

Talk - Evolution of the Switchboard



New England Telephone and Telegraph Company

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January 7, 1966

*Mr. Anthony
Area file*

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Mr. P. A. Hines
Rhode Island Traffic Manager
234 Washington Street
Providence, Rhode Island

Attached for your information is a copy of a talk given recently to the Board of Directors of the American Telephone and Telegraph Company. A similar presentation was given by the Massachusetts Area Traffic people to the Board of Directors of the New England Company. This may be of interest to you in discussions with your people.


General Operations Supervisor - Traffic

Attachment

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ATT_Evolution_of_the_Switchboard_1965_p1

Talk - Evolution of the Switchboard

AMERICAN TELEPHONE AND TELEGRAPH COMPANY

195 BROADWAY, NEW YORK, N. Y. 10007

AREA CODE 212 393-3178

C. K. COLLINS
ASSISTANT VICE PRESIDENT

December 10, 1965

File No. 304.6

We were invited recently to make a presentation to the Board of Directors of the American Telephone and Telegraph Company on the "Evolution of the Switchboard." The talk was accompanied by thirteen 35-millimeter slides, using color wherever possible. Starting with a diagram showing why a switchboard is required, various historic types of boards were discussed and illustrated from the first commercial one at New Haven through recent Traffic Service Position installations.

In order that the Directors might observe the TSP at first hand, the meeting was held at the headquarters of the New York Telephone Company. Subsequent to the meeting and the presentation, a brief tour was conducted. First an existing 3CL type office, soon to be replaced by TSP, was visited. The Directors were then taken to the TSP office where the Chief Operator demonstrated the operation at the training position using a specially prepared training tape.

After this, the tremendous amount of equipment associated with a TSP office was observed when the Directors walked through an equipment room. Printed signs attached to the various pieces of equipment indicated the name.

I am attaching a copy of the talk and reproductions of the slides for your information. We will be glad to furnish a duplicate of the slides if you desire them and, where applicable, a copy of the TSP training tape.

If any of your people wish further information, they may contact Mr. P. B. Howell, Area Code 212 393-2316.

Yours very truly,



Assistant Vice President

Attachments

Notes
Photos

To all General Traffic Managers

THE EVOLUTION OF THE SWITCHBOARD

The evolution of the switchboard is a good example of the continuing application of technological development in the telephone business in order to (1) improve the quality and usefulness of telephone service, (2) to satisfy the demand for service, and (3) to keep the cost of our product at a reasonable level and thus expand our market.

First, why a switchboard at all? From the very first days of the telephone, the need for a switchboard was evident to make it practicable for any telephone to be connected to any other. To illustrate this need, the first slide (Slide 1) shows that, to interconnect 10 telephones without a switchboard, 45 lines would be needed. For each telephone added, there would be an additional line required for every other telephone already in service. On the other hand, as shown on the next slide (Slide 2), with a central switchboard 10 telephones require only 10 lines, and each additional telephone requires only one additional line. S-1

The first commercial switchboard was installed in New Haven in January 1878 to serve 8 lines and 21 telephones (Slide 3). It was equipped with lever type switches for interconnecting the lines. S-3

During the first few years after the invention of the telephone, there was considerable experimentation with types of switchboards. One of the early versions is shown in the next picture (Slide 4). It is of particular interest because it shows the early use of boys to operate switchboards. S-4

History tells us that boys generally did not make good operators. So, 87 years ago this month, in September 1878 in Boston, Massachusetts, the first girl operator was employed. Over the intervening years, the job

of a telephone operator has become associated in people's minds as one for young ladies, and has been typified by terms such as the "spirit of service" and "the voice with a smile."

As the business grew and the complications of interconnection multiplied, research and development started designing switchboards which were similar in arrangement to those which served us until very recent years. The next picture (Slide 5) is of an office in downtown New York about 1888. The positions were placed side by side and customer lines had multiple appearances throughout so that any operator answering a call could complete to any locally called number.

S-5

Growth quickly developed the need for more than one switchboard in the larger cities. So, in order to receive calls from other central offices, a separate incoming switchboard was developed. The originating board was called the A board, the incoming board was called the B board. The two types of boards had quite different operating requirements. The next picture (Slide 6) shows a typical manual A board in the early 1900's. "A" operators answered the customer and advanced his call. The following picture (Slide 7) shows a large city B board. "B" operators had no direct dealing with customers; they received calls from other operators, handling between 250 and 300 calls per hour. Their work also involved considerable physical effort in stretching and reaching.

S-6

S-7

I have mentioned only local switchboards up to this point. Some toll traffic to nearby points was handled at local offices, since the operation, except for ticketing, was similar to handling local calls from one office to another. However, to handle more distant calls, it was necessary to install specialized long distance switchboards for access to intercity trunks and to provide improved transmission.

This was the situation up to 1919 when the Bell System announced its plans to convert from manual to dial service and cutover its first local dial central office in Norfolk, Virginia. At that time, the operating force consisted of 115,000 people, or about 50% of the total employees of the System telephone companies.

If we had the same number of operators per 10,000 telephones today as we had at that time, and if all connections were still made by hand, we would need about a million operators right now. But, of course, this couldn't happen - because we couldn't sell 1919 type service to today's public at the price we would have to charge in order to pay our wage bill.

The changeover from manual service to dial service is now about complete. However, although local manual switchboards have nearly disappeared, the growth of the business has required substantial increases in other types of switchboards, such as for handling toll, Information, and Intercepting calls.

In our toll operations, a dramatic change has also taken place, both in the speed of service to our customers and in the numbers of operators and switchboards required, as shown on the next slide (Slide 8). Back in the pre-dial days, 7 operators or more were involved in the handling of a typical long distance call - and average speed of service was about 10 minutes. After the introduction of local dialing, plus other changes in operating procedures, the number of operators and switchboards was reduced to 3 - and the speed of service was brought down to $2\frac{1}{2}$ minutes. In the 1940's, operator toll dialing was introduced, reducing the number of operators per call to one - speed of service on a dialed call was brought down to about 70 seconds. Then in the 1950's, customer direct

S-8

distance dialing of station-to-station paid calls was introduced; on this 50% of our toll business, no operator at all is required, and the speed of service is about 20 seconds.

The remaining operator-handled connections, consisting of local assistance calls; person-to-person, collect and credit card toll calls; and coin toll calls, are now handled at combined local plus toll switchboards. An example of a modern combined service switchboard is shown in the next picture (Slide 9).

S-9

Despite all of these changes, we have today over 175,000 people in the operating force or over 50% more than we had when dial was first introduced.

It was natural then to study the possibilities of extending mechanization to the remaining 50% of our toll business. A new service, known as "Expanded Direct Distance Dialing," has been developed for handling these special types of calls - using a new cordless console for operator assistance which we call the Traffic Service Position or "TSP". The next picture (Slide 10) shows one of these positions.

S-10

Let me describe the operation briefly. A customer desiring to place a person-to-person call to, say, Mr. Brown in Los Angeles dials "Zero" immediately followed by the Area Code and the desired telephone number. The equipment starts setting up the connection to the distant point and, at the same time, bridges in an idle position to the connection. The operator answers, "May I help you?" The customer says "Mr. Brown." The operator presses the person-to-person class of service key. A distant telephone rings and, when the called station answers, the operator asks for Mr. Brown. When conversation begins, she presses the start timing and position release keys. The call is freed from her position and she

is available for another call. The recording of the details of the call and the timing of the end of conversation are all handled automatically. (There is an average saving in operator worktime on these calls in the order of 25%.)

When a customer dials a long distance call from a coin telephone, a display on the panel at the top of the board automatically shows the amount due - including tax but less the initial deposit. The operator merely requests the customer to deposit the amount shown, and releases the call from the position. At the end of the initial period, the equipment selects any idle position and an operator notifies the customer. In case of overtime, another idle position is selected and the additional amount due is displayed, along with the total minutes of the overtime. (There is a saving of about 50% in operator worktime on coin toll calls.)

(There is, of course, a very substantial amount of equipment behind the Traffic Service Positions to enable them to perform their service functions. We expect ultimately to get the capital investment per position, including all the equipment, down close to that of present cord boards, although some of the early installations are more costly. Then, with about 70 positions doing the work of 100 cord type positions, plus the saving of 30% in operator requirements, the rate of return on the investment should be very good.)

The first standard installation of Expanded Direct Distance Dialing was made in October 1963 in New York and installations have since been made in 8 other cities: Cleveland; Boston; Sioux City, Iowa; Springfield, Missouri; San Francisco; Newark; Philadelphia; and Hartford. At the present time, there are over 1,500 positions in service. The program

ahead calls for 4-5,000 additional positions per year. We expect that about 70% of all person-to-person, collect and coin toll calls will be handled at Traffic Service Positions by the late 1970's.

Expanded Direct Distance Dialing has been very well received by our customers, with favorable comments particularly on the faster speed of service.

The Traffic Service Position has the ability to display either the called number or the calling number if needed. The latter is especially advantageous in the handling of emergency calls if the calling party in excitement hangs up without giving his number.

The Traffic Service Position has other advantages, too. The calls are automatically distributed to idle positions in order of appearance. This results in a faster and more uniform speed of answer. The consoles are built in two position sections, as shown on the next slide (Slide 11). S-11 They can be arranged in office-like patterns which lend themselves to improved working conditions and a more pleasant atmosphere for women employees. The physical exertion and repetitive nature of operating have largely been removed, and the majority of the operator's time is spent in giving individual assistance to customers. Further, since these positions are only bridged into a connection for a short period of time, they can be installed at locations remote from the actual switching point - this permits TSP offices to be situated in areas of good employment. This is very important in certain Metropolitan areas to enable us to obtain the high quality people we need to give good service efficiently.

The next picture (Slide 12) shows the TSP office in Philadelphia S-12 which was cutover this July.

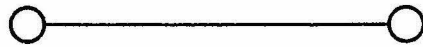
The next (Slide 13) is a picture of one of the TSP offices in Boston.

S-13

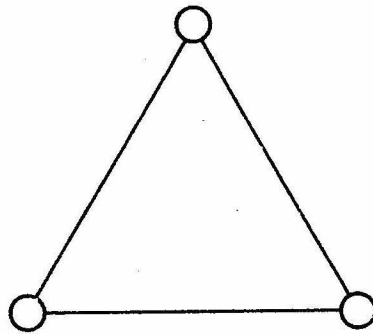
It certainly is apparent that, in addition to giving better service at lower cost, these offices do provide substantially more attractive working conditions for operators than some of our older switchboards. We hope that this is so, because we still feel that customer opinion of telephone service is influenced very largely by his personal contacts with telephone people, and we must attract and hold well qualified people for the operating job if we are to handle the remaining customer contacts in truly superb fashion.

9-15-65

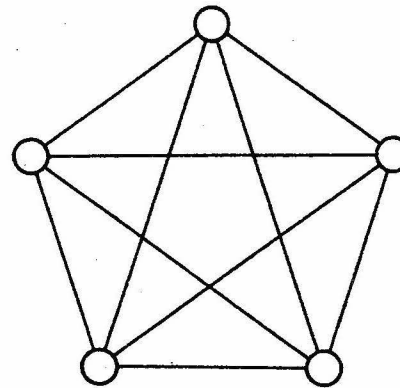
Lines Required for Direct Connections Between Various Numbers of Telephones



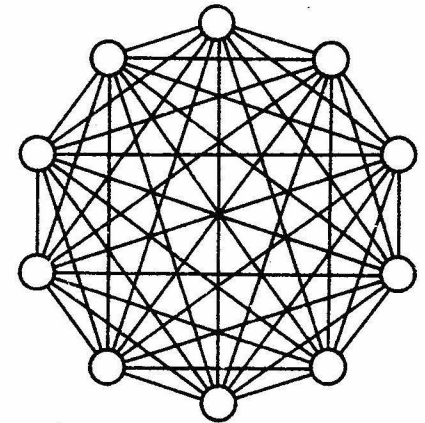
2 TELEPHONES
1 LINE



3 TELEPHONES
3 LINES



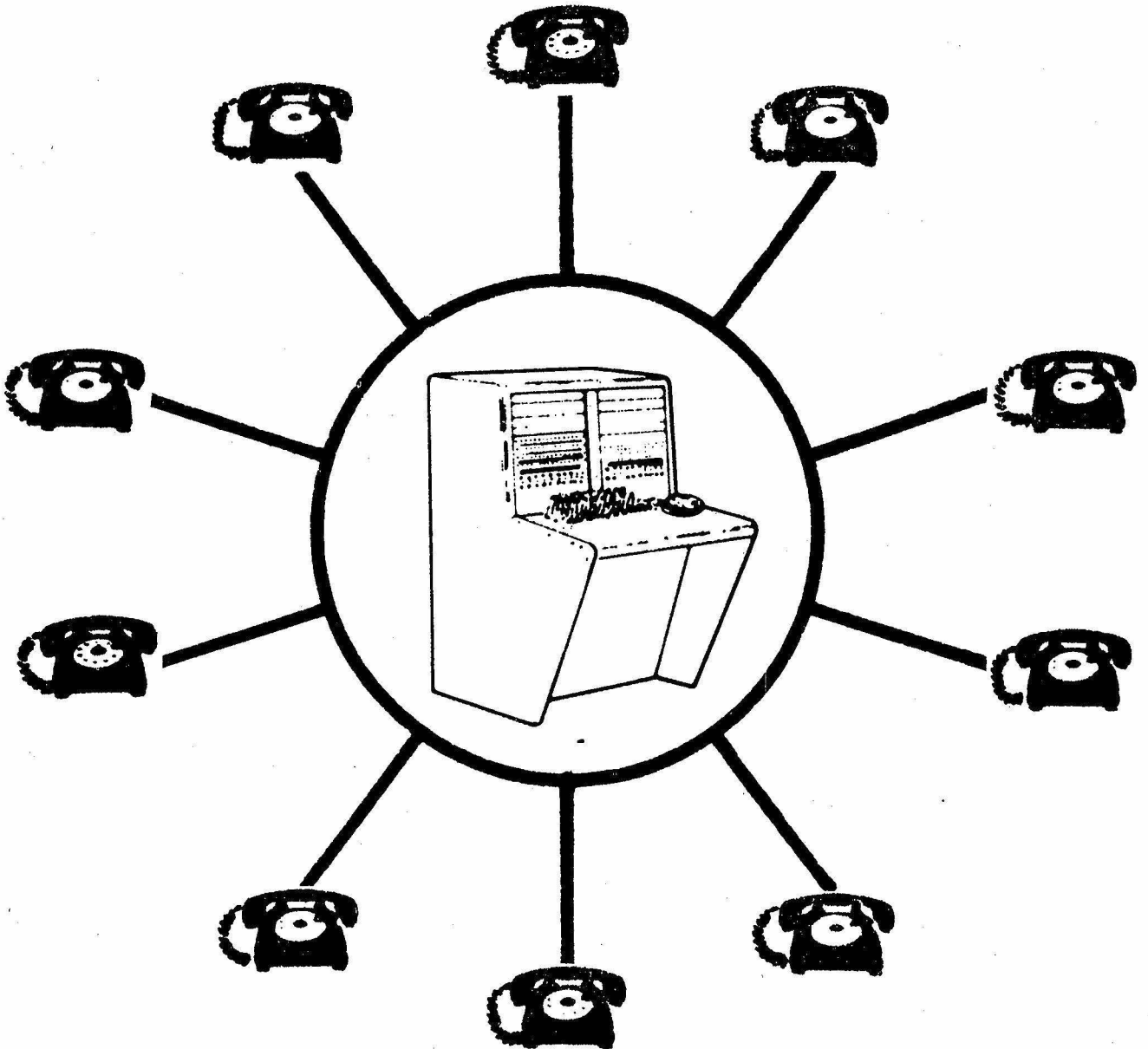
5 TELEPHONES
10 LINES



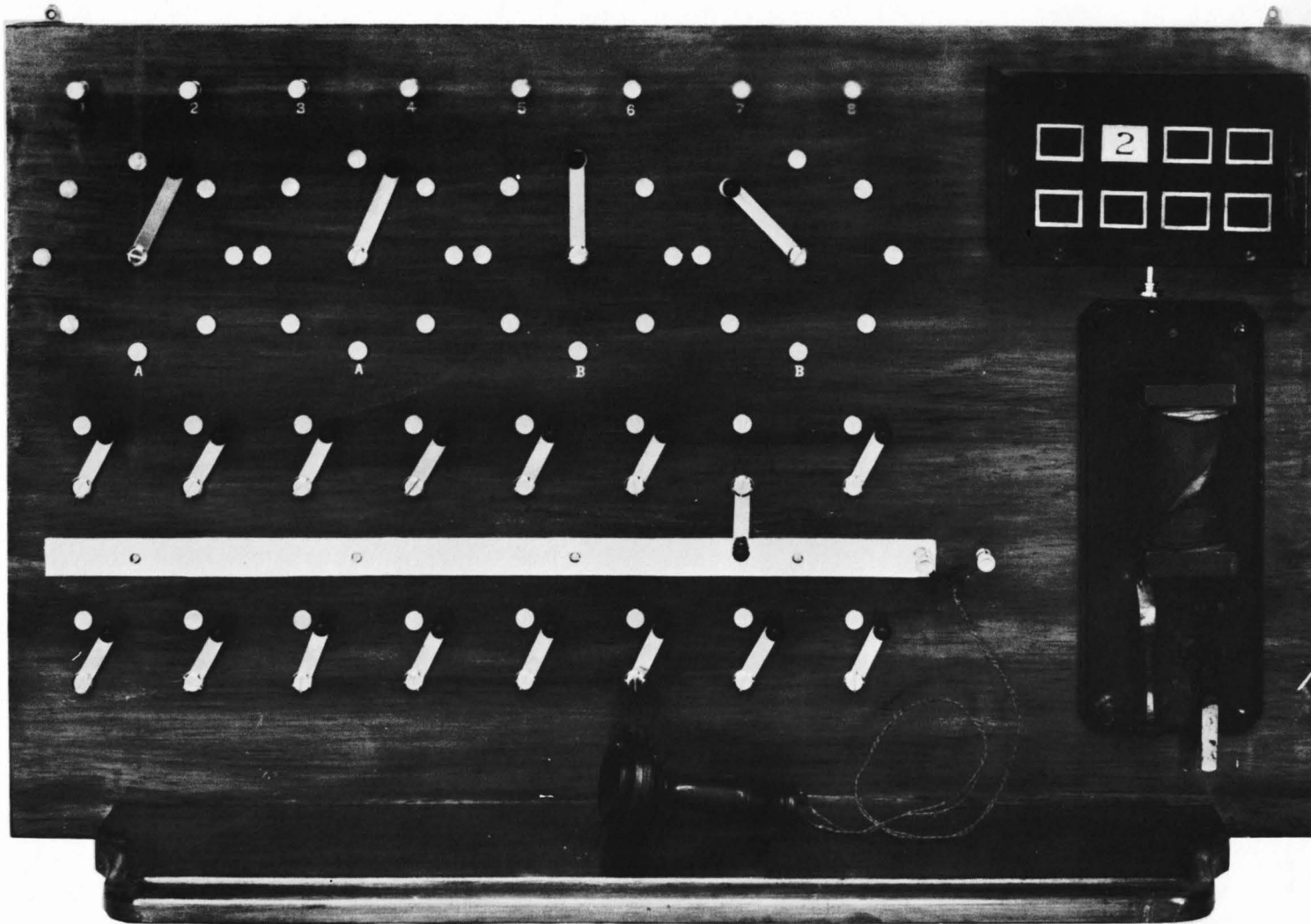
10 TELEPHONES
45 LINES

Slide 1

With a Central Switchboard 10 Telephones — 10 Lines



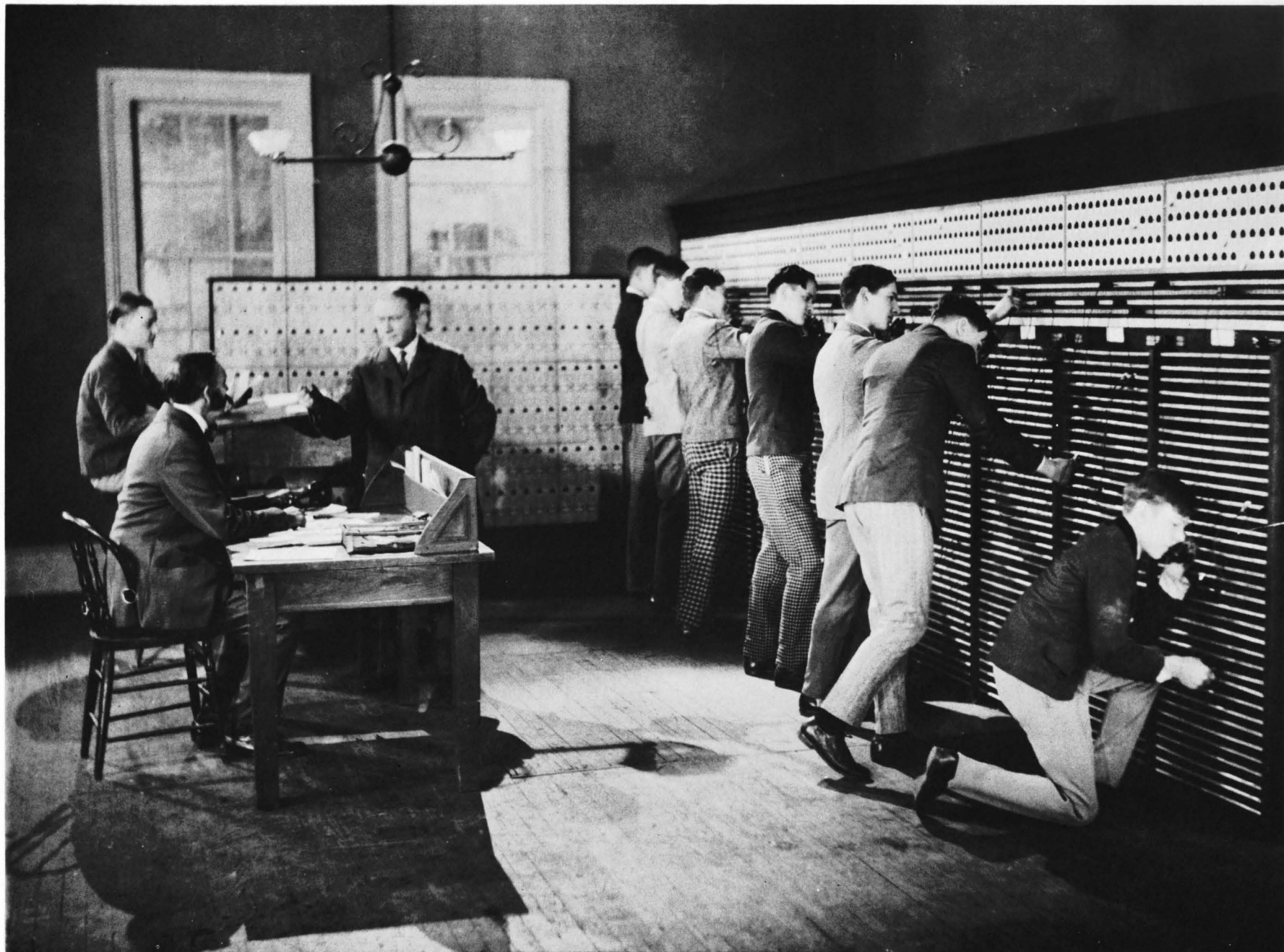
Slide 2



Slide 3

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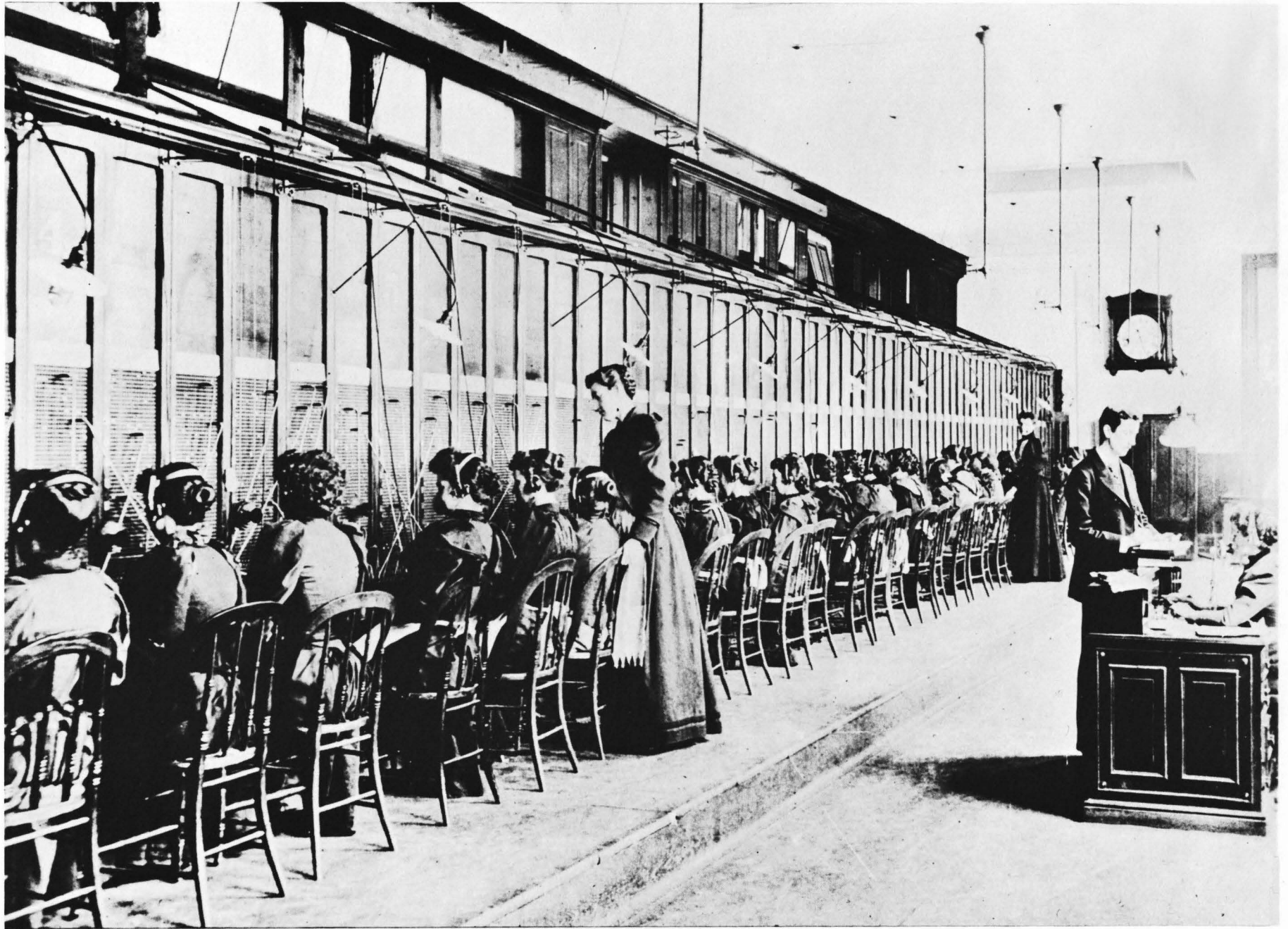
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Slide 4

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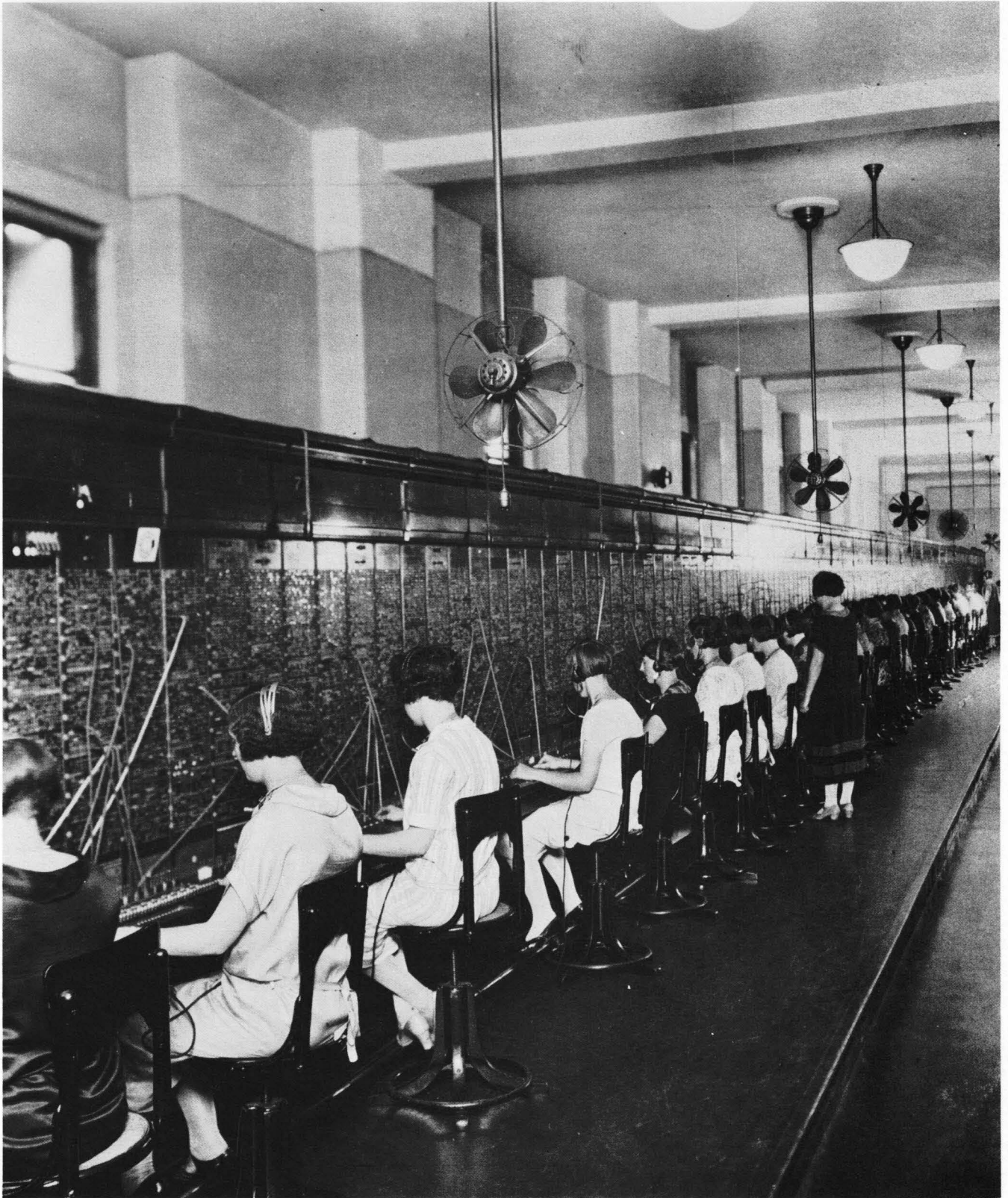
ATT_Evolution_of_the_Switchboard_1965_p13



Slide 5














Slide 6

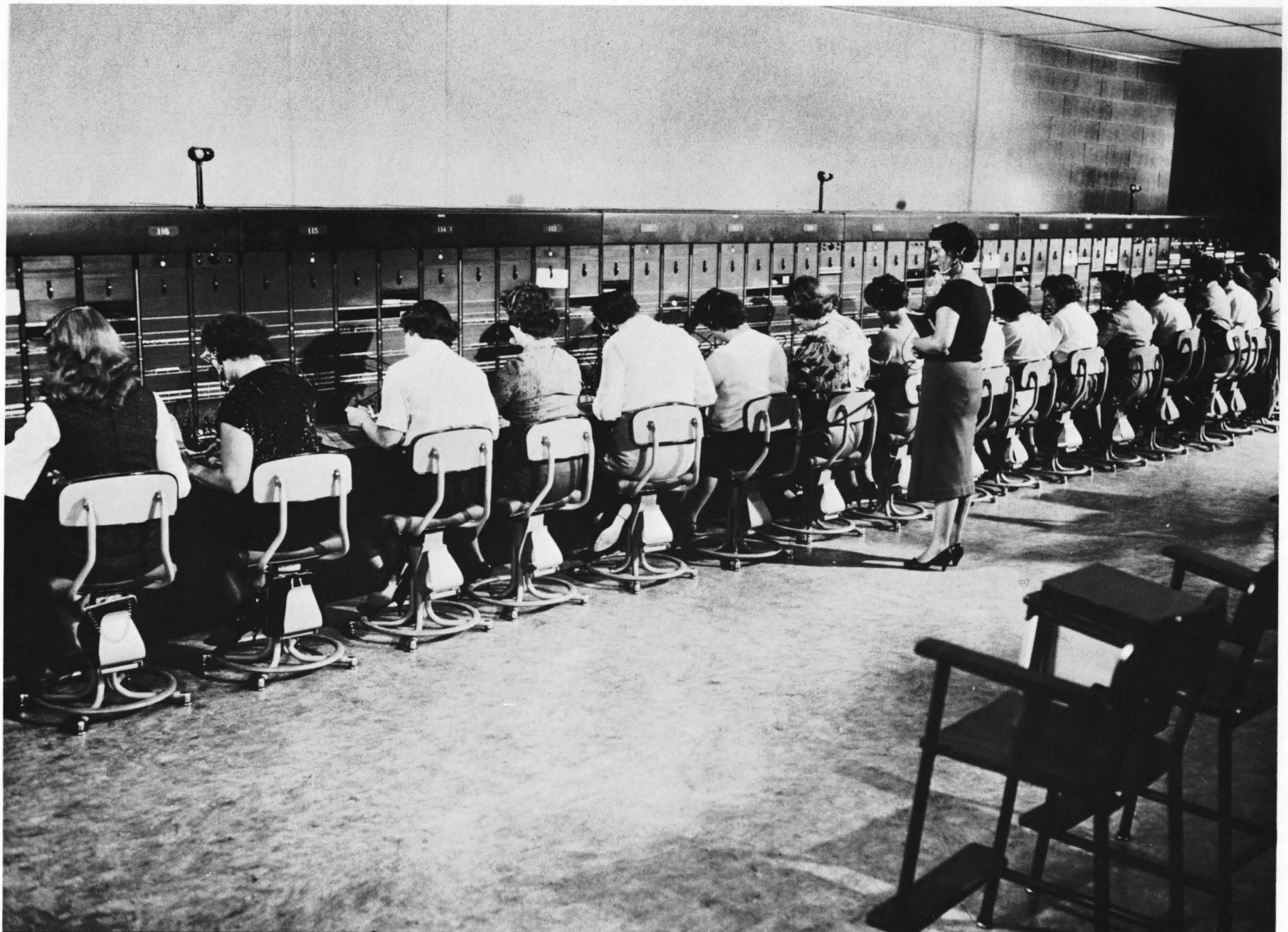


Slide 7

Toll calls - operators and speed of service . . .

Up To 1926	With Local Dialing	With Operator Toll Dialing	With Station DDD
Local A Operator			
Toll Recording Messenger			
Toll Outward	Toll Outward	Toll Outward	
Toll Through	Toll Through		
Toll Inward	Toll Inward		
Local B Operator			
7 Operators 10 Minutes	3 Operators 2.5 Minutes	1 Operator 70 Seconds	No Operator 20 Seconds

Slide 8



Slide 9

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Slide 10

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Slide 11



Slide 12

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Slide 13

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ATT_Evolution_of_the_Switchboard_1965_p22

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