the easy to use

Bendix

G-15

GENERAL PURPOSE DIGITAL COMPUTER

and introducing a new low-cost accessory that enables the G-15 to operate as a digital differential analyzer

Bendix Computer division of BENDIX AVIATION CORPORATION
principal features

THE 6-15 COMPUTER

- Combines the advantages of a general purpose computer and a digital differential analyzer in one machine.
- Versatile, easy-to-learn programming methods.
- Input-output equipment for every need.
- Paper tape punch and high speed reader as standard equipment.
- Low initial and operating costs.
- Proven reliability in continuous operation.
- Available on either lease or purchase plan.
new simplified programming techniques

With just four hours of instruction, personnel who have had no computer experience can now solve their own problems with the Bendix G-15. Since the G-15 is so low in cost, many companies are finding it profitable to put their computers right in the office or laboratory. There they can be used directly by the personnel who know the problems best. The inefficiency of waiting for "computer center" solutions is eliminated.

The Bendix INTERCOM programming system makes this ease-of-use possible. In this system, a single command results in a number of internal operations. Much programming time is saved, and the operator need know only the simple operating commands. Since INTERCOM is floating point, the user does not need to consider scaling problems.

Without changing commands, INTERCOM will operate with either a five or a twelve decimal digit word, plus two digit decimal exponent. Positive or negative numbers may be used.

INTERCOM commands are single address. Memory addresses may be modified automatically by index registers. The command list contains all arithmetic operations, transfers of control based on various conditions, input-output operations, and special commands for facilitating the use of subroutines. Output may be in either fixed or floating decimal point form.

The portion of a typical Intercom program shown below illustrates the simplicity of problem preparation for the G-15. This program is for the calculation of \((a^2-bc)/d\) where a, b, c and d are stored in memory positions 1100, 1101, 1102 and 1103 respectively. Each operation is performed on the contents of an arithmetic register called the accumulator, and the answer appears in the accumulator.

<table>
<thead>
<tr>
<th>NOTES</th>
<th>Operation Code</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear accumulator and add b</td>
<td>42</td>
<td>1101</td>
</tr>
<tr>
<td>Multiply b, in accumulator by c</td>
<td>44</td>
<td>1102</td>
</tr>
<tr>
<td>Store bc</td>
<td>49</td>
<td>1104</td>
</tr>
<tr>
<td>Clear accumulator and add a</td>
<td>42</td>
<td>1100</td>
</tr>
<tr>
<td>Multiply a, in accumulator by a</td>
<td>44</td>
<td>1100</td>
</tr>
<tr>
<td>Subtract bc from a</td>
<td>41</td>
<td>1104</td>
</tr>
<tr>
<td>Divide a²—bc, in accumulator by d</td>
<td>48</td>
<td>1103</td>
</tr>
</tbody>
</table>

A basic programming system is also available for users who want to exercise control over every internal operation performed by the machine. The Bendix G-15 offers this control to a degree unequalled by other computers of its size. Thus it offers versatility in unusual situations that other computers can not match.

specifications

BASIC COMPUTATION TIMES

- Addition:
  - Single precision: 0.54 msec.
  - Double precision: 0.81 msec.
- Multiplication:
  - Single precision: 16.7 msec.
  - Double precision: 33.1 msec.
- Multiplication of arbitrary precision is possible. The factors may be up to 57 binary digits plus sign with the operation time equal to 0.27 msec. for command access plus 0.54 msec. per digit of the multiplier. These times include minimum access to the command with consideration that operands have been programmed to minimum access position.

MAIN DRUM MEMORY
- 2160 words — 14.5 msec. average access

FAST ACCESS DRUM MEMORY
- 16 words — 0.54 msec. average access

AUXILIARY MEMORY
- Magnetic Tape Units
  - Capacity: 300,000 words per reel
  - Block length: arbitrary to 108 words
  - File length: arbitrary number of blocks
- Search Speed: 45 inches per second
- Read-Write Speed: 7\(\frac{1}{2}\) inches per second

NUMBER SYSTEM
- Decimal or sexadecimal, input/output
- Serial binary, internally

WORD SIZE
- Single Precision:
  - 7 decimal digits, input/output
  - 29 binary bits, internally
- Double Precision:
  - 14 decimal digits, input/output
  - 58 binary bits, internally
- Note:
  - Any command may be specified to be single or double precision

RELIABILITY
- Maximum error-free operating time has been assured the G-15 user, through conservative design and careful selection of components. Reliability checks may be included in G-15 programs, as a further safeguard.
For auxiliary storage, up to four of these units may be connected to one G-15. Each stores up to 300,000 words, and can be searched for blocks of up to 108 words or for file sections of any number of blocks.

The AN-1 provides compatibility between the G-15 and other computing, data handling and communication systems. Any alpha-numeric code punched into 5 or 7 hole paper tape can be read into the computer, operated on, and punched out in the same or another alpha-numeric code. The AN-1 can also be connected directly to your own input-output equipment.

Punched card input and output equipment may be connected to the G-15 through the CA-1 Coupler. One or two IBM 026 reader/punches may be used with one coupler.

Will plot output of the DDA accessory in .01 inch increments.
With the addition of a Model DA-1 Digital Differential Analyzer Accessory, the G-15 assumes a dual role. It combines the wide applicability of the general purpose computer with the simple programming for the solution of linear and nonlinear differential equations which is characteristic of the digital differential analyzer. As a general purpose computer it is identical with a standard G-15. As a differential analyzer it has greater capacity than other digital differential analyzers, and comparable speed. When used as a combination machine it is a new and powerful tool for solving the problems of engineering and automatic control.

The differential analyzer of this combination incorporates many features of the Bendix Model D-12 Digital Differential Analyzer, which has earned an enviable record of performance. These include coding which is simplified to the bare essentials, improved stability and accuracy made possible by ternary transfer of incremental information, improved performance of servo and adder units, and the facility for efficient use of tabular empirical functions.
Many industrial and scientific organizations are finding imaginative solutions to a wide range of problems through new mathematical and data processing methods. Bendix G-15 computers are playing an important role in many of these firms.

With its unusually flexible programming schemes, the G-15 is ideally suited to both repetitive and non-repetitive problems, regardless of complexity. Examples of the hundreds of possible applications are illustrated here.