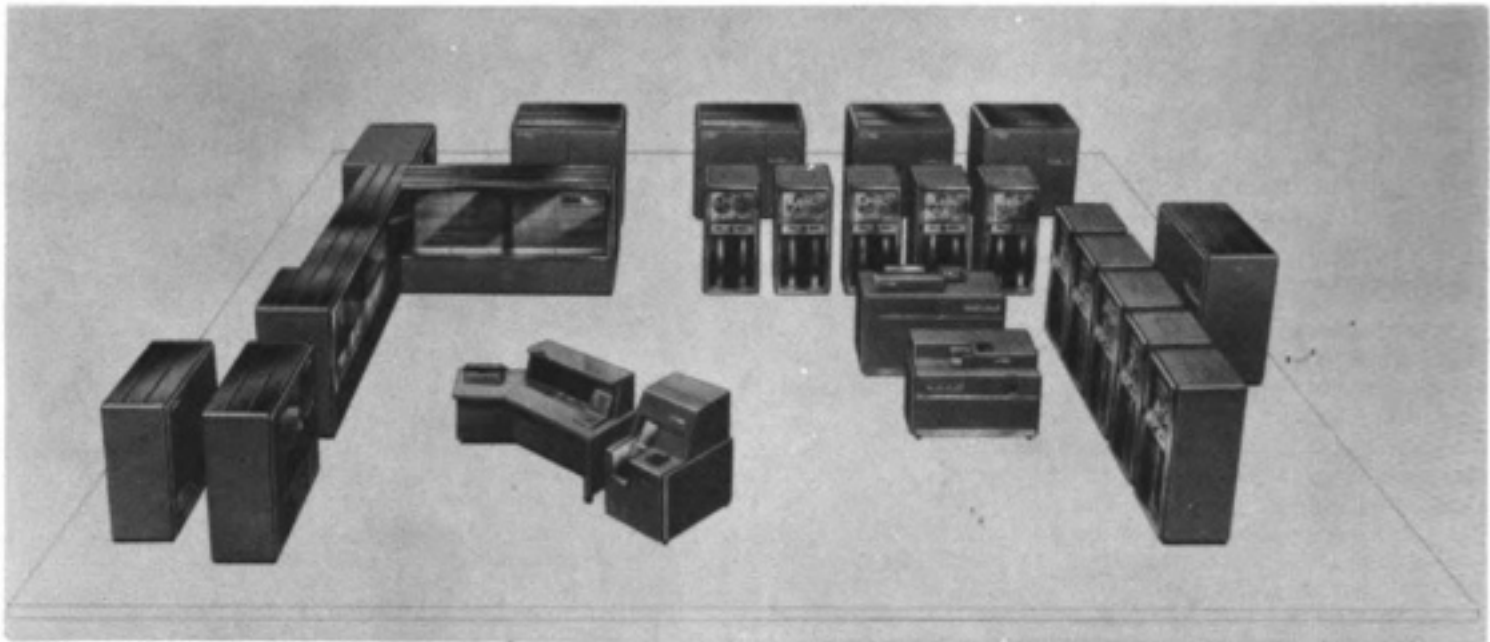# IBM 705

International Business Machines Type 705 Electronic
Data Processing Machine

MANUFACTURER

International Business Machines Corporation

Picture by International Business Machines Corporation

APPLICATIONS

Manufacturer
Commercial, may be used for scientific.

Government Sample
Department of Health, Education and Welfare,
Social Security Administration
Data processing for maintaining earnings records of
all persons covered by Title II of the Social
Security Act.

Navy Department Ships Parts Control Center
One of the major uses of the system is the mainten-
ance of perpetually current inventory records for
approximately 185,000 items of ships repair parts.
Master inventory records are updated through the
media of transaction or situation reports. The
transaction reporting system was implemented shortly
after installation of the new machine in August 1956.
An analysis of items having experienced any type of
action during the current week is processed and
provides the tool for improved stock positioning
and more effective management control. The machine
is also being used to develop component and item
population data; in the preparation of shipboard
allowance lists; budgeting and inventory analysis
and in the automatic maintenance of voluminous
technical engineering data files.

The Army Signal Supply Agency
Contract status accounting, computation of require-
ments, inventory management, processing of requis-
itions, inventory control of 162,500 items. The
system, consisting of 20,000 positions of magnetic

core storage, a magnetic drum, ten tape units, a
card punch, and a 150 line/min. printer, performs
the following functions:

Assimilates and memorizes 8,000,000 different facts
on more than 150,000 different electronic items
required to keep the Army's global communication
system in operation.

Makes 37,500 changes to these facts per day within
24 hours after the change occurs, regardless of
where the change occurs.

Uses these facts to process 6,000 orders for
supplies received each day from troops maintaining
communications and electronics equipment throughout
the world.

Orders shipment of supplies quickly after receipt
of order and considers distance to the consumer in
choosing the shipping point, thus reducing trans-
portation costs and shipping time.

Remembers all orders received when stocks were not
available, and automatically ships such orders as
soon as stocks are received.

Reviews the stored 8,000,000 facts each day to
determine which items are in short supply, and
triggers action to place approximately 150 orders
per day with manufacturers of such supplies in time
to be received before stocks are exhausted.

Reviews orders placed with manufacturers to assure
supplies are still needed, and if not necessary,
because of diminished requirements, may recommend
cancellations.

Practices management by exception by making
thousands of routine decisions per day, and by
printing out special data for management control
when unusual supply conditions exist.
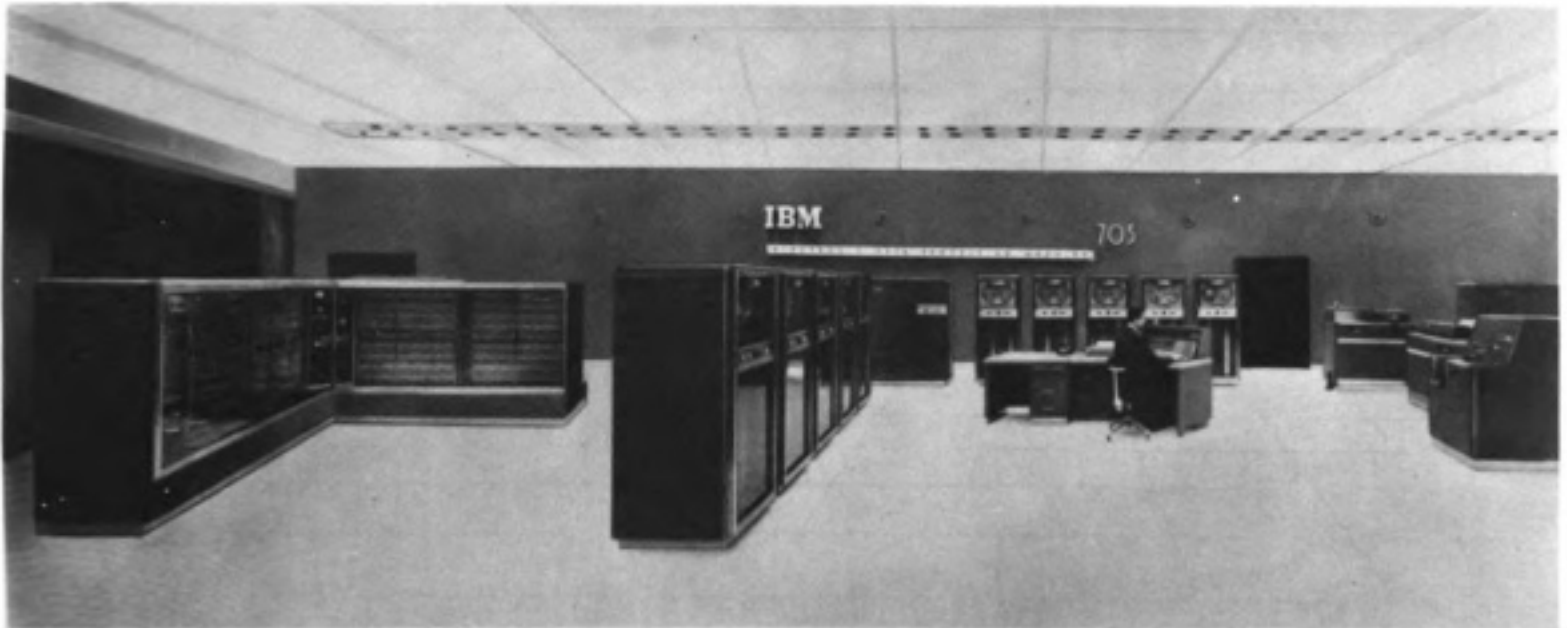
Picture by International Business Machines Corporation

Has the capacity for memorizing and storing millions of additional facts, and processing thousands of additional orders - thereby greatly increasing the Army's readiness for mobilization in the event of an emergency.

Effects a major saving in the cost of supply control and supply management and insures Signal Supplies are delivered at the right place, in the right quantities and at the right time.

U. S. Department of Agriculture, Commodities Stabilization Service

The first application for the system is Cotton Loan Accounting (this embodies loan making and liquidation, reconcentration and producers settlements) consisting of approximately six to seven million bales per year. Following this application, conversion activities such as inventory accounting and management activities, and other type financial accounting will be surveyed with the view of including them in the system, thereby making possible the release of the present conventional equipment except key punches and verifiers.

This system is to consist of: one 705 central Processing Unit, three 714-759 Card Reader and Control Units, one 722-758 Card Punch and Control Unit, four 760 Control and Storage Units, four 730 Printers (1,000 lines per minute), twelve Magnetic Tape Units, two 777 Tape Record Coordinators, and one 774 Tape Data Selector.

Industrial Sample

Consolidated Edison Company of New York
Payroll and general accounting.

Farmers Insurance Group
Accounting, statistical, and premium billing.

The Prudential Insurance Company of America
Record keeping, accounting, premium notices, and commission statements.

NUMERICAL SYSTEM

Internal number system   Binary coded decimal and alphabetic

Characters per instruction	5
Instructions decoded	35
Instructions used	35
Arithmetic system	Fixed point
Instruction type	One address
Number range	Variable

The 705 is not a fixed word length system. It is possible to have both variable field and variable record lengths. Consequently there are no words. The characters are alphanumeric. Five characters are required to make up an instruction. Each character of a record is individually addressable.

ARITHMETIC UNIT

Time

Add (exclud. stor. access)	17 Microseconds
Construction	Vacuum tubes and cores
Rapid access word registers	16 storage registers, including 14 at 16 positions, 1 at 32 positions, 1 at 256 positions.
Basic pulse repetition rate	1 Mc/sec
Arithmetic mode	Serial
Timing	Synchronous for central processing unit Asynchronous for input-output devices
Operation	Sequential for internal data handling in the central processing unit and concurrent in the use of the tape record coordinator or when doing simultaneous reading while writing without the use of the tape record coordinator.

Multiply time

$$17 \left[N_p (N_c + 4) + 2 \right] \quad microsec$$

N_p = number of digits in multiplier (accumulator 00)

N_c = number of digits in multiplicand storage

Divide time

$$17 \left[11 + N_d + (N_d - N_r)(7.5 \, N_r + 15) \right] \quad microsec$$

N_d = number of digits in dividend

N_r = number of digits in divisor

Picture by Department of Health, Education and Welfare, Social Security Administration

STORAGE

Media	Alphanum/char	Microsec Access
Magnetic Core	40,000	17
Magnetic Drum	60,000	(8,000-40N)/char
Magnetic Tape	5,760,000	(10,000-67N)/char

N above is the number of characters. There are 300 sections of 200 characters each on the magnetic drum.

INPUT

Media	Speed
Magnetic Tape	75 in/sec
Punched Cards	250 cards/min

Industrial Sample
Farmers Insurance Group
Card reader operates at 250 cards/min on 80 column cards. Magnetic tape speed is 15,000 char/sec. Ten units are connected to the main frame.

OUTPUT

Media	Speed
Punched Card	100 cards/min
Magnetic Tape	75 in/sec or 15,000 char/sec
Printer	150 lines/min, 120 print positions

500 lines/min, 120 print positions
1,000 lines/min, 60 or 120 print positions
60 characters/min

CIRCUIT ELEMENTS ENTIRE SYSTEM

| Tubes	1,700 in Central Processing Unit
	4,400 in peripheral equipment
Tube Types	10
Crystal diodes	4,600 in Central Processing Unit
	8,300 in peripheral equipment
Magnetic elements	155,000

CHECKING FEATURES

Fixed
Instruction: verifies the character code and also checks the correct interpretation of the operation.
Machine: checks the character coding of instructions when data are transferred from accumulator or auxiliary storage or memory.
Read - Write: Checks the transmission of data from all input units to memory. It also checks the transmission of all output data from memory to the drum tape unit, card punch record storage, printer record storage, and typewriter.
Record: This indicator reflects any error when information is punched in a card or when printed on the printer.

IBM 705
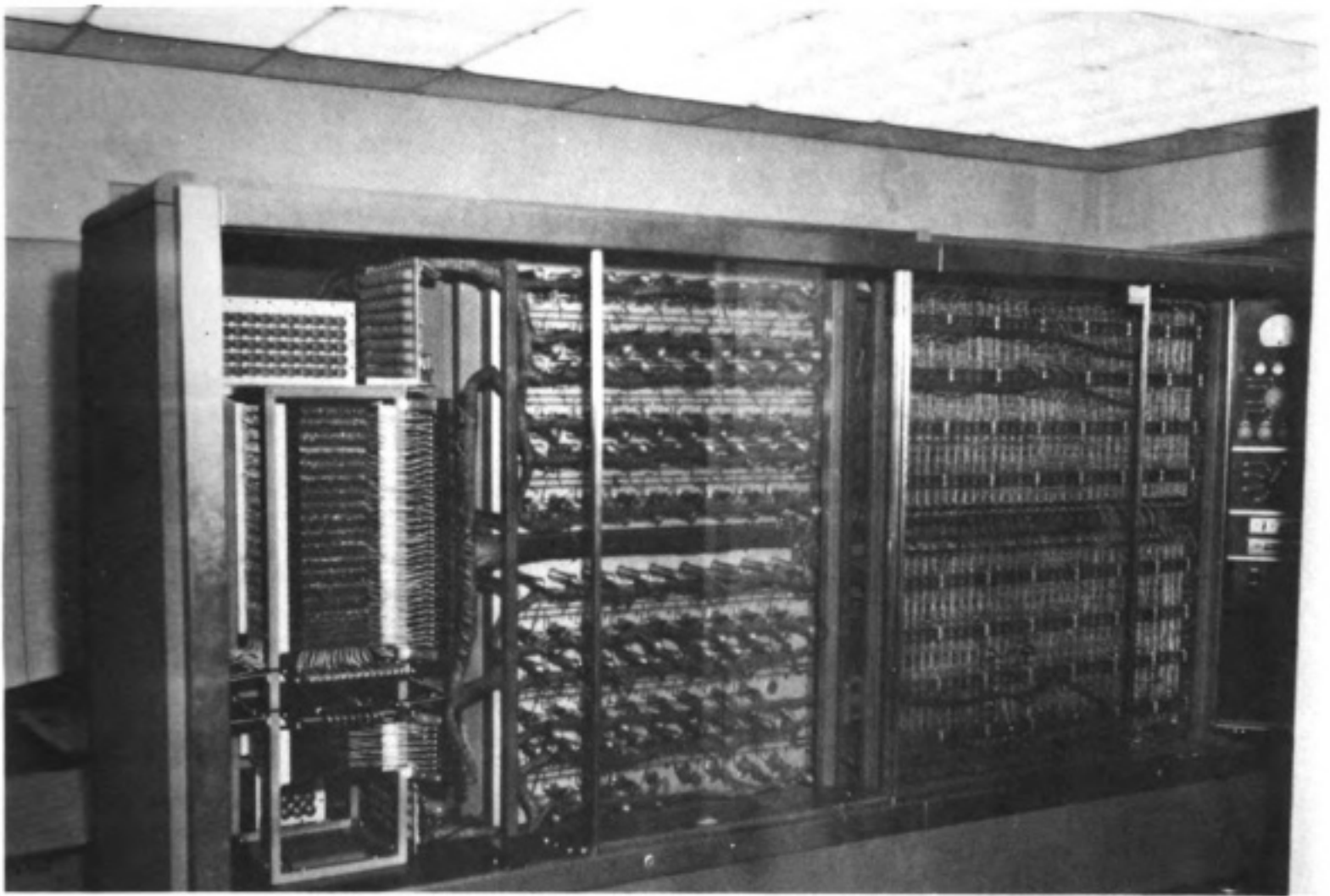
Picture by Department of Health, Education and Welfare, Social Security Administration

Overflow: The overflow check indicator is turned on during an add or subtract operation when the number of digits in the result is greater than the number of digits in the longer of the two fields. An overflow is indicated as a result of a round operation, if a carry-over is made out of the high-order position of the accumulator storage field. The indicator is turned on by a divide instruction when the divisor does not have a greater absolute value than an equal number of digits taken from the left end of the dividend. When the error switch for this indicator is turned to AUTOMATIC, an error stops the machine during the execution of the instruction.

Sign: The indicator turns on when a field addressed by an arithmetic instruction does not have plus or minus zoning over the right hand digit.

POWER, SPACE AND WEIGHT

Type	Name	Qty.	K.W.	B.T.U.	Weight (lbs.)	Size (nearest inch) Width	Length	Height
705	Central Processing Unit	1	25.0	85,325	5,291	147	139	63
	Main Power Unit	1			2,961	34	61	66
	Console	1			508	35	61	46
714	Card Reader	1	4.75	16,320	1,053	43	28	49
759	Card Reader Control Unit	1			1,712	27	57	64
717	Printer	1	7.46	25,500	2,244	30	64	47
757	Printer Control Unit	1			1,866	27	57	64
722	Card Punch	1	5.76	19,680	1,176	25	53	50
758	Card Punch Control Unit	1			1,866	27	57	64
734	Drum Unit	1	6.9	23,580	1,775	27	62	64
	Drum Power Supply	1			1,646	27	40	64
727	Tape Unit	10	11.3	38,640	9,110	26	24	66
754	Tape Control Unit	1	8.4	28,570	1,636	27	57	64
	Total		69.57	237,615	32,844			

Approximately one ton of air conditioning required for 12,000 B.T.U./hour.

Industrial Sample
Farmers Insurance Group

Computer utilizes 30.7 KVA at a 0.9 PF. Total space required is 25,000 cu. ft. or 2,500 sq. ft. The computer weighs 50,000 lbs. Entire system requires 35 Tons of air conditioning.

PRODUCTION RECORD

Produced	47
Operating	42
Delivery time	Special

COST, PRICE AND RENTAL RATE

Type	Name	Monthly Rate
705	Central Processing Unit -- With Core Memory	$14,000
714-759	Card Reader and Card Reader Control Unit	2,400
717-757	Printer and Printer Control Unit	1,800
722-758	Card Punch and Card Punch Control Unit	1,050
727	Magnetic Tape Unit	550
754	Tape Control Unit	2,000
734	Magnetic Drum Storage Unit	2,800
760	Storage Unit for Printers and Tapes	1,850
719	Printer, 1,000 lines per/min 60 printing positions	1,400
730	Printer, 1,000 lines per/min 120 printing positions	2,100
777	Tape Record Coordinator	3,000

Rental rates include customer engineering maintenance and parts.

There is no predetermined grouping of equipment. Combinations are based on customers needs.

Rates are subject to change.

Government Sample
Department of Health, Education and Welfare, Social Security Administration

Basic system consists of one Type 705, one Type 754 Tape Control Unit, two Type 760 Control Units and eleven Type 727 Tape Units. Rental rate is $25,750/month for one shift.

Additional equipment consisting of four Type 720 printers with control and tape units, four Type 714 card readers with control and tape units, and four Type 722 card punchers with control and tape units. Rental rate is $33,400/month for one shift.

Basic system refers to the computer and attached components.

Navy Department Ships Parts Control Center
Prime shift rental amounts to $29,700 per month for a central processing unit with 20,000 positions of core memory, one (1) Card Reader and Control Unit, two (2) Printers and Printer Control Units (150 line per minute), one (1) Card Punch and Control Unit (equipped with validity checking device), twelve (12) Magnetic Tape Units, and one (1) Tape Control Unit.

Industrial Sample
Farmers Insurance Group

Rental rate for basic system is $25,000/month. Rental rate for additional equipment is $11,000/month.

PERSONNEL REQUIREMENTS

Daily Operation	Engineers
1-8 Hour shift	4
2-8 Hour shifts	7

One console operator and 2 floor operators on each

shift. Programmers vary from 4 to over 30, depending on number of applications on system.

Government Sample
Department of Health, Education and Welfare, Social Security Administration

System is operated three 8 hour shifts/day, 7 days/week, and the additional equipment is operated three 8 hour shifts/day, 5 days/week. The total personnel requirements is 17 engineers and 62 technician-operators.

Industrial Sample
Farmer Insurance Group

One 8 hour shift requires 4 engineers and 3 technician-operators.

RELIABILITY AND OPERATING EXPERIENCE

Government Sample
Department of Health, Education and Welfare, Social Security Administration

Based on 168 hours/week, 82% utilization was obtained, 16.3% preventive maintenance, and 1.7% other maintenance, primarily due to tape failure. Figures based on period 1 September 1956 to 15 October 1956. System accepted March 1956.

Navy Department Ships Parts Control Center
The machine is operated on a two shift, six day week basis. All preventive maintenance is performed before the start of the prime shift and between the prime and second shifts. Less than 4% down time on the Central Processing Unit has been experienced.

Industrial Sample
Farmers Insurance Group

Average error-free running period	8 to 12 hours
Good time	6 to 7 hours
Attempted to run time	8 hours
Operating ratio (Good/Attempted to run)	0.90-0.95

Figures based on period 27 July 1956 to 20 January 1957.

Acceptance test 25 September 1956.

Above figures are approximate and on a daily basis.

FUTURE PLANS

Government Sample
Department of Health, Education and Welfare, Social Security Administration

Expect to acquire 20,000 additional storage positions and a tape record coordinator, Type 777 in July 1957. Two Type 730 printers to replace four Type 720 printers when former are available.

United States Department of Agriculture, Commodity Stabilization Service

System to be installed in 1957-1958 at New Orleans Commodity Office on a rental basis.

U. S. Navy Aviation Supply Office
System to be installed, in addition to Type 702 in July 1957.

Industrial Sample
American Telephone and Telegraph Company

Three systems are on order.

Commonwealth Edison Company of Chicago
Delivery of system expected in March 1957.

Consolidated Edison Company of New York
Auxiliary equipment to be added as required.

The Prudential Insurance Company of America
System on order for use at South-Central Home Office in Jacksonville, Florida.

The Texas Company
System will be installed in March 1957.

INSTALLATIONS

Present and near future installations:

Government Sample

Department of Health, Education and Welfare, Social Security Administration, Bureau of Old-Age and Survivors Insurance, Candler Building, Baltimore 2, Maryland

Navy Department, Ships Parts Control Center, Mechanicsburg, Pennsylvania

The Army Signal Supply Agency, Philadelphia 3, Pennsylvania

United States Department of Agriculture, Commodity Stabilization Service, Washington 25, D. C.

U. S. Navy Aviation Supply Office, Philadelphia 11, Pennsylvania

Industrial Sample

American Telephone and Telegraph Company, New York 7, New York

Boeing Aircraft Company, Seattle, Washington

Commonwealth Edison Company of Chicago, Chicago 90, Illinois

Consolidated Edison Company of New York, New York 3, New York

Esso Standard Oil, Baton Rouge, Louisianna

Farmers Insurance Group, Los Angeles 6, California

International Harvestor Company, Chicago 1, Illinois

The Prudential Insurance Company of America, South Central Home Office, Jacksonville, Florida

The Prudential Insurance Company of America, Home Office, Newark, New Jersey

The Texas Company, Houston 1, Texas

Westinghouse Electric Corporation, Pittsburgh 30, Pennsylvania

ADDITIONAL FEATURES AND REMARKS

The following assistance is available:

Special Representatives

This group offers overall consulting service in connection with the study of possible uses.

Educational Program

One-week classes conducted for executives at IBM educational departments in Endicott and Poughkeepsie, New York. Comparable classes are available in several major cities across the country. These courses are designed to acquaint executives with the organization, operating characteristics, capacities, and applications of the 705. Customers who complete this course are better able to evaluate the advantages, economies and wide business applications of the 705. In addition to the executive class, courses are available to qualified methods personnel. These classes are of longer duration and provide knowledge of programming and necessary operating details.

Programming Service

Personnel are available for consultation with field representatives and customers. A library of programs common to many problems is available for adoption as sub-routines by customer. Automatic coding techniques similar to the 702 Autocoder System are being prepared. Symbolic coding methods and assembly programs are available.

Sales Engineering

Engineers are available to assist in preparing the site for physical installation. This assistance begins twelve months in advance of delivery.