TECHNITROL 180
Technitrol General Purpose Computer Type 180

MANUFACTURER
Technitrol Engineering Company

APPLICATIONS
General purpose computation

NUMERICAL SYSTEM
- Internal number system: Binary
- Binary digits per word: 48
- Binary digits per instruction: 48
- Instructions per word: 1
- Instructions used: 40
- Arithmetic system: Fixed point
- Instruction type: Four address
- Number range: +2^44 to -2^44

ARITHMETIC UNIT
- Add time (excl. stor. access): 48 Microsec
- Mult time (excl. stor. access): 3,160
- Div time (excl. stor. access): 3,160
- Construction: Diode logic
- Number of rapid access word registers: 64
- Basic pulse repetition rate: 1 Mc/sec
- Arithmetic mode: Synchronous
- Timing: Sequential
- Operation:

STORAGE
- Media: 
  - Acoustic Quartz: 512 Words, 384 max Microsec Access
  - Magnetic Tapes: 100

  Acoustic quartz delay lines store 24,576 bits.
  Magnetic tapes constitute intermediate speed storage.
Acoustic quartz has 448 words in 8-word loops and 64 words in one word loop.
Seven tape positions are available.

INPUT

<table>
<thead>
<tr>
<th>Media</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnetic Tape</td>
<td>5,000 char/sec</td>
</tr>
<tr>
<td>Paper Tape (Ferranti)</td>
<td>200 char/sec</td>
</tr>
<tr>
<td>Keyboard</td>
<td>Manual</td>
</tr>
</tbody>
</table>

OUTPUT

<table>
<thead>
<tr>
<th>Media</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Page Printer (Anelex)</td>
<td>400 char/sec</td>
</tr>
<tr>
<td>Paper Tape (Ferranti)</td>
<td>200 char/sec</td>
</tr>
<tr>
<td>Typewriter (IBM)</td>
<td>8 char/sec</td>
</tr>
<tr>
<td>Magnetic Tape</td>
<td>5,000 char/sec</td>
</tr>
</tbody>
</table>

CIRCUIT ELEMENTS ENTIRE SYSTEM

<table>
<thead>
<tr>
<th>Item</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tubes</td>
<td>2,600</td>
</tr>
<tr>
<td>Tube types</td>
<td>4</td>
</tr>
<tr>
<td>Crystal diodes</td>
<td>30,000</td>
</tr>
</tbody>
</table>

CHECKING FEATURES

Fixed
Marginal checking of plug-in units may be controlled manually or automatically from the console.

POWER, SPACE AND WEIGHT

<table>
<thead>
<tr>
<th>Specification</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power, computer</td>
<td>50 KW</td>
</tr>
<tr>
<td>Space, computer</td>
<td>600 cu ft</td>
</tr>
<tr>
<td>Weight, computer</td>
<td>14,000 lbs</td>
</tr>
<tr>
<td>Power, air cond.</td>
<td>20 KW</td>
</tr>
<tr>
<td>Space, air cond.</td>
<td>350 cu ft</td>
</tr>
<tr>
<td>Weight, air cond.</td>
<td>4,000 lbs</td>
</tr>
<tr>
<td>Capacity, air cond.</td>
<td>20 Tons</td>
</tr>
</tbody>
</table>

PRODUCTION RECORD

Unit described is a general purpose large scale digital computer made up of Technitrol standard computer blocks.

COST, PRICE AND RENTAL RATE

Approximate cost of basic system $500,000

ADDITIONAL FEATURES AND REMARKS

Flexibility is achieved by block type of construction. Instruction code and number base are flexible. Capacity may be increased readily.
The first picture shows the memory cabinets.
The second picture is a close-up of the control and arithmetic units, showing plug-in structure.
TRANSCAC S 1000

Philco Transistor Automatic
Computer S-1000
(Scientific Computer)

MANUFACTURER
Philco Corporation

APPLICATIONS
Manufacturer
Primarily scientific applications, some commercial or industrial applications.

NUMERICAL SYSTEM
Internal number system Binary
Binary digits per word 36
Instructions per word 1
Instruction type Two address
Code will include two 12-binary digit addresses, two 3-binary digit address modifiers, and a 6-binary digit command.

ARITHMETIC UNIT
Time
Add (exclud. stor. access) 5.5
Mult (exclud. stor. access) 130 avg
Div (exclud. stor. access) 200
Construction Transistors
Arithmetic mode Parallel

Maximum multiply time excluding storage access is 200 microseconds. Ones complement binary arithmetic is used.
STORAGE

Media                         Words   Digits
Magnetic Core                4,096    147,456

Cycle time is 12 microseconds

INPUT

Media        Speed
Perforated Tape Reader       60 char/sec
Teletype Model 28 Keyboard   Manual

OUTPUT

Media        Speed
Perforated Tape Punch        60 char/sec
Teletype Model 28 Page Printer

Either 5 or 7 level tapes may be used. Punched card equipment, magnetic tape and magnetic drum may be added, if desired.

CIRCUIT ELEMENTS ENTIRE SYSTEM

All transistor circuits are used in arithmetic and storage units.

POWER, SPACE AND WEIGHT

System requires approximately 1.2 KW. The total volume occupied by the arithmetic section, storage section, power supplies, control panel and ventilating equipment is about 36 cubic feet.

INSTALLATIONS

Philco Corporation
Government and Industrial Division, Philadelphia 44, Pennsylvania

ADDITIONAL FEATURES AND REMARKS

A cathode ray storage address reference indicator is included in the system.
Applications
Electronic data processing and computing.

Numerical System
Internal number system: Bin coded dec
Binary digits per word: 48
Binary digits per instruction: 24
Instructions per word: 2
Instruction type: One address

Of the 24 binary digits/instruction, 16 are for address and 8 are for command with two independent instructions per word.

Arithmetic Unit

<table>
<thead>
<tr>
<th>Time</th>
<th>Average</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add(excl. stor access)</td>
<td>1.5</td>
<td>0.5</td>
<td>6.3</td>
</tr>
<tr>
<td>Mult(excl. stor access)</td>
<td>45</td>
<td>45</td>
<td>300</td>
</tr>
<tr>
<td>Div(excl. stor access)</td>
<td>30</td>
<td>30</td>
<td>300</td>
</tr>
<tr>
<td>Construction</td>
<td>Transistors throughout</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arithmetic mode</td>
<td>Parallel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timing</td>
<td>Asynchronous</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation</td>
<td>Concurrent</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Picture by Philco Corporation
STORAGE

Words
Magnetic Core 4,096
Magnetic Drum 16,384 - 24,576

The magnetic core storage unit operates on a 5 microsec, destructive read cycle, 7 microsec write cycle, separately or together in sequence. The magnetic drum operates in parallel mode at 3600 RPM with 400 channels at 4000 BITS. Access time is 17 millisec.

INPUT

Media Speed
Punched Card 1,200 bin. words/min
Dec. words/min
Perforated Tape 300 char/sec (5 or 7 level)
Magnetic Tape 750 words/sec

Magnetic tapes operate at a speed of 75 inches/sec, error corrections included. Other input media are available. Toggle Switch Register provides for human intervention and decision making during control cycles when the machine is used for realtime work.

OUTPUT

Media
Electric Typewriters
High Speed Printers

Card to drum, drum to card, perforated tape to drum, drum to perforated tape converters are available. Simultaneous operation of input-output devices and internal computations.

CIRCUIT ELEMENTS ENTIRE SYSTEM

Magnetic cores 200,000
Transistors 8,000
Separate cabinets 8

8 cabinets, comprising a single group, plus additional input/output units as required by special applications.

POWER, SPACE AND WEIGHT

Power, computer 1.5 KW
Space, computer 48 cu. ft.
Weight, computer 1,500 lbs.
Capacity, air cond. Small ventilating fan.

PRODUCTION RECORD

In production 2
Delivery time 18 Months

One system is 80% complete.

COST, PRICE AND RENTAL RATE

Approximate cost of basic system $1,000,000

INSTALLATIONS

Philco Corporation
Government and Industrial Division
4700 Wissahickon Avenue

ADDITIONAL FEATURES AND REMARKS

Manufacturer
System Advantages
Movable as any office appliance
Compact, light weight, reliable, fast, low power consumption, operates on conventional power outlets no periodical component replacements.

Magnetic Tape Central File System (MTCF)
This facility which may be obtained separately from TRANSAC, employs magnetic tape loops up to 600 feet in length, stored in bins. Up to 48 bins can be included in one unit, quite flexible in design to accommodate a variety of needs. A typical unit would consist of the following: One group of heads with pinch rollers mounted on a traverse mechanism to serve 32 bins; 16 groups of fixed heads on 16 bins. On 3 of these, mechanisms may be provided to permit the tapes to also accept information from keyboard or perforated tape readers of medium speed. The common set of drive shafts for the entire unit is designed for tape speeds of the order of 10 feet per second in forward and reverse directions. The tape width is 1" to accommodate 14 channels. The loops are removable, with rewinding mechanism.

It is expected that this type of storage device can be made available within approximately 12 months. It looks as a likely competitor to the magnetic drum.