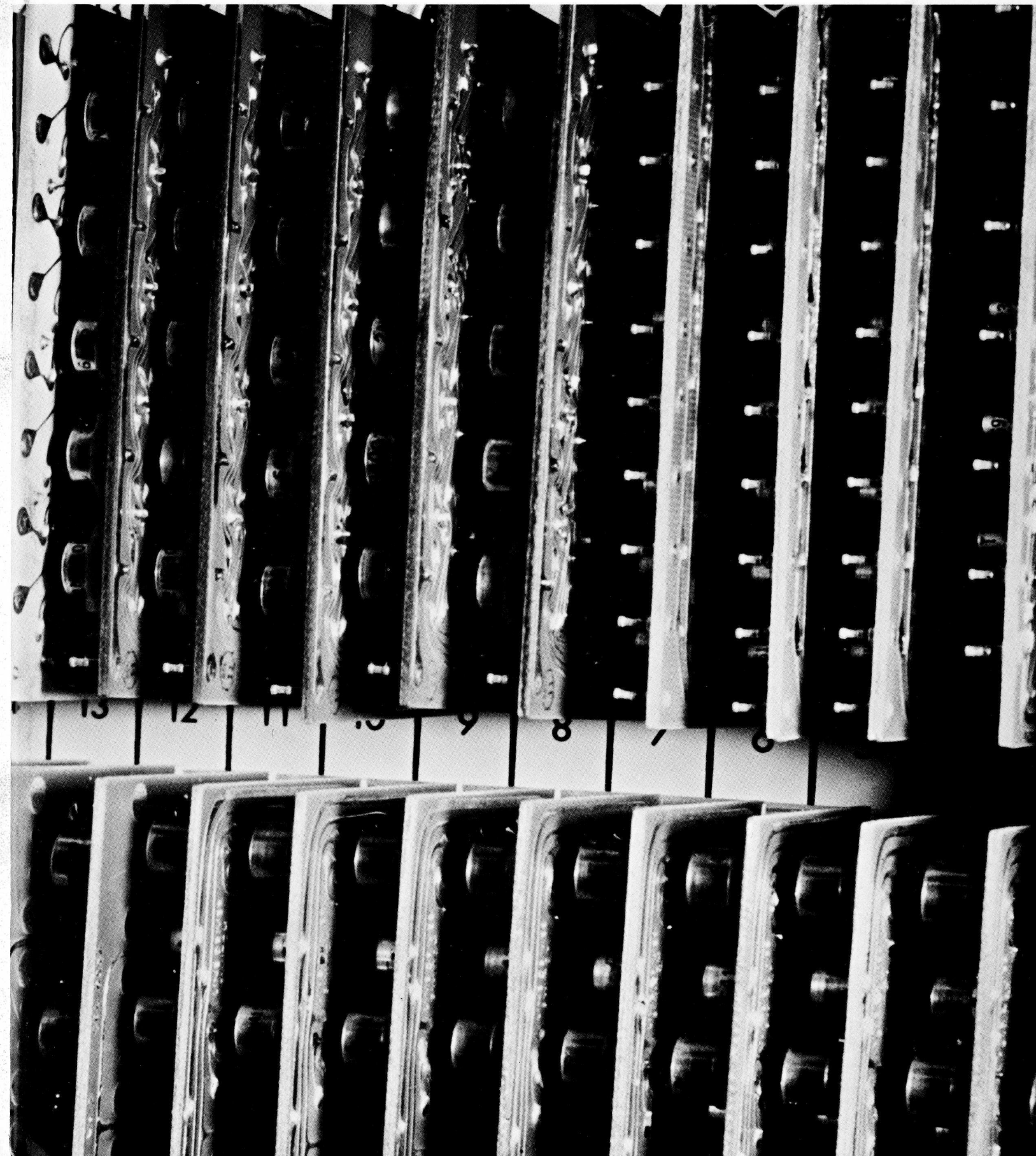


**Systems Engineering Laboratories
SEL 810A General Purpose Computer**



SEL 810
THE FIELD
THIRD C



SEL 810A
THE FIELD PROVEN
THIRD GENERATION COMPUTER



STEEL 810A

OPERAND ADDRESS AUGMENTED OF CODE

INDEX INDIR MAP NUMBER OF SHIFTS

PROG COUNTER

INSTR REGISTER

A ACCUMULATOR

B ACCUMULATOR

T REGISTER

MASTER CLEAR

PRTC

MODE

INTERRUPT OVER DISP ME ENT STEP PROG INSTR A B

Why The SEL 810A?

The SEL 810A general purpose 16-bit parallel computer is the fully field proven third generation computer utilizing highly reliable monolithic silicon integrated logic circuits throughout. In its basic configuration, the computer is delivered with a Teletype input/output typewriter with paper tape reader and punch, 4k memory, high speed hardware multiply and divide, and real time input/output structure. The full set of computer instructions offered as standard with the SEL 810A relieves the operator or programmer of complicated programming and bookkeeping tasks, a feature that adds significant program execution and turn-around time.

Boasting the highest throughput rate of any general purpose computer in its size or price class, the SEL 810A is also a superior real time system computer. Complete operator controls are supplied on the basic computer control panel to reduce operator/computer communication time.

The internal memory full cycle time is 1.75 microseconds with a minimum available core storage of 4096 words. Indexing and multi-level indirect addressing are additional basic features offered on the SEL 810A. Indexing operations require no additional time. Only one memory cycle is added to the instruction execution time for each level of indirect addressing. Both pre-indexing and post-indexing can be performed.

Also included as basic features in the SEL 810A are hardware multiply and divide, hardware program counter, double precision accumulator, two priority interrupt levels, multi-level indirect addressing, complete software, manual program stop, four sense switches, hardware index register, real time input/output system and power fail safe.

The high degree of flexibility obtained by comprehensive input/output configurations coupled with field proven software enables the SEL 810A to meet any moderate sized computer requirements and operate in a wide variety of applications.

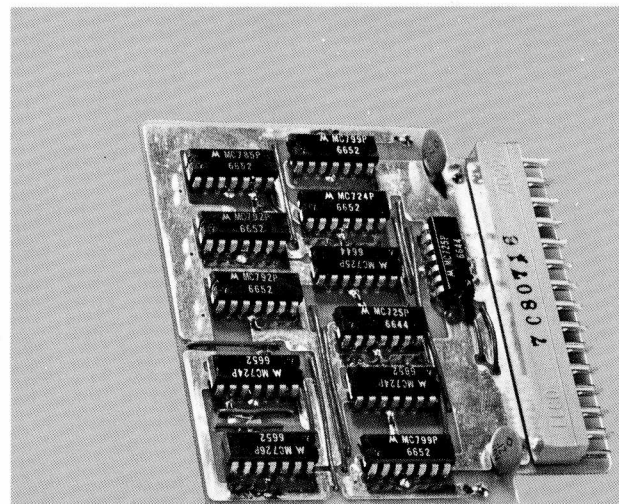
Options include additional core storage up to 32,768 words in modules of 4096 and 8192 words each, as well as up to 8 block transfer control channels, memory and input/output parity generator/checkers, 96 levels of priority interrupts, auto start

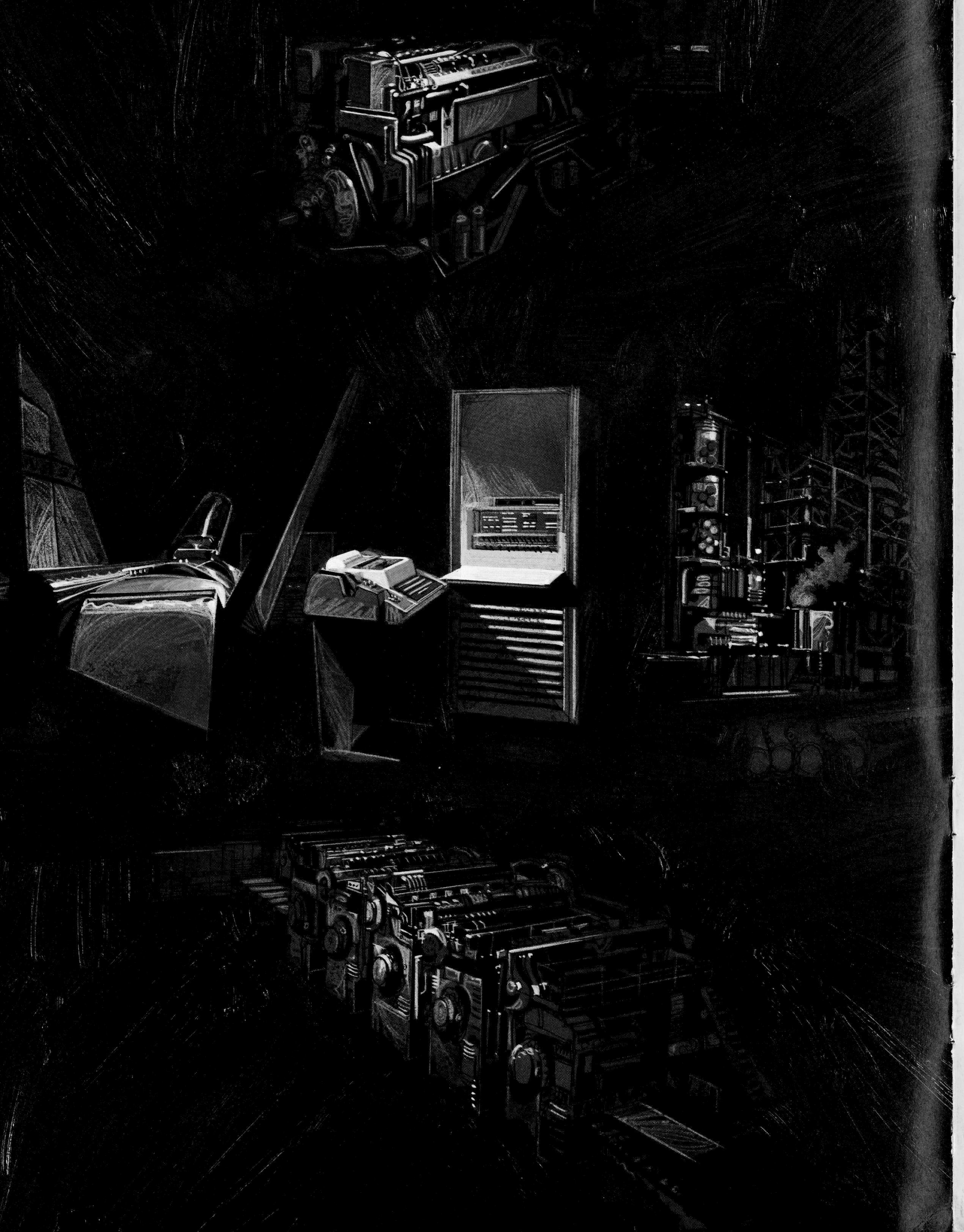
and time sharing options including program protect, instruction trap, stall alarm and variable base register. Block transfer control permits simultaneous input/output control of up to eight input/output devices. A maximum of 64 devices can be placed under block transfer control.

With over 30 units now operating in the field, the SEL 810A has become an accepted and fully field proven computer. Since the first SEL 810 series computer was delivered in September 1965, it has developed an enviable reputation and history of performance and reliability. A wide range of customers and applications have proven the reliability and adaptability of the SEL 810A in areas including high speed off-line data processing, on-line real time computation, recording and display, scientific computation, industrial process automation and supervisory control systems.

The SEL 810A is currently in full production and Systems Engineering Laboratories is continually in a position to offer guaranteed delivery within 60 to 90 days from date of order.

Systems Engineering Laboratories is the only data acquisition systems company specializing in real time systems that has developed its own general purpose digital computer systems. This experience has resulted in the development of a superior computer with a significantly lower price, significantly better and field proven peripheral equipment, well documented and exercised standard and special application software, superior delivery schedules and delivery confidence — the SEL 810A.





The SEL 810A In Action

The high degree of flexibility designed into the SEL 810A computer and its enviable reputation for reliability and performance has made it the first choice of a large and rapidly growing list of customers with requirements running the full gambit of industrial and scientific applications. Since delivery of the first SEL 810 series computer in September 1965 for telemetry data simulation; adaptability, reliability and performance have been proven by extended field use in areas including manufacturing test control, industrial process control, scientific research, product reliability testing, nuclear experimentation, aircraft simulation, industrial automation, real-time computation and off-line data processing.

Metal Rolling Mill Control

An SEL 800 series computer controlled system is now in use by a major manufacturer for pre-programmed control of their rolling mill. Mill variables are continuously monitored by the system computer. The computer compares the acquired data with preset conditions entered into the program and adjusts mill conditions accordingly. From this data comparison and analysis, the system automatically presets mill controls to bring performance within program specified limits. Mill and system operations are continuously controlled during the preset operation.

Flight Test Simulation and Control

An SEL 810 computer, CRT bar-graph display and several analog-to-digital mobile data acquisition sub-systems are now in use for high accuracy checkout on the structural integrity of supersonic aircraft. Structural test data is acquired, processed and displayed on the Systems Engineering Laboratories computer controlled system, aiding design engineers in the development of structural members strong enough to withstand the effects of the extreme

stresses and temperatures that are encountered during supersonic flight.

Diesel Locomotive Engine Test Monitor

An SEL 810 computer is the heart of a system now testing diesel locomotive engines. The Systems Engineering Laboratories computer controlled system tests parameters of up to five engines. The system centers around the SEL 810A computer, measurement unit and display and switch panels located at each engine test stand. A Systems Engineering Laboratories CRT display at each test stand enables the test stand operator to visually monitor selected test functions. An input/output typewriter equipped with a paper tape punch permits operational program entry into the computer and print out of selected and recorded test data.

Oil Field Exploration and Refinery Control

SEL 800 series computers are in the oil industry. Applications ranging from the exploration field to the refinery demand what the SEL 810A has to offer. This demand includes the providing of inexpensive digital processing of seismic data for preparation of highly reliable data for use by geophysicists and geologists in making oil field exploration data interpretations. In oil exploration, the SEL 810A serves as a powerful tool for providing a clearer and more vivid picture of the sub-surface areas that may contain new crude oil deposits by making feasible the production of computer drawn integrated maps, cross sections and reports. Petroleum industry data processing applications now include areas of log analysis, reservoir calculations, cost and profitability estimates and various data storage and retrieval functions. The SEL 810A is currently working in refinery process control for a major petroleum products producer.

Software

The SEL 810A has an unusually powerful, field tested and thoroughly debugged software package for a computer in its size and price class. The most complete instruction list in its price class makes the SEL 810A an extremely easy computer to program. Full computer instructions eliminate the costly and time consuming need for involved programmer bookkeeping and the extra program memory locations required in competitive computers. Fifty-seven instructions are included in the basic instruction repertoire. These instructions include arithmetic, load/store, branch/skip, logical, register change, shift, control and input/output.

Both standard and custom SEL 810A software packages have been delivered, accepted and are now in use by a large number of customers working in a wide variety of computer system applications. SEL 810A software systems are completely modular permitting the use of more powerful software elements as the configuration and size of the computer expands.

MNEMLER — The SEL 810A mnemonic assembler translates programs written in symbolic code into meaningful machine language code. While designed to operate in the minimum configuration (4,096 words of core memory, ASR33 reader, punch and typewriter), the mnebler makes use of all available memory and all standard Systems Engineering Laboratories peripheral equipment. Powerful pseudo-operations are available for the convenience of the programmer.

FORTTRAN IV — SEL 810A FORTRAN IV meets all ASA (American Standards Association) standards and includes all the features and capabilities of FORTRAN II, including double precision real, complex, logical and Hollerith data type representation. Mixed mode expressions are allowable and present a simple method of quickly obtaining a scientific program.

LIBRARY — The SEL 810A library includes a comprehensive set of sub-routines for use by the programmer. The FORTRAN IV set is included and callable by both the FORTRAN IV compiler and mnebler. The wide range of available

sub-routines include sine, cosine, arctan, square root, exponential, log and number base conversion.

UTILITY ROUTINES — A large number of utility routines are available, including an efficient tape editor, on-line debug, dumps, listing, conversion programs and input/output handlers.

DIAGNOSTIC PROGRAMS — Diagnostic programs for the mainframe, memory and all available peripheral equipment are provided with the SEL 810A. These diagnostic programs test worst case parameters and provide the operator with meaningful hardware debugging information.

APPLICATIONS PROGRAMMING — Systems Engineering Laboratories programmers have developed a large number of applications programs for SEL 810A systems including real time executive/monitor systems, data collection, correction, recording and logging, industrial process control, time sharing operations, data display, data analysis, complex systems checkout and scientific computation.

Customer Services

MAINTENANCE — Systems Engineering Laboratories maintains a staff of customer engineers specializing in computer hardware operation, repair and programming. Service representatives are located at area field offices in many major cities throughout the United States, offering SEL 810A customers immediate computer service and programming assistance. On call or resident service contracts are available.

MAINTENANCE and PROGRAMMING TRAINING Maintenance and programming training courses are regularly scheduled at the Ft. Lauderdale plant. Maintenance and programming training courses are also conducted at the customers facility. The regularly scheduled programming courses held in Ft. Lauderdale provide 70 hours of intensive instruction time over a two-week period.



Peripheral Equipment

A full range of completely field proven input/output peripheral equipment is available for use with the SEL 810A computer. Every peripheral device is a completely self contained unit with appropriate buffers as required. Up to 64 input and output peripheral units can be remotely connected to the standard computer input/output control.

CARD PUNCHES — 100 cards per minute. The unit accepts and punches either Hollerith or row binary, providing complete output format freedom.

CARD READERS — Reads 80 column cards coded in Hollerith or binary. Cards are read photoelectrically in parallel columns at rates of 200 or 400 cards per minute.

PAPER TAPE SYSTEM — Punches eight-level tapes at speeds up to 110 characters per second and reads at speeds up to 300 characters per second.

MAGNETIC TAPE UNITS — Seven or nine tracks at 200, 556 and 800 bits per inch at 45, 75, 120 and 150 inches per second.

LINE PRINTERS — Prints 64 characters at 300, 600, or 1,000 lines per minute.

TYPEWRITERS — Tied directly to computer, types 10 alpha-numeric characters per second. ASR33, KSR33, ASR35 and KSR35 available. Page printers RO33 and RO35 are available.

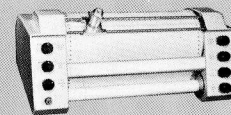
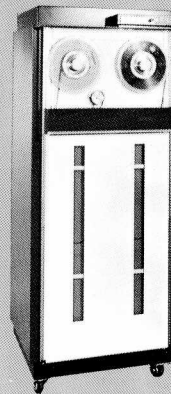
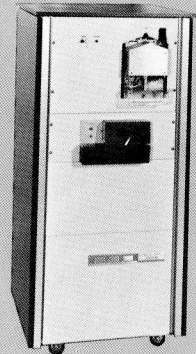
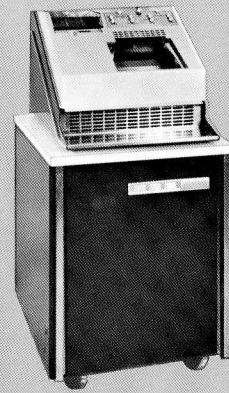
X-Y PLOTTERS — Produce final report quality plots. Chart widths 12 inches and 31 inches (300 steps per second).

CRT DISPLAYS — A 16 inch display with optional vector and character generators, refresh memory and light pen.

DISC FILE — Provides random access bulk storage capability with a capacity of over 24.5 million data bits recorded on ten discs. Each disc contains 100 data tracks.

ACQUISITION and CONTROL COMPONENTS

A full range of Systems Engineering Laboratories data acquisition and control components are available with the SEL 810A including high and low level multiplexers, A/D and D/A converters, digital inputs/outputs, display panels, timing units and data interfaces.



Systems Engineering Laboratories

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Area offices: San Francisco / Los Angeles / Cleveland /
Orlando / Huntsville / Washington, D. C. /
Boston / Houston



WHAT DID SYSTEMS ENGINEERING LABORATORIES DO TO THE 810A?

We reduced the price

\$23,950 now buys:

SEL 810A with 4096 words of memory

Multiply (7.0 microseconds)

Divide (10.5 microseconds)

Four Sense Switches

Three Priority Interrupt Levels

ASR-33 Teletypewriter

Paper Tape Punch and Reader (10 cps)

Power Fail Safe

\$28,450 buys the same configuration above with 8192 words of memory.

We increased the reliability

Wiring connections have been reduced by over 80%.

We reduced the size

The new 810A measures 62" high, 26" deep, 23-1/4" wide and is suitable for 19" rack mounting.

WHICH FEATURES DID WE CHANGE? NONE.

Proven Software

The field proven set of software that has been developed over the last two years for the earlier generation of 810A's is still there.

All Integrated Circuit Design

This has been standard in all 800 series computers since June 1965.

Features

Standard

16-bit Parallel Operation
1.75 microsecond Cycle Time
Hardware Index Register
Multi-level Indirect Addressing
All Registers simultaneously Displayed
Double Length Accumulator
15-bit Program Counter
Manual Program Halt
Single Word I/O Transfers
From Memory OR Accumulator

Optional

Program Protect
Stall Alarm
Instruction Trap
Parity Checker/Generator
Variable Base Register
Automatic Restart
Up to 32K of Core
Wide Variety of Peripherals
Up to 8 Fully Buffered Channels
Up to 96 Priority Interrupt Levels

HOW DID WE DO IT?

By careful redesign of the logical mechanization and repackaging, including bit oriented functional printed circuit cards, we have reduced the 378 logic cards previously employed to 124 cards. Wiring connections have been reduced from 22,000 to 4,000.

WHAT ABOUT -

Input/Output Rates?

Look at our input/output and priority interrupt structure. Compare it against any 16-bit machine on the market - paper or otherwise - regardless of the cycle time. Compare effective input/output speed for a system configuration with any number of real-time demands. Compare -

- I/O Setup Time
- I/O Transfer Time
- Interrupt Response Time

Systems?

That's our forte. SEL has been in the systems business for over six years. We are a systems company that makes its own computer. Our product line consists of:

Analog-to-Digital Converters	Magnetic Core Memories
Digital-to-Analog Converters	Operational Amplifiers
Low-Level Multiplexers	Instrumentation Amplifiers
High-Level Multiplexers	Digital Logic Modules
Micrologic Modules	

Application Software?

Try us. We have a real-time programming staff that loves tough problems.

Deliveries?

Would you believe 60 days?

INTERESTED?

Send in the attached reply card and see for yourself. Or, if you are impatient like me, call area code 415/ 941-1185.

SYSTEMS ENGINEERING LABORATORIES,
INCORPORATED



J. H. Geers
Area Manager

JHG:pr