operations coded, enabling the programmer to step through the program and observe output at various points to identify errors. Batch and interactive.

MODGEN

Enables the user to rapidly and accurately extract MOS model parameters that are needed for the ASPEC circuit simulation program. These parameters are either extracted directly from measured data on actual devices or from other simulation programs such as SUPREM and GEMINI. Both P and N channel enhancement mode devices can be modeled with this program. It is divided into a series of modules, which may either be run independently or as a group, depending on specific model parameters required by the user. Batch, U.S., ISD network.

NCC

Network Consistency Checker is a modular subsystem of NCA Design Automation software. Verifies agreement between integrated circuit logic diagram and corresponding physical layout to detect misinterpretations of diagram by layout personnel. Applicable to both analog and digital circuits.

NEMOS

Device simulation program capable of simulating the steady-state operation of an N-channel enhancement mode MOSFET in two dimensions. Such a simulation can provide the process development engineer, the device designer or the circuit designer with extensive insight into device operation, insight not easily gained through laboratory experimentation. Additionally, many MOSFET electrical characteristics can be predicted prior to device fabrication. NEMOS can represent a highly efficient and cost-effective design tool.

NEMOS is capable of performing the following types of calculations:

- Single drain current
- Volt-ampere (V-I) family of curves
- Threshold voltage
- Punch-through voltage

Batch, U.S., ISD network.

PCAP

Process Characterization Analysis Package is an integrated collection of statistical techniques for obtaining a manufacturing process characterization. Enables systematic identification of significant process variables, detects interaction between them and set conditions to maximize yields or minimize defects. PCAP also has capabilities for generating process or yield models and determining operating limits for minimum product costs.

PREDICTOR

Reliability/maintainability for electronic design. It is intended for use on engineering projects to assist in design improvement and evaluation via automation. The major functions are engineering parts lists, parts catalogs, design to cost and design monitoring, and reliability/maintainability predictions. User-convenience characterizes the PREDICTOR features, which include automatic recognition of most electronic parts by industry style and/or military specification numbers, several methods for failure rate determination, system effects analysis to determine critical elements and block diagram evaluation to analyze complex situations for design sensitive opportunities for successful project completion. Interactive.

RESULTS

Realtime Evaluation Systems Using Logic Tree Software. RESULTS is an analytical tool for risk management. It can be used by design engineers, systems analysts, safety analysts, and reliability and maintainability engineers to model systems outcomes from the top down. Interactive.

RFOPT (Compact)

Microwave design/analysis. RFOPT is an interactive program to design linear circuits in the high frequency/microwave region. It has five main functions: (1) circuit analysis and stability analysis, (2) sensitivity analysis, (3) optimization, (4) providing data for mapping, and (5) providing data for two-dimensional error-contours used in optimization. RFOPT works in the frequency domain; it has multi-band capabilities to perform any of these five functions. Batch and interactive.

SAMPLE

Simulates various processes in photolithography and etching. Analysis includes image formation from a simple mask pattern under various optical conditions, the exposure of a photoresist coated wafer, and the development of an exposed wafer.

The optical models used in the program for the computation of image profiles are based on the modulation transfer function approach, with a capability for simulating defocused images and multiple wavelengths.

The exposure of the photoresist is computed from simple one-dimensional models of optical wave propagation in thin absorbing films. The effect of exposure is modeled by the breakdown of the photoactive species in the photoresist.

The two-dimensional chemical development of the exposed wafer is simulated using a surface-reaction limited model where the reaction rate depends on the extent of local exposure in the photoresist. Batch, U.S., ISD network.

SLIC

Simulation for Linear Integrated Circuits. A general purpose circuit simulator used to design and analyze various linear circuits such as electrical filters. SLIC is capable of performing the following types of analysis:

- Small signal pole/zero
- Small signal frequency response
- DC operating point
- Noise
- Sensitivity

Batch, U.S., ISD network.

SUPREM II

Process application for manufacturing silicon-based integrated circuits. Input information on ion implementation, etch step, oxide deposition, predeposition (non-implant), epitaxial growth, etc., is used to derive a list of optimized target parameters. These include:

- Surface concentration
- Integrated impurity concentration in oxide
- Integrated impurity concentration in silicon
- Total integrated impurity concentration
- Threshold voltage
- Field capacitance
- Oxide thickness
- Junction depth
- Sheet resistance
- Peak concentration

Interactive.

SYSCAP II

Static and dynamic nonlinear analysis of electronic circuits. SYSCAP II simulates the transient (time) response of electronic circuits and performs alternating current and direct current analysis. The program contains built-in general models, a semiconductor data bank, macro model/nested model capability and a function capability allowing user definable equations for intricate modeling. Batch and interactive.

TEGAS5

Test generation and simulation for analysis and verification of digital logic networks. TEGAS5 is a complete package for design verification, test generation and fault simulation, using the same input language and network description for all three options. Applications include verification of digital logic designs (including race, hazard and spike analysis), assessment of diagnostic tests, investigation of the fault-tolerance, generation of production and diagnostic tests, and interactive design analysis. Batch and interactive.

YES

Yield Enhancement System assists in analyzing data and reporting trends in wafer fabrication and device testing. YES accepts input from a variety of test equipment and merges raw and processed data into an engineering data base organized by run or lot identifiers, production and test dates, device types, product families, production shifts and electrical test parameters.

Electrical Engineering

ACSL

Advanced Continuous Simulation Language. Developed to help the engineer or scientist analyze dynamic response, given a mathematical description of the system. Designed for modeling the behavior of continuous systems described by time-dependent, nonlinear differential equations of transfer functions, ACSL helps the design engineer express a model for complete solutions by eliminating extraneous statements and by providing an extensive sequence of programs associated with obtaining data output, particularly plots or pictures. Batch and interactive.

CSSL IV

Continuous System Simulation Language. This program allows the user to investigate the dynamic behavior of physical phenomena described by systems of differential equations. It provides powerful simulation operators for integration, differentiation, function generation, stochastic analysis, linear transfer functions, digital switching functions and nonlinear control system operators. Other features include a macro generator, numerical integration algorithms, a time interpreter, empirical function generator, vector and array capabilities, logical control variables and automatic sorting. Batch and interactive.

DAPPER

System of computer programs for design specification and analysis of industrial, commercial and institutional electrical power systems. Capable of modeling multilevel voltage power systems containing one or more sources of fault contributions, DAPPER can also model any system configuration including radial design, loop design and multiple isolated systems. DAPPER solutions are intended to meet requirements of National Electrical Code (NEC) and incorporate NEC data for design criteria. Also incorporates design standards of equipment manufacturers. Interactive.

EMTRAN

Electromagnetic transients and circuit analysis for modeling nonlinear and time varying electrical circuit elements. EMTRAN calculates transient voltages and currents developed in user-defined networks. The principal application is the study of high voltage transmission systems. Typical problems solved include study of lightning arrester operation, observation of transients associated with clear transmission line faults and predicting harmonic levels on a power system. The program can be used to solve problems involving electromagnetic systems from power system analysis to electronic circuit noise problems. Batch.

SCAN

A fault analysis program that calculates currents and voltages during faults (short circuits) on three-phase power systems. Solutions for three-phase and single line-to-ground faults are produced using a complex direct matrix inversion technique. Mutual coupling between lines in the zero sequence network is permitted. Optional modes allow generation of network equivalents and application of faults at various points along a transmission line. Output is in per-unit sequence quantities and also in amperes at the base KV of each bus. SCAN is suitable for low voltage distribution circuits as well as high voltage transmission systems. Batch.



management

- **Management Sciences**
- **Financial Management**

Management Sciences

APEX® IV

Advanced interactive mathematical programming system that includes linear and mixed integer programming, matrix reduction and matrix scaling, and parametric capabilities. Out-of-core feature allows cost-effective solutions of very large problems. Typical applications include production scheduling, process optimization, blending, economic modeling, long-range planning and transportation and distribution studies. Batch, interactive.

BMDP

Generalized data analysis package with extensive statistical capabilities, including data description, frequency tables, regression analysis, analysis of variance, multivariate analysis, and life tables and survival analysis.

The BMDP statistical computer programs are integrated by a common English-based control language and self-documented files that enable users to pass data and results from program to program. Provides 33 statistical routines, file maintenance, data management and data transformation capabilities. Its statistical computing capabilities range from simple data display and description to advanced complex statistics. Each BMDP program features graphical displays, multiple analyses capabilities and data editing capabilities. BMDP interfaces with data management systems such as PSTAT and SIR.

COMMIT

A unit commitment program for scheduling and economic dispatching of generating units. COMMIT determines the hourly net generation schedule for up to a full seven-day period including start-up and shut-down of all units and the distribution of hourly generation requirements over units on line. To minimize costs the program considers maintenance of adequate spinning and fast-start reserves, minimum unit down-time and up-time constraints, maintenance schedules, unit durations and off-system energy transactions including net interchange requirements. Batch and interactive.

EZPERT

A graphics postprocessor for the PROPLAN project control system. EZPERT Project Graphics System generates charts and diagrams showing cost, schedule and resource information for project management. It operates in four modes: Pre-net, Gantt Barchart, Network and Cost/Resource. Each mode provides comprehensive time, cost and manpower graphics throughout the planning, scheduling and control phases of a project. Batch and interactive.

FEPP

Easy-to-use interactive interface to PROPLAN that allows a user to prepare files to create input to PROPLAN modules. FEPP accepts free formatted input directives and converts them to the fixed, structured form used by PROPLAN. Editing is done during data entry. A user can build a project master file, update, run resource analysis, calculate cost and generate reports.

GPSS V

General-purpose simulation language for testing and evaluating the performance of existing and proposed systems. Any physical process that can be modeled in a flowchart can be simulated. GPSS V allows the user to investigate and evaluate proposed changes to existing policies, methods and operations without capital investment or disruption of existing operations. In a matter of minutes, the computer can evaluate years of simulated activity, allowing the user to avoid costly mistakes involved in implementing a program before alternatives are evaluated. Batch and interactive.

IMSL

A library of approximately 400 FORTRAN mathematical and statistical subroutines. The International Mathematical and Statistical Library provides the tools needed to build applications including input/output, plotting and error processing routines. The subroutines are divided into chapters that cover: analysis of experimental design data; basic statistics; categorized data analysis; differential equations; eigenanalysis; forecasting and econometrics; generating and testing random numbers; interpolation, approximation and smoothing; linear algebra; special functions; nonparametric statistics; multivariate statistics; regression analysis; sampling; utilities; vector and matrix arithmetic; zeroes and extrema; and linear programming. Batch and interactive.

MEVAL

Maintenance Schedule Evaluation. This program employs a dynamic optimization technique combined with a gradient algorithm to assist utility personnel in scheduling maintenance of generating units. Given a set of specified generating units (boilers and turbines) and an estimated outage duration and level of repair effort for each, MEVAL solves the preventive maintenance scheduling problems by selecting the time periods for each unit's repairs while minimizing associated costs. The problem is solved under constraints of availability of maintenance crews, forced outage risk, energy sales and purchase, and replacement energy costs. MEVAL prints up to ten effective maintenance schedules for a period of up to three years. It can also conduct after-the-fact cost analysis and provide accurate short-range planning requirements for fuel purchases and energy sales and purchases. Batch and interactive.

MITIS

Mine Tire Information System. Integrated system of computer programs creates and maintains tire data files and generates inventory and performance reports. Aids surface and underground mines in managing tire resources. The system can be used by any company or site which uses tires, or a consulting firm processing data for several mines. MITIS can support up to 99 different mines in a single user account.

Orr System

Interactive system utilizing an extensive, historical data base to provide accurate estimates of construction costs. Designed for the construction industry, the Orr System also is a useful tool for government, commercial banks, insurance companies, and architectural and engineering firms. Allows cost estimators to combine knowledge about an individual project with historical data from any construction economy or environment. The data base contains information from more than 100 worldwide metropolitan economies and is updated quarterly. Initial cost estimates can be obtained by comparing the average cost of building similar structures in the same location. More detailed estimates are derived from the data base of actual item costs. This data can be automatically adjusted for any locality.

NIPS NUCLEAR INFORMATION PROCESSING SYSTEM

Personnel Qualifications and Training—Documents and cross-references personnel records required in USNRC Regulatory Guide 1.70 and ANSI N45.2.9 and ANSI N45.2.12.

Personnel Radiation Exposure—Maintains and reports personnel radiation exposure statistics for NRC requirements. Receives and stores exposure data, updates and monitors cumulative radiation, prepares reports, and provides personnel radiation exposure data for plant maintenance, testing, and inspection.

P-STAT

An interactive statistical system for file maintenance, data display, cross-tabulation and statistical analysis. P-STAT will interface with both SIR and SPSS by reading/writing SPSS save files. P-STAT provides superb cross-tabulation routines, invaluable in census survey analysis and tabulation of statistical data. Batch and interactive.

PDS/MaGen

Matrix and report generation language used in conjunction with APEX IV. PDS/MaGen transforms large quantities of data into a properly structured linear programming matrix to be solved by APEX IV. Subsequently, PDS/MaGen allows the structuring of APEX IV output into customized reports. Batch and Interactive.

PROPLAN

Project control system for resource allocation and scheduling of complex projects. PROPLAN uses the precedence method to control the times, resources and costs of a project. Scheduling may be time- or resource-based or a mixture of the two. Several independent projects can be scheduled against one pool of resources with different priorities assigned to each project. Batch and interactive.

SIMSCRIPT II.5

Discrete event simulation language for construction of program models that simulate simple and complex systems. SIMSCRIPT analyzes the effect of variables and conditions that change over time and offers conveniences that free the analyst to devote time to defining and analyzing the program. Several capabilities make SIMSCRIPT an excellent compiler for nonsimulation problem solving. These include controlled timing, a report generator, queuing techniques and random number functions, statistical macros and list processing. Batch and interactive.

SPSS

Statistical analysis. SPSS is an integrated system of statistical procedures such as regression, cross tabulation and analysis of variance. These procedures are embedded in a language designed specifically for examining, editing and transforming the data before calling on the actual statistical procedures. These data preparation facilities significantly reduce the time needed to examine and manipulate data before analysis can take place. SPSS data can be plotted on virtually any type of plotting device. Batch and interactive.

VAST

Vector and Array Syntax Translator — Analyzes DO loops in standard FORTRAN programs and converts those for which vectorization is possible. VAST creates a listing of the input program with diagnostic comments added to inform the user which loops were not vectorized and why. It also creates an enhanced version of the input FORTRAN containing efficient array syntax in place of the vectorized loops.

Financial Management

ASCENT Editor

A program for creating and maintaining data files for use with IPF, IFPS and PLOTPAC. ASCENT Editor is used to insert, delete, and change columns of numeric data. It also can append, merge and sum several data files together. Interactive.

GEM 6

Designed to provide problem-solving capabilities to meet the changing needs of utility fuel cycle economics evaluations and analysis: supports contract performance evaluation, plant performance evaluation and economic optimization of reload requirements, using vendor-supplied or utility-generated physics data. Typical applications include nuclear fuel bid evaluation, contract evaluation (in-core analysis), in-core fuel management evaluation and optimization, and fuel cost projection risk analysis.

GEM 6 exceeds capabilities of earlier fuel cost applications through state-of-the-art enhancement of continuous discounting methods, self-consistent cash flow and allocated cost analysis, and ability to evaluate fuel cycles with recycle options. It links directly to nodal analysis simulators, such as SUPER-NODE and EPRI-NODE. Batch.

IFPS

Interactive Financial Planning System combines extensive capabilities of financial modeling with risk analysis and plotting features. IFPS uses nonprocedural English-like language to produce a variety of financial reports, qualification of uncertainties and numeric representation of the risks involved in alternative courses of action. Thus, a financial manager or analyst can develop models and prepare reports without a need for programming capability. Use of powerful what if and goal seeking commands provide effective evaluation of alternative courses of action. As a decision support generator it enables managers to analyze cash flow, develop dynamic budgeting and planning systems, and provide up-to-date forecasts. Includes extensive consolidation, submodel, duplication of variables, and user help subroutines capabilities enable effective interfaces to other related products such as data base management, optimization, and data file, IPF and PLOTPAC.

IFPS/DATASPAN

Interactive file transformation program enables the extraction and reformatting of standard print files for input to IFPS models. Provides a handy tool for selective transfer of data from a source file to a new target file. File construction of DATASPAN facilitates reformatting of data to user specifications. Includes variable as well as column selection and reordering as well as selection of text for MICRO definitions. The constructed target file meets all specifications for an IFPS data file. Positioning as well as print commands allow the user to look at the contents of the source file and direct an invisible pointer to the desired lines of information. Then a series of processing commands may be given to identify either the variables and columns of data in desired order or the micro definitions that transfer to the target file. Each command may be executed interactively or by command file. A DEBUG capability allows viewing of each line as it is created. Once all commands and micro definitions have been transferred, the completed target file is then ready for immediate use with IFPS.

IFPS/OPTIMUM

Provides decision makers and planners capabilities for solving a variety of optimization problems. While IFPS answers "what if" type questions, IFPS/OPTIMUM assists in determining "what's best" with a given number of constraints and decision variables. The user identifies the appropriate decision variable in an IFPS model, such as production mix or investment amounts. IFPS/OPTIMUM then determines the best values for those variables in the light of a user-specified objective. Models can be designed that not only describe results of an activity but that suggest the direction an activity should take. Used in conjunction with IFPS, IFPS/OPTIMUM enables users to custom-build their own optimization models. IFPS/OPTIMUM features an easy-to-use English-like language and has the same editing commands as IFPS. Includes determination of problem type and selection of appropriate solution. Also provides post-solution analysis indicating changes in solution with different model parameters. Can be stored in data files for use in other IFPS models for further analysis, formal reports or graphics presentation.

IFPS/SENTRY

Builds and maintains data files with maximum accuracy and minimum effort for use with IFPS models. Includes operator prompts and response monitoring by comparison with predetermined specifications. Validation tables increase accuracy of input. In addition to checking data input for accuracy, SENTRY also structures data for use in a model. Features include editing commands to correct typing errors and to update existing data files. The VALTAB subsystem is used to create the validation table. The ENTER subsystem is used to key in the data values. An executive level provides commands to facilitate use of these two subsystems as well as other related file manipulation utility commands. These enable the user to list, save or delete files and also exit from the system. A utility command, QUICKVAL, automatically builds a functional validation table from a specified model. Prompting for variables in the model, the builder can use the QUICKVAL table to expand it into a more detailed one with such features as setting of min/max values and providing help messages.

MINECAN

Aids in mineral exploration and development decision-making through use of specific ore deposit characteristics, engineering cost estimates, technical operating data and commodity price information. MINECAN can be used in validating economic characteristics of geologic models, evaluating property submissions, negotiating property acquisitions and joint venture arrangements, planning exploration, monitoring exploration progress and determining project acceptability prior to proceeding with mine development. Batch and interactive.

SORITEC

An econometric analysis software system. SORITEC provides ordinary least squares and two-stage least squares regression; seasonal adjustment and generation of seasonal dummy variables; three-stage least squares; linear and nonlinear maximum-likelihood estimation; covariance and correlation matrix calculations; multivariate least squares; nonlinear ordinary least squares, nonlinear two-stage least squares and nonlinear three-stage least squares regression; hypothesis testing and restricted estimation; generalized least squares (Aitken) regression; Almon and Shiller distributed lag estimations; principal components analysis; and stepwise regression. Batch and interactive.



mechanical engineering

- **Discrete Mechanical Systems**
- **Structural**
- **Offshore Structural**
- **Plant Mechanical Systems**
- **Bridge Design and Rating**

Discrete Mechanical Systems

CADENSE

Programs for design and analysis of rotating machinery rotor and bearing systems. Provides the capability for computer modeling of rotors, bearing load calculations, bearing analysis, evaluation of undamped lateral critical speeds, dynamic stability, and other functions related to computerized audits of rotor bearings. Applications include analyzing steam turbines, electric motors, pumps, compressors, fans, gas turbines and high-speed spindles. Batch.

CD/2000

Automated design, drafting, and numerical control programming system. CD/2000 provides basic geometric definitions such as a point, line, circle, and arc for use in creating designs of two- and three-dimensional parts. Sculptured and complex figures may be generated using the extended geometry module. A variety of geometric manipulations simplify design and drafting. CD/2000 can generate finished drawings and numerical control tapes that are ready for post-processing. CD/2000 performs standard types of two- and three-dimensional analysis, such as center of gravity, surface area, volume, weight, moments of inertia, and center of mass. Interactive.

CDC-SynthaVision

Produces shaded, high-resolution color pictures in three-dimensional perspective. Also generates wire-frame illustrations suitable for technical drawings and mass property calculations of solid objects. Uses a building-block approach to modeling three-dimensional objects. Basic solid shapes called primitives are combined to form complex, three-dimensional objects which are displayed on a graphics terminal.

EDL

Engineering Data Library is multipurpose data base for management of computer-aided engineering designs. Provides a complete management bank for storage and retrieval of engineering drawings and all information related to those drawings. EDL stores and retrieves information on both wire-frame and solid-modeling systems including CD/2000 and CDC-SynthaVision.

FEMGEN

Interactive graphics pre- and post-processors to reduce time required for structural design and analysis by rapidly generating finite-element models. FEMGEN is easy to learn and easy to use from an interactive graphics terminal, from a TTY-type terminal, or in batch mode. The program can generate isoparametric elements and surface intersections. Translators generate input data to NASTRAN, ANSYS, STARDYNE and ABAQUS.

SDRC/IMP

Integrated Mechanism Program. IMP offers an advanced capability for solving two- and three-dimensional mechanical design problems. Kinematic, static and dynamic options, including transfer functions, provide complete design analysis. Two- and three-dimensional analyses enable a broad spectrum of linkages to be designed. A wide selection of springs, masses, dampers and joint types provide extensive modeling flexibility. User defined damping and spring rates, initial conditions, input motions and forces enable analysis of nonlinearities. Interactive.

SDRC Mechanical Design Library

A system of more than 60 programs for structural and mechanical analysis. The programs are divided into structural, frame, section, rotating machinery analysis and system simulation. The library offers the capability of static and dynamic, linear and nonlinear analysis. Pre- and post-processors save engineering time. Interactive, batch (partial).

SDRC/SUPERB

General-purpose, isoparametric, finite element structural analysis. SUPERB is especially suited to determine the displacement and stress characteristics of complex structures such as machine parts subjected to concentrated loads, pressure distributions, enforced displacements and thermal gradients. Extensive post-processing graphics display deformed geometry, displacement contours and stress contours. SUPERB's isoparametric elements with curved boundaries and high-order strain variations permit curved regions and areas with high stress concentrations to be accurately represented with a minimum number of elements. SUPERB provides both static and dynamic analysis. Batch and interactive.

SDRC/SUPERTAB

A graphics program for interactive finite element model generation oriented toward the rotating machinery, mechanical design industry. A Tektronix 40xx display and a digitizing tablet are used to develop two- and three-dimensional models using conventional or isoparametric finite elements. After the model is generated, the data is automatically formatted for any of these finite element analysis programs: SDRC/SUPERB, ANSYS, NASTRAN or SDRC/SASA. Interactive.

UNISTRUC™

Unified Structural Design System. Interactive graphics pre- and post-processors to reduce time needed for structural design and analysis. With UNISTRUC an engineer can quickly and automatically generate a finite element model at an interactive graphics terminal (instead of hand coding), check the model visually and submit it to one or a number of finite element applications for analysis. Results can be scanned for data needed to interpret the solution; modifications, if needed, can be submitted immediately. Interactive.

Structural

ABAQUS

Structural and heat-transfer analysis system that includes a large range of material and geometric modeling capabilities. Models may include beams, shells, and continuum elements with large rotation, small strain capability. Important material behaviors are plasticity, creep and swelling. The program includes both user and automatic control of step size in statics and dynamics. Both steady-state and transient heat transfer analyses are possible. A complete set of plotting options, print controls, versatile restart are included. Input is free-format, keyworded and uses set definitions for easy cross-reference. Unique controls for simplifying use in nonlinear analysis are featured. Batch and interactive.

ABAQUS/AQUA

Analysis of seabed piping installation and marine riser problems. Processes that can be studied include: Towing process where the pipeline is moved about the seabed with a cable arrangement; pull-in and alignment process, where subsequent to a towing operation, the end of the pipeline must be drawn into a fixed seabed attachment and aligned with a stationary fitting. Geometric nonlinear analysis of deep-water marine risers can also be effectively analyzed. Batch and interactive.

ANSYS

Large-scale finite-element program for structural, heat transfer and fluid-flow analysis. ANSYS performs linear and nonlinear elastic analysis of structures subjected to static loads (pressure, temperature, concentrated forces and prescribed displacements) and dynamic excitations (transient and harmonic). The program considers the effects of plasticity, creep, swelling and large deformations. Transient and steady-state heat transfer analyses consider conduction, convection and radiation effects. Coupled thermal-fluid, coupled thermal-electric and wave-motion analysis capabilities are available. Structural and heat transfer analyses can be made in one, two or three dimensions, including axisymmetric and plane problems. Interactive pre- and post-processors reduce model generation time. Batch and interactive.

AOS/Magnetic

Calculates magnetic fields and performance of a wide variety of magnetic and electrical products by extending finite element technology to the analysis of electromagnetic devices. AOS/Magnetic calculates and displays in color graphics magnetic field distributions. Can also calculate performance parameters such as force, torque, power loss and impedance.

BASEPLATE II

Analyzes flexible, bolted baseplates in nuclear power plants meeting the baseplate analysis requirements of the Nuclear Regulatory Commission. Accommodates baseplates with multiple attachments, integral frame structures, and mixed boundary conditions. BASEPLATE II generates all input for the STARDYNE/SPRING program and analyzes and summarizes the results.

EAC/EASE2

Static and dynamic structural analysis of linear three-dimensional systems subjected to arbitrarily prescribed mechanical, inertial and thermal loads. Results of static analysis include displacements, beam internal forces and stresses at predetermined locations, quadrilateral and triangular finite element stresses, solid element stresses and reaction forces at boundary joints. Dynamic results include natural frequencies and corresponding modes of vibrations and dynamic response to time-dependent forces. Time history plots and response spectrum curves can be generated on a pen plotter and/or printer. Input can be entered through interactive terminals in fixed or free format. Batch and interactive.

EZPLOT/STARDYNE

EZPLOT is an interactive graphics routine for plotting STARDYNE structural data for geometry check runs. The model geometry is read directly by EZPLOT, and features selective labeling of joints, beams, plates and plot titles; view windowing and rotation; listings of joint and element data; extensive data checking; built-in HELP commands and sample problems. EZPLOT prompts the user for information pertaining to plot views and orientation.

FASOR

Performs stress, buckling and vibration analysis of stiffened laminated shells with anisotropic, transverse shear deformation, nonlinear, and thermal options. It employs a stable, numerical integration method that eliminates mesh generation, ill-conditioning and convergence problems typical of finite-difference and finite-element methods. Very compact data decks are achieved through use of a "building block" input format coupled with NAMELIST definition of structural properties and loads. Applications include rocket nozzles, missile fuel tanks and bulkheads, nuclear containment vessels and cooling towers, flue gas scrubbers, radiotelescopes and gridwork shells, with particular emphasis on composites. Batch and interactive.

FLUSH

Seismic analysis of soil-structure interaction. FLUSH uses two-dimension finite element techniques to model the soil overlying bedrock and compute the seismic response of structures on top of or embedded in the soil. The program computes time history accelerations of the structure or the spectral response and bending moments in the model elements. Almost any arrangement of soils, rocks and hills can be accommodated. The structure can be of soil type such as an earthen dam. Because the structure is modeled, the effect of several nearby and dissimilar structures can be assessed. Batch.

GTSTRUDL

A general-purpose structural analysis program. Based upon the original MIT ICES/STRUDL system, this version has been extensively updated and improved by the Georgia Institute of Technology. Features of GTSTRUDL include the basic ICES system, language processor, interactive input/editing, linear static frame analysis, linear static finite element analysis, steel design, plotter output, dynamic analysis, and nonlinear frame analysis. Customer-owned subsystems can be added to the basic ICES application. Batch and interactive.

MARC

Linear and nonlinear static, dynamic and heat transfer analysis. MARC provides linear elastic analysis of two- and three-dimension solids, shells and beams as well as applications in which nonlinear material (plasticity, creep, swelling) and geometric (buckling, large deformation) effects dominate. Both the linear and nonlinear analysis can be carried out in static and dynamic regimes for stress analysis and also for heat transfer (diffusion) analysis. Mesh generators, graphics and post-processing aid the user in the preparation of input and the interpretation of results. Batch.

MSC/NASTRAN

The largest general-purpose, finite element static and dynamic structural analysis system in use today. MSC/NASTRAN provides static analysis, elastic stability analysis, vibration mode analysis, frequency and random response, transient analysis with the option to include nonlinear effects and response spectrum analysis, heat transfer problems, hyroelastic analysis and general matrix mathematical problems. This advanced version, written by The MacNeal-Schwendler Corporation, provides effective solutions to symmetrical structures, including reflective symmetry and cyclic symmetry. User-oriented substructuring provides an efficient method for economizing computer runs with large problems. Substructures can be added in building block fashion. Batch.

PISCES

Static and dynamic finite-difference codes based on computational methods developed to calculate nonlinear, large-amplitude responses of structures, fluid bodies, and solid media. The codes solve the fundamental partial differential equations on continuum mechanics expressed in the explicit finite difference form. PISCES provides solutions to problems including fluid-structure interaction, soil-structure interaction, hypervelocity particle impact and flow interaction. Batch.

POSTEN/CNCGRD

Analyzes and designs continuous prismatic or nonprismatic slabs, girders, beams, waffle slabs, flat slabs with drop panels and flat plates with or without column capitals. Most designs conforming to American Concrete Institute (ACI) 318-77 standards are made in a single computer run. Includes continuous bents of up to 9 continuous spans plus cantilevers. Spans can have uniform load, up to 10 concentrated, 3 partial uniform and 3 partial triangular loads. Members can be prismatic or nonprismatic and of different shapes, including T, inverted T and I sections.

PS/BASEPLATE

Analyzes flexible bolted baseplates in nuclear power plants in support of regulatory requirements. Pre-processor generates all input to STARDYNE/SPRING. Post-processor summarizes analysis results. Reduces engineer-hours required to perform baseplate analysis. Interactive.

SPSTRESS

Systems Professional Structural Engineering System Solver. Performs linear analysis on two- or three-dimensional elastic, statically loaded structures. Computes joint displacements, member end forces, and reactions for a structure. Input includes makeup, type and orientation of all members; position and magnitude of all applied loads, displacements and distortions. SGEN and STRCHK can also be used with SPSTRESS. SGEN generates input data for SPSTRESS, and STRCHK checks steel beam and column sections against member output from a previous SPSTRESS run for their ability to handle applied loads in accordance with American Institute of Steel Construction specifications. Batch and interactive.

STAAD-III

Structural analysis and design program, performed according to the American Institute of Steel Construction (AISC) for steel structures and the American Concrete Institute (ACI) for concrete structures. STAAD-III contains complete built-in steel tables from the AISC-80 manual which include W, S, M, C, HP and MC sections, cover plated beams, pipes, tubes, double angles or channels, tees and composite sections. Concrete design is accomplished including detailed reinforcement for rectangular or square beams subjected to flexure and shear, rectangular or circular columns subjected to biaxial bending and axial load. Batch and interactive.

STARDYNE

Finite element static and dynamic structural analysis. A STARDYNE static analysis will predict the stresses and deflections resulting from pressure, temperature, concentrated forces and enforced displacements. Dynamic analysis will predict the node displacements, velocities, accelerations, element forces and stresses from transient, harmonic, random or shock excitations. STARDYNE is user oriented, containing automatic node and element generation features that reduce the effort required to generate input. Plots of the original model and deformed structural shapes help the user evaluate results. Contour plots show surface stress for two-dimensional elements. The program creates time histories of element forces and stresses, and of node displacements, velocities, and accelerations. The PRESTAR preprocessor allows users to enter free-format input through an interactive terminal. Batch and interactive.

STRCHK

Uses the results of SPSTRESS frame analysis program to investigate a preselected steel beam or column. Each run automatically retrieves up to three independent loading conditions, and modifies and combines each with the others using load factors chosen by the user. Batch and interactive.

STRU-PAK

A library of 31 structural analysis programs designed for small, individual problems and for components or selected portions of larger structures. Capabilities of the library include calculation of section properties for general and standard cross sections, bending analysis of single and multi-span beams, elastic column buckling analysis, elastic and dynamic analysis of 2- and 3-dimensional frames and trusses, and elastic analysis of thin circular rings. The STRU-PAK library can also perform an elastic analysis of circular plates, cylindrical shells, circular bolted flange connections and both conical disc and open coil-helical springs. In addition, the library has programs to calculate principal stresses and strains for user-defined set of strain gauge readings and perform a torsional analysis of thin-walled multicellular closed sections. Interactive, batch (partial).

SYSTEMS PROFESSIONAL

A library of 28 structural design programs for the building construction industry. Updated to the latest requirements of accepted building codes, such as AISC and ACI, these programs can be used to design individual structural components or to analyze entire framing systems. Programs are divided into concrete, steel, masonry, wood and general analysis. Interactive.

WELDDA

Postprocessor which designs and analyzes welded steel joints. Integrated with GTSTRUDL, WELDDA performs weld design and analysis based on the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section III, Rules for Construction of Nuclear Power Plant Components, Division 1 — Subsection NF, Component Support, 1974, and to the American Institute of Steel Construction (AISC) Code Sixth to Eighth Editions. Currently 25 standard weld configurations are available. Batch.

Offshore Structural

EZPLOT/FRESAX

An interactive graphics routine used for plotting structural data, EZPLOT prompts the user for information pertaining to plot views and orientation. It reads SACS or STARDYNE model geometry directly, and features selective labeling of joints, beams, plates and plot titles; view windowing and rotation; listing of joint and element data; extensive data checking; built-in HELP commands and sample problem.

FRESAX is a preprocessor program that allows free-field input to the SACS system of programs. By separating data with commas, it allows data coding without regard to card column number. FRESAX features reduced coding time and input error potential, extensive error checking, support of all EDI/SACS card types, interactive or batch submission, and requires only two control cards for operation. Batch and interactive.

OSCAR

OSCAR (Ocean Systems Computer Analysis Routines) performs static and dynamic analysis of ocean structures, and a variety of problems ranging from ship hydrostatics and hydrodynamics, to platform installation. Several floating structures, each having six degrees of freedom and constrained by mooring lines, may be considered simultaneously. Environmental loads due to wind, current and waves, regular and irregular, may be applied. Batch.

SACS

A structural analysis system for offshore platform design. It determines structural forces derived from wave motions and pile-structure interaction calculations, and performs AISC design code checks. Batch.

Plant Mechanical Systems

AAA Technology

A series of design and analysis programs for the petroleum, chemical and related industries:

PIPING

- TRIFLEX — Piping flexibility and stress analysis
- TRI*MC — Material control system for piping products
- TRI*ME — Cost estimation for piping products

VESSELS

- STEM — Shell and tube heat exchanger design
- TRI*FLANGE — Flange design and analysis
- TRI*VESSEL — Pressure vessel design, analysis and rating
- WERCO — Clip and nozzle connection stress analysis

FOUNDATIONS

- TRI*DRILL — Drilled pile footing design and analysis
- TRI*MAT — Octagonal mat foundation design and analysis
- TRI*VEX — Foundation design for horizontal vessels and heat exchangers

PROCESS SIMULATION AND DESIGN

- CONCEPT — Gas, chemical and petrochemical process simulation
- ECONOMIST — Economic analysis of chemical processes
- PIPENET — Piping network fluid flow analysis
- SYMBOL — Mass balance calculation for any process
- TRI*DIST — Refinery process simulation design and specification
- TRI*FLARE — Flare header system design and analysis
- TRI*STEAM — Simulation and analysis of process plant utility steam systems

ADLPIPE

Flexibility and stress analysis for piping systems subjected to thermal, static and dynamic loads. ADLPIPE meets ASME and ANSI standards and provides for design code validation for nuclear and fossil fuel power plants, petroleum refineries, chemical plants, industrial process plants and general-purpose power piping. The programs perform flexibility, stress and thermal transient analysis and compute dynamic response to time history forcing functions. Batch.

CAPIM

Computer Automated Piping Isometrics and Material System. An integrated application system, CAPIM is designed to generate piping specifications, piping isometric drawings and bills of materials, material status reports, purchase orders, and cost records. It processes and controls quantities of piping, valves, fittings and other components that are required in many sizes, pressure ratings and materials. CAPIM ensures the correct selection of piping components for all classes of services defined in the piping specification. It also ensures the proper dimensioning for shop or field fabrication and the availability of materials when they are needed. Batch.

DIS

Piping design and analysis. This Design Information System features simplified input; a permanent catalog of components and specifications; automated isometric drawings and bills of materials; interference detection in piping system, heating, ventilation, air conditioning, machinery and walls; and data verification. DIS automatically supplies input data to ADLPIPE. Batch and interactive.

HANGIT

Pipe hanger optimization. HANGIT will select a hanger configuration from potential hanger locations. Selection criteria include configurations that are adequate or those that are fully optimized. HANGIT will optimize for dead weight and thermal loads and provides for limiting the reaction force at specified hangers. Batch.

NUPIPE

Piping analysis and design evaluation for nuclear power plants in accordance with ASME and ANSI codes. NUPIPE performs linear elastic analysis of three-dimensional piping systems subjected to thermal, static, seismic and dynamic time history loads. The program also analyzes temperature transient in the contained fluid. Batch.

PIPERUP, PRTHRUST

Nonlinear analysis for piping systems subjected to postulated ruptures. PRTHRUST calculates blowdown forces for both longitudinal and circumferential breaks and provides for modeling of all major components. PIPERUP analyzes an elastic-plastic solution while considering the effects of strain hardening, gaps and pipewhip restraints. Batch.

PIPESD

Static, dynamic and thermal analysis of three-dimensional piping systems found in nuclear power plants, conventional power plants, petrochemical refineries and other industrial applications. Static analysis predicts the stresses and deflections from gravity, pressure, support displacement, concentrated forces and moments, thermal expansion, joint temperature gradients and thermal discontinuity stress. Dynamic analysis computes the frequency response and mode shapes for a system subjected to earthquake excitations. PIPESD automatically combines loading conditions, performs fatigue analysis and calculates stresses according to ASME and ANSI codes. Batch.

PREPIPE

Models complete piping system and creates input files for pipe stress application codes. PREPIPE reduces time required to produce input files for NUPIPE, HANGIT or ADLPIPE. Question format prompts users quickly through process of modeling piping system for analysis and provides shortcut methods to enter piping geometry, materials and sizes.

SYNTHA III

Advanced computer program for design and optimization of process utility systems. Applications include electric utilities, oil refineries, heavy manufacturing and food processing. SYNTHA III can model systems with up to 400 pumps, boilers, turbines, and other components. The program reduces the time required for performance studies and provides information required for selecting optimum system designs. Batch.

Bridge Design and Rating

BARS/PREBARS

Bridge Analysis and Rating System. Analyzes and rates timber bridges, composite prestressed girders, hybrid steel girder bridges, steel reinforced, prestressed concrete and composite steel bridges. Conforms to AASHTO requirements for rating regulations and performs an inventory, operating and posting analysis for each member in a bridge. BARS can be used to meet federal, state or agency requirements, to perform a special vehicle or permit analysis, rehabilitation analysis, damage or deterioration analysis, or for analysis of increased legal loads. High-production process related to analysis and rating of many structures, rather than concentrating on the analysis of a single structure. Batch and interactive.

BDS

Bridge Design System. Analyzes and designs prestressed concrete bridges that are continuous or simple-span, and contain up to 1296 prestressed cable paths. It considers primary and secondary effects, three-dimensional cable friction losses, shear requirements (ACI) ultimate capacity and segmental prestress. As a cross-section check, the user can employ the segmental prestress option with any prestressed bridge. BDS also performs bridge capacity ratings for prestressed and reinforced concrete bridges. Batch and interactive.

BRGCOL

Analyzes and redesigns concrete columns with any symmetrical cross-sectional shape (section to be symmetrical about its bending axes) for axial loads and biaxial moments. Design requirements are based on Bureau of Public Roads Criteria, October 1969.

BRPIER

Analyzes and designs a rigid frame pier having up to 100 joints and 150 members. Arranged in single or multistory pattern, members are described in four types: both ends restrained, start joint pinned with end joint restrained, start joint restrained with end joint pinned and both ends pinned. Columns may be vertical or inclined. Foundation of the pier can be individual or continuous footing, either on soil or on piles. BRPIER analyzes the individual loading case first, then combines them according to AASHTO 1977 loading combinations for either service load design or load factor design.

CONBGR

Continuous Bridge Girder Analysis. Performs complete dead-load and live-load analysis of a continuous-span highway bridge girder of the composite or noncomposite type of steel or concrete, in accordance with AASHTO specifications. CONBGR analyzes any bridge model that has small, lateral girder dimensions (as compared with the longitudinal dimensions) and has negligible torsional stresses. This ensures that program assumptions are correct, and includes the following sections: Symmetrical flanged, rolled or plate girders; symmetrical concrete beams; individual box girder sections, where loading is applied through shear center. Where girders act as continuous beams, CONBGR can be used to analyze any prismatic or nonprismatic bridge. Batch and interactive.

DESCUS1/DESCUS2

Design of Curved Girders. Performs complete analysis and partial design of horizontally curved girder bridges composed of flanged steel sections, which act compositely or noncompositely with a concrete deck. The bridge can be of arbitrary plan configuration and can also be continuous and skewed over supports. The girders can have a high degree of curvature, be nonconcentric and contain hinges. Output includes maximum moment, shear and torsion along with corresponding primary and warping stresses for each girder, beam, truss or diaphragm element. All loading conforms with AASHTO requirements.

DESCUS2 performs a complete analysis of a horizontally curved bridge composed of symmetric steel box girder sections. Batch.

PILEGP

Pile Group Analysis. Analyzes three-dimensional pile groups subjected to static loadings. The direct stiffness approach, in conjunction with conventional matrix methods, performs the analysis. Performing analysis of poor soil conditions, PILEGP is used to determine properties for structures such as harbors and bridges. Interactive.

TRAP

Truss Rating and Analysis Program. Analyzes and rates determinate or indeterminate bridge trusses that have up to six continuous spans. Determines maximum compressive and tensile forces in bridge members under AASHTO standard loadings, standard state vehicle loadings built into the program, or any specialized truck loading for vehicles that have up to 20 axles. Performs six types of rating analysis: Inventory; operating; posting 1, 2, 3; and special truck posting. Interactive.

miscellaneous

MOBILE1

Analyzes air pollution impact from mobile sources. Computes emissions of carbon monoxide, hydrocarbons, and oxides of nitrogen from motor vehicles, using the most recent emission factors and methodology promulgated by the U.S. Environmental Protection Agency, and described in Mobile Source Emission Factors, Final Document (MSEF). Generates emission projections from both current, established deterioration rates and possible or anticipated deterioration rates. Batch and interactive.

OPTICAL SCIENCES

AUTOMATIC THIN FILM DESIGN—For multilayer optical thin film coatings designed to specified performance criteria. Coatings may be metals, dielectrics, absorbing, nonabsorbing (relatively) and dispersive media. Includes evaluation and correction options for any angle of incidence and both polarizations. Films containing up to 200 layers may be designed. Batch and interactive.

COOL/GENII—Integrated optical design system for both fixed focus and zoom systems. Includes GENII and COP in a single run with simple, easy-to-use input specifications. Batch and interactive.

COP—David Grey's Computer Optics Package of powerful orthonormalization optimization techniques; programs optimize and analyze fixed focus, optically compensated zoom, and mechanically compensated zoom lenses, and calculate the modulation transfer function (MTF) and perform tolerance analysis. Batch.

GENII—Complete optical design and evaluation system including optimization, tolerance analysis, and graphical output. Handles lenses with up to 150 surfaces, multiple configurations, tilts, decenters, scanners, double aspheric toroids, Fresnel lenses, conic base Fresnels, six zoom positions, intermediate images, and all types of zoom compensation. Designed for ease of use. Batch and interactive.

SLAP—Enhanced version of POLYPAGOS which analyzes and optimizes image-forming systems in terms of geometrical, physical (diffraction) and manufacturing errors. SLAP handles surface deformations, three-axis tilts and decentrations, rectangular and circular vignetting or obscuration, and segmented aperture systems. Batch.

SYNOPSISYS—Complete optical evaluation and design program. Provides easy-to-use analysis, extensive graphics, tolerancing, and utilities in a single package. Batch and interactive.

TPG—Thermal Perturbation Generator permits a lens designer to perform one-dimensional thermal perturbations with a minimum of input data. Batch.

Programs offered by Control Data through rights acquired under license from leading software developers include:

AUTOMATIC THIN FILM DESIGN, COOL/GENII, COP, GENII, SLAP, SYNOPSIS, TPG (Genesee Computer Center Inc.), AAA Technology (AAA Technology and Specialties Co., Inc.), ABAQUS, ABAQUS/AQUA (Hibbitt, Karlsson, & Sorensen, Inc.), ACSL (Mitchell & Gauthier Assoc.), ADINA (Dr. Klaus-Jürgen Bathe), ADLPIPE, DIS (DIS/ADLPIPE, Inc.), AMPSYN, FILSYN, RFOPT (Compact Engineering Inc.), ANSYS (Swanson Analysis Systems, Inc.), BARS/PREBARS, BDS, BRPIER, CONBRG, DAPPER, PATTERN/DRAW, PILEGP, POLYSEWR, RADS, SPSTRESS, SGEN/STRCHK, CONCHK, TRAP (Sys Comp Corp.), BASIS (Battelle Development Corporation), CADENSE (Mechanical Technology, Inc.), CAP-MP, DIANA (Lisco, Inc.), CAPIM (Chevron Research Co.), CASMO-2E (Studsvik Energiteknik AB), CDC-SYNTHAVISION, SAMCE/2000 (Mathematical Applications Group, Inc.), CNCGRD, POSTEN (Posten Design System), COMEX (Graham Exploration Consultants), COMMIT, MEVAL (System Control Inc.), CPS-1 (Radian Corp.), CSSL-IV (Simulation Services), DESCUS1/DESCUS2 (Production Systems, Inc.), DISSPLA (Integrated Software Systems), DRC, ERC, MDP, NCC (NCA Corporation), EAC/EASE2 (Engineering/Analysis Corp.), EP (Energy Management Service), ESP-1 (Automated Procedures for Engineering Consultants, Inc.), EZPERT (Systonetics Inc.), EZPLOT/FRESAX (Engineering Mechanics Co.), FFAST, HEC (GCN/Hydronet), FASOR (Structures Research Associates) FEMGEN (FECS, Ltd.), GEM6 (HTH Associates, Inc.), GTSTRUDL (Georgia Institute of Technology), GPSS, SPSS (Northwestern University), HANGIT (E.A. Botti, Inc.), HEXTRAN (Simulation Services), IMSL (International Mathematical & Statistical Libraries, Inc.), IFPS (Execucom Systems Corp.), MARC (Mark Analysis Research Corp.), MICROLIB (Microtec), MINECAN (Whitney & Whitney, Inc.), MITAS, SOLCOST (Martin Marietta Corp.), MITIS (Mine Data Consultants), MIVENDES (Floyd Bossard & Assoc. Inc.), MSC/NASTRAN (MacNeal Schwendler Corp.), MVIP, VIP (J.S. Nolen & Assoc. Inc.), NUPIPE, TRHEAT (Quadrex Corp.), ORR SYSTEM (Cost Systems Engineers, Inc.), OSCAR (Ultramarine, Inc.), PATH (GA Technologies), PDS/MaGen (Haverly Systems), PERSPECTIVE (Digital Enterprises, Inc.), PIPESD (John A. Blume & Assoc.), PISCES (Physics International), PLOT-10 (Tektronix Inc.), PREDICTOR, RESULTS (Management Sciences), PROMIS (Applied Kinetics, Inc.), PROPLAN (K & H Computing Systems), P-STAT (P-STAT, Inc.), RESIDENTIAL ENERGY ANALYST (American Energy Services), RETRAN (Electric Power Research Institute), SACM (Application Consultants, Inc.), SACS (Engineering Dynamics, Inc.), SDRC (Structural Dynamics Research Corporation), SIMSCRIPT (CACI Inc.-Federal), SINDA (Prose, Inc.), SIR (Scientific Information Retrieval, Inc.), SLOPE II (Geo-Slope Programming Ltd.), SORITEC (Sorities Group), SPAM (Digital Graphics, Inc.), SPCOGO (TerraGraphics), SSI/PROCESS (Simulation Sciences Inc.), STAAD III (Research Engineers), STARDYNE (System Development Corp.), STRU-PAK (TRW), SURFACE MAP (Digital Enterprises), SURNAL (FENCO Consultants Ltd.), SYNTHA II and III (Syntha Corp.), SYSCAP (Rockwell International), SYSPRO (Systems Professional), SYSTEM 2000 (INTEL Systems Corp.), TEGAS5 (Comsat General Integrated Systems, Inc.), THERMAL (Technical Consultants, Inc.), TOTAL (Cincom Systems), WAVENET (R.T. Bradshaw), WAVES (Seismic Research Corp.).

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