APPLICATIONS

Government
Ballistic Research Laboratories
Solution of ballistic equations; bombing and firing tables; fire control; data reduction; related scientific problems.
A general purpose computer which may be used for solving many varieties of mathematical problems.

NUMERICAL SYSTEM

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal number system</td>
<td>Binary</td>
</tr>
<tr>
<td>Binary digits per word</td>
<td>44</td>
</tr>
<tr>
<td>Binary digits per instruction</td>
<td>4 bits/command</td>
</tr>
<tr>
<td>10 bits each address</td>
<td></td>
</tr>
<tr>
<td>Instructions per word</td>
<td>1</td>
</tr>
<tr>
<td>Instructions decoded</td>
<td>16</td>
</tr>
<tr>
<td>Instructions used</td>
<td>12</td>
</tr>
<tr>
<td>Arithmetic system</td>
<td>Floating and Fixed point</td>
</tr>
<tr>
<td>Instruction type</td>
<td>Four-address code</td>
</tr>
</tbody>
</table>

Number range
- Fixed: \(-12^{-43} \leq n \leq 12^{-43}\)
- Floating: \(-12^{-33} \leq n \leq 12^{-33}\)

The fractional part of floating point number has 33 bits plus sign, and the exponent of 2 may range from -512 to +511.

ARITHMETIC UNIT

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add time (includ. stor. access)</td>
<td>864</td>
</tr>
<tr>
<td>(min 192 max 1,536)</td>
<td></td>
</tr>
<tr>
<td>Mlt time (includ. stor. access)</td>
<td>2,880</td>
</tr>
<tr>
<td>(min 2,208 max 3,552)</td>
<td></td>
</tr>
<tr>
<td>Div time (includ. stor. access)</td>
<td>2,930</td>
</tr>
<tr>
<td>(min 2,256 max 3,600)</td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>Vacuum-tubes and Diode-gates</td>
</tr>
<tr>
<td>Number of rapid access word registers</td>
<td>4</td>
</tr>
<tr>
<td>Basic pulse repetition rate</td>
<td>1.0 megacycle/sec</td>
</tr>
<tr>
<td>Arithmetic mode</td>
<td>Serial</td>
</tr>
<tr>
<td>Timing</td>
<td>Synchronous</td>
</tr>
<tr>
<td>Operation</td>
<td>Sequential</td>
</tr>
</tbody>
</table>
**STORAGE**

<table>
<thead>
<tr>
<th>Media</th>
<th>Words</th>
<th>Access microsec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mercury Acoustic Delay Line</td>
<td>1,024</td>
<td>48-384</td>
</tr>
<tr>
<td>Magnetic Drum</td>
<td>4,608</td>
<td>17,000</td>
</tr>
</tbody>
</table>

Includes relay hunting and closure. The rate of information transfer to and from the drum is at one megacycle per second. The block length is optional from 1 to 384 words per transfer instruction.

**INPUT**

<table>
<thead>
<tr>
<th>Media</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photoelectric Tape Reader</td>
<td>942 sexadecimal char/sec</td>
</tr>
<tr>
<td></td>
<td>78 words/sec</td>
</tr>
<tr>
<td>Card Reader (IBM)</td>
<td>15 rows/sec</td>
</tr>
<tr>
<td></td>
<td>100 cards/min</td>
</tr>
</tbody>
</table>

**CIRCUIT ELEMENTS ENTIRE SYSTEM**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tubes</td>
<td>4,000</td>
</tr>
<tr>
<td>Tube types</td>
<td>20</td>
</tr>
<tr>
<td>Crystal diodes</td>
<td>10,000</td>
</tr>
<tr>
<td>Magnetic elements</td>
<td>1,325 (relays, coils and trans)</td>
</tr>
<tr>
<td>Transistors</td>
<td>6</td>
</tr>
<tr>
<td>Capacitors</td>
<td>6,000</td>
</tr>
<tr>
<td>Resistors</td>
<td>26,000</td>
</tr>
<tr>
<td>Neons</td>
<td>500</td>
</tr>
<tr>
<td>No. of separate cabinets</td>
<td>13 (excluding power and air cond.)</td>
</tr>
</tbody>
</table>

**CHECKING FEATURES**

Fixed

Two arithmetic units perform computation simultaneously, discrepancies halt machine. Unused command. Paper tape reader error detection.

**POWER, SPACE AND WEIGHT**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Power, computer</td>
<td>50 K.W.</td>
</tr>
<tr>
<td>Space, Computer</td>
<td>490 sq. ft. floor</td>
</tr>
<tr>
<td>Weight, Computer</td>
<td>17,500 lbs.</td>
</tr>
<tr>
<td>Power, Air Cond.</td>
<td>25 K.W.</td>
</tr>
<tr>
<td>Space, Air Cond.</td>
<td>6 sq. ft. floor</td>
</tr>
<tr>
<td>Weight, Air Cond.</td>
<td>4,345 lbs.</td>
</tr>
<tr>
<td>Capacity, Air Cond.</td>
<td>20-Tons</td>
</tr>
</tbody>
</table>
PRODUCTION RECORD

Number produced 1
Number in current operation 1

COST, PRICE AND RENTAL RATE

Approximate cost, basic system $467,000
Rental rates for additional equipment
I.B.M. card reader $82.50 per month
I.B.M. card punch $77.00 per month

PERSONNEL REQUIREMENTS

Daily Operation No. of Tech.
24 hours per day 5
7 days per week

No engineers are assigned to operation of the computer, but are used for design and development of improvements to the computer. The technicians consult with engineers when a total break-down occurs.

RELIABILITY AND OPERATING EXPERIENCE

Average error-free running period Approx. 8 hours
Good time 6,752 hours
Attempted to run time 8,728 hours
Operating ratio 0.78

Above figures based on period from 1 January 1956 to 28 December 1956. The 1,976 hours of down time includes testing, break-down, bad operation time, and machine improvement time to incorporate new equipment. The 6,752 hours is good time during which production, code checking or duplication were performed. This represents an average of approximately 130 hours of good time per week.

ADDITIONAL FEATURES AND REMARKS

Oscilloscope and neon indicator for viewing contents of any storage locations at any time.
Exceed capacity options: halt, ignore, transfer control, or go to selected location.
Unused instruction (command) halt.
Storage of previously executed instruction and which storage location it came from, for viewing during code checking.
Storage of current instruction and storage location it originated from.
Address halt when prescribed address appears in any of 4 addresses of instruction to be executed by computer.
Tape reader error detection.
Built in automatic floating point equipment.
Magnetic tape auxiliary storage unit and high speed printing techniques are being investigated.
Punching one card requires from 364 to 768 microseconds. The computer may proceed between cards.
INSTALLATIONS

Ballistic Research Laboratories
Aberdeen Proving Ground, Maryland
ELECOM 50
Elecom Type 50 Electronic Accounting Machine

MANUFACTURER
Underwood Corporation
Electronic Computer Division

APPLICATIONS
Commercial

NUMERICAL SYSTEM

- Internal number system: Decimal
- Decimal digits per word: 10 plus sign
- Instructions decoded: 42 plus combinations
- Arithmetic system: Fixed point
- Number range: .000001 to 9999999

ARITHMETIC UNIT

- Add time (excl. stor. access): Microsec 650
- Milt time (excl. stor. access): Microsec 39,000
- Construction: Vacuum tubes
- Rapid access word registers: 3
- Basic pulse repetition rate: 67 Kc/sec
- Arithmetic mode: Serial
- Timing: Synchronous

Operation: Sequential
650 microseconds is one minor cycle, multiplication requires 60 minor cycles.

STORAGE

<table>
<thead>
<tr>
<th>Media</th>
<th>Words</th>
<th>Digits</th>
<th>Microsec Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnetic Drum (Main)</td>
<td>100</td>
<td>1,000</td>
<td>33,000</td>
</tr>
<tr>
<td>Magnetic Drum (Working Registers)</td>
<td>3</td>
<td>50</td>
<td>325</td>
</tr>
</tbody>
</table>

INPUT

- Media: Keyboard
- Paper Tape: Manual speed 20 dec dig/sec

OUTPUT

- Media: Printers (Two-gang)
- Paper Tape: Speed 10 char/sec 2 dec dig/sec
The printers operate in parallel.

**CIRCUIT ELEMENTS ENTIRE SYSTEM**

- Tubes: 160
- Tube types: 5
- Crystal diodes: 2,000
- Number of different kinds of plug-in units: 42
- Number of separate cabinets, excluding power supplies and air conditioners: 3

**POWER, SPACE AND WEIGHT**

- Power, computer: 2 kW
- Space, computer: 50 cu. ft. 20 sq. ft.
- Weight, computer: 750 lbs.

**PRODUCTION RECORD**

- Produced: 3
- In production: 50
- Operating: 3
- On order: 50
- Delivery time: 12 Months

**COST, PRICE AND RENTAL RATE**

- Approximate cost of basic system: $22,500
- Rental rates of basic system: $600/month

**PERSONNEL REQUIREMENTS**

- Manufacturer
  - Daily Operation: Tech and Operators 1
  - One 8 Hour shift: 2
  - Two 8 Hour shifts: 2
  - Three 8 Hour shifts: 3

**RELIABILITY AND OPERATING EXPERIENCE**

- Manufacturer
  - Average error-free running period: 6 hours

**INSTALLATIONS**

- Underwood Corporation, Electronic Computer Division, 35-10 56th Avenue, Long Island City 6, New York (1)
- Underwood Corporation, One Park Avenue, New York, New York (2)

- On order:
  - American Telephone and Telegraph Company, 195 Broadway, New York 7, New York (2)

**ADDITIONAL FEATURES AND REMARKS**

- Manufacturer
  - Simple operation
  - Programming by manufacturer
  - 2,400 step program tape
  - Interchangeable program tapes
APPLICATIONS

Manufacturer
Engineering and scientific
Government Sample
Aberdeen Proving Ground Development and Proof Services
Missiles, aircraft systems accuracy, expansion of firing tables, fire control problems.
Industrial Sample
Stevens Institute of Technology
Instruction in programming and research calculations.
Reeves Instrument Company
The computer is owned by the U.S. Navy, Bureau of Aeronautics, and is operated by Reeves Instrument Company under Project Cyclone.

NUMERICAL SYSTEM

Internal number system       Binary
Binary digits per word        30

Binary digits per instruction 30
Instructions per word         1
Instructions decoded          8
Instructions used             8
Arithmetic system             Fixed point
Instruction type              Three address
Number range                  -(4-2^-7) to (4-2^-7)

The 8 instructions include an "external operation" which, in turn, includes six different operations. Octal number system is used.

ARITHMETIC UNIT

Construction       Vacuum tubes
Basic pulse repetition rate 100 Kc/sec
Arithmetic mode     Serial
Timing              Synchronous (Magnetic Drum)
Asynchronous (Magnetic Tape)
Operation           Sequential

25-50 operations per second may be performed, including drum storage access.
STORAGE

<table>
<thead>
<tr>
<th>Media</th>
<th>Words</th>
<th>Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnetic Drum</td>
<td>512</td>
<td>20,000</td>
</tr>
<tr>
<td>Magnetic Tape</td>
<td>60,000</td>
<td></td>
</tr>
</tbody>
</table>

Access time is the maximum value. One block of tape is equivalent to one channel on the drum (64 words). A transfer, or movement of one block takes approximately 2 seconds.

INPUT

<table>
<thead>
<tr>
<th>Media</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typewriter (Flexowriter)</td>
<td>Manual</td>
</tr>
<tr>
<td>Paper Tape (Flexowriter)</td>
<td>7.5 octal dig/sec</td>
</tr>
</tbody>
</table>

OUTPUT

<table>
<thead>
<tr>
<th>Media</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typewriter (Flexowriter)</td>
<td>7.5 char dig/sec</td>
</tr>
</tbody>
</table>

CIRCUIT ELEMENTS ENTIRE SYSTEM

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tubes</td>
<td>230</td>
</tr>
<tr>
<td>Tube types</td>
<td>6</td>
</tr>
</tbody>
</table>

Crystal diodes 2,200
Separate cabinets 2
Number of different kinds of plug-in units 5

Government Sample
Aberdeen Proving Ground, Development and Proof Services
System has 42 relays.

Industrial Sample
Stevens Institute of Technology
System consists of 5 adjacent racks with 22 panels.

CHECKING FEATURES

Fixed
Overflow indication and halt
Out of synchronism for tape and halt
Engineering diagnostic tests

POWER, SPACE AND WEIGHT

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Power, computer</td>
<td>3.5 kW</td>
</tr>
<tr>
<td>Space, computer</td>
<td>120 sq. ft.</td>
</tr>
</tbody>
</table>

Industrial Sample
Stevens Institute of Technology
System requires 3.5 kW, occupies 1,200 cu. ft., 120 sq. ft. Air conditioner capacity is 5 Tons and
Picture by Reeves Instrument Company

Occupies 200 cu. ft. and 20 sq. ft.

PRODUCTION RECORD
Produced 3
Operating 3

COST, PRICE AND RENTAL RATE
Approximate cost of basic system $60,000.

Industrial Sample
Stevens Institute of Technology
System donated to the Institute for educational purposes.

PERSONNEL REQUIREMENTS

<table>
<thead>
<tr>
<th>Daily Operation</th>
<th>Engineers</th>
<th>Tech and Operators</th>
</tr>
</thead>
<tbody>
<tr>
<td>One 8 Hour shift</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Two 8 Hour shifts</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Three 8 Hour shifts</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

Industrial Sample
Stevens Institute of Technology

RELIABILITY AND OPERATING EXPERIENCE
First unit passed acceptance test on 9 December 1952.

Government Sample
Aberdeen Proving Ground, Development and Proof Services
Good time 1,471 hours
Attempted to run time 2,225 hours
Operating ratio (Good/Attempted to run) 0.66

Industrial Sample
Stevens Institute of Technology
Good time 892 hours
Attempted to run time 1,212 hours
Operating ratio (Good/Attempted to run) 0.735

Figures based on period March 1956 to 5 November 1956.

FUTURE PLANS
Industrial Sample
Stevens Institute of Technology
Magnetic tape unit to be placed in service during 1957.
Government Sample
Aberdeen Proving Ground, Development and Proof Services

It is planned to improve the input-output systems, the Flexowriter attachment, tape, and prepared programs. It is further planned to increase the size of the rapid access storage unit.

INSTALLATIONS
Aberdeen Proving Ground, Development and Proof Services, Maryland
Reeves Instrument Corporation, 215 E. 91st Street, New York 28, New York
Stevens Institute of Technology, Hudson Street, Hoboken, New Jersey
APPLICATIONS

Manufacturer
Engineering and scientific applications.

Government Sample
Griffiss Air Force Base, RADC
Scientific and general purpose applications.

Industrial Sample
Republic Aviation Corporation
Aircraft engineering, research and development.

Shell Development Company
Non-routine research calculations.

NUMERICAL SYSTEM

Internal number system  Decimal
Decimal digits per word  8 plus sign
Decimal digits per instruction  10
Instructions per instruction  1
Instructions decoded  35

Instructions used  35
Arithmetic system  Fixed and floating point
Instruction type  Two address
Number range
Fixed point  \(-10^{-10} \leq n \leq 10^{-10}\)
Floating point  Exponent  \(-50 \leq c \leq 49\)
Coefficient  \((-10^{-8}) \leq c \leq (10^{-8})\)

Floating point operation is optional and is supplied with fixed point at extra cost.

ARITHMETIC UNIT

Manufacturer

Add time (excl. stor. access)  330
Mult time (excl. stor. access)  18,500
Div time (excl. stor. access)  18,700
Construction  Vacuum tubes and crystal diodes
Rapid access word registers  3
Basic pulse repetition rate  105 Kc/sec
Arithmetic mode  Serial
Timing
Synchronous
Operation
Sequential

Above operation times are for average 10 digit multiplier, dividend and divisor, respectively.

Government Sample
Griffiss Air Force Base, RADC
Average add time including access time 32,000 microseconds.
Average multiply time including access time 46,000 microseconds.
Average divide time including access time 46,000 microseconds.

Industrial Sample
Republic Aviation Corporation
This system utilizes the 12AP7, 6CL6, 5687, and 2C51 in the arithmetic unit. Diodes used are 1N34A, 1N140 and 1N91.
Shell Development Corporation
350 vacuum tubes and 4,000 diodes are used.

STORAGE

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Media</th>
<th>Words</th>
<th>Microsec Access</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Magnetic Drum</td>
<td>1,000-10,000</td>
<td>8,300 Avg.</td>
</tr>
<tr>
<td></td>
<td>Magnetic Drum</td>
<td>10-100</td>
<td>1,870 Avg.</td>
</tr>
</tbody>
</table>

Main storage is on single head per channel basis. Fast access storage is a group of recirculating channels.

Government Sample
Griffiss Air Force Base, RADC
Storage includes magnetic drum of 1,000 words of 20,000 microsecond maximum access time and 330 microsecond minimum access time. Access time depends on programming. Magnetic tape drives store 125,000 words each. Present drives will be replaced with Potter type tape drives by Underwood at no charge. Access time on tapes is 1.6 microsecond per 50 words.

Industrial Sample
Republic Aviation Corporation
System has 2,000 words of magnetic drum, 125,000 words of magnetic tape and 10 words of rapid access drum loop storage. Magnetic tape transfers information in blocks of 50 words.
Shell Development Company
Drum and tape storage of 10, 1,000, and 125,000 words, respectively.

INPUT

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Media</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typewriter</td>
<td>Paper Tape Reader</td>
<td>Manual and 8 char/sec</td>
</tr>
<tr>
<td>Magnetic Tape</td>
<td></td>
<td>8 to 400 char/sec</td>
</tr>
</tbody>
</table>

400 char/sec
Typewriter is standard equipment. The high-speed paper tape reader is optional. One magnetic tape unit is supplied as standard equipment. Standard model includes controls for additional tape units.

**Government Sample**
Griffiss Air Force Base, RADC
System uses Flexowriter tape reader at a speed of .95 seconds/word (9 digits) and a Ferranti high speed tape reader at 200 decimal digits/sec.

**Industrial Sample**
Republic Aviation Corporation
Input system uses Flexowriter (keyboard and paper tape) and a Ferranti paper tape reader at 200 char/sec.

Shell Development Company
System uses Flexowriter and Ferranti reader at 1 and 20 words/sec, respectively.

**OUTPUT**

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typewriter</td>
<td>8 or 60 char/sec</td>
</tr>
<tr>
<td>Paper Tape</td>
<td>8 or 60 char/sec</td>
</tr>
<tr>
<td>Magnetic Tape</td>
<td>400 char/sec</td>
</tr>
</tbody>
</table>

Typewriter is standard equipment. High speed paper tape punch is optional.

**Industrial Sample**
Republic Aviation Corporation
System uses Flexowriter and Teletype punch at 10 and 60 char/sec, respectively.

**CIRCUIT ELEMENTS ENTIRE SYSTEM**

- Tubes: 400
- Crystal diodes: 4,500

95% of tubes are of two basic types.

**Government Sample**
Griffiss Air Force Base, RADC
System utilizes 6 types of tubes and is contained in 5 separate cabinets.

**CHECKING FEATURES**

- Manufacturer: Fixed
- Internal check for forbidden pulse combinations and check of drum-writing operations. Parity check on tapes with automatic re-read.

**Government Sample**
Griffiss Air Force Base, RADC
System has transfer error check for number and existence of coded digits. Magnetic tape has parity check.
Industrial Sample
Republic Aviation Corporation
System has a bit check, a timing check, address
marker check, instruction completion check, overflow
check and tape redundancy check.
Shell Development Company
Built-in checks on reading and writing, arithmetic
operations, tape insertions.

POWER, SPACE AND WEIGHT
Manufacturer
Power, computer 5 to 7 KW
Space, computer 200 cu. ft.
Weight, computer 3,500 lbs.

These figures are for computer complete with control
desk and one tape unit.

Industrial Sample
Republic Aviation Corporation
System operates at 7 KW, 7.5 KVA, 0.9 PF, occupies
95 sq. ft., weighs 4,500 lbs. and requires 15 Tons
of air conditioning.

PRODUCTION RECORD
Produced 5
Operating 5
Delivery time 6 to 9 Months

COST, PRICE AND RENTAL RATE
Manufacturer
Approximate cost of basic system $97,000.
Rental rates of basic system $3,500/Month for
complete system, including maintenance.

Government Sample
Griffiss Air Force Base, RADC
This system costs $90,000 plus $35,000 for additional
equipment.

Industrial Sample
Republic Aviation Corporation
The approximate cost of basic system was $135,000
and additional equipment was $10,000.

PERSONNEL REQUIREMENTS
Manufacturer
Daily Operation Engineers Tech and Operators
One 8 Hour shift 1 1
Two 8 Hour shifts 2 2
Three 8 Hour shifts 3 3

Industrial Sample
Republic Aviation Corporation
For three 8-hour shifts, 5 engineers and 5 techni-
cians-operators are used for maintenance and
operation only. This does not include programming.
RELIABILITY AND OPERATING EXPERIENCE

Manufacturer
Operating ratio (Good/Attempted to run) 0.90 to 0.95
Figures based on eight month period.

Above up-times (machine time available for problem work divided by total time) reported for 5 ELECOM 120 Computer installations. At one location, up-times of 100% and 99.9% were obtained for two successive months.

Government Sample
Griffiss Air Force Base, RADC
Good Time
1,185 hours
Attempted to run time
4,300 hours
Operating ratio (Good/Attempted to run) 0.93
Figures based on period March 1955 to November 1956.
Acceptance test March 1955.

Industrial Sample
Republic Aviation Corporation
Respectively as above, 471.4 hours, 519.7 hours, 0.907, 1 October 1956 to 31 October 1956. System accepted in January 1954.

Shell Development Company
Average error free running period is 10 hours.
Respectively as above, 375 hours/month, 25 hours/month, 0.94, April 1954 to October 1956. System accepted 15 April 1954.

INSTALLATIONS
Redstone Arsenal
Huntsville, Alabama

Rome Air Development Center
Griffiss Air Force Base
Rome, New York

Republic Aviation Corporation
Farmingdale
Long Island, New York

Shell Development Laboratories
Houston, Texas

Westinghouse Electric
Aviation Gas Turbine Division
Kansas City, Missouri

Sandia Corporation
Albuquerque, New Mexico

ADDITIONAL FEATURES AND REMARKS

Industrial Sample
Republic Aviation Corporation
System has one 4-digit base register.
APPLICATIONS

Manufactured
Commercial, engineering and scientific. The Elecom 125FP is primarily commercial.

Industrial Sample
Sandia Corporation
Scientific applications.

NUMERICAL SYSTEM

<table>
<thead>
<tr>
<th>Internal number system</th>
<th>Decimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decimal digits per word</td>
<td>10 and sign</td>
</tr>
<tr>
<td>Decimal digits per instruction</td>
<td>10</td>
</tr>
<tr>
<td>Instructions per word</td>
<td>1</td>
</tr>
<tr>
<td>Instructions decoded</td>
<td>36</td>
</tr>
<tr>
<td>Instructions used</td>
<td>36</td>
</tr>
<tr>
<td>Arithmetic system</td>
<td>Floating and fixed</td>
</tr>
<tr>
<td>Instruction type</td>
<td>Two address</td>
</tr>
</tbody>
</table>

Number range
- Coefficient range $-1 \times 10^{-8} \leq c \leq 1 \times 10^{-8}$
- Exponent range $-50 \leq e \leq 49$
- Fixed point range $-1 \times 10^{-10} \leq n \leq 1 \times 10^{-10}$

Floating point is optional at extra cost and is additional to fixed point. Fixed point is standard. The Elecom 125FP utilizes 2 decimal dig/alpha char. It operates on "Items" containing any integral number of words. Fixed program, switch-selected; sequence, collate, select, collate and select, separate, and substitute. The following combinational operations are available as an option: Select-separate, collate-separate, substitute-separate, collate-select-separate.

Industrial Sample
Sandia Corporation
Of two systems, one has a floating point, both have fixed point.
**ARITHMETIC UNIT**

<table>
<thead>
<tr>
<th></th>
<th>Microsec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add time (excl. stor. access)</td>
<td>330</td>
</tr>
<tr>
<td>Mult time (excl. stor. access)</td>
<td>18,300</td>
</tr>
<tr>
<td>Div time (excl. stor. access)</td>
<td>18,700</td>
</tr>
<tr>
<td>Construction</td>
<td>Vacuum tubes</td>
</tr>
<tr>
<td>Rapid access word registers</td>
<td>3</td>
</tr>
<tr>
<td>Basic pulse repetition rate</td>
<td>132 Kc/sec</td>
</tr>
<tr>
<td>Arithmetic mode</td>
<td>Serial</td>
</tr>
<tr>
<td>Timing</td>
<td>Synchronous</td>
</tr>
<tr>
<td>Operation</td>
<td>Sequential</td>
</tr>
</tbody>
</table>

Above operation time is based on average 10 decimal digit multiplier, dividend and divisor.

**Industrial Sample**

<table>
<thead>
<tr>
<th></th>
<th>Microsec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add time (incl. stor. access)</td>
<td>3,500</td>
</tr>
<tr>
<td>Add time (excl. stor. access)</td>
<td>330</td>
</tr>
<tr>
<td>Mult time (incl. stor. access)</td>
<td>22,000</td>
</tr>
<tr>
<td>Mult time (excl. stor. access)</td>
<td>18,000</td>
</tr>
<tr>
<td>Div time (incl. stor. access)</td>
<td>22,000</td>
</tr>
<tr>
<td>Div time (excl. stor. access)</td>
<td>18,000</td>
</tr>
</tbody>
</table>

The above figures are obtained for 10 digit numbers.

**STORAGE**

<table>
<thead>
<tr>
<th>Media</th>
<th>Words Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnetic Drum</td>
<td>4,000 to 10,000</td>
</tr>
<tr>
<td>Magnetic Drum</td>
<td>50 to 100</td>
</tr>
</tbody>
</table>

Main storage operates on a single head per channel basis. The rapid-access storage is a recirculation channel. The Elecom 125 FP has a 100 word acoustic delay line.

**INPUT**

<table>
<thead>
<tr>
<th>Media</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typewriter</td>
<td>8 char/sec</td>
</tr>
<tr>
<td>Paper Tape</td>
<td>8 to 400 char/sec</td>
</tr>
<tr>
<td>Magnetic Tape</td>
<td>6,000 char/sec</td>
</tr>
<tr>
<td>Cards (IBM 528 or similar)</td>
<td></td>
</tr>
</tbody>
</table>

The typewriter is standard equipment. The high speed tape reader and punched card unit is optional. Magnetic tape synchronizing circuits and controls are included as standard equipment. The Elecom 125 FP unit is utilized in conjunction with magnetic tape and typewriter. The typewriter and punched paper tape are used for checking and control.

**OUTPUT**

<table>
<thead>
<tr>
<th>Media</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typewriter</td>
<td>8 char/sec</td>
</tr>
<tr>
<td>Paper Tape</td>
<td>8 or 60 char/sec</td>
</tr>
<tr>
<td>Magnetic Tape</td>
<td>6,000 char/sec</td>
</tr>
<tr>
<td>Tabulation (IBM 407)</td>
<td>6,000 char/sec</td>
</tr>
</tbody>
</table>

Typewriter is standard equipment. High speed paper tape and card equipment are optional.

**CIRCUIT ELEMENTS ENTIRE SYSTEM**

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Elecom 125</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tubes</td>
<td>450 for ELECOM 125; 250 for 125 FP</td>
</tr>
<tr>
<td>Diodes</td>
<td>2,900 for ELECOM 125 FP</td>
</tr>
<tr>
<td>95% of the tubes are of 2 types.</td>
<td></td>
</tr>
</tbody>
</table>

**CHECKING FEATURES**

**Manufacturer**

- Elecom 125

**Fixed**

Internal check for forbidden pulse combinations
Check of drum writing circuits
Parity check on tape with automatic re-read.
The Elecom 125 FP makes a parity check on all data.

**Industrial Sample**

| Sandia Corporation |

Magnetic tape circuits contain check to determine if block read contains some number of digits as block contains when written. Automatic re-read takes place if error is detected. The storage signals are continuously monitored for forbidden combinations.

**POWER, SPACE AND WEIGHT**

<table>
<thead>
<tr>
<th>Power, computer</th>
<th>5-7 KW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Space, computer</td>
<td>400 cu. ft.</td>
</tr>
<tr>
<td>Weight, computer</td>
<td>4,000 lbs.</td>
</tr>
<tr>
<td>Capacity, air cond.</td>
<td>5 Tons</td>
</tr>
</tbody>
</table>

Space and weight figures are for computer (complete) with control desk and three tape units. Room air conditioning is recommended. No built-in air conditioning is supplied with system. Elecom 125 FP requires 7 kW and occupies 200 cu. ft., including control desk and 3 magnetic tape units. 5 Tons of room air conditioning is recommended. No built-in air conditioning is supplied with system.

**Industrial Sample**

| Sandia Corporation |

System requires 7 kw. System operates on normal room air conditioner only. Space requirement is 191.2 cu. ft. and 26.64 sq. ft. Dimensions are:
Main Computer Cabinet 72 in. by 24 in. by 78 in.
Storage Cabinet 44 in. by 24 in. by 61 in.
Power Supply Cabinet 44 in. by 24 in. by 61 in.

**PRODUCTION RECORD**

<table>
<thead>
<tr>
<th></th>
<th>Elecom 125</th>
<th>Elecom 125 FP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Produced</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>In production</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Operating</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>On order</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Delivery time</td>
<td>12 to 18 Months</td>
<td>6 to 9 Months</td>
</tr>
</tbody>
</table>

**COST, PRICE AND RENTAL RATE**

<table>
<thead>
<tr>
<th>Price</th>
<th>$155,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer only</td>
<td>$450,000</td>
</tr>
<tr>
<td>Computer System with File Processor</td>
<td>$450,000 to $1,000,000</td>
</tr>
<tr>
<td>File Processor only</td>
<td>$85,000</td>
</tr>
</tbody>
</table>

**Monthly Rental Rate**

| Computer only       | $4,185 |
| Computer System with File Processor | $8,500 to $9,500 |
| File Processor only | $2,925  |

**Industrial Sample**

| Sandia Corporation |

Price was $100,000 each for two systems and $50,000 for additional equipment.
PERSONNEL REQUIREMENTS

Manufacturer

Daily Operation Engineers Tech and Operators
1-8 Hour shift 1 1
2-8 Hour shifts 2 2
3-8 Hour shifts 3 3

Above figures are the same for the File Processor.

Industrial Sample
Sandia Corporation
Two systems require 2 engineers and 4 tech-operators for one 8 hour shift.

RELIABILITY AND OPERATING EXPERIENCE

Operating ratio (Good/Attempted to run) 0.90 to 0.95
Figures based on an eight-month period.

Above up-times (machine time available for problem work divided by total time) reported for 5 ELECOM 120 computer installations. (Much of the ELECOM 125 internal circuitry is substantially the same as that of ELECOM 120) at one location, up times of 100% and 99.9% were obtained for two successive months.

FUTURE PLANS

Manufacturer
ELECOM Universal Data Converter - A device for transcribing data between ELECOM magnetic tapes and those of other manufacturers. In addition, the converter will be able to handle punched paper tape and punched cards. The converter is designed to make the ELECOM 125 System, or the ELECOM 125 Computer compatible with the input/output from a to any other data processing equipment currently manufactured.

Industrial Sample
Sandia Corporation
Present plans include the addition of approximately 3 more tape units, a line printer and possibly a File Processor.

INSTALLATIONS

Sandia Corporation  (2)
Albuquerque, New Mexico

Undertwood Corporation  (1)
Data Processing Center
New York City, New York

The Texas Company
Houston, Texas  (1)

Sylvania Electric Corporation
Waltham, Massachusetts

ADDITIONAL FEATURES AND REMARKS

Manufacturer
Two (2) Four-digit base registers (B-boxes) are included as standard equipment.

An important partner in the ELECOM 125 System is the ELECOM File Processor. This is an entirely separate piece of equipment, designed and engineered to handle the sequencing, collating, extracting and similar operations necessary in day-to-day business applications.

The ELECOM File Processor extracts from the voluminous "Library Tapes", the particular items upon which processing is to be done. It is the job of the ELECOM File Processor to pick the pertinent items out of the tape file, so that the associated Computer wastes no time in "searching" through unwanted items. Once the items have been processed by the ELECOM 125 Computer the ELECOM File Processor puts them back into their proper place (in sequence) in the main file.

The picture shows the Elecom File Processor on the left, the Elecom 125 Computer on the right. The Magnetic Tape Units and the Magnetic Tape Inter-connceting panel are in the rear. The Elecom High-Speed Line Printer is not shown.