

IBM
PLANT TOUR

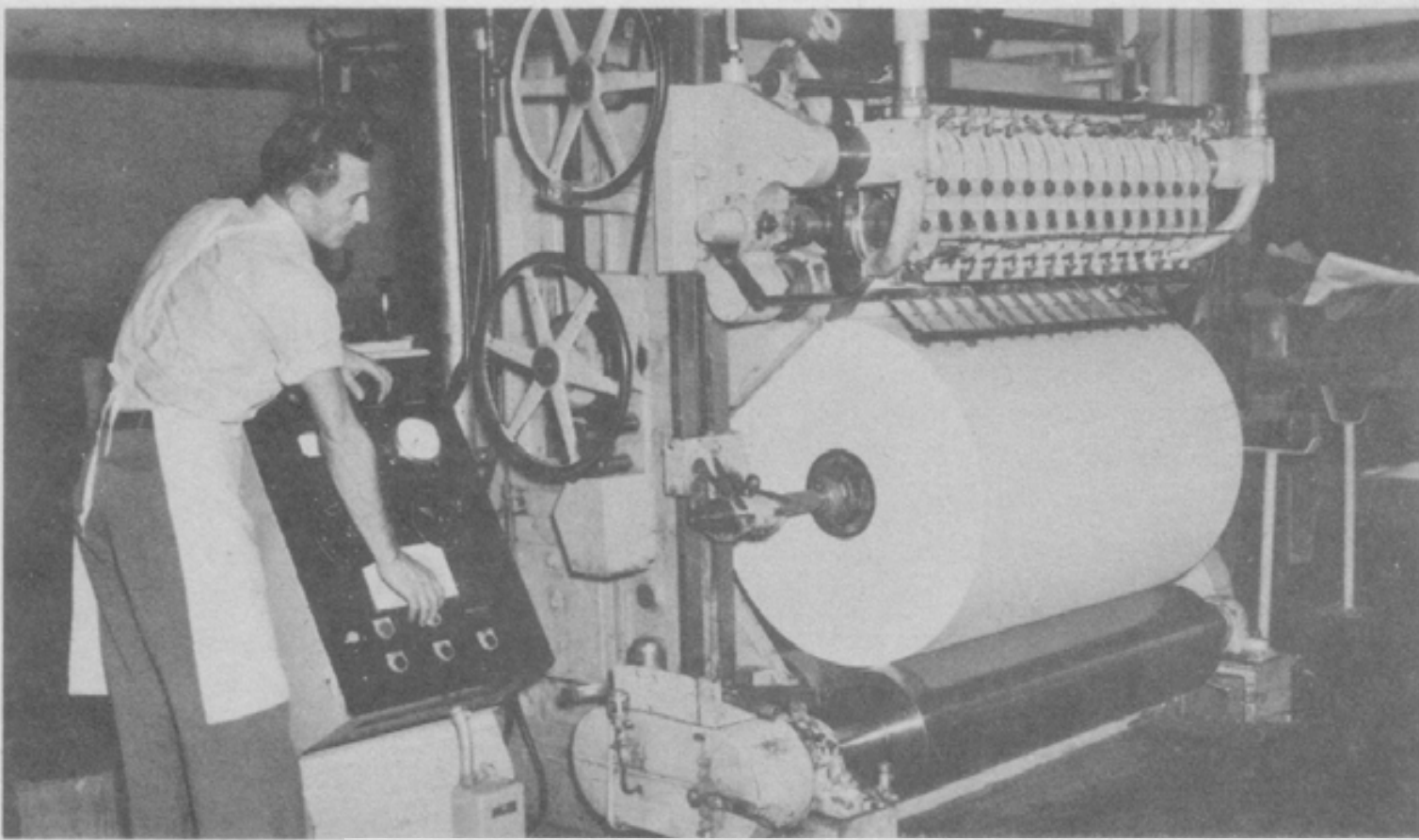
PLANT 1
ENDICOTT, N. Y.

c. 1948 Vintage

IBM PLANT TOUR

The comfort and welfare of our guests is important.

- 1 Be sure to assist each visitor in every way possible to obtain complete information about the subjects in which he may be especially interested.
- 2 All guests and guides are requested to wear safety glasses in those departments where employees are required to wear them.
- 3 Should a visitor become ill, ask a Manager to take him to the nearest first aid room.
- 4 If you are asked questions which you are unable to answer, contact the Manager in the department you are visiting for assistance.
- 5 If a guest requests samples of cards, etc., please pass the request on to the Manager so he may give personal attention to the request.



SLITTING

Kidder slitting machines cut a mill roll of paper into fourteen reels, each the exact width of the IBM card. The only waste in slitting this paper is at the extreme ends of the roll.

The slitter must be started and stopped gradually to prevent tearing or fouling the paper, but operates at an average speed of 2,100 feet a minute or approximately twenty-four miles an hour. It takes six minutes to slit a roll of paper into fourteen reels.

Building 21
1st Floor



CARROLL PRESS LINE

Each operator sets up the press, loads reels into place, runs the press and inspects and packs the completed cards. One reel contains about 10,000 feet and will make approximately 16,000 cards.

There are 57 presses in the two lines and each produces over 1,000 cards a minute or a total of 33,000,000 to 36,000,000 cards a day.

The Carroll press prints the card, cuts it to exact length, cuts off one corner and checks each card for insulating quality, automatically rejecting any which will conduct an electrical current. Cards are checked by the operator at the press for overall length, registration, and inking, and by random sampling at the end of the line.

Carroll Presses
Building 21, 2nd Floor



PAPER TESTING LABORATORY

Room temperature and humidity are constantly controlled in this area. Mill roll samples are given tests such as tearing strength, moisture content, bending, bursting, etc. Card stock will withstand a pressure of more than 70 pounds a square inch.

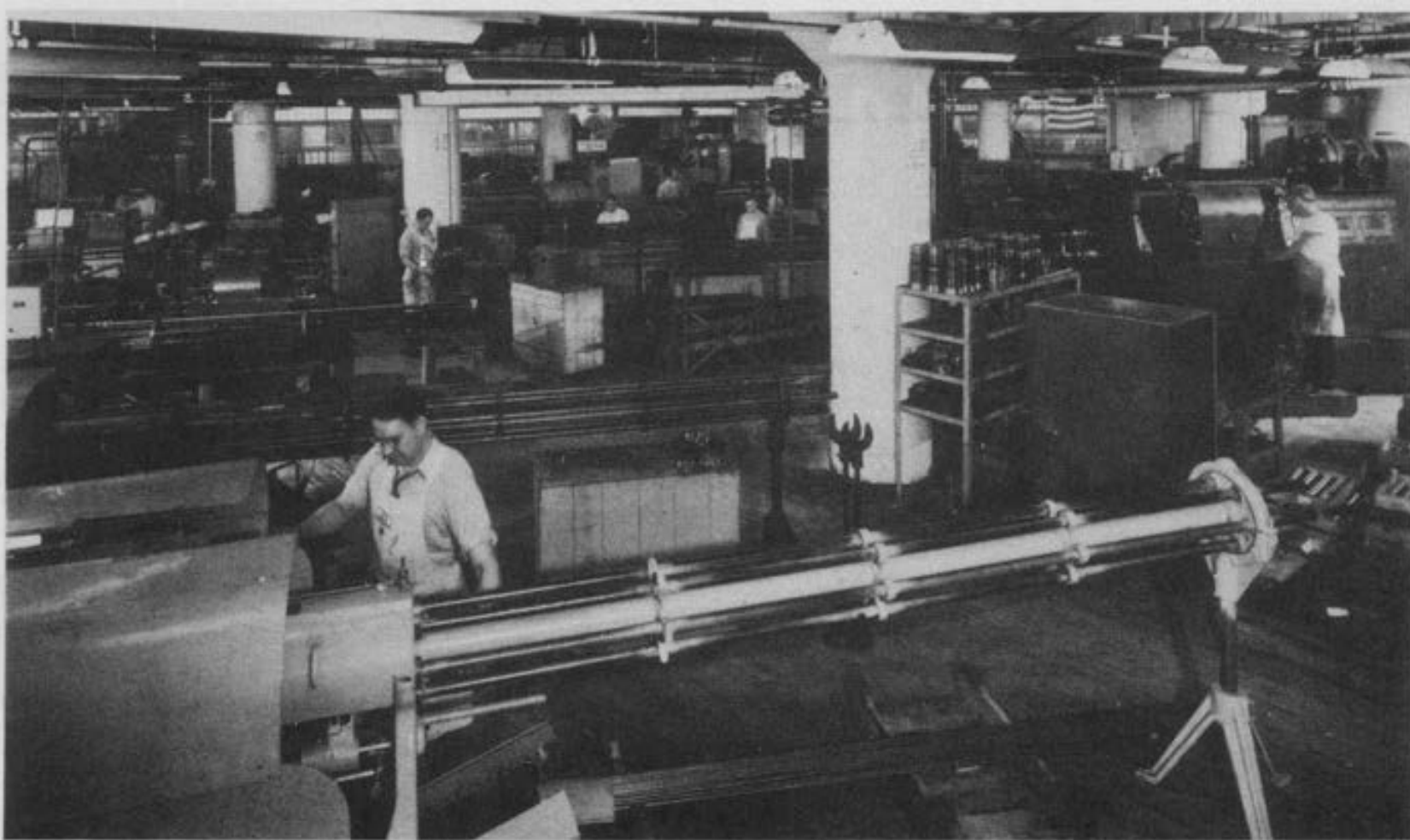
PAPER TESTING LAB Building 21, 2nd Floor



COMMERCIAL PRESS LINE

These machines print test scoring sheets which are widely used by educational institutions, civil service and the Army and Navy. In this department there are compositors type setters for job printing orders for IBM and its customers.

COMMERCIAL PRESS LINE Building 21, 2nd Floor



This is known as a primary or starting department. ACME-GRIDLEY-a six-spindle machine. One part is completed at each movement of the rack which holds six bars of raw material, or six parts for each complete revolution of the rack. A different machining operation is performed at each of the six different tool stages.

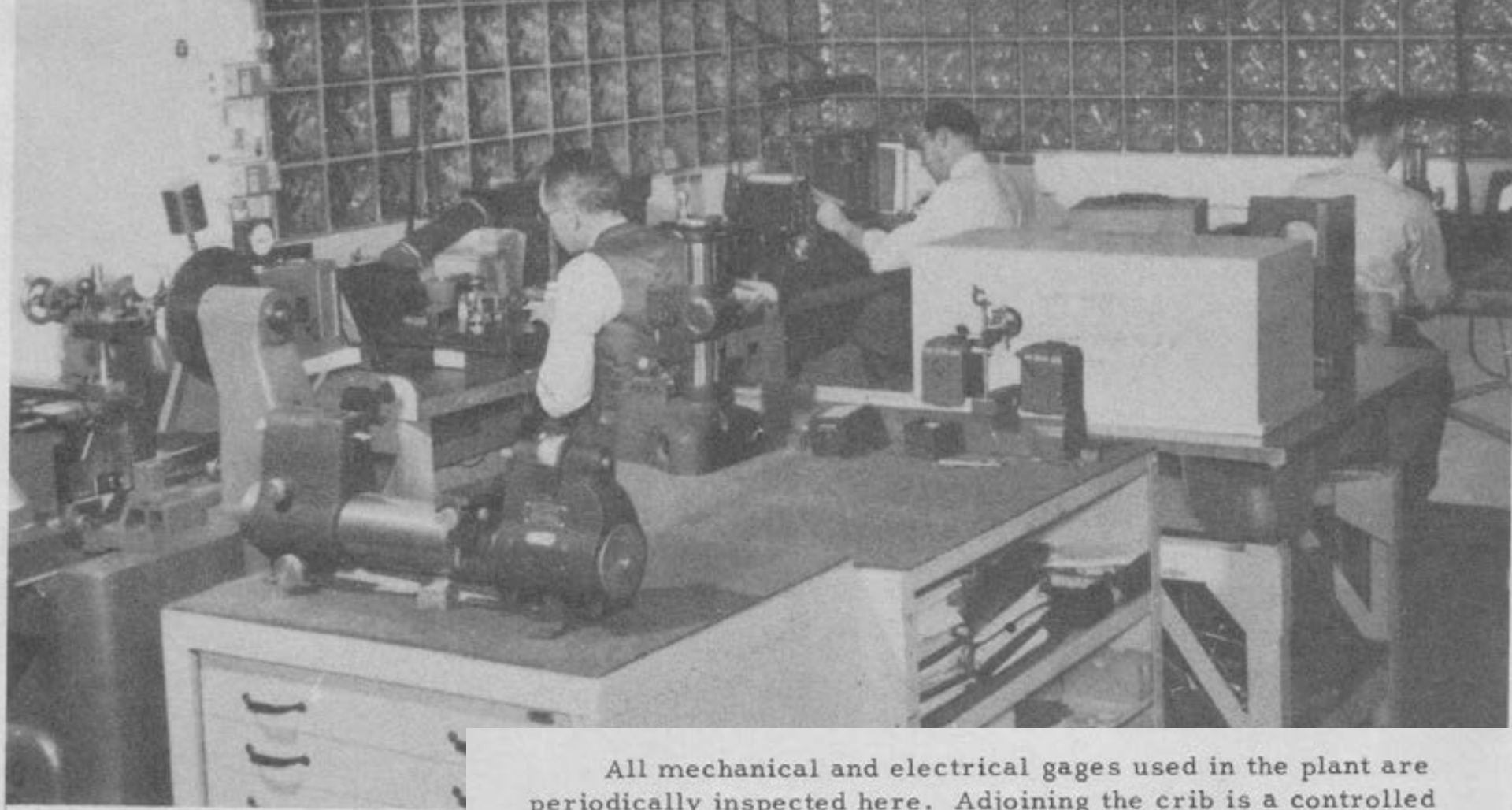
Automatic
Screw
Machines
Building 41
1st Floor



GEAR CUTTING AND ENGRAVING

We manufacture gears for our products by a number of different methods such as shaping, hobbing and generating. Mechanical engraving is done using Pantograph machines.

Gear cutting & Engraving Building 41, 2nd Floor



GAGE AND TEMPERATURE ROOM

All mechanical and electrical gages used in the plant are periodically inspected here. Adjoining the crib is a controlled temperature gage room where precision gage blocks are brought in at scheduled times, allowed to cool down to gage room temperature and inspected to an accuracy of $2\frac{1}{2}$ millionths of an inch by the use of an electrolimit gage to compare them with master set of gage blocks.

Thread gages are checked on a Pratt & Whitney lead checker which measures to an accuracy of millionths of an inch.

**Building 41
2nd Floor**

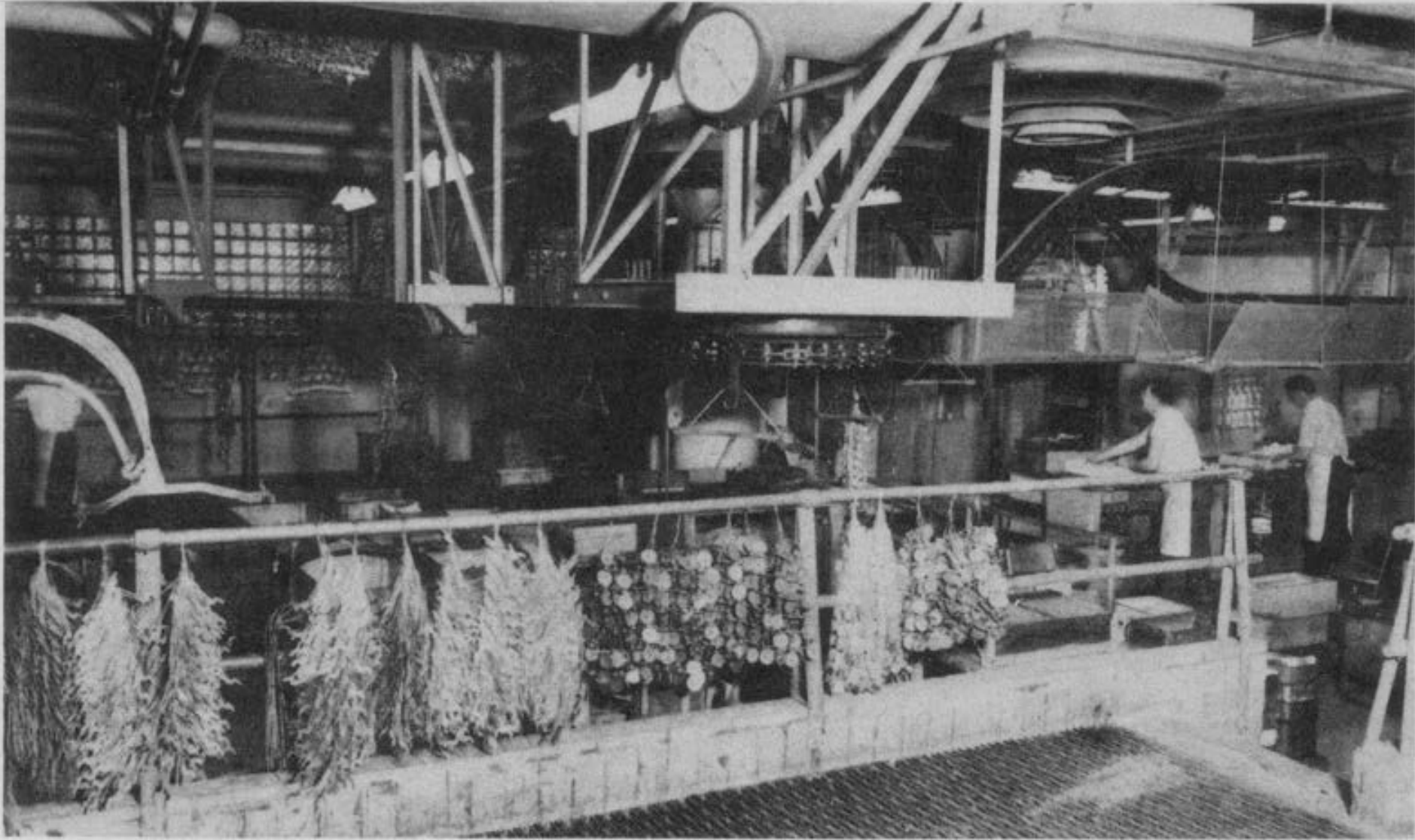


FINISHED PARTS AND BENCH INSPECTION

This department is equipped with the latest gaging equipment. Optical comparators are extensively used to project the contour of parts on a translucent screen, so inspection can be performed visually, helping to produce quality work in reduced time.

Hardened parts are checked by the Magnaflux process for fractures due to straightening, handling, etc. Parts are either approved for use in the machines or are routed for rework.

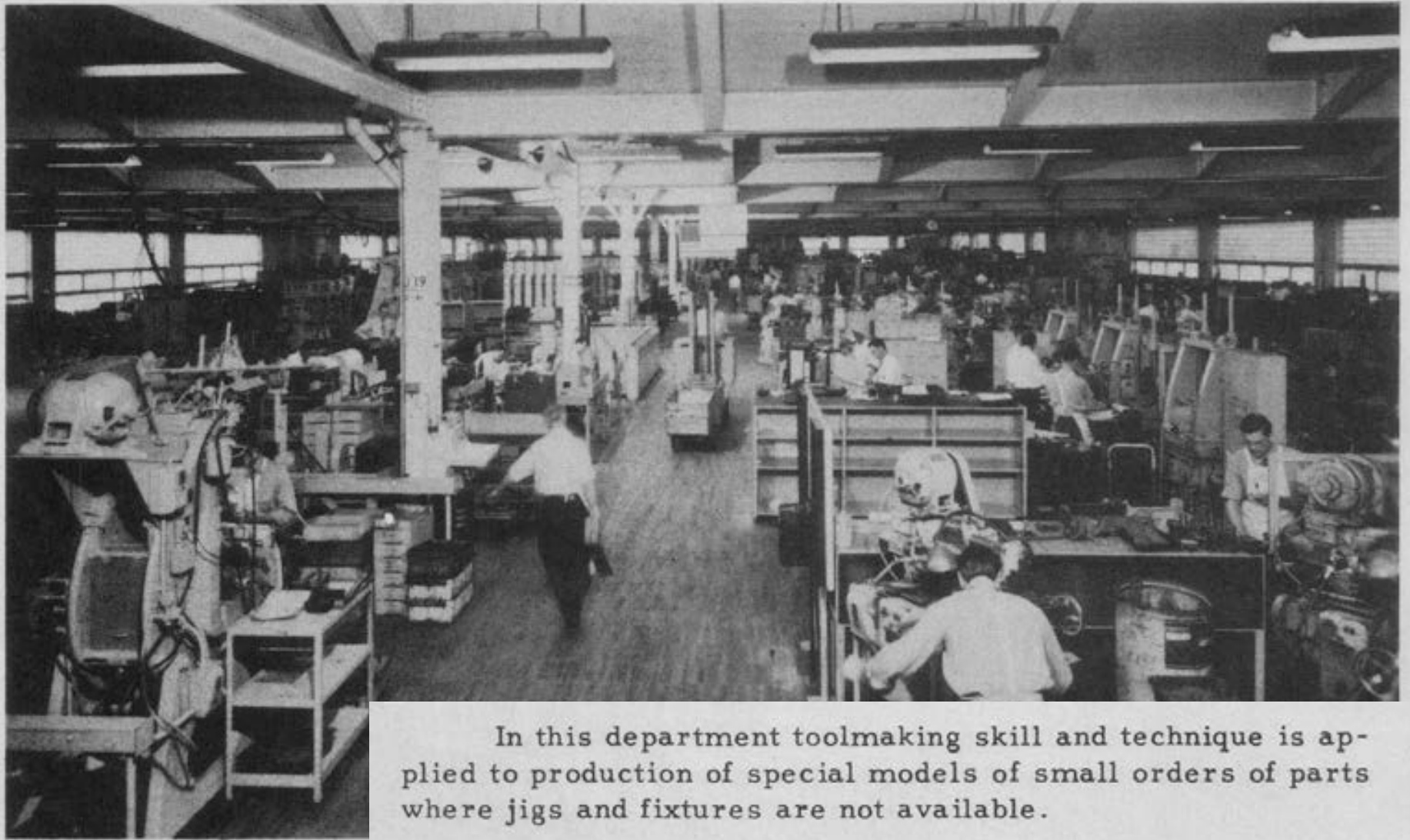
**Building 41
2nd Floor**



PLATING AND POLISHING

**Bui l di ng 41
2nd Floor**

You will note that parts are being strung on racks and put on the conveyor. In many instances these parts are automatically conveyed through the various plating tanks, and in all instances returned by the conveyor for removal from the racks. (Point out polishing stands.)



SPECIAL PRODUCTION AND MO

In this department toolmaking skill and technique is applied to production of special models of small orders of parts where jigs and fixtures are not available.

Some of our most highly skilled employees and finest equipment are located here. We have several jig borers, used for work of extremely small tolerances. Some of these are equipped with optical systems to permit the great accuracy necessary in locating and sizing holes in jigs, fixtures, other tools or model parts.

Model Making
Building 41
3rd Floor



All time indicating, recording and signalling equipment is assembled in this area. The master clock, which is used to control a group of clocks in a system, is accurate within ten seconds a month. This clock is equipped with a mercury pendulum.

The secondary clock is controlled by the master clock. If for any reason, such as failure of electrical current, this clock gets out of time with the masterclock, it will receive impulses each hour which will bring it back into time with the master clock.

I TR ASSEMBLY

Building 46,
4th Floor



Coils are wound and covered at the south end of the building. Coil production now averages $1/4$ million a month. One hundred thousand relays a month are built up of yokes, armatures, insulators, contact springs and terminals. The coils are assembled to make a complete relay. Relays are assembled into a frame or gate and wired. This makes up a relay gate assembly which controls various circuits in our equipment.

RELAYS
Building 46
4th Floor



WIRE CONTACT RELAY

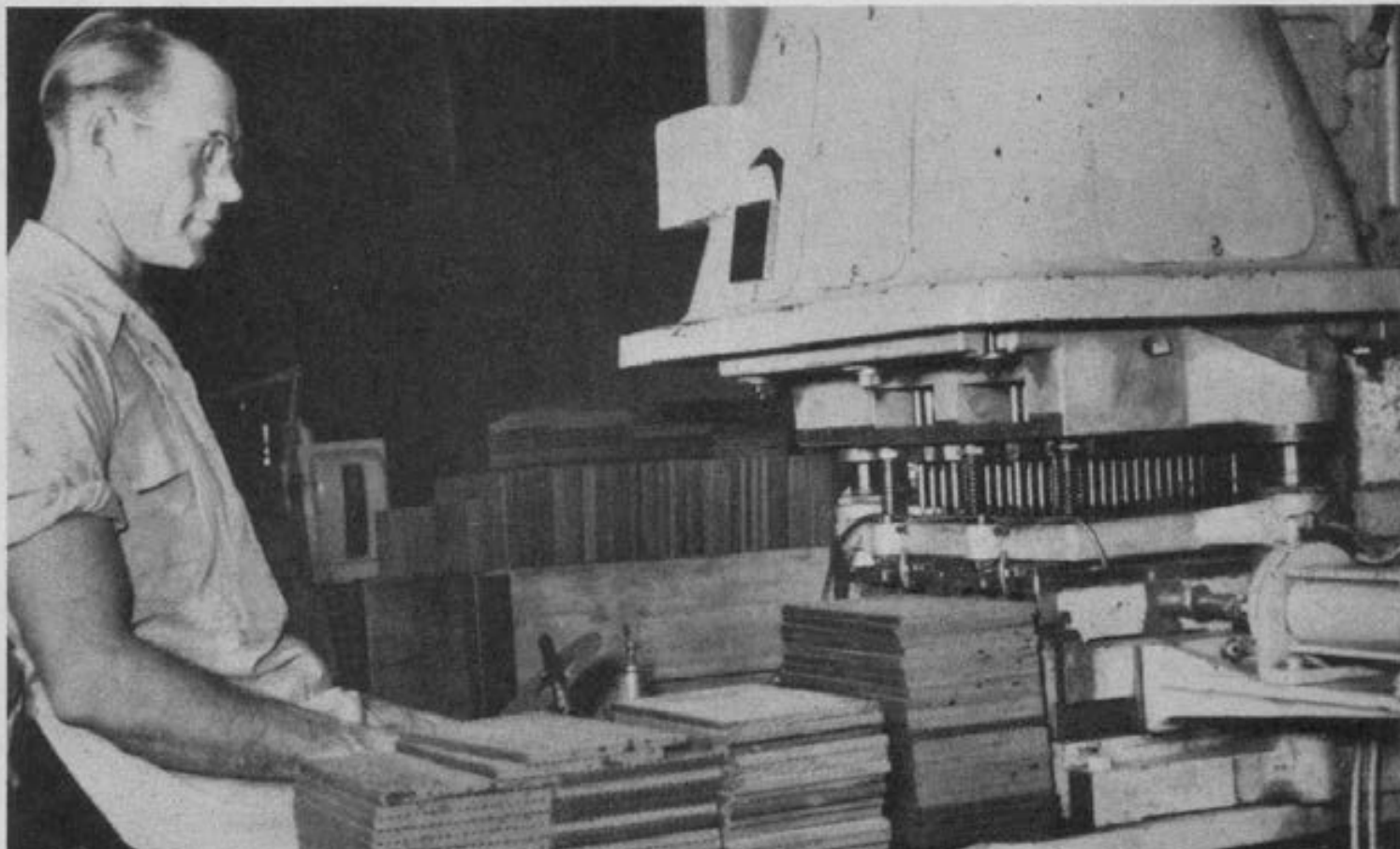
Building 46
4th Floor

The wire contact relay is a comparatively new development. It is plugged into place instead of wired. It can be replaced easily and quickly, and since it is much smaller, saves a great amount of space. At present we are making 75,000 of the relays monthly.



Brushes are assembled into a brush block and placed in such a position as to pass over the surface of the IBM Card which serves as an insulator until the brush reaches a hole in the card. As the brush drops through the hole, it makes contact with the contact roll and completes an electrical circuit which energizes the coil, which in turn actuates a relay which furnishes a directed electrical impulse for a machine function.

**Brush
Making**
Bldg 46
4th fl



The control panel is roughly similar to a telephone switchboard. The operator sets up plug wires to pick up information from certain columns in the operating unit and send impulses to various parts of the machine such as type bars, counters, selectors, etc. Bakelite panels are milled and drilled. Beryllium copper contacts are inserted and fastened. Present usage of one type beryllium copper contact is approximately 10 million a month. These are silver plated to insure a good electrical contact. The panel is then assembled in a frame in groups of one, two or three as the specific machine may require.

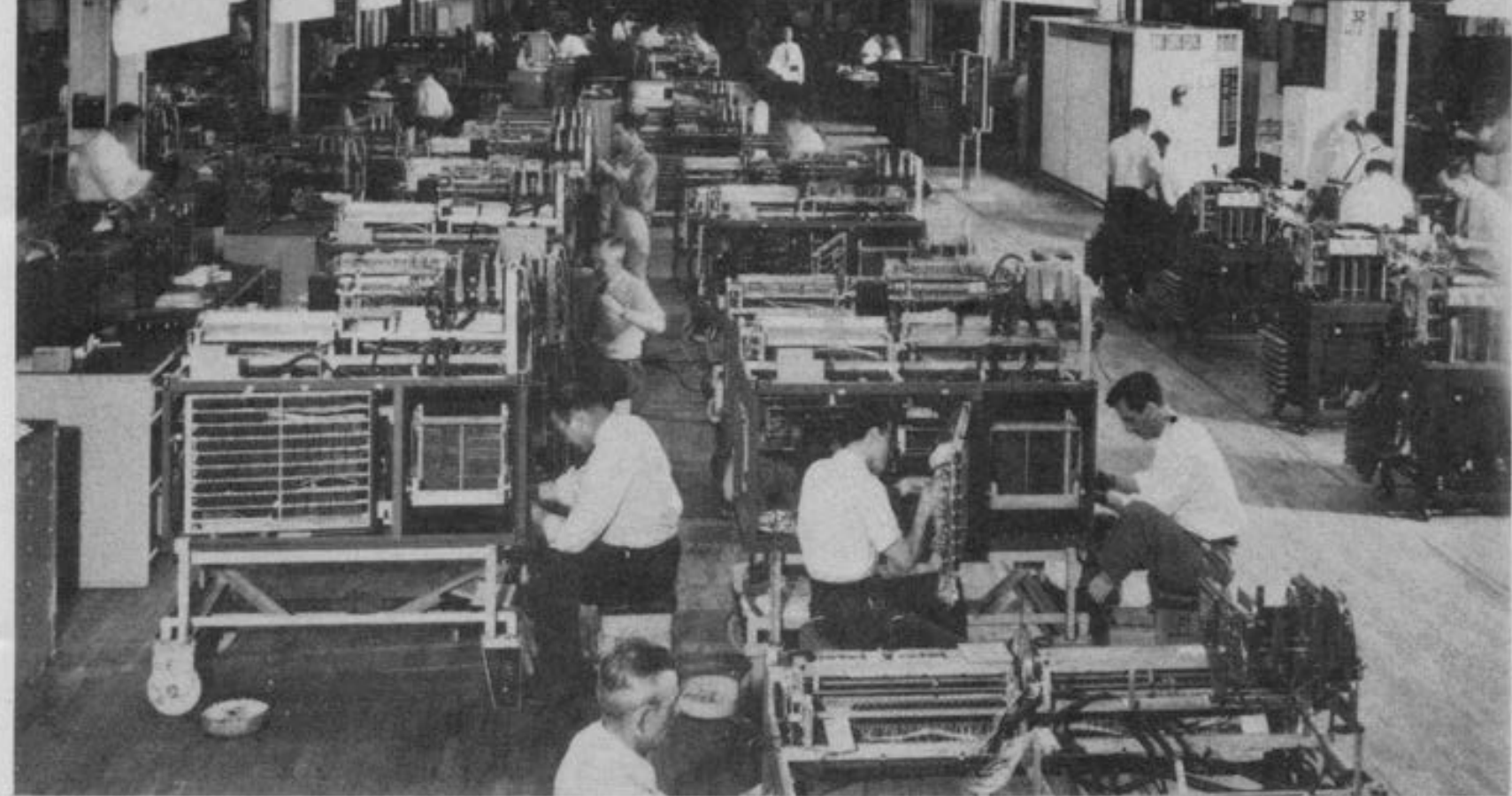


The cable is the nerve system of an accounting machine. Wires transmit electrical impulses to various mechanisms in the machine. Cables are laid out in advance from wiring diagrams, which in many instances are very complicated. Cables are wound, sewed or tied, and cut. Then clips or connectors are fastened to the wire ends at the rate of $1\frac{1}{2}$ million monthly.

All branches of the cable touching the machine frame are taped on special taping devices to prevent chafing of the insulation, with resulting electrical short circuits in the machine.

Cable
Assembly

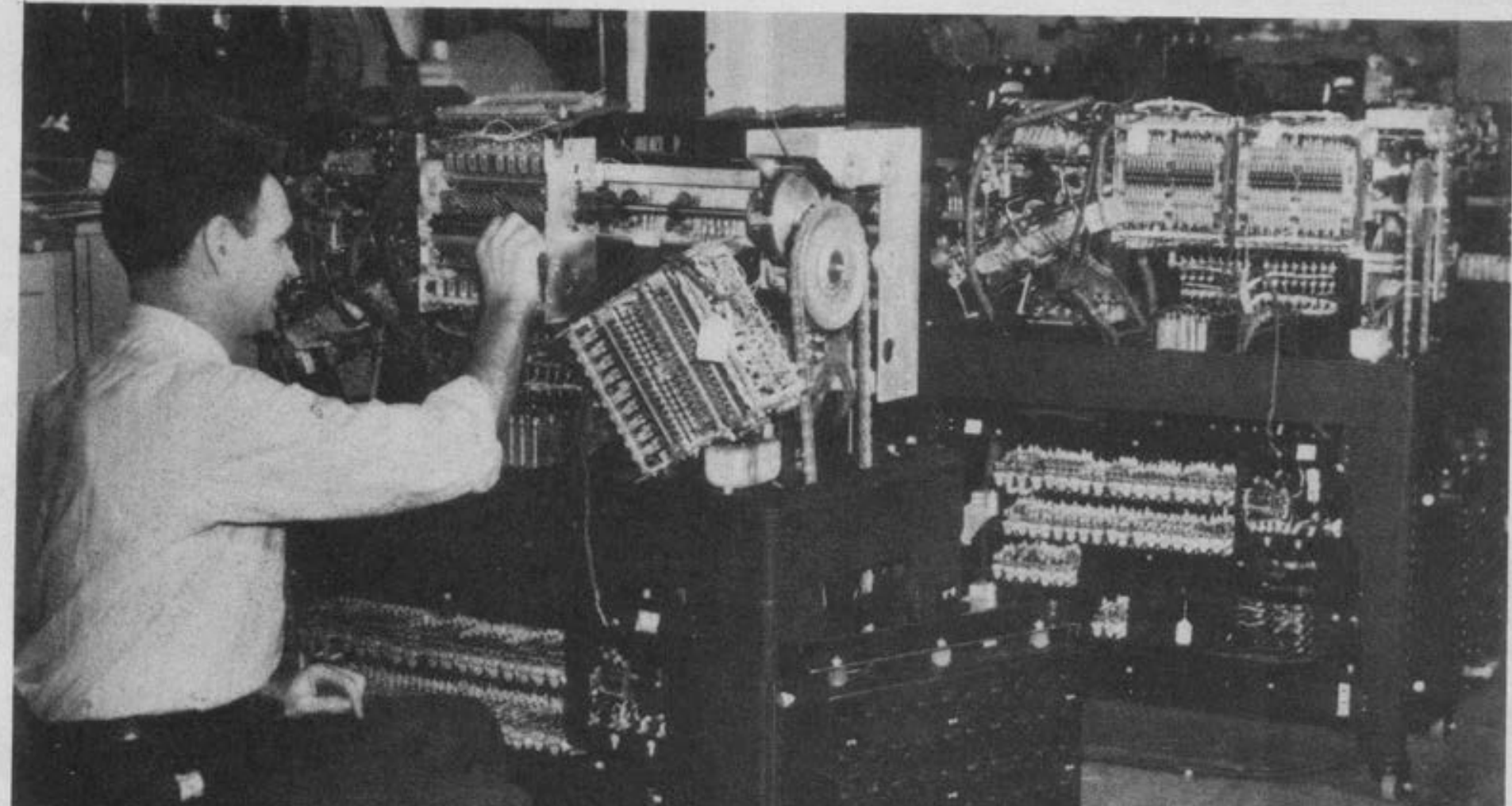
4th floor



CALCULATING PUNCH—TYPE 602

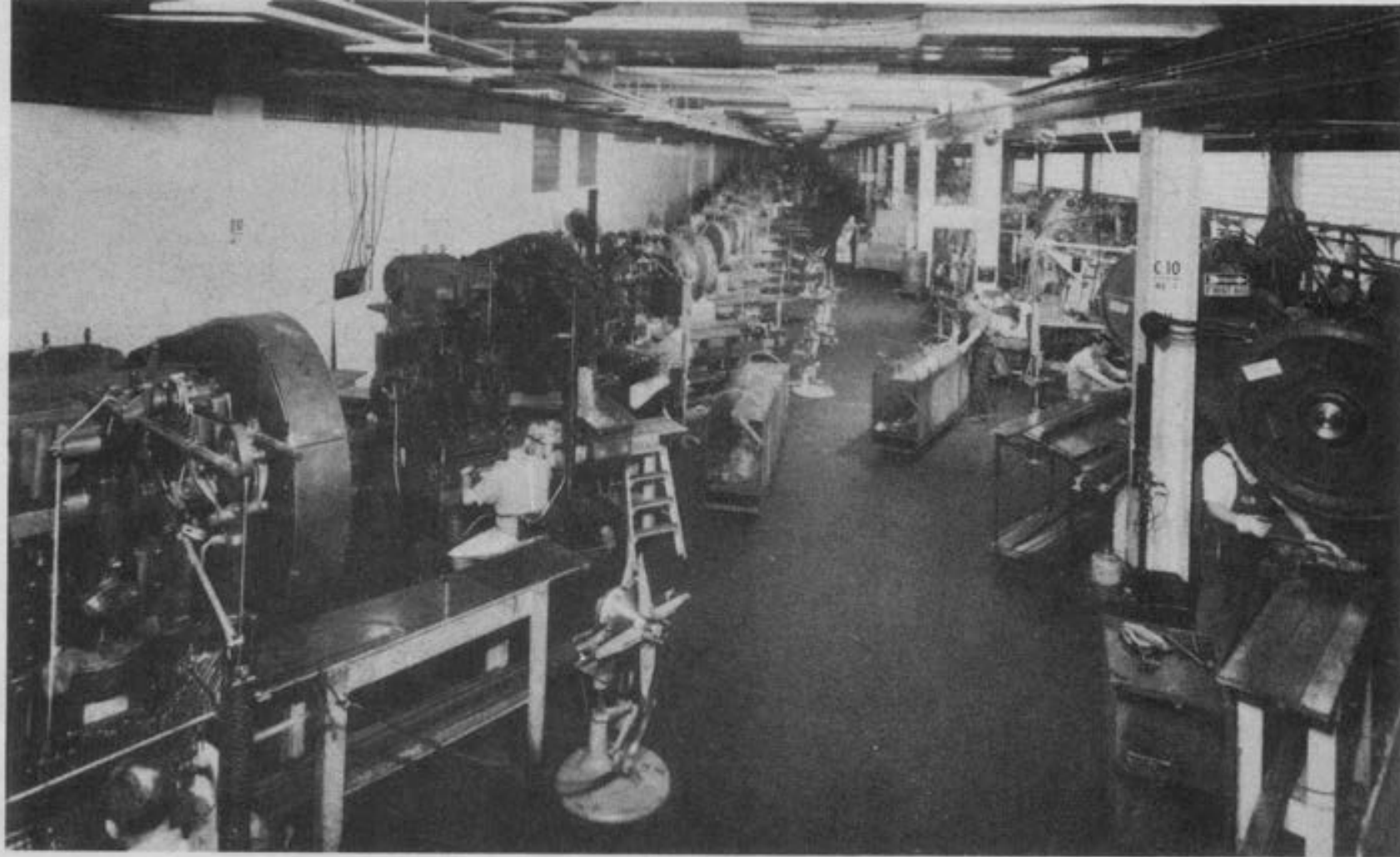
602
46th Fl
3rd fl r

This machine is capable of solving all types of calculating problems. The factors of the problems are read from IBM cards. Calculations involving addition, subtraction, multiplication, division or all of these operations are performed automatically at high speed and results are punched in the card as it passes once through the machine. Capacity is 10 digits in multiplier, 10 digits in multiplicand and 20 digits in product. Speed ranges from 1000 an hour for 10 digit factors with 20 position product, to 3000 an hour for a 1 digit multiplier with a 6 position product.



COLLATOR

The collator was first built as a special machine, but is now considered a standard item in an installation. It could be called a filing machine since it will file one deck of cards into another after both are arranged in proper sequence by the sorter. It will also compare two decks without merging, rejecting any cards which have no mate in the other deck. It will also select certain desired cards from a deck.



PUNCH PRESS

Punch press stamps or cuts parts to a desired shape, punches holes and forms angles or curves from flat stock.

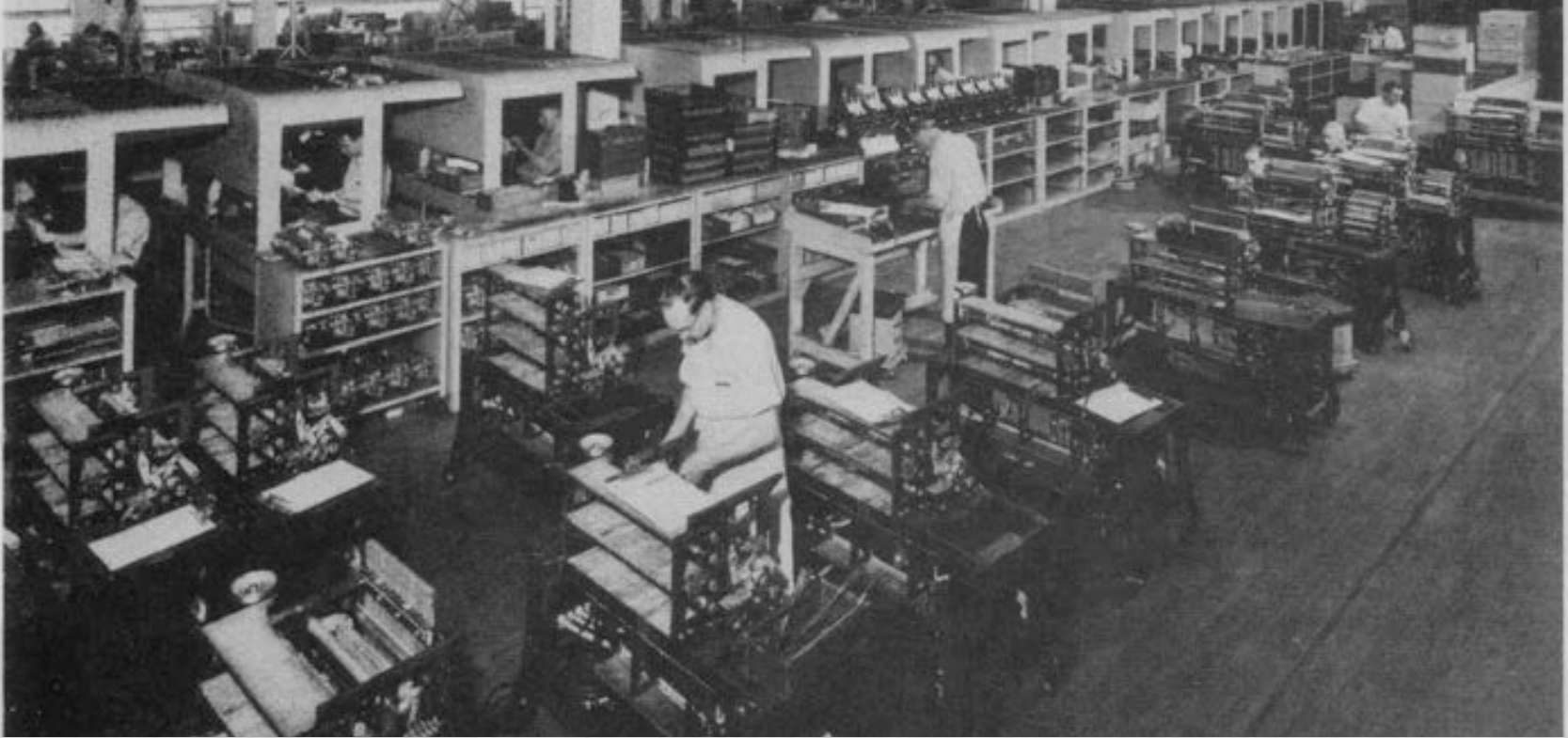
Point out the safety features. The Posson's guard consists of a camming arrangement hooked to cables which in turn are attached by straps to the operator's hands. This will pull his hands from danger if he should fail to remove them. Another type of guard is steel rods arranged to form a cage or basket around the danger area.



ELECTRIC DOCUMENT ORIGINATING MACHINE

This machine reads all the holes punched in the IBM card and punches (Reproduces) any or all of them in another card in the same or a different location. It can also be used as a gang punch. The automatic punch reads from pencil marks (Mark sensing) or can be coupled to an alphabet accounting machine and used as a summary punch, punching totals in the IBM card at the same time the alphabet machine is printing the totals on paper. It will print across the left end of a card as many as 8 digits punched in that card (interpreting) or as many as 8 digits punched in another card (transcribing).

Bldg 46,
3rd fl



The alphabetic accounting machine will list or print information, add and subtract, taking totals and feeding paper automatically. Various carriage attachments are available making it possible to address envelopes and magazines; prepare invoices such as light, gas and water.

(Point out that the line is so arranged that sub assembly departments feed the final line with units, switch plates, counter assemblies, etc., at the point where they are assembled to the final machine.) This machine is a good example of our progressive assembly procedure.

Al ph a b e t i c D u p l i c a t i n g P u n c h

B l d g 46, 3rd fl



TOOL AND CUTTER GRINDING

In this department milling cutters, drills, broaches, etc., are sharpened by grinding, then used in other manufacturing departments.

Tool & Cutter Grinding Bldg 28. 3rd fl



APPRENTICE TOOLMAKING

Selected graduates of high school technical courses are given an extensive three-year course in toolmaking. The course consists of both actual practice on machine tool operation and intensive class room work on toolmaking practice and tool design.

Apprentice Toolmaking Bldg 25, 3rd fl



PHOTO ENGRAVING

In this department the type cylinders are made from which IBM cards are printed. A rough sketch or layout (approximately double size) is sent in by the salesman or customer. The finished design (six times final size) is made. It is then reduced by photograph to actual card size, contact print from the negative is made on a sensitized brass cylinder and unnecessary metal is etched away, leaving cylindrical type for use on Carroll presses.



IBM ENGINEERING LABORATORY

1. Chemical
2. Electrical
3. Acoustical
4. Paper Test
5. Metallurgical
6. Plastics

Second Floor
Second Floor
First Floor
First Floor
First Floor
North end of tunnel



IBM SCHOOL

The IBM School was erected in 1933 and is the central office of the IBM educational program which is offered in the IBM branch offices and plants throughout the world.

The words appearing on the steps leading to the IBM School -- READ, LISTEN, DISCUSS, OBSERVE, THINK -- were used by Mr. Watson when the "first school" in IBM was held in 1915. They are placed here as a reminder of the five basic steps necessary for effective study.

This division offers advanced courses for IBM customers who are experienced executives in business and public administration, as well as courses in the principles of IBM EAM operation.

IBM representatives are given intensive training in sales technique and the application of IBM equipment so as to provide better service to industry and government. Customer Engineer Training and Systems Service Training are also provided to maintain the high standard of IBM service.

In addition, good human relations are fostered by the IBM Executive Training program, and opportunities for knowledge and advancement are provided by the Extension Education Program which includes a course in Electronics.



SALES AND SERVICE EDUCATION



GENERAL AND VOCATIONAL EDUCATION

The Vocational Training Program provides job training for employees as well as a course in toolmaking for apprentices. Management Training in the manufacturing organizations is similar in purpose to Executive Training in the field. To meet the increasing manpower requirements of IBM invention and research, a General Engineering Training Program has been established.