IBM 1401 Programming Systems

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When companies order an IBM 1401 Data Processing System, methods-programming staffs are given the responsibility of translating the requirements of management into finished applications. 1401 Programming Systems are helping cut the costs of getting the computer into operation by simplifying and expediting the work of these methods staffs.

Modern, high-speed computers, such as the 1401, are marvelous electronic instruments, but they represent only portions of data processing systems. Well-tested programming languages for communication with computers must accompany the systems. It is through these languages that the computer itself is used to perform many of the tedious functions that the programmer would otherwise have to perform. A few minutes of computer time in translating the program can be equal to many, many hours of staff time in writing instructions coded in the language of the computer.

The combination of a modern computer plus modern programming languages is the key to profitable data processing. This brochure explains modern IBM Programming Languages and their significance to management.

Left: Here an operator points to machine language instructions for a new application being generated by the 1401 system on the 1403 high-speed printer. Statements about the application which were written by the programmer are being translated internally to machine-coded language.
"What Is A 1401 Program?"
A program is a series of instructions that direct the 1401 as it solves an application.

"What Is A Stored Program Machine?"
A stored program machine is one which stores its own instructions in magnetic form and is capable of acting on those instructions to complete the application assigned. The 1401 uses a stored program.

"What Are 1401 Programming Systems?"
There are two types: (1) Systems that provide the programmer with a simplified vocabulary of statements to use in writing programs, and (2) Pre-written programs, which take care of many of the everyday operations of the 1401.

What 1401 Programming Systems Mean To Management:

INCREASED PROGRAMMING EFFICIENCY
Programmers can concentrate on the application and results rather than on a multitude of "bookkeeping" functions, such as keeping track of storage locations.

FASTER TRANSLATION OF MANAGEMENT REQUIREMENTS INTO USABLE RESULTS
Simplified programming routines allow programmers to write more instructions in less time.

SHORTER TRAINING PERIODS
Programmers use a language more familiar to them rather than having to learn detailed machine codes.

REDUCED PROGRAMMING COSTS
Many pre-written programs are supplied by IBM, eliminating necessity of customers' staffs writing their own.

MORE AVAILABLE 1401 TIME
Pre-written programs have already been tested by IBM, reducing tedious checking operations on the computer.

EASIER TO UNDERSTAND PROGRAMS
Programs are written in symbolic or application-oriented form instead of computer language. This enables management to communicate more easily with the programming staff.

FASTER REPORTS ON OPERATIONS
Routines such as those designed for report writing permit faster translation of management requirements into usable information.
IBM Programming Systems:
*Symbolic Programming Systems*
These systems permit programs to be written using meaningful names (symbols) rather than actual machine language.

**Autocoder**
This is an advanced symbolic programming system. It allows generation of multiple machine instructions from one source statement, free-form coding, and an automatic assembly process through magnetic tape.

**COBOL**
COBOL is a problem-oriented programming language for commercial applications.* COBOL permits a programmer to use language based on English words and phrases in describing an application.

**Input/Output Control System**
This system provides the programmer with a packaged means of accomplishing input and output requirements.

**Utility Programs**
These are pre-written instructions to perform many of the everyday operations of an installation.

**Subroutines**
These are routines for multiplication, division, dozens conversion, and program error detection aids.

**Tape Utilities**
These are generalized instructions, particularly useful to 1401 customers who also use larger data processing systems. They facilitate the transfer of data between IBM cards, magnetic tapes, and printers. They also provide for some 1401 processing while the transfer of data is taking place.

**Tape Sort Programs**
Data can be sorted and classified at high speed for further processing by use of these generalized sorting routines.

**Report Program Generator**
The programmer uses simplified, descriptive language with which he is already familiar to obtain reports swiftly and efficiently.

**FORTRAN (Contraction of Formula Translator)**
Engineers and mathematicians state problems in familiar algebraic language for solution by the computer.

**RAMAC® File Organization**
Routines are supplied for simplifying organization of records for storage in the 1401 Random Access File.

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*COBOL specifications were developed by the Conference on Data Systems Languages, a voluntary cooperative effort of users, and manufacturers of data processing systems.*
Here's how one of the 1401 programming systems—Report Program Generator—works to increase programming efficiency

1401 computers produce important reports for management in record time because of their outstanding processing and printing abilities. In addition to this rapid machine processing of input data used in reports, still more speed is achieved by the rapid preparation of programs to produce the reports. This is possible because of the IBM Report Program Generator, a unique system which permits programs to be created with a minimum of time and effort.

This example illustrates how the Report Program Generator simplifies the preparation of one part of an Expense Distribution Report (The Major Total Line):

<table>
<thead>
<tr>
<th>VOUCHER NUMBER</th>
<th>DATE NO</th>
<th>AMOUNT ACCOUNT</th>
<th>AMOUNT BY DEBT</th>
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</thead>
<tbody>
<tr>
<td>*** MERT. NO. 041 ***</td>
<td>12042</td>
<td>4,07</td>
<td>687.50</td>
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<td>** GEN. LEDGER NO. 915 **</td>
<td>12084</td>
<td>2,14</td>
<td>1,408.40</td>
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<td>* SUB. LEDGER NO. 680 *</td>
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Major Total Line ——> 4,204.87
Without the Report Program Generator, the program to get the Major Total Line would be written out in detail, step by step:

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<th>LINE</th>
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But with the Report Program Generator, all the programmer has to write are these two statements:

But it's just as easy to write the statements to generate the rest of the report! The 1401 itself does the work of converting the programmers' statements into the detailed instructions. The Report Program Generator is an example of what IBM Programming Systems can accomplish.

With IBM you can be certain of total systems support for maximum profitability.
Stands For Service
Service that begins long before the delivery of a computer . . . and continues in
depth long after. Service that has been proven by years of data processing experience.

New IBM Services include:

Programmed Applications Library
Pre-tested computer programs designed to handle various major data processing
functions common to firms within a specific industry.

Programming Systems Support
To keep customers up-to-date on the availability and use of
all new programming systems.

To assist the IBM programming staff in reflecting customer
requirements in the specification of new programming systems.

Other services available to every IBM customer:

Program Library
A library of 1401 programs will be established to aid all 1401 customers
in solving specific applications, scientific as well as commercial. These will
include programs written by customers and programs written by IBM.

Schools and Seminars
Executive schools for management personnel.
Programming schools for methods personnel.
Industry seminars where customers meet to discuss subjects of common interest.

Branch Offices
More than 200 branch offices serve customer needs promptly and efficiently.

Sales and Systems Representatives
Experienced, highly trained individuals work with customers
in applying IBM methods to their requirements.

These are just a few of the many IBM services. Your IBM Sales Representative
will be pleased to discuss all of them with you.