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DESIGN AND MANUFACTURING LOW-COST RECEIVERS OF RADIO BROADCASTS IN DEVELOPING COUNTRIES

Addendum 1:

An Example of Process Control for Production of Radio Receivers by Belt Conveyor System[1]

by

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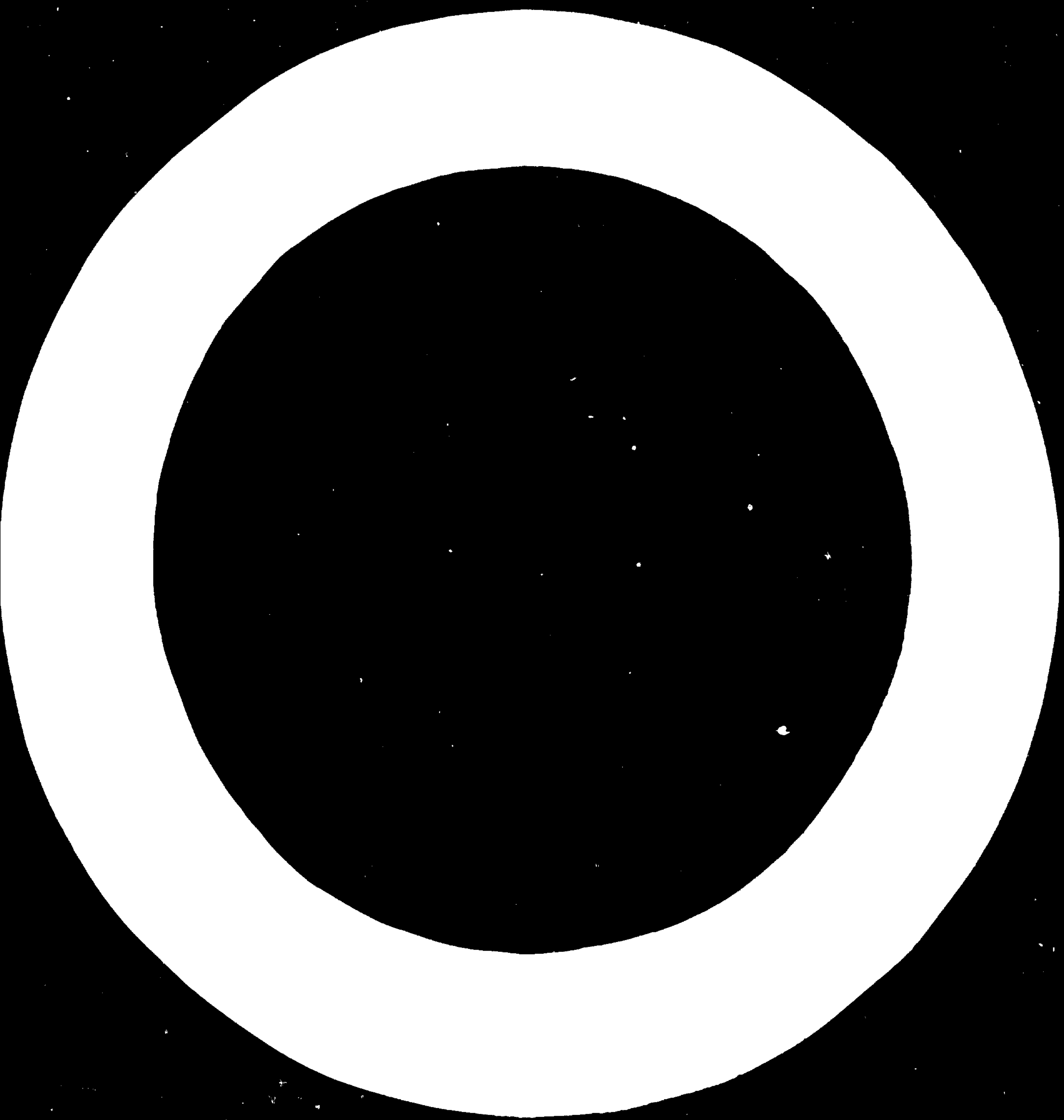


CONTENTS

Chapter 1 Standard Number of Man-hours

1) Standard number of man-hours as a basic unit employed for estimating output

When production is based principally on human labor, the individual's work time is employed as a basic for estimating output.

Total work time required for completing one piece or one unit of a product is called the number of man-hours. Man-seconds, man-minutes, or man-hours are used as the time unit.

The standard number of man-hours for one piece or one unit of a product is determined by summing up the standard work time of each operation with an allowance (man-hours for repair) determined by the available percentage.

The standard work time of each operation must be established before determining the standard number of man-hours; in case the standard work time is not available, manhours may be determined by judgment based on the recommendations of experienced persons, in which case errors must be corrected as soon as possible.

Regarding the standard number of man-hours, process analysis based on standard work time is usually performed, then the standard number of manhours is determined by the following equation:

Standard number of man-hours = Pitch time x No. of processes

Pitch time in the above is one cycle-time obtained by evenly dividing certain processes, a detailed description of which is given later herein.

When the standard number of man-hours is established, output is determined according to the former equation.

Example: The standard number of man-hours for manufacturing a given product is determined as 1.MH. Assuming that the products are to be manufactured by 40 workers who are to actually work for 7 hours daily under a continuous flow operation system, the daily maximum output is determined as:

40 (men) x 7H/MH = 280 (units)

2) Definition of standard number of man-hours

A standard work unit as a basis for determining the output is generally defined as:

"The standard number of man-hours is the length of time required for a worker (who possesses skill necessary for properly accomplishing a given job and who has received sufficient training) to accomplish a given work load under a satisfactory working condition, at an ordinarily endurable working rate accompanied by normal fatigue and delay."

Content of the foregoing description is broken down item by item as follows:

1) The worker has received proper training.

2) Working conditions (facilities and instructions) are satisfactory.

3) The worker is to proceed at an endurable working rate with a given allowance for rest and other factors.

3) Formula for standard number of man-hours

According to the above-described theory, the standard number of man-hours is determined as:

$$\text{Standard number of man-hours} = \text{Actual work time} \times (1 + \text{allowance rate})$$

where,

Actual work time...Net work time determined by subtracting time due to delays caused during work time from practical work time.

Allowance rate...Allowance means time allowance to be included in the standard work time for compensating delay of work due to factors irregularly caused during operation. The allowance rate is the percentage of time allowance with respect to standard work time. The allowance rate is classified as shown below.

4) Classification of allowance rate

General allowance:

a) Allowance for operation

Factors caused irregularly while operating.

b) Allowance for workshop

Factors due to workshop facility control system.

c) Fatigue allowance

Factors of delays due to fatigue.

d) Group allowance

Factors of idle time due to difference in completion time of individual allotted jobs during group work.

Special allowance:

e) Learning allowance

Factors of idle time due to worker's unfamiliarity until he becomes experienced when a new job is allotted or a new operation group is organized.

Allowance rates to be included in the standard number of man-hours when performing process analysis are those regarding (a) to (d), above. Once the standard number of man-hours has been established, the maximum daily output can be determined.

The learning allowance, constituting idle time incurred until the worker has reached an experience a status by turning out the maximum output of given type on the production line, is determined according to how much percentage of this idle time is to be included in the standard number of man-hours while one lot of products is being turned out.

The above description is summarized as:

1) Pitch-time is determined by executing process analysis with a given allowance rate (general allowance) included.

2) The standard number of man-hours is determined as:

Standard number of man-hours = Pitch-time x Number of processes

However, value of the above standard number of man-hours cannot represent a true value of the standard number of man-hours since learning allowance is not included in this value. Therefore, to avoid confusion, this standard number of man-hours is tentatively referred to as standard number of man-hours 1, or standard number of man-hours A, or basic number of man-hours.

3) When the maximum number of output units daily has been determined, a daily sheet is prepared with learning allowance taken into consideration.

Example:

One lot consisting of 10,000 units* is assumed to be turned out; (* with daily output of 500 units) then, this one lot is to be turned out in 20 days if no rising period in the learning curve is taken into consideration. Since production without following the learning curve cannot be conceived, idle time due to rising period should be included as a standard.

When the daily sheet is made with this rising period taken into consideration, it is estimated that one lot is to be turned out in 24 days. This time consumption of 4 days represents idle time for the rising period.

Example of calculating standard number of man-hours

Working hours : 8 hours daily

Pitch time : 57 sec.

Daily output : 500 pieces

No. of processes : 60

$$\frac{60 \times 8H \times 24}{10,000} = 1.15H$$ (Standard number of man-hours)

While the values of allowance rates vary according to the types of operation, in light work (such as assembling radio sets), an allowance rate of 15 to 25% is added to the net time.

Chapter 2 Flow Operation by Belt Conveyor System

1) Characteristics of flow operation

Flow operation by a belt conveyor system, one of the most rationalized forms of product layout which increases productivity regardless of the amount of output, offers stabilized quality, decreases the number of works half finished, and saves various shop control procedures in the shop. Consequently, this is a most effective layout for reducing product costs.

A typical flow operation displays these characteristics:

a) Work time of each process is evenly established.

b) Layout of each process is accomplished according to the order of assembling procedure so that no work is delayed on the way, moved in reverse, or moved by jumping over the next process due.

c) Work transportation is performed by power conveyors, minimizing the transportation distance and/or labor in the flow operation.

d) Each piece of work is moved to the next process attended by one operator.

2) Data and formula for flow operation

Listed below are data necessary for establishing flow operation:

N : Daily output (pieces or units)

T : Daily actual work time

Daily actual work time in this case means the conveyor net operating time. Occasionally, idle time due to the rising period immediately after starting operation is subtracted from the daily actual work time.

P : Pitch-time

Length of time during which a completed unit is turned out at the final process.

(This is process time; that is, work time of one piece or one unit of work for each process.)

t1 : Work time of the 1st process

t2 : Work time of the 2nd process

tn : Work time of the nth process (final process)

Σt : Total work time of all processes

n : Number of processes

V : Conveyor velocity (m/min)

L : Effective length of conveyor (m)

l : Average length occupied by one process on the conveyor (m)

l' Distance of *pitch marks * adjacent

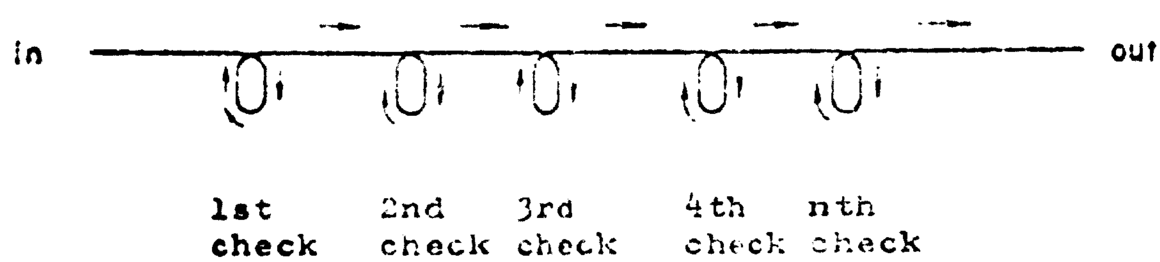
The pitch mark in this case indicates the location of placing work on the conveyor.

$P = T/N$ $V = l'/P$ $P = l'/V$ $L = n.l$

$P = t1 = t2 = tn$ $P = \sum t . n$

3) Complete flow diagram of flow operation

When work on a certain type of equipment is put on the conveyor belt line from the top, on completion of proper process analysis, the work passes through each successive procedure undergoing assembling of each process approaching the final stage. It is necessary to ascertain that all the assembling work is being completed without error. Since it is a rational policy to detect and repair errors as soon as possible, several checks are made along the procedures up to the final inspection process. Thus, the equipment is advanced, circulating each of determined check processes until it reaches the final process.



Referring to the above diagram, when work put on the line from the input side has reached a certain process, the work undergoes a check for ascertaining that it has been properly assembled. Work accepted is then allowed to advance on the line, while work found defective is delivered to the repair workers at each check process. On completing repairs, the repaired work is put on the line for further processing.

Thus, some processes involve making a circulation before the work reaches completion. The flow operation shown in the diagram is called a regular circulating flow operation.

Chapter 3 Process Analysis

1) Process analysis

Process analysis is effected to divide each process into the most efficient average allotted time.

Assuming that each process is to be divided into 60-sec. pitch times, the net work time is determined by an formula of the standard time as:

Net work time = 60 (sec) x (1 - 0.20 (allowance rate)) = 48 sec

Thus, processes must be set up so that the net work time of each process is determined as 48 sec.

The process analysis is written on the following form:

No.	Operation item	Operating procedure	Tools used	Work time	Operator

When performing process analysis (on a radio set for example) according to the operating procedures, the radio set is completed by undergoing approximately the processes shown below.

1) Mounting
2) Wiring
3) Aligning
4) Cabinet assembling
5) Encasing
6) Final testing
7) Packaging

2) Example of calculating number of man-hours

Calculated when the number of processes on each procedure is determined as follows, as a result of process analysis on the basis of 60-sec. pitch time according to the machining order.

Process		Number of processes (pitch time = 60 sec)
1)	Mounting	20
2)	Wiring	5
3)	Aligning	4
4)	Cabinet assembling	8
5)	Encasing	5
6)	Final testing	4
7)	Packaging	5
	Total	51

The number of man-hours is determined by the formul

Number of man-hours = Pitch time x Number of processes

Thus, 1 (minute) x 51) = 51 (min.) = 0.85H

Since this 0.85H is used as a basis for output calculation, it is easy to ascertain the output if a certain amount of manpower to permit establishing a flow type layout is maintained.

Example:

No. of workers	30
Work time	7H
Amount of manpower to be maintained	80 (men) x 7 (H) = 560 (H)

Rate of operation is assumed to be 90%

Thus, net work time is determined as:

$$560 \text{ (H)} \times 0.9 = 504 \text{ (H)}$$

Output $504 \text{ (H)}/0.85 \text{ (H)} = 590 \text{ (pc)}$

3) **Basic concept of process analysis**

The basic concept of process analysis is summarized as follows:

1) The purpose of process analysis is to determine the most efficient operating procedures and the most appropriate methods of using jigs and tools by examining the result of analysis of the entire processes from a standpoint of operational efficiency for establishing standard operations and a standard number of man-hours.

2) The result of process analysis is embodied in determinating the operating procedure of flow operation, number of processes, number of workers, the content of each operation, and work time.

3) The standard time of each operation is employed when performing process analysis. In case no standard times have been established, the standard time is determined by skilled technician's experience.

4) In process analysis, the technical skill level of each worker is assumed to be the same.

Chapter 4 Process Control

Process control implies executing physical and personal control so that the operation of each process allotted as a result of process analysis may be properly performed and the operation may be accomplish as scheduled.

Process control is usually performed by the chief supervisor.

Personal control

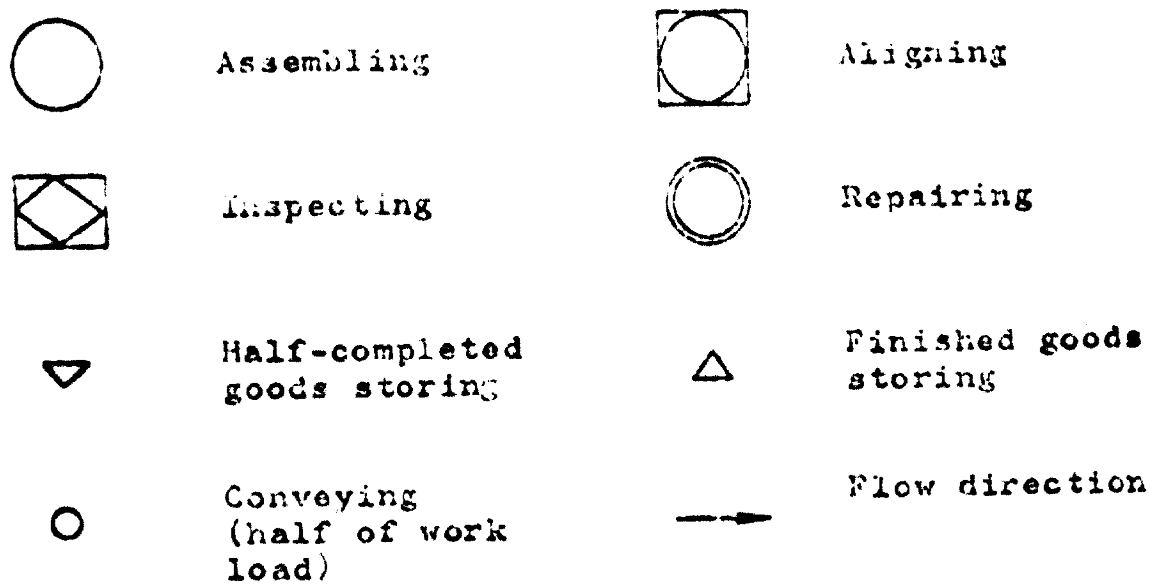
(Production capacity...process control
(Countermeasures against defective unit ...operational instruction

Physical control

(Dynamic aspect........follow-up control
(Static aspect.........control over work

1) Preparation of flow-chart

A flow-chart is prepared according to the process analysis sheet. The process analysis symbols shown below are used when drawing a flow chart.



2) **Determining number of workers**

On completing the flow chart, personnel distribution is planned. The supervisor determines personnel distribution by allotting a process most suitable to individual workers by taking their personal aptitudes into consideration.

As one of its characteristics, since flow operation stops even if only one process is suspended, there is need of securing standby manpower (standby personnel) to take the place of any absentee among the workers allotted to the processes.

The rate of standby manpower is determined by the former rate of absenteeism; when the rate of absenteeism is 10%, a standby manpowor of 10% is maintained.

The supervisor must execute control so that the rate of worker absenteeism on the production line is maintained below 10% all the time .

Shown in the following are tools for the control:

1) A worker who is scheduled to take leave must submit a request for leave to his supervisor beforehand. The supervisor grants him leave of absence on confirming that the absentee's vacancy can be filled by standby manpower.

2) Workers are strictly prohibited from taking leave without previously requesting permission, and to come late or to leave the shop early.

3) Countermeasures are promptly taken should any worker absent himself over a long period due to illness.

4) Efforts should be made to draw a graph of the rate of absenteeism, keeping a check list of absentees in order to constantly maintain a given amount of manpower.

3) Making a layout chart

On completing the flow chart, the staff in charge of the flow operation examines the layout. In this case, the positions of alignment, repair, and inspectio are studied. When a conclusion has been reached, a layout of the belt is put on the chart. Thus, a general plan of flow type layout is established; however, the supervisor should check on the following items before completing the above layout:

1) Are the parts to be used completely prepared at the specified work sites?

2) Are the tools to be employed proper? Is there a need of manufacturing jigs?

3) Are the measuring instruments completely prepared?

4) Preparing operating instruction sheets

The next problem to take up are the operating instructions. While these instructions are given verbally in some cases, usually an operating instruction sheet is prepared for that purpose.

The general form of the operation instruction sheet is shown below.

Type of equipment		Process No.	Operating Instruction Sheet	Name	
Operation item	Operating procedure	Time	Precautions		Parts used
					Tools used, subsidiary materials

The following items are recorded on the operating instruction sheet:

1) Operating sequence, operating method, and assembly drawing.

2) Operating precautions (schematic drawing of spots requiring attention).

3) Standard work time. In how many seconds is the operation to be completed?

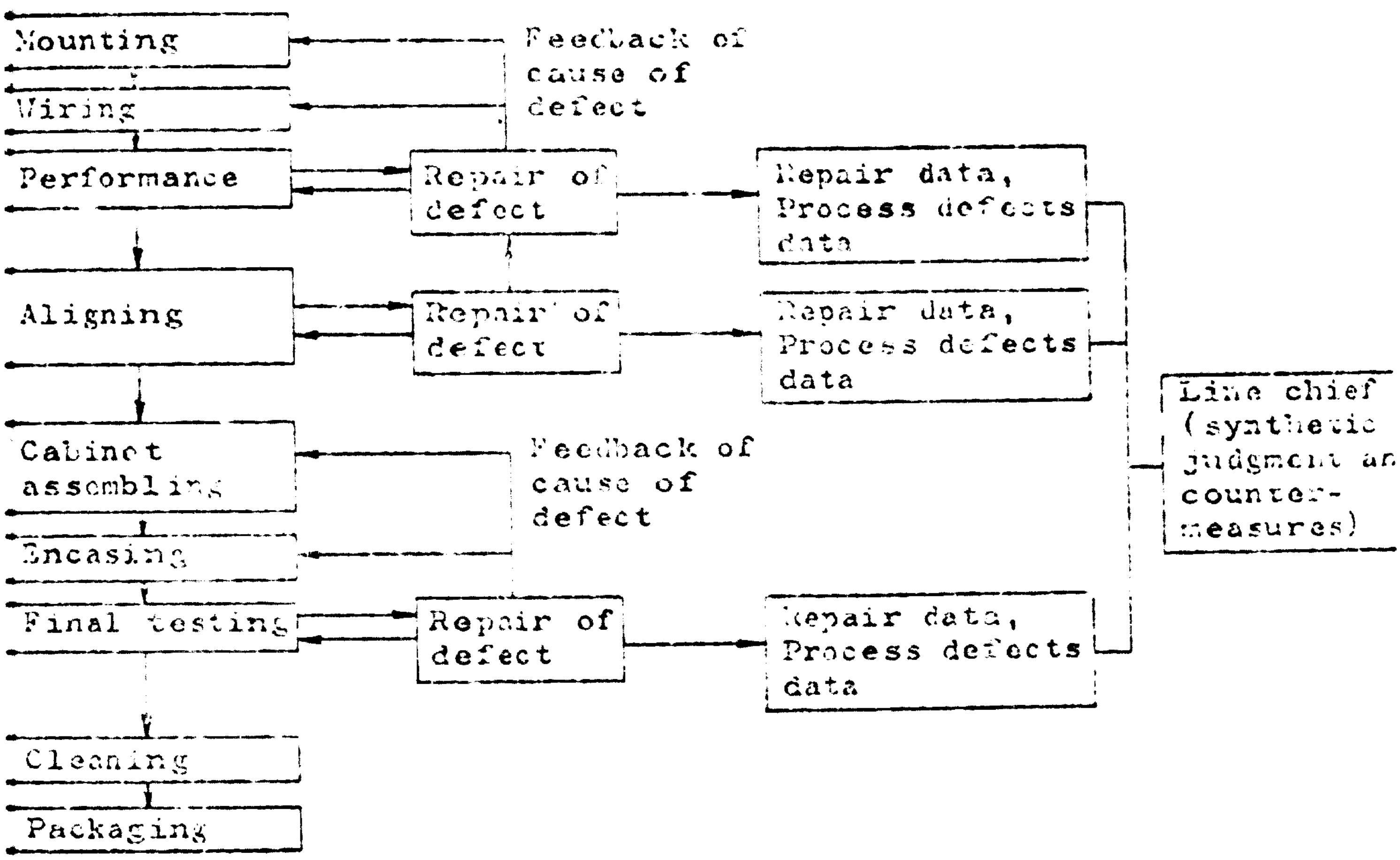
4) Number of parts used.

5) Tools used and subsidiary materials (wiring materia etc.)

The worker should always proceed with the operation by following the operating instruction sheet; if notified of his own defective work, he must record future precautions against defects on the operating instruction sheet. This operating instruction sheet is posted in front of the worker so that he is constantly able to check on what he is doing.

5) Process control loop diagram

While the worker at each process in the flow operation performs an operation to turn out a predetermined workload according to a predetermined operating procedure recorded on the operating instruction sheet, he may fail to properly perform the operation several times daily. Check data are to be attached to the work at each check process in order to take necessary steps by detecting these defects as soon as possible. The relation between the check process and process control is set up in the loop system shown in the diagram below.



6) Shown below are a defects check data form and repairs data form.

a. Process defects check data

Type of equipment   Name of process   Date

	No. of units inspected	No. of units accepted	Rate of acceptance	Fraction defective	Total frequency	Lot No.	Inspector
Frequency							
Repair							

	Item	Flow							Repair			
		5	10	15	20	25	30	Frequency	5	10	15	Frequency
1												
2												
3												
4												
5												
6												
7												
8												

b. Defect repair data

Type of equipment

Name of process

Repair Data

Date

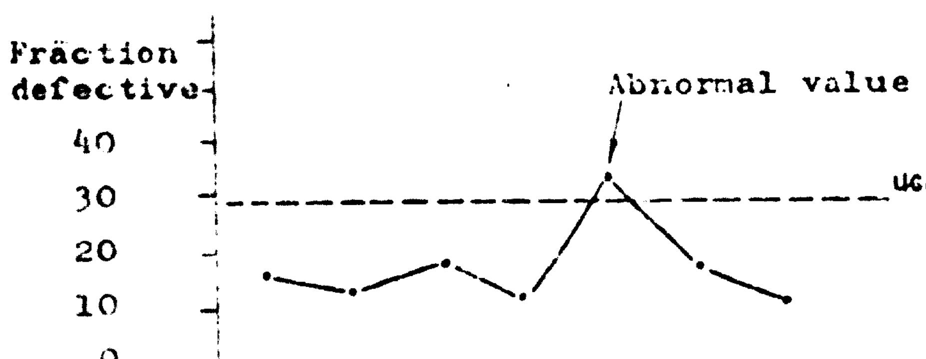
	Defective item	Description of repair	Check				Scope		
			5	10	15	Total		Assy	Sectio
1									
2									
3									
4									
5									
6									
7									
8									

7) While defects detected at each daily process are recognizable through the data (a), how fractional defects changes are to be made is recorded by a control chart. Daily fractional defects are put on the control chart for expediting countermeasures to be taken in order to decrease fractional defects as far as possible.

A p-control chart is employed; thereby the value of UCL is determined by the following formula for controlling abnormal values:

$$UCL = \overline{P} + \sqrt{\frac{\overline{P}\,(1 - \overline{P})}{n}}$$

Process Control Chart



Item \ Date	1	2	3	4	5	6	7	
No. of units inspected								
No. of units accepted								
No. of defective units								
Fractional defects								

8) Electrical performance measurement data

Data formerly described are those intended for countermeasures against process defects; on the other hand, sampling performance data are obtained for the purpose of checking on whether or not the level of the electrical performance has dropped.

Any five to ten units are selected at random among the units on the flow line for measuring the following items, whereby $\bar{x}$ (mean value of measurements) and R (range) are calculated. These values are recorded on an $\bar{x}$ - R chart for checking performance against specifications.

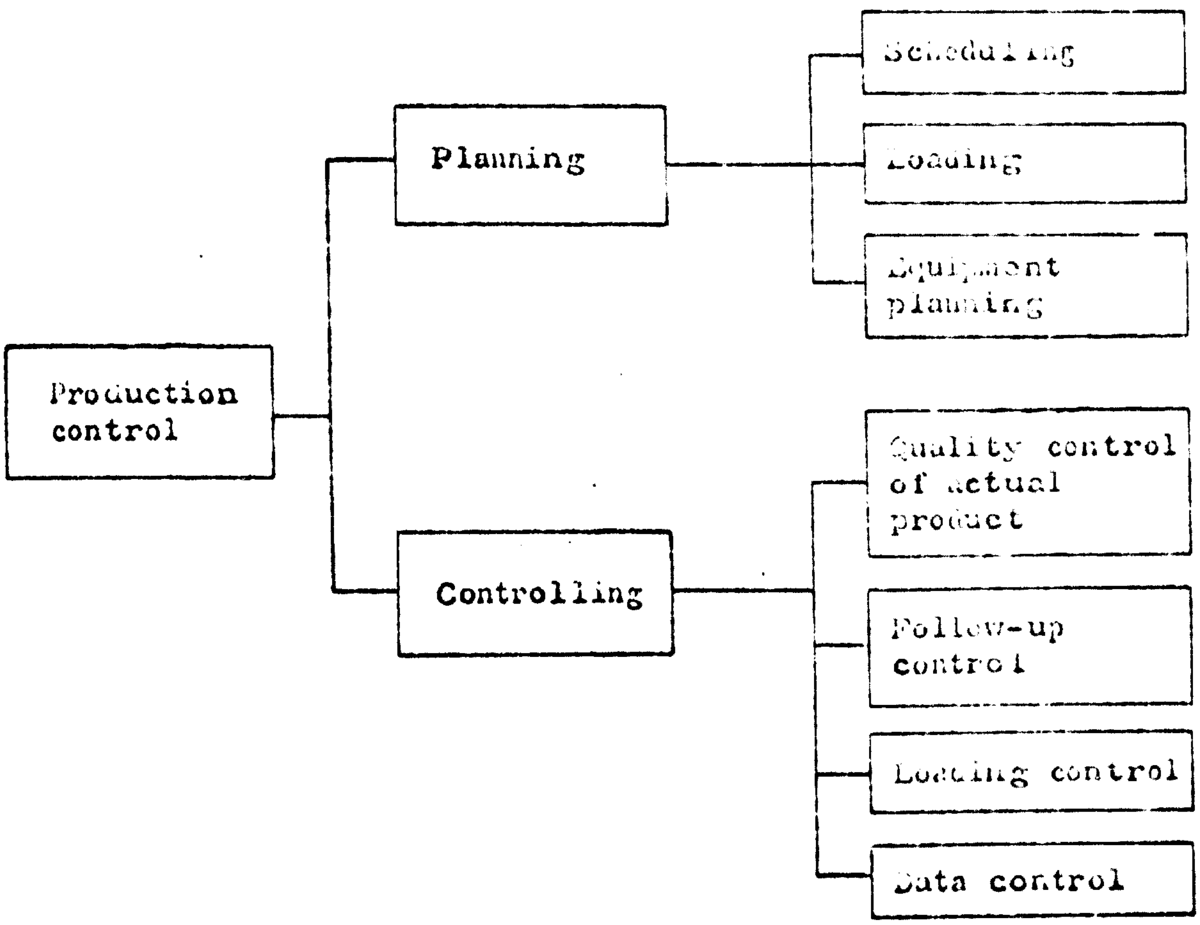
In the case of MW (medium wave) radio sets, the following items are measured.

Inspection Report on PR Radio Set

MW	Receiving frequency		Sensitivity			Signal-to-noise ratio			Scale error		Image frequency interference ratio	Intermediate frequency interference ratio	Selectivity			
	F min	F max	600KC	1000KC	1400KC	600KC	1000KC	1400KC	600KC	1200KC	1400KC	600KC	+10KC	-10KC	+10KC	-
1																
2																
3																
4																
5																
$\bar{x}$																
R																

Chapter 5 Production Control

This chapter contains a description of the production control function. A block diagram of this function is shown below.



a) Planning

1) Master schedule (long-range plan)

This master plan, covering a long-range such as a half-year or one-year period, is intended for co-ordination among production planning, parts procurement planning, and sales planning.

Planning intent

a) To assure sales planning (orders received) of delivery date and output. The business department prepares a delivery schedule and sales forecast according to the master schedule. The finance department establishes a schedule of financing and so on. Thus, a master schedule which may be regarded as the company's operation schedule should preferably be a concrete plan covering as long a period as possible.

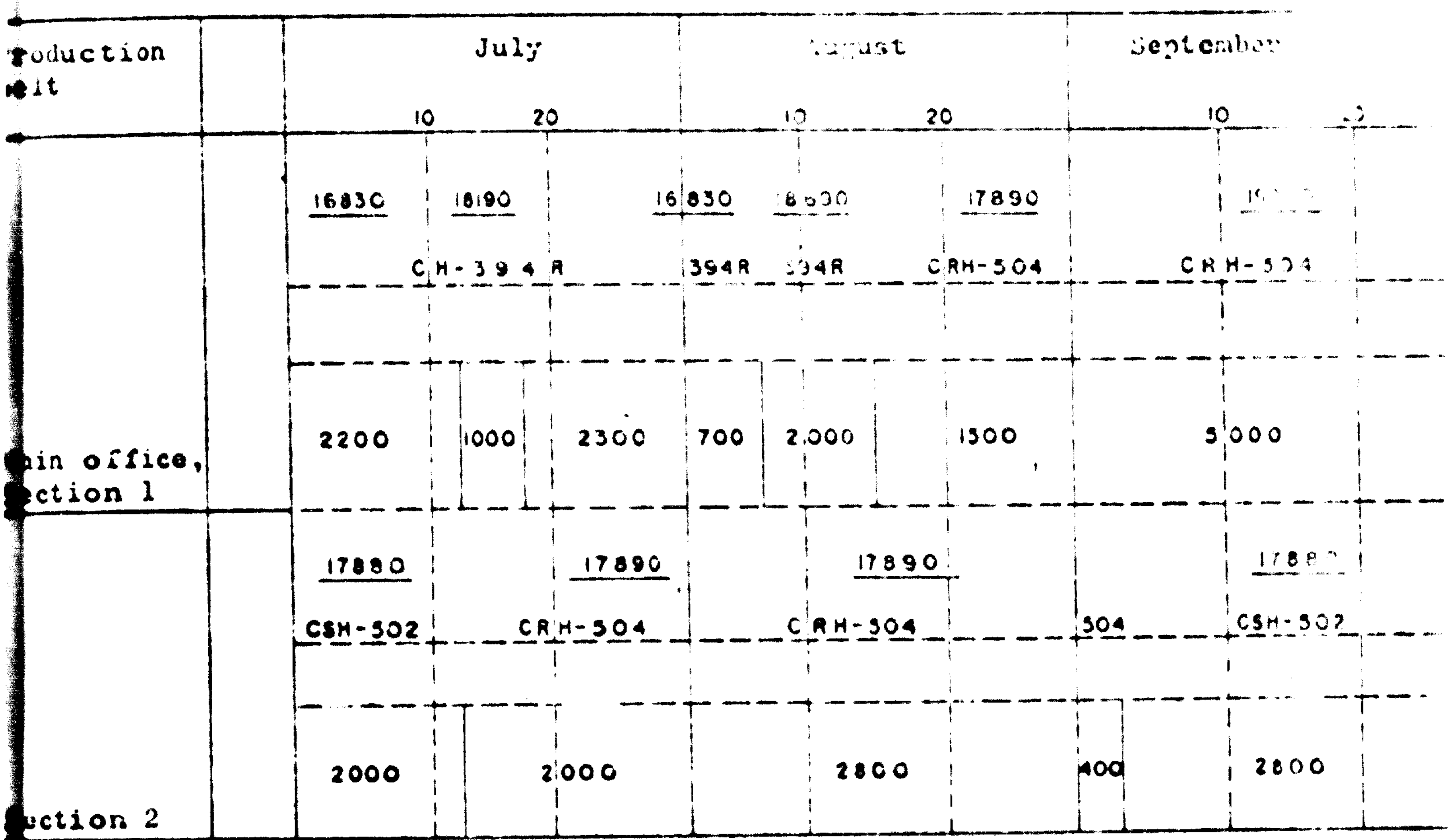
b) To provide a work load of the proper amount fitted to shop production capacity, thereby maintaining a proper operating rate (level of activity). (To prevent delay of deliveries caused by an excessive work load and to eliminate idle time or standby time due to work load shortage).

c) The parts procurement department makes plans according to the master schedule.

d) To devise a long-range plan of personnel and equipment.

An example of a production master schedule is shown below.

Master schedule



2) Detailed schedule (monthly planning)

This is a short-term schedule of monthly units. While the monthly product schedule has been set up on the master schedule, there appears a discrepancy between the actual result and the schedule as time elapses, attributed to the following causes:

1) Misestimate

2) Delay in material delivery and failure (parts)

3) Shortage in manpower maintained

While efforts should be exerted to set up a detail schedule in compliance with the master schedule as far as possible, discrepancies between both should always be adjusted to meet the schedule.

The following items should appear on the detail schedule:

1) Estimated number of units to be produced daily.

2) Standard number of man-hours

Formula of calculating daily output:

1) Number of units of daily output

$$= \frac{(\text{No. of workers maintained} \times \text{rate of attendance}) \times \text{work time}}{\text{Standard number of man-hours}}$$

2) Number of days for completion of producing one lot

$$= \frac{\text{Standard number of man-hours} \times \text{number of units in one lot}}{\text{Actual man-hours}^{*}}$$

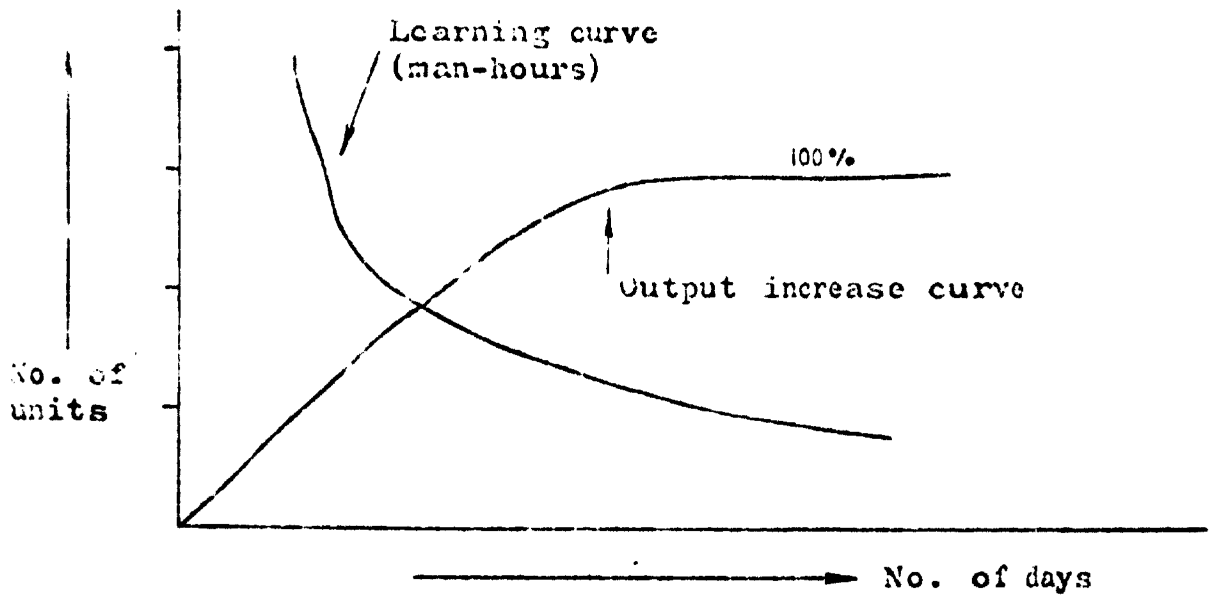
* = (No. of attendant workers x work time)

3) Number of workers to be maintained

$$= \frac{\text{Number of units of daily output} \times \text{Standard number of man-hours}}{\text{Work time}}$$

Problem of familiarization

In the case of a detailed schedule, an increase in efficiency owing to familiarization should be taken into consideration for the type of equipment which has been produced continuously since the previous month; when new equipment is put on the production line, a familiarization allowance should be taken into consideration for a period over which the workers become skilled with new equipment. The above period is usually 5 to 8 days.



3) **Loading**

When a type of equipment to be produced has been determined when establishing the master schedule, loading is made to determine how much manpower (no. of workers) to maintain, taking into consideration the delivery date and number of units to be produced.

1) Estimated number of additional workers is reported to the department concerned where a countermeasure for hiring workers is taken.
2) Training plan is drawn up.
3) In case sufficient manpower cannot be maintained, a countermeasure is effected--such as resorting to subcontracting the work, etc.
4) A check is kept on when and how many workers are to retire.

4) **Installation planning**

Planning is effected on necessary measuring instruments, special tools, shield rooms, inspection boxes, etc. Regarding measuring instruments, their orders should be placed as earlier as possible, considering the delivery date.

b) Controlling

1) Work control

Work control infers a firm grasp of the location and amount of finished goods and the work in process.

a) Ascertaining records and reports

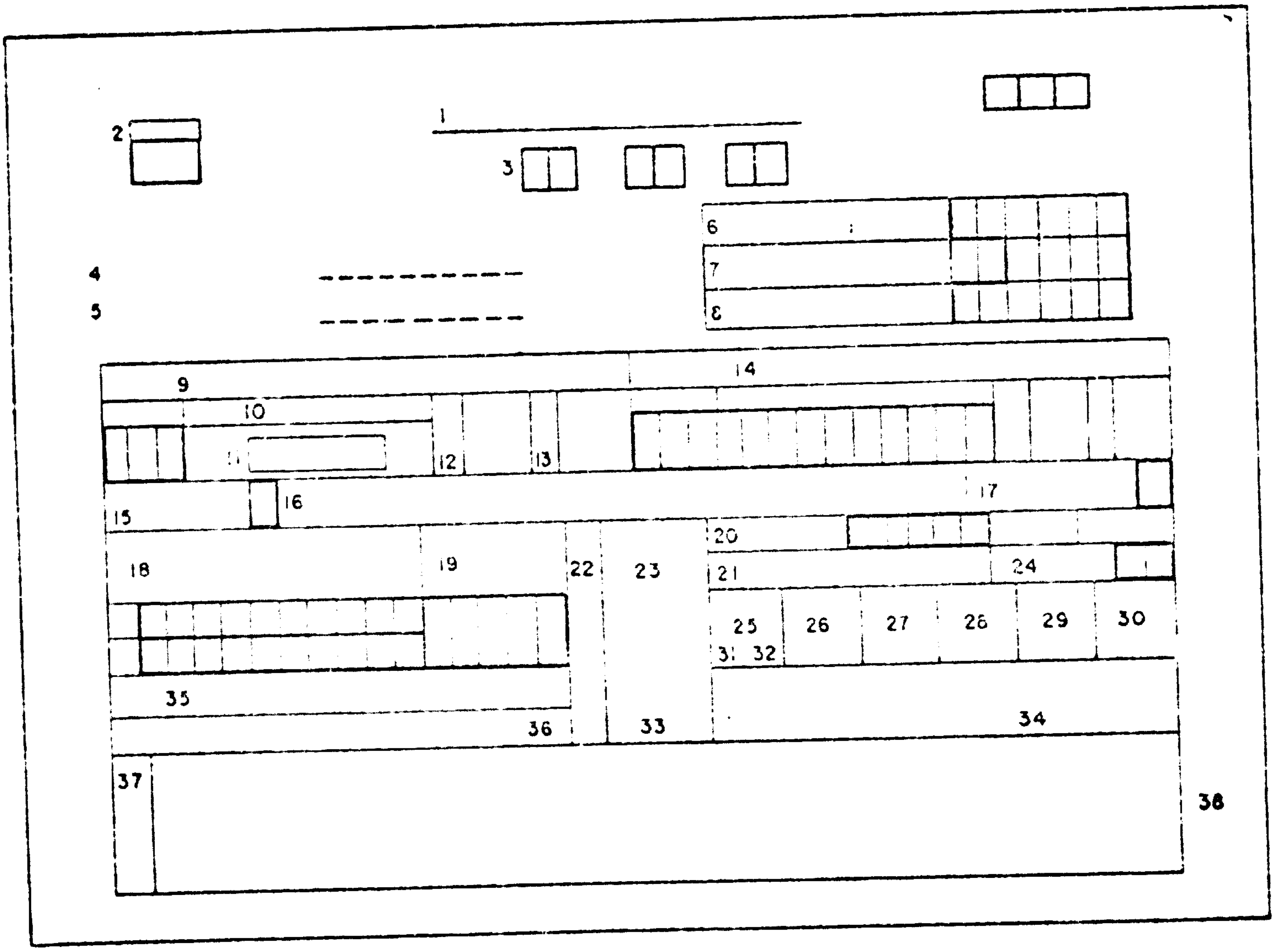
Initially, it is essential (1) not to arbitrarily move work without getting an approval slip; (2) not to neglect missing parts; and (3) not to use parts for other purposes than those intended.

b) Ascertaining an inventory

It is necessary to realize the amount of work in process from the amount of work on the production line and the finished goods, then to ascertain that work-in-process of the determined amount is at predetermined locations.

c) Observation of regular rules on delivery and receiving

Unauthorized delivery and receiving from shop to shop or from individual worker to individual worker should be prohibited. Instead, a delivery and receiving section should be established, wherein the delivery and receiving transactions are executed only after obtaining approval.



(1) Completion slip

(2) Card code number

(3) Date

(4) No. of instruction or order sheet

(5) No. of previous slips transferred

(6) Customer

(7) Order received

(8) Lot

(9) Receiving department

(10) Name

(11) Receiving and delivery section

(12) Signature of chief

(13) Signature of supervisor

(14) Production department

(15) Working classification No.

(16) 1 = Production;
2 = Trial production;
3 = Repair;
4 = Modification;
5 = Spare parts;
6 = Mount

(17) Color classification No.

(18) Type of equipment

(19) Quantity

(20) Specification No.

(21) Accessories

(24) Combination No.

(25) Earphone:

(26) Leather case:

(27) Ornamental case:

(28) Battery:

(29) Power source cord:

(30) Headphone

(31) With

(32) Without

(33) Work in process

(34) Process completion

(35) Attached papers

(36) Sheets

(37) Remarks

(38) Receiving and delivery section

d) Completion slip

Radio sets leaving the shop after completely finishing operation are delivered, together with a completion slip, to the receiving and delivery section. On checking the number of the sets received against the completion slip, the receiving and delivery section returns the slips to the shop.

2) Follow-up control

The functions of follow-up control are as follows:

i) Progress inspection ... To inspect progress on the processes, and to check how many units have been completed.

ii) Judgment on whether on, behind, or ahead of schedule .... To determine whether production is on, behind, or ahead of schedule.

iii) Examining cause of delay ... To ascertain the cause of delay and to find out who is responsible for the delay, subsequently taking necessary countermeasures.

iv) Facilitating recovery from delay ... To inspect the status of recovery from delay and to facilitate recovery.

Since all results of process control are shown in the reports, the line chief and shop chief should always exercise supervision over the progress, taking corrective action as necessary.

The progress status of each process is put on the daily job report of each process. A supervisor compiles all these reports on a collective report; thus, the amount of work in process and the amount of finished goods of each process are checked to ascertain whether or not there is an error on the daily reports and the collective report.

The following items are entered on the collective report:

1) Name of equipment type
2) Soheduled daily output and actual result
3) Man-hours
4) Amt. of work-in-process at each process
5) Amt. of work at each process and the number of man-hours.

6) Total number of delivered products and actual result.

7) Process fractional defects

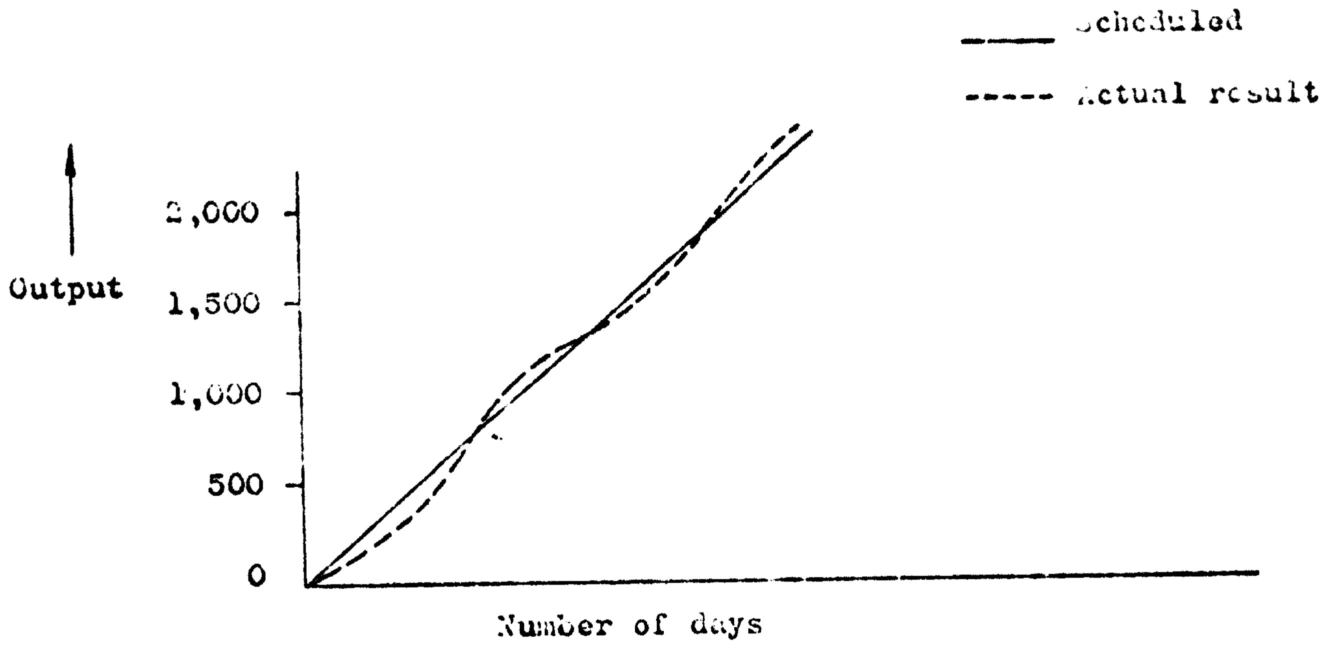
Follow-up control sheet

An actual result is recorded on the daily job report which, in turn, is transferred to the follow-up control sheet. Usually the amount of work completed at the final process is entered on the follow-up control sheet. The form of follow-up control sheet is as follows.

Follow-up control sheet

Name of equipment				1	2	3	4	5	6	7	8	9	10	11	12
No. of workers	On the register	Final inspection	Scheduled												
	Attendant		Actual result												
Man-hour	Man-hour maintained		Difference												
	Effective man-hour		Total actual result												
			Man-hours												
		Delivery	Scheduled												
			Actual result												

B) Output control graph



3) Loading control

To determine whether the manpower maintained is sufficient or insufficient by making a comparison between actual man-hours and estimated man-hours.

If the actual man-hours are less than the estimated man-hours, and output is excessively ahead of schedule, adjustment should be made with the material section either to have parts delivered earlier than the scheduled date or to reduce the excessive manpower maintained. If, on the contrary, output is behind schedule, an effort should be made either to turn out the scheduled output through improving processes or by increasing manpower.

4) Data control

To compile, maintain, and control data necessary for production. Listed below are necessary data involved:

1) Design drawing (parts list, circuit diagram, design drawing, specification etc.)
2) Job daily report on each process
3) Follow-up control sheet (production actual result sheet)
4) Performance measurement data
5) Completion slip
6) Measuring instrument control ledger

- The above description constitutes the essence of a general description of production control on flow operation.

Attached for reference are an example of flow chart, including layout, and instruments arrangement, based on the above data.

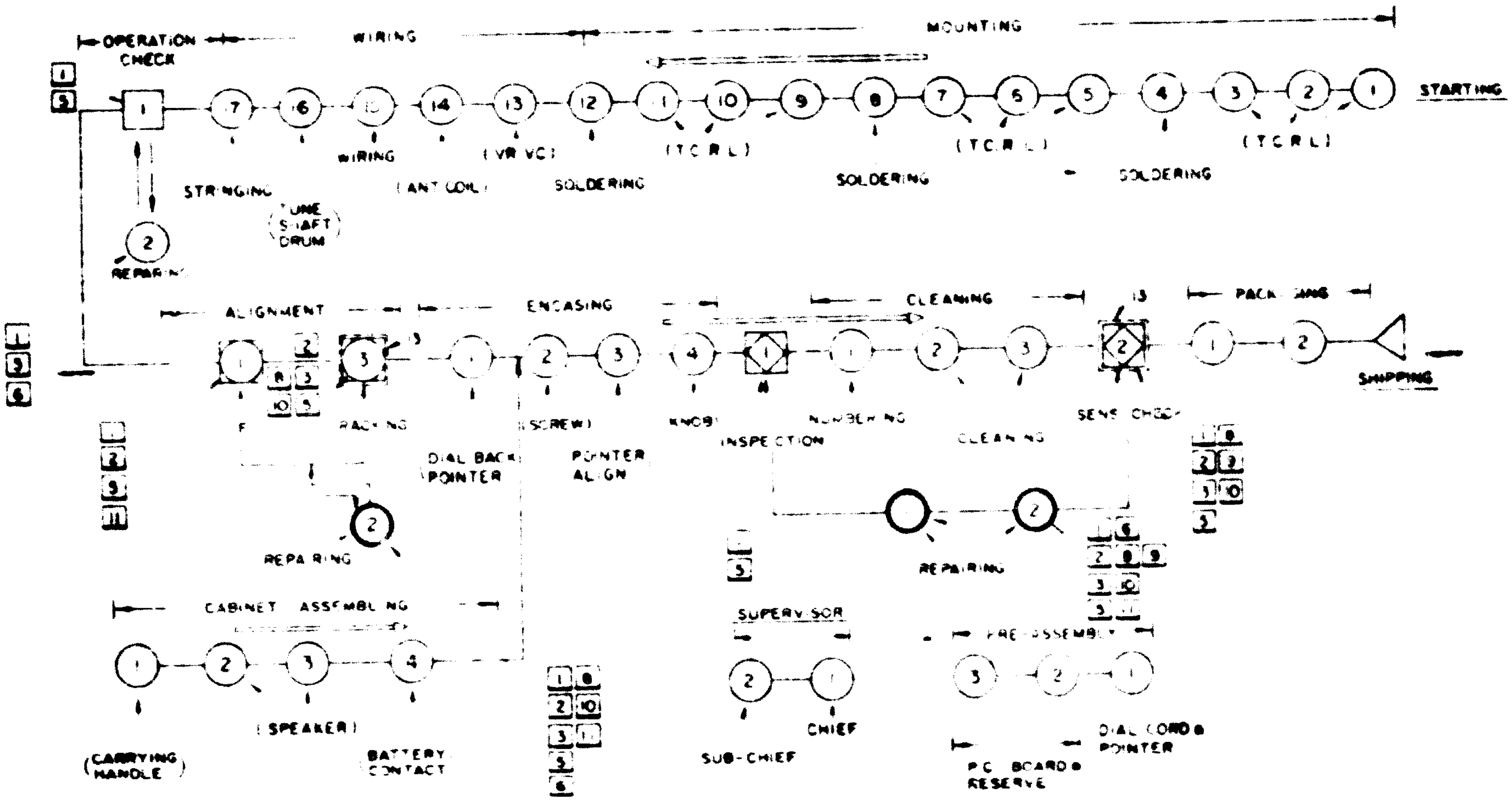
FLOW CHART FOR PRODUCTION [illegible] TYPE A [illegible] OF INSTRUMENTS

PITCH TIME: 60 SEC   STEP NUMBER: 43
PRODUCTION: 480 SET / DAY,   WORKING HR. 8/DAY

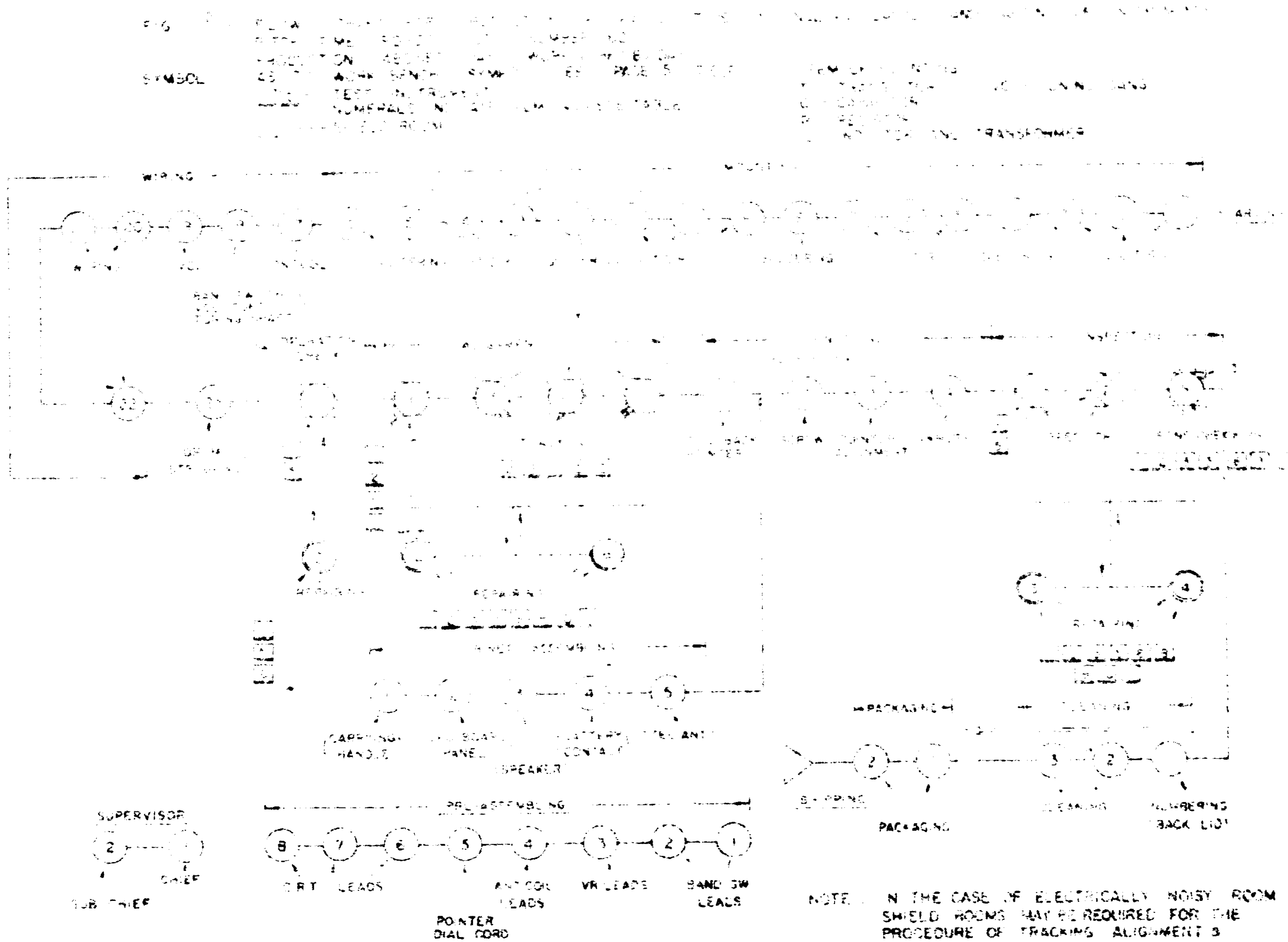
SYMBOL: AS TO WORK BENCH SYMBOL, SEE PAGE 15
1 2 --- TEST INSTRUMENT
NUMERALS INDICATE ITEM NO (SEE TABLE 1)
[ ] --- SHIELD ROOM

(T,C,R,L) --- ITEM OF MOUNTING
T --- TRANSISTOR
C --- CAPACITOR
R --- RESISTOR
L --- INDUCTOR AND TRANSFORMER

VC --- TUNING GANG
VR --- VOLUME CONTROL



NOTE: IN THE CASE OF ELECTRICALLY NOISY ROOM SHIELD ROOMS MAY BE REQUIRED FOR THE PROCEDURE OF TRACKING ALIGNMENT & SESITIVITY CHECKING



NOTE: IN THE CASE OF ELECTRICALLY NOISY ROOM SHIELD ROOMS MAY BE REQUIRED FOR THE PROCEDURE OF TRACKING ALIGNMENT & SESITIVITY CHECKING

FIG 3 FLOW CHART FOR PRODUCTION OF RADIO TYPE C INCLUDING LAYOUT AND ARRANGEMENT OF INSTRUMENTS

PITCH TIME : 60 SEC STEP NUMBER: 48

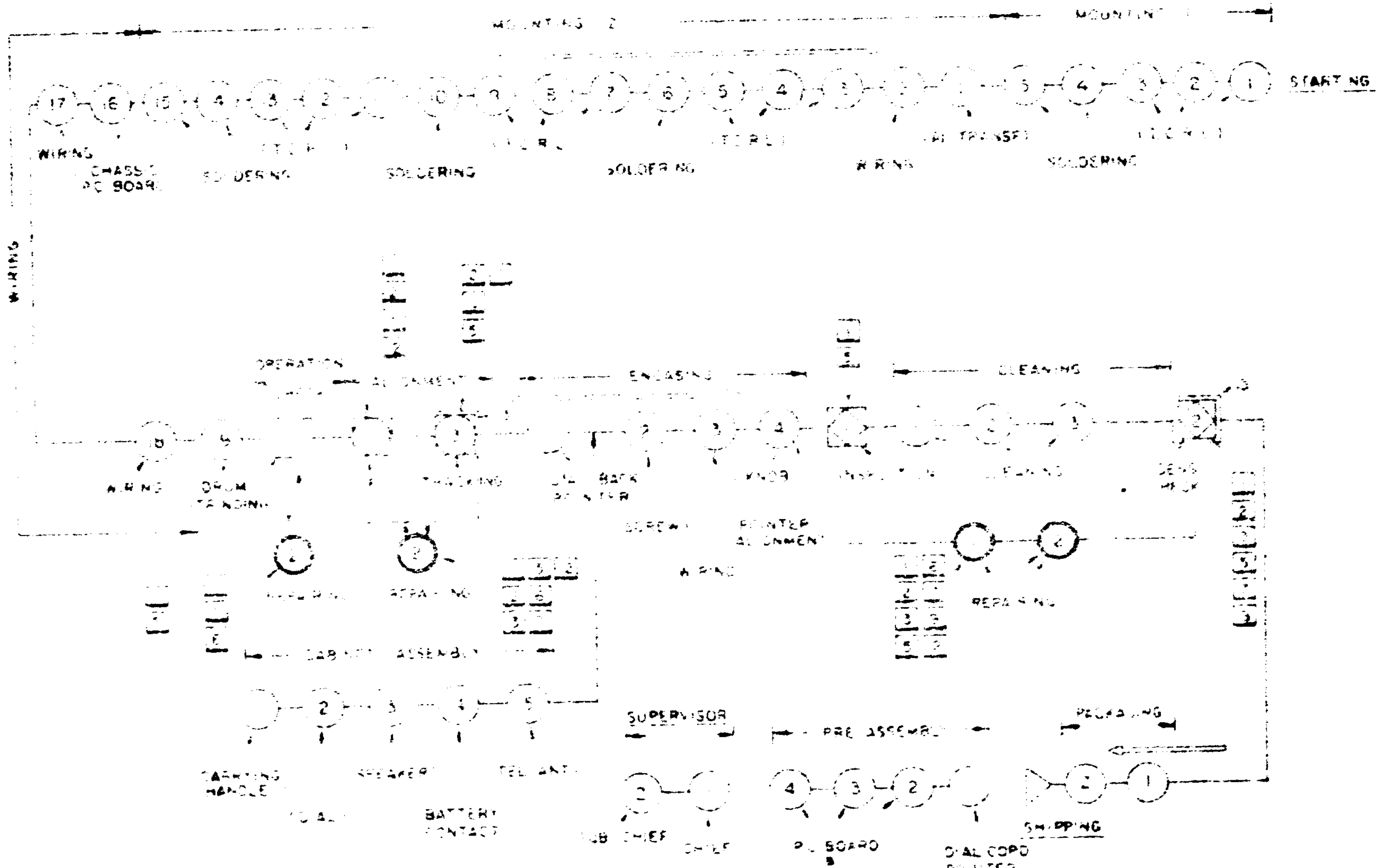
PRODUCTION : 480 SET/DAY, WORKING HR: 8/DAY

SYMBOL AS TO WORK BENCH SYMBOL, SEE PAGE 15

TEST INSTRUMENT
NUMERALS INDICATE ITEM NO. (SEE TABLE)

SHIELD ROOM

T, C, R, L : ITEM OF MOUNTING
T : TRANSISTOR VC : TUNING GANG
C : CAPACITOR
R : RESISTOR
L : INDUCTOR AND TRANSFORMER



NOTE IN THE CASE OF ELECTRICALLY NOISY ROOM SHIELD ROOMS MAY BE REQUIRED FOR THE PROCEDURE OF TRACKING, ALIGNMENT & SENSITIVITY CHECKING.

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