

840 THE LOADED NOVA

JUL 12 1973



DATA GENERAL
CORPORATION



At the Penn Central Railroad's Selkirk yards, near Albany, New York, a Data General computer controls the power switches of the important "pull-out" end of the classification yard, where strings of cars are moved into the departure yard for final make-up into trains. The yard handles about 3,000 cars every day

The Loaded Nova is the Nova 840 and the most powerful combination of software/hardware capabilities ever available with a Data General computer.

The Loaded Nova is a very economical, compact set of capabilities.

Capabilities that match requirements: raw speed, job throughput, easy access to system resources, processing power, flexible input/output, system growth, economy.

Capabilities that match demanding applications: data communications, real-time control of instruments, machines, and processes, time-sharing, Batch processing, remote job entry, and data collection and analysis.

Capabilities you can rely on: since we shipped the first Nova in 1969, Data General has installed over 6,000 computer systems in dozens of countries. Those machines are supported by a worldwide sales, service, and application engineering organization.

The Loaded Nova is Dual Operations: 32 terminals time-sharing while a Batch stream runs independently; a real-time data collection job running while the system functions simultaneously as a Remote Job Entry terminal; a Fortran program compiling while the system outputs management reports from a production line.

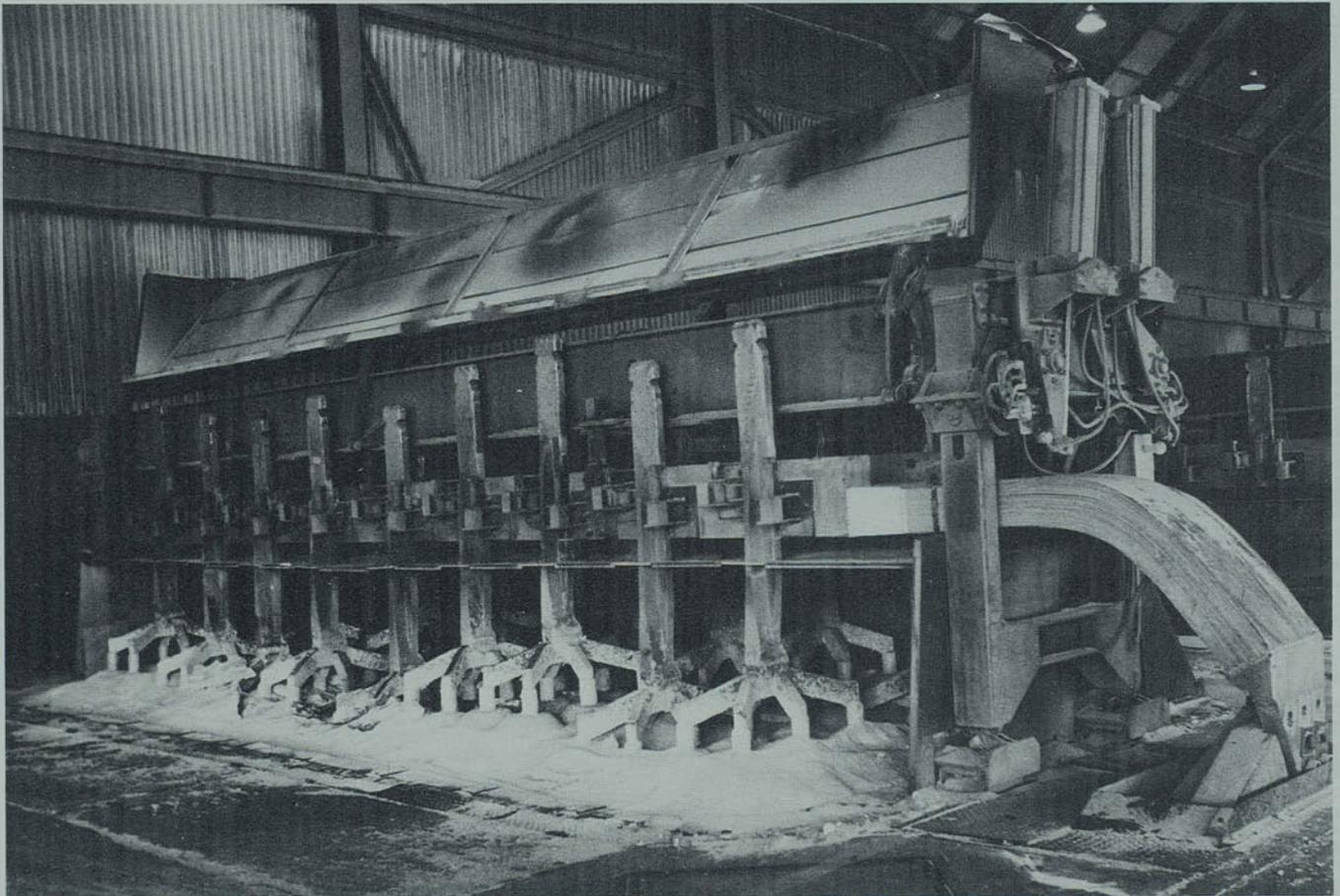
The Loaded Nova is the Nova 840 with a built-in Memory Management and Protection Unit that lets you expand main memory to 128K 16-bit words.

The Loaded Nova is the Nova 840 with Real-time Disc Operating System: the single most versatile set of software available with any comparably priced general purpose computer.

The Loaded Nova is a system. Besides the Nova 840 and RDOS, it includes a high-speed Floating Point Processor, hardware Multiply/Divide unit, fast-access disc storage and 9-track mag tape, card reader, and line printer. You can add Novadisplay terminals, fixed-head Novadiscs, cartridge discs, disc-pack drives, Nova Cassette tape, and communications interfaces.

The Loaded Nova just might be the computer capability you're looking for.

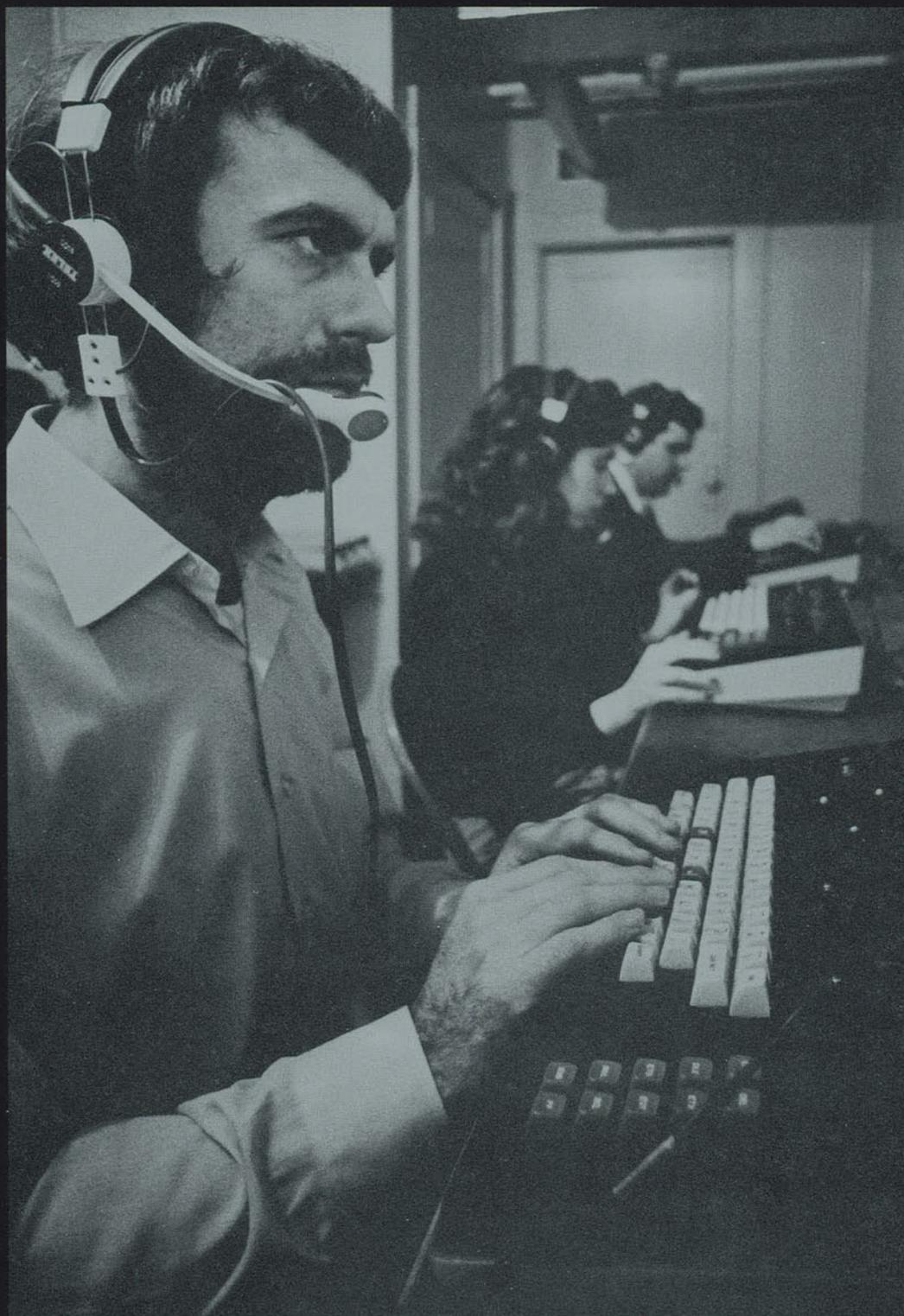
Four Data General computers control 720 ore reduction pots in Intalco Aluminum Corporation's Ferndale, Washington, ore reduction plant. The operation produces over 5,000 tons of molten aluminum each week. The control system was developed jointly by Intalco and Allis-Chalmers Corporation.



REAL-TIME CONTROL

Your Requirement	Loaded Nova Capability
system integrity	hardware protection against interference between the foreground program, the background program, and the operating system by providing separate address spaces for each in main memory hardware protection against unauthorized use of input/output devices hardware protection against use of privileged system-level instructions and addressing modes
file security	access to files only under the control of the operating system, preventing unauthorized physical access to files an advanced directory/partitioning system that guarantees the integrity of disc files in a multi-user environment
programming in high-level languages	two Fortran language processors and runtime monitors, both of which are compatible with assembly language and support multi-tasking at 256 levels and ISA real-time Fortran extensions Fortran 5, an extremely thorough, multipass compiler that produces globally optimized code that's nearly as efficient as assembly language code Fortran IV, a superset of ANSI Fortran IV
redundant systems	dual processor, shared-disc configurations that are fully supported by system software
input/output, information display	Data General high level A-to-D, wide - range A-to-D, D-to-A, and digital I/O devices, and Novadisplay terminals
computer numerical control (CNC)	Contour, a dedicated, computer-based system that controls several multi-axis machines, and provides fast, on-line editing of parts programs
numerical control subsystems	a series of off-the-shelf NC controls and interfaces
parts programming for NC machines	Dataprep, Data General's easy to use, dedicated parts programming language for two-axis, point-to-point machines

At the Protestant Guild for the Blind in Watertown, Massachusetts, blind programmers and students communicate with a Data General computer that converts typed input to audio response. The system was designed by American Systems, Inc.



TIMESHARING

Your Requirement

Loaded Nova Capability

interactive timesharing
for business, science,
and education

BASIC, an easy-to-learn timesharing language
for teaching programming concepts and for
problem solving
BASIC, an interactive language that allows
rapid, easy program debugging
computer-based instructional programs, includ-
ing the Huntington Computer Project programs

accounting features

for billing or for tracking a student's progress, a
timesharing BASIC system that keeps track of
terminal connect time, CPU time, and use of
I/O units

BASIC language
extensions

character string operations, formatted output,
and extensive file capabilities that make BASIC
a general-purpose data processing language
suitable for inventory control, management
information, and many other data processing
applications
matrix operations for computational applications

growth

support for as many as 32 simultaneous users
from local and remote teletypewriter and display
terminals, giving each user access to other
system resources, including line printers, mag
tapes, and disc files.



A system built around a Data General computer controls order-entry, invoicing, shipping, inventory, and sales analysis at World Tableware International, Inc., a subsidiary of International Silver Company. The system, which was developed by Ultimacc Systems, Inc., keeps track of 5,000 inventory items, 8,000 customers, and over 150 individual orders each day.

DATA PROCESSING

Your Requirement

Loaded Nova Capability

Batch processing

a Batch monitor that increases throughput by stacking jobs for execution without operator intervention

a simple, easily learned Batch job control language

spooled output, so one job can start executing while results from a previous job are output

a log of accounting information for each job

Batch support for Fortran IV, Fortran 5, Algol, Macro Assembler

remote job entry

software that communicates with a remote IBM 360/370 for access to a data base, back-up for large computational problems, or access to system software available only on the 360/370

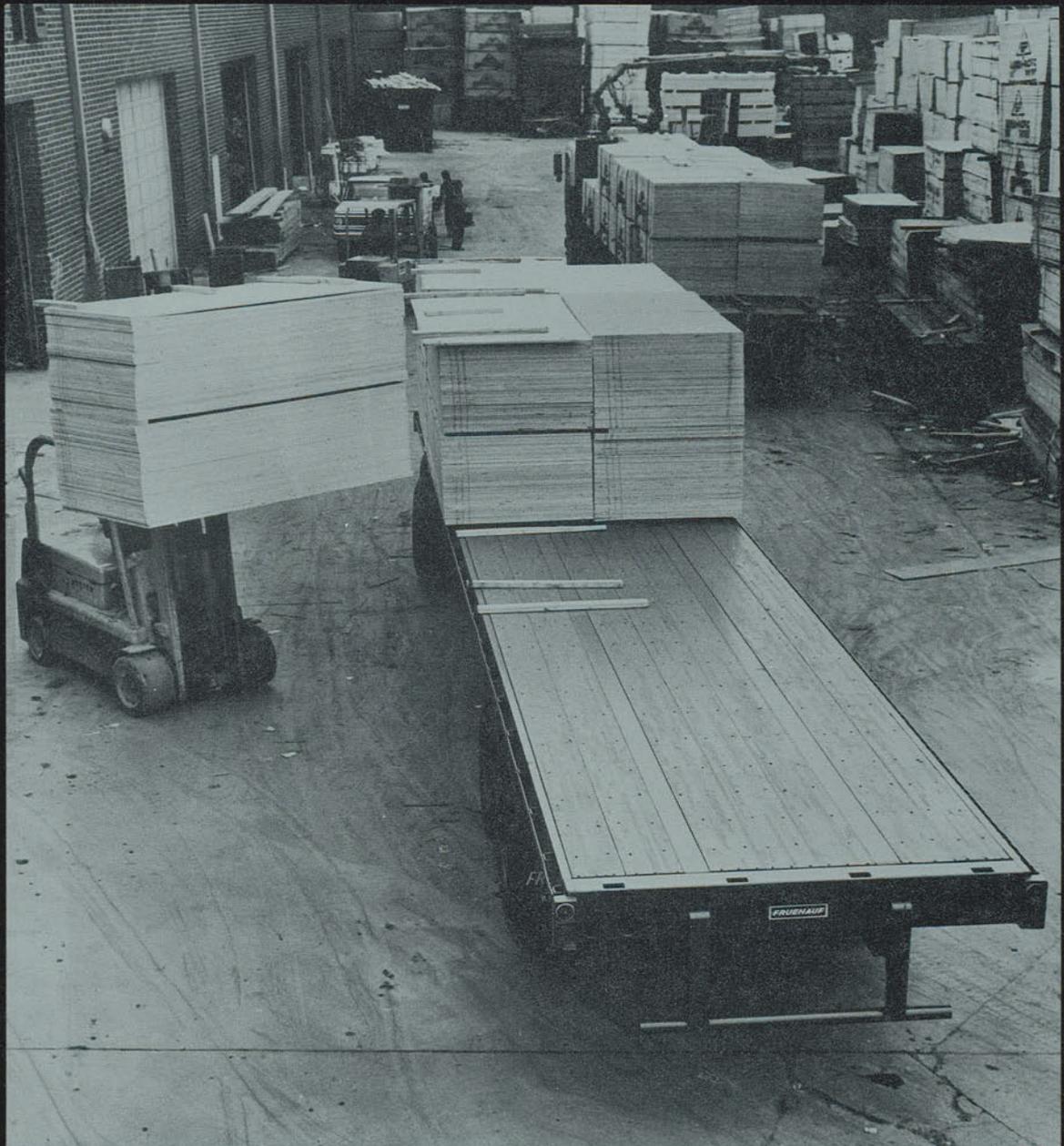
scientific computation

Fortran 5, a powerful compiler that gives big-computer performance by generating very efficient, globally optimized code

a high-speed Floating Point Processor for arithmetic operations with 32- and 64-bit precision

Extended Algol, a highly generalized system development language that offers sophisticated programmers features otherwise available only with much larger computers

Fruehauf Corporation, manufacturer of truck-trailers and diversified transportation equipment, uses a Data General computer in a data communication system that processes and transfers information among its 167 field offices and Detroit corporate headquarters. The system was designed by Action Communications Systems, Inc.



DATA COMMUNICATIONS

Your Requirement

Loaded Nova Capability

front end processor

IBM 360/370 channel interface
bisynchronous, synchronous and asynchronous
line adapters
Real-Time Operating Systems

remote concentrator

64-line synchronous and asynchronous
multiplexors
high speed synchronous line adapters
Real-time Operating Systems

message switcher

1024-line asynchronous multiplexor that has
programmable line speeds and can be shared
among several processors
fast access fixed-head Novadiscs for store-and-
forward systems that can operate in a dual
processor/shared disc mode
Real-time Operating Systems

information storage

Nova 840 main memory expandable to 128K
16-bit words, cartridge discs, fixed-head
Novadiscs, disc pack drives, industry-
compatible magnetic tape, Nova Cassette tape

display and hard-copy

Novadisplay terminals, teletypewriter terminals,
line printers, card readers, paper tape readers
and punches, plotters

At Pensacola Naval Air Station in Florida, eight Nova computers run a 40-station simulation system used to train U.S. Navy flight officers in airborne navigation and communication techniques. The system was built by General Electric Space Division.

Navy News Bureau Photo



SYSTEMS BUILDING

Your Requirement

Loaded Nova Capability

efficient program development

Dual Operations, giving two programmers simultaneous access to development tools
completely symbolic debugger that allows debugging in an interrupt-driven environment
Fortran IV, Fortran 5, Algol – efficient, high-level language processors that shorten the program development cycle

run-time software support

Real-time Disc Operating System, supervising file management, peripheral device handling, and scheduling in a multi-task environment

flexible configurations

growth to 128K 16-bit words of main memory
highly reliable, redundant dual processor/shared disc systems with complete software support
distributed processing with up to 15 Data General computers connected through Multi-processor Communications Adapters (MCA)
fast Floating Point Processor for demanding real-time analysis

a broad product line

cartridge discs, fixed head Novadisks, disc pack drives, industry compatible mag tape, Nova Cassette tape, printers, plotters, Nova-display terminals, teletypewriters, card readers, paper tape readers and punches, A-to-D, D-to-A, digital I/O, high-speed, low-speed, synchronous, asynchronous, and bisynchronous communications interfaces, a custom-engineering group, and the biggest package of system development software available for any comparably priced computer

product reliability

computer products designed with the lowest parts counts possible, a very high level of integration within major subassemblies, and reliable plug-in connectors between subassemblies, backed up by an aggressive quality assurance program that puts every computer through over 175 hours of testing and burn-in before it's shipped to a customer

NOVA 840 FEATURES

MEMORY MANAGEMENT AND PROTECTION UNIT

Nova 840 Memory Management and Protection Unit (MMPU) lets you have up to 128K 16-bit words (or 256K 8-bit bytes) of main memory, and provides hardware write protection, address validity protection and I/O device protection.

Each user has his own "map" of memory, divided into convenient 1K blocks. He needn't worry about where everybody else is in the system, and his programs execute as fast as they would in a machine with only a 32K main memory. In conjunction with the Real-time Disc Operating System (RDOS), the MMPU makes possible Dual Operations, in which two jobs share the total resources of the system.

REAL-TIME DISC OPERATING SYSTEM

The Real-time Disc Operating System (RDOS) gives the user two important capabilities: it's a program development tool, and it's a run-time support system.

In a program development environment, RDOS supports Data General's system development software: Fortran IV, Fortran 5, Extended Algol, Time-sharing BASIC, Macro Assembler, editors, debuggers, and a library of utility programs. As a run-time executive, RDOS handles file management, monitors access to I/O devices, and schedules tasks.

Running on a Nova 840 with Memory Management and Protection Unit, RDOS supports Dual Operations, so any two user programs, developmental or run-time, can share the total hardware/software resources of the system.

FORTRAN 5

Data General's Fortran 5 is an extremely thorough, multipass compiler. Programs written in Fortran 5 are optimized globally. That is, each statement is examined, not only internally, but also in terms of every other statement in the program. The resulting program code is unusually clean and compact, and is, therefore, very fast executing. Fortran 5 also has an exhaustive set of precise diagnostics that tell exactly what and where a program error is.

Fortran 5 is particularly well suited for real-time applications, for two reasons. First, Fortran 5 programs are reentrant: through a very efficient set of subprogram linkages and rapid intertask context switching, a program can pursue several asynchronous tasks at the same time, in real-time. Second, because Fortran 5 code is globally optimized, it executes quickly enough to react well to real-time demands.

With these Fortran 5 features available, even inexperienced programmers can write sophisticated software, including real-time control programs, that otherwise could be handled only in machine language.

BATCH

Batch lets Nova 840 users load programs and enter instructions for executing the programs; Batch then runs the series of jobs with no further intervention.

Data General Batch is not limited to card input and line printer output. A program running under Batch can use all the system capabilities available to an interactive user, including paper tape, magnetic tape, and disc.

REMOTE JOB ENTRY

The Remote Synchronous Terminal Control Program (RSTCP) is an application program supported by RDOS. It lets a Nova 840 system double as a programmable remote job entry terminal. It communicates on a point-to-point basis with an IBM system 360/370 computer or with another RSTCP-equipped Nova 840, using IBM's Binary Synchronous Communications (BISYNCH) method.

TIMESHARING BASIC

BASIC is the most widely used timesharing language available.

It makes available to a number of users a powerful, inexpensive, yet easily used computing capability. It is easy to write practical, useful programs in BASIC with only a few hours of training.

Extended Timesharing BASIC used with the Nova 840 has all the important BASIC extensions, and it can talk to as many as 32 terminals at once. Each user also has at his disposal all the other peripheral equipment in the system, including mass storage and I/O devices.

ALGOL

Data General's Extended Algol is a powerful language which allows systems programmers to develop programs on Nova-line computers that would otherwise require the use of much larger, more expensive computers. No other comparably priced computer offers a language with the programming features and general applicability of Data General's Extended Algol.

Extended Algol has a flexible, generalized, arithmetic organization and a modular structure that allows the programmer to work independently on separate parts of a prototype program. It provides clear, easily readable documentation, making it easy for the programmer to recognize and correct program deficiencies. The language is powerful and concise, allowing the systems programmer to state algorithms without resorting to "tricks" to bypass the language. These characteristics of Algol are especially important in the development of working prototype systems.

FLOATING POINT PROCESSOR

The Floating Point Processor (FPP) handles a heavy load of complex, high-speed arithmetic across a very wide range of numerical values in single or double precision. A Nova 840 with FPP can execute a floating point multiply in less than 12 microseconds.

The Floating Point Processor is a separate, dedicated processor that operates in parallel with or synchronized with the Nova 840 central processor. It has multiple hardware registers, its own instruction set, and its own status reporting code, making programming simple and execution fast.



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