# A HEURISTIC APPROACH TO THE PRODUCTION PLANNING AND THE LINE BALANCING PROBLEMS IN A METAL PROCESSING INDUSTRY

By

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M. Nadir Kutluca

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# PART I

## CHAPTER 1

## INTRODUCTION

### 1.1 Objective of the Study

Today one of the major problems of the Turkish Industrial establishments, is the inefficient use of the production facilities. We believe that some of the modern management techniques can be used to solve this problem.

We know that the low efficiency problem of the production facilities can be solved by using many different methods. Some of these are not related with scientific programming techniques, such as:

1 - Training the labor force.

2 - More efficient production control.

3 - Technically more sopisticated machines.

Here we are not concerning ourselves with the above mentioned methods, and assume that they are applied to a reasonable level as much as the internal conditions of the company and the environmental factors permit. Then the objective of this study is to analyze and determine whether the application of scientific programming techniques can make any improvement in the way of increasing the efficient utilization of the production facilities over and above the rule-of-thumb methods.

In order to achieve a better understanding of the underlying assumptions, and to be able to evaluate the outcomes of the theoretical analysis under more realistic conditions, a Metal Processing Company has been chosen as a model. The development of the methodology for the solution of the efficiency problem is carried on with respect to the specific characteristics of this company. However, in this study the emphasis is on the methodology itself, and not on finding specific solutions to the problems considered.

## 1.2. Scope of the Study

In this study, only the problems of the Tin Can Body Manufacturing department of the factory is taken into consideration. While analysing the problems of the tins and can lids - prepared at printing and lid departments - are assumed ready for processing.

As it is mentioned, in the objectives of the study, only the inefficiency problem of the tin can department will try to be solved in this study.

It should be mentioned that the tested alternatives to solve the problem are not exhaustive, some other alternatives that are not considered in this study certainly do exist. This is the characteristic of the heuristic problem solving approach;

where we take only the most likely, instead of all of the alternatives.

We solved the general problem of increasing the efficiency of the production facilities by using an example of a specific factory, therefore the alternatives applied to solve the problem give us specific ways to solve the problem designed especially for the model.

## 1.3. Method of the Study

The background information about the programming techniques applied in this study, given in Appendices I, II, and III, are written on the basis of research carried out in the books written on the related subjects. The books used for this study are listed in the biliography.

The practical work is based on mainly five computer programs, three of which were developed for this thesis.

The tird and fourth ones are the Production Line Balancing and Linear Programming with IBM 1620 developed by the IBM Company. The fifth computer program applied to test one of the alternatives, is obtained by some modifications made on the scheduling program.

The method of approach can be summarized in a few steps as follows:

1 - Fourty different tin cans manufactured in the department will be standardized into 14 models according to their shape and size.

2 - Weekly orders of 14 standardized models will be simulated by using the simulation program.

3 - The simulated weekly orders obtained from the simulation program run will be used in scheduling programs to obtain the efficiencies of the machines.

4 - Several alternatives to decrease the inefficiencies of the machines will be tested by using the Production Scheduling Production Line Balancing with IBM 1620, Linear Programming with IBM 1620 and the modified Production Scheduling Program.

5 - Finally the best tested alternative will be idenfied and suggested to the application of new plant layout.

General information about the factory will be given in Chapter II. This information about the factory, the product, the production process, the customer orders, the production facilities the production planning, the problems met in the factory and the alternatives suggested for the problems are the basis of the scientific management techniques applied to solve the problem, given in Chapter III.

The practical applications of the four scientific management techniques, namely, Production Simulation, Production Scheduling, Line Balancing and Linear Programming used in this study will be explained in Chapter III.

In Chapter IV, the analysis of results of the actual conditions and the suggested alternatives will be made.

Chapter V will give the summary of the results obtained from the alternatives, together with their advantages and disadvantages. Additionally, conclusion and the recommendation to the factory manager will be given in this chapter.

The background information about the management techniques used in this study will be given in Appendices I, II, and III in order to have a smooth flow in explaination of the practical work. Also, the computer programs, their inputs and outputs, and supporting data will be given in the Appendices.

## 1.4. Time of the Study

The work on this distertation started in November 1968. The research work on the problem in the factory and the theory ended in February 1969. The work on the computer programs and the alternatives tested ended in mid April 1969. The final copy was typed and presented in May 1969.

# CHAPTER 2

# GENERAL INFORMATION

## 2.1. Factory

TASAŞ Tin Can Factory is a medium size establishment. Yearly production capacity of the factory is about 6 million cans, working on a two shift basis. Nearly 40 different models of tin cans, varying in shape and size, are manufactured by using 3 offset printing presses and 64 processing machines.

The factory is composed of 3 basic departments:

1 - Offset Printing Department: has 3 offset printing presses.

2 - Tin Can Body Manufacturing Department: has 46 machines which are placed in 6 different production lines.

3 - Lid Department: has 18 punch presses.

## 2.2. Customer Orders

The factory operates on job order basis. Since tin can storage requires a great floor space, the policy of the management is to produce the cans after a "Delivery Request" comes in from the customers. At the beginning of the year, most of the customers place blanket orders about the number of cans that they will demand during the year. Also few additional orders come in during the year without any previous agreements made. But these orders constitute a very minor part of the total amount to be manufactured. When the customer needs cans, they give the "Delivery Request" for the required amount. Upon receipt of the request, the man in charge of production planning, schedules and then issues the order - to start on scheduled date - to the production department. Some-times rush orders come in from the customers. At that time, the production department postpones the previously scheduled orders, in order to manufacture these rush orders. This shows that there is not a rigid production policy in the factory.

## 2.3. Products

As it is mentioned above, more than 40 different models of cans are manufactured in the factory. Since most of the cans are similar in size, shape and are produced in the same production lines, they can be classified into 14 standard models. These 14 standard models, their shape and the production lines used in production process are listed in Table 1.

| Item No | Models | Shape | Production Line used |
|---|---|---|---|
| 1 | Brezilya kahve kutusu | Rectangular | A |
| 2 | 1/2 kg Drazman | " | B |
| 3 | 1/2 kg Baygan | " | B |
| 4 | 100 gr Baygan | Cylindrical | E |
| 5 | 1 gallon Mobil | R | C |
| 6 | 1 kg Mobil | C | E |
| 7 | 1 kg ÇBS | C | E |
| 8 | 3.5 kg ÇBS | C | D |
| 9 | 2 kg Vita | C | D |
| 10 | 5 kg Vita | C | D |
| 11 | 1 kg Fosferno | C | E |
| 12 | 10 kg Bayer | C | E |
| 13 | 5 kg Bayer | C | E |
| 14 | SMA Mara Kutusu | C | F |

TABLE 1: - Models of Cans Manufactured

A general Process Flow Chart is drawn in order to be able to see the processes in the sequence followed in the production (Figure 1).

The standard operations for tin can manufacturing are:

1. Shearing (horizontal and vertical)
2. Body Rolling or bending
3. Electrical soldering or seaming
4. Flanging (punching edges)
5. Assembling bottom and top lids by seaming

Additional operations required for some cans are:

1. Flanging
2. Corner notching
3. Tracking
4. Gasket placing
5. Attaching handle.

Three months ago a time study was made in the factory. The standard times of each operation for the 14 models was obtained at the end of this study. The operation sequences, standard times, machines employed for the operations and the machine capacities per shift for one model are given in Figure 2, and the data for the other models are given in Appendix IV.

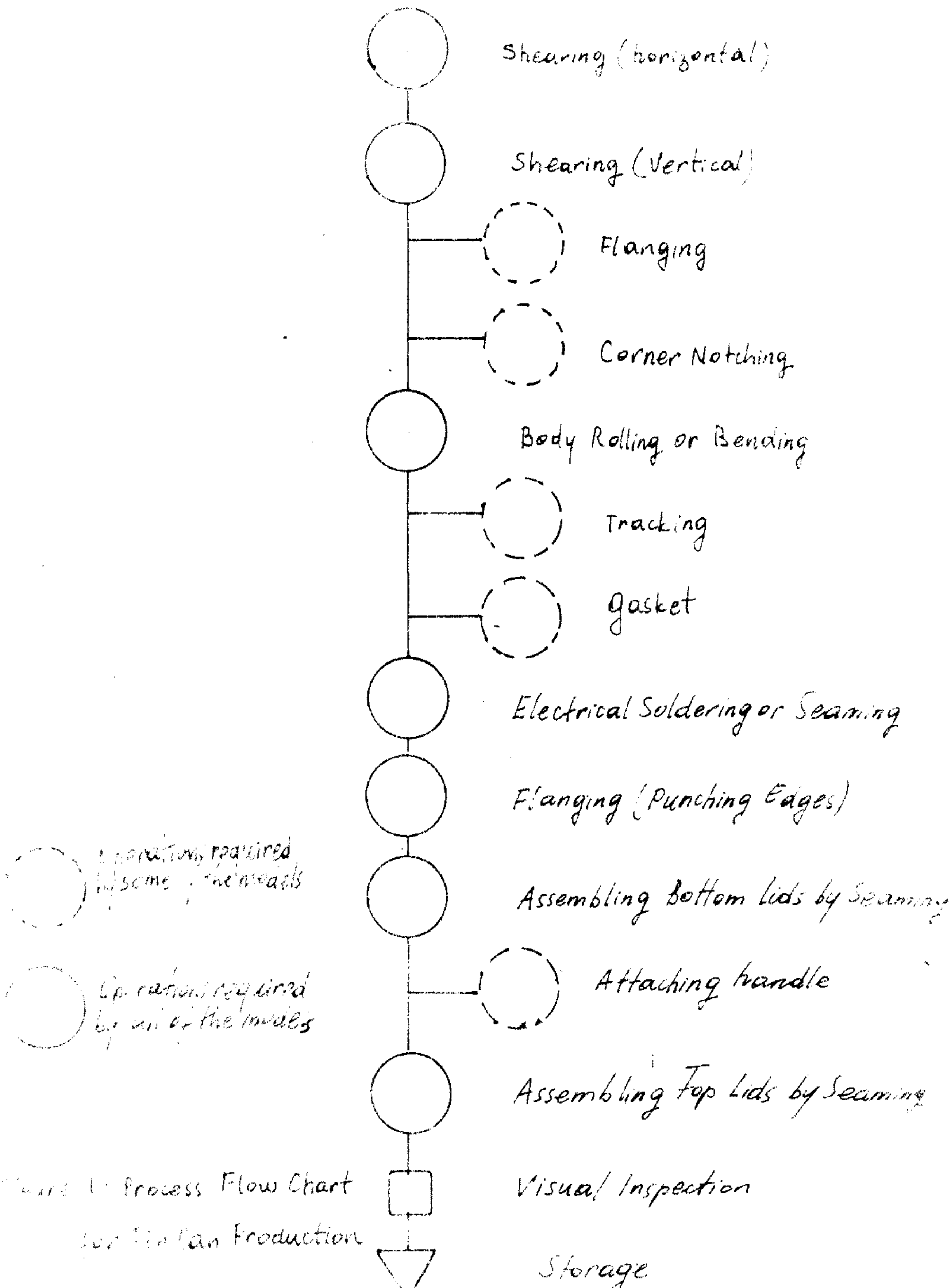



Chart 1: Process Flow Chart for Tin Can Production

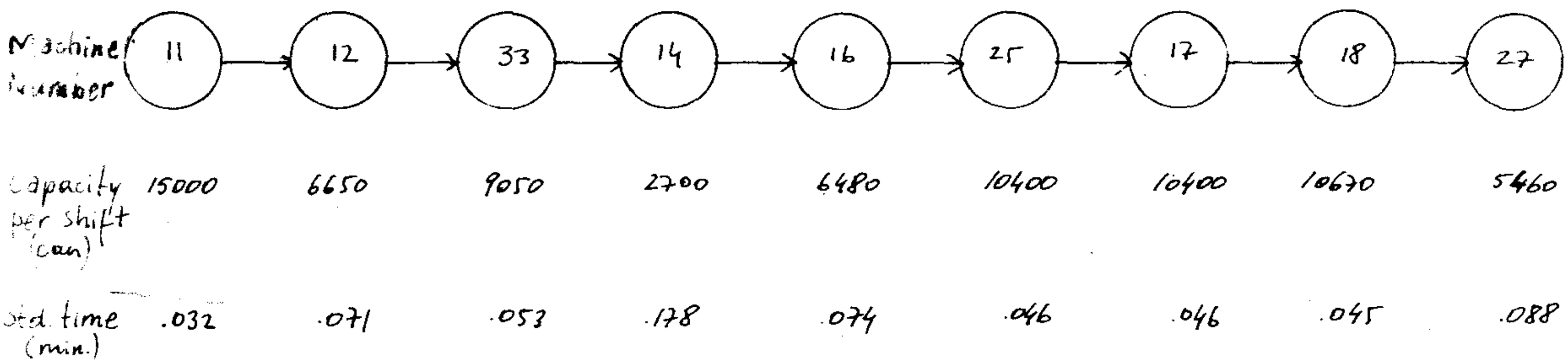



Figure: 2 Precedence Diagram of Brezilya Can Production

## 2.4. Prodcution Facilities

2.4.1. General: The Tin Can Body Manufacturing Department involves 46 machines which are arranged in 6 production lines, e.g., A, B, C, D, E, and F.

Nearly 6 million cans per year in 40 different models are manufactured in the department by using these 46 machines.

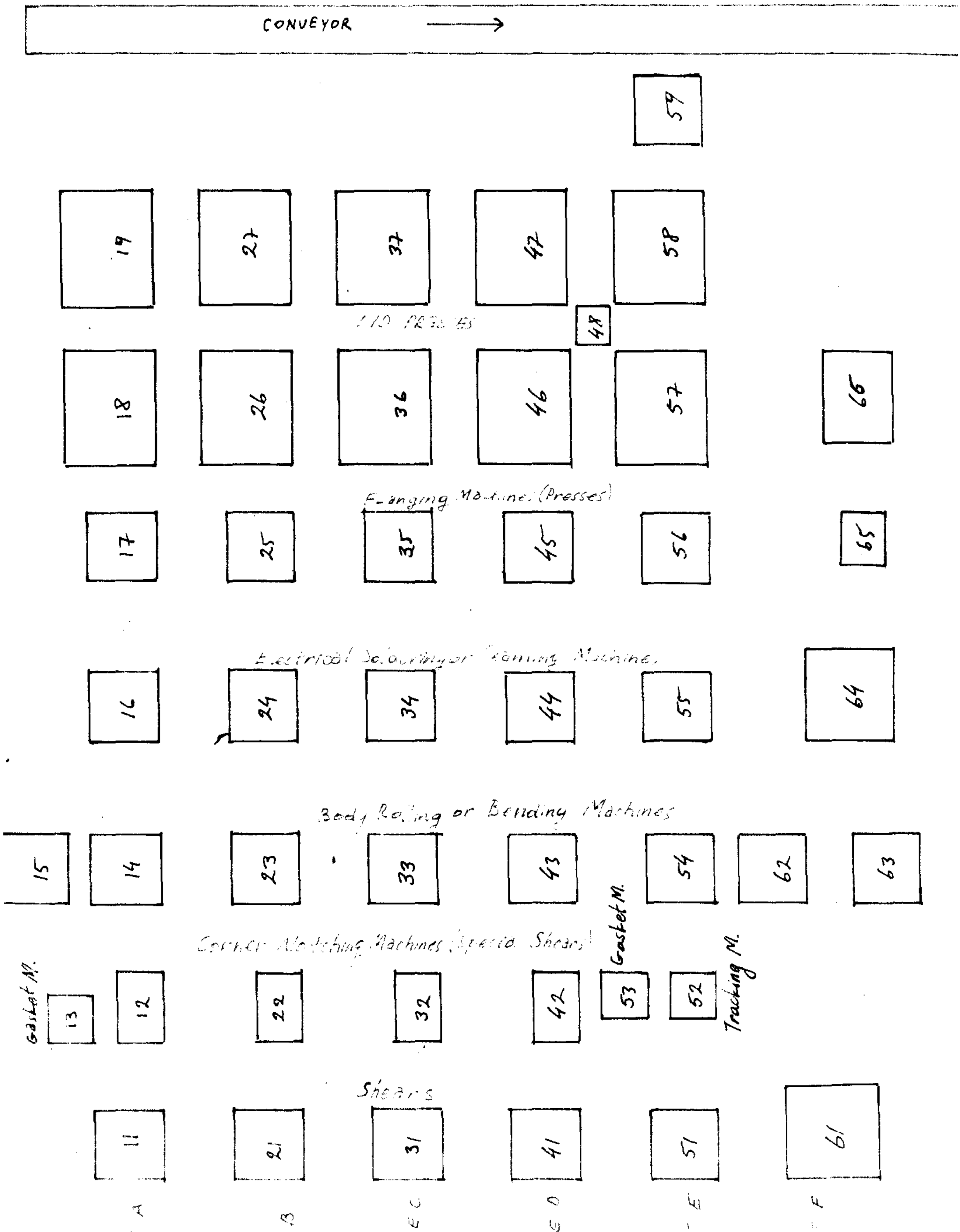
A line production system is used in the production of the cans, but some times the machines located in different lines are also employed. At that time zig-zag movements of the cans between the production lines are seen during the production process. The Plant Layout given in Figure 3 shows the 6 production lines, and the machines performing the lines. The machines are coded according to their position in the Plant Layout, e.g., machine number 32 indicates that this machine is the second machine in line 3. This fact is easily seen in Figure 3.

The machines and the operations performed by them can be analysed as follows:

1. Shears: Six shears (machines numbered 11, 21, 31, 41, 51, 61) are operated in the department. The shears are used for tin cutting. Shearing is the first in the can manufacturing process.

2. Special Shears: Four special shears (machines numbered 12, 22, 32, 42) for Corner Notching process, are located in the department. Two of them are arranged for small rectangular

FIGURE 3: Present Plant Layout
(Tin Can Body Forming Department)



cans. The remaining two are used for cylindirical cans. Some of the canns do not require the Corner Notching, instead they are directly sent to form machine.

3. Body Rolling or Bending Machines: Two Body Rolling Machines (machines numbered 43, 62), five Body Bending Machines (machines numbered 14, 15, 23, 33, 54), and one Body Rolling Machine (machine number 63) are employed for cylindirical, rectangular cans and small barrels in the department. Since a long time the small barrels have not been manufactured, the machine number 63 is kept idle.

4. Soldering and Seaming Machines: Three Soldering and three Seaming Machines are employed in the department. The greater portion of the can models manufactured in the factory are soldered and the remaining models are seamed. The three machines (numbers 24, 55, 64) are identified as Electrical Soldering Machines and the other three machines ( numbers 16, 34, 44) are identified as Seaming Machines.

5. Flanging Presses: There are five Flanging Presses (machines numbered 17, 25, 35, 45, 46) operated in the department. Top and bottom sides of the cans are made ready for lid seaming processes by using these machines.

6. Lid Seaming Presses: These machines are used to attach the lids of the cans. Ten Lid Seaming Presses (machines numbered 18, 19, 26, 27, 36, 37, 46, 47, 57, 58) are employed in the department. Some cans do not require both top and bottom lids

to be attached, e.g., the bottom lids are not seamed to SMA cans and the top lids are not seamed to ÇBS cans.

There are also other special purpose machines in the department. These machines are:

1. One Tracking Machine (machine number 52).
2. One Handle Machine (machine number 48).
3. One special Lid Seaming Press for small barrels (machine number 65).
4. One small Punch Press (machine number 59).
5. Two Gasket Machines (machines numbered 13, 53).

2.4.2. Machine Capacities and Idle Times

The capacities of the machines and idle times are studied in terms of 14 standard cans. Idle time percentages of the machines for one product are given in Table 2, and the percentages for the other models are given in Appendix V. The idle times of the machines are found by using standard operation times of the machines.

The figures under column four in Table 2 are calculated using the formula:

$$ID = \frac{M_c - P_c}{M_c}$$

where: $ID$ = Idle time percentage

$M_c$ = Machine capacity per shift

$P_c$ = Production Capacity per shift

| Machine Number | Capacity of the machines per shift | Production capacity per shift | Idle Time percentages |
|---|---|---|---|
| 11 | 15000 | 2700 | 82 |
| 12 | 6650 | " | 59 |
| 33 | 9050 | " | 71 |
| 14 | 2700 | " | |
| 16 | 6480 | " | 59 |
| 25 | 10400 | " | 74 |
| 17 | 10400 | " | 74 |
| 18 | 10670 | " | 75 |
| 27 | 5460 | " | 50 |

TABLE 2: - Idle Time Percentages of the Machines Employed for Brezilya Kahve Kutusu

## 2.5. Personnel Employed in the Department

Eighty-five operators and mater ial handling men are employed in the department. Operators and material handling men are supervised by two foremen and four leadmen. They work on a 2 shift basis. Sometimes, because of the abseentism, the number operators and material handling men falls to 70. The machine operators employed in the department are skilled workers. The material handlers are employed to carry the cans between the machines according to the sequence of operations. One forklift opperator is employed in the department to carry the tins from the offset printing department to the shears.

The worker turnover and abseentism in the department is high. Because of the abseentism some of the operators are asked to run more than one machine during different periods of the shift. The material handlers employed in the department are treated as apprentices. Sometimes, because of the high labor turnover, the management has to assign 1 or 1/2 year trained material handlers to run the machines,

According to the managers, labor shortage is one of the big problems that they often meet.

## 2.6. Production Planning

The production planning applied today, is mostly interrupted by rush orders. The Gant Charts are used for machine loading in 3 printing presses and 6 production lines. The finish and start dates of the orders are known from these Gant Charts. Delivery Request of the customers are accepted by the management according to the scheduled dates of the charts. Daily production orders, issued to the department, are prepared according to the line load indicated on the charts.

Since the first step to production is printing, when an order comes in, the printing presses are loaded by the standard time of printing process of the order plus 10% scheduling allowance time. The finishing time of the printing process is starting time for the Can-body Manufacturing processes, if the line used in production for the order is idle. If the line is not idle, at the finishing time of printing process, the printed tins are delivered to the warehouse and the finishing time of the previous orders utilizing the line becomes the starting time for the order.

The load time of each order is found by the below formula:

$$P_t = \frac{O_s}{D_c} + .10 \left(\frac{O_s}{D_c}\right)$$

where:

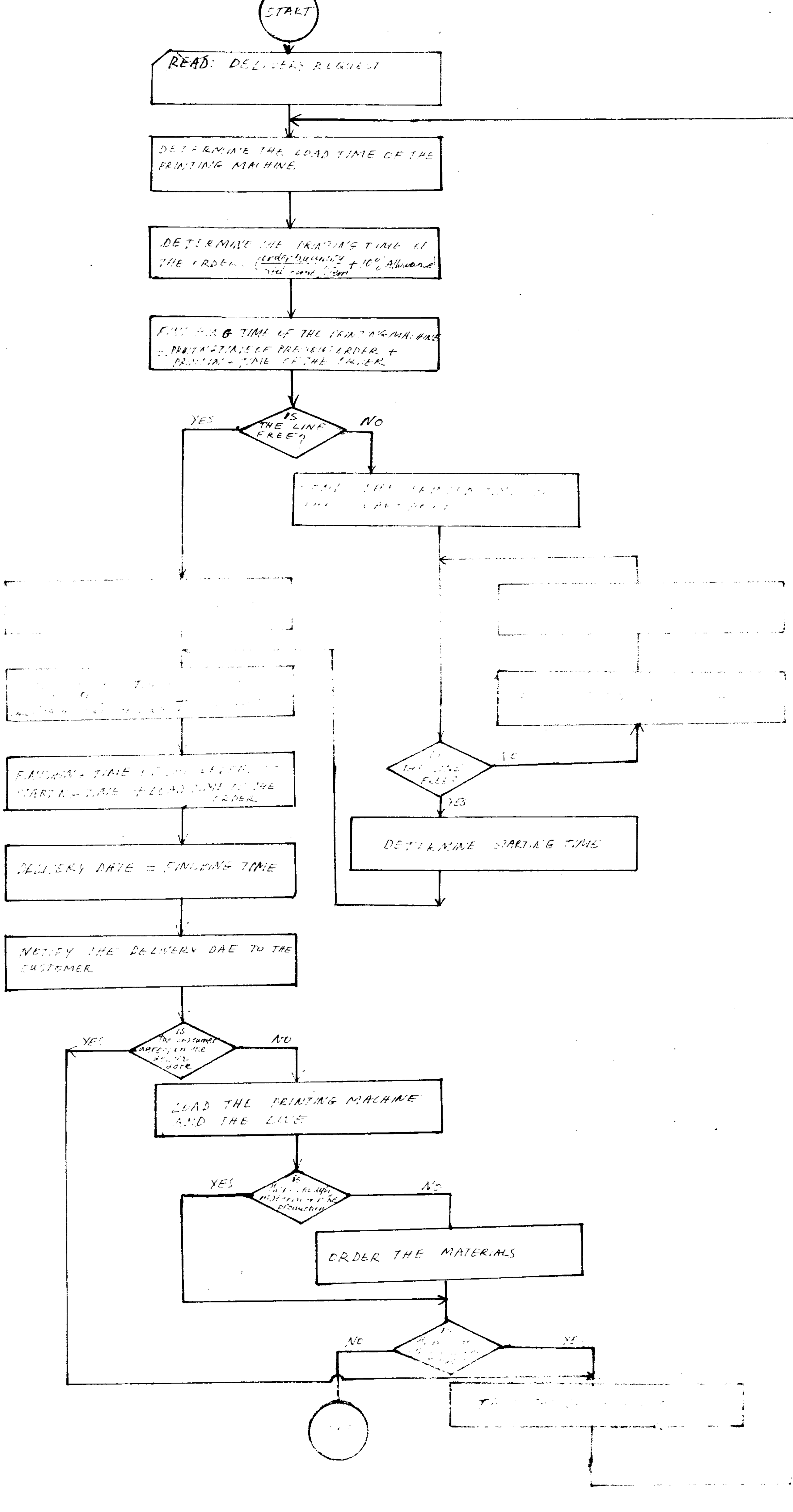
$P_t$ = Production time (load time)

$O_s$ = Order size

$D_c$ = Daily capacity of the line for the model.

The finishing time for the order is obtained by adding the production time to the starting time. The finishing time is the delivery date for the order. The finishing time is notified to the customer when an order comes in. If the customer agrees on the delivery date, the printing machines and the line employed for the model are loaded for this order. Then a material check slip is sent to the warehouse, so that the unavailable materials at the start date of the order will be purchased. Figure 4 explains the production planning process followed by the management.

As was mentioned before, sometimes the rush orders interrupts the Gant Charts, and previously loaded orders are postponed to some later date. Therefore the agreed delivery dates are not met, most of the time the delivery is behind the schedule.


START
READ: DELIVERY REQUEST
DETERMINE THE LOAD TIME OF THE PRINTING MACHINE
DETERMINE THE PRINTING TIME OF THE ORDER
+ 10% Allowance
IS THE LINE FREE?
YES
NO
DELIVERY DATE = FINISHING TIME
NOTIFY THE DELIVERY DATE TO THE CUSTOMER
YES
NO
DETERMINE STARTING TIME
LOAD THE PRINTING MACHINE AND THE LINE
YES
NO
ORDER THE MATERIALS
NO

## 2.7. Definition of the Problem and Alternative Solutions

### 2.7.1. Problems of the Department

The analysis of the production facilities shows that (Table 2), the major problem for the department is under-utilization of the machines. This underutilization arises due to the following reasons:

1. Although line production system is used, the production process does not follow a smooth path, instead a zig-zag movement from one line to another is often encountered.

2. The machine capacities in each line show great variences. The bottleneck machines (minimum capacity machines in the line) hinder the operation speed of the other high capacity machines in the line.

The other problems encountered in the department are:

1. High labor turnover rate.
2. Being behind the scheduled finishing time for the products (increase of order queue)

### 2.7.2. Alternative Suggestions to Increase the Efficiency of the Departments

The problem, as posed in Section 2.7.1. was studied in length and 5 alternative solutions were found to be most likely to yield better results. These alternatives are not exhaustive. In this study, only the most likely was taken instead of all of the alternatives.

The alternatives are briefly stated below:

1. To keep the present locations of the machines fixed, but:

a) Increase the capacities of the critical machines that cause the bottlenecks in the line. This is to be done by adding new machines.

b) Shift some products from original production lines to less utilized lines of the department.

c) Following a sales and/or production scheduling policy of rejecting orders below a minimum level for some products

2. To make the machines transferable from one place to another and set up the production lines according to the specific orders.

3. To group the machines performing similar functions and schedule the products according to their operational sequences to the groups. In this alternative, the operation will be done by any machine in the group rather than the particular machine in the line assigned to the models.

4. To reduce the number of present production lines by combining them into:

a) one line

b) two lines

c) three lines

d) four lines

e) keep them as they are (for checking reasons)

5. To adjust the product mix in an optimum manner while keeping other factors, so that a greater utilization of the facilities result.

These five alternatives were tested by using four computer programs:

1. Production Scheduling Program I, written for this study.

2. Production Scheduling Progam II, obtained by some modifications made on the first Production Scheduling Program I.

3. IBM 1620 Production Line Balancing Program.

4. IBM 1620 Linear Programming Program.

The first 3 alternatives were tested by the Production Scheduling Program I and II, while the IBM 1620 Line Balancing and IBM 1620 Linear Programming Programs were used to test the fourth and fifth alternatives respectively.

# PART II

## CHAPTER 3

## DESCRIPTION OF THE ANALYTICAL TECHNIQUES USED

In this distertaion 4 scientific programming techniques, namely, Simulation, Production Scheduling, Production Line Balancing and Linear Programming were applied to solve the problem of the department. The application of the techniques was performed by using the computer programs. In this chapter these programs will be analysed briefly.

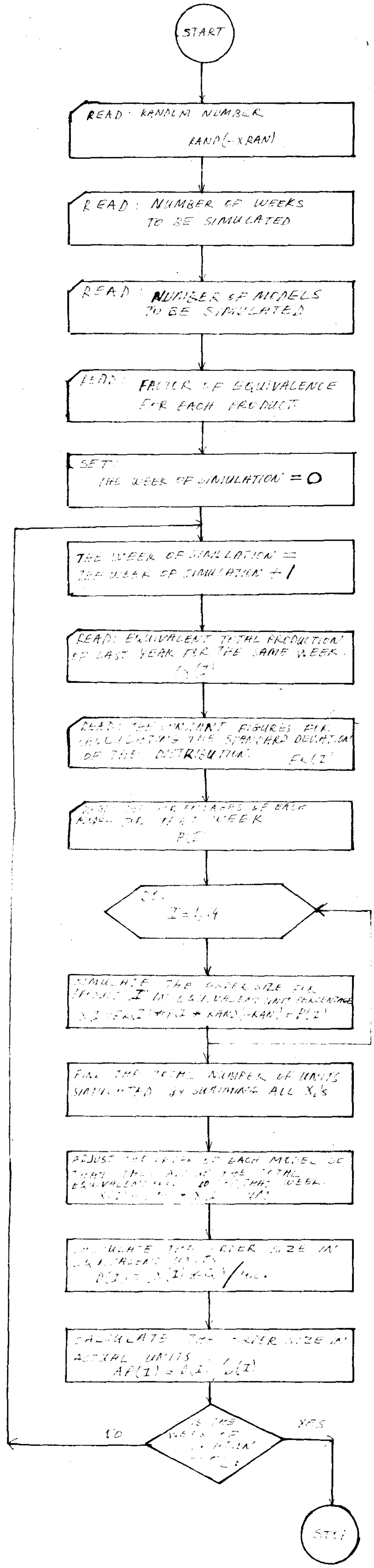
### 3.1. Order Generating (Simulation) Program

In this study, the order generating program is used to simulate the actual weekly customer orders of 14 standard tin cans. As it is explained in the "method of the study" section, the output of the simulation program is used as the orders to be scheduled in the scheduling program.

#### 3.1.1. Discription of the order generating (simulation) Program

The methodology followed in the simulation process is explained in the Flow Chart of the Simulation Program (Figure 5). The Detailed Flow Chart and the Fortran Program are depicted in Appendices VI and VII respectively. The calculations made to

FIGURE: 5. FLOW CHART OF THE PRODUCTION SIMULATION (ORDER GENERATING) PROGRAM.



simulate the weekly orders are explained below;

First a random number; number of weeks to be simulated; number of models to be simulated; the factor of equivalence for each product; equivalent total production of last year; the constant figure (FK) of each model for calculating standard deviation of the distribution; and production percentages of each model for that week are read by the computer. Then the random number, the constant FK figure, for each model, and the production percentages of each model are multiplied together, and the product is added to the mean (production percentage of the model). So that new percentages are obtained for each model. The adjusted equivalent percentages are obtained by dividing the new percentages of each product into total equivalent percentage for that week. The product of the adjust equivalent percentage of each model by the total equivalent production of the week gives us order size of the models in equivalent units. And the order size of each model in actual units for that week is obtained by dividing the equivalent order size of each model into its factor of equivalence.

3.1.2. Assumptions

The assumptions made for the program are summarized as follows;

1. The weekly order of each product is distributed normally. The mean of this normal distribution is equal to the

percentage of the last year's order for the same week.

It is further assumed that the $\sigma$ of this distribution is equal to a constant times the mean, that is:

$$\sigma_x = FK(I) * P(I)$$

where:

$FK(I)$ = a constant figure

$P\ (I)$ = mean

Then we generate a random normal number by using a random number generator, and according to formula:

$$z = \frac{X - \mu}{\sigma_x}$$

RAND FK*P(I) P(I)

We find $\quad X = (z)\ (\sigma_x) + \mu$

where $\mu = P(I)$

$z = RAND(-XRAN)$

$\sigma_x = FK(I) * P(I)$

2. Equivalent factor numbers are assumed to be proportional to the direct labor content of the product.

3. The constant FK(I) figure has to be between 0.50 - 1.50 of the mean value. (These limits are practical limits.)

In this study we assigned these constants arbitrarily but in practice it is possible to make a statistical analysis of the orders of the same week for the past 3 years and determine these constant numbers from this analysis.

3.1.3. Inputs of the Simulation Program

The following inputs are required to run the program.

1. A random number.
2. Number of total weeks to be simulated.
3. Number of products to be simulated.
4. Factors of equivalence for each product.
5. Equivalent total production of last year for each model.
6. The size of each product order as a percentage of total equivalent order of that week.
7. The constant FK(I) figure of each model for calculating the standard deviation of the normal distribution.

3.1.4. Preparation of the Inputs

The aboved mentioned inputs are prepared as follows:

1. A random number is obtained from a generator.
2. The number of total weeks is determined. In this study, the simulation is made for 52 weeks.
3. The number of products simulated is 14 for this study.
4. The factor of equivalence for each model is obtained

by dividing the maximum per shift production capacity among the 14 standard models into per shift production capacity of the model For example, maximum per shift production capacity among 14 products belongs to 3.5 kg ÇBS cans which is 9600 = 10000 cans.

Production capacities of 5 kg and 10 kg Bayer cans are 3000 and 2000 cans respectively. Therefore, the factor of equivalence for 5 kg Bayer can is

$$\frac{10000}{3000} = 3.33,$$

and the factor of equivalence for 10 kg Bayer can is

$$\frac{10000}{2000} = 5.00$$

But because of the unavilablity of production capacities of the cans during the simulation process we assigned arbitrarily numbers between 1.00 and 5.00 as the factor of equivalence of the models.

5 - 6. Weekly figures of equivalent total production and equivalent percentages of each product are obtained after performing the following steps.

a) First actual amount of production of 14 cans for each week of the past year is obtained from the factory records. Since no records of the Customer Delivery Requisitions are kept (in the company files only original blanket orders exist). But these are yearly figures. Weekly production figures are taken to be equicalent of customer orders. Considering the short production cycle time and the fact that no significant order backlog existed at any time during the past year, this is a fairly good assumption.

b) The actual figures are multiplied by the factor of equivalence of each product to obtain the equivalent production.

c) The total equivalent production for the week is determined.

d) The equivalent percentage of each product is obtained by dividing each equivalent production into the total equivalent production of the week. Total equivalent production and equivalent production percentages of the models for the first two weeks are shown in Table 3.

7. The constant FK figures of each model used in the calculation of the standard deviation are assigned arbitrarily. Appendix VII shows the input data of the program.

### 3.1.5. Outputs of the Simulation Program

Two types of outputs are obtained at the end of the simulation process.

1. Simulated equivalent and actual units of 14 products for 52 weeks.

2. A graph on which simulated figures of 14 different boxes for 52 weeks are plotted. The first 14 graphs show the simulated actual productions and the second 14 graphs show the simulated equivalent productions of the year for each product.

3.1.6. Tabulation of the Results

In this study the simulation program is run twice using different random numbers in order to see the effects of the random numbers on the simulated actual and equivalent units of the products.

The comparison of actual 1968 production and the simulation results is made below in Table 4.

| Actual production for the year 1968 (cans) | 1st simulation result (using random numbers .12345) (cans) | 2nd simulation result (using random numbers .16666) (cans) |
|---|---|---|
| 6,200,275 | 6,373,244 | 6,589,375 |

TABLE 4: - Total Actual and Simulated Orders Per Annum

A comparison of actual productions and 1st and 2nd simulation results for the first and second weeks of the year is made in Table 5. The outputs of the 1st and 2nd simulation runs are shown in Appendices VII and VIII respectively.

3.1.7. Evaluation of the Simulation Program

The sample outputs of the simulation program given in Tables 4 and 5 show that the results obtained are reasonalbe. The actual number of orders in the year of 1968 were 6,200,275 cans/year. However, at the end of the simulation process, we

| Model Number | F/E+ | 1st Week A+ | 1st Week E+ | 1st Week %+ | 2nd Week A | 2nd Week E | 2nd Week % |
|---|---|---|---|---|---|---|---|
| 1 | 1.00 | | | | | | |
| 2 | 1.20 | | | | | | |
| 3 | 1.50 | 8320 | 12481 | 6.6 | 23580 | 35370 | 16.9 |
| 4 | 1.00 | | | | | | |
| 5 | 2.50 | 1590 | 3975 | 2.1 | 924 | 2310 | 1.1 |
| 6 | 1.50 | 7344 | 11016 | 5.8 | 7224 | 10836 | 5.2 |
| 7 | 1.90 | | | | | | |
| 8 | 3.00 | 561 | 1683 | 0.8 | | | |
| 9 | 2.50 | 31016 | 77540 | 41.2 | 31016 | 77540 | 37.2 |
| 10 | 3.00 | 23315 | 69945 | 37.2 | 23315 | 69945 | 33.6 |
| 11 | 2.00 | 1320 | 2640 | 1.4 | 390 | 780 | 0.3 |
| 12 | 5.00 | | | | | | |
| 13 | 3.00 | 2910 | 8730 | 4.6 | 3780 | 11340 | 5.4 |
| 14 | 2.00 | | | | | | |
| TOTAL | | 76376 | 188009 | | 90224 | 208121 | |

TABLE 3: – Total Equivalent Production and Equivalent Production percentages of the Models for the first Two Weeks.

+ F/E – Factor of Equivalence

A – Actual Productions

E – Equivalent Production

% – Equivalent Production Percentage

| Model Number | Week No. 1 | | | Week No. 2 | | |
|---|---|---|---|---|---|---|
| | | S / O+ | | | S / O | |
| | A+ | 1st S+ | 2nd S+ | A+ | 1st S | 2nd S |
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | 8320 | 17458 | 48 | 23580 | 56641 | 42907 |
| 4 | | | | | | |
| 5 | 1590 | | | 924 | 617 | 283 |
| 6 | 7344 | 5077 | | 7224 | 11775 | 8868 |
| 7 | | | | | | |
| 8 | 561 | | 479 | | | |
| 9 | 31016 | 23025 | 23508 | 31016 | 34016 | 39291 |
| 10 | 23315 | 31389 | 38133 | 23315 | | 3434 |
| 11 | 1320 | 1077 | 1190 | 390 | 527 | |
| 12 | | | | | | |
| 13 | 2910 | 106 | 3648 | 3780 | 5951 | 7071 |
| 14 | | | | | | |
| TOTAL | 76376 | 78132 | 63358 | 90224 | 109527 | 101854 |

TABLE 5: - A Comparison of Actual Production and Simulated Orders for 2 week period.

\+ A = Actual Production

S/O = Simulated Order

1stS = First Simulation

2nd S = Second Simulation

were able to obtain 6,373,224 cans/year.

Table 5 compares the total actual and simulated orders for the first 2 weeks. The total figures of the actual and simulated order do not show much difference. Therefore, it can be said that the results obtained from the simulation program can sufficiently be used as inputs for the Scheduling Programs.

## 3.2. Production Scheduling

The objective for writing the production scheduling program is to test some of the alternatives listed in Section 2.7.2 for their comperative efficiencies.

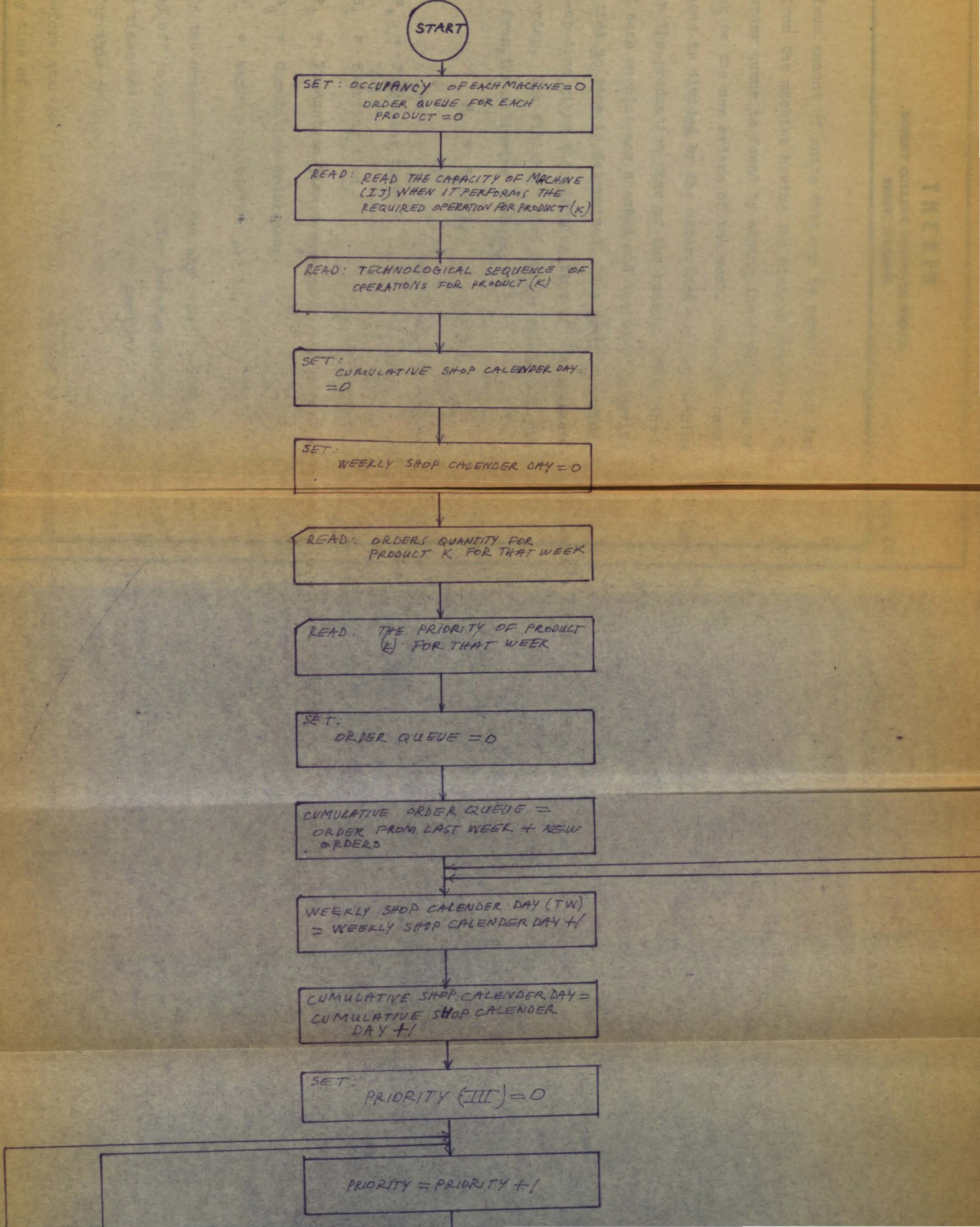
In the program, two things are performed at the same time, namely, orders to be produced are scheduled and in relation to this, the efficiencies of the production facilities are calculated.

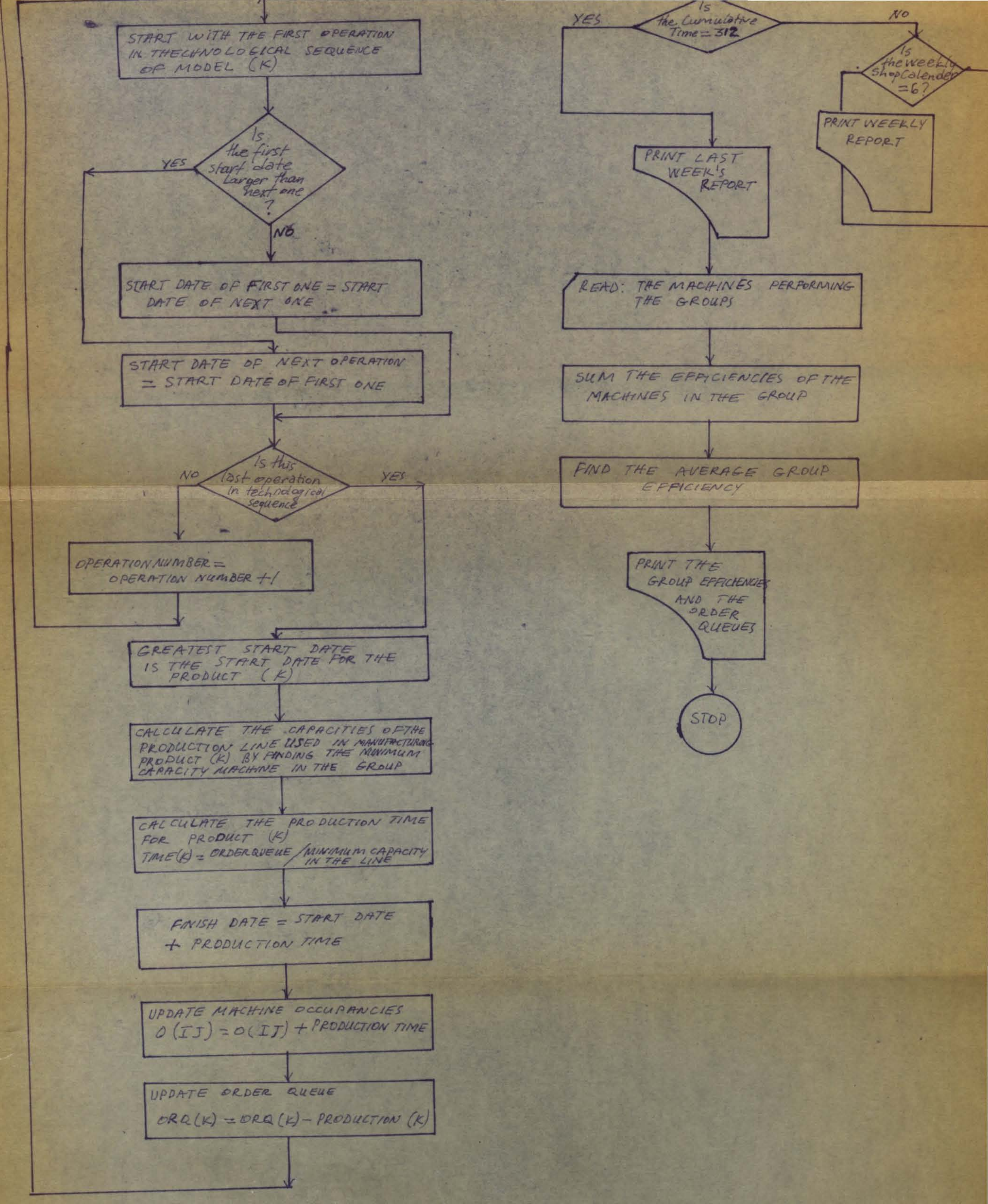
### 3.2.1. Description of the Scheduling Program I

The methodology of the production scheduling program is explained in the Flow Chart (Figure 6).

As it is seen in the flow chart first, the capacities of the machines when they perform the required operations, technological sequence of operations, and order quantity of each model are read by the computer. Then the product having the highest priority is taken as the product to be scheduled. The machines used for this product and their daily capacities are determined.

FIGURE : 6. FLOW CHART OF THE PRODUCTION SCHEDULING PROGRAM I




START WITH THE FIRST OPERATION IN THECHNOLOGICAL SEQUENCE OF MODEL (K)
Is the first start date Larger than next one ?
YES
NO
START DATE OF FIRST ONE = START DATE OF NEXT ONE
START DATE OF NEXT OPERATION = START DATE OF FIRST ONE
Is this last operation in technological sequence
NO
YES
OPERATION NUMBER = OPERATION NUMBER + 1
GREATEST START DATE IS THE START DATE FOR THE PRODUCT (K)
CALCULATE THE CAPACITIES OF THE PRODUCTION LINE USED IN MANUFACTURING PRODUCT (K) BY FINDING THE MINIMUM CAPACITY MACHINE IN THE GROUP
CALCULATE THE PRODUCTION TIME FOR PRODUCT (K)
TIME(K) = ORDERQUEUE / MINIMUM CAPACITY IN THE LINE
FINISH DATE = START DATE + PRODUCTION TIME
UPDATE MACHINE OCCUPANCIES
O(IJ) = O(IJ) + PRODUCTION TIME
UPDATE ORDER QUEUE
ORQ(K) = ORQ(K) − PRODUCTION (K)
Is the Cumulative Time = 312
YES
NO
Is the weekly ShopCalender = 6?
PRINT WEEKLY REPORT
PRINT LAST WEEK'S REPORT
READ: THE MACHINES PERFORMING THE GROUPS
SUM THE EFFICIENCIES OF THE MACHINES IN THE GROUP
FIND THE AVERAGE GROUP EFFICIENCY
PRINT THE GROUP EFFICIENCIES AND THE ORDER QUEUES
STOP

The maximum amount of units that can be produced per day is obtained from the machine having the minimum capacity. The cumulative order queue is found by adding the order queue of the last week to the new orders of the week. Then the cumulative order queue is divided by the determined minimum machine capacity to obtain the production time of the order. Then, the tied up times of each machine are checked and the machine having the maximum tied up time is determined. The machine having the maximum tied-up time gives the starting time of the production process for the order. The finishing time of the production process is obtained from the following formula:

$$F_t = S_t + P_t$$

where:

$F_t$ = Finishing time

$S_t$ = Starting time

$P_t$ = Production time = $\frac{O_q}{P_m}$

$O_q$ = Cumulative orderqueue

$P_m$ = Maximum production per day

If the production time for any order is 25% or more, it is rounded off to a full day. After determining the starting and finishing times and the quantity to be produced, the scheduling process for this product is completed.

Before starting the scheduling process of the next product occuppancy time of each machine is found from the formula:

$$O_a = O_b + P_t$$

where:

$O_a$ = Occupancy time of each machine after the production

$O_b$ = " " " " " before " "

$P_t$ = Production time

Then the order having the next priority is scheduled following the same procedure explained above. At the end of the Scheduling Process of the product having least priority, before going into the scheduling process of the next week, the weekly and cumulative idle times of each machine are calculated by using the formulas:

$$I_t = 6 - O_t$$

$$I_c = I_c + I_t$$

where:

$I_t$ = Machine idle time for the week

$I_c$ = Cumulative machine idle time

$O_t$ = Occupied time for the week

And then using the idle time figure obtained above, the weekly and cumulative efficiencies of each machine are calculated by using the formulas given below:

$$E_w = \frac{6 - I_t}{6}$$

$$E_c = \frac{T_c - I_c}{T_c}$$

where;

$E_w$ = Efficiency for the week

$E_c$ = Cumulative efficiency

$I_t$ = Idle time for the week

$I_c$ = Cumulative idle time

$T_c$ = Cumulative total time (Cumulative shop calender day

At the end of the program, the average efficiencies of several machine groups are obtained. These average group efficiencies are found by dividing the total cumulative efficiencies of the machines in the group into the number of machines in the group. Detailed Flow Chart and the Fortran Program are given in Appendices IX and X respectively.

### 3.2.2. Assumptions of the Scheduling Program

The following assumptions are made in the program;

1. Orders are given to the shop at the beginning of each week.

2. The line capacity is equal to minimum machine capacity used in the production of that model.

3. Sequence of operations are fixed. (No alternative machines are used.)

4. A week has 6 working days and the year has 312 days (Shop calender.)

| $T_c = 6$ | 1st Week | | | | 2nd Week | | $T_c = 12$ | |
|---|---|---|---|---|---|---|---|---|
| Machine # | Weekly Idle time | Cumulative idle time | Effi. wkly | Cumu. effi. | Weekly idle time | Cumu. idle/T | Effi. wkly | Cumu. effi. |
| 11 | 5 | 5 | .16 | .16 | 2 | 7 | .66 | .41 |
| 14 | 6 | 6 | .00 | .00 | 6 | 12 | .00 | .00 |
| 31 | 3 | 3 | .50 | .50 | 2 | 5 | .66 | .58 |
| 41 | 6 | 6 | .00 | .00 | 6 | 12 | .00 | .00 |
| 51 | 5 | 5 | .16 | .16 | 4 | 9 | .33 | .25 |

TABLE 9: - A Sample of Machine Efficiency Results of the Scheduling Program I.

Effi -- Efficiency

wkly -- Weekly

cumu. -- Cumulative

T -- Time

5. The department works on a 2 shift basis.

6. Machine set-ups are done in off hours.

7. Any order having 25% or more of a day is rounded off to a full day.

8. Cumulative Order Queue = Order Queue from previous period + Incoming orders for this period

9. No banking of semi-finished products between the machines is allowed.

10. Priorities are determined arbitrarily according to the order size. Higher priorities are assigned to the larger orders.

11. When a machine is idle because of technological restrictions, we cannot use it for other purposes.

12. Occuppancy time of each machine is calculated from the formula:

$$O_A = O_b + \text{TIME (K)}$$

where:

$O_a$ = Occuppancy time of each machine after the production

$O_b$ = " " " " " before " "

TIME(K) = Production time required to manufacture product K

13. The efficiencies of the machines are calculated according to the following formulas explained in Section 3.2.2:

$$E_W = \frac{6 - I_t}{6}$$

$$E_c = \frac{T_c - I_c}{T_c}$$

3.2.3. Inputs of the Program

The inputs that go into the program are given below:

1. The technological sequence of the operations and the machines used in these operations of each model.

2. The capacities of each machine utilized in the production of the 14 models.

3. Weekly order quantity and priority of each product.

3.2.4. Preparation of the Inputs

1. The technological sequence and the machines employed in the production of each model are seen in Table 6. As we explained previously, the 1st figure of a machine number indicates the row and the second figure indicates the column where this machine is located in the department. For example, number 42 indicates that this machine is the second machine of line (row) 4 in the department.

2. Per shift capacities of all machines employed in the production process of each model was obtained from a time study performed 3 months ago. Since the factory works on a 2 shift basis, these capacity figures are doubled to obtain the daily capacities of the production facilities.

3. Weekly order quantities of each product are obtained from the simulation

from the simulation program outputs. Simulated quantity of each product is given as an order to be scheduled. A unique number between 1 to 14 is assigned to each product as its priority. We assumed that the higher priorities are assigned to the larger orders. The inputs of the Scheduling Program can be seen in Appendix X.

3.2.5. Outputs of the Program

As it is seen in Appendix XI, two types of output were obtained at the end of the Scheduling Program:

a) Weekly report
b) Yearly report.

a) The outputs of the weekly report are:

1. Starting time
2. Finishing time
3. Amount of production scheduled
4. Time each machine is occupied
5. Idle time of each machine for the week
6. Cumulative idle time of each machine
7. Efficiency of each machine for the week
8. Cumulative efficiency of each machine

b) The outputs of the yearly report are:

1. Order queue of the models at the end of the scheduling process for the 52 week period. (These figures were not ob

tained for the initial run of the program.)

2. Efficiencies of the 33 machine groups, the groups and the machines is each group are shown in Table 7.

| Model Number | Operation sequences and the machines utilized in the operations |
|---|---|
| 1 | 11, 12, 33, 14, 16, 25, 17, 28, 27 |
| 2 | 11, 21, 23, 24, 25, 26, 27, |
| 3 | 11, 21, 23, 24, 25, 26, 27 |
| 4 | 11, 51, 42, 62, 64, 56, 57, 58 |
| 5 | 31, 21, 33, 55, 35, 36, 37, 48 |
| 6 | 31, 51, 54, 55, 56, 57 |
| 7 | 41, 51, 54, 55, 56, 57, 58, 59 |
| 8 | 41, 51, 54, 55, 56, 57, 58, 59, 48 |
| 9 | 21, 31, 32, 54, 53, 44, 45, 46 |
| 10 | 21, 22, 54, 34, 35, 46, 48, 47 |
| 11 | 31, 51, 32, 54, 44, 56, 58, 57 |
| 12 | 61, 62, 55, 56, 57, 58 |
| 13 | 61, 62, 55, 56, 57, 58, 48 |
| 14 | 41, 51, 52, 42, 54, 64, 56, 57 |

TABLE 6: - The Technological Sequence and the Machine Employed in Production Process of the 14 Models.

| Group Number | Name of the group | Machines in the group |
|---|---|---|
| 1 | Departments 1st line | 11, 12, 13, 14, 15, 16, 17, 18, 19 |
| 2 | " " " | 21, 22, 23, 24, 25, 26, 27 |
| 3 | " " " | 31, 32, 33, 34, 35, 36, 37 |
| 4 | " " " | 41, 42, 43, 44, 45, 46, 47, 48 |
| 5 | " " " | 51, 52, 53, 54, 55, 56, 57, 58, 59 |
| 6 | " " " | 61, 62, 63, 64, 65, 66 |
| 7 | Shears | 11, 21, 31, 41, 51, 61 |
| 8 | Corner Notching Mach. | 12, 22, 32, 42 |
| 9 | Gasket Machines | 13, 53 |
| 10 | Tracking Machine | 52 |
| 11 | Body Rolling or Bending Machine | 14, 15, 23, 33, 43, 54, 62, 63 |
| 12 | Electrical Soldering or Seaming Machine | 16, 24, 34, 44, 55, 64 |
| 13 | Seaming Machines | 16, 34, 44 |
| 14 | Electrical Soldering Machines | 24, 55, 64, 66 |
| 15 | Flanging Machines | 17, 25, 35, 45, 56 |
| 16 | 1st lid seaming machines | 18, 26, 36, 46, 57 |
| 17 | 2nd lid seaming machines | 19, 27, 37, 47, 58, 59 |
| 18 | Assembling lid Attaching handle Mach. | 18, 19, 26, 27, 36, 37, 46, 47, 57, 58, 59, 48, 65 |

TABLE 7: - Machine Groups and the Machines in Each Group (1)

| Group Number | Name of the group | Machines in the group |
|---|---|---|
| 19 | 1st product Machine | 11, 12, 33, 14, 16, 25, 17, 18, 27 |
| 20 | 2nd " " | 11, 21, 23, 24, 25, 26, 27 |
| 21 | 3rd " " | 11, 21, 23, 24, 25, 26, 27 |
| 22 | 4th " " | 11, 51, 42, 62, 64, 56, 57 58 |
| 23 | 5th " " | 31, 21, 33, 55, 35, 36, 37 48 |
| 24 | 6th " " | 31, 51, 54, 55, 56, 57 |
| 25 | 7th " " | 41, 51, 54, 55, 56, 57, 58, 59 |
| 26 | 8th " " | 41, 51, 54, 55, 56, 57, 58, 59, 48 |
| 27 | 9th " " | 21, 31, 32, 54, 45, 53, 44, 45, 46 |
| 28 | 10th " " | 21, 22, 54, 34, 43, 54, 46 48, 47 |
| 29 | 11th " " | 31, 51, 32, 54, 44, 56, 58, 57 |
| 30 | 12th " " | 61, 62, 55, 56, 57, 58 |
| 31 | 13th " " | 61, 62, 55, 56, 57, 58, 48 |
| 32 | 14th " " | 41, 51, 52, 42, 54, 64, 56, 57 |
| 33 | All the machines in the department | 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 23, 24, 25, 26, 27, 31, 32, 33, 34, 35, 36, 37, 41, 42, 43, 44, 45, 46, 47, 48, 51, 52, 53, 54, 55, 56, 57, 58, 59, 61, 62, 63, 64, 65, 66. |

TABLE 7: - Machine Groups and the Machines in Each Group (2)

### 3.2.6. Tabulation of the Results

The outputs of the Scheduling Program are seen in Appendix XI. Here, in order to evaluate the program, first sample outputs of the program are given in Tables 8 and 9.

### 3.2.7. Evaluation of the Scheduling Progam I

If the scheduling program is analysed according to the results obtained from the run of the program (Appendix XI and Table 8), it can be said that the program scheduled the orders quite well.

In the first week, all the orders, except Product 11, which has 5th priority, are scheduled. The machines used in Product 11 are: 31, 51, 32, 54, 44, 56, 58, 57. If we look at Appendix XI, we see that the machine number 54 is fully employed for the week by products 6, 9, and 10 which had higher priorities than product 11. Therefore, product 11 is not scheduled in the first week, but scheduled in the second week with the order that came in the second week.

As we mentioned previously, the machine efficiencies were found from the formulas:

$$E_w = \frac{6 - I_t}{6}$$

$$E_c = \frac{T_c - I_c}{T_c}$$

where:

$E_w$ = Efficiency for the week

$E_c$ = Cumulative efficiency

$I_t$ Idle time for the week

$I_c$ = Cumulative idle time

$T_c$ = Cumulative total time

The efficiencies of the machines given in Table 9 are checked according to the formulas given above, it is seen that the efficiencies are correct.

For example, cumulative efficiency of machines 31 is found as 58% from the scheduling program, which is the same with the result obtained from the formula: $E_c = \frac{T_c - I_c}{T_c} = \frac{12 - 5}{12} = \frac{7}{12} = .58$. If we apply the formulat for the cumulative efficiency of machine number 51 we obtain $\frac{12 - 9}{12} = \frac{3}{12} = .25$ which is the same with the result obtained from the scheduling program.

Therefore, it can be said that the Scheduling Program can successfully be applied to the problem that we are trying to solve in this study.

### 3.2.8. <u>Production Scheduling Program II</u>

The Production Scheduling Program II was obtained by some modifications made on the production scheduling program I (See Appendix XII).

| Model Number | Week No. 1 Priority | Week No. 1 Simulation Order | Week No. 1 Scheduling Order | Week No. 2 Priority | Week No. 2 Simulation Order | Week No. 2 Scheduling Order |
|---|---|---|---|---|---|---|
| 1 | 07 | | | 07 | | |
| 2 | 08 | | | 08 | | |
| 3 | 04 | 17458 | 17458 | 03 | 56641 | 56641 |
| 4 | 09 | | | 09 | | |
| 5 | 10 | | | 06 | 617 | |
| 6 | 03 | 5077 | 5077 | 02 | 11775 | 11775 |
| 7 | 11 | | | 10 | | |
| 8 | 12 | | | 11 | | |
| 9 | 01 | 23025 | 23025 | 01 | 34016 | 34016 |
| 10 | 02 | 31389 | 31389 | 12 | | 1604 |
| 11 | 05 | 1077 | | 04 | 527 | 1604 |
| 12 | 13 | | | 13 | | |
| 13 | 06 | 106 | 106 | 05 | 5951 | 5951 |
| 14 | 14 | | | 14 | | |

TABLE 8: - Orders Scheuled by the Scheduling Program I, for a Two Weeks Period.

We used this program to test the third alternative, to group the machines performing similar functions and to schedule the products to the groups.

The modifications made on the first program were based on the assumptions given below:

1. The machines performing similar functions are grouped together. (After grouping the machines performing similar functions we obtained 18 machine groups in the department (Table 10).)

2. The capacities of each machine in the group are the same with the capacity of the original machine used in the production of a model.

3. Group sequences instead of machine sequences are followed in the production process of a model.

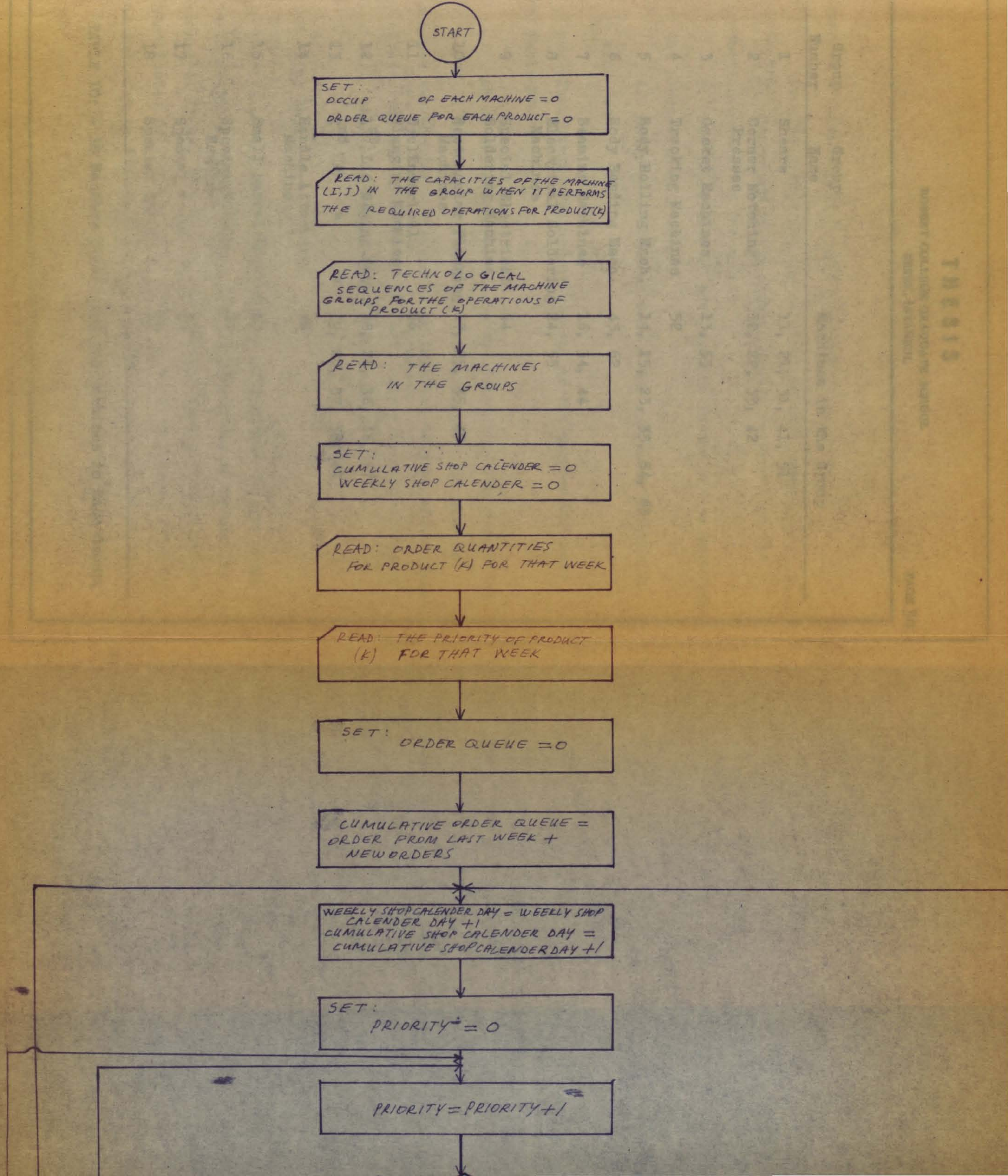
4. The products are produced in any machine of a group.

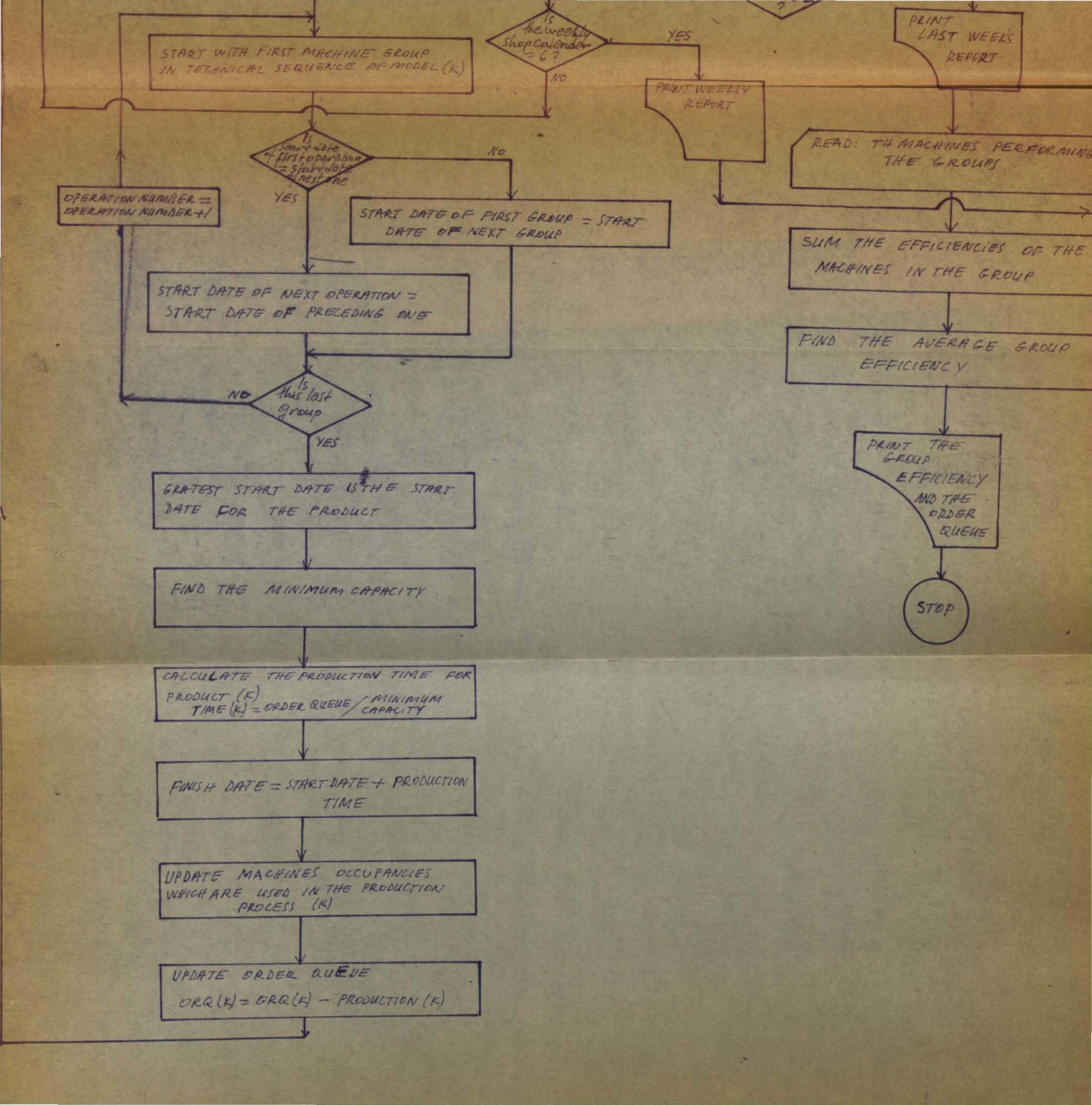
5. Only one machine in the group can be assigned to the production of a model.

The production scheduling program II depicted in Appendix XII schedules the orders following the same procedure of the production schedluling program I, explained in Section 3.2.1. The Flow Chart of the Production Scheduling Program (Figure 7) explains the Scheduling process of the program.

In order to run the program some changes in the input data of the first program are made. The inputs of the scheduling

FIGURE: 7. FLOW CHART OF THE PRODUCTION SCHEDULING PROGRAM II.




START WITH FIRST MACHINE GROUP IN TECHNICAL SEQUENCE OF MODEL (K)
Is the weekly Shop Calender = 6?
YES
NO
PRINT WEEKLY REPORT
PRINT LAST WEEK'S REPORT
READ: TH MACHINES PERFORMING THE GROUPS
Is Start date of first operation = Start date of next one
NO
YES
OPERATION NUMBER = OPERATION NUMBER + 1
START DATE OF FIRST GROUP = START DATE OF NEXT GROUP
START DATE OF NEXT OPERATION = START DATE OF PRECEDING ONE
SUM THE EFFICIENCIES OF THE MACHINES IN THE GROUP
FIND THE AVERAGE GROUP EFFICIENCY
Is this last group
NO
YES
PRINT THE GROUP EFFICIENCY AND THE ORDER QUEUE
STOP
GRATEST START DATE IS THE START DATE FOR THE PRODUCT
FIND THE MINIMUM CAPACITY.
CALCULATE THE PRODUCTION TIME FOR PRODUCT (K)
TIME (K) = ORDER QUEUE / MINIMUM CAPACITY
FINISH DATE = START DATE + PRODUCTION TIME
UPDATE MACHINES OCCUPANCIES WHICH ARE USED IN THE PRODUCTION PROCESS (K)
UPDATE ORDER QUEUE
ORQ (K) = ORQ (K) - PRODUCTION (K)

| Group Number | Group Name | Machines in the Group |
|---|---|---|
| 1 | Shears | 11, 21, 31, 41, 51 |
| 2 | Corner Notching Presses | 12, 22, 33, 42 |
| 3 | Gasket Machines | 13, 53 |
| 4 | Tracking Machines | 52 |
| 5 | Body Rolling Mach. | 14, 15, 23, 33, 54, 63 |
| 6 | Body Bending Mach. | 43, 62 |
| 7 | Seaming Machines | 16, 34, 44 |
| 8 | Electrical Soldering Machines | 24, 55 |
| 9 | Special Electrical Soldering Machine | 64 |
| 10 | Rectangular Flanging Machines | 17, 25, 35, 45 |
| 11 | Cyclinderical Flanging Machines | 56 |
| 12 | 1st Lid Sewing Mach. | 18, 26, 36, 46, 57 |
| 13 | 2nd " " " | 19, 27, 37, 58, 47 |
| 14 | Handle Attaching Machine | 48 |
| 15 | Small barrel Machine | 65 |
| 16 | Special Welding Machine | 66 |
| 17 | Special Press | 59 |
| 18 | Special Shear | 61 |

TABLE 10: - 18 Machine Groups and the Machines in Each Group.

program II are:

1. The groups and the machines in each group.

2. Sequences of the machine groups required for the production process of the models.

3. The capacities of each machine in the groups employed in the production of a model.

4. Order quantities of each model and their priorities for each week.

The output obtained at the end of the program is shown in Table 2.1.

As we explained previously the Scheduling Programs I and II were not used just to schedule the production but also to measure the machine efficiencies so that the testing of the first 3 alternative solutions could be done. The alternatives tested and their results are explained in Chapter IV.

## 3.3 Line Balancing

As we saw earlier, the fourth alternative thought upon, to increase the efficiency of the department was to reduce the number of lines. For this purpose two or more different models were feeded together to the reduced production lines. This test is achieved by the modified IBM 1620 Line Balancing Program. These modifications will be explained in the proceeding pages.

### 3.3.1. IBM 1620 Line Balancing Program

In order to achieve line balancing by IBM 1620 certain specifications should be performed.

1. The assembly line is divided into zones. Only a portion of the assembly line is considered instead of the entire line, when assigning an element of work.

2. Some elements of work can be done in more than one zone, therefore they are called as can-do jobs. Other elements of works can be done in only one specific zone, and they are called must-do jobs.

3. Each operation representing an element of work.is given a unique 3 digit number and classified as can do or must do operation.

4. In order to see the precedence relationships of the operations easily, a precedence diagram is prepared. The number in the circle indicates the number of operation. The numbers outside the circle indicates the time required for the operations in hours. (* Symbol outside the circle indicates that the job is a must do job (○.xxxx hours). Arrows indicate the precedence in the diagram. The precedence diagrams of the models used in this study are given in Appendix XIII.)

### 3.3.2. Restrictions of the Program

The restrictions of the program are summarized as follows:

1. Number of jobs for each zone is between 27-98, depending on the number of the preceeding jobs. This figure is read from the graph shown in Appendix XIV.

2. One operation cannot be immediately proceeded by more than 12 operations.

3. A dummy job with zero time can be used if required.

4. Each sone must have at least one must-do operation in it.

5. A can-do job must not precede a must-do type of operation.

6. No operator works in more than one zone.

7. No operator's total working time exceeds balancing time.

$$T_o = \frac{L_s - A}{dr}$$

where:

$T_o$ = Balancing time

$L_s$ = Length of shift (in hours).

A = Allowances

$D_r$ = Desired rate of production per shift.

### 3.3.3. Assumptions of the Program

In this study the application of the program is based upon certain assumptions which are given below:

1. Since the machines in the department constitute 6 production lines, and the production of only one product in a

line at one time is allowed, at most 6 products are produced at any time in the department. Therefore, the maximum amount of models needed to test an alternative is 6.

2. Since 14 different cans are produced in the department and at most 6 products are produced at the same time, the existence of 3003 combination is found by using the combination formula $\frac{n!}{r!\,(n-r)!}$. Therefore the number of times, that this sub-alternative of reducing the existing lines to 1 in the department can be tested and decided accordingly is 3003. Number of times that we have to test for each subalternative are given in Chapter 5.

3. Since a 3 digits place is availabe in the program, the quantities to be produced, and the production times of the operations are given in terms of lots. We let 1 lot = 10 cans. Therefore, the operation times of each product are multiplied by 10 to get the operation time of each lot and the daily production of each product is divided by 10 to find the daily (8 hrs) production in terms of lots.

4. When 2 or more models are produced together for balancing the operation times, the quantity of products to be produced within 8 hours is determined from the smallest daily production capacity of the models, e.g., suppose products 7 and 9 are produced together in a line; the capacities of product 7 and 9 are 774 and 800 lots/shift respectively, the quantity of products to be produced is 774 lots for both of the products.

5. A dummy job with zero time is used to connect the

operations of two or more cans and to perform the operations in required sequence, when they are produced together in a line (see Appendix XIII).

### 3.3.4. Input Data Required by the Program

The inputs required by the program are seen in Appendix XV.

Here they will only be briefly mentioned.

1. An identification card is punched according to the instructions given below:

| Column No. | Specification |
|---|---|
| 2 | No. 9 |
| 31-33 | Run No. |
| 34-37 | $T_o$ = balancing time |
| 38-40 | lots/day |

2. Can-do table cards are punched according to the instructions given belwo:

| Column No. | Specification |
|---|---|
| 11 - 13 | Job No. |
| 29 - 30 | Total No. of zones in which this operation is performed |

These cards are sorted according to increasing job numbers.

3. A blank card.

4. Job data cards punched according to the instructions given below:

| Column No. | Specification |
|---|---|
| 8 - 9 | Job No. |
| 11 - 13 | No. of precedence of job |
| 47 - 49 | [illegible] |
| 51 | Can-do (8) or must-do (9) coding |
| 59 - 60 | Zone No. |
| 67 - 70 | Job time |

These cards should be sorted according to decreasing job times for each zone.

5. Last card: In column 2 number 9 is punched.

3.3.5. Preparation of the input cards

The input cards required for the program are prepared as follows:

1. A precedence diagram is prepared according to the instructions given above (Appendix XIII).

2. Any 3 digit number is assigned as the run number.

3. The number of lots per shift is determined as is explained in assumption 4.

4. $T_0$ figure for the run is obtained. This figure is obtained by dividing shift time into the number of lots per shift. (This number is the minimum capacity figure if 2 are more product

are produced together.)

5. Since the quantity produced is measured in terms of lots, (1 lot = 10 cans), the times of operations are also in terms of lots. Therefore, the operation time of each product is multiplied by 10 to find the operation time of each lot.

### 3.3.6. Output of the Program

The output of the IBM 1620 Line Balancing Program is obtained by:

1. By typewriter
2. By punched cards

In output we obtain:

1. Number of operators used in production
2. Operators accumulated job time
3. Run's accumulated job time

At the end of the run 3 factor numbers are typed. These numbers and their indications are shown below:

1. The first number shows the unused time for the entire run by all operators.

2. The second number shows the number of operators over the theoretical minimum.

The theoretical minimum number of operators is obtained from the formula

$$TM = \frac{TT}{T_o}$$

where:

TM = Theoretical minimum

TT = Total time

$T_o$ = Balancing time

and if th ere is a remainder it is rounded off to the greater number.

3. The third number shows the amount of unused time there would be, if only the theoretical minimum number of operators were used.

The efficiencies of the sub-alternatives are calculated by using the formula given below

$$E = 1 - \frac{TUT}{TU}$$

where:

E = Efficiency

TUT = Total unused time

TU = Total used time

The figures required for finding the efficiency of the department are obtained from the outputs of the Line Balancing Program. The outputs of the Line Balancing Program are given in Appendix XV.

## 3.4 Linear Programming

The Linear Programming with IBM 1620 program developed by the IBM Co. is used to test the fifth alternative which is to find optimum product mix for the company. The program is used in this study without any modification. But we made some assumptions to use the program for the alternative. These assumptions are explained below:

### 3.4.1. The Assumptions

1. Equivalent factor number of each product equalize the profit obtained from each product that is, as explained in Section 3.1.4., the products 8 and 12 had factor of equivalence 1 and 5 respectively. These factors of equivalance show that we produce 5 times more from product 8 than 12 per shift. But it was assumed that the profit obtained from product 12 is 5 times greater than the profit of product 8. Therefore, the profit of each product is equalized by this factor of equivalance. These factors of equivalance are used in determining the objective function.

2. The available time for each machine in the department is 299520 minutes.

$$299520 = 2 \times 8 \times 312 \times 60$$

where:

60 = minutes

2 = shifts per day

8 = hours per shift

312 = days per year

3. The machines are not idle during the production process.

4. No technical and order restrictions are seen for the

products.

3.4.2. Preparation of the inputs

1. Preparation of the inputs: As it is explained in assumption 1 in Section 3.4.1., the factor of equivalance of each model found in Section 3.1.4., equilize the benefit obtained from each product. Therefore, if we produce "X" units from products number 1 and 2, we obtain 3.70 $X_1$ and 1.82 $X_2$ units of profit from the production process. For this reason, the objective function is determined as follows:

Maximize $Z = 3.70\ X_1 + 1.87\ X_2 + 1.66\ X_3 + 2.50\ X_4 + 3.33\ X_5 + 1.66\ X_6 + 1.29\ X_7 + 1.00\ X_8 + 1.25\ X_9 + 1.56\ X_{10} + 1.56\ X_{11} + 5.00\ X_{12} + 3.33\ X_{13} + 1.69\ X_{14}$.

2. Preparation of the inequalities: One inequality is written for each machine in the department. The inequality, written for machine number 11 is shown below:. It is known that this machine was used in production processes of models 1, 2, 3, and 4. The production time required to produce 1 unit of product in machine 11 is 0.032 minutes (see Figure 2). In like manner, the production times required to produce units of models 2, 3, 4 in machine 11 are 0.029, 0.005 and 0.020 minutes respectively. The total available time of machine number 11 is 299520 minutes per annum. It is known that the time spent for

the production of $X_1$, $X_2$, $X_3$ and $X_4$ units/year of the models should be equal or less than the total available time of the machine. Therefore, the inequality for machine number 11 is:

$$0.032\ X_1 + 0.029\ X_2\ X\ 0.005\ X_3 + 0.020\ X_4 \leqslant 299520$$

3.4.3. The Objective Function and the Inequaties for the Alternative

Maximize $Z = 3.70X_1 + 1.87\ X_2 + 1.66\ X_3 + 2.50\ X_4 + 3.33X_5 + 1.66\ X_6 + 1.29\ X_7 + 1.00\ X_8 + 1.25\ X_9 + 1.56\ X_{10} + 1.56\ X_{11} + 5.00\ X_{12} + 3.33\ X_{13} + 1.60\ X_{14}$
which is subject to:

| Machine # | | |
|---|---|---|
| 11 | $0.032\ X_1 + 0.029\ X_2 + 0.005X_3 + 0.020X_4$ | $\leqq$ 299520min |
| 12 | $0.071\ X_1$ | |
| 13 | -- | |
| 14 | $0.178\ X_1$ | |
| 15 | -- | |
| 16 | $0.074\ X_1$ | |
| 17 | $0.046\ X_1$ | |
| 18 | $0.045\ X_1$ | |
| 19 | -- | |
| 21 | $0.026X_2 + 0.030X_3 + 0.074X_5 + 0.024X_9 + 0.053\ X_{10}$ | |
| 22 | $).054\ X_{10}$ | |

| Machine # | | |
|---|---|---|
| 23 | $0.089\ X_2 + 0.034\ X_3$ | $\leqq$ 299520 min |
| 24 | $0.072\ X_2 + 0.071\ X_3$ | |
| 25 | $0.046\ X_1 + 0.067\ X_2 + 0.053\ X_3$ | |
| 26 | $0.090\ X_2 + 0.080\ X_3$ | |
| 27 27 | $0.088\ X_1 + 0.090\ X_2 + 0.079\ X_3$ | |
| 31 | $0.074\ X_5 + 0.040\ X_6 + 0.014\ X_9 + 0.017\ X_{11}$<br>$0.017\ X_{11}$ | |
| 32 | $0.053\ X_9 + 0.047\ X_{11}$ | |
| 33 | $0.053\ X_1 + 0.100\ X_5$ | |
| 34 | $0.075\ X_{10}$ | |
| 35 | $0.070\ X_5 + 0.059\ X_{10}$ | |
| 36 | $0.160\ X_5$ | |
| 37 | $0.140\ X_5$ | |
| 41 | $0.007\ X_7 + 0.017\ X_8 \pm 0.007\ X_{14}$ | |
| 42 | $0.063\ X_4 + 0.063\ X_{14}$ | |
| 43 | =- | |
| 44 | $0.060\ X_9 + 0.075\ X_{11}$ | |
| 45 | $0.050\ X_9$ | |
| 46 | $0.060\ X_9 + 0.073\ X_{10}$ | |
| 47 | $0.071\ X_{10}$ | |
| 48 | $0.144\ X_5 + 0.047\ X_8 + 0.090\ X_{10}$ | |
| 51 | $0.026\ X_4 + 0.040\ X_6 + 0.026\ X_7 +$<br>$0.049\ X_8 + 0.026\ X_{11} + 0.026\ X_{14}$ | |
| 52 | $0.034\ X_{14}$ | |
| 53 | $0.041\ X_9$ | |

| Machine # | |
|---|---|
| 54 | $0.030\ X_6 + 0.033\ X_7 + 0.024\ X_8 +$ $\leq$ 299520 min |
| | $0.031\ X_9 + 0.039\ X_{10} + 0.028\ X_{11} + 0.081 X_{14}$ |
| 55 | $0.100\ X_5 + 0.080\ X_6 + 0.062\ X_7 + 0.049 X_8$ |
| | $0.100\ X_{12} + 0.088\ X_{13}$ |
| 56 | $0.076\ X_4 + 0.050\ X_6 + 0.044\ X_7 + 0.050\ X_8$ |
| | $0.070\ X_{11} + 0.094\ X_{12} + 0.073\ X_{13} +$ |
| | $0.076\ X_{14}$ |
| 57 | $0.075\ X_4 + 0.080\ X_6 + 0.051\ X_7 + 0.049\ X_8$ |
| | $0.072\ X_{11} + 0.114\ X_{12} + 0.084\ X_{13} + 0.075 X_{14}$ |
| 58 | $0.062\ X_4 + 0.060\ X_7 + 0.044\ X_8 + 0.062\ X_{11}$ |
| | $0.123\ X_{12} + 0.088\ X_{13}$ |
| 59 | $0.051\ X_7 + 0.045\ X_8$ |
| 61 | $0.003\ X_{12} + 0.032\ X_{13}$ |
| 62 | $0.120\ X_4 + 0.120\ X_{12} + 0.157\ X_{13}$ |
| 63 | =-- |
| 64 | $0.055\ X_4 + 0.035\ X_{14}$ |

The inputs of the Linear Programming Problem, prepared according to the requirements of the program from the objective function and the inequalities are given in Appendix XVI.

### 3.4.4. Tabulation of the Results

After running the Linear Programmin with IBM 1620 program for the inputs, the models in the optimum product mix and the yearly production figures of each model in the mix were obtained. The outputs of the program can be seen in Table 11 and Appendix XVII. Table 12 shows that: if only the optimum mixed products are manufactured, total amount of production increases from 6,200,275 cans/annum to 11,201,070 cans/annum.

| Product Number | Amount of production per year (cans) |
|---|---|
| 1 | 565 090 |
| 2 | 2 601 400 |
| 3 | 198 210 |
| 4 | 220 420 |
| 6 | 899 530 |
| 9 | 133 120 |
| 10 | 3 993 500 |
| 12 | 2 275 500 |
| 14 | 314 300 |
| TOTAL | 11 201 070 |

TABLE 11: - Optimum Product Mix and the Total Amount of Production Per Annum.

PART III

CHAPTER 4

# ANALYSIS AND EVALUATION OF ALTERNATIVE SOLUTIONS

As it is explained in Section 2.7.2., in this study, the 5 alternatives we tested using the Production Scheduling I and II, the Line Balancing and the Linear Programming Programs to obtain a solution to the problem of low departmental efficiency. In order to reach a solution the Production Scheduling Program was run 8, the Line Balancing Program 13 , and the Linear Programming Program 1 times.

Before analysing the results of each alternative it pays to see the present position of the department in terms of departmental efficiency and the number of orders in the queue.

## 4.1. Present Position of the Department

As it is explained in Section 1.3, at first step we simulated the actual production figures of the 14 standard models and then the outputs of the simulation programs were used as the inputs of the Scheduling Program I. The Scheduling Program I, scheduled the orders and calculated the departmental efficiency (Appendix XI). At the end of the run we obtained the following results:

1. 23% departmental efficiency

2. 2, 170, 120 cans/year in the order queue[1]. (6,373, 244 cans/year were ordered for the scheduling process.) Therefore, the run proved the existence of the problem that was tried to be solved in this study.

In this Chapter, the results that were obtained from the alternatives applied to solve the problem will be explained. The summary of the results of the first 3 alternatives and the 4th one, are given in Tables 12 and 13 respectively.

These alternatives are stated briefly below, before going into the explaination of the results obtained:

1. To keep the present locations of the machines fixed but:

a) Increase capacities of the critical machines that cause the bottlenecks in the line.
This was done by adding new machines.

b) Shift some products from original production lines to less utilized lines of the department.

---

[1] The reasons for the high order queue is that: In the program we assumed that when a machine is idle because of technological restrictions, it cannot be used for other purposes. In practice idle machines are used for individual operations as much as the conditions permit and the semi-finished cans are stored on the floor.

TABLE: IZ. Summary of the Results Obtained from the Application of the Production Scheduling Programs I and II.

...iciency:

| ... ...nber | Name of the Group | 1st Critical Machine Change | 2nd Critical Machine Change | 1st Shift Change | 2nd Shift Change | Factor Change | New Simulation | Group Change | Origina... Shedu... |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Line A | .08 | .07 | .16 | .17 | .14 | .08 | .68 | .07 |
| 2 | Line B | .32 | .29 | .41 | .35 | .35 | .38 | .47 | .28 |
| 3 | Line C | .32 | .33 | .37 | .43 | .22 | .24 | .22 | .31 |
| 4 | Line D | .22 | .27 | .31 | .30 | .24 | .26 | .17 | .24 |
| 5 | Line E | .37 | .36 | .32 | .24 | .48 | .40 | .17 | .39 |
| 6 | Line F | .03 | .06 | .05 | .06 | .20 | .03 | .03 | .05 |
| 7 | Shears | .38 | .37 | .46 | .43 | .39 | .40 | .34 | .38 |
| 8 | C. Notching M. | .18 | .21 | .22 | .21 | .21 | .21 | .27 | .20 |
| 9 | Gasket M. | .03 | .08 | .08 | .08 | .09 | .13 | .10 | .06 |
| 10 | Tracking M. | .05 | .04 | .03 | .05 | .00 | .00 | .07 | .05 |
| 11 | B. Rolling M. | .18 | .18 | .22 | .20 | .23 | .19 | .25 | .18 |
| 12 | S. ... Seaming M. | .23 | .23 | .28 | .26 | .29 | .24 | .34 | .23 |
| 13 | Seaming M. | .21 | .25 | .27 | .25 | .28 | .27 | .32 | .23 |
| 14 | Soldering M. | .18 | .15 | .21 | .20 | .22 | .15 | .27 | .17 |
| 15 | Flanging M. | .29 | .29 | .35 | .33 | .38 | .30 | .41 | .29 |
| 16 | 1st Lid Seaming | .28 | .28 | .33 | .31 | .34 | .29 | .41 | .28 |
| 17 | 2nd Lid Seaming | .19 | .19 | .23 | .21 | .25 | .19 | .29 | .18 |
| 18 | Lid. S. H. Attaching | .24 | .24 | .28 | .27 | .29 | .23 | .35 | .23 |
| 19 | Model 1 | .17 | .15 | .23 | .24 | .24 | .16 | .57 | .15 |
| 20 | Model 2 | .31 | .27 | .42 | .36 | .36 | .39 | .54 | .27 |
| 21 | Model 3 | .31 | .27 | .42 | .36 | .36 | .39 | .54 | .27 |
| 22 | Model 4 | .30 | .29 | .27 | .21 | .46 | .30 | .24 | .32 |
| 23 | Model 5 | .44 | .43 | .45 | .49 | .36 | .31 | .34 | .42 |
| 24 | Model 6 | .57 | .53 | .49 | .38 | .61 | .57 | .27 | .59 |
| 25 | Model 7 | .42 | .39 | .39 | .29 | .52 | .43 | .20 | .43 |
| 26 | Model 8 | .43 | .41 | .41 | .33 | .52 | .42 | .26 | .44 |
| 27 | Model 9 | .39 | .47 | .50 | .43 | .43 | .55 | .17 | .43 |
| 28 | Model 10 | .52 | .55 | .57 | .56 | .47 | .50 | .29 | .51 |
| 29 | Model 11 | .46 | .48 | .47 | .33 | .56 | .55 | .20 | .50 |
| 30 | Model 12 | .33 | .34 | .29 | .22 | .72 | .33 | .22 | .36 |
| [illegible] | Model 13 | .36 | .37 | .33 | .28 | .70 | .34 | .30 | .39 |

| [illegible] | Simulated Orders | 1st Critical Machine Change | 2nd Critical Machine Change | 1st Shift Change | 2nd Shift Change | Factor Change | New Simulation | Group Change | Original Schedu[illegible] |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 81 074 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 252 685 | 69976 | 74433 | 65141 | 196409 | 0 | 75358 | 0 | 7287[illegible] |
| 3 | 372 538 | 21046 | 164 011 | 11901 | 44 790 | 0 | 0 | 0 | 13226[illegible] |
| 4 | 86 760 | 0 | 0 | 0 | 0 | 69909 | 0 | 0 | 0 |
| 5 | 409565 | 92 139 | 0 | 0 | 110340 | 388683 | 507384 | 0 | 12555[illegible] |
| 6 | 884418 | 9929 | 106979 | 0 | 0 | 565911 | 129129 | 0 | 32952[illegible] |
| 7 | 367922 | 204 074 | 209911 | 0 | 0 | 309911 | 241232 | 0 | 309911[illegible] |
| 8 | 317770 | 155 799 | 111 896 | 182561 | 131867 | 232206 | 154368 | 41223 | 111 896[illegible] |
| 9 | 840145 | 493 871 | 44296 | 44298 | 44298 | 0 | 319912 | 0 | 271 69[illegible] |
| 10 | 1573972 | 79134 | 162266 | 79134 | 79134 | 361776 | 69729 | 0 | 52876[illegible] |
| 11 | 813698 | 199224 | 199224 | 74898 | 271473 | 199224 | 55418 | 0 | 199224[illegible] |
| 12 | 68968 | 0 | 0 | 0 | 0 | 10032 | 0 | 0 | 0 |
| 13 | 64048 | 57540 | 12458 | 12458 | 1314 | 2102 | 10832 | 1314 | 46357[illegible] |
| 14 | 239649 | 63550 | 0 | 0 | 39042 | 222700 | 302155 | 0 | 39[illegible] |
| TOTAL | 6 373 224 | 1446282 | 1185 476 | 470391 | 923143 | 2159024 | 1865517 | 42537 | [illegible] |

... 13: Summary of the Results obtained from the Application of the Line Balancing Program

| Number of the Experiment | Specifications | Total Unassigned Time | Number of Workers over Theoretical Minimum | Total Assigned Time | Number of Workers Required | Efficiency |
|---|---|---|---|---|---|---|
| 1 | line (A, B, C, D, E, F) | .0394 | 1 | .2862 | 11 | |
| | | .0493 | 1 | .2172 | 9 | |
| | | .0887 | 2 | .5033 | 20 | $1-\frac{.0887}{.5033}=.824$ |
| 2 | Line (A, B, C, F) | .0491 | 1 | .3949 | 15 | |
| | Line (D, F) | .0236 | 2 | .1103 | 13 | |
| | | .0727 | 3 | .5152 | 28 | $1-\frac{.0727}{.5152}=.854$ |
| 3 | Line (A, F) | .0326 | 1 | .1746 | 7 | |
| | Line (B, C) | .0358 | 1 | .2036 | 9 | |
| | Line (D, E) | .0236 | 2 | .1103 | 13 | |
| | | .0920 | 4 | .4885 | 29 | $1-\frac{.0920}{.4885}=.812$ |
| 4 | Line (A, F) | .0326 | 1 | .1746 | 7 | |
| | Line (B, C) | .0358 | 1 | .2036 | 9 | |
| | Line (D) | .0145 | 1 | .0553 | 7 | |
| | Line (E) | .0418 | 1 | .1182 | 4 | |
| | | .1249 | 4 | .5517 | 27 | $1-\frac{.1249}{.5517}=.774$ |
| [illegible] | Line (A) | .0132 | 0 | .1052 | 4 | |
| | Line (B) | .0130 | 0 | .0770 | 6 | |
| | Line (C) | .0429 | 1 | .1433 | 7 | |
| | Line (D) | .0147 | 1 | .0553 | 7 | |
| | Line (E) | .0418 | 1 | .1182 | 4 | |
| | Line (F) | .0116 | 1 | .0694 | 6 | |
| | | .1372 | 4 | .5684 | 34 | $1-\frac{.1372}{.5684}=.759$ |

c) Follow a sales and/or production scheduling policy of rejecting orders below a minimum level for some products.

2. To make the machines transferable from one place to another and set up the production lines according to the specific orders.

3. To group the machines performing similar functions and schedule the products according to their operational sequences to the groups. Operation will be done by anyidle machine in the group rather than the particular machine assigned to the products.

4. To reduce the number of present production lines by combining them into

a) one line

b) two lines

c) three lines

d) four lines

e) keep them as they are (for checking purposes).

5. To adjust the product mix in an optimum manner while keeping other factors so that a greater utilization of the facilities result.

The results obtained from the application of those alternatives are stated below. The advantages and the disadvantages of the alternatives causing increase in the efficiency will be explained in Chapter 5.

## 4.2. Alternatives Tested

4.2.1. To Keep the Present Locations of the Machines Fixed but:

a) Increase the capacities of the critical machines. According to alternative 4.2.1, the reasons for the low departmental efficiency can be summarized as follows:

1. The low production capacities of the bottleneck machines. Therefore, the machines with higher capacities in the line are idle most of the time.

2. Some of the production lines are used in the production of a great number of models while some others are used in production of just one product. For example, in line E, 6 products (products number 4, 6, 7, 11, 12, 13) and in lines A and F only 1 product (products number 1, 14) are manufactured. The bottleneck machines were determined in two ways:

1. In the first way, the minimum capacity machines for each product was determined and called as bottleneck machine. The machines constituting bottleneck were machine numbers 26, 27, 37, 54, 55, 51, 34, 46, 44, 62. After identifying the bottleneck machines we doubled their capacities and tested the alternative by running the Scheduling Programm I with the modified input data.

And as a result of this test, 23% departmental efficiency and a little bit of decrease in order queue amount were obtained (Tables 12 and 14) The conclusion of this alternative is that: Adding new machines to the bottlenecks does not change the overall departmental efficiency.

The reason for having the same efficiency figure can be summarized as follows:

1. Some of the machine capacities in the lines are quite close to capacities of the bottleneck machines. Therefore, when we double the bottleneck machines, the other machines become bottleneck for the line. Thus by doubling the bottleneck machine, the production capacity of the line was not doubled but increased a little bit without affecting the efficiency.

2. In the second way the bottleneck machines were determined from a Tally Chart. We found the number of times that machines were fully occupied in a week, for the year; then the machines which are fully utilized 13 weeks or more (25% or more of the 52 weeks) in a year were determined.

$$(.25)\ (52) = 13 \text{ weeks}$$

The machines which are fully utilized 13 or more weeks in a year were considered as bottleneck machines, and therefore they were doubled. According to the Tally Chart (see Table 15), the doubled machines are:
Machine number 21, 31, 35, 46, 48, 51, 54, 55, 56, 57. After doubling the capacities of these machines and running the Scheduling Program I with the modified input data, again 23% departmental efficiency, and nearly the same amount of orders in the queue, that we obtained in the first change, was obtained. The outputs of the alternative are seen in Tables 12 and 16. The same reason, that was explained in the first change is valid for

TABLE : 15. TALLY CHART FOR FINDING BOTTLENECK MACHINES.

| Machine Number | | Total Number of uses |
|---|---|---|
| 11 | /// | 3 |
| 21 | ~~////~~ ~~////~~ ~~////~~ ~~////~~ ~~////~~ ~~////~~ ~~////~~ // | 37 |
| 22 | ~~////~~ ~~////~~ // | 12 |
| 23 | / | 1 |
| 24 | / | 1 |
| 25 | // | 2 |
| 26 | / | 1 |
| 27 | // | 2 |
| 31 | ~~////~~ ~~////~~ ~~////~~ ~~////~~ ~~////~~ | 25 |
| 32 | ~~////~~ / | 6 |
| 33 | ~~////~~ // | 7 |
| 34 | ~~////~~ ~~////~~ // | 12 |
| 35 | ~~////~~ ~~////~~ ~~////~~ ~~////~~ | 20 |
| 36 | ~~////~~ // | 7 |
| 37 | ~~////~~ // | 7 |
| 41 | / | 1 |
| 42 | // | 2 |
| 44 | ~~////~~ / | 6 |
| 45 | / | 1 |
| 46 | ~~////~~ ~~////~~ ~~////~~ | 15 |
| 47 | ~~////~~ ~~////~~ // | 12 |
| 48 | ~~////~~ ~~////~~ ~~////~~ ~~////~~ | 20 |
| 51 | ~~////~~ ~~////~~ ~~////~~ / | 16 |
| 52 | / | 1 |
| 53 | / | 1 |
| 54 | ~~////~~ ~~////~~ ~~////~~ ~~////~~ ~~////~~ ~~////~~ ~~////~~ ~~////~~ | 40 |
| 56 | ~~////~~ ~~////~~ ~~////~~ //// | 19 |
| 57 | ~~////~~ ~~////~~ ~~////~~ //// | 19 |

the unchanged efficiency figure of this test.

b) Shift some products from their original production lines to the less utilized lines of the department.

Under this alternative two different tests were made:

1. First Shift Change: The products 6 and 7 which are manufactured in line E (in line E, 6 models are manufactured) were shifted to lines A and B. Originally, in line A only 1 product and in line B 2 products were produced. The sequence of operations and new machine numbers used in productions are:

| | Machine Numbers |
|---|---|
| Product 6: | 41, 31, 23, 24, 17, 18, 19, 59 |
| Product 7: | 41, 31, 23, 24, 17, 18, 19 |

In the test the capacities of new machines were assumed to be the same with the previous machine capacities.

After making the necessary changes in inputs, the Scheduling Program I was run for the test and at the end 28% efficiency for the department and a quite high decrease in order queue was obtained. The queue decreased from 2,170,120 cans/year to 580421 cans/year. The outputs of the test are listed in Tables 12 and 17.

2. Second Shift Change: In the second shift change, the products 6, 7, 11 were shifted from lone E to lines A, B, C, respectively. The sequence of operations and the number of machines used in the operations are:

| | |
|---|---|
| Product 6: | 41, 31, 23, 24, 17, 18, 19, 59 |
| Product 7: | 41, 11, 23, 24, 17, 18, 19 |
| Product 11: | 11, 31, 32, 33, 34, 17, 36, 37 |

As it was mentioned above the capacities of new machines were assumed to be the same with the original machines.

After scheduling the orders according to the changes in input data a 26% efficiency for the department, and order queue increase, compared to previous shift changes, was obtained. The outputs of this test (second shift change) are listed in Table 12 and 18.

c) Follow a sales and/or production scheduling policy of rejecting orders below a minimum level for some products,

In this alternative the following are assumed:

1. Order quantities for some products are low, therefore the machines used in the production of these products are idle most of the time, and their idleness decreases the overall efficiency of the department.

2. The cans that are produced in the other lines cannot be shifted to the less utilized lines.

The line efficiencies obtained at the end of original scheduling are listed below:

| | |
|---|---|
| line A | .07 |
| line B | .28 |
| line C | .31 |
| line D | .24 |

| | |
|---|---|
| line E | .39 |
| line F | .05 |

The lines A and F are the less utilized lines, therefore, they are causing the overall efficiency to decrease to 23%. For this reason their efficiencies should be increased by manufacturing more in the lines. The critical efficiency was assumed as 23%. Therefore, the critical efficiency figure is divided by the efficiencies of lines A and F in order to find the factor number that will be used to find the minimum order level for the models of lines A and F.

$$\frac{0.23}{0.07} = 3.3 = 3$$

$$\frac{0.23}{0.05} = 4.6 = 5$$

Therefore, by looking at the factor numbers it can be said that the order quantities for the cans manufactured in lines A and F should be 3 and 5 times greater than their original scheduling amounts.

For testing this alternative, the weekly simulated orders of Brezilya Coffee Can manufactured in line A were multiplied by the factor 3, and 10 kg Bayer, 5 kg Bayer and SMA cans manufactured in line F by the factor 5. Then the input data cards for this test were changed. After scheduling the products according to the modified input data 27% departmental efficiency was obtained and the order queue increased drastically (Tables 12 and 19). We can expect this queue increase because of increases in orders.

Here a question comes to mind. What is the effect of random number used in sumulation, on the efficiency of the department? For answering this question the random number of the first simulation which was .12945 is changed to .16666 and the simulation program was run again for this number. New simulation results were obtained for the year (Appendix XIII). Then the simulated orders of the models were scheduled by the Scheduling Program. As a result of this change, 24% efficiency was obtained for the department. Therefore, it can be said that the effect of the random number on the departmental efficiency was not significant (Tables 12 and 20).

4.2.2. To Make the Machines Transferable from One Place to Another and Set up the Production Lines According to the Specific Orders

According to this alternative, the reason the low departmental efficiency is the zig-zag movements of the products among machine lines in the department. Therefore, in order to have smooth production lines in the department, we have to set up the' lines according to the incoming orders every week.

The alternative is briefly explained below:

Suppose the models 10, 1, 8, 12 are ordered for a week. On Sunday, the machines required in the production will be set up according to the required machine sequences of the orders, to have a smooth production path, and to cancel the zigzag movements between the lines during production.

The average value of the efficiencies of the machine groups 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32 gives the departmental efficiency for the alternative. (Table 12)

The departmental efficiency increases to 38.85 = 39% if the lines set up according to the incoming orders (Table 12). The advantages and disadvantages of this alternative will be explained in Chapter 5.

4.2.3. <u>To Group the Machine Performing Similar Functions and Schedule the Products to the Groups</u>

For testing this alternative, the Scheduling Program II was run with the modified input data. As it is mentioned previously, to test this alternative certain assumptions were made. Here they are briefly reviewed:

1. The machines performing similar functions are grouped together.

2. The capacities of all the machines in the group are the same with the capacity of the original machine used in the production of a model.

3. Products follow group sequences instead of machine sequence in the production process.

4. The machines are not particularly determined for the products. The operations can be done by any machine in the group.

5. Only one machine in the group can be used in production of a model.

In order to test the alternative some changes in the input data were made (Appendix XII). Following informations are given as inppts of the program:

1. Machine groups and the machines in each group. In this study after calssifying the machines according to their function, 18 machine groups were obtained (Table 10).

2. Group sequences required in the production process.

3. The capacity of each machine in the group employed in the production of a model.

After making the necessary changes in the input data the program was run and 30% departmental efficiency was obtained. And the order queue decreased from 2,170.120 cans/year to 42537 cans/year (Tables 12 and 21). If the increase in the departmental efficiency is analysed, it will be seen that by the application of this alternative 30% increase in efficiency was obtained. This figure is found as follows:

$$\frac{.30 - .23}{.23} = \frac{0.07}{.23} = .30$$

4.2.4. To Reduce the Number of Present Production Lines by Combing them into:

a) One line in the depabtment:

As it was mentioned previously the maximum number of products in production process at a time was assumed 6. Since the number of standard models is 14, the number of times that this alternative is to be tested is found from the combinational formula $\frac{n!}{r!\,(n-r)!}$ as 3003. But this alternatuve was tested once because of time limitations. This alternative was testes for the production of models 1, 2, 5, 9, 6, 14 (one product from each line).

According to the alternative the setting up of a converyor and locating the machines along the conveyor on bothe sides is assumed. Then the cans are sent together by the conveyor to the machines for the operations.

The precedence diagrams, inputs and outputs of this' alternative are given in Appendices XIII and XV respectively. The balancing time is obtained from the division of 8/2700 = 0.0296 hrs, and the balancing quantity 2700 is the smallest per shift capacity of the models manufactured in the line. After running the input data by the program 82.4% efficiency figure for the department is obtained (Appendix XV and Table 13).[1]

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[1] This 82.4% efficiency figure should not be confused with 23% efficiency obtained from Scheduling Program. In the Scheduling Program the efficiency figure is obtained after the orders are produced. But in IBM 1620 Line Balancing Program order quantities are not taken into consideration, only the time of each operation and the balancing quantity per shift is taken into consideration. These two figures are used in decision making process separately.

b) Two lines in the department:

A new arrangement in the department was made so that the lines A, B, C, F, which are used in the production of rectangular cans, constitute the first line. And in the same way lines D and E which are used in the production of cylindirical cans constitute the second line of the department. Total number of products produced in the first line is 5. Since 4 products are produced in this line (one can from each line), the number of times that this line has to be tested is found from the combination formula, is 5.

$$\frac{n\,!}{r!\,(n-r)\,!} = \frac{5\,!}{4!\;1!} = 5$$

The number of product manufactured in the second line is 9, there fore, the number of times that this alternative has to be tested is 36. $\dfrac{9\,!}{2!\;7!} = 36$

And total number of times that we have to test for finding the best product mix for the lines is 180.

$$36 \times 5 = 180$$

Here the alternative tested for the product mix of models

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(footnote continued) The 82.4% efficiency can be compared with 75.9% efficiency of having 6 lines in the department found by using the IBM Line Balancing Program.

1, 2, 5, 14 for the first line and models 9, 7 for the second line. The precedence diagram of the alternative is shown in Appendix XIII.

Products 9 and 7 were balanced at 774 lots per shift (which is the minimum lot production among the models) at 0.0103 hrs/lot.

$$\frac{8 \text{ Hrs/shift}}{774 \text{ lot/shift}} = 0.0103 \text{ hours/lot}$$

Products 1, 2, 5, 14 were balanced at 270 lots/shift, at time 0.0296 hours. After running the program with the prepared input data 85.7% depatmental efficiency was obtained (Table 13 and Appendix XV).

c) Three lines in the department:

For testing this alternative, the machines of the department were arranged to obtain 3 lines of production process in the department. The lines A and F which are used in production of small cans,(100 gr. coffee cans, and 350 gr. SMA cans (the cans are rectangular) constituted the first, the lines B, C which are allocated to production of medium size rectangular cans constitued the second, and the lines D and E which are used in the production of cylindirical cans constitutes the third line in the department.

Total number of products produced in the first line is 2 and since 2 cans are produced (1 can from each line) the number

of

of times that this line has to be tested is 1 $\dfrac{2!}{2!\,0!} = 1$

The number of times that we have to test for the second and third lines in the department is found in the same way as 3 and 36. Then the total number of times that we have to test this alternative is found by multiplying the figure obtained for each line as 108.

$$36 \times 3 \times 1 = 108$$

In this study the alternative of producing the products 1 and 14 in the first, the products 3 and 5 in the second, and the products 9 and 7 in the third line was tested. The balancing quantity and balancing time, which are found by the same method that was mentioned above, are given below in Table 22.

| Line number | Balancing quantity (lot) | Balancing time (Hrs) = to |
|---|---|---|
| 1 | 270 | 0.0296 |
| 2 | 300 | 0.0266 |
| 3 | 774 | 0.0103 |

TABLE 22: Balancing Times and Balancing Quantities of Having Three Lines in the Department.

After running the alternative by using the IBM program, as it is clearly seen in Table 13 and Appendix XV, 81.2% departmental efficiency was obtained.

d) Four lines in the department:

In order to test this alternative, the machines of the department were arranged so as to obtain 4 lines of production in the department. Lines A and F which were allocated to the production of small cans constituted the first, lines B and C which were used in the production of medium size rectangular cans constituted the second, and lines D and E which are allocated to the production of cylindirical cans constituted the third and fourth lines in the department. The number of times that the first and second lines had to be teasted were found above as 1 and 3 respectively. Since three products in line D and 6 products in line E are produced, the number of times that we have to test is 3 and 6 respectively. Then the total number of times that we have to test the alternative is 54. The figure is obtained from the multiplication $1 \times 3 \times 3 \times 6 = 54$.

In this study, we tested the alternative of producing the products 1, and 14 in line 1, the products 3, 5 in line 2 and the product 9 in line 3 and the product 12 in line 4. The precedence relationships of the operations are seen in Appendix XIII. The balancing quantities and time that were used to test the alternative is given below in Table 23.

| Line Number | Balancing quantity lots | Balancing time to hrs |
|---|---|---|
| 1 | 270 | 0.0296 |
| 2 | 300 | 0.0266 |
| 3 | 800 | 0.0100 |
| 12 | 200 | 0.0400 |

TABLE 23: Balancing Times and Quantities of Having Four Lines in the Department.

Then the program was run by using the data cards prepared for this alternative and obtained 77.4% departmental efficiency. (This figure is clearly seen in Table 13, the outputs of the run are given in Appendix XV.)

e) Six lines in the department:

For checking purposes, we found the departmental efficiency with 6 lines in the department.

The number of times that we have to test each line is found directly from the number of products that are produced in the line. Therefore, the number of times that we have to test the lines are 1, 2, 1, 3, 6, 1 for the lines A, B, C, D, E and F respectively. The total number of times that we have to test the alternative is 36. This figure is found by multiplying the number of times that we have to test for each line.

In this study the alternative of manufacturing the products 1, 2, 5, 9, 12, 14 (one product from each line) in lines 1, 2, 3, 4, 5, 6 respectively, was tested. The precedecence diagram are given in Appendix XIII. The balancing quantities and times that we used to test the alternative are given below in Table 24.

| Line Number | Balancing quantity | Balancing Time |
|---|---|---|
| 1 | 270 | 0.0296 |
| 2 | 533 | 0.0150 |
| 3 | 300 | 0.0266 |
| 4 | 800 | 0.0100 |
| 5 | 200 | 0.0400 |
| 6 | 591 | 0.0135 |

TABLE 24: - Balancing Times and Quantities of Having Six Lines in the Department.

After running the input data by using the program, 75.9% departmental efficiency was obtained. This figure is clearly seen in Table 13, and the outputs of the run are given in Appendix XV.

4.2.5. To Adjust the Product Mix in an Optimum Manner While Keeping Other Factors (Determination of Optimum Product Mix)

As it is known, 14 different models of cans are manufactured in the department. This product mix is a quite high figure. During the analysis of the facilities, it was seen that some of the machines were used in the production of two or more cans which were produced in different production lines. These machines are named as Common Machines. This fact is clearly seen in Table 6. For example, machine number 11 is a common machine for products 1 and 4. The reason for having a high number of common machines is high product mix. Initially the machines were set according to the low level of product mix, but today the number of standard products in the mix increased to 14, and no relocation of the machines was made since the establishment of the factory.

Because of the full utilization of these common machines for any week, some of the orders are not scheduled, therefore, not manufactured. This situation affected the study in two ways:

1. Only 4 202 124 cans, out of 6 373 244 can order were manufactured during the year.

2. Due to the great amount of unscheduled cans, the machine utilization decreased.

At this step such a question comes to mind. Can an optimum mix be found so that production in the department is maximized? Yes, by using the Linear Programming with IBM 1620 program, the optimum product mix which maximize the production quantity in the department can be found.

After running the Linear Programming with IBM 1620 Program, the optimum product mix of the department was obtained. The outputs of the program are listed in Table 25 and Appendix XVII.

The models in the optimum product mix and their yearly optimum production quantities are given in Table 25.

| Model Number | Optimum Production Quantity (can/year) |
|---|---|
| 1 | 565 090 |
| 2 | 2 601 400 |
| 3 | 198 210 |
| 4 | 220 420 |
| 6 | 899 530 |
| 9 | 133 120 |
| 10 | 3 993 500 |
| 12 | 2 275 500 |
| 14 | 314 300 |
| | 11 201 070 |

TABLE 25: The Models in the Optimum Product Mix.

As a total 11 201 070 cans would be produced per annum. This amount of production increases the facility utilization in the department. More can is produced in the department greater utilities of the facilities are obtained. Of course, this amount (11 201 070 cans/year) of production cannot be realized even if only the cans which are seen in the optimum product mix are manufactured. Because, during the application of the program, as was mentioned above, it was assumed:

1. No technical and order restriction.

2. No idle time for the machines during the production time.

In actual life it is known that

1. There are technical and order restrictions.

2. The machines can be idle some of the time which is beyond the control of the managers.

Therefore, the total level of production may be assumed as 8 000 000 cans/year for the optimum product mix. The decrease from from 11 201 120 cans/year is because of the restrictions and the increase from 6 200 275 cans/year because of the application of the policy of optimum product mix in the production process.

Assuming 8 000 000 cans/year production in the department the efficiency in case of optimum product mix can be found by following the procedure given below:

At the first step, the weekly production indeces of each standard model are found. The yearly actual production of a model is divided into 52 to obtain the average production per week. Then the actual production of each week is divided by the average production per week to obtain the weekly index of that product. The weekly indeces of each product is determined by following the same procedure given above.

At the second step, the yearly total production percentages of each product of the mix are found according to the total 11 201 120 cans/year production. Then these percentages are multiplied by the assumed amount of total production of 8 000 000 cans/year to obtain the yearly total production quantities of each product. Later these yearly figures are multiplied by their weekly production percentages to find the weekly productions of each model. After obtaining the weekly productions of each model, these figures are simulated to obtain the simulated weekly productions by using the simulation program. Then the simulated weekly productions are scheduled by applying the scheduling program. At the end the departmental efficiency in the case of production of optimum product mix is obtained.

Because of the time limitation, we could not apply the above mentioned procedure to find the departmental efficiency in the case of optimum product mix.

Here it is necessary to mention that: The policy of producing only the products which are seen in the mix is very difficult to realize in practice because of the following reasons:

1. Sometimes products which are seen in the optimum product mix and which are not seen, are ordered by some customers. It is impossible to refuse the customers by telling them that the model which is in the mix will be manufactured while the other

will not be manufactured. For example, the products 6 and 5 are ordered by one of the respectable customers of the factory. The product 6 is in the optimum mix but 5 is not.

2. The demand of the customer for products which are seen in the mix may not be so high in quantity as it is indicated by the mix.

# CHAPTER 5

## SUMMARY AND CONCLUSION

### 5.1. Summary of the Results Obtained

According to the results obtained, it can be said that present utilization of the production facilities is very low.

After having a thorough analysis, efficiency increases were obtained in the following alternatives:

1. By shifting some products from the original lines to some other less utilized lines. (See alternative 1-b). This alternative was tested two times.

a. Shifting the products 6 and 7 from line D to lines A and B, increased the departmental efficiency from 23% to 28% (Table 12).

b. Shifting the products 6,7 and 11 from line D to lines A,B,and C, increased the efficiency from 23% to 26% (Table 12).

If we analyse 5% and 3% efficiency increases it is seen that:

$$\frac{.28 - .23}{.23} = 22\% \qquad \frac{.26 - .23}{.23} = 13\%$$

The departmental efficiency was increased by 22% and 13% by the first and second changes respectively. The 22% increase in departmental efficiency is quite a high figure obtained by a simple manipulation.

This shows that the efficiency of the facilities may be increased by changing the production lines. Therefore additional increase in the efficiency can be maintained through a careful study of the other products.

The Advantages and Disadvantages of the Alternative

The advantages can be enumareted as follows:

1. It does not incur any machine set up cost.
2. It eliminates setting up time.
3. It is practical and can be applied easily.

Disadvantage:

This method is a short run solution, in long-run when the product mix changes, the same problem can be encountered.

2. Follow a sales and/or production scheduling policy of rejecting orders below a minimum level for some product.

This alternative increased the departmental efficiency from 23% to 27% (Table 12). The advantages of this alternative are:

1. An increase in the efficiency of less utilized lines (lines A and F) is obtained.

2. It eliminates the setting up time and cost.

The disadvantages can be summarized as follows:

1. An increase in order queue.

2. The customer cannot be forced to order more

than they demand. Therefore this alternative may not be a practical one.

3. By making the machines transferable from one place to another and setting up the production lines according to the specific orders. Thirty-nine percent efficiency was obtained. But this alternative is not a practical one to apply because of 3 reasons:

1. The machines are heavy and they have to be fixed during the operation. Therefore, the reinstallation of 46 machines every week in a single day is a very difficult job.

2. It is too costly. Skilled set up men should be employed for this job.

3. Two different products may require the same machine to be set up in 2 different lines for a week. Therefore, the smooth path may not be seen.

4. By grouping the machines according to their functions and performing the operations at the idle machines of the group without following the machine load specifications, the departmental efficiency was increased to 30 %. This shows 30 % efficiency increase in utilization ($\frac{.30-.23}{.30}$: .30 ). This utilization percentage is quite a high figure as compared with 23 % original departmental efficiency.

The advantages and the disadvantages of this alternative can be summarized as follows:

Advantages:

1. A high % of increase in departmental efficiency.

2. Order queue decreases to a very small number, 42577 cans per year.

3. It is a long run solution to the problem (Changes in product mix do not affect the efficiency)

4. The machine idleness problem created by the high product mix is eliminated by this alternative.

Disadvantages:

1. To re-layout the machines incurs some cost factor

2. For intermachine deliveries some additional conveyors are required, therefore new investments have to be undertaken.

3. Manual delivery of the materials increases the traffic and creates traffic jam in the department.

4. It makes the supervision difficult in the department.

5. The alternative that created increase in departmental efficiency in applying alternative 4, was to reduce the number of the present production lines to two.

By reducing the number of lines from six to two in the department, we obtained an efficiency increase from 75.9 % to 85 % and decrease in operator requirement from 34 operators per shift to 28 operators per shift. Therefore, it can be said that departmental efficiency increased as the number of lines decreased. (Table 13)

The advantages of this alternative are:

1. Number of workers required to operate the machines decreased.

2. The traffic jam, observed in other alternatives, is eliminated.

3. It is somewhat a long-run solution ( The effect of change of product mix on idleness is eliminated).

4. The supervision becomes easier.

The disadvantages of the alternative are:

1. It incurs additional costs to re-install the machines.

2. The efficiency increase is small compared to other alternatives (the groupimg alternative and shifting subalternatives).

3. New investment is required for the conveyor.

4. The number of units produced per shift may be decreased, for the conveyor speed is determined according to the lowest production amount of the product mix.

## 5.2. Suggestions

All the alternatives analysed above increased the departmental efficiency in different percentages. But only two of them resulted in satisfactory solutions. These alternatives are:

1. To shift products 6,7 from their original lines to the lines A and B.

2. To group the machines according to their functions.

The first alternative is a good solution for short run. Therefore, the same problem may be encountered in the long-run if new products are added to the product mix.

The second alternative brings solution to the problems in the long-run. Therefore, although it requires a new layout for the department, this alternative is suggested to the managers to solve the low efficiency problem of the machines in the tin can department. In order to have a clear understanding of the new layout suggested, a block diagram of the machine groups locations is given in Appendix XVIII.

## 5.3. Conclusion

In this study the problem of increasing the efficiency of the production facilities is analysed from several points of view. The most important factors involved in this problem are:

1. The arrival pattern of customer orders,
2. The composition of orders-product mix,
3. The layout of the production facilities,
4. Scheduling procedure followed in the department.

Each one of the above mentioned factors can be assumed to have different values, states, or configurations. Some possible alternatives are as follows:

1. Arrival pattern of customer orders:

a. Deterministicaly known. The average of the previous years for each period will be used.

b. They show a probability distribution for each period.

c. The arrival rates are constant between given intervals of time.

d. The orders for each model arrive in a continious and constant pattern.

2. Product Mix:

a. The product mix by models will be the same as the past year.

b. The aggregate( annual total) product mix will be the same as the last year, but it will show a probability distribution during given periods.

c. The product mix will be determined in an optimum manner by only considering the existing production facilities.

3. Allocation of Production Facilities:

a. Production facilities are assumed to be fixed in their present locations in the department.

b. The location of the facilities are assumed to be fixed, but the capacities of bottleneck areas are increased by adding new machines.

c. It is assumed that the machines in the department can be easily moved from one place to another, and production lines are adjusted according to the models to be manufactured.

d. Similar machines are grouped together.

e. The machines in the department can be re-located.

4. Scheduling Procedure:

a. Present scheduling practice of the department is followed.

b. Some models are run on production lines different than the current ones.

c. Different models are combined together and run on production lines specifically designed for the mix.

d. Some models are scheduled if they are above the minimum level.

As it is seen the number of alternative assumptions are quite numerous, and it is possible to combine these into many different sets and test them one by one. However, the amount of work involved in such a procedure will be prohibitive. Therefore, by following a heuristic approach only the most logical and practical combinations are considered.

The alternatives that are tested in this study are as follows:

1. To keep the present locations of the machines fixed, but:

a. Increase the capacities of the critical machines that cause the bottlenecks in the line. This alternative is the set composed of the items (1b,2b,3b,4a) explained above.

b. Shift some products from original production lines to less utilized lines of the department. This alternative is the set composed of the items(1b, 2b, 3a, 4b).

c. Follow a sales and/or production scheduling policy of rejecting orders below a minimum level. This alternative is the set (1b, 2b, 3a, 4d).

2. To make the machines transferable from one place to another. This alternative is the set (1b, 2b, 3c, 4a).

3. To group the machines performing similar functions. This alternative is the set (1b, 2b, 3d, 4a).

4. To reduce the number of present production lines by combining them into 1, 2, 3, 4, lines. This alternative is the set (1d, 2c, 3e, 4c).

5. To adjust the production mix in an optimum manner. (Determination of optimum product mix.) This alternative is the set (1b, 2c, 3a, 4a).

The analysis of the alternatives showed that the problem of efficiency increase of the production facilities cannot be solved analysing and applying just one of them. A combinational study of all the promising alternatives is necessary for obtaining a good solution to the problem.

The selection of the particular combinations for testing purposes is done by rules of thumb or taking educated guesses. As we have mentioned before, this is the Heuristic Approach to Problem Solving. It does not guarantee that we have an optimum solution, but it provides us with a practical algorithm which gives the better or near optimum solutions within a reasonable time effort or cost.

By the application of the simulation techniques to the:

a. Synthetic generation of customer orders, and

b. Machine loading and shop scheduling process:

1. We were able to test the alternatives before applying them to the problem. Therefore, we obtained

a. Less cost incurrance

b. time saving.

2. We were able to correct the wrong alternatives that appeared in the solution to the problem, before their application. For example, increasing the capacities of the critical machines was seen as the solution to the problem, but after the application of simulation we saw that it was not.

3. We had the ability to test the alternatives that did not come in our minds at the first look into the problem. For example, the shifting alternative of products 6, 7 (one of the best two alternatives tested in this study), did not appear as the problem solving alternative at the first analysis of the problem. It gained importance after testing the doubling the capacities of the critical machines alternative. Therefore, we can say that the simulation technique is management's laboratory to find and test several alternatives of a problem. The managers

can obtain better solution by the application of the simulation technique together with their judgment, experience, and sometimes their intuitions to the problems they meet.

And finally it can be said that the efficiency problem of the model factory was solved by applying the scientific management techniques.

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# APPENDIX - I

## BACKGROUND INFORMATION ABOUT SIMULATION

### 1. General

Simulation is defined as "a process of conducting experiments on a model instead of attempting experiments with a real system" [1]. In business simulation is setting up a model according to the conditions of the company operations and then generating the resulting outcomes of different alternatives by using a digital computer.

Simulation is an experimental problem solving technique. It involves the use of mathematical expressions and operations in order to approximate random fluctuations in the simulated system and in electronic computer because of the complex nature of the system[2]. It is used when the system under consideration can not be designed or analyzed by direct or formal analytical methods.

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[1] C. McMillan and R. Gonzalez, Systems Analysis : A Computer Approach to Decision Models (Homewood, Illinois: Richard D. Irwin, Inc., 1961), p. 15

[2] W.K. Holstein and W. Sonkup, Monte Carlo Simulation (Lafayette, Indiana: Institute for Quantitative Research and Economics and Management Purdue University, 1962), p.1

At this moment it would be rather convenient to emphasise that if various alternatives are tried in actual word this would be a trial and error method rather than simulation. Therefore, in order to have a simulation we have to test the various alternatives in a model which is designed according to the dynamic characteristics of a real system.

A system is defined as "a set of objects, together with relationships between the objects and between their attributes."[3] The systems are classified as natural and man-made, open and closed.

A model is a subtitute for some real equipment or system. The first step of model building is observation of a system or event. The second step is the formulation of hyphothesis which explaines the dynamic behavior of the system. "Model building is an extention and formalization of statement of hypothesis".[4] Models cannot replace the real wold, they only can reduce a complex system to a manageable size, or help our understanding the system that they represent.

The model building is the first step toward simulation. The models that are used in simulation problems, are called

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3 C. McMillan and R. Gonzoles, op.cit., p.1

4 İbid., p.6

simulation models, they are usually computer models because of the necessity to be processed by digital computer. Computer model is a special mathematical model written according to the particular requirements of a computer so that the model can be processed by the computer.

2. Basic Elements of Simulation

In simulation we need 4 basic elements:[5]

1. A decision making opportunity. Various possible alternatives must exist for decision making.
2. A model reflecting the behavior of the environment undergiven decision. (dynamic characteristics of the system)
3. A computer for accurate and quick calculation.
4. A very well knowledge on components of the system and their characteristics.

3. The General Procedure for Computer Simulation

1. The problem is defined. The components of the system and their properties are identified. Variables and their inter-relationships are determined.
2. A computer model is developed. At this step flow charting and programming the model are performed.

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[5] E. Buffa (ed), Readings in Production and Operations Management (Newyork: John Wiley and Sons Inc., 1966), p.133

3. The validity of the model is evaluated. The program errors are checked that is we try to find out if the model represent the reality as it is planned or not.
4. The model is processed by the computer.
5. The results are summarized and analyzed.
6. Changes in the model are made if required and the model, after necessary changes, processed again.

4. Area of Application

The area of application can be studied under 2 categories:

1. System design
2. System Analysis

In the system design, the analyst has alternative ways of putting system components together. According to the specifications of the desired output of the system, the analyst tries to find a design that optimize the system behavior. Here the simulation is used to obtain information about a system which is created by analyst.

In the system analysis, the analyst observes the inputs and outputs of the system and tries to find the transformation procedure. The behavior of the system is analysed. In this application, simulation is used to test the hypothesis about a system which he does not know well and the behaviors of the system can be explained by presuming the existance of particular entities and relationships.

5. The Characteristics of the Simulation

1. Large number of variables can be handled.
2. "The data to be processed can be empirically drived or does not have to be smoothed or changed into equation form."[6]
3. "The relationship between variables can be complex."[7]
4. The models should vary in time, they should be revised as more information is obtained.
5. Simulation model is a special purpose model.
6. It is not quaranteed that the best result of simulated alternative is optimum. It may be near optimum if simulation is designed and held properly.

6. Need For Simulation

The reasons for using simulation in problem solving are as follows:

1. It may be either impossible or extreemly costly to observe certain processes in the real world.
2. The observed system may be so complex that it is impossible to describe it in terms of a set of mathematical equations or even though it can be expressed in mathematical equations, it may not be possible to obtain a solution to the model by straight forward analytical

6 Stanford Optner, System Analysis for Business Management (Englewood Cliffs, N.J.: Prentice Hall Inc., 1960), p.161

7 Ibid., p. 162

techniques.

3. It may be either impossible or very costly to perform validating experiments on the mathematical models describing the system.

## 7. Kinds of Simulation

Monte Carlo, Model sampling and operational Gaming are 3 basic kinds of simulation.

7.1 Monte Carlo technique is a method of simulation or generating a schedule of events which would be expected to occure in a random fashion.[8] The problems that have a probabilistic nature and are too difficult, too time consuming to solve mathematically are solved by Monte Carlo Simulation.[9] ?

The famous example of defining Monte Carlo Simulation is to find the irregularly shaped area from a known rectangular area.[10] (Figure I.1)

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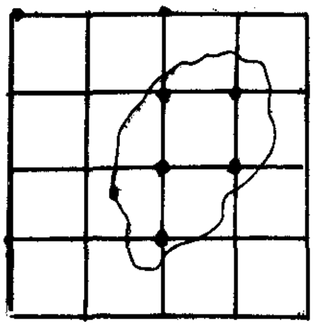
8 J.M. Hammersley, D.C. Handscomb, Monte Carlo Methods (London: Methuen and Co. Ltd., 1964), p.2

9 James Moore, Plant Layout and Design (Newyork: McMillan Co. 1962), p.197

10 E.H. Bowman and R.B. Fetter, Analysis for Production and Operations Management (Homewood, Illinois: R.D. Irwin, Inc., 1967), p. 418



$$K = A\left(\frac{n}{N}\right)$$

where:

K: Area to be estimated

A: Area of the rectangular

n: Number of points fall within the area to be estimated.

N: Number of points in the known rectangul.

FIGURE I.1 Definition of Monte Carlo Simulation

If the number of points falls into the rectangul and the number of points fall into to be estimated area are too great and too difficult to count. Assign to each of the grid points along each coordinate as the numbers from 000 to 999. Write each number on a piece of paper place in a bowl, the draw of two papers with replacement and mixing between draws in sufficient to establish a point in the grid. It is then recorded whether a point falls inside or outside the area. So without a need of counting the large number of points we can determine the n and N of the formula. Monte Carlo is used to describe any chance process used to solve a problem. The central role in the process is played by random numbers. Random numbers are generated from a random number generator.

The shematic diagram depicted below. The process of Monte Carlo Simulation . (Figure I.2)

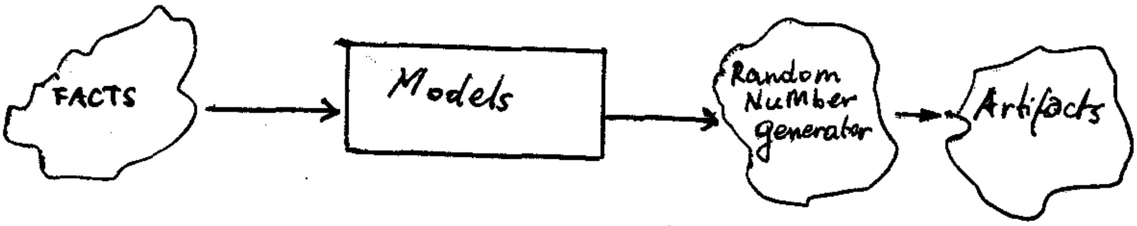



FIGURE I.2 The process of Monte Carlo Simulation
Source: Bowman and Teller, Analysis for Production and Operations Management, Homewood, Illinois, Richard Irwin Inc. 1957, p.423.

The procedure in Monte Carlo Simulation is that: from the collection of facts a model is designed. The model and random number generater produce artifacts ( which is the result of Monte Carlo Simulation.)

The problem should be carefully defined before the model is set. Because in simulation the model is most important thing. The model has to be changed according to the changes that occure in the environment. Therefore the model is not static but dynamic in nature. The Monte Carlo Simulation consists of choosing random numbers and maching them with the inputs of the model. This calculation is repeated several times. Therefore, we can say that the more calculations we make the more reliable the Monte Carlo Solution would be.

7.2 Model Sampling: Model sampling is a special case of Monte

Carlo Simulation. This simulation technique is used when problem is very difficult to analyse.

7.3 Operational Gaming: The main difference of this kind of simulation from above mentioned 2 cases is that in operational gaming the intervention of people is involved. Military games and management games, are 2 widely used forms of Operational Gaming.

8. Classification of Simulation According to Media used

The simulation can be divided into 4 categories according to media that are used.

8.1 Manual simulation: A good example of manual simulation is map game played by military officer for developing strategy, tactics and decision making ability and to train them.

A map and moveable templates representing troops, vehicles, tans etc. are played on a map like achess. Also small scale simulations made by mathematical calculations can be named as Manual Simulation.

8.2 Mechanical Simulation are studied under 2 categories:

a. Physical simulation

b. Analog simulation

a. Physical system having the same properties as the real system is constructed for easy manupulation. A simple example of a physical system is accelårometer. İt is used to measure acceleration, the rate of change of speed. Accelerometer may be mechanical, hydraulic and electrical.

Analog simulation: We can construct an analog system only if we know the transformation between simulated system and the original system.

Analog computer calculates by making measuremens on same parallel system. A slide rule is an analog computer. A scale model is simplest analog.

From a set of measurements made on the scale model, solutions of the problems of full scale situation can be achieved.

The wind tunels are example for such a simulation. The difference between analog and physical simulation is that simultaneous measurment of system values in many points of the system is allowed in analog simulation.

8.3. Symbolic Simulation: The symbolic simulations are made by the help of digital computers. "These digital computers work with symbols and logical requirement of symbolic simulation are substantially greater than those above mentioned simulations"[11]

11 Van Court Hare Jr., Systems Analysis: A Diagnostic Approach (Newyork: Harcourt Brace and World Inc. 1967), p. 365

in digital simulation we use computer as a laboratory.

The systems that have complex series of logical statements are best handled by a digital computer.

The advantage of digital computer is that it gives greater flexibility, speed and precision in system simulation. The disadvantage is that the digital computer work sequentially, and make one decision at a time therefore extensive control routins are required.

8.4 Operational simulation: In this kind of simulation human participants are allowed to use their judgements and other human abilities to interact with the simulated system.

The simulated system evaluates the input data and feeds back the information.

9. Advantages of Simulation

1. By simulating a system, the system analyst can control many aspects of the system that could not be controlled in practice usually.

2. The reduced size of the actual system can be easily studied.

3. We can test the hypothetical conditions that do not exist in reality, projects concerning the operations of new equipment or present equipment under extreme conditions can be tested.

4. Less data is required to simulate a model than the experimentation of the system for obtaining the dynamic characteristics of the system and reaching at a result, therefore it is less time consuming and costly. It is cheaper than any other experiments testing facilities.

5. The cost of obtaining results by way of simulation is usually less and the safety factor (having result) is greater than experimentation with the real object.

6. Simulation is easy to understand and relatively easy to implement.

7. A physical simulation is an useful training facility.

8. It has led the evaluation of new ideas and policies.

9. It gives control over time.

10. Disadvantages of Simulation Technique

1. Monte Carlo technique is essentially in accurate.
2. It is very slow procedure to do research.
3. It is costly computer programming and running time are costly.
4. In large scale simulation the analyst cannot see beforehand exactly which variables will be needed.
5. Some simulations are too complex.

11. Simulation and the Production Manager

Today the simulation of production management problems are rapidly growing because of the availability of high speed computers. By using simulation the production manager can get information about the interdependence of the variables in a complex production system. We can say that simulation with the aid of high speed computers constitute an experimental laboratory to production manager.

By the help of Monte Carlo Simulation, the production manager can simulate the conditions that would occur in his plant.

# APPENDIX - II

## BACKGROUND INFORMATION ABOUT HEURISTIC PROBLEM SOLVING

### 1. Definitions

Dictionaries define heuristic as serving to discover or reveal.

Heuristic comes from the Greek word, Heuriskein, means to discover (discovery of a solution to a problem). The term has been used by Simon and Newel in their article, "Heuristic Problem Solving: The Next Advance in Operation Research" in "Journal of Operations Research", January-February 1958, to show a particular problem solving and decision making approach.[1]

Since logic, intuition, judgment, and common sense are used to drive a meaningful solution, the heuristic models replaces the classical Mathematical approach when formal, analytical methods have little promise to problem solving procedure.

The principle of heuristic is the application of selective routines that reduce the size of a problem. Therefore the heuristic problem solving procedures can be named as effort saving devices. The use of computer to solve ill structured problems is called Heuristic Problem Solving.

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1 Star, M. K., Production Management Systems and Synthesis, (Englewood Cliffs: Prentice-Hall Inc., 1964), p. 182.

A heuristic is any device or prodedure used to reduce problem solving effort.

Examples of Heuristics from everyday life: We use heuristics in our daily living, getting them from our knowledge and experience.

a. When the sky is claudy we take an umbrella in order not to become wet when it rains

in business life;

b. When the inventory levels fall down to reorder level we order authomatically

c. In inventory valuation we use FIFO or LIFO according to our experience or the nature of the inventory

d. In inventory scheduling we use firstcome first served or any other policy according to our experience.

Therefore, by heuristics we can find good solutions to recurring problems with minimum effort. All the heuristics can be improved by having more and more information.

A Heuristic Program: is the collection of heuristics used for solving a particular problem. If the problem is complex we solve it by using a digital computer, according to the instructions of the heuristic program.

2. Heuristic Programming is the construction of computer problem solving programs to make effective use of partial information in hand.

The below question can come into minds.
Why we use heuristic programming instead of other new methods of problem solving such as linear programming, Operations Research?

The answer is that:

1. Some problems, even they are simplified, are still complex and too large to solve by analytical techniques.
2. Some problems are ill structured.

That is they cannot be expressed in mathematical terms, because quantitative techniques are not either available or not suitable for solving such problems. They are solved by judgement intuition and creativity.[2]

Most of the management oriented heuristic programs are characterized as cambinatorial problems because of extreemly large number of series decision making requirements.[3]

A problem solving procedure may be thought as a sequence of decision points and at each point a number of paths are available to decision maker, but decision maker chooses only

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2 D.J. Wiest, "Heuristic Programs for Decision Making", Harward Business Review, Vol.44, No.5 (Sept. Oct. 1966), p.131

3 Ibid., p.132

one of them. Therefore, a tree diagram exists in every decision and a numerous combinations of paths are available from initial point to final point. (Figure II-1)

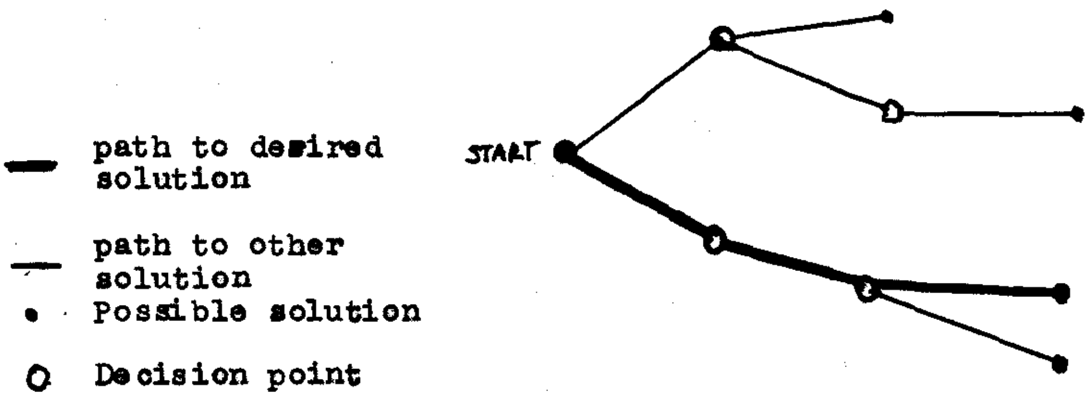


FIGURE II-1. Decision Tree
(Source: Jerome D. Wiest, Heuristic Programs for Decision Making, Harward Business Review, Mass., September-October 1966, Vol.44, No.5, p.133)

Each node represents a decision point, lines links two decision points or a decision point and a terminal node. The havy line shows a series of decisions made to reach at the solution. One method of finding optimum solution is to enumarete each possible path and select the best one.

If the problem contains a number of decision points and various paths at each decision point, the solution reached at by enumarating each possible path becomes a tadious, costly work. For example, a problem with a series of 10 decisions and each of which could be made in 5 different ways requires 10 million

($5^{10}$) different decision for reaching at an optimum solution.

"Therefore, even with the aid of high speed computer, the enumeration is not a feasible solution method for large problems. Accordingly the heuristic technique is to prune the tree - to eliminate from the start. Those branches at each decision point is raised to the much smaller maze remains to be searched. This is illustrated in Figure II-2."[4]

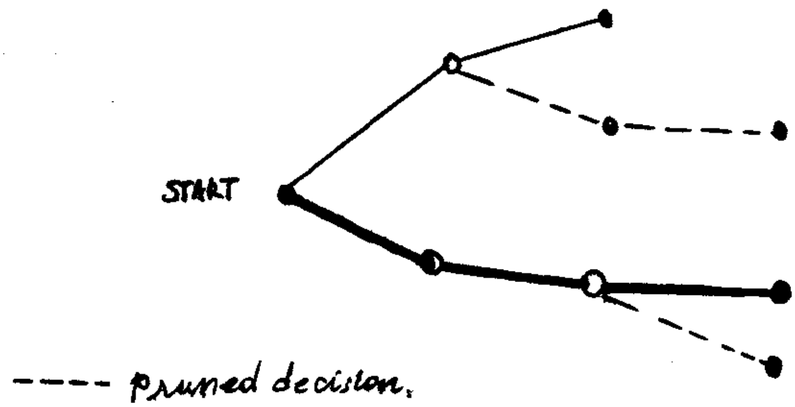


FIGURE II-2: Pruned Decision Tree
(Source: J.D. Wiest, Heuristic Programs for Decsion Making, Harward Business Review, September-October 1966, Vol.44 No.5, p.133)

The disadvantage of pruning the decision tree is that a

4 Ibid., p.132

good branch may be cut off by mistake. A path appearing to be doubtful may later lead a desirable solution.

However, in heuristics we do not quarantee optimum solution sufficient solution is just enough for us.

"Sacrifice of a quaranteed optimum solution is the price paid for the reduction in search effort that heuristics provide".[5] Therefore, in constructing a heuristic program we have to decide which factors should be given weight and which ones should be ignored, which relationships are important in the model and which ones are not important, and where, at which point, we should decide and what is the sufficient solution (at which point we stop heuristic decision making process).

## 3. Ill-Structured Problems

An ill-structured problem is one that we do not understand well enough to solve by mathematical model.

There are 3 characteristics of ill-structured problems for which heuristic problem solving technique can appropriately be applied.

1. Non numerical variables (verbal or symbolic) are used to express the problem.
2. The goal, objective function is not clearly expressed or objective is non quantitative.

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[5] Ibid., p. 132

3. Computational algorithms are simply not available.

In ill-structured problems judgement, intuition creativity and learning are important elements.

4. <u>Characteristics of Heuristic Models</u> (constructed for problem solving)

1. It is an improvement over trial and error method
2. It is relatively a new approach to problem solving
3. Solutions obtained by heuristic procedure are not unique
4. Heuristic models do not produce an optimal results. No quarantee for best or even any solution is given for heuristic problem solving prowedures. The heuristic models are used to find out the relative goodness of various strategies subject to specific constraints.
5. Judgement, intuition and creativity are involved in problem solving procedures
6. It is a rule of thumb method of problem solving.
7. They are constructed for special purpose problems
8. The problem is handled and solved by dividing into a number of smaller problems and subproblems.
9. Heuristic programming is an art. The examination of the heuristic programs written up to date show that the correctness and effectiveness of the heuristic programs based on the experience, judgement, insight

of the manager in problem solving procedure.

10. In heuristic decision making we emphasise on selectivity rather than pure computational speed.

11. The cues of the environment are used to decrease the number of alternative to be tested in problem solving procedures.

5. <u>Advantages of Heuristic Decision Making</u>

1. The heuristic models are able to deal with more data and larger systems than is humanly possible
2. The heuristic models have high speed, consistency and endurance
3. It saves time in decision making
4. The heuristic approach is an attractive alternative for the situation where mathematical analysis are difficult to handle
5. Unsuspective system behaviors can be deduced
6. The problem of training junior executives can be considerably reduced
7. Relatively small computational effort is required for any size of problem
8. Non-programmed problem solving and decision making activities are solved easily by heuristic processes.

6. Disadvantages of Heuristic Decision Making

   1. Heuristic Decision Making does not give an optimal solution or even sometimes no solution is obtained
   2. In decision making process we based on largely judgement and intuition
   3. It is a rule of thumb method
   4. For every specific decision making process, we have to develop a new special purpose heuristic decision making model (program).

7. Area of Application

Today the heuristic decision making procedures are successfully applied to business problems mentioned below.

   1. Assembly line balancing
   2. Facilities layout
   3. Job shop scheduling
   4. Ware house location
   5. Inventory control
   6. Portfolio selection
   7. Resource allocation to large projects.

8. A Summary of Decision Making Techniques

Decision making in production management is giving answer to the questions.

   1. What to produce

2. How to produce
3. Where to produce
4. When to produce
5. By whom to be produced

According to Simon "we are in the prime stages of technological revolution of decision making and this revolution has two aspects:

1. The first aspect concerned with decisions close to the programmed end of the continium, is the province of operations research or management science.

2. The second aspect concerned with unprogrammed as well as programmed decisions, is the province of a set of techniques that are coming to be known as heuristic programming".[6] Table II-1 gives a summary of Decision Making Techniques.

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6 Harper Simon, <u>The Shape of Automation for Men and Management</u>, (New York: Harper and Row Publishers, 1965), p.47.

TABLE II-1. Decision Making Techniques

| Types of Decision | Traditional | Modern |
|---|---|---|
| 1. Programmed: Routine Repetitive decisions handled by specific processes | 1. Habit<br>2. Clerical routine (standard operating procedures)<br>3. Organization structure common expectations well defined information channels. | 1. OR Mathematical analysis models computer simulation<br>2. Electronic data processing |
| 2. Non programmed: one-shot ill-structured novel policy decision handled by general problem solving processes. | 1. Judgement intuition and creativity<br>2. Rules of thumb<br>3. Selection and training of executives. | Heuristic problem solving technique applied to<br>a) training human decision makers<br>b) constructing heuristic computer programs. |

Source: Harper Simon, The Shape of Automation for Men and Management (Harper and Row Publishers, Newyork: 1965) p. 62

# APPENDIX III

## BACKGROUND INFORMATION ABOUT LINE BALANCING

### 1. Definitions

Line balancing is a systematic method of analyzing production facilities for the establishment of a balanced load for each work station, minimizing the total idle time within the technological, positional and fixed facility restrictions of the line.

It is the basis for sound manpower planning and facility utilization in a production area. It is establishing a relationship between:

1- The rate of production.

2- The operations necessary and their required sequence.

3- The time necessary to perform each operation.

As it is said above, the problem in line balancing is minimizing the idle time of the line for all combinations of work stations subject to certain restrictions given below:

1- Minimum required production.

2- Precedence relations of the operations.

3- Fixed facility restrictions.

A perfectly balanced production line has the following characteristics:

1- The production rate at each work station is exactly same through the system.

2- The idle time is zero for all work stations (production system runs at a uniform rate.)

3- The work in process inventory is always equal to the number of work stations in the system.[1]

Here it is necessary to mention that the perfect balance is rarely achieved in the production systems.

2. Required Conditions for Line Balancing

The line balancing may be done in a production area if the following conditions exist:

1- Work is under mechanical control.

2- Work is performed in a cycle that is completely paced by mechanical means.

3- In an integrated manufacturing process work is restricted by the production of other groups or areas.

3. The Information Required for Line Balancing

In order to balance the production line certain data should be obtained at first step. These data are:[2]

1- Production volume (the rate of production per shift).

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[1] E. McGarrah, Production and Logistic Management: Text and Cases (New York: John Willey and Sons Inc., 1963), p. 203

[2] James Moore, op. cit., p. 438

2- List of operations and their sequence.

3- Time required to complete each operation.

4- Working time per shift.

## 4. Kinds of Line Balancing

There are two types of line balancing:

1- Assembly line balancing

2- Production line balancing

The difference is because of the type of operation taking place on the line to be balanced.

In assembly line, individual component parts at work stations are assembled and a final product is obtained at the end.

In production line, operations form or change the physical or sometimes the chemical characteristics of product involved.

### 4.1. Assembly Line Balancing:

In the ideally balanced assembly line, all the stations of the line would have equal work content measured in terms of the time assigned to them.

The Methods of Getting Balance for Assembly Line:

1- To divide operations into small components: This is the most common way of balancing assembly operations; since assembly operations can be easily divided, a high degree of balance with small idle time is obtained.

2- To combine operations and balance groups: Sometimes we cannot divide the operations further, at that time we combine them.

3- To let operators move: When operations take relatively less time than the station or balancing time, a worker may be led to move for doing several operations in the assembly line.

4- To improve operations: When an operation is longer than the station time or balancing time, the line is balanced by improving the operations.

5- To bank materials and do slower operations in extra time: This method sacrifices floor space and increases material in process in bottleneck machines (operations). It requires extra time of supervision, but it is simple and mostly used.

6- To improve operators' performance: The bottleneck operation is identified and the fastest worker is allocated to this operation or method of performance of this operation is improved by time study. [3]

4.2. Production Line Balancing:

The production line balancing is more difficult than the assembly line balancing. Because it is not easy to divide the

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[3] H.B.Maynard (Ed.), Industrial Engineering Handbook (New York: McGraw Hill Book Co. Inc., 1963), p. 8-104

operations into relatively small elements for redistributions; the precedence restrictions are ususally tighter than assembly line balancing.

"Balancing the production line means to plan its operation so that the rate of materials flow through all work stations is as nearly uniform as practicable."[4]

A production line is a group of two or more sequentially related work stations set up and manned simultaneously to process a product. The work stations are physically arranged near one another to the precedence requirements of operations of the product. And the work stations are usually connected by conveyor. Most of the time a unit of product is moved one at a time through the line without backtracking, therefore the distinguishing characteristics of a production line are:

1- Work stations of a production line are set up simultaneously to perform all or most of the operations to produce a unit of the product.

2- The productivity of the production line work stations depend critically upon the previous work stations' productivity. The reason is that usually no banking is allowed because of the working area limitation.

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[4] Robert McGarrah, op. cit., p. 203

[5] Ibid., p. 203

3- The planning and scheduling production operations are completely self realized for all work stations on the line.

The Methods of Getting Balance for Production Line:

1- To improve the operation: that is to concentrate attention on the bottleneck operation and try to improve the operation. By changing the method, improving the tooling, mounting two pieces at one time, eliminating extra handling time or by some other ways we can obtain a good balance for the production line. This is the best way of balancing.

2- Changing machine speeds: This method is sometimes easy and practical. It is applied when we have a machine with high speed, where banking and to increase the speeds of other machines are not possible.

3- To bank material and operate the slower machines overtime or on extra shift. This method sacrifices floor space and increases material in process and it also increases the supervision problems.

4- To divert the excess pieces to the other machines not in the line: This method is practical if only one or a few construction points are involved in the line.

5- Multiple items or combined lines: Sometimes it is possible to group similar items and to produce them on a combination line. The theory of this method is to spread idle machine time of one product against another.

The application of this method in production line balancing problems is increasing by the passage of time.[6]

5. Advantages of Line Balancing

1- Idle time at each work station in the line is decreased or eliminated, therefore efficiency is increased.

2- Production rate of the line may increase since the idle time is decreased.

3- Since the production rate per shift is known, a good production planning may be done.

4- It eliminates the banking before the bottleneck machines.

5- It eliminates the difficulty of working at bottleneck machines; psychological effect on workers is eliminated.

6- A uniform working time is established between workers, therefore it eliminates the conflict between them.

7- Since a time study and work improvements are done before the production line balancing, waste movements are eliminated and this may cause an increase in production.

6. Disadvantages of Line Balancing

1- Sometimes the production rates of high speed machines are decreased.

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[6] B. Maynard, op. cit., p. 8-103

2- Workers do not want to work on perfectly balanced production line, because the idle time is eliminated, waste movements are decreased and fatigue is increased.

3- More skilled workers are required for each work station or machine in order to have maximum speed of the line and not to have machine break down.

4- Speed of each work station depends on the previous work station. Therefore the interdependence between the work stations increases.

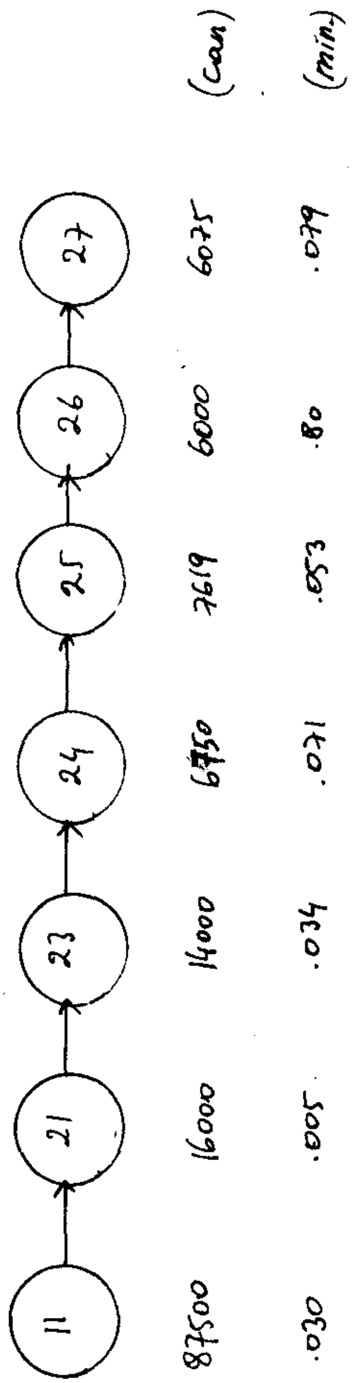
APPENDIX IV : Precedence Diagrams of the Models.

Model: 2.

$11 \rightarrow 21 \rightarrow 23 \rightarrow 24 \rightarrow 25 \rightarrow 26 \rightarrow 27$

| Machine number | 11 | 21 | 23 | 24 | 25 | 26 | 27 |
|---|---|---|---|---|---|---|---|
| capacity per shift. (can) | 16551 | 18461 | 5393 | 6666 | 7164 | 5333 | 5333 |
| std. time. (min) | .026 | .029 | .089 | .072 | .067 | .090 | .090 |

Model: 3.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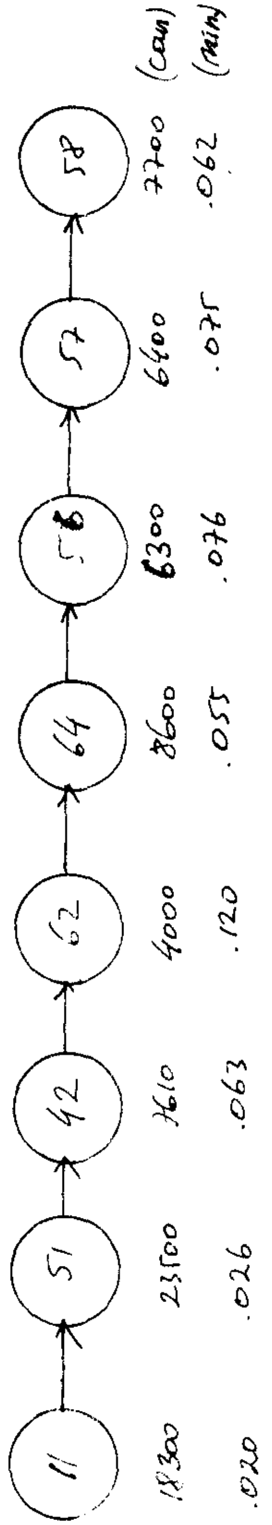
Model: 4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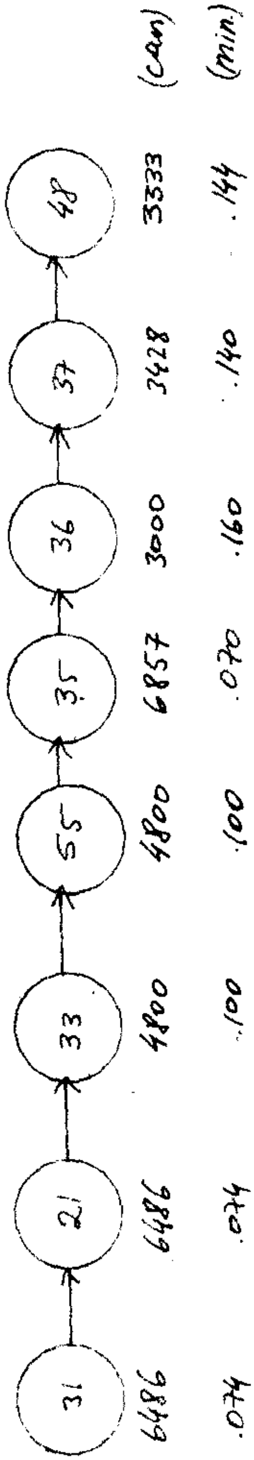
(min)

Model: 5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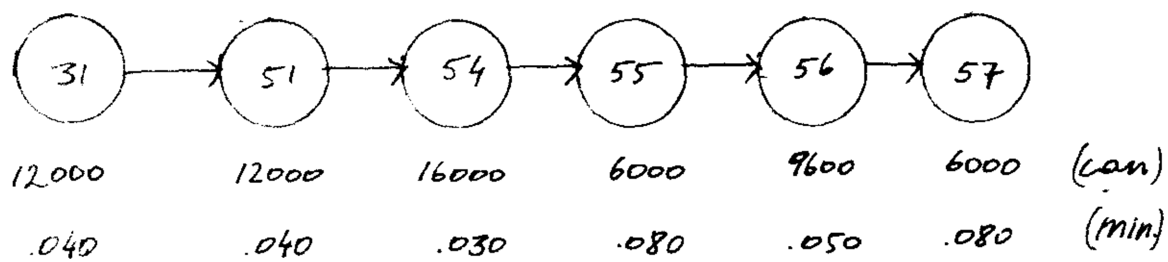
(min)

Model: 6.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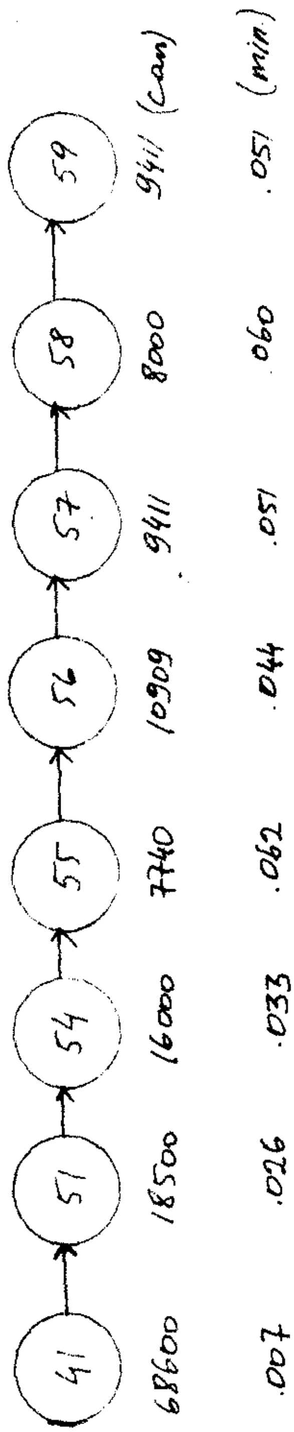
Model 7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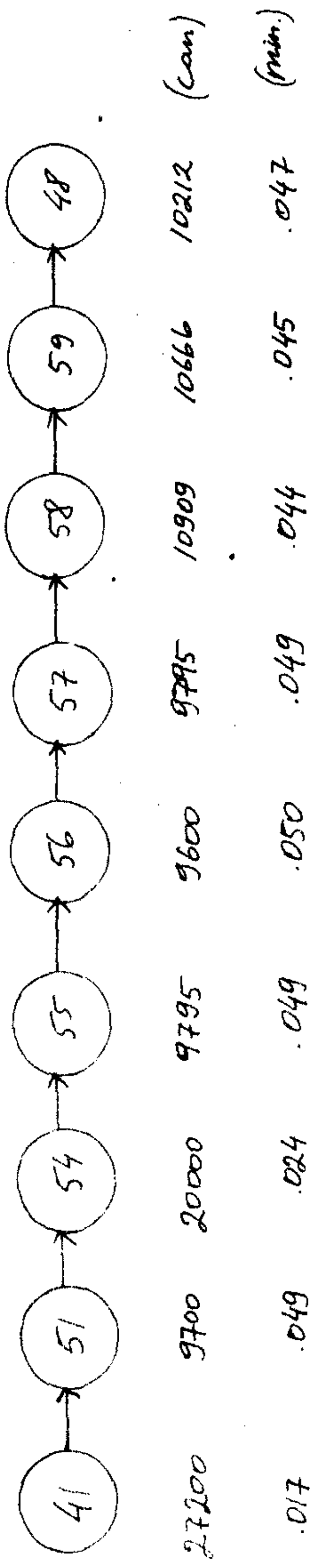
.051 (min)

Model 8.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9600
9795
10909
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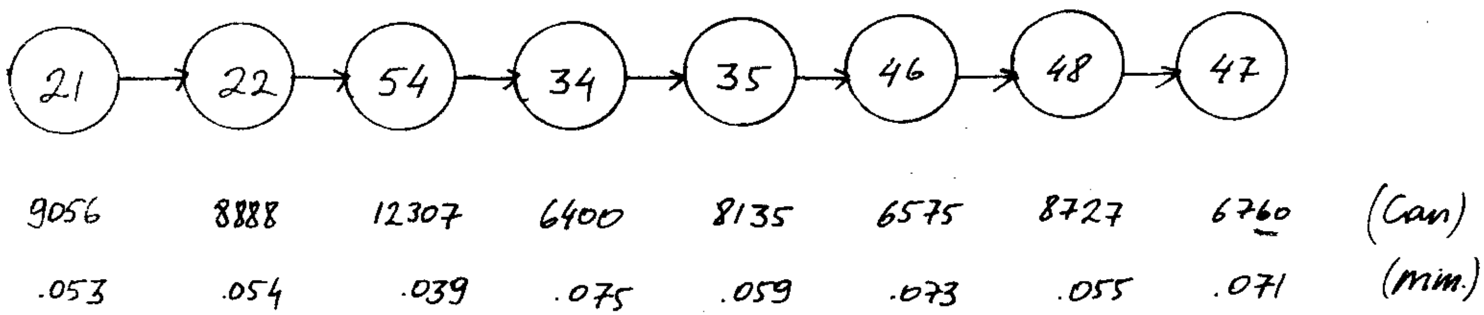
(can)
.017
.049
.024
.049
.050
.049
.044
.045
.047
(min.)

Model : 9.

21 → 31 → 32 → 54 → 53 → 44 → 45 → 46

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 21 | 31 | 32 | 54 | 53 | 44 | 45 | 46 | |
| 20000 | 34385 | 9056 | 15483 | 11707 | 8000 | 9600 | 8000 | (car) |
| .024 | .014 | .053 | .031 | .041 | .060 | .050 | .060 | (min.) |

Model: 10.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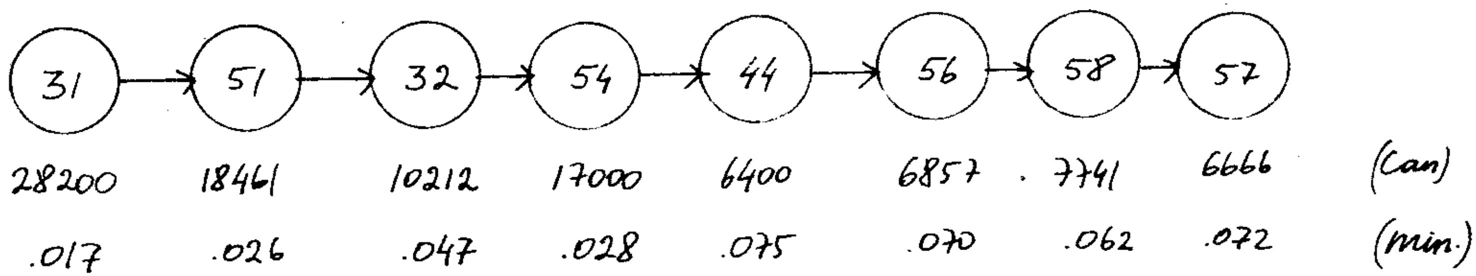
Model: II.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10212
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(Can)
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.047
.028
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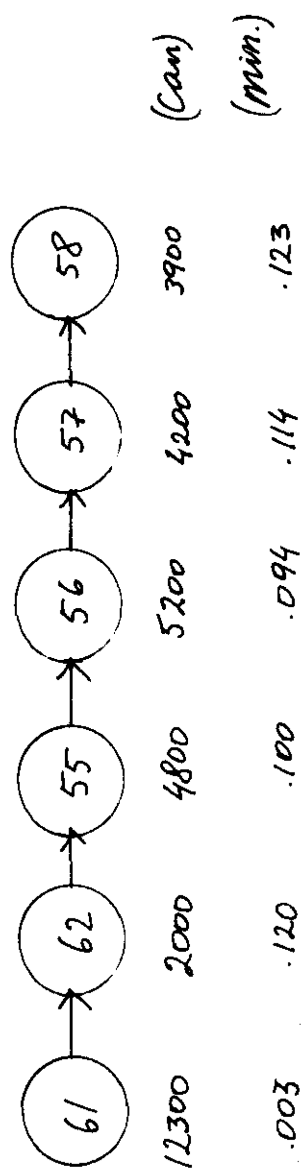
.070
.062
.072
(min.)

Model: 12.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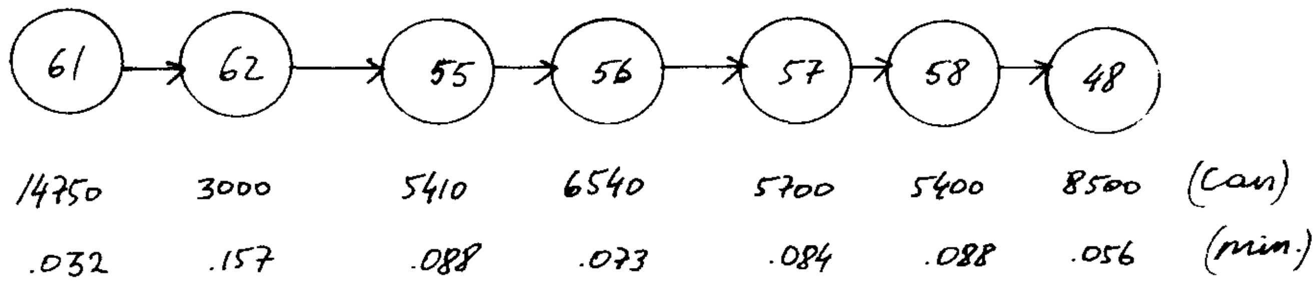
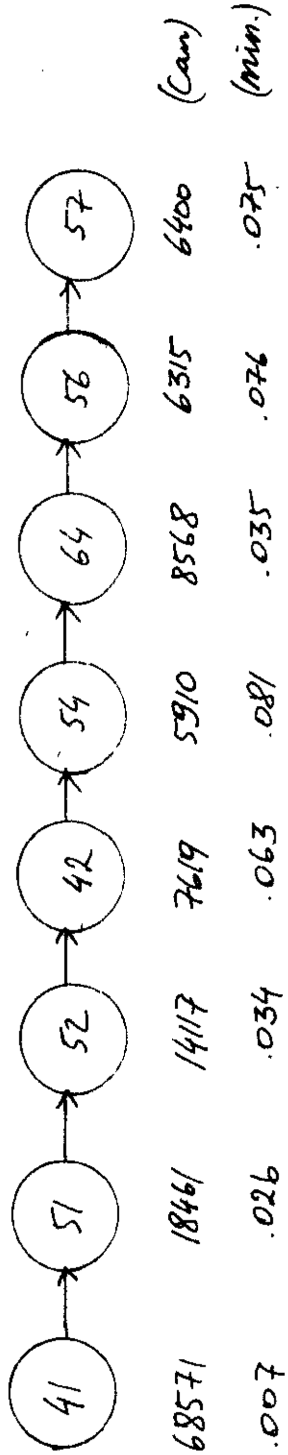
55
56
57
58
12300
2000
4800
5200
4200
3900
(Can)
.003
.120
.100
.094
.114
.123
(min.)

Model : 13.


61
62
55
56
57
58
48
14750
3000
5410
6540
5700
5400
8500
(Can)
.032
.157
.088
.073
.084
.088
.056
(min.)

Model: 14.


41
51
52
42
54
64
56
57
68571
18461
1417
7619
5910
8568
6315
6400
(Can)
.007
.026
.034
.063
.081
.035
.076
.075
(min.)

APPENDIX V

IDLE TIME PERCENTAGES OF THE MACHINES EMPLOYED FOR MODELS 2 AND 3

Model 2 : 1/2 Diazman

| Machine | Capacity of Machine/Shift | Production Capacity/Shift | Idle Time Percentages |
|---|---|---|---|
| 11 | 16551 | 5333 | 67 |
| 21 | 18461 | 5333 | 71 |
| 23 | 5391 | 5333 | 22 |
| 24 | 6666 | 5333 | 24 |
| 25 | 7166 | 5333 | 25 |
| 26 | 5333 | 5333 | - |
| 27 | 5333 | 5333 | - |

Model 3 : 1/2 Baygon

| | | | |
|---|---|---|---|
| 11 | 87500 | 6000 | 93 |
| 21 | 16000 | 6000 | 63 |
| 23 | 14000 | 6000 | 70 |
| 24 | 6750 | 6000 | 11 |
| 25 | 7619 | 6000 | 21 |
| 26 | 6000 | 6000 | - |
| 27 | 6075 | 6000 | 1 |

Model 4: 100gr Diazman

| | | | |
|---|---|---|---|
| 11 | 23 500 | 4 000 | 83 |
| 51 | 18 300 | 4 000 | 78 |
| 42 | 7 610 | 4 000 | 47 |
| 62 | 4 000 | 4 000 | - |
| 64 | 8 600 | 4 000 | 53 |
| 56 | 6 300 | 4 000 | 37 |
| 57 | 6 400 | 4 000 | 38 |
| 58 | 7 700 | 4 000 | 48 |

Model 5: Galon Mobil

| | | | |
|---|---|---|---|
| 31 | 6 486 | 3 000 | 54 |
| 21 | 6 486 | 3 000 | 54 |
| 33 | 4 800 | 3 000 | 37 |
| 55 | 4 800 | 3 000 | 37 |
| 35 | 6 857 | 3 000 | 56 |
| 36 | 3 000 | 3 000 | - |
| 37 | 3 428 | 3 000 | 12 |
| 48 | 3 333 | 3 000 | 10 |

Model 6: Galon Mobil

| | | | |
|---|---|---|---|
| 31 | 12 000 | 6 000 | 50 |
| 51 | 12 000 | 6 000 | 50 |
| 54 | 16 000 | 6 000 | 62 |
| 55 | 6 000 | 6 000 | - |
| 56 | 9 600 | 6 000 | 37 |
| 57 | 6 000 | 6 000 | - |

Model 7: 1 kg ÇBS

| | | | |
|---|---|---|---|
| 41 | 68 600 | 7 740 | 89 |
| 51 | 18 500 | 7 740 | 58 |
| 54 | 16 000 | 7 740 | 52 |
| 55 | 7 740 | 7 740 | - |
| 56 | 10909 | 7 740 | 29 |
| 57 | 9 411 | 7 740 | 17 |
| 58 | 8 000 | 7 740 | 3 |
| 59 | 9 411 | 7 740 | 17 |

Model 8: 3.5 kg ÇBS

| | | | |
|---|---|---|---|
| 41 | 27 200 | 9 600 | 65 |
| 51 | 9 700 | 9 600 | 2 |
| 54 | 20 000 | 9 600 | 52 |
| 55 | 9 795 | 9 600 | 2 |
| 56 | 9 600 | 9 600 | - |
| 57 | 9 795 | 9 600 | 2 |
| 58 | 10 909 | 9 600 | 12 |
| 59 | 10 666 | 9 600 | 10 |
| 48 | 10 212 | 9 600 | 6 |

Model 9: 2 kg Vita

| | | | |
|---|---|---|---|
| 21 | 20 000 | 8 000 | 60 |
| 31 | 34 385 | 8 000 | 77 |
| 32 | 9 095 | 8 000 | 11 |
| 54 | 15 483 | 8 000 | 48 |
| 53 | 11 707 | 8 000 | 31 |
| 44 | 8 000 | 8 000 | - |
| 45 | 9 600 | 8 000 | 16 |
| 46 | 8 000 | 8 000 | - |

Model 10: 5 kg Vita

| | | | |
|---|---|---|---|
| 21 | 9 056 | 6 400 | 29 |
| 22 | 8 888 | 6 400 | 27 |
| 54 | 12 307 | 6 400 | 47 |
| 34 | 6 400 | 6 400 | - |
| 35 | 8 135 | 6 400 | 21 |
| 46 | 6 575 | 6 400 | 2 |
| 48 | 8 727 | 6 400 | 26 |
| 47 | 6 760 | 6 400 | 5 |

Model 11: Fosferno

| | | | |
|---|---|---|---|
| 31 | 28 200 | 6 400 | 77 |
| 51 | 18 461 | 6 400 | 65 |
| 32 | 10 212 | 6 400 | 37 |
| 54 | 17 000 | 6 400 | 62 |
| 44 | 6 400 | 6 400 | - |
| 56 | 6 857 | 6 400 | 6 |
| 58 | 7 741 | 6 400 | 17 |
| 57 | 6 666 | 6 400 | 3 |

Model 12: 10 kg Bayer

| | | | |
|---|---|---|---|
| 61 | 12 300 | 2 000 | 84 |
| 62 | 2 000 | 2 000 | - |
| 55 | 4 800 | 2 000 | 58 |
| 56 | 5 100 | 2 000 | 60 |
| 57 | 4 200 | 2 000 | 52 |
| 58 | 3 900 | 2 000 | 49 |

Model 13: 5 kg Bayer

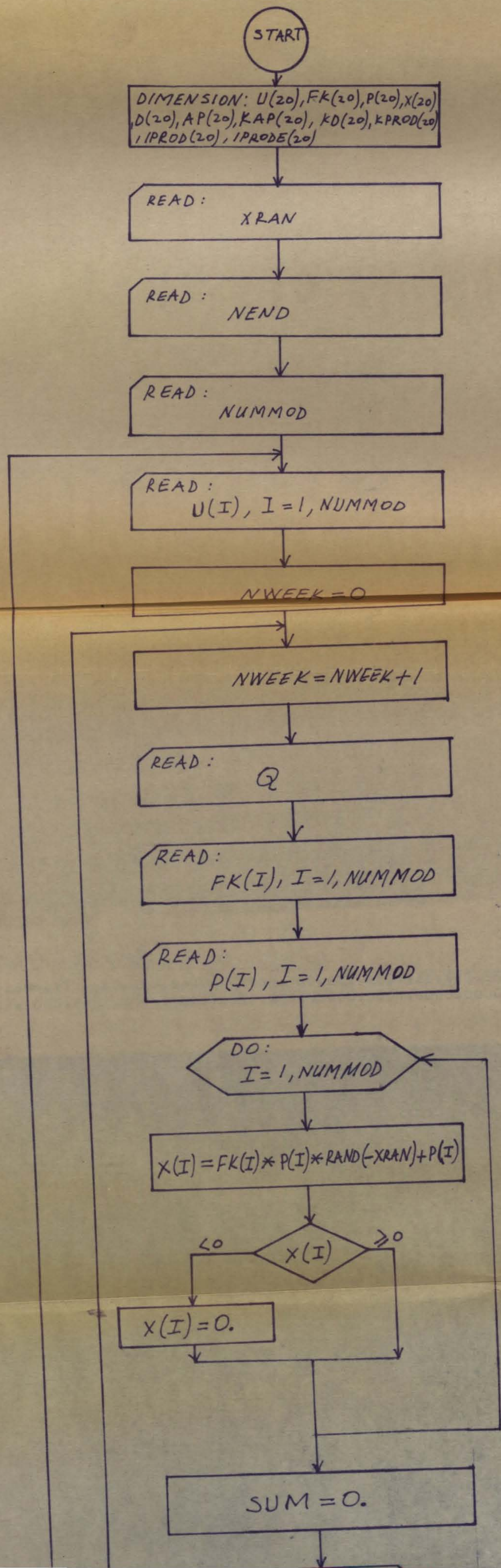
| | | | |
|---|---|---|---|
| 61 | 14 750 | 3 000 | 80 |
| 62 | 3 000 | 3 000 | - |
| 55 | 5 410 | 3 000 | 45 |
| 56 | 6 540 | 3 000 | 54 |
| 57 | 5 700 | 3 000 | 47 |
| 58 | 5 400 | 3 000 | 45 |
| 48 | 8 500 | 3 000 | 65 |

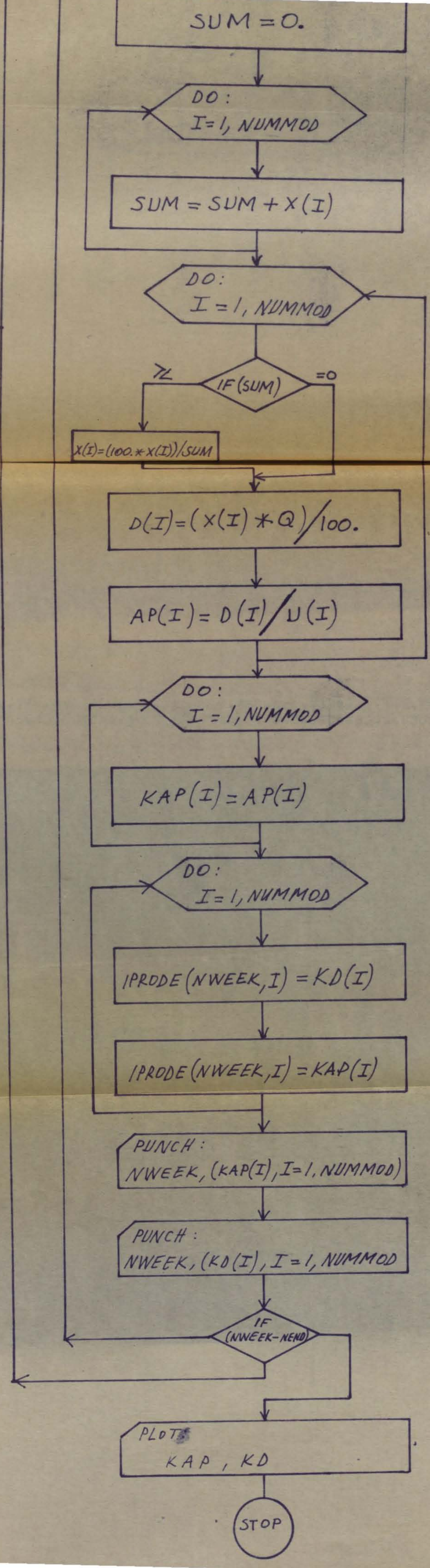
Model 14:

| | | | |
|---|---|---|---|
| 41 | 68 571 | 5 910 | 92 |
| 51 | 18 461 | 5 910 | 67 |
| 52 | 14 117 | 5 910 | 58 |
| 42 | 7 619 | 5 910 | 22 |
| 54 | 5 910 | 5 910 | - |
| 64 | 8 568 | 5 910 | 30 |
| 56 | 6 315 | 5 910 | 6 |
| 57 | 6 400 | 5 910 | 7 |

The figures obtained from Column 4 indicates that the idel time for most of the machines is quite high in the department.

APPENDIX : VI. DETAILED FLOW CHART OF THE PRODUCTION SIMULATION FOR A 52 WEEK PERIOD.




SUM = 0.
DO:
I = 1, NUMMOD
SUM = SUM + X(I)
DO:
I = 1, NUMMOD
IF (SUM)
≠
= 0
X(I) = (100. * X(I))/SUM
D(I) = (X(I) * Q)/100.
AP(I) = D(I)/U(I)
DO:
I = 1, NUMMOD
KAP(I) = AP(I)
DO:
I = 1, NUMMOD
IPRODE(NWEEK,I) = KD(I)
IPRODE(NWEEK,I) = KAP(I)
PUNCH:
NWEEK, (KAP(I), I = 1, NUMMOD)
PUNCH:
NWEEK, (KD(I), I = 1, NUMMOD
IF
(NWEEK-NEND)
PLOT:
KAP, KD
STOP

# APPENDIX VII. FORTRAN PROGRAM, INPUTS, AND OUTPUTS OF THE SIMULATION PROCESS

```
ZZJOB
ZZFOR
*LDISKPLOT
*FANDK0810
      SUBROUTINE PLOT( KPROD, NEND )
C
C     KPROD(I) = ARRAY TO BE PLOTED
C     NEND= NUMBER OF WEEKS TO BE PLOTED
C
      DIMENSION KPROD(52), IA(75)
      COMMON KPROD, NEND
      DO 100 I=1,75
  100 IA(I)=0
      PUNCH 99
   99 FORMAT (79X,1H-)
      PUNCH 101
  101 FORMAT ( 4X, 76(1H.))
      PUNCH 102
  102 FORMAT(  4X, 1H.   )
C     DETERMINE SCALE
      MAX=
      DO 200 I=1,NEND
      IF ( MAX - KPROD(I)) 199,200,200
  199 MAX= KPROD(I)
  200 CONTINUE
      IUNIT = MAX / 75
C     BEGIN PLOT
      DO 500 I= 1,NEND
      INDEX = KPROD(I) / IUNIT
      IF( INDEX)  240, 250, 24
  250 CONTINUE
      INDEX = 1
  240 IA(INDEX) = 14
      PUNCH 501,  IA
  501 FORMAT(  4X, 1H.,  75A1        )
      PUNCH 102
  540 IA(INDEX) = 0
  500 CONTINUE
      RETURN
      END
ZZZZ
ZZJOB
ZZFORX
*FANDK0810
C      PRODUCTION SIMULATION FOR A 52 WEEK PERIOD
C
       DIMENSION U(20),FK(20),P(20),X(20),D(20),AP(20)
       DIMENSION KAP(20),KD(20)
       DIMENSION KPROD(52), IPROD(52,20)
       DIMENSION IPRODE( 52, 14   )
       COMMON KPROD, NEND
       READ 10,XRAN
    10 FORMAT(F10.2)
       READ 2, [illegible]
     2  FORMAT(20F4.2)
       NWEEK=0
       PUNCH 3
     3 FORMAT(20X, 6HMODELS, / , 5HWEEKS,//)
   100 CONTINUE
       NWEEK=NWEEK+1
       READ 5,Q
     5 FORMAT(F6.0)
       READ 6, (FK(I),I=1,NUMMOD)
     6 FORMAT(20F4.2)
       READ 7, (P(I),I=1,NUMMOD)
     7 FORMAT(16F5.2)
       DO 200 I=1,NUMMOD
       X(I)=FK(I)*P(I)*RAND(-XRAN)+P(I)
       IF( X(I) )    249, 250, 250
   249 X(I) = 0.
   250 CONTINUE
   200 CONTINUE
       SUM=0.
       DO 201 I=1,NUMMOD
   201 SUM=SUM+X(I)
       DO 202 I=1,NUMMOD
       IF(SUM)220,225,220
   220 CONTINUE
       X(I)=(100.*X(I))/SUM
   225 CONTINUE
       D(I)=(X(I)*Q)/100.
       AP(I)=D(I)/U(I)
   202 CONTINUE
       DO 210 I= 1, NUMMOD
       KD(I)=D(I)
   210 KAP(I) = AP(I)
       DO 400 I=1, NUMMOD
       IPRODE( NWEEK, I   ) = KD(I)
   400 IPROD( NWEEK, I ) = KAP(I)
       PUNCH 300, NWEEK, ( KAP(I), I=1,NUMMOD   )
   300 FORMAT(  I4, 1X,    7F9.0 //  5X,  7F9.0      )
       PUNCH 301,(KD(I),I=1,NUMMOD)
   301 FORMAT(  //   , 5X,    7F9.0     )
       PUNCH 999
   999 FORMAT(  /   )
       IF(  NWEEK - NEND    )  1   , 900, 100
   900 CONTINUE
C       BEGIN PLOTING
       DO 600 I=1, NUMMOD
       DO 550 L=1, NEND
   550 KPROD(L) = IPROD(L,I)
       CALL PLOT( KPROD, NEND  )
       DO 575 L=1,NEND
   575 KPROD(L)=IPRODE(L,I)
       CALL PLOT(KPROD,NEND)
   600 CONTINUE
       STOP
       END
.12345
52
14
1.001.201.501.002.501.501.903.02.503.002.005.003.002.00
188009
0.680.670.980.780.990.880.770.660.550.560.860.960.760.881.111.121.141.251.291.28
00.0000.0006.6000.0002.1005.8000.0000.8041.2037.2001.4000.0004.6000.0000.00
```

```
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217811
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01.2000.0000.0000.0000.0004.1004.2004.8035.4032.1017.6000.1000.1000.0000.00
231310
1.021.031.041.231.251.231.171.281.291.091.051.061.450.940.930.781.031.231.25
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352516
1.021.051.361.241.251.231.171.281.291.091.051.061.450.940.930.780.850.740.95
00.0000.0003.0000.0003.1006.9001.3000.6048.5034.3001.8000.0000.0000.0000.00
369450
1.121.211.141.151.131.171.181.281.251.351.081.011.051.401.301.361.321.12
00.0000.0000.9000.0000.0002.6008.5000.9046.3032.7007.8000.0000.0000.0000.00
406414
0.960.950.980.970.950.940.931.121.111.221.241.251.261.251.231.141.141.11
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00.8000.2000.0000.0002.2002.0000.0001.5042.2029.8020.9000.0000.0000.00
340459
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01.1000.7000.0000.0001.6000.0018.9003.1015.4048.2010.7000.0000.0000.00
306529
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00.0001.2000.0000.0003.1000.6000.0003.5017.1053.6020.7000.0000.0000.00
299071
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00.0002.2800.0000.0003.5100.0000.0009.0417.5454.9405.5600.0007.1000.00
304593
0.960.980.850.870.680.950.990.860.850.870.770.851.121.141.251.351.361.24
00.5001.2000.0000.0003.2006.4000.7004.1017.2053.9011.1000.0001.3000.00
268968
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00.0000.0000.0000.0005.5010.0008.4006.5008.0049.0005.7000.0006.4000.00
326693
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198607
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176435
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264981
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202344
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119130
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215560
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334178
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311927
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323220
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305355
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00.0000.0000.0000.0008.4016.5000.0001.0012.6032.8000.0000.0028.3000.00
167208
0.960.900.960.860.840.810.820.840.720.730.740.720.710.730.710.750.650.646
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210048
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00.0003.5002.9002.2004.0003.4009.3000.7015.1039.1012.1000.0007.1000.00
174997
0.960.950.980.940.750.790.760.780.740.650.630.620.610.640.560.590.580.57
00.0003.0000.0000.0000.0006.6009.3015.8018.1046.9000.0000.0000.0000.00
170601
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300161
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344542
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412164
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00.0005.3013.7002.4003.7010.7000.0008.4006.9028.3013.8000.0000.0006.30
350012
```

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258448
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272516
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01.8011.6000.0000.0008.7002.6000.0015.0005.5030.6001.3000.0000.0022.50
289247
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00.0005.6000.0000.0000.8010.8011.0002.6000.0040.4013.1000.0000.0015.40
258295
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03.0008.1000.0000.0002.2000.0011.6000.0000.0045.2008.9000.0000.1020.50
199701
0.950.940.960.980.970.950.860.840.840.860.670.780.770.740.970.991.001.121.24
00.0010.9000.0000.0005.9002.4006.2000.2000.0058.5011.6000.0003.9000.00
243957
1.111.221.331.441.121.141.241.251.351.361.181.171.141.181.291.391.281.42
00.0000.0020.8000.0023.7000.0000.0000.0000.0047.9004.1000.0003.2000.00
ZZZZ
ZZJOB
ZZDUP
*DELETPLOT
ZZZZ
```

| WEEKS | MODELS | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 0. | 0. | 17458. | 0. | 0. | 5077. | 0. |
| | 0. | 23025. | 31389. | 1077. | 0. | 106. | 0. |
| | 0. | 0. | 26187. | 0. | 0. | 7616. | 0. |
| | 0. | 57564. | 94168. | 2154. | 0. | 318. | 0. |
| 2 | 0. | 0. | 56641. | 0. | 617. | 11775. | 0. |
| | 0. | 34016. | 0. | 527. | 0. | 5951. | 0. |
| | 0. | 0. | 84962. | 0. | 1544. | 17663. | 0. |
| | 0. | 85041. | 0. | 1054. | 0. | 17853. | 0. |
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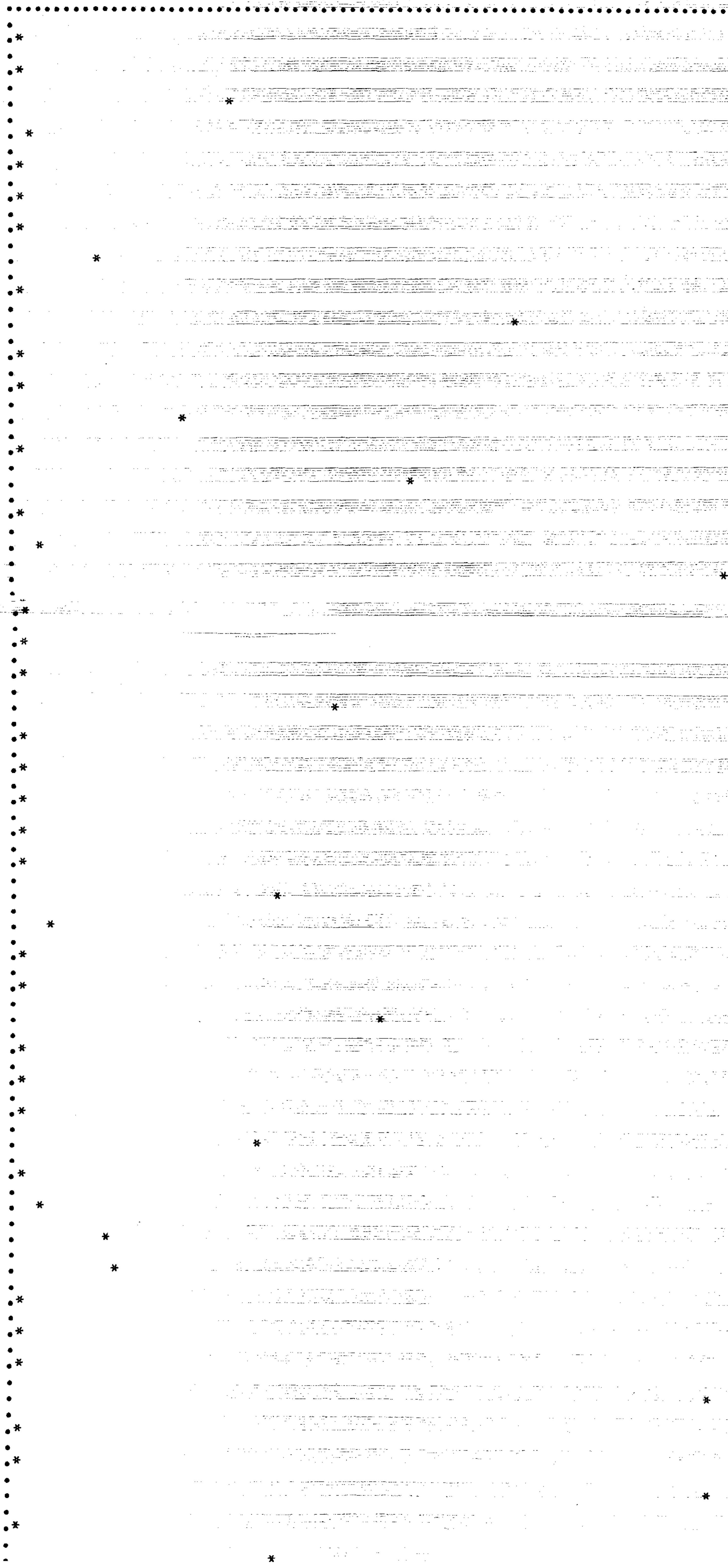
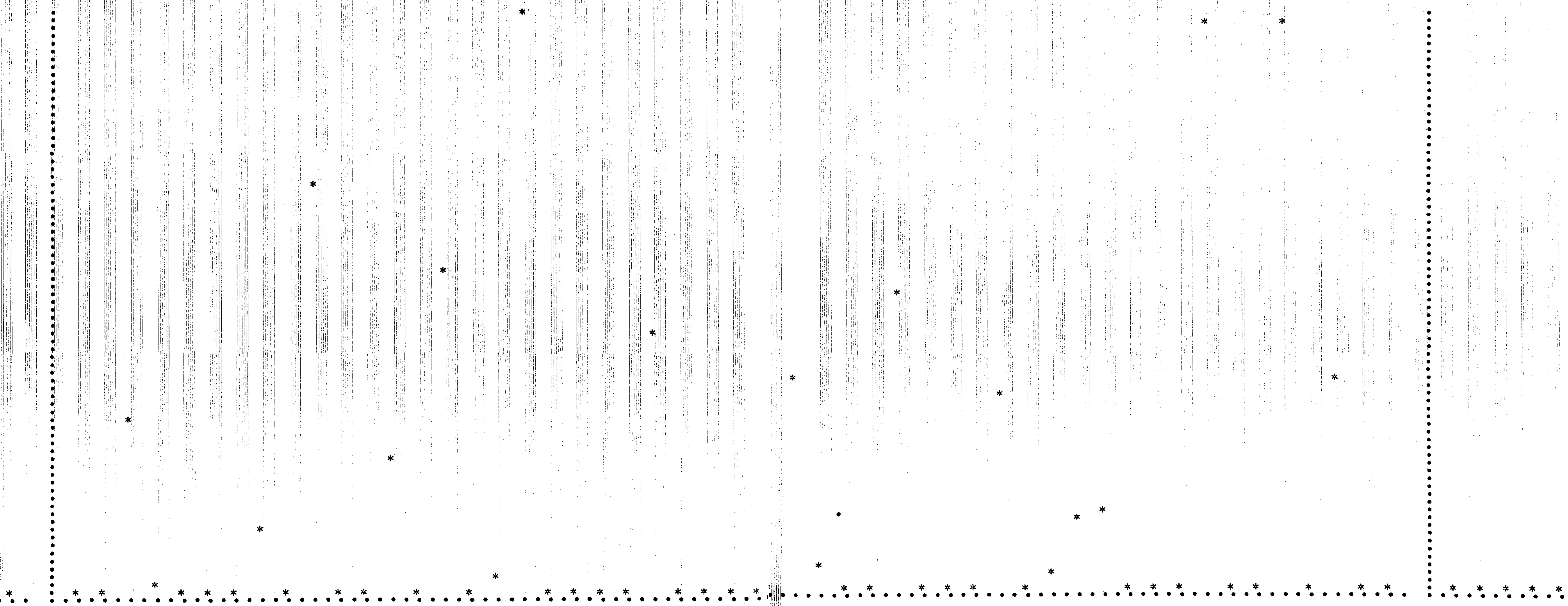
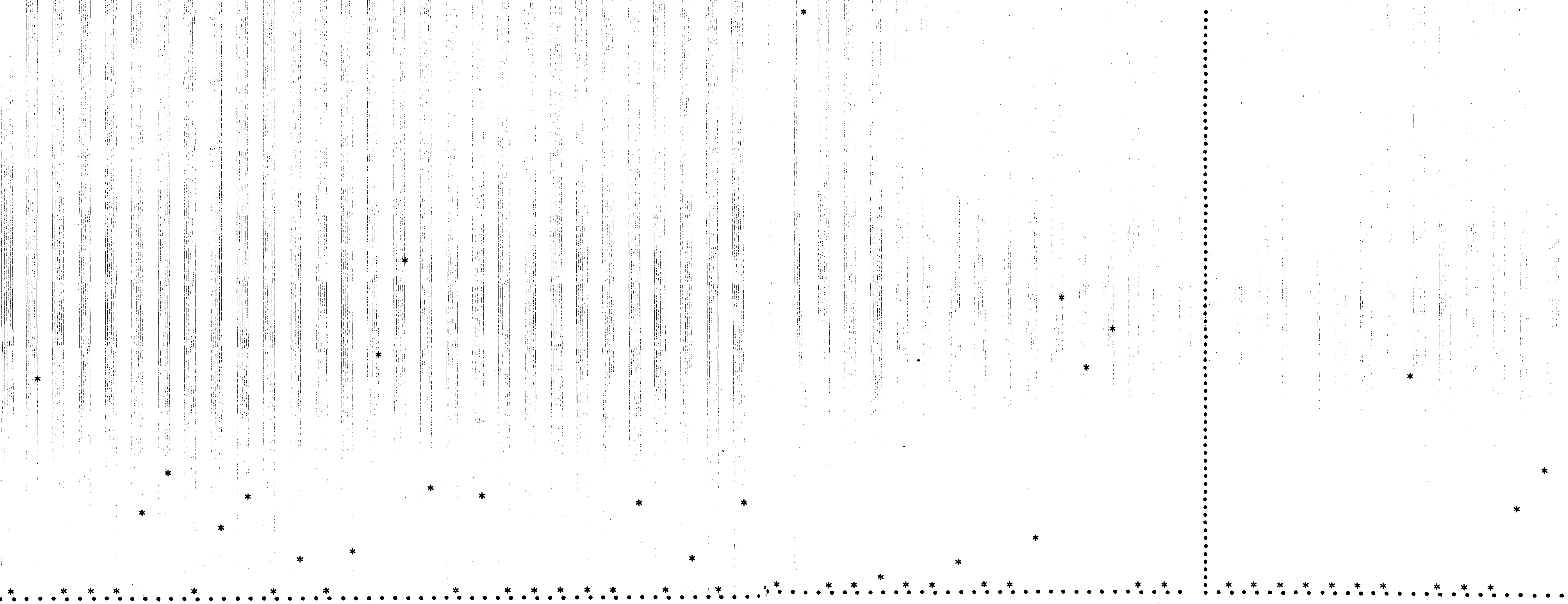
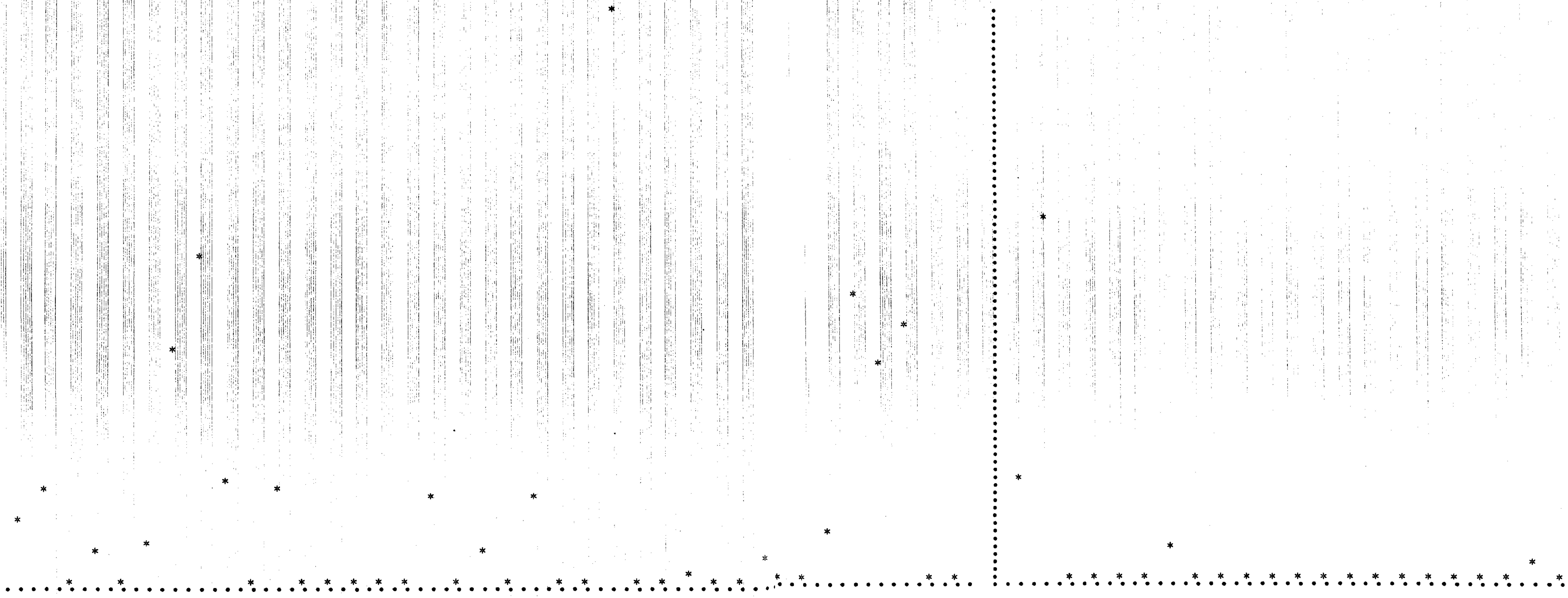
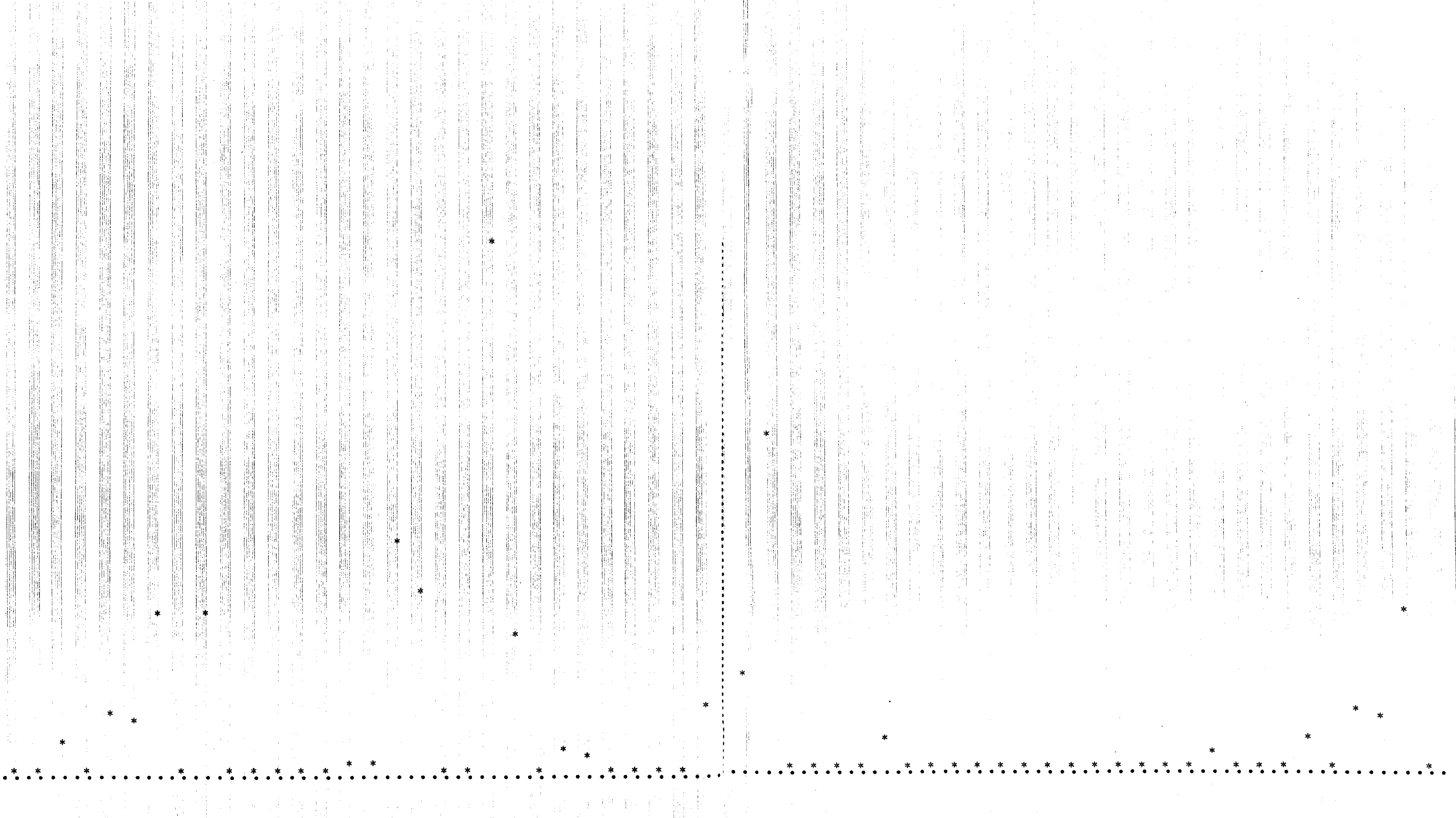
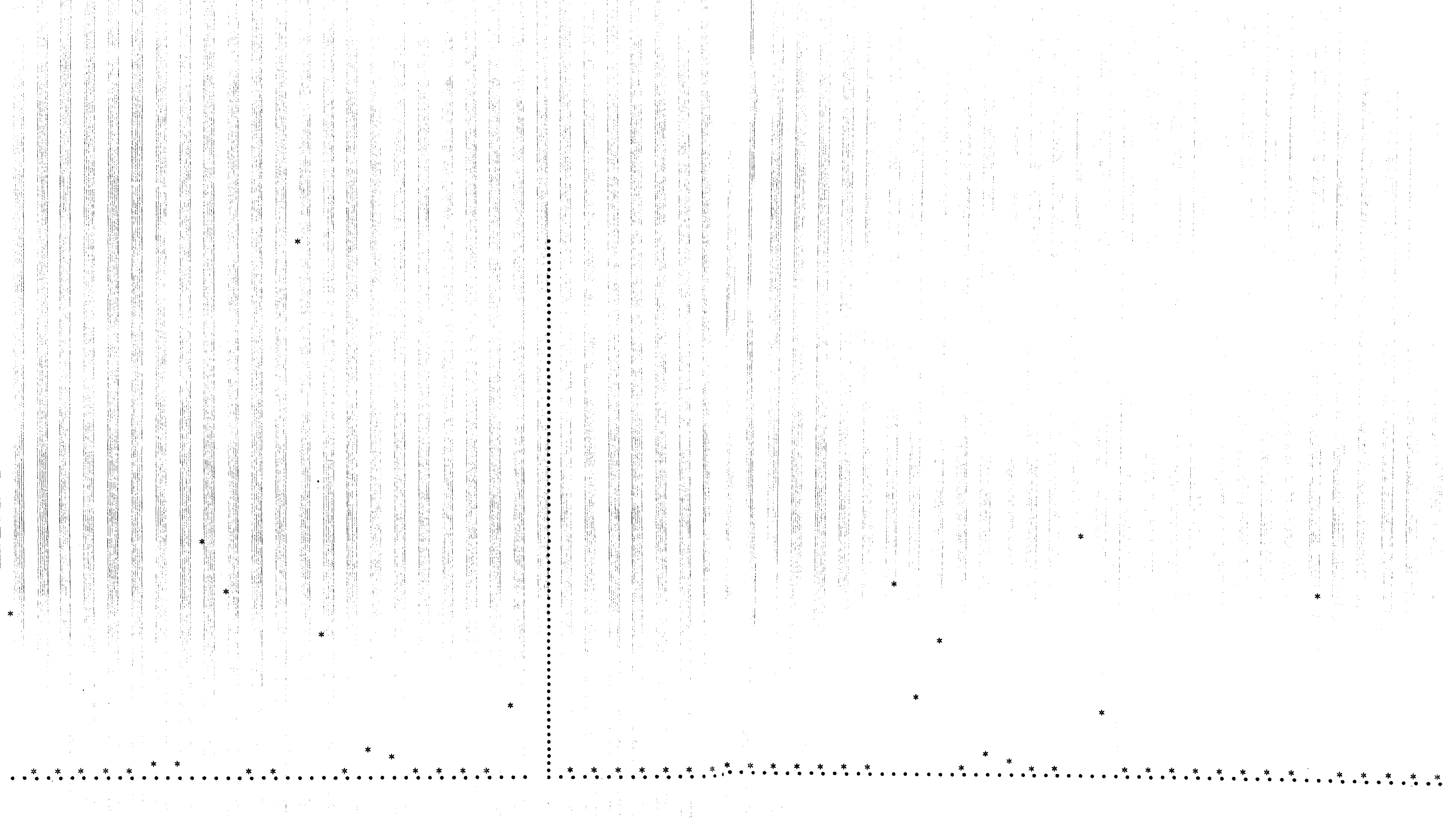


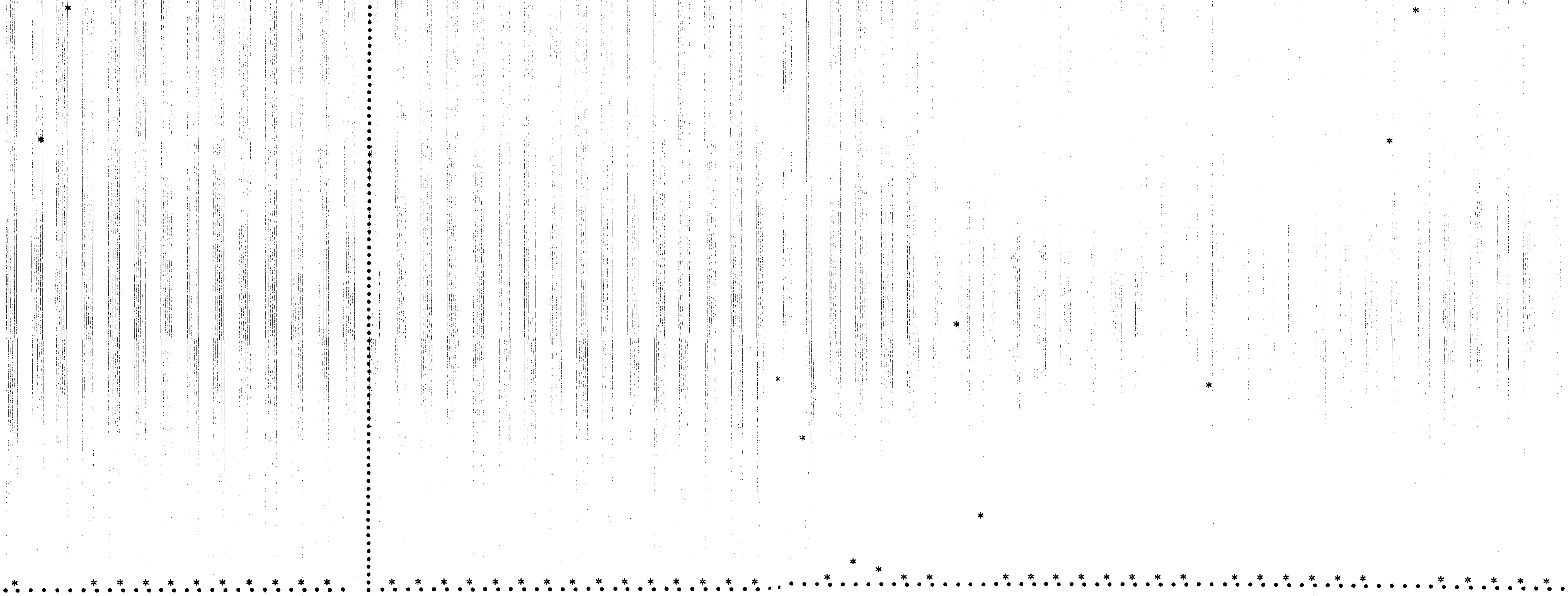


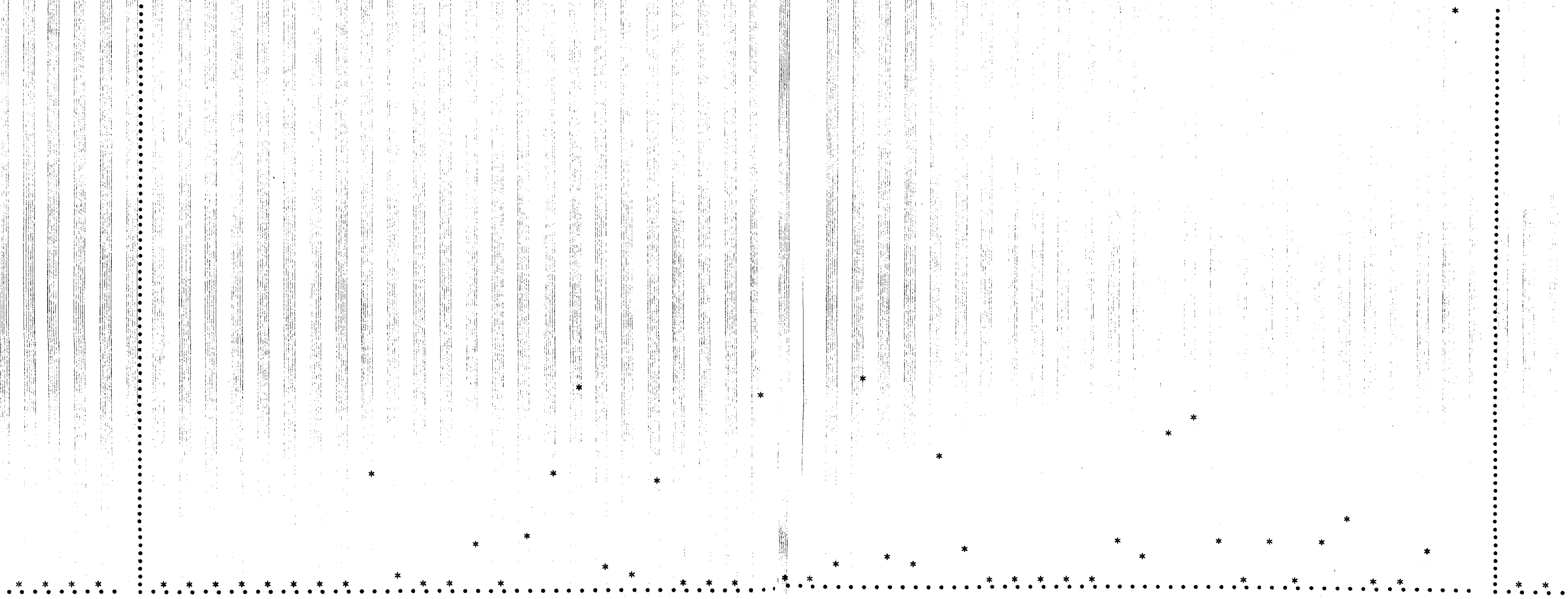


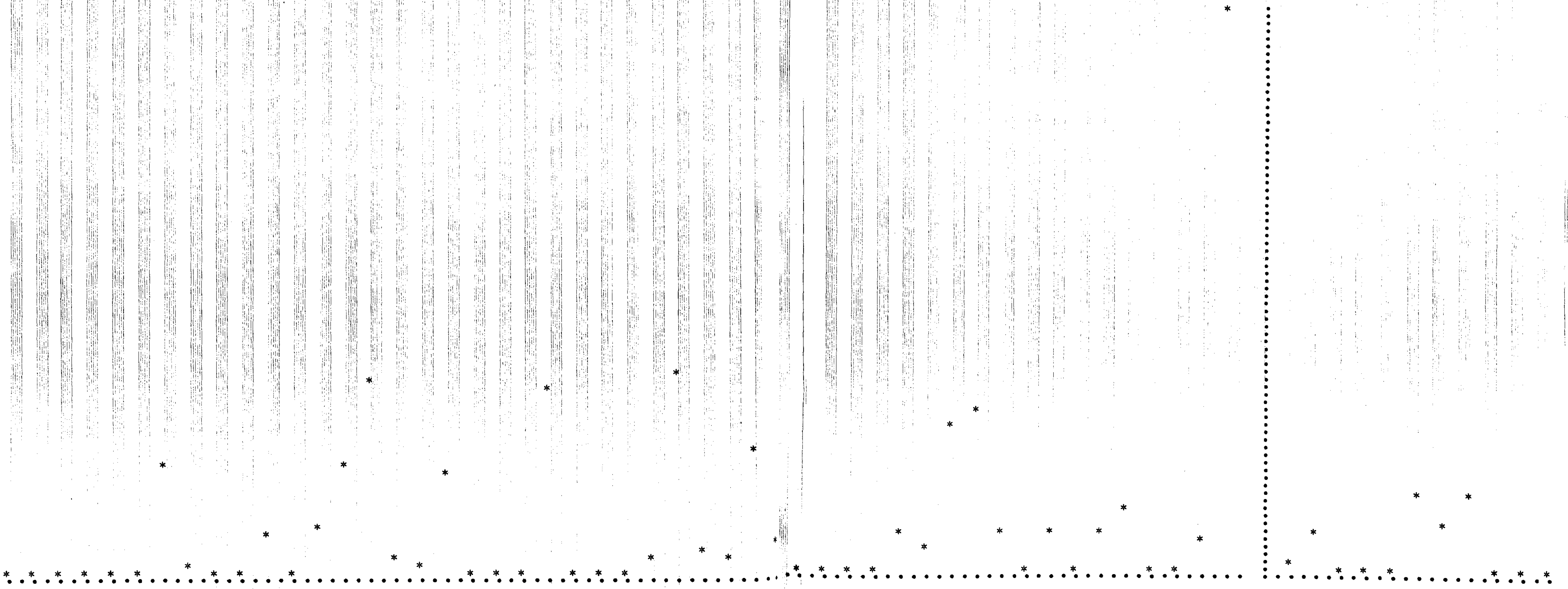


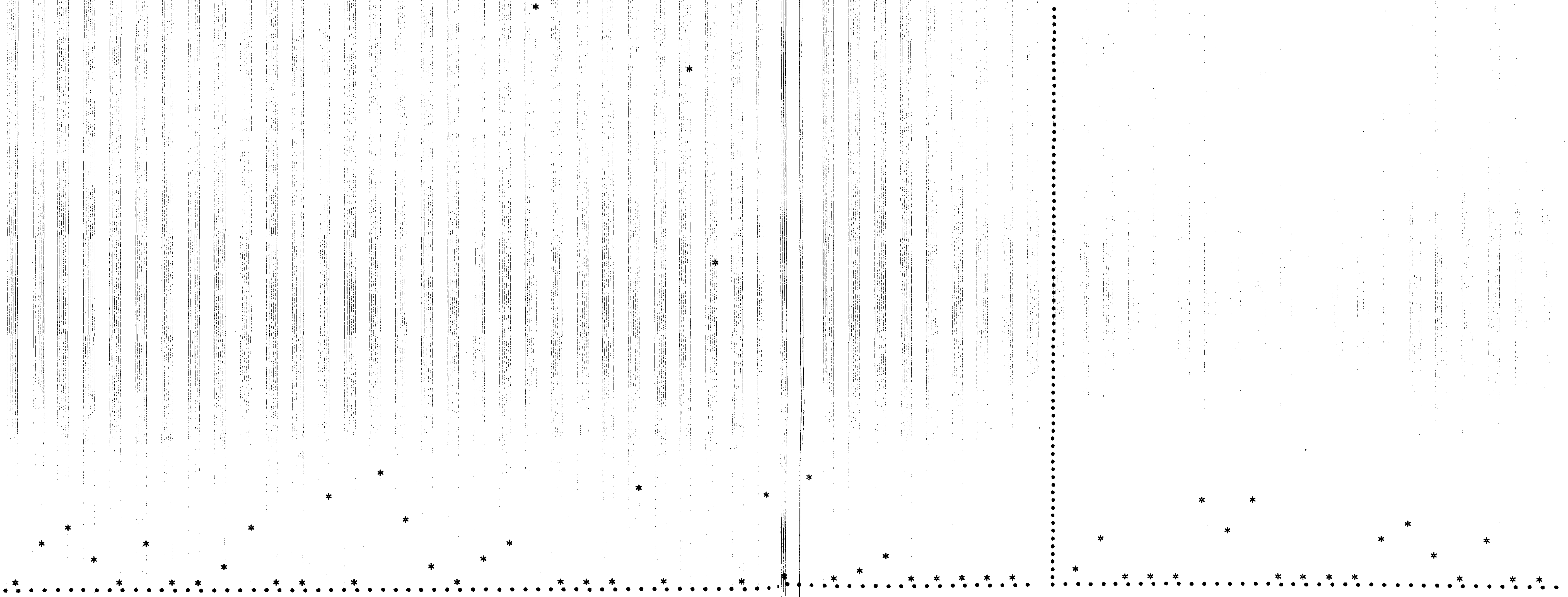


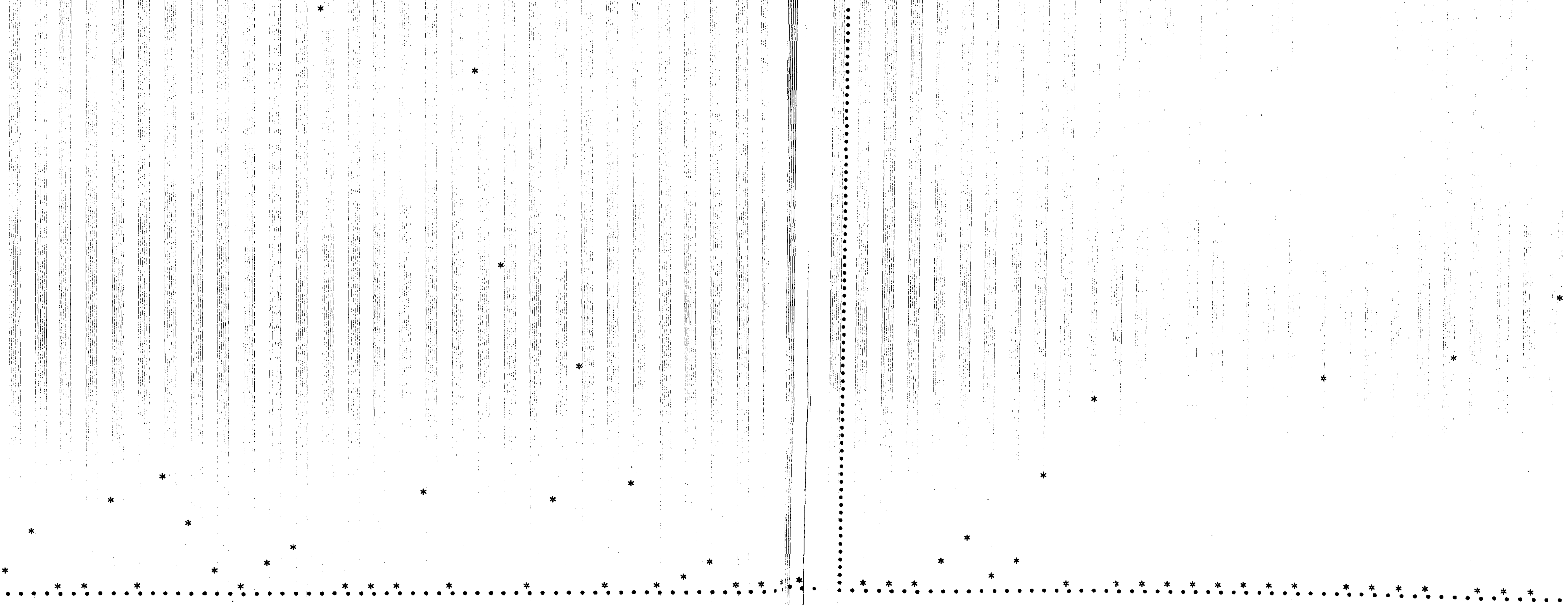


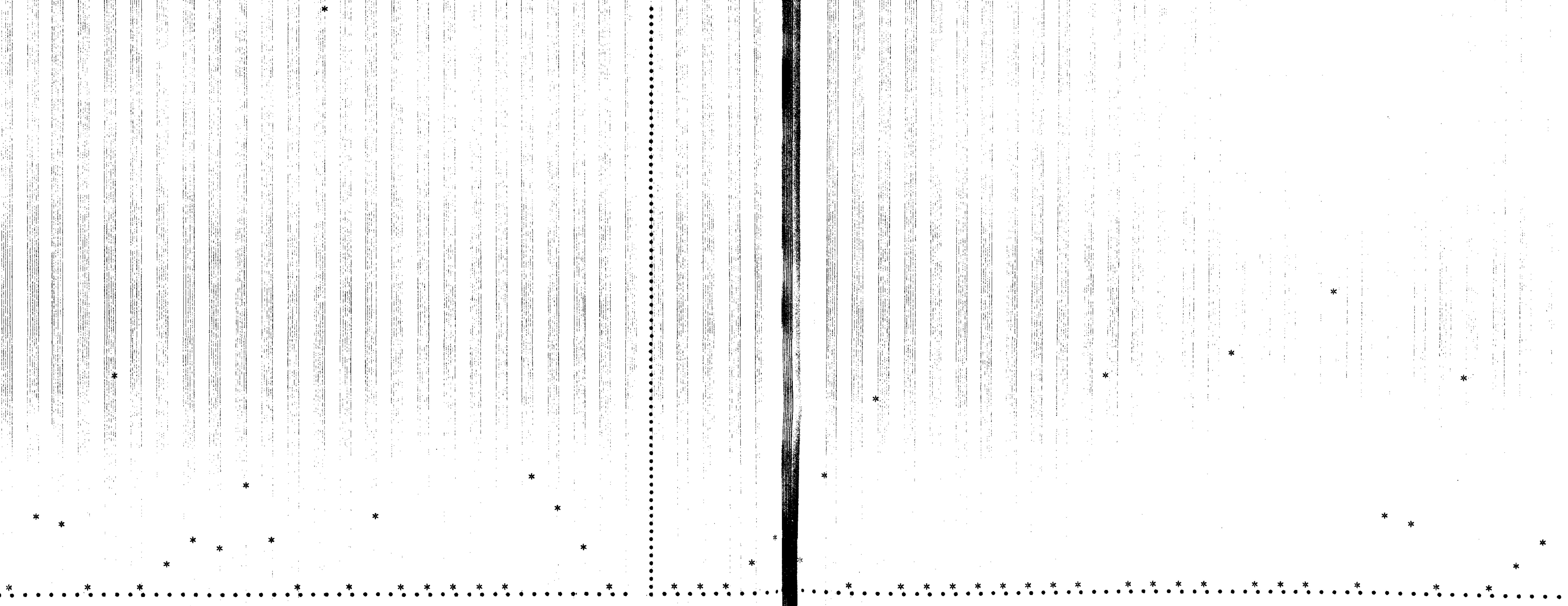


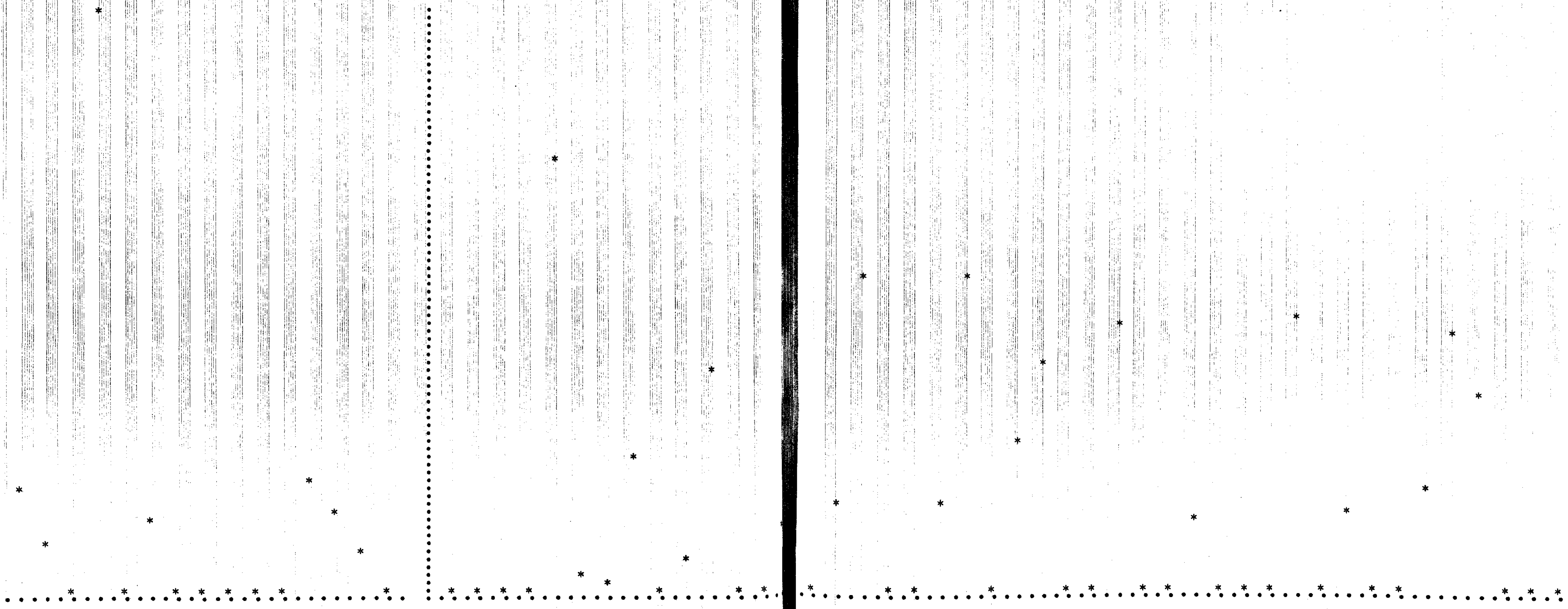


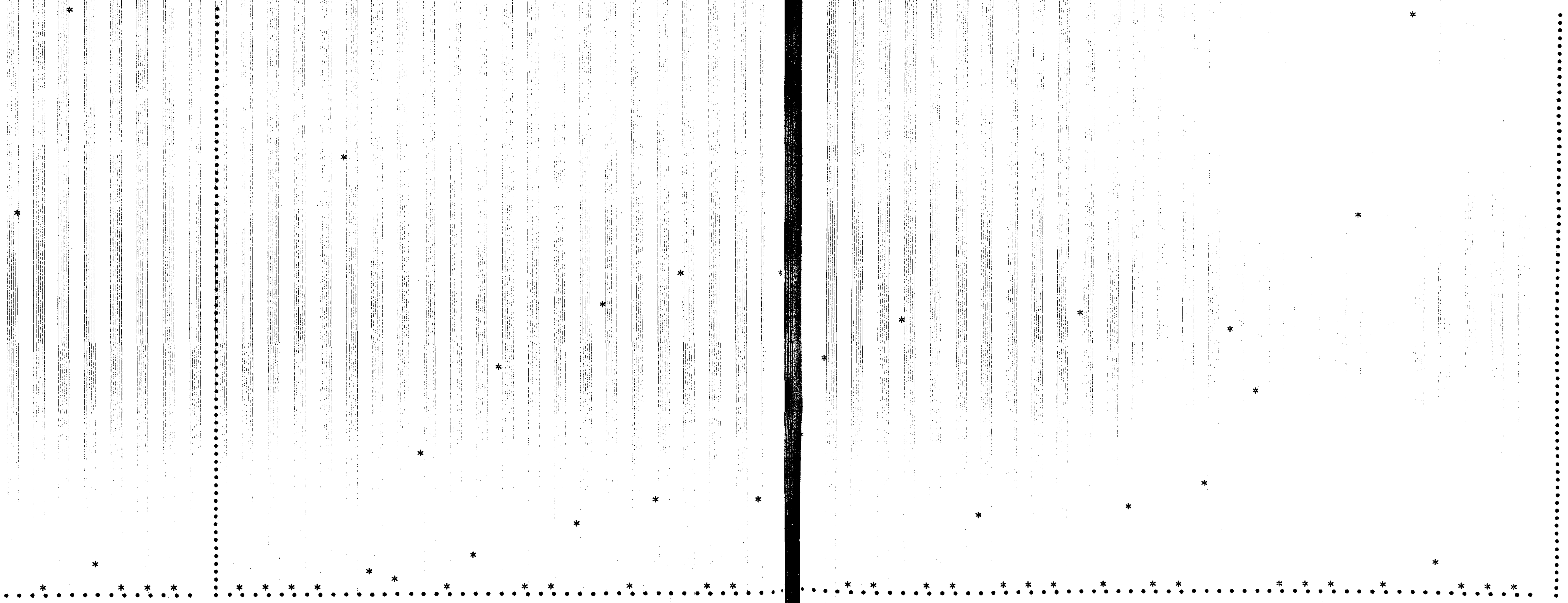


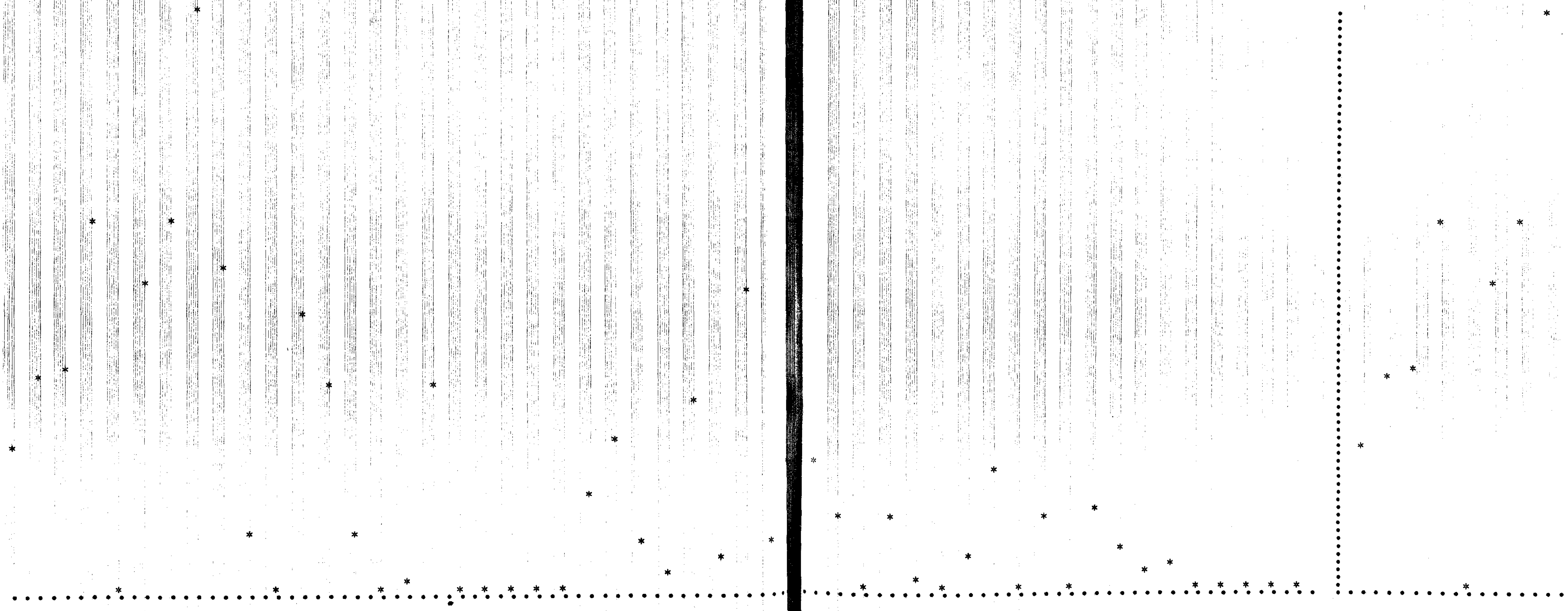


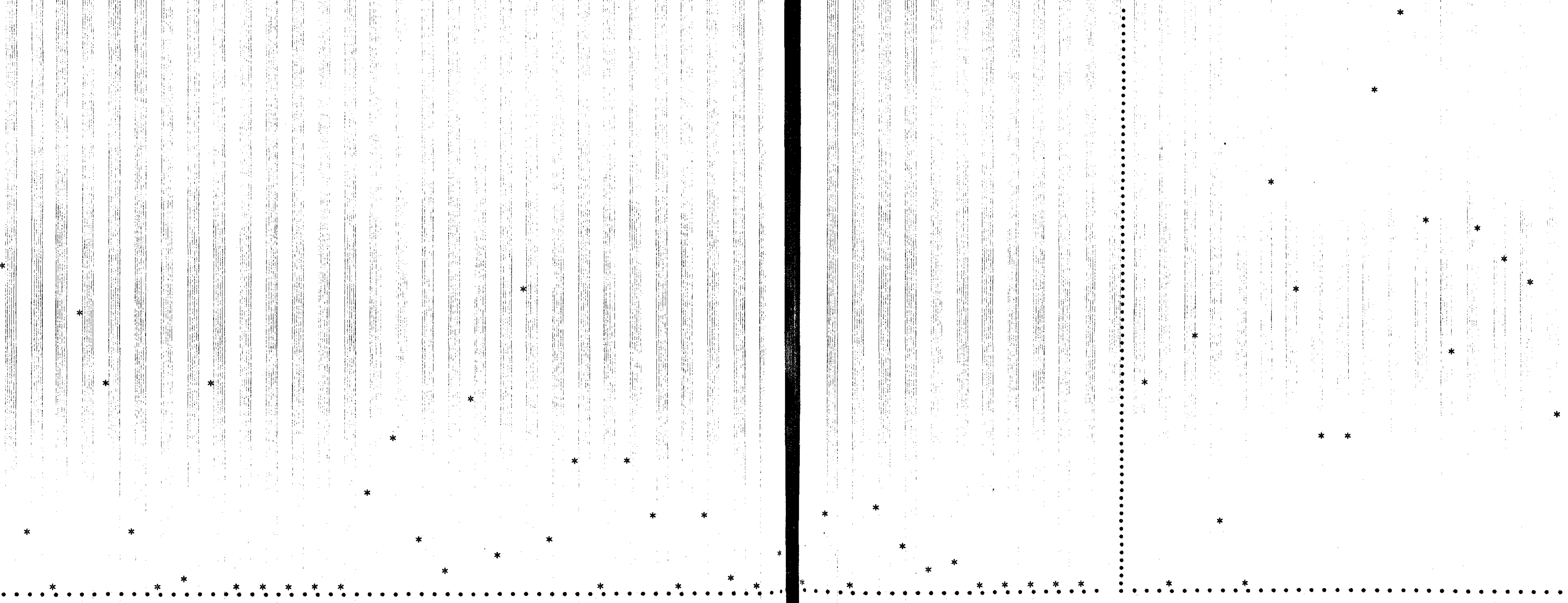


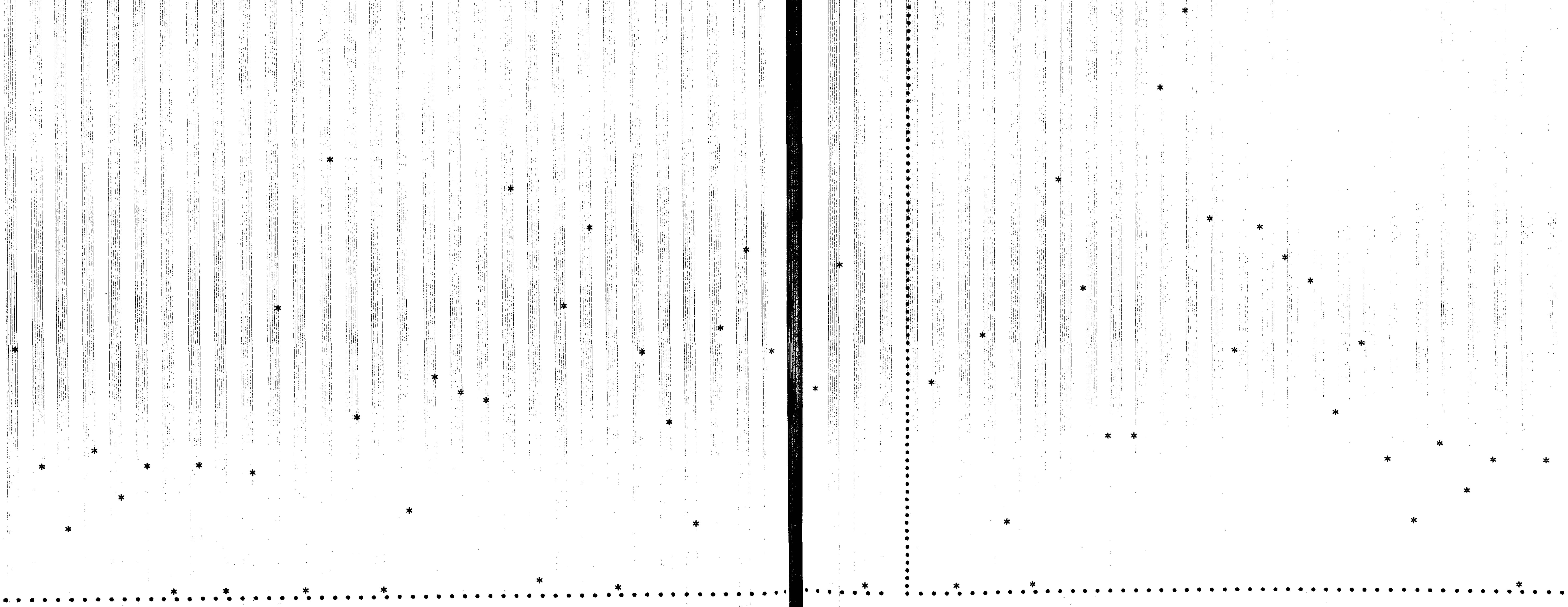


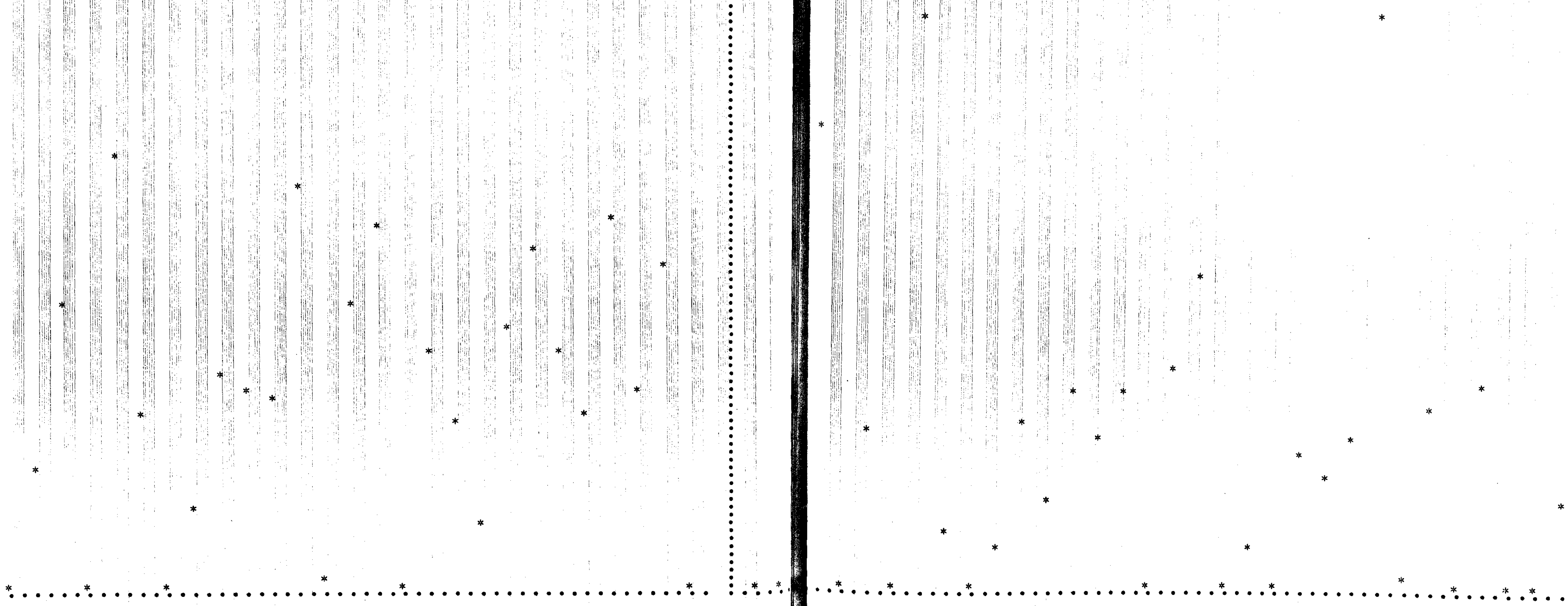


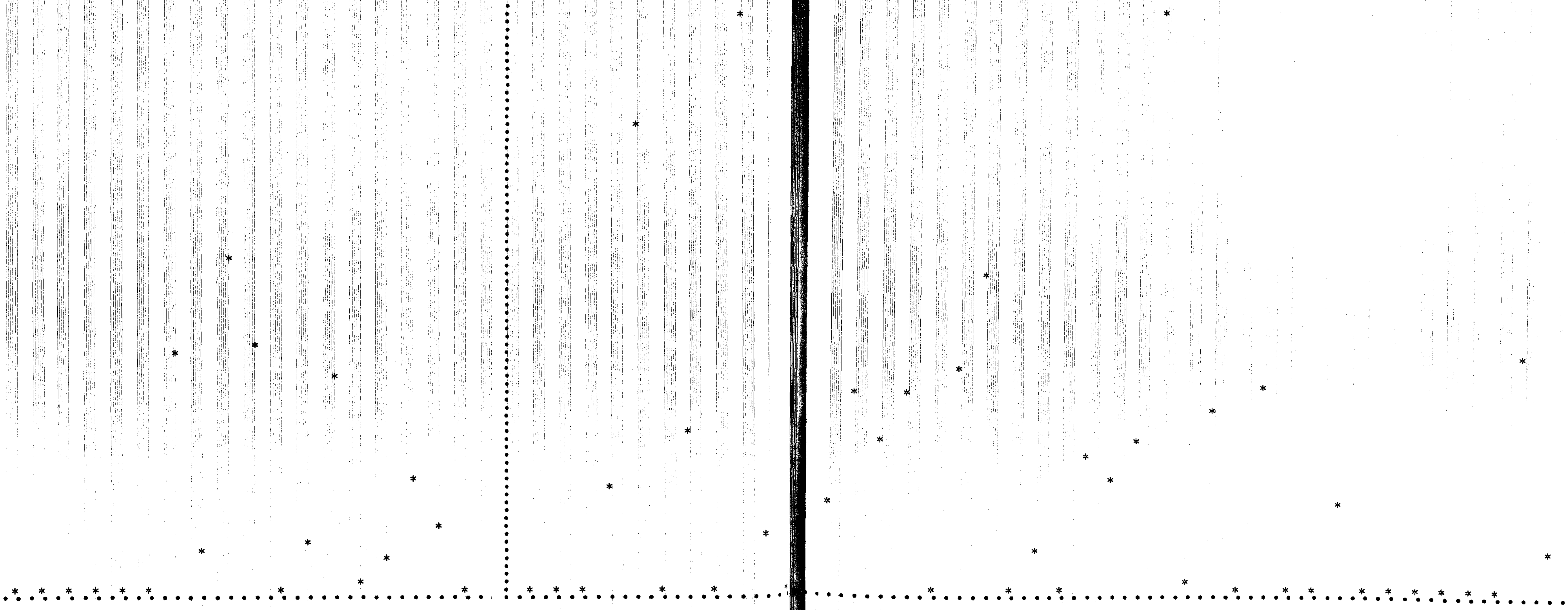


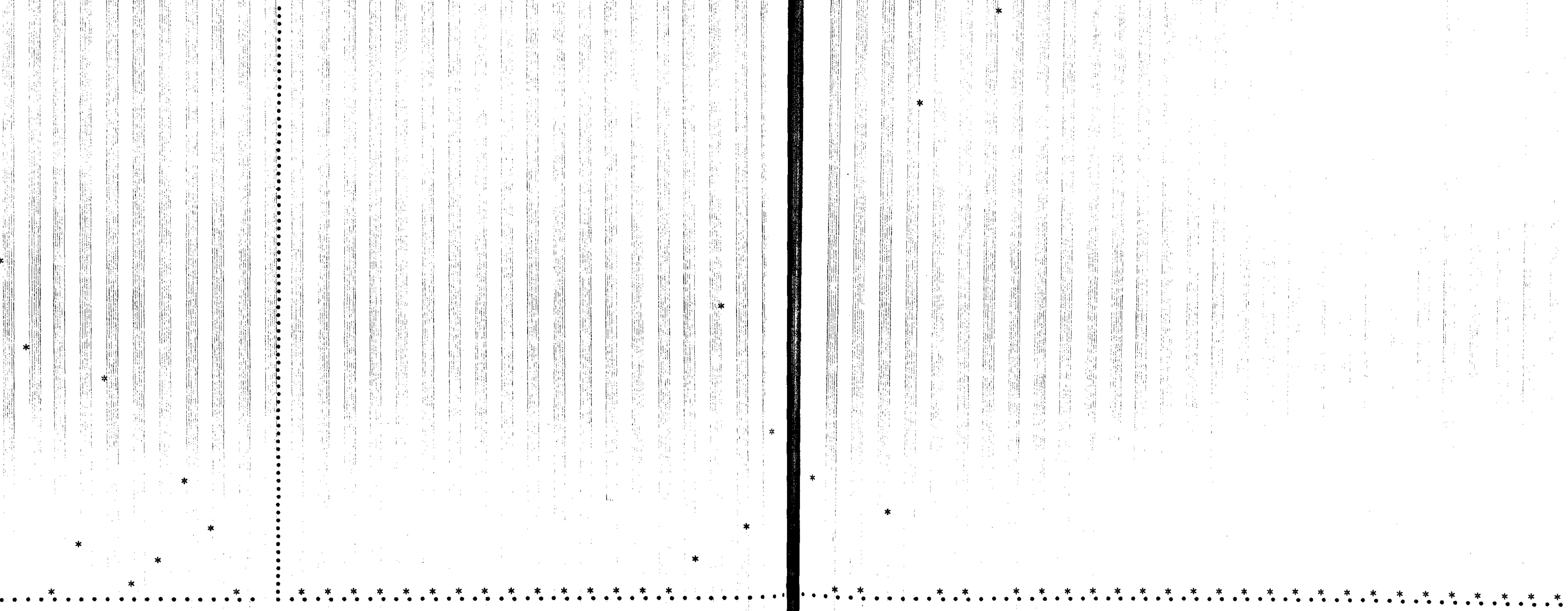


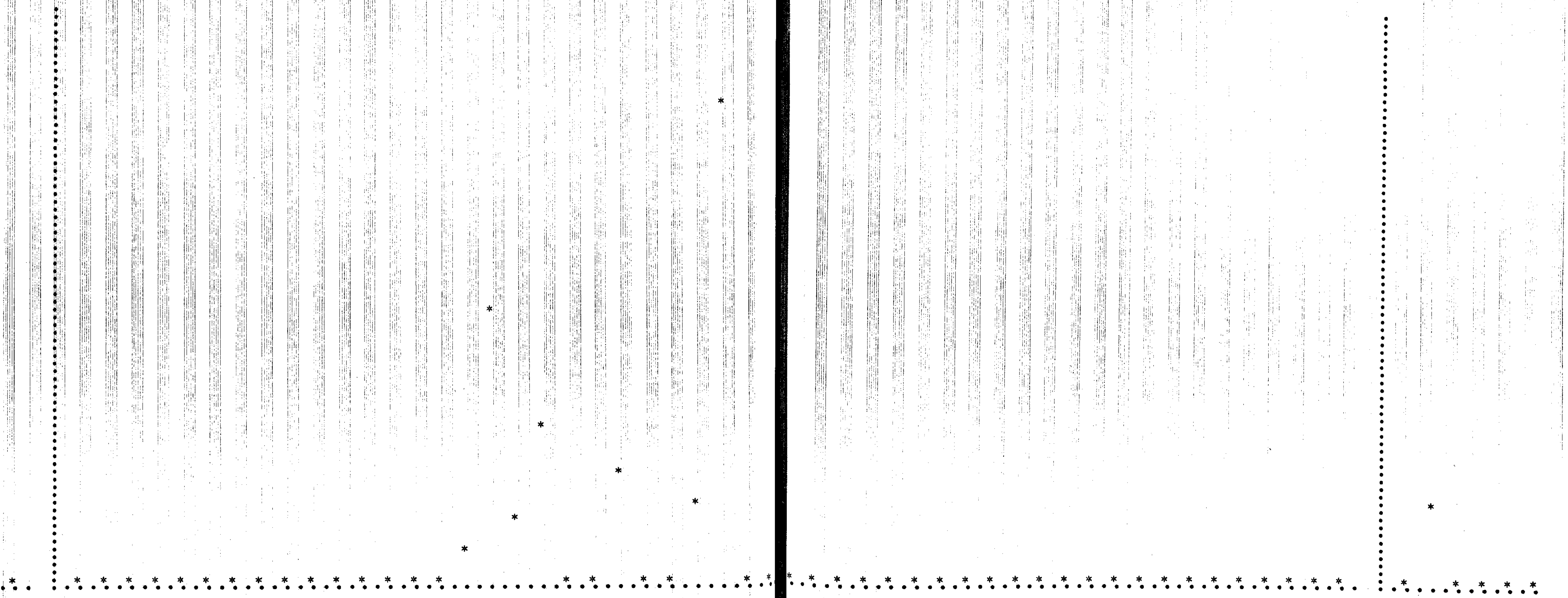


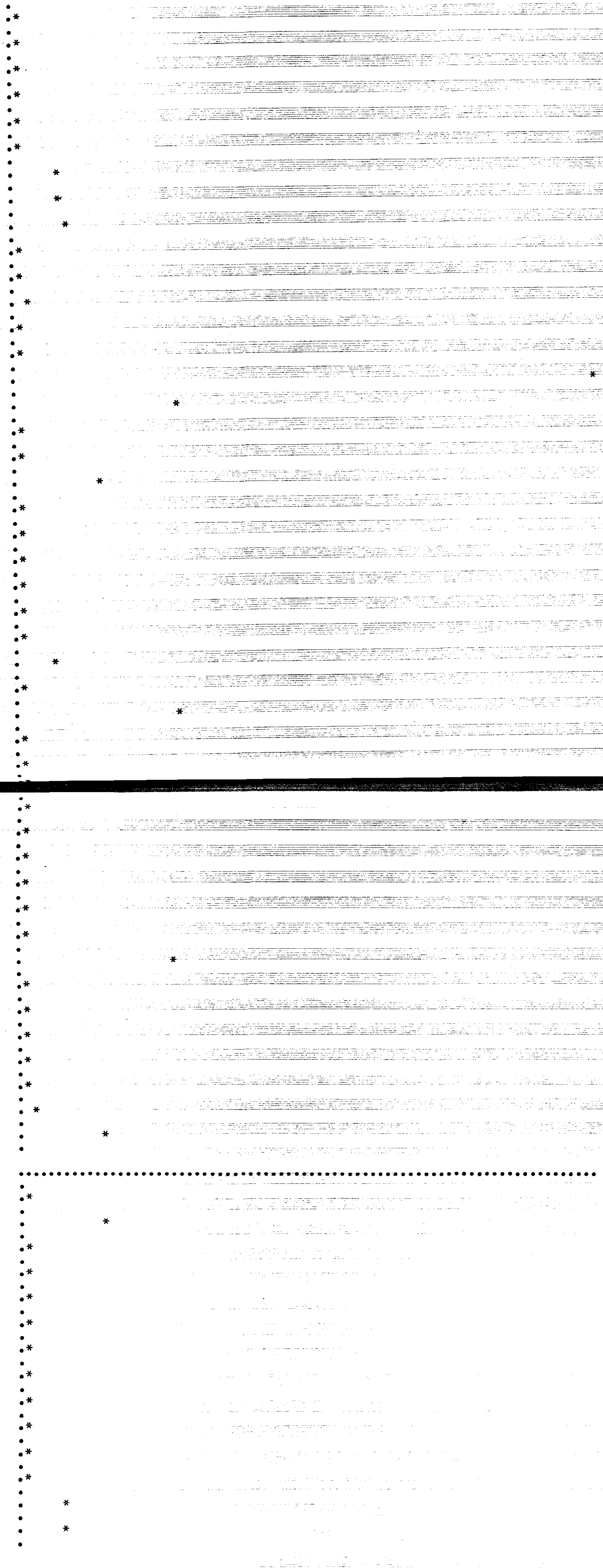


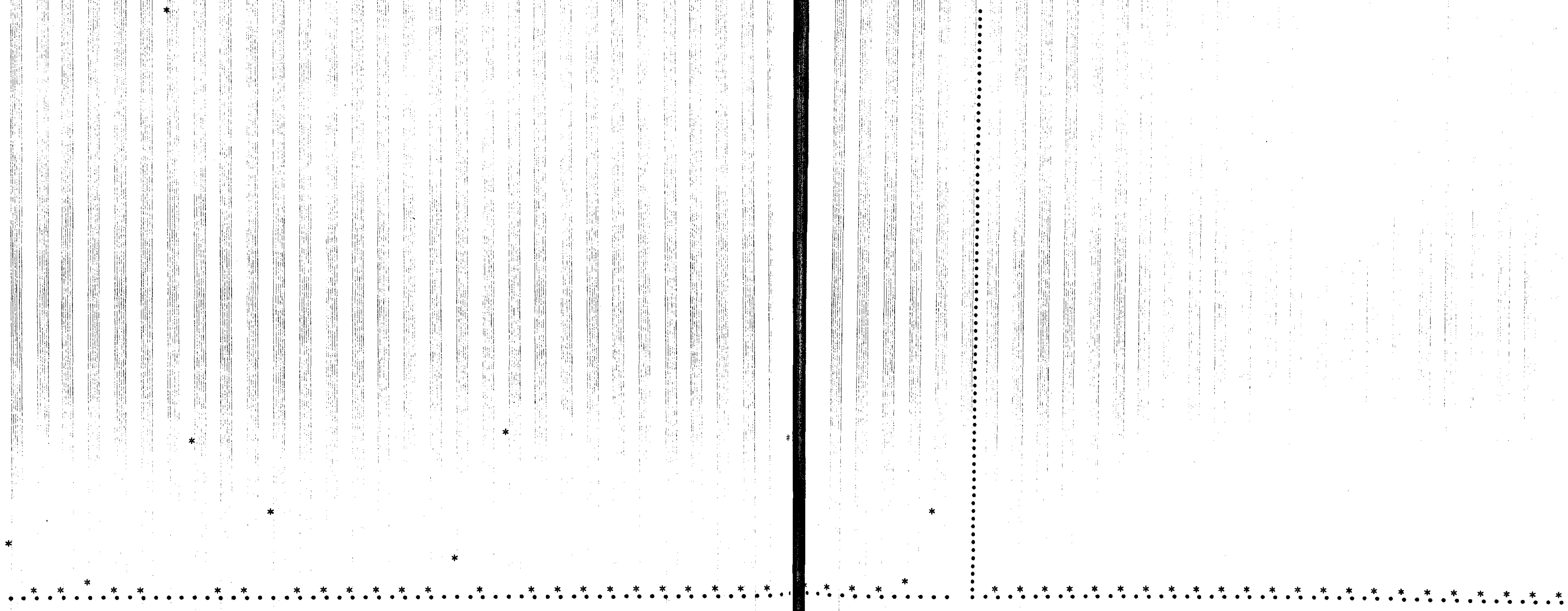


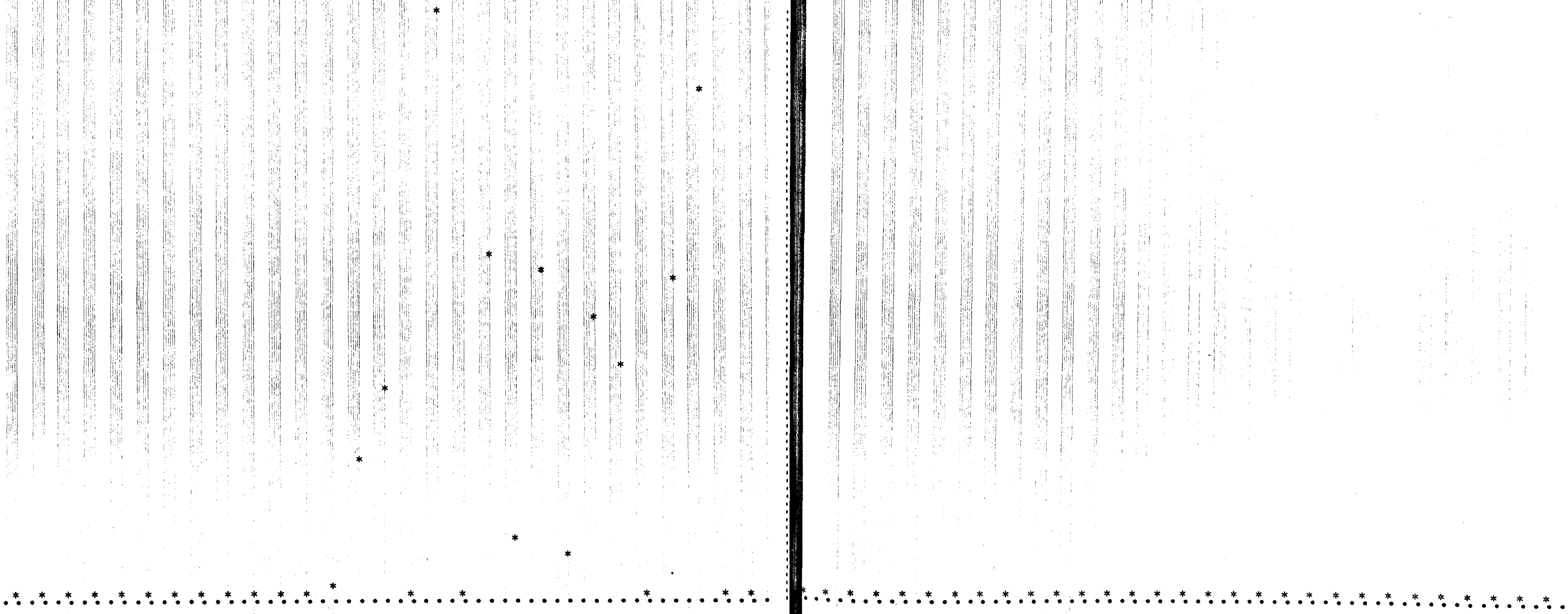


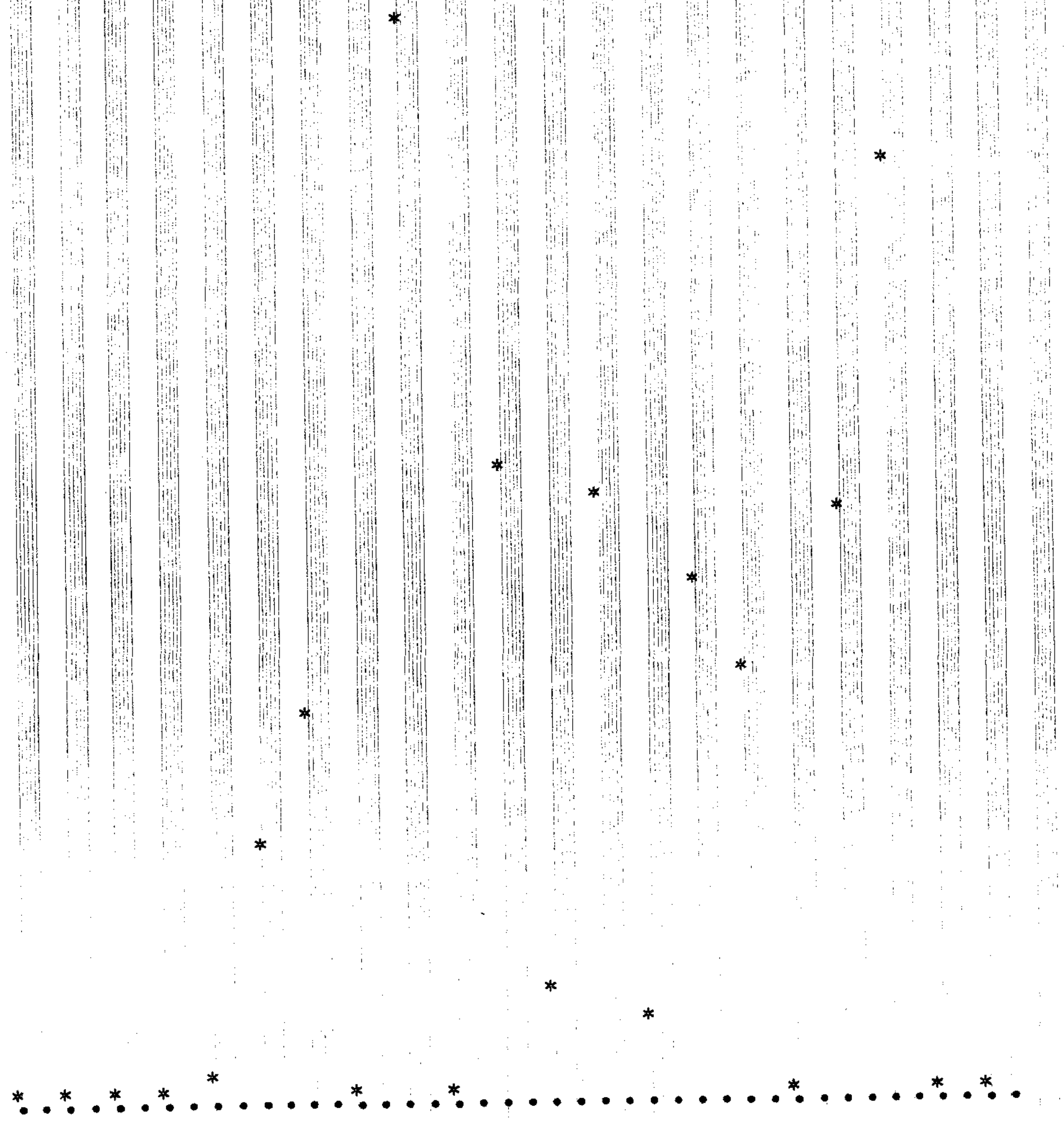












APPENDIX: VIII. OUTPUTS OF THE SECOND SIMULATION PROCESS.

SECOND SIMULATION RESULTS

| WEEKS | MODELS | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 0. | 0. | 48. | 0. | 0. | 0. | 0. |
| | 479. | 23508. | 38133. | 1190. | 0. | 3648. | 0. |
| | 0. | 0. | 72. | 0. | 0. | 0. | 0. |
| | 1439. | 58771. | 114399. | 2381. | 0. | 10945. | 0. |
| 2 | 0. | 0. | 42907. | 0. | 283. | 8868. | 0. |
| | 0. | 39291. | 3434. | 0. | 0. | 7071. | 0. |
| | 0. | 0. | 64361. | 0. | 709. | 13302. | 0. |
| | 0. | 98227. | 10304. | 0. | 0. | 21215. | 0. |
| 3 | 0. | 0. | 3972. | 0. | 1615. | 0. | 0. |
| | 0. | 0. | 66459. | 0. | 0. | 0. | 0. |
| | 0. | 0. | 5958. | 0. | 4039. | 0. | 0. |
| | 0. | 0. | 199379. | 0. | 0. | 0. | 0. |
| 4 | 2861. | 0. | 0. | 0. | 0. | 5347. | 2034. |
| | [redacted] | | | | | | |
| 5 | 0. | 0. | 0. | 0. | 0. | 0. | 1545. |
| | 7476. | 28906. | 38034. | 9787. | 0. | 0. | 0. |
| | 0. | 0. | 0. | 0. | 0. | 0. | 2936. |
| | 22428. | 72266. | 114103. | 19575. | 0. | 0. | 0. |
| 6 | 0. | 0. | 15968. | 0. | 3520. | 46816. | 3323. |
| | 634. | 0. | 80317. | 182. | 0. | 0. | 0. |
| | 0. | 0. | 23952. | 0. | 8801. | 70224. | 6315. |
| | 1904. | 0. | 240953. | 364. | 0. | 0. | 0. |
| 7 | 0. | 0. | 353. | 0. | 0. | 0. | 17371. |
| | 0. | 92613. | 31773. | 4529. | 0. | 0. | 0. |
| | 0. | 0. | 530. | 0. | 0. | 0. | 33005. |
| | 0. | 231533. | 95321. | 9059. | 0. | 0. | 0. |
| 8 | 0. | 18563. | 0. | 0. | 562. | 35477. | 29511. |
| | 30384. | 0. | 59881. | 1322. | 0. | 0. | 0. |
| | 0. | 22276. | 0. | 0. | 1406. | 53215. | 56071. |
| | 91153. | 0. | 179644. | 2645. | 0. | 0. | 0. |
| 9 | 896. | 809. | 0. | 0. | 0. | 5869. | 0. |
| | 963. | 97024. | 21952. | 41925. | 0. | 0. | 0. |
| | 896. | 970. | 0. | 0. | 0. | 8804. | 0. |
| | 2889. | 242561. | 65858. | 83851. | 0. | 0. | 0. |
| 10 | 2610. | 6588. | 0. | 0. | 898. | 0. | 81892. |

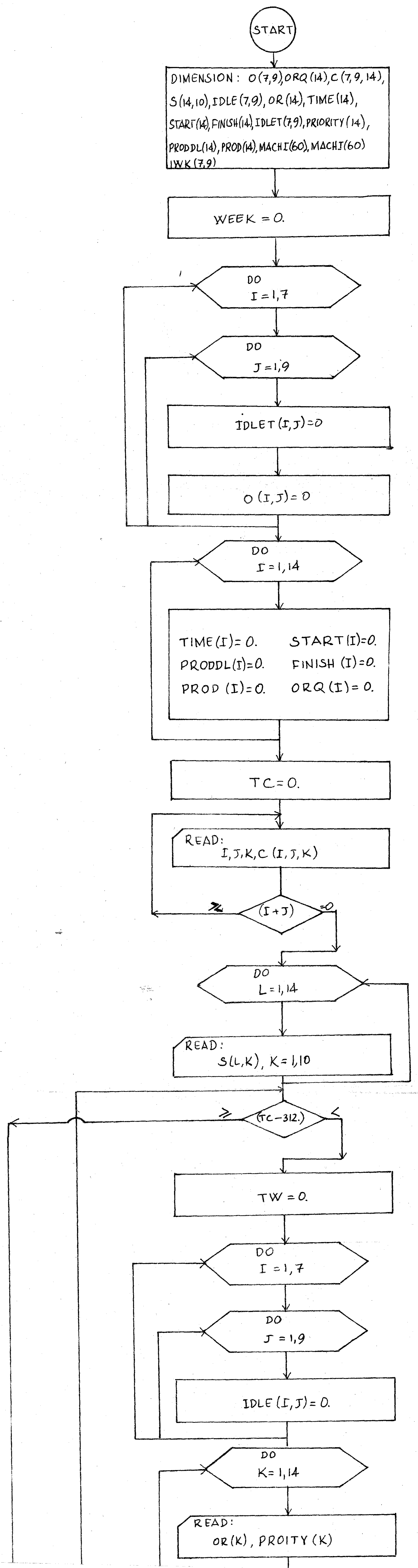
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2610. | 7906. | 0. | 0. | 2246. | 0. | 155596. |
| | 5278. | 102848. | 0. | 63971. | 0. | 0. | 0. |
| 11 | 0. | 3512. | 0. | 0. | 8657. | 5199. | 0. |
| | 0. | 19060. | 72109. | 4445. | 0. | 0. | 0. |
| | 0. | 4215. | 0. | 0. | 21643. | 7798. | 0. |
| | 0. | 47652. | 216328. | 8890. | 0. | 0. | 0. |
| 12 | 0. | 11227. | 0. | 0. | 2972. | 0. | 0. |
| | 8885. | 38948. | 30820. | 20279. | 0. | 7040. | 0. |
| | 0. | 13472. | 0. | 0. | 7430. | 0. | 0. |
| | 26655. | 97372. | 92460. | 40558. | 0. | 21121. | 0. |
| 13 | 737. | 1273. | 0. | 0. | 4598. | 25958. | 280. |
| | 0. | 33657. | 47664. | 12110. | 0. | 0. | 0. |
| | 737. | 1528. | 0. | 0. | 11497. | 38937. | 533. |
| | 0. | 84144. | 142993. | 24221. | 0. | 0. | 0. |
| 14 | 0. | 0. | 0. | 0. | 8468. | 14399. | 25128. |
| | 8517. | 6018. | 27818. | 8924. | 0. | 12182. | 0. |
| | 0. | 0. | 0. | 0. | 21171. | 21598. | 47744. |
| | 25553. | 15045. | 83456. | 17848. | 0. | 36547. | 0. |
| 15 | 0. | 0. | 0. | 0. | 5365. | 7184. | 616. |
| | 12065. | 8869. | 33355. | 71446. | 0. | 0. | 0. |
| | 0. | 0. | 0. | 0. | 13413. | 10776. | 1171. |
| 16 | 0. | 92098. | 0. | 14960. | 0. | 0. | 0. |
| | 0. | 8553. | 34721. | 0. | 856. | 0. | 0. |
| | 0. | 110518. | 0. | 14960. | 0. | 0. | 0. |
| | 0. | 21382. | 104164. | 0. | 4280. | 0. | 0. |
| 17 | 1073. | 25597. | 0. | 0. | 28762. | 28946. | 0. |
| | 46780. | 18356. | 0. | 6219. | 308. | 0. | 0. |
| | 1073. | 30717. | 0. | 0. | 71905. | 43420. | 0. |
| | 140340. | 45891. | 0. | 12438. | 1544. | 0. | 0. |
| 18 | 5686. | 155. | 0. | 4150. | 6079. | 6158. | 0. |
| | 15651. | 0. | 12217. | 47235. | 25. | 0. | 0. |
| | 5686. | 186. | 0. | 4150. | 15198. | 9238. | 0. |
| | 46955. | 0. | 36651. | 94470. | 125. | 0. | 0. |
| 19 | 552. | 0. | 0. | 0. | 610. | 1307. | 2592. |
| | 0. | 0. | 417. | 92428. | 379. | 545. | 0. |
| | 552. | 0. | 0. | 0. | 1527. | 1960. | 4924. |
| | 0. | 0. | 1252. | 184856. | 1895. | 1636. | 0. |
| 20 | 0. | 14204. | 0. | 967. | 33818. | 7447. | 0. |
| | 0. | 0. | 3648. | 25878. | 0. | 0. | 0. |
| | 0. | 17045. | 0. | 967. | 84547. | 11171. | 0. |
| | 0. | 0. | 10945. | 51757. | 0. | 0. | 0. |
| 21 | 0. | 27933. | 27374. | 390. | 1885. | 0. | 0. |
| | 0. | 0. | 26600. | 0. | 0. | 35163. | 0. |

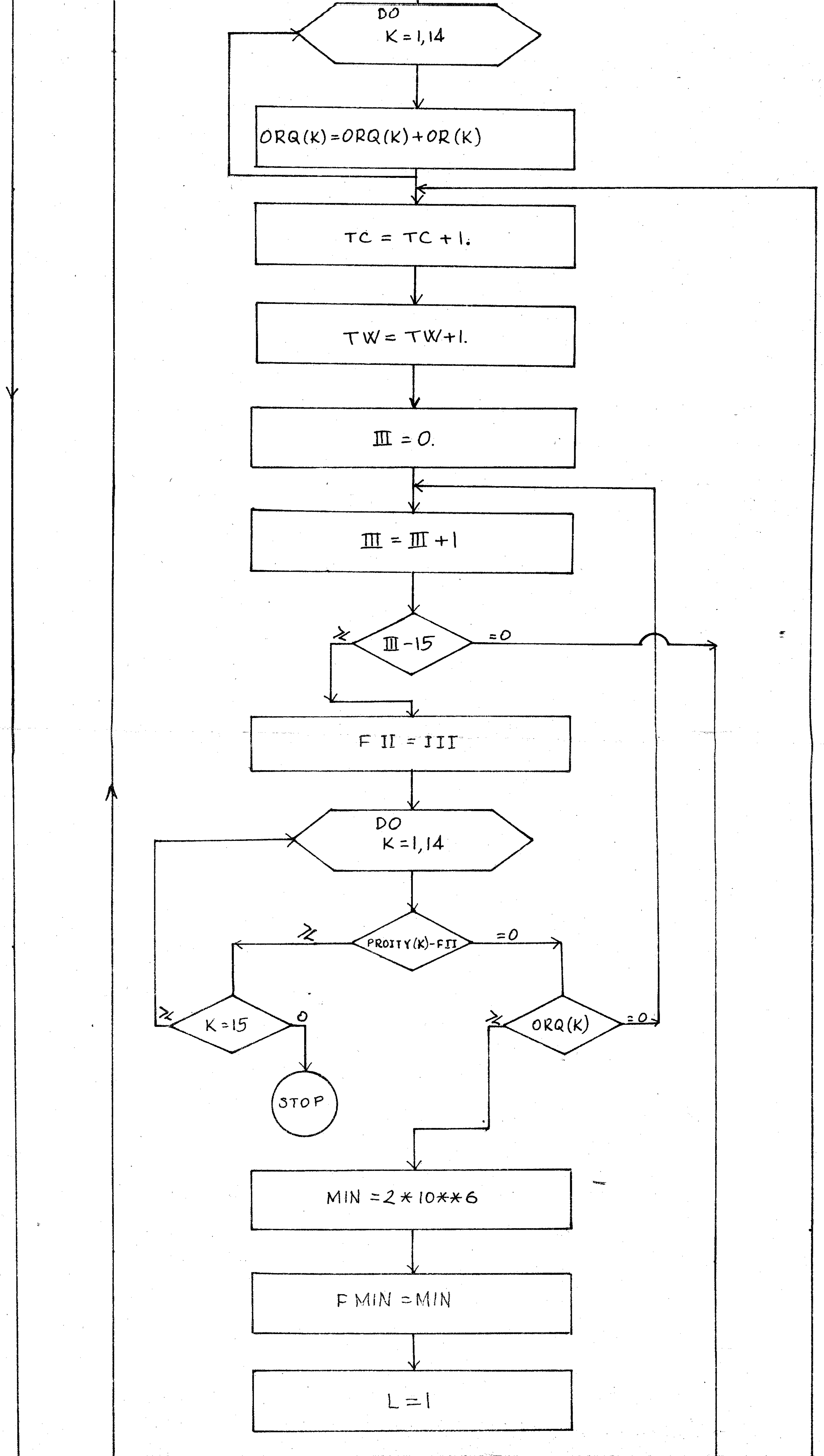
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 0. | 0. | 79802. | 0. | 0. | 105491. | 0. |
| 22 | 0. | 25906. | 1995. | 2082. | 7716. | 0. | 0. |
| | 20831. | 0. | 25566. | 3848. | 0. | 0. | 0. |
| | 0. | 31087. | 2993. | 2082. | 19291. | 0. | 0. |
| | 62493. | 0. | 76698. | 7697. | 0. | 0. | 0. |
| 23 | 13859. | 4100. | 0. | 0. | 0. | 56292. | 0. |
| | 0. | 0. | 0. | 0. | 0. | 5303. | 0. |
| | 13859. | 4920. | 0. | 0. | 0. | 84439. | 0. |
| | 0. | 0. | 0. | 0. | 0. | 15910. | 0. |
| 24 | 0. | 0. | 32152. | 6010. | 3940. | 17787. | 45330. |
| | 25800. | 7712. | 0. | 11480. | 0. | 2700. | 0. |
| | 0. | 0. | 48228. | 6010. | 9850. | 26681. | 86127. |
| | 77401. | 19280. | 0. | 22961. | 0. | 8101. | 0. |
| 25 | 0. | 11121. | 28414. | 4626. | 7074. | 0. | 0. |
| | 10709. | 0. | 9135. | 11700. | 2018. | 14751. | 0. |
| | 0. | 13346. | 42622. | 4626. | 17685. | 0. | 0. |
| | 32127. | 0. | 27407. | 23401. | 10090. | 44253. | 0. |
| 26 | 0. | 0. | 0. | 0. | 13880. | 25935. | 0. |
| | 0. | 6912. | 0. | 8368. | 2867. | 0. | 0. |
| | 0. | 0. | 0. | 0. | 34700. | 38902. | 0. |
| | 0. | 17280. | 0. | 16737. | 14335. | 0. | 0. |
| | 0. | 0. | 30781. | 0. | 0. | 8161. | 0. |
| | 19677. | 20872. | 84658. | 170026. | 0. | 0. | 0. |
| 28 | 0. | 0. | 5234. | 0. | 1201. | 4928. | 34497. |
| | 10930. | 28207. | 38915. | 4037. | 0. | 0. | 0. |
| | 0. | 0. | 7852. | 0. | 3003. | 7392. | 65544. |
| | 32792. | 70519. | 116746. | 8075. | 0. | 0. | 0. |
| 29 | 1855. | 0. | 57908. | 0. | 9131. | 1249. | 0. |
| | 31607. | 10032. | 22834. | 6943. | 1500. | 0. | 0. |
| | 1855. | 0. | 86862. | 0. | 22827. | 1874. | 0. |
| | 94823. | 25080. | 68503. | 13887. | 7504. | 0. | 0. |
| 30 | 1738. | 0. | 0. | 0. | 12926. | 0. | 25440. |
| | 2466. | 67956. | 0. | 0. | 0. | 0. | 0. |
| | 1738. | 0. | 0. | 0. | 32317. | 0. | 48337. |
| | 7398. | 169891. | 0. | 0. | 0. | 0. | 0. |
| 31 | 0. | 0. | 9614. | 0. | 27090. | 5420. | 0. |
| | 24798. | 12299. | 10471. | 18439. | 0. | 13879. | 0. |
| | 0. | 0. | 14421. | 0. | 67725. | 8131. | 0. |
| | 74396. | 30747. | 31413. | 36879. | 0. | 41638. | 0. |
| 32 | 0. | 0. | 0. | 0. | 15519. | 17720. | 0. |
| | 2363. | 70982. | 0. | 0. | 0. | 0. | 0. |
| | 0. | 0. | 0. | 0. | 38797. | 26581. | 0. |

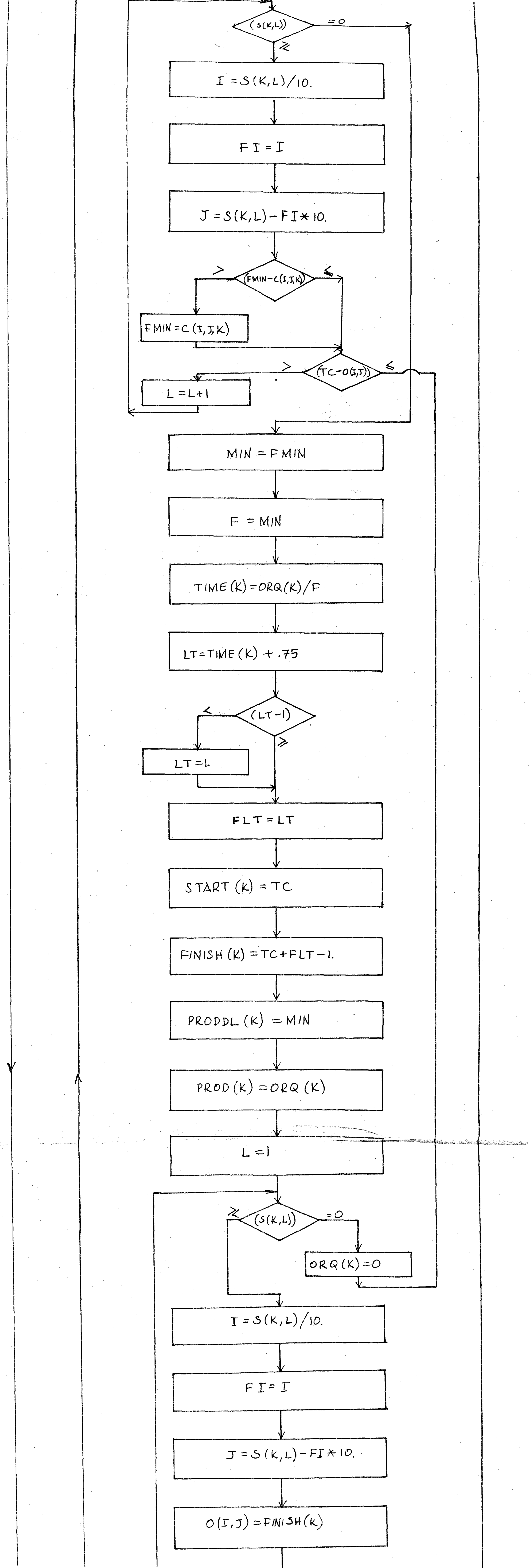
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 33 | 1756. | 6468. | 5125. | 0. | 4236. | 0. | 6737. |
| | 137. | 18199. | 26899. | 0. | 0. | 0. | 0. |
| | 1756. | 7761. | 7687. | 0. | 10590. | 0. | 12800. |
| | 412. | 45499. | 80698. | 0. | 0. | 0. | 0. |
| 34 | 0. | 12145. | 0. | 11121. | 3361. | 8919. | 4675. |
| | 455. | 27160. | 11657. | 21812. | 0. | 1939. | 0. |
| | 0. | 14574. | 0. | 11121. | 8403. | 13379. | 8883. |
| | 1366. | 67901. | 34971. | 43625. | 0. | 5819. | 0. |
| 35 | 0. | 0. | 0. | 0. | 0. | 12116. | 9267. |
| | 12461. | 6864. | 28223. | 0. | 0. | 0. | 0. |
| | 0. | 0. | 0. | 0. | 0. | 18174. | 17607. |
| | 37384. | 17161. | 84669. | 0. | 0. | 0. | 0. |
| 36 | 0. | 0. | 0. | 0. | 0. | 22444. | 12591. |
| | 0. | 17854. | 17711. | 4145. | 0. | 0. | 3474. |
| | 0. | 0. | 0. | 0. | 0. | 33666. | 23923. |
| | 0. | 44636. | 53135. | 8291. | 0. | 0. | 6948. |
| 37 | 19595. | 36057. | 23440. | 0. | 0. | 0. | 43129. |
| | 0. | 0. | 0. | 0. | 0. | 0. | 34330. |
| | 19595. | 43269. | 35160. | 0. | 0. | 0. | 81946. |
| | 0. | 0. | 0. | 0. | 0. | 0. | 68661. |
| 38 | 0. | 28695. | 0. | 0. | 0. | 21840. | 7209. |
| | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| | 4949. | 27376. | 139642. | 0. | 0. | 0. | 47300. |
| 39 | 826. | 0. | 21022. | 0. | 7939. | 83182. | 0. |
| | 0. | 2400. | 50412. | 0. | 0. | 0. | 5160. |
| | 826. | 0. | 31533. | 0. | 19849. | 124773. | 0. |
| | 0. | 6001. | 151237. | 0. | 0. | 0. | 10320. |
| 40 | 0. | 0. | 84069. | 0. | 6744. | 10777. | 0. |
| | 0. | 8794. | 53552. | 0. | 0. | 0. | 20691. |
| | 0. | 0. | 126104. | 0. | 16860. | 16165. | 0. |
| | 0. | 21985. | 160658. | 0. | 0. | 0. | 41383. |
| 41 | 2116. | 5508. | 0. | 7744. | 8720. | 10155. | 94665. |
| | 24483. | 3408. | 16189. | 5723. | 0. | 0. | 0. |
| | 2116. | 6610. | 0. | 7744. | 21802. | 15233. | 179865. |
| | 73449. | 8522. | 48567. | 11446. | 0. | 0. | 0. |
| 42 | 0. | 26373. | 20453. | 7943. | 2538. | 0. | 0. |
| | 0. | 5165. | 73439. | 30137. | 0. | 0. | 21018. |
| | 0. | 31648. | 30680. | 7943. | 6346. | 0. | 0. |
| | 0. | 12913. | 220317. | 60275. | 0. | 0. | 42037. |
| 43 | 0. | 0. | 0. | 0. | 16086. | 14467. | 1286. |
| | 0. | 19801. | 74051. | 0. | 0. | 0. | 6996. |
| | 0. | 0. | 0. | 0. | 40215. | 21700. | 2443. |
| | 0. | 49504. | 222154. | 0. | 0. | 0. | 13993. |

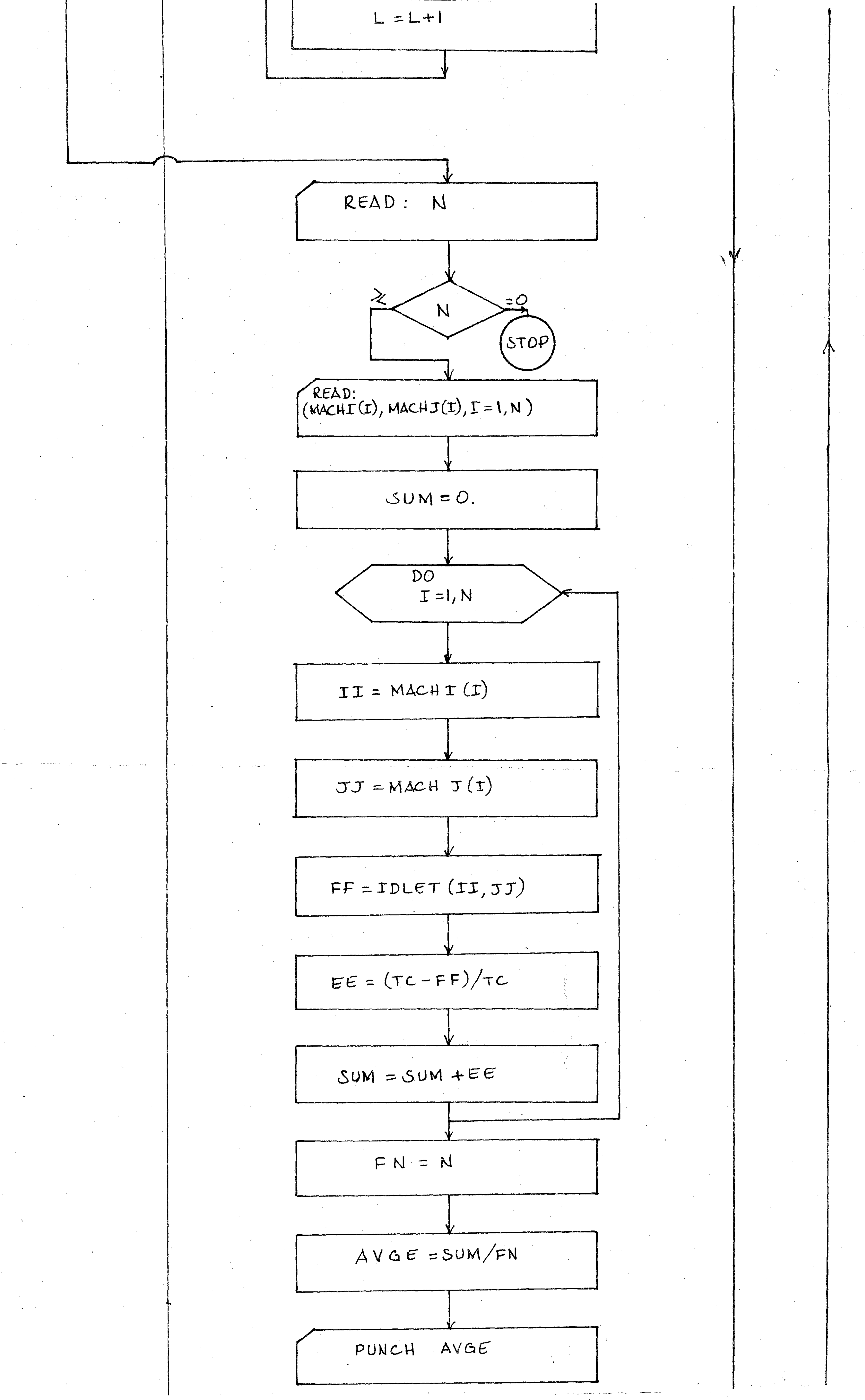
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 0. | 7119. | 42528. | 18278. | 0. | 0. | 24055. |
| | 0. | 0. | 33681. | 0. | 0. | 3568. | 0. |
| | 0. | 17788. | 126980. | 36556. | 0. | 0. | 48111. |
| 45 | 0. | 43172. | 0. | 0. | 0. | 43423. | 0. |
| | 0. | 11034. | 16431. | 0. | 0. | 0. | 6684. |
| | 0. | 51807. | 0. | 0. | 0. | 65134. | 0. |
| | 0. | 27586. | 49294. | 0. | 0. | 0. | 13368. |
| 46 | 0. | 10444. | 884. | 0. | 3535. | 11618. | 0. |
| | 9999. | 9424. | 49017. | 12124. | 0. | 0. | 24289. |
| | 0. | 12533. | 1326. | 0. | 8837. | 17427. | 0. |
| | 29997. | 23560. | 147051. | 24248. | 0. | 0. | 48578. |
| 47 | 0. | 0. | 25988. | 0. | 20226. | 45253. | 0. |
| | 0. | 8201. | 0. | 0. | 0. | 0. | 40257. |
| | 0. | 0. | 38982. | 0. | 50566. | 67880. | 0. |
| | 0. | 20503. | 0. | 0. | 0. | 0. | 80514. |
| 48 | 5800. | 0. | 0. | 0. | 14789. | 5147. | 0. |
| | 20908. | 12306. | 17393. | 1669. | 0. | 0. | 36504. |
| | 5800. | 0. | 0. | 0. | 36973. | 7721. | 0. |
| | 62724. | 30766. | 52180. | 3338. | 0. | 0. | 73009. |
| 49 | 0. | 21980. | 0. | 0. | 825. | 0. | 0. |
| | 5188. | 0. | 68343. | 20105. | 0. | 0. | 0. |
| 50 | 10531. | 30327. | 0. | 0. | 0. | 0. | 0. |
| | 0. | 0. | 26040. | 11435. | 0. | 95. | 55045. |
| | 10531. | 36393. | 0. | 0. | 0. | 0. | 0. |
| | 0. | 0. | 78122. | 22870. | 0. | 286. | 110090. |
| 51 | 0. | 23051. | 0. | 0. | 3788. | 6843. | 1736. |
| | 365. | 0. | 32784. | 15620. | 0. | 6103. | 0. |
| | 0. | 27662. | 0. | 0. | 9470. | 10265. | 3299. |
| | 1097. | 0. | 98353. | 31240. | 0. | 18311. | 0. |
| 52 | 0. | 0. | 0. | 0. | 73662. | 0. | 0. |
| | 0. | 0. | 10905. | 6589. | 0. | 4634. | 0. |
| | 0. | 0. | 0. | 0. | 184156. | 0. | 0. |
| | 0. | 0. | 32717. | 13179. | 0. | 13902. | 0. |

APPENDIX: IX. DETAILED FLOW CHART OF THE PRODUCTION SCHEDULING PROGRAM I.

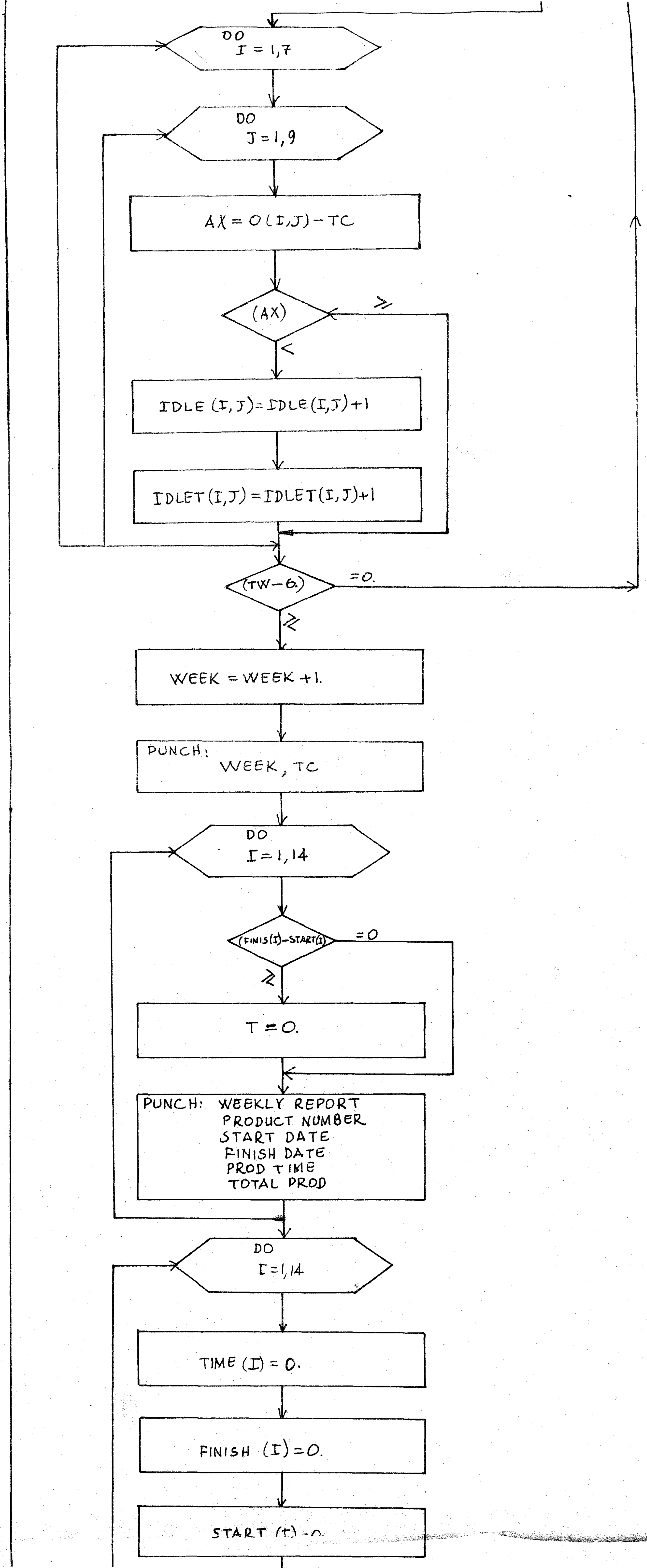



DO K = 1, 14
ORQ(K) = ORQ(K) + OR(K)
TC = TC + 1.
TW = TW + 1.
III = 0.
III = III + 1
III - 15
=0
≷
F II = III
DO K = 1, 14
PROITY(K) - FII
=0
≷
K = 15
0
≷
STOP
ORQ(K)
=0
≷
MIN = 2 * 10 ** 6
F MIN = MIN
L = 1

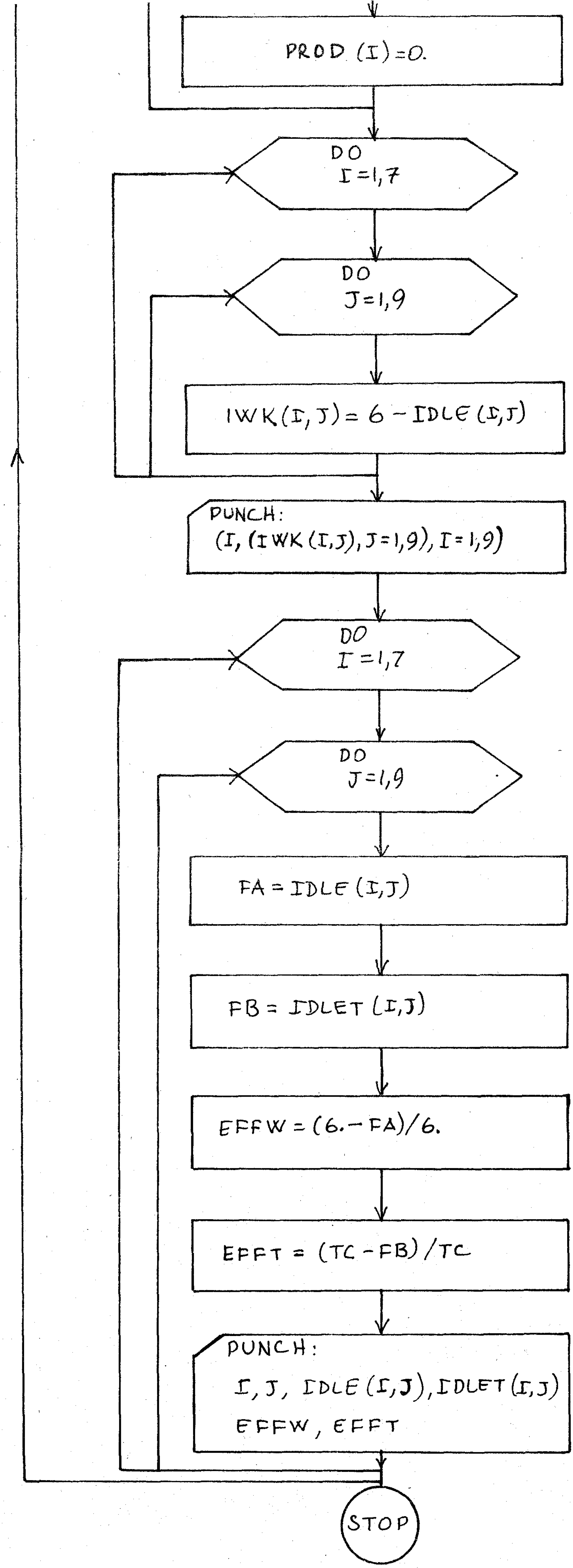

(S(K,L))
=0
≥
I = S(K,L)/10.
FI = I
J = S(K,L) − FI * 10.
>
(FMIN−C(I,J,K))
≤
FMIN = C(I,J,K)
>
(TC−O(I,J))
≤
L = L+1
MIN = FMIN
F = MIN
TIME(K) = ORQ(K)/F
LT = TIME(K) + .75
<
(LT−1)
≥
LT = 1.
FLT = LT
START (K) = TC
FINISH (K) = TC+FLT−1.
PRODDL (K) = MIN
PROD (K) = ORQ (K)
L = 1
≥
(S(K,L))
=0
ORQ (K) = 0
I = S(K,L)/10.
FI = I
J = S(K,L) − FI * 10.
O(I,J) = FINISH(K)



L = L+1
READ : N
N
≷
=0
STOP
READ:
(MACHI(I), MACHJ(I), I = 1, N)
SUM = 0.
DO
I = 1, N
II = MACH I (I)
JJ = MACH J (I)
FF = IDLET (II, JJ)
EE = (TC - FF)/TC
SUM = SUM + EE
FN = N
AVGE = SUM/FN
PUNCH AVGE



DO
I = 1,7
DO
J = 1,9
AX = O(I,J) - TC
(AX)
≥
<
IDLE (I,J) = IDLE(I,J)+1
IDLET(I,J) = IDLET(I,J)+1
(TW - 6.)
= 0.
≷
WEEK = WEEK + 1.
PUNCH:
WEEK, TC
DO
I = 1,14
(FINIS(I) - START(I))
= 0
≷
T = 0.
PUNCH: WEEKLY REPORT
PRODUCT NUMBER
START DATE
FINISH DATE
PROD TIME
TOTAL PROD
DO
I = 1,14
TIME (I) = 0.
FINISH (I) = 0.


PROD (I) = 0.
DO I = 1,7
DO J = 1,9
IWK(I,J) = 6 - IDLE(I,J)
PUNCH:
(I, (IWK(I,J), J=1,9), I=1,9)
DO I = 1,7
DO J = 1,9
FA = IDLE(I,J)
FB = IDLET(I,J)
EFFW = (6. - FA)/6.
EFFT = (TC - FB)/TC
PUNCH:
I, J, IDLE(I,J), IDLET(I,J)
EFFW, EFFT
STOP

APPENDIX X. FORTRAN PROGRAM, INPUTS, AND OUTPUTS OF THE PRODUCTION SCHEDULING I

PRODUCTION SCHEDULING PROGRAM 1

DEFINATIONS OF THE TERMS OF THE SCHEDULING PROGRAM 1

```
I= COLUMN NUMBER OF THE MACHINE
J=  ROW   NUMBER OF THE MACHINE
IDLET(I,J)=IDLE TIME OF THE MACHINE
O(I,J)=OCCUPIED TIME OF THE MACHINE
PRODDL(I)=PRODUCTION RATE PER DAY
PROD(I)=NUMBER OF PRODUCTION
START(I)=START TIME
FINISH(I)=FINISH TIME
ORQ(I)=ORDER QUEJE
K= NUMBER OF PRODUCT
C(I,J,K)=CAPACITY OF THE MACHINE FOR  THE PRODUCT
S(L,K)=MACHINE SEQUENCESFOR THE PRODUCT
TC=CUMULATIVE SHOP CALENDER
TW=WEEKLY SHOP CALENDER
OR(K)=ORDER QUANTITY FOR THE PRODUCT
PROITY(K)=PRIORITY OF THE PRODUCT
TIME(K)=PRODUCTION TIME OF THE MODEL
AVGE=GROUP EFFICICIENCY
IWK=OCCUPIED TIME
IDLE(I,J)IDLE TIME FOR THE WEEK
IDLET(I,J)=CUMULATIVE IDLE TIME
EFFW=WEEKLY EFFICIENCY
EFFT=CUMULATIVE EFFICIENCY
ZZJOB
ZZFORX
*FANDK0810
      DIMENSION O(7,9),ORQ(14),C(7,9,14),S(14,10),IDLE(7,9),
     1 OR(14),TIME(14),START(14),FINISH(14),IDLET(7,9)
      DIMENSION  PROITY(14)
      DIMENSION PRODDL(14)
      DIMENSION IWK(7,9)
      DIMENSION PROD(14)
      DIMENSION MACHI(60),MACHJ(60)
      WEEK = 0.
      DO 100 I=1,7
      DO 100  J=1,9
      IDLET(I,J)=0
  100 O(I,J)=0.
      DO 200 I=1,14
      TIME(I) = 0.
      PRODDL(I)=0.
      PROD(I)=0.
      START(I)=0.
      FINISH(I)=0.
  200 ORQ(I)=0.
C
      TC=0.
C
   88 CONTINUE
```

```
      READ 1,I,J,K,C(I,J,K)
    1 FORMAT(3I5,5X,F20.1)
      IF( I+J  )  88, 89 , 88
   89 CONTINUE
C
      DO 79 L=1,14
      READ 2,(S(L,K),K=1,10)
    2 FORMAT(F2.0,10F5.0)
C
  500 CONTINUE
      IF(TC-312.)  502,9999,9999
  502 CONTINUE
      TW=0.
      DO 501 I=1,7
      DO 501 J=1,9
  501 IDLE(I,J)=0
      DO 8 K=1,14
    8 READ 3, OR(K),PROITY(K)
    3 FORMAT(  10X, F20.1   F2.0    )
C
      DO 550 K=1,14
  550 ORQ(K)=ORQ(K)+OR(K)
C
  600 CONTINUE
      TC=TC+1.
      TW=TW+1.
      III=
  650 CONTINUE
      III=III+1
      IF(III-15)675,900,675
  675 CONTINUE
      FII=III
      DO 700 K=1,14
      IF(PROITY(K)-FII)700,710,700
  700 CONTINUE
      STOP
  710 CONTINUE
      IF(ORQ(K))725,650,725
  725 CONTINUE
      MIN=2*10**6
      FMIN=MIN
      L=1
 1000 CONTINUE
      IF(S(K,L))780,2000,780
  780 CONTINUE
      I=S(K,L)/10.
      FI=I
      J=S(K,L)-FI*10.
C
      IF(FMIN-C(I,J,K))795,795,790
  790 FMIN=C(I,J,K)
  795 CONTINUE
      IF(TC-O(I,J))650,650,796
  796 L=L+1
      GO TO 1000
C
 2000 CONTINUE
      MIN=FMIN
      F=MIN
      TIME(K)=ORQ(K)/F
      LT=TIME(K)+.75
      IF(LT-1) 297,298,298
  297 LT=1.
  298 CONTINUE
      FLT=LT
      START(K)=TC
      FINISH(K)=TC+FLT-1.
      PRODDL(K)=MIN
      PROD(K)=OR )(K)
      L=1
 2001 CONTINUE
      IF(S(K,L))2010,2005,2010
 2005 ORQ(K)=0
      GO TO 650
 2010 CONTINUE
      I=S(K,L)/10.
      FI=I
      J=S(K,L)-FI*10.
      O(I,J)=FINISH(K)
      L=L+1
      GO TO 2001
C
  900 CONTINUE
      DO 901 I=1,7
      DO 901 J=1,9
      AX=O(I,J)-TC
      IF(AX) 899,901,901
  899 IDLE(I,J)=IDLE(I,J)+1
      IDLET(I,J)=IDLET(I,J)+1
  901 CONTINUE
C
      GO TO 850
 9999 CONTINUE
      READ 8000,N
 8000 FORMAT (I5)
      IF(N) 8001,8999,8001
 8999 STOP
 8001 CONTINUE
C
C
      READ 8002,(MACHI(I),MACHJ(I),I=1,N)
 8002 FORMAT(80I1)
      SUM=0.
      DO 8500 I=1,N
      II=MACHI(I)
      JJ=MACHJ(I)
      FF=IDLET(II,JJ)
      EE = (  TC - FF   )/TC
      SUM = SUM + EE
 8500 CONTINUE
      FN=N
      AVGE = SUM/FN
      PUNCH 8006,AVGE
 8006 FORMAT (11HGROUP EFF= ,F10.2,//)
      GO TO 9999
  850 CONTINUE
      IF(TW-6.)600,860,600
  860 CONTINUE
C
C     WEEKLY REPORT
      WEEK = WEEK + 1.
C
      PUNCH 9001,WEEK,TC
 9001 FORMAT(5HWEEK=,2X,I4,//3HTC=,I8,//)
```

```
      PUNCH 9002
 9002 FORMAT(7HPRODUCT , 3X,5HSTART, 5X,6HFINISH,4X,5HPROD.,5X,5HTOTAL,/
     1  6HNUMBER,1X,3X,4HDATE,1X,5X,4HDATE,2X,4X,4HTIME,6X,5HPROD.,//)
C
      DO 9010 I=1,14
      IF(FINISH(I)+START(I)) 9  9,9008,9009
 9008 T=0
      GO TO 9010
 9009 CONTINUE
 9010 PUNCH 9003,I,START(I),FINISH(I),TIME(I),PROD(I)
 9003 FORMAT(I5,5X,I5,5X,I5,4X,F6.2,5X,F10.1/)
      DO 9901 I=1,14
      TIME(I)=0.
      FINISH(I)=0.
      START(I)=0.
      PROD(I)=0
 9901 CONTINUE
C
      DO 9915 I=1,7
      DO 9915 J=1,9
 9915 IWK(I,J)=6-IDLE(I,J)
      PUNCH 9902, (I,(IWK(I,J),J=1,9),I=1,7)
 9902 FORMAT (I5,9F7.2//)
      DO 9990 I=1,7
      DO 9990 J=1,9
      FA=IDLE(I,J)
      FB=IDLET(I,J)
      EFFW=(6.-FA)/6.
      EFFT=(TC-FB)/TC
      PUNCH 9906,I,J,IDLE(I,J),IDLET(I,J),EFFW,EFFT
 9906 FORMAT (2I5,10X,I5,10X,I5,2F10.2)
 9990 CONTINUE
      PUNCH 9004
 9004 FORMAT(79X,1H-)
      GO TO 500
      END
DATA CARDS

    1    1   01     30000.
    1    2    1     13300.
    3    3   01     18100.
    1    4   01     5400.
    1    6   01     12960.
    2    5    1     20800.
    1    7   01     20800.
    1    8   01     21340.
    2    7   01     10920.
    1    1   02     33102.
    2    1   02     36922.
    2    3   02     10786.
    2    4    2     13332.
    2    5   02     14328.
    2    6    2     10666.
    2    7   02     10666.
    1    1   03     175000.
    2    1   03     32000.
    2    3   03     28000.
    2    4    3     13500.
    2    5   03     15838.
    2    6   03     12000.
    2    7   03     12150.
              04    47000.
    5    1   04     36600.
    4    2   04     15220.
    6    2   04     8000.
    6    4   04     17200.
    5    6   04     12600.
    5    7   04     12800.
    5    8   04     15400.
    3    1   05     12972.
    2    1   05     12972.
    3    3   05     9600.
    5    5   05     9600.
    3    5   05     13714.
    3    6   05     6000.
    3    7   05     6856.
    4    8   05     6666.
    3    1   06     24000.
    5    1   06     24000.
    5    4   06     32000.
    5    5   06     12000.
    5    6    6     19200.
    5    7   06     12000.
    4    1   07     137200.
    5    1   07     37000.
    5    4   07     32000.
    5    5   07     15480.
    5    6   07     21818.
    5    7   07     18822.
    5    8   07     16000.
    5    9   07     18822.
    4    1   08     34400.
    5    1   08     19400.
    5    4   08     40000.
    5    5   08     19590.
    5    6   08     19200.
    5    7   08     19590.
    5    8   08     21818.
    5    9   08     21332.
    4    8   08     20414.
    2    1   09     40000.
    3    1   09     68770.
    3    2   09     18112.
    5    4   09     30966.
    5    3   09     23414.
    4    4   09     16000.
    4    5   09     19200.
    4    6   09     16000.
    2    1   10     27200.
    2    2   10     17776.
    5    4   10     24614.
    3    4   10     12800.
    3    5   10     16270.
    4    6   10     13150.
    4    8   10     17454.
    4    7   10     13520.
    3    1   11     56400.
    5    1   11     36922.
    3    2   11     20414.
    5    4   11     34000.
    4    4   11     12800.
    5    6   11     13714.
    5    8   11     15482.
```

| | | | |
|---|---|---|---|
| 5 | 7 | 11 | 13332. |
| 6 | 1 | 12 | 24600. |
| 6 | 2 | 12 | 4000. |
| 5 | 5 | 12 | 9600. |
| 5 | 6 | 12 | 10200. |
| 5 | 7 | 12 | 8400. |
| 5 | 8 | 12 | 7800. |
| 6 | 1 | 13 | 29500. |
| 6 | 2 | 13 | 6000. |
| 5 | 5 | 13 | 10820. |
| 5 | 6 | 13 | 13080. |
| 5 | 7 | 13 | 11400. |
| 5 | 8 | 13 | 10800. |
| 4 | 8 | 13 | 17000. |
| 4 | 1 | 14 | 137142. |
| 5 | 1 | 14 | 137142. |
| 5 | 2 | 14 | 28234. |
| 4 | 2 | 14 | 15238. |
| 5 | 4 | 14 | 11820. |
| 6 | 4 | 14 | 17136. |
| 5 | 6 | 14 | 12630. |
| 5 | 7 | 14 | 12800. |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11 | 12 | 33 | 14 | 16 | 25 | 17 | 18 | 27 |
| 11 | 21 | 23 | 24 | 25 | 26 | 27 | | |
| 11 | 21 | 23 | 24 | 25 | 26 | 27 | | |
| 11 | 51 | 42 | 62 | 64 | 56 | 57 | 58 | |
| 31 | 21 | 33 | 55 | 35 | 36 | 37 | 48 | |
| 31 | 51 | 54 | 55 | 56 | 57 | | | |
| 41 | 51 | 54 | 55 | 56 | 57 | 58 | 59 | |
| 41 | 51 | 54 | 55 | 56 | 57 | 58 | 59 | 48 |
| 21 | 31 | 32 | 54 | 53 | 44 | 45 | 46 | |
| 21 | 22 | 54 | 34 | 35 | 46 | 48 | 47 | |
| 31 | 51 | 32 | 54 | 44 | 56 | 58 | 57 | |
| 61 | 62 | 55 | 56 | 57 | 58 | | | |
| 61 | 62 | 55 | 56 | 57 | 58 | 48 | | |
| 41 | 51 | 52 | 42 | 54 | 64 | 56 | 57 | |

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|---|---|---|---|
| 1 | 1 | | 07 |
| 2 | 1 | | 08 |
| 3 | 1 | 17458. | 04 |
| 4 | 1 | | 09 |
| 5 | 1 | | 10 |
| 6 | 1 | 5077. | 03 |
| 7 | 1 | | 11 |
| 8 | 1 | | 12 |
| 9 | 1 | 23025. | 01 |
| 10 | 1 | 31389. | 02 |
| 11 | 1 | 1077. | 05 |
| 12 | 1 | | 13 |
| 13 | 1 | 106. | 06 |
| 14 | 1 | | 14 |
| 1 | 2 | | 07 |
| 2 | 2 | | 08 |
| 3 | 2 | 56641. | 03 |
| 4 | 2 | | 09 |
| 5 | 2 | 617. | 06 |
| 6 | 2 | 11775. | 02 |
| 7 | 2 | | 10 |
| 8 | 2 | | 11 |
| 9 | 2 | 34016. | 01 |
| 10 | 2 | | 12 |
| 11 | 2 | 527. | 04 |
| [illegible] | [illegible] | [illegible] | 13 |
| 13 | 2 | 5951. | 05 |
| 14 | 2 | | 14 |
| 1 | 3 | 2552. | 03 |
| 2 | 3 | | 09 |
| 3 | 3 | 450. | 06 |
| 4 | 3 | | 10 |
| 5 | 3 | 761. | 07 |
| 6 | 3 | 450. | 08 |
| 7 | 3 | | 11 |
| 8 | 3 | | 12 |
| 9 | 3 | 35220. | 01 |
| 10 | 3 | 38459. | 02 |
| 11 | 3 | | 13 |
| 12 | 3 | 761. | 04 |
| 13 | 3 | 450. | 05 |
| 14 | 3 | | 14 |
| 1 | 4 | 243. | 05 |
| 2 | 4 | | 07 |
| 3 | 4 | | 09 |
| 4 | 4 | | 08 |
| 5 | 4 | | 10 |
| 6 | 4 | | 11 |
| 7 | 4 | 4078. | 04 |
| 8 | 4 | | 12 |
| 9 | 4 | 58500. | 01 |
| 10 | 4 | 10471. | 03 |
| 11 | 4 | 16025. | 02 |
| 12 | 4 | | 13 |
| 13 | 4 | 33. | 06 |
| 14 | 4 | | 14 |
| 1 | 5 | | 04 |
| 2 | 5 | | 05 |
| 3 | 5 | | 06 |
| 4 | 5 | | 07 |
| 5 | 5 | | 08 |
| 6 | 5 | | 09 |
| 7 | 5 | 7204. | 03 |
| 8 | 5 | 29324. | 01 |
| 9 | 5 | | 10 |
| 10 | 5 | | 11 |
| 11 | 5 | 64823. | 02 |
| 12 | 5 | | 12 |
| 13 | 5 | | 13 |
| 14 | 5 | | 14 |
| 1 | 6 | | 08 |
| 2 | 6 | | 09 |
| 3 | 6 | | 10 |
| 4 | 6 | | 11 |
| 5 | 6 | 1376. | 05 |
| 6 | 6 | 19379. | 04 |
| 7 | 6 | 2179. | 03 |
| 8 | 6 | 1978. | 06 |
| 9 | 6 | 48156. | 01 |
| 10 | 6 | 61805. | 02 |
| 11 | 6 | 2059. | 07 |
| 12 | 6 | | 12 |
| 13 | 6 | | 13 |
| 14 | 6 | | 14 |
| 1 | 7 | | 08 |
| 2 | 7 | | 09 |
| 3 | 7 | 6305. | 05 |

| | | | |
|---|---|---|---|
| 4 | 7 | | 10 |
| 5 | 7 | | 11 |
| 6 | 7 | 13069. | 02 |
| 7 | 7 | 4280. | 06 |
| 8 | 7 | 1094. | 07 |
| 9 | 7 | 57748. | 01 |
| 10 | 7 | 45954. | 03 |
| 11 | 7 | 23367. | 04 |
| 12 | 7 | | 12 |
| 13 | 7 | | 13 |
| 14 | 7 | | 14 |
| 1 | 8 | 973. | 07 |
| 2 | 8 | 18274. | 03 |
| 3 | 8 | | 09 |
| 4 | 8 | | 10 |
| 5 | 8 | 604. | 08 |
| 6 | 8 | 19258. | 04 |
| 7 | 8 | 15329. | 02 |
| 8 | 8 | 9466. | 05 |
| 9 | 8 | 89609. | 01 |
| 10 | 8 | 23853. | 06 |
| 11 | 8 | | 11 |
| 12 | 8 | | 12 |
| 13 | 8 | | 13 |
| 14 | 8 | | 14 |
| 1 | 9 | | 07 |
| 2 | 9 | | 08 |
| 3 | 9 | | 09 |
| 4 | 9 | | 10 |
| 5 | 9 | 17498. | 01 |
| 6 | 9 | 533. | 06 |
| 7 | 9 | | 11 |
| 8 | 9 | 753. | 05 |
| 9 | 9 | 50259. | 03 |
| 10 | 9 | 24132. | 04 |
| 11 | 9 | 80488. | 02 |
| 12 | 9 | | 12 |
| 13 | 9 | | 13 |
| 14 | 9 | | 14 |
| 1 | 10 | 5774. | 07 |
| 2 | 10 | 430. | 08 |
| 3 | 10 | | 09 |
| 4 | 10 | | 10 |
| 5 | 10 | 2814. | 05 |
| 6 | 10 | | 11 |
| 7 | 10 | 24941. | 01 |
| 8 | 10 | 2679. | 06 |
| 9 | 10 | 10714. | 03 |
| 10 | 10 | 75825. | 04 |
| 11 | 10 | 8720. | 02 |
| 12 | 10 | | 12 |
| 13 | 10 | | 13 |
| 14 | 10 | | 14 |
| 1 | 11 | | 04 |
| 2 | 11 | 962. | 03 |
| 3 | 11 | | 05 |
| 4 | 11 | | 06 |
| 5 | 11 | | 07 |
| 6 | 11 | | 08 |
| 7 | 11 | | 09 |
| 8 | 11 | 15532. | 02 |
| 9 | 11 | | 10 |
| 10 | 11 | 86258. | 01 |
| 11 | 11 | | 11 |
| 12 | 11 | | 12 |
| 13 | 11 | | 13 |
| 14 | 11 | | 14 |
| 1 | 12 | | 06 |
| 2 | 12 | 7116. | 04 |
| 3 | 12 | | 07 |
| 4 | 12 | | 08 |
| 5 | 12 | 1059. | 05 |
| 6 | 12 | | 09 |
| 7 | 12 | | 10 |
| 8 | 12 | | 11 |
| 9 | 12 | 43317. | 01 |
| 10 | 12 | 55481. | 02 |
| 11 | 12 | 6572. | 03 |
| 12 | 12 | | 12 |
| 13 | 12 | | 13 |
| 14 | 12 | | 14 |
| 1 | 13 | 1952. | 08 |
| 2 | 13 | 10782. | 01 |
| 3 | 13 | | 09 |
| 4 | 13 | | 10 |
| 5 | 13 | 7570. | 11 |
| 6 | 13 | 11566. | 02 |
| 7 | 13 | 1137. | 07 |
| 8 | 13 | | 12 |
| 9 | 13 | 33135. | 04 |
| 10 | 13 | 36299. | 05 |
| 11 | 13 | 24231. | 03 |
| 12 | 13 | | 13 |
| 13 | 13 | 3688. | 06 |
| 14 | 13 | | 14 |
| 1 | 14 | | 08 |
| 2 | 14 | | 09 |
| 3 | 14 | | 10 |
| 4 | 14 | | 11 |
| 5 | 14 | 1535. | 07 |
| 6 | 14 | 14853. | 01 |
| 7 | 14 | | 12 |
| 8 | 14 | 5004. | 06 |
| 9 | 14 | 10369. | 02 |
| 10 | 14 | 54764. | 03 |
| 11 | 14 | 13580. | 04 |
| 12 | 14 | | 13 |
| 13 | 14 | 3485. | 05 |
| 14 | 14 | | 14 |
| 1 | 15 | 4543. | 08 |
| 2 | 15 | 6361. | 07 |
| 3 | 15 | | 09 |
| 4 | 15 | | 10 |
| 5 | 15 | 8154. | 05 |
| 6 | 15 | 8448. | 06 |
| 7 | 15 | 996. | 11 |
| 8 | 15 | 19734. | 01 |
| 9 | 15 | | 12 |
| 10 | 15 | 50316. | 02 |
| 11 | 15 | 28868. | 03 |
| 12 | 15 | | 13 |
| 13 | 15 | 3890. | 04 |
| 14 | 15 | | 14 |
| 1 | 16 | | 08 |

| | | |
|---|---|---|
| 2 16 | 8879. | 03 |
| 3 16 | | 09 |
| 4 16 | 8862. | 02 |
| 5 16 | 16723. | 01 |
| 6 16 | | 10 |
| 7 16 | | 11 |
| 8 16 | | 12 |
| 9 16 | 2973. | 04 |
| 10 16 | 46848. | 05 |
| 11 16 | 21682. | 06 |
| 12 16 | 527. | 07 |
| 13 16 | | 13 |
| 14 16 | | 14 |
| 1 17 | 378. | 08 |
| 2 17 | | 10 |
| 3 17 | | 11 |
| 4 17 | 3778. | 09 |
| 5 17 | 28730. | 01 |
| 6 17 | 10712. | 02 |
| 7 17 | | 12 |
| 8 17 | 6553. | 03 |
| 9 17 | 32896. | 04 |
| 10 17 | 26902. | 05 |
| 11 17 | 28030. | 06 |
| 12 17 | 3296. | 07 |
| 13 17 | | 13 |
| 14 17 | | 14 |
| 1 18 | 8143. | 01 |
| 2 18 | 3472. | 02 |
| 3 18 | | 09 |
| 4 18 | 6187. | 03 |
| 5 18 | 3473. | 04 |
| 6 18 | | 10 |
| 7 18 | | 11 |
| 8 18 | 21462. | 05 |
| 9 18 | | 12 |
| 10 18 | 37698. | 06 |
| 11 18 | | 13 |
| 12 18 | 888. | 07 |
| 13 18 | 1185. | 8 |
| 14 18 | | 14 |
| 1 19 | 193. | 07 |
| 2 19 | | 09 |
| 3 19 | | 10 |
| 4 19 | | 11 |
| 5 19 | 2798. | 05 |
| 6 19 | 3078. | 06 |
| 7 19 | 27665. | 01 |
| 8 19 | | 12 |
| 9 19 | | 13 |
| 10 19 | 20180. | 02 |
| 11 19 | 31391. | 03 |
| 12 19 | 1939. | 04 |
| 13 19 | 405. | 08 |
| 14 19 | | 14 |
| 1 20 | | 07 |
| 2 20 | 3873. | 02 |
| 3 20 | | 08 |
| 4 20 | 1024. | 03 |
| 5 20 | 15511. | 01 |
| 6 20 | 6511. | 04 |
| 7 20 | | 09 |
| 8 20 | | [illegible] |
| 9 20 | | 11 |
| 10 20 | 11042. | 05 |
| 11 20 | 44544. | 06 |
| 12 20 | | 12 |
| 13 20 | | 13 |
| 14 20 | | 14 |
| 1 21 | 19935. | 02 |
| 2 21 | 3929. | 06 |
| 3 21 | 848. | 07 |
| 4 21 | 1395. | 05 |
| 5 21 | 14838. | 01 |
| 6 21 | | 09 |
| 7 21 | 6682. | 08 |
| 8 21 | | 10 |
| 9 21 | 22289. | 04 |
| 10 21 | | 11 |
| 11 21 | | 12 |
| 12 21 | 40550. | 03 |
| 13 21 | | 13 |
| 14 21 | | 14 |
| 1 22 | | 08 |
| 2 22 | 27508. | 01 |
| 3 22 | 2134. | 07 |
| 4 22 | | 09 |
| 5 22 | | 10 |
| 6 22 | | 11 |
| 7 22 | | 12 |
| 8 22 | 21630. | 02 |
| 9 22 | | 13 |
| 10 22 | 15708. | 03 |
| 11 22 | 6630. | 04 |
| 12 22 | 1363. | 06 |
| 13 22 | 11344. | 05 |
| 14 22 | | 14 |
| 1 23 | 3712. | 04 |
| 2 23 | 9359. | 03 |
| 3 23 | | 06 |
| 4 23 | | 07 |
| 5 23 | | 08 |
| 6 23 | 2902. | 05 |
| 7 23 | | 09 |
| 8 23 | | 10 |
| 9 23 | 16210. | 01 |
| 10 23 | 19768. | 02 |
| 11 23 | | 11 |
| 12 23 | | 12 |
| 13 23 | | 13 |
| 14 23 | | 14 |
| 1 24 | | 09 |
| 2 24 | | 10 |
| 3 24 | | 11 |
| 4 24 | 11039. | 07 |
| 5 24 | 28226. | 02 |
| 6 24 | 20456. | 03 |
| 7 24 | 30652. | 01 |
| 7 24 | 10836. | 06 |
| 9 24 | 24694. | 04 |
| 10 24 | | 12 |
| 11 24 | 19680. | 05 |
| 12 24 | | 13 |
| 13 24 | 169. | 08 |

| | | |
|---|---|---|
| 14 24 | | 14 |
| 1 25 | | 10 |
| 2 25 | 8521. | 07 |
| 3 25 | 6655. | 06 |
| 4 25 | 3148. | 08 |
| 5 25 | 2132. | 09 |
| 6 25 | | 11 |
| 7 25 | | 12 |
| 8 25 | 15926. | 01 |
| 9 25 | 8686. | 05 |
| 10 25 | 20051. | 02 |
| 11 25 | 16853. | 03 |
| 12 25 | 1037. | 13 |
| 13 25 | 6109. | 04 |
| 14 25 | | 14 |
| 1 26 | | 05 |
| 2 26 | | 06 |
| 3 26 | | 07 |
| 4 26 | | 08 |
| 5 26 | | 09 |
| 6 26 | 25735. | 01 |
| 7 26 | | 10 |
| 8 26 | | 11 |
| 9 26 | 4189. | 04 |
| 10 26 | | 12 |
| 11 26 | 22354. | 02 |
| 12 26 | 5634. | 03 |
| 13 26 | | 13 |
| 14 26 | | 14 |
| 1 27 | | 06 |
| 2 27 | | 07 |
| 3 27 | 10748. | 05 |
| 4 27 | | 08 |
| 5 27 | | 09 |
| 6 27 | 15871. | 04 |
| 7 27 | | 10 |
| 8 27 | | 11 |
| 9 27 | 30653. | 02 |
| 10 27 | 18721. | 03 |
| 11 27 | 80724. | 01 |
| 12 27 | | 12 |
| 13 27 | | 13 |
| 14 27 | | 14 |
| 1 28 | | 11 |
| 2 28 | | 09 |
| 3 28 | 9427. | 04 |
| 4 28 | | 10 |
| 5 28 | 3564. | 07 |
| 6 28 | 6555. | 05 |
| 7 28 | 38705. | 02 |
| 8 28 | 18322. | 03 |
| 9 28 | 6981. | 08 |
| 10 28 | 42728. | 01 |
| 11 28 | 2446. | 06 |
| 12 28 | | 12 |
| 13 28 | | 13 |
| 14 28 | | 14 |
| 1 29 | 3107. | 04 |
| 2 29 | | 08 |
| 3 29 | 26847. | 03 |
| 4 29 | | 09 |
| 5 29 | 30276. | 02 |
| 6 29 | [illegible] | [illegible] |
| 7 29 | | 10 |
| 8 29 | | 11 |
| 9 29 | 46728. | 01 |
| 10 29 | | 12 |
| 11 29 | 26499. | 05 |
| 12 29 | 6703. | 06 |
| 13 29 | | 13 |
| 14 29 | | 14 |
| 1 30 | 527. | 06 |
| 2 30 | | 07 |
| 3 30 | | 08 |
| 4 30 | | 09 |
| 5 30 | 5236. | 05 |
| 6 30 | 7568. | 04 |
| 7 30 | 10227. | 02 |
| 8 30 | | 14 |
| 9 30 | 8479. | 03 |
| 10 30 | 64692. | 01 |
| 11 30 | | 10 |
| 12 30 | | 11 |
| 13 30 | | 12 |
| 14 30 | | 13 |
| 1 31 | | 10 |
| 2 31 | 7958. | 02 |
| 3 31 | 27235. | 01 |
| 4 31 | | 11 |
| 5 31 | 4268. | 04 |
| 6 31 | 11743. | 03 |
| 7 31 | 9002. | 08 |
| 8 31 | 5610. | 09 |
| 9 31 | 21318. | 05 |
| 10 31 | 26594. | 06 |
| 11 31 | 29825. | 07 |
| 12 31 | | 12 |
| 13 31 | | 13 |
| 14 31 | | 14 |
| 1 32 | | 04 |
| 2 32 | | 05 |
| 3 32 | | 06 |
| 4 32 | | 07 |
| 5 32 | 19687. | 02 |
| 6 32 | 127569. | 01 |
| 7 32 | | 08 |
| 8 32 | | 09 |
| 9 32 | | 10 |
| 10 32 | | 11 |
| 11 32 | | 12 |
| 12 32 | | 13 |
| 13 32 | 3117. | 03 |
| 14 32 | | 14 |
| 1 33 | 4213. | 05 |
| 2 33 | 3478. | 03 |
| 3 33 | | 07 |
| 4 33 | | 08 |
| 5 33 | 5674. | 04 |
| 6 33 | | 09 |
| 7 33 | 27899. | 01 |
| 8 33 | 209. | 06 |
| 9 33 | 21150. | 10 |
| 10 33 | 12707. | 02 |
| 11 33 | | 11 |

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| 12 33 | | 12 |
| 13 33 | | 13 |
| 14 33 | | 14 |
| 1 34 | | 10 |
| 2 34 | | 11 |
| 3 34 | | 12 |
| 4 34 | 8502. | 04 |
| 5 34 | 2148. | 07 |
| 6 34 | | 13 |
| 7 34 | 546. | 08 |
| 8 34 | 730. | 05 |
| 9 34 | 12403. | 06 |
| 10 34 | 33301. | 03 |
| 11 34 | 13479. | 01 |
| 12 34 | | 02 |
| 13 34 | 11690. | 09 |
| 14 34 | | 14 |
| 1 35 | | 07 |
| 2 35 | 8290. | 06 |
| 3 35 | | 08 |
| 4 35 | | 09 |
| 5 35 | | 10 |
| 6 35 | 2012. | 05 |
| 7 35 | 4812. | 04 |
| 8 35 | 19032. | 01 |
| 9 35 | 2039. | 03 |
| 10 35 | 30229. | 02 |
| 11 35 | | 11 |
| 12 35 | | 12 |
| 13 35 | | 13 |
| 14 35 | | 14 |
| 1 36 | | 07 |
| 2 36 | | 08 |
| 3 36 | | 09 |
| 4 36 | | 10 |
| 5 36 | | 11 |
| 6 36 | 22314. | 01 |
| 7 36 | 7198. | 02 |
| 8 36 | | 12 |
| 9 36 | 12097. | 04 |
| 10 36 | 29147. | 03 |
| 11 36 | 1184. | 05 |
| 12 36 | | 13 |
| 13 36 | | 14 |
| 14 36 | 1698. | 06 |
| 1 37 | 2893. | 07 |
| 2 37 | 1127. | 06 |
| 3 37 | 2645. | 08 |
| 4 37 | | 09 |
| 5 37 | | 10 |
| 6 37 | | 11 |
| 7 37 | 6568. | 02 |
| 8 37 | 6017. | 03 |
| 9 37 | 2615. | 05 |
| 10 37 | 60557. | 01 |
| 11 37 | | 12 |
| 12 37 | | 13 |
| 13 37 | | 14 |
| 14 37 | 10789. | 04 |
| 1 38 | | 07 |
| 2 38 | 47933. | 02 |
| 3 38 | 2362. | 06 |
| [illegible] | [illegible] | 08 |
| 5 38 | | 09 |
| 6 38 | 114075. | 01 |
| 7 38 | 14413. | 03 |
| 8 38 | | 10 |
| 9 38 | | 11 |
| 10 38 | 2527. | 04 |
| 11 38 | | 12 |
| 12 38 | | 13 |
| 13 38 | | 14 |
| 14 38 | 16507. | 05 |
| 1 39 | 430. | 08 |
| 2 39 | | 09 |
| 3 39 | 38772. | 02 |
| 4 39 | | 10 |
| 5 39 | 7253. | 07 |
| 6 39 | 72842. | 01 |
| 7 39 | 7245. | 05 |
| 8 39 | | 11 |
| 9 39 | 6036. | 04 |
| 10 39 | 42847. | 03 |
| 11 39 | | 12 |
| 12 39 | | 13 |
| 13 39 | | 14 |
| 14 39 | 576. | 06 |
| 1 40 | 1143. | 06 |
| 2 40 | | 08 |
| 3 40 | 30622. | 05 |
| 4 40 | | 09 |
| 5 40 | 4447. | 07 |
| 6 40 | | 10 |
| 7 40 | | 11 |
| 8 40 | 7462. | 04 |
| 9 40 | 19343. | 01 |
| 10 40 | 54943. | 02 |
| 11 40 | | 12 |
| 12 40 | | 13 |
| 13 40 | | 14 |
| 14 40 | 44693. | 03 |
| 1 41 | 1263. | 05 |
| 2 41 | 1556. | 08 |
| 3 41 | 1120. | 09 |
| 4 41 | 18791. | 04 |
| 5 41 | 22197. | 03 |
| 6 41 | 21713. | 01 |
| 7 41 | 73461. | 02 |
| 8 41 | 17682. | 07 |
| 9 41 | | 11 |
| 10 41 | 1370. | 10 |
| 11 41 | 33476. | 06 |
| 12 41 | | 12 |
| 13 41 | | 13 |
| 14 41 | | 14 |
| 1 42 | | 09 |
| 2 42 | | 10 |
| 3 42 | | 11 |
| 4 42 | 24034. | 01 |
| 5 42 | 24844. | 02 |
| 6 42 | 50469. | 03 |
| 7 42 | | 12 |
| 8 42 | 13783. | 06 |
| 9 42 | 13131. | 07 |

| | | |
|---|---|---|
| 10 42 | 36013. | 04 |
| 11 42 | 7332. | 05 |
| 12 42 | | 13 |
| 13 42 | | 14 |
| 14 42 | 26714. | 08 |
| 1 43 | | 07 |
| 3 43 | | 08 |
| 3 43 | 87479. | 01 |
| 4 43 | | 09 |
| 5 43 | 7503. | 06 |
| 6 43 | | 10 |
| 7 43 | 9977. | 05 |
| 8 43 | | 11 |
| 9 43 | | 12 |
| 10 43 | 25347. | 02 |
| 11 43 | 47315. | 03 |
| 12 43 | | 13 |
| 13 43 | | 14 |
| 14 43 | 5202. | 04 |
| 1 44 | | 08 |
| 2 44 | 2901. | 07 |
| 3 44 | 23744. | 02 |
| 4 44 | | 09 |
| 5 44 | | 10 |
| 6 44 | 24868. | 01 |
| 7 44 | | 11 |
| 8 44 | | 12 |
| 9 44 | 14284. | 03 |
| 10 44 | 11136. | 06 |
| 11 44 | 35019. | 04 |
| 12 44 | | 13 |
| 13 44 | | 14 |
| 14 44 | 25562. | 05 |
| 1 45 | 8016. | 02 |
| 2 45 | | 09 |
| 3 45 | | 10 |
| 4 45 | | 11 |
| 5 45 | 7683. | 01 |
| 6 45 | 1614. | 07 |
| 7 45 | | 12 |
| 8 45 | | 13 |
| 9 45 | 7407. | 04 |
| 10 45 | 39102. | 03 |
| 11 45 | 69. | 08 |
| 12 45 | | 14 |
| 13 45 | 11144. | 05 |
| 14 45 | 4072. | 06 |
| 1 46 | | 08 |
| 2 46 | | 09 |
| 3 46 | 5238. | 04 |
| 4 46 | | 10 |
| 5 46 | | 11 |
| 6 46 | 3708. | 05 |
| 7 46 | | 12 |
| 8 46 | 25729. | 01 |
| 9 46 | 3887. | 07 |
| 10 46 | 50792. | 02 |
| 11 46 | 8495. | 06 |
| 12 46 | | 13 |
| 13 46 | | 14 |
| 14 46 | 21934. | 03 |
| 1 47 | | 14 |
| 2 47 | 4835. | 07 |
| 3 47 | 3907. | 06 |
| 4 47 | | 09 |
| 5 47 | 7264. | 05 |
| 6 47 | 2821. | 04 |
| 7 47 | | 10 |
| 8 47 | | 11 |
| 9 47 | 4965. | 08 |
| 10 47 | 35750. | 01 |
| 11 47 | 30258. | 02 |
| 12 47 | | 12 |
| 13 47 | | 13 |
| 14 47 | 18352. | 03 |
| 1 48 | 8034. | 05 |
| 2 48 | 24808. | 03 |
| 3 48 | | 08 |
| 4 48 | | 09 |
| 5 48 | 10937. | 02 |
| 6 48 | | 10 |
| 7 48 | | 11 |
| 8 48 | 39004. | 01 |
| 9 48 | 624. | 07 |
| 10 48 | 27503. | 04 |
| 11 48 | 3141. | 06 |
| 12 48 | | 12 |
| 13 48 | | 13 |
| 14 48 | | 14 |
| 1 49 | | 09 |
| 2 49 | 18591. | 04 |
| 3 49 | | 10 |
| 4 49 | | 11 |
| 5 49 | 813. | 05 |
| 6 49 | 1017. | 07 |
| 7 49 | 15563. | 03 |
| 8 49 | 2219. | 06 |
| 9 49 | | 12 |
| 10 49 | 55629. | 01 |
| 11 49 | 5621. | 08 |
| 12 49 | | 13 |
| 13 49 | | 14 |
| 14 49 | 24508. | 02 |
| 1 50 | 3050. | 06 |
| 2 50 | 21742. | 05 |
| 3 50 | | 09 |
| 4 50 | | 10 |
| 5 50 | 2105. | 07 |
| 6 50 | | 11 |
| 7 50 | 10859. | 01 |
| 8 50 | | 12 |
| 9 50 | | 13 |
| 10 50 | 30480. | 02 |
| 11 50 | 16827. | 03 |
| 12 50 | | 14 |
| 13 50 | 25. | 08 |
| 14 50 | 39042. | 04 |
| 1 51 | | 07 |
| 2 51 | | 08 |
| 3 51 | | 09 |
| 4 51 | | 10 |
| 5 51 | 6304. | 05 |
| 6 51 | 769. | 04 |
| 7 51 | 6304. | 06 |

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 8 51                                 11
 9 51                                 12
10 51       48654.                    01
11 51       10487.                    03
12 51                                 13
13 51       1289.                     02
14 51                                 14
 1 52                                 04
 2 52                                 05
 3 52       11901.                    03
 4 52                                 06
 5 52       82917.                    01
 6 52                                 07
 7 52                                 08
 8 52                                 09
 9 52                                 10
10 52                                 11
11 52                                 12
12 52       6270.                     02
13 52                                 13
14 52                                 14
    9
111213141516171819
    7
21222324252627
    7
31323334353637
    8
4142434445464748
    9
515253545556575819
    6
616263646566
    6
112131415161
    4
12223242
    2
1353
    1
52
    8
1415233343546263
    6
162434445564
    3
163444
    4
24556466
    5
1725354556
    5
1826364657
    6
192737475859
   13
18192627363746475758594865
    9
111233141625171827
    7
11212324252627
    7
    8
 1151426264565758
    8
 3121335535363748
    6
 315154555657
    8
 4151545556575859
    9
 415154555657585948
    8
 2131325453444546
    8
 2122543435464847
    8
 3151325444565857
    6
 616255565758
    7
 61625556575848
    8
 4151524254645657
   46
 1112131415161718192122232425262731323334353637414243444546474851525354555657585 9
 616263646566
 ZZZZ
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APPENDIX: XI. OUTPUTS OF THE PRODUCTION SCHEDULING PROCESS I
(ACTUAL SITUATION OF THE DEPARTMENT).



WEEK= 1

TC= 6

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | | | 0.00 | 0.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | 6 | 7 | 1.45 | 17458.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | 6 | 6 | .42 | 5077.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | 1 | 2 | 1.43 | 23025.0 |
| 10 | 3 | 5 | 2.45 | 31389.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | 1 | 1 | .01 | 106.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 6.00 | 3.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 |
| 3 | 3.00 | 2.00 | 0.00 | 3.00 | 3.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 0.00 | 0.00 | 2.00 | 2.00 | 5.00 | 3.00 | 4.00 | 0.00 |
| 5 | 1.00 | 0.00 | 2.00 | 6.00 | 2.00 | 2.00 | 2.00 | 1.00 | 0.00 |
| 6 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 5 | 5 | .16 | .16 |
| 1 | 2 | 6 | 6 | 0.00 | 0.00 |
| 1 | 3 | 6 | 6 | 0.00 | 0.00 |
| 1 | 4 | 6 | 6 | 0.00 | 0.00 |
| 1 | 5 | 6 | 6 | 0.00 | 0.00 |
| 1 | 6 | 6 | 6 | 0.00 | 0.00 |
| 1 | 7 | 6 | 6 | 0.00 | 0.00 |
| 1 | 8 | 6 | 6 | 0.00 | 0.00 |
| 1 | 9 | 6 | 6 | 0.00 | 0.00 |
| 2 | 1 | | 0 | 1.00 | 1.00 |
| 2 | 2 | 3 | 3 | .50 | .50 |
| 2 | 3 | 5 | 5 | .16 | .16 |
| 2 | 4 | 5 | 5 | .16 | .16 |
| 2 | 5 | 5 | 5 | .16 | .16 |
| 2 | 6 | 5 | 5 | .16 | .16 |
| 2 | 7 | 5 | 5 | .16 | .16 |
| 2 | 8 | 6 | 6 | 0.00 | 0.00 |
| 2 | 9 | 6 | 6 | 0.00 | 0.00 |
| 3 | 1 | 3 | 3 | .50 | .50 |
| 3 | 2 | 4 | 4 | .33 | .33 |
| 3 | 3 | 6 | 6 | 0.00 | 0.00 |
| 3 | 4 | 3 | 3 | .50 | .50 |
| 3 | 5 | 3 | 3 | .50 | .50 |
| 3 | 6 | 6 | 6 | 0.00 | 0.00 |
| 3 | 7 | 6 | 6 | 0.00 | 0.00 |
| 3 | 8 | 6 | 6 | 0.00 | 0.00 |
| 3 | 9 | 6 | 6 | 0.00 | 0.00 |
| 4 | 1 | 6 | 6 | 0.00 | 0.00 |
| 4 | 2 | 6 | 6 | 0.00 | 0.00 |
| 4 | 3 | 6 | 6 | 0.00 | 0.00 |
| 4 | 4 | 4 | 4 | .33 | .33 |
| 4 | 5 | 4 | 4 | .33 | .33 |
| 4 | 6 | 1 | 1 | .83 | .83 |
| 4 | 7 | 3 | 3 | .50 | .50 |
| 4 | 8 | 2 | 2 | .66 | .66 |
| 4 | 9 | 6 | 6 | 0.00 | 0.00 |
| 5 | 1 | 5 | 5 | .16 | .16 |
| 5 | 2 | 6 | 6 | 0.00 | 0.00 |
| 5 | 3 | 4 | 4 | .33 | .33 |
| 5 | 4 | | 0 | 1.00 | 1.00 |
| 5 | 5 | 4 | 4 | .33 | .33 |
| 5 | 6 | 4 | 4 | .33 | .33 |
| 5 | 7 | 4 | 4 | .33 | .33 |
| 5 | 8 | 5 | 5 | .16 | .16 |
| 5 | 9 | 6 | 6 | 0.00 | 0.00 |
| 6 | 1 | 5 | 5 | .16 | .16 |
| 6 | 2 | 5 | 5 | .16 | .16 |
| 6 | 3 | 6 | 6 | 0.00 | 0.00 |
| 6 | 4 | 6 | 6 | 0.00 | 0.00 |
| 6 | 5 | 6 | 6 | 0.00 | 0.00 |
| 6 | 6 | 6 | 6 | 0.00 | 0.00 |
| 6 | 7 | 6 | 6 | 0.00 | 0.00 |
| 6 | 8 | 6 | 6 | 0.00 | 0.00 |
| 6 | 9 | 6 | 6 | 0.00 | 0.00 |
| 7 | 1 | 6 | 6 | 0.00 | 0.00 |
| 7 | 2 | 6 | 6 | 0.00 | 0.00 |
| 7 | 3 | 6 | 6 | 0.00 | 0.00 |
| 7 | 4 | 6 | 6 | 0.00 | 0.00 |
| [illegible] | [illegible] | 6 | 6 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 7 | 6 | 6 | 6 | 0.00 | 0.00 |
| 7 | 7 | 6 | 6 | 0.00 | 0.00 |
| 7 | 8 | 6 | 6 | 0.00 | 0.00 |
| 7 | 9 | 6 | 6 | 0.00 | 0.00 |

WEEK= 2

TC= 12

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | | | 0.00 | 0.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | 10 | 14 | 4.72 | 56641.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | 7 | 7 | .98 | 11775.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | 8 | 9 | 2.12 | 34016.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | 10 | 10 | .12 | 1604.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | 8 | 8 | .99 | 5951.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 6.00 | 0.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 0.00 | 0.00 |
| 3 | 4.00 | 3.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 0.00 | 0.00 | 3.00 | 2.00 | 2.00 | 0.00 | 1.00 | 0.00 |
| 5 | 2.00 | 0.00 | 2.00 | 4.00 | 2.00 | 3.00 | 3.00 | 2.00 | 0.00 |
| 6 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 2 | 6 | 12 | 0.00 | 0.00 |
| 1 | 3 | 6 | 12 | 0.00 | 0.00 |
| 1 | 4 | 6 | 12 | 0.00 | 0.00 |
| 1 | 5 | 6 | 12 | 0.00 | 0.00 |
| 1 | 6 | 6 | 12 | 0.00 | 0.00 |
| 1 | 7 | 6 | 12 | 0.00 | 0.00 |
| 1 | 8 | 6 | 12 | 0.00 | 0.00 |
| 1 | 9 | 6 | 12 | 0.00 | 0.00 |
| 2 | 1 | | 0 | 1.00 | 1.00 |
| 2 | 2 | 6 | 9 | 0.00 | .25 |
| 2 | 3 | 2 | 7 | .66 | .41 |
| 2 | 4 | 2 | 7 | .66 | .41 |
| 2 | 5 | 2 | 7 | .66 | .41 |
| 2 | 6 | 2 | 7 | .66 | .41 |
| 2 | 7 | 2 | 7 | .66 | .41 |
| 2 | 8 | 6 | 12 | 0.00 | 0.00 |
| 2 | 9 | 6 | 12 | 0.00 | 0.00 |
| 3 | 1 | 2 | 5 | .66 | .58 |
| 3 | 2 | 3 | 7 | .50 | .41 |
| 3 | 3 | 6 | 12 | 0.00 | 0.00 |
| 3 | 4 | 6 | 9 | 0.00 | .25 |
| 3 | 5 | 6 | 9 | 0.00 | .25 |
| 3 | 6 | 6 | 12 | 0.00 | 0.00 |
| 3 | 7 | 6 | 12 | 0.00 | 0.00 |
| 3 | 8 | 6 | 12 | 0.00 | 0.00 |
| 3 | 9 | 6 | 12 | 0.00 | 0.00 |
| 4 | 1 | 6 | 12 | 0.00 | 0.00 |
| 4 | 2 | 6 | 12 | 0.00 | 0.00 |
| 4 | 3 | 6 | 12 | 0.00 | 0.00 |
| 4 | 4 | 3 | 7 | .50 | .41 |
| 4 | 5 | 4 | 8 | .33 | .33 |
| 4 | 6 | 4 | 5 | .33 | .58 |
| 4 | 7 | 6 | 9 | 0.00 | .25 |
| 4 | 8 | 5 | 7 | .16 | .41 |
| 4 | 9 | 6 | 12 | 0.00 | 0.00 |
| 5 | 1 | 4 | 9 | .33 | .25 |
| 5 | 2 | 6 | 12 | 0.00 | 0.00 |
| 5 | 3 | 4 | 8 | .33 | .33 |
| 5 | 4 | 2 | 2 | .66 | .83 |
| 5 | 5 | 4 | 8 | .33 | .33 |
| 5 | 6 | 3 | 7 | .50 | .41 |
| 5 | 7 | 3 | 7 | .50 | .41 |
| 5 | 8 | 4 | 9 | .33 | .25 |
| 5 | 9 | 6 | 12 | 0.00 | 0.00 |
| 6 | 1 | 5 | 10 | .16 | .16 |
| 6 | 2 | 5 | 10 | .16 | .16 |
| 6 | 3 | 6 | 12 | 0.00 | 0.00 |
| 6 | 4 | 6 | 12 | 0.00 | 0.00 |
| 6 | 5 | 6 | 12 | 0.00 | 0.00 |
| 6 | 6 | 6 | 12 | 0.00 | 0.00 |
| 6 | 7 | 6 | 12 | 0.00 | 0.00 |
| 6 | 8 | 6 | 12 | 0.00 | 0.00 |
| 6 | 9 | 6 | 12 | 0.00 | 0.00 |
| 7 | 1 | 6 | 12 | 0.00 | 0.00 |
| 7 | 2 | 6 | 12 | 0.00 | 0.00 |
| 7 | 3 | 6 | 12 | 0.00 | 0.00 |
| 7 | 4 | 6 | 12 | 0.00 | 0.00 |
| 7 | 5 | 6 | 12 | 0.00 | 0.00 |
| 7 | 6 | 6 | | | |

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| 6 | 12 | 0.00 | 0.00 |

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| 7 | 8 | 6 | 12 | 0.00 | 0.00 |
| 7 | 9 | 6 | 12 | 0.00 | 0.00 |

WEEK= 3

TC= 18

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | 15 | 15 | .47 | 2552.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | | | 0.00 | 0.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | 15 | 16 | 2.20 | 35220.0 |
| 10 | 17 | 19 | 3.00 | 38459.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | 13 | 13 | .19 | 761.0 |
| 13 | 14 | 14 | .07 | 450.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 3.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 |
| 2 | 6.00 | 2.00 | 2.00 | 2.00 | 3.00 | 2.00 | 3.00 | 0.00 | 0.00 |
| 3 | 2.00 | 2.00 | 1.00 | 2.00 | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 0.00 | 0.00 | 2.00 | 2.00 | 4.00 | 2.00 | 3.00 | 0.00 |
| 5 | 0.00 | 0.00 | 2.00 | 4.00 | 2.00 | 2.00 | 2.00 | 2.00 | 0.00 |
| 6 | 2.00 | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

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| 1 | 2 | [illegible] | 17 | [illegible] | [illegible] |
| 1 | 3 | 6 | 18 | 0.00 | 0.00 |
| 1 | 4 | 5 | 17 | .16 | .05 |
| 1 | 5 | 6 | 18 | 0.00 | 0.00 |
| 1 | 6 | 5 | 17 | .16 | .05 |
| 1 | 7 | 5 | 17 | .16 | .05 |
| 1 | 8 | 5 | 17 | .16 | .05 |
| 1 | 9 | 6 | 18 | 0.00 | 0.00 |
| 2 | 1 | | 0 | 1.00 | 1.00 |
| 2 | 2 | 4 | 13 | .33 | .27 |
| 2 | 3 | 4 | 11 | .33 | .38 |
| 2 | 4 | 4 | 11 | .33 | .38 |
| 2 | 5 | 3 | 10 | .50 | .44 |
| 2 | 6 | 4 | 11 | .33 | .38 |
| 2 | 7 | 3 | 10 | .50 | .44 |
| 2 | 8 | 6 | 18 | 0.00 | 0.00 |
| 2 | 9 | 6 | 18 | 0.00 | 0.00 |
| 3 | 1 | 4 | 9 | .33 | .50 |
| 3 | 2 | 4 | 11 | .33 | .38 |
| 3 | 3 | 5 | 17 | .16 | .05 |
| 3 | 4 | 4 | 13 | .33 | .27 |
| 3 | 5 | 4 | 13 | .33 | .27 |
| 3 | 6 | 6 | 18 | 0.00 | 0.00 |
| 3 | 7 | 6 | 18 | 0.00 | 0.00 |
| 3 | 8 | 6 | 18 | 0.00 | 0.00 |
| 3 | 9 | 6 | 18 | 0.00 | 0.00 |
| 4 | 1 | 6 | 18 | 0.00 | 0.00 |
| 4 | 2 | 6 | 18 | 0.00 | 0.00 |
| 4 | 3 | 6 | 18 | 0.00 | 0.00 |
| 4 | 4 | 4 | 11 | .33 | .38 |
| 4 | 5 | 4 | 12 | .33 | .33 |
| 4 | 6 | 2 | 7 | .66 | .61 |
| 4 | 7 | 4 | 13 | .33 | .27 |
| 4 | 8 | 3 | 10 | .50 | .44 |
| 4 | 9 | 6 | 18 | 0.00 | 0.00 |
| 5 | 1 | 6 | 15 | 0.00 | .16 |
| 5 | 2 | 6 | 18 | 0.00 | 0.00 |
| 5 | 3 | 4 | 12 | .33 | .33 |
| 5 | 4 | 2 | 4 | .66 | .77 |
| 5 | 5 | 4 | 12 | .33 | .33 |
| 5 | 6 | 4 | 11 | .33 | .38 |
| 5 | 7 | 4 | 11 | .33 | .38 |
| 5 | 8 | 4 | 13 | .33 | .27 |
| 5 | 9 | 6 | 18 | 0.00 | 0.00 |
| 6 | 1 | 4 | 14 | .33 | .22 |
| 6 | 2 | 4 | 14 | .33 | .22 |
| 6 | 3 | 6 | 18 | 0.00 | 0.00 |
| 6 | 4 | 6 | 18 | 0.00 | 0.00 |
| 6 | 5 | 6 | 18 | 0.00 | 0.00 |
| 6 | 6 | 6 | 18 | 0.00 | 0.00 |
| 6 | 7 | 6 | 18 | 0.00 | 0.00 |
| 6 | 8 | 6 | 18 | 0.00 | 0.00 |
| 6 | 9 | 6 | 18 | 0.00 | 0.00 |
| 7 | 1 | 6 | 18 | 0.00 | 0.00 |
| 7 | 2 | 6 | 18 | 0.00 | 0.00 |
| 7 | 3 | 6 | 18 | 0.00 | 0.00 |
| 7 | 4 | 6 | 18 | 0.00 | 0.00 |
| 7 | 5 | 6 | 18 | 0.00 | 0.00 |
| 7 | 6 | 6 | 18 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 7 | 8 | 6 | 18 | 0.00 | 0.00 |
| 7 | 9 | 6 | 18 | 0.00 | 0.00 |

WEEK= 4

TC= 24

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | 19 | 19 | .04 | 243.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | 24 | 24 | .03 | 450.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | 20 | 23 | 3.65 | 58500.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | 24 | 25 | 1.25 | 16025.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | 20 | 20 | 0.00 | 33.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 |
| 2 | 6.00 | 1.00 | 1.00 | 1.00 | 2.00 | 1.00 | 2.00 | 0.00 | 0.00 |
| 3 | 5.00 | 5.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 0.00 | 0.00 | 5.00 | 4.00 | 5.00 | 1.00 | 2.00 | 0.00 |
| 5 | 1.00 | 0.00 | 4.00 | 6.00 | 1.00 | 2.00 | 2.00 | 2.00 | 0.00 |
| 6 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 4 | 5 | 22 | .16 | .08 |
| 1 | 5 | 6 | 24 | 0.00 | 0.00 |
| 1 | 6 | 5 | 22 | .16 | .08 |
| 1 | 7 | 5 | 22 | .16 | .08 |
| 1 | 8 | 5 | 22 | .16 | .08 |
| 1 | 9 | 6 | 24 | 0.00 | 0.00 |
| 2 | 1 | | 0 | 1.00 | 1.00 |
| 2 | 2 | 5 | 18 | .16 | .25 |
| 2 | 3 | 5 | 16 | .16 | .33 |
| 2 | 4 | 5 | 16 | .16 | .33 |
| 2 | 5 | 4 | 14 | .33 | .41 |
| 2 | 6 | 5 | 16 | .16 | .33 |
| 2 | 7 | 4 | 14 | .33 | .41 |
| 2 | 8 | 6 | 24 | 0.00 | 0.00 |
| 2 | 9 | 6 | 24 | 0.00 | 0.00 |
| 3 | 1 | 1 | 10 | .83 | .58 |
| 3 | 2 | 1 | 12 | .83 | .50 |
| 3 | 3 | 5 | 22 | .16 | .08 |
| 3 | 4 | 5 | 18 | .16 | .25 |
| 3 | 5 | 5 | 18 | .16 | .25 |
| 3 | 6 | 6 | 24 | 0.00 | 0.00 |
| 3 | 7 | 6 | 24 | 0.00 | 0.00 |
| 3 | 8 | 6 | 24 | 0.00 | 0.00 |
| 3 | 9 | 6 | 24 | 0.00 | 0.00 |
| 4 | 1 | 6 | 24 | 0.00 | 0.00 |
| 4 | 2 | 6 | 24 | 0.00 | 0.00 |
| 4 | 3 | 6 | 24 | 0.00 | 0.00 |
| 4 | 4 | 1 | 12 | .83 | .50 |
| 4 | 5 | 2 | 14 | .66 | .41 |
| 4 | 6 | 1 | 8 | .83 | .66 |
| 4 | 7 | 5 | 18 | .16 | .25 |
| 4 | 8 | 4 | 14 | .33 | .41 |
| 4 | 9 | 6 | 24 | 0.00 | 0.00 |
| 5 | 1 | 5 | 20 | .16 | .16 |
| 5 | 2 | 6 | 24 | 0.00 | 0.00 |
| 5 | 3 | 2 | 14 | .66 | .41 |
| 5 | 4 | | 4 | 1.00 | .83 |
| 5 | 5 | 5 | 17 | .16 | .29 |
| 5 | 6 | 4 | 15 | .33 | .37 |
| 5 | 7 | 4 | 15 | .33 | .37 |
| 5 | 8 | 4 | 17 | .33 | .29 |
| 5 | 9 | 6 | 24 | 0.00 | 0.00 |
| 6 | 1 | 5 | 19 | .16 | .20 |
| 6 | 2 | 5 | 19 | .16 | .20 |
| 6 | 3 | 6 | 24 | 0.00 | 0.00 |
| 6 | 4 | 6 | 24 | 0.00 | 0.00 |
| 6 | 5 | 6 | 24 | 0.00 | 0.00 |
| 6 | 6 | 6 | 24 | 0.00 | 0.00 |
| 6 | 7 | 6 | 24 | 0.00 | 0.00 |
| 6 | 8 | 6 | 24 | 0.00 | 0.00 |
| 6 | 9 | 6 | 24 | 0.00 | 0.00 |
| 7 | 1 | 6 | 24 | 0.00 | 0.00 |
| 7 | 2 | 6 | 24 | 0.00 | 0.00 |
| 7 | 3 | 6 | 24 | 0.00 | 0.00 |
| 7 | 4 | 6 | 24 | 0.00 | 0.00 |
| 7 | 5 | 6 | 24 | 0.00 | 0.00 |
| 7 | 6 | 6 | 24 | 0.00 | 0.00 |
| 7 | 7 | 6 | 24 | 0.00 | 0.00 |
| 7 | 8 | 6 | 24 | 0.00 | 0.00 |
| | | | 24 | 0.00 | 0.00 |

WEEK= 5

TC= 3

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | | | 0.00 | 0.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | | | 0.00 | 0.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | 26 | 27 | 1.52 | 29324.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | 28 | 32 | 5.06 | 64823.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | 4.00 | 4.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 2.00 | 0.00 | 0.00 | 4.00 | 0.00 | 0.00 | 0.00 | 2.00 | 0.00 |
| 5 | 6.00 | 0.00 | 0.00 | 6.00 | 2.00 | 6.00 | 6.00 | 6.00 | 2.00 |
| 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 6 | 20 | 0.00 | .33 |
| 1 | 2 | 6 | 28 | 0.00 | .06 |
| 1 | 6 | 6 | 28 | 0.00 | .06 |
| 1 | 7 | 6 | 28 | 0.00 | .06 |
| 1 | 8 | 6 | 28 | 0.00 | .06 |
| 1 | 9 | 6 | 30 | 0.00 | 0.00 |
| 2 | 1 | 6 | 6 | 0.00 | .80 |
| 2 | 2 | 6 | 24 | 0.00 | .20 |
| 2 | 3 | 6 | 22 | 0.00 | .26 |
| 2 | 4 | 6 | 22 | 0.00 | .26 |
| 2 | 5 | 6 | 20 | 0.00 | .33 |
| 2 | 6 | 6 | 22 | 0.00 | .26 |
| 2 | 7 | 6 | 20 | 0.00 | .33 |
| 2 | 8 | 6 | 30 | 0.00 | 0.00 |
| 2 | 9 | 6 | 30 | 0.00 | 0.00 |
| 3 | 1 | 2 | 12 | .66 | .60 |
| 3 | 2 | 2 | 14 | .66 | .53 |
| 3 | 3 | 6 | 28 | 0.00 | .06 |
| 3 | 4 | 6 | 24 | 0.00 | .20 |
| 3 | 5 | 6 | 24 | 0.00 | .20 |
| 3 | 6 | 6 | 30 | 0.00 | 0.00 |
| 3 | 7 | 6 | 30 | 0.00 | 0.00 |
| 3 | 8 | 6 | 30 | 0.00 | 0.00 |
| 3 | 9 | 6 | 30 | 0.00 | 0.00 |
| 4 | 1 | 4 | 28 | .33 | .06 |
| 4 | 2 | 6 | 30 | 0.00 | 0.00 |
| 4 | 3 | 6 | 30 | 0.00 | 0.00 |
| 4 | 4 | 2 | 14 | .66 | .53 |
| 4 | 5 | 6 | 20 | 0.00 | .33 |
| 4 | 6 | 6 | 14 | 0.00 | .53 |
| 4 | 7 | 6 | 24 | 0.00 | .20 |
| 4 | 8 | 4 | 18 | .33 | .40 |
| 4 | 9 | 6 | 30 | 0.00 | 0.00 |
| 5 | 1 | | 20 | 1.00 | .33 |
| 5 | 2 | 6 | 30 | 0.00 | 0.00 |
| 5 | 3 | 6 | 20 | 0.00 | .33 |
| 5 | 4 | | 4 | 1.00 | .86 |
| 5 | 5 | 4 | 21 | .33 | .30 |
| 5 | 6 | | 15 | 1.00 | .50 |
| 5 | 7 | | 15 | 1.00 | .50 |
| 5 | 8 | | 17 | 1.00 | .43 |
| 5 | 9 | 4 | 28 | .33 | .06 |
| 6 | 1 | 6 | 25 | 0.00 | .16 |
| 6 | 2 | 6 | 25 | 0.00 | .16 |
| 6 | 3 | 6 | 30 | 0.00 | 0.00 |
| 6 | 4 | 6 | 30 | 0.00 | 0.00 |
| 6 | 5 | 6 | 30 | 0.00 | 0.00 |
| 6 | 6 | 6 | 30 | 0.00 | 0.00 |
| 6 | 7 | 6 | 30 | 0.00 | 0.00 |
| 6 | 8 | 6 | 30 | 0.00 | 0.00 |
| 6 | 9 | 6 | 30 | 0.00 | 0.00 |
| 7 | 1 | 6 | 30 | 0.00 | 0.00 |
| 7 | 2 | 6 | 30 | 0.00 | 0.00 |
| 7 | 3 | 6 | 30 | 0.00 | 0.00 |
| 7 | 4 | 6 | 30 | 0.00 | 0.00 |
| 7 | 5 | 6 | 30 | 0.00 | 0.00 |
| 7 | 6 | 6 | 30 | 0.00 | 0.00 |
| 7 | 7 | 6 | 30 | 0.00 | 0.00 |
| 7 | 8 | 6 | 30 | 0.00 | 0.00 |
| 7 | 9 | 6 | 30 | 0.00 | 0.00 |

WEEK= 6

TC= 36

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | | | 0.00 | 0.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | | | 0.00 | 0.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | 33 | 35 | 3.00 | 48156.0 |
| 10 | 36 | 41 | 5.64 | 72276.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 4.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | 5.00 | 5.00 | 0.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 0.00 | 0.00 | 5.00 | 3.00 | 4.00 | 1.00 | 1.00 | 0.00 |
| 5 | 2.00 | 0.00 | 3.00 | 6.00 | 0.00 | 2.00 | 2.00 | 2.00 | 0.00 |
| 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 6 | 26 | 0.00 | .27 |
| 1 | 2 | 6 | 34 | 0.00 | .05 |
| 1 | 3 | 6 | 36 | 0.00 | 0.00 |
| 1 | 4 | 6 | 34 | 0.00 | .05 |
| 1 | 8 | 6 | 34 | 0.00 | .05 |
| 1 | 9 | 6 | 36 | 0.00 | 0.00 |
| 2 | 1 | 2 | 8 | .66 | .77 |
| 2 | 2 | 5 | 29 | .16 | .19 |
| 2 | 3 | 6 | 28 | 0.00 | .22 |
| 2 | 4 | 6 | 28 | 0.00 | .22 |
| 2 | 5 | 6 | 26 | 0.00 | .27 |
| 2 | 6 | 6 | 28 | 0.00 | .22 |
| 2 | 7 | 6 | 26 | 0.00 | .27 |
| 2 | 8 | 6 | 36 | 0.00 | 0.00 |
| 2 | 9 | 6 | 36 | 0.00 | 0.00 |
| 3 | 1 | 1 | 13 | .83 | .63 |
| 3 | 2 | 1 | 15 | .83 | .58 |
| 3 | 3 | 6 | 34 | 0.00 | .05 |
| 3 | 4 | 5 | 29 | .16 | .19 |
| 3 | 5 | 5 | 29 | .16 | .19 |
| 3 | 6 | 6 | 36 | 0.00 | 0.00 |
| 3 | 7 | 6 | 36 | 0.00 | 0.00 |
| 3 | 8 | 6 | 36 | 0.00 | 0.00 |
| 3 | 9 | 6 | 36 | 0.00 | 0.00 |
| 4 | 1 | 6 | 34 | 0.00 | .05 |
| 4 | 2 | 6 | 36 | 0.00 | 0.00 |
| 4 | 3 | 6 | 36 | 0.00 | 0.00 |
| 4 | 4 | 1 | 15 | .83 | .58 |
| 4 | 5 | 3 | 23 | .50 | .36 |
| 4 | 6 | 2 | 16 | .66 | .55 |
| 4 | 7 | 5 | 29 | .16 | .19 |
| 4 | 8 | 5 | 23 | .16 | .36 |
| 4 | 9 | 6 | 36 | 0.00 | 0.00 |
| 5 | 1 | 4 | 24 | .33 | .33 |
| 5 | 2 | 6 | 36 | 0.00 | 0.00 |
| 5 | 3 | 3 | 23 | .50 | .36 |
| 5 | 4 | | 4 | 1.00 | .88 |
| 5 | 5 | 6 | 27 | 0.00 | .25 |
| 5 | 6 | 4 | 19 | .33 | .47 |
| 5 | 7 | 4 | 19 | .33 | .47 |
| 5 | 8 | 4 | 21 | .33 | .41 |
| 5 | 9 | 6 | 34 | 0.00 | .05 |
| 6 | 1 | 6 | 31 | 0.00 | .13 |
| 6 | 2 | 6 | 31 | 0.00 | .13 |
| 6 | 3 | 6 | 36 | 0.00 | 0.00 |
| 6 | 4 | 6 | 36 | 0.00 | 0.00 |
| 6 | 5 | 6 | 36 | 0.00 | 0.00 |
| 6 | 6 | 6 | 36 | 0.00 | 0.00 |
| 6 | 7 | 6 | 36 | 0.00 | 0.00 |
| 6 | 8 | 6 | 36 | 0.00 | 0.00 |
| 6 | 9 | 6 | 36 | 0.00 | 0.00 |
| 7 | 1 | 6 | 36 | 0.00 | 0.00 |
| 7 | 2 | 6 | 36 | 0.00 | 0.00 |
| 7 | 3 | 6 | 36 | 0.00 | 0.00 |
| 7 | 4 | 6 | 36 | 0.00 | 0.00 |
| 7 | 5 | 6 | 36 | 0.00 | 0.00 |
| 7 | 6 | 6 | 36 | 0.00 | 0.00 |
| 7 | 7 | 6 | 36 | 0.00 | 0.00 |
| 7 | 8 | 6 | 36 | 0.00 | 0.00 |
| 7 | 9 | 6 | 36 | 0.00 | 0.00 |

WEEK= 7

| RODUCT UMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | | | 0.00 | 0.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | | | 0.00 | 0.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | 42 | 45 | 3.60 | 57748.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 6.00 | 5.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | 1.00 | 1.00 | 0.00 | 5.00 | 5.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 | 6.00 | 5.00 | 5.00 | 0.00 |
| 5 | 0.00 | 0.00 | 1.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 6 | 32 | 0.00 | .23 |
| 1 | 2 | 6 | 40 | 0.00 | .04 |
| 1 | 3 | 6 | 42 | 0.00 | 0.00 |
| 1 | 4 | 6 | 40 | 0.00 | .04 |
| 1 | 5 | 6 | 42 | 0.00 | 0.00 |
| 1 | 6 | 6 | 40 | 0.00 | .04 |
| 2 | 1 | | 8 | 1.00 | .80 |
| 2 | 2 | 1 | 30 | .83 | .28 |
| 2 | 3 | 6 | 34 | 0.00 | .19 |
| 2 | 4 | 6 | 34 | 0.00 | .19 |
| 2 | 5 | 6 | 32 | 0.00 | .23 |
| 2 | 6 | 6 | 34 | 0.00 | .19 |
| 2 | 7 | 6 | 32 | 0.00 | .23 |
| 2 | 8 | 6 | 42 | 0.00 | 0.00 |
| 2 | 9 | 6 | 42 | 0.00 | 0.00 |
| 3 | 1 | 5 | 18 | .16 | .57 |
| 3 | 2 | 5 | 20 | .16 | .52 |
| 3 | 3 | 6 | 40 | 0.00 | .04 |
| 3 | 4 | 1 | 30 | .83 | .28 |
| 3 | 5 | 1 | 30 | .83 | .28 |
| 3 | 6 | 6 | 42 | 0.00 | 0.00 |
| 3 | 7 | 6 | 42 | 0.00 | 0.00 |
| 3 | 8 | 6 | 42 | 0.00 | 0.00 |
| 3 | 9 | 6 | 42 | 0.00 | 0.00 |
| 4 | 1 | 6 | 40 | 0.00 | .04 |
| 4 | 2 | 6 | 42 | 0.00 | 0.00 |
| 4 | 3 | 6 | 42 | 0.00 | 0.00 |
| 4 | 4 | 5 | 20 | .16 | .52 |
| 4 | 5 | 5 | 28 | .16 | .33 |
| 4 | 6 | | 16 | 1.00 | .61 |
| 4 | 7 | 1 | 30 | .83 | .28 |
| 4 | 8 | 1 | 24 | .83 | .42 |
| 4 | 9 | 6 | 42 | 0.00 | 0.00 |
| 5 | 1 | 6 | 30 | 0.00 | .28 |
| 5 | 2 | 6 | 42 | 0.00 | 0.00 |
| 5 | 3 | 5 | 28 | .16 | .33 |
| 5 | 4 | | 4 | 1.00 | .90 |
| 5 | 5 | 6 | 33 | 0.00 | .21 |
| 5 | 6 | 6 | 25 | 0.00 | .40 |
| 5 | 7 | 6 | 25 | 0.00 | .40 |
| 5 | 8 | 6 | 27 | 0.00 | .35 |
| 5 | 9 | 6 | 40 | 0.00 | .04 |
| 6 | 1 | 6 | 37 | 0.00 | .11 |
| 6 | 2 | 6 | 37 | 0.00 | .11 |
| 6 | 3 | 6 | 42 | 0.00 | 0.00 |
| 6 | 4 | 6 | 42 | 0.00 | 0.00 |
| 6 | 5 | 6 | 42 | 0.00 | 0.00 |
| 6 | 6 | 6 | 42 | 0.00 | 0.00 |
| 6 | 7 | 6 | 42 | 0.00 | 0.00 |
| 6 | 8 | 6 | 42 | 0.00 | 0.00 |
| 6 | 9 | 6 | 42 | 0.00 | 0.00 |
| 7 | 1 | 6 | 42 | 0.00 | 0.00 |
| 7 | 2 | 6 | 42 | 0.00 | 0.00 |
| 7 | 3 | 6 | 42 | 0.00 | 0.00 |
| 7 | 4 | 6 | 42 | 0.00 | 0.00 |
| 7 | 5 | 6 | 42 | 0.00 | 0.00 |
| 7 | 6 | 6 | 42 | 0.00 | 0.00 |
| 7 | 7 | 6 | 42 | 0.00 | 0.00 |
| 7 | 8 | 6 | 42 | 0.00 | 0.00 |
| 7 | 9 | 6 | 42 | 0.00 | 0.00 |

WEEK= 8

TC= 48

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | 43 | 43 | .18 | 973.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | | | 0.00 | 0.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | 46 | 51 | 5.60 | 89609.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 |
| 2 | 6.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 0.00 | 0.00 |
| 3 | 6.00 | 6.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 0.00 | 0.00 | 6.00 | 6.00 | 6.00 | 0.00 | 0.00 | 0.00 |
| 5 | 0.00 | 0.00 | 6.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 5 | 37 | .16 | .22 |
| 1 | 2 | 5 | 45 | .16 | .06 |
| 1 | 3 | 6 | 48 | 0.00 | 0.00 |
| 1 | 4 | 5 | 45 | .16 | .06 |
| 1 | 5 | 6 | 48 | 0.00 | 0.00 |
| 1 | 6 | 5 | 45 | .16 | .06 |
| 1 | 7 | 5 | 45 | .16 | .06 |
| 1 | 8 | 5 | 45 | .16 | .06 |
| 2 | 3 | 6 | 40 | 0.00 | .16 |
| 2 | 4 | 6 | 40 | 0.00 | .16 |
| 2 | 5 | 5 | 37 | .16 | .22 |
| 2 | 6 | 6 | 40 | 0.00 | .16 |
| 2 | 7 | 5 | 37 | .16 | .22 |
| 2 | 8 | 6 | 48 | 0.00 | 0.00 |
| 2 | 9 | 6 | 48 | 0.00 | 0.00 |
| 3 | 1 | | 18 | 1.00 | .62 |
| 3 | 2 | | 20 | 1.00 | .58 |
| 3 | 3 | 5 | 45 | .16 | .06 |
| 3 | 4 | 6 | 36 | 0.00 | .25 |
| 3 | 5 | 6 | 36 | 0.00 | .25 |
| 3 | 6 | 6 | 48 | 0.00 | 0.00 |
| 3 | 7 | 6 | 48 | 0.00 | 0.00 |
| 3 | 8 | 6 | 48 | 0.00 | 0.00 |
| 3 | 9 | 6 | 48 | 0.00 | 0.00 |
| 4 | 1 | 6 | 46 | 0.00 | .04 |
| 4 | 2 | 6 | 48 | 0.00 | 0.00 |
| 4 | 3 | 6 | 48 | 0.00 | 0.00 |
| 4 | 4 | | 20 | 1.00 | .58 |
| 4 | 5 | | 28 | 1.00 | .41 |
| 4 | 6 | | 16 | 1.00 | .66 |
| 4 | 7 | 6 | 36 | 0.00 | .25 |
| 4 | 8 | 6 | 30 | 0.00 | .37 |
| 4 | 9 | 6 | 48 | 0.00 | 0.00 |
| 5 | 1 | 6 | 36 | 0.00 | .25 |
| 5 | 2 | 6 | 48 | 0.00 | 0.00 |
| 5 | 3 | | 28 | 1.00 | .41 |
| 5 | 4 | | 4 | 1.00 | .91 |
| 5 | 5 | 6 | 39 | 0.00 | .18 |
| 5 | 6 | 6 | 31 | 0.00 | .35 |
| 5 | 7 | 6 | 31 | 0.00 | .35 |
| 5 | 8 | 6 | 33 | 0.00 | .31 |
| 5 | 9 | 6 | 46 | 0.00 | .04 |
| 6 | 1 | 6 | 43 | 0.00 | .10 |
| 6 | 2 | 6 | 43 | 0.00 | .10 |
| 6 | 3 | 6 | 48 | 0.00 | 0.00 |
| 6 | 4 | 6 | 48 | 0.00 | 0.00 |
| 6 | 5 | 6 | 48 | 0.00 | 0.00 |
| 6 | 6 | 6 | 48 | 0.00 | 0.00 |
| 6 | 7 | 6 | 48 | 0.00 | 0.00 |
| 6 | 8 | 6 | 48 | 0.00 | 0.00 |
| 6 | 9 | 6 | 48 | 0.00 | 0.00 |
| 7 | 1 | 6 | 48 | 0.00 | 0.00 |
| 7 | 2 | 6 | 48 | 0.00 | 0.00 |
| 7 | 3 | 6 | 48 | 0.00 | 0.00 |
| 7 | 4 | 6 | 48 | 0.00 | 0.00 |
| 7 | 5 | 6 | 48 | 0.00 | 0.00 |
| 7 | 6 | 6 | 48 | 0.00 | 0.00 |
| 7 | 7 | 6 | 48 | 0.00 | 0.00 |
| 7 | 8 | 6 | 48 | 0.00 | 0.00 |
| 7 | 9 | 6 | 48 | 0.00 | 0.00 |

WEEK= 9

TC= 54

| PRODUCT | START | FINISH | PROD. | TOTAL |
|---|---|---|---|---|
| | | DATE | TIME | PROD. |

| | | | | |
|---|---|---|---|---|
| 1 | | | 0.00 | 0.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | | | 0.00 | 0.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | 52 | 55 | 3.47 | 20856.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | 6.00 | 3.00 | 3.00 | 0.00 | 3.00 | 3.00 | 3.00 | 0.00 | 0.00 |
| 4 | 0.00 | 0.00 | 0.00 | 3.00 | 3.00 | 3.00 | 0.00 | 3.00 | 0.00 |
| 5 | 0.00 | 0.00 | 3.00 | 3.00 | 3.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 6 | 43 | 0.00 | .20 |
| 1 | 2 | 6 | 51 | 0.00 | .05 |
| 1 | 3 | 6 | 54 | 0.00 | 0.00 |
| 1 | 4 | 6 | 51 | 0.00 | .05 |
| 1 | 5 | 6 | 54 | 0.00 | 0.00 |
| 1 | 6 | 6 | 51 | 0.00 | .05 |
| 1 | 7 | 6 | 51 | 0.00 | .05 |
| 1 | 8 | 6 | 51 | 0.00 | .05 |
| 1 | 9 | 6 | 54 | 0.00 | 0.00 |
| 2 | 1 | | 8 | 1.00 | .85 |
| 2 | 5 | 6 | 43 | 0.00 | .20 |
| 2 | 6 | 6 | 46 | 0.00 | .14 |
| 2 | 7 | 6 | 43 | 0.00 | .20 |
| 2 | 8 | 6 | 54 | 0.00 | 0.00 |
| 2 | 9 | 6 | 54 | 0.00 | 0.00 |
| 3 | 1 | | 18 | 1.00 | .66 |
| 3 | 2 | 3 | 23 | .50 | .57 |
| 3 | 3 | 3 | 48 | .50 | .11 |
| 3 | 4 | 6 | 42 | 0.00 | .22 |
| 3 | 5 | 3 | 39 | .50 | .27 |
| 3 | 6 | 3 | 51 | .50 | .05 |
| 3 | 7 | 3 | 51 | .50 | .05 |
| 3 | 8 | 6 | 54 | 0.00 | 0.00 |
| 3 | 9 | 6 | 54 | 0.00 | 0.00 |
| 4 | 1 | 6 | 52 | 0.00 | .03 |
| 4 | 2 | 6 | 54 | 0.00 | 0.00 |
| 4 | 3 | 6 | 54 | 0.00 | 0.00 |
| 4 | 4 | 3 | 23 | .50 | .57 |
| 4 | 5 | 3 | 31 | .50 | .42 |
| 4 | 6 | 3 | 19 | .50 | .64 |
| 4 | 7 | 6 | 42 | 0.00 | .22 |
| 4 | 8 | 3 | 33 | .50 | .38 |
| 4 | 9 | 6 | 54 | 0.00 | 0.00 |
| 5 | 1 | 6 | 42 | 0.00 | .22 |
| 5 | 2 | 6 | 54 | 0.00 | 0.00 |
| 5 | 3 | 3 | 31 | .50 | .42 |
| 5 | 4 | 3 | 7 | .50 | .87 |
| 5 | 5 | 3 | 42 | .50 | .22 |
| 5 | 6 | 6 | 37 | 0.00 | .31 |
| 5 | 7 | 6 | 37 | 0.00 | .31 |
| 5 | 8 | 6 | 39 | 0.00 | .27 |
| 5 | 9 | 6 | 52 | 0.00 | .03 |
| 6 | 1 | 6 | 49 | 0.00 | .09 |
| 6 | 2 | 6 | 49 | 0.00 | .09 |
| 6 | 3 | 6 | 54 | 0.00 | 0.00 |
| 6 | 4 | 6 | 54 | 0.00 | 0.00 |
| 6 | 5 | 6 | 54 | 0.00 | 0.00 |
| 6 | 6 | 6 | 54 | 0.00 | 0.00 |
| 6 | 7 | 6 | 54 | 0.00 | 0.00 |
| 6 | 8 | 6 | 54 | 0.00 | 0.00 |
| 6 | 9 | 6 | 54 | 0.00 | 0.00 |
| 7 | 1 | 6 | 54 | 0.00 | 0.00 |
| 7 | 2 | 6 | 54 | 0.00 | 0.00 |
| 7 | 3 | 6 | 54 | 0.00 | 0.00 |
| 7 | 4 | 6 | 54 | 0.00 | 0.00 |
| 7 | 5 | 6 | 54 | 0.00 | 0.00 |
| 7 | 6 | 6 | 54 | 0.00 | 0.00 |
| 7 | 7 | 6 | 54 | 0.00 | 0.00 |
| 7 | 8 | 6 | 54 | 0.00 | 0.00 |
| 7 | 9 | 6 | 54 | 0.00 | 0.00 |

WEEK= 10

TC= 6

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| 1 | 56 | 56 | 1.06 | 5774.0 |
| 2 | 57 | 58 | 1.75 | 18704.0 |
| 3 | 59 | 59 | .52 | 6305.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | 56 | 59 | 3.74 | 58011.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | 60 | 68 | 8.95 | 114634.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 |
| 2 | 4.00 | 0.00 | 3.00 | 3.00 | 4.00 | 3.00 | 4.00 | 0.00 | 0.00 |
| 3 | 2.00 | 1.00 | 2.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 |
| 4 | 4.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 |
| 5 | 5.00 | 0.00 | 0.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 4.00 |
| 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 2 | 45 | .66 | .25 |
| 1 | 2 | 5 | 56 | .16 | .06 |
| 1 | 3 | 6 | 60 | 0.00 | 0.00 |
| 1 | 4 | 5 | 56 | .16 | .06 |
| 1 | 5 | 6 | 60 | 0.00 | 0.00 |
| 1 | 6 | 5 | 56 | .16 | .06 |
| 1 | 7 | 5 | 56 | .16 | .06 |
| 1 | 8 | 5 | 56 | .16 | .06 |
| 1 | 9 | 6 | 60 | 0.00 | 0.00 |
| 2 | 1 | 2 | 10 | .66 | .83 |
| 2 | 2 | 6 | 48 | 0.00 | .20 |
| 2 | 3 | 3 | 49 | .50 | .18 |
| 2 | 7 | 2 | 45 | .66 | .25 |
| 2 | 8 | 6 | 60 | 0.00 | 0.00 |
| 2 | 9 | 6 | 60 | 0.00 | 0.00 |
| 3 | 1 | 4 | 22 | .33 | .63 |
| 3 | 2 | 5 | 28 | .16 | .53 |
| 3 | 3 | 4 | 52 | .33 | .13 |
| 3 | 4 | 6 | 48 | 0.00 | .20 |
| 3 | 5 | 5 | 44 | .16 | .26 |
| 3 | 6 | 5 | 56 | .16 | .06 |
| 3 | 7 | 5 | 56 | .16 | .06 |
| 3 | 8 | 6 | 60 | 0.00 | 0.00 |
| 3 | 9 | 6 | 60 | 0.00 | 0.00 |
| 4 | 1 | 2 | 54 | .66 | .10 |
| 4 | 2 | 6 | 60 | 0.00 | 0.00 |
| 4 | 3 | 6 | 60 | 0.00 | 0.00 |
| 4 | 4 | 5 | 28 | .16 | .53 |
| 4 | 5 | 6 | 37 | 0.00 | .38 |
| 4 | 6 | 6 | 25 | 0.00 | .58 |
| 4 | 7 | 6 | 48 | 0.00 | .20 |
| 4 | 8 | 5 | 38 | .16 | .36 |
| 4 | 9 | 6 | 60 | 0.00 | 0.00 |
| 5 | 1 | 1 | 43 | .83 | .28 |
| 5 | 2 | 6 | 60 | 0.00 | 0.00 |
| 5 | 3 | 6 | 37 | 0.00 | .38 |
| 5 | 4 | 1 | 8 | .83 | .86 |
| 5 | 5 | 1 | 43 | .83 | .28 |
| 5 | 6 | 1 | 38 | .83 | .36 |
| 5 | 7 | 1 | 38 | .83 | .36 |
| 5 | 8 | 1 | 40 | .83 | .33 |
| 5 | 9 | 2 | 54 | .66 | .10 |
| 6 | 1 | 6 | 55 | 0.00 | .08 |
| 6 | 2 | 6 | 55 | 0.00 | .08 |
| 6 | 3 | 6 | 60 | 0.00 | 0.00 |
| 6 | 4 | 6 | 60 | 0.00 | 0.00 |
| 6 | 5 | 6 | 60 | 0.00 | 0.00 |
| 6 | 6 | 6 | 60 | 0.00 | 0.00 |
| 6 | 7 | 6 | 60 | 0.00 | 0.00 |
| 6 | 8 | 6 | 60 | 0.00 | 0.00 |
| 6 | 9 | 6 | 60 | 0.00 | 0.00 |
| 7 | 1 | 6 | 60 | 0.00 | 0.00 |
| 7 | 2 | 6 | 60 | 0.00 | 0.00 |
| 7 | 3 | 6 | 60 | 0.00 | 0.00 |
| 7 | 4 | 6 | 60 | 0.00 | 0.00 |
| 7 | 5 | 6 | 60 | 0.00 | 0.00 |
| 7 | 6 | 6 | 60 | 0.00 | 0.00 |
| 7 | 7 | 6 | 60 | 0.00 | 0.00 |
| 7 | 8 | 6 | 60 | 0.00 | 0.00 |
| 7 | 9 | 6 | 60 | 0.00 | 0.00 |

WEEK= 11

TC= 66

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | | | 0.00 | 0.0 |

| | | | | |
|---|---|---|---|---|
| 2 | 61 | 61 | .09 | 962.0 |
| 3 | | | 0.00 | 0.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 |
| 3 | 6.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 0.00 | 0.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5 | 6.00 | 0.00 | 0.00 | 6.00 | 0.00 | 6.00 | 6.00 | 6.00 | 0.00 |
| 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 5 | 50 | .16 | .24 |
| 1 | 2 | 6 | 62 | 0.00 | .06 |
| 1 | 3 | 6 | 66 | 0.00 | 0.00 |
| 1 | 4 | 6 | 62 | 0.00 | .06 |
| 1 | 5 | 6 | 66 | 0.00 | 0.00 |
| 1 | 6 | 6 | 62 | 0.00 | .06 |
| 1 | 7 | 6 | 62 | 0.00 | .06 |
| 1 | 8 | 6 | 62 | 0.00 | .06 |
| 1 | 9 | 6 | 66 | 0.00 | 0.00 |
| 2 | 1 | 5 | 15 | .16 | .77 |
| 2 | 2 | 6 | 54 | 0.00 | .18 |
| 2 | 3 | 5 | 54 | .16 | .18 |
| 2 | 4 | 5 | 54 | .16 | .18 |
| 2 | 5 | 5 | 50 | .16 | .24 |

[redacted]

| | | | | | |
|---|---|---|---|---|---|
| 3 | 1 | | 22 | 1.00 | .66 |
| 3 | 2 | | 28 | 1.00 | .57 |
| 3 | 3 | 6 | 58 | 0.00 | .12 |
| 3 | 4 | 6 | 54 | 0.00 | .18 |
| 3 | 5 | 6 | 50 | 0.00 | .24 |
| 3 | 6 | 6 | 62 | 0.00 | .06 |
| 3 | 7 | 6 | 62 | 0.00 | .06 |
| 3 | 8 | 6 | 66 | 0.00 | 0.00 |
| 3 | 9 | 6 | 66 | 0.00 | 0.00 |
| 4 | 1 | 6 | 60 | 0.00 | .09 |
| 4 | 2 | 6 | 66 | 0.00 | 0.00 |
| 4 | 3 | 6 | 66 | 0.00 | 0.00 |
| 4 | 4 | | 28 | 1.00 | .57 |
| 4 | 5 | 6 | 43 | 0.00 | .34 |
| 4 | 6 | 6 | 31 | 0.00 | .53 |
| 4 | 7 | 6 | 54 | 0.00 | .18 |
| 4 | 8 | 6 | 44 | 0.00 | .33 |
| 4 | 9 | 6 | 66 | 0.00 | 0.00 |
| 5 | 1 | | 43 | 1.00 | .34 |
| 5 | 2 | 6 | 66 | 0.00 | 0.00 |
| 5 | 3 | 6 | 43 | 0.00 | .34 |
| 5 | 4 | | 8 | 1.00 | .87 |
| 5 | 5 | 6 | 49 | 0.00 | .25 |
| 5 | 6 | | 38 | 1.00 | .42 |
| 5 | 7 | | 38 | 1.00 | .42 |
| 5 | 8 | | 40 | 1.00 | .39 |
| 5 | 9 | 6 | 60 | 0.00 | .09 |
| 6 | 1 | 6 | 61 | 0.00 | .07 |
| 6 | 2 | 6 | 61 | 0.00 | .07 |
| 6 | 3 | 6 | 66 | 0.00 | 0.00 |
| 6 | 4 | 6 | 66 | 0.00 | 0.00 |
| 6 | 5 | 6 | 66 | 0.00 | 0.00 |
| 6 | 6 | 6 | 66 | 0.00 | 0.00 |
| 6 | 7 | 6 | 66 | 0.00 | 0.00 |
| 6 | 8 | 6 | 66 | 0.00 | 0.00 |
| 6 | 9 | 6 | 66 | 0.00 | 0.00 |
| 7 | 1 | 6 | 66 | 0.00 | 0.00 |
| 7 | 2 | 6 | 66 | 0.00 | 0.00 |
| 7 | 3 | 6 | 66 | 0.00 | 0.00 |
| 7 | 4 | 6 | 66 | 0.00 | 0.00 |
| 7 | 5 | 6 | 66 | 0.00 | 0.00 |
| 7 | 6 | 6 | 66 | 0.00 | 0.00 |
| 7 | 7 | 6 | 66 | 0.00 | 0.00 |
| 7 | 8 | 6 | 66 | 0.00 | 0.00 |
| 7 | 9 | 6 | 66 | 0.00 | 0.00 |

WEEK= 12

TC= 72

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | | | 0.00 | 0.0 |
| 2 | 67 | 67 | .66 | 7116.0 |

| | | | | |
|---|---|---|---|---|
| 3 | | | 0.00 | 0.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | 69 | 75 | 6.51 | 104290.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 5.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 |
| 3 | 6.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 0.00 | 0.00 | 6.00 | 4.00 | 4.00 | 0.00 | 0.00 | 0.00 |
| 5 | 2.00 | 0.00 | 4.00 | 6.00 | 0.00 | 2.00 | 2.00 | 2.00 | 0.00 |
| 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 5 | 55 | .16 | .23 |
| 1 | 2 | 6 | 68 | 0.00 | .05 |
| 1 | 3 | 6 | 72 | 0.00 | 0.00 |
| 1 | 4 | 6 | 68 | 0.00 | .05 |
| 1 | 5 | 6 | 72 | 0.00 | 0.00 |
| 1 | 6 | 6 | 68 | 0.00 | .05 |
| 1 | 7 | 6 | 68 | 0.00 | .05 |
| 1 | 8 | 6 | 68 | 0.00 | .05 |
| 1 | 9 | 6 | 72 | 0.00 | 0.00 |
| 2 | 1 | 1 | 16 | .83 | .77 |
| 2 | 2 | 6 | 60 | 0.00 | .16 |
| 2 | 3 | 5 | 59 | .16 | .18 |
| 2 | 4 | 5 | 59 | .16 | .18 |
| 2 | 5 | 5 | 55 | .16 | .23 |
| 2 | 6 | 5 | 59 | .16 | .18 |
| 2 | 7 | 5 | 55 | .16 | .23 |
| 3 | 2 | [illegible] | [illegible] | [illegible] | [illegible] |
| 3 | 3 | 6 | 64 | 0.00 | .11 |
| 3 | 4 | 6 | 60 | 0.00 | .16 |
| 3 | 5 | 6 | 56 | 0.00 | .22 |
| 3 | 6 | 6 | 68 | 0.00 | .05 |
| 3 | 7 | 6 | 68 | 0.00 | .05 |
| 3 | 8 | 6 | 72 | 0.00 | 0.00 |
| 3 | 9 | 6 | 72 | 0.00 | 0.00 |
| 4 | 1 | 6 | 66 | 0.00 | .08 |
| 4 | 2 | 6 | 72 | 0.00 | 0.00 |
| 4 | 3 | 6 | 72 | 0.00 | 0.00 |
| 4 | 4 | | 28 | 1.00 | .61 |
| 4 | 5 | 2 | 45 | .66 | .37 |
| 4 | 6 | 2 | 33 | .66 | .54 |
| 4 | 7 | 6 | 60 | 0.00 | .16 |
| 4 | 8 | 6 | 50 | 0.00 | .30 |
| 4 | 9 | 6 | 72 | 0.00 | 0.00 |
| 5 | 1 | 4 | 47 | .33 | .34 |
| 5 | 2 | 6 | 72 | 0.00 | 0.00 |
| 5 | 3 | 2 | 45 | .66 | .37 |
| 5 | 4 | | 8 | 1.00 | .88 |
| 5 | 5 | 6 | 55 | 0.00 | .23 |
| 5 | 6 | 4 | 42 | .33 | .41 |
| 5 | 7 | 4 | 42 | .33 | .41 |
| 5 | 8 | 4 | 44 | .33 | .38 |
| 5 | 9 | 6 | 66 | 0.00 | .08 |
| 6 | 1 | 6 | 67 | 0.00 | .06 |
| 6 | 2 | 6 | 67 | 0.00 | .06 |
| 6 | 3 | 6 | 72 | 0.00 | 0.00 |
| 6 | 4 | 6 | 72 | 0.00 | 0.00 |
| 6 | 5 | 6 | 72 | 0.00 | 0.00 |
| 6 | 6 | 6 | 72 | 0.00 | 0.00 |
| 6 | 7 | 6 | 72 | 0.00 | 0.00 |
| 6 | 8 | 6 | 72 | 0.00 | 0.00 |
| 6 | 9 | 6 | 72 | 0.00 | 0.00 |
| 7 | 1 | 6 | 72 | 0.00 | 0.00 |
| 7 | 2 | 6 | 72 | 0.00 | 0.00 |
| 7 | 3 | 6 | 72 | 0.00 | 0.00 |
| 7 | 4 | 6 | 72 | 0.00 | 0.00 |
| 7 | 5 | 6 | 72 | 0.00 | 0.00 |
| 7 | 6 | 6 | 72 | 0.00 | 0.00 |
| 7 | 7 | 6 | 72 | 0.00 | 0.00 |
| 7 | 8 | 6 | 72 | 0.00 | 0.00 |
| 7 | 9 | 6 | 72 | 0.00 | 0.00 |

WEEK= 13

TC= 78

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | 73 | 73 | .36 | 1952.0 |
| 2 | 76 | 76 | 1.01 | 10782.0 |
| 3 | | | 0.00 | 0.0 |

| | | | | |
|---|---|---|---|---|
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | 76 | 81 | 5.35 | 64255.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | 73 | 73 | .61 | 3688.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 |
| 2 | 4.00 | 0.00 | 1.00 | 1.00 | 2.00 | 1.00 | 2.00 | 0.00 | 0.00 |
| 3 | 6.00 | 3.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 0.00 | 0.00 | 3.00 | 3.00 | 3.00 | 0.00 | 1.00 | 0.00 |
| 5 | 3.00 | 0.00 | 3.00 | 6.00 | 4.00 | 4.00 | 4.00 | 1.00 | 0.00 |
| 6 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 4 | 59 | .33 | .24 |
| 1 | 2 | 5 | 73 | .16 | .06 |
| 1 | 3 | 6 | 78 | 0.00 | 0.00 |
| 1 | 4 | 5 | 73 | .16 | .06 |
| 1 | 5 | 6 | 78 | 0.00 | 0.00 |
| 1 | 6 | 5 | 73 | .16 | .06 |
| 1 | 7 | 5 | 73 | .16 | .06 |
| 1 | 8 | 5 | 73 | .16 | .06 |
| 1 | 9 | 6 | 78 | 0.00 | 0.00 |
| 2 | 1 | 2 | 18 | .66 | .76 |
| 2 | 2 | 6 | 66 | 0.00 | .15 |
| 2 | 3 | 5 | 64 | .16 | .17 |
| 2 | 4 | 5 | 64 | .16 | .17 |
| 2 | 5 | 4 | 59 | .33 | .24 |
| 2 | 6 | 5 | 64 | .16 | .17 |
| 2 | 7 | 4 | 59 | .33 | .24 |
| 2 | 8 | 6 | 78 | 0.00 | 0.00 |
| 2 | 9 | 6 | 78 | 0.00 | 0.00 |
| 3 | 4 | 6 | 66 | 0.00 | .15 |
| 3 | 5 | 6 | 62 | 0.00 | .20 |
| 3 | 6 | 6 | 74 | 0.00 | .05 |
| 3 | 7 | 6 | 74 | 0.00 | .05 |
| 3 | 8 | 6 | 78 | 0.00 | 0.00 |
| 3 | 9 | 6 | 78 | 0.00 | 0.00 |
| 4 | 1 | 6 | 72 | 0.00 | .07 |
| 4 | 2 | 6 | 78 | 0.00 | 0.00 |
| 4 | 3 | 6 | 78 | 0.00 | 0.00 |
| 4 | 4 | 3 | 31 | .50 | .60 |
| 4 | 5 | 3 | 48 | .50 | .38 |
| 4 | 6 | 3 | 36 | .50 | .53 |
| 4 | 7 | 6 | 66 | 0.00 | .15 |
| 4 | 8 | 5 | 55 | .16 | .29 |
| 4 | 9 | 6 | 78 | 0.00 | 0.00 |
| 5 | 1 | 3 | 50 | .50 | .35 |
| 5 | 2 | 6 | 78 | 0.00 | 0.00 |
| 5 | 3 | 3 | 48 | .50 | .38 |
| 5 | 4 | | 8 | 1.00 | .89 |
| 5 | 5 | 2 | 57 | .66 | .26 |
| 5 | 6 | 2 | 44 | .66 | .43 |
| 5 | 7 | 2 | 44 | .66 | .43 |
| 5 | 8 | 5 | 49 | .16 | .37 |
| 5 | 9 | 6 | 72 | 0.00 | .07 |
| 6 | 1 | 5 | 72 | .16 | .07 |
| 6 | 2 | 5 | 72 | .16 | .07 |
| 6 | 3 | 6 | 78 | 0.00 | 0.00 |
| 6 | 4 | 6 | 78 | 0.00 | 0.00 |
| 6 | 5 | 6 | 78 | 0.00 | 0.00 |
| 6 | 6 | 6 | 78 | 0.00 | 0.00 |
| 6 | 7 | 6 | 78 | 0.00 | 0.00 |
| 6 | 8 | 6 | 78 | 0.00 | 0.00 |
| 6 | 9 | 6 | 78 | 0.00 | 0.00 |
| 7 | 1 | 6 | 78 | 0.00 | 0.00 |
| 7 | 2 | 6 | 78 | 0.00 | 0.00 |
| 7 | 3 | 6 | 78 | 0.00 | 0.00 |
| 7 | 4 | 6 | 78 | 0.00 | 0.00 |
| 7 | 5 | 6 | 78 | 0.00 | 0.00 |
| 7 | 6 | 6 | 78 | 0.00 | 0.00 |
| 7 | 7 | 6 | 78 | 0.00 | 0.00 |
| 7 | 8 | 6 | 78 | 0.00 | 0.00 |
| 7 | 9 | 6 | 78 | 0.00 | 0.00 |

WEEK= 14

TC= 84

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | | | 0.00 | 0.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | | | 0.00 | 0.0 |
| 4 | | | 0.00 | 0.0 |

| | | | | |
|---|---|---|---|---|
| 5 | | | 0.00 | 0.0 |
| 6 | 82 | 82 | 1.23 | 14853.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | 83 | 85 | 2.71 | 43504.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | 83 | 83 | .58 | 3485.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | 6.00 | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 0.00 | 0.00 | 2.00 | 2.00 | 2.00 | 0.00 | 1.00 | 0.00 |
| 5 | 4.00 | 0.00 | 2.00 | 6.00 | 5.00 | 5.00 | 5.00 | 1.00 | 0.00 |
| 6 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 6 | 65 | 0.00 | .22 |
| 1 | 2 | 6 | 79 | 0.00 | .05 |
| 1 | 3 | 6 | 84 | 0.00 | 0.00 |
| 1 | 4 | 6 | 79 | 0.00 | .05 |
| 1 | 5 | 6 | 84 | 0.00 | 0.00 |
| 1 | 6 | 6 | 79 | 0.00 | .05 |
| 1 | 7 | 6 | 79 | 0.00 | .05 |
| 1 | 8 | 6 | 79 | 0.00 | .05 |
| 1 | 9 | 6 | 84 | 0.00 | 0.00 |
| 2 | 1 | 4 | 22 | .33 | .73 |
| 2 | 2 | 6 | 72 | 0.00 | .14 |
| 2 | 3 | 6 | 70 | 0.00 | .16 |
| 2 | 4 | 6 | 70 | 0.00 | .16 |
| 2 | 5 | 6 | 65 | 0.00 | .22 |
| 2 | 6 | 6 | 70 | 0.00 | .16 |
| 2 | 7 | 6 | 65 | 0.00 | .22 |
| 2 | 8 | 6 | 84 | 0.00 | 0.00 |
| 2 | 9 | 6 | 84 | 0.00 | 0.00 |
| 3 | 1 | | 22 | 1.00 | .73 |
| 3 | 2 | 4 | 35 | .33 | .58 |
| 3 | 7 | 6 | 80 | 0.00 | .04 |
| 3 | 8 | 6 | 84 | 0.00 | 0.00 |
| 3 | 9 | 6 | 84 | 0.00 | 0.00 |
| 4 | 1 | 6 | 78 | 0.00 | .07 |
| 4 | 2 | 6 | 84 | 0.00 | 0.00 |
| 4 | 3 | 6 | 84 | 0.00 | 0.00 |
| 4 | 4 | 4 | 35 | .33 | .58 |
| 4 | 5 | 4 | 52 | .33 | .38 |
| 4 | 6 | 4 | 40 | .33 | .52 |
| 4 | 7 | 6 | 72 | 0.00 | .14 |
| 4 | 8 | 5 | 60 | .16 | .28 |
| 4 | 9 | 6 | 84 | 0.00 | 0.00 |
| 5 | 1 | 2 | 52 | .66 | .38 |
| 5 | 2 | 6 | 84 | 0.00 | 0.00 |
| 5 | 3 | 4 | 52 | .33 | .38 |
| 5 | 4 | | 8 | 1.00 | .90 |
| 5 | 5 | 1 | 58 | .83 | .30 |
| 5 | 6 | 1 | 45 | .83 | .46 |
| 5 | 7 | 1 | 45 | .83 | .46 |
| 5 | 8 | 5 | 54 | .16 | .35 |
| 5 | 9 | 6 | 78 | 0.00 | .07 |
| 6 | 1 | 5 | 77 | .16 | .08 |
| 6 | 2 | 5 | 77 | .16 | .08 |
| 6 | 3 | 6 | 84 | 0.00 | 0.00 |
| 6 | 4 | 6 | 84 | 0.00 | 0.00 |
| 6 | 5 | 6 | 84 | 0.00 | 0.00 |
| 6 | 6 | 6 | 84 | 0.00 | 0.00 |
| 6 | 7 | 6 | 84 | 0.00 | 0.00 |
| 6 | 8 | 6 | 84 | 0.00 | 0.00 |
| 6 | 9 | 6 | 84 | 0.00 | 0.00 |
| 7 | 1 | 6 | 84 | 0.00 | 0.00 |
| 7 | 2 | 6 | 84 | 0.00 | 0.00 |
| 7 | 3 | 6 | 84 | 0.00 | 0.00 |
| 7 | 4 | 6 | 84 | 0.00 | 0.00 |
| 7 | 5 | 6 | 84 | 0.00 | 0.00 |
| 7 | 6 | 6 | 84 | 0.00 | 0.00 |
| 7 | 7 | 6 | 84 | 0.00 | 0.00 |
| 7 | 8 | 6 | 84 | 0.00 | 0.00 |
| 7 | 9 | 6 | 84 | 0.00 | 0.00 |

WEEK= 15

TC= 9

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | 85 | 85 | .84 | 4543.0 |
| 2 | 86 | 86 | .59 | 6361.0 |
| 3 | | | 0.00 | 0.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |

| | | | | |
|---|---|---|---|---|
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | 86 | 88 | 2.92 | 56240.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | 89 | 124 | 35.38 | 452882.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | 85 | 85 | .64 | 3890.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 |
| 2 | 4.00 | 2.00 | 1.00 | 1.00 | 2.00 | 1.00 | 2.00 | 0.00 | 0.00 |
| 3 | 1.00 | 1.00 | 1.00 | 2.00 | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 3.00 | 0.00 | 0.00 | 1.00 | 1.00 | 3.00 | 2.00 | 6.00 | 0.00 |
| 5 | 3.00 | 0.00 | 1.00 | 6.00 | 4.00 | 4.00 | 4.00 | 4.00 | 3.00 |
| 6 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 4 | 69 | .33 | .23 |
| 1 | 2 | 5 | 84 | .16 | .06 |
| 1 | 3 | 6 | 90 | 0.00 | 0.00 |
| 1 | 4 | 5 | 84 | .16 | .06 |
| 1 | 5 | 6 | 90 | 0.00 | 0.00 |
| 1 | 6 | 5 | 84 | .16 | .06 |
| 1 | 7 | 5 | 84 | .16 | .06 |
| 1 | 8 | 5 | 84 | .16 | .06 |
| 1 | 9 | 6 | 90 | 0.00 | 0.00 |
| 2 | 1 | 2 | 24 | .66 | .73 |
| 2 | 2 | 4 | 76 | .33 | .15 |
| 2 | 3 | 5 | 75 | .16 | .16 |
| 2 | 4 | 5 | 75 | .16 | .16 |
| 2 | 5 | 4 | 69 | .33 | .23 |
| 2 | 6 | 5 | 75 | .16 | .16 |
| 2 | 7 | 4 | 69 | .33 | .23 |
| 2 | 8 | 6 | 90 | 0.00 | 0.00 |
| 2 | 9 | 6 | 90 | 0.00 | 0.00 |
| 3 | 1 | 5 | 27 | .16 | .70 |
| 3 | 2 | 5 | 40 | .16 | .55 |
| 3 | 3 | 5 | 80 | .16 | .11 |
| 3 | 4 | 4 | 76 | .33 | .15 |
| 3 | 8 | 6 | 90 | 0.00 | 0.00 |
| 3 | 9 | 6 | 90 | 0.00 | 0.00 |
| 4 | 1 | 3 | 81 | .50 | .10 |
| 4 | 2 | 6 | 90 | 0.00 | 0.00 |
| 4 | 3 | 6 | 90 | 0.00 | 0.00 |
| 4 | 4 | 5 | 40 | .16 | .55 |
| 4 | 5 | 5 | 57 | .16 | .36 |
| 4 | 6 | 3 | 43 | .50 | .52 |
| 4 | 7 | 4 | 76 | .33 | .15 |
| 4 | 8 | | 60 | 1.00 | .33 |
| 4 | 9 | 6 | 90 | 0.00 | 0.00 |
| 5 | 1 | 3 | 55 | .50 | .38 |
| 5 | 2 | 6 | 90 | 0.00 | 0.00 |
| 5 | 3 | 5 | 57 | .16 | .36 |
| 5 | 4 | | 8 | 1.00 | .91 |
| 5 | 5 | 2 | 60 | .66 | .33 |
| 5 | 6 | 2 | 47 | .66 | .47 |
| 5 | 7 | 2 | 47 | .66 | .47 |
| 5 | 8 | 2 | 56 | .66 | .37 |
| 5 | 9 | 3 | 81 | .50 | .10 |
| 6 | 1 | 5 | 82 | .16 | .08 |
| 6 | 2 | 5 | 82 | .16 | .08 |
| 6 | 3 | 6 | 90 | 0.00 | 0.00 |
| 6 | 4 | 6 | 90 | 0.00 | 0.00 |
| 6 | 5 | 6 | 90 | 0.00 | 0.00 |
| 6 | 6 | 6 | 90 | 0.00 | 0.00 |
| 6 | 7 | 6 | 90 | 0.00 | 0.00 |
| 6 | 8 | 6 | 90 | 0.00 | 0.00 |
| 6 | 9 | 6 | 90 | 0.00 | 0.00 |
| 7 | 1 | 6 | 90 | 0.00 | 0.00 |
| 7 | 2 | 6 | 90 | 0.00 | 0.00 |
| 7 | 3 | 6 | 90 | 0.00 | 0.00 |
| 7 | 4 | 6 | 90 | 0.00 | 0.00 |
| 7 | 5 | 6 | 90 | 0.00 | 0.00 |
| 7 | 6 | 6 | 90 | 0.00 | 0.00 |
| 7 | 7 | 6 | 90 | 0.00 | 0.00 |
| 7 | 8 | 6 | 90 | 0.00 | 0.00 |
| 7 | 9 | 6 | 90 | 0.00 | 0.00 |

WEEK= 16

TC= 96

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | | | 0.00 | 0.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | | | 0.00 | 0.0 |
| 4 | 91 | 91 | 1.10 | 8862.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |

| | | | | |
|---|---|---|---|---|
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | 92 | 92 | .13 | 527.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 6.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | 0.00 | 0.00 | 0.00 | 6.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 6.00 | 6.00 | 6.00 | 0.00 |
| 5 | 1.00 | 0.00 | 0.00 | 6.00 | 1.00 | 2.00 | 2.00 | 2.00 | 0.00 |
| 6 | 1.00 | 2.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 5 | 74 | .16 | .22 |
| 1 | 2 | 6 | 90 | 0.00 | .06 |
| 1 | 3 | 6 | 96 | 0.00 | 0.00 |
| 1 | 4 | 6 | 90 | 0.00 | .06 |
| 1 | 5 | 6 | 96 | 0.00 | 0.00 |
| 1 | 6 | 6 | 90 | 0.00 | .06 |
| 1 | 7 | 6 | 90 | 0.00 | .06 |
| 1 | 8 | 6 | 90 | 0.00 | .06 |
| 1 | 9 | 6 | 96 | 0.00 | 0.00 |
| 2 | 1 | | 24 | 1.00 | .75 |
| 2 | 2 | | 76 | 1.00 | .20 |
| 2 | 3 | 6 | 81 | 0.00 | .15 |
| 2 | 4 | 6 | 81 | 0.00 | .15 |
| 2 | 5 | 6 | 75 | 0.00 | .21 |
| 2 | 6 | 6 | 81 | 0.00 | .15 |
| 2 | 7 | 6 | 75 | 0.00 | .21 |
| 2 | 8 | 6 | 96 | 0.00 | 0.00 |
| 2 | 9 | 6 | 96 | 0.00 | 0.00 |
| 3 | 1 | 6 | 33 | 0.00 | .65 |
| 3 | 2 | 6 | 46 | 0.00 | .52 |
| 3 | 3 | 6 | 86 | 0.00 | .10 |
| 3 | 4 | | 76 | 1.00 | .20 |
| 3 | 5 | | 72 | 1.00 | .25 |
| 3 | 6 | 6 | 92 | 0.00 | .04 |
| 3 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| 4 | 1 | 6 | 87 | 0.00 | .09 |
| 4 | 2 | 5 | 95 | .16 | .01 |
| 4 | 3 | 6 | 96 | 0.00 | 0.00 |
| 4 | 4 | 6 | 46 | 0.00 | .52 |
| 4 | 5 | 6 | 63 | 0.00 | .34 |
| 4 | 6 | | 43 | 1.00 | .55 |
| 4 | 7 | | 76 | 1.00 | .20 |
| 4 | 8 | | 60 | 1.00 | .37 |
| 4 | 9 | 6 | 96 | 0.00 | 0.00 |
| 5 | 1 | 5 | 60 | .16 | .37 |
| 5 | 2 | 6 | 96 | 0.00 | 0.00 |
| 5 | 3 | 6 | 63 | 0.00 | .34 |
| 5 | 4 | | 8 | 1.00 | .91 |
| 5 | 5 | 5 | 65 | .16 | .32 |
| 5 | 6 | 4 | 51 | .33 | .46 |
| 5 | 7 | 4 | 51 | .33 | .46 |
| 5 | 8 | 4 | 60 | .33 | .37 |
| 5 | 9 | 6 | 87 | 0.00 | .09 |
| 6 | 1 | 5 | 87 | .16 | .09 |
| 6 | 2 | 4 | 86 | .33 | .10 |
| 6 | 3 | 6 | 96 | 0.00 | 0.00 |
| 6 | 4 | 5 | 95 | .16 | .01 |
| 6 | 5 | 6 | 96 | 0.00 | 0.00 |
| 6 | 6 | 6 | 96 | 0.00 | 0.00 |
| 6 | 7 | 6 | 96 | 0.00 | 0.00 |
| 6 | 8 | 6 | 96 | 0.00 | 0.00 |
| 6 | 9 | 6 | 96 | 0.00 | 0.00 |
| 7 | 1 | 6 | 96 | 0.00 | 0.00 |
| 7 | 2 | 6 | 96 | 0.00 | 0.00 |
| 7 | 3 | 6 | 96 | 0.00 | 0.00 |
| 7 | 4 | 6 | 96 | 0.00 | 0.00 |
| 7 | 5 | 6 | 96 | 0.00 | 0.00 |
| 7 | 6 | 6 | 96 | 0.00 | 0.00 |
| 7 | 7 | 6 | 96 | 0.00 | 0.00 |
| 7 | 8 | 6 | 96 | 0.00 | 0.00 |
| 7 | 9 | 6 | 96 | 0.00 | 0.00 |

WEEK= 17

TC= 102

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | 97 | 97 | .07 | 378.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | | | 0.00 | 0.0 |
| 4 | 98 | 98 | .47 | 3778.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |

| | | | | |
|---|---|---|---|---|
| 8 | | | 0.00 | 0.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | 97 | 97 | .82 | 3296.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 |
| 2 | 6.00 | 6.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 0.00 | 0.00 |
| 3 | 0.00 | 0.00 | 1.00 | 6.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 6.00 | 6.00 | 6.00 | 0.00 |
| 5 | 1.00 | 0.00 | 0.00 | 6.00 | 1.00 | 2.00 | 2.00 | 2.00 | 0.00 |
| 6 | 1.00 | 2.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 4 | 78 | .33 | .23 |
| 1 | 2 | 5 | 95 | .16 | .06 |
| 1 | 3 | 6 | 102 | 0.00 | 0.00 |
| 1 | 4 | 5 | 95 | .16 | .06 |
| 1 | 5 | 6 | 102 | 0.00 | 0.00 |
| 1 | 6 | 5 | 95 | .16 | .06 |
| 1 | 7 | 5 | 95 | .16 | .06 |
| 1 | 8 | 5 | 95 | .16 | .06 |
| 1 | 9 | 6 | 102 | 0.00 | 0.00 |
| 2 | 1 | | 24 | 1.00 | .76 |
| 2 | 2 | | 76 | 1.00 | .25 |
| 2 | 3 | 6 | 87 | 0.00 | .14 |
| 2 | 4 | 6 | 87 | 0.00 | .14 |
| 2 | 5 | 5 | 80 | .16 | .21 |
| 2 | 6 | 6 | 87 | 0.00 | .14 |
| 2 | 7 | 5 | 80 | .16 | .21 |
| 2 | 8 | 6 | 102 | 0.00 | 0.00 |
| 2 | 9 | 6 | 102 | 0.00 | 0.00 |
| 3 | 1 | 6 | 39 | 0.00 | .61 |
| 3 | 2 | 6 | 52 | 0.00 | .49 |
| 3 | 3 | 5 | 91 | .16 | .10 |
| 3 | 4 | | 76 | 1.00 | .25 |
| 3 | 5 | | 72 | 1.00 | .29 |
| 3 | 6 | 6 | 98 | 0.00 | .03 |
| 3 | 7 | 6 | 98 | 0.00 | .03 |
| 3 | 8 | 6 | 102 | 0.00 | 0.00 |
| 4 | 2 | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | [illegible] | 6 | 102 | [illegible] | [illegible] |
| 4 | 4 | 6 | 52 | 0.00 | .49 |
| 4 | 5 | 6 | 69 | 0.00 | .32 |
| 4 | 6 | | 43 | 1.00 | .57 |
| 4 | 7 | | 76 | 1.00 | .25 |
| 4 | 8 | | 60 | 1.00 | .41 |
| 4 | 9 | 6 | 102 | 0.00 | 0.00 |
| 5 | 1 | 5 | 65 | .16 | .36 |
| 5 | 2 | 6 | 102 | 0.00 | 0.00 |
| 5 | 3 | 6 | 69 | 0.00 | .32 |
| 5 | 4 | | 8 | 1.00 | .92 |
| 5 | 5 | 5 | 70 | .16 | .31 |
| 5 | 6 | 4 | 55 | .33 | .46 |
| 5 | 7 | 4 | 55 | .33 | .46 |
| 5 | 8 | 4 | 64 | .33 | .37 |
| 5 | 9 | 6 | 93 | 0.00 | .08 |
| 6 | 1 | 5 | 92 | .16 | .09 |
| 6 | 2 | 4 | 90 | .33 | .11 |
| 6 | 3 | 6 | 102 | 0.00 | 0.00 |
| 6 | 4 | 5 | 100 | .16 | .01 |
| 6 | 5 | 6 | 102 | 0.00 | 0.00 |
| 6 | 6 | 6 | 102 | 0.00 | 0.00 |
| 6 | 7 | 6 | 102 | 0.00 | 0.00 |
| 6 | 8 | 6 | 102 | 0.00 | 0.00 |
| 6 | 9 | 6 | 102 | 0.00 | 0.00 |
| 7 | 1 | 6 | 102 | 0.00 | 0.00 |
| 7 | 2 | 6 | 102 | 0.00 | 0.00 |
| 7 | 3 | 6 | 102 | 0.00 | 0.00 |
| 7 | 4 | 6 | 102 | 0.00 | 0.00 |
| 7 | 5 | 6 | 102 | 0.00 | 0.00 |
| 7 | 6 | 6 | 102 | 0.00 | 0.00 |
| 7 | 7 | 6 | 102 | 0.00 | 0.00 |
| 7 | 8 | 6 | 102 | 0.00 | 0.00 |
| 7 | 9 | 6 | 102 | 0.00 | 0.00 |

WEEK= 18

TC= 108

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | 103 | 104 | 1.50 | 8143.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | | | 0.00 | 0.0 |
| 4 | 105 | 105 | .77 | 6187.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |

| | | | | |
|---|---|---|---|---|
| 9 | | | 0.00 | 0.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | 103 | 103 | .22 | 888.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 3.00 | 2.00 | 0.00 | 2.00 | 0.00 | 2.00 | 2.00 | 2.00 | 0.00 |
| 2 | 6.00 | 6.00 | 0.00 | 0.00 | 2.00 | 0.00 | 2.00 | 0.00 | 0.00 |
| 3 | 0.00 | 0.00 | 2.00 | 6.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 6.00 | 6.00 | 6.00 | 0.00 |
| 5 | 1.00 | 0.00 | 0.00 | 6.00 | 1.00 | 2.00 | 2.00 | 2.00 | 0.00 |
| 6 | 1.00 | 2.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 3 | 81 | .50 | .25 |
| 1 | 2 | 4 | 99 | .33 | .08 |
| 1 | 3 | 6 | 108 | 0.00 | 0.00 |
| 1 | 4 | 4 | 99 | .33 | .08 |
| 1 | 5 | 6 | 108 | 0.00 | 0.00 |
| 1 | 6 | 4 | 99 | .33 | .08 |
| 1 | 7 | 4 | 99 | .33 | .08 |
| 1 | 8 | 4 | 99 | .33 | .08 |
| 1 | 9 | 6 | 108 | 0.00 | 0.00 |
| 2 | 1 | | 24 | 1.00 | .77 |
| 2 | 2 | | 76 | 1.00 | .29 |
| 2 | 3 | 6 | 93 | 0.00 | .13 |
| 2 | 4 | 6 | 93 | 0.00 | .13 |
| 2 | 5 | 4 | 84 | .33 | .22 |
| 2 | 6 | 6 | 93 | 0.00 | .13 |
| 2 | 7 | 4 | 84 | .33 | .22 |
| 2 | 8 | 6 | 108 | 0.00 | 0.00 |
| 2 | 9 | 6 | 108 | 0.00 | 0.00 |
| 3 | 1 | 6 | 45 | 0.00 | .58 |
| 3 | 2 | 6 | 58 | 0.00 | .46 |
| 3 | 3 | 4 | 95 | .33 | .12 |
| 3 | 4 | | 76 | 1.00 | .29 |
| 3 | 5 | | 72 | 1.00 | .33 |
| 3 | 6 | 6 | 104 | 0.00 | .03 |
| 3 | 7 | 6 | 104 | 0.00 | .03 |
| 3 | 8 | 6 | 108 | 0.00 | 0.00 |
| 3 | 9 | 6 | 108 | 0.00 | 0.00 |
| 4 | 1 | 6 | 99 | 0.00 | .08 |

| | | | | | |
|---|---|---|---|---|---|
| 4 | 5 | 6 | 75 | 0.00 | .30 |
| 4 | 6 | | 43 | 1.00 | .60 |
| 4 | 7 | | 76 | 1.00 | .29 |
| 4 | 8 | | 60 | 1.00 | .44 |
| 4 | 9 | 6 | 108 | 0.00 | 0.00 |
| 5 | 1 | 5 | 70 | .16 | .35 |
| 5 | 2 | 6 | 108 | 0.00 | 0.00 |
| 5 | 3 | 6 | 75 | 0.00 | .30 |
| 5 | 4 | | 8 | 1.00 | .92 |
| 5 | 5 | 5 | 75 | .16 | .30 |
| 5 | 6 | 4 | 59 | .33 | .45 |
| 5 | 7 | 4 | 59 | .33 | .45 |
| 5 | 8 | 4 | 68 | .33 | .37 |
| 5 | 9 | 6 | 99 | 0.00 | .08 |
| 6 | 1 | 5 | 97 | .16 | .10 |
| 6 | 2 | 4 | 94 | .33 | .12 |
| 6 | 3 | 6 | 108 | 0.00 | 0.00 |
| 6 | 4 | 5 | 105 | .16 | .02 |
| 6 | 5 | 6 | 108 | 0.00 | 0.00 |
| 6 | 6 | 6 | 108 | 0.00 | 0.00 |
| 6 | 7 | 6 | 108 | 0.00 | 0.00 |
| 6 | 8 | 6 | 108 | 0.00 | 0.00 |
| 6 | 9 | 6 | 108 | 0.00 | 0.00 |
| 7 | 1 | 6 | 108 | 0.00 | 0.00 |
| 7 | 2 | 6 | 108 | 0.00 | 0.00 |
| 7 | 3 | 6 | 108 | 0.00 | 0.00 |
| 7 | 4 | 6 | 108 | 0.00 | 0.00 |
| 7 | 5 | 6 | 108 | 0.00 | 0.00 |
| 7 | 6 | 6 | 108 | 0.00 | 0.00 |
| 7 | 7 | 6 | 108 | 0.00 | 0.00 |
| 7 | 8 | 6 | 108 | 0.00 | 0.00 |
| 7 | 9 | 6 | 108 | 0.00 | 0.00 |

WEEK= 19

TC= 114

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | 109 | 109 | .03 | 193.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | | | 0.00 | 0.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | | | 0.00 | 0.0 |

| | | | | |
|---|---|---|---|---|
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | 109 | 109 | .48 | 1939.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 |
| 2 | 6.00 | 6.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 0.00 | 0.00 |
| 3 | 0.00 | 0.00 | 1.00 | 6.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 6.00 | 6.00 | 6.00 | 0.00 |
| 5 | 0.00 | 0.00 | 0.00 | 6.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 |
| 6 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 5 | 86 | .16 | .24 |
| 1 | 2 | 5 | 104 | .16 | .08 |
| 1 | 3 | 6 | 114 | 0.00 | 0.00 |
| 1 | 4 | 5 | 104 | .16 | .08 |
| 1 | 5 | 6 | 114 | 0.00 | 0.00 |
| 1 | 6 | 5 | 104 | .16 | .08 |
| 1 | 7 | 5 | 104 | .16 | .08 |
| 1 | 8 | 5 | 104 | .16 | .08 |
| 1 | 9 | 6 | 114 | 0.00 | 0.00 |
| 2 | 1 | | 24 | 1.00 | .78 |
| 2 | 2 | | 76 | 1.00 | .33 |
| 2 | 3 | 6 | 99 | 0.00 | .13 |
| 2 | 4 | 6 | 99 | 0.00 | .13 |
| 2 | 5 | 5 | 89 | .16 | .21 |
| 2 | 6 | 6 | 99 | 0.00 | .13 |
| 2 | 7 | 5 | 89 | .16 | .21 |
| 2 | 8 | 6 | 114 | 0.00 | 0.00 |
| 2 | 9 | 6 | 114 | 0.00 | 0.00 |
| 3 | 1 | 6 | 51 | 0.00 | .55 |
| 3 | 2 | 6 | 64 | 0.00 | .43 |
| 3 | 3 | 5 | 100 | .16 | .12 |
| 3 | 4 | | 76 | 1.00 | .33 |
| 3 | 5 | | 72 | 1.00 | .36 |
| 3 | 6 | 6 | 110 | 0.00 | .03 |
| 3 | 7 | 6 | 110 | 0.00 | .03 |
| 3 | 8 | 6 | 114 | 0.00 | 0.00 |
| 3 | 9 | 6 | 114 | 0.00 | 0.00 |
| 4 | 1 | 6 | 105 | 0.00 | .07 |
| 4 | 2 | 6 | 111 | 0.00 | .02 |
| 4 | 3 | 6 | 114 | 0.00 | 0.00 |
| 4 | 7 | | 76 | 1.00 | .33 |
| 4 | 8 | | 60 | 1.00 | .47 |
| 4 | 9 | 6 | 114 | 0.00 | 0.00 |
| 5 | 1 | 6 | 76 | 0.00 | .33 |
| 5 | 2 | 6 | 114 | 0.00 | 0.00 |
| 5 | 3 | 6 | 81 | 0.00 | .28 |
| 5 | 4 | | 8 | 1.00 | .92 |
| 5 | 5 | 5 | 80 | .16 | .29 |
| 5 | 6 | 5 | 64 | .16 | .43 |
| 5 | 7 | 5 | 64 | .16 | .43 |
| 5 | 8 | 5 | 73 | .16 | .35 |
| 5 | 9 | 6 | 105 | 0.00 | .07 |
| 6 | 1 | 5 | 102 | .16 | .10 |
| 6 | 2 | 5 | 99 | .16 | .13 |
| 6 | 3 | 6 | 114 | 0.00 | 0.00 |
| 6 | 4 | 6 | 111 | 0.00 | .02 |
| 6 | 5 | 6 | 114 | 0.00 | 0.00 |
| 6 | 6 | 6 | 114 | 0.00 | 0.00 |
| 6 | 7 | 6 | 114 | 0.00 | 0.00 |
| 6 | 8 | 6 | 114 | 0.00 | 0.00 |
| 6 | 9 | 6 | 114 | 0.00 | 0.00 |
| 7 | 1 | 6 | 114 | 0.00 | 0.00 |
| 7 | 2 | 6 | 114 | 0.00 | 0.00 |
| 7 | 3 | 6 | 114 | 0.00 | 0.00 |
| 7 | 4 | 6 | 114 | 0.00 | 0.00 |
| 7 | 5 | 6 | 114 | 0.00 | 0.00 |
| 7 | 6 | 6 | 114 | 0.00 | 0.00 |
| 7 | 7 | 6 | 114 | 0.00 | 0.00 |
| 7 | 8 | 6 | 114 | 0.00 | 0.00 |
| 7 | 9 | 6 | 114 | 0.00 | 0.00 |

WEEK= 2(

TC= 12(

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | | | 0.00 | 0.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | | | 0.00 | 0.0 |
| 4 | 115 | 115 | .12 | 1024.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | | | 0.00 | 0.0 |

| | | | | |
|---|---|---|---|---|
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 6.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | 0.00 | 0.00 | 0.00 | 6.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 6.00 | 6.00 | 6.00 | 0.00 |
| 5 | 1.00 | 0.00 | 0.00 | 6.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 |
| 6 | 0.00 | 1.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 5 | 91 | .16 | .24 |
| 1 | 2 | 6 | 110 | 0.00 | .08 |
| 1 | 3 | 6 | 120 | 0.00 | 0.00 |
| 1 | 4 | 6 | 110 | 0.00 | .08 |
| 1 | 5 | 6 | 120 | 0.00 | 0.00 |
| 1 | 6 | 6 | 110 | 0.00 | .08 |
| 1 | 7 | 6 | 110 | 0.00 | .08 |
| 1 | 8 | 6 | 110 | 0.00 | .08 |
| 1 | 9 | 6 | 120 | 0.00 | 0.00 |
| 2 | 1 | | 24 | 1.00 | .80 |
| 2 | 2 | | 76 | 1.00 | .36 |
| 2 | 3 | 6 | 105 | 0.00 | .12 |
| 2 | 4 | 6 | 105 | 0.00 | .12 |
| 2 | 5 | 6 | 95 | 0.00 | .20 |
| 2 | 6 | 6 | 105 | 0.00 | .12 |
| 2 | 7 | 6 | 95 | 0.00 | .20 |
| 2 | 8 | 6 | 120 | 0.00 | 0.00 |
| 2 | 9 | 6 | 120 | 0.00 | 0.00 |
| 3 | 1 | 6 | 57 | 0.00 | .52 |
| 3 | 2 | 6 | 70 | 0.00 | .41 |
| 3 | 3 | 6 | 106 | 0.00 | .11 |
| 3 | 4 | | 76 | 1.00 | .36 |
| 3 | 5 | | 72 | 1.00 | .40 |
| 3 | 6 | 6 | 116 | 0.00 | .03 |
| 3 | 7 | 6 | 116 | 0.00 | .03 |
| 3 | 8 | 6 | 120 | 0.00 | 0.00 |
| 3 | 9 | 6 | 120 | 0.00 | 0.00 |
| 4 | 1 | 6 | 111 | 0.00 | .07 |
| 4 | 2 | 5 | 116 | .16 | .03 |
| 4 | 3 | 6 | 120 | 0.00 | 0.00 |
| 4 | 4 | 6 | 70 | 0.00 | .41 |
| 4 | 5 | 6 | 87 | 0.00 | .27 |
| 4 | 9 | 6 | 120 | 0.00 | 0.00 |
| 5 | 1 | 5 | 81 | .16 | .32 |
| 5 | 2 | 6 | 120 | 0.00 | 0.00 |
| 5 | 3 | 6 | 87 | 0.00 | .27 |
| 5 | 4 | | 8 | 1.00 | .93 |
| 5 | 5 | 6 | 86 | 0.00 | .28 |
| 5 | 6 | 5 | 69 | .16 | .42 |
| 5 | 7 | 5 | 69 | .16 | .42 |
| 5 | 8 | 5 | 78 | .16 | .35 |
| 5 | 9 | 6 | 111 | 0.00 | .07 |
| 6 | 1 | 6 | 108 | 0.00 | .10 |
| 6 | 2 | 5 | 104 | .16 | .13 |
| 6 | 3 | 6 | 120 | 0.00 | 0.00 |
| 6 | 4 | 5 | 116 | .16 | .03 |
| 6 | 5 | 6 | 120 | 0.00 | 0.00 |
| 6 | 6 | 6 | 120 | 0.00 | 0.00 |
| 6 | 7 | 6 | 120 | 0.00 | 0.00 |
| 6 | 8 | 6 | 120 | 0.00 | 0.00 |
| 6 | 9 | 6 | 120 | 0.00 | 0.00 |
| 7 | 1 | 6 | 120 | 0.00 | 0.00 |
| 7 | 2 | 6 | 120 | 0.00 | 0.00 |
| 7 | 3 | 6 | 120 | 0.00 | 0.00 |
| 7 | 4 | 6 | 120 | 0.00 | 0.00 |
| 7 | 5 | 6 | 120 | 0.00 | 0.00 |
| 7 | 6 | 6 | 120 | 0.00 | 0.00 |
| 7 | 7 | 6 | 120 | 0.00 | 0.00 |
| 7 | 8 | 6 | 120 | 0.00 | 0.00 |
| 7 | 9 | 6 | 120 | 0.00 | 0.00 |

WEEK= 21

TC= 126

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | 121 | 124 | 3.69 | 19935.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | | | 0.00 | 0.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | 125 | 128 | 3.63 | 58158.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |

| | | | | |
|---|---|---|---|---|
| 12 | 121 | 130 | 10.13 | 40550.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.00 | 4.00 | 0.00 | 4.00 | 0.00 | 4.00 | 4.00 | 4.00 | 0.00 |
| 2 | 6.00 | 4.00 | 0.00 | 0.00 | 4.00 | 0.00 | 4.00 | 0.00 | 0.00 |
| 3 | 2.00 | 2.00 | 4.00 | 4.00 | 4.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 0.00 | 0.00 | 2.00 | 2.00 | 6.00 | 4.00 | 4.00 | 0.00 |
| 5 | 0.00 | 0.00 | 2.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 0.00 |
| 6 | 6.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 2 | 93 | .66 | .26 |
| 1 | 2 | 2 | 112 | .66 | .11 |
| 1 | 3 | 6 | 126 | 0.00 | 0.00 |
| 1 | 4 | 2 | 112 | .66 | .11 |
| 1 | 5 | 6 | 126 | 0.00 | 0.00 |
| 1 | 6 | 2 | 112 | .66 | .11 |
| 1 | 7 | 2 | 112 | .66 | .11 |
| 1 | 8 | 2 | 112 | .66 | .11 |
| 1 | 9 | 6 | 126 | 0.00 | 0.00 |
| 2 | 1 | | 24 | 1.00 | .80 |
| 2 | 2 | 2 | 78 | .66 | .38 |
| 2 | 3 | 6 | 111 | 0.00 | .11 |
| 2 | 4 | 6 | 111 | 0.00 | .11 |
| 2 | 5 | 2 | 97 | .66 | .23 |
| 2 | 6 | 6 | 111 | 0.00 | .11 |
| 2 | 7 | 2 | 97 | .66 | .23 |
| 2 | 8 | 6 | 126 | 0.00 | 0.00 |
| 2 | 9 | 6 | 126 | 0.00 | 0.00 |
| 3 | 1 | 4 | 61 | .33 | .51 |
| 3 | 2 | 4 | 74 | .33 | .41 |
| 3 | 3 | 2 | 108 | .66 | .14 |
| 3 | 4 | 2 | 78 | .66 | .38 |
| 3 | 5 | 2 | 74 | .66 | .41 |
| 3 | 6 | 6 | 122 | 0.00 | .03 |
| 3 | 7 | 6 | 122 | 0.00 | .03 |
| 3 | 8 | 6 | 126 | 0.00 | 0.00 |
| 3 | 9 | 6 | 126 | 0.00 | 0.00 |
| 4 | 1 | 6 | 117 | 0.00 | .07 |
| 4 | 2 | 6 | 122 | 0.00 | .03 |
| 4 | 3 | 6 | 126 | 0.00 | 0.00 |
| 4 | 4 | 4 | 74 | .33 | .41 |
| 4 | 5 | 4 | 91 | .33 | .27 |
| 4 | 6 | | 43 | 1.00 | .65 |
| 4 | 7 | 2 | 78 | .66 | .38 |

| | | | | | |
|---|---|---|---|---|---|
| 4 | 9 | 6 | 126 | [illegible] | 0.00 |
| 5 | 1 | 6 | 87 | 0.00 | .30 |
| 5 | 2 | 6 | 126 | 0.00 | 0.00 |
| 5 | 3 | 4 | 91 | .33 | .27 |
| 5 | 4 | | 8 | 1.00 | .93 |
| 5 | 5 | | 86 | 1.00 | .31 |
| 5 | 6 | | 69 | 1.00 | .45 |
| 5 | 7 | | 69 | 1.00 | .45 |
| 5 | 8 | | 78 | 1.00 | .38 |
| 5 | 9 | 6 | 117 | 0.00 | .07 |
| 6 | 1 | | 108 | 1.00 | .14 |
| 6 | 2 | | 104 | 1.00 | .17 |
| 6 | 3 | 6 | 126 | 0.00 | 0.00 |
| 6 | 4 | 6 | 122 | 0.00 | .03 |
| 6 | 5 | 6 | 126 | 0.00 | 0.00 |
| 6 | 6 | 6 | 126 | 0.00 | 0.00 |
| 6 | 7 | 6 | 126 | 0.00 | 0.00 |
| 6 | 8 | 6 | 126 | 0.00 | 0.00 |
| 6 | 9 | 6 | 126 | 0.00 | 0.00 |
| 7 | 1 | 6 | 126 | 0.00 | 0.00 |
| 7 | 2 | 6 | 126 | 0.00 | 0.00 |
| 7 | 3 | 6 | 126 | 0.00 | 0.00 |
| 7 | 4 | 6 | 126 | 0.00 | 0.00 |
| 7 | 5 | 6 | 126 | 0.00 | 0.00 |
| 7 | 6 | 6 | 126 | 0.00 | 0.00 |
| 7 | 7 | 6 | 126 | 0.00 | 0.00 |
| 7 | 8 | 6 | 126 | 0.00 | 0.00 |
| 7 | 9 | 6 | 126 | 0.00 | 0.00 |

WEEK= 22

TC= 132

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | | | 0.00 | 0.0 |
| 2 | 129 | 133 | 4.46 | 47661.0 |
| 3 | | | 0.00 | 0.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | 131 | 133 | 2.58 | 49645.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |

| | | |
|---|---|---|
| 13 | 0.00 | 0.0 |
| 14 | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 6.00 | 0.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 0.00 | 0.00 |
| 3 | 2.00 | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 2.00 | 0.00 | 0.00 | 2.00 | 2.00 | 2.00 | 0.00 | 2.00 | 0.00 |
| 5 | 2.00 | 0.00 | 2.00 | 4.00 | 6.00 | 6.00 | 6.00 | 6.00 | 2.00 |
| 6 | 4.00 | 4.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 2 | 95 | .66 | .28 |
| 1 | 2 | 6 | 118 | 0.00 | .10 |
| 1 | 3 | 6 | 132 | 0.00 | 0.00 |
| 1 | 4 | 6 | 118 | 0.00 | .10 |
| 1 | 5 | 6 | 132 | 0.00 | 0.00 |
| 1 | 6 | 6 | 118 | 0.00 | .10 |
| 1 | 7 | 6 | 118 | 0.00 | .10 |
| 1 | 8 | 6 | 118 | 0.00 | .10 |
| 1 | 9 | 6 | 132 | 0.00 | 0.00 |
| 2 | 1 | | 24 | 1.00 | .81 |
| 2 | 2 | 6 | 84 | 0.00 | .36 |
| 2 | 3 | 2 | 113 | .66 | .14 |
| 2 | 4 | 2 | 113 | .66 | .14 |
| 2 | 5 | 2 | 99 | .66 | .25 |
| 2 | 6 | 2 | 113 | .66 | .14 |
| 2 | 7 | 2 | 99 | .66 | .25 |
| 2 | 8 | 6 | 132 | 0.00 | 0.00 |
| 2 | 9 | 6 | 132 | 0.00 | 0.00 |
| 3 | 1 | 4 | 65 | .33 | .50 |
| 3 | 2 | 4 | 78 | .33 | .40 |
| 3 | 3 | 6 | 114 | 0.00 | .13 |
| 3 | 4 | 6 | 84 | 0.00 | .36 |
| 3 | 5 | 6 | 80 | 0.00 | .39 |
| 3 | 6 | 6 | 128 | 0.00 | .03 |
| 3 | 7 | 6 | 128 | 0.00 | .03 |
| 3 | 8 | 6 | 132 | 0.00 | 0.00 |
| 3 | 9 | 6 | 132 | 0.00 | 0.00 |
| 4 | 1 | 4 | 121 | .33 | .08 |
| 4 | 2 | 6 | 128 | 0.00 | .03 |
| 4 | 3 | 6 | 132 | 0.00 | 0.00 |
| 4 | 4 | 4 | 78 | .33 | .40 |
| 4 | 5 | 4 | 95 | .33 | .28 |
| 4 | 6 | 4 | 47 | .33 | .64 |
| 4 | 7 | 6 | 84 | 0.00 | .36 |
| 4 | 8 | 4 | 66 | .33 | .50 |
| 4 | 9 | 6 | 132 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 5 | 3 | 4 | 95 | .33 | .28 |
| 5 | 4 | 2 | 10 | .66 | .92 |
| 5 | 5 | | 86 | 1.00 | .34 |
| 5 | 6 | | 69 | 1.00 | .47 |
| 5 | 7 | | 69 | 1.00 | .47 |
| 5 | 8 | | 78 | 1.00 | .40 |
| 5 | 9 | 4 | 121 | .33 | .08 |
| 6 | 1 | 2 | 110 | .66 | .16 |
| 6 | 2 | 2 | 106 | .66 | .19 |
| 6 | 3 | 6 | 132 | 0.00 | 0.00 |
| 6 | 4 | 6 | 128 | 0.00 | .03 |
| 6 | 5 | 6 | 132 | 0.00 | 0.00 |
| 6 | 6 | 6 | 132 | 0.00 | 0.00 |
| 6 | 7 | 6 | 132 | 0.00 | 0.00 |
| 6 | 8 | 6 | 132 | 0.00 | 0.00 |
| 6 | 9 | 6 | 132 | 0.00 | 0.00 |
| 7 | 1 | 6 | 132 | 0.00 | 0.00 |
| 7 | 2 | 6 | 132 | 0.00 | 0.00 |
| 7 | 3 | 6 | 132 | 0.00 | 0.00 |
| 7 | 4 | 6 | 132 | 0.00 | 0.00 |
| 7 | 5 | 6 | 132 | 0.00 | 0.00 |
| 7 | 6 | 6 | 132 | 0.00 | 0.00 |
| 7 | 7 | 6 | 132 | 0.00 | 0.00 |
| 7 | 8 | 6 | 132 | 0.00 | 0.00 |
| 7 | 9 | 6 | 132 | 0.00 | 0.00 |

WEEK= 23

TC= 138

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | 134 | 134 | .68 | 3712.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | | | 0.00 | 0.0 |
| 4 | 135 | 135 | .17 | 1395.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | 134 | 134 | 1.01 | 16210.0 |
| 10 | 135 | 148 | 13.91 | 178146.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | 134 | 134 | .34 | 1363.0 |
| 13 | | | 0.00 | 0.0 |

| | | |
|---|---|---|
| 13 | 0.00 | 0.0 |
| 14 | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 3.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 |
| 2 | 6.00 | 4.00 | 1.00 | 1.00 | 2.00 | 1.00 | 2.00 | 0.00 | 0.00 |
| 3 | 1.00 | 1.00 | 1.00 | 4.00 | 4.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 5.00 | 4.00 | 5.00 | 0.00 |
| 5 | 2.00 | 0.00 | 1.00 | 6.00 | 2.00 | 3.00 | 3.00 | 3.00 | 1.00 |
| 6 | 1.00 | 2.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 3 | 98 | .50 | .28 |
| 1 | 2 | 5 | 123 | .16 | .10 |
| 1 | 3 | 6 | 138 | 0.00 | 0.00 |
| 1 | 4 | 5 | 123 | .16 | .10 |
| 1 | 5 | 6 | 138 | 0.00 | 0.00 |
| 1 | 6 | 5 | 123 | .16 | .10 |
| 1 | 7 | 5 | 123 | .16 | .10 |
| 1 | 8 | 5 | 123 | .16 | .10 |
| 1 | 9 | 6 | 138 | 0.00 | 0.00 |
| 2 | 1 | | 24 | 1.00 | .82 |
| 2 | 2 | 2 | 86 | .66 | .37 |
| 2 | 3 | 5 | 118 | .16 | .14 |
| 2 | 4 | 5 | 118 | .16 | .14 |
| 2 | 5 | 4 | 103 | .33 | .25 |
| 2 | 6 | 5 | 118 | .16 | .14 |
| 2 | 7 | 4 | 103 | .33 | .25 |
| 2 | 8 | 6 | 138 | 0.00 | 0.00 |
| 2 | 9 | 6 | 138 | 0.00 | 0.00 |
| 3 | 1 | 5 | 70 | .16 | .49 |
| 3 | 2 | 5 | 83 | .16 | .39 |
| 3 | 3 | 5 | 119 | .16 | .13 |
| 3 | 4 | 2 | 86 | .66 | .37 |
| 3 | 5 | 2 | 82 | .66 | .40 |
| 3 | 6 | 6 | 134 | 0.00 | .02 |
| 3 | 7 | 6 | 134 | 0.00 | .02 |
| 3 | 8 | 6 | 138 | 0.00 | 0.00 |
| 3 | 9 | 6 | 138 | 0.00 | 0.00 |
| 4 | 1 | 5 | 126 | .16 | .08 |
| 4 | 2 | 5 | 133 | .16 | .03 |
| 4 | 3 | 6 | 138 | 0.00 | 0.00 |
| 4 | 4 | 5 | 83 | .16 | .39 |
| 4 | 5 | 5 | 100 | .16 | .27 |
| 4 | 6 | 1 | 48 | .83 | .65 |
| 4 | 7 | 2 | 86 | .66 | .37 |
| 4 | 8 | 1 | 67 | .83 | .51 |
| 4 | 9 | 6 | 138 | 0.00 | 0.00 |
| 5 | 1 | 4 | 95 | .33 | .31 |
| 5 | 2 | 6 | 138 | 0.00 | 0.00 |
| 5 | 6 | 3 | 72 | .50 | .47 |
| 5 | 7 | 3 | 72 | .50 | .47 |
| 5 | 8 | 3 | 81 | .50 | .41 |
| 5 | 9 | 5 | 126 | .16 | .08 |
| 6 | 1 | 5 | 115 | .16 | .16 |
| 6 | 2 | 4 | 110 | .33 | .20 |
| 6 | 3 | 6 | 138 | 0.00 | 0.00 |
| 6 | 4 | 5 | 133 | .16 | .03 |
| 6 | 5 | 6 | 138 | 0.00 | 0.00 |
| 6 | 6 | 6 | 138 | 0.00 | 0.00 |
| 6 | 7 | 6 | 138 | 0.00 | 0.00 |
| 6 | 8 | 6 | 138 | 0.00 | 0.00 |
| 6 | 9 | 6 | 138 | 0.00 | 0.00 |
| 7 | 1 | 6 | 138 | 0.00 | 0.00 |
| 7 | 2 | 6 | 138 | 0.00 | 0.00 |
| 7 | 3 | 6 | 138 | 0.00 | 0.00 |
| 7 | 4 | 6 | 138 | 0.00 | 0.00 |
| 7 | 5 | 6 | 138 | 0.00 | 0.00 |
| 7 | 6 | 6 | 138 | 0.00 | 0.00 |
| 7 | 7 | 6 | 138 | 0.00 | 0.00 |
| 7 | 8 | 6 | 138 | 0.00 | 0.00 |
| 7 | 9 | 6 | 138 | 0.00 | 0.00 |

WEEK= 24

TC= 144

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | | | 0.00 | 0.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | | | 0.00 | 0.0 |
| 4 | 139 | 140 | 1.37 | 11039.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 6.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | 0.00 | 0.00 | 0.00 | 6.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 2.00 | 0.00 | 0.00 | 0.00 | 6.00 | 6.00 | 6.00 | 0.00 |
| 5 | 2.00 | 0.00 | 0.00 | 6.00 | 0.00 | 2.00 | 2.00 | 2.00 | 0.00 |
| 6 | 0.00 | 2.00 | 0.00 | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 4 | 102 | .33 | .29 |
| 1 | 2 | 6 | 129 | 0.00 | .10 |
| 1 | 3 | 6 | 144 | 0.00 | 0.00 |
| 1 | 4 | 6 | 129 | 0.00 | .10 |
| 1 | 5 | 6 | 144 | 0.00 | 0.00 |
| 1 | 6 | 6 | 129 | 0.00 | .10 |
| 1 | 7 | 6 | 129 | 0.00 | .10 |
| 1 | 8 | 6 | 129 | 0.00 | .10 |
| 1 | 9 | 6 | 144 | 0.00 | 0.00 |
| 2 | 1 | | 24 | 1.00 | .83 |
| 2 | 2 | | 86 | 1.00 | .40 |
| 2 | 3 | 6 | 124 | 0.00 | .13 |
| 2 | 4 | 6 | 124 | 0.00 | .13 |
| 2 | 5 | 6 | 109 | 0.00 | .24 |
| 2 | 6 | 6 | 124 | 0.00 | .13 |
| 2 | 7 | 6 | 109 | 0.00 | .24 |
| 2 | 8 | 6 | 144 | 0.00 | 0.00 |
| 2 | 9 | 6 | 144 | 0.00 | 0.00 |
| 3 | 1 | 6 | 76 | 0.00 | .47 |
| 3 | 2 | 6 | 89 | 0.00 | .38 |
| 3 | 3 | 6 | 125 | 0.00 | .13 |
| 3 | 4 | | 86 | 1.00 | .40 |
| 3 | 5 | | 82 | 1.00 | .43 |
| 3 | 6 | 6 | 140 | 0.00 | .02 |
| 3 | 7 | 6 | 140 | 0.00 | .02 |
| 3 | 8 | 6 | 144 | 0.00 | 0.00 |
| 3 | 9 | 6 | 144 | 0.00 | 0.00 |
| 4 | 1 | 6 | 132 | 0.00 | .08 |
| 4 | 2 | 4 | 137 | .33 | .04 |
| 4 | 3 | 6 | 144 | 0.00 | 0.00 |
| 4 | 4 | 6 | 89 | 0.00 | .38 |
| 4 | 5 | 6 | 106 | 0.00 | .26 |
| 4 | 6 | | 48 | 1.00 | .66 |
| 4 | 7 | | 86 | 1.00 | .40 |
| 4 | 8 | | 67 | 1.00 | .53 |
| 4 | 9 | 6 | 144 | 0.00 | 0.00 |
| 5 | 1 | 4 | 99 | .33 | .31 |
| 5 | 2 | 6 | 144 | 0.00 | 0.00 |
| 5 | 3 | 6 | 106 | 0.00 | .26 |
| 5 | 4 | | 10 | 1.00 | .93 |

| | | | | | |
|---|---|---|---|---|---|
| 5 | 7 | 4 | 76 | .33 | .47 |
| 5 | 8 | 4 | 85 | .33 | .40 |
| 5 | 9 | 6 | 132 | 0.00 | .08 |
| 6 | 1 | 6 | 121 | 0.00 | .15 |
| 6 | 2 | 4 | 114 | .33 | .20 |
| 6 | 3 | 6 | 144 | 0.00 | 0.00 |
| 6 | 4 | 4 | 137 | .33 | .04 |
| 6 | 5 | 6 | 144 | 0.00 | 0.00 |
| 6 | 6 | 6 | 144 | 0.00 | 0.00 |
| 6 | 7 | 6 | 144 | 0.00 | 0.00 |
| 6 | 8 | 6 | 144 | 0.00 | 0.00 |
| 6 | 9 | 6 | 144 | 0.00 | 0.00 |
| 7 | 1 | 6 | 144 | 0.00 | 0.00 |
| 7 | 2 | 6 | 144 | 0.00 | 0.00 |
| 7 | 3 | 6 | 144 | 0.00 | 0.00 |
| 7 | 4 | 6 | 144 | 0.00 | 0.00 |
| 7 | 5 | 6 | 144 | 0.00 | 0.00 |
| 7 | 6 | 6 | 144 | 0.00 | 0.00 |
| 7 | 7 | 6 | 144 | 0.00 | 0.00 |
| 7 | 8 | 6 | 144 | 0.00 | 0.00 |
| 7 | 9 | 6 | 144 | 0.00 | 0.00 |

WEEK= 25

TC= 15

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | | | 0.00 | 0.0 |
| 2 | 150 | 151 | 1.67 | 17880.0 |
| 3 | 149 | 149 | .80 | 9637.0 |
| 4 | 145 | 145 | .39 | 3148.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | 149 | 150 | 1.39 | 26762.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | 146 | 146 | .25 | 1037.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 3.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 6.00 | 4.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 0.00 | 0.00 |
| 3 | 0.00 | 0.00 | 0.00 | 4.00 | 4.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 2.00 | 1.00 | 0.00 | 0.00 | 0.00 | 4.00 | 4.00 | 6.00 | 0.00 |
| 5 | 3.00 | 0.00 | 0.00 | 6.00 | 3.00 | 4.00 | 4.00 | 4.00 | 2.00 |
| 6 | 1.00 | 2.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 3 | 105 | .50 | .30 |
| 1 | 2 | 6 | 135 | 0.00 | .10 |
| 1 | 3 | 6 | 150 | 0.00 | 0.00 |
| 1 | 4 | 6 | 135 | 0.00 | .10 |
| 1 | 5 | 6 | 150 | 0.00 | 0.00 |
| 1 | 6 | 6 | 135 | 0.00 | .10 |
| 1 | 7 | 6 | 135 | 0.00 | .10 |
| 1 | 8 | 6 | 135 | 0.00 | .10 |
| 1 | 9 | 6 | 150 | 0.00 | 0.00 |
| 2 | 1 | | 24 | 1.00 | .84 |
| 2 | 2 | 2 | 88 | .66 | .41 |
| 2 | 3 | 4 | 128 | .33 | .14 |
| 2 | 4 | 4 | 128 | .33 | .14 |
| 2 | 5 | 4 | 113 | .33 | .24 |
| 2 | 6 | 4 | 128 | .33 | .14 |
| 2 | 7 | 4 | 113 | .33 | .24 |
| 2 | 8 | 6 | 150 | 0.00 | 0.00 |
| 2 | 9 | 6 | 150 | 0.00 | 0.00 |
| 3 | 1 | 6 | 82 | 0.00 | .45 |
| 3 | 2 | 6 | 95 | 0.00 | .36 |
| 3 | 3 | 6 | 131 | 0.00 | .12 |
| 3 | 4 | 2 | 88 | .66 | .41 |
| 3 | 5 | 2 | 84 | .66 | .44 |
| 3 | 6 | 6 | 146 | 0.00 | .02 |
| 3 | 7 | 6 | 146 | 0.00 | .02 |
| 3 | 8 | 6 | 150 | 0.00 | 0.00 |
| 3 | 9 | 6 | 150 | 0.00 | 0.00 |
| 4 | 1 | 4 | 136 | .33 | .09 |
| 4 | 2 | 5 | 142 | .16 | .05 |
| 4 | 3 | 6 | 150 | 0.00 | 0.00 |
| 4 | 4 | 6 | 95 | 0.00 | .36 |
| 4 | 5 | 6 | 112 | 0.00 | .25 |
| 4 | 6 | 2 | 50 | .66 | .66 |
| 4 | 7 | 2 | 88 | .66 | .41 |
| 4 | 8 | | 67 | 1.00 | .55 |
| 4 | 9 | 6 | 150 | 0.00 | 0.00 |
| 5 | 1 | 3 | 102 | .50 | .32 |
| 5 | 2 | 6 | 150 | 0.00 | 0.00 |
| 5 | 3 | 6 | 112 | 0.00 | .25 |
| 5 | 4 | | 10 | 1.00 | .93 |
| 5 | 5 | 3 | 99 | .50 | .34 |
| 5 | 6 | 2 | 78 | .66 | .48 |
| 5 | 9 | 4 | 136 | .33 | .09 |
| 6 | 1 | 5 | 126 | .16 | .16 |
| 6 | 2 | 4 | 118 | .33 | .21 |
| 6 | 3 | 6 | 150 | 0.00 | 0.00 |
| 6 | 4 | 5 | 142 | .16 | .05 |
| 6 | 5 | 6 | 150 | 0.00 | 0.00 |
| 6 | 6 | 6 | 150 | 0.00 | 0.00 |
| 6 | 7 | 6 | 150 | 0.00 | 0.00 |
| 6 | 8 | 6 | 150 | 0.00 | 0.00 |
| 6 | 9 | 6 | 150 | 0.00 | 0.00 |
| 7 | 1 | 6 | 150 | 0.00 | 0.00 |
| 7 | 2 | 6 | 150 | 0.00 | 0.00 |
| 7 | 3 | 6 | 150 | 0.00 | 0.00 |
| 7 | 4 | 6 | 150 | 0.00 | 0.00 |
| 7 | 5 | 6 | 150 | 0.00 | 0.00 |
| 7 | 6 | 6 | 150 | 0.00 | 0.00 |
| 7 | 7 | 6 | 150 | 0.00 | 0.00 |
| 7 | 8 | 6 | 150 | 0.00 | 0.00 |
| 7 | 9 | 6 | 150 | 0.00 | 0.00 |

WEEK= 26

TC= 156

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | | | 0.00 | 0.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | | | 0.00 | 0.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | 151 | 157 | 6.48 | 77842.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

1.00 1.00 1.00 0.00 0.00

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5 | 6.00 | 0.00 | 0.00 | 6.00 | 6.00 | 6.00 | 6.00 | 0.00 | 0.00 |
| 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 5 | 110 | .16 | .29 |
| 1 | 2 | 6 | 141 | 0.00 | .09 |
| 1 | 3 | 6 | 156 | 0.00 | 0.00 |
| 1 | 4 | 6 | 141 | 0.00 | .09 |
| 1 | 5 | 6 | 156 | 0.00 | 0.00 |
| 1 | 6 | 6 | 141 | 0.00 | .09 |
| 1 | 7 | 6 | 141 | 0.00 | .09 |
| 1 | 8 | 6 | 141 | 0.00 | .09 |
| 1 | 9 | 6 | 156 | 0.00 | 0.00 |
| 2 | 1 | 5 | 29 | .16 | .81 |
| 2 | 2 | 6 | 94 | 0.00 | .39 |
| 2 | 3 | 5 | 133 | .16 | .14 |
| 2 | 4 | 5 | 133 | .16 | .14 |
| 2 | 5 | 5 | 118 | .16 | .24 |
| 2 | 6 | 5 | 133 | .16 | .14 |
| 2 | 7 | 5 | 118 | .16 | .24 |
| 2 | 8 | 6 | 156 | 0.00 | 0.00 |
| 2 | 9 | 6 | 156 | 0.00 | 0.00 |
| 3 | 1 | | 82 | 1.00 | .47 |
| 3 | 2 | 6 | 101 | 0.00 | .35 |
| 3 | 3 | 6 | 137 | 0.00 | .12 |
| 3 | 4 | 6 | 94 | 0.00 | .39 |
| 3 | 5 | 6 | 90 | 0.00 | .42 |
| 3 | 6 | 6 | 152 | 0.00 | .02 |
| 3 | 7 | 6 | 152 | 0.00 | .02 |
| 3 | 8 | 6 | 156 | 0.00 | 0.00 |
| 3 | 9 | 6 | 156 | 0.00 | 0.00 |
| 4 | 1 | 6 | 142 | 0.00 | .08 |
| 4 | 2 | 6 | 148 | 0.00 | .05 |
| 4 | 3 | 6 | 156 | 0.00 | 0.00 |
| 4 | 4 | 6 | 101 | 0.00 | .35 |
| 4 | 5 | 6 | 118 | 0.00 | .24 |
| 4 | 6 | 6 | 56 | 0.00 | .64 |
| 4 | 7 | 6 | 94 | 0.00 | .39 |
| 4 | 8 | 6 | 73 | 0.00 | .53 |
| 4 | 9 | 6 | 156 | 0.00 | 0.00 |
| 5 | 1 | | 102 | 1.00 | .34 |
| 5 | 2 | 6 | 156 | 0.00 | 0.00 |
| 5 | 3 | 6 | 118 | 0.00 | .24 |
| 5 | 4 | | 10 | 1.00 | .93 |
| 5 | 5 | | 99 | 1.00 | .36 |
| 5 | 6 | | 78 | 1.00 | .50 |
| 5 | 7 | | 78 | 1.00 | .50 |
| 5 | 8 | 6 | 93 | 0.00 | .40 |
| 6 | 3 | 6 | 156 | 0.00 | 0.00 |
| 6 | 4 | 6 | 148 | 0.00 | .05 |
| 6 | 5 | 6 | 156 | 0.00 | 0.00 |
| 6 | 6 | 6 | 156 | 0.00 | 0.00 |
| 6 | 7 | 6 | 156 | 0.00 | 0.00 |
| 6 | 8 | 6 | 156 | 0.00 | 0.00 |
| 6 | 9 | 6 | 156 | 0.00 | 0.00 |
| 7 | 1 | 6 | 156 | 0.00 | 0.00 |
| 7 | 2 | 6 | 156 | 0.00 | 0.00 |
| 7 | 3 | 6 | 156 | 0.00 | 0.00 |
| 7 | 4 | 6 | 156 | 0.00 | 0.00 |
| 7 | 5 | 6 | 156 | 0.00 | 0.00 |
| 7 | 6 | 6 | 156 | 0.00 | 0.00 |
| 7 | 7 | 6 | 156 | 0.00 | 0.00 |
| 7 | 8 | 6 | 156 | 0.00 | 0.00 |
| 7 | 9 | 6 | 156 | 0.00 | 0.00 |

WEEK= 27

TC= 162

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | | | 0.00 | 0.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | 157 | 157 | .89 | 10748.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | 158 | 184 | 26.96 | 345139.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| [illegible] | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | 6.00 | 5.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 0.00 | 0.00 | 5.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5 | 6.00 | 0.00 | 0.00 | 6.00 | 1.00 | 6.00 | 6.00 | 5.00 | 0.00 |
| 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 5 | 115 | .16 | .29 |
| 1 | 2 | 6 | 147 | 0.00 | .09 |
| 1 | 3 | 6 | 162 | 0.00 | 0.00 |
| 1 | 4 | 6 | 147 | 0.00 | .09 |
| 1 | 5 | 6 | 162 | 0.00 | 0.00 |
| 1 | 6 | 6 | 147 | 0.00 | .09 |
| 1 | 7 | 6 | 147 | 0.00 | .09 |
| 1 | 8 | 6 | 147 | 0.00 | .09 |
| 1 | 9 | 6 | 162 | 0.00 | 0.00 |
| 2 | 1 | 5 | 34 | .16 | .79 |
| 2 | 2 | 6 | 100 | 0.00 | .38 |
| 2 | 3 | 5 | 138 | .16 | .14 |
| 2 | 4 | 5 | 138 | .16 | .14 |
| 2 | 5 | 5 | 123 | .16 | .24 |
| 2 | 6 | 5 | 138 | .16 | .14 |
| 2 | 7 | 5 | 123 | .16 | .24 |
| 2 | 8 | 6 | 162 | 0.00 | 0.00 |
| 2 | 9 | 6 | 162 | 0.00 | 0.00 |
| 3 | 1 | | 82 | 1.00 | .49 |
| 3 | 2 | 1 | 102 | .83 | .37 |
| 3 | 3 | 6 | 143 | 0.00 | .11 |
| 3 | 4 | 6 | 100 | 0.00 | .38 |
| 3 | 5 | 6 | 96 | 0.00 | .40 |
| 3 | 6 | 6 | 158 | 0.00 | .02 |
| 3 | 7 | 6 | 158 | 0.00 | .02 |
| 3 | 8 | 6 | 162 | 0.00 | 0.00 |
| 3 | 9 | 6 | 162 | 0.00 | 0.00 |
| 4 | 1 | 6 | 148 | 0.00 | .08 |
| 4 | 2 | 6 | 154 | 0.00 | .04 |
| 4 | 3 | 6 | 162 | 0.00 | 0.00 |
| 4 | 4 | 1 | 102 | .83 | .37 |
| 4 | 5 | 6 | 124 | 0.00 | .23 |
| 4 | 6 | 6 | 62 | 0.00 | .61 |
| 4 | 7 | 6 | 100 | 0.00 | .38 |
| 4 | 8 | 6 | 79 | 0.00 | .51 |
| 4 | 9 | 6 | 162 | 0.00 | 0.00 |
| 5 | 1 | | 102 | 1.00 | .37 |
| 5 | 2 | 6 | 162 | 0.00 | 0.00 |
| 5 | 3 | 6 | 124 | 0.00 | .23 |
| 5 | 4 | | 10 | 1.00 | .93 |
| 5 | 5 | 5 | 104 | .16 | .35 |
| 5 | 6 | | 78 | 1.00 | .51 |
| 5 | 7 | | 78 | 1.00 | .51 |
| 5 | 8 | 1 | 94 | .83 | .41 |
| 5 | 9 | 6 | 148 | 0.00 | .08 |
| 6 | 1 | 6 | 138 | 0.00 | .14 |
| 6 | 4 | 6 | [illegible] | [illegible] | [illegible] |
| 6 | 5 | 6 | 162 | 0.00 | 0.00 |
| 6 | 6 | 6 | 162 | 0.00 | 0.00 |
| 6 | 7 | 6 | 162 | 0.00 | 0.00 |
| 6 | 8 | 6 | 162 | 0.00 | 0.00 |
| 6 | 9 | 6 | 162 | 0.00 | 0.00 |
| 7 | 1 | 6 | 162 | 0.00 | 0.00 |
| 7 | 2 | 6 | 162 | 0.00 | 0.00 |
| 7 | 3 | 6 | 162 | 0.00 | 0.00 |
| 7 | 4 | 6 | 162 | 0.00 | 0.00 |
| 7 | 5 | 6 | 162 | 0.00 | 0.00 |
| 7 | 6 | 6 | 162 | 0.00 | 0.00 |
| 7 | 7 | 6 | 162 | 0.00 | 0.00 |
| 7 | 8 | 6 | 162 | 0.00 | 0.00 |
| 7 | 9 | 6 | 162 | 0.00 | 0.00 |

WEEK= 28

TC= 168

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | | | 0.00 | 0.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | 163 | 163 | .78 | 9427.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 |
| 3 | 6.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| 4 | 0.00 | 0.00 | 0.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5 | 6.00 | 0.00 | 0.00 | 6.00 | 0.00 | 6.00 | 6.00 | 6.00 | 0.00 |
| 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 5 | 120 | .16 | .28 |
| 1 | 2 | 6 | 153 | 0.00 | .08 |
| 1 | 3 | 6 | 168 | 0.00 | 0.00 |
| 1 | 4 | 6 | 153 | 0.00 | .08 |
| 1 | 5 | 6 | 168 | 0.00 | 0.00 |
| 1 | 6 | 6 | 153 | 0.00 | .08 |
| 1 | 7 | 6 | 153 | 0.00 | .08 |
| 1 | 8 | 6 | 153 | 0.00 | .08 |
| 1 | 9 | 6 | 168 | 0.00 | 0.00 |
| 2 | 1 | 5 | 39 | .16 | .76 |
| 2 | 2 | 6 | 106 | 0.00 | .36 |
| 2 | 3 | 5 | 143 | .16 | .14 |
| 2 | 4 | 5 | 143 | .16 | .14 |
| 2 | 5 | 5 | 128 | .16 | .23 |
| 2 | 6 | 5 | 143 | .16 | .14 |
| 2 | 7 | 5 | 128 | .16 | .23 |
| 2 | 8 | 6 | 168 | 0.00 | 0.00 |
| 2 | 9 | 6 | 168 | 0.00 | 0.00 |
| 3 | 1 | | 82 | 1.00 | .51 |
| 3 | 2 | | 102 | 1.00 | .39 |
| 3 | 3 | 6 | 149 | 0.00 | .11 |
| 3 | 4 | 6 | 106 | 0.00 | .36 |
| 3 | 5 | 6 | 102 | 0.00 | .39 |
| 3 | 6 | 6 | 164 | 0.00 | .02 |
| 3 | 7 | 6 | 164 | 0.00 | .02 |
| 3 | 8 | 6 | 168 | 0.00 | 0.00 |
| 3 | 9 | 6 | 168 | 0.00 | 0.00 |
| 4 | 1 | 6 | 154 | 0.00 | .08 |
| 4 | 2 | 6 | 160 | 0.00 | .04 |
| 4 | 3 | 6 | 168 | 0.00 | 0.00 |
| 4 | 4 | | 102 | 1.00 | .39 |
| 4 | 5 | 6 | 130 | 0.00 | .22 |
| 4 | 6 | 6 | 68 | 0.00 | .59 |
| 4 | 7 | 6 | 106 | 0.00 | .36 |
| 4 | 8 | 6 | 85 | 0.00 | .49 |
| 4 | 9 | 6 | 168 | 0.00 | 0.00 |
| 5 | 1 | | 102 | 1.00 | .39 |
| 5 | 2 | 6 | 168 | 0.00 | 0.00 |
| 5 | 3 | 6 | 130 | 0.00 | .22 |
| 5 | 4 | | 10 | 1.00 | .94 |
| 5 | 5 | 6 | 110 | 0.00 | .34 |
| 5 | 6 | | 78 | 1.00 | .53 |
| 5 | 7 | | 78 | 1.00 | .53 |
| 5 | 8 | | 94 | 1.00 | .44 |
| 5 | 9 | 6 | 154 | 0.00 | .08 |
| 6 | 1 | 6 | 144 | 0.00 | .14 |
| 6 | 2 | 6 | 136 | 0.00 | .19 |
| 6 | 3 | 6 | 168 | 0.00 | 0.00 |
| 6 | 6 | [illegible] | [illegible] | [illegible] | [illegible] |
| 6 | 7 | 6 | 168 | 0.00 | 0.00 |
| 6 | 8 | 6 | 168 | 0.00 | 0.00 |
| 6 | 9 | 6 | 168 | 0.00 | 0.00 |
| 7 | 1 | 6 | 168 | 0.00 | 0.00 |
| 7 | 2 | 6 | 168 | 0.00 | 0.00 |
| 7 | 3 | 6 | 168 | 0.00 | 0.00 |
| 7 | 4 | 6 | 168 | 0.00 | 0.00 |
| 7 | 5 | 6 | 168 | 0.00 | 0.00 |
| 7 | 6 | 6 | 168 | 0.00 | 0.00 |
| 7 | 7 | 6 | 168 | 0.00 | 0.00 |
| 7 | 8 | 6 | 168 | 0.00 | 0.00 |
| 7 | 9 | 6 | 168 | 0.00 | 0.00 |

WEEK= 29

TC= 174

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | 171 | 171 | .57 | 3107.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | 169 | 170 | 2.23 | 26847.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 3.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 |
| 2 | 2.00 | 0.00 | 2.00 | 2.00 | 3.00 | 2.00 | 3.00 | 0.00 | 0.00 |
| 3 | 6.00 | 6.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | [illegible] | [illegible] | [illegible] | 0.00 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 5 | 6.00 | 0.00 | 0.00 | 6.00 | 0.00 | 6.00 | 6.00 | 6.00 | 0.00 |
| 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 3 | 123 | .50 | .29 |
| 1 | 2 | 5 | 158 | .16 | .09 |
| 1 | 3 | 6 | 174 | 0.00 | 0.00 |
| 1 | 4 | 5 | 158 | .16 | .09 |
| 1 | 5 | 6 | 174 | 0.00 | 0.00 |
| 1 | 6 | 5 | 158 | .16 | .09 |
| 1 | 7 | 5 | 158 | .16 | .09 |
| 1 | 8 | 5 | 158 | .16 | .09 |
| 1 | 9 | 6 | 174 | 0.00 | 0.00 |
| 2 | 1 | 4 | 43 | .33 | .75 |
| 2 | 2 | 6 | 112 | 0.00 | .35 |
| 2 | 3 | 4 | 147 | .33 | .15 |
| 2 | 4 | 4 | 147 | .33 | .15 |
| 2 | 5 | 3 | 131 | .50 | .24 |
| 2 | 6 | 4 | 147 | .33 | .15 |
| 2 | 7 | 3 | 131 | .50 | .24 |
| 2 | 8 | 6 | 174 | 0.00 | 0.00 |
| 2 | 9 | 6 | 174 | 0.00 | 0.00 |
| 3 | 1 | | 82 | 1.00 | .52 |
| 3 | 2 | | 102 | 1.00 | .41 |
| 3 | 3 | 5 | 154 | .16 | .11 |
| 3 | 4 | 6 | 112 | 0.00 | .35 |
| 3 | 5 | 6 | 108 | 0.00 | .37 |
| 3 | 6 | 6 | 170 | 0.00 | .02 |
| 3 | 7 | 6 | 170 | 0.00 | .02 |
| 3 | 8 | 6 | 174 | 0.00 | 0.00 |
| 3 | 9 | 6 | 174 | 0.00 | 0.00 |
| 4 | 1 | 6 | 160 | 0.00 | .08 |
| 4 | 2 | 6 | 166 | 0.00 | .04 |
| 4 | 3 | 6 | 174 | 0.00 | 0.00 |
| 4 | 4 | | 102 | 1.00 | .41 |
| 4 | 5 | 6 | 136 | 0.00 | .21 |
| 4 | 6 | 6 | 74 | 0.00 | .57 |
| 4 | 7 | 6 | 112 | 0.00 | .35 |
| 4 | 8 | 6 | 91 | 0.00 | .47 |
| 4 | 9 | 6 | 174 | 0.00 | 0.00 |
| 5 | 1 | | 102 | 1.00 | .41 |
| 5 | 2 | 6 | 174 | 0.00 | 0.00 |
| 5 | 3 | 6 | 136 | 0.00 | .21 |
| 5 | 4 | | 10 | 1.00 | .94 |
| 5 | 5 | 6 | 116 | 0.00 | .33 |
| 5 | 6 | | 78 | 1.00 | .55 |
| 5 | 7 | | 78 | 1.00 | .55 |
| 5 | 8 | | 94 | 1.00 | .45 |
| 5 | 9 | 6 | 160 | 0.00 | .08 |
| 6 | 1 | 6 | 150 | 0.00 | .13 |
| 6 | 2 | 6 | 142 | 0.00 | .18 |
| 6 | 3 | 6 | 174 | 0.00 | 0.00 |
| 6 | 4 | 6 | 166 | 0.00 | .04 |
| 6 | 5 | 6 | 174 | 0.00 | 0.00 |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| 6 | 9 | 6 | 174 | [illegible] | [illegible] |
| 7 | 1 | 6 | 174 | 0.00 | 0.00 |
| 7 | 2 | 6 | 174 | 0.00 | 0.00 |
| 7 | 3 | 6 | 174 | 0.00 | 0.00 |
| 7 | 4 | 6 | 174 | 0.00 | 0.00 |
| 7 | 5 | 6 | 174 | 0.00 | 0.00 |
| 7 | 6 | 6 | 174 | 0.00 | 0.00 |
| 7 | 7 | 6 | 174 | 0.00 | 0.00 |
| 7 | 8 | 6 | 174 | 0.00 | 0.00 |
| 7 | 9 | 6 | 174 | 0.00 | 0.00 |

WEEK= 3

TC= 18

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | 175 | 175 | .09 | 527.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | | | 0.00 | 0.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 |
| 2 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 0.00 | 0.00 |
| 3 | 6.00 | 6.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 0.00 | 0.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5 | 6.00 | 0.00 | 0.00 | 6.00 | 0.00 | 6.00 | 6.00 | 6.00 | 0.00 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 5 | 128 | .16 | .28 |
| 1 | 2 | 5 | 163 | .16 | .09 |
| 1 | 3 | 6 | 180 | 0.00 | 0.00 |
| 1 | 4 | 5 | 163 | .16 | .09 |
| 1 | 5 | 6 | 180 | 0.00 | 0.00 |
| 1 | 6 | 5 | 163 | .16 | .09 |
| 1 | 7 | 5 | 163 | .16 | .09 |
| 1 | 8 | 5 | 163 | .16 | .09 |
| 1 | 9 | 6 | 180 | 0.00 | 0.00 |
| 2 | 1 | 6 | 49 | 0.00 | .72 |
| 2 | 2 | 6 | 118 | 0.00 | .34 |
| 2 | 3 | 6 | 153 | 0.00 | .15 |
| 2 | 4 | 6 | 153 | 0.00 | .15 |
| 2 | 5 | 5 | 136 | .16 | .24 |
| 2 | 6 | 6 | 153 | 0.00 | .15 |
| 2 | 7 | 5 | 136 | .16 | .24 |
| 2 | 8 | 6 | 180 | 0.00 | 0.00 |
| 2 | 9 | 6 | 180 | 0.00 | 0.00 |
| 3 | 1 | | 82 | 1.00 | .54 |
| 3 | 2 | | 102 | 1.00 | .43 |
| 3 | 3 | 5 | 159 | .16 | .11 |
| 3 | 4 | 6 | 118 | 0.00 | .34 |
| 3 | 5 | 6 | 114 | 0.00 | .36 |
| 3 | 6 | 6 | 176 | 0.00 | .02 |
| 3 | 7 | 6 | 176 | 0.00 | .02 |
| 3 | 8 | 6 | 180 | 0.00 | 0.00 |
| 3 | 9 | 6 | 180 | 0.00 | 0.00 |
| 4 | 1 | 6 | 166 | 0.00 | .07 |
| 4 | 2 | 6 | 172 | 0.00 | .04 |
| 4 | 3 | 6 | 180 | 0.00 | 0.00 |
| 4 | 4 | | 102 | 1.00 | .43 |
| 4 | 5 | 6 | 142 | 0.00 | .21 |
| 4 | 6 | 6 | 80 | 0.00 | .55 |
| 4 | 7 | 6 | 118 | 0.00 | .34 |
| 4 | 8 | 6 | 97 | 0.00 | .46 |
| 4 | 9 | 6 | 180 | 0.00 | 0.00 |
| 5 | 1 | | 102 | 1.00 | .43 |
| 5 | 2 | 6 | 180 | 0.00 | 0.00 |
| 5 | 3 | 6 | 142 | 0.00 | .21 |
| 5 | 4 | | 10 | 1.00 | .94 |
| 5 | 5 | 6 | 122 | 0.00 | .32 |
| 5 | 6 | | 78 | 1.00 | .56 |
| 5 | 7 | | 78 | 1.00 | .56 |
| 5 | 8 | | 94 | 1.00 | .47 |
| 5 | 9 | 6 | 166 | 0.00 | .07 |
| 6 | 1 | 6 | 156 | 0.00 | .13 |
| 6 | 2 | 6 | 148 | 0.00 | .17 |
| 6 | 3 | 6 | 180 | 0.00 | 0.00 |
| 6 | 4 | 6 | 172 | 0.00 | .04 |
| 6 | 5 | 6 | 180 | 0.00 | 0.00 |
| 6 | 6 | 6 | 180 | 0.00 | 0.00 |
| 6 | 7 | 6 | 180 | 0.00 | 0.00 |
| 6 | 8 | 6 | 180 | 0.00 | 0.00 |
| 7 | 2 | 6 | 180 | [illegible] | [illegible] |
| 7 | 3 | 6 | 180 | 0.00 | 0.00 |
| 7 | 4 | 6 | 180 | 0.00 | 0.00 |
| 7 | 5 | 6 | 180 | 0.00 | 0.00 |
| 7 | 6 | 6 | 180 | 0.00 | 0.00 |
| 7 | 7 | 6 | 180 | 0.00 | 0.00 |
| 7 | 8 | 6 | 180 | 0.00 | 0.00 |
| 7 | 9 | 6 | 180 | 0.00 | 0.00 |

WEEK= 31

TC= 186

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | | | 0.00 | 0.0 |
| 2 | 184 | 184 | .74 | 7958.0 |
| 3 | 181 | 183 | 2.26 | 27235.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | 185 | 188 | 3.52 | 42278.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 4.00 | 0.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 0.00 | 0.00 |
| 3 | 6.00 | 4.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 0.00 | 0.00 | 4.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5 | 6.00 | 0.00 | 0.00 | 6.00 | 2.00 | 6.00 | 6.00 | 4.00 | 0.00 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 2 | 130 | .66 | .30 |
| 1 | 2 | 6 | 169 | 0.00 | .09 |
| 1 | 3 | 6 | 186 | 0.00 | 0.00 |
| 1 | 4 | 6 | 169 | 0.00 | .09 |
| 1 | 5 | 6 | 186 | 0.00 | 0.00 |
| 1 | 6 | 6 | 169 | 0.00 | .09 |
| 1 | 7 | 6 | 169 | 0.00 | .09 |
| 1 | 8 | 6 | 169 | 0.00 | .09 |
| 1 | 9 | 6 | 186 | 0.00 | 0.00 |
| 2 | 1 | 2 | 51 | .66 | .72 |
| 2 | 2 | 6 | 124 | 0.00 | .33 |
| 2 | 3 | 2 | 155 | .66 | .16 |
| 2 | 4 | 2 | 155 | .66 | .16 |
| 2 | 5 | 2 | 138 | .66 | .25 |
| 2 | 6 | 2 | 155 | .66 | .16 |
| 2 | 7 | 2 | 138 | .66 | .25 |
| 2 | 8 | 6 | 186 | 0.00 | 0.00 |
| 2 | 9 | 6 | 186 | 0.00 | 0.00 |
| 3 | 1 | | 82 | 1.00 | .55 |
| 3 | 2 | 2 | 104 | .66 | .44 |
| 3 | 3 | 6 | 165 | 0.00 | .11 |
| 3 | 4 | 6 | 124 | 0.00 | .33 |
| 3 | 5 | 6 | 120 | 0.00 | .35 |
| 3 | 6 | 6 | 182 | 0.00 | .02 |
| 3 | 7 | 6 | 182 | 0.00 | .02 |
| 3 | 8 | 6 | 186 | 0.00 | 0.00 |
| 3 | 9 | 6 | 186 | 0.00 | 0.00 |
| 4 | 1 | 6 | 172 | 0.00 | .07 |
| 4 | 2 | 6 | 178 | 0.00 | .04 |
| 4 | 3 | 6 | 186 | 0.00 | 0.00 |
| 4 | 4 | 2 | 104 | .66 | .44 |
| 4 | 5 | 6 | 148 | 0.00 | .20 |
| 4 | 6 | 6 | 86 | 0.00 | .53 |
| 4 | 7 | 6 | 124 | 0.00 | .33 |
| 4 | 8 | 6 | 103 | 0.00 | .44 |
| 4 | 9 | 6 | 186 | 0.00 | 0.00 |
| 5 | 1 | | 102 | 1.00 | .45 |
| 5 | 2 | 6 | 186 | 0.00 | 0.00 |
| 5 | 3 | 6 | 148 | 0.00 | .20 |
| 5 | 4 | | 10 | 1.00 | .94 |
| 5 | 5 | 4 | 126 | .33 | .32 |
| 5 | 6 | | 78 | 1.00 | .58 |
| 5 | 7 | | 78 | 1.00 | .58 |
| 5 | 8 | 2 | 96 | .66 | .48 |
| 5 | 9 | 6 | 172 | 0.00 | .07 |
| 6 | 1 | 6 | 162 | 0.00 | .12 |
| 6 | 2 | 6 | 154 | 0.00 | .17 |
| 6 | 3 | 6 | 186 | 0.00 | 0.00 |
| 6 | 4 | 6 | 178 | 0.00 | .04 |
| 6 | 5 | 6 | 186 | 0.00 | 0.00 |
| 6 | 6 | 6 | 186 | 0.00 | 0.00 |
| 6 | 7 | 6 | 186 | 0.00 | 0.00 |
| 6 | 8 | 6 | 186 | 0.00 | 0.00 |
| 6 | 9 | 6 | 186 | 0.00 | 0.00 |
| 7 | 1 | 6 | 186 | 0.00 | 0.00 |
| 7 | 5 | 6 | 186 | 0.00 | 0.00 |
| 7 | 6 | 6 | 186 | 0.00 | 0.00 |
| 7 | 7 | 6 | 186 | 0.00 | 0.00 |
| 7 | 8 | 6 | 186 | 0.00 | 0.00 |
| 7 | 9 | 6 | 186 | 0.00 | 0.00 |

WEEK= 32

TC= 192

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | | | 0.00 | 0.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | | | 0.00 | 0.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | 189 | 199 | 10.63 | 127569.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5 | 6.00 | 0.00 | 0.00 | 6.00 | 6.00 | 6.00 | 6.00 | 0.00 | 0.00 |
| 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 6 | 136 | 0.00 | .29 |
| 1 | 2 | 6 | 175 | 0.00 | .08 |
| 1 | 3 | 6 | 192 | 0.00 | 0.00 |
| 1 | 4 | 6 | 175 | 0.00 | .08 |
| 1 | 5 | 6 | 192 | 0.00 | 0.00 |
| 1 | 6 | 6 | 175 | 0.00 | .08 |
| 1 | 7 | 6 | 175 | 0.00 | .08 |
| 1 | 8 | 6 | 175 | 0.00 | .08 |
| 1 | 9 | 6 | 192 | 0.00 | 0.00 |
| 2 | 1 | 6 | 57 | 0.00 | .70 |
| 2 | 2 | 6 | 130 | 0.00 | .32 |
| 2 | 3 | 6 | 161 | 0.00 | .16 |
| 2 | 4 | 6 | 161 | 0.00 | .16 |
| 2 | 5 | 6 | 144 | 0.00 | .25 |
| 2 | 6 | 6 | 161 | 0.00 | .16 |
| 2 | 7 | 6 | 144 | 0.00 | .25 |
| 2 | 8 | 6 | 192 | 0.00 | 0.00 |
| 2 | 9 | 6 | 192 | 0.00 | 0.00 |
| 3 | 1 | | 82 | 1.00 | .57 |
| 3 | 2 | 6 | 110 | 0.00 | .42 |
| 3 | 3 | 6 | 171 | 0.00 | .10 |
| 3 | 4 | 6 | 130 | 0.00 | .32 |
| 3 | 5 | 6 | 126 | 0.00 | .34 |
| 3 | 6 | 6 | 188 | 0.00 | .02 |
| 3 | 7 | 6 | 188 | 0.00 | .02 |
| 3 | 8 | 6 | 192 | 0.00 | 0.00 |
| 3 | 9 | 6 | 192 | 0.00 | 0.00 |
| 4 | 1 | 6 | 178 | 0.00 | .07 |
| 4 | 2 | 6 | 184 | 0.00 | .04 |
| 4 | 3 | 6 | 192 | 0.00 | 0.00 |
| 4 | 4 | 6 | 110 | 0.00 | .42 |
| 4 | 5 | 6 | 154 | 0.00 | .19 |
| 4 | 6 | 6 | 92 | 0.00 | .52 |
| 4 | 7 | 6 | 130 | 0.00 | .32 |
| 4 | 8 | 6 | 109 | 0.00 | .43 |
| 4 | 9 | 6 | 192 | 0.00 | 0.00 |
| 5 | 1 | | 102 | 1.00 | .46 |
| 5 | 2 | 6 | 192 | 0.00 | 0.00 |
| 5 | 3 | 6 | 154 | 0.00 | .19 |
| 5 | 4 | | 10 | 1.00 | .94 |
| 5 | 5 | | 126 | 1.00 | .34 |
| 5 | 6 | | 78 | 1.00 | .59 |
| 5 | 7 | | 78 | 1.00 | .59 |
| 5 | 8 | 6 | 102 | 0.00 | .46 |
| 5 | 9 | 6 | 178 | 0.00 | .07 |
| 6 | 1 | 6 | 168 | 0.00 | .12 |
| 6 | 2 | 6 | 160 | 0.00 | .16 |
| 6 | 3 | 6 | 192 | 0.00 | 0.00 |
| 6 | 4 | 6 | 184 | 0.00 | .04 |
| 6 | 5 | 6 | 192 | 0.00 | 0.00 |
| 6 | 6 | 6 | 192 | 0.00 | 0.00 |
| 6 | 7 | 6 | 192 | 0.00 | 0.00 |
| 6 | 8 | 6 | 192 | 0.00 | 0.00 |
| 6 | 9 | 6 | 192 | 0.00 | 0.00 |
| 7 | 1 | 6 | 192 | 0.00 | 0.00 |
| 7 | 2 | 6 | 192 | 0.00 | 0.00 |
| 7 | 3 | 6 | 192 | 0.00 | 0.00 |
| [illegible] | [illegible] | [illegible] | 192 | [illegible] | [illegible] |
| 7 | 8 | 6 | 192 | 0.00 | 0.00 |
| 7 | 9 | 6 | 192 | 0.00 | 0.00 |

WEEK= 33

TC= 198

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | 194 | 194 | .78 | 4213.0 |
| 2 | 193 | 193 | .32 | 3478.0 |
| 3 | | | 0.00 | 0.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 |
| 2 | 1.00 | 0.00 | 1.00 | 1.00 | 2.00 | 1.00 | 2.00 | 0.00 | 0.00 |
| 3 | 6.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5 | 6.00 | 0.00 | 0.00 | 6.00 | 6.00 | 6.00 | 6.00 | 0.00 | 0.00 |
| 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

121 13

1 2.00 0.00 0.00 0.00 0.00 0.00 [illegible]

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 4 | 140 | .33 | .29 |
| 1 | 2 | 5 | 180 | .16 | .09 |
| 1 | 3 | 6 | 198 | 0.00 | 0.00 |
| 1 | 4 | 5 | 180 | .16 | .09 |
| 1 | 5 | 6 | 198 | 0.00 | 0.00 |
| 1 | 6 | 5 | 180 | .16 | .09 |
| 1 | 7 | 5 | 180 | .16 | .09 |
| 1 | 8 | 5 | 180 | .16 | .09 |
| 1 | 9 | 6 | 198 | 0.00 | 0.00 |
| 2 | 1 | 5 | 62 | .16 | .68 |
| 2 | 2 | 6 | 136 | 0.00 | .31 |
| 2 | 3 | 5 | 166 | .16 | .16 |
| 2 | 4 | 5 | 166 | .16 | .16 |
| 2 | 5 | 4 | 148 | .33 | .25 |
| 2 | 6 | 5 | 166 | .16 | .16 |
| 2 | 7 | 4 | 148 | .33 | .25 |
| 2 | 8 | 6 | 198 | 0.00 | 0.00 |
| 2 | 9 | 6 | 198 | 0.00 | 0.00 |
| 3 | 1 | | 82 | 1.00 | .58 |
| 3 | 2 | 6 | 116 | 0.00 | .41 |
| 3 | 3 | 5 | 176 | .16 | .11 |
| 3 | 4 | 6 | 136 | 0.00 | .31 |
| 3 | 5 | 6 | 132 | 0.00 | .33 |
| 3 | 6 | 6 | 194 | 0.00 | .02 |
| 3 | 7 | 6 | 194 | 0.00 | .02 |
| 3 | 8 | 6 | 198 | 0.00 | 0.00 |
| 3 | 9 | 6 | 198 | 0.00 | 0.00 |
| 4 | 1 | 6 | 184 | 0.00 | .07 |
| 4 | 2 | 6 | 190 | 0.00 | .04 |
| 4 | 3 | 6 | 198 | 0.00 | 0.00 |
| 4 | 4 | 6 | 116 | 0.00 | .41 |
| 4 | 5 | 6 | 160 | 0.00 | .19 |
| 4 | 6 | 6 | 98 | 0.00 | .50 |
| 4 | 7 | 6 | 136 | 0.00 | .31 |
| 4 | 8 | 6 | 115 | 0.00 | .41 |
| 4 | 9 | 6 | 198 | 0.00 | 0.00 |
| 5 | 1 | | 102 | 1.00 | .48 |
| 5 | 2 | 6 | 198 | 0.00 | 0.00 |
| 5 | 3 | 6 | 160 | 0.00 | .19 |
| 5 | 4 | | 10 | 1.00 | .94 |
| 5 | 5 | | 126 | 1.00 | .36 |
| 5 | 6 | | 78 | 1.00 | .60 |
| 5 | 7 | | 78 | 1.00 | .60 |
| 5 | 8 | 6 | 108 | 0.00 | .45 |
| 5 | 9 | 6 | 184 | 0.00 | .07 |
| 6 | 1 | 6 | 174 | 0.00 | .12 |
| 6 | 2 | 6 | 166 | 0.00 | .16 |
| 6 | 3 | 6 | 198 | 0.00 | 0.00 |
| 6 | 4 | 6 | 190 | 0.00 | .04 |
| 6 | 5 | 6 | 198 | 0.00 | 0.00 |
| 6 | 6 | 6 | 198 | 0.00 | 0.00 |
| 6 | 7 | 6 | 198 | 0.00 | 0.00 |
| 6 | 8 | 6 | 198 | 0.00 | 0.00 |
| 6 | 9 | 6 | 198 | 0.00 | 0.00 |
| 7 | 1 | 6 | 198 | 0.00 | 0.00 |
| 7 | 2 | 6 | 198 | 0.00 | 0.00 |
| 7 | 3 | 6 | 198 | 0.00 | 0.00 |
| 7 | 4 | 6 | 198 | 0.00 | 0.00 |
| 7 | 5 | 6 | 198 | 0.00 | 0.00 |
| 7 | 8 | 6 | 198 | 0.00 | 0.00 |
| 7 | 9 | 6 | 198 | 0.00 | 0.00 |

WEEK= 34

TC= 204

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | | | 0.00 | 0.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | | | 0.00 | 0.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | 200 | 205 | 5.64 | 72249.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | 6.00 | 5.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 0.00 | 0.00 | 5.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5 | 6.00 | 0.00 | 0.00 | 6.00 | 1.00 | 6.00 | 6.00 | 5.00 | 0.00 |
| 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 6 | 146 | 0.00 | .28 |
| 1 | 2 | 6 | 186 | 0.00 | .08 |
| 1 | 3 | 6 | 204 | 0.00 | 0.00 |
| 1 | 4 | 6 | 186 | 0.00 | .08 |
| 1 | 5 | 6 | 204 | 0.00 | 0.00 |
| 1 | 6 | 6 | 186 | 0.00 | .08 |
| 1 | 7 | 6 | 186 | 0.00 | .08 |
| 1 | 8 | 6 | 186 | 0.00 | .08 |
| 1 | 9 | 6 | 204 | 0.00 | 0.00 |
| 2 | 1 | 6 | 68 | 0.00 | .66 |
| 2 | 2 | 6 | 142 | 0.00 | .30 |
| 2 | 3 | 6 | 172 | 0.00 | .15 |
| 2 | 4 | 6 | 172 | 0.00 | .15 |
| 2 | 5 | 6 | 154 | 0.00 | .24 |
| 2 | 6 | 6 | 172 | 0.00 | .15 |
| 2 | 7 | 6 | 154 | 0.00 | .24 |
| 2 | 8 | 6 | 204 | 0.00 | 0.00 |
| 2 | 9 | 6 | 204 | 0.00 | 0.00 |
| 3 | 1 | | 82 | 1.00 | .59 |
| 3 | 2 | 1 | 117 | .83 | .42 |
| 3 | 3 | 6 | 182 | 0.00 | .10 |
| 3 | 4 | 6 | 142 | 0.00 | .30 |
| 3 | 5 | 6 | 138 | 0.00 | .32 |
| 3 | 6 | 6 | 200 | 0.00 | .01 |
| 3 | 7 | 6 | 200 | 0.00 | .01 |
| 3 | 8 | 6 | 204 | 0.00 | 0.00 |
| 3 | 9 | 6 | 204 | 0.00 | 0.00 |
| 4 | 1 | 6 | 190 | 0.00 | .06 |
| 4 | 2 | 6 | 196 | 0.00 | .03 |
| 4 | 3 | 6 | 204 | 0.00 | 0.00 |
| 4 | 4 | 1 | 117 | .83 | .42 |
| 4 | 5 | 6 | 166 | 0.00 | .18 |
| 4 | 6 | 6 | 104 | 0.00 | .49 |
| 4 | 7 | 6 | 142 | 0.00 | .30 |
| 4 | 8 | 6 | 121 | 0.00 | .40 |
| 4 | 9 | 6 | 204 | 0.00 | 0.00 |
| 5 | 1 | | 102 | 1.00 | .50 |
| 5 | 2 | 6 | 204 | 0.00 | 0.00 |
| 5 | 3 | 6 | 166 | 0.00 | .18 |
| 5 | 4 | | 10 | 1.00 | .95 |
| 5 | 5 | 5 | 131 | .16 | .35 |
| 5 | 6 | | 78 | 1.00 | .61 |
| 5 | 7 | | 78 | 1.00 | .61 |
| 5 | 8 | 1 | 109 | .83 | .46 |
| 5 | 9 | 6 | 190 | 0.00 | .06 |
| 6 | 1 | 6 | 180 | 0.00 | .11 |
| 6 | 2 | 6 | 172 | 0.00 | .15 |
| 6 | 3 | 6 | 204 | 0.00 | 0.00 |
| 6 | 4 | 6 | 196 | 0.00 | .03 |
| 6 | 5 | 6 | 204 | 0.00 | 0.00 |
| 6 | 6 | 6 | 204 | 0.00 | 0.00 |
| 6 | 7 | 6 | 204 | 0.00 | 0.00 |
| 6 | 8 | 6 | 204 | 0.00 | 0.00 |
| 6 | 9 | 6 | 204 | 0.00 | 0.00 |
| 7 | 1 | 6 | 204 | 0.00 | 0.00 |
| 7 | 2 | 6 | 204 | 0.00 | 0.00 |
| 7 | 3 | 6 | 204 | 0.00 | 0.00 |
| 7 | 4 | 6 | 204 | 0.00 | 0.00 |
| 7 | 5 | 6 | 204 | 0.00 | 0.00 |
| 7 | 6 | 6 | 204 | 0.00 | 0.00 |
| 7 | 7 | 6 | 204 | 0.00 | 0.00 |

WEEK= 35

TC= 21

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | | | 0.00 | 0.0 |
| 2 | 205 | 205 | .77 | 8290.0 |
| 3 | | | 0.00 | 0.0 |
| 4 | 209 | 209 | 1.06 | 8502.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | 206 | 208 | 2.28 | 43903.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | 209 | 228 | 19.45 | 249023.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | 210 | 212 | 3.08 | 12337.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 3.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 |
| 3 | 1.00 | 1.00 | 0.00 | 2.00 | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 3.00 | 1.00 | 0.00 | 1.00 | 0.00 | 2.00 | 2.00 | 5.00 | 0.00 |
| 5 | 5.00 | 0.00 | 0.00 | 6.00 | 4.00 | 6.00 | 6.00 | 6.00 | 3.00 |
| 6 | 1.00 | 2.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 4 | 150 | .33 | .28 |
| | | 6 | 192 | 0.00 | .08 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 3 | 6 | 210 | 0.00 | 0.00 |
| 1 | 4 | 6 | 192 | 0.00 | .08 |
| 1 | 5 | 6 | 210 | 0.00 | 0.00 |
| 1 | 6 | 6 | 192 | 0.00 | .08 |
| 1 | 7 | 6 | 192 | 0.00 | .08 |
| 1 | 8 | 6 | 192 | 0.00 | .08 |
| 1 | 9 | 6 | 210 | 0.00 | 0.00 |
| 2 | 1 | 3 | 71 | .50 | .66 |
| 2 | 2 | 4 | 146 | .33 | .30 |
| 2 | 3 | 5 | 177 | .16 | .15 |
| 2 | 4 | 5 | 177 | .16 | .15 |
| 2 | 5 | 5 | 159 | .16 | .24 |
| 2 | 6 | 5 | 177 | .16 | .15 |
| 2 | 7 | 5 | 159 | .16 | .24 |
| 2 | 8 | 6 | 210 | 0.00 | 0.00 |
| 2 | 9 | 6 | 210 | 0.00 | 0.00 |
| 3 | 1 | 5 | 87 | .16 | .58 |
| 3 | 2 | 5 | 122 | .16 | .41 |
| 3 | 3 | 6 | 188 | 0.00 | .10 |
| 3 | 4 | 4 | 146 | .33 | .30 |
| 3 | 5 | 4 | 142 | .33 | .32 |
| 3 | 6 | 6 | 206 | 0.00 | .01 |
| 3 | 7 | 6 | 206 | 0.00 | .01 |
| 3 | 8 | 6 | 210 | 0.00 | 0.00 |
| 3 | 9 | 6 | 210 | 0.00 | 0.00 |
| 4 | 1 | 3 | 193 | .50 | .08 |
| 4 | 2 | 5 | 201 | .16 | .04 |
| 4 | 3 | 6 | 210 | 0.00 | 0.00 |
| 4 | 4 | 5 | 122 | .16 | .41 |
| 4 | 5 | 6 | 172 | 0.00 | .18 |
| 4 | 6 | 4 | 108 | .33 | .48 |
| 4 | 7 | 4 | 146 | .33 | .30 |
| 4 | 8 | 1 | 122 | .83 | .41 |
| 4 | 9 | 6 | 210 | 0.00 | 0.00 |
| 5 | 1 | 1 | 103 | .83 | .50 |
| 5 | 2 | 6 | 210 | 0.00 | 0.00 |
| 5 | 3 | 6 | 172 | 0.00 | .18 |
| 5 | 4 | | 10 | 1.00 | .95 |
| 5 | 5 | 2 | 133 | .66 | .36 |
| 5 | 6 | | 78 | 1.00 | .62 |
| 5 | 7 | | 78 | 1.00 | .62 |
| 5 | 8 | | 109 | 1.00 | .48 |
| 5 | 9 | 3 | 193 | .50 | .08 |
| 6 | 1 | 5 | 185 | .16 | .11 |
| 6 | 2 | 4 | 176 | .33 | .16 |
| 6 | 3 | 6 | 210 | 0.00 | 0.00 |
| 6 | 4 | 5 | 201 | .16 | .04 |
| 6 | 5 | 6 | 210 | 0.00 | 0.00 |
| 6 | 6 | 6 | 210 | 0.00 | 0.00 |
| 6 | 7 | 6 | 210 | 0.00 | 0.00 |
| 6 | 8 | 6 | 210 | 0.00 | 0.00 |
| 6 | 9 | 6 | 210 | 0.00 | 0.00 |
| 7 | 1 | 6 | 210 | 0.00 | 0.00 |
| 7 | 2 | 6 | 210 | 0.00 | 0.00 |
| 7 | 3 | 6 | 210 | 0.00 | 0.00 |
| 7 | 4 | 6 | 210 | 0.00 | 0.00 |
| 7 | 5 | 6 | 210 | 0.00 | 0.00 |
| 7 | 6 | 6 | 210 | 0.00 | 0.00 |
| 7 | 7 | 6 | 210 | 0.00 | 0.00 |
| 7 | 8 | 6 | 210 | 0.00 | 0.00 |
| 7 | 9 | 6 | 210 | 0.00 | 0.00 |

WEEK= 36

TC= 216

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | | | 0.00 | 0.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | | | 0.00 | 0.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 6.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | 0.00 | 0.00 | 0.00 | 6.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 6.00 | 6.00 | 6.00 | 0.00 |
| 5 | 0.00 | 0.00 | 0.00 | 6.00 | 2.00 | 2.00 | 2.00 | 2.00 | 0.00 |
| 6 | 2.00 | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 6 | 156 | 0.00 | .27 |
| 1 | 2 | 6 | 198 | 0.00 | .08 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 3 | 6 | 216 | 0.00 | 0.00 |
| 1 | 4 | 6 | 198 | 0.00 | .08 |
| 1 | 5 | 6 | 216 | 0.00 | 0.00 |
| 1 | 6 | 6 | 198 | 0.00 | .08 |
| 1 | 7 | 6 | 198 | 0.00 | .08 |
| 1 | 8 | 6 | 198 | 0.00 | .08 |
| 1 | 9 | 6 | 216 | 0.00 | 0.00 |
| 2 | 1 | | 71 | 1.00 | .67 |
| 2 | 2 | | 146 | 1.00 | .32 |
| 2 | 3 | 6 | 183 | 0.00 | .15 |
| 2 | 4 | 6 | 183 | 0.00 | .15 |
| 2 | 5 | 6 | 165 | 0.00 | .23 |
| 2 | 6 | 6 | 183 | 0.00 | .15 |
| 2 | 7 | 6 | 165 | 0.00 | .23 |
| 2 | 8 | 6 | 216 | 0.00 | 0.00 |
| 2 | 9 | 6 | 216 | 0.00 | 0.00 |
| 3 | 1 | 6 | 93 | 0.00 | .56 |
| 3 | 2 | 6 | 128 | 0.00 | .40 |
| 3 | 3 | 6 | 194 | 0.00 | .10 |
| 3 | 4 | | 146 | 1.00 | .32 |
| 3 | 5 | | 142 | 1.00 | .34 |
| 3 | 6 | 6 | 212 | 0.00 | .01 |
| 3 | 7 | 6 | 212 | 0.00 | .01 |
| 3 | 8 | 6 | 216 | 0.00 | 0.00 |
| 3 | 9 | 6 | 216 | 0.00 | 0.00 |
| 4 | 1 | 6 | 199 | 0.00 | .07 |
| 4 | 2 | 6 | 207 | 0.00 | .04 |
| 4 | 3 | 6 | 216 | 0.00 | 0.00 |
| 4 | 4 | 6 | 128 | 0.00 | .40 |
| 4 | 5 | 6 | 178 | 0.00 | .17 |
| 4 | 6 | | 108 | 1.00 | .50 |
| 4 | 7 | | 146 | 1.00 | .32 |
| 4 | 8 | | 122 | 1.00 | .43 |
| 4 | 9 | 6 | 216 | 0.00 | 0.00 |
| 5 | 1 | 6 | 109 | 0.00 | .49 |
| 5 | 2 | 6 | 216 | 0.00 | 0.00 |
| 5 | 3 | 6 | 178 | 0.00 | .17 |
| 5 | 4 | | 10 | 1.00 | .95 |
| 5 | 5 | 4 | 137 | .33 | .36 |
| 5 | 6 | 4 | 82 | .33 | .62 |
| 5 | 7 | 4 | 82 | .33 | .62 |
| 5 | 8 | 4 | 113 | .33 | .47 |
| 5 | 9 | 6 | 199 | 0.00 | .07 |
| 6 | 1 | 4 | 189 | .33 | .12 |
| 6 | 2 | 4 | 180 | .33 | .16 |
| 6 | 3 | 6 | 216 | 0.00 | 0.00 |
| 6 | 4 | 6 | 207 | 0.00 | .04 |
| 6 | 5 | 6 | 216 | 0.00 | 0.00 |
| 6 | 6 | 6 | 216 | 0.00 | 0.00 |
| 6 | 7 | 6 | 216 | 0.00 | 0.00 |
| 6 | 8 | 6 | 216 | 0.00 | 0.00 |
| 6 | 9 | 6 | 216 | 0.00 | 0.00 |
| 7 | 1 | 6 | 216 | 0.00 | 0.00 |
| 7 | 2 | 6 | 216 | 0.00 | 0.00 |
| 7 | 3 | 6 | 216 | 0.00 | 0.00 |
| 7 | 4 | 6 | 216 | 0.00 | 0.00 |
| 7 | 5 | 6 | 216 | 0.00 | 0.00 |
| 7 | 6 | 6 | 216 | 0.00 | 0.00 |
| 7 | 7 | 6 | 216 | 0.00 | 0.00 |
| 7 | 8 | 6 | 216 | 0.00 | 0.00 |
| 7 | 9 | 6 | 216 | 0.00 | 0.00 |

TC= 222

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | 217 | 217 | .53 | 2893.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | | | 0.00 | 0.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 |
| 2 | 6.00 | 6.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 0.00 | 0.00 |
| 3 | 0.00 | 0.00 | 1.00 | 6.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 6.00 | 6.00 | 6.00 | 0.00 |
| 5 | 0.00 | 0.00 | 0.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 5 | 161 | .16 | .27 |
| 1 | 2 | 5 | 203 | .16 | .08 |
| 1 | 3 | 6 | 222 | 0.00 | 0.00 |
| 1 | 4 | 5 | 203 | .16 | .08 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 5 | 6 | 222 | 0.00 | 0.00 |
| 1 | 6 | 5 | 203 | .16 | .08 |
| 1 | 7 | 5 | 203 | .16 | .08 |
| 1 | 8 | 5 | 203 | .16 | .08 |
| 1 | 9 | 6 | 222 | 0.00 | 0.00 |
| 2 | 1 | | 71 | 1.00 | .68 |
| 2 | 2 | | 146 | 1.00 | .34 |
| 2 | 3 | 6 | 189 | 0.00 | .14 |
| 2 | 4 | 6 | 189 | 0.00 | .14 |
| 2 | 5 | 5 | 170 | .16 | .23 |
| 2 | 6 | 6 | 189 | 0.00 | .14 |
| 2 | 7 | 5 | 170 | .16 | .23 |
| 2 | 8 | 6 | 222 | 0.00 | 0.00 |
| 2 | 9 | 6 | 222 | 0.00 | 0.00 |
| 3 | 1 | 6 | 99 | 0.00 | .55 |
| 3 | 2 | 6 | 134 | 0.00 | .39 |
| 3 | 3 | 5 | 199 | .16 | .10 |
| 3 | 4 | | 146 | 1.00 | .34 |
| 3 | 5 | | 142 | 1.00 | .36 |
| 3 | 6 | 6 | 218 | 0.00 | .01 |
| 3 | 7 | 6 | 218 | 0.00 | .01 |
| 3 | 8 | 6 | 222 | 0.00 | 0.00 |
| 3 | 9 | 6 | 222 | 0.00 | 0.00 |
| 4 | 1 | 6 | 205 | 0.00 | .07 |
| 4 | 2 | 6 | 213 | 0.00 | .04 |
| 4 | 3 | 6 | 222 | 0.00 | 0.00 |
| 4 | 4 | 6 | 134 | 0.00 | .39 |
| 4 | 5 | 6 | 184 | 0.00 | .17 |
| 4 | 6 | | 108 | 1.00 | .51 |
| 4 | 7 | | 146 | 1.00 | .34 |
| 4 | 8 | | 122 | 1.00 | .45 |
| 4 | 9 | 6 | 222 | 0.00 | 0.00 |
| 5 | 1 | 6 | 115 | 0.00 | .48 |
| 5 | 2 | 6 | 222 | 0.00 | 0.00 |
| 5 | 3 | 6 | 184 | 0.00 | .17 |
| 5 | 4 | | 10 | 1.00 | .95 |
| 5 | 5 | 6 | 143 | 0.00 | .35 |
| 5 | 6 | 6 | 88 | 0.00 | .60 |
| 5 | 7 | 6 | 88 | 0.00 | .60 |
| 5 | 8 | 6 | 119 | 0.00 | .46 |
| 5 | 9 | 6 | 205 | 0.00 | .07 |
| 6 | 1 | 6 | 195 | 0.00 | .12 |
| 6 | 2 | 6 | 186 | 0.00 | .16 |
| 6 | 3 | 6 | 222 | 0.00 | 0.00 |
| 6 | 4 | 6 | 213 | 0.00 | .04 |
| 6 | 5 | 6 | 222 | 0.00 | 0.00 |
| 6 | 6 | 6 | 222 | 0.00 | 0.00 |
| 6 | 7 | 6 | 222 | 0.00 | 0.00 |
| 6 | 8 | 6 | 222 | 0.00 | 0.00 |
| 6 | 9 | 6 | 222 | 0.00 | 0.00 |
| 7 | 1 | 6 | 222 | 0.00 | 0.00 |
| 7 | 2 | 6 | 222 | 0.00 | 0.00 |
| 7 | 3 | 6 | 222 | 0.00 | 0.00 |
| 7 | 4 | 6 | 222 | 0.00 | 0.00 |
| 7 | 5 | 6 | 222 | 0.00 | 0.00 |
| 7 | 6 | 6 | 222 | 0.00 | 0.00 |
| 7 | 7 | 6 | 222 | 0.00 | 0.00 |
| 7 | 8 | 6 | 222 | 0.00 | 0.00 |
| 7 | 9 | 6 | 222 | 0.00 | 0.00 |

WEEK= 38

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | | | 0.00 | 0.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | | | 0.00 | 0.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 6.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | 0.00 | 0.00 | 0.00 | 6.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 6.00 | 6.00 | 6.00 | 0.00 |
| 5 | 0.00 | 0.00 | 0.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 6 | 167 | 0.00 | .26 |
| 1 | 2 | 6 | 209 | 0.00 | .08 |
| 1 | 3 | 6 | 228 | 0.00 | 0.00 |
| 1 | 4 | 6 | 209 | 0.00 | .08 |
| 1 | 5 | 6 | 228 | 0.00 | 0.00 |
| [illegible] | 6 | 6 | 209 | 0.00 | .08 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 7 | 6 | 209 | 0.00 | .08 |
| 1 | 8 | 6 | 209 | 0.00 | .08 |
| 1 | 9 | 6 | 228 | 0.00 | 0.00 |
| 2 | 1 | | 71 | 1.00 | .68 |
| 2 | 2 | | 146 | 1.00 | .35 |
| 2 | 3 | 6 | 195 | 0.00 | .14 |
| 2 | 4 | 6 | 195 | 0.00 | .14 |
| 2 | 5 | 6 | 176 | 0.00 | .22 |
| 2 | 6 | 6 | 195 | 0.00 | .14 |
| 2 | 7 | 6 | 176 | 0.00 | .22 |
| 2 | 8 | 6 | 228 | 0.00 | 0.00 |
| 2 | 9 | 6 | 228 | 0.00 | 0.00 |
| 3 | 1 | 6 | 105 | 0.00 | .53 |
| 3 | 2 | 6 | 140 | 0.00 | .38 |
| 3 | 3 | 6 | 205 | 0.00 | .10 |
| 3 | 4 | | 146 | 1.00 | .35 |
| 3 | 5 | | 142 | 1.00 | .37 |
| 3 | 6 | 6 | 224 | 0.00 | .01 |
| 3 | 7 | 6 | 224 | 0.00 | .01 |
| 3 | 8 | 6 | 228 | 0.00 | 0.00 |
| 3 | 9 | 6 | 228 | 0.00 | 0.00 |
| 4 | 1 | 6 | 211 | 0.00 | .07 |
| 4 | 2 | 6 | 219 | 0.00 | .03 |
| 4 | 3 | 6 | 228 | 0.00 | 0.00 |
| 4 | 4 | 6 | 140 | 0.00 | .38 |
| 4 | 5 | 6 | 190 | 0.00 | .16 |
| 4 | 6 | | 108 | 1.00 | .52 |
| 4 | 7 | | 146 | 1.00 | .35 |
| 4 | 8 | | 122 | 1.00 | .46 |
| 4 | 9 | 6 | 228 | 0.00 | 0.00 |
| 5 | 1 | 6 | 121 | 0.00 | .46 |
| 5 | 2 | 6 | 228 | 0.00 | 0.00 |
| 5 | 3 | 6 | 190 | 0.00 | .16 |
| 5 | 4 | | 10 | 1.00 | .95 |
| 5 | 5 | 6 | 149 | 0.00 | .34 |
| 5 | 6 | 6 | 94 | 0.00 | .58 |
| 5 | 7 | 6 | 94 | 0.00 | .58 |
| 5 | 8 | 6 | 125 | 0.00 | .45 |
| 5 | 9 | 6 | 211 | 0.00 | .07 |
| 6 | 1 | 6 | 201 | 0.00 | .11 |
| 6 | 2 | 6 | 192 | 0.00 | .15 |
| 6 | 3 | 6 | 228 | 0.00 | 0.00 |
| 6 | 4 | 6 | 219 | 0.00 | .03 |
| 6 | 5 | 6 | 228 | 0.00 | 0.00 |
| 6 | 6 | 6 | 228 | 0.00 | 0.00 |
| 6 | 7 | 6 | 228 | 0.00 | 0.00 |
| 6 | 8 | 6 | 228 | 0.00 | 0.00 |
| 6 | 9 | 6 | 228 | 0.00 | 0.00 |
| 7 | 1 | 6 | 228 | 0.00 | 0.00 |
| 7 | 2 | 6 | 228 | 0.00 | 0.00 |
| 7 | 3 | 6 | 228 | 0.00 | 0.00 |
| 7 | 4 | 6 | 228 | 0.00 | 0.00 |
| 7 | 5 | 6 | 228 | 0.00 | 0.00 |
| 7 | 6 | 6 | 228 | 0.00 | 0.00 |
| 7 | 7 | 6 | 228 | 0.00 | 0.00 |
| 7 | 8 | 6 | 228 | 0.00 | 0.00 |
| 7 | 9 | 6 | 228 | 0.00 | 0.00 |

WEEK= 39

TC= 234

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | 233 | 233 | .07 | 430.0 |
| 2 | 234 | 238 | 4.59 | 49060.0 |
| 3 | 229 | 232 | 3.64 | 43779.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | 229 | 246 | 17.60 | 211243.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 6.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 |
| 2 | 5.00 | 0.00 | 5.00 | 5.00 | 6.00 | 5.00 | 6.00 | 0.00 | 0.00 |
| 3 | 6.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5 | 6.00 | 0.00 | 0.00 | 6.00 | 6.00 | 6.00 | 6.00 | 0.00 | 0.00 |
| 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | | 167 | 1.00 | .28 |
| 1 | 2 | 5 | 214 | .16 | .08 |
| 1 | 3 | 6 | 234 | 0.00 | 0.00 |
| 1 | 4 | 5 | 214 | .16 | .08 |
| 1 | 5 | 6 | 234 | 0.00 | 0.00 |
| 1 | 6 | 5 | 214 | .16 | .08 |
| 1 | 7 | 5 | 214 | .16 | .08 |

| | | | | |
|---|---|---|---|---|
| | 5 | 214 | .16 | .08 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 9 | 6 | 234 | 0.00 | 0.00 |
| 2 | 1 | 1 | 72 | .83 | .69 |
| 2 | 2 | 6 | 152 | 0.00 | .35 |
| 2 | 3 | 1 | 196 | .83 | .16 |
| 2 | 4 | 1 | 196 | .83 | .16 |
| 2 | 5 | | 176 | 1.00 | .24 |
| 2 | 6 | 1 | 196 | .83 | .16 |
| 2 | 7 | | 176 | 1.00 | .24 |
| 2 | 8 | 6 | 234 | 0.00 | 0.00 |
| 2 | 9 | 6 | 234 | 0.00 | 0.00 |
| 3 | 1 | | 105 | 1.00 | .55 |
| 3 | 2 | 6 | 146 | 0.00 | .37 |
| 3 | 3 | 5 | 210 | .16 | .10 |
| 3 | 4 | 6 | 152 | 0.00 | .35 |
| 3 | 5 | 6 | 148 | 0.00 | .36 |
| 3 | 6 | 6 | 230 | 0.00 | .01 |
| 3 | 7 | 6 | 230 | 0.00 | .01 |
| 3 | 8 | 6 | 234 | 0.00 | 0.00 |
| 3 | 9 | 6 | 234 | 0.00 | 0.00 |
| 4 | 1 | 6 | 217 | 0.00 | .07 |
| 4 | 2 | 6 | 225 | 0.00 | .03 |
| 4 | 3 | 6 | 234 | 0.00 | 0.00 |
| 4 | 4 | 6 | 146 | 0.00 | .37 |
| 4 | 5 | 6 | 196 | 0.00 | .16 |
| 4 | 6 | 6 | 114 | 0.00 | .51 |
| 4 | 7 | 6 | 152 | 0.00 | .35 |
| 4 | 8 | 6 | 128 | 0.00 | .45 |
| 4 | 9 | 6 | 234 | 0.00 | 0.00 |
| 5 | 1 | | 121 | 1.00 | .48 |
| 5 | 2 | 6 | 234 | 0.00 | 0.00 |
| 5 | 3 | 6 | 196 | 0.00 | .16 |
| 5 | 4 | | 10 | 1.00 | .95 |
| 5 | 5 | | 149 | 1.00 | .36 |
| 5 | 6 | | 94 | 1.00 | .59 |
| 5 | 7 | | 94 | 1.00 | .59 |
| 5 | 8 | 6 | 131 | 0.00 | .44 |
| 5 | 9 | 6 | 217 | 0.00 | .07 |
| 6 | 1 | 6 | 207 | 0.00 | .11 |
| 6 | 2 | 6 | 198 | 0.00 | .15 |
| 6 | 3 | 6 | 234 | 0.00 | 0.00 |
| 6 | 4 | 6 | 225 | 0.00 | .03 |
| 6 | 5 | 6 | 234 | 0.00 | 0.00 |
| 6 | 6 | 6 | 234 | 0.00 | 0.00 |
| 6 | 7 | 6 | 234 | 0.00 | 0.00 |
| 6 | 8 | 6 | 234 | 0.00 | 0.00 |
| 6 | 9 | 6 | 234 | 0.00 | 0.00 |
| 7 | 1 | 6 | 234 | 0.00 | 0.00 |
| 7 | 2 | 6 | 234 | 0.00 | 0.00 |
| 7 | 3 | 6 | 234 | 0.00 | 0.00 |
| 7 | 4 | 6 | 234 | 0.00 | 0.00 |
| 7 | 5 | 6 | 234 | 0.00 | 0.00 |
| 7 | 6 | 6 | 234 | 0.00 | 0.00 |
| 7 | 7 | 6 | 234 | 0.00 | 0.00 |
| 7 | 8 | 6 | 234 | 0.00 | 0.00 |
| 7 | 9 | 6 | 234 | 0.00 | 0.00 |

WEEK= 4

TC= 24

| | | | | |
|---|---|---|---|---|
| 1 | | | 0.00 | 0.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | 239 | 241 | 2.55 | 30622.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 6.00 | 0.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 0.00 | 0.00 |
| 3 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5 | 6.00 | 0.00 | 0.00 | 6.00 | 6.00 | 6.00 | 6.00 | 0.00 | 0.00 |
| 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | | 167 | 1.00 | .30 |
| 1 | 2 | 6 | 220 | 0.00 | .08 |
| 1 | 3 | 6 | 240 | 0.00 | 0.00 |
| 1 | 4 | 6 | 220 | 0.00 | .08 |
| 1 | 5 | 6 | 240 | 0.00 | 0.00 |
| 1 | 6 | 6 | 220 | 0.00 | .08 |
| 1 | 7 | 6 | 220 | 0.00 | .08 |
| 1 | 8 | 6 | 220 | 0.00 | .08 |
| 1 | 9 | 6 | 240 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 2 | 2 | 6 | 158 | 0.00 | .34 |
| 2 | 3 | | 196 | 1.00 | .18 |
| 2 | 4 | | 196 | 1.00 | .18 |
| 2 | 5 | | 176 | 1.00 | .26 |
| 2 | 6 | | 196 | 1.00 | .18 |
| 2 | 7 | | 176 | 1.00 | .26 |
| 2 | 8 | 6 | 240 | 0.00 | 0.00 |
| 2 | 9 | 6 | 240 | 0.00 | 0.00 |
| 3 | 1 | | 105 | 1.00 | .56 |
| 3 | 2 | 6 | 152 | 0.00 | .36 |
| 3 | 3 | 6 | 216 | 0.00 | .10 |
| 3 | 4 | 6 | 158 | 0.00 | .34 |
| 3 | 5 | 6 | 154 | 0.00 | .35 |
| 3 | 6 | 6 | 236 | 0.00 | .01 |
| 3 | 7 | 6 | 236 | 0.00 | .01 |
| 3 | 8 | 6 | 240 | 0.00 | 0.00 |
| 3 | 9 | 6 | 240 | 0.00 | 0.00 |
| 4 | 1 | 6 | 223 | 0.00 | .07 |
| 4 | 2 | 6 | 231 | 0.00 | .03 |
| 4 | 3 | 6 | 240 | 0.00 | 0.00 |
| 4 | 4 | 6 | 152 | 0.00 | .36 |
| 4 | 5 | 6 | 202 | 0.00 | .15 |
| 4 | 6 | 6 | 120 | 0.00 | .50 |
| 4 | 7 | 6 | 158 | 0.00 | .34 |
| 4 | 8 | 6 | 134 | 0.00 | .44 |
| 4 | 9 | 6 | 240 | 0.00 | 0.00 |
| 5 | 1 | | 121 | 1.00 | .49 |
| 5 | 2 | 6 | 240 | 0.00 | 0.00 |
| 5 | 3 | 6 | 202 | 0.00 | .15 |
| 5 | 4 | | 10 | 1.00 | .95 |
| 5 | 5 | | 149 | 1.00 | .37 |
| 5 | 6 | | 94 | 1.00 | .60 |
| 5 | 7 | | 94 | 1.00 | .60 |
| 5 | 8 | 6 | 137 | 0.00 | .42 |
| 5 | 9 | 6 | 223 | 0.00 | .07 |
| 6 | 1 | 6 | 213 | 0.00 | .11 |
| 6 | 2 | 6 | 204 | 0.00 | .15 |
| 6 | 3 | 6 | 240 | 0.00 | 0.00 |
| 6 | 4 | 6 | 231 | 0.00 | .03 |
| 6 | 5 | 6 | 240 | 0.00 | 0.00 |
| 6 | 6 | 6 | 240 | 0.00 | 0.00 |
| 6 | 7 | 6 | 240 | 0.00 | 0.00 |
| 6 | 8 | 6 | 240 | 0.00 | 0.00 |
| 6 | 9 | 6 | 240 | 0.00 | 0.00 |
| 7 | 1 | 6 | 240 | 0.00 | 0.00 |
| 7 | 2 | 6 | 240 | 0.00 | 0.00 |
| 7 | 3 | 6 | 240 | 0.00 | 0.00 |
| 7 | 4 | 6 | 240 | 0.00 | 0.00 |
| 7 | 5 | 6 | 240 | 0.00 | 0.00 |
| 7 | 6 | 6 | 240 | 0.00 | 0.00 |
| 7 | 7 | 6 | 240 | 0.00 | 0.00 |
| 7 | 8 | 6 | 240 | 0.00 | 0.00 |
| 7 | 9 | 6 | 240 | 0.00 | 0.00 |

WEEK= 41

TC= 246

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 2 | 243 | 243 | .14 | 1556.0 |
| 3 | 244 | 244 | .09 | 1120.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 |
| 2 | 3.00 | 0.00 | 3.00 | 3.00 | 4.00 | 3.00 | 4.00 | 0.00 | 0.00 |
| 3 | 6.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5 | 6.00 | 0.00 | 0.00 | 6.00 | 6.00 | 6.00 | 6.00 | 0.00 | 0.00 |
| 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 2 | 169 | .66 | .31 |
| 1 | 2 | 5 | 225 | .16 | .08 |
| 1 | 3 | 6 | 246 | 0.00 | 0.00 |
| 1 | 4 | 5 | 225 | .16 | .08 |
| 1 | 5 | 6 | 246 | 0.00 | 0.00 |
| 1 | 6 | 5 | 225 | .16 | .08 |
| 1 | 7 | 5 | 225 | .16 | .08 |
| 1 | 8 | 5 | 225 | .16 | .08 |
| 1 | 9 | 6 | 246 | 0.00 | 0.00 |
| 2 | 1 | 3 | 75 | .50 | .69 |
| 2 | 2 | 6 | 164 | 0.00 | .33 |

| | | | | | |
|---|---|---|---|---|---|
| 2 | 4 | 3 | 199 | .50 | .19 |
| 2 | 5 | 2 | 178 | .66 | .27 |
| 2 | 6 | 3 | 199 | .50 | .19 |
| 2 | 7 | 2 | 178 | .66 | .27 |
| 2 | 8 | 6 | 246 | 0.00 | 0.00 |
| 2 | 9 | 6 | 246 | 0.00 | 0.00 |
| 3 | 1 | | 105 | 1.00 | .57 |
| 3 | 2 | 6 | 158 | 0.00 | .35 |
| 3 | 3 | 5 | 221 | .16 | .10 |
| 3 | 4 | 6 | 164 | 0.00 | .33 |
| 3 | 5 | 6 | 160 | 0.00 | .34 |
| 3 | 6 | 6 | 242 | 0.00 | .01 |
| 3 | 7 | 6 | 242 | 0.00 | .01 |
| 3 | 8 | 6 | 246 | 0.00 | 0.00 |
| 3 | 9 | 6 | 246 | 0.00 | 0.00 |
| 4 | 1 | 6 | 229 | 0.00 | .06 |
| 4 | 2 | 6 | 237 | 0.00 | .03 |
| 4 | 3 | 6 | 246 | 0.00 | 0.00 |
| 4 | 4 | 6 | 158 | 0.00 | .35 |
| 4 | 5 | 6 | 208 | 0.00 | .15 |
| 4 | 6 | 6 | 126 | 0.00 | .48 |
| 4 | 7 | 6 | 164 | 0.00 | .33 |
| 4 | 8 | 6 | 140 | 0.00 | .43 |
| 4 | 9 | 6 | 246 | 0.00 | 0.00 |
| 5 | 1 | | 121 | 1.00 | .50 |
| 5 | 2 | 6 | 246 | 0.00 | 0.00 |
| 5 | 3 | 6 | 208 | 0.00 | .15 |
| 5 | 4 | | 10 | 1.00 | .95 |
| 5 | 5 | | 149 | 1.00 | .39 |
| 5 | 6 | | 94 | 1.00 | .61 |
| 5 | 7 | | 94 | 1.00 | .61 |
| 5 | 8 | 6 | 143 | 0.00 | .41 |
| 5 | 9 | 6 | 229 | 0.00 | .06 |
| 6 | 1 | 6 | 219 | 0.00 | .10 |
| 6 | 2 | 6 | 210 | 0.00 | .14 |
| 6 | 3 | 6 | 246 | 0.00 | 0.00 |
| 6 | 4 | 6 | 237 | 0.00 | .03 |
| 6 | 5 | 6 | 246 | 0.00 | 0.00 |
| 6 | 6 | 6 | 246 | 0.00 | 0.00 |
| 6 | 7 | 6 | 246 | 0.00 | 0.00 |
| 6 | 8 | 6 | 246 | 0.00 | 0.00 |
| 6 | 9 | 6 | 246 | 0.00 | 0.00 |
| 7 | 1 | 6 | 246 | 0.00 | 0.00 |
| 7 | 2 | 6 | 246 | 0.00 | 0.00 |
| 7 | 3 | 6 | 246 | 0.00 | 0.00 |
| 7 | 4 | 6 | 246 | 0.00 | 0.00 |
| 7 | 5 | 6 | 246 | 0.00 | 0.00 |
| 7 | 6 | 6 | 246 | 0.00 | 0.00 |
| 7 | 7 | 6 | 246 | 0.00 | 0.00 |
| 7 | 8 | 6 | 246 | 0.00 | 0.00 |
| 7 | 9 | 6 | 246 | 0.00 | 0.00 |

WEEK= 42

TC= 252

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | | | 0.00 | 0.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | | | 0.00 | 0.0 |
| 4 | 247 | 252 | 5.35 | 42825.0 |
| 5 | 247 | 290 | 43.85 | 263157.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | 6.00 | 0.00 | 6.00 | 0.00 | 6.00 | 6.00 | 6.00 | 0.00 | 0.00 |
| 4 | 0.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 6.00 | 0.00 |
| 5 | 6.00 | 0.00 | 0.00 | 0.00 | 6.00 | 6.00 | 6.00 | 6.00 | 0.00 |
| 6 | 0.00 | 6.00 | 0.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | | 169 | 1.00 | .32 |
| 1 | 2 | 6 | 231 | 0.00 | .08 |
| 1 | 3 | 6 | 252 | 0.00 | 0.00 |
| 1 | 4 | 6 | 231 | 0.00 | .08 |
| 1 | 5 | 6 | 252 | 0.00 | 0.00 |
| 1 | 6 | 6 | 231 | 0.00 | .08 |
| 1 | 7 | 6 | 231 | 0.00 | .08 |
| 1 | 8 | 6 | 231 | 0.00 | .08 |
| 1 | 9 | 6 | 252 | 0.00 | 0.00 |
| 2 | 1 | | 75 | 1.00 | .70 |
| 2 | 2 | 6 | 170 | 0.00 | .32 |
| 2 | 3 | 6 | 205 | 0.00 | .18 |

| | | | | | |
|---|---|---|---|---|---|
| 2 | 4 | 6 | 205 | 0.00 | .18 |
| 2 | 5 | 6 | 184 | 0.00 | .26 |
| 2 | 6 | 6 | 205 | 0.00 | .18 |
| 2 | 7 | 6 | 184 | 0.00 | .26 |
| 2 | 8 | 6 | 252 | 0.00 | 0.00 |
| 2 | 9 | 6 | 252 | 0.00 | 0.00 |
| 3 | 1 | | 105 | 1.00 | .58 |
| 3 | 2 | 6 | 164 | 0.00 | .34 |
| 3 | 3 | | 221 | 1.00 | .12 |
| 3 | 4 | 6 | 170 | 0.00 | .32 |
| 3 | 5 | | 160 | 1.00 | .36 |
| 3 | 6 | | 242 | 1.00 | .03 |
| 3 | 7 | | 242 | 1.00 | .03 |
| 3 | 8 | 6 | 252 | 0.00 | 0.00 |
| 3 | 9 | 6 | 252 | 0.00 | 0.00 |
| 4 | 1 | 6 | 235 | 0.00 | .06 |
| 4 | 2 | | 237 | 1.00 | .05 |
| 4 | 3 | 6 | 252 | 0.00 | 0.00 |
| 4 | 4 | 6 | 164 | 0.00 | .34 |
| 4 | 5 | 6 | 214 | 0.00 | .15 |
| 4 | 6 | 6 | 132 | 0.00 | .47 |
| 4 | 7 | 6 | 170 | 0.00 | .32 |
| 4 | 8 | | 140 | 1.00 | .44 |
| 4 | 9 | 6 | 252 | 0.00 | 0.00 |
| 5 | 1 | | 121 | 1.00 | .51 |
| 5 | 2 | 6 | 252 | 0.00 | 0.00 |
| 5 | 3 | 6 | 214 | 0.00 | .15 |
| 5 | 4 | 6 | 16 | 0.00 | .93 |
| 5 | 5 | | 149 | 1.00 | .40 |
| 5 | 6 | | 94 | 1.00 | .62 |
| 5 | 7 | | 94 | 1.00 | .62 |
| 5 | 8 | | 143 | 1.00 | .43 |
| 5 | 9 | 6 | 235 | 0.00 | .06 |
| 6 | 1 | 6 | 225 | 0.00 | .10 |
| 6 | 2 | | 210 | 1.00 | .16 |
| 6 | 3 | 6 | 252 | 0.00 | 0.00 |
| 6 | 4 | | 237 | 1.00 | .05 |
| 6 | 5 | 6 | 252 | 0.00 | 0.00 |
| 6 | 6 | 6 | 252 | 0.00 | 0.00 |
| 6 | 7 | 6 | 252 | 0.00 | 0.00 |
| 6 | 8 | 6 | 252 | 0.00 | 0.00 |
| 6 | 9 | 6 | 252 | 0.00 | 0.00 |
| 7 | 1 | 6 | 252 | 0.00 | 0.00 |
| 7 | 2 | 6 | 252 | 0.00 | 0.00 |
| 7 | 3 | 6 | 252 | 0.00 | 0.00 |
| 7 | 4 | 6 | 252 | 0.00 | 0.00 |
| 7 | 5 | 6 | 252 | 0.00 | 0.00 |
| 7 | 6 | 6 | 252 | 0.00 | 0.00 |
| 7 | 7 | 6 | 252 | 0.00 | 0.00 |
| 7 | 8 | 6 | 252 | 0.00 | 0.00 |
| 7 | 9 | 6 | 252 | 0.00 | 0.00 |

WEEK= 43

TC= 258

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| [illegible] | | | [illegible] | [illegible] |
| 3 | | | 0.00 | 0.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | 253 | 261 | 8.98 | 106179.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | 6.00 | 0.00 | 6.00 | 0.00 | 6.00 | 6.00 | 6.00 | 0.00 | 0.00 |
| 4 | 6.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 6.00 | 0.00 |
| 5 | 6.00 | 6.00 | 0.00 | 6.00 | 6.00 | 6.00 | 6.00 | 0.00 | 0.00 |
| 6 | 0.00 | 0.00 | 0.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 6 | 175 | 0.00 | .32 |
| 1 | 2 | 6 | 237 | 0.00 | .08 |
| 1 | 3 | 6 | 258 | 0.00 | 0.00 |
| 1 | 4 | 6 | 237 | 0.00 | .08 |
| 1 | 5 | 6 | 258 | 0.00 | 0.00 |
| 1 | 6 | 6 | 237 | 0.00 | .08 |
| 1 | 7 | 6 | 237 | 0.00 | .08 |
| 1 | 8 | 6 | 237 | 0.00 | .08 |
| 1 | 9 | 6 | 258 | 0.00 | 0.00 |
| 2 | 1 | | 75 | 1.00 | .70 |
| 2 | 2 | 6 | 176 | 0.00 | .31 |
| 2 | 3 | 6 | 211 | 0.00 | .18 |
| 2 | 4 | 6 | 211 | 0.00 | .18 |
| 2 | 5 | 6 | 190 | 0.00 | .26 |

| | | | | | |
|---|---|---|---|---|---|
| 2 | 6 | 6 | 211 | 0.00 | .18 |
| 2 | 7 | 6 | 190 | 0.00 | .26 |
| 2 | 8 | 6 | 258 | 0.00 | 0.00 |
| 2 | 9 | 6 | 258 | 0.00 | 0.00 |
| 3 | 1 | | 105 | 1.00 | .59 |
| 3 | 2 | 6 | 170 | 0.00 | .34 |
| 3 | 3 | | 221 | 1.00 | .14 |
| 3 | 4 | 6 | 176 | 0.00 | .31 |
| 3 | 5 | | 160 | 1.00 | .37 |
| 3 | 6 | | 242 | 1.00 | .06 |
| 3 | 7 | | 242 | 1.00 | .06 |
| 3 | 8 | 6 | 258 | 0.00 | 0.00 |
| 3 | 9 | 6 | 258 | 0.00 | 0.00 |
| 4 | 1 | | 235 | 1.00 | .08 |
| 4 | 2 | | 237 | 1.00 | .08 |
| 4 | 3 | 6 | 258 | 0.00 | 0.00 |
| 4 | 4 | 6 | 170 | 0.00 | .34 |
| 4 | 5 | 6 | 220 | 0.00 | .14 |
| 4 | 6 | 6 | 138 | 0.00 | .46 |
| 4 | 7 | 6 | 176 | 0.00 | .31 |
| 4 | 8 | | 140 | 1.00 | .45 |
| 4 | 9 | 6 | 258 | 0.00 | 0.00 |
| 5 | 1 | | 121 | 1.00 | .53 |
| 5 | 2 | | 252 | 1.00 | .02 |
| 5 | 3 | 6 | 220 | 0.00 | .14 |
| 5 | 4 | | 16 | 1.00 | .93 |
| 5 | 5 | | 149 | 1.00 | .42 |
| 5 | 6 | | 94 | 1.00 | .63 |
| 5 | 7 | | 94 | 1.00 | .63 |
| 5 | 8 | 6 | 149 | 0.00 | .42 |
| 5 | 9 | 6 | 241 | 0.00 | .06 |
| 6 | 1 | 6 | 231 | 0.00 | .10 |
| 6 | 2 | 6 | 216 | 0.00 | .16 |
| 6 | 3 | 6 | 258 | 0.00 | 0.00 |
| 6 | 4 | | 237 | 1.00 | .08 |
| 6 | 5 | 6 | 258 | 0.00 | 0.00 |
| 6 | 6 | 6 | 258 | 0.00 | 0.00 |
| 6 | 7 | 6 | 258 | 0.00 | 0.00 |
| 6 | 8 | 6 | 258 | 0.00 | 0.00 |
| 6 | 9 | 6 | 258 | 0.00 | 0.00 |
| 7 | 1 | 6 | 258 | 0.00 | 0.00 |
| 7 | 2 | 6 | 258 | 0.00 | 0.00 |
| 7 | 3 | 6 | 258 | 0.00 | 0.00 |
| 7 | 4 | 6 | 258 | 0.00 | 0.00 |
| 7 | 5 | 6 | 258 | 0.00 | 0.00 |
| 7 | 6 | 6 | 258 | 0.00 | 0.00 |
| 7 | 7 | 6 | 258 | 0.00 | 0.00 |
| 7 | 8 | 6 | 258 | 0.00 | 0.00 |
| 7 | 9 | 6 | 258 | 0.00 | 0.00 |

WEEK= 44

TC= 264

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | | | 0.00 | 0.0 |
| 3 | | | 0.00 | 0.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | 262 | 263 | 2.16 | 25562.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | 6.00 | 0.00 | 6.00 | 0.00 | 6.00 | 6.00 | 6.00 | 0.00 | 0.00 |
| 4 | 5.00 | 5.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 6.00 | 0.00 |
| 5 | 5.00 | 5.00 | 0.00 | 5.00 | 6.00 | 5.00 | 5.00 | 0.00 | 0.00 |
| 6 | 0.00 | 0.00 | 0.00 | 5.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 6 | 181 | 0.00 | .31 |
| 1 | 2 | 6 | 243 | 0.00 | .07 |
| 1 | 3 | 6 | 264 | 0.00 | 0.00 |
| 1 | 4 | 6 | 243 | 0.00 | .07 |
| 1 | 5 | 6 | 264 | 0.00 | 0.00 |
| 1 | 6 | 6 | 243 | 0.00 | .07 |
| 1 | 7 | 6 | 243 | 0.00 | .07 |
| 1 | 8 | 6 | 243 | 0.00 | .07 |
| 1 | 9 | 6 | 264 | 0.00 | 0.00 |
| 2 | 1 | | 75 | 1.00 | .71 |
| 2 | 2 | 6 | 182 | 0.00 | .31 |
| 2 | 3 | 6 | 217 | 0.00 | .17 |
| 2 | 4 | 6 | 217 | 0.00 | .17 |
| 2 | 5 | 6 | 196 | 0.00 | .25 |
| 2 | 6 | 6 | 217 | 0.00 | .17 |
| 2 | 7 | 6 | 196 | 0.00 | .25 |

| | | | | | |
|---|---|---|---|---|---|
| 2 | 8 | 6 | 264 | 0.00 | 0.00 |
| 2 | 9 | 6 | 264 | 0.00 | 0.00 |
| 3 | 1 | | 105 | 1.00 | .60 |
| 3 | 2 | 6 | 176 | 0.00 | .33 |
| 3 | 3 | | 221 | 1.00 | .16 |
| 3 | 4 | 6 | 182 | 0.00 | .31 |
| 3 | 5 | | 160 | 1.00 | .39 |
| 3 | 6 | | 242 | 1.00 | .08 |
| 3 | 7 | | 242 | 1.00 | .08 |
| 3 | 8 | 6 | 264 | 0.00 | 0.00 |
| 3 | 9 | 6 | 264 | 0.00 | 0.00 |
| 4 | 1 | 1 | 236 | .83 | .10 |
| 4 | 2 | 1 | 238 | .83 | .09 |
| 4 | 3 | 6 | 264 | 0.00 | 0.00 |
| 4 | 4 | 6 | 176 | 0.00 | .33 |
| 4 | 5 | 6 | 226 | 0.00 | .14 |
| 4 | 6 | 6 | 144 | 0.00 | .45 |
| 4 | 7 | 6 | 182 | 0.00 | .31 |
| 4 | 8 | | 140 | 1.00 | .46 |
| 4 | 9 | 6 | 264 | 0.00 | 0.00 |
| 5 | 1 | 1 | 122 | .83 | .53 |
| 5 | 2 | 1 | 253 | .83 | .04 |
| 5 | 3 | 6 | 226 | 0.00 | .14 |
| 5 | 4 | 1 | 17 | .83 | .93 |
| 5 | 5 | | 149 | 1.00 | .43 |
| 5 | 6 | 1 | 95 | .83 | .64 |
| 5 | 7 | 1 | 95 | .83 | .64 |
| 5 | 8 | 6 | 155 | 0.00 | .41 |
| 5 | 9 | 6 | 247 | 0.00 | .06 |
| 6 | 1 | 6 | 237 | 0.00 | .10 |
| 6 | 2 | 6 | 222 | 0.00 | .15 |
| 6 | 3 | 6 | 264 | 0.00 | 0.00 |
| 6 | 4 | 1 | 238 | .83 | .09 |
| 6 | 5 | 6 | 264 | 0.00 | 0.00 |
| 6 | 6 | 6 | 264 | 0.00 | 0.00 |
| 6 | 7 | 6 | 264 | 0.00 | 0.00 |
| 6 | 8 | 6 | 264 | 0.00 | 0.00 |
| 6 | 9 | 6 | 264 | 0.00 | 0.00 |
| 7 | 1 | 6 | 264 | 0.00 | 0.00 |
| 7 | 2 | 6 | 264 | 0.00 | 0.00 |
| 7 | 3 | 6 | 264 | 0.00 | 0.00 |
| 7 | 4 | 6 | 264 | 0.00 | 0.00 |
| 7 | 5 | 6 | 264 | 0.00 | 0.00 |
| 7 | 6 | 6 | 264 | 0.00 | 0.00 |
| 7 | 7 | 6 | 264 | 0.00 | 0.00 |
| 7 | 8 | 6 | 264 | 0.00 | 0.00 |
| 7 | 9 | 6 | 264 | 0.00 | 0.00 |

WEEK= 45

TC= 27

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | | | 0.00 | 0.0 |
| 2 | | | 0.00 | 0.0 |
| [illegible] | | | [illegible] | [illegible] |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | 265 | 265 | .34 | 4072.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | 6.00 | 0.00 | 6.00 | 0.00 | 6.00 | 6.00 | 6.00 | 0.00 | 0.00 |
| 4 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 6.00 | 0.00 |
| 5 | 1.00 | 1.00 | 0.00 | 1.00 | 6.00 | 1.00 | 1.00 | 0.00 | 0.00 |
| 6 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 6 | 187 | 0.00 | .30 |
| 1 | 2 | 6 | 249 | 0.00 | .07 |
| 1 | 3 | 6 | 270 | 0.00 | 0.00 |
| 1 | 4 | 6 | 249 | 0.00 | .07 |
| 1 | 5 | 6 | 270 | 0.00 | 0.00 |
| 1 | 6 | 6 | 249 | 0.00 | .07 |
| 1 | 7 | 6 | 249 | 0.00 | .07 |
| 1 | 8 | 6 | 249 | 0.00 | .07 |
| 1 | 9 | 6 | 270 | 0.00 | 0.00 |
| 2 | 1 | | 75 | 1.00 | .72 |
| 2 | 2 | 6 | 188 | 0.00 | .30 |
| 2 | 3 | 6 | 223 | 0.00 | .17 |
| 2 | 4 | 6 | 223 | 0.00 | .17 |
| 2 | 5 | 6 | 202 | 0.00 | .25 |
| 2 | 6 | 6 | 223 | 0.00 | .17 |
| 2 | 7 | 6 | 202 | 0.00 | .25 |
| 2 | 8 | 6 | 270 | 0.00 | 0.00 |
| 2 | 9 | 6 | 270 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 3 | 1 | | 105 | 1.00 | .61 |
| 3 | 2 | 6 | 182 | 0.00 | .32 |
| 3 | 3 | | 221 | 1.00 | .18 |
| 3 | 4 | 6 | 188 | 0.00 | .30 |
| 3 | 5 | | 160 | 1.00 | .40 |
| 3 | 6 | | 242 | 1.00 | .10 |
| 3 | 7 | | 242 | 1.00 | .10 |
| 3 | 8 | 6 | 270 | 0.00 | 0.00 |
| 3 | 9 | 6 | 270 | 0.00 | 0.00 |
| 4 | 1 | 5 | 241 | .16 | .10 |
| 4 | 2 | 5 | 243 | .16 | .10 |
| 4 | 3 | 6 | 270 | 0.00 | 0.00 |
| 4 | 4 | 6 | 182 | 0.00 | .32 |
| 4 | 5 | 6 | 232 | 0.00 | .14 |
| 4 | 6 | 6 | 150 | 0.00 | .44 |
| 4 | 7 | 6 | 188 | 0.00 | .30 |
| 4 | 8 | | 140 | 1.00 | .48 |
| 4 | 9 | 6 | 270 | 0.00 | 0.00 |
| 5 | 1 | 5 | 127 | .16 | .52 |
| 5 | 2 | 5 | 258 | .16 | .04 |
| 5 | 3 | 6 | 232 | 0.00 | .14 |
| 5 | 4 | 5 | 22 | .16 | .91 |
| 5 | 5 | | 149 | 1.00 | .44 |
| 5 | 6 | 5 | 100 | .16 | .62 |
| 5 | 7 | 5 | 100 | .16 | .62 |
| 5 | 8 | 6 | 161 | 0.00 | .40 |
| 5 | 9 | 6 | 253 | 0.00 | .06 |
| 6 | 1 | 6 | 243 | 0.00 | .10 |
| 6 | 2 | 6 | 228 | 0.00 | .15 |
| 6 | 3 | 6 | 270 | 0.00 | 0.00 |
| 6 | 4 | 5 | 243 | .16 | .10 |
| 6 | 5 | 6 | 270 | 0.00 | 0.00 |
| 6 | 6 | 6 | 270 | 0.00 | 0.00 |
| 6 | 7 | 6 | 270 | 0.00 | 0.00 |
| 6 | 8 | 6 | 270 | 0.00 | 0.00 |
| 6 | 9 | 6 | 270 | 0.00 | 0.00 |
| 7 | 1 | 6 | 270 | 0.00 | 0.00 |
| 7 | 2 | 6 | 270 | 0.00 | 0.00 |
| 7 | 3 | 6 | 270 | 0.00 | 0.00 |
| 7 | 4 | 6 | 270 | 0.00 | 0.00 |
| 7 | 5 | 6 | 270 | 0.00 | 0.00 |
| 7 | 6 | 6 | 270 | 0.00 | 0.00 |
| 7 | 7 | 6 | 270 | 0.00 | 0.00 |
| 7 | 8 | 6 | 270 | 0.00 | 0.00 |
| 7 | 9 | 6 | 270 | 0.00 | 0.00 |

WEEK= 46

TC= 276

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | | | 0.00 | 0.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | | | 0.00 | 0.0 |
| 5 | | | [illegible] | [illegible] |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | 271 | 272 | 1.85 | 21934.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | 6.00 | 0.00 | 6.00 | 0.00 | 6.00 | 6.00 | 6.00 | 0.00 | 0.00 |
| 4 | 2.00 | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 6.00 | 0.00 |
| 5 | 2.00 | 2.00 | 0.00 | 2.00 | 6.00 | 2.00 | 2.00 | 0.00 | 0.00 |
| 6 | 0.00 | 0.00 | 0.00 | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 6 | 193 | 0.00 | .30 |
| 1 | 2 | 6 | 255 | 0.00 | .07 |
| 1 | 3 | 6 | 276 | 0.00 | 0.00 |
| 1 | 4 | 6 | 255 | 0.00 | .07 |
| 1 | 5 | 6 | 276 | 0.00 | 0.00 |
| 1 | 6 | 6 | 255 | 0.00 | .07 |
| 1 | 7 | 6 | 255 | 0.00 | .07 |
| 1 | 8 | 6 | 255 | 0.00 | .07 |
| 1 | 9 | 6 | 276 | 0.00 | 0.00 |
| 2 | 1 | | 75 | 1.00 | .72 |
| 2 | 2 | 6 | 194 | 0.00 | .29 |
| 2 | 3 | 6 | 229 | 0.00 | .17 |
| 2 | 4 | 6 | 229 | 0.00 | .17 |
| 2 | 5 | 6 | 208 | 0.00 | .24 |
| 2 | 6 | 6 | 229 | 0.00 | .17 |
| 2 | 7 | 6 | 208 | 0.00 | .24 |
| 2 | 8 | 6 | 276 | 0.00 | 0.00 |
| 2 | 9 | 6 | 276 | 0.00 | 0.00 |
| 3 | 1 | | 105 | 1.00 | .61 |
| 3 | 2 | 6 | 188 | 0.00 | .31 |

| | | | | | |
|---|---|---|---|---|---|
| 3 | 3 | | 221 | 1.00 | .19 |
| 3 | 4 | 6 | 194 | 0.00 | .29 |
| 3 | 5 | | 160 | 1.00 | .42 |
| 3 | 6 | | 242 | 1.00 | .12 |
| 3 | 7 | | 242 | 1.00 | .12 |
| 3 | 8 | 6 | 276 | 0.00 | 0.00 |
| 3 | 9 | 6 | 276 | 0.00 | 0.00 |
| 4 | 1 | 4 | 245 | .33 | .11 |
| 4 | 2 | 4 | 247 | .33 | .10 |
| 4 | 3 | 6 | 276 | 0.00 | 0.00 |
| 4 | 4 | 6 | 188 | 0.00 | .31 |
| 4 | 5 | 6 | 238 | 0.00 | .13 |
| 4 | 6 | 6 | 156 | 0.00 | .43 |
| 4 | 7 | 6 | 194 | 0.00 | .29 |
| 4 | 8 | | 140 | 1.00 | .49 |
| 4 | 9 | 6 | 276 | 0.00 | 0.00 |
| 5 | 1 | 4 | 131 | .33 | .52 |
| 5 | 2 | 4 | 262 | .33 | .05 |
| 5 | 3 | 6 | 238 | 0.00 | .13 |
| 5 | 4 | 4 | 26 | .33 | .90 |
| 5 | 5 | | 149 | 1.00 | .46 |
| 5 | 6 | 4 | 104 | .33 | .62 |
| 5 | 7 | 4 | 104 | .33 | .62 |
| 5 | 8 | 6 | 167 | 0.00 | .39 |
| 5 | 9 | 6 | 259 | 0.00 | .06 |
| 6 | 1 | 6 | 249 | 0.00 | .09 |
| 6 | 2 | 6 | 234 | 0.00 | .15 |
| 6 | 3 | 6 | 276 | 0.00 | 0.00 |
| 6 | 4 | 4 | 247 | .33 | .10 |
| 6 | 5 | 6 | 276 | 0.00 | 0.00 |
| 6 | 6 | 6 | 276 | 0.00 | 0.00 |
| 6 | 7 | 6 | 276 | 0.00 | 0.00 |
| 6 | 8 | 6 | 276 | 0.00 | 0.00 |
| 6 | 9 | 6 | 276 | 0.00 | 0.00 |
| 7 | 1 | 6 | 276 | 0.00 | 0.00 |
| 7 | 2 | 6 | 276 | 0.00 | 0.00 |
| 7 | 3 | 6 | 276 | 0.00 | 0.00 |
| 7 | 4 | 6 | 276 | 0.00 | 0.00 |
| 7 | 5 | 6 | 276 | 0.00 | 0.00 |
| 7 | 6 | 6 | 276 | 0.00 | 0.00 |
| 7 | 7 | 6 | 276 | 0.00 | 0.00 |
| 7 | 8 | 6 | 276 | 0.00 | 0.00 |
| 7 | 9 | 6 | 276 | 0.00 | 0.00 |

WEEK= 47

TC= 282

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | | | 0.00 | 0.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | | | 0.00 | 0.0 |
| 4 | | | 0.00 | 0.0 |
| [illegible] | | | | |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | 277 | 278 | 1.55 | 18352.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | 6.00 | 0.00 | 6.00 | 0.00 | 6.00 | 6.00 | 6.00 | 0.00 | 0.00 |
| 4 | 2.00 | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 6.00 | 0.00 |
| 5 | 2.00 | 2.00 | 0.00 | 2.00 | 6.00 | 2.00 | 2.00 | 0.00 | 0.00 |
| 6 | 0.00 | 0.00 | 0.00 | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 6 | 199 | 0.00 | .29 |
| 1 | 2 | 6 | 261 | 0.00 | .07 |
| 1 | 3 | 6 | 282 | 0.00 | 0.00 |
| 1 | 4 | 6 | 261 | 0.00 | .07 |
| 1 | 5 | 6 | 282 | 0.00 | 0.00 |
| 1 | 6 | 6 | 261 | 0.00 | .07 |
| 1 | 7 | 6 | 261 | 0.00 | .07 |
| 1 | 8 | 6 | 261 | 0.00 | .07 |
| 1 | 9 | 6 | 282 | 0.00 | 0.00 |
| 2 | 1 | | 75 | 1.00 | .73 |
| 2 | 2 | 6 | 200 | 0.00 | .29 |
| 2 | 3 | 6 | 235 | 0.00 | .16 |
| 2 | 4 | 6 | 235 | 0.00 | .16 |
| 2 | 5 | 6 | 214 | 0.00 | .24 |
| 2 | 6 | 6 | 235 | 0.00 | .16 |
| 2 | 7 | 6 | 214 | 0.00 | .24 |
| 2 | 8 | 6 | 282 | 0.00 | 0.00 |
| 2 | 9 | 6 | 282 | 0.00 | 0.00 |
| 3 | 1 | | 105 | 1.00 | .62 |
| 3 | 2 | 6 | 194 | 0.00 | .31 |
| 3 | 3 | | 221 | 1.00 | .21 |
| 3 | 4 | 6 | 200 | 0.00 | .29 |

| | | | | | |
|---|---|---|---|---|---|
| 3 | 5 | | 160 | 1.00 | .43 |
| 3 | 6 | | 242 | 1.00 | .14 |
| 3 | 7 | | 242 | 1.00 | .14 |
| 3 | 8 | 6 | 282 | 0.00 | 0.00 |
| 3 | 9 | 6 | 282 | 0.00 | 0.00 |
| 4 | 1 | 4 | 249 | .33 | .11 |
| 4 | 2 | 4 | 251 | .33 | .10 |
| 4 | 3 | 6 | 282 | 0.00 | 0.00 |
| 4 | 4 | 6 | 194 | 0.00 | .31 |
| 4 | 5 | 6 | 244 | 0.00 | .13 |
| 4 | 6 | 6 | 162 | 0.00 | .42 |
| 4 | 7 | 6 | 200 | 0.00 | .29 |
| 4 | 8 | | 140 | 1.00 | .50 |
| 4 | 9 | 6 | 282 | 0.00 | 0.00 |
| 5 | 1 | 4 | 135 | .33 | .52 |
| 5 | 2 | 4 | 266 | .33 | .05 |
| 5 | 3 | 6 | 244 | 0.00 | .13 |
| 5 | 4 | 4 | 30 | .33 | .89 |
| 5 | 5 | | 149 | 1.00 | .47 |
| 5 | 6 | 4 | 108 | .33 | .61 |
| 5 | 7 | 4 | 108 | .33 | .61 |
| 5 | 8 | 6 | 173 | 0.00 | .38 |
| 5 | 9 | 6 | 265 | 0.00 | .06 |
| 6 | 1 | 6 | 255 | 0.00 | .09 |
| 6 | 2 | 6 | 240 | 0.00 | .14 |
| 6 | 3 | 6 | 282 | 0.00 | 0.00 |
| 6 | 4 | 4 | 251 | .33 | .10 |
| 6 | 5 | 6 | 282 | 0.00 | 0.00 |
| 6 | 6 | 6 | 282 | 0.00 | 0.00 |
| 6 | 7 | 6 | 282 | 0.00 | 0.00 |
| 6 | 8 | 6 | 282 | 0.00 | 0.00 |
| 6 | 9 | 6 | 282 | 0.00 | 0.00 |
| 7 | 1 | 6 | 282 | 0.00 | 0.00 |
| 7 | 2 | 6 | 282 | 0.00 | 0.00 |
| 7 | 3 | 6 | 282 | 0.00 | 0.00 |
| 7 | 4 | 6 | 282 | 0.00 | 0.00 |
| 7 | 5 | 6 | 282 | 0.00 | 0.00 |
| 7 | 6 | 6 | 282 | 0.00 | 0.00 |
| 7 | 7 | 6 | 282 | 0.00 | 0.00 |
| 7 | 8 | 6 | 282 | 0.00 | 0.00 |
| 7 | 9 | 6 | 282 | 0.00 | 0.00 |

WEEK= 48

TC= 288

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | | | 0.00 | 0.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | | | 0.00 | 0.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | 6.00 | 0.00 | 6.00 | 0.00 | 6.00 | 6.00 | 6.00 | 0.00 | 0.00 |
| 4 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 6.00 | 0.00 |
| 5 | 0.00 | 0.00 | 0.00 | 0.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 6 | 205 | 0.00 | .28 |
| 1 | 2 | 6 | 267 | 0.00 | .07 |
| 1 | 3 | 6 | 288 | 0.00 | 0.00 |
| 1 | 4 | 6 | 267 | 0.00 | .07 |
| 1 | 5 | 6 | 288 | 0.00 | 0.00 |
| 1 | 6 | 6 | 267 | 0.00 | .07 |
| 1 | 7 | 6 | 267 | 0.00 | .07 |
| 1 | 8 | 6 | 267 | 0.00 | .07 |
| 1 | 9 | 6 | 288 | 0.00 | 0.00 |
| 2 | 1 | | 75 | 1.00 | .73 |
| 2 | 2 | 6 | 206 | 0.00 | .28 |
| 2 | 3 | 6 | 241 | 0.00 | .16 |
| 2 | 4 | 6 | 241 | 0.00 | .16 |
| 2 | 5 | 6 | 220 | 0.00 | .23 |
| 2 | 6 | 6 | 241 | 0.00 | .16 |
| 2 | 7 | 6 | 220 | 0.00 | .23 |
| 2 | 8 | 6 | 288 | 0.00 | 0.00 |
| 2 | 9 | 6 | 288 | 0.00 | 0.00 |
| 3 | 1 | | 105 | 1.00 | .63 |
| 3 | 2 | 6 | 200 | 0.00 | .30 |
| 3 | 3 | | 221 | 1.00 | .23 |
| 3 | 4 | 6 | 206 | 0.00 | .28 |
| 3 | 5 | | 160 | 1.00 | .44 |
| 3 | 6 | | 242 | 1.00 | .15 |

| | | | | | |
|---|---|---|---|---|---|
| 3 | 7 | | 242 | 1.00 | .15 |
| 3 | 8 | 6 | 288 | 0.00 | 0.00 |
| 3 | 9 | 6 | 288 | 0.00 | 0.00 |
| 4 | 1 | 6 | 255 | 0.00 | .11 |
| 4 | 2 | 6 | 257 | 0.00 | .10 |
| 4 | 3 | 6 | 288 | 0.00 | 0.00 |
| 4 | 4 | 6 | 200 | 0.00 | .30 |
| 4 | 5 | 6 | 250 | 0.00 | .13 |
| 4 | 6 | 6 | 168 | 0.00 | .41 |
| 4 | 7 | 6 | 206 | 0.00 | .28 |
| 4 | 8 | | 140 | 1.00 | .51 |
| 4 | 9 | 6 | 288 | 0.00 | 0.00 |
| 5 | 1 | 6 | 141 | 0.00 | .51 |
| 5 | 2 | 6 | 272 | 0.00 | .05 |
| 5 | 3 | 6 | 250 | 0.00 | .13 |
| 5 | 4 | 6 | 36 | 0.00 | .87 |
| 5 | 5 | | 149 | 1.00 | .48 |
| 5 | 6 | 6 | 114 | 0.00 | .60 |
| 5 | 7 | 6 | 114 | 0.00 | .60 |
| 5 | 8 | 6 | 179 | 0.00 | .37 |
| 5 | 9 | 6 | 271 | 0.00 | .05 |
| 6 | 1 | 6 | 261 | 0.00 | .09 |
| 6 | 2 | 6 | 246 | 0.00 | .14 |
| 6 | 3 | 6 | 288 | 0.00 | 0.00 |
| 6 | 4 | 6 | 257 | 0.00 | .10 |
| 6 | 5 | 6 | 288 | 0.00 | 0.00 |
| 6 | 6 | 6 | 288 | 0.00 | 0.00 |
| 6 | 7 | 6 | 288 | 0.00 | 0.00 |
| 6 | 8 | 6 | 288 | 0.00 | 0.00 |
| 6 | 9 | 6 | 288 | 0.00 | 0.00 |
| 7 | 1 | 6 | 288 | 0.00 | 0.00 |
| 7 | 2 | 6 | 288 | 0.00 | 0.00 |
| 7 | 3 | 6 | 288 | 0.00 | 0.00 |
| 7 | 4 | 6 | 288 | 0.00 | 0.00 |
| 7 | 5 | 6 | 288 | 0.00 | 0.00 |
| 7 | 6 | 6 | 288 | 0.00 | 0.00 |
| 7 | 7 | 6 | 288 | 0.00 | 0.00 |
| 7 | 8 | 6 | 288 | 0.00 | 0.00 |
| 7 | 9 | 6 | 288 | 0.00 | 0.00 |

WEEK= 49

TC= 294

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | 291 | 293 | 2.97 | 16050.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | | | 0.00 | 0.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 9 | | | 0.00 | 0.0 |
| 10 | 291 | 327 | 36.92 | 472663.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | 289 | 290 | 2.07 | 24508.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 3.00 | 3.00 | 0.00 | 3.00 | 0.00 | 3.00 | 3.00 | 3.00 | 0.00 |
| 2 | 6.00 | 4.00 | 0.00 | 0.00 | 3.00 | 0.00 | 3.00 | 0.00 | 0.00 |
| 3 | 2.00 | 0.00 | 5.00 | 4.00 | 6.00 | 2.00 | 2.00 | 0.00 | 0.00 |
| 4 | 2.00 | 2.00 | 0.00 | 0.00 | 0.00 | 4.00 | 4.00 | 6.00 | 0.00 |
| 5 | 2.00 | 2.00 | 0.00 | 6.00 | 2.00 | 2.00 | 2.00 | 0.00 | 0.00 |
| 6 | 0.00 | 0.00 | 0.00 | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 3 | 208 | .50 | .29 |
| 1 | 2 | 3 | 270 | .50 | .08 |
| 1 | 3 | 6 | 294 | 0.00 | 0.00 |
| 1 | 4 | 3 | 270 | .50 | .08 |
| 1 | 5 | 6 | 294 | 0.00 | 0.00 |
| 1 | 6 | 3 | 270 | .50 | .08 |
| 1 | 7 | 3 | 270 | .50 | .08 |
| 1 | 8 | 3 | 270 | .50 | .08 |
| 1 | 9 | 6 | 294 | 0.00 | 0.00 |
| 2 | 1 | | 75 | 1.00 | .74 |
| 2 | 2 | 2 | 208 | .66 | .29 |
| 2 | 3 | 6 | 247 | 0.00 | .15 |
| 2 | 4 | 6 | 247 | 0.00 | .15 |
| 2 | 5 | 3 | 223 | .50 | .24 |
| 2 | 6 | 6 | 247 | 0.00 | .15 |
| 2 | 7 | 3 | 223 | .50 | .24 |
| 2 | 8 | 6 | 294 | 0.00 | 0.00 |
| 2 | 9 | 6 | 294 | 0.00 | 0.00 |
| 3 | 1 | 4 | 109 | .33 | .62 |
| 3 | 2 | 6 | 206 | 0.00 | .29 |
| 3 | 3 | 1 | 222 | .83 | .24 |
| 3 | 4 | 2 | 208 | .66 | .29 |
| 3 | 5 | | 160 | 1.00 | .45 |
| 3 | 6 | 4 | 246 | .33 | .16 |
| 3 | 7 | 4 | 246 | .33 | .16 |

| | | | | | |
|---|---|---|---|---|---|
| 3 | 9 | 6 | 294 | 0.00 | 0.00 |
| 4 | 1 | 4 | 259 | .33 | .11 |
| 4 | 2 | 4 | 261 | .33 | .11 |
| 4 | 3 | 6 | 294 | 0.00 | 0.00 |
| 4 | 4 | 6 | 206 | 0.00 | .29 |
| 4 | 5 | 6 | 256 | 0.00 | .12 |
| 4 | 6 | 2 | 170 | .66 | .42 |
| 4 | 7 | 2 | 208 | .66 | .29 |
| 4 | 8 | | 140 | 1.00 | .52 |
| 4 | 9 | 6 | 294 | 0.00 | 0.00 |
| 5 | 1 | 4 | 145 | .33 | .50 |
| 5 | 2 | 4 | 276 | .33 | .06 |
| 5 | 3 | 6 | 256 | 0.00 | .12 |
| 5 | 4 | | 36 | 1.00 | .87 |
| 5 | 5 | 4 | 153 | .33 | .47 |
| 5 | 6 | 4 | 118 | .33 | .59 |
| 5 | 7 | 4 | 118 | .33 | .59 |
| 5 | 8 | 6 | 185 | 0.00 | .37 |
| 5 | 9 | 6 | 277 | 0.00 | .05 |
| 6 | 1 | 6 | 267 | 0.00 | .09 |
| 6 | 2 | 6 | 252 | 0.00 | .14 |
| 6 | 3 | 6 | 294 | 0.00 | 0.00 |
| 6 | 4 | 4 | 261 | .33 | .11 |
| 6 | 5 | 6 | 294 | 0.00 | 0.00 |
| 6 | 6 | 6 | 294 | 0.00 | 0.00 |
| 6 | 7 | 6 | 294 | 0.00 | 0.00 |
| 6 | 8 | 6 | 294 | 0.00 | 0.00 |
| 6 | 9 | 6 | 294 | 0.00 | 0.00 |
| 7 | 1 | 6 | 294 | 0.00 | 0.00 |
| 7 | 2 | 6 | 294 | 0.00 | 0.00 |
| 7 | 3 | 6 | 294 | 0.00 | 0.00 |
| 7 | 4 | 6 | 294 | 0.00 | 0.00 |
| 7 | 5 | 6 | 294 | 0.00 | 0.00 |
| 7 | 6 | 6 | 294 | 0.00 | 0.00 |
| 7 | 7 | 6 | 294 | 0.00 | 0.00 |
| 7 | 8 | 6 | 294 | 0.00 | 0.00 |
| 7 | 9 | 6 | 294 | 0.00 | 0.00 |

WEEK= 50

TC= 30

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | 295 | 295 | .56 | 3050.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | | | 0.00 | 0.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 10 | | | 0.00 | 0.0 |
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.00 | 1.00 | 0.00 | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 |
| 2 | 6.00 | 6.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1.00 | 0.00 | 0.00 |
| 3 | 0.00 | 0.00 | 1.00 | 6.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 6.00 | 6.00 | 6.00 | 0.00 |
| 5 | 0.00 | 0.00 | 0.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 5 | 213 | .16 | .29 |
| 1 | 2 | 5 | 275 | .16 | .08 |
| 1 | 3 | 6 | 300 | 0.00 | 0.00 |
| 1 | 4 | 5 | 275 | .16 | .08 |
| 1 | 5 | 6 | 300 | 0.00 | 0.00 |
| 1 | 6 | 5 | 275 | .16 | .08 |
| 1 | 7 | 5 | 275 | .16 | .08 |
| 1 | 8 | 5 | 275 | .16 | .08 |
| 1 | 9 | 6 | 300 | 0.00 | 0.00 |
| 2 | 1 | | 75 | 1.00 | .75 |
| 2 | 2 | | 208 | 1.00 | .30 |
| 2 | 3 | 6 | 253 | 0.00 | .15 |
| 2 | 4 | 6 | 253 | 0.00 | .15 |
| 2 | 5 | 5 | 228 | .16 | .24 |
| 2 | 6 | 6 | 253 | 0.00 | .15 |
| 2 | 7 | 5 | 228 | .16 | .24 |
| 2 | 8 | 6 | 300 | 0.00 | 0.00 |
| 2 | 9 | 6 | 300 | 0.00 | 0.00 |
| 3 | 1 | 6 | 115 | 0.00 | .61 |
| 3 | 2 | 6 | 212 | 0.00 | .29 |
| 3 | 3 | 5 | 227 | .16 | .24 |
| 3 | 4 | | 208 | 1.00 | .30 |
| 3 | 5 | | 160 | 1.00 | .46 |
| 3 | 6 | 6 | 252 | 0.00 | .16 |
| 3 | 7 | 6 | 252 | 0.00 | .16 |
| 3 | 8 | 6 | 300 | 0.00 | 0.00 |
| 3 | 9 | 6 | 300 | 0.00 | 0.00 |
| 4 | 1 | 6 | 265 | 0.00 | .11 |

| | | | | | |
|---|---|---|---|---|---|
| 4 | 2 | 6 | 267 | 0.00 | .11 |
| 4 | 3 | 6 | 300 | 0.00 | 0.00 |
| 4 | 4 | 6 | 212 | 0.00 | .29 |
| 4 | 5 | 6 | 262 | 0.00 | .12 |
| 4 | 6 | | 170 | 1.00 | .43 |
| 4 | 7 | | 208 | 1.00 | .30 |
| 4 | 8 | | 140 | 1.00 | .53 |
| 4 | 9 | 6 | 300 | 0.00 | 0.00 |
| 5 | 1 | 6 | 151 | 0.00 | .49 |
| 5 | 2 | 6 | 282 | 0.00 | .06 |
| 5 | 3 | 6 | 262 | 0.00 | .12 |
| 5 | 4 | | 36 | 1.00 | .88 |
| 5 | 5 | 6 | 159 | 0.00 | .47 |
| 5 | 6 | 6 | 124 | 0.00 | .58 |
| 5 | 7 | 6 | 124 | 0.00 | .58 |
| 5 | 8 | 6 | 191 | 0.00 | .36 |
| 5 | 9 | 6 | 283 | 0.00 | .05 |
| 6 | 1 | 6 | 273 | 0.00 | .09 |
| 6 | 2 | 6 | 258 | 0.00 | .14 |
| 6 | 3 | 6 | 300 | 0.00 | 0.00 |
| 6 | 4 | 6 | 267 | 0.00 | .11 |
| 6 | 5 | 6 | 300 | 0.00 | 0.00 |
| 6 | 6 | 6 | 300 | 0.00 | 0.00 |
| 6 | 7 | 6 | 300 | 0.00 | 0.00 |
| 6 | 8 | 6 | 300 | 0.00 | 0.00 |
| 6 | 9 | 6 | 300 | 0.00 | 0.00 |
| 7 | 1 | 6 | 300 | 0.00 | 0.00 |
| 7 | 2 | 6 | 300 | 0.00 | 0.00 |
| 7 | 3 | 6 | 300 | 0.00 | 0.00 |
| 7 | 4 | 6 | 300 | 0.00 | 0.00 |
| 7 | 5 | 6 | 300 | 0.00 | 0.00 |
| 7 | 6 | 6 | 300 | 0.00 | 0.00 |
| 7 | 7 | 6 | 300 | 0.00 | 0.00 |
| 7 | 8 | 6 | 300 | 0.00 | 0.00 |
| 7 | 9 | 6 | 300 | 0.00 | 0.00 |

WEEK= 51

TC= 306

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | | | 0.00 | 0.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | | | 0.00 | 0.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |

| | | | | |
|---|---|---|---|---|
| 11 | | | 0.00 | 0.0 |
| 12 | | | 0.00 | 0.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 6.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | 0.00 | 0.00 | 0.00 | 6.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 6.00 | 6.00 | 6.00 | 0.00 |
| 5 | 0.00 | 0.00 | 0.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 6 | 219 | 0.00 | .28 |
| 1 | 2 | 6 | 281 | 0.00 | .08 |
| 1 | 3 | 6 | 306 | 0.00 | 0.00 |
| 1 | 4 | 6 | 281 | 0.00 | .08 |
| 1 | 5 | 6 | 306 | 0.00 | 0.00 |
| 1 | 6 | 6 | 281 | 0.00 | .08 |
| 1 | 7 | 6 | 281 | 0.00 | .08 |
| 1 | 8 | 6 | 281 | 0.00 | .08 |
| 1 | 9 | 6 | 306 | 0.00 | 0.00 |
| 2 | 1 | | 75 | 1.00 | .75 |
| 2 | 2 | | 208 | 1.00 | .32 |
| 2 | 3 | 6 | 259 | 0.00 | .15 |
| 2 | 4 | 6 | 259 | 0.00 | .15 |
| 2 | 5 | 6 | 234 | 0.00 | .23 |
| 2 | 6 | 6 | 259 | 0.00 | .15 |
| 2 | 7 | 6 | 234 | 0.00 | .23 |
| 2 | 8 | 6 | 306 | 0.00 | 0.00 |
| 2 | 9 | 6 | 306 | 0.00 | 0.00 |
| 3 | 1 | 6 | 121 | 0.00 | .60 |
| 3 | 2 | 6 | 218 | 0.00 | .28 |
| 3 | 3 | 6 | 233 | 0.00 | .23 |
| 3 | 4 | | 208 | 1.00 | .32 |
| 3 | 5 | | 160 | 1.00 | .47 |
| 3 | 6 | 6 | 258 | 0.00 | .15 |
| 3 | 7 | 6 | 258 | 0.00 | .15 |
| 3 | 8 | 6 | 306 | 0.00 | 0.00 |
| 3 | 9 | 6 | 306 | 0.00 | 0.00 |
| 4 | 1 | 6 | 271 | 0.00 | .11 |
| 4 | 2 | 6 | 273 | 0.00 | .10 |

| | | | | | |
|---|---|---|---|---|---|
| [illegible] | [illegible] | 6 | 306 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 4 | 4 | 6 | 218 | 0.00 | .28 |
| 4 | 5 | 6 | 268 | 0.00 | .12 |
| 4 | 6 | | 170 | 1.00 | .44 |
| 4 | 7 | | 208 | 1.00 | .32 |
| 4 | 8 | | 140 | 1.00 | .54 |
| 4 | 9 | 6 | 306 | 0.00 | 0.00 |
| 5 | 1 | 6 | 157 | 0.00 | .48 |
| 5 | 2 | 6 | 288 | 0.00 | .05 |
| 5 | 3 | 6 | 268 | 0.00 | .12 |
| 5 | 4 | | 36 | 1.00 | .88 |
| 5 | 5 | 6 | 165 | 0.00 | .46 |
| 5 | 6 | 6 | 130 | 0.00 | .57 |
| 5 | 7 | 6 | 130 | 0.00 | .57 |
| 5 | 8 | 6 | 197 | 0.00 | .35 |
| 5 | 9 | 6 | 289 | 0.00 | .05 |
| 6 | 1 | 6 | 279 | 0.00 | .08 |
| 6 | 2 | 6 | 264 | 0.00 | .13 |
| 6 | 3 | 6 | 306 | 0.00 | 0.00 |
| 6 | 4 | 6 | 273 | 0.00 | .10 |
| 6 | 5 | 6 | 306 | 0.00 | 0.00 |
| 6 | 6 | 6 | 306 | 0.00 | 0.00 |
| 6 | 7 | 6 | 306 | 0.00 | 0.00 |
| 6 | 8 | 6 | 306 | 0.00 | 0.00 |
| 6 | 9 | 6 | 306 | 0.00 | 0.00 |
| 7 | 1 | 6 | 306 | 0.00 | 0.00 |
| 7 | 2 | 6 | 306 | 0.00 | 0.00 |
| 7 | 3 | 6 | 306 | 0.00 | 0.00 |
| 7 | 4 | 6 | 306 | 0.00 | 0.00 |
| 7 | 5 | 6 | 306 | 0.00 | 0.00 |
| 7 | 6 | 6 | 306 | 0.00 | 0.00 |
| 7 | 7 | 6 | 306 | 0.00 | 0.00 |
| 7 | 8 | 6 | 306 | 0.00 | 0.00 |
| 7 | 9 | 6 | 306 | 0.00 | 0.00 |

WEEK= 52

TC= 312

| PRODUCT NUMBER | START DATE | FINISH DATE | PROD. TIME | TOTAL PROD. |
|---|---|---|---|---|
| 1 | | | 0.00 | 0.0 |
| 2 | | | 0.00 | 0.0 |
| 3 | | | 0.00 | 0.0 |
| 4 | | | 0.00 | 0.0 |
| 5 | | | 0.00 | 0.0 |
| 6 | | | 0.00 | 0.0 |
| 7 | | | 0.00 | 0.0 |
| 8 | | | 0.00 | 0.0 |
| 9 | | | 0.00 | 0.0 |
| 12 | 307 | 308 | 1.56 | 6270.0 |
| 13 | | | 0.00 | 0.0 |
| 14 | | | 0.00 | 0.0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 6.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | 0.00 | 0.00 | 0.00 | 6.00 | 6.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 6.00 | 6.00 | 6.00 | 0.00 |
| 5 | 0.00 | 0.00 | 0.00 | 6.00 | 2.00 | 2.00 | 2.00 | 2.00 | 0.00 |
| 6 | 2.00 | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 6 | 225 | 0.00 | .27 |
| 1 | 2 | 6 | 287 | 0.00 | .08 |
| 1 | 3 | 6 | 312 | 0.00 | 0.00 |
| 1 | 4 | 6 | 287 | 0.00 | .08 |
| 1 | 5 | 6 | 312 | 0.00 | 0.00 |
| 1 | 6 | 6 | 287 | 0.00 | .08 |
| 1 | 7 | 6 | 287 | 0.00 | .08 |
| 1 | 8 | 6 | 287 | 0.00 | .08 |
| 1 | 9 | 6 | 312 | 0.00 | 0.00 |
| 2 | 1 | | 75 | 1.00 | .75 |
| 2 | 2 | | 208 | 1.00 | .33 |
| 2 | 3 | 6 | 265 | 0.00 | .15 |
| 2 | 4 | 6 | 265 | 0.00 | .15 |
| 2 | 5 | 6 | 240 | 0.00 | .23 |
| 2 | 6 | 6 | 265 | 0.00 | .15 |
| 2 | 7 | 6 | 240 | 0.00 | .23 |
| 2 | 8 | 6 | 312 | 0.00 | 0.00 |
| 2 | 9 | 6 | 312 | 0.00 | 0.00 |
| 3 | 1 | 6 | 127 | 0.00 | .59 |
| 3 | 2 | 6 | 224 | 0.00 | .28 |
| 3 | 3 | 6 | 239 | 0.00 | .23 |
| 3 | 4 | | 208 | 1.00 | .33 |
| 3 | 5 | | 160 | 1.00 | .48 |
| 3 | 6 | 6 | 264 | 0.00 | .15 |
| 3 | 7 | 6 | 264 | 0.00 | .15 |
| 3 | 8 | 6 | 312 | 0.00 | 0.00 |
| 3 | 9 | 6 | 312 | 0.00 | 0.00 |
| 4 | 1 | 6 | 277 | 0.00 | .11 |
| 4 | 2 | 6 | 279 | 0.00 | .10 |
| 4 | 3 | 6 | 312 | 0.00 | 0.00 |
| 4 | 4 | 6 | 224 | 0.00 | .28 |
| | | 6 | 274 | 0.00 | .13 |

| | | | | | |
|---|---|---|---|---|---|
| 4 | 6 | | 170 | 1.00 | .45 |
| 4 | 7 | | 208 | 1.00 | .33 |
| 4 | 8 | | 140 | 1.00 | .55 |
| 4 | 9 | 6 | 312 | 0.00 | 0.00 |
| 5 | 1 | 6 | 163 | 0.00 | .47 |
| 5 | 2 | 6 | 294 | 0.00 | .05 |
| 5 | 3 | 6 | 274 | 0.00 | .12 |
| 5 | 4 | | 36 | 1.00 | .88 |
| 5 | 5 | 4 | 169 | .33 | .45 |
| 5 | 6 | 4 | 134 | .33 | .57 |
| 5 | 7 | 4 | 134 | .33 | .57 |
| 5 | 8 | 4 | 201 | .33 | .35 |
| 5 | 9 | 6 | 295 | 0.00 | .05 |
| 6 | 1 | 4 | 283 | .33 | .09 |
| 6 | 2 | 4 | 268 | .33 | .14 |
| 6 | 3 | 6 | 312 | 0.00 | 0.00 |
| 6 | 4 | 6 | 279 | 0.00 | .10 |
| 6 | 5 | 6 | 312 | 0.00 | 0.00 |
| 6 | 6 | 6 | 312 | 0.00 | 0.00 |
| 6 | 7 | 6 | 312 | 0.00 | 0.00 |
| 6 | 8 | 6 | 312 | 0.00 | 0.00 |
| 6 | 9 | 6 | 312 | 0.00 | 0.00 |
| 7 | 1 | 6 | 312 | 0.00 | 0.00 |
| 7 | 2 | 6 | 312 | 0.00 | 0.00 |
| 7 | 3 | 6 | 312 | 0.00 | 0.00 |
| 7 | 4 | 6 | 312 | 0.00 | 0.00 |
| 7 | 5 | 6 | 312 | 0.00 | 0.00 |
| 7 | 6 | 6 | 312 | 0.00 | 0.00 |
| 7 | 7 | 6 | 312 | 0.00 | 0.00 |
| 7 | 8 | 6 | 312 | 0.00 | 0.00 |
| 7 | 9 | 6 | 312 | 0.00 | 0.00 |

GROUP EFF= .07

GROUP EFF= .28

GROUP EFF= .31

GROUP EFF= .24

GROUP EFF= .39

GROUP EFF= .05

GROUP EFF= .38

GROUP EFF= .2

GROUP EFF= .06

GROUP EFF= .05

GROUP EFF= .23

GROUP EFF= .23

GROUP EFF= .17

GROUP EFF= .29

GROUP EFF= .28

GROUP EFF= .18

GROUP EFF= .23

GROUP EFF= .15

GROUP EFF= .27

GROUP EFF= .27

GROUP EFF= .32

GROUP EFF= .42

GROUP EFF= .59

GROUP EFF= .43

GROUP EFF= .44

GROUP EFF= .43

GROUP EFF= .51

GROUP EFF= .5

GROUP EFF= .36

GROUP EFF= .39

GROUP EFF= .36

GROUP EFF= .23

APPENDIX: XII



PRODUCTION SCHEDULING PROGRAM 2

```
DEFINATIONS OF THE TERMS OF THE SCHEDULING PROGRAM 2
I= COLUMN NUMBER OF THE MACHINE
J=  ROW   NUMBER OF THE MACHINE
IDLET(I,J)=IDLE TIME OF THE MACHINE
O(I,J)=OCCUPIED TIME OF THE MACHINE
PRODDL(I)=PRODUCTION RATE PER DAY
PROD(I)=NUMBER OF PRODUCTION
START(I)=START TIME
FINISH(I)=FINISH TIME
ORQ(I)=ORDER QUEUE
K= NUMBER OF PRODUCT
C(I,J,K)=CAPACITY OF THE MACHINE FOR  THE PRODUCT
S(L,K)=MACHINE SEQUENCESFOR THE PRODUCT
TC=CUMULATIVE SHOP CALENDER
TW=WEEKLY SHOP CALENDER
OR(K)=ORDER QUANTITY FOR THE PRODUCT
PROITY(K)=PRIORITY OF THE PRODUCT
TIME,K)
TIME(K)=PRODUCTION TIME OF THE MODEL
AVGE=GROUP EFFICICIENCY
IWK=OCCUPIED TIME
IDLE(I,J)IDLE TIME FOR THE WEEK
IDLET(I,J)=CUMULATIVE IDLE TIME
EFFW=WEEKLY EFFICIENCY
EFFT=CUMULATIVE EFFICIENCY
L=NUMBER OF OPERATIONS IN TECHNOLOGICAL SEQUENCE
G(L,1,K)=1.DIGIT OF KTH MACHINE IN GROUP L
MGP(IJ,1)=MACHINE IN THE GROUP
ZZJOB
ZZFORX
*FANDK0810
      DIMENSION O(7,9),ORQ(14),C(7,9,14),S(14,10),IDLE(7,9),
     1  OR(14),TIME(14),START(14),FINISH(14),IDLET(7,9)
      DIMENSION  PROITY(14)
      DIMENSION PRODDL(14)
      DIMENSION PROD(14)
      DIMENSION GROUP(18,2,7),MGP(18,2)
      WEEK = 0.
      DO 100 I=1,7
      DO 100  J=1,9
      IDLET(I,J)=0
  100 O(I,J)=0.
      DO 200 I=1,14
      TIME(I) = 0.
      PRODDL(I)=0.
      PROD(I)=0.
      START(I)=0.
      FINISH(I)=0.
  200 ORQ(I)=0.
C
      TC=0.
C
   88 CONTINUE
      IF( I+J   )  88, 89 , 88
   89 CONTINUE
C
      DO 79 L=1,14
      READ 2,(S(L,K),K=1,10)
    2 FORMAT(F2.0,10F5.0)
   79 CONTINUE
      DO 78 J=1,18
   78 READ 77,L,(GROUP(L,1,K),GROUP(L,2,K),K=1,7)
   77 FORMAT (I5,7(3X,I1,I1))
C
  500 CONTINUE
      IF(TC-312.)  502,9999,9999
  502 CONTINUE
      TW=0.
      DO 501 I=1,7
      DO 501 J=1,9
  501 IDLE(I,J)=0.
      DO 8 K=1,14
    8 READ 3, OR(K),PROITY(K)
    3 FORMAT(  10X, F20.1   F2.0    )
C
      DO 550 K=1,14
  550 ORQ(K)=ORQ(K)+OR(K)
C
  600 CONTINUE
      TC=TC+1.
      TW=TW+1.
      III=
  650 CONTINUE
      III=III+1
      IF(III-15)675,900,675
  675 CONTINUE
      FII=III
      DO 700 K=1,14
      IF(PROITY(K)-FII)700,710,700
  700 CONTINUE
      STOP
  710 CONTINUE
      IF(ORQ(K))725,650,725
  725 CONTINUE
      MIN=2*10**6
      FMIN=MIN
      L=1
 1000 CONTINUE
      IF(S(K,L))780,2000,780
  780 CONTINUE
      IJ=S(K,L)
      DO 781 IK=1,7
      I=GROUP(IJ,1,IK)
      J=GROUP(IJ,2,IK)
      IF(I+J) 769,650,769
  769 CONTINUE
      IF(TC-O(I,J)) 781,781,782
  782 CONTINUE
      IF(FMIN-C(I,J,K))795,795,790
  790 FMIN=C(I,J,K)
  795 CONTINUE
      MGP(L,1)=I
      MGP(L,2)=J
      L=L+1
      GO TO 1000
```

```
  781 CONTINUE
      GO TO 650
C
 2000 CONTINUE
      MIN=FMIN
      F=MIN
      TIME(K)=ORQ(K)/F
      LT=TIME(K)+.75
      IF(LT-1) 297,298,298
  297 LT=1.
  298 CONTINUE
      FLT=LT
      START(K)=TC
      FINISH(K)=TC+FLT-1.
      PRODDL(K)=MIN
      PROD(K)=ORQ(K)
      L=1
 2001 CONTINUE
      IF(S(K,L))2010,2005,2010
 2005 ORQ(K)=0
      GO TO 650
 2010 CONTINUE
      I=MGP(L,1)
      J=MGP(L,2)
      O(I,J)=FINISH(K)
      L=L+1
      GO TO 2001
C
  900 CONTINUE
      DO 901 I=1,7
      DO 901 J=1,9
      AX=O(I,J)-TC
      IF(AX) 899,901,901
  899 IDLE(I,J)=IDLE(I,J)+1
      IDLET(I,J)=IDLET(I,J)+1
  901 CONTINUE
C
      GO TO 850
 9999 CONTINUE
      DIMENSION MACHI(60),MACHJ(60)
      READ 8000,N
 8000 FORMAT (I5)
      IF(N) 8001,8999,8001
 8999 CONTINUE
      DO 9990 I=1,7
      DO 9990 J=1,9
      FB=IDLET(I,J)
      EFFT=(TC-FB)/TC
      PUNCH 9906,I,J,IDLET(I,J),EFFT
 9906 FORMAT (2I5,10X,I5,F10.2)
 9990 CONTINUE
      PUNCH 7556,(I,ORQ(I),I=1,14)
 7556 FORMAT(I5,5X,F15.0)
      CALL EXIT
 8001 CONTINUE
C
C
      READ 8002,(MACHI(I),MACHJ(I),I=1,N)
 8002 FORMAT(80I1)
      SUM=0.
      JJ=MACHJ(I)
      FF=IDLET(II,JJ)
      EE = (  TC - FF  )/TC
      SUM = SUM + EE
 8500 CONTINUE
      FN=N
      AVGE = SUM/FN
      PUNCH 8006,AVGE
 8006 FORMAT (11HGROUP EFF= ,F10.2,//)
      GO TO 9999
  850 CONTINUE
      IF(TW-6.)600,860,600
  860 CONTINUE
C
C     WEEKLY REPORT
      WEEK = WEEK + 1.
C
      GO TO 7551
 7552 CONTINUE
      PUNCH 9001,WEEK,TC
 9001 FORMAT(5HWEEK=,2X,I4,//3HTC=,I8,//)
      PUNCH 9002
 9002 FORMAT(7HPRODUCT , 3X,5HSTART, 5X,6HFINISH,4X,5HPROD.,5X,5HTOTAL,/
     1 6HNUMBER,1X,3X,4HDATE,1X,5X,4HDATE,2X,4X,4HTIME,6X,5HPROD.,//)
C
      DO 9010 I=1,14
      IF(FINISH(I)+START(I)) 90 9,9008,9009
 9008 T=0
      GO TO 9010
 9009 CONTINUE
 9010 PUNCH 9003,I,START(I),FINISH(I),TIME(I),PROD(I)
 9003 FORMAT(I5,5X,I5,5X,I5,4X,F6.2,5X,F10.1/)
 7551 CONTINUE
      DO 9901 I=1,14
      TIME(I)=0.
      FINISH(I)=0.
      START(I)=0.
      PROD(I)=0
 9901 CONTINUE
C
      GO TO 500
      DIMENSION IWK(7,9)
 7553 CONTINUE
      DO 9915 I=1,7
      DO 9915 J=1,9
 9915 IWK(I,J)=6-IDLE(I,J)
      PUNCH 9902, (I,(IWK(I,J),J=1,9),I=1,7)
 9902 FORMAT (I5,9F7.2//)
      PUNCH 9004
 9004 FORMAT(79X,1H-)
      GO TO 500
      END
```

DATA CARDS

```
    1    1   01      30000.
    2    1   01      30000.
    3    1   01      30000.
    4    1   01      30000.
    5    1   01      30000.
```

| | | | |
|---|---|---|---|
| 1 | 2 | 1 | 13300. |
| 2 | 2 | 01 | 13300. |
| 3 | 2 | 01 | 13300. |
| 4 | 2 | 01 | 13300. |
| 1 | 4 | 01 | 18100. |
| 1 | 5 | 01 | 18100. |
| 2 | 3 | 01 | 18100. |
| 3 | 3 | 01 | 18100. |
| 5 | 4 | 01 | 18100. |
| 6 | 3 | 01 | 18100. |
| 1 | 4 | 01 | 5400. |
| 1 | 5 | 01 | 5400. |
| 2 | 3 | 01 | 5400. |
| 3 | 3 | 01 | 5400. |
| 5 | 4 | 01 | 5400. |
| 6 | 3 | 01 | 5400. |
| 1 | 6 | 01 | 12960. |
| 3 | 4 | 01 | 12960. |
| 4 | 4 | 01 | 12960. |
| 1 | 7 | 01 | 20800. |
| 2 | 5 | 1 | 20800. |
| 3 | 5 | 01 | 20800. |
| 4 | 5 | 01 | 20800. |
| 1 | 7 | 01 | 20800. |
| 2 | 5 | 01 | 20800. |
| 3 | 5 | 01 | 20800. |
| 4 | 5 | 01 | 20800. |
| 1 | 8 | 01 | 21340. |
| 2 | 6 | 01 | 21340. |
| 3 | 6 | 01 | 21340. |
| 4 | 6 | 01 | 21340. |
| 5 | 7 | 01 | 21340. |
| 1 | 9 | 01 | 10920. |
| 2 | 7 | 01 | 10920. |
| 3 | 7 | 01 | 10920. |
| 4 | 7 | 01 | 10920. |
| 5 | 8 | 01 | 10920. |
| 1 | 1 | 02 | 33102. |
| 2 | 1 | 02 | 33102. |
| 3 | 1 | 02 | 33102. |
| 4 | 1 | 02 | 33102. |
| 5 | 1 | 02 | 33102. |
| 1 | 1 | 02 | 36922. |
| 2 | 1 | 02 | 36922. |
| 3 | 1 | 02 | 36922. |
| 4 | 1 | 02 | 36922. |
| 5 | 1 | 02 | 36922. |
| 1 | 4 | 02 | 10786. |
| 1 | 5 | 02 | 10786. |
| 2 | 3 | 02 | 10786. |
| 3 | 3 | 02 | 10786. |
| 5 | 4 | 02 | 10786. |
| 6 | 3 | 02 | 10786. |
| 2 | 4 | 2 | 13332. |
| 5 | 5 | 02 | 13332. |
| 1 | 7 | 02 | 14328. |
| 2 | 5 | 02 | 14328. |
| 3 | 5 | 02 | 14328. |
| 4 | 5 | 02 | 14328. |
| 1 | 8 | 02 | 10666. |
| 4 | 6 | 02 | 10666. |
| 5 | 7 | 02 | 10666. |
| 1 | 9 | 02 | 10666. |
| 2 | 7 | 02 | 10666. |
| 3 | 7 | 02 | 10666. |
| 4 | 7 | 02 | 10666. |
| 5 | 8 | 02 | 10666. |
| 1 | 1 | 03 | 175000. |
| 2 | 1 | 03 | 175000. |
| 3 | 1 | 03 | 175000. |
| 4 | 1 | 03 | 175000. |
| 5 | 1 | 03 | 175000. |
| 1 | 1 | 03 | 32000. |
| 2 | 1 | 03 | 32000. |
| 3 | 1 | 03 | 32000. |
| 4 | 1 | 03 | 32000. |
| 5 | 1 | 03 | 32000. |
| 1 | 4 | 03 | 28000. |
| 1 | 5 | 03 | 28000. |
| 2 | 3 | 03 | 28000. |
| 3 | 3 | 03 | 28000. |
| 5 | 4 | 03 | 28000. |
| 6 | 3 | 03 | 28000. |
| 2 | 4 | 3 | 13500. |
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| 3 23 | | 06 |
| 4 23 | | 07 |
| 5 23 | | 08 |
| 6 23 | 2902. | 05 |
| 7 23 | | 09 |
| 8 23 | | 10 |
| 9 23 | 16210. | 01 |
| 10 23 | 19768. | 02 |
| 11 23 | | 11 |
| 12 23 | | 12 |
| 13 23 | | 13 |
| 14 23 | | 14 |
| 1 24 | | 09 |
| 2 24 | | 10 |
| 3 24 | | 11 |
| 4 24 | 11039. | 07 |
| 5 24 | 28226. | 02 |
| 6 24 | 20456. | 03 |
| 7 24 | 30652. | 01 |
| 7 24 | 10836. | 06 |
| 9 24 | 24694. | 04 |
| 10 24 | | 12 |
| 11 24 | 19680. | 05 |
| 12 24 | | 13 |
| 13 24 | 169. | 08 |
| 14 24 | | 14 |
| 1 25 | | 10 |
| 2 25 | 8521. | 07 |
| 3 25 | 6655. | 06 |
| 4 25 | 3148. | 08 |
| 5 25 | 2132. | 09 |
| 6 25 | | 11 |
| 7 25 | | 12 |
| 8 25 | 15926. | 01 |
| 9 25 | 8686. | 05 |
| 10 25 | 20051. | 02 |
| 11 25 | 16853. | 03 |
| 12 25 | 1037. | 13 |
| 13 25 | 6109. | 04 |
| 14 25 | | 14 |
| 1 26 | | 05 |
| 2 26 | | 06 |
| 3 26 | | 07 |
| 4 26 | | 08 |
| 5 26 | | 09 |
| 6 26 | 25735. | 01 |
| 7 26 | | 10 |
| 8 26 | | 11 |
| 9 26 | 4189. | 04 |
| 10 26 | | 12 |
| 11 26 | 22354. | 02 |
| 12 26 | [illegible] | [illegible] |
| 1 27 | | 06 |
| 2 27 | | 07 |
| 3 27 | 10748. | 05 |
| 4 27 | | 08 |
| 5 27 | | 09 |
| 6 27 | 15871. | 04 |
| 7 27 | | 10 |
| 8 27 | | 11 |
| 9 27 | 30653. | 02 |
| 10 27 | 18721. | 03 |
| 11 27 | 80724. | 01 |
| 12 27 | | 12 |
| 13 27 | | 13 |
| 14 27 | | 14 |
| 1 28 | | 11 |
| 2 28 | | 09 |
| 3 28 | 9427. | 04 |
| 4 28 | | 10 |
| 5 28 | 3564. | 07 |
| 6 28 | 6555. | 05 |
| 7 28 | 38705. | 02 |
| 8 28 | 18322. | 03 |
| 9 28 | 6981. | 08 |
| 10 28 | 42728. | 01 |
| 11 28 | 2446. | 06 |
| 12 28 | | 12 |
| 13 28 | | 13 |
| 14 28 | | 14 |
| 1 29 | 3107. | 04 |
| 2 29 | | 08 |
| 3 29 | 26847. | 03 |
| 4 29 | | 09 |
| 5 29 | 30276. | 02 |
| 6 29 | 541. | 07 |
| 7 29 | | 10 |
| 8 29 | | 11 |
| 9 29 | 46728. | 01 |
| 10 29 | | 12 |
| 11 29 | 26499. | 05 |
| 12 29 | 6703. | 06 |
| 13 29 | | 13 |
| 14 29 | | 14 |
| 1 30 | 527. | 06 |
| 2 30 | | 07 |
| 3 30 | | 08 |
| 4 30 | | 09 |
| 5 30 | 5236. | 05 |
| 6 30 | 7568. | 04 |
| 7 30 | 10227. | 02 |
| 8 30 | | 14 |
| 9 30 | 8479. | 03 |
| 10 30 | 64692. | 01 |
| 11 30 | | 10 |
| 12 30 | | 11 |
| 13 30 | | 12 |
| 14 30 | | 13 |
| 1 31 | | 10 |
| 2 31 | 7958. | 02 |
| 3 31 | 27235. | 01 |
| 4 31 | | 11 |
| 5 31 | 4268. | 04 |
| [illegible] | [illegible] | 03 |

| | | |
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| 8 31 | 5610. | 09 |
| 9 31 | 21318. | 05 |
| 10 31 | 26594. | 06 |
| 11 31 | 29825. | 07 |
| 12 31 | | 12 |
| 13 31 | | 13 |
| 14 31 | | 14 |
| 1 32 | | 04 |
| 2 32 | | 05 |
| 3 32 | | 06 |
| 4 32 | | 07 |
| 5 32 | 19687. | 02 |
| 6 32 | 127569. | 01 |
| 7 32 | | 08 |
| 8 32 | | 09 |
| 9 32 | | 10 |
| 10 32 | | 11 |
| 11 32 | | 12 |
| 12 32 | | 13 |
| 13 32 | 3117. | 03 |
| 14 32 | | 14 |
| 1 33 | 4213. | 05 |
| 2 33 | 3478. | 03 |
| 3 33 | | 07 |
| 4 33 | | 08 |
| 5 33 | 5674. | 04 |
| 6 33 | | 09 |
| 7 33 | 27899. | 01 |
| 8 33 | 209. | 06 |
| 9 33 | 21150. | 10 |
| 10 33 | 12707. | 02 |
| 11 33 | | 11 |
| 12 33 | | 12 |
| 13 33 | | 13 |
| 14 33 | | 14 |
| 1 34 | | 10 |
| 2 34 | | 11 |
| 3 34 | | 12 |
| 4 34 | 8502. | 04 |
| 5 34 | 2148. | 07 |
| 6 34 | | 13 |
| 7 34 | 546. | 08 |
| 8 34 | 730. | 05 |
| 9 34 | 12403. | 06 |
| 10 34 | 33301. | 03 |
| 11 34 | 13479. | 01 |
| 12 34 | | 02 |
| 13 34 | 11690. | 09 |
| 14 34 | | 14 |
| 1 35 | | 07 |
| 2 35 | 8290. | 06 |
| 3 35 | | 08 |
| 4 35 | | 09 |
| 5 35 | | 10 |
| 6 35 | 2012. | 05 |
| 7 35 | 4812. | 04 |
| 8 35 | 19032. | 01 |
| 9 35 | 2039. | 03 |
| 10 35 | 30229. | 02 |
| 13 35 | | 13 |
| 14 35 | | 14 |
| 1 36 | | 07 |
| 2 36 | | 08 |
| 3 36 | | 09 |
| 4 36 | | 10 |
| 5 36 | | 11 |
| 6 36 | 22314. | 01 |
| 7 36 | 7198. | 02 |
| 8 36 | | 12 |
| 9 36 | 12097. | 04 |
| 10 36 | 29147. | 03 |
| 11 36 | 1184. | 05 |
| 12 36 | | 13 |
| 13 36 | | 14 |
| 14 36 | 1698. | 06 |
| 1 37 | 2893. | 07 |
| 2 37 | 1127. | 06 |
| 3 37 | 2645. | 08 |
| 4 37 | | 09 |
| 5 37 | | 10 |
| 6 37 | | 11 |
| 7 37 | 6568. | 02 |
| 8 37 | 6017. | 03 |
| 9 37 | 2615. | 05 |
| 10 37 | 60557. | 01 |
| 11 37 | | 12 |
| 12 37 | | 13 |
| 13 37 | | 14 |
| 14 37 | 10789. | 04 |
| 1 38 | | 07 |
| 2 38 | 47933. | 02 |
| 3 38 | 2362. | 06 |
| 4 38 | | 08 |
| 5 38 | | 09 |
| 6 38 | 114075. | 01 |
| 7 38 | 14413. | 03 |
| 8 38 | | 10 |
| 9 38 | | 11 |
| 10 38 | 2527. | 04 |
| 11 38 | | 12 |
| 12 38 | | 13 |
| 13 38 | | 14 |
| 14 38 | 16507. | 05 |
| 1 39 | 430. | 08 |
| 2 39 | | 09 |
| 3 39 | 38772. | 02 |
| 4 39 | | 10 |
| 5 39 | 7253. | 07 |
| 6 39 | 72842. | 01 |
| 7 39 | 7245. | 05 |
| 8 39 | | 11 |
| 9 39 | 6036. | 04 |
| 10 39 | 42847. | 03 |
| 11 39 | | 12 |
| 12 39 | | 13 |
| 13 39 | | 14 |
| 14 39 | 576. | 06 |
| 1 40 | 1143. | 06 |
| 2 40 | | 08 |
| 3 40 | 30622. | 05 |
| 4 40 | | 09 |

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|---|---|---|
| 5 40 | 4447. | 07 |
| 6 40 | | 10 |
| 7 40 | | 11 |
| 8 40 | 7462. | 04 |
| 9 40 | 19343. | 01 |
| 10 40 | 54943. | 02 |
| 11 40 | | 12 |
| 12 40 | | 13 |
| 13 40 | | 14 |
| 14 40 | 44693. | 03 |
| 1 41 | 1263. | 05 |
| 2 41 | 1556. | 08 |
| 3 41 | 1120. | 09 |
| 4 41 | 18791. | 04 |
| 5 41 | 22197. | 03 |
| 6 41 | 21713. | 01 |
| 7 41 | 73461. | 02 |
| 8 41 | 17682. | 07 |
| 9 41 | | 11 |
| 10 41 | 1370. | 10 |
| 11 41 | 33476. | 06 |
| 12 41 | | 12 |
| 13 41 | | 13 |
| 14 41 | | 14 |
| 1 42 | | 09 |
| 2 42 | | 10 |
| 3 42 | | 11 |
| 4 42 | 24034. | 01 |
| 5 42 | 24844. | 02 |
| 6 42 | 50469. | 03 |
| 7 42 | | 12 |
| 8 42 | 13783. | 06 |
| 9 42 | 13131. | 07 |
| 10 42 | 36013. | 04 |
| 11 42 | 7332. | 05 |
| 12 42 | | 13 |
| 13 42 | | 14 |
| 14 42 | 26714. | 08 |
| 1 43 | | 07 |
| 3 43 | | 08 |
| 3 43 | 87479. | 01 |
| 4 43 | | 09 |
| 5 43 | 7503. | 06 |
| 6 43 | | 10 |
| 7 43 | 9977. | 05 |
| 8 43 | | 11 |
| 9 43 | | 12 |
| 10 43 | 25347. | 02 |
| 11 43 | 47315. | 03 |
| 12 43 | | 13 |
| 13 43 | | 14 |
| 14 43 | 5202. | 04 |
| 1 44 | | 08 |
| 2 44 | 2901. | 07 |
| 3 44 | 23744. | 02 |
| 4 44 | | 09 |
| 5 44 | | 10 |
| 6 44 | 24868. | 01 |
| 7 44 | | 11 |
| 8 44 | | 12 |
| 11 44 | 35019. | 04 |
| 12 44 | | 13 |
| 13 44 | | 14 |
| 14 44 | 25562. | 05 |
| 1 45 | 8016. | 02 |
| 2 45 | | 09 |
| 3 45 | | 10 |
| 4 45 | | 11 |
| 5 45 | 7683. | 01 |
| 6 45 | 1614. | 07 |
| 7 45 | | 12 |
| 8 45 | | 13 |
| 9 45 | 7407. | 04 |
| 10 45 | 39102. | 03 |
| 11 45 | 69. | 08 |
| 12 45 | | 14 |
| 13 45 | 11144. | 05 |
| 14 45 | 4072. | 06 |
| 1 46 | | 08 |
| 2 46 | | 09 |
| 3 46 | 5238. | 04 |
| 4 46 | | 10 |
| 5 46 | | 11 |
| 6 46 | 3708. | 05 |
| 7 46 | | 12 |
| 8 46 | 25729. | 01 |
| 9 46 | 3887. | 07 |
| 10 46 | 50792. | 02 |
| 11 46 | 8495. | 06 |
| 12 46 | | 13 |
| 13 46 | | 14 |
| 14 46 | 21934. | 03 |
| 1 47 | | 14 |
| 2 47 | 4835. | 07 |
| 3 47 | 3907. | 06 |
| 4 47 | | 09 |
| 5 47 | 7264. | 05 |
| 6 47 | 2821. | 04 |
| 7 47 | | 10 |
| 8 47 | | 11 |
| 9 47 | 4965. | 08 |
| 10 47 | 35750. | 01 |
| 11 47 | 30258. | 02 |
| 12 47 | | 12 |
| 13 47 | | 13 |
| 14 47 | 18352. | 03 |
| 1 48 | 8034. | 05 |
| 2 48 | 24808. | 03 |
| 3 48 | | 08 |
| 4 48 | | 09 |
| 5 48 | 10937. | 02 |
| 6 48 | | 10 |
| 7 48 | | 11 |
| 8 48 | 39004. | 01 |
| 9 48 | 624. | 07 |
| 10 48 | 27503. | 04 |
| 11 48 | 3141. | 06 |
| 12 48 | | 12 |
| 13 48 | | 13 |
| 14 48 | | 14 |
| 1 49 | | 09 |
| 2 49 | 18591. | 04 |

| | | |
|---|---|---|
| 3 49 | | 10 |
| 4 49 | | 11 |
| 5 49 | 813. | 05 |
| 6 49 | 1017. | 07 |
| 7 49 | 15563. | 03 |
| 8 49 | 2219. | 06 |
| 9 49 | | 12 |
| 10 49 | 55629. | 01 |
| 11 49 | 5621. | 08 |
| 12 49 | | 13 |
| 13 49 | | 14 |
| 14 49 | 24508. | 02 |
| 1 50 | 3050. | 06 |
| 2 50 | 21742. | 05 |
| 3 50 | | 09 |
| 4 50 | | 10 |
| 5 50 | 2105. | 07 |
| 6 50 | | 11 |
| 7 50 | 10859. | 01 |
| 8 50 | | 12 |
| 9 50 | | 13 |
| 10 50 | 30480. | 02 |
| 11 50 | 16827. | 03 |
| 12 50 | | 14 |
| 13 50 | 25. | 08 |
| 14 50 | 39042. | 04 |
| 1 51 | | 07 |
| 2 51 | | 08 |
| 3 51 | | 09 |
| 4 51 | | 10 |
| 5 51 | 6304. | 05 |
| 6 51 | 769. | 04 |
| 7 51 | 6304. | 06 |
| 8 51 | | 11 |
| 9 51 | | 12 |
| 10 51 | 48654. | 01 |
| 11 51 | 10487. | 03 |
| 12 51 | | 13 |
| 13 51 | 1289. | 02 |
| 14 51 | | 14 |
| 1 52 | | 04 |
| 2 52 | | 05 |
| 3 52 | 11901. | 03 |
| 4 52 | | 06 |
| 5 52 | 82917. | 01 |
| 6 52 | | 07 |
| 7 52 | | 08 |
| 8 52 | | 09 |
| 9 52 | | 10 |
| 10 52 | | 11 |
| 11 52 | | 12 |
| 12 52 | 6270. | 02 |
| 13 52 | | 13 |
| 14 52 | | 14 |

9
111213141516171819
7
21222324252627
7
31323334353637
9
515253545556575859
6
616263646566
6
112131415161
4
12223242
2
1353
1
52
8
1415233343546263
6
162434445564
3
163444
4
24556466
5
1725354556
5
1826364657
6
192737475859
13
18192627363746475758594865
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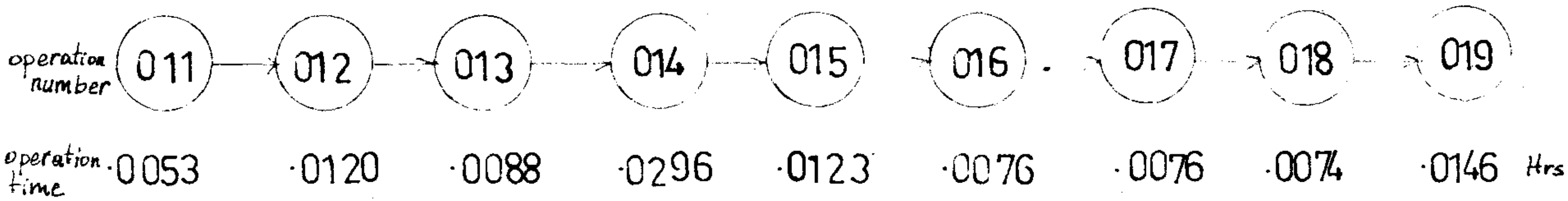
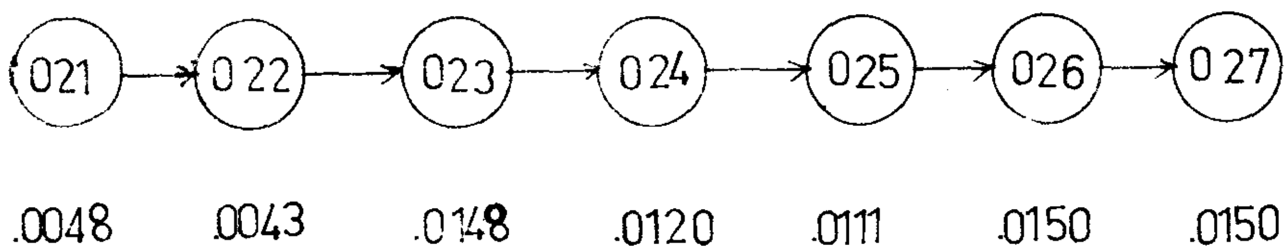
111233141625171827
7
11212324252627
7
11212324252627
8
1151426264565758
8
3121335535363748
6
315154555657
8
4151545556575859
9
415154555657585948
8
2131325453444546
8
2122543435464847
8
3151325444565857
6
616255565758
7
61625556575848
8
4151524254645657
46
111213141516171819212223242526273132333435363741424344454647485152535455565758 59

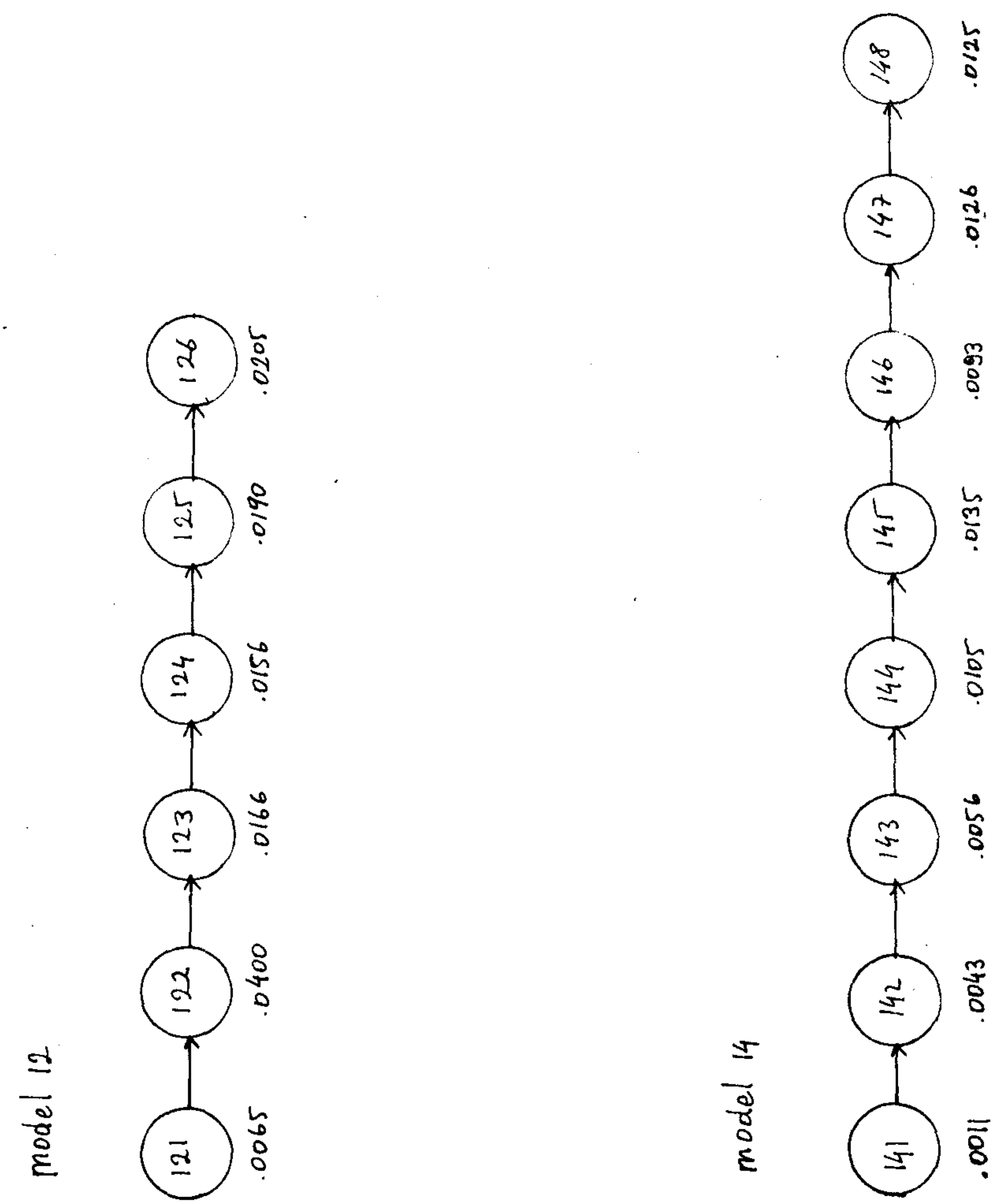
## APPENDIX XIII: Precedence Diagrams of Models for Testing Line Balancing Alternernative

### model 1

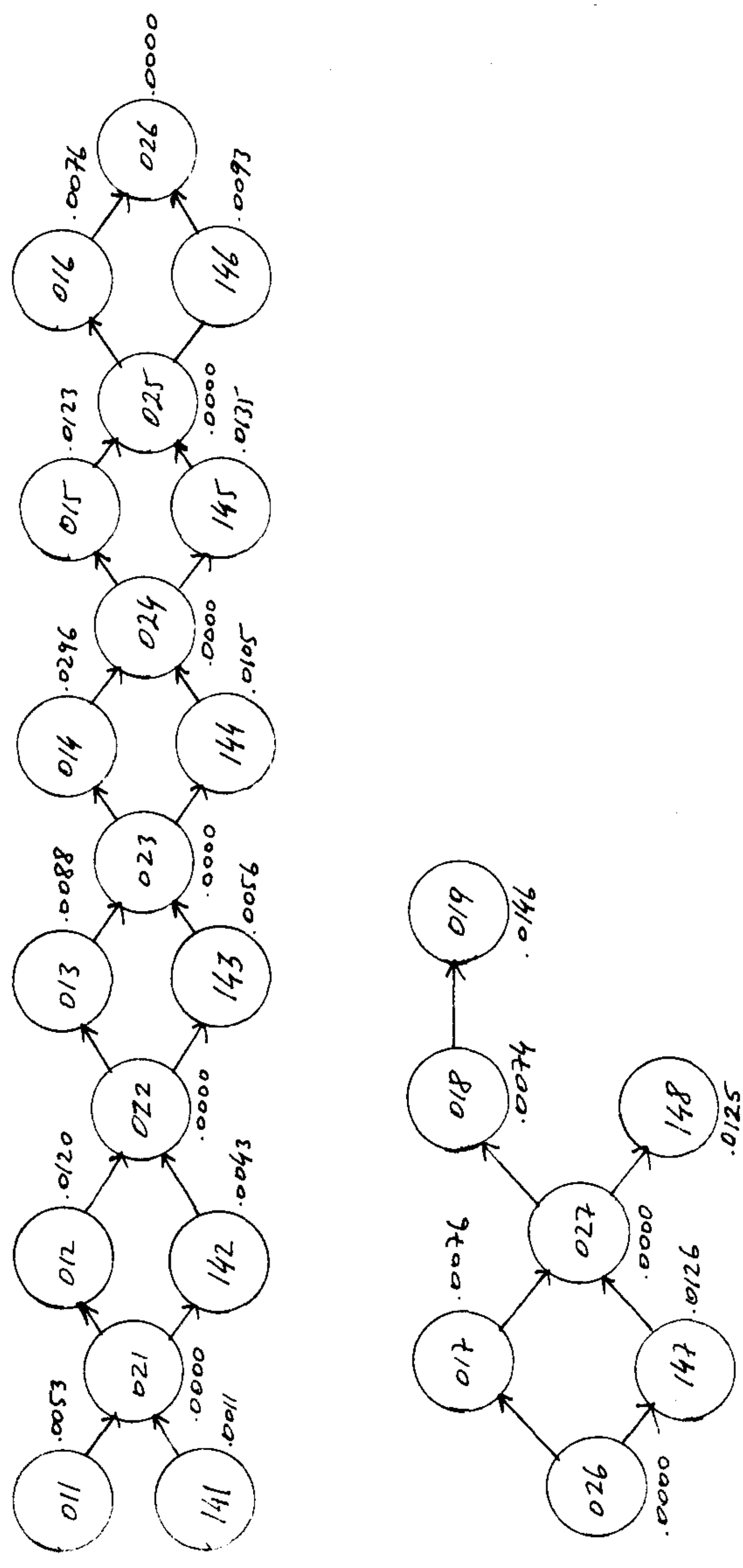



### model 2

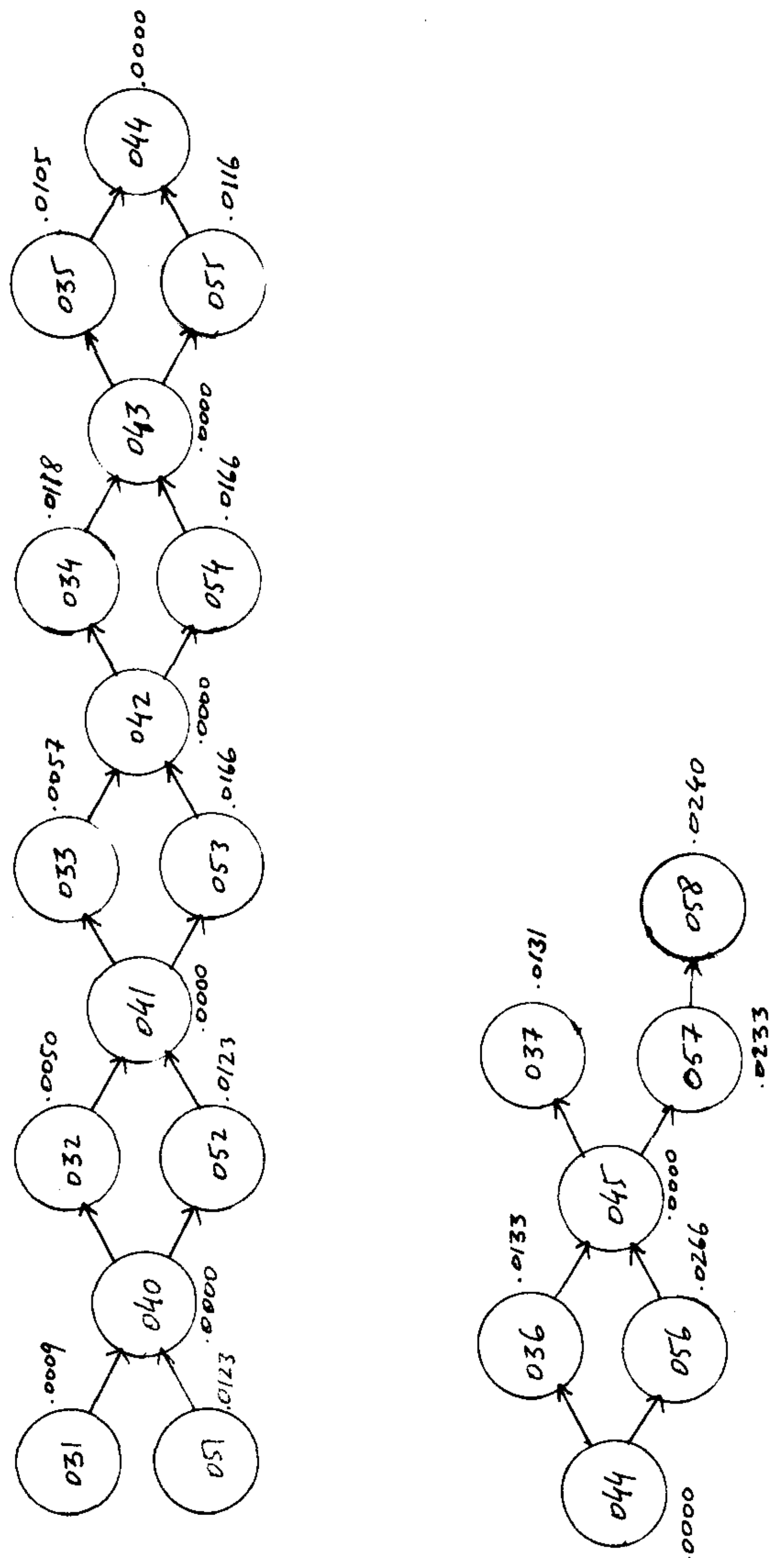



model 12
121
.0065
122
.0400
123
.0166
124
.0156
125
.0190
126
.0205
model 14
141
.0011
142
.0043
143
.0056
144
.0105
145
.0135
146
.0093
147
.0126
148
.0125

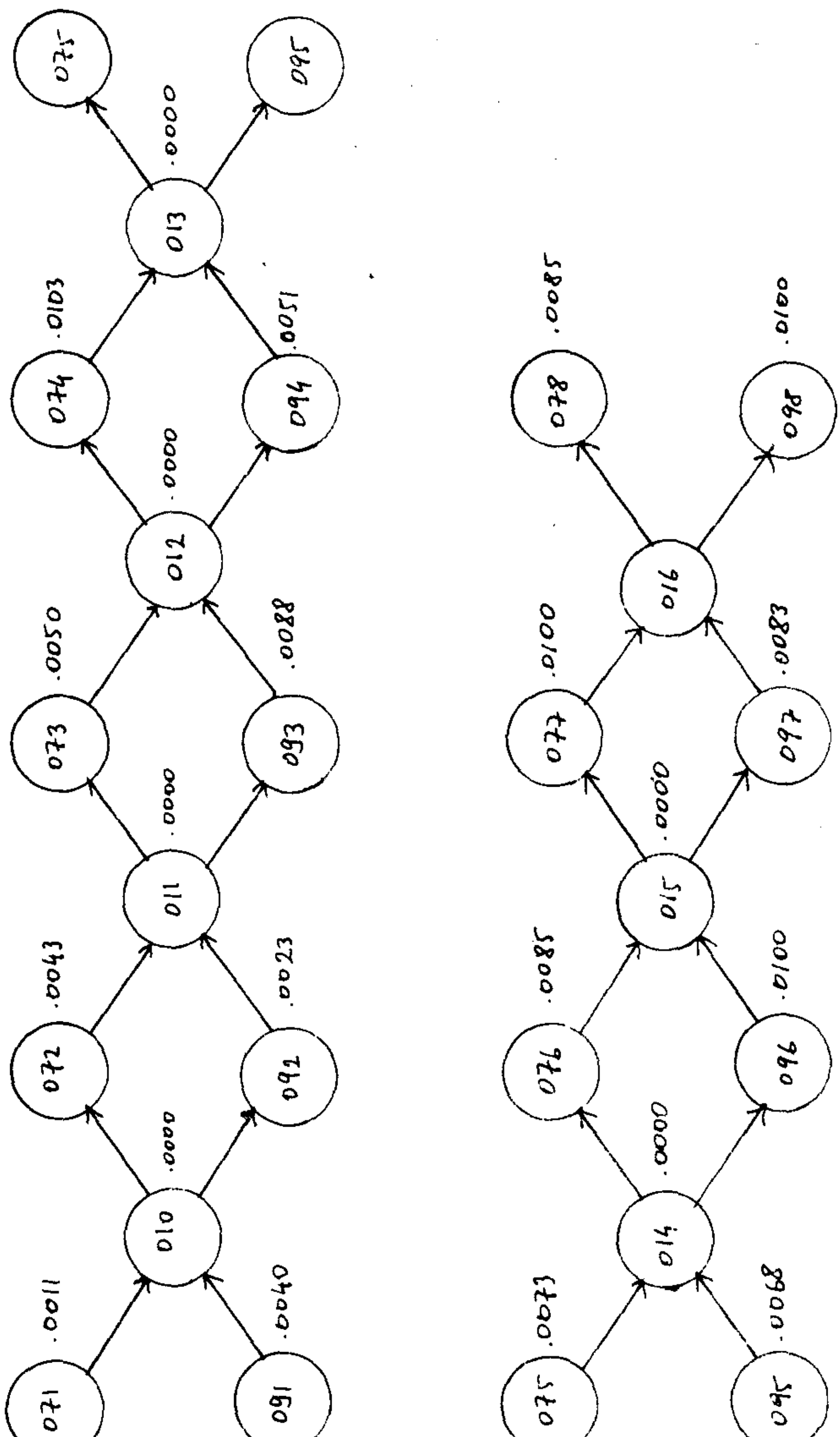
Models: 1,14

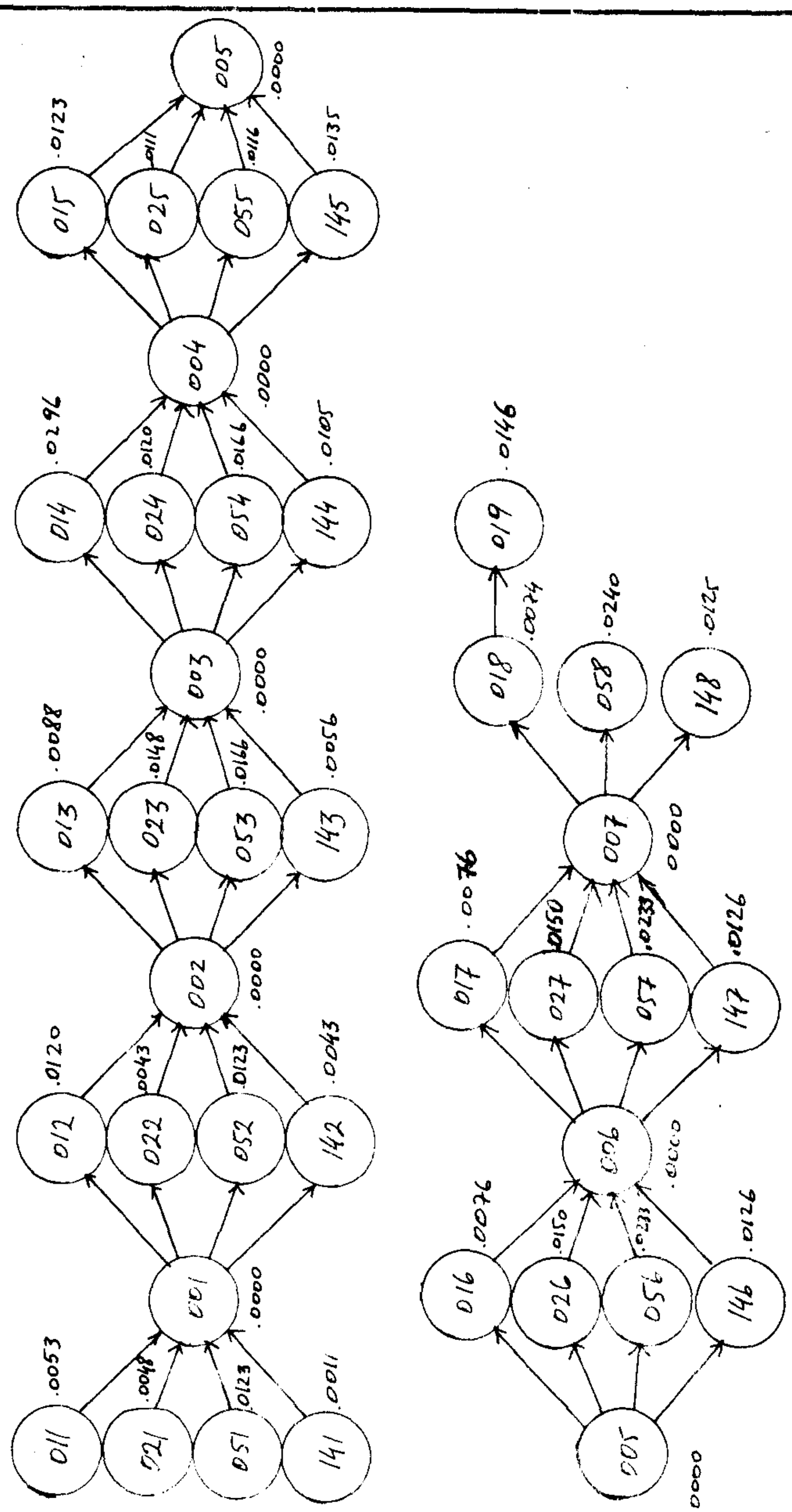

011
141
021
.0053
.0011
.0000
012
142
022
.0120
.0043
.0000
013
143
023
.0088
.0056
.0000
014
144
024
.0296
.0105
.0000
015
145
025
.0123
.0135
.0000
016
146
026
.0076
.0093
.0000
026
017
147
027
.0000
.0074
.0126
.0000
018
148
.0074
.0125
019
.0146

Models: 3,5.

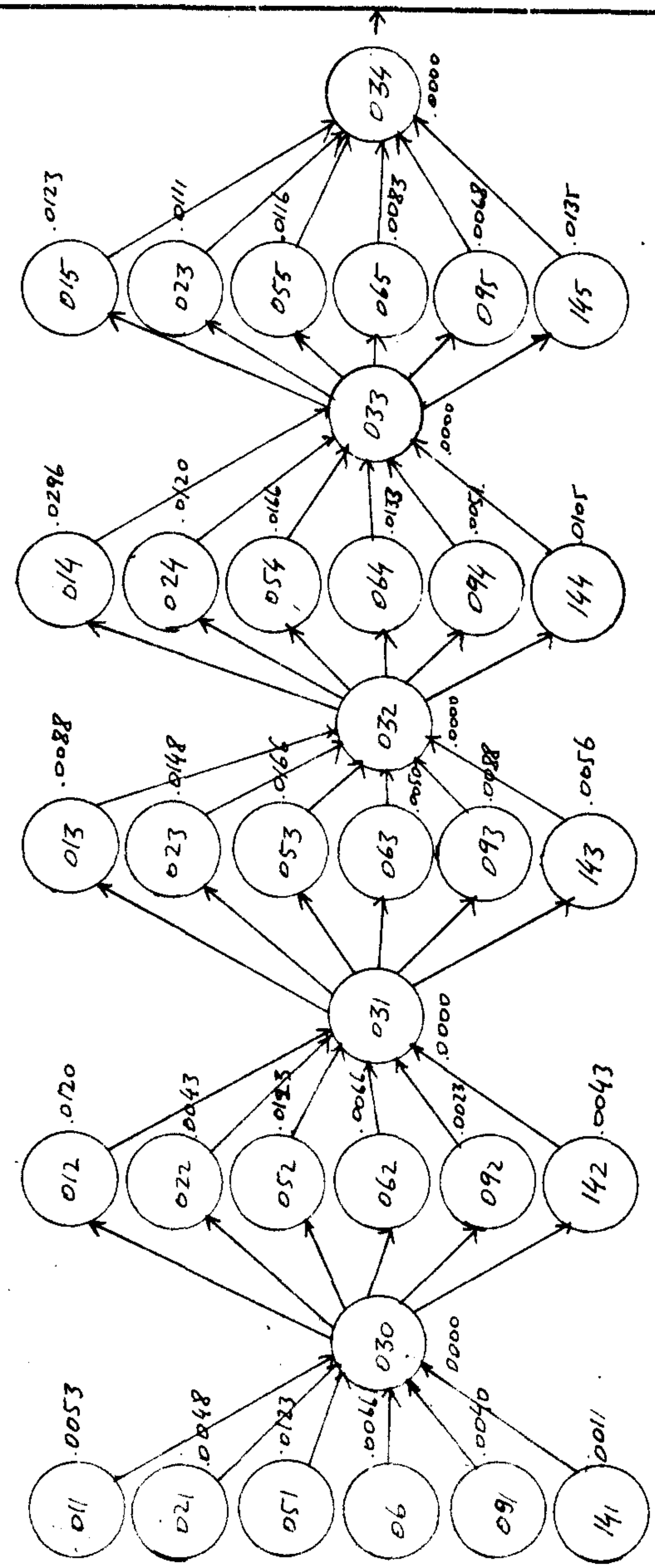


Models 7,9

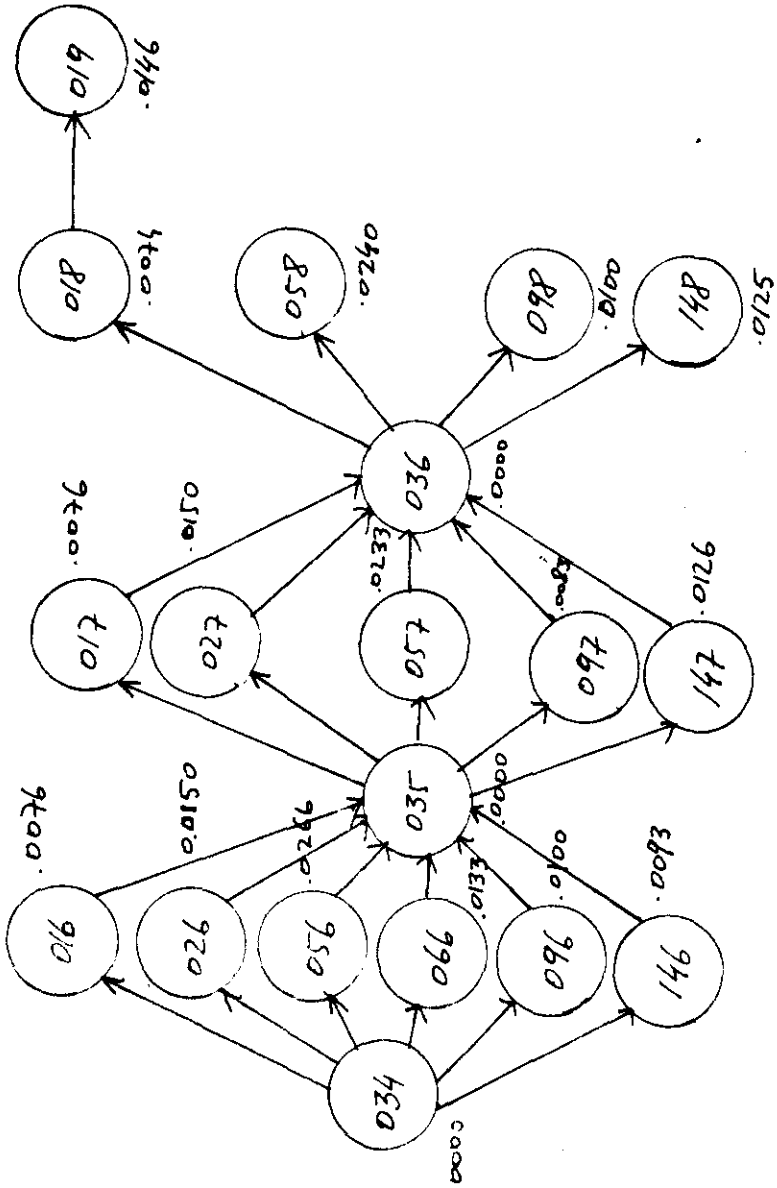





Models: 1,2,5,14.




Models: 1,2,5,6,9,14.



019
.0046
018
.0074
058
.0240
098
.0100
148
.0125
036
.0000
017
.0046
027
.0150
057
.0233
097
.0083
147
.0126
035
.0000
016
.0046
026
.0150
056
.0266
066
.0133
096
.0100
146
.0093
034
.0000

PRODUCTION LINE BALANCING ON THE IBM 1620

DATA CARDS

```
9                                0010296270
        011              01
        012              01
        013              01
        014              01
        015              01
        016              01
        017              01
        018              01
        019              01

      014013                                         9       01       0296
      019018                                         9       01       0146
      015014                                         9       01       0123
      012011                                         9       01       0120
      013012                                         9       01       0088
      016015                                         9       01       0076
      017016                                         9       01       0076
      018017                                         9       01       0074
      011                                            9       01       0053
9
```

RESULT

| OPER NO | ZONE | JOB NO | TIME | CUM T/M | CARD NO | RUN NO | TO | UNITS | CUMULATIVE TIME/RUN |
|---|---|---|---|---|---|---|---|---|---|
| 01 | 01 | 011 | 0053 | 0053 | 001 | 001 | 0296 | 270 | 0000053 |
| 01 | 01 | 012 | 0120 | 0173 | 002 | 001 | 0296 | 270 | 0000173 |
| 01 | 01 | 013 | 0088 | 0261 | 003 | 001 | 0296 | 270 | 0000261 |
| 02 | 01 | 014 | 0296 | 0296 | 004 | 001 | 0296 | 270 | 0000557 |
| 03 | 01 | 015 | 0123 | 0123 | 005 | 001 | 0296 | 270 | 0000680 |
| 03 | 01 | 016 | 0076 | 0199 | 006 | 001 | 0296 | 270 | 0000756 |
| 03 | 01 | 017 | 0076 | 0275 | 007 | 001 | 0296 | 270 | 0000832 |
| 04 | 01 | 018 | 0074 | 0074 | 008 | 001 | 0296 | 270 | 0000906 |
| 04 | 01 | 019 | 0146 | 0220 | 009 | 001 | 0296 | 270 | 0001052 |

0132 0000 0132

```
PRODUCTION LINE BALANCING ON THE IBM 1620
  DATA  CARDS
9                                      0020150533
            021              01
            022              01
            023              01
            024              01
            025              01
            026              01
            027              01

         026025                                         9        02       0150
         027026                                         9        02       0150
         023022                                         9        02       0148
         024023                                         9        02       0120
         025024                                         9        02       0111
         021                                            9        02       0048
         022021                                         9        02       0043
9

RESULT

OPER  ZONE   JOB     CUM   CARD RUN  TO    UNITS  CUMULATIVE
 NO          NO TIME  T/M   NO  NO                TIME/RUN


  01   02  021 0048 0048  001  002 0150  533    0000048
  01   02  022 0043 0091  002  002 0150  533    0000091
  02   02  023 0148 0148  003  002 0150  533    0000239
  03   02  024 0120 0120  004  002 0150  533    0000359
  04   02  025 0111 0111  005  002 0150  533    0000470
  05   02  026 0150 0150  006  002 0150  533    0000620
  06   02  027 0150 0150  007  002 0150  533    0000770

00130 0000 130
```

```
PRODUCTION LINE BALANCING ON THE IBM 1620
  DATA  CARDS
9                                      50266300
            051              01
            052              01
            053              01
            054              01
            055              01
            056              01
            057              01
            058              01

         056055                                         9        03       0266
         058057                                         9        03       0240
         057056                                         9        03       0233
         053052                                         9        03       0166
         054053                                         9        03       0166
         051                                            9        03       0123
         052051                                         9        03       0123
         055054                                         9        03       0116
9

RESULT

OPER  ZONE   JOB     CUM   CARD RUN  TO    UNITS  CUMULATIVE
 NO          NO TIME  T/M   NO  NO                TIME/RUN


  01   03  051 0123 0123  001  005 0266  300    0000123
  01   03  052 0123 0246  002  005 0266  300    0000246
  02   03  053 0166 0166  003  005 0266  300    0000412
  03   03  054 0166 0166  004  005 0266  300    0000578
  04   03  055 0116 0116  005  005 0266  300    0000694
  05   03  056 0266 0266  006  005 0266  300    0000960
  06   03  057 0233 0233  007  005 0266  300    0001193
  07   03  058 0240 0240  008  005 0266  300    0001433

00429  0001  0163
```

```
PRODUCTION LINE BALANCING ON THE IBM 1620
  DATA  CARDS
9                                        90100800
           091                 01
           092                 01
           093                 01
           094                 01
           095                 01
           096                 01
           097                 01
           098                 01

        096095                                    9       04      0100
        098097                                    9       04      0100
        093092                                    9       04      0088
        097096                                    9       04      0083
        095094                                    9       04      0068
        094093                                    9       04      0051
        091                                       9       04      0040
        092091                                    9       04      0023
9

RESULT

OPER  ZONE   JOB      CUM   CARD RUN  TO    UNITS  CUMULATIVE
 NO          NO TIME  T/M    NO  NO                TIME/RUN


  01    04   091 0040 0040  001  009 0100   800    0000040
  01    04   092 0023 0063  002  009 0100   800    0000063
  02    04   093 0088 0088  003  009 0100   800    0000151
  03    04   094 0051 0051  004  009 0100   800    0000202
  04    04   095 0068 0068  005  009 0100   800    0000270
  05    04   096 0100 0100  006  009 0100   800    0000370
  06    04   097 0083 0083  007  009 0100   800    0000453
  07    04   098 0100 0100  008  009 0100   800    0000553

00147 0001 0047
```

```
PRODUCTION LINE BALANCING ON THE IBM 1620
  DATA  CARDS
9                                        0120400200
           121                 01
           122                 01
           123                 01
           124                 01
           125                 01
           126                 01

        122121                                    9       05      0400
        126125                                    9       05      0205
        125124                                    9       05      0190
        123122                                    9       05      0166
        124123                                    9       05      0156
        121                                       9       05      0065
9

RESULT

OPER  ZONE   JOB      CUM   CARD RUN  TO    UNITS  CUMULATIVE
 NO          NO TIME  T/M    NO  NO                TIME/RUN


  01    05   121 0065 0065  001  012 0400   200    0000065
  02    05   122 0400 0400  002  012 0400   200    0000465
  03    05   123 0166 0166  003  012 0400   200    0000631
  03    05   124 0156 0322  004  012 0400   200    0000787
  04    05   125 0190 0190  005  012 0400   200    0000977
  04    05   126 0205 0395  006  012 0400   200    0001182


00418 0001 0018
```

```
PRODUCTION LINE BALANCING ON THE IBM 1620
  DATA  CARDS
9                                  0140135591
          141                      01
          142                      01
          143                      01
          144                      01
          145                      01
          146                      01
          147                      01
          148                      01

       145144                                                 9       06       0135
       147146                                                 9       06       0126
       148147                                                 9       06       0125
       144143                                                 9       06       0105
       146145                                                 9       06       0093
       143142                                                 9       06       0056
       142141                                                 9       06       0043
       141                                                    9       06       0011
9

RESULT

OPER  ZONE    JOB     CUM   CARD RUN  TO    UNITS  CUMULATIVE
 NO        NO TIME   T/M    NO  NO                  TIME/RUN


 01    06  141 0011 0011   001   014 0135   591    0000011
 01    06  142 0043 0054   002   014 0135   591    0000054
 01    06  143 0056 0110   003   014 0135   591    0000110
 02    06  144 0105 0105   004   014 0135   591    0000215
 03    06  145 0135 0135   005   014 0135   591    0000350
 04    06  146 0093 0093   006   014 0135   591    0000443
 05    06  147 0126 0126   007   014 0135   591    0000569
 06    06  148 0125 0125   008   014 0135   591    0000694

00116 0000 0116
```

```
PRODUCTION LINE BALANCING ON THE IBM 1620
  DATA  CARDS
9                                  0150103774
          010                      01
          011                      01
          012                      01
          013                      01
          014                      01
          015                      01
          016                      01
          071                      01
          072                      01
          073                      01
          074                      01
          075                      01
          076                      01
          077                      01
          078                      01
          091                      01
          092                      01
          093                      01
          094                      01
          095                      01
          096                      01
          097                      01
          098                      01

       074012                                                 9       02       0103
       077015                                                 9       02       0100
       096014                                                 9       02       0100
       098016                                                 9       02       0100
       093011                                                 9       02       0088
       076014                                                 9       02       0085
       078016                                                 9       02       0085
       097015                                                 9       02       0083
       075013                                                 9       02       0073
       095013                                                 9       02       0068
       094012                                                 9       02       0051
       073011                                                 9       02       0050
       072010                                                 9       02       0043
       091                                                    9       02       0040
       092010                                                 9       02       0023
       071                                                    9       02       0011
       010071091                                              9       02       0000
       011072092                                              9       02       0000
       012073093                                              9       02       0000
       013074094                                              9       02       0000
       014075095                                              9       02       0000
       015076096                                              9       02       0000
       016077097                                              9       02       0000
9

RESULT

OPER  ZONE    JOB     CUM   CARD RUN  TO    UNITS  CUMULATIVE
 NO        NO TIME   T/M    NO  NO                  TIME/RUN
```

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 01 | 02 | 091 | 0040 | 0040 | 001 | 015 | 0103 | 774 | 0000040 |
| 01 | 02 | 071 | 0011 | 0051 | 002 | 015 | 0103 | 774 | 0000051 |
| 01 | 02 | 010 | 0000 | 0051 | 003 | 015 | 0103 | 774 | 0000051 |
| 01 | 02 | 072 | 0043 | 0094 | 004 | 015 | 0103 | 774 | 0000094 |
| 02 | 02 | 092 | 0023 | 0023 | 005 | 015 | 0103 | 774 | 0000117 |
| 02 | 02 | 011 | 0000 | 0023 | 006 | 015 | 0103 | 774 | 0000117 |
| 02 | 02 | 073 | 0050 | 0073 | 007 | 015 | 0103 | 774 | 0000167 |
| 03 | 02 | 093 | 0088 | 0088 | 008 | 015 | 0103 | 774 | 0000255 |
| 04 | 02 | 012 | 0000 | 0000 | 009 | 015 | 0103 | 774 | 0000255 |
| 04 | 02 | 074 | 0103 | 0103 | 010 | 015 | 0103 | 774 | 0000358 |
| 05 | 02 | 094 | 0051 | 0051 | 011 | 015 | 0103 | 774 | 0000409 |
| 06 | 02 | 013 | 0000 | 0000 | 012 | 015 | 0103 | 774 | 0000409 |
| 06 | 02 | 075 | 0073 | 0073 | 013 | 015 | 0103 | 774 | 0000482 |
| 07 | 02 | 095 | 0068 | 0068 | 014 | 015 | 0103 | 774 | 0000550 |
| 08 | 02 | 014 | 0000 | 0000 | 015 | 015 | 0103 | 774 | 0000550 |
| 08 | 02 | 096 | 0100 | 0100 | 016 | 015 | 0103 | 774 | 0000650 |
| 09 | 02 | 076 | 0085 | 0085 | 017 | 015 | 0103 | 774 | 0000735 |
| 10 | 02 | 015 | 0000 | 0000 | 018 | 015 | 0103 | 774 | 0000735 |
| 10 | 02 | 077 | 0100 | 0100 | 019 | 015 | 0103 | 774 | 0000835 |
| 11 | 02 | 097 | 0083 | 0083 | 020 | 015 | 0103 | 774 | 0000918 |
| 12 | 02 | 016 | 0000 | 0000 | 021 | 015 | 0103 | 774 | 0000918 |
| 12 | 02 | 098 | 0100 | 0100 | 022 | 015 | 0103 | 774 | 0001018 |
| 13 | 02 | 078 | 0085 | 0085 | 023 | 015 | 0103 | 774 | 0001103 |

00236 0002 0030

PRODUCTION LINE BALANCING ON THE IBM 1620

DATA CARDS

| | | |
|---|---|---|
| 9 | | 0150296270 |
| | 001 | 01 |
| | 002 | 01 |
| | 003 | 01 |
| | 004 | 01 |
| | 005 | 01 |
| | 006 | 01 |
| | 007 | 01 |
| | 011 | 01 |
| | 012 | 01 |
| | 013 | 01 |
| | 014 | 01 |
| | 015 | 01 |
| | 016 | 01 |
| | 017 | 01 |
| | 018 | 01 |
| | 019 | 01 |
| | 021 | 01 |
| | 022 | 01 |
| | 023 | 01 |
| | 024 | 01 |
| | 025 | 01 |
| | 026 | 01 |
| | 027 | 01 |
| | 051 | 01 |
| | 052 | 01 |
| | 053 | 01 |
| | 054 | 01 |
| | 055 | 01 |
| | 056 | 01 |
| | 057 | 01 |
| | 058 | 01 |
| | 141 | 01 |
| | 142 | 01 |
| | 143 | 01 |
| | 144 | 01 |
| | 145 | 01 |
| | 146 | 01 |
| | 147 | 01 |
| | 148 | 01 |

| | | | |
|---|---|---|---|
| 014003 | 9 | 01 | 0296 |
| 056005 | 9 | 01 | 0266 |
| 058007 | 9 | 01 | 0240 |
| 057006 | 9 | 01 | 0233 |
| 053002 | 9 | 01 | 0166 |
| 054003 | 9 | 01 | 0166 |
| 026005 | 9 | 01 | 0150 |
| 027006 | 9 | 01 | 0150 |
| 023002 | 9 | 01 | 0148 |
| 019018 | 9 | 01 | 0146 |
| 145004 | 9 | 01 | 0135 |
| 147006 | 9 | 01 | 0126 |
| 148007 | 9 | 01 | 0125 |
| 051 | 9 | 01 | 0123 |

| | | | |
|---|---|---|---|
| 052001 | 9 | 01 | 0123 |
| 015004 | 9 | 01 | 0123 |
| 012001 | 9 | 01 | 0120 |
| 024003 | 9 | 01 | 0120 |
| 055004 | 9 | 01 | 0116 |
| 025004 | 9 | 01 | 0111 |
| 144003 | 9 | 01 | 0105 |
| 146005 | 9 | 01 | 0093 |
| 013002 | 9 | 01 | 0088 |
| 016005 | 9 | 01 | 0076 |
| 017006 | 9 | 01 | 0076 |
| 018007 | 9 | 01 | 0074 |
| 143002 | 9 | 01 | 0056 |
| 011 | 9 | 01 | 0053 |
| 021 | 9 | 01 | 0048 |
| 022001 | 9 | 01 | 0043 |
| 142001 | 9 | 01 | 0043 |
| 141 | 9 | 01 | 0011 |
| 001011021051 141 | 9 | 01 | 0000 |
| 002012022052 142 | 9 | 01 | 0000 |
| 003013023053 143 | 9 | 01 | 0000 |
| 004014024054 144 | 9 | 01 | 0000 |
| 005015025055 145 | 9 | 01 | 0000 |
| 006016026056 146 | 9 | 01 | 0000 |
| 007017027057 147 | 9 | 01 | 0000 |

9

RESULT

| OPER NO | ZONE | JOB NO | TIME | CUM T/M | CARD NO | RUN NO | TO | UNITS | CUMULATIVE TIME/RUN |
|---|---|---|---|---|---|---|---|---|---|
| 01 | 01 | 051 | 0123 | 0123 | 001 | 015 | 0296 | 270 | 0000123 |
| 01 | 01 | 011 | 0053 | 0176 | 002 | 015 | 0296 | 270 | 0000176 |
| 01 | 01 | 021 | 0048 | 0224 | 003 | 015 | 0296 | 270 | 0000224 |
| 01 | 01 | 141 | 0011 | 0235 | 004 | 015 | 0296 | 270 | 0000235 |
| 01 | 01 | 001 | 0000 | 0235 | 005 | 015 | 0296 | 270 | 0000235 |
| 01 | 01 | 022 | 0043 | 0278 | 006 | 015 | 0296 | 270 | 0000278 |
| 02 | 01 | 052 | 0123 | 0123 | 007 | 015 | 0296 | 270 | 0000401 |
| 02 | 01 | 012 | 0120 | 0243 | 008 | 015 | 0296 | 270 | 0000521 |
| 02 | 01 | 142 | 0043 | 0286 | 009 | 015 | 0296 | 270 | 0000564 |
| 03 | 01 | 002 | 0000 | 0000 | 010 | 015 | 0296 | 270 | 0000564 |
| 03 | 01 | 023 | 0148 | 0148 | 011 | 015 | 0296 | 270 | 0000712 |
| 03 | 01 | 013 | 0088 | 0236 | 012 | 015 | 0296 | 270 | 0000800 |
| 03 | 01 | 143 | 0056 | 0292 | 013 | 015 | 0296 | 270 | 0000856 |
| 04 | 01 | 053 | 0166 | 0166 | 014 | 015 | 0296 | 270 | 0001022 |
| 04 | 01 | 003 | 0000 | 0166 | 015 | 015 | 0296 | 270 | 0001022 |
| 04 | 01 | 024 | 0120 | 0286 | 016 | 015 | 0296 | 270 | 0001142 |
| 05 | 01 | 014 | 0296 | 0296 | 017 | 015 | 0296 | 270 | 0001438 |
| 06 | 01 | 054 | 0166 | 0166 | 018 | 015 | 0296 | 270 | 0001604 |
| 06 | 01 | 144 | 0105 | 0271 | 019 | 015 | 0296 | 270 | 0001709 |
| 07 | 01 | 004 | 0000 | 0000 | 020 | 015 | 0296 | 270 | 0001709 |
| 07 | 01 | 145 | 0135 | 0135 | 021 | 015 | 0296 | 270 | 0001844 |
| 07 | 01 | 015 | 0123 | 0258 | 022 | 015 | 0296 | 270 | 0001967 |
| 08 | 01 | 055 | 0116 | 0116 | 023 | 015 | 0296 | 270 | 0002083 |
| 08 | 01 | 025 | 0111 | 0227 | 024 | 015 | 0296 | 270 | 0002194 |
| 09 | 01 | 005 | 0000 | 0000 | 025 | 015 | 0296 | 270 | 0002194 |
| 09 | 01 | 056 | 0266 | 0266 | 026 | 015 | 0296 | 270 | 0002460 |
| 10 | 01 | 026 | 0150 | 0150 | 027 | 015 | 0296 | 270 | 0002610 |
| 10 | 01 | 146 | 0093 | 0243 | 028 | 015 | 0296 | 270 | 0002703 |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| 11 | 01 | 006 | 0000 | 0076 | 030 | 015 | 0296 | 270 | 0002779 |
| 11 | 01 | 147 | 0126 | 0202 | 031 | 015 | 0296 | 270 | 0002905 |
| 11 | 01 | 017 | 0076 | 0278 | 032 | 015 | 0296 | 270 | 0002981 |
| 12 | 01 | 057 | 0233 | 0233 | 033 | 015 | 0296 | 270 | 0003214 |
| 13 | 01 | 027 | 0150 | 0150 | 034 | 015 | 0296 | 270 | 0003364 |
| 13 | 01 | 007 | 0000 | 0150 | 035 | 015 | 0296 | 270 | 0003364 |
| 13 | 01 | 148 | 0125 | 0275 | 036 | 015 | 0296 | 270 | 0003489 |
| 14 | 01 | 058 | 0240 | 0240 | 037 | 015 | 0296 | 270 | 0003729 |
| 15 | 01 | 018 | 0074 | 0074 | 038 | 015 | 0296 | 270 | 0003803 |
| 15 | 01 | 019 | 0146 | 0220 | 039 | 015 | 0296 | 270 | 0003949 |

00491 0001 0195

PRODUCTION LINE BALANCING ON THE IBM 1620

DATA CARDS

```
9                                  0160296270
            011                01
            012                01
            013                01
            014                01
            015                01
            016                01
            017                01
            018                01
            019                01
            021                01
            022                01
            023                01
            024                01
            025                01
            026                01
            027                01
            141                01
            142                01
            143                01
            144                01
            145                01
            146                01
            147                01
            148                01

         014023                              9       03       0296
         019018                              9       03       0146
         145024                              9       03       0135
         147026                              9       03       0126
         148027                              9       03       0125
         015024                              9       03       0123
         012021                              9       03       0120
         144023                              9       03       0105
         146025                              9       03       0093
         013022                              9       03       0088
         016025                              9       03       0076
         017026                              9       03       0076
         018027                              9       03       0074
         143022                              9       03       0056
         011                                 9       03       0053
         142021                              9       03       0043
         141                                 9       03       0011
         021011141                           9       03       0000
         022012142                           9       03       0000
         023013143                           9       03       0000
         024014144                           9       03       0000
         025015145                           9       03       0000
         026016146                           9       03       0000
         027017147                           9       03       0000
9
```

RESULT

```
OPER   ZONE    JOB        CUM   CARD  RUN   TO    UNITS   CUMULATIVE
[redacted]

 01     03   011 0053 0053   001   016 0296   270    0000053
 01     03   141 0011 0064   002   016 0296   270    0000064
 01     03   021 0000 0064   003   016 0296   270    0000064
 01     03   012 0120 0184   004   016 0296   270    0000184
 01     03   142 0043 0227   005   016 0296   270    0000227
 01     03   022 0000 0227   006   016 0296   270    0000227
 01     03   143 0056 0283   007   016 0296   270    0000283
 02     03   013 0088 0088   008   016 0296   270    0000371
 02     03   023 0000 0088   009   016 0296   270    0000371
 02     03   144 0105 0193   010   016 0296   270    0000476
 03     03   014 0296 0296   011   016 0296   270    0000772
 04     03   024 0000 0000   012   016 0296   270    0000772
 04     03   145 0135 0135   013   016 0296   270    0000907
 04     03   015 0123 0258   014   016 0296   270    0001030
 05     03   025 0000 0000   015   016 0296   270    0001030
 05     03   146 0093 0093   016   016 0296   270    0001123
 05     03   016 0076 0169   017   016 0296   270    0001199
 05     03   026 0000 0169   018   016 0296   270    0001199
 05     03   147 0126 0295   019   016 0296   270    0001325
 06     03   017 0076 0076   020   016 0296   270    0001401
 06     03   027 0000 0076   021   016 0296   270    0001401
 06     03   018 0074 0150   022   016 0296   270    0001475
 06     03   019 0146 0296   023   016 0296   270    0001621
 07     03   148 0125 0125   024   016 0296   270    0001746

0(326 0001 0030
```

PRODUCTION LINE BALANCING ON THE IBM 1620

DATA CARDS

| | | |
|---|---|---|
| 9 | | 0170266300 |
| | 031 | 01 |
| | 032 | 01 |
| | 033 | 01 |
| | 034 | 01 |
| | 035 | 01 |
| | 036 | 01 |
| | 037 | 01 |
| | 040 | 01 |
| | 041 | 01 |
| | 042 | 01 |
| | 043 | 01 |
| | 044 | 01 |
| | 045 | 01 |
| | 051 | 01 |
| | 052 | 01 |
| | 053 | 01 |
| | 054 | 01 |
| | 055 | 01 |
| | 056 | 01 |
| | 057 | 01 |
| | 058 | 01 |

| | | | |
|---|---|---|---|
| 056044 | 9 | 04 | 0266 |
| 058057 | 9 | 04 | 0240 |
| 057045 | 9 | 04 | 0233 |
| 053041 | 9 | 04 | 0166 |
| 054042 | 9 | 04 | 0166 |
| 036044 | 9 | 04 | 0133 |
| 037045 | 9 | 04 | 0131 |
| 051 | 9 | 04 | 0123 |
| 052040 | 9 | 04 | 0123 |
| 034042 | 9 | 04 | 0118 |
| 055043 | 9 | 04 | 0116 |
| 035043 | 9 | 04 | 0105 |
| 033041 | 9 | 04 | 0057 |
| 032040 | 9 | 04 | 0050 |
| 031 | 9 | 04 | 0009 |
| 040031051 | 9 | 04 | 0000 |
| 041032052 | 9 | 04 | 0000 |
| 042033053 | 9 | 04 | 0000 |
| 043034054 | 9 | 04 | 0000 |
| 044035055 | 9 | 04 | 0000 |
| 045036056 | 9 | 04 | 0000 |

9

RESULT

| OPER NO | ZONE | JOB NO | TIME | CUM T/M | CARD NO | RUN NO | TO | UNITS | CUMULATIVE TIME/RUN |
|---|---|---|---|---|---|---|---|---|---|
| 01 | 04 | 051 | 0123 | 0123 | 001 | 017 | 0266 | 300 | 0000123 |
| 01 | 04 | 031 | 0009 | 0132 | 002 | 017 | 0266 | 300 | 0000132 |
| 01 | 04 | 040 | 0000 | 0132 | 003 | 017 | 0266 | 300 | 0000132 |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| 02 | 04 | 032 | 0050 | 0050 | 005 | 017 | 0266 | 300 | 0000305 |
| 02 | 04 | 041 | 0000 | 0050 | 006 | 017 | 0266 | 300 | 0000305 |
| 02 | 04 | 053 | 0166 | 0216 | 007 | 017 | 0266 | 300 | 0000471 |
| 03 | 04 | 033 | 0057 | 0057 | 008 | 017 | 0266 | 300 | 0000528 |
| 03 | 04 | 042 | 0000 | 0057 | 009 | 017 | 0266 | 300 | 0000528 |
| 03 | 04 | 054 | 0166 | 0223 | 010 | 017 | 0266 | 300 | 0000694 |
| 04 | 04 | 034 | 0118 | 0118 | 011 | 017 | 0266 | 300 | 0000812 |
| 04 | 04 | 043 | 0000 | 0118 | 012 | 017 | 0266 | 300 | 0000812 |
| 04 | 04 | 055 | 0116 | 0234 | 013 | 017 | 0266 | 300 | 0000928 |
| 05 | 04 | 035 | 0105 | 0105 | 014 | 017 | 0266 | 300 | 0001033 |
| 05 | 04 | 044 | 0000 | 0105 | 015 | 017 | 0266 | 300 | 0001033 |
| 05 | 04 | 036 | 0133 | 0238 | 016 | 017 | 0266 | 300 | 0001166 |
| 06 | 04 | 056 | 0266 | 0266 | 017 | 017 | 0266 | 300 | 0001432 |
| 07 | 04 | 045 | 0000 | 0000 | 018 | 017 | 0266 | 300 | 0001432 |
| 07 | 04 | 057 | 0233 | 0233 | 019 | 017 | 0266 | 300 | 0001665 |
| 08 | 04 | 058 | 0240 | 0240 | 020 | 017 | 0266 | 300 | 0001905 |
| 09 | 04 | 037 | 0131 | 0131 | 021 | 017 | 0266 | 300 | 0002036 |

00358 0001 0092

PRODUCTION LINE BALANCING ON THE IBM 1620

DATA CARDS

```
9                                  0190296270
         011              01
         012              01
         013              01
         014              01
         015              01
         021              01
         022              01
         023              01
         024              01
         025              01
         030              01
         031              01
         032              01
         033              01
         034              01
         035              01
         051              01
         052              01
         053              01
         054              01
         055              01
         061              01
         062              01
         063              01
         064              01
         065              01
         091              01
         092              01
         093              01
         094              01
         095              01
         141              01
         142              01
         143              01
         144              01
         145              01

      014032                                       9      05      0296
      053031                                       9      05      0166
      054032                                       9      05      0166
      023031                                       9      05      0148
      019018                                       9      05      0146
      145033                                       9      05      0135
      064032                                       9      05      0133
      015033                                       9      05      0123
      051                                          9      05      0123
      052030                                       9      05      0123
      012030                                       9      05      0120
      024032                                       9      05      0120
      055033                                       9      05      0116
      025033                                       9      05      0111
      144032                                       9      05      0105
      013031                                       9      05      0088
      065033                                       9      05      0083
      095033                                       9      05      0068
      061                                          9      05      0066
      062030                                       9      05      0066
      143031                                       9      05      0056
      011                                          9      05      0053
      094032                                       9      05      0051
      063031                                       9      05      0050
      021                                          9      05      0048
      022030                                       9      05      0043
      142030                                       9      05      0043
      091                                          9      05      0040
      092030                                       9      05      0023
      141                                          9      05      0011
      030011021051 061091141                       9      05      0000
      031012022052 062092142                       9      05      0000
      032013023053 063093143                       9      05      0000
      033014024054 064094144                       9      05      0000
```

RESULT

| OPER NO | ZONE | JOB NO | TIME | CUM T/M | CARD NO | RUN NO | TO | UNITS | CUMULATIVE TIME/RUN |
|---|---|---|---|---|---|---|---|---|---|
| 01 | 05 | 051 | 0123 | 0123 | 001 | 019 | 0296 | 270 | 0000123 |
| 01 | 05 | 061 | 0066 | 0189 | 002 | 019 | 0296 | 270 | 0000189 |
| 01 | 05 | 011 | 0053 | 0242 | 003 | 019 | 0296 | 270 | 0000242 |
| 01 | 05 | 091 | 0040 | 0282 | 004 | 019 | 0296 | 270 | 0000282 |
| 01 | 05 | 141 | 0011 | 0293 | 005 | 019 | 0296 | 270 | 0000293 |
| 02 | 05 | 021 | 0048 | 0048 | 006 | 019 | 0296 | 270 | 0000341 |
| 02 | 05 | 030 | 0000 | 0048 | 007 | 019 | 0296 | 270 | 0000341 |
| 02 | 05 | 052 | 0123 | 0171 | 008 | 019 | 0296 | 270 | 0000464 |
| 02 | 05 | 012 | 0120 | 0291 | 009 | 019 | 0296 | 270 | 0000584 |
| 03 | 05 | 062 | 0066 | 0066 | 010 | 019 | 0296 | 270 | 0000650 |
| 03 | 05 | 022 | 0043 | 0109 | 011 | 019 | 0296 | 270 | 0000693 |
| 03 | 05 | 142 | 0043 | 0152 | 012 | 019 | 0296 | 270 | 0000736 |
| 03 | 05 | 092 | 0023 | 0175 | 013 | 019 | 0296 | 270 | 0000759 |
| 03 | 05 | 031 | 0000 | 0175 | 014 | 019 | 0296 | 270 | 0000759 |
| 03 | 05 | 143 | 0056 | 0231 | 015 | 019 | 0296 | 270 | 0000815 |
| 03 | 05 | 063 | 0050 | 0281 | 016 | 019 | 0296 | 270 | 0000865 |
| 04 | 05 | 053 | 0166 | 0166 | 017 | 019 | 0296 | 270 | 0001031 |
| 04 | 05 | 013 | 0088 | 0254 | 018 | 019 | 0296 | 270 | 0001119 |
| 05 | 05 | 023 | 0148 | 0148 | 019 | 019 | 0296 | 270 | 0001267 |
| 05 | 05 | 093 | 0088 | 0236 | 020 | 019 | 0296 | 270 | 0001355 |
| 05 | 05 | 032 | 0000 | 0236 | 021 | 019 | 0296 | 270 | 0001355 |
| 05 | 05 | 094 | 0051 | 0287 | 022 | 019 | 0296 | 270 | 0001406 |
| 06 | 05 | 014 | 0296 | 0296 | 023 | 019 | 0296 | 270 | 0001702 |
| 07 | 05 | 054 | 0166 | 0166 | 024 | 019 | 0296 | 270 | 0001868 |
| 07 | 05 | 024 | 0120 | 0286 | 025 | 019 | 0296 | 270 | 0001988 |
| 08 | 05 | 064 | 0133 | 0133 | 026 | 019 | 0296 | 270 | 0002121 |
| 08 | 05 | 144 | 0105 | 0238 | 027 | 019 | 0296 | 270 | 0002226 |
| 09 | 05 | 033 | 0000 | 0000 | 028 | 019 | 0296 | 270 | 0002226 |
| 09 | 05 | 055 | 0116 | 0116 | 029 | 019 | 0296 | 270 | 0002342 |
| 09 | 05 | 025 | 0111 | 0227 | 030 | 019 | 0296 | 270 | 0002453 |
| 09 | 05 | 095 | 0068 | 0295 | 031 | 019 | 0296 | 270 | 0002521 |
| 10 | 05 | 145 | 0135 | 0135 | 032 | 019 | 0296 | 270 | 0002656 |
| 10 | 05 | 015 | 0123 | 0258 | 033 | 019 | 0296 | 270 | 0002779 |
| 11 | 05 | 065 | 0083 | 0083 | 034 | 019 | 0296 | 270 | 0002862 |

```
00394 0001 0098
```

```
PRODUCTION LINE BALANCING ON THE IBM 1620
  DATA  CARDS
9      0                            0190296270
             016                    01
             017                    01
             018                    01
             019                    01
             026                    01
             027                    01
             036                    01
             056                    01
             057                    01
             058                    01
             066                    01
             096                    01
             097                    01
             098                    01
             146                    01
             147                    01
             148                    01

          056034                                        9      06      0266
          058036                                        9      06      0240
          057035                                        9      06      0233
          026034                                        9      06      0150
          027035                                        9      06      0150
          019018                                        9      06      0146
          066034                                        9      06      0133
          147035                                        9      06      0126
          148036                                        9      06      0125
          096034                                        9      06      0100
          098036                                        9      06      0100
          146034                                        9      06      0093
          097035                                        9      06      0083
          016034                                        9      06      0076
          017035                                        9      06      0076
          018036                                        9      06      0074
          034                                           9      06      0000
          035016026056 066096146                        9      06      0000
          036017027057 097147                           9      06      0000
9
```

RESULT

| OPER NO | ZONE | JOB NO | TIME | CUM T/M | CARD NO | RUN NO | TO | UNITS | CUMULATIVE TIME/RUN |
|---|---|---|---|---|---|---|---|---|---|
| 01 | 06 | 034 | 0000 | 0000 | 001 | 19 | 0296 | 270 | 0000000 |
| 01 | 06 | 026 | 0150 | 0150 | 002 | 019 | 0296 | 270 | 0000150 |
| 01 | 06 | 066 | 0133 | 0283 | 003 | 019 | 0296 | 270 | 0000283 |
| 02 | 06 | 096 | 0100 | 0100 | 004 | 019 | 0296 | 270 | 0000383 |
| 02 | 06 | 146 | 0093 | 0193 | 005 | 019 | 0296 | 270 | 0000476 |
| 02 | 06 | 016 | 0076 | 0269 | 006 | 019 | 0296 | 270 | 0000552 |
| 03 | 06 | 056 | 0266 | 0266 | 007 | 019 | 0296 | 270 | 0000818 |
| 04 | 06 | 035 | 0000 | 0000 | 008 | 019 | 0296 | 270 | 0000818 |
| 04 | 06 | 147 | 0126 | 0126 | 009 | 019 | 0296 | 270 | 0000944 |
| 04 | 06 | 097 | 0083 | 0209 | 010 | 019 | 0296 | 270 | 0001027 |
| 04 | 06 | 017 | 0076 | 0285 | 011 | 019 | 0296 | 270 | 0001103 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 05 | 06 | 057 | 0233 | 0233 | 012 | 019 | 0296 | 270 | 0001336 |
| 06 | 06 | 027 | 0150 | 0150 | 013 | 019 | 0296 | 270 | 0001486 |
| 06 | 06 | 036 | 0000 | 0150 | 014 | 019 | 0296 | 270 | 0001486 |
| 06 | 06 | 148 | 0125 | 0275 | 015 | 019 | 0296 | 270 | 0001611 |
| 07 | 06 | 058 | 0240 | 0240 | 016 | 019 | 0296 | 270 | 0001851 |
| 08 | 06 | 018 | 0074 | 0074 | 017 | 019 | 0296 | 270 | 0001925 |
| 08 | 06 | 019 | 0146 | 0220 | 018 | 019 | 0296 | 270 | 0002071 |
| 09 | 06 | 098 | 0100 | 0100 | 019 | 019 | 0296 | 270 | 0002171 |

00493 0001 0197

| ITER | FUNCTIONAL | VAR IN | VAR OUT |
|---|---|---|---|
| 0001 | 1217560908 | 0012005000 | 0049000000 |
| 0002 | 1426645708 | 0001003700 | 0030000000 |
| 0003 | 1953933708 | 0002001900 | 0027000000 |
| 0004 | 2073000208 | 0006001700 | 0046000000 |
| 0005 | 2122676708 | 0014001700 | 0043000000 |
| 0006 | 2761652608 | 0010001600 | 0031000000 |
| 0007 | 2778953208 | 0009001300 | 0039000000 |
| 0008 | 2786977908 | 0004002500 | 0052000000 |
| 0009 | 2791809408 | 0011001600 | 0047000000 |
| 0010 | 2792443108 | 0003001700 | 0023000000 |
| 0011 | 2792538108 | 0049000000 | 0011001600 |

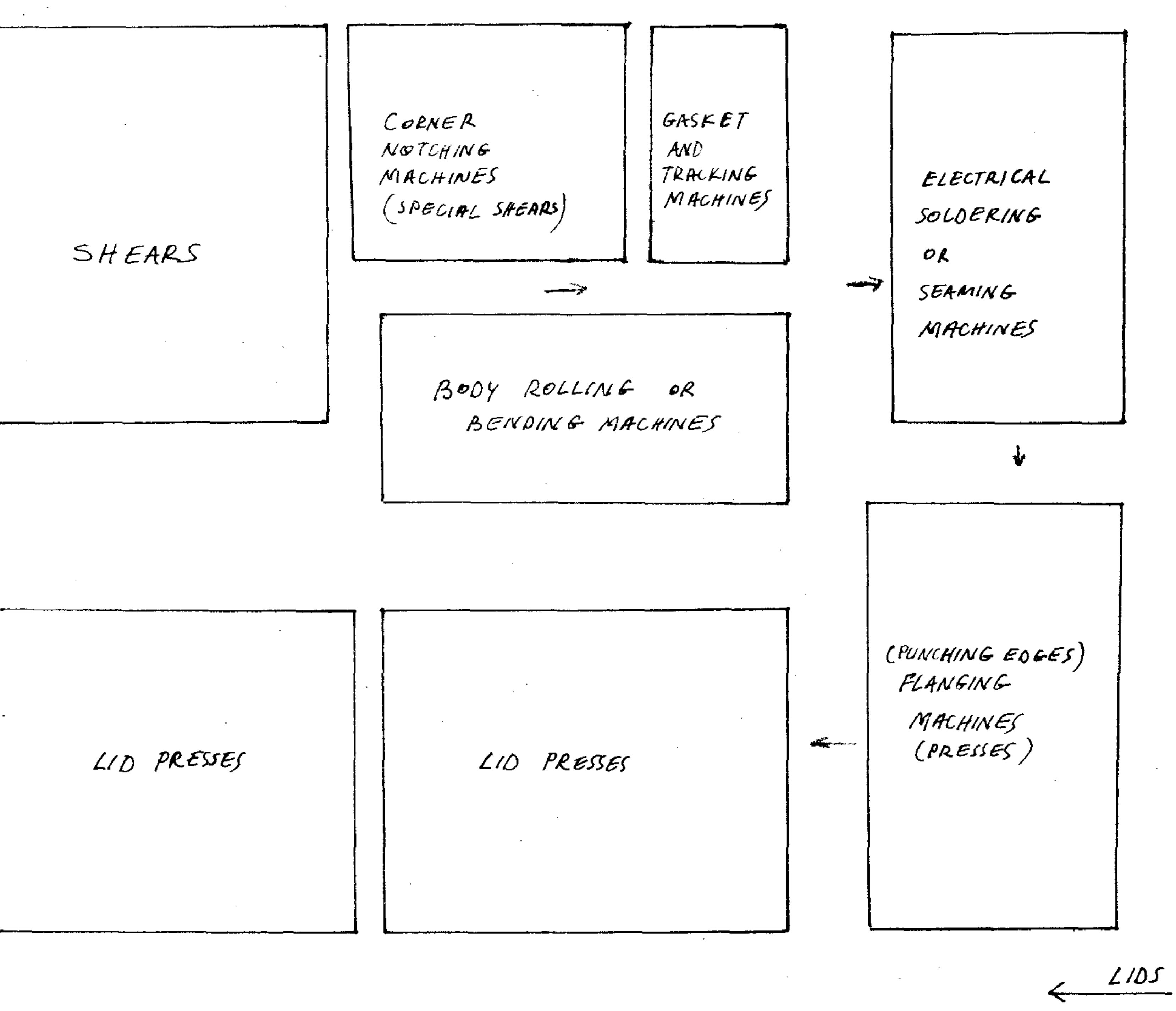
FUNCTIONAL = 08 .27925

BASIC SOLUTION

| ID | CJ | LEVEL | |
|---|---|---|---|
| 0015 | 000.000 | 09 | .20059 |
| 0016 | 000.000 | 09 | .25939 |
| 0017 | 000.000 | 08 | .19893 |
| 0013 | 000.000 | 09 | .25770 |
| 0019 | 000.000 | 09 | .27352 |
| 0020 | 000.000 | 09 | .27352 |
| 0021 | 000.000 | 08 | .11079 |
| 0022 | 000.000 | 08 | .83865 |
| 0003 | 001.700 | 06 | .19821 |
| 0024 | 000.000 | 08 | .98140 |
| 0025 | 000.000 | 08 | .71768 |
| 0026 | 000.000 | 08 | .49530 |
| 0002 | 001.900 | 07 | .26014 |
| 0023 | 000.000 | 09 | .19378 |
| 0029 | 000.000 | 09 | .29246 |
| 0001 | 003.700 | 06 | .56509 |
| 0010 | 001.600 | 07 | .39935 |
| 0032 | 000.000 | 09 | .29952 |
| 0033 | 000.000 | 08 | .29952 |
| 0034 | 000.000 | 08 | .29952 |
| 0035 | 000.000 | 09 | .29731 |
| 0036 | 000.000 | 09 | .26583 |
| 0037 | 000.000 | 09 | .29153 |
| 0038 | 000.000 | 09 | .29286 |
| 0009 | 001.300 | 06 | .13312 |
| 0040 | 000.000 | 08 | .15974 |
| 0041 | 000.000 | 08 | .26357 |
| 0042 | 000.000 | 09 | .28201 |
| 0043 | 000.000 | 09 | .23883 |
| 0044 | 000.000 | 09 | .29406 |
| 0045 | 000.000 | 08 | .87198 |
| 0006 | 001.700 | 06 | .89953 |
| 0049 | 000.000 | 06 | .59580 |
| 0014 | 001.700 | 06 | .31430 |
| 0012 | 005.000 | 07 | .22755 |
| 0050 | 000.000 | 09 | .29952 |

APPENDIX XVIII: Proposed Block Diagram for the Machines in the Tin Body Forming Department.

| ID | CJ | SHADOW PRICES |
|---|---|---|
| 0030 | 000.000 | .34953 |
| 0027 | 000.000 | .02099 |
| 0023 | 000.000 | .00121 |
| 0052 | 000.000 | .06666 |
| 0005 | 003.400 | 1.84223 |
| 0046 | 000.000 | .17463 |
| 0007 | 001.300 | .14847 |
| 0008 | 001.000 | .96848 |
| 0039 | 000.000 | .02166 |
| 0031 | 000.000 | .00024 |
| 0047 | 000.000 | .00605 |
| 0011 | 001.600 | .01406 |
| 0013 | 003.400 | 1.01404 |
| 0048 | 000.000 | .16527 |




APPENDIX XVIII: Proposed Block Diagram for the Machines in the Tin Body Forming Department.

TABLE: 14. FIRST CHANGE RESULTS

| | |
|---|---|
| 1 | 0. |
| 2 | 69976. |
| 3 | 21046. |
| 4 | 0. |
| 5 | 92139. |
| 6 | 9929. |
| 7 | 204074. |
| 8 | 155799. |
| 9 | 493871. |
| 10 | 79134. |
| 11 | 199224. |
| 12 | 0. |
| 13 | 57540. |
| 14 | 63550. |

| | |
|---|---|
| GROUP EFF= | .08 |
| GROUP EFF= | .32 |
| GROUP EFF= | .32 |
| GROUP EFF= | .22 |
| GROUP EFF= | .37 |
| GROUP EFF= | .03 |
| GROUP EFF= | .38 |
| GROUP EFF= | .18 |
| GROUP EFF= | .03 |
| GROUP EFF= | .05 |
| GROUP EFF= | .18 |
| GROUP EFF= | .23 |
| GROUP EFF= | .21 |
| GROUP EFF= | .18 |
| GROUP EFF= | .29 |
| GROUP EFF= | .28 |
| GROUP EFF= | .19 |
| GROUP EFF= | .24 |
| GROUP EFF= | .17 |
| GROUP EFF= | .31 |
| GROUP EFF= | .31 |
| GROUP EFF= | .3 |
| GROUP EFF= | .44 |
| GROUP EFF= | .57 |
| GROUP EFF= | .42 |
| GROUP EFF= | .43 |
| GROUP EFF= | .39 |
| GROUP EFF= | .52 |
| GROUP EFF= | .46 |
| GROUP EFF= | .33 |
| GROUP EFF= | .36 |
| GROUP EFF= | .34 |
| GROUP EFF= | .23 |

TABLE 16. SECOND CHANGE RESULTS

GROUP EFF= .07

GROUP EFF= .29

GROUP EFF= .33

GROUP EFF= .27

GROUP EFF= .36

GROUP EFF= .06

GROUP EFF= .37

GROUP EFF= .21

GROUP EFF= .08

GROUP EFF= .04

GROUP EFF= .18

GROUP EFF= .23

GROUP EFF= .25

GROUP EFF= .15

GROUP EFF= .29

GROUP EFF= .28

GROUP EFF= .19

GROUP EFF= .24

GROUP EFF= .15

GROUP EFF= .27

GROUP EFF= .27

GROUP EFF= .29

GROUP EFF= .43

GROUP EFF= .53

GROUP EFF= .39

GROUP EFF= .41

GROUP EFF= .47

GROUP EFF= .55

GROUP EFF= .48

GROUP EFF= .34

GROUP EFF= .37

GROUP EFF= .32

GROUP EFF= .23

| | | | |
|---|---|---|---|
| 1 | 1 | 229 | .26 |
| 1 | 2 | 285 | .08 |
| 1 | 3 | 312 | 0.00 |
| 1 | 4 | 285 | .08 |
| 1 | 5 | 312 | 0.00 |
| 1 | 6 | 285 | .08 |
| 1 | 7 | 285 | .08 |
| 1 | 8 | 285 | .08 |
| 1 | 9 | 312 | 0.00 |
| 2 | 1 | 55 | .82 |
| 2 | 2 | 199 | .36 |
| 2 | 3 | 270 | .13 |
| 2 | 4 | 270 | .13 |
| 2 | 5 | 243 | .22 |
| 2 | 6 | 270 | .13 |

| | | | |
|---|---|---|---|
| 2 | 8 | 312 | 0.00 |
| 2 | 9 | 312 | 0.00 |
| 3 | 1 | 134 | .57 |
| 3 | 2 | 209 | .33 |
| 3 | 3 | 236 | .24 |
| 3 | 4 | 199 | .36 |
| 3 | 5 | 150 | .51 |
| 3 | 6 | 263 | .15 |
| 3 | 7 | 263 | .15 |
| 3 | 8 | 312 | 0.00 |
| 3 | 9 | 312 | 0.00 |
| 4 | 1 | 283 | .09 |
| 4 | 2 | 284 | .08 |
| 4 | 3 | 312 | 0.00 |
| 4 | 4 | 209 | .33 |
| 4 | 5 | 259 | .16 |
| 4 | 6 | 146 | .53 |
| 4 | 7 | 199 | .36 |
| 4 | 8 | 126 | .59 |
| 4 | 9 | 312 | 0.00 |
| 5 | 1 | 193 | .38 |
| 5 | 2 | 298 | .04 |
| 5 | 3 | 259 | .16 |
| 5 | 4 | 41 | .86 |
| 5 | 5 | 186 | .40 |
| 5 | 6 | 157 | .49 |
| 5 | 7 | 157 | .49 |
| 5 | 8 | 197 | .36 |
| 5 | 9 | 297 | .04 |
| 6 | 1 | 276 | .11 |
| 6 | 2 | 262 | .16 |
| 6 | 3 | 312 | 0.00 |
| 6 | 4 | 284 | .08 |
| 6 | 5 | 312 | 0.00 |
| 6 | 6 | 312 | 0.00 |
| 6 | 7 | 312 | 0.00 |
| 6 | 8 | 312 | 0.00 |
| 6 | 9 | 312 | 0.00 |
| 7 | 1 | 312 | 0.00 |
| 7 | 2 | 312 | 0.00 |
| 7 | 3 | 312 | 0.00 |
| 7 | 4 | 312 | 0.00 |
| 7 | 5 | 312 | 0.00 |
| 7 | 6 | 312 | 0.00 |
| 7 | 7 | 312 | 0.00 |
| 7 | 8 | 312 | 0.00 |
| 7 | 9 | 312 | 0.00 |

| | |
|---|---|
| 1 | 0. |
| 2 | 74433. |
| 3 | 164011. |
| 4 | 0. |
| 5 | 0. |
| 6 | 106979. |
| 7 | 309911. |
| 8 | 111896. |
| 9 | 44298. |
| 10 | 162266. |
| 11 | 199224. |
| 12 | 0. |
| 13 | 12458. |
| 14 | 0. |

TABLE 17 (FIRST SHIFT CHANGE) THIRT CHANGE RESULTS

GROUP EFF= .16

GROUP EFF= .41

GROUP EFF= .37

GROUP EFF= .31

GROUP EFF= .32

GROUP EFF= .05

GROUP EFF= .46

GROUP EFF= .22

GROUP EFF= .08

GROUP EFF= .03

GROUP EFF= .22

GROUP EFF= .28

GROUP EFF= .27

GROUP EFF= .21

GROUP EFF= .35

GROUP EFF= .33

GROUP EFF= .23

GROUP EFF= .28

GROUP EFF= .23

GROUP EFF= .42

GROUP EFF= .42

GROUP EFF= .27

GROUP EFF= .45

GROUP EFF= .49

GROUP EFF= .39

GROUP EFF= .41

GROUP EFF= .5

GROUP EFF= .57

GROUP EFF= .47

GROUP EFF= .29

GROUP EFF= .33

GROUP EFF= .31

GROUP EFF= .28

| | | | |
|---|---|---|---|
| 1 | 1 | 186 | .40 |
| 1 | 2 | 289 | .07 |
| 1 | 3 | 312 | 0.00 |
| 1 | 4 | 289 | .07 |
| 1 | 5 | 312 | .00 |
| 1 | 6 | 289 | .07 |
| 1 | 7 | 190 | .39 |
| 1 | 8 | 190 | .39 |
| 1 | 9 | 276 | .11 |
| 2 | 1 | 34 | .89 |
| 2 | 2 | 191 | .38 |
| 2 | 3 | 159 | .49 |
| 2 | 4 | 159 | .49 |
| 2 | 5 | 235 | .24 |
| 2 | 6 | 258 | .17 |
| 2 | 7 | 235 | .24 |
| 2 | 8 | 312 | .00 |
| 2 | 9 | 312 | .00 |
| 3 | 1 | 84 | .73 |
| 3 | 2 | 198 | .36 |
| [illegible] | 3 | [illegible] | [illegible] |

| | | | |
|---|---|---|---|
| 3 | 4 | 191 | .38 |
| 3 | 5 | 140 | .55 |
| 3 | 6 | 261 | .16 |
| 3 | 7 | 261 | .16 |
| 3 | 8 | 312 | 0.00 |
| 3 | 9 | 312 | 0.00 |
| 4 | 1 | 193 | .38 |
| 4 | 2 | 287 | .08 |
| 4 | 3 | 312 | 0.00 |
| 4 | 4 | 198 | .36 |
| 4 | 5 | 260 | .16 |
| 4 | 6 | 139 | .55 |
| 4 | 7 | 191 | .38 |
| 4 | 8 | 120 | .61 |
| 4 | 9 | 312 | 0.00 |
| 5 | 1 | 217 | .30 |
| 5 | 2 | 300 | .03 |
| 5 | 3 | 260 | .16 |
| 5 | 4 | 57 | .81 |
| 5 | 5 | 220 | .29 |
| 5 | 6 | 184 | .41 |
| 5 | 7 | 184 | .41 |
| 5 | 8 | 196 | .37 |
| 5 | 9 | 268 | .14 |
| 6 | 1 | 279 | .10 |
| 6 | 2 | 266 | .14 |
| 6 | 3 | 312 | 0.00 |
| 6 | 4 | 287 | .08 |
| 6 | 5 | 312 | 0.00 |
| 6 | 6 | 312 | 0.00 |
| 6 | 7 | 312 | 0.00 |
| 6 | 8 | 312 | 0.00 |
| 6 | 9 | 312 | 0.00 |
| 7 | 1 | 312 | 0.00 |
| 7 | 2 | 312 | 0.00 |
| 7 | 3 | 312 | 0.00 |
| 7 | 4 | 312 | 0.00 |
| 7 | 5 | 312 | 0.00 |
| 7 | 6 | 312 | 0.00 |
| 7 | 7 | 312 | 0.00 |
| 7 | 8 | 312 | 0.00 |
| 7 | 9 | 312 | 0.00 |

| | |
|---|---|
| 1 | 0. |
| 2 | 65141. |
| 3 | 11901. |
| 4 | 0. |
| 5 | 0. |
| 6 | 0. |
| 7 | 0. |
| 8 | 182561. |
| 9 | 44298. |
| 10 | 79134. |
| 11 | 74898. |
| 12 | 0. |
| 13 | 12456. |
| 14 | 0. |

TABLE: 18: SECOND SHIFT CHANGE RESULTS

GROUP EFF= .17

GROUP EFF= .35

GROUP EFF= .43

GROUP EFF= .3

GROUP EFF= .24

GROUP EFF= .06

GROUP EFF= .43

GROUP EFF= .21

GROUP EFF= .08

GROUP EFF= .05

GROUP EFF= .2

GROUP EFF= .26

GROUP EFF= .25

GROUP EFF= .2

GROUP EFF= .33

GROUP EFF= .31

GROUP EFF= .21

GROUP EFF= .27

GROUP EFF= .24

GROUP EFF= .36

GROUP EFF= .36

GROUP EFF= .21

GROUP EFF= .49

GROUP EFF= .38

GROUP EFF= .29

GROUP EFF= .33

GROUP EFF= .43

GROUP EFF= .56

GROUP EFF= .33

GROUP EFF= .22

GROUP EFF= .28

GROUP EFF= .24

GROUP EFF= .26

| | | | |
|---|---|---|---|
| 1 | 1 | 168 | .46 |
| 1 | 2 | 291 | .06 |
| 1 | 3 | 312 | 0.00 |
| 1 | 4 | 291 | .06 |
| 1 | 5 | 312 | 0.00 |
| 1 | 6 | 291 | .06 |
| 1 | 7 | 159 | .49 |
| 1 | 8 | 202 | .35 |
| 1 | 9 | 282 | .09 |
| 2 | 1 | 53 | .83 |
| 2 | 2 | 192 | .38 |
| 2 | 3 | 188 | .39 |
| 2 | 4 | 188 | .39 |
| 2 | 5 | 256 | .17 |
| 2 | 6 | 277 | .11 |
| 2 | 7 | 256 | .17 |
| 2 | 8 | 312 | 0.00 |
| 2 | 9 | 312 | 0.00 |
| 3 | 1 | 106 | .66 |

| | | | |
|---|---|---|---|
| 3 | 3 | 196 | .37 |
| 3 | 4 | 149 | .52 |
| 3 | 5 | 140 | .55 |
| 3 | 6 | 217 | .30 |
| 3 | 7 | 217 | .30 |
| 3 | 8 | 312 | 0.00 |
| 3 | 9 | 312 | 0.00 |
| 4 | 1 | 192 | .38 |
| 4 | 2 | 279 | .10 |
| 4 | 3 | 312 | 0.00 |
| 4 | 4 | 260 | .16 |
| 4 | 5 | 260 | .16 |
| 4 | 6 | 140 | .55 |
| 4 | 7 | 192 | .38 |
| 4 | 8 | 111 | .64 |
| 4 | 9 | 312 | 0.00 |
| 5 | 1 | 266 | .14 |
| 5 | 2 | 294 | .05 |
| 5 | 3 | 260 | .16 |
| 5 | 4 | 109 | .65 |
| 5 | 5 | 210 | .32 |
| 5 | 6 | 229 | .26 |
| 5 | 7 | 229 | .26 |
| 5 | 8 | 247 | .20 |
| 5 | 9 | 269 | .13 |
| 6 | 1 | 275 | .11 |
| 6 | 2 | 260 | .16 |
| 6 | 3 | 312 | 0.00 |
| 6 | 4 | 279 | .10 |
| 6 | 5 | 312 | 0.00 |
| 6 | 6 | 312 | 0.00 |
| 6 | 7 | 312 | 0.00 |
| 6 | 8 | 312 | 0.00 |
| 6 | 9 | 312 | 0.00 |
| 7 | 1 | 312 | 0.00 |
| 7 | 2 | 312 | 0.00 |
| 7 | 3 | 312 | 0.00 |
| 7 | 4 | 312 | 0.00 |
| 7 | 5 | 312 | 0.00 |
| 7 | 6 | 312 | 0.00 |
| 7 | 7 | 312 | 0.00 |
| 7 | 8 | 312 | 0.00 |
| 7 | 9 | 312 | 0.00 |

| | |
|---|---|
| 1 | 0. |
| 2 | 196409. |
| 3 | 44790. |
| 4 | 0. |
| 5 | 110340. |
| 6 | 0. |
| 7 | 0. |
| 8 | 131867. |
| 9 | 44298. |
| 10 | 79134. |
| 11 | 271473. |
| 12 | 0. |
| 13 | 1314. |
| 14 | 39042. |

TABLE: 19. FACTOR CHANGE RESULTS

GROUP EFF= .14

GROUP EFF= .35

GROUP EFF= .22

GROUP EFF= .24

GROUP EFF= .48

GROUP EFF= .2

GROUP EFF= .39

GROUP EFF= .21

GROUP EFF= .09

GROUP EFF= 0.0

GROUP EFF= .23

GROUP EFF= .29

GROUP EFF= .28

GROUP EFF= .22

GROUP EFF= .38

GROUP EFF= .34

GROUP EFF= .25

GROUP EFF= .29

GROUP EFF= .24

GROUP EFF= .26

GROUP EFF= .36

GROUP EFF= .46

GROUP EFF= .36

GROUP EFF= .61

GROUP EFF= .52

GROUP EFF= .52

GROUP EFF= .43

GROUP EFF= .47

GROUP EFF= .56

GROUP EFF= .72

GROUP EFF= .7

GROUP EFF= .33

GROUP EFF= .27

| | | | |
|---|---|---|---|
| 1 | 1 | 188 | .39 |
| 1 | 2 | 258 | .17 |
| 1 | 3 | 312 | 0.00 |
| 1 | 4 | 258 | .17 |
| 1 | 5 | 312 | 0.00 |
| 1 | 6 | 258 | .17 |
| 1 | 7 | 258 | .17 |
| 1 | 8 | 258 | .17 |
| 1 | 9 | 312 | 0.00 |
| 2 | 1 | 81 | .74 |
| 2 | 2 | 214 | .31 |
| 2 | 3 | 245 | .21 |
| 2 | 4 | 245 | .21 |
| 2 | 5 | 191 | .38 |
| 2 | 6 | 245 | .21 |
| 2 | 7 | 191 | .38 |
| 2 | 8 | 312 | 0.00 |
| 2 | 9 | 312 | 0.00 |
| 3 | 1 | 188 | .39 |
| 3 | 2 | 2[illegible]1 | .25 |
| 3 | 3 | 254 | .18 |
| 3 | 4 | 214 | .31 |
| 3 | 5 | 210 | .32 |
| 3 | 6 | 308 | .01 |
| 3 | 7 | 308 | .01 |
| 3 | 8 | 312 | 0.00 |
| 3 | 9 | 312 | 0.00 |
| 4 | 1 | 303 | .02 |
| 4 | 2 | 309 | 0.00 |
| 4 | 3 | 312 | 0.00 |
| 4 | 4 | 201 | .35 |
| 4 | 5 | 250 | .19 |
| 4 | 6 | 152 | .51 |
| 4 | 7 | 214 | .31 |
| 4 | 8 | 142 | .54 |
| 4 | 9 | 312 | 0.00 |
| 5 | 1 | 242 | .22 |
| 5 | 2 | 312 | 0.00 |
| 5 | 3 | 250 | .19 |
| 5 | 4 | 85 | .72 |
| 5 | 5 | 100 | .67 |
| 5 | 6 | 52 | .83 |
| 5 | 7 | 52 | .83 |
| 5 | 8 | 61 | .80 |
| 5 | 9 | 303 | .02 |
| 6 | 1 | 122 | .60 |
| 6 | 2 | 119 | .61 |
| 6 | 3 | 312 | 0.00 |
| 6 | 4 | 309 | 0.00 |
| 6 | 5 | 312 | 0.00 |
| 6 | 6 | 312 | 0.00 |
| 6 | 7 | 312 | 0.00 |
| 6 | 8 | 312 | 0.00 |
| 6 | 9 | 312 | 0.00 |
| 7 | 1 | 312 | 0.00 |
| 7 | 2 | 312 | 0.00 |
| 7 | 3 | 312 | 0.00 |
| 7 | 4 | 312 | 0.00 |
| 7 | 5 | 312 | 0.00 |
| 7 | 6 | 312 | 0.00 |
| 7 | 7 | 312 | 0.00 |
| 7 | 8 | 312 | 0.00 |
| 7 | 9 | 312 | 0.00 |

| | |
|---|---|
| 1 | 0. |
| 2 | 0. |
| 3 | 0. |
| 4 | 66909. |
| 5 | 388683. |
| 6 | 565911. |
| 7 | 309911. |
| 8 | 232206. |
| 9 | 0. |
| 10 | 361776. |
| 11 | 199224. |
| 12 | 50160. |
| 13 | 10512. |
| 14 | 1113501. |

TABLE: 20. NEW SIMULATION CHANGE RESULTS.

| | |
|---|---|
| GROUP EFF= | .08 |
| GROUP EFF= | .38 |
| GROUP EFF= | .24 |
| GROUP EFF= | .26 |
| GROUP EFF= | .4 |
| GROUP EFF= | .03 |
| GROUP EFF= | .4 |
| GROUP EFF= | .21 |
| GROUP EFF= | .13 |
| GROUP EFF= | 0.0 |
| GROUP EFF= | .19 |
| GROUP EFF= | .24 |
| GROUP EFF= | .27 |
| GROUP EFF= | .15 |
| GROUP EFF= | .3 |
| GROUP EFF= | .29 |
| GROUP EFF= | .19 |
| GROUP EFF= | .23 |
| GROUP EFF= | .16 |

GROUP EFF= .39

GROUP EFF= .3

GROUP EFF= .31

GROUP EFF= .57

GROUP EFF= .43

GROUP EFF= .42

GROUP EFF= .55

GROUP EFF= .5

GROUP EFF= .55

GROUP EFF= .33

GROUP EFF= .34

GROUP EFF= .33

GROUP EFF= .24

| | | | |
|---|---|---|---|
| 1 | 1 | 195 | .37 |
| 1 | 2 | 290 | .07 |
| 1 | 3 | 312 | 0.00 |
| 1 | 4 | 290 | .07 |
| 1 | 5 | 312 | 0.00 |
| 1 | 6 | 290 | .07 |
| 1 | 7 | 290 | .07 |
| 1 | 8 | 290 | .07 |
| 1 | 9 | 312 | 0.00 |
| 2 | 1 | 48 | .84 |
| 2 | 2 | 219 | .29 |
| 2 | 3 | 226 | .27 |
| 2 | 4 | 226 | .27 |
| 2 | 5 | 204 | .34 |
| 2 | 6 | 226 | .27 |
| 2 | 7 | 204 | .34 |
| 2 | 8 | 312 | 0.00 |
| 2 | 9 | 312 | 0.00 |
| 3 | 1 | 126 | .59 |
| 3 | 2 | 169 | .45 |
| 3 | 3 | 290 | .07 |
| 3 | 4 | 219 | .29 |
| 3 | 5 | 219 | .29 |
| 3 | 6 | 312 | 0.00 |
| 3 | 7 | 312 | 0.00 |
| 3 | 8 | 312 | 0.00 |
| 3 | 9 | 312 | 0.00 |
| 4 | 1 | 281 | .09 |
| 4 | 2 | 303 | .02 |
| 4 | 3 | 312 | 0.00 |
| 4 | 4 | 169 | .45 |
| 4 | 5 | 227 | .27 |
| 4 | 6 | 134 | .57 |
| 4 | 7 | 219 | .29 |
| 4 | 8 | 187 | .40 |
| 4 | 9 | 312 | 0.00 |
| 5 | 1 | 171 | .45 |
| 5 | 2 | 312 | 0.00 |
| 5 | 3 | 227 | .27 |
| 5 | 4 | 2 | .99 |
| 5 | 5 | 211 | .32 |
| 5 | 6 | 144 | .53 |
| 5 | 7 | 144 | .53 |
| 5 | 8 | 187 | .40 |
| 5 | 9 | 281 | .09 |
| 6 | 1 | 285 | .08 |
| 6 | 2 | 276 | .11 |
| 6 | 3 | 312 | 0.00 |
| 6 | 4 | 303 | .02 |
| 6 | 5 | 312 | 0.00 |
| 6 | 6 | 312 | 0.00 |
| 6 | 7 | 312 | 0.00 |
| 6 | 8 | 312 | 0.00 |
| 6 | 9 | 312 | 0.00 |
| 7 | 1 | 312 | 0.00 |
| 7 | 2 | 312 | 0.00 |
| 7 | 3 | 312 | 0.00 |
| 7 | 4 | 312 | 0.00 |
| 7 | 5 | 312 | 0.00 |
| 7 | 6 | 312 | 0.00 |
| 7 | 7 | 312 | 0.00 |
| 7 | 8 | 312 | 0.00 |
| 7 | 9 | 312 | 0.00 |

| | |
|---|---|
| 1 | 0. |
| 2 | 75358. |
| 3 | 0. |
| 4 | 0. |
| 5 | 507384. |
| 6 | 129129. |
| 7 | 241232. |
| 8 | 154368. |
| 9 | 319912. |
| 10 | 69729. |
| 11 | 55418. |
| 12 | 0. |
| 13 | 10832. |
| 14 | 302155. |

GROUP EFF= .08

GROUP EFF= .38

GROUP EFF= .24

GROUP EFF= .26

TABLE: 21. GROUP CHANGE RESULTS.



GROUP EFF= .68

GROUP EFF= .47

GROUP EFF= .22

GROUP EFF= .17

GROUP EFF= .17

GROUP EFF= .03

GROUP EFF= .34

GROUP EFF= .27

GROUP EFF= .1

GROUP EFF= .07

GROUP EFF= .25

GROUP EFF= .34

GROUP EFF= .32

GROUP EFF= .27

GROUP EFF= .41

GROUP EFF= .41

GROUP EFF= .29

GROUP EFF= .35

GROUP EFF= .57

GROUP EFF= .54

GROUP EFF= .54

GROUP EFF= .24

GROUP EFF= .34

GROUP EFF= .27

GROUP EFF= .2

GROUP EFF= .26

GROUP EFF= .17

GROUP EFF= .29

GROUP EFF= .2

GROUP EFF= .22

GROUP EFF= .3

GROUP EFF= .16

GROUP EFF= .3

| | | | |
|---|---|---|---|
| 1 | 1 | 40 | .87 |
| 1 | 2 | 127 | .59 |
| 1 | 3 | 246 | .21 |
| 1 | 4 | 136 | .56 |
| 1 | 5 | 46 | .85 |
| 1 | 6 | 133 | .57 |
| 1 | 7 | 105 | .66 |
| 1 | 8 | 23 | .92 |
| 1 | 9 | 33 | .89 |
| 2 | 1 | 137 | .56 |
| 2 | 2 | 201 | .35 |
| 2 | 3 | 216 | .30 |
| 2 | 4 | 104 | .66 |
| 2 | 5 | 197 | .36 |

| | | | |
|---|---|---|---|
| 2 | 9 | 312 | 0.00 |
| 3 | 1 | 209 | .33 |
| 3 | 2 | 266 | .14 |
| 3 | 3 | 271 | .13 |
| 3 | 4 | 223 | .28 |
| 3 | 5 | 272 | .12 |
| 3 | 6 | 199 | .36 |
| 3 | 7 | 257 | .17 |
| 3 | 8 | 312 | 0.00 |
| 3 | 9 | 312 | 0.00 |
| 4 | 1 | 269 | .13 |
| 4 | 2 | 312 | 0.00 |
| 4 | 3 | 261 | .16 |
| 4 | 4 | 274 | .12 |
| 4 | 5 | 297 | .04 |
| 4 | 6 | 267 | .14 |
| 4 | 7 | 301 | .03 |
| 4 | 8 | 68 | .78 |
| 4 | 9 | 312 | 0.00 |
| 5 | 1 | 297 | .04 |
| 5 | 2 | 290 | .07 |
| 5 | 3 | 312 | 0.00 |
| 5 | 4 | 297 | .04 |
| 5 | 5 | 217 | .30 |
| 5 | 6 | 44 | .85 |
| 5 | 7 | 296 | .05 |
| 5 | 8 | 312 | 0.00 |
| 5 | 9 | 257 | .17 |
| 6 | 1 | 275 | .11 |
| 6 | 2 | 312 | 0.00 |
| 6 | 3 | 312 | 0.00 |
| 6 | 4 | 276 | .11 |
| 6 | 5 | 312 | 0.00 |
| 6 | 6 | 312 | 0.00 |
| 6 | 7 | 312 | 0.00 |
| 6 | 8 | 312 | 0.00 |
| 6 | 9 | 312 | 0.00 |
| 7 | 1 | 312 | 0.00 |
| 7 | 2 | 312 | 0.00 |
| 7 | 3 | 312 | 0.00 |
| 7 | 4 | 312 | 0.00 |
| 7 | 5 | 312 | 0.00 |
| 7 | 6 | 312 | 0.00 |
| 7 | 7 | 312 | 0.00 |
| 7 | 8 | 312 | 0.00 |
| 7 | 9 | 312 | 0.00 |
| 1 | | 0. | |
| 2 | | 0. | |
| 3 | | 0. | |
| 4 | | 0. | |
| 5 | | 0. | |
| 6 | | 0. | |
| 7 | | 0. | |
| 8 | | 41223. | |
| 9 | | 0. | |
| 10 | | 0. | |
| 11 | | 0. | |
| 12 | | 0. | |
| 13 | | 1314. | |
| 14 | | 0. | |