

PROGRESS REPORT NO. 3  
AUGUST 15, 1928

PROGRESS REPORT  
ON AN INVESTIGATION OF REST PERIODS, WORK-  
ING CONDITIONS, AND INDUSTRIAL EFFICIENCY

EXPLANATION

This report has been compiled from data which represent the progressive steps of the study, and will be supplemented as occasions warrant.

The intention has been to place in the first five sections only that material which is of a descriptive nature, and which it will be unnecessary to change.

As the study progresses, those sections which are composed of material of a changeable nature, such as Sections Nos. VI, VII, VIII, IX, and X will be revised and brought down to date until the conclusion of the study has been reached and a final report can be issued.

**DONT DISCLOSE IDENTITIES**

From the beginning of these studies, the identities of the persons under study have been kept confidential. We look to you to carry on this trust. Please guard the privacy of the persons involved by substituting fictitious names, or code symbols for real names.

CHANGES AND NEW MATERIAL IN THIS ISSUE OF THE REPORT, JUNE 30, 1928.

Through a special arrangement with the Massachusetts Institute of Technology, Dr. Clair E. Turner, Professor of Biology and Public Health, is now participating in the evaluation and direction of this experiment. He is being assisted at Technology in the statistical analyses of data by George G. Morrill, S.B., a graduate in Biology and Public Health from Technology in 1927.

In order to save the time of the reader new material and changes in this report are indicated by stars in the right-hand margin of pages.

New sections have been added as follows:

- V. D. Physical and Mental Health Status
  - 1. Questionnaire of May 8
  - 2. Questionnaire of May 10
  - 3. Special Case History - [REDACTED]
  - 4. Blood Pressure Readings [REDACTED]
- VI. (1) G. Combination Lunch, Rest, and 4:00 o'clock Stop Feature
- H. Combination Lunch, Rest, and 5:00 o'clock Stop Feature
- I. Reliability of Data Showing Increased Output
- (2) Rest Pauses in Relay Assembly Department
- (3) Rest Pauses in Tapping Department
- VII. B. Uniformity of Performance (new data)
- F. Production in Terms of Maximum Speed
- G. Average Daily Output by Days of Week
- VIII. Observations and Conclusions (revised)
- X. Factors Affecting Output but External to the Changing Conditions of the Experiment.
  - A. Seasonal Variation
  - B. Vacations and Practice Effect

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AN INVESTIGATION OF REST PERIODS, WORKING CONDITIONS,  
AND INDUSTRIAL EFFICIENCY

SEC. I.

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PROGRESS REPORT  
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WESTERN ELECTRIC COMPANY  
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SECTION I.

OBJECT OF THE TEST

A. PURPOSE

The object of the test to be described in this paper is to determine what effect rest periods and various hours of work will have in increasing the efficiency of an operator.

Studies made in the past regarding methods to improve working conditions, the establishment of piece rates, and reduction in the cost of manufacture, have shown large variations in outputs over different periods of the day.

Tests are being conducted to determine an answer to such questions as the following:

1. Why does output drop in the afternoon?
2. Do operators actually get tired out?
3. Desirability of establishing rest periods.
4. Changes in equipment.
5. What is the attitude of the operators?
6. Effects of a shorter working day on output.

B. PROCEDURE

In order to investigate these conditions it is proposed to select and segregate certain groups of operators for study. The initial group is composed of girls working on relay assembly. They have been placed in a separate room and are indirectly supervised by one of their number who is considered an "expert" and whose capacity is that of "layout operator."

Each phase of the study has been taken up in separate sections in the following pages.

SECTION II  
BEGINNING OF TEST AND ESTABLISHMENT  
OF TEST ROOM

SEC. II

- A. Location of Test Room and Reasons for Selection.
- B. Equipment of Test Room and Design of Equipment.
- C. Test Conditions Differ from Regular Work Conditions.

The test began on April 25, 1927. The relay assembly job was selected as the one on which the initial study would be conducted, as it represents a high degree of repetitive work. Five operators experienced on this work were chosen, together with a sixth to act as a layout operator. This group was permitted to remain in the regular department from the beginning of the test, April 25, 1927, and until May 10, 1927, at which time the Test Room was equipped and in readiness.

A. Location of Test Room and Reasons for Selection

The Test Room is located in the southeast corner of Building 47-5, and was formed by inclosing two sides with temporary board partitions. In selecting this location it was felt that better ventilation could be had since the room was equipped with fans, and because it would not be exposed to the afternoon sun during the summer months. The lighting effect in the Test Room is approximately equivalent to the light in the Relay Assembly Department, except that the distribution is more uniform. This is made possible by the use of lighting fixtures used in a former Illumination Study which were left in this room.

The location was also chosen as it afforded a better opportunity for segregation because the operators would not come in constant and direct contact with the main group, thereby reducing the possibilities of the test group keeping familiar with the activity of the main group, and thus reducing the tendency of similarity of performance.

B. Equipment of Test Room and Design of Equipment

A regular assembly bench of sufficient length to accomodate five positions and include space for the layout operator was installed. Each of the five assembly positions was connected to a recording device so that each time an operator finishes an assembly or completes a cycle, it is automatically registered by an electrical recorder perforating a hole in a moving tape. The perforating mechanism is selective and each operator's respective position is therefore positive, as the operators occupy the same bench position at all times.

In addition to the assembly bench there are three other small benches upon two of which the recording apparatus is mounted, and the third serves as a stock bench for piece parts. A table, file cabinet, and drafting table comprise the rest of the equipment with the exception of the recording devices which are described in the following paragraphs. A comprehensive view of the Test Room is shown in Photographs No. 155739 and No. 155740, forming a part of this chapter.

A hole has been cut in the bench to the right of each operator's position sufficiently large to accommodate the passage of a relay. When the relay is dropped through this hole it passes into a chute mounted at a 45° angle to the bench, passing by and operating a "flapper" gate or switch and on out into the receptacle. The gate is attached to an axis which extends through the side of the chute. A cam is attached to that portion of the axis extending beyond the chute and this cam when operated engages contact springs, thereby closing a circuit and operating the recording perforator which punches a hole in the tape traveling across the mechanism.

The perforating recorder proper consists of a perforator for the printing telegraph modified to meet the conditions of the test in that the circuit from each operator's position is connected to a respective coil in the perforator which operates the recording punch associated with that position. A view of this apparatus is shown in Photograph No. 149583.

The travel of the tape through the perforating recorder is accomplished by means of a 110-V A.C. motor of a 1/6 H.P. rating, connected through proper gears to friction rollers through which the tape passes. These friction rolls pull the tape through the recording device at a definite speed of 1/4" per minute.

In the circuit of the perforating machine a set of five message registers has been included. These registers correspond to the five rows of perforations in the tape, and are therefore selective for each assembly position. Each register functions when the corresponding coil in the perforating device is actuated, and therefore, provides accumulative totals of relays assembled at the particular assembly position to which the register is connected. The advantage of these registers is that a ready means is provided whereby a direct reading of each operator's output may be had for any period.

An automatic temperature and humidity recorder was used for a period to keep a graphic record of atmospheric conditions; however, operating difficulties minimized the advantages to such an extent that this machine was abandoned in favor of the Hygrodeik from which hourly temperature and humidity readings are made.

C. Test Conditions Differ from Regular Work Conditions

The equipment for the assembly of the relays is practically the same as in the regular shop. The greatest variance is that a hole has been provided for each operator into which the finished work is deposited, instead of having to replace it in the compartment boxes from which the coils have been taken.

The conditions surrounding the test are the principal differences. These are the segregation features and the more uniform distribution of day light, as the day light value is much higher since the building in which the test is being conducted is equipped with full sectional width sky lights. Besides these, there is the absence of customary supervision, less interruption due to changing of jobs, visiting, etc. In addition to the material and physical differences, there are the mental or psychological differences which obviously would surround a group of people selected for such a test.

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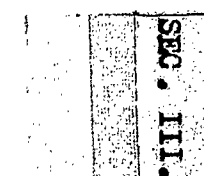
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### SECTION III

#### METHOD OF RECORDING OUTPUT DATA

- A. Reading of Message Register Record and Perforated Tape.
- B. Records Taken for Average Hourly Outputs.
- C. Pertinent Records.
- D. Uniformity of Performance.



Considerable attention has been given the recording of output, since with adequate and correct records any short periods as well as longer periods, may be selected for separate study.

#### A. Reading of Message Register Record and Perforated Tape

During the course of the study, readings of the message registers are taken at half-hour intervals. The figures are entered upon a form and when not immediately used in plotting curves are filed for future reference.

The perforated tape is being used in obtaining the exact output during the fifteen-minute intervals and this is done by counting the number of perforations. Before the tape or perforations are counted, it is necessary to make an exact division of each fifteen-minute interval. Since, as previously mentioned, the speed of the tape through the perforating machine is  $1/4$ " a minute, it is obvious that a distance of  $3-3/4$ " represents a fifteen-minute interval. The tape is then divided into intervals of  $3-3/4$ ", and the number of perforations in these intervals is counted. This number is an accurate record of the total relays assembled during that period. There is a slight variation in the length of the tape from day to day. This variation, however, is compensated for when the tape is divided into intervals.

In counting the number of perforations in each fifteen-minute section, care is used in determining how close the first or last perforation comes to the sectional markings. In this way it is possible to divide the fractional portions of partially completed cycles, and record the nearer correct number in each interval.

The outputs thus obtained are converted to a common basis. This is necessary as the schedules of the various types assembled are not sufficient to permit continuous performance on any one type, and the operators at times are forced during one day's run to work on more than one type. This sometimes causes a fluctuation in the output as some types require a different length of time to assemble than others.

Daily curves may be plotted on the basis of these outputs over fifteen-minute intervals for each operator. The curves give a picture of the variation in rate of production at any hour of the day and from them it is possible to select the periods of lessened or increased activity on a very definite basis, and to determine at what periods rest pauses should be introduced in order to be most effective. The curves also bring out any improvement in regularity of performance from day to day as various experiments, such as rest pauses, are tried out.

#### B. Records Taken for Average Hourly Outputs

Records of the total daily output of each operator and the corresponding total operating time are kept. The outputs are converted to a common basis and an average hourly output for the day is determined.

Continuous curves are plotted from these data for each operator and a combined curve showing the average performance of the whole group is maintained. These curves show the progress, in so far as average production is concerned, of the individuals and of the group over the periods of the experiments and they also present a ready means of comparing the performance of one period against another.

#### C. Pertinent Records

Other records pertinent to the test and of value as an aid in interpreting results and psychological effects are maintained as follows:

1. The temperature and relative humidity, which are recorded each hour and then averaged, are plotted on the daily average hourly output curve.
2. A complete report of the daily happenings (History Sheets) of the test is made and this records what changes are made; what transpires during the day; operators' remarks; our own observations; and anything that will assist as an explanation when rationalizing the performance curve.
3. A "Log Sheet" is maintained on each operator upon which her starting and finishing time is entered, and the time at which changes from one type to another are made; also all intervals, or non-productive time, such as, personal time out, changes in type, repairs, and anything detracting from the actual production time.
4. An original hospital report, or record of physical examination, is kept. This has been supplemented each time the group is re-examined, which occurs periodically every five or six weeks. In this

record an attempt has been made to classify each operator, giving her a definite place in the list according to her physical fitness, reactionary tendencies, etc.

5. An attempt was made to discover the home and social environs under which each girl lives. A set of questions was prepared and answers were obtained to as many of these as possible. These questions and answers are recorded as Appendix B.

6. Data have been gathered in the attempt to reflect what in the judgment of the operators themselves is the reason why they do better work under Test Room conditions. These data are further discussed under D in Section V. This record, together with the records outlined in paragraphs 4 and 5, is used in determining to what extent the more personal elements influence the individuals' activities and output.

#### D. Uniformity of Performance

In order to determine the effects on uniformity of performance resulting from the various features tried out, a system of obtaining and recording these data has been worked out as follows:

When the tape has been divided into the fifteen-minute intervals, and these intervals counted and recorded, they are changed or corrected to be comparable to the type of relay which had the longest run on the particular day being considered. By doing this, the intervals all become consistent in their relation to each other. The average output on the basis of fifteen-minute intervals is then obtained. This is arbitrarily taken to represent ideal performance, and which obviously would have produced the same total output provided it were actual.

Since it is hardly to be expected that ideal performance can be maintained where the rate of output depends approximately one hundred per cent on the individual's efforts, it was decided to consider a variation of plus or minus one relay from the theoretical average as being representative of ideal performance. This was done, and upon the plotted curves a line representative of the average was drawn. Two other lines were then drawn, one above the average line, to represent the plus-one relay allowance, and one below, to represent the minus-one relay allowance. This arrangement produces a band or field of relatively ideal performance and any points of the curve falling outside of this arbitrarily established field are counted, and an index of the total variation for any operator for any day or division of a day is thus obtained.

A further advantage is gained by this method in that it permits of the extent of the variation to be shown singly, i.e., the total

variation on the plus side of the band or the total variation on the minus side of the band may be seen, as well as the grand total for the day.

The figures representative of this variation are tabulated for each operator daily and are then totaled at the conclusion of a specific feature. The average variation for any particular feature is then obtained from which the value of the feature in terms of uniformity of performance may readily be seen. By this system fluctuations as small as one-tenth of one relay are included in the total, which directly represents the increased or decreased amount of fluctuation in the rate of working.

As an expedient, however, the uniformity of performance curves are plotted direct from the data and the actual plotting of the fifteen-minute interval curves is done only when it is desired to know the trend of the daily production.

## SECTION IV

### METHOD OF PAYMENT

Under regular operating conditions the work which was selected for the test is done by one large gang, the individual members of which share proportionately in the earnings of the gang as a whole. The operators selected for the test were members of this large gang. Under this system individual effort is not always actually recognized or rewarded to the fullest extent; also no definite figures on individual outputs are kept.

For the purpose of the test it was necessary that it be known what each of the assembly operators selected was capable of doing in the way of daily outputs, and it was also desirable that some method of payment should be introduced which would pay each one in direct proportion to her efforts while on test. It was felt that, unless the latter were done, the operators would not respond with the fullest cooperation that would be essential to a test of this nature.

Also, it was necessary that the operators should feel assured that they would not suffer financially in any way as a result of their participation in the test. They were told, then, that a method of payment would be introduced after the test was well under way, which would assure them earnings equal to what they had been getting in the past, with the possibility that these earnings would actually be increased should their outputs obtained in the Test Room increase over those obtained in the regular gang.

For two weeks previous to the start of the test, accurate records were kept of the individual outputs of the operators while working under the normal conditions of operation in the regular department. These records gave a picture for use as a basis of comparison with later results and also made it possible to establish piece rates for use in the Test Room.

The average earnings of the operators used in the test were computed by totaling the hourly piece work earnings for March, April, and May, 1927, as shown on their respective attendance records. During this period the operators averaged \$.553 an hour or 64.66% earnings over their average hourly day rate. These average hourly earnings were increased 23.8% as an allowance to cover the rate of the layout operator who participates in the earnings but who has no direct output. This allowance brought the average hourly rate which must be earned by each assembly operator up to \$.686. Thus, piece rates figured to return earnings of \$.686 an hour on the basis of average outputs would permit all the operators in the gang to make earnings of 64.66% over their hourly day rate.

The total outputs of each type of relay assembled during the two weeks previous to the start of the test were reduced to an average hourly basis which, when divided into \$.686, gave a piece rate to be used for that particular type in the Test Room.

It should be mentioned here that the types assembled just previous to the start of the test were the ones selected to be run in the Test Room so far as possible.

The rates figured as above were checked by applying them against the outputs obtained for the two weeks previous to the test, and the results showed that the earnings returned would be on the basis desired. This was done to prove the adequacy of the proposed rates before putting them into effect.

After the start of the test, the operators worked for five weeks in the Test Room under exactly the same conditions as those in effect in the regular gang. They used the same piece rates as were in effect and shared in the earnings of the whole group as formerly. This was done to enable them to become thoroughly familiar with the new conditions and surroundings before introducing any changes whatever.

At the end of the five-week period, the new piece rates were introduced and the Test Room group was separated into a special gang to be paid on the basis of earnings obtained from the piece rates effective for the Test Room work only. This was done in order that the entire earnings resulting from their efforts would be returned directly to them and not distributed over a large number of people. By these means we were able to easily convince the operators that any gains in output would be returned entirely to them and we were thus reasonably assured of their full cooperation.

## SECTION V

### PHYSICAL EXAMINATIONS AND HEALTH STATUS

- A. Introduction
- B. Physical condition of operators
- C. Home and social environs
- D. Physical and mental health status
  - 1. Questionnaire of May 8
  - 2. Questionnaire of May 10
  - 3. Special case history
  - 4. Blood pressure readings

#### A. Introduction

It is universally considered that, when an individual's physical condition is impaired, that person is unfit to render satisfactory or efficient service. The operators selected were, therefore, given a physical examination at the beginning of the test and reexamined at intervals of about six weeks to detect the presence of any condition of a detrimental nature that might be developing.

The home conditions under which a person lives, and his social environs, contribute to such an extent to the individual's efficiency, that attempts were made to discover these conditions in so far as possible, and to apply the knowledge thus gained when analyzing the daily performance curves of the test operators.

#### B. Physical Condition of Operators at First and at Last Examination

Physical examination data are given in Appendix A. The physical rating given the girls before beginning the test was of a certain value and was intended to establish their fitness to participate in the test. It is also used as a gauge or standard when making the reexaminations to determine what physical advantages or disadvantages, if any, the test is having on the operators.

The original examination for the test was made during the early part of May, 1927. The first reexamination was made on May 24, 1927, and it was found that the general condition of the girls was improved and in two or three cases (those of Operator Nos. 1, 2, and 6) a noteworthy improvement was found and the girls had gained weight as well. This improvement in the general health and gain in weight of the operators is felt to be due in part to a more contented state of mind due to the realization of their having been chosen, the experiencing of something new, the anticipation of impending and continued changes, etc. These factors are important considerations in our attempt to determine the essential features required to overcome monotony and to establish

the relationship existing between monotony and efficient performance. The physical examinations have, naturally, called the attention of the operators to their health, and some improvement in health practices may have resulted, although the need for such improvement has never been stressed.

Aside from the necessary information which was needed in connection with the study, the operators were given the added advantage of having this medical advice without cost to themselves. The examinations were presented to the girls as something they were fortunate in being able to get, as so complete and frequent an examination would cost them a considerable amount of money and time.

The reactions from the first examination were not altogether favorable, as each girl had an independent reason and complained of not wanting to go through with it again. Some of the objections raised were: "I hope it doesn't occur too often," and "That's all the bunk, those doctors don't understand you." These and similar expressions made it evident that a feeling existed which was antagonistic and which would react unfavorably in the test.

To afford an opportunity for analyzing and to overcome this feeling, it was decided that when the girls were finished with their next examination they would be assembled in Mr. Hallett's office so that expressions of opinions could be had of the proceeding. This would also tend to create a more friendly and cooperative spirit between the hospital people and the girls. At this gathering there were present, besides the operators, Messrs. Hallett and Kraft, the examining doctor, and an observer of the study group. During the meeting or "get together" one of the operators called it a "party" and made remarks about serving ice cream. One girl said she would "bake a cake" and Mr. Hallett suggested that he (Mr. Hallett) serve "tea."

It was decided to continue these meetings and incorporate the idea of refreshments. Arrangements were made to serve the ice cream at the subsequent examination. When the next examination was held, one of the operators baked a cake, which, together with the ice cream, gave the "party" effect. This served to break down the opposition which had existed and a pronounced increase in cooperation was evident.

The extent to which a more favorable reaction was created by the "party" was evidenced in the offer of a second operator to "bake a cake or make cookies" for the next party. This offer came from a girl who had previously raised the loudest objections to the examination and it was, therefore, of particular significance.

The original intention was to have the examinations every three weeks. This was seen to be too frequent and the interval between examinations has been from five to six weeks. Whenever conditions at the hospital and in the Test Room permit, the examinations are to be made every six weeks.



### C. Home and Social Environs

In attempting to gain an insight into the home and social environs, we were animated by the belief that the influence exerted by these was of importance also. Thirteen questions, covering as much of the field as possible, were used in obtaining this information.

This list of questions follows and it will be seen that the intention was to include those questions which could be used to assist in determining the extent of the psychological and mental pressure surrounding the operator outside of working hours; also the fatigue-producing activities.

1. What responsibility rests on each girl at home?
2. Do they contribute their entire earnings to the family budget?
3. If not, approximately how much do they have for themselves?
4. Any domestic scruples at home which might react unfavorably?
5. What routine duties around the house are theirs?
6. If any, on which days do they perform them (anything of a strenuous nature - sweeping, washing, scrubbing, etc.)?
7. How is time usually occupied between supper and bed time?
8. Have they their own rooms or do they sleep in a room with someone else?
9. Are their bedrooms removed from any distracting street noises which might affect the subconscious?
10. Have they gained or lost weight since being on test?
11. What are they most interested in doing outside of work?
12. Are their parents exacting in discipline?
13. If given three wishes what would they be?

The completed questionnaire will be found in Appendix B.

### D. Physical and Mental Health Status

#### (1) Questionnaire of May 8, 1928

In the search for information regarding changes in physical condition and mental attitude the following questions were asked the six operators individually on May 8, 1928:

1. In general health do you feel the same \_\_\_\_\_,  
better \_\_\_\_\_, or worse \_\_\_\_\_?
2. How about the amount of vegetables you eat?

3. How about the amount of fruit you now eat?
4. Do you drink the same amount of water?
5. Do you drink the same amount of milk?
6. Do you sleep the same number of hours?
7. Have there been any changes in the way you spend your evenings? If so, what?
8. What do you think has made it possible for you to increase your earnings since you have been on the test?

The completed questionnaire will be found in Appendix C. It will be seen that there have been no general changes in the health practices.

In answer to question 8, all operators indicate an improved mental attitude due to the greater freedom, the absence of bosses, more personal attention, the opportunity to set one's pace, and the opportunity to "get what one makes" without being held back by the big gang, as factors in making possible an increased output.

#### (2) Questionnaire of May 10, 1928

A more extensive set of questions was used on May 10 to secure further information concerning the attitude of the operators toward working conditions. This completed questionnaire will be found in Appendix D. It brings out further evidence of important improvement in mental attitude under Test Room conditions.

Further comment upon the significance of these facts will be found at the end of Section VII, "Observations and Conclusions."

#### (3) A Special Case History

The case of #7 is of interest. It will be recalled that it was found necessary to take her off the test in December, 1927, as her attitude toward the test had apparently changed from one of cooperation to an antagonistic attitude. Questioning by Mr. Hibarger and again by Mr. Pennock failed to disclose the reason for this change.

When Professor Mayo was here in April this case was discussed with him and upon looking over her physical examination records he noticed that her blood condition was considerably below average. Her red corpuscle count was 3,890,000, and hemoglobin, 69%. Dr. Mayo felt that this anemic condition might easily account for her apparent change in mental attitude.

Mr. Pennock had a talk with her outlining what we had found and she readily agreed to a check-up on her physical condition and to try a liver diet if it should be found advisable. An examination on May 4, 1928, showed as follows: red corpuscle count, 3,640,000 - hemoglobin, 72%.

She started taking an extract of liver on May 9 and an examination on May 28 showed blood count, 4,440,000 - hemoglobin, 82%.

The figures as of June 25, 1928, are: blood count 4,860,000 - hemoglobin, 83%.

She is going on a two-week vacation starting July 2 and will be on a farm in Wisconsin. She has been given sufficient extract to last the two weeks, after which it is planned to discontinue the treatment and check up each month for some time. [REDACTED] says she now has a good appetite whereas previous to the treatment she had almost no appetite. She now feels ambitious to do something when she gets home at night.

Mr. Pennock had a talk with her on June 27 and the following facts were disclosed:

Her weight record since May, 1927, when she started on the test, is as follows:

May, 1927	-	102 lbs.
Sept. "	-	101½ "
Dec. "	-	104 "
May, 1928	-	101½ "
June "	-	104 "

She stated that during October or November of last year she noticed a decided loss of pep. She couldn't get started at anything and had no ambition to do anything when she got home at night. When her output began to slump the other girls razed her about it and this irritated her and led her to make the remarks she did.

She said she never had the idea that the test was not being run solely to determine the best working conditions although she did hear comments from girls in the regular department that what the Company was really after was the maximum output.

It seems very probable that we now have the real story of the case, viz., that her physical condition accounted for the slump in output and that the remarks of the other operators goaded her into making the remarks she did relative to not hurting herself working, et cetera.

(4) Blood Pressure Readings

During the last few months Dr. Elton Mayo of the Graduate School of Business Administration at Harvard University has made a series of blood pressure readings from operators in different industries in the attempt to work out a method which would determine changes in working capacity among individuals and in the same individuals at different times during the day. Through special arrangements Dr. Mayo and two assistants came to the Hawthorne Plant of the Western Electric Company on April 25 and 26 where they took blood pressure readings from the girls in the Test Room and from three operators outside in the Coil Winding Room.

It is generally recognized that efficiency of the vascular system is important. There are various expressions of the vascular efficiency. In the test used by Dr. Mayo the maximum pressure (systolic) and the pressure during the rest-phase of the heart (diastolic) are taken. The difference between these two readings is the "pulse pressure." Another figure, the "pulse product," is obtained by multiplying the pulse pressure by the pulse rate. This figure is believed to give a fair quantitative indication of changes in volume of blood supply. The fatigue laboratory in which Dr. Mayo is at work has observed that high production occurs when the worker is able to achieve organic equilibrium under the condition of higher metabolic rate demanded by the industrial process which he is carrying on. It is expected, therefore, that (a) relatively low index and (b) steady index figure indicate satisfactory and desirable organic status. It may be expected also that these conditions will be correlated with high output.

The charts for individual operators show rather wide fluctuations at different periods of the day. These fluctuations are in part due to excitement, to eating, and (in one case) to running back from the Lunch Room to the Test Room. The index of blood pressure does not maintain any constant relationship to the fluctuation of output at different times during the day. The average of the blood pressure index, since it is made from a series of varying individual fluctuations, tends to flatten out.

Two individual record charts are included here; that of #2 for April 25 shows a highly desirable organic equilibrium; that of #9 for April 26 shows the unsatisfactory condition of a high and unsteady index. Further study of the physical condition of [redacted] was suggested but she was obliged to stay at home because of illness a few days after these blood pressure readings were made and she did not return to employment.

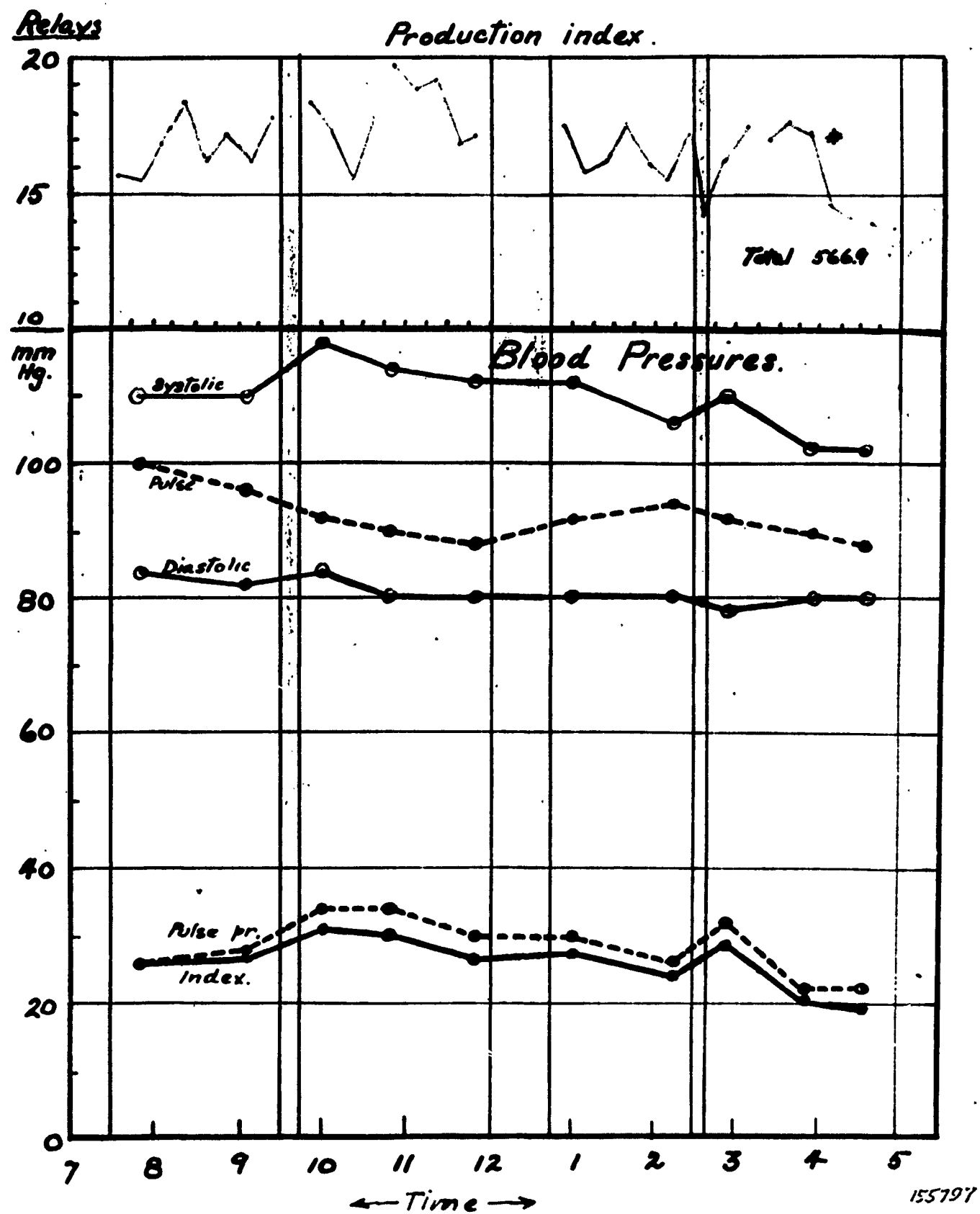
A third chart is included here showing "average heights of index" for the groups of operators mentioned above and for workers in other industries which have been studied by Dr. Mayo. Dr. Mayo says in his report: "This diagram will enable you to compare the (organic) conditions in your Test Room with conditions we have found elsewhere. The measurements were made on men at the American Pulley Company (2), and the Continental Mills (4). The other measurements are all of girls. In the laboratory it has been decided that the most abnormal position for a human is continuously standing still. It is interesting to observe that the job which shows up as worst in this list (1) is one which involves hours of continuous standing with little movement - the two rest periods are not enough . . . . . The girls in your Test Room show a better index and a better diurnal variation than we have known elsewhere. The fact that you have obtained this with increased production, better health, and an improved mental attitude should make the experiment that you are conducting of high value to industry."

Dr. Mayo feels that further studies in this field are necessary in order to determine the exact significance and reliability of blood pressure indices. The value of some index of organic equilibrium under the stress of working conditions is unquestioned and it would seem well worth while to provide further opportunity for a similar set of readings from our Test Room operators at a later date when working conditions may be different or when rest periods are absent.

#2.

Apr. 25, 1928.

Age 21. Ht. 5' 2". Wt. 106 lbs.

Operation: Assembling electrical machinery (relays).  
Position: Sitting.

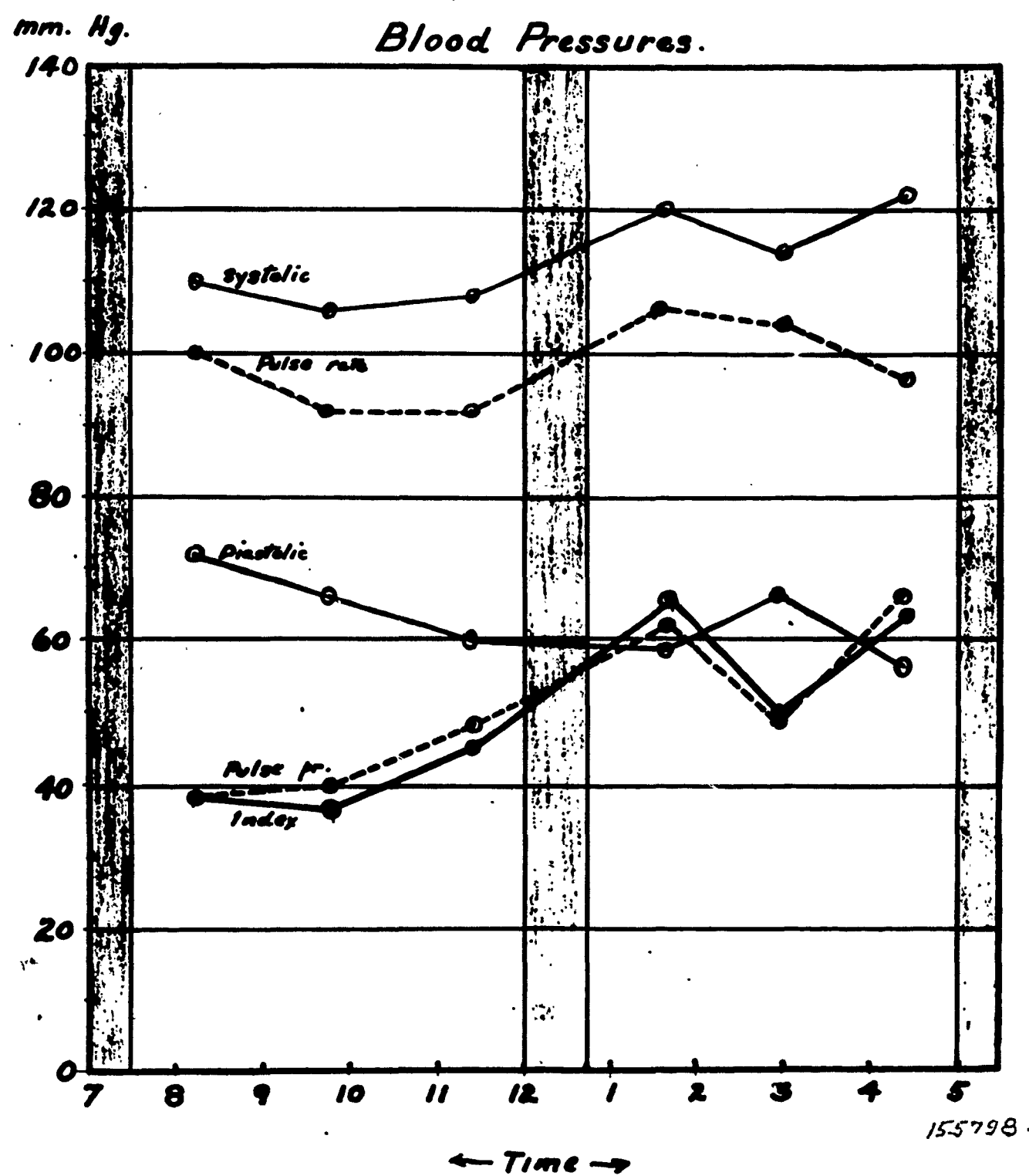
\* Interruptions occurred from 10:00 to 10:15 due to machine trouble

155797

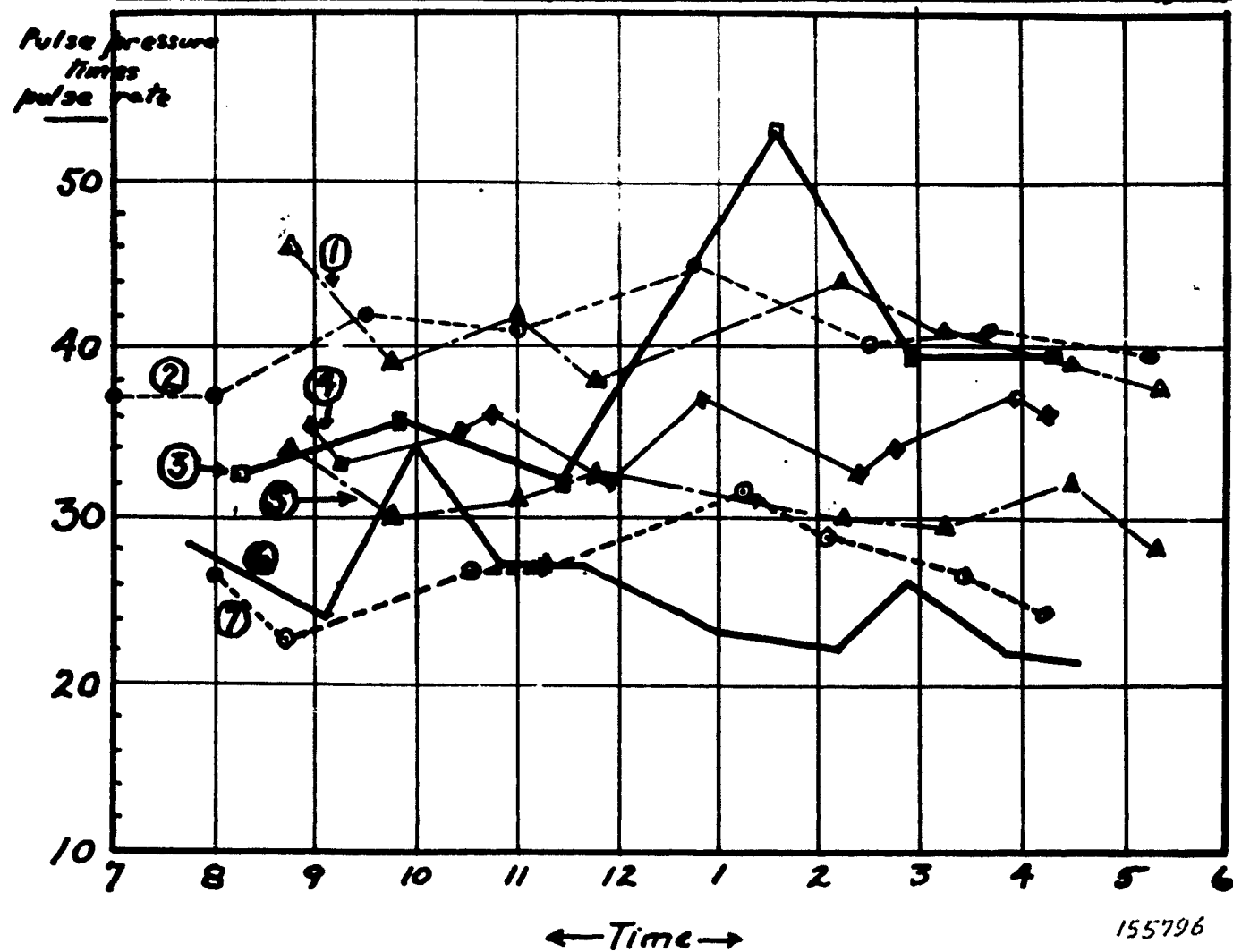
#12.

April 26, 1928.

Operation: Core winding.  
Position: Sitting.



Average Heights of Index			subjects	Avg.	No.
Company	Job	Position	Rules, per point.	figure.	below.
Wm. Carter Co.	Inspecting and folding underwear	Standing. Two 10 min rest periods	4/6	40.75	1
American Pulley Co.	Machine shop.	Standing. No rest per.	9/9	40.30	2
Continental Mills	Mule Spinning	Walking Four 10 min. rest periods.	6/6	34.80	4
Western Electric	Core winding	Sitting No rest periods	3/3	38.78	3
Wm. Carter Co.	Running power sewing-machines	Sitting Two 10 min rest periods	3/6	30.94	5
Western Electric	Relay assembly. (Test room April 25, 1928)	Sitting. One 15 min. rest period. One 10 min. rest period.	5/5	26.74	6
Western Electric	Same April 26, 1928	Same	5/5	25.54	7





## SECTION VI

### (1) REST PAUSES IN TEST ROOM

- A. Introduction
- B. Five-Minute Rest Pauses
- C. Ten-Minute Rest Pauses
- D. Three Five-Minute Rest Pauses
- E. Combination Lunch and Rest  
Pauses
- F. Combination Lunch, Rest, and  
4:30 o'clock Stop
- G. Combination Lunch, Rest, and  
4:00 o'clock Stop
- H. Combination Lunch, Rest, and  
5:00 o'clock Stop
- I. Reliability of Data Showing  
Increased Output

### (2) REST PAUSES IN RELAY ASSEMBLY DEPARTMENT

### (3) REST PAUSES IN TAPPING DEPARTMENT

#### (1) A. Introduction

It is a commonly accepted opinion that long spells of repetitive work tend to produce monotony, which is accompanied by mental fatigue and to a somewhat lesser degree, physical fatigue as well. Studies which have been made of monotony in repetitive work have usually succeeded in reducing this element by the introduction of rest pauses.

Obviously, no better relief measures are necessary since rest pauses of the correct duration, and when interposed at the proper time, have a threefold advantage, offering as they do a "novelty" feature; reduction in the length of the work period; and permitting a partial recuperation of expended energy. Because of this, it was decided to introduce rest pauses as the first and principal factor when making this study.

Between the beginning of the study on April 26, 1927, and the first rest period on August 8, 1927, a lapse of fifteen weeks occurred. This time was divided into two periods, one of which was used in permitting the operators to become familiar with their environs, and the other in working with the new special gang rates as covered in Section IV. These are the rates computed for the test and are the ones to be used during the remainder of the time. These two intervals are considered as secondary to the prime factors of the study (No Rest Periods).

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vs. Rest Periods), but are being considered in relation to the combined features tried thus far as a matter of comparison.

When establishing the rest pauses it was necessary to consider the time at which they were to be interposed, as well as the duration. To do this, curves of the daily production for ten days were plotted. These curves were plotted from production data taken throughout a ten-day period previous to the beginning of the rest periods and were on the basis of fifteen-minute intervals. The high and low periods of the day were shown and from these the time at which the rest pauses would apparently be the most effective were selected.

The opinions of the operators were also considered as to when they would prefer to have the "rest" and from this combined information 10:00 o'clock in the morning and 2:00 o'clock in the afternoon were fixed as the proper periods. These fixed periods for rest were used when the five and ten-minute periods were being tried, but were not used during the third rest feature (three five-minute periods) as will be described under that title.

The length of the pauses was arbitrarily set at five minutes for the first experiment and ten minutes for the second, which represents 2% and 4% respectively of the total operating time. The principal factor in the rest pauses, of course, is the determination of the maximum length of time to be so consumed, which in turn will be decided by the most efficient performance as reflected in the production data, "Efficiency," here applying to uniformity of performance as well as to increased activity. To do this it was decided to begin with the minimum length of time and then increase, rather than start with a longer pause, which it was felt might present a mental handicap to the operators.

#### B. Five Minute Rest Pauses

The five-minute rests were begun on August 8, and continued until September 10, 1927, a period of five weeks. The advances made during this time may best be seen by a comparison of each operator's output prior to the rest pauses. The figures representing the gains are shown in Table No. 1, Section VII.

During the different rest-pause plans which have been tried, the operators have always been permitted to leave the room, and in fact encouraged to do so. It was felt that a more marked break in the monotony would be realized by this practice and the girls have always appeared eager to take advantage of the pause. During the last few days of the five-minute pauses more of the period was actually being spent outside of the Test Room than during the first days of this feature.

As the operators became more accustomed to the pause, they began to express a desire for longer periods since they had proved to their own satisfaction that their earnings were not falling off even when the "personal time off" was added to the compulsory pause. Expressions were made by them, such as, "You don't feel so tired when you get home," - and "It's better now with the rests, you feel fine when you start in again." During one of the pauses Operator No. 4 said, "Make it ten minutes this time."

When the time for extending the pauses was near, the operators were all questioned concerning their feeling about a ten-minute pause. The answers to this follow:

Operator No. 1	- "I would like ten minutes."
"	2 - "I would like ten minutes too."
"	3 - "Oh! Ten or fifteen minutes is all right."
"	4 - "Say! Fifteen minutes would be swell."
"	5 - On vacation when others were interrogated.

Other advantages are gained by the "rests" as the operators claim these give them a chance to "wake up" following late hours the previous night, or a too-heavy meal at noon time.

#### C. Ten-Minute Rest Pauses

The increase from the five-minute to the ten-minute rest pause was made after a five-weeks' trial of the former. The increase in efficiency during the first experiment was a favorable indication that rests would not be detrimental to the operators so far as their earnings were concerned, but, quite to the contrary, would be beneficial. This was pointed out to them during a meeting which preceded the change from the five to the ten-minute rest.

They were told that the additional time being used in "rests" would not affect their earnings so long as they were able to compensate without any noticeable increase in effort. They were told also that it was the plan to try a rest of fifteen minutes and were requested to express their opinions in this respect; the consensus being that the ten-minute rest would be the better to try, as it had been explained to them that going from the five to the fifteen-minute rests might constitute too great a handicap and that their earnings might, therefore, be jeopardized. The ten-minute rests were, therefore, decided upon with no change in the starting time from that of the five-minute rests.

This experiment was started on September 12, and continued until October 8, 1927, inclusive, a period of four weeks. Of the two experiments tried out, up to this time, the ten-minute rests were the better liked and the operators expressed themselves accordingly. A record of the expressions and opinions of the operators has been kept during the entire study and these are to be

found in a separate section, "Comments of Operators." At this point, however, a few of the more outstanding comments concerning the ten-minute rest pause will no doubt be of value.

On the first day of the ten-minute rest pauses, the operators' increased efficiency returned them an earning of 80.6%, which was the highest since the test had been running. When notified of these increased earnings the girls remarked:

Operator No. 1 - "80.6 per cent! No?"  
 "Hurrah for our side! And on Monday, too!  
 Isn't that nice?"

Operator No. 2 - "Gee, we made 80% yesterday! To-day we ought to make 90%! We all feel better now with the ten-minute rest periods."

They were all in favor of the ten-minute rest, and when asked if it would not be hard to occupy the increased time when fifteen minutes was tried, expressions such as: "It passes fast, it isn't too long," and "I don't think fifteen minutes would be too long," were obtained. However, these expressions were in connection with a single rest pause of fifteen minutes which we contemplate trying as a separate feature some time in the future.

The advance or gains made in efficiency during the ten-minute rests may be seen by referring to Table No. 1, Section VII, "Weekly Average Hourly Output."

#### D. Three Five-Minute Rests

The three five-minute rests were begun on October 10, 1927, and continued until November 5, 1927, a period of four weeks. Before beginning this rest period, the operators were assembled for a conference in order to gain their views of previous experiments and opinions of succeeding ones.

The opinions expressed by them when the relative merits of a fifteen minute rest vs. three five-minute rests were discussed, were that the fifteen-minute rest would be better, and that the three five-minute rests would be too short and would cause too much "breaking up" of the work. It was decided, however, to introduce the three five-minute rest pauses at this time, inasmuch as the next experiment to be tried (the lunch period) would necessarily require a fifteen-minute pause to be adequate. In the three five-minute rest pauses the uniformity of performance showed improvement and only a slight decrease resulted in the average hourly output when compared to the ten-minute rest, although the operators' reactions and impressions were unfavorable to this experiment.

Assuming that the results of the test group may be taken as an indication of the reaction of an entire department's personnel, the three five-minute rest periods may be considered highly effective. This conclusion was reached when it was seen that the least favorably accepted rest pause resulted in a uniformity of performance which is third in the list in order of "Efficiency" as shown in Table No. 2-B, Section VII. Besides this there was only a slight decrease in the average hourly output when compared to the better-liked rest pause of ten minutes as shown in Table No. 1, Section VII.

Table No. 2 in Section VII, shows the morning and afternoon daily average variation of uniformity as well as the total average daily variation for each operator by the successive stops in which the different rest periods or features were tried.

Emphasis is being placed on this comparison, since the five-minute period, being the first one tried, had more of a "novelty" aspect to the operators than had the one under discussion, and very good results were obtained notwithstanding the adverse opinions of the operators themselves.

#### E. Combination Lunch and Rest Period

The combination lunch and rest period was begun on November 7, 1927. At the time of changing to this feature the operators were again assembled for a short meeting, where an attempt was made to establish a time and a menu that would be acceptable to the group. The period from 9:30 to 9:45 was decided upon, as it came nearer being the half-way point between the time of breakfast and the noon lunch. The afternoon rest pause was set at 2:30 to 2:40, making a total of 25 minutes rest each day.

The mid-morning lunch feature was introduced with the idea of eliminating the early afternoon slump which the production curves indicated was common to all operators. This slump is attributed to a feeling of drowsiness or a dullness of faculties occurring about 2:00 P.M. each day, and this condition in turn is attributed to the heavy lunch indulged in by each operator at noon.

A check made of outside circumstances revealed that the operators, without exception, had very light breakfasts, usually taken at an early hour, and not sufficient to break the fast from the evening meal of one day to the noon lunch of the following day. The result was that they required heavy lunches to compensate. It was felt that a lunch introduced during the morning would have the effect of lightening the lunches eaten at noon, and this would tend to eliminate or at least reduce the drowsy feeling at 2:00 o'clock and at the same time afford the needed stimulant to overcome the mid-morning slump.

A record was made of the lunches eaten for a short period some time before the beginning of the morning lunch experiment. This record covered the week ending August 13, 1927, a hot month, when in general, the intake of food is less than during the winter months. The Medical Department were consulted as to what foods and combinations would be most beneficial to serve as lunches and they recommended a variety from which the daily lunch menus are arranged.

The lunches eaten by the operators at noon previous to the introduction of the lunch experiment, as well as those eaten at noon after the morning lunch was instituted, are listed in Appendix E. The menus furnished for the first two weeks at the 9:30 lunch period are shown as examples. These lunches supplied by the Works Restaurant, are served to the operators at their bench positions. The service to the operators is efficient and thorough, and has a flattering effect. A good impression is thus produced.

The results of this phase of the study may be seen in Table Nos. 1 and 2-B of Section VII, and are represented by the data compiled over a period of eleven weeks, which is the length of time this feature was permitted to run.

#### F. Combination Lunch, Rest and 4:30 Stop

On Monday, January 23, 1928, a subsequent phase of the study was begun. This phase of the investigation was for the purpose of obtaining data covering what effects a shortened working day would have on output. It is the same as the preceding phase or feature, except that work stops each day at 4:30 P.M. instead of 5:00 P.M. This is the only difference in the arrangements of the two periods or features. At the beginning of this feature it was found necessary to replace Operators Nos. 1 and 2.

In accordance with past practice the operators were assembled at a meeting previous to changing the feature. At this meeting the expressions and opinions of the girls were obtained as heretofore. In Section IX of this report, the comments of operators are to be found.

When the girls were told that the half-hour off would be in addition to their present twenty-five minutes rest, expressions such as the following were made: "Oh, I didn't know we would still have the rest periods too!" "Won't that be swell!" "We're still going to have lunches. Gee! that's nice!" - etc. The girls have expressed themselves as being extremely pleased with this feature, and when directly questioned concerning their reasons for favoring going home at 4:30 the majority of opinions centered around a feeling of favoritism being shown them, which permitted an escape from the crowded and congested traffic conditions encountered at regular stopping time. Other advantages were mentioned and were to the

effect that the extra half-hour afforded time to engage in things they liked to do such as, helping around the home in preparing supper, and in going to the store for their mothers, etc., all of which each girl claimed she enjoyed doing.

The favorable acceptance by the entire group of the additional one-half hour is of particular significance. By this it is meant that the operators, no doubt, have become conscious of a reserve efficiency, or ability, and for this reason feel confident of maintaining as high an earning as previously. Further credence may be attached to this analysis when it is remembered that an objection was raised at the time it was planned to increase the rest periods from five minutes to fifteen minutes, at which time the feeling was that the increase was too great and that it would be better to go from five minutes to ten minutes instead.

This point is being brought out here because it affords some light on two of our major questions as given among the original six questions shown in Section No. 1 of this report, which are: "What is the Attitude of the Operators?" - and "Effects of a Shorter Working Day on Output."

The hesitancy to accept the fifteen-minute rests may have been due to a practice of restricted output, or, it may have been due to an honest fear of lowered earnings. Irrespective of the dominating motives at that time, these influences are absent in the present period, as the girls are making up almost twice the time lost due to rest periods and to going home early. The results of this period in terms of average hourly output are shown in Table No. 1, Section VII.

The total variation in uniformity of performance is less. This is an indication that it is necessary for the girls to concentrate on their work. This is done without a noticeable increase in effort or any appreciable increase in the amount of fatigue as would be evidenced by adverse results.

#### G. Combination Lunch, Rest, and 4:00 o'clock Stop

On Monday, March 12, 1928, the working day was further shortened and the operators finished work at 4:00 P.M. The fifteen-minute rest and lunch period in the morning and ten-minute rest period in the afternoon were continued and the new program provided a day similar to those in the preceding period except that it was further shortened a half-hour in the afternoon. The proposed change was discussed with the operators on Friday, March 9. They were willing to make the change and preferred that the extra half-hour should be taken off the afternoon instead of the morning period.

\*

Their attitude indicated that they had confidence based upon previous experience that they could still maintain a high output with the loss of an additional half-hour.

The data for this period shown in conjunction with the tables and graphs giving comparable data for earlier periods show that the average hourly output was increased by the shorter day but not sufficiently to make up for the extra time off. The average hourly output for this feature is the highest yet obtained but the total output drops off somewhat. The variability of production although low was slightly greater than the variability shown during the combination lunch, rest, and 4:30 p.m. stop. Tables 1, 3, and 3-A, in Section VII, show comparative outputs.

#### H. Combination Lunch, Rest, and 5 o'clock Stop Period

On Monday, April 9, a new feature was started which involved the lunch and rest period of the preceding features (twenty-five minutes daily) but returned to the 5:00 o'clock stop. This feature duplicated feature No. 7.

It will be seen from reference to the charts and tables in Section VII that the rate of production was still on the increase when feature No. 7 was terminated. The hourly output rate has appreciably increased since that time, that is, during the periods of the shortened working day. It seemed advisable, therefore, to return to the 5:00 o'clock stop in order to see what would happen to the hourly output rate and in order that we might continue this feature until production under these conditions reached a level.

This last feature gave us the greatest total output which has yet been achieved. This is true for the group as a whole and for each operator individually. During the first two weeks of this period each operator continued at approximately the same hourly rate as she had been attaining on the basis of the 4:00 o'clock stop, with a consequent increase in output. A drop in the output of the third week was undoubtedly due in part to the interference with working conditions during the two days when Professor Mayo took blood pressure readings. Following this week Operators Nos. 1 and 2 developed a further slump for about one month and gradually returned to a higher output, which, however, never equaled that of the first two weeks. Operators Nos. 3, 4, and 5 were less affected by the interference when blood pressure readings were taken. Operator No. 3 continued to increase her output, reaching the greatest output she has



ever attained on the seventh week of this feature. Operator No. 4 made a gradual increase, reaching her maximum output on the ninth week of this feature. After these maximum outputs both operators fell off somewhat. The output line for Operator No. 5 shows a decline. A part of this decline was due to a change in type of relays and a part may have been due to physical condition. The latter possibility we are now attempting to check.

From the standpoint of total output, better results have been obtained during this period than during any previous feature.

\*

#### I. The Reliability of Data Showing Increased Output

The tables already referred to show the average output for various operators and for the group under different working conditions. The question naturally arises, "Are these outputs reliable or are they accidental?" Two factors determine the reliability of such comparative data. The first is the consistency of the data and the second is the amount of data. In this study, although the number of weeks in each period is not great, the consistency of performance under each of the varying conditions gives a high reliability to the comparative average output.

\*

The following graph shows the average weekly output for the different features of the experiment and the pages immediately following show the computation of the Standard Deviation of the Difference and the Probable Error of the Difference of these averages computed by the usual process. Statisticians regard a difference between two averages as being significant beyond possible doubt when the actual difference is three times the Standard Deviation of the Difference or four times the Probable Error of the Difference. The factors produced by dividing the difference by the standard deviation of the difference and by the probable error of the difference are shown in the last two columns of the right in the table on page VI-12.

\*

The factors show the high reliability of the increased output data obtained. Further computations are now being made upon the average daily output and in comparing the various features with each other in the same way that the output of the "regular department" is compared with the output under various other conditions in the following table. The following pages illustrate the method of computing the standard deviation and probable error, and show the actual standard deviations and probable error of average output for Operators Nos. 3, 4, and 5. The records

\*

of these three operators were used in this computation because these operators had been present throughout the experiment. The following chart shows average weekly output for these three operators (a dotted line) and average weekly output for all five operators (the solid line). These lines so closely parallel each other that the tests or reliability in the following computation will obviously apply to the data for the five operators as well as for Operators Nos. 3, 4, and 5.

PRELIMINARY DETERMINATION OF RELIABILITY OF VARIATIONS IN  
OUTPUT FOR OPERATORS 3, 4, AND 5

## Regular Department Weekly Output

Units	D	D <sup>2</sup>
2374	12	144
2400	38	1444
2374	12	144
2394	32	1024
2294	68	4624
2338	24	576
6 / 14174	6 / 7956	
2362		

$$\sqrt{1326} = 36.4$$

$$\sigma \text{ Dis.} = 36.4$$

$$\sigma \text{ Av.} = 15.90$$

$$\text{P.E. Av.} = 10.72$$

$$\text{P.E.} = 0.674 \sigma \text{ Av.}$$

$$\sigma \text{ Av.} = \frac{\sigma \text{ distribution}}{\sqrt{N}}$$

$$\sigma \text{ Dis.} = \sqrt{\frac{\sum D^2}{N}}$$

## Test Room Weekly Output

Units	D	D <sup>2</sup>
2411	18	324
2525	132	17424
2400	7	49
2097	296	87616
2446	53	2809
2539	146	21316
2592	199	39601
2438	45	2025
2309	84	7056
2397	4	16
2305	88	7744
2440	47	2209
2299	94	8836
2289	104	10816
2404	11	121
15 / 35891	15 / 207962	
2393		

$$\sqrt{13864} = 117.8$$

$$\sigma \text{ Dis.} = 117.8$$

$$\sigma \text{ Av.} = 30.42$$

$$\text{P.E. Av.} = 20.50$$

$$\text{To find the P.E. of the difference: } \text{P.E. diff.} = \sqrt{\text{P.E.}_1^2 + \text{P.E.}_2^2} = \sqrt{10.72^2 + 20.50^2} = 23.15$$

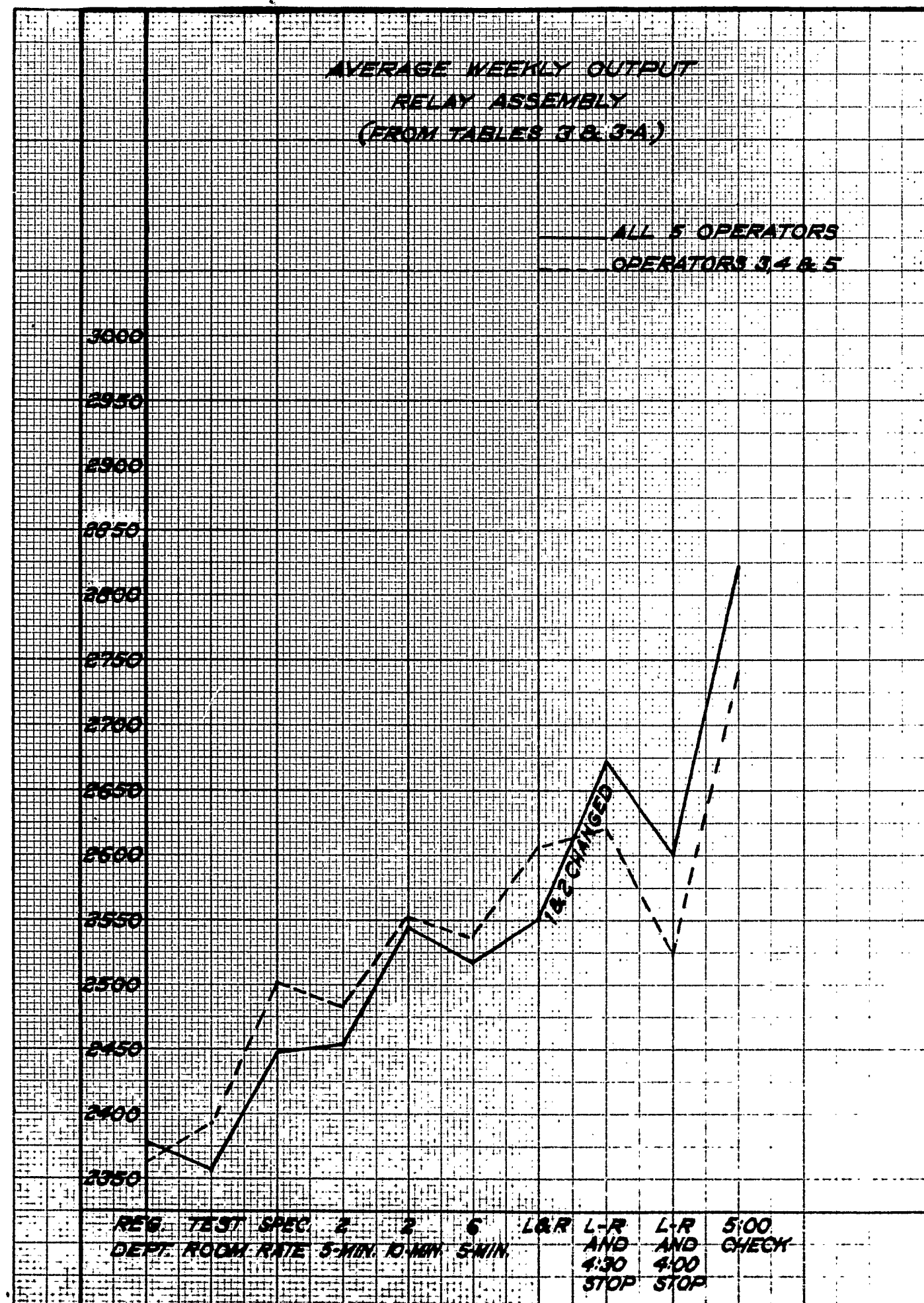
The difference = 31 or 1.34 x P.E. diff. 82 chances in 100 against the observed increase in plus direction.

Since there are only 18 chances in 100 that the difference observed could arise from random causes, it is felt that the difference is due to some change in working conditions of the operators.

$$\text{For testing reliability by means of } \sigma \text{ use formula: } \sigma \text{ diff.} = \sqrt{\sigma_1^2 + \sigma_2^2}$$

## RELIABILITY OF VARIATIONS IN OUTPUT

Period	Average Weekly Output	Standard Dev. of the Av.	P.E. of the Average	Comb.	Diff. of Aver.	$\sigma$ Diff.	P.E. Diff.	$\frac{\text{Diff.}}{\sigma \text{ Diff.}}$	$\frac{\text{Diff.}}{\text{P.E. Diff.}}$
Regular Dept.	2362	15.90	10.72						
Test Room	2393	30.42	20.50	Regular Dept. vs. Test Room	31	34.32	23.13	0.91	1.34
Special Gang	2503	17.39	11.72	Regular Dept. vs. Special Gang	141	23.56	15.89	5.98	8.85
Two 5-Min. Rests	2483	22.55	15.20	Regular Dept. vs. Two 5-Min. R.	121	27.58	18.59	4.40	6.52
Two 10-Min. Rests	2554	26.50	17.86	Regular Dept. vs. Two 10-Min. R.	192	30.92	20.82	6.20	9.21
Six 5-Min. Rests	2537	22.52	15.18	Regular Dept. vs. Six 5-Min. R.	175	27.57	18.58	6.34	9.43
Lunch & Rest	2607	22.70	15.30	Regular Dept. vs. Lunch & Rest	245	27.71	18.67	8.85	13.14
Lunch, Rest & 4:30 S.	2621	27.54	18.56	Regular Dept. vs. L., R., & 4:30 S.	259	31.77	21.42	8.17	12.08
Lunch, Rest & 4:00 S.	2523	25.26	17.03	Regular Dept. vs. L., R., & 4:00 S.	161	31.48	21.21	5.12	7.59



(2) REST PAUSES IN RELAY ASSEMBLY DEPARTMENT

As a further check on the effect of rest periods, the Relay Assembly Department started operating with a fifteen-minute rest period at 9:30 and a ten-minute rest period at 2:30 on February 27, 1928.

\*

No special set-up was made to determine output, and monthly earnings figures are being used. The attached chart (B) does show a noticeable increase in earnings for April and May but no definite conclusions can be drawn from figures covering so short a period. It will be noted, however, that chart (B1), covering all gang piece work operators, shows practically no increase for April and May. The month of May seems to have been a favorable month so far as amount of work on hand and supply of piece parts are concerned. The indications are that June will not be so good.

\*

The operators are, however, all enthusiastic about the rest periods, and almost without exception eat a part of their lunch during the morning period and in many cases some fruit in the afternoon period.

\*

Due to a proposed combination of departments in which the Relay Assembly Department is involved, it has recently been necessary to transfer some operators from this room to a room having no rest periods.

The comments of five operators from the Relay Assembly Department are as follows:

\*

No. 11 - [REDACTED] Misses relaxation period. Likes to take a walk and rest for a little while.

No. 5 - [REDACTED] Does not like it at all since relaxation period has been discontinued. Looks forward to period. Able to talk to the rest of the girls. Likes to have a little lunch and is almost starved by noon. Does not eat breakfast.

\*

No. 125 - [REDACTED] Misses relaxation period very much. It gets very monotonous to work up till noon since the relaxation period has been discontinued. It seems quite different to go to the washroom during working hours. Likes to walk around at leisure and talk to the rest of the girls and feels very tired at the end of the day since they have discontinued the relaxation period.

\*

No. 78 - [REDACTED] \*  
 Since relaxation period. Could do as she liked for  
 ten or fifteen minutes. Likes to get up from chair and  
 walk around.

No. 225 - [REDACTED] \*  
 Would like to have relaxation period back again.  
 Feels more like working after a little walk. Likes to  
 have a bite to eat and talk to the rest of the boys.

Ten girls and two men on relay inspection work were moved  
 after having had rest periods for approximately three months.  
 Their comments are as follows:

No. 880 - [REDACTED] \*  
 "My work is of a close nature and I can rest my  
 eyes during relaxation period. I also notice that I  
 am not so fatigued after working hours."

#No. 846 - [REDACTED] \*  
 "The time of day seems to pass more quickly when  
 we have relaxation time. Also I have been eating fruit  
 during the 9:30 period and this seemed to have a re-  
 freshing effect on me."

No. 847 - [REDACTED] \*  
 "Since discontinuing the relaxation period, I notice  
 a tired feeling coming over me during the day. I am  
 also more fatigued in going home as I stand up in the  
 street car most of the way."

#No. 868 - [REDACTED] \*  
 "The day seems to pass quicker and the work is more  
 interesting because of the relaxation period."

No. 852 - [REDACTED] \*  
 "Since discontinuing the relaxation period it seems  
 as if the time drags along. I think the rest we were  
 getting fitted us better for our work. Also, the first  
 day after discontinuing the rest period I was real tired  
 after 5:00 p.m."

#No. 848 - [REDACTED] \*  
 "I believe I am more efficient in my work when I  
 rest between times. I also notice that after the rest  
 period I can start working at about the same rate of  
 speed as I have when I start work in the morning."

No. 843 - [REDACTED]  
 When relaxation was started I thought the twenty-five\* minutes a day we lost would affect my efficiency. It seems to have worked the other way as my efficiency has increased and I feel better physically."

No. 768 - [REDACTED]  
 During relaxation period the operators eat fruit, \* cake, or a sandwich, and I believe this has a tendency to cut down on the amount of food they eat for breakfast and dinner; consequently they feel better physically, as they are not so sluggish as when they eat heavy meals."

No. 834 - [REDACTED]  
 I think if this period is discontinued we will \* always have a feeling that something has been taken away from us. In my opinion the rest to the eyes and body is well worth the twenty-five minutes a day we are giving up."

No. 755 - [REDACTED]  
 My job is supervising and part time utility work. As it is necessary for me to be on my feet most of the day, the rest period is appreciated very much."

No. 909 - [REDACTED]  
 Since discontinuing the rest period I notice a lazy \* feeling during the afternoon. I think that if the periods are started again we should have ten minutes in the morning and fifteen minutes in the afternoon. This would give us most of the relaxation time when we really need it."

#No. 851 - [REDACTED]  
 Relaxation time makes the day shorter. It also \* rests the eyes and body. Since the period was discontinued I get a tired or fatigued feeling after working hours. As it is now, I cannot eat breakfast as I get a sickly feeling while riding on the street car. The relaxation period allowed me to eat at 9:30 a.m."

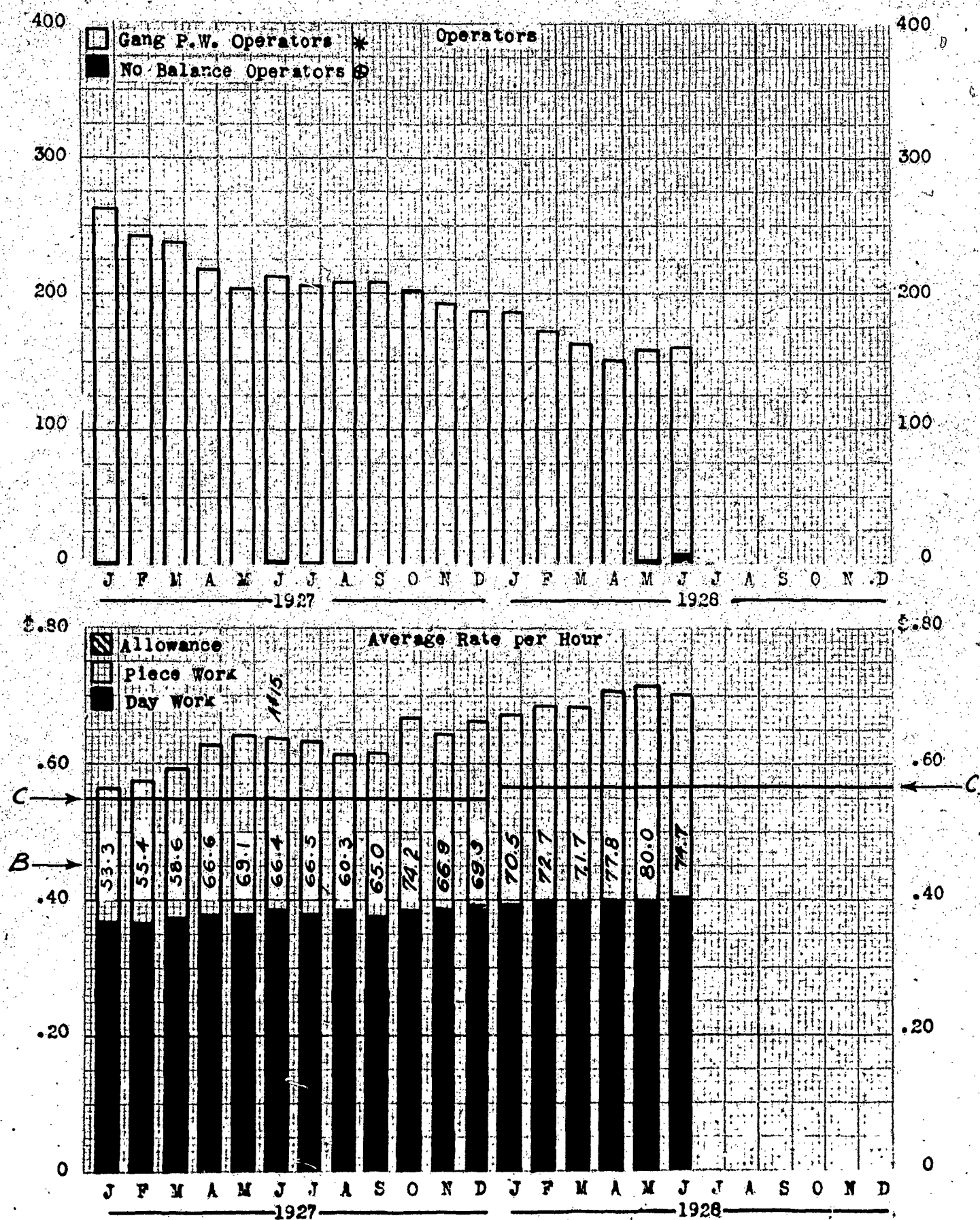
#Denotes girls were informed they would be questioned. Others were not.

These girls were working against a task or bogey and the \* change in performance is shown on curve C, following.

During this period no special drive was made to increase the output of the Inspection operators and the increase shown is, therefore, significant.



**NUMBER OF GANG PIECE WORK OPERATORS AND EARNINGS**  
**RELAY ASSEMBLY DEPARTMENT, 6329**  
 (Monthly)



Copies to:-

6003  
 6034  
 6306  
 6305  
 6363  
 6005

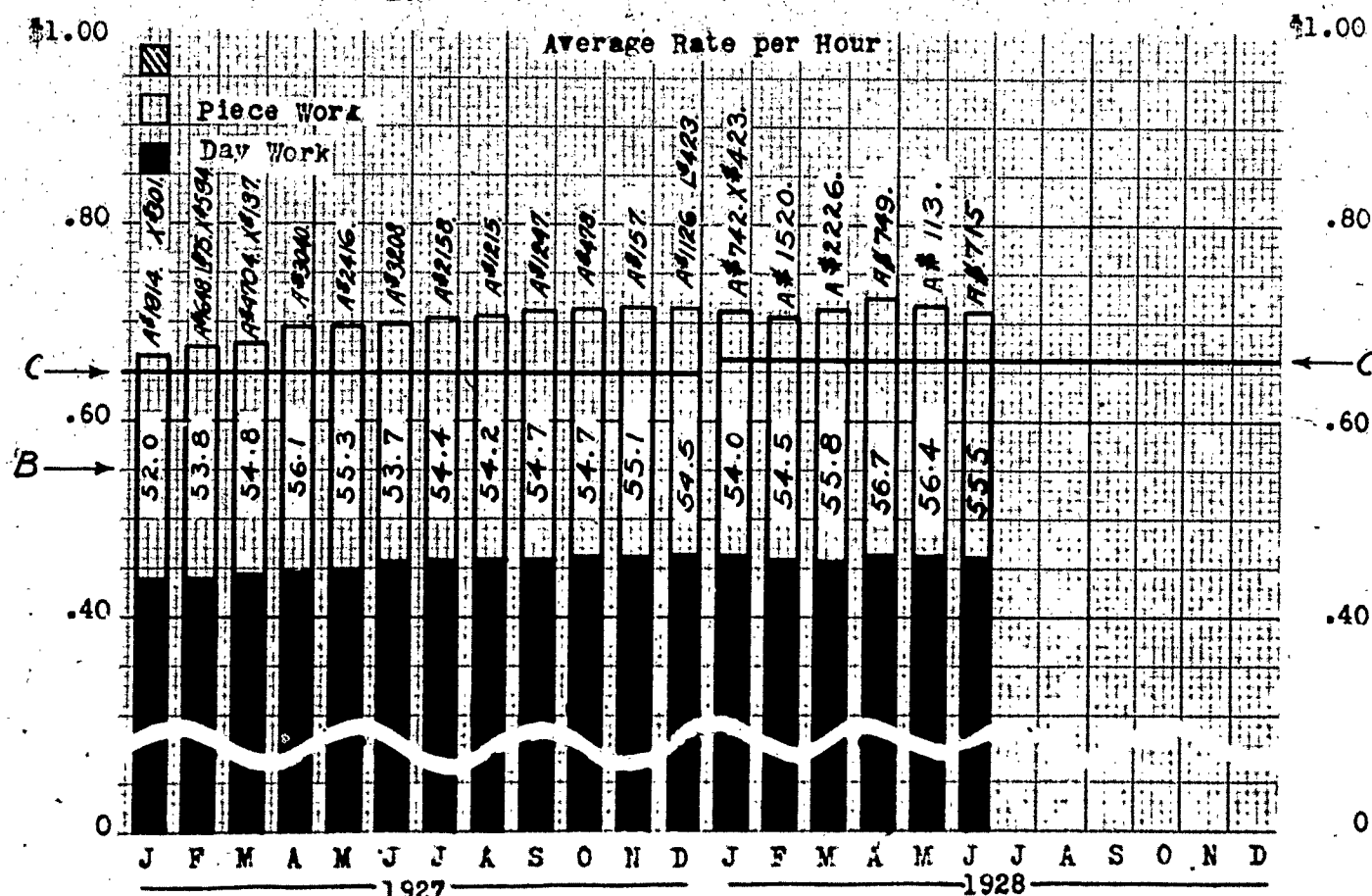
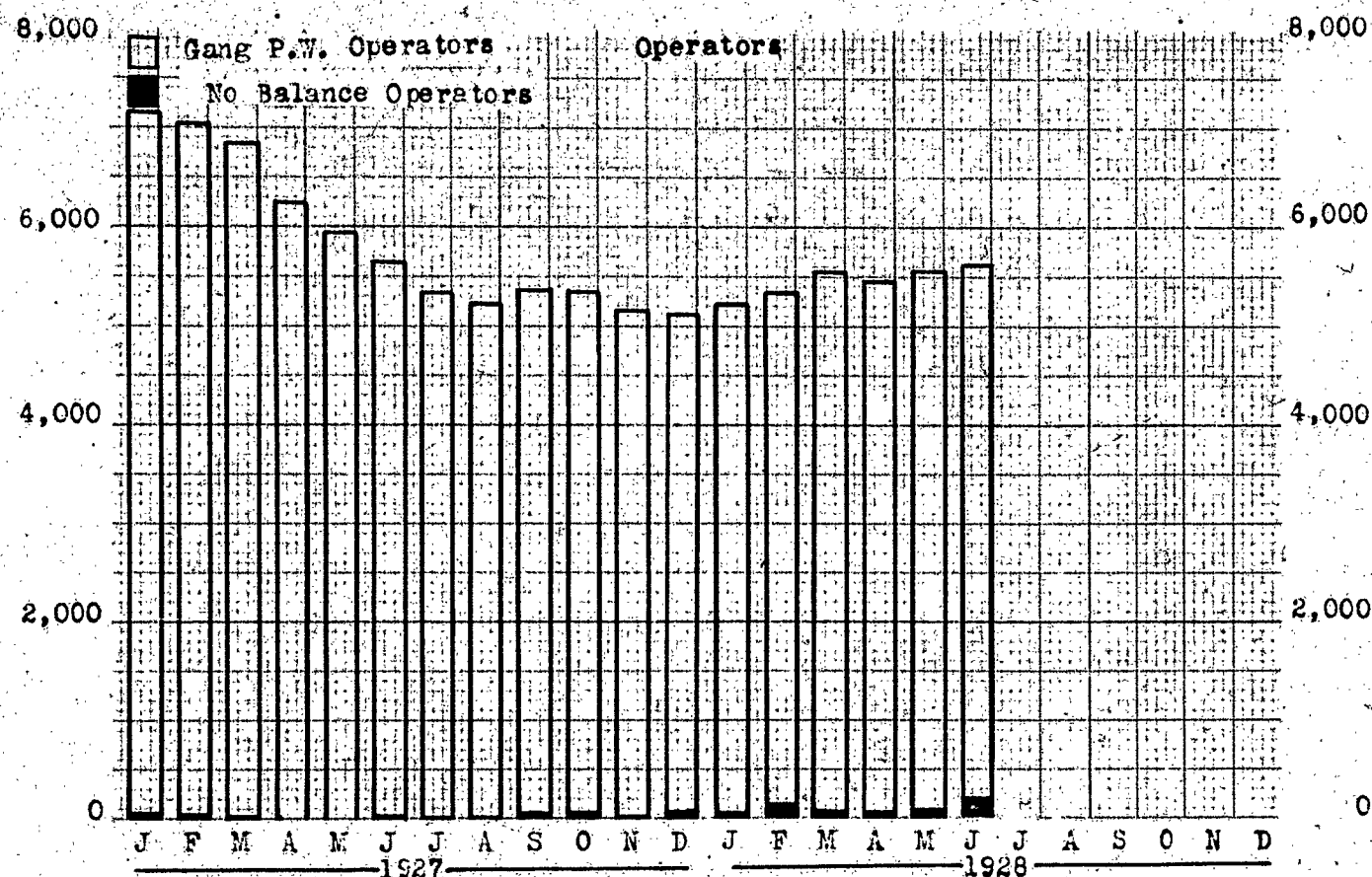
\* - Has no direct relation to number of employees in dept.  
 Ⓢ - Non-participating account less than 12 days service.  
 A - Total Allowance.  
 B - Balance Paid.  
 C - Average earnings during period bulletin in effect was based.  
 Source of Information:- H.V. Report M-853.4

Issued by  
 Dept. 6026

NUMBER OF GANG PIECE WORK OPERATORS AND EARNINGS  
OPERATING BRANCH, 6306  
(Weekly, Monthly, Definite and Premium)

M-853.4-306

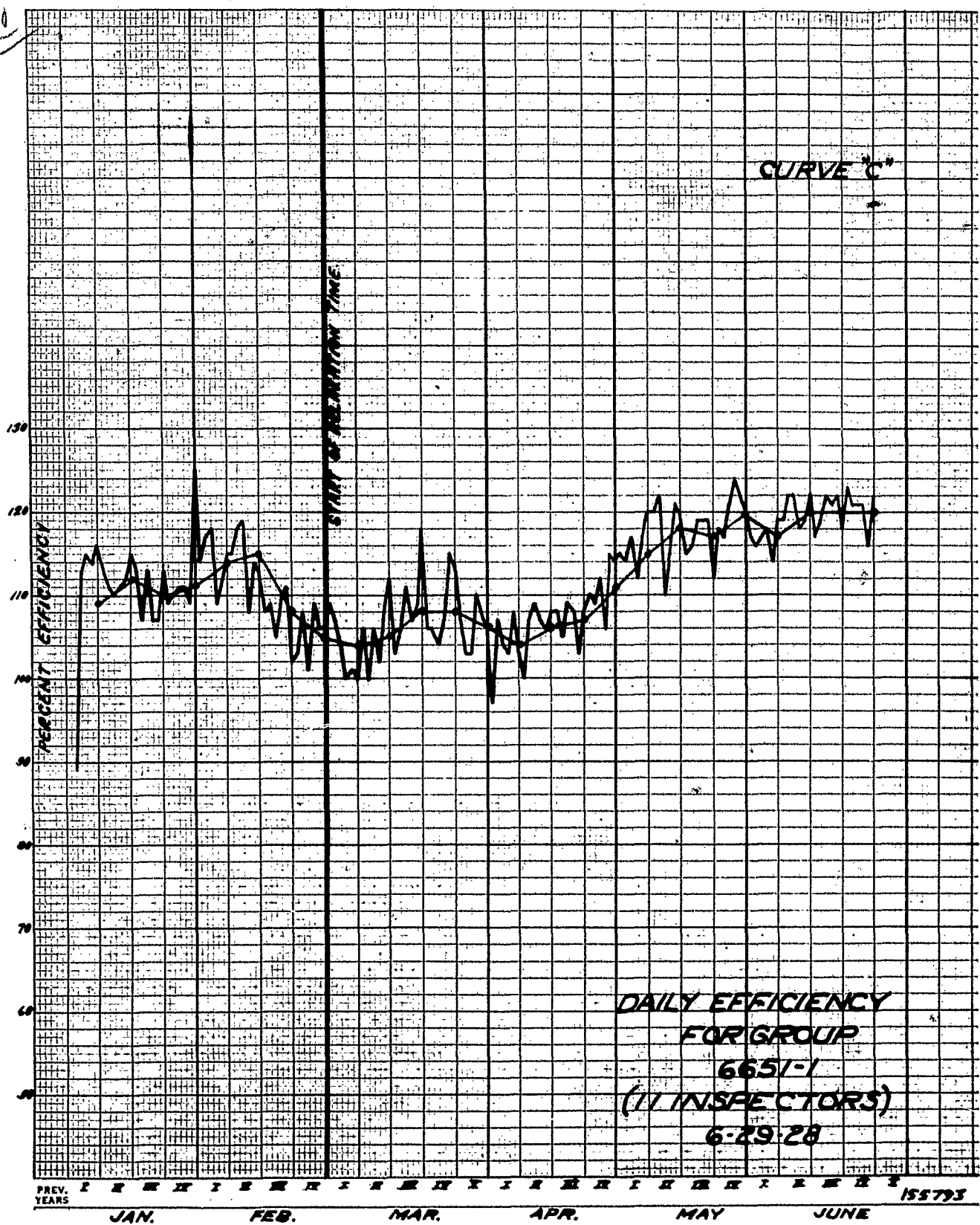
B-1



Copies to:- \* - Has no direct relation to number of employees in dept.  
9437 ① - Non-participating account less than 12 days service.  
6003 A - Total Allowance.. L - Loan  
6005 B - % Balance Paid.  
6020 X - Allowance Repaid  
6306

Source of Information:- H.W. Report M-853.4

Issued by  
Dept. 6026



(3) REST PAUSES IN TAPPING DEPARTMENT

As a further check, the Tapping Department having approximately eighty men, and thirty-five women, was selected, and a ten-minute rest period at 9:30 and a fifteen-minute period at 2:30 were started on June 18.

This is a straight piece work department and accurate records of any changes in performance will be available without any special arrangements.

The test has not been in effect long enough yet to obtain any results except comments from the operators which are uniformly favorable.

## SECTION VII

### RESULTS

- A. Average Hourly Output - Each Period.
- B. Uniformity of Performance.
- C. Table Showing Average Weekly Output.
- D. Curves Showing Record of Performance.
- E. Curve of Quality Variations.
- F. Production in Terms of Maximum Speed.
- G. Average Daily Output by Days of Week.

\*

\*

\*

In this section the results of the various periods are shown in tabulated form, and are contrasted with the "No Rest" period. Table No. 1 is of the Average Hourly Output, and Tables No. 2, 2-A, and 2-B show the Variation in the Uniformity of Performance. Table 3 presents weekly output data and Table 3-A presents weekly and hourly output summaries. Graphs are presented to illustrate these tables.

#### A. Average Hourly Output - Each Period

In Table No. 1 of this section, are shown the average hourly outputs for each operator by periods. The average hourly outputs are supplemented by a percentage column which shows the individual's increase or decrease in any period as compared to the "No Rest" period. This information is also shown for the entire group.

#### B. Uniformity of Performance - See Sheet No. VII-5 for details.

C. Table No. 3 shows the total production (in the equivalent of E-901 type relay) of each operator for each period, and also the average weekly production for each period of the test.

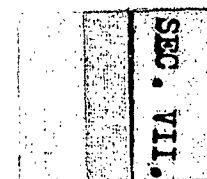
\*

Table No. 3-A shows the average weekly output, the average hourly output, and the percentage increase over the base period for each operator throughout the experiment.

\*

D. A graph is also included showing the weekly output expressed as a percentage of the output during the two weeks in the regular department previous to beginning work in the Test Room. The base period for the new operators Nos. 1 and 2 is the 4:30 o'clock stop feature. This output is probably their maximum. A second chart shows the total weekly output for each operator and the average weekly output for the group.

\*



E. All assembled relays found defective and for which each operator is held responsible, are returned to be repaired by the individual. A record of the number of defects daily charged to each operator represents the variation in degree of quality. Chart "E" shows the daily average repairs for each week of the test.

F. Production in Terms of Maximum Speed  
(See Sheet No.VII-9 for details)

TABLE NO. 1

VII-3

WEEKLY AVERAGE HOURLY OUTPUT AND WEEKLY PER CENT OF EFFICIENCY  
SHOWN FOR INDIVIDUAL OPERATORS, FOR THE GROUP AND BY PERIODS

		OPERATOR NO. 1		OPERATOR NO. 2		OPERATOR NO. 3		OPERATOR NO. 4		OPERATOR NO. 5		GROUP	
		Per Cent of Effi- ciency		Per Cent of Effi- ciency		Per Cent of Effi- ciency		Per Cent of Effi- ciency		Per Cent of Effi- ciency		Average Per Cent of Effi- ciency	
		No.	Average	Average	Average	Average	Average	Average	Average	Average	Average	Average	Average
		Weekly	Hourly	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over
		Hours	Output	Based	Based	Based	Based	Based	Based	Based	Based	Based	Based
Period	Hours	Wks.	Output	Period	Output	Period	Output	Period	Output	Period	Output	Period	Output
In Regular	48	1											
Department		2											
			50.5	100	49.7	100	49.7	100	49.7	100	48.3	100	49.7
													100
In Test	48	1	47.6	94.3	45.6	91.7	50.2	101.0	52.9	106.4	48.0	99.4	48.9
Room		2	50.2	99.4	54.5	109.7	52.6	105.8	54.0	108.7	50.8	105.2	52.4
		3	47.3	93.7	45.9	92.3	50.0	100.6	50.8	102.2	47.9	99.2	48.4
		4	46.7	92.5	45.7	91.9	43.7	87.9	48.1	96.8	47.7	98.8	46.4
		5	47.2	93.5	48.9	98.4	51.0	102.6	49.9	100.4	50.1	103.7	49.4
			47.8	94.6	48.0	96.6	49.5	99.6	51.1	102.8	48.9	101.2	49.1
													99.1
Special	48	1	47.4	93.9	48.9	98.4	51.6	103.8	50.0	100.6	50.4	104.3	49.7
Rates		2	46.4	91.9	48.1	96.8	52.9	106.4	51.0	102.6	51.8	107.2	50.0
		3	44.4	87.9	46.6	93.8	52.5	105.6	Vac.	Vac.	50.1	103.7	48.4
		4	48.6	96.2	49.2	99.0	54.3	109.3	51.1	102.8	48.6	100.6	50.4
		5	47.5	94.1	51.2	103.0	54.5	109.7	53.8	108.2	52.1	107.9	51.8
		6	50.3	99.6	52.4	105.4	54.4	109.5	53.9	108.5	50.4	104.3	52.3
		7	52.1	103.2	53.3	107.2	54.3	109.3	52.9	106.4	50.9	105.4	52.7
		8	50.7	100.4	53.4	107.4	54.8	110.3	52.7	106.0	50.4	104.3	52.4
			48.4	95.8	50.4	101.4	53.6	107.8	52.2	104.8	50.5	104.5	51.0
													102.8
5 Min. Rest	47.083	1	52.9	104.8	Vac.	Vac.	53.1	106.8	52.6	105.8	51.0	105.6	52.4
		2	52.1	103.2	48.9	98.4	55.2	111.1	53.3	107.2	50.4	104.3	52.0
		3	49.9	98.8	50.6	101.8	Vac.	Vac.	54.5	109.7	50.2	103.9	51.3
		4	50.6	100.2	51.6	103.8	51.4	103.4	52.2	105.0	51.6	106.8	51.5
		5	52.2	103.4	51.9	104.4	54.9	110.5	55.2	111.1	Vac.	Vac.	53.6
			51.5	101.9	50.7	102.0	53.6	107.8	53.6	107.8	50.8	105.2	52.2
													105.1

10 Min. Rest 46.165	1	54.2	107.3	56.4	113.5	56.0	112.7	54.4	109.5	54.2	112.2	55.0	111.0
	2	52.8	104.6	53.0	106.6	58.7	118.1	56.9	114.5	53.2	110.1	54.9	110.8
	3	55.8	110.5	56.8	114.3	56.1	112.9	55.8	112.3	51.9	107.5	55.3	111.5
	4	<u>53.7</u>	<u>106.3</u>	<u>55.6</u>	<u>111.9</u>	<u>57.0</u>	<u>114.7</u>	<u>57.1</u>	<u>114.9</u>	<u>52.6</u>	<u>108.9</u>	<u>55.2</u>	<u>111.3</u>
		54.1	107.1	55.4	111.4	56.9	114.5	56.1	112.8	52.9	109.5	55.1	111.2

Three 5 Min. Rests 46.165	1	55.2	109.3	55.9	112.5	54.1	108.9	54.0	108.7	51.8	107.2	54.2	109.3
	2	53.9	106.7	54.6	109.9	54.4	109.5	56.2	113.1	54.2	112.2	54.7	110.3
	3	53.2	105.3	51.4	103.4	55.9	112.5	55.3	111.3	53.7	111.2	53.9	108.7
	4	<u>54.0</u>	<u>106.9</u>	<u>52.7</u>	<u>106.0</u>	<u>58.3</u>	<u>117.3</u>	<u>57.3</u>	<u>115.3</u>	<u>54.4</u>	<u>112.6</u>	<u>55.3</u>	<u>111.6</u>
		54.0	106.9	53.6	107.9	55.7	112.0	55.7	112.1	53.5	110.8	54.5	110.0

Comb. Lunch and Rest 45.67	1	55.2	109.3	54.9	110.5	57.4	115.5	55.4	111.5	54.3	112.4	55.4	111.8
	2	54.9	108.7	56.0	112.7	57.8	116.3	56.4	113.5	55.6	115.1	56.1	113.3
	3	55.1	109.1	55.4	111.5	60.0	120.7	56.2	113.1	54.4	112.6	56.2	113.4
	4	56.4	111.7	56.6	113.9	57.8	116.3	56.6	113.9	54.6	113.0	56.4	113.8
	5	54.7	108.3	55.2	111.1	55.7	112.1	54.9	110.5	53.4	110.6	54.8	110.5
	6	53.3	105.5	52.9	106.4	58.6	117.9	58.6	117.9	50.4	104.3	54.8	110.4
	7	49.4	97.8	49.7	100.0	57.7	116.1	58.6	117.9	53.2	110.1	53.7	108.4
	8	53.4	105.7	52.6	105.8	58.7	118.1	61.3	123.3	53.9	111.6	56.0	112.9
	9	53.3	105.5	52.2	105.0	59.7	120.1	59.2	119.1	56.0	115.9	56.1	113.1
	10	55.0	108.9	51.9	104.4	61.8	124.3	60.4	121.5	55.4	114.7	56.9	114.8
	11	<u>54.5</u>	<u>107.9</u>	<u>56.3</u>	<u>113.3</u>	<u>62.6</u>	<u>126.0</u>	<u>62.5</u>	<u>125.8</u>	<u>55.0</u>	<u>113.9</u>	<u>58.2</u>	<u>117.4</u>
		54.0	106.9	53.9	108.5	58.9	118.5	58.2	117.0	54.2	112.2	55.9	112.7

Opers. No. 1 & 2 changed from here on.

Comb. Lunch Rest & 4:30 p.m. Stop 43.17	1	60.7	96.6	59.9	93.8	62.1	124.9	62.0	124.7	56.0	115.9	Due to changing Opers. Nos. 1 & 2 at beginning of the 4:30 stop period, a division of the group data has been made from there on, and is shown in Table 1-A.
	2	63.0	100.3	64.7	100.3	61.6	123.9	63.5	127.8	56.8	117.6	
	3	62.4	99.4	64.6	100.1	60.4	121.5	62.5	125.8	55.9	115.7	
	4	62.8	100.0	66.7	103.4	62.8	126.4	63.6	128.0	57.3	118.6	
	5	62.0	98.7	64.5	100.0	63.8	128.4	63.7	128.2	58.8	121.7	
	6	64.0	101.9	66.2	102.6	62.2	125.2	64.0	128.8	56.7	117.4	
	7	<u>64.8</u>	<u>103.2</u>	<u>65.1</u>	<u>100.9</u>	<u>62.6</u>	<u>126.0</u>	<u>62.6</u>	<u>126.0</u>	<u>56.2</u>	<u>116.4</u>	
		62.8	100.0	64.5	100.0	62.2	125.1	63.1	127.0	56.8	117.6	
Comb. Lunch Rest & 4:00 p.m. Stop. 40.67	1	64.8	103.2	68.5	106.2	63.7	128.2	64.9	130.6	59.1	122.4	
	2	64.5	102.7	67.0	103.8	63.8	128.4	64.5	129.8	61.0	126.3	
	3	65.3	103.9	68.1	105.5	62.8	126.4	63.3	127.4	57.6	119.3	
	4	<u>67.3</u>	<u>107.1</u>	<u>68.5</u>	<u>106.2</u>	<u>61.9</u>	<u>124.5</u>	<u>61.6</u>	<u>123.9</u>	<u>60.2</u>	<u>124.6</u>	
		65.5	104.3	68.0	105.4	63.0	126.7	63.5	127.8	59.5	123.2	



Comb. Lunch 45.67	1	65.3	103.9	66.9	103.7	61.6	123.9	60.7	122.1	56.6	117.2
Rest & 5:00 p.m.	2	67.7	107.8	69.0	106.9	61.4	123.5	61.1	122.9	58.0	120.1
Check Period.	3	62.2	99.0	62.9	97.5	58.8	118.3	60.2	121.1	56.5	117.0
	4	63.5	101.1	63.8	98.9	60.5	121.7	62.0	124.7	55.7	115.3
	5	60.1	95.7	62.9	97.5	64.0	128.8	61.7	124.1	54.9	113.7
	6	61.3	97.6	63.3	98.1	61.9	124.5	62.7	126.1	55.7	115.3
	7	62.0	98.7	63.6	98.6	65.1	131.0	64.6	129.9	51.6	106.8
	8	64.6	102.8	64.9	100.6	61.8	124.3	64.2	129.2	53.0	109.7
	9	65.8	104.7	67.1	104.0	63.6	127.9	65.9	132.6	55.4	114.7
	10	63.9	101.7	64.4	99.8	62.3	125.3	64.2	129.2	56.7	117.4
	11	64.9	103.3	65.7	101.8	62.9	126.5	63.8	128.3	55.7	115.3
	12	<u>65.5</u>	<u>104.3</u>	<u>64.5</u>	<u>100.0</u>	<u>61.2</u>	<u>123.1</u>	<u>62.1</u>	<u>124.9</u>	<u>53.3</u>	<u>110.3</u>
		63.9	101.7	64.9	100.6	62.1	124.9	62.8	126.3	55.2	114.3

TABLE 1-A

Table showing division of data due to changing of Operators No. 1 and 2 at the beginning of the 4:30 Stop Period.

		SECOND OPERATORS		OPERATORS	
		NO. 1 AND 2.		NO. 3, 4 AND 5	
		Average Hourly Output	Average Per Cent of Efficiency	Average Hourly Output	Average Per Cent of Efficiency Over Base Period
Comb. Lunch,	1	60.3	95.2	60.0	121.8
Rest and 4:30	2	63.9	100.3	60.6	123.1
P.M. Stop	3	63.5	99.8	59.6	121.0
43.17 Hours	4	64.8	101.7	61.2	124.3
	5	63.3	99.4	62.1	126.1
	6	65.1	102.3	61.0	123.8
	7	65.0	102.1	60.5	122.8
		63.7	100.0	60.7	123.3
Comb. Lunch,	1	66.7	104.7	62.6	127.1
Rest and 4:00	2	65.8	103.3	63.1	128.2
P.M. Stop	3	66.7	104.7	61.2	124.4
40.67 Hours	4	67.9	106.7	61.2	124.3
		66.8	104.9	62.0	126.0
Comb. Lunch,	1	66.1	103.8	59.6	121.1
Rest and 5:00	2	68.4	107.4	60.2	122.2
O'clock Check	3	62.6	98.3	58.5	118.8
Period.	4	63.7	100.0	59.4	120.6
45.67 Hours	5	61.5	96.6	60.2	122.2
	6	62.3	97.9	60.1	122.0
	7	62.8	98.7	60.4	122.6
	8	64.8	101.7	59.7	121.1
	9	66.5	104.4	61.6	125.1
	10	64.2	100.8	61.1	124.0
	11	65.3	102.6	60.8	123.4
	12	65.0	102.0	58.9	119.7
		64.4	101.2	60.0	121.9

Table No. 1 includes new Operators No. 1 and 2 from the beginning of the 4:30 Stop Period. The base period for new Operators No. 1 and 2 was derived from output of the 4:30 Stop Period, while Operators No. 3, 4 and 5's base period was derived from output in their regular department.

B. Uniformity of Performance

The following figures are those which indicate the trend of the uniformity of performance for the period shown, and are given by morning spell and afternoon spell for each operator. These figures are known as "indexes."

TABLE 2

## MORNING AND AFTERNOON VARIATIONS

Oper. No.	No Rests			Two 5-Min.Rests			Two 10-Min.Rests			Six 5-Min.Rests		
	A.M.	P.M.	Tot.	A.M.	P.M.	Tot.	A.M.	P.M.	Tot.	A.M.	P.M.	Tot.
1	5.1	4.2	9.3	2.9	3.2	6.1	6.3	5.7	12.0	5.6	3.9	9.5
2	5.4	7.2	12.6	3.6	3.8	7.4	6.0	4.8	10.8	3.8	4.4	8.2
3	3.2	5.9	9.1	2.2	3.6	5.8	2.0	3.3	5.3	1.6	2.3	3.9
4	2.1	2.5	4.6	1.6	3.7	5.3	3.2	4.2	7.4	1.5	2.0	3.5
5	5.4	3.7	9.1	3.7	3.0	6.7	2.5	3.3	5.8	2.7	3.1	5.8

Oper. No.	Comb. Lunch and Rest			Comb. Lunch Rest and 4:30 P.M.Stop			Same but 4:00 Stop			Comb. Lunch, Rest and 5 o'clock Check Period		
	A.M.	P.M.	Tot.	A.M.	P.M.	Tot.	A.M.	P.M.	Tot.	A.M.	P.M.	Tot.
1	3.7	3.8	7.5	*2.2	2.2	4.4	2.0	2.2	4.2	2.9	4.4	7.3
2	3.3	4.0	7.3	*3.3	3.3	6.6	3.7	3.6	7.3	4.7	6.3	11.0
3	2.2	3.8	6.0	1.7	2.7	4.4	2.0	2.3	4.3	1.7	3.3	5.0
4	1.5	3.1	4.6	0.5	1.3	1.8	1.0	1.4	2.4	1.3	2.6	3.9
5	3.4	3.7	7.1	2.6	2.0	4.6	2.5	2.7	5.2	2.9	2.5	5.4

\*Change of operator

Note: In this division of the data the effectiveness of the various periods may be noted both in the A.M. and P.M.

The relative efficiency of the different operators in terms of uniformity of performance is shown in the following:

TABLE 2-A

TOTAL AVERAGE VARIATION ALL PERIODS  
(INDIVIDUALLY)

Oper. No.	Average Total Variation	Average Total Variation Last Two Periods Only (4:00 and 5:00 Stop Period)	
4	4.2		3.1
1	5.3*		5.8
3	5.5		4.7
5	6.2		5.3
2	8.3*		9.2

\*These figures for Operators No. 1 and 2 are for the 4:30 P.M. stop period and are not directly comparable with the figures of operators 3, 4, and 5 which are averages for all periods. It will be seen, however, from the last column in Table No. 2 that the relative rating of the different operators seems to remain constant.

The following table shows the average relative efficiency for the group of five operators in terms of uniformity of performance when we compare the seven periods already completed with each other. \*

TABLE 2-B

## TOTAL AVERAGE VARIATION FOR THE GROUP

<u>Period Number</u>	<u>Period or Feature</u>	<u>Total Average Variation</u>
	Comb. Lunch, Rest and 4:30 P.M. Stop	4.4
	Comb. Lunch, Rest and 4:00 P.M. Stop	4.7
	Six 5-Minute Rests	6.2
	Two 5-Minute Rests	6.3
	*Comb. Lunch and Rest	6.5
	*Comb. Lunch, Rest and 5 o'clock Check	
	Period	6.5
	Two 10-Minute Rests	8.3
	No Rests	8.9

Note: It is interesting to note that the two periods which were identical, (\*) in respect to hours worked and features, have the same index figures for variation in performance.

RECORD OF PRODUCTION IN EQUIVALENT TO E-901  
RELAYS OF TEST OPERATORS  
TOTAL WEEKLY OUTPUTS AND AVERAGE WEEKLY OUTPUT BY PERIODS  
OF TEST

VII-7

TABLE NO. 3

Period	Week	OPERATOR NO. 1		OPERATOR NO. 2		OPERATOR NO. 3		OPERATOR NO. 4		OPERATOR NO. 5	
		Total Weekly Output	Average Weekly Output	Total Weekly Output	Average Weekly Output	Total Weekly Output	Average Weekly Output	Total Weekly Output	Average Weekly Output	Total Weekly Output	Average Weekly Output
1. In Regular Dept.	1	2422		2463		2374		2374		2294	
	2	2426		2309		2400		2394		2338	
		4848	2424	4772	2386	4774	2387	4768	2384	4632	2316
2. In Test Room	1	2284		2187		2411		2539		2305	
	2	2410		2616		2525		2592		2440	
	3	2270		2204		2400		2438		2299	
	4	2241		2193		2097		2309		2289	
	5	2266		2345		2446		2397		2404	
		11471	2294	11545	2309	11879	2376	12275	2455	11737	2345
3. Special Rates	1	2276		2347		2477		2400		2418	
	2	2225		2307		2539		2448		2484	
	3	2131		2238		2521		Vac.		2406	
	4	2333		2362		2606		2453		2333	
	5	2281		2457		2616		2583		2500	
	6	2412		2513		2612		2589		2418	
	7	2502		2560		2607		2537		2443	
	8	2434		2563		2630		2529		2419	
		18594	2324	19347	2418	20608	2576	17539	2505	19421	2427
4. 5-Min. Rest	1	2491		Vac.		2501		2477		2400	
	2	2452		2302		2598		2508		2374	
	3	2348		2381		Vac.		2567		2362	
	4	2384		2430		2420		2460		2428	
	5	2457		2443		2587		2597		Vac.	
		12132	2426	9556	2389	10106	2527	12609	2522	9564	2391

5. 10-Min. Rest	1	2501		2602		2587		2510		2501	
	2	2438		2449		2710		2628		2455	
	3	2577		2621		2588		2578		2394	
	4	2478		2569		2630		2634		2427	
		<u>9994</u>	2498	<u>10241</u>	2560	<u>10515</u>	2629	<u>10350</u>	2588	<u>9777</u>	2444
6. Three 5-Min. Rests	1	2547		2580		2498		2493		2390	
	2	2487		2522		2510		2595		2501	
	3	2458		2371		2582		2553		2477	
	4	2491		2434		2693		2645		2510	
		<u>9983</u>	2496	<u>9907</u>	2477	<u>10283</u>	2571	<u>10286</u>	2571	<u>9878</u>	2469
7. Comb. Lunch and Rest	1	2519		2506		2623		2532		2480	
	2	2508		2558		2641		2576		2537	
	3	2516	Sub.	2528		2740		2569		2484	
	4	2575	"	2585		2641		2584		2493	
	5	2496		2520		2544		2505		2438	
	6	2435		2418		2675		2676		2301	
	7	2256		2271		2607		2675		2429	
	8	2437		2404		2683		2799		2463	
	9	2433		2386		2726		2702		2558	
	10	2510		2371		2822		2760		2529	
	11	2491		2573		2861		2856		2510	
		<u>27176</u>	2470	<u>27120</u>	2465	<u>29563</u>	2688	<u>29334</u>	2658	<u>27222</u>	2475
<hr/>											
Opers. Nos. 1 & 2 changed from here on.											
8. Comb. Lunch, Rest and 4:30 P.M. Stop	1*	2622		2584		2681		2676		2416	
	2	2721		2795		2658		2743		2453	
	3	2694		2787		2607		2700		2412	
	4	2712		2880		2707		2746		2475	
	5	2675		2784		2753		2748		2539	
	6	2761		2859		2685		2762		2446	
	7	2798		**2812		2703		2704		2425	
		<u>18983</u>	2712	<u>19501</u>	2786	<u>18794</u>	2685	<u>19079</u>	2726	<u>17166</u>	2452
9. Comb. Lunch, Rest, and 4:00 P.M. Stop	1	2634		2788		2591		2641		2403	
	2	2624		2726		2594		2625		2482	
	3	2655		2770		2555		2574		2344	
	4	2739		2785		2516		2504		2448	
		<u>10652</u>	2663	<u>11069</u>	2767	<u>10256</u>	2564	<u>10344</u>	2586	<u>9677</u>	2419

10. Comb. Lunch,	1	2984	3053	2814	2773	2585					
Rest and	2	3094	3150	2804	2791	2647					
5:00 o'clock	3***	2839	2873	2686	2751	2580					
Check Period	4	2901	2912	2763	2832	2543					
	5	2747	2875	2924	2817	2508					
	6	2801	2894	2830	2864	2543					
	7	2833	2906	2973	2949	2357					
	8	2951	2965	2825	2930	2423					
	9	3008	3064	2904	3009	2514					
	10	2919	2940	2847	2930	2561					
	11	2964	3002	2877	2917	2549					
	12****	2994	2948	2794	2835	2434					
		35035	2920	35582	2965	34041	2837	34398	2866	30224	2519

(No. 5 worked on an unfamiliar type most of the 7th week.  
20:45 work on unfamiliar type 8th week.  
21:00 less familiar type 9th week.)

NOTE: Where hours actually worked were less than full week, the totals have been increased to basis of full week.

(\*) On the third day after the beginning of the 4:30 P.M. stop period, two new operators were put on the test to replace old Operators No. 1 and No. 2 who had been on the test from the start. Because of this change the output records of Operators No. 1 and 2 for the 4:30 P.M. stop period, and thereon, are not directly comparable with previous records for these positions.

(\*\*) Substitute for regular operator from Tuesday noon on, for balance of week.

(\*\*\*) Blood pressure tests were taken this week. On Tues. one was taken (These tests required approximately 1 1/2 " Wed. ten were " ( minutes each, and caused a slight degree " Thurs.eight " " ( of excitement which, no doubt, accounts ( for the decrease in production.

(\*\*\*\*) The 12th week's production was interrupted by, Fatigue Readings; Meeting and Hospital Visit.

SUMMARY OF AVERAGE WEEKLY OUTPUTS AND  
PERCENTAGE INCREASE IN RATE OF PRODUCTION OF TEST OPERATORS  
TABLE NO. 3-A

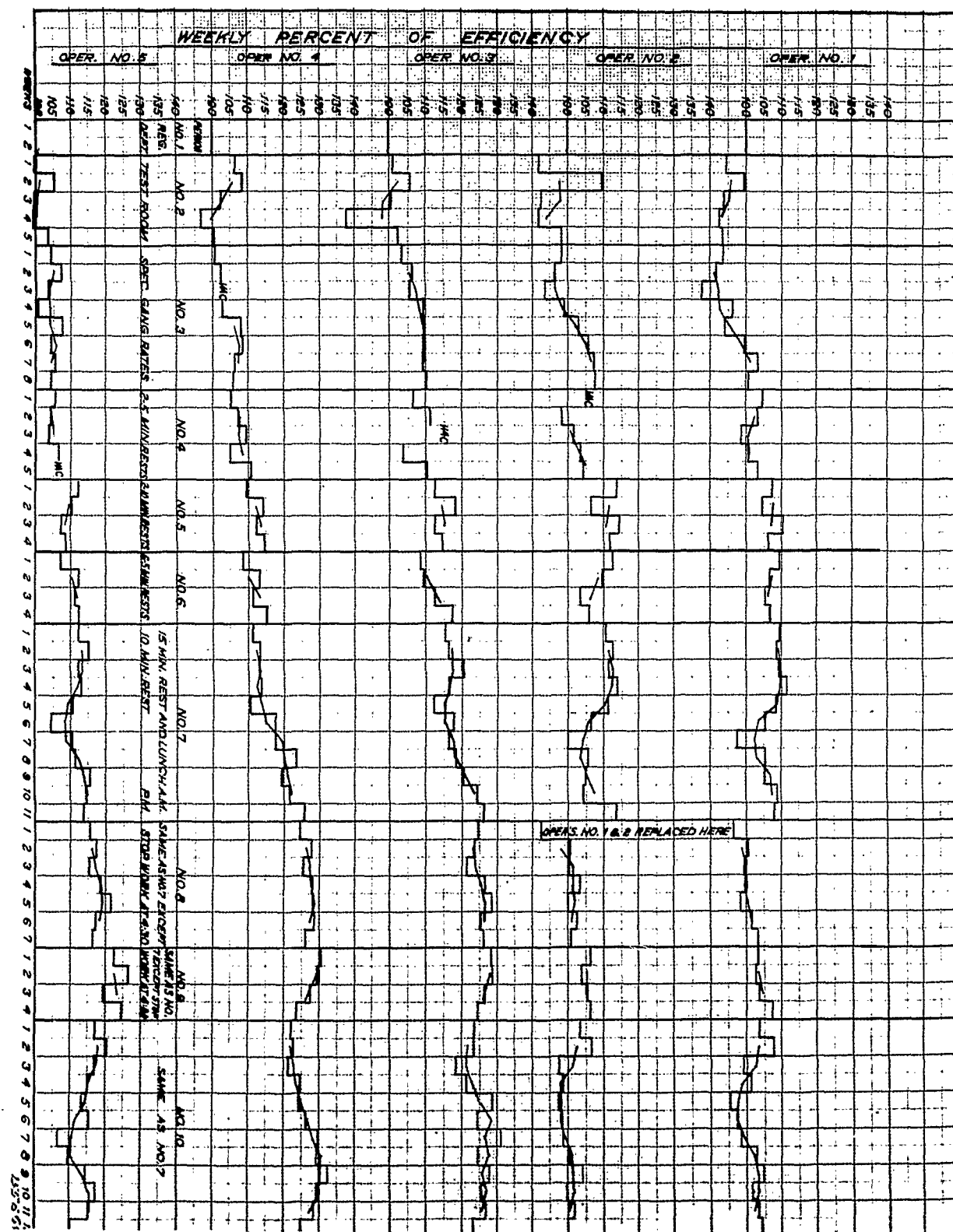
VII-8

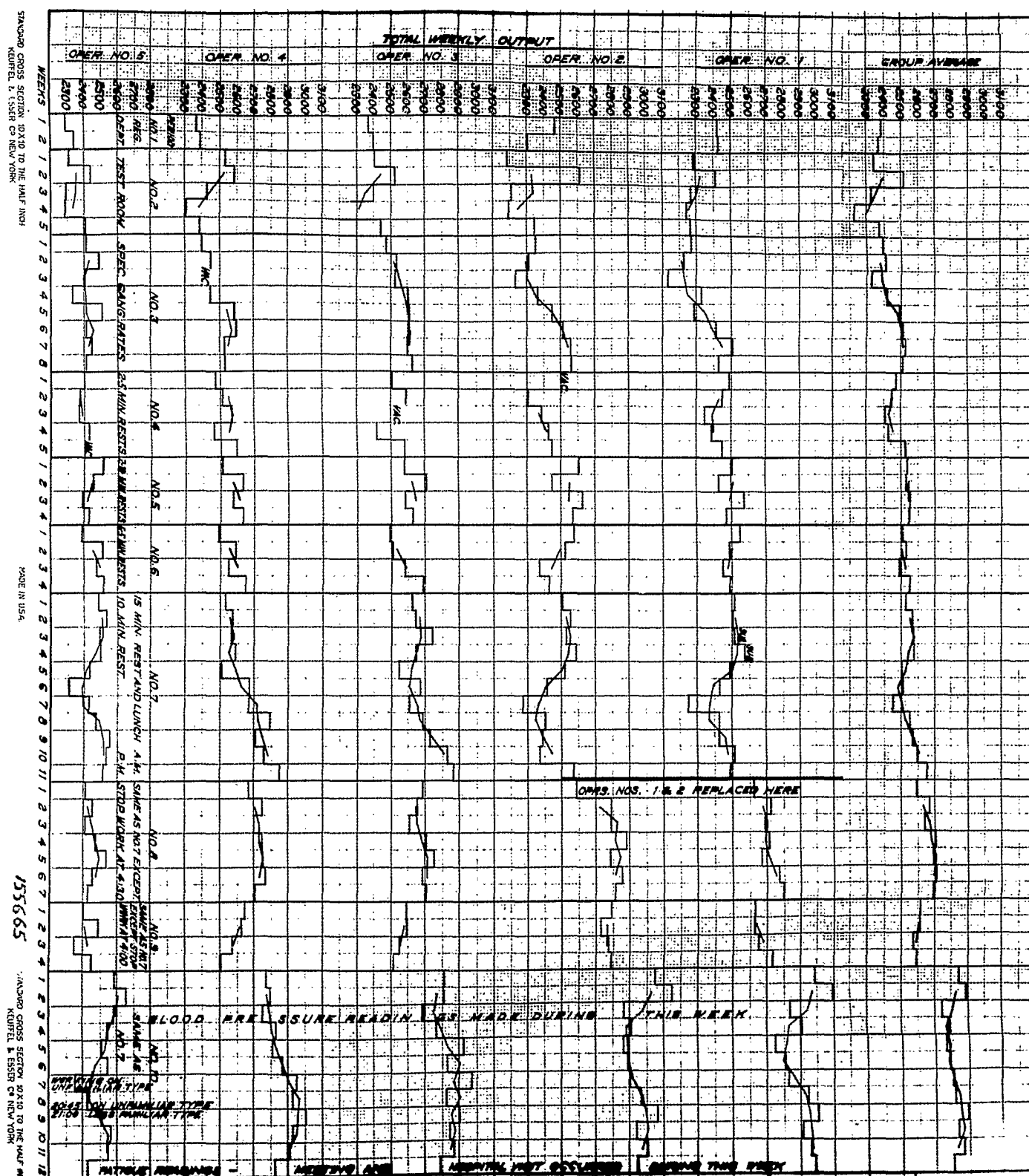
Period Number	Period	OPER. NO. 1			OPER. NO. 2			OPER. NO. 3			OPER. NO. 4			OPER. NO. 5		
		Average Weekly Output	Average Hourly Output	%	Average Weekly Output	Average Hourly Output	%	Average Weekly Output	Average Hourly Output	%	Average Weekly Output	Average Hourly Output	%	Average Weekly Output	Average Hourly Output	%
1.	In Regular De- partment (48 hours worked) Used as Basis.	2424	50.5	100	2386	49.7	100	2387	49.7	100	2384	49.7	100	2316	48.3	100
2.	In Test Room (48 hours)	2294	47.8	94.6	2309	48.0	96.6	2376	49.5	99.6	2455	51.1	102.8	2345	48.9	101.2
3.	Using Spl. Gang Rates (48 hours)	2324	48.4	95.8	2418	50.4	101.4	2576	53.6	107.8	2505	52.1	104.8	2427	50.5	104.5
4.	Two 5-Min. Rests 47.083 hours (Account of rests deducted)	2426	51.5	101.9	2389	50.7	102.0	2526	53.6	107.8	2522	53.6	107.8	2391	50.8	105.2
5.	Two 10-Min. Rests 46.165 hours (Account of rests deducted)	2498	54.1	107.1	2560	55.4	111.4	2629	56.9	114.5	2588	56.1	112.8	2444	52.9	109.5
6.	Six 5-Min. Rests 46.165 hours (Account of four 5-Min. Rests deducted. Oper. take personal time out in two rests)	2496	54.0	106.9	2477	53.6	107.9	2571	55.7	112.0	2571	55.7	112.1	2469	53.5	110.8



7. Comb. Lunch and Rest, 45.67 hours (Account of rest and lunch time deducted)	2470	54.0	106.9	2465	53.9	108.5	2688	58.9	118.5	2658	58.2	117.0	2475	54.2	112.2
8. Comb. Lunch, Rest and 4:30 P.M. stop. 43.17 hours (Account of Rests etc. deducted)	2712	62.8	See Note 100.	2786	64.5	See Note 100.	2685	62.2	125.1	2725	63.1	127.0	2452	56.8	117.6
9. Comb. Lunch, Rest and 4:00 P.M. stop. 40.67 hours (Account of Rests and Lunch Time Deducted)	2663	65.5	104.3	2767	68.0	105.4	2564	63.0	126.7	2586	63.5	127.8	2419	59.5	123.2
10. Comb. Lunch, Rest and 5:00 o'clock "Check" period. 45.67 hours (Account of Rest and Lunch Time deducted)	2920	63.9	101.7	2965	64.9	100.6	2837	62.1	123.3	2866	62.8	126.3	2520	55.2	114.3

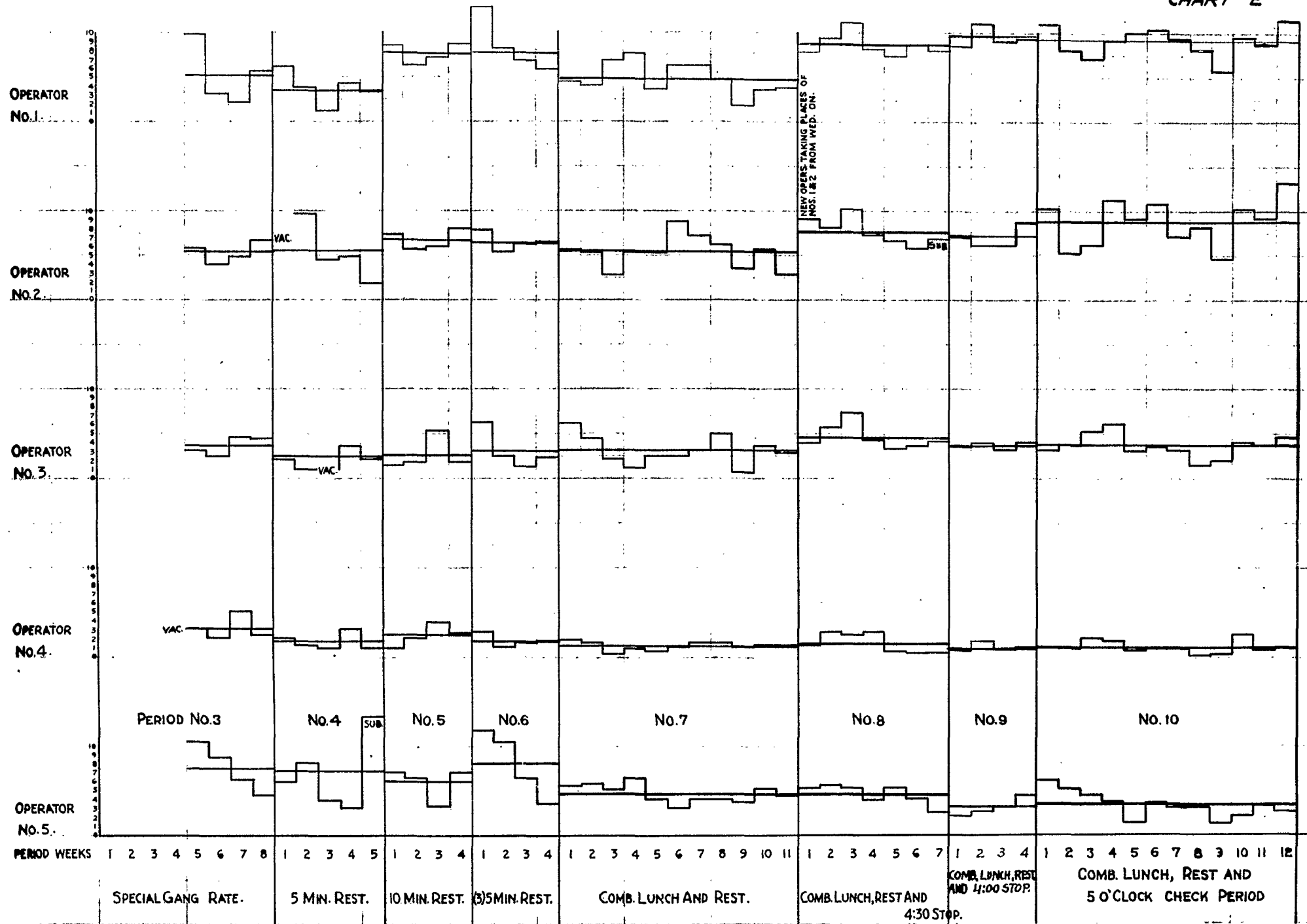
NOTE: At the beginning of period No. 8, two new operators were put on the test to replace old operator Nos. 1 and 2. Because of this change, the output figures for period No. 8 are being accepted as the base or 100%, for these two girls. The percentage gain in production in succeeding periods will, therefore, be determined in relation to the 4:30 stop period for Ops. Nos. 1 and 2.





REPAIRS ~ DAILY AVERAGE AMOUNT

CHART "E"



155794

## F. Production in Terms of Maximum Speed

Another indication of the relative value of different working conditions may be seen by expressing the rate of production for the various periods in terms of each operator's maximum speed. Our records show the output for each operator by fifteen-minute periods. These outputs were scanned and for each period or type of working condition used in the experiment the fifteen-minute period having the greatest production was noted for each operator. Table 4, in this section, shows the maximum production for each of these fifteen-minute periods, the hour of the day, the day of the week, and the date upon which the record was made.

An examination of the table shows that the maximum speed records were all made after the rest periods were introduced. Operators 3, 4, and 5, are the only ones continuing throughout the experiment and one of them made her fastest speed with the 4:00 o'clock stop and two with the 4:30 o'clock stop. An examination of the distribution of these speed periods at different times during the day shows that they were pretty well scattered except that we do not find these maximum speeds occurring just after beginning work or just before quitting time. The frequency of these maximum speeds during afternoon work shows that whatever fatigue may pile up during the day is not sufficient to prevent bursts of speed in the afternoon. The scatter of these periods over the different days of the week is rather even. Maximum speed for a brief period seems as likely to be found on one day as on another.

Taking the fastest fifteen minutes work or the maximum fifteen-minute output for each operator as her maximum speed and representing the average hourly output for each operator as a percentage of this figure, we find a gradual approach toward the capacity or speed limit as shown by the graph at the close of this section. It will be seen that in general the operators were working at 64% to 72% of maximum speed at the beginning of the experiment. During the 4:00 o'clock stop period their average hourly production was between 80% and 84% of maximum speed.

This difference is significant and the ability to maintain an average hourly production throughout the day so near to maximum speed seems rather remarkable. It will be noted from the curve that the old operators Nos. 1 and 2 did not continue to improve their output rate during the last few weeks they were in the Test Room as did Operators Nos. 3, 4, and 5.

G. Chart "G" shows a noticeable flattening during the last period covered by this report, viz., the second run of the full day with rest and lunch periods. This is shown as period 10 on other charts and data. It is possible that the hump in the solid curves covering period 7, which was the first run on a full day and with rest and lunch periods, may have been due to an attempt on the part of the operators to hurry during the early part of the week, resulting in fatigue on Saturday.

Similar curves covering all other periods have not been made

Table 4

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## HIGHEST 15-MIN. OUTPUT BY WORKING PERIODS ON BASIS OF E901

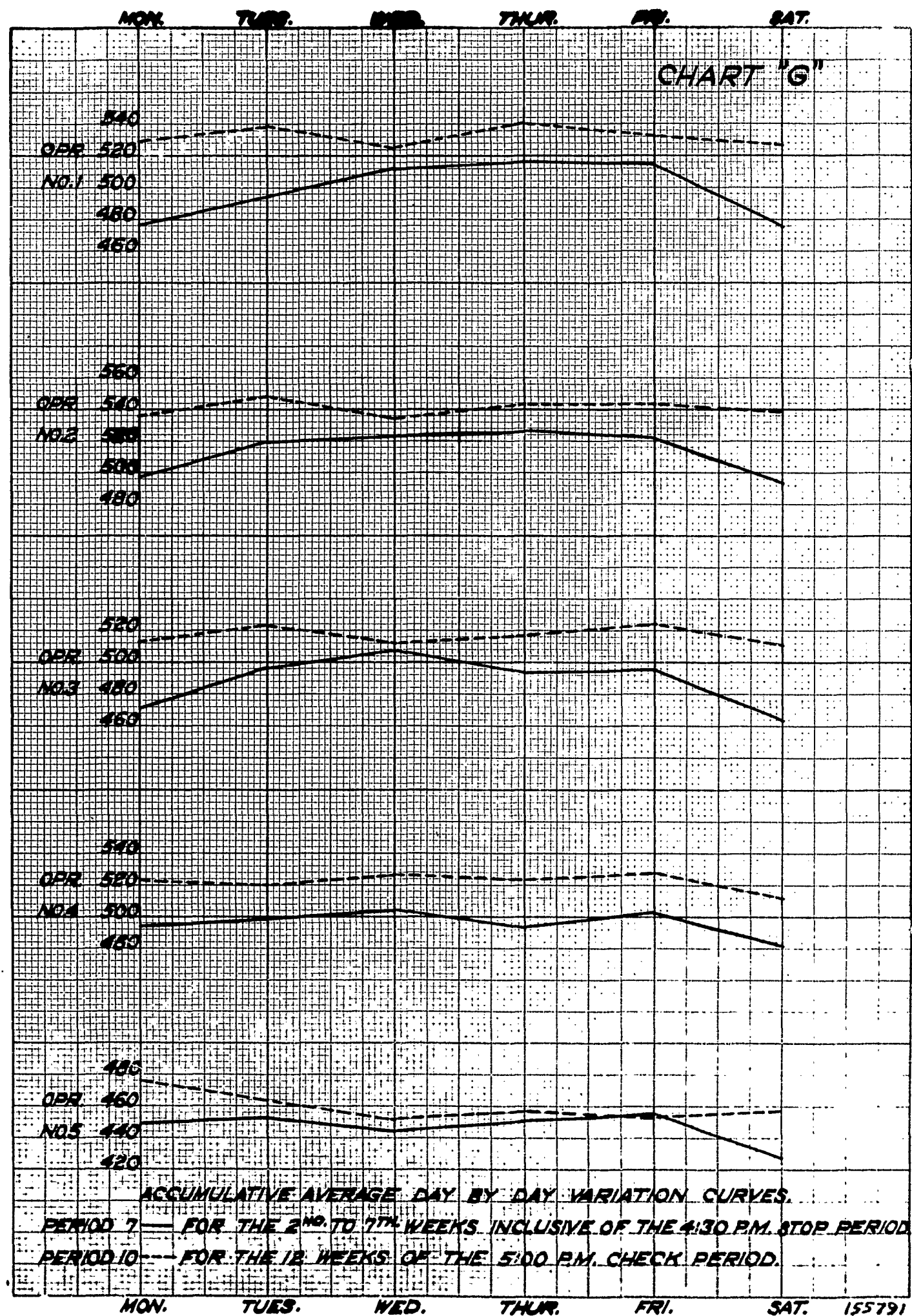
\*

Period	Operators					Operators					Operators				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
	NO. OF RELAYS					Time Period Began					Date of Record				
No Rest	16.5	18.1	16.9	16.5	15.4	Tu	F	Tu	Tu	F	7/26	7/22	7/26	7/19	7/22
Two 5-Min. Rests	17.0	17.9	18.1	18.2	14.7	S	Tu	S	F	F	9/3	8/30	9/10	9/2	8/26
Two 10-Min. Rests	18.7*	19.3*	18.5	18.2	15.1	Th	Th	W	W	W	9/29	9/29	9/21	9/21	10/5
Six 5-Min. Rests	18.5	17.7	18.5	17.6	16.1	F	F	Th	Th	F	10/14	10/14	11/3	11/3	10/21
25-Min. R. & L.	18.2	16.1	19.6	18.6	16.4	M	M	M	W	Th	1/9	11/7	1/16	1/18	1/12
25-Min. Lunch & 4:30 S.	a	b				Th	F	F	W	W	2/16	3/2	2/24	2/15	2/22
25-Min. Lunch & 4:00 S.	20.0*	20.9	17.5	17.5	17.7*	Th	W	S	Th	F	4/5	3/28	3/31	4/5	3/16

a - [REDACTED]  
b - [REDACTED]  
\* indicates best record for the operator









## SECTION VIII

### OBSERVATIONS AND CONCLUSIONS

- A. Further Comments on Working Conditions
- B. Future Procedure

The observations and conclusions given here have been suggested by the results of the experiments conducted thus far. They are not, therefore, to be construed as final, since further experiments may warrant changing.

The results to date show that:

1. The late morning and afternoon slumps which were thought to be due to fatigue, are largely due to production time lost on account of personal time taken by the operators just previous to noon and quitting time.
2. A slump in production which has been observed to occur in the early afternoon apparently is the result of drowsiness brought about by the heavy lunches indulged in by the operators. This is particularly true during the warmer months. These heavy lunches are required because of the long interval between breakfast and lunch time of shop employees.
3. The rest pauses have a distinct effect upon the uniformity of production. The lowest index of variability ("combination lunch, rest, and 4:30 stop") was less than half the highest index of variability ("no rest"). \*
4. The greatest uniformity of production occurred during the period immediately following the change of Operators 1 and 2. The uniformity of production during the period just preceding this change was poor. The index of uniformity is consistently lower in the forenoon than in the afternoon. \*
5. The highest fluctuation in the rate of working encountered to date exclusive of the "no rest" period was during the ten-minute rests. Fear of lowered earnings due to maximum amount of time off and consequent spurt in production after each rest, no doubt, caused the irregularity in the rate of working during the ten-minute rests.
6. The operators vary widely (300%) in uniformity of performance but remain in the same relative position when compared with each other in this respect. There is no relation between their comparative rating in production and their comparative rating in uniformity of performance. An operator's working capacity cannot be judged from her uniformity of performance, or vice versa. \*

SEC. VIII.

7. The highest average hourly output of relays assembled throughout any experiment completed thus far was obtained over the periods of the "combination lunch, rest and 4:00 o'clock stop." \*
8. The total daily outputs are not reduced by rest pauses, but are increased. In all features having rest periods these increases in production were so great as to exclude the possibility of their being chance variations. \*
9. The highest total daily output yet obtained was with the full working day broken by a fifteen-minute rest period with lunch in the forenoon and a ten-minute rest period in the afternoon. The data show with perfect reliability, moreover, that the total daily output with a lunch and rest program and with the conditions under which these girls were working, was definitely in excess of that under original working conditions even when the day was shortened by the 4:00 o'clock stop. \*
10. The fifteen-minute periods showing highest outputs are evenly scattered throughout the day with the exception of the beginning and end of the work periods. They are evenly distributed over the days of the week. \*
11. If we use the greatest fifteen-minute output ever attained by each operator as an index of her maximum speed we find that during the "no-rest period" the operators maintained an average speed throughout the day which was equivalent to 64% to 72% of their maximum possible output, while during the "lunch, rest, and 4:00 o'clock stop" feature, their average daily output was equivalent to 80% to 84% of their maximum possible output. \*
12. The physical condition of the operators under test has improved. This may, no doubt, be partly attributed to a greater freedom of mind due to the absence of the closer supervision customary in the regular department.
13. The changed working conditions have resulted in creating an eagerness on the part of the operators to come to work in the morning.
14. Outside influences tend to create either a buoyant or a depressed spirit which is reflected in production. Evidence of this effect is to be found in the comments and experience of individual operators.
15. The improvement in general physical conditions has been so gradual that no distinct or unusual reflections in the performance can be noted as a result of this improvement.

16. The earnings constitute only a fraction of the incentive.
17. An appreciable increase in output took place when the Test Room operators were put on special gang pay basis and were no longer paid with the large gang. \*
18. Important factors in the production of a better mental attitude and greater enjoyment of work have been the greater freedom, less strict supervision and the opportunity to vary from a fixed pace without reprimand from a gang boss. \*
19. The operators have no clear idea as to why they are able to produce more in the Test Room; but, as shown in replies to questionnaires in the appendix, there is the feeling that better output is in some way related to the distinctly pleasanter, freer, and happier working conditions. \*
20. The outcomes of the Test Room experiment seem to demand that we ask ourselves whether the personal consideration which exists at the upper levels of employment cannot and should not be carried to the lowest levels of employment. \*

#### A. Further Comments on Working Conditions

The probability that the improved mental attitude of these operators has been an important factor in their increased output makes it seem worth while for us to give further consideration to this problem at this point. \*

As far as the upper levels of employment are concerned, industry generally recognizes the following three conditions, which are based upon biological principles: \*

1. We recognize that the emotions affect health. Not only have Pavlov, Cannon, and others shown the effect of fear, anxiety, worry and other emotions upon the digestion and the general health, but we have seen in the experience of our associates and ourselves that worry, unhappiness, and frustrated efforts are more potent factors in breaking down the individual than an excess of hard work at which one is eminently successful.
2. Variation in output is natural. We are not at our best every day. We do not work equally fast all day long. We expect a man to have an off day once in a while.
3. We believe that in the long run output will largely depend upon the mental and physical state of the individual. Preoccupation, caused by physical ills or unhappy mental states, is an arch-enemy of production.

The acceptance of these general principles has made industry for the men at the higher levels, a pleasant, cooperative, friendly and interesting activity. To be sure, competition still exists and attention is given to individual production; but this does not injuriously affect the emotions. A man enjoys a fair race with a clear track ahead and encouragement along the way. \*

Yet, while industry has given important consideration to these biological and human principles when dealing with the higher levels of employment, we may properly ask whether these same principles have been applied at the lower levels of employment, and, if not, whether they are applicable. \*

Perhaps unconsciously industry may have made two fallacious assumptions:

1. It seems to be a general assumption by people everywhere that emotional reactions are of minor importance among those of limited mental scope. The parent thoughtlessly denies the child some harmless thing which seems unimportant to the father but which is all-important to the son. There is a difference in values. The parent rebukes the child in the presence of the boy's play fellows and social equals. It is an unimportant incident to the father but the child may always carry the personality scar. The gang boss often tries to live up to his title, when he ought to be a group supervisor. He assumes that the gang are thick-skinned and that his thrusts must go deep. It is characteristic for people to feel the importance of severity and discipline when they first assume authority. The soldier may occasionally fail to salute a colonel without reprimand but woe to him if he "passes up" a second lieutenant. \*

As a matter of fact, emotions are stronger and minor matters of greater importance among those people whose horizons are limited and whose interests are few. Recognition by one's superior, a minor success, and a word of encouragement mean more to such people than to the self-reliant mental giant. An operator in the Test Room recently had a birthday. The girl who sits beside her got up early enough in the morning to make a cake for her and get to work at 7:30. Measured in money value the gift was trivial. Measured in personal effort it was greater perhaps than any gift which we might give to the person working beside us. \*

The whole point is that the average employee at the bottom of the industry is keenly sensitive in matters of human relationship. Why do we fail to recognize this? Perhaps we have not yet outgrown the attitude inherited from the beginnings of the factory period, which were surrounded by class distinctions and a lack of understanding \*

of the human mind which we should have left behind. Moreover, the emotion of fear - fear that we may be laughed at for considering a thing so intangible as the human emotions - often keeps us from giving due consideration to this problem. Emotions exist and business management must be unemotional enough to consider with coolness and candor their place in the organization of working conditions.

2. There is also the common assumption that consistency of output is desirable and may be obtained through discipline. Neither phase of this assumption has been proved. If consistency of production is demanded, the worker must in self-protection make sure that the maximum output figure is kept low enough so that he can consistently approximate it. Industry would not think of demanding consistency of performance through discipline in the higher levels of employment in the way that this end is sought at the lower levels. \*

There is, perhaps, greater need for the recognition of the three principles previously mentioned and their application at the lower levels of industry than at the higher levels. \*

#### B. Future Procedure

The results of the investigation so far are so conclusive as to the desirability of rest and lunch periods, particularly from the operators' viewpoints, that we feel that the problem of the introduction of rest periods generally must be faced in the very near future, and a committee has been appointed to study the questions connected with such a move and to make recommendations to the officials of the Company. \*

We are more than ever impressed with the necessity for training the first line supervisors, viz., gang bosses and group chiefs, in better methods of handling and dealing with employees, and to this end we are working up a special series of lessons to be incorporated in our supervisors' training course.

## SECTION IX

### COMMENTS OF OPERATORS

- A. Introduction
- B. Working in Test Room
  - 1. Period of Special Gang Rate
  - 2. Five-Minute Rest
  - 3. Ten-Minute Rest
  - 4. Three Five-Minute Rests
  - 5. Combination Lunch and Rest

#### A. Introduction

The comments of the operators are being given wherever they have a direct reference or bearing on the study. Each sub-division of this section is devoted to the individual operator's expressions. These are recorded in the chronological order in which the features were tried. This is done so that an individual's opinions, likes, wishes, reactions, - in fact her entire attitude toward any phase of the study, - may be analyzed in relation to any given feature, or for contrasting with the other operators.

In some cases the operators were questioned concerning their feeling and whenever the "comments" are involuntary, the question will be given in conjunction with the replies.

#### B. Working in Test Room

##### Operator No. 1

Question: "How do you like it in here?"

Answer: "I like it. I liked it from the first day, I wouldn't want to go back." (Meaning to the regular department). "It's nice in here, not so crowded."

##### Operator No. 2

Nothing of direct application.

##### Operator No. 3

Nothing of direct application.

##### Operator No. 4

Nothing of direct application.

##### Operator No. 5

Nothing of direct application.

SEC. IX.

1. Period of Special Gang RateOperator No. 1

When special gang rates were introduced this girl's comments were:

"When are we going to have rest periods?"

"We like it better in here because some of the girls out there didn't get along with us so well."

"I think we ought to get a Saturday off because we worked so hard the past two days."

During this period or feature, this girl received an engagement ring which caused considerable distraction.

Question: "Do you have to think about the work or not?"

Answer: "Oh, I can think about other things, but it's better when you can talk."

When informed of the rest periods to come, this operator favored a ten-minute rest.

Operator No. 2

"The next time they ask us to tell them what we want, [redacted] and I are going to tell them we want to eat our lunch about 11:00 o'clock. You get so hungry by then,"

"Last week we made a pretty good percentage didn't we?"

"I'm tired and don't feel like working hard today."

"Oh, I know what we're going up there for, we're going to be bawled out." (This was with reference to the meeting in Mr. Pennock's office prior to the beginning of the five-minute rest period).

This operator was in favor of a rest period of ten minutes duration.

Operator No. 3

This operator was asked if she thought she did more, less, or about the same amount of work when compared to yesterday (6-12-27).

Answer: "More, I'm almost up to [redacted] and I have a bigger relay."

"I went to bed at 9:00 o'clock last night and feel OK today."

Operator No. 1 (Cont'd.)

"Before we had the rest periods, I would get so sleepy; I would almost fall off of the chair and I was more tired when I got home."

"It's better now with the rest, you feel fine when you start in again."

When the question of increasing the rest periods to ten minutes was discussed, this operator said she would like a ten-minute rest.

Operator No. 2

This operator returned from her vacation, during which time rest periods had been introduced. When asked by Operator No. 1, "Don't you feel like working now when you have a rest?" she answered, "Yes, I do."

This operator purchased a cushion for her chair, saying, "These chairs are so hard!" (8-16-27)

"Gee! we can't always make a big percentage. Some days you feel more like working than others."

"Out in the other room they'd come around and tell you when you didn't make your rate, and they would bawl you out too."

"Nobody ever said anything when you made over your rate."

"But in here (Test Room) with the rests, you don't feel so tired and can work better."

"You ought to make 20,000 piece parts now, [REDACTED], with nobody to talk to." (This was prompted by the friend of one of the girls being on a vacation).

When the 10:00 A.M. rest period was up, this operator remarked:

"Oh, so soon?"

"It doesn't go so good today, I'm more tired."

"I would like a ten-minute rest."

Operator No. 3

"I like the rest periods."

When asked, at one time, how the work was going now that rest periods were being used, she replied:

"It goes like always."



Operator No. 3 (Cont'd.)

Question: "How do you account for the higher output?"

Answer: "Oh, if I don't keep making them you will mark it down." (The reference to "marking it down" was due to our practice of recording pauses, by marking a code number on the tape.)

We told her not to speed up on that account.

"I'm not speeding up on that account." "If I don't get \$30. next week I don't know what I'll do."

"If I get \$30 I'm going to ask my mother for half of it."

"I give her all of it, and when I ask her for \$.50 she tells me I spend more than I make."

Operator No. 4

"I feel great today." (6-21-27)

"I like to work in here better than in the regular department, because one doesn't have so many changes of layouts. It's nice when we run along on one kind of relay."

This girl is of a quiet nature and had no suggestions to offer covering rests.

Operator No. 5

This girl has made no direct reference to the work unless questioned directly. Her physical condition is such as to cause her to complain of being sleepy, having a headache. "The heat bothers me very much," etc.

When beginning rest periods this operator was in favor of a rest period between 10:00 and 10:30, but did not have a suggestion as to length.

2. Five Minute Rest PeriodOperator No. 1

"We'll be getting spoiled with these rest periods."

"Gee! that's the berries! It rests you to have five minutes like that!"

"I wonder if this study will be a success?"

"Gee! you're dead tired now when you come home at night!"

"When Wednesday night comes I'm too tired to go out."

Operator No. 1 (Cont'd.)

"Before we had the rest periods, I would get so sleepy; I would almost fall off of the chair and I was more tired when I got home."

"It's better now with the rest, you feel fine when you start in again."

When the question of increasing the rest periods to ten minutes was discussed, this operator said she would like a ten-minute rest.

Operator No. 2

This operator returned from her vacation, during which time rest periods had been introduced. When asked by Operator No. 1, "Don't you feel like working now when you have a rest?" she answered, "Yes, I do."

This operator purchased a cushion for her chair, saying, "These chairs are so hard!" (8-16-27)

"Gee! we can't always make a big percentage. Some days you feel more like working than others."

"Out in the other room they'd come around and tell you when you didn't make your rate, and they would bawl you out too."

"Nobody ever said anything when you made over your rate."

"But in here (Test Room) with the rests, you don't feel so tired and can work better."

"You ought to make 20,000 piece parts now, [REDACTED], with nobody to talk to." (This was prompted by the friend of one of the girls being on a vacation).

When the 10:00 A.M. rest period was up, this operator remarked:

"Oh, so soon?"

"It doesn't go so good today, I'm more tired."

"I would like a ten-minute rest."

Operator No. 3

"I like the rest periods."

When asked, at one time, how the work was going now that rest periods were being used, she replied:

"It goes like always."

Operator No. 3 (Cont'd)

At another time: "Oh, I would like ten or fifteen minutes, that would be all right. Five minutes is too short."

Operator No. 4

"I like the rest periods, but I think one every hour would be better."

Question: "How does the work go today?"

Answer: "Oh, about the same, I think it's a little too warm today and that makes me sleepy, but I woke up during the rest period."

Question: "How do you like the rest periods?"

Answer: "All right, but I think fifteen minutes would be swell."

Later, this operator decided ten minutes would be better, saying, "You might not be able to make up the fifteen," (9-8-27). (This was, no doubt an honest impression, as looking back from the present when fifty-five minutes are being consumed instead of ten minutes or the anticipated total of thirty minutes, the output is still maintained.)

"We were saying the rest periods ought to be fifteen minutes long." (8-6-27).

Operator No. 5

"It rests you a little bit."

"I don't think I'll move because I'm tired."

"I'm so sleepy today."

Question: "How does the work go today?"

Answer: "All right, only I've got a bum layout again, but I'm going on my vacation tomorrow and that makes it better."

3. Ten-Minute Rest PeriodOperator No. 1

Question: "To what do you attribute the high earnings of the last two days?"

Answer: "I think the rest periods is what causes it."  
"I don't think the earnings have much to do with it."

(This reference to earnings was the result of their being told each day what per cent they had made).

Operator No. 1 (Cont'd.)

"What's the use of working hard, only 60%."

(This remark was the result of a mistake in the percentage as figured by the clerk of the department and came at a time when the operators were conscious of added efforts.) Also may be seen that this girl was interested in the earnings which she had previously stated were not of as much interest to her as the rest periods.

Question: "Wouldn't a fifteen-minute rest period be too long?"

Answer: "It passes fast, it isn't too long."

Operator No. 2

"Gee! we made 80% yesterday. Today we ought to make 90%!"

"We all feel better now with ten-minute rest periods."

"When can we stay home on Saturday mornings?"

"I suppose we can when we make about \$28 in five days."

Question: "To what do you attribute the high production for Monday and Tuesday?"

Answer: "Sure, the rest period does it, you feel better and can work better, and then you know you are making a little more money, and that makes some difference."

Question - Mr. Platenka:

"How is it you girls can make 75% in here (Test Room) and so much less when working in the regular department?"

Answer: "How can you make good out there, when one girl does only 7,000 and another does 11,000?"

"I don't think fifteen minutes would be too long."

(This was brought out during the meeting when an increase from ten to three five-minute rest periods was being planned.)

Question: "Would you have speeded up as much in the regular shop, as you have in the Test Room?"

Answer: "Well, if you have the steady running jobs."

Operator No. 3

"Oh! the dickens with that place!" (Said in connection with advice regarding a pending hospital visit.)

Operator No. 3 (Cont'd)

Question: "To what do you attribute the high production for Monday and Tuesday?"

Answer: "I guess on account of the rests."

When told of a previous day's earnings, this girl said:

"I'm not going to do more than 10,000 parts next Monday."

When asked if fifteen minutes would be too long a rest this girl said:

"I feel the same." (Meaning Operator No. 2's expression of, "I don't think fifteen minutes would be too long," was satisfactory to her).

Operator No. 4

When the girls were informed of a previous day's earnings, this girl said:

"Oh! we earned 80% but we'll only get 60%!"

Question: "To what do you attribute the high production for Monday and Tuesday?"

Answer: "Maybe it's the rests. That's the only thing I can think of for going so high when it's so hot."

"I like to know how much I make so I can tell when I am making more."

"What do we work hard for, we never get the money?"

(This operator was inclined to be rather skeptical about receiving her money, but this has disappeared.) At another time:

"We'll never get all that money."

When assured there was nobody else that could get it, and asked if she could suggest some one that would, she replied, "The bosses, I guess."

Operator No. 5

Question: "To what do you attribute the high production for Monday and Tuesday?"

Answer: "Maybe it's the heat, and oh! you like to know how much you make."

This girl has complained of the heat during the hot weather, and often of an unusually hot afternoon, would express a wish to go home.

The tendency of this girl is toward a number of ailments, such as; being sleepy, a bad feeling in her head and neck.

4. Three Five-Minute RestsOperator No. 1

"I don't like these rest periods. I just get started to work then have to stop, and when I come back I don't feel like working."

"I don't feel like working after the 3:15 rest period."

"I don't feel like working today, although I don't mind coming down in the morning, I really like to come."

"I don't intend to go back in the other department."

"I ate too much for dinner and now I can't work."

Question: "Does everybody like the three five-minute rest periods?"

Answer: "It's too much breaking up."

"I can hardly wait until Monday comes." (First day of lunch.)

Operator No. 2

"I don't like these rest periods."

"Tomorrow I'm going to work like a horse."

A departmental error in calculating the per cent of earnings brought this:

"Oh gee! they're cheating us!"

"I don't mind coming down in the morning either, because there's such a difference in here than in the regular department." "We don't have to worry about getting bawled out about our rates. I wish this test would last two more years."

"I'm getting nuts on this job, I don't know what I'm doing."

"When the whistle blows tonight I won't have anything done. Everything seems to slip out of my fingers."

"If I get any more repairs I'm going on strike."

"I went to church at 5:00 o'clock too, then I went to the store for my mother."

"You can work as hard as you want on this layout, but you can't make anything."

"Anyway with these crazy old rest periods they break it up."

Operator No. 2 (Cont'd)

When time to change to new rest period came, the girls were asked:

Question: "What rest appealed the most?"

Answer: "The ten-minute rest."

"Tonight I have to clean house, scrub the floor and everything, still I'm getting fat."

"I work here and work at home too, but keep on getting fat."

"Tomorrow I have to wash the windows."

Operator No. 3

Question: "How do you like the present rest period?"

Answer: "I feel the same as Wanda does about it."

[redacted] is No. 4 and her reply is found under her paragraph.)

"I feel stiff after the first rest period in the morning."

"I don't feel like working after the 3:15 rest period."

"I don't make a good rate on account of the rest periods."

"I feel goofy today."

"I ate too much for dinner and now I can't work."

"I went to bed at 10:30 last night, but my mother wouldn't wake me up that early." (5:00 A.M. to go to church.)

An unusual average hourly output (60 an hour) was made by this girl, and when asked if she could give a reason for it, said:

"I'm working for a raise."

Question: "Why did your output reach such a high mark?"

Answer: "Mr. Hibarger told us the present rest system was going to be changed."

Operator No. 4

Question: "How do you like the present rest period?"

Answer: "I don't like it. I didn't like it yesterday or today, so why should I like it tomorrow?"

(The last part of this answer was occasioned by the observer's suggestion that perhaps she would like it better when tried longer.)

Operator No. 4 (Cont'd.)

"I would like to have a ten-minute rest at 10:00 o'clock and a five-minute rest at 11:20 in the morning."

"I guess when it comes my turn to bake a cake I'll have to bake two, they're not satisfied with one piece any more."

(This remark was with reference to the hospital visit and "party" as explained in Section No. 5, Physical Examinations.)

"I didn't go to church. I didn't get to bed until 11:30. We were putting up mushrooms."

Operator No. 5

Question: "How do you like the present rest period?"

Answer: "It's too much jumping up and running around. I don't like it."

"I'm so hungry I don't feel like working."

5. Combination Lunch and Rest

Operator No. 1

"Gee! that was swell! You feel like working now!"

"Now I can work better." (After the 9:30 lunch)

"I'm coming here the day before Thanksgiving and have a sandwich." (This girl was on a leave of absence at this time.)

This girl was told that the results of the study might be spoiled and was requested to call out the defective parts in an attempt to distract her mind from a conversation trend. When this was done for one day, she said:

"Yes and say! was I tired? I could hardly wait till 5:00 o'clock!"

Operator No. 2

This girl was told of the possibility of spoiling the results of this period by too much talking.

"Sure, you get too tired when you don't talk. That's what I used to tell Mr. Platenka (shop foreman). If you sit all day without talking it makes you tired."



Operator No. 2 (Cont'd)

"Let's work hard and make a lot of money this week."

"Let's all make 16,000 today." (This was said just after the lunch.)

This operator is inclined to moody spells and her remarks and replies to questions are becoming vague and inadequate.

"I would like to be in bed today, I've got a terrible headache."

"I don't know what is the matter with me, everything is going wrong and I'm glad today's over."

"I don't feel like working today."

"We worked like horses yesterday to make 15,000."

(These large figures are piece parts and denote the terms in which an operator has a mental conception of her work.)

"I'm tired of the lunch period."

"I can't get started to work today."

"I can't eat so much now, I brought only one sandwich." (All operators claimed to eat less at noon.)

Operator No. 3

"When we go over to the hospital again I'll weigh about 130 lbs."

Question: "What does your mother say about your getting so much heavier?"

Answer: "Oh! she says it's all right!"

"How long are they going to feed us?"

"Gee! I thought yesterday was a week."

"I'm so hungry." (4:00 P.M.)

"You won't hear me say another word around here, you go and write it down right away."

"I'm so tired I think the weather makes me feel that way."

"I'm going to do 15,000 today, if I work until 6:00 o'clock."

"I thought 12:00 o'clock would never come."

"I can't work today, I'm too excited over one of my Christmas gifts."

"I'm so sleepy today, I'm just beginning to wake up." (4:45)

"I'm making up for yesterday, that's why I'm working hard."

Operator No. 3 (Cont'd)

"I'm getting sick I feel so weak." (An expression such as this is given because it is felt that its origin may be due to nervous exhaustion.)

Question: "How do you girls feel about the rest periods?  
Would you want to know you had to go your whole working life with or without rest periods?"

Answer: "I want rest periods."

Operator No. 4

"When they serve oranges I want mine peeled." "I don't like to peel an orange."

"My mother will save money now, she won't have to put any sandwiches in my lunch."

"They'll have to keep it up now, or we won't work here."

(Believing that the truth is often spoken in jest, the last remark was recorded. All of these, of course, are in connection with the Combination Lunch and Rest Period.)

"I would like to have a sandwich at 4:00 P.M."

"I'm going to turn out at least 17,000."

"Yesterday was a long day and I was tired."

"I can't make anything with this layout."

"When I work fast all morning I feel like working in the afternoon."

[REDACTED], you and I have to make 17,000 piece parts today." (at 3:35) (This girl turned out 17,214 parts that day.)

"I don't like to work on Saturday morning."

This Operator and Operator No. 3 delight in engaging in "races," spurts of fast working in which each tries to drop a relay ahead of the other, etc.

When the time came to change the feature being tried, they were asked:

Question: "Would you rather discontinue the lunch or the rest?"

Answer: "I would rather continue with both, the lunch and rest."

Operator No. 5

Question: "Will you share your lunch?"

Answer: "I should say not. I'm so hungry about 9:30 or 10:00 o'clock that I could eat a big lunch."

Operator No. 5 (Cont'd)

"My back hurts."

"I'm so lazy today."

"My neck and head hurts me."

"I wish today was over, I'm so tired."

"I'm so sleepy today I could fall right to sleep."

"I ate so much I can just about move."

"I don't feel very well today."

"That dressing on the sandwich made me sick, and  
I was so hungry today, I didn't get enough."

Question: "How is your sore finger?"

Answer: "It doesn't hurt today. This is Saturday and  
Saturday is only a half day, and that makes  
everything feel all right."

(Approximately 75% of this operator's remarks are  
about how sleepy she is, or how tired, or "I don't feel so  
good today.")

## SECTION X

### Factors Affecting Output but External to the

#### Changing Conditions of the Experiment

##### A. SEASONAL VARIATION

In order to determine the existence or absence of general seasonal fluctuations in the output rate, two sets of data were examined. There were (1) the percentage earnings of the whole group of approximately fifty-five hundred gang piece work operators for a three-year period expressed as a percentage of the base rate, and (2) the output of a small group of assembly operators for one year beginning March, 1927, expressed as a percentage of the bogey. In the latter case twenty-nine operators were selected from an examination of the bogey book and the elimination of operators whose record showed changes in the bogey, illness, and extended absence during the period under investigation. \*

The results of this study may be read directly from the accompanying chart to which average monthly temperatures have been added. The chart shows two things clearly: (1) A general upward trend in the production rate during the period under examination; and (2) a definite seasonal variation during the year, producing a two-hump curve with high points in the spring and fall and low points in mid-summer and mid-winter. The individual yearly variations, and hence the average variation, are consistent in the type of seasonal fluctuation shown. The fluctuations are not extreme but are worthy of consideration in interpreting the data of this experiment. \*

The interpretation of this seasonal fluctuation is not entirely easy. The average monthly temperatures which are given on the chart show that the fluctuation is not directly and entirely a function of temperature. Obviously humidity and sudden changes in temperature, as well as the dry bulb temperature itself, would be factors in determining output. Other factors which may influence the vitality of the worker are seasonal changes in the amount of sunlight, changes in the diet due to the materials available in the market, and changes in activities outside of factory hours. \*

An examination of the curves shows that the lowest production is in the summer and the highest production in the fall. January is always the low point in the winter slump but the low point in summer production may be in June, July, or August. Production usually reaches its fall peak in November and its spring peak in April or May. While the curves do not closely follow the temperature the fluctuation is so consistent as to indicate that extremes of temperature in either direction are disadvantageous. The upper critical point seems to be somewhere between 60° and 70°, and the lower critical point between 25° and 30° F. When the

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average temperature moves far beyond either of these critical points production definitely drops. It is to be expected that the movement of the curve showing weekly output for twenty-nine operators would be more variable than the curve showing production for the large group of assembly operators.

#### B. VACATIONS AND PRACTICE EFFECT

The examination of the bogey book showing the output of individual operators during the year from March, 1927, to March, 1928, showed that many operators had an unusually low production for the week following their vacation. Comparative data were drawn off from this book showing the production of one hundred twenty-one operators for the week before their vacation and for the week after. The results of this computation are shown on the following sheet. \*

Sixty-nine of these operators had a one-week vacation and it will be seen that their output for the week following vacation was practically identical with their average output for the week preceding vacation.

Fifty-two of the operators received a two-week vacation. The following table shows that their production, in terms of a percentage of the bogey, was 2.9% less the week after vacation than the week before. The standard deviation of the difference is 1.51. The probable error of the difference is 1.02. \*

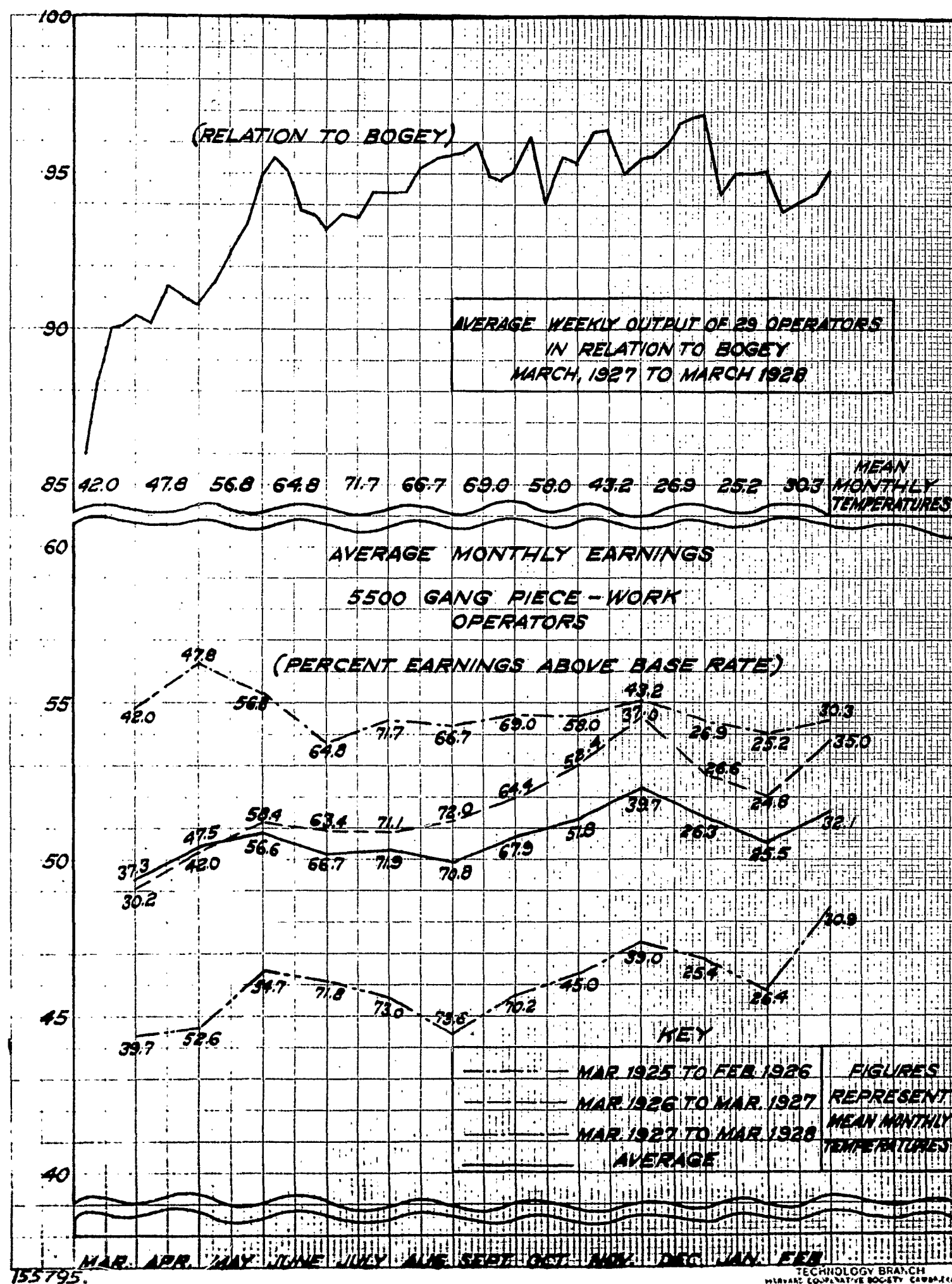
The interpretation of the reliability of this average drop in production by statistical comparison of the average difference with its standard deviation and probable error shows a probability of ninety-seven chances in one hundred that the average production of all operators would be somewhat less the week following a two-week vacation than the week before. \*

This limited study is, therefore, not conclusive but shows the high probability that such a difference exists. Should further data confirm this finding, it would seem that a two-week vacation period produces a physical condition or a "lack of practice" which causes the worker to work at a slightly lower rate when first resuming work.

## Average Output in Relation to Bogey the Week Before (A) and the Week After (B)

## Vacation for 121 Operators in 1927

Two Weeks' Vacation				One Week Vacation			
<u>A</u>	<u>B</u>	<u>A</u>	<u>B</u>	<u>A</u>	<u>B</u>	<u>A</u>	<u>B</u>
92	85	90	94	94	98	92	92
95	76	90	99	102	97	98	94 *
102	96	96	90	87	88	90	100
99	94	96	90	110	93	94	92
89	90	99	96	92	94	94	90
96	86	95	88	98	92	96	94
101	98	96	94	108	98	98	102
94	92			80	93	92	88 *
65	70	Av. 92.5	89.6	96	96	92	92
89	94			88	89	94	94
94	98	$\sigma = 1.11$	1.02	92	92	97	99
101	95			91	102	94	94
98	97	P.E. .748	P.E..737	80	84	98	96
97	91			106	95	94	92
98	84	Aver. Diff. 2.9		98	100	90	92
80	84			77	80	96	96
92	99	$\sigma$ Diff. 1.51		104	95	96	100
103	98			92	86	104	108
97	101	P.E. Diff. 1.02		90	90	94	94
94	94			91	92	84	75 *
89	82	Chances that all oper-		69	71	101	101
80	78	ators would show some		99	99	100	108
93	89	average loss in produc-		95	95	84	85
72	78	tion 97 to 100.		99	101	88	94
98	90			93	96		
89	84			96	80	Av. 93.3	93.17
110	94			102	107		
88	80			65	65		
70	86			85	96		
92	86			104	95		
88	88			84	97		
99	90			91	93		
84	88			100	96		
90	88			101	96		
94	82			100	97		
98	98			95	95		
88	70			96	94		
94	86			96	96		
88	90			78	78		
98	98			92	86		
92	92			95	105		
100	101			92	94		
90	92			94	94		
94	91			90	88		
92	95			93	94		



APPENDIX "A" \*

Physical Examination Data

The following is a report of the Health Examination of Miss  
/H, clock No. 39, an Assembler of Department 6329.  
She is eighteen years old and of Polish descent, and has been in the  
employ of the Company for approximately twenty-one months.

\*

Her replies to the questionnaire are as follows:

She sleeps approximately eight hours a day, has the windows  
open in her room, and her sleep is restful. She eats at home regular-  
ly, is a moderate eater, and does not eat between meals. Her food con-  
sists of meats, fish, eggs, vegetables, beans, sweets, salads, cheese,  
pastry, fruits, bread, and butter. She drinks one glass of milk and one  
cup of coffee daily. She uses a cathartic once a week. She is subject  
to worries.

\*

Had tonsils removed.

Protected against small pox.

Consults a physician and dentist approximately once a year.

She is considered in good health.

Dr. Olmstead's physical examination taken on May 5, 1927, is  
as follows:

\*

Height 5'4"; weight 122 pounds; temperature 98.8; pulse 78;  
respiration 18. Crowns over seventh upper right tooth and sixth and  
eighth teeth in lower right jaw have been removed. Teeth are clean and  
there is no formation. No blue line, bleeding, sponginess, or swelling  
of the gums. The tongue is pink and there are no scars, tremors, coating,  
or tissue substance. Throat is normal; nasal passages are normal;  
sinuses are normal on palpation; eyes are normal. Vision without glasses  
- right, N.V. 50, left N.V. 50; right F.V. 20/20, left F.V. 20/20.  
Pupils are equal and regular and react to light and accommodation. Ears  
are normal; glands are normal; nervous system is normal.

\*

Respiratory System: Chest is symmetrical. Measurements, at  
rest, 31; deep inspiration 32½; expiration 30½. Right and left lungs  
normal. Circulatory System: Rate, at rest 78; after exercise, 96;  
two minutes after, 80. Rhythm, normal.

\*

APPEN. "A"



Border of Heart:	Right: Sub-sternal	Left: 4-6-12 c.m.
	Upper Second Inter Space	Lower (Fifth Inter Space Apex)

Abdomen: Measurement, 34; is not prominent, retracted, or fat, and has no scars; good wall. Liver, spleen, and kidney, normal and not palpable. No ascites; no tympanites; no pain or tenderness. Inguinal rings, right and left, internal and external, normal and good.

Extremities: Hands and feet are normal

Examination of May 24, 1927

Patient is clear but dark; walks erectly; smiles easily; cooperation is very good. Dress is neat, plain; underwear, clean and sufficient; shoes, military heels, round toes. Feet are good. Voice is normal (low).

Urinalysis: Albumen and sugar are negative.

A-3

N 2A, clock No. 147, Department No. 6329, is an assembler, of Polish descent, residing at 4920 W. 30th Street, Cicero, Illinois. She has been employed for four years at the Western Electric Company. She is nineteen years old and was born in Chicago.

\*

Her answers to questionnaire are as follows:

She sleeps eight hours a day with the windows open and her sleep is restful. She lives at home and eats there regularly. Her diet consists of such foods as vegetables, potatoes, beans, salads, pastry, fruits, bread, and butter. She does not eat cheese or sweets. She drinks milk, tea, coffee, and water daily. Her bowels move normally. She takes walks for exercise. She does not worry. Her tonsils have been removed.

\*

She is protected against small pox.

Does not consult a physician regularly.

Consulted a dentist approximately four years ago.

\*

Parents, brothers, and sisters are still living.

She considers herself in good health.

Dr. Olmstead's report of examination of May 6, 1927, is as follows:

Height 5'1"; weight 102 pounds; temperature 99.4; pulse 80; respiration 16. Lower right tooth No. 6 being treated; teeth are clean; formation on teeth. No tremor, scars, coating or fissured substances on tongue; color is pink; No blue line, sponginess, bleeding or swelling of gums.

\*

Throat is normal; nasal passages are normal; sinuses are normal on palpation.

\*

Eyes are normal; vision without glasses - right, N.V. 50, left N.V. 50; right F.V. 20/20, left F.V. 20/20.

\*

Ears are normal; skin is normal; nails are good; hair on head is well kept; body is normal.

\*

Nervous System: Stellag, Romberg, Von Graffe are normal; no tremors; pupils equal and regular, reacting to light and accommodation.

\*

Respiratory System: Chest is symmetrical; at rest, 29 1/2"; at inspiration 30 1/2"; at expiration 28 1/2"; right and left lungs are normal.

\*

Circulatory System: Rate at rest is 80, after exercise is 100, and two minutes after is 78. Rhythm is normal. \*

Urinalysis: Sugar and albumen negative.

Blood Pressure:	<u>Systolic</u>	<u>Diastolic</u>	<u>Pulse Pressure</u>	
At Rest	122	80	42	*
After Exercise	130	80	50	
Two Minutes After	124	80	44	

Border of Heart: Right - Sub Sternal Upper third rib      Left - 6-10-12 Lower fifth Inter Space.

Valves:	<u>Mitral</u>	<u>Aortic</u>	<u>Tricuspid</u>	<u>Pulmonary</u>	
At Rest	0	0	0	0	*
After Exercise	0	0	0	0	
Two Minutes After	0	0	0	0	

No Varicose or Varicocele Veins

Abdomen: 30 inches. Is not fat, prominent, or retracted. No scars; good wall. Liver, spleen, and kidneys, normal and not palpable. No ascites, tympanites, pains or tenderness. Inguinal rings, right and left, internal and external, are normal. Muscles good. \*

Bones, joints, hands, and feet are normal.

#### Summary of Examination May 6, 1927

1. Enlarged thyroid gland \*
2. One carious tooth
3. Temperature 99.4
4. Patient menstruating
5. Low hemoglobin 68% - red blood corpuscles, 3,890,000

#### Summary of Examination May 24, 1927

1. Thyroid enlarged, Nodular - Non-toxic adenoma \*
2. One carious tooth
3. Temperature 99.6. Pulse 122
4. Chronic tonsillitis
5. Chest: Breath sounds roughened over uppers, associated with fine, moist, sub-crepitant rales occasionally.
6. History: Patient feels fine and has gained a pound since examination.

Remarks: Patient walks erectly; pleasant; smiles easily. Clothes plain and neat. Underwear clean and sufficient. Shoes, military heels and round toes. Voice normal and pleasant. \*

3.

A-5

Blood Count:

Hemoglobin . . . . . 68%  
 Erythrocytes per cmm. . . . 3890000  
 Leukocytes per cmm. . . . . 5600

\*

Small Lymphocytes . . . . . 30%  
 Large Lymphocytes . . . . . 7%  
 Polynuclear: Neutrophiles . . 54%  
                   Eosinophiles . . 4%  
                   Basophiles . . 5%  
                                   100%

\*

Mi. <sup>#3</sup> , an assembler in Department No. 6329, is eighteen years old, of Polish descent, and is 5'4" tall, weighing 116 pounds.

Her replies to questionnaire are as follows:

She lives at home. She sleeps eight hours a day with the windows open, although while sleeping she is easily disturbed. Her meals consist mostly of vegetables, sweets, pastry, fruits, and bread. She does not eat beans, salads, cheese, or butter. She drinks two glasses of milk, water, and tea, daily. Her bowels move naturally every day. She has plenty of outdoor recreations and does not worry. She has been vaccinated. She consults a dentist every six months. Her parents, brothers, and sisters, are still living. She is considered to be in good health.

Dr. Olmstead's examination of May 5, 1927, is as follows:

Height 5'4"; weight 116 pounds; temperature 99.6; pulse 100; respiration 18. A crown on No. 7 upper right tooth and No. 7 lower left is absent. No signs of blue line, sponginess, bleeding, or swelling of gums. No tremor, scars, coating or fissured substances on the tongue; color normal. Throat slightly red; tag of tonsil on right side. Nasal passages normal. Sinuses normal to palpation. Eyes normal. Vision, without glasses, right, N.V. 50 - left 50; right, F.V. 20/20 - left 20/20. Ears normal. Nails fair. Hair on head well kept. Body normal.

Glands: Thyroid, slight enlargement; epitrochlear normal; cervical, axillary, and inguinal normal.

Nervous System: Tremor, slight digital. Pupils equal, regular, reacting to light and accommodation.

Respiratory System: Measurements: at rest, 31"; deep inspiration, 32 $\frac{1}{4}$ "; expiration, 29 $\frac{1}{4}$ ". Right and left lungs normal.

Circulatory System: Rate: at rest, 100; after exercise, 120; two minutes after, 100. Rhythm normal.

Blood Pressure:	<u>Systolic</u>	<u>Diastolic</u>	<u>Pulse Pressure</u>
At Rest	122	70	52
After Exercise	128	72	56
Two Minutes After	118	70	48
Border of Heart:	Right - Sub-sternal Upper 3rd rib.	Left - 6-10-12 cmn. Lower from M.S.L.	
Valves:	Normal		

No hemorrhoids, varicose or varicocèle veins.

Abdomen: 33"; is not prominent, retracted, or fat; walls good. Liver, spleen and kidneys, normal and not palpable. Ascites, none. No lymph nodes, pains or tenderness. Inguinal rings, right and left, internal and external, normal.

Muscles good; bones normal; joints normal; hands and feet normal.

Summary of Examination of May 5, 1927

1. Temperature 99.6.
2. Slight thyroid enlargement.
3. Fine, digital tremor.
4. Accelerated pulse.
5. Slightly infected tonsil tag on right side.
6. Slight pharyngitis. Doctor suggested Basal Metabolism Rate.

Summary of Examination of May 24, 1927

1. Temperature 98.6.
2. Thyroid same.
3. Digital tremor somewhat more pronounced.
4. Pulse 80.
5. Chest and heart negative.
6. Throat negative.
7. Patient has been in good condition since last examined, although she is very nervous. Patient walks erectly, smiles easily, and seems to be very pleasant. Dress is neat and plain. Wears low heels and round toes on shoes. Underwear is clean and sufficient.

Blood Count:	Hemoglobin . . . . .	90%
	Erythrocytes per cmm. . . . .	4560000
	Leukocytes per cmm. . . . .	12000
	Small lymphocytes . . . . .	36%
	Large lymphocytes . . . . .	8%
	Polynuclear:	
	Neutrophiles . . . . .	<u>56%</u>
		100%

Urinalysis: Albumin and sugar are negative.

Miss # 4 clock No. 562, Department No. 6329, is an assembler, of Polish descent, residing at 3128 S. 52nd Ct., Cicero. She is nineteen years old, was born in the United States, and has been employed at the Western Electric Company for the past three and one-half years.

Her replies to questionnaire are as follows:

She sleeps eight hours a day with the windows open. She eats regularly at home, and is a hearty eater. Her food consists mostly of meats, potatoes, vegetables, beans, sweets, salads, pastry, fruits, bread, and butter. Does not eat cheese. She drinks one cup of coffee daily and several glasses of water. She eats candy once a week. Her movements of the bowels are normal and daily. She plays ball and roller skates for exercise. She goes to the movies. She does not worry. She has had no diseases, fractures, or surgical operations. She is protected against small pox. She never consulted a physician. She consulted a dentist nine years ago. Her family is still living. She is considered to be in good health.

Dr. Olmstead's report of examination of May 3, 1927, is as follows:

Height 5'1 $\frac{1}{2}$ "; weight 133 pounds; temperature 99.6; pulse 92; respiration 18; No. 7 lower left and right teeth crowned. Teeth clean; no formation. Gums have no blue line, sponginess, bleeding, or swelling. Tongue has no tremor, scars, coating, or tissue substances; color is pink. Throat is red and tonsils are buried and infected. Nasal passages are normal. Sinuses are normal to palpation. Eyes are normal. Vision without glasses is - right, N.V. 50, left 50; right F.V. 20/30, left 20/30. Ears are normal. Skin is normal. Nails are fair. Head of hair is good. Body is normal.

Glands: Thyroid enlarged moderately. Epitrochlear normal. Cervical, Axillary, and Inguinal, normal.

Respiratory System: Measurements: at rest 33 $\frac{1}{4}$ "; deep inspiration 34; expiration 32 $\frac{1}{2}$ . Right and left lungs normal.

Circulatory System: Rate - at rest, 92; after exercise, 100; two minutes after, 92.

Blood pressure:	<u>Systolic</u>	<u>Diastolic</u>	<u>Pulse Pressure</u>
At Rest	120	85	35
After Exercise	130	90	40
Two Minutes After	120	86	34

Border of Heart:	Right - Sub-sternal	Left 6-9-11 cmm.
	Upper 2nd Interspace	

Valves: Normal; no hemorrhoids, varicose or varicocele veins.

Abdomen: 38"; prominent, fat. Wall, liver, spleen, and kidney, normal. Rings, right and left, internal and external, normal. Muscles normal.

Muscles, bones, joints, hands, and feet are normal.

Summary of Examination of May 3, 1927

1. Enlarged thyroid.
2. Slightly accelerated pulse.
3. Elevated temperature.
4. Red throat and chronic tonsillitis.

Summary of Examination of May 24, 1927

1. Thyroid same. No digital tremor.
2. Pulse 88.
3. Temperature 99.4.
4. Throat red. Tonsillitis. Chronically infected.
5. Chest is negative.
6. Patient has been very well since she was here last.

Blood Count:

Hemoglobin . . . . .	82%
Erythrocytes per cmm. . .	4370000
Leukocytes per cmm. . . .	8400
Small Lymphocytes . . . .	20%
Large Lymphocytes . . . .	9%
Polynuclear:	
Neutrophiles . . . . .	71%
	<u>100%</u>

Holds herself in an erect position while walking. Heels are too high and narrow, slightly run over to outside. Voice is normal and pleasant sounding. She smiles easily, is slightly nervous, but very cooperative. Clothes are neat and clean.

Urinalysis: Sugar and albumin are negative.



#5 an Assembler in Department No. 6329, is twenty-eight years old, and has been employed at the Western Electric Company for one year.

Her answers to questionnaire are as follows:

She was born in Norway. She sleeps eight hours a day with the windows open. She eats regularly and her food consists of vegetables, potatoes, beans, salads, cheese, fruits, bread, and butter. She does not eat pastry or sweets. She drinks three cups of coffee daily. She does not exercise, and her only recreation is dancing. She has no worries. She never had any diseases, fractures, or surgical operations. She is vaccinated against small pox. She never consulted a physician and consulted a dentist once. Her family is still living. She is considered to be in good health.

Dr. Olmstead's report of May 5, 1927, is as follows:

Height 5'2 $\frac{1}{2}$ "; weight 130 pounds; temperature 99; pulse 68; respiration 18. A plate in the entire upper portion of mouth and lower 3rd, 4th, 5th, 6th, 7th, 8th, and right 4th, 5th, 6th, 7th, and 8th. Left teeth replaced with plates. Teeth are clean with a slight formation. Gums are not spongy, bleeding, swelled, and there is no blue line. No tremor, scars, coating, or tissue substances on tongue; color pink. Throat normal. Nasal passages normal. Sinuses normal to palpation.

Eyes normal. Vision without glasses: right, N.V., 62 - left, 50; right, F.V., 20/40 - left, 20/25. Does not wear glasses.

Ears normal. Skin, clear, white, and clean. Nails ill kept. Head of hair well kept and abundant. Body normal.

Glands: Thyroid Isthmus prominent. Epitrochlear not enlarged. Cervical, Axillary, and Inguinal not enlarged. No others.

Nervous system: Stellway, Romberg, and Von Graef's negative. Tremors - none. Pupils are equal, regular, reacting to light and accommodation.

Respiratory system: Chest symmetrical. Measurements: at rest 31 $\frac{1}{2}$ "; inspiration 33 $\frac{1}{2}$ "; expiration 31". Right and left lungs normal.

Circulatory system: Rate - at rest, 68; after exercise, 72; two minutes after, 68. Rhythm normal.

Blood pressure:	<u>Systolic</u>	<u>Diastolic</u>	<u>Pulse Pressure</u>
At Rest	120	80	40
After Exercise	130	84	46
Two Minutes After	120	82	38



Mrs. #8 clock No. 558, is an instructor in Department 6329. She resides at 2417 S. Avers Avenue, and has been employed by the Western Electric Company for the past six and one-half years.

Her answers to questionnaire are as follows:

She is twenty-four years old and was born in Chicago. She sleeps eight hours a day with the windows open and her sleep is restful. She is a moderate eater, and eats regularly at home. Her food consists of meats, potatoes, green vegetables, beans, salads, cheese, fruits, bread and butter. She does not eat sweets or pastry. She drinks one glass of milk, tea and water daily. Her bowels move naturally daily. She does not worry. Has been vaccinated. Never consults a physician. Consulted a dentist three years ago. Her family is still living. She is considered to be in good health.

Dr. Olmstead's examination of May 6, 1927, is as follows:

Height 5'2"; weight 102 pounds; temperature 99; pulse 76; respiration 16; teeth clean and no formation, Infection at gum margin at No. 1 left and right lower teeth. Gums: no blue line, bleeding, swelling, sponginess. Tongue is pink. Throat is normal. Nasal passages are normal. Sinuses are normal to palpation. Eyes are normal. Vision without glasses: right, N.V. 50 - left 50; right, F.V. 20/20 - left, 20/20. Ears are normal. Skin is normal. Nails are good. Hair on head is good. Body is normal except for a few isolated lesions of psoriasis.

Glands: Moderately enlarged thyroid. Epitrochlear normal. Cervical, Axillary, and Inguinal normal.

Respiratory System: Chest is symmetrical. Measurements: at rest, 29; inspiration,  $30\frac{1}{2}$ "; expiration,  $28\frac{1}{2}$ ". Right and left lung normal.

Circulatory system: rate at rest, 76; after exercise, 80; two minutes after, 72. Rhythm normal.

Blood Pressure:	<u>Systolic</u>	<u>Diastolic</u>	<u>Pulse Pressure</u>
At rest	118	72	46
After exercise	124	70	54
Two Minutes After	116	70	46

Border of Heart:	Right Sub-sternal	Left 4-8-10 cm.
	Upper 3rd Interspace	Lower 5th Interspaces

Valves: Normal at rest; after exercise; two minutes after.

No hemorrhoids, varicose, or varicocele veins.

2.

Abdomen: 31"; is not prominent, retracted, or fat; no scars; wall is good. Liver, spleen, and kidneys, normal and not palpable. No ascites, lymph nodes, pains or tenderness. Inguinal rings, right and left, internal and external, normal.

Muscles good; bones normal; joints good; hands and feet normal.

Summary of Examination of May 6, 1927

1. Pyorrhea alveolaris.
2. Psoriasis.
3. Moderate enlargements of thyroid.
4. Patient is menstruating.
5. Temperature is 99.

Summary of Examination of May 24, 1927

1. Teeth good except for three lower incisors which show a slight pyorrhea.
2. Pulse 78. Temperature 99.4
3. Fine digital tremor.
4. Throat: tonsils slightly infected.
5. Chest: occasional fine sub-crepitant rales. Coughs a little now and then.

Blood count:	Hemoglobin . . . . .	83%
	Erythrocytes per cmm. . . . .	4450000
	Leukocytes per cmm. . . . .	7600
	Small Lymphocytes . . . . .	32%
	Large Lymphocytes . . . . .	4%
	Polynuclear:	
	Neutrophils . . . . .	64%
		100%

Walks erectly and quickly. Is rather indifferent. Smiles occasionally. Clothes plain and neat. Underwear is clean and sufficient. Shoes, medium low heels and round toes. Person is clean. Voice is normal. Feet are good.

Urinalysis: Sugar and albumin are negative.

February 23, 1928.

Mis. #1, an Assembler, in Department 6329, is eighteen \*  
years old and has been employed for a year and six months at the  
Western Electric Company.

Her answers to questionnaire are as follows:

She was born in Springfield, Illinois. She sleeps eight hours \*  
a day with the windows open, and her sleep is restful. She eats  
regularly at home and does not eat between meals. Her food consists  
of green vegetables, potatoes, baked beans, salads, fruits, bread and  
butter. She does not eat pastry or sweets but eats candy occasionally.  
She drinks milk and plenty of water; also drinks one cup of tea and one  
cup of coffee daily. Her bowels move normally. She walks for exercise.  
She is not subject to worries. She consults family physician once a  
year. She never had any diseases, fractures, or surgical operations.

Dr. Olmstead's report of February 23, 1928, is as follows:

Height 5'5"; weight 114 pounds; temperature 98.6; pulse 80; \*  
blood pressure 132-90-42. Eyes: Vision without glasses - Right 50 -  
20/20; Left 50 - 20/20.

Ears are normal. Tonsils enlarged and slightly infected. \*  
Thyroid and other glands are all right. Heart apex 12 cm. in inter-  
space 5th in. from midsternum; muscular sound all right. Murmurs  
transmitted to axilla to right great vessels. Morale good.

Mi <sup>2</sup>, an Assembler, in Department 6329, is  
twenty years old and has been employed for four years at the Western  
Electric Company.

\*

Her answers to questionnaire are as follows:

She was born in Chicago, Illinois. She sleeps eight hours  
a day with windows open, and her sleep is restful. She eats regular-  
ly and does not eat between meals. Her food consists of meat, green  
vegetables, potatoes, baked beans, sweets, salads, cheese, pastry,  
fruits, bread and butter. She drinks milk and water; also drinks  
one cup of tea and one cup of coffee daily. She does not eat candy.  
Her bowels move normally. She walks for exercise and enjoys being  
out of doors. She is subject to worries. She never had any diseases,  
fractures or surgical operations.

\*

Dr. Olmstead's report of February 23, 1928, is as follows:

Height 5'2"; weight 106 pounds (says she has gained three  
pounds since January 25, 1928); temperature 99; blood pressure  
130-90-40, excitement. No deformity. Ears are normal.

\*

Eyes: Vision, Right 50 - 20/25; Left 50 - 20/25, without  
glasses. Glands: Tonsillar left gland slightly enlarged. Heart  
and lungs negative. Skin clear. Teeth and gums good. She had ton-  
sils removed last May.

\*

The following is Dr. Olmstead's report of examination of  
# 1 clock No. 167, Department 6329:

Summary of May 17, 1928

1. No illness since last examination. Feels very well.
2. Temperature 99.2. Throat red. Tonsils chronically infected.
3. Chest negative.  
Heart: Mitral regurgitation and aortic insufficiency.
4. Weight 113 pounds - a loss of three pounds since last examination. Does not know why she has lost weight.
5. General physical condition fair.

1. Blood pressure on reexamination: 114/60/54.
2. Data on skin stimulation in the morning:
  - a. Shower or tub:  
Tub twice a week.
  - b. Sponge bath:  
Almost every day.
  - c. Cold water on face, throat and chest:  
Cold water.
  - d. Vigorous all-over rub with rough towel.  
Dry - not vigorous.
3. Regularity and time of bowel movement:  
Daily in morning.
4. Menstrual History:
  - a. Date of periods, etc.:  
Menstruating now. Last period April 12.  
Regular. No dysmenorrhea.

The following is Dr. Olmstead's report of examination of  
 #2 clock No. 500, Department 6329:

Summary of May 17, 1928

1. Has been well since last visit. Temperature 99.4. \*
2. Weight 107 pounds - a gain of 1 pound.
3. Chest - rough breath sounds. Heart negative.
4. Throat - red.
5. General physical condition fair. Not improved since last time. \*

1. Blood pressure on reexamination: \*
- 128/90/38
2. Data on skin stimulation in the morning:
- a. Shower or tub: \*
- Tub
- b. Sponge bath:
- No
- c. Cold water on face, throat, and chest:
- Lukewarm.
- d. Vigorous all-over rub with rough towel:
- Turkish towel - lightly.
3. Regularity and time of bowel movement: \*
- Irregular - sometimes morning or evening.
- Once daily.
4. Menstrual History:
- a. Date of Periods, etc.: \*
- Menstruating now.
- Last period four weeks ago.
- Regular.
- No dysmenorrhea.



The following is Dr. Olmstead's report of examination of  
# 3 clock No. 21, Department 6329:

Summary of Examination of May 17, 1928

1. Has felt well since last examination. Hoarseness of throat a week ago.
2. Temperature 99.6. Throat slightly red.
3. Chest - rough breath sounds. No rales. Heart negative.
4. Weight 118 pounds - a loss of 2 pounds.
5. Physical condition fair.

1. Blood pressure on reexamination: 100/60/40.

2. Data on skin stimulation in the morning:

- a. Shower or tub:  
Tub twice a week.
- b. Sponge bath:  
Daily in the evening.
- c. Cold water on face, throat, and chest:  
Face only - daily.
- d. Vigorous all-over rub with rough towel:  
No.

3. Regularity and time of bowel movement:  
Twice daily - midday and evening.

4. Menstrual History:

- a. Date of periods, etc.:  
Three weeks ago. Regular. No dysmenorrhea.

The following is Dr. Olmstead's report of examination of  
#4, clock No. 562, Department 6329:

Summary of Examination of May 17, 1928

1. Has been very well since last examination.
2. Temperature 99.8. Throat negative. Pulse 92.
3. Chest - rough. No rales.  
Heart negative.
4. Weight 141 pounds, - a gain of 4 pounds.
5. General physical condition good.

1. Blood pressure on reexamination: 120/85/35.

2. Data on skin stimulation in the morning:

- a. Shower or tub:  
Tub - two or three times a week.
- b. Sponge bath:  
Sponge daily.
- c. Cold water on face, throat and chest:  
Face - daily.
- d. Vigorous all-over rub with rough towel:  
Moderate

3. Regularity and time of bowel movement:  
Daily - evening.

4. Menstrual History:

- a. Date of periods, etc.:  
Menstruating now. Last period twenty-eight  
days ago. Regular. No dysmenorrhea.

The following is Dr. Olmstead's report of examination of

#5 clock No. 75, Department 6329:

Summary of May 17, 1928

1. Patient has felt very well since last examination -  
in fact, she says she is feeling better now than  
she has felt for a long time. \*
  2. Temperature 98.8. Throat negative.
  3. Chest negative. Heart negative.
  4. Weight, 133 pounds - a loss of 1 pound. \*
  5. Physical condition excellent.
- 
1. Blood pressure on reexamination: \*
  - 120/80/40.
  2. Data on skin stimulation in the morning: \*
  - a. Shower or tub:  
Tub
  - b. Sponge bath:  
Occasionally in evening.
  - c. Cold water on face, throat and chest: \*
  - Warm in evening - cold in morning.
  - d. Vigorous all-over rub with rough towel:
  - Vigorous with a turkish towel.
  3. Regularity and time of bowel movement: \*
  - Once daily usually. Occasionally only once every  
three days. Evening.
  4. Menstrual History:
  - a. Date of periods, etc.: \*
  - Three weeks ago. Regular. Severe  
Dysmenorrhea.

The following is Dr. Olmstead's report of examination of  
 #8 clock No. 558, Department 6329:

\*

Summary of May 17, 1928

1. Has been feeling very well since last examination.
2. Temperature 99. Throat negative.
3. Chest negative. Heart negative.
4. Weight 105 pounds - a loss of  $3\frac{1}{2}$  pounds since last visit.  
 Does not know why she has lost weight. Is not diet-  
 ing and feels well.
5. Physical condition excellent.

\*

\*

1. Blood pressure on reexamination:  
 110/64/46
2. Data on skin stimulation in the morning:

\*

- a. Shower or tub:  
 Tub bath twice or thrice a week.
- b. Sponge bath:  
 Evening - daily.
- c. Cold water on face, throat and chest:  
 Face only - daily.
- d. Vigorous all-over rub with rough towel:  
 Yes, with sponge bath.

\*

3. Regularity of bowel movement:  
 Regular - in morning.

4. Menstrual history:

- a. Date of periods, etc.:  
 Menstruating now.  
 Last menstruation period - 26 days ago.  
 Usually every four weeks.

\*

A-22

May, 1928.

COMPARATIVE PHYSICAL RATING

1. #8
2. #3
3. #5
4. #4
5. #2
6. #1

APPENDIX "B"

HOME AND SOCIAL ENVIRONS

1. WHAT RESPONSIBILITY RESTS ON EACH GIRL AT HOME?

Operator No. 1: No excessive financial responsibilities, but has the house to take care of.

" 2: None.

" 3: Father and herself have supported the family together until recently when young brother started to work. (Father makes \$25.a week.)

" 4: Helps support the family.

" 5: None. Does not live at home. Boards with friends.

New " 1: None.

" " 2: Takes care of family affairs.

2. DOES SHE CONTRIBUTE HER ENTIRE EARNINGS TO THE FAMILY BUDGET?

Operator No. 1: Most all her money is turned in at home.

" 2: Most all.

" 3: Yes.

" 4: Gives all her money home. Mother gives her \$2.50 each week for spending, and also buys her clothes. (Says she doesn't need that much money to spend.)

" 5: Keeps all her money except what is necessary to spend to clothe her sister.

New " 1: Generally contributes her earnings except when in need of wearing apparel. Sometimes gets more than she contributes when in need of more expensive clothes, such as a winter coat, etc.

" " 2: Sometimes has enough for necessities and sometimes not.

APPENDIX "B"

3. IF NOT, APPROXIMATELY HOW MUCH DOES SHE HAVE FOR HERSELF? \*

Operator No. 1: Mother gives her what she needs, which is now greater, as she is buying things for her hope chest.

" 2: Has two dollars a week to spend.

" 3: Only gets money for herself by asking for it, which is infrequently, as family is saving to buy a bungalow next spring.

" 4: ---

" 5: ---

New " 1: Gets as much as she needs.

" " 2: Sometimes has enough for necessities and sometimes not.

4. ANY DOMESTIC SCRUPLES AT HOME WHICH MIGHT REACT UNFAVORABLY? \*

Operator No. 1: Nothing unusual. Have misunderstandings "the same as any other family, I guess."

" 2: None. Says the family gets along just like any other family.

" 3: Nothing unusual. Has arguments with brother. Father never talks. Says what is necessary and that is all. Never talks to the children.

" 4: None. Says father takes pleasure in doing things with the children, such as showing them how to fix things and do whatever they are interested in.

" 5: ---

New " 1: None - no more than the usual. Nothing more than an occasional dispute of no meaning to her. Doesn't amount to any worry.

" " 2: Nothing of an unusual nature.

## 5. WHAT ROUTINE DUTIES AROUND THE HOUSE ARE THEIRS?

- Operator No. 1: All the house work, as her mother has been operated upon and has been ailing for the past eight years.
- " 2: Washes the supper dishes.
- " 3: Has some duties occasionally. Young sister goes to school and does most of the chores, but is not capable enough to relieve mother sufficiently. Does not like to see mother work hard, so helps her, although she is not supposed to. "Has one job already."
- " 4: None. Says father takes pleasure in doing things with the children, such as showing them how to fix things and do whatever they are interested in.
- " 5: Does no more than make her own bed.
- New " 1: Nothing of a routine nature. Occasionally does some house work.
- " " 2: Most of the entire house work.

## 6. IF ANY, ON WHICH DAYS DO THEY PERFORM THEM? (Anything of a strenuous nature - sweeping, washing, scrubbing, etc.)

- Operator No. 1: Prepares supper and does dishes and other work which keeps her occupied until 8:00 or 9:00 o'clock every evening.
- " 2: On Saturday helps her mother with the house cleaning.
- " 3: Does her share of house work on Friday night. Then "can go home Saturday and the work is all done." Does her mother's shopping Saturday afternoons; always has.
- " 4: ---
- " 5: ---
- New " 1: If done at all is done on Saturday.
- " " 2: Monday, Friday, Saturday, and Sunday.



## 7. HOW IS TIME USUALLY OCCUPIED BETWEEN SUPPER AND BED TIME? \*

Operator No. 1: Seldom has time for anything except on Wednesday evenings and sometimes Saturday or Sunday evenings.

" 2: Says when she gets home at night she's almost always too tired to want to do anything. Likes to go auto riding.

" 3: Goes auto riding with sister and brother-in-law. Stays home most of the time.

" 4: Likes to go to the movies and also does her mending and fancy work.

" 5: Does her washing and mending - visits friends - and likes to dance.

New " 1: Ordinary time-passing - walking - visiting - shopping - movies.

" " 2: Does house work on night stated and on amusement nights usually goes to a movie.

## 8. HAVE THEY THEIR OWN ROOM, OR DO THEY SLEEP IN A ROOM WITH SOMEONE ELSE? \*

Operator No. 1: Has always slept alone until recently, when she had to share her room and bed with an orphan cousin.

" 2: Sleeps in her own room.

" 3: Shares room with sister.

" 4: Sleeps with her sister.

" 5: Has her own room and sleeps alone.

New " 1: Sleeps with sister.

" " 2: Sleeps alone.

9. IS THEIR BEDROOM REMOVED FROM ANY DISTRACTING STREET NOISES WHICH MIGHT AFFECT THE SUBCONSCIOUS? HAVE THEY GAINED OR LOST WEIGHT SINCE BEING ON TEST?

Operator No. 1: Bedroom fronts on Kedzie Avenue, but says she is accustomed to the traffic noises.

" 2: No noises bother her in her bedroom.

" 3: Is quiet in bedroom.

" 4: Noises do not bother her. Had lost, then gained weight on the test. When losing weight was on a diet.

" 5: Bedroom is quiet. People she lives with own their home, which is located in Elmwood Park, a northwest suburb, and is a very quiet community. Had lost then gained weight on test.

New " 1: Rather quiet. Lives on a side street (50th Ave.)

" " 2: Yes - not much traffic.

10. WHAT ARE THEY MOST INTERESTED IN DOING OUTSIDE OF WORK?

Operator No.1: In getting things ready for her coming wedding.

" 2: Doesn't know of anything in particular she is interested in.

" 3: Visiting. Likes to go to see her grandmother.

" 4: Likes nothing especially. "Just likes to take it easy around the house."

" 5: Taking care of her lodge work and visiting.

New " 1: She likes light house work. Likes to make things look nice around the house.

" " 2: Would like to be free to do as she pleases.

## 11. ARE THEIR PARENTS EXACTING IN DISCIPLINE? \*

Operator No. 1: Not unusually, "but when it comes to 12:00 or 1:00 o'clock they call up to see why I'm not home."

" 2: "They used to be when I was younger, but not now."

" 3: Very. Cannot have a door key. Must be in when told to. Cannot go out too many times in succession.

" 4: No.

" 5: Parents are in Norway. Father is 73 years old. Was sick last spring, which was the first time in his life but is better now. Has mother, brother and sister at home, and a married brother, all in Norway.

New " 1: No, unless they do not know where she is; then they worry.

" " 2: No.

## 12. IF GIVEN THREE WISHES WHAT WOULD THEY BE? \*

Operator No. 1: "I wish I were married now already, so that all the trouble and worry would be over."

(2)  
(3)

" 2: (1) Would like to have a vacation each week (says about 1/2 day).

(2)  
(3)

Remarks: "I suppose if you had a vacation each week you'd want to be back at work."

This operator did not wish to talk freely but had to be prompted in order to get her answers.

She thinks the rest periods are fine, but not long enough.

" 3: (1) Would like to see her mother get their bungalow.

(2)  
(3)

## 12. IF GIVEN THREE WISHES WHAT WOULD THEY BE? (Continued) \*

Operator No. 3:  
(continued)

Remarks: She thinks the rest periods are fine, but that it will be much better when they are longer or when there are more of them.

This operator seems to be concerned about everything in general, and while she claims not to worry, is ready to do anything with a willingness (in some cases eagerness) that seems to be born of a fear of the consequences if she didn't.

Operator No. 4: (1) I would like about two months' vacation.  
(2)  
(3)

Remarks: Used to go to many dances but does not go now. Parents want to know why she doesn't go out more. Says she "can't understand her parents;" they want her to go out and never bothered her about the time she used to come in. Says her girl friend's folks are different; "always bawling her girl friend out for being out late."

" 5: (1) Health  
(2) Would like to take a trip home at Christmas time.  
(3) Perhaps will get married and take a wedding trip to Norway next spring. (Not a direct wish, but an expression.)

Remarks: Is perfectly satisfied with her work and conditions in general. Likes "the way things are going" and "appreciates her place."

New " 1: (1) To keep health.  
(2) Happiness.  
(3) Traveling.

Remarks: This girl lives at home, has a father and mother, and seems to be free from any responsibilities of any kind. Is rather reticent with strangers but enjoys conversations with acquaintances.

## 12. IF GIVEN THREE WISHES WHAT WOULD THEY BE? (Continued) \*

- New Operator No. 2. (1) Health.  
(2) Keeping a good job.  
(3) Traveling.

Remarks: This girl is a pleasant, friendly type, of an excitable nature, and apparently enjoys the notice her troubles afford her. Among her troubles may be mentioned the loss of her sister and mother, by death, each occurring within a short time of the other.

She feels the responsibility of the care and welfare of her father and brother, and expressed a wish that both could find work, her father not having had any work for the past eight months. The financial condition of the family was further impaired by the purchase of a costly tombstone for her mother's grave, and this expense, together with the funeral expenses, was no doubt excessively high, being aggravated by the natural characteristics of the Italian people.

APPENDIX "C"

ANSWERS TO QUESTIONNAIRE GIVEN ON MAY 8, 1928

Since the test began have you changed your habits in the following:

1. IN GENERAL HEALTH DO YOU FEEL THE SAME, BETTER, OR WORSE?

- Operator No. 1: Feels the same, but has gained in weight. Gained two pounds. \*
- " 2: Has gained and feels better in general. Thinks it due to "a pleasure to come to work now."
- " 3: Thinks she feels better because she likes it in Test Room.
- " 4: Has gained in weight but feels the same. She felt good before coming in and feels good now.
- " 5: Does not feel any worse, certainly; but thinks she feels better.
- " 6: Does not feel so tired any more.

2. HOW ABOUT THE AMOUNT OF VEGETABLES YOU NOW EAT?

- Operator No. 1: Has always eaten vegetables. \*
- " 2: Eats about the same.
- " 3: Thinks she eats more.
- " 4: Eats the same.
- " 5: Eats the same.
- " 6: Eats the same. She always ate a lot.

3. HOW ABOUT THE AMOUNT OF FRUIT YOU NOW EAT?

- Operator No. 1: Thinks she has increased the amount of fruit. \*
- " 2: Eats about the same.
- " 3: Eats about the same.
- " 4: Always did eat a lot of fruit, and still does.
- " 5: Thinks she eats more fruit than before.
- " 6: Eats the same.

## 4. DO YOU DRINK THE SAME AMOUNT OF WATER?

Operator No. 1: Says there is no difference in the amount of water intake. \*

" 2: Drinks more now - about two glasses a day more.

" 3: Says she drinks less water.

" 4: Drinks the same amount.

" 5: Drinks just the same. Always did drink a large quantity of water.

" 6: Drinks the same.

## 5. DO YOU DRINK THE SAME AMOUNT OF MILK?

Operator No. 1: Drinks no more than usual. \*

" 2: Drinks about the same. Never was a big milk drinker.

" 3: Never did drink milk, never liked it; but now does, and drinks more.

" 4: Never drinks any milk. Has learned to eat cheese since being in Test Room.

" 5: Never drinks milk.

" 6: Doesn't drink much milk.

## 6. DO YOU SLEEP THE SAME NUMBER OF HOURS?

Operator No. 1: Used to sleep a greater number of hours than now. \*  
Wants to try to get more sleep.

" 2: Sleeps the same.

" 3: Sleeps about the same.

" 4: Says the number of sleeping hours is a little less because she didn't go out so much before.

" 5: Sleeps more now. Never used to retire before 12:00 or 1:00.

" 6: Thinks she gets less. Before, always felt more tired and went to bed earlier.

7. HAVE THERE BEEN ANY CHANGES IN THE WAY YOU SPEND YOUR EVENINGS?  
IF SO, WHAT?

Operator No. 1: No. \*

" 2: Has an increased amount of household duties,  
and fewer chances of recreation.

" 3: Thinks she is outdoors more now.

" 4: Yes. Used to stay home and sew. Now does  
more going out. "Can't get me to sew or  
do anything any more."

" 5: Yes. Used to go out dancing often. Now  
stays home.

" 6: No.

8. WHAT DO YOU THINK HAS MADE IT POSSIBLE FOR YOU TO INCREASE YOUR  
EARNINGS SINCE YOU HAVE BEEN ON THE TEST?

Operator No. 1: Thinks the working conditions are better. \*  
Likes the absence of bosses; likes the  
rest periods, the lunches, and all things  
about the Test Room in general. "Nobody  
pays any attention to you over there; there  
are too many."

" No. 2: Doesn't have to turn out the same amount of  
work each day. "Can work more as you feel."

" No. 3: "I think the best for me is because we have no  
bosses."

" No. 4: "Conditions in general" and she gets more of  
what they make because of a smaller gang.  
"In there (regular department) the big gang  
holds you back."

" 5: "More free in here. Smaller gang. Never  
have to worry about making your rate."

" 6: Finds it more interesting.



APPENDIX "D"

QUESTIONNAIRE OF MAY 10, 1928

1. WHICH PLACE DO YOU LIKE TO WORK IN BETTER, REGULAR DEPARTMENT OR TEST ROOM?

Operator No. 1: Test Room

" 2: " "  
" 3: " "  
" 4: " "  
" 5: " "  
" 6: " "

2. WHY?

Operator No. 1: Small gang. No bosses.

" 2: Less supervision. Can work faster. Does not have to turn out the same amount of work each day.  
" 3: No boss. Freedom. No fixed rate of output. Easier to work.  
" 4: The way they are treated. Less varieties of relays to assemble. Can place parts where she wishes in Test Room. Does not have to pick up parts from floor. Does not get bawled out if output is low on certain days. Stated that in regular department she sometimes hated to come to work in the morning on account of this. She had a friend who used to cry at times coming to work on the street car for fear of the criticism she would get from the gang boss for low output.  
" 5: No gang boss. More freedom. Can put piece parts on jig. Does not have to pick up parts from floor. Can work better.  
" 6: Less work. Less variety of relays. Less number of layouts.

3. WHAT DO YOU DISLIKE ABOUT TEST ROOM?

Operator No. 1: Nothing

\*

" 2: "

" 3: Would like another fan in hot weather.

" 4: Nothing

" 5: Would like another fan.

" 6: Nothing

4. DO YOU LIKE BEING QUESTIONED?

Operator No. 1: Does not mind.

\*

" 2: No objection.

" 3: "

" 4: "

" 5: Does not mind.

" 6: No objection.

5. DO YOU GET ANY COMMENTS FROM THE GIRLS IN THE REGULAR DEPARTMENT?

Operator No. 1: No.

\*

" 2: "

" 3: Some girls in regular department occasionally sent word in they were sick the next day after a low output rather than come in and be criticized by gang boss. Could never talk back to gang boss. One girl said she did more one day because gang boss did not come around to talk to her.

" 4: No.

" 5: Some girls thought test was for purpose of boosting output which would later be applied to girls in regular department.

" 6: Not much.

6. ARE TEST GIRLS ALL FRIENDLY?

Operator No. 1: Yes.

\*

" 2: "

" 3: "

" 4: "

" 5: "

" 6: Yes. Operators 1, 2, 3, and 4 have parties at each other's house. Operator No. 5 goes to country to see her beau.

7. DO YOU LIKE FREEDOM TO TALK?

Operator No. 1: Yes. Passes away the time.

\*

" 2: Yes.

" 3: Yes. Talking makes her less tired sometimes.

" 4: Yes. Said she used to talk in regular department when the gang boss was out of sight.

" 5: Yes.

" 6: Yes.

8. DO YOU LIKE ADDITIONAL MONEY?

Operator No. 1: Not so important.

\*

" 2: Big factor.

" 3: Not very important.

" 4: Not especially. Stated that girls in regular departments say they would rather earn less money and not have to work so hard.

" 5: Yes, but not controlling.

" 6: Not so important.

9. DO YOU LIKE TO HAVE PEOPLE COME INTO THE ROOM WHERE YOU ARE WORKING?

Operator No. 1: Does not mind. \*

" 2: No bother.

" 3: No choice.

" 4: No objection.

" 5: If she had choice would choose not to have so many people coming into room. However, she has no objection now.

" 6: Pays no attention to outside people now. They made her nervous at first.

10. IS NOISE OBJECTIONABLE?

Operator No. 1: No. \*

" 2: Not now. Floor repair job just outside did bother her.

" 3: Objected to noise from floor repair.

" 4: Test Room quite noisy and disturbs her at times.

" 5: No, except the noise while repairing floor.

" 6: A little.

11. DO YOU LIKE THE SMALL GANG?

Operator No. 1: Yes. \*

" 2: "

" 3: "

" 4: "

" 5: "

" 6: "

## 12. DID YOU LIKE THE GANG BOSS?

Operator No. 1: Never had any trouble with any of them. Does \*  
not mind them.

" 2: Had very little business with gang boss as she  
was one of the fastest operators.

" 3: Liked one gang boss. Did not like two. One  
gang boss used to frighten her very much.  
Was afraid to talk to him.

" 4: Some are not bad. Others very much disliked.  
One gang boss liked to bawl the girls out and  
sometimes made them cry.

" 5: Had three different gang bosses. Liked one.  
He talked nicely to her. Girl next to her  
was criticized every morning. She got so  
nervous she could hardly work at all. Oper-  
ator No. 5 used to worry all the time.  
Never worries now. One gang boss talked  
fresh.

" 6: Had been layout operator for long time. Has  
not had much contact with gang bosses.

## 13. DID YOU LIKE THE FOREMAN?

Operator No. 1: Yes. \*

" 2: "

" 3: Yes. Had very little to do with.

" 4: Foreman very strict. Mentioned that girls  
all liked to work in [REDACTED] department  
because he was not strict. Gave them more  
freedom.

" 5: Yes.

" 6: "

## 14. DO YOU LIKE A LARGE ROOM?

Operator No. 1: Large room, other things being equal. \*

" 2: Was not sure.

" 3: Large room, all things being equal.

" 4: Large room, other things being equal.

" 5: Small room, other things being equal.

" 6: Large room is perhaps pleasanter, other things being equal.

## 15. HAVE YOU EVER WORKED FOR ANY OTHER COMPANY?

Operator No. 1: Yes. Victor Gasket Company. \*

" 2: Yes.

" 3: No.

" 4: Yes.

" 5: No.

" 6: No.

## 16. HOW DO CONDITIONS HERE COMPARE WITH THOSE UNDER WHICH YOU WORKED?

Operator No. 1: Less supervision at Victor Gasket Co. and less money. \*

" 2: More freedom, which she liked too much. Less money.

" 3: ---

" 4: Said she worked for Victor Gasket Co. where they had one foreman with a large number of people in the department and no gang bosses. Girls were free to do as much or as little as they pleased. Said they had a fine time but did not earn very much money. \$14 or \$15.

" 5: ---

" 6: ---

17. WHY DOES OUTPUT FLUCTUATE ON DIFFERENT DAYS?

Operator No. 1: Does not know. \*

" 2: " " "

" 3: Some days does not feel like working.

" 4: Does not know.

" 5: Just feels like working some days and other days does not feel so much like it. Cannot explain.

" 6: Does not know.

18. WHY IS MONDAY'S OUTPUT LOW?

Operator No. 1: Does not know. \*

" 2: " " "

" 3: Being out late Sunday night and it takes some time to break in on the first of the week.

" 4: Does not know.

" 5: " " "

" 6: Tired from Saturday night and Sunday.

19. WHY IS SATURDAY'S OUTPUT LOW?

Operator No. 1: Does not know. \*

" 2: " " "

" 3: Does house work Friday night and is usually pretty tired Saturday morning.

" 4: Perhaps getting tired.

" 5: Cannot explain. Says she has tried harder on Saturday mornings but does not seem to be able to work as well as on other days.

" 6: Does not know.

## 20. WHAT CAUSED OUTPUT TO GO UP IN THE TEST ROOM?

Operator No. 1: Does not know.

\*

" 2: " " "

" 3: When she came on test did not know there was no gang boss. Turned out 14,000 parts first day and 13,000 parts second day. Expected criticism for low output and when this did not happen she speeded up.  
Note: This girl thinks that Irene had the idea that the results of the Test Room would some day be forced on the girls in the regular department.

" 4: Freedom to place parts where she wishes. Rest periods. Happier.

" 5: Says girls sometimes had to wait for parts in regular department and had more changes in types.

" 6: Operators know what they get. Less variety. Less tired.  
Note: Stated that [REDACTED] and [REDACTED] had said several times that they hated to come to work in the morning in regular departments when their output had been bad the day before. They would be told about it in the morning and this discouraged them for the day.

## 21. WHICH DO YOU LIKE BETTER, A MAN OR WOMAN SUPERVISOR?

Operator No. 1: Man

\*

" 2: "

" 3: "

" 4: "

" 5: "

" 6: No choice.



9:30 A.M. LUNCHEES  
SERVED TO OPERATORS ON TEST

1st Week

Monday - Postum, tomato sandwich (whole wheat bread)  
Apple (raw)

Tuesday - Coffee, tongue sandwich (rye bread)  
Orange

Wednesday - Tea  
Peanut butter and jelly sandwich (whole wheat bread)  
Sliced pineapple

Thursday - Vegetable soup  
Stewed prunes

Friday - Orange juice, marmalade sandwich (whole wheat bread)  
Banana

Saturday - Oatmeal and cream  
Apple (raw)

2nd Week

Coffee, tongue sandwich (rye bread)  
Sliced pineapple

Postum, tomato sandwich (whole wheat bread)  
Rice pudding

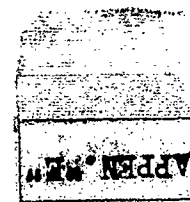
Vegetable soup  
Apple (raw)

Orange juice  
Peanut butter and jelly sandwich (whole wheat bread)  
Banana

Tea  
Egg salad sandwich (whole wheat bread)  
Orange

Oatmeal and cream  
Stewed prunes

APPENDIX E



NOON TIME LUNCHES OF OPERATOR NO. 1

# 6

Before Introduction  
of  
9:30 A.M. Lunch

After Introduction of  
9:30 A.M. Lunch

Lunch - 1st Week

Lunch - 2nd Week

Mon. Aug. 8 - Spanish rice,  
potato salad,  
orange and milk.

Tues. Aug. 9 - Sandwich, milk,  
tomatoes, pear  
and orange.

Wed. Aug. 10 - Sandwich, pie  
a la mode, and  
milk.

Thurs. Aug. 11 - Ham sandwich,  
pie a la mode,  
and milk.

Fri. Aug. 12 - Spaghetti, pie,  
milk, and orange.

Sat. Aug. 13 - Hamburger sand-  
wich, and coffee.

Mon. Nov. 7 - Veal sandwich,  
bottle of milk  
and an apple.

Tues. Nov. 8 - Bologna sausage,  
sandwich, bottle  
of milk, apple  
and banana.

Wed. Nov. 9 - Summer sausage  
sandwich, bottle  
of milk, and  
apple.

Thurs. Nov. 10 - Ham sandwich, pie,  
bottle of milk  
and apple.

Fri. Nov. 11 - Absent.

Sat. Nov. 12 - Absent.

Mon. Nov. 14 - Pork sandwich, pie  
and apple.

Tues. Nov. 15 - Ham sandwich,  
apple, banana and  
milk.

Wed. Nov. 16 - One-half sandwich,  
2 cookies and  
apple.

Thurs. Nov. 17 - One-half B&B  
sandwich, 4  
cookies, apple  
and milk.

Fri. Nov. 18 - No record.

Sat. Nov. 19 - Absent

11-2

NOON TIME LUNCHES OF OPERATOR NO. 2

#7

Before Introduction of 9:30 A.M. Lunch		After Introduction of 9:30 A.M. Lunch	
		Lunch - 1st Week	Lunch - 2nd Week
<u>Mon. Aug. 15.</u>	- One-half sandwich, 2 pieces of cake, peach, pear, and bottle of milk.	<u>Mon. Nov. 7.</u>	- Ham sandwich, 4 graham crackers and orange.
<u>Tues. Aug. 16.</u>	- Two sandwiches, pickle, cake, orange and milk.	<u>Tues. Nov. 8.</u>	- Jelly sandwich, two doughnuts, two cookies, one-half banana and orange.
<u>Wed. Aug. 17.</u>	- Sandwich, 2 pieces of cake, 2 pears and milk.	<u>Wed. Nov. 9.</u>	- Corned beef sandwich, 2 pears, cake, bunch of grapes.
<u>Thurs. Aug. 18.</u>	- Sandwich, pickle, 2 pieces of cake, orange and milk.	<u>Thurs. Nov. 10.</u>	- Ham sandwich, 2 pcs. of cake and orange.
<u>Fri. Aug. 19.</u>	- Potato salad, spaghetti, doughnut, banana, pie, and milk.	<u>Fri. Nov. 11.</u>	- Absent
<u>Sat. Aug. 20.</u>	- One pork chop, 2 slices of bread, cake and root beer.	<u>Sat. Nov. 12.</u>	- Pot roast, mashed potatoes, pie and tea.
		<u>Mon. Nov. 14.</u>	- B&B sandwich, 2 pieces of cake and apple.
		<u>Tues. Nov. 15.</u>	- Corned beef sandwich, pie, cake and grapes.
		<u>Wed. Nov. 16.</u>	- Ham sandwich, cake and 6 plums.
		<u>Thurs. Nov. 17.</u>	- Ham sandwich, cake and apple.
		<u>Fri. Nov. 18.</u>	- Cheese sandwich, 2 pieces of cake and apple.
		<u>Sat. Nov. 19.</u>	- Soup, beef stew, potatoes, pickle, cake and tea.

11-5

NOON TIME LUNCHES OF OPERATOR NO. 3

#3

Before Introduction of 9:30 A.M. Lunch		After Introduction of 9:30 A.M. Lunch	
		Lunch - 1st Week	Lunch - 2nd Week
<u>Mon. Aug. 8.</u>	- Sandwich, pear, 4 plums, and bottle of milk.	<u>Mon. Nov. 7.</u>	- Liver sausage sand- wich, slice of cake, piece of pie, banana, apple and milk.
<u>Tues. Aug. 9.</u>	- Sandwich, pie, 2 bananas, 2 pears and milk.	<u>Tues. Nov. 8.</u>	- Ham sandwich, apple, and milk.
<u>Wed. Aug. 10.</u>	- Sandwich, pineapple pie, orange, banana, pear, plum and milk.	<u>Wed. Nov. 9.</u>	- Minced ham sandwich orange, apple and milk.
<u>Thurs. Aug. 11.</u>	- Sandwich, corned beef hash, orange, banana, 2 pears, plum and milk.	<u>Thurs. Nov. 10.</u>	- Ham sandwich, pie and milk.
<u>Fri. Aug. 12.</u>	- Two slices of bread, spaghetti, orange, 2 bananas, plum and milk.	<u>Fri. Nov. 11.</u>	- Egg sandwich, pie and milk.
<u>Sat. Aug. 13.</u>	- Cake and coffee.	<u>Sat. Nov. 12.</u>	- Ham sandwich, cake and coffee.
		<u>Mon. Nov. 14.</u>	- One-half liver sausage sand- wich, spanish rice, milk, banana and apple.
		<u>Tues. Nov. 15.</u>	- Doughnut, 2 bananas, apple and milk.
		<u>Wed. Nov. 16.</u>	- Pie, 2 bananas, apple and milk.
		<u>Thurs. Nov. 17.</u>	- Hamburger sand- wich, orange, banana, apple and milk.
		<u>Fri. Nov. 18.</u>	- One-half egg sandwich, pie, banana, orange, apple and milk.
		<u>Sat. Nov. 19.</u>	- Frankfurter sand- wich and coffee.

NOON TIME LUNCHES OF OPERATOR NO. 4

Before Introduction of 9:30 A.M. Lunch		After Introduction of 9:30 A.M. Lunch	
		<u>Lunch - 1st Week</u>	<u>Lunch - 2nd Week</u>
<u>Mon. Aug. 8.</u>	- Sandwich, 2 sweet pickles, cake, banana and pear.	<u>Mon. Nov. 7.</u>	- Piece of cake, 2 apples and orange.
<u>Tues. Aug. 9.</u>	- Sandwich, cake, 2 bananas, and pear.	<u>Tues. Nov. 8.</u>	- Two apples and orange.
<u>Wed. Aug. 10.</u>	- One-half sandwich, banana and 2 pears.	<u>Wed. Nov. 9.</u>	- Piece of pie, orange and apple.
<u>Thurs. Aug. 11.</u>	- Chop suey, rice, 2 buns and tea.	<u>Thurs. Nov. 10.</u>	- Pork chop sandwich, tangerine, and apple.
<u>Fri. Aug. 12.</u>	- Sandwich, pie, 2 hard boiled eggs, 2 bananas and 2 pears.	<u>Fri. Nov. 11.</u>	- Egg sandwich, tangerine and apple.
<u>Sat. Aug. 13.</u>	- Hamburger steak, 2 slices of bread, cake and coffee.	<u>Sat. Nov. 12.</u>	- Hamburger sandwich and coffee.
		<u>Mon. Nov. 14.</u>	- Two pork chop sandwiches, orange and apple.
		<u>Tues. Nov. 15.</u>	- Two ham sandwiches, orange and milk.
		<u>Wed. Nov. 16.</u>	- Ham sandwich, orange and apple.
		<u>Thurs. Nov. 17.</u>	- One-half sandwich, piece of cake, orange and apple.
		<u>Fri. Nov. 18.</u>	- Two peanut butter sandwiches, apple and orange.
		<u>Sat. Nov. 19.</u>	- Spaghetti and coffee.

#5  
NOON TIME LUNCHES OF OPERATOR NO. 5

Before Introduction of 9:30 A.M. Lunch		After Introduction of 9:30 A.M. Lunch	
		Lunch - 1st Week	Lunch - 2nd Week
<u>Mon. Aug. 8.</u>	- Two sandwiches, apple and peaches.	<u>Mon. Nov. 7.</u>	- Cheese sandwich, apple and pear.
<u>Tues. Aug. 9.</u>	- Two sandwiches, sweet bread, 3 plums and grapes.	<u>Tues. Nov. 8.</u>	- Pork chop sandwich and apple.
<u>Wed. Aug. 10.</u>	- Two egg sandwiches, sweet bread, peach and pear.	<u>Wed. Nov. 9.</u>	- Egg sandwich, and tangerine.
<u>Thurs. Aug. 11.</u>	- Two cheese sandwiches, apple and pear.	<u>Thurs. Nov. 10.</u>	- Ham sandwich and grapes.
<u>Fri. Aug. 12.</u>	- Two sandwiches and apple.	<u>Fri. Nov. 11.</u>	- Cheese sandwich and apple.
<u>Sat. Aug. 13.</u>	- Corned beef and cabbage, cake and coffee.	<u>Sat. Nov. 12.</u>	- Meat, potatoes, corn, pie and coffee.
		<u>Mon. Nov. 14.</u>	- Roast pork sandwich and apple.
		<u>Tues. Nov. 15.</u>	- Jelly sandwich, 1 pear and grapes.
		<u>Wed. Nov. 16.</u>	- Ham and pickle sandwich, and apple.
		<u>Thurs. Nov. 17.</u>	- Ham sandwich and apple.
		<u>Fri. Nov. 18.</u>	- Pork chop sandwich, orange and apple.
		<u>Sat. Nov. 19.</u>	- Meat balls, cabbage, potatoes, coffee and cake.

NOON TIME LUNCHES OF LAYOUT OPERATOR

#8

Before Introduction of 9:30 A.M. Lunch		After Introduction of 9:30 A.M. Lunch	
		Lunch - 1st Week	Lunch - 2nd Week
<u>Mon. Aug. 8.</u>	- Sandwich, cookies, milk, orange and pear.	<u>Mon. Nov. 7.</u>	- One-half sandwich, apple, banana and 4 cookies.
<u>Tues. Aug. 9.</u>	- Sandwich, orange, 2 pears and cookies.	<u>Tues. Nov. 8.</u>	- Ham sandwich, orange, banana, grapes and 2 cookies.
<u>Wed. Aug. 10.</u>	- Two sandwiches, orange and pear.	<u>Wed. Nov. 9.</u>	- Minced ham sand- wich, apple and banana.
<u>Thurs. Aug. 11.</u>	- Two sandwiches, and 2 oranges.	<u>Thurs. Nov. 10.</u>	- Steak sandwich, and 2 bananas.
<u>Fri. Aug. 12.</u>	- One sandwich and 2 oranges.	<u>Fri. Nov. 11.</u>	- One-half cheese sandwich, orange and banana.
<u>Sat. Aug. 13.</u>	- Veal, creamed gravy, potatoes, coffee and cake.	<u>Sat. Nov. 12.</u>	- Veal stew, pota- toes, tomato salad, coffee and cake.
		<u>Mon. Nov. 14.</u>	- Ham sandwich, piece of cake, apple and banana.
		<u>Tues. Nov. 15.</u>	- Ham sandwich, apple and banana.
		<u>Wed. Nov. 16.</u>	- Veal sandwich, apple and orange.
		<u>Thurs. Nov. 17.</u>	- Ham sandwich, apple and banana.
		<u>Fri. Nov. 18.</u>	- Cheese sandwich, apple and tangerine.
		<u>Sat. Nov. 19.</u>	- Soup, roast pork, baked potatoes, cabbage, coffee, bread and butter.

APPENDIX "F"

LIST OF FIRMS HAVING REST PERIODS

<u>Name</u>	<u>Address</u>
Alexander Hamilton Institute	New York, N.Y.
Aluminum Castings Co.	Detroit, Mich.
Cadillac Motor Car Co.	"
Chicago Telephone Co.	Chicago, Ill.
Cincinnati Wire Bound Box Co.	Cincinnati, Ohio
Cooper Liberty & Thompson	Marlboro, Mass.
Dennison Manufacturing Co.	Framingham, Mass.
A. C. Gilbert Co.	New Haven, Conn.
A. Goodman	New York, N.Y.
Hammerhill Paper Co.	Erie, Pa.
Metropolitan Life Insurance Co.	New York, N.Y.
Miller Lock Co.	Philadelphia, Pa.
Missouri & Kansas Telephone Co.	Kansas City, Mo.
Montgomery Ward & Co.	Chicago, Ill.
National Cash Register Co.	Dayton, O.
National Cloak & Suit Co.	New York, N.Y.
New England Telephone & Telegraph Co.	Boston, Mass.
New York Telephone Co.	New York, N.Y.
Norton Co.	Worcester, Mass.
Pennsylvania Railroad	Brooklyn, N.Y.
Pilgrim Steam Laundry Co.	"
Plimpton Press	Norwood, Mass.
Poole, C. L.	
Sefton Manufacturing Co.	Brooklyn, N.Y.
Successful Farming	Des Moines, Ia.
United Life & Accident Insurance Co.	Concord, N.H.
Yale & Towne Manufacturing Co.	Stamford, Conn.

Letters were addressed to some of the concerns listed and their comments are as follows:

Mr. G. L. Peck of the Pennsylvania Railroad Company states that they have, up to within a few months, observed what was termed "recreation periods" of five minutes in the morning and afternoon, during which time the windows were raised and light calisthenic exercises were engaged in. Interest in this waned, however, and the two five-minute rest periods were apparently added to the noon lunch period. It is quite apparent that the practice mentioned corresponds with the practice we have followed for some years in the large offices of having a ventilating period in the morning and afternoon during cold weather.

Mr. G. L. Mahoney of the Dennison Manufacturing Company writes that they have not done a great deal along this line although they



have rest periods in several of the factory departments and in the main office. Mr. Mahoney states that their staff psychologist will write further giving more information.

Mr. F. T. Ellis, Cadillac Motor Car Company, thinks we have been misinformed concerning their practice as they have no relaxation periods on any class of work. They have never given the subject very much consideration as they have never noticed the real need for it, but if other industrial concerns are working along this line Mr. Ellis would be very much interested to know how the scheme is working out.

Mr. J. W. Collins of the United States Aluminum Company states that some years ago, when their starting time was 6:30 a.m., they allowed the workmen a five-minute rest period at 9:00 o'clock, as the men seemed to become hungry and wished to eat lunch. This time was frequently taken advantage of to smoke, but for the last four or five years, since their starting time has been 7:00 o'clock in the morning, the rest period has been discontinued entirely. They have no records to show whether or not the rest period made any particular difference in their production.

Dr. Clark of the Norton Company writes over his secretary's signature that they have no rest periods at the Norton Company.

James C. Marshall of the General Box Company states that just after the war they did adopt relaxation periods of fifteen minutes' duration in the morning and afternoon. At that time, however, they were operating ten hours a day and it was necessary to take on employees who could not work the full ten hours without a rest. At the request of their employees they first dropped out the afternoon rest period, closing the factory fifteen minutes earlier, and also adopting a nine-hour day. This worked satisfactorily and they were later approached by the employees requesting that the morning rest period be cut out, shortening the day to this extent. They are now operating nine hours a day, that is, from 7:00 to 12:00, and from 12:30 to 4:30, and have no rest periods. They found that in spite of all they could do these rest periods were stretched out and it took from five to ten minutes to get started again. Under present circumstances they would not return to the rest-period plan.

Mr. John Williams of the Yale & Towne Manufacturing Company states that for the last twelve years they have observed two rest periods each day throughout the Works and Offices. These periods have been 9:30 to 9:35 a.m., and 3:00 to 3:05 p.m. Their experience has proved the value of such relaxation. It relieves the tension incident to constant application and their presumption is that it aids concentration during the work period immediately thereafter.