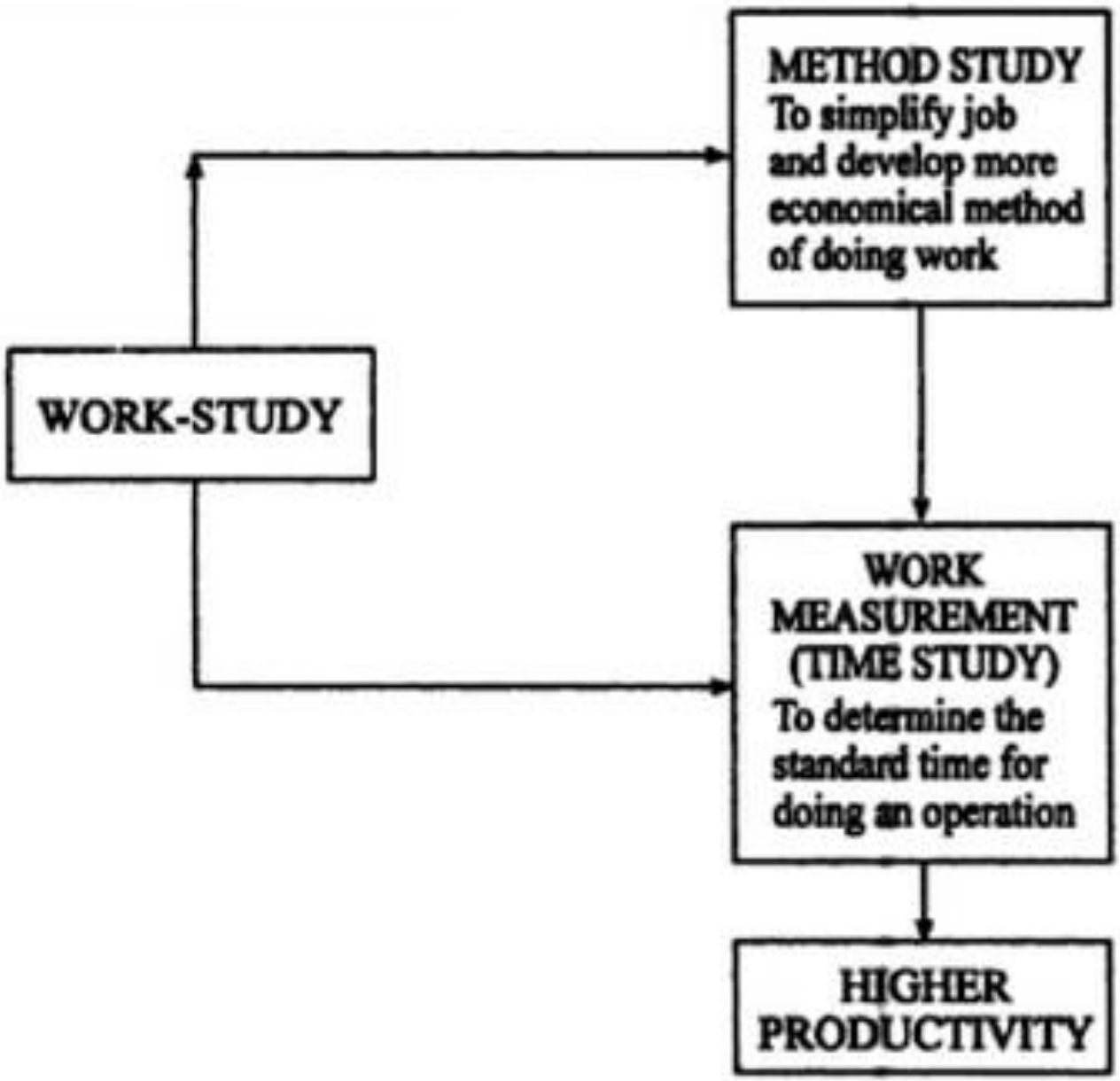
Work Study

Work Study

- *It is a generic term for those techniques, method study and work measurement which are used in the examination of human work in all its context. And which lead systematically to the investigation of all the factors which affect the efficiency and economy of the situation being reviewed, in order to effect improvement*

WORK STUDY COMPONENTS

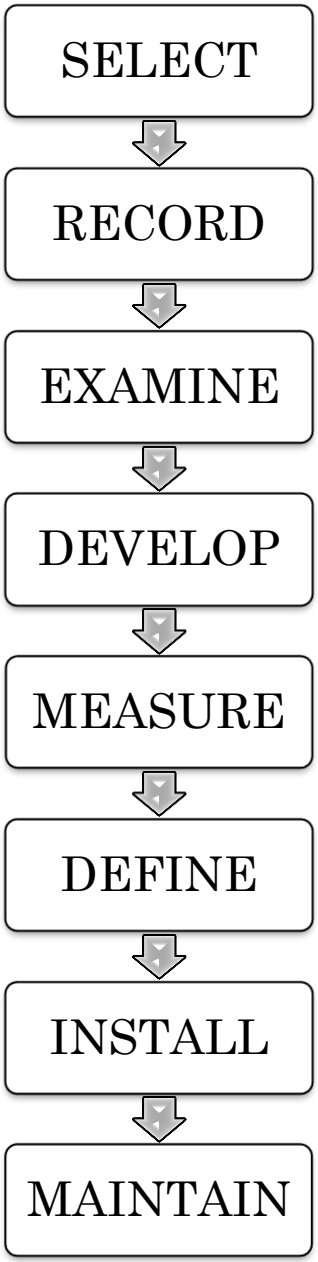


WORK STUDY

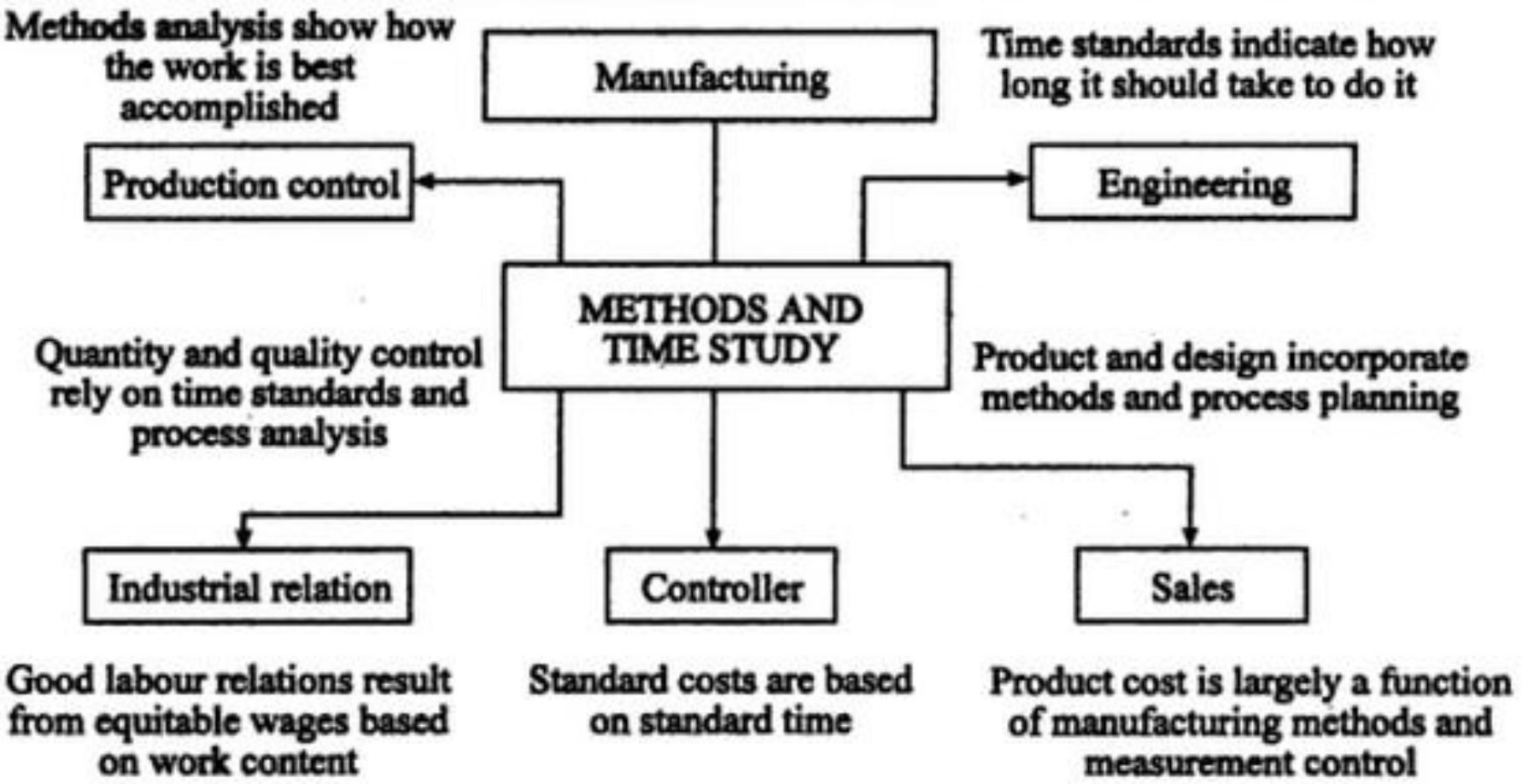
- ***Method study***
  - *It is the systematic recording & critical examination of existing and proposed ways of doing work, as a means of developing and applying easier and more effective methods and reducing cost*

- ***Work measurement / Time study***
  - *It is the application of techniques designed to establish the time for a qualified worker to carry out a specified job at a defined level of performance*

WORK STUDY PROCEDURE



INFLUENCE OF METHOD & TIME STUDY IN PRODUCTION ACIVITIES



Work Content

- ✓ *Basic work content*
- ✓ *Excess work content*

Reasons for Excess Work Content

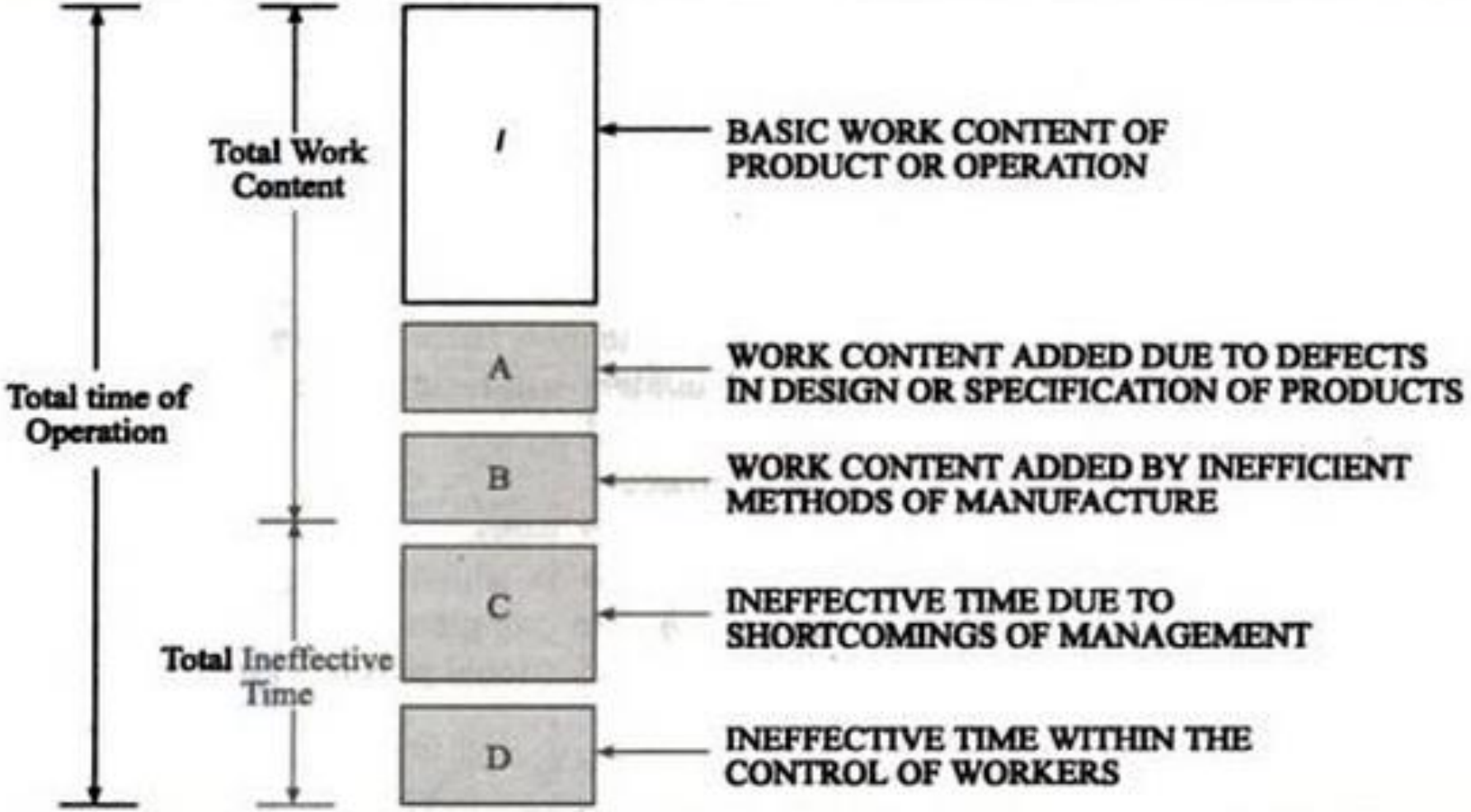
A. Defects in design

B. Inefficient methods of manufacture

C. Short-comings of the mgt.

D. Work-man attributes

MANUFACTURING TIME



METHOD STUDY

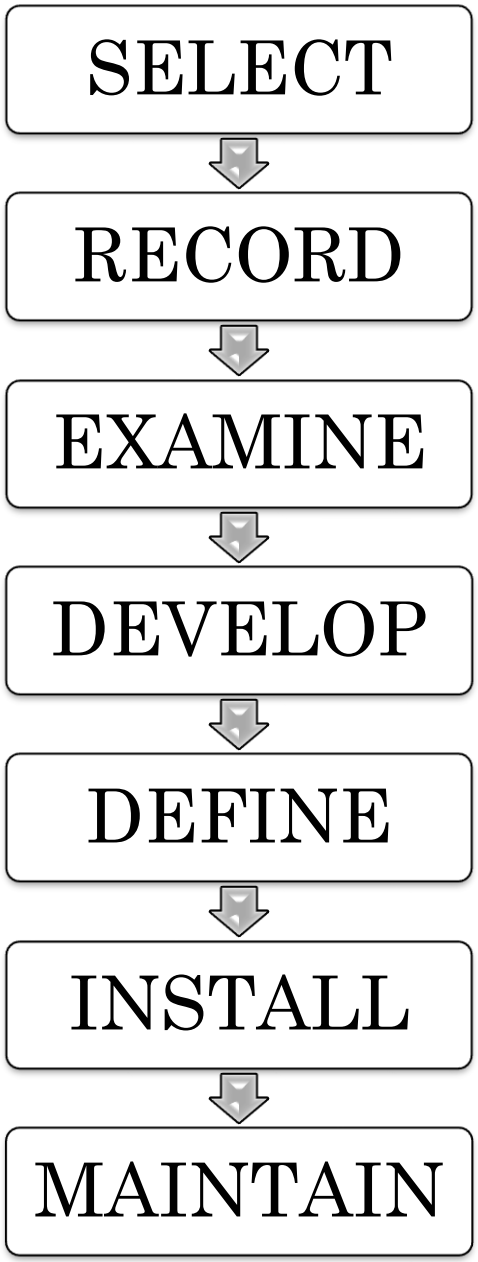
It is the systematic recording & critical examination of existing and proposed ways of doing work, as a means of developing and applying easier and more effective methods and reducing cost

METHOD STUDY

Objectives

- *Critical examination of facts*
- *Develop best possible solution*
- *Eliminate unnecessary operations*
- *Add value & Avoid delays*
- *Optimize 3M*

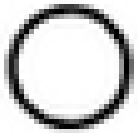
METHOD STUDY PROCEDURE



Job Selection

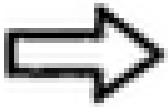
- *Economic aspect*
- *Technical aspect*
- *Human aspect*

METHOD STUDY SYMBOLS

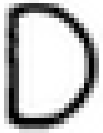


OPERATION

INSPECTION

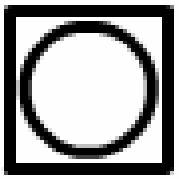


TRANSPORTATION



DELAY

STORAGE



Combined Activity

Recording Techniques

- ***CHARTS***
  - ✓ *Macro-motion charts*
  - ✓ *Micro-motion charts*

- ***DIAGRAMS***
  - ✓ *Flow & String diagrams*
  - ✓ *Cycle graph & Chronocycle graph*

RECORDING TECHNIQUES - CHARTS

- ***Primary Information required on the chart***

✓*Adequate description of activities*

✓*Chart for present or proposed method*

✓*Specific reference to when the activities will begin & end*

✓*If applicable, time & distance scales*

✓*Name of person & date*

Recording Techniques - Charts

- ***Macro-motion charts***
- ✓ *Operation/Outline process chart*
- ✓ *Flow process chart*
- ✓ *Multiple activity chart*
- ✓ *Two handed process chart*

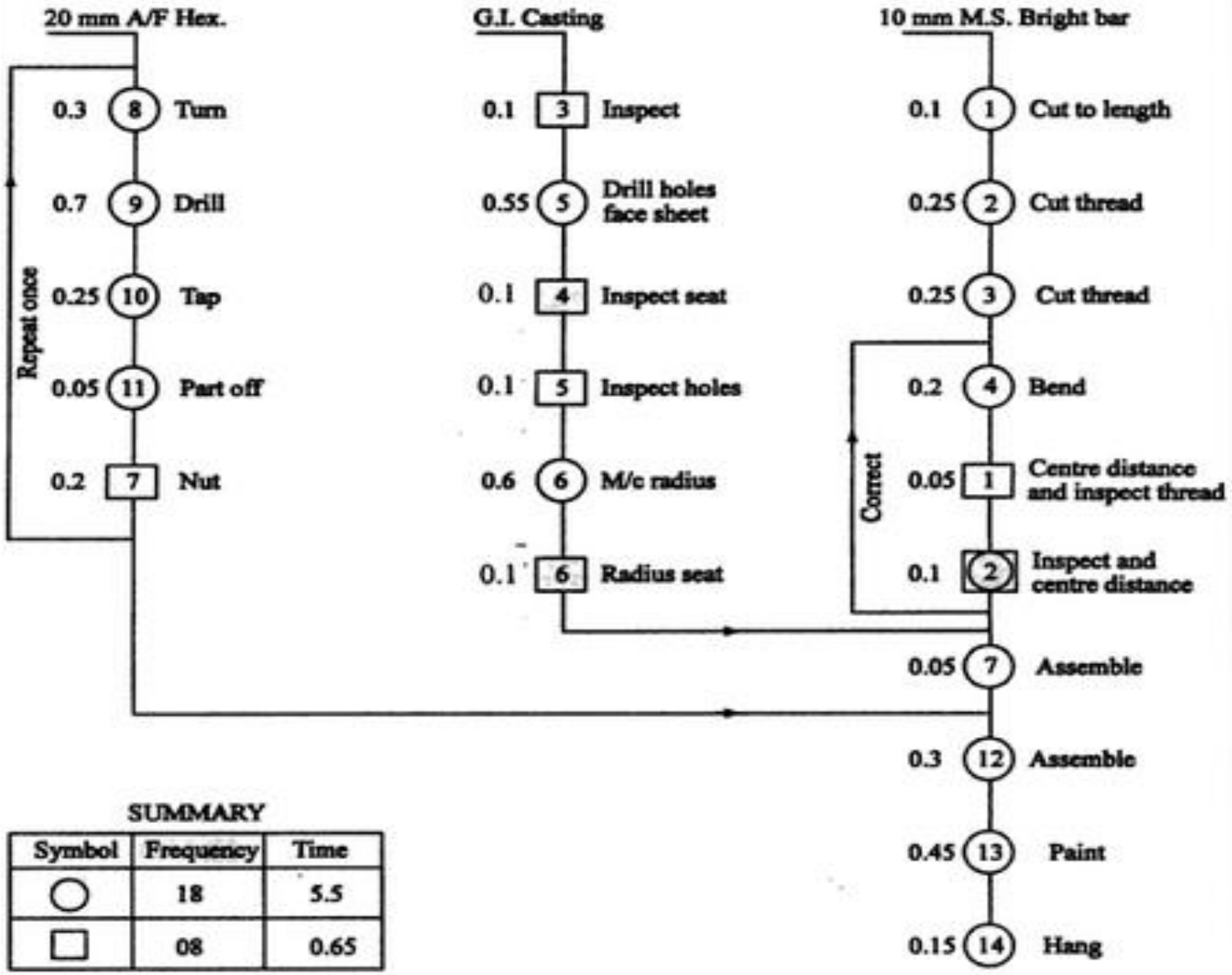
RECORDING TECHNIQUES - CHARTS

✓***Operation/Outline process chart***

- *Record major activities & inspections*
- *Operation & Inspection symbol used*

OPERATION PROCESS CHART
(PRESENT METHOD)

Task : Manufacture of pipe clip assembly
Chart begins : Raw materials lying in the stores
Chart ends : Finished assembly of pipe clip on the rack
Charted by : .....
Date of charting : .....

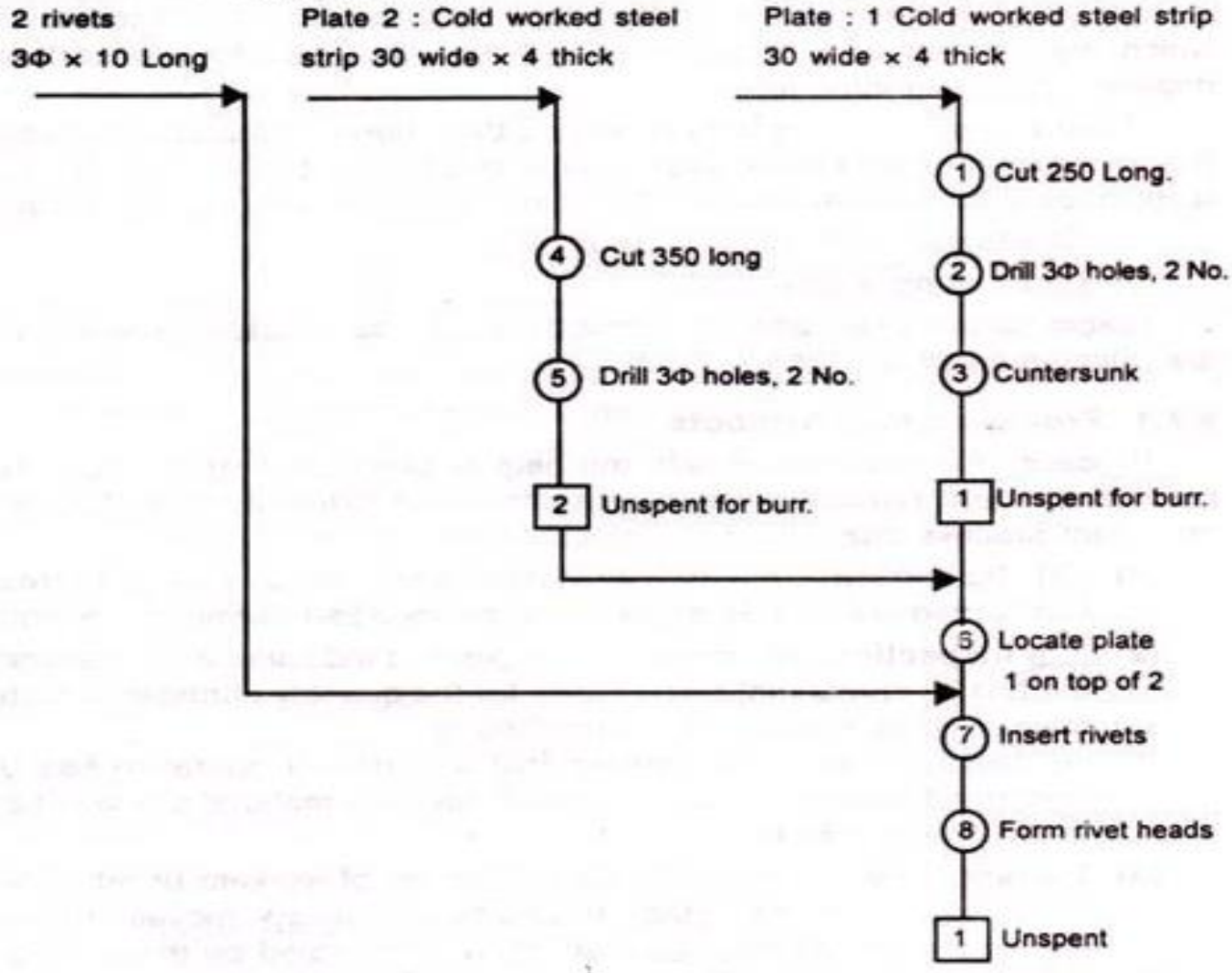


SUMMARY

Symbol	Frequency	Time
○	18	5.5
□	08	0.65

Outline Process Chart

Part No.	:	R.35 X X
Part Name	:	Rivetted plate Assembly.
Location	:	Assembly Shop
Method	:	Present
Charted by	:	A.K. Ramayaa.
Approved by	:	L.M. Krishna.

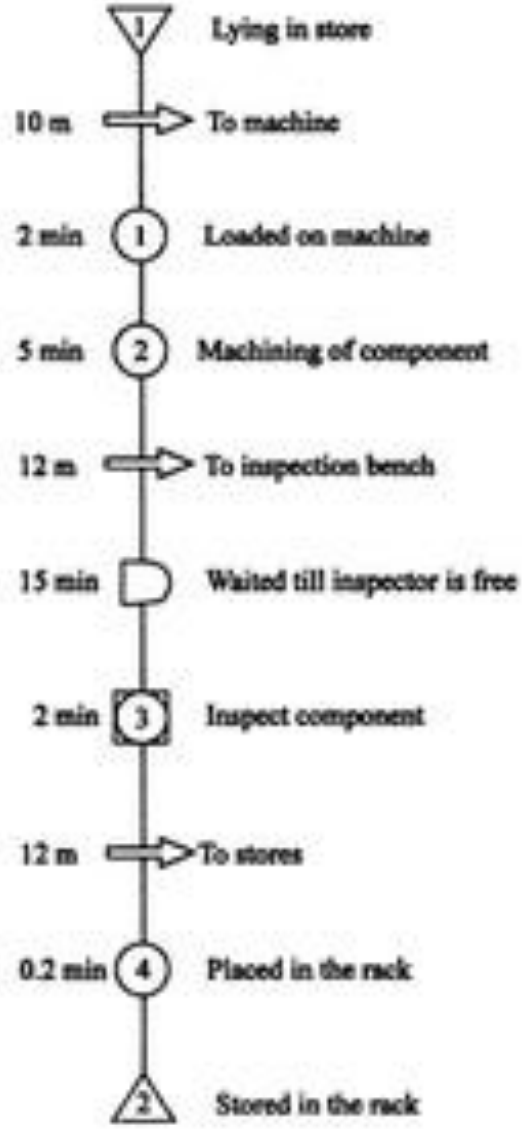


RECORDING TECHNIQUES - CHARTS

- ✓ ***Flow process chart***
- *Material type*
- *Man type*
- *Equipment type*

FLOW PROCESS CHART (Material type)
(PRESENT METHOD)

Task : Machining of the component
Chart begins : Component lying in the stores
Chart ends : The machined component lying in the stores
Charted by : .....
Date of charting : .....

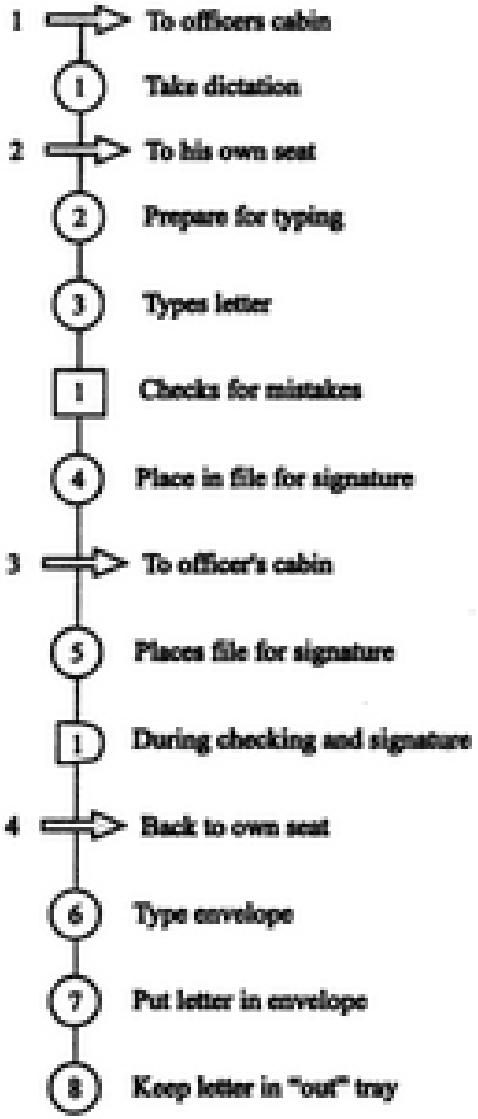


SUMMARY

Symbol	Frequency	Time	Distance
○	4	9.2 min	–
⇨	3	–	34 m
□	1	2 min	–
D	1	15 min	–
▽	2	–	–

FLOW PROCESS CHART (Man type)
(PRESENT METHOD)

Task : Writing a letter
Chart begins : Typist in his chiar at his office
Chart ends : Typist puts letter in "out tray"
Charted by : .....
Date of charting : .....



SUMMARY

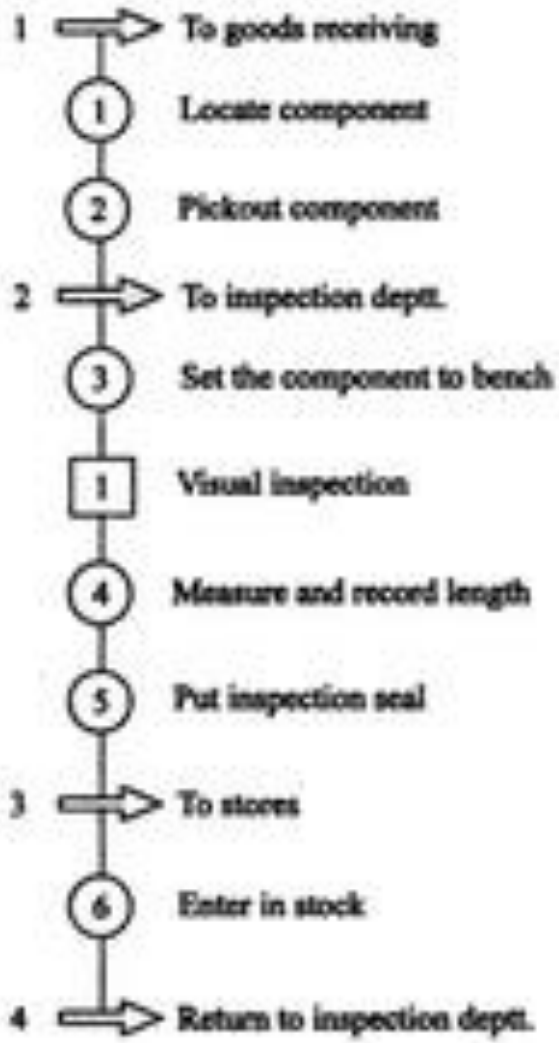
Symbol	○	⇨	□	▽	D
Frequency	08	04	01	–	01

FLOW PROCESS CHART (Man and Material type)
(PRESENT METHOD)

Task : Inspection of component

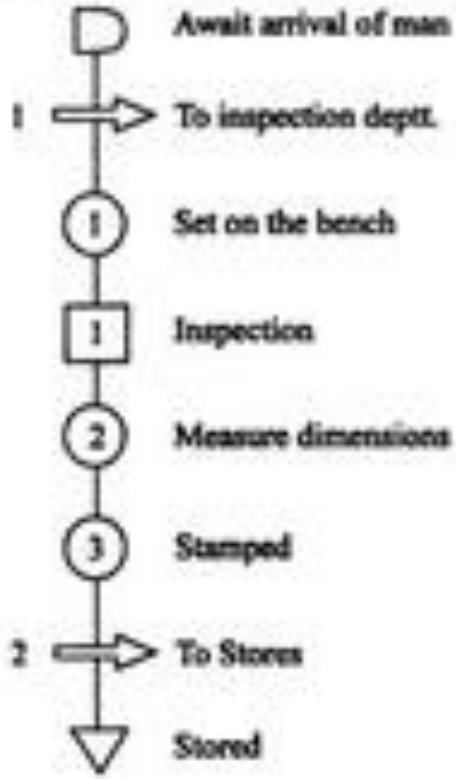
MAN TYPE

Chart begins : Man in inspection Deptt.
Chart ends : Man in inspection Deptt.



MATRERIAL TYPE

Chart begins : Material in goods receiving
Chart ends : Material in stores



SUMMARY

Symbol	○	⇨	□
Frequency	6	4	1

Symbol	○	⇨	□	D	▽
Frequency	3	2	1	1	1

RECORDING TECHNIQUES - CHARTS

✓*Flow process chart usefulness:*

- *Reduce travel distance of man/material*
- *Avoid waiting time & unnecessary delays*
- *Reduce cycle time by combining or eliminating operations*
- *Fix up the sequence of operations*
- *Relocate the inspection stages*

RECORDING TECHNIQUES - CHARTS

✓ ***Two handed process chart***

(Operator process chart)

- *Records activity of workers hand*
- *Representing sequence of manual activities of the worker*
- *Studies work station layout & repetitive task*

➢ *Inspection – touch/feel by hand is to be recorded*

➢ *Storage – hand used as a grip or vice to hold the object*

TWO HANDED PROCESS CHART (PRESENT METHOD)

Task : Assembly of nut and bolt
Chart begins : Both hands free before assembly
Chart ends : Both hands free after assembly
Charted by : .....
Date of charting : .....

SUMMARY

Symbol	○	⇨	▽	D
Frequency (R.H.)	5	4	–	–
Frequency (L.H.)	2	2	2	2

LEFT HAND		RIGHT HAND	
Description	*Symbol*	*Symbol*	*Description*
Reach for bolt	1 ⇨	1 ⇨	Reach for nut
Grasp bolt head	(1)	(1)	Grasp nut
Carry to central position	2 ⇨	2 ⇨	Carry to central position
Hold bolt	▽	(2)	Place nut on bolt
		(3)	Screw nut
Hold bolt	▽	(4)	Grasp assembly
Transfer assembly to right hand	(2)	3 ⇨	Carry to box
	D	(4)	Release assembly
	D	4 ⇨	Return hand to central position

RECORDING TECHNIQUES - CHARTS

✓ *Multiple activity chart*

- *Activities of more than one subject (man or equip.) are each recorded on a common time scale to show their inter-relationship*
- *Study idle time of man & machines*
- *Determining number of machines handled by one operator*
- *Determining number of operator required in teamwork to perform given job*

MULTIPLE ACTIVITY CHART

(Present Method)

Task : **Machining of a component**
Chart begins : **The part to be machined lying near machine**
Chart ends : **Machined part lying in the container**
Charted by : .....
Charting date : .....

	Operator			***Machine***		
0	Description	**T**	**S**		**T**	S
0.20	LOAD JOB	0.2		IDLE		
0.28	SWITCH **'ON'**	0.08		IDLE		
0.36	SWITCH 'ON'	0.08		IDLE		
1.86	IDLE			MACHINING OF PART "Autocycle"	1.5	
1.91	PICKUP PART	**0.05**		IDLE		
1.96	KEEP **IN** TRAY	0.05		**IDLE**		

Subject	*Cycle time (min)*	*Time **worked** per cycle*	*Percentage utilisation*
OPERATOR	1.96	**0.46**	**23.4**
MACHINE	1.96	**1.5**	**76.6**

MICRO-MOTION STUDY

➢ ***Micro-motion/Therbligs***

✓*Technique of* ***recording*** *and* ***analyzing*** *the timing of basic elements of an operation*

✓*Developing best possible* ***pattern of movement****; operator performing @ minimum effort and fatigue, for repeated operations*

✓*Consists of taking* ***motion pictures*** *of the operation with a clock in the picture (or with a video camera running at a known speed)*

MICRO-MOTION STUDY

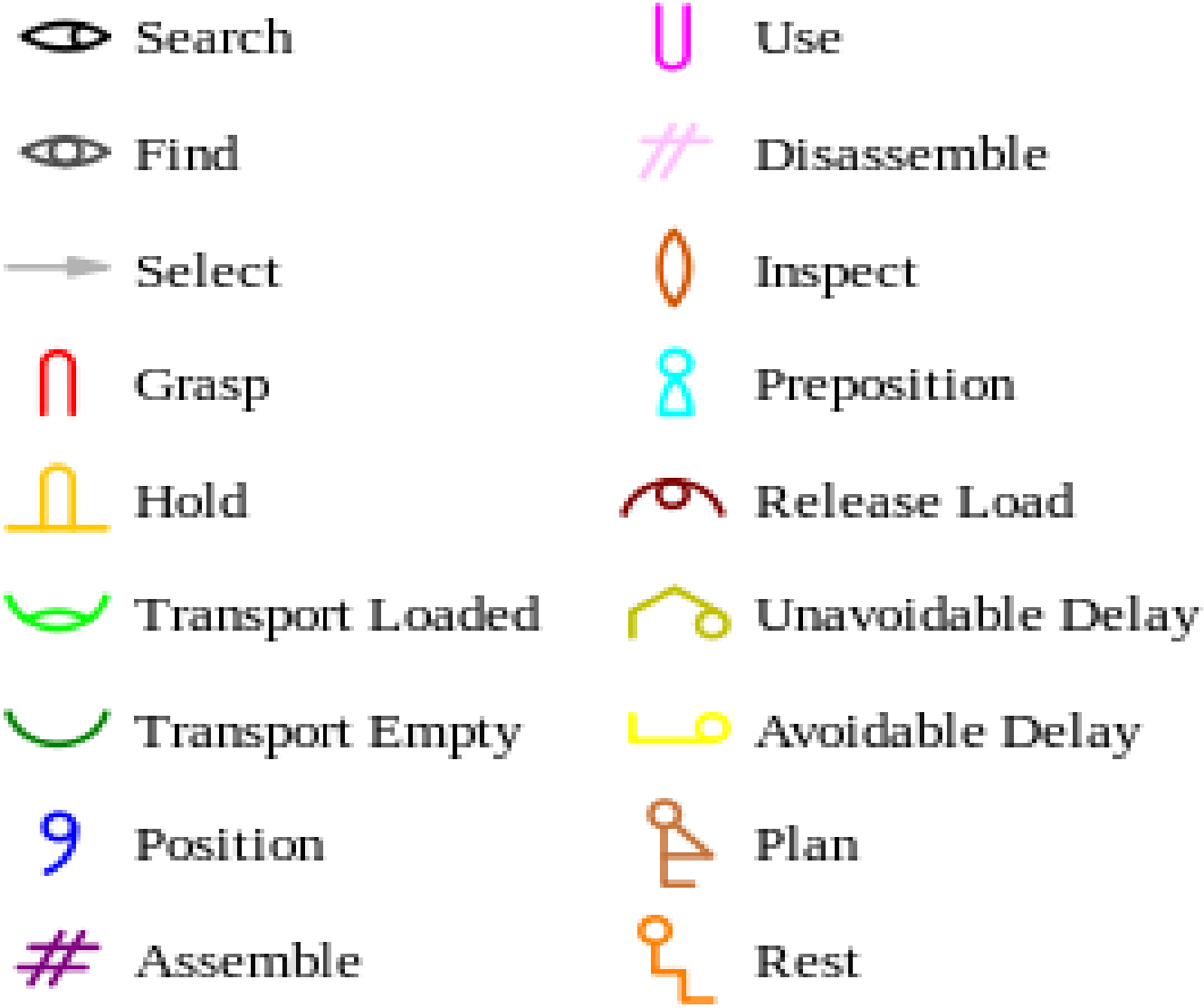
➢ ***Micro-motion/Therbligs***

✓*The speed of the camera used ranges from 960 to 1000 frames per minute. But faster cameras may be used to study very fast hand motions or complex operations.*

✓*Micromotion study should be used when it is economical to do so (**short cycle** highly repetitive operations, large **volume production** or operation performed by a large number of workers)*

MICRO-MOTION STUDY

➢ ***Therbligs***



MICRO-MOTION STUDY

- ***Therbligs***

- *Search (SH) – attempt to find an object using eyes or hand*
- *Find (F) – mental reaction at end of search*
- *Select (ST) – choose among several objects in a group*
- *Grasp (G) – grasp an object*
- *Hold (H) – hold an object*
- *Transport loaded (TL) – move an object with hand and arm*
- *Transport empty (TE) – reach for an object*
- *Position (P) – position object in defined location*
- *Assemble (A) – join two parts*
- *Use (U) – manipulate a tool*
- *Disassemble (DA) – separate multiple parts that were previously joined*
- *Inspect (I) – determine quality of object*
- *Pre-position (PP) – position object for next operation*
- *Release load (RL) – release control of an object*
- *Unavoidable delay (UD) – waiting due to factors beyond worker control*
- *Avoidable delay (AD) – worker waiting*
- *Plan (PN) – decide on an action*
- *Rest (R) – resting to overcome fatigue*

MICRO-MOTION STUDY

➢ ***Micro-motion study involves the following steps:***

1)Filming the operation to study

2)Analysis of the data from the films

3)Making recording of the data (using SIMO chart)

MICRO-MOTION STUDY

➢*SIMO chart format:*

(SImultaneous MOtion cycle chart)

Operation : ..... Film No. : .....
Part drawing No. : ..... Chart No. : .....
Method : ..... Present/Proposed Date : .....
Operation No. : ..... Charted by: .....

Wink counter Reading	*Left hand description*	*Therbligs*	*Time*	*Time in 200/m*	*Time*	*Therbligs*	*Right hand description*

MICRO-MOTION STUDY

- *Provides a **permanent record** of motion study on films.*

- *A large number of operators can **see the procedure at any time** even after the completion of motion study work.*

- *Films can easily **reveal the difference** between the present and the proposed technique.*

- *Films can be demonstrated to large work force at **any desired speed**.*

- *It provides **very accurate time for each operation** or motion in comparison to stop watch time study.*

MICRO-MOTION STUDY

- *It helps in making **detailed and accurate analysis** of the prevailing technique.*

- *To study the **activities** of the machine and the operator.*

- *To **impart training** to the workers or operators regarding motion; economy so that unnecessary movement by the workers may be avoided.*

- *To study the **relationship** between the activities of operator and the machine.*

- *To obtain motion time data for **developing synthetic time standards** for various elements.*

MEMO-MOTION STUDY

- *In memomotion study, the camera speed is at 60 or 100 frames per minute*
- *It is a form of **time lapsed cine-photography***
- *Time interval lies b/w 1/2sec to 4sec*
- *10 or 20 min. may be compressed into 1min*

RECORDING TECHNIQUES - DIAGRAMS

➢ ***Diagrams***

✓*Indicates the* ***path of movement***

✓*Study of* ***traffic & frequency*** *over different routes of plant*

✓*Identification of* ***back-tracking & obstacles*** *during movements*

✓*Study of different* ***layout plans*** *& select optimal layout*

Recording Techniques - Diagrams

- ***Flow Diagram***

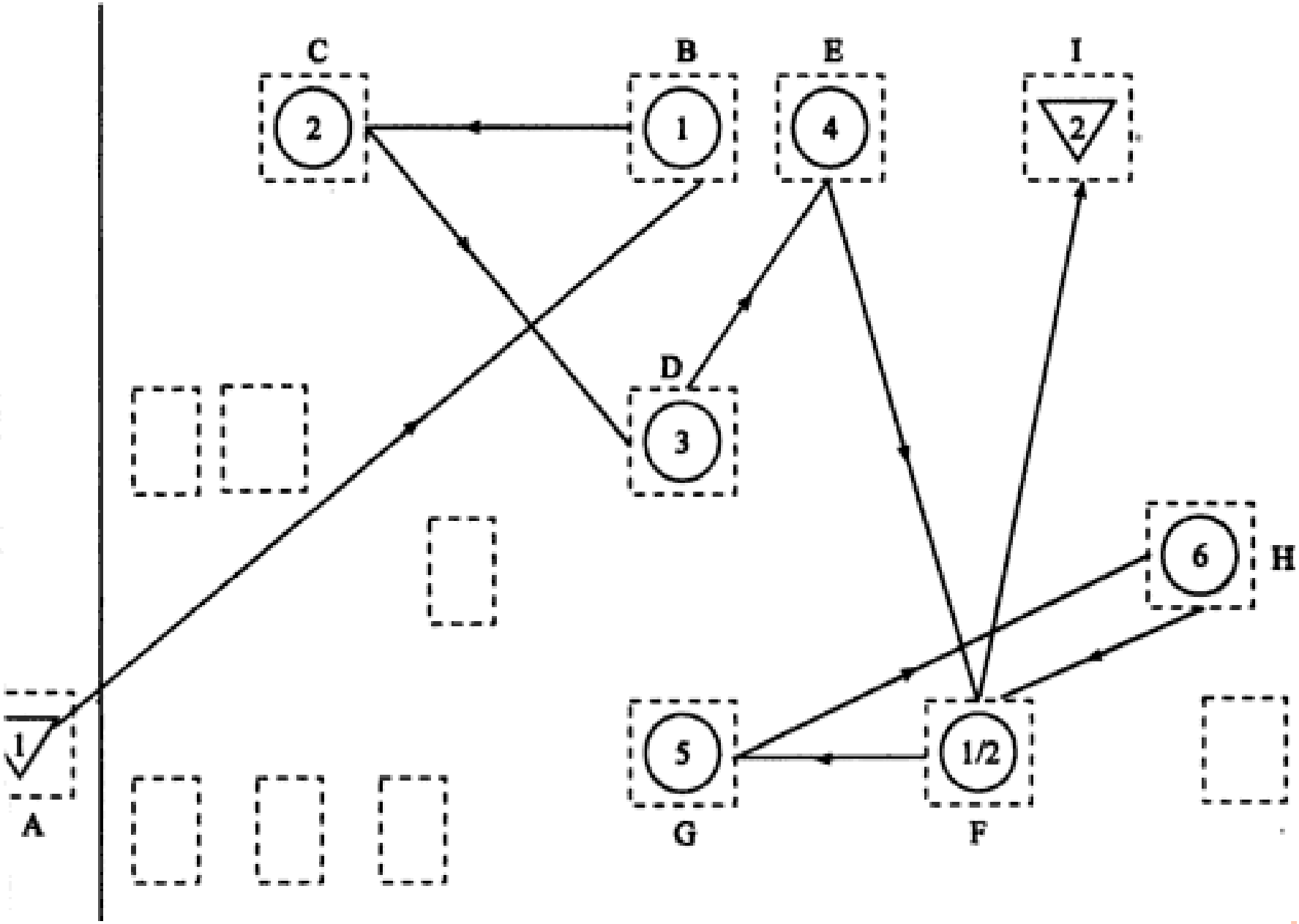
1)Layout of w/p is drawn to scale

2)Relative positions of m/c tools, work benches, etc are marked

3)Path followed by the subject under study is traced by drawing lines

4)Each movement is serially numbered and indicated by arrow for direction

5)Different colors are used to denote different types of movements


C
B
E
I
2
1
4
2
D
3
6
H
1
5
1/2
A
G
F

RECORDING TECHNIQUES - DIAGRAMS

➢ *String Diagram*

✓ ***String/Thread*** *is used to measure the distance*

✓ *Records the pattern of movement of a worker working* ***within a limited area*** *during a certain period of time*

✓ ***Repetitive movements*** *can be conveniently traced*

RECORDING TECHNIQUES - DIAGRAMS

➢ *String Diagram*

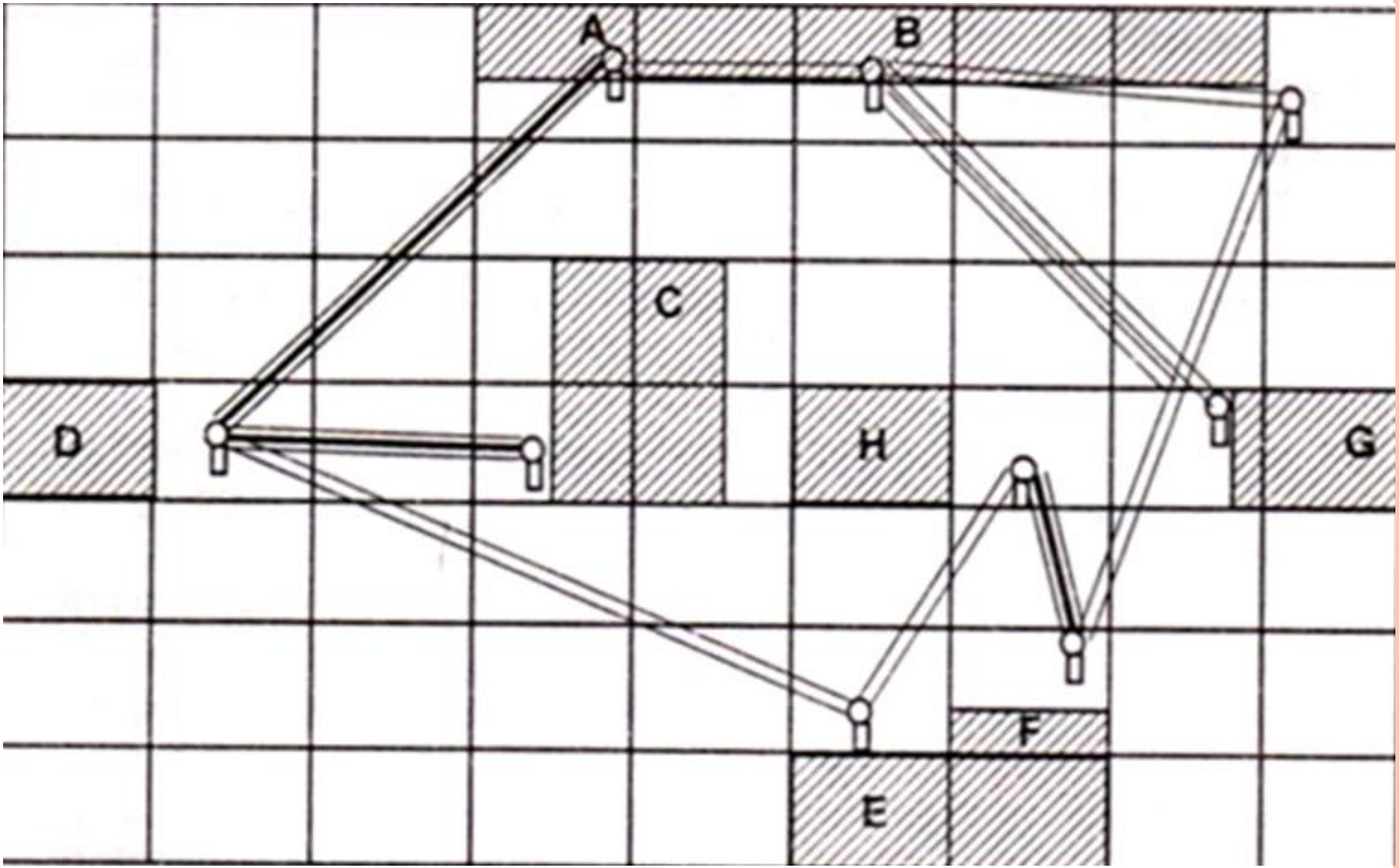
1)Layout of the w/p or factory is drawn to scale on a soft board

2)Pins are fixed into boards to mark the location of work stations,

3)Pins are also driven at the turning point of the routes

4)A measured length of thread is taken to trace the movement (path)

5)The distance covered by the object is obtained by measuring the remaining part of the thread and subtracting it from the original length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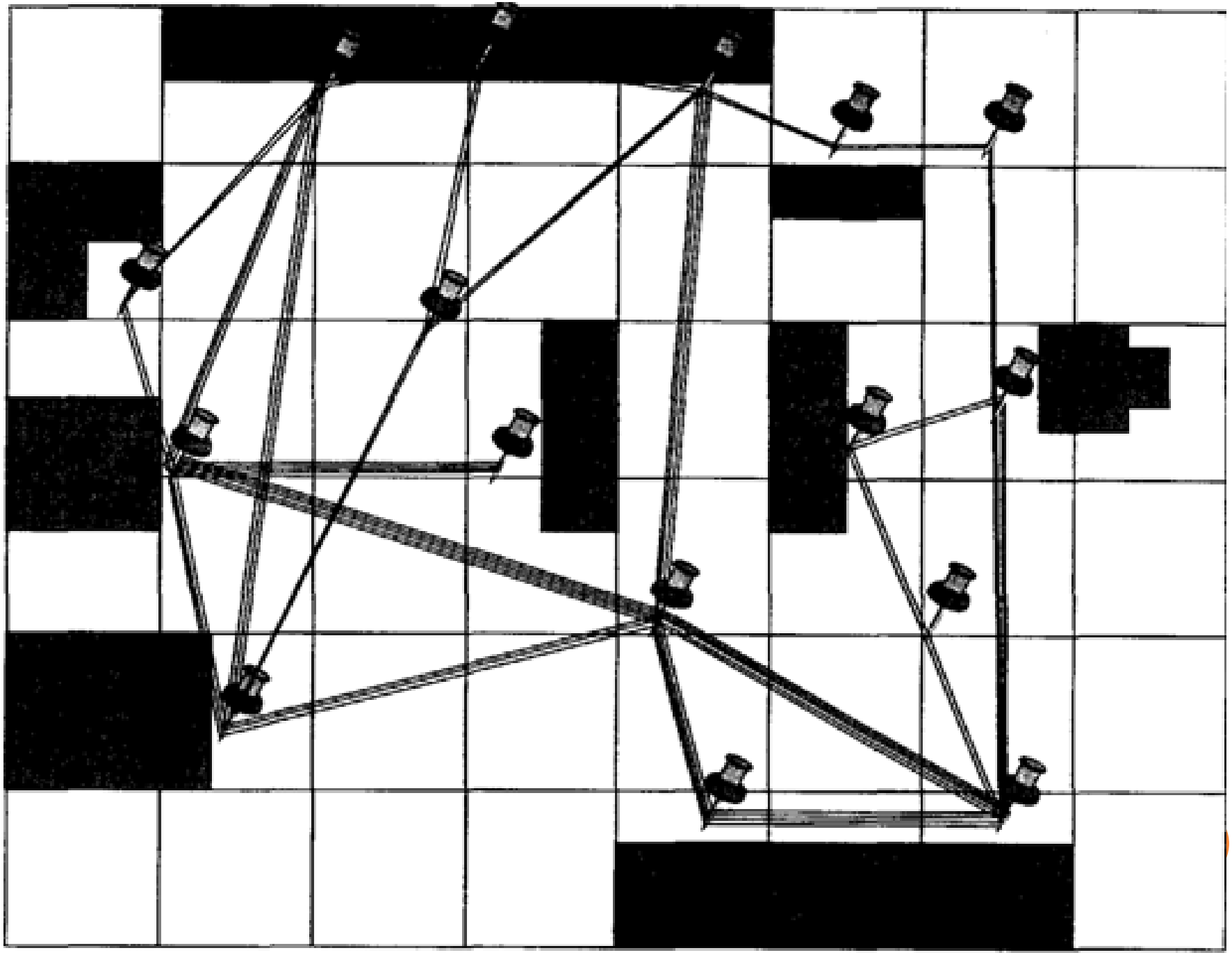


Recording Techniques - Diagrams

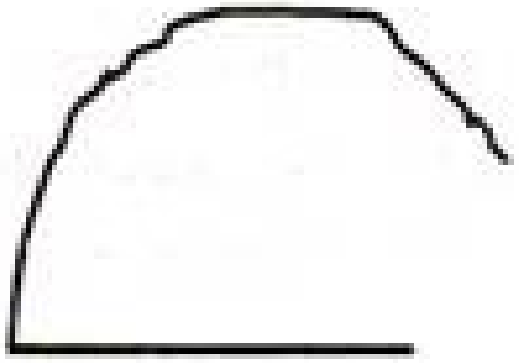
➢ ***Cycle graph & Chronocycle graph***

✓*Both* ***records the motion path*** *of an operator & requires filming equipment*

✓*Movements which are very fast and very* ***difficult for the human eye*** *to trace are traced by these techniques*

RECORDING TECHNIQUES - DIAGRAMS

- ***Cycle graph***
- *Indicates a permanent record of the motion pattern employed in the form of a closed loop of* ***continuous line****.*



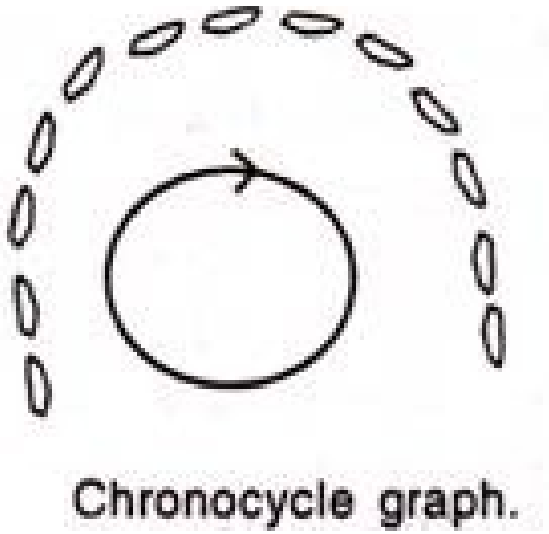
Cycle graph.

- *It* ***does not*** *indicate the direction or speed of motion.*

RECORDING TECHNIQUES - DIAGRAMS

- ***Chronocycle graph***
- *Indicates **short dashes of line spaced** in proportion to the speed of the body member photographed*

- ***Wide spacing** would represent fast moves while **close spacing** would represent slow moves*



Chronocycle graph.

- ***Jumbling of dots** at one point would indicate fumbling or hesitation of the body member*

- *Used to study the **motion pattern** as well as to **compute velocity, acceleration and retardation** experienced by the body member at different locations.*

CRITICAL EXAMINATION

- *A **systematic and progressive series** of questions with the purpose of determining true reasons*

- *Based on the reasons, improvements are found and adopted into a new method, called **better method***

- *The **use of questioning technique** reduces the possibility of missing any information which may be useful for the development of better method*

CRITICAL EXAMINATION

➢*A popular procedure of carrying out critical examination uses two sets of questions:*

✓***Primary questions*** *(answers to these show up the necessity of carrying out the activity), &*

✓***Secondary questions*** *(answers to these allow considerations to alternative methods of doing the activity)*

➢*Selection of the best way of doing each activity is later* ***determined to develop new method*** *which is introduced as a standard practice.*

CRITICAL EXAMINATION

PRIMARY QUESTIONS

the	PURPOSE	*for which*
the	PLACE	*at which*
the	SEQUENCE	*in which*
the	PERSON	*by whom*
the	MEANS	*by which*

CRITICAL EXAMINATION

SECONDARY QUESTIONS

PURPOSE:	*what is done?*
	why is it done?
	what else might be done?
	what should be done?
PLACE:	*where is it done?*
	Why is it done there?
	Where else might it is done?
	Where should it be done?

CRITICAL EXAMINATION

SEQUENCE:	*When is it done?*
	Why is it done?
	When might it be done?
	When should it be done?
PERSON:	*who does it?*
	Why does that person do it?
	Who else might do it?
	Who should do it?
MEANS:	*How is it done?*
	Why is it done that way?
	How else might it be done?
	How should it be done ?

CRITICAL EXAMINATION

	Primary Questions		*Secondary Questions*	
			Possible alternatives	*Selected alternatives*
PURPOSE	What is achieved?	Is it necessary? Why?	What else could be done?	What should be done?
PLACE	Where is it done?	Why there? Advantages: Disadvantages:	Where else could it be? A: D:	Where should it be done?
SEQUENCE	When it is done? After: Before:	Why then? A: D:	When else could it be? A: D:	When should it be?
PERSON	Who does it?	Why that person? A: D:	Who else could do it? A: D:	Who should do it?
MEANS	How is it?	Why that way? A: D:	How else could it be? A: D:	How should it?

Development & Selection of Improved Method

- *Eliminate all unnecessary operations*
- *Combine operations & elements*
- *Change the sequence of operations*
- *Simplify the necessary operations*

✓ ***Steps in development & selection***

- *Evaluation (evaluate the alternatives)*
- *Investigation (tech. & eco. feasibility)*
- *Selection*

Principles of Motion Economy

These principles can be considered under three different groups;

- ✓ *Those related to the use of the **human body***
- ✓ *Those related to the **workplace arrangement***
- ✓ *Those related to the **design of tools & equipment***

Principles of Motion Economy

➢ ***Principles related to the use of human body:***

✓ *Both **hands should begin and end** their basic divisions of activity simultaneously & should not be idle at the same instant, except during the rest periods*

✓ ***Momentum** should be employed to assist the worker wherever possible, and it should be reduced to a minimum if it must be overcome by muscular effort*

✓ ***Continuous curved motions** should be preferred to straight line motions involving sudden and sharp changes in the direction*

✓ ***Work that can be done by the feet** should be arranged so that it is done together with work being done by the hands*

✓ ***Twisting motions** should be performed with the elbows bent*

PRINCIPLES OF MOTION ECONOMY

➢ ***Principles related to the arrangement & conditions of workplace:***

✓ *Fixed locations should be provided for all tools and materials so as to permit the best sequence and* ***eliminate search and select***

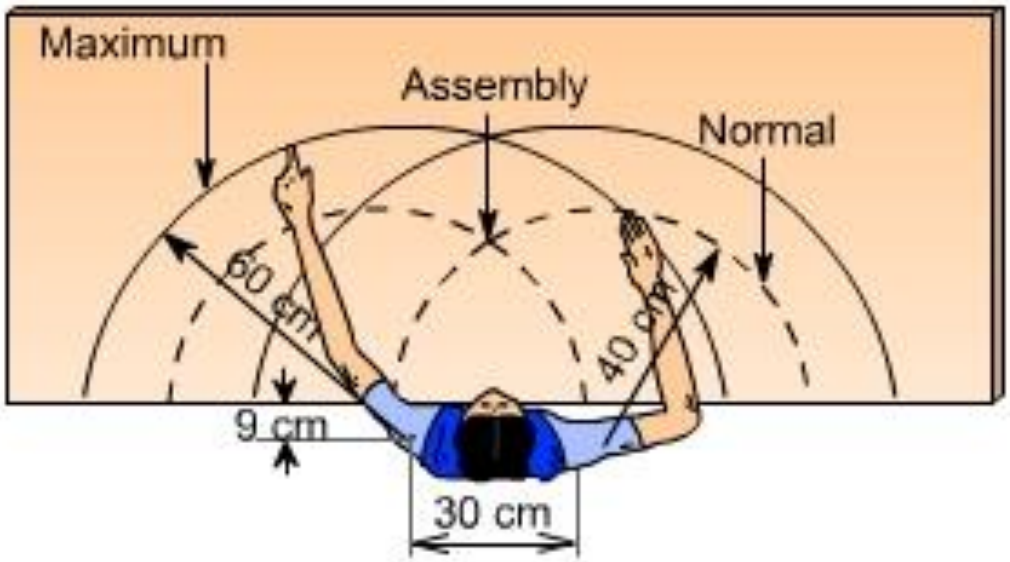
✓ *Gravity bins and drop delivery should be used to* ***reduce reach and move times***

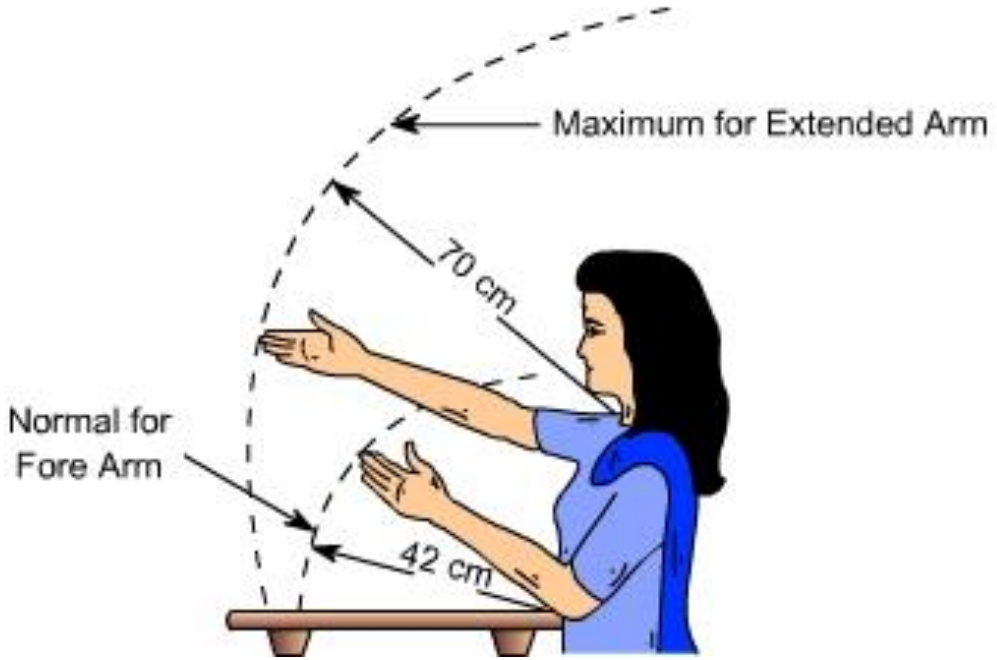
✓ *Use may be made of* ***ejectors for removing*** *finished parts*

✓ ***Work table height*** *should permit work by the operator in alternately sitting and standing posture*

✓ *Glare-free* ***adequate illumination****, proper* ***ventilation*** *and proper* ***temperature*** *should be provided*

Principles of Motion Economy





Principles of Motion Economy

➢ ***Principles related to the design of tools and equipment:***

✓ *Use **colour, shape or size coding** to maximize speed and minimize error in finding controls*

✓ *Use simple on/off, either/or **indicators** whenever possible*

✓ *All levers, handles, wheels and other control devices should be **readily accessible** to the operator and should be designed so as to give the best possible mechanical advantage*

✓ *Use **quick acting fixture** to hold the part/material upon which the work is being performed*

✓ *Use **stop guides** to reduce the control necessary in positioning motions*

✓ ***Operating, set-up and emergency controls** should be grouped according to the function*

Installation of the Proposed Method

- *Recommendation phase*
- *Implementation phase*

Maintain the Proposed Method

- *Follow-up*
- *Monitoring & control*
- *Audit of the savings*
- *Review of the approach*
- *Evaluation of effectiveness of proposed method*

WORK MEASUREMENT / TIME STUDY

- *The application of techniques designed to establish the time for a qualified worker to carry out a specified job at a defined level of performance*

- *Work measurement refers to the estimation of standard time for an activity, that is the time allowed for completing one piece of job by using the prescribed method. Standard time can be defined as the time taken by an average experienced worker for the job with provisions for delays beyond the worker's control.*

Work Measurement Objectives

- *Comparing alternative methods*
- *Assessing the correct initial manning*
- *Realistic costing*
- *Delivery date of goods*
- *Cost reduction & cost control*
- *Training new employees*
- *Find ineffective time in a process*
- *Evaluate worker's performance*
- *Facilitate operations scheduling*
- *Establish wage incentive schemes*

Work Measurement Techniques

➢*For repetitive work (short work cycle) or non-repetitive work;*

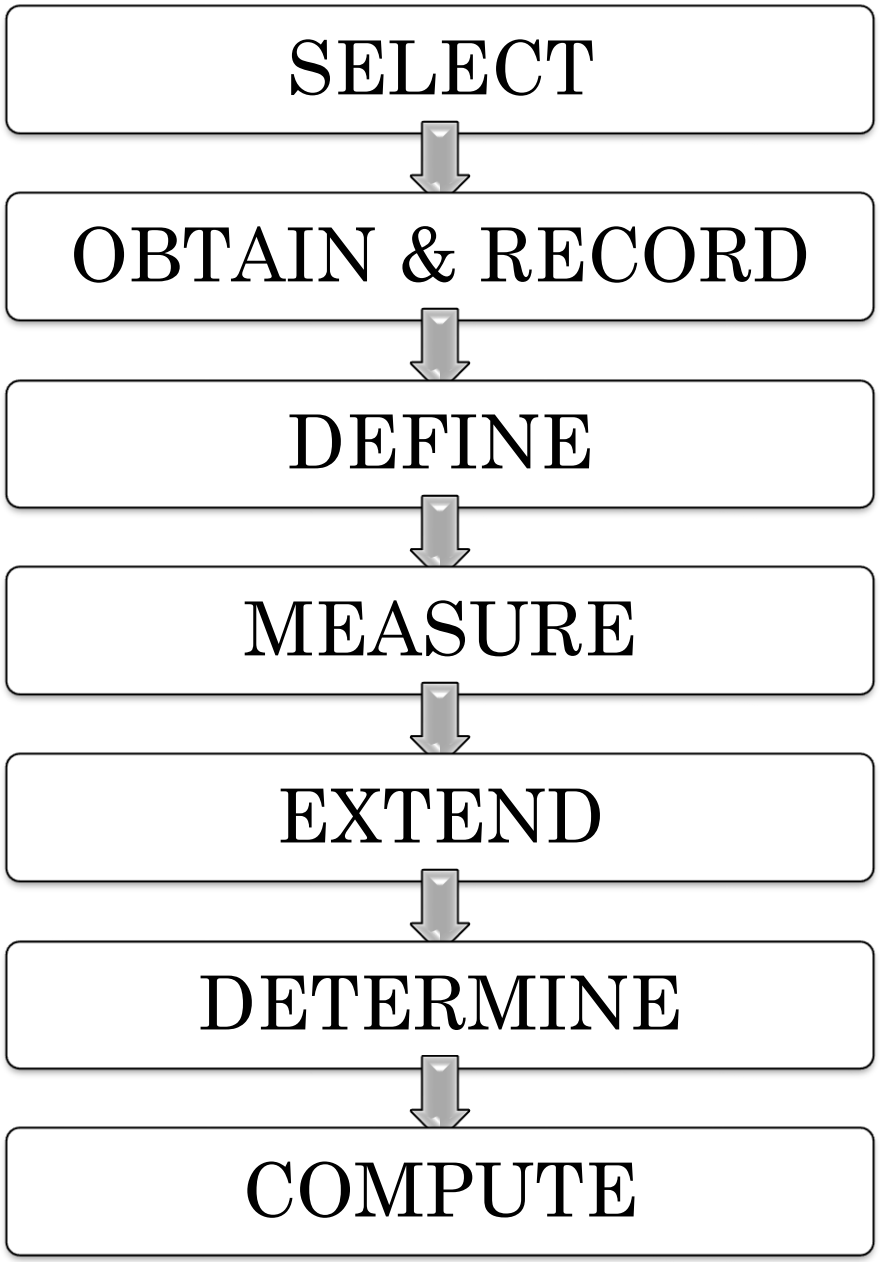
- ✓*Time study (stop watch technique)*
- ✓*Work sampling*
- ✓*Synthetic data*
- ✓*Analytical estimating*
- ✓*Predetermined Motion Time Study (PMTS)*

❖***Note*** *- Time study & Work sampling involve direct observation while remaining are data-based & analytical in nature*

Work Measurement Techniques

Techniques	***Applications***	***Unit of measurements***
Time study	*Short cycle repetitive jobs. Widely used for direct work*	*Centi-minute (0.01 min)*
Work sampling	*Long cycle jobs*	*Minutes*
Synthetic data	*Short cycle repetitive jobs*	*Centi-minute*
Analytical estimating	*Short cycle non-repetitive jobs*	*Minutes*
MTM	*Manual operation confined to one work centre*	*TMU (1 TMU = 0.006min)*

TIME STUDY PROCEDURE



TIME STUDY – BASIC STEPS

a. *Obtaining and recording all available information about the job, operator and the surrounding conditions likely to affect the execution of the work*

b. *Recording the complete description of the method, breaking down the operation into 'elements'*

c. *Measuring with a stopwatch and recording the time taken by the operator to perform each element of the operation*

d. *Assessing the rating*

e. *Extending observed time to 'basic times'*

f. *Determining the allowances to be made over and above the basic time for the operation*

g. *Determining the 'standard time' for the operation*

Types of Elements

- *A repetitive element*
- *An occasional element*
- *A constant element*
- *A variable element*
- *A manual element*
- *A machine element*
- *Governing element*
- *A foreign element*

TIME STUDY EQUIPMENT

➢ *There are two methods of timing using a stop watch. They are:*

✓ *Fly back or Snap back method*

✓ *Continuous or Cumulative method*

Time Study Equipment

1. Fly back Method:

Here the stop watch is started at the beginning of the first element. At the end of the element the reading is noted in the study sheet. At the same time, the stop watch hand is snapped back to zero. This is done by pressing down the knob, immediately the knob is released. The hand starts moving from zero for timing the next element. Thus the timing for each element found is called observed time.

2. Continuous method:

Here the stop watch is started at the beginning of the first element. The watch runs Continuously throughout the study. At the end of each element the watch readings are recorded on the study sheet. The time for each element is calculated by successive subtraction. The final reading of the stop watch gives the total time known as observed time.

TIME STUDY EQUIPMENT

➢*Equipments used to measure time using Stop watch:*

- ✓ *Digital or electronics stop watch*
- ✓ *Electronic data collector and computer*
- ✓ *Observation board*
- ✓ *Observation sheet*
- ✓ *Stationary – Pen, Pencil, Eraser, Calculator*

PERFORMANCE RATING

➢*Process of adjusting the actual pace of working of an operator by comparing it with mental picture of pace of an operator working at normal speed*

➢*Performance rating methods*

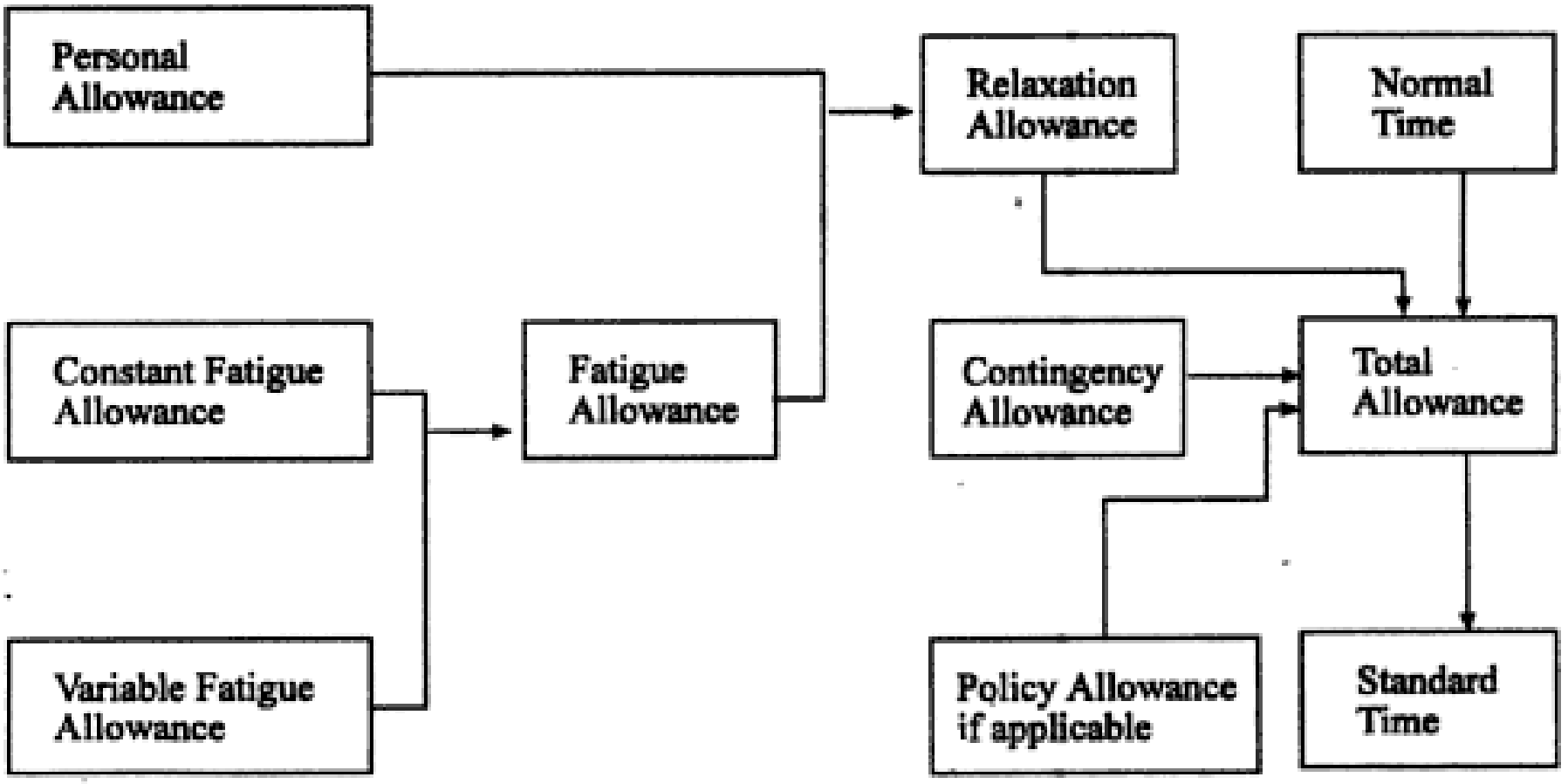
✓*Speed rating*

✓*Westing house method of rating (S,E,C,C)*

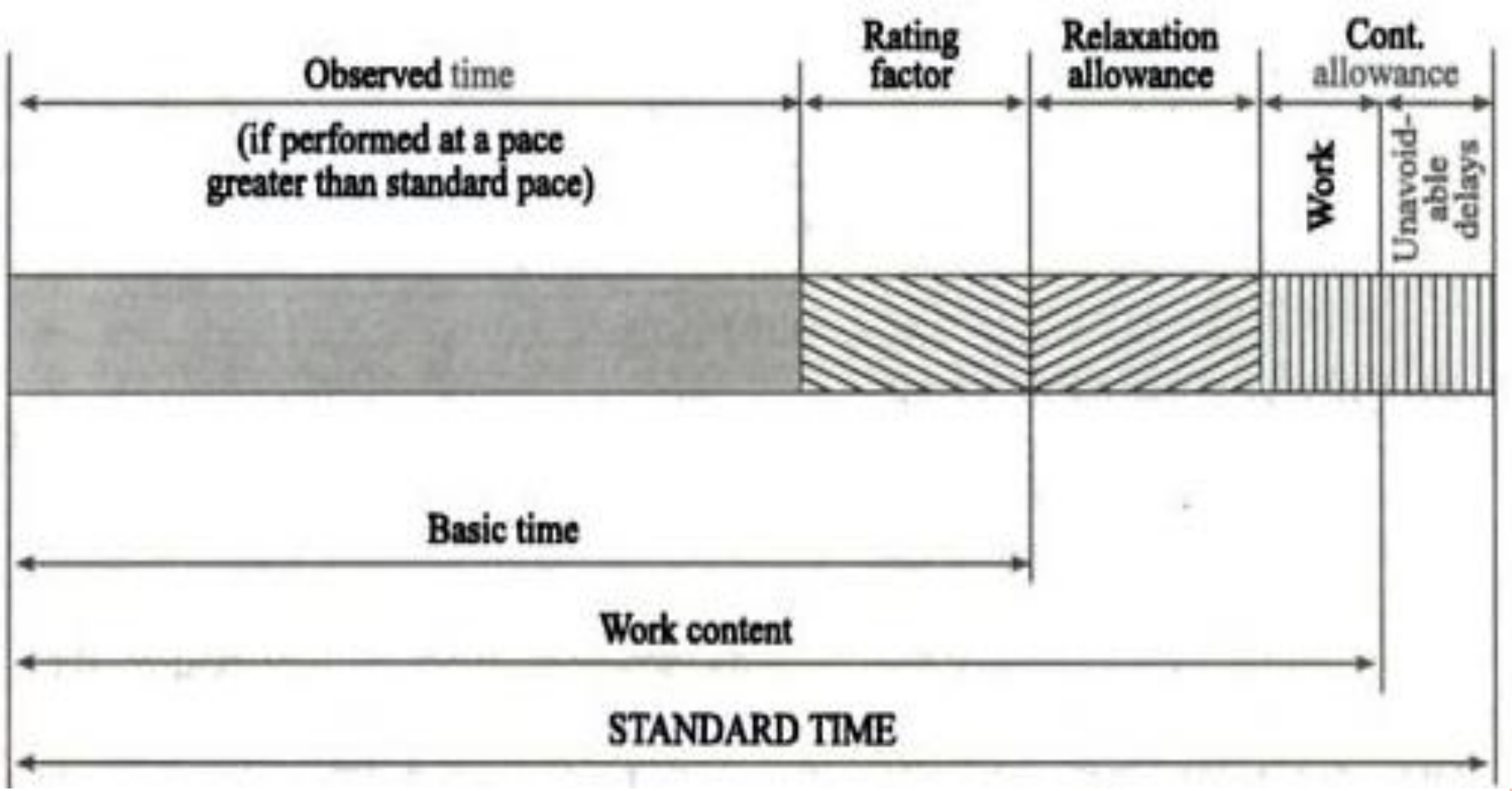
✓*Synthetic rating (R = P/A)*

✓*Objective rating*

ALLOWANCES


Personal Allowance
Relaxation Allowance
Normal Time
Constant Fatigue Allowance
Fatigue Allowance
Contingency Allowance
Total Allowance
Variable Fatigue Allowance
Policy Allowance if applicable
Standard Time

STANDARD TIME COMPUTATION



Work Measurement Techniques

✓ ***Work sampling (ratio delay study)***

➢ *A technique of getting facts about utilization of machines or human beings through a* ***large number of instantaneous observations taken at random time intervals.***

➢ *The* ***ratio of observations*** *of a given activity to the total observations approximates the percentage of time that the process is in that state of activity.*

Work Measurement Techniques

✓ ***Work sampling***

- ***Estimates percent of time*** *a worker spends on various tasks*
- *Determines how* ***employees allocate their time***
- *Used to* ***set*** *staffing levels, reassign duties, estimate costs, and set delay allowances*

Work Measurement Techniques

✓***Work sampling Procedure***

Step 1 . *Define the problem*.

- *Describe the job for which the standard time is to be determined.*
- *Unambiguously state and discriminate between the two classes of activities of operator on the job: what are the activities of job that would entitle him to be in* ***'working' state***.

*This would imply that when operator will be found engaged in any activity other than those would entitle him to be in '****Not Working****' state*.

Step 2. *Design the sampling plan*.

- *Estimate satisfactory* ***number of observations*** *to be made.*
- *Decide on the* ***period of study****, e.g. two days, one week, etc.*
- *Prepare detailed plan for taking the observations.*

This will ***include*** *observation schedule, exact method of observing, design of observation sheet, route to be followed, particular person to be observed at the observation time, etc.*

Work Measurement Techniques

✓***Work sampling Procedure***

Step 3. *Contact the persons concerned and take them in confidence regarding conduct of the study.*

Step 4. *Make the observations at the pre-decided random times about the working/not working state of the operator. When operator is in working state, determine his performance rating. Record both on the observation sheet.*

Step 5. *Obtain and record other information. This includes operator's starting time and quitting time of the day and total number of parts of acceptable quality produced during the day.*

Step 6. *Calculate the standard time per piece.*

Work Measurement Techniques

✓ ***Predetermined Motion Time Study (PMTS)***

➢ *A procedure that* ***analyzes any manual activity*** *in terms of basic or fundamental motions required to perform it.*

➢ *Each of these* ***motions is assigned a previously established standard time value*** *and then the timings for the individual motions are synthesized to obtain the total time needed for performing the activity.*

WORK MEASUREMENT TECHNIQUES

✓ ***Predetermined Motion Time Study (PMTS)***

➢ *The main use of PMTS lies in the* ***estimation of time*** *for the performance of a task before it is performed.*

➢ *The procedure is particularly useful to those organizations which* ***do not want troublesome performance rating*** *to be used with each study.*

Work Measurement Techniques

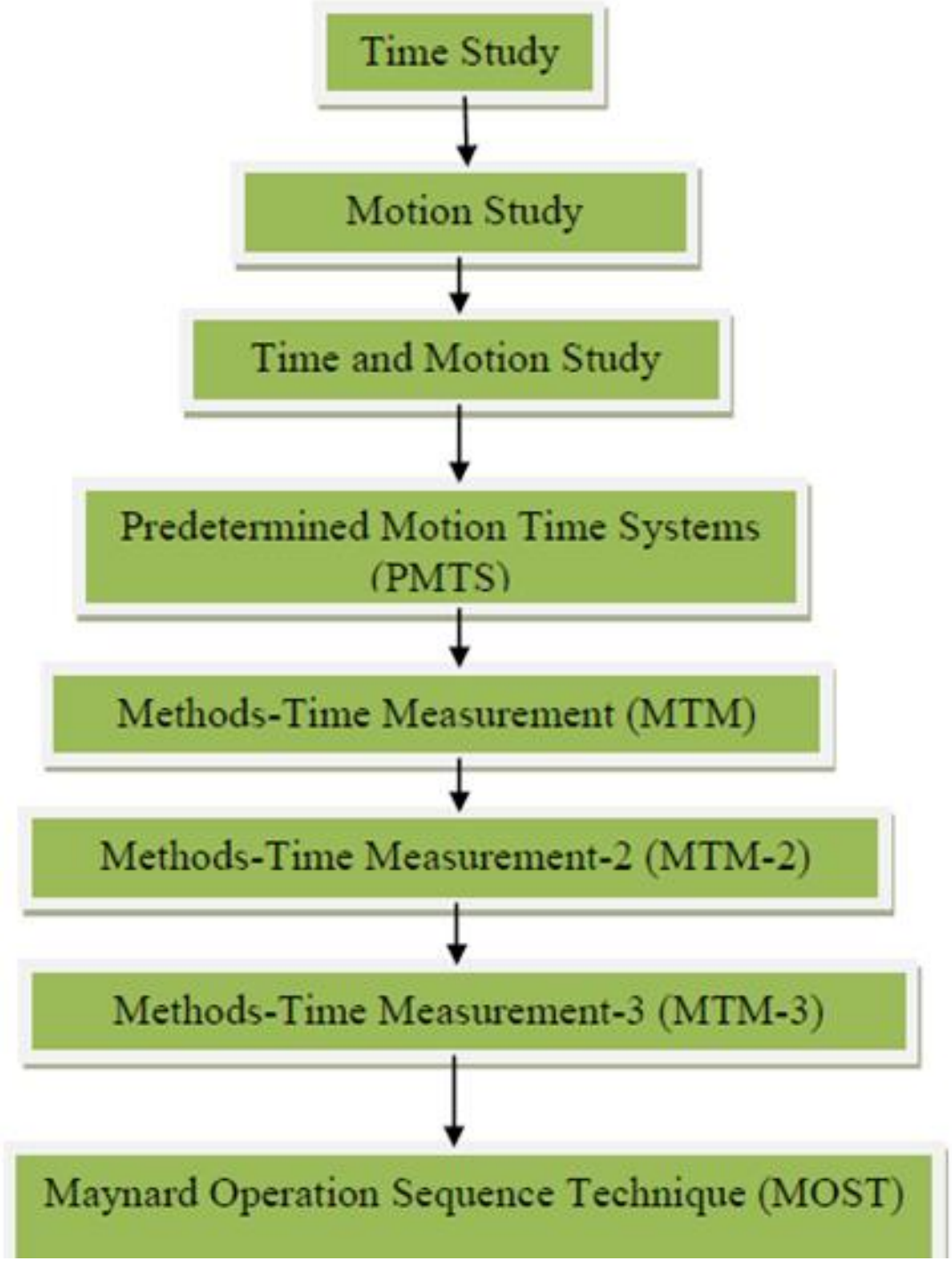
✓***Applications of PMTS are for***

- *Determination of **job time standards**.*
- *Comparing the times for alternative proposed methods so as to find the economics of the proposals **prior to production run**.*
- *Estimation of manpower, equipment and space requirements **prior to setting up the facilities** and start of production.*
- *Developing **tentative work layouts for assembly lines** prior to their working in order to minimize the amount of subsequent re-arrangement and re-balancing.*

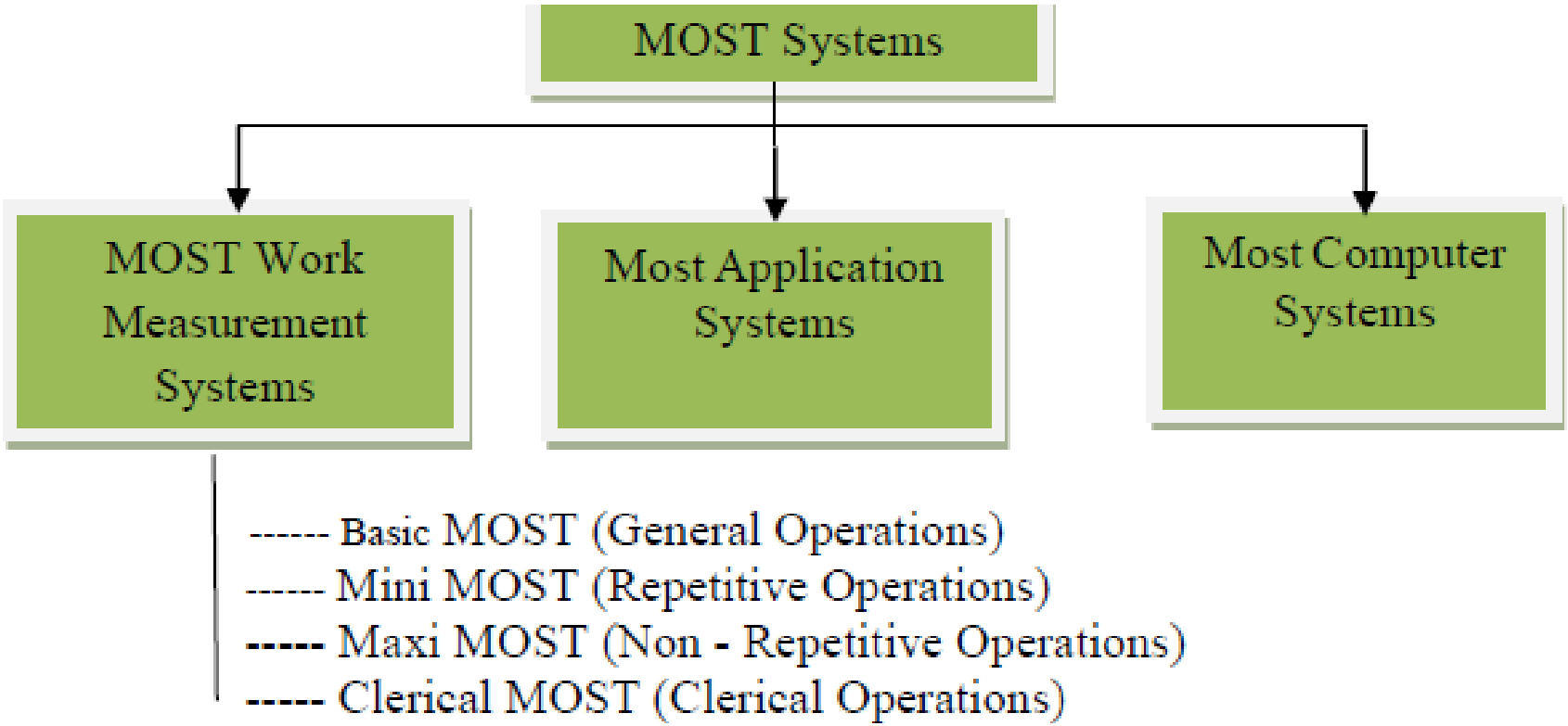
Work Measurement Techniques

✓ ***Some commonly used PMT systems are:***

- *Method Time Analysis*
- *Work Factor*
- *Basic Motion Time*
- *Method Time Measurement*


Time Study
Motion Study
Time and Motion Study
Predetermined Motion Time Systems (PMTS)
Methods-Time Measurement (MTM)
Methods-Time Measurement-2 (MTM-2)
Methods-Time Measurement-3 (MTM-3)
Maynard Operation Sequence Technique (MOST)

MOST


MOST Systems
MOST Work Measurement Systems
Most Application Systems
Most Computer Systems
------ Basic MOST (General Operations)
------ Mini MOST (Repetitive Operations)
----- Maxi MOST (Non - Repetitive Operations)
----- Clerical MOST (Clerical Operations)

MOST WORK MEASUREMENT TECHNIQUE

Sr.No	Activity	Sequence Model	Sub-Activity/ Parameter
1	General Move	A B G A B P A	A- Action Distance B- Body Motion G- Gain Control P – Placement
2	Controlled Move	A B G M X I A	A- Action Distance B- Body Motion G- Gain Control M - Move Control X - Process Time I - Alignment
3	Tool Use	A B G A B P _ A B P A	A- Action Distance B- Body Motion G- Gain Control P - Placement **Blank Space (_) is filled with below tool use parameter:** F-Fasten L - Loosen S - Surface Treatment M - Measure R - Record T – Think