IBM *1401 Programming Systems*

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PROGRAMMING SYSTEMS

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* FOR*mula* TRAN*slator)*

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.

*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):

EXPENSE DISTRIBUTION REPORT

REPORT DATE 07-18-60 PAGE 1

	OUR VOUCHER NUMBER	DATE MO	DATE DAY	AMOUNT	AMOUNT BY ACCOUNT	AMOUNT BY DEPT
*** DEPT. NO. 041						
** GEN. LEDGER NO. 913						
* SUB. LEDGER NO. 660						
	12042	4	07	687.50		
	12084	2	14	721.92		
				1,409.42 *		
* SUB. LEDGER NO. 700						
	12125	11	23	675.95		
				675.95 *		
					2,085.37	
** GEN. LEDGER NO. 915						
* SUB. LEDGER NO. 760						
	12086	12	15	2,119.50		
				2,119.50 *		
					2,119.50	
					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:

LINE	COUNT	LABEL	OPERATION	(A) OPERAND ADDRESS	±	CHAR. ADJ.	RES	(B) OPERAND ADDRESS	±	CHAR. ADJ.	RES	d	COMMENTS
010	8	T31T00	B	T21T00				CØNF3				0	
020	7		MCWØNES					T3					
030	4		B	T11									
040	4	T31	CS	PRINT									
050	1		CS										
060	7		LCAFLD020					0297					
070	7		MCEAMTDEP					0297					
080	7		MCWBLANKS					AMTDEP					
090	1	T31EXTW											
100	7		MCWDSA010					ØFRTRN+003					
110	5		B	ØFRØUT								@	
120	4	T31RTN	B	TT0000									
130													

But with the Report Program Generator, all the programmer has to write are these two statements:

FORM	LINE TYPE	LINE LEVEL	LINE NUMBER	OUTPUT PRINT	OUTPUT PUNCH	OUTPUT RELEASE	NEXT LINE TYPE	NEXT LINE LEVEL	NEXT LINE NUMBER	SPACE BEFORE	SPACE AFTER	SKIP BEFORE	SKIP AFTER	STACKER	LINE OUTPUT CONDITIONS A COND. N COND. A COND. N COND.	FIELD NAME	FIELD END	FIELD OUTPUT CONDITIONS A COND. N COND. A COND. N COND.	ZERO SUPPRESS	CONSTANT OR EDIT CONTROL WORD FIELD LENGTH	CARD NUMBER
L	T	3	/	X							01				F3						010
D																AMTDEP	097			013bb,bbb,bb0.bb	020
																					030

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.

IBM®

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.

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