MODAPTS®
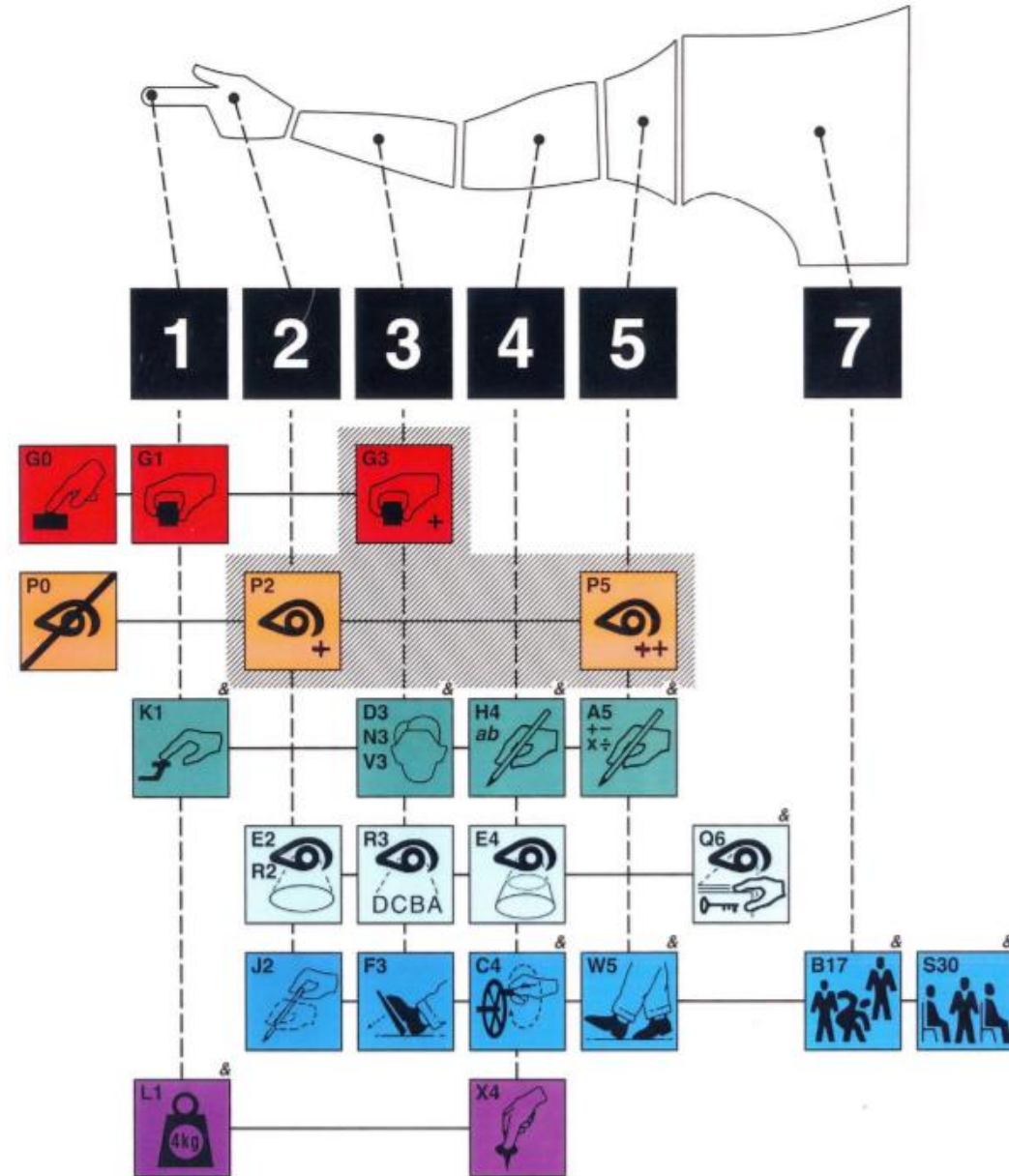## THE LANGUAGE OF WORK

Introduction:

- MODAPTS stands for Modular Arrangement of Predetermined Time Standards.

- First database named 'Concise MODAPTS' was created in 1966.

- 'Office MODAPTS' or database for clerical time studies created in 1969.

- Developed by Mr. G. Chris Heyde.

What is MODAPTS?

- It is a system that relates standard time values to movements of human body.

- Standard time is not the same as "real time", it refers to "a unit of time required to do certain work".

- In MODAPTS 'these units of time' are expressed as **modules** or '**MODS**'.

- The entire system is based on the discovery that all human body movements can be expressed in terms of single unit of time, called a **MOD**.

What is the value of a MOD ?

1 MOD = 0.129 seconds		1 second = 7.75 MODs	
1 MOD = 0.00215 min		1 min = 465 MODs	
1 MOD = 0.000036 hr.		1 hr. = 27933 MODs	

According to the MODAPTS handbook published by the International MODAPTS Association, "value of a **MOD** i.e. 0.129 seconds corresponds to the **normal time** required to complete an activity by a qualified, thoroughly experienced person approximately 5'7" tall and 145 lbs. at a pace that can be sustained throughout a work day without any undue stress. This is often called a "fair day's work." The concept of normal will not be adequate for a task performed by novice. A novice work may add un-necessary motion leading to added time to standard work. On the other hand, a highly skilled employee that is able to the job both quickly and in a different way normal times will be loose."

HIGHLY SKILLED EMPLOYEE

QUALIFIED, THROUGHLY EXPERIENCED EMPLOYEE → STANDARDS

INEXPERIENCED EMPLOYEE
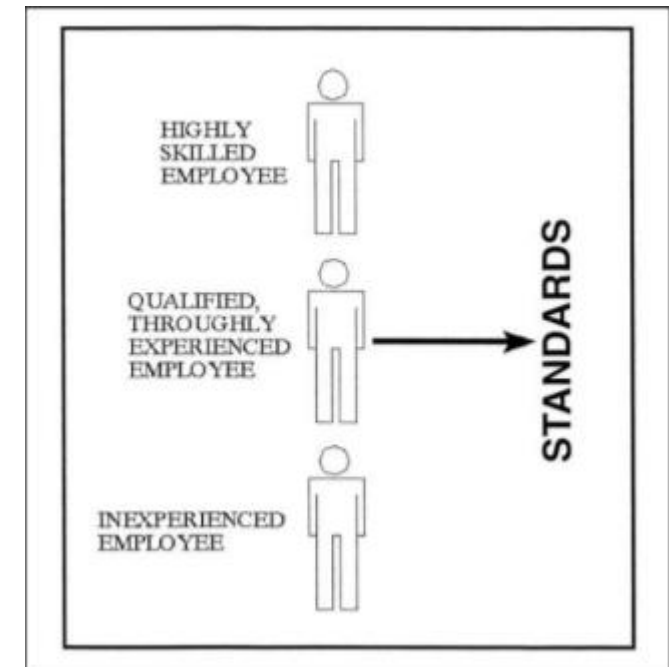
Why MODAPTS?

- It has been accepted as a valid and useful work measurement tool around the world. [1] The acceptance is a tribute to the system's logic, simplicity, effectiveness, low cost and diversity of application

- Research conducted at the Israel Institute of Technology on the speed of application of different work measurement systems compared stopwatch time study, MTM-1, MTM-2, Work Factor and MODAPTS®. Results indicate that MODAPTS® is many times faster than MTM-1 and Work Factor. It is 25% faster than MTM-2 and stop watch time study, on tasks with cycle times of one minute or less. [2]

- Earlier predetermined time studies required an analyst to measure the distance involved in each move. In contrast, MODAPTS prefers to classify by the body part required to perform a move. [3]

- MODAPTS does take distances into consideration but the primary focus is on the body part. This approach improves the speed of constructing an analysis.

(1) Minter, A.L. (1983). MODAPTS®: Management Service
(2) Riese, A. & Roll, Y. (1977). Determining Speed of Application of Work Measurement Systems. Work Study.
(3) International MODAPTS Association Reference Manual

MODAPTS classes of elements:

There are three main classes of elements:

a) **Movement** – refers to movements through space done by finger-hand-arm-shoulder trunk system. "Movement" is the activity that is required to position a part of the arm to perform the "TERMINAL" activity.

b) **Terminal –** Terminal activities are done at the end of a movement and are in close proximity to the things being worked on. This class includes two types of activities:

   i) **Get-** Activities that involve gaining control of objects.

   ii) **Put-** Activities that involve putting objects to destinations.

c) **Auxiliary –** Auxiliary class refers to other activities that are not performed with the finger-hand-arm-shoulder-trunk system. They include walking, bending, inspection, deciding etc.

MODAPTS CODES
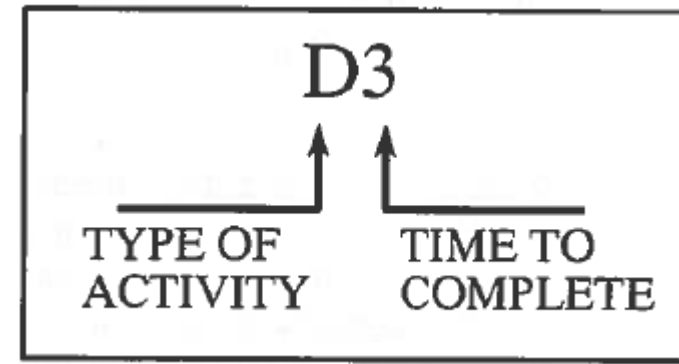
- In MODAPTS every activity is defined by a two part code.

- The first letter is an alphabet that indicates the type of activity.

- The second part is a number.

- The numeric value when multiplied by 0.00215 minutes becomes the time required to finish the activity.
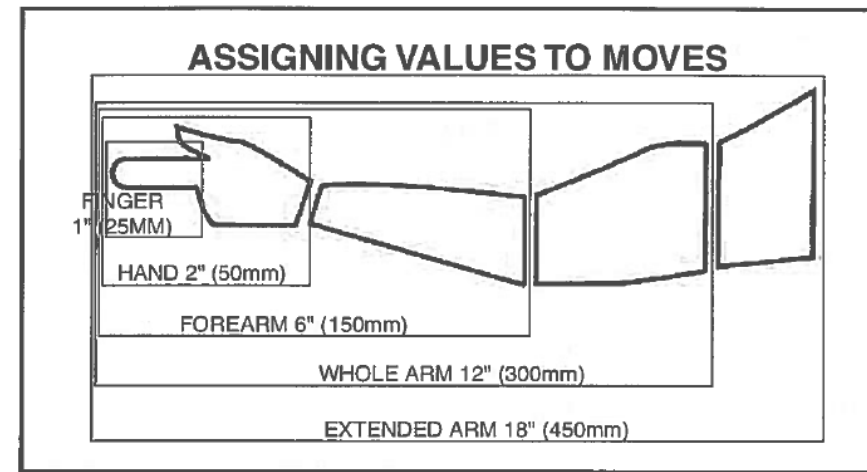
I. MOVEMENTS:
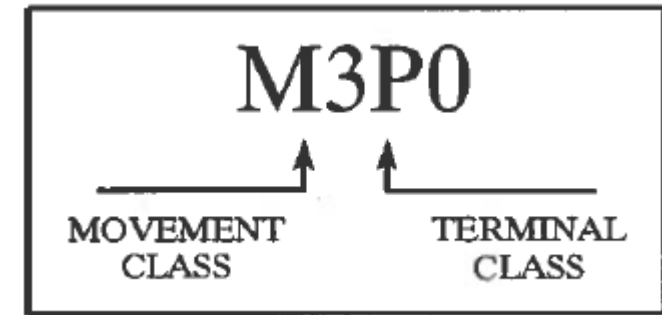
- The element move is an action of finger, hand, arm, shoulder or trunk.

- Movement and terminal activities don't occur as independent activities instead they take place in pairs.

- A movement activity is always followed by a terminal activity.

- For example, M5G3 (Movement of shoulder joint to get) and M5P2 (Movement of shoulder to put).

- "Reaching out", "carrying" etc. are movement activities.

Types of movements:

- Part of the overall action of getting and putting objects to their destinations. This is by far the most common.

- Rapid forward and backward, such as sawing, filing, polishing, erasing and so forth. A special category has been developed for this activity; it is called "**USE**".

- Circular, such as the use of lathe feed wheels, pencil sharpener handles, and so forth. A special category for this type of movement has been developed for this activity, called "**CRANK**".

MOVEMENTS:

ASSIGNING VALUES TO MOVES

FINGER 1" (25MM)
HAND 2" (50mm)
FOREARM 6" (150mm)
WHOLE ARM 12" (300mm)
EXTENDED ARM 18" (450mm)

- Movements from the knuckle are finger movements. (1 MOD, avg. dist. 1")

- Movements from the wrist are hand movements. Hand or palm must move in space. (2 MODs, avg. dist. 2")

- Movements from the elbow are forearm movements. The wrist must move in space. (3 MODs, avg. dist. 6")

- Movements from the shoulder directly forward, may involve some body assistance. The elbow must move in space. 45 degree cone in space (4 MODs, avg. dist. 12")

- Movements from the shoulder fully to left, right, or across the body. The shoulder must move in space. (5 MODs, avg. dist. 18")

- Movements of the trunk, in which the upper body moves in space. (7 MODs, avg. dist. 30")
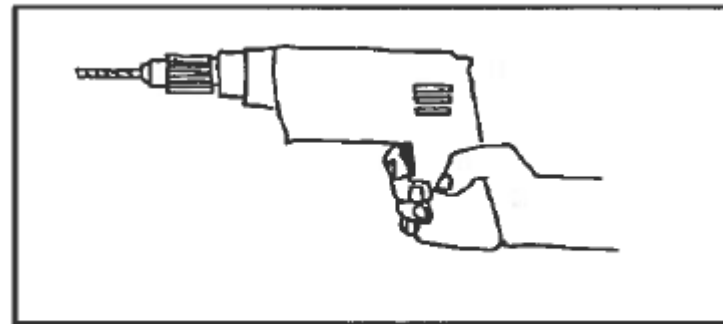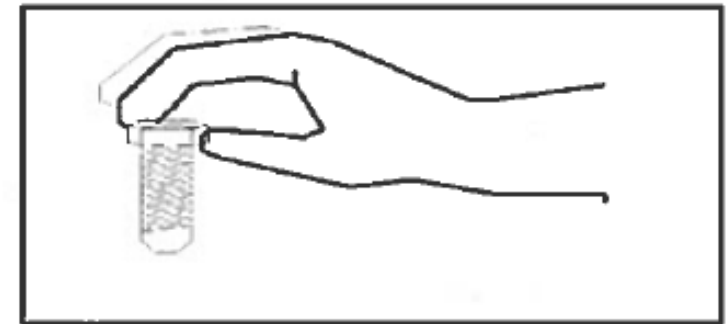
MOVES:
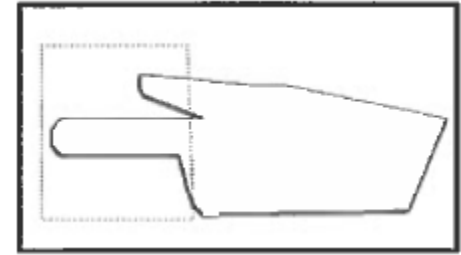
1. M1 Movement

Finger move; performed with any finger, an average distance of 1". For e.g
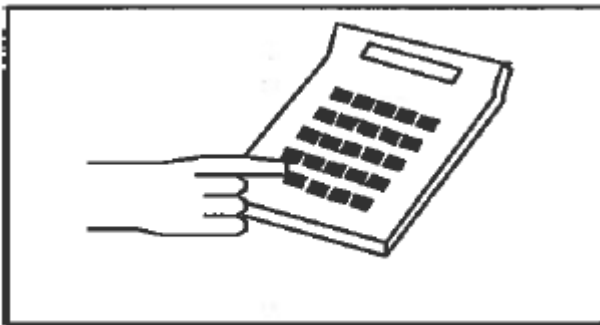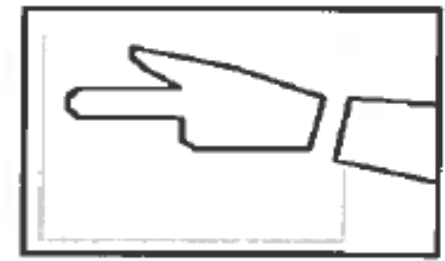

DEPRESSING KEYS - M1P0

SQUEEZING TRIGGER - M1P0

TURN DOWN NUT - M1G1 M1P0

Reference- MODAPTS The language of work handbook
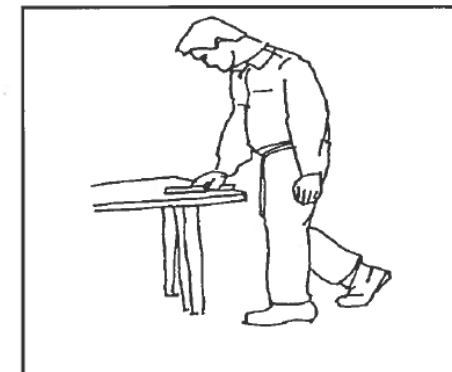
MOVES (Contd.):

M2 MOVEMENT

2. M2 Movement

- Hand move; performed with either hand, an average distance of 2". This motion is common when handling small articles. Keep in mind that the hand must in space for it to qualify as M2 movement.

- The forearm remains stationary.

- After a walk or bend and rise, when small, light objects are handled a M2 movement is awarded. For e.g. if an operator walks 3 steps to pick a bolt, the activity can be coded as 3 x W5 M2G1.

- Preceding the second terminal activity when two high conscious control activities are completed together. For e.g. a mechanic positioning two wheel nuts simultaneously. The activity can be coded as M4P5 M2P5
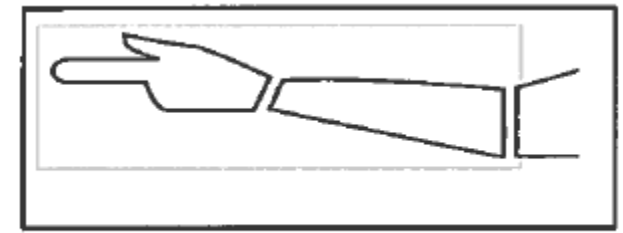
Reference- MODAPTS The language of work handbook
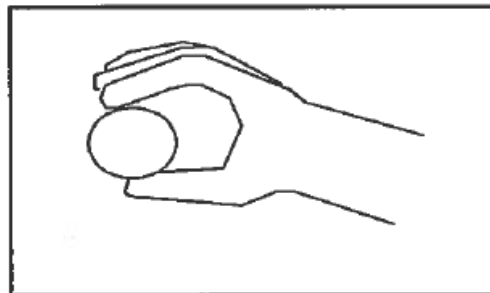
TURN DOORKNOB - M2P0

GET OBJECT FOLLOWING A WALK - M2G1

MOVES (Contd.):

M3 MOVEMENT

3. M3 Movement

- Forearm move; performed with forearm, an average distance of 6". In order for a move to be awarded M3, the wrist must travel in space. This is very common in compact areas
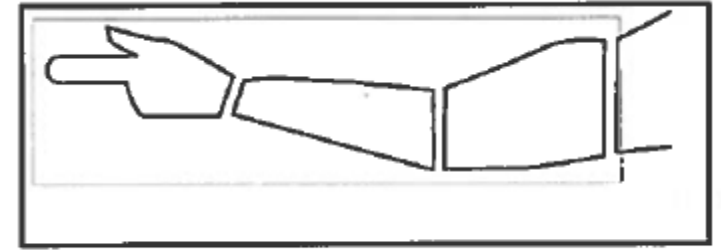
- The elbow remains stationary.

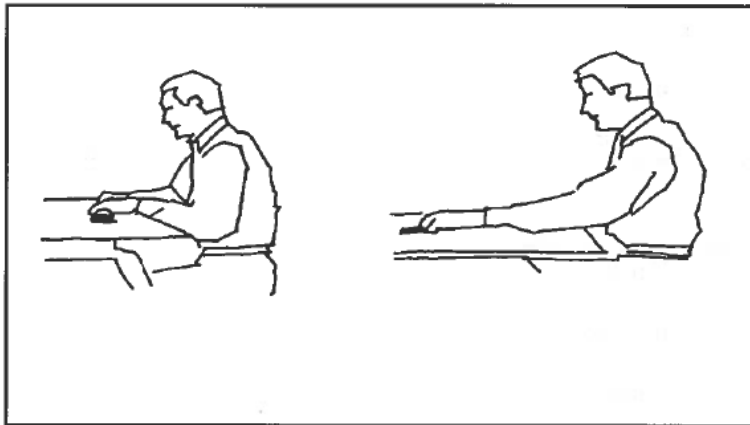MOVE DIVIDERS - 6"(250 MM)

MOVE PENCIL - 6" (250 MM)

Reference- MODAPTS The language of work handbook
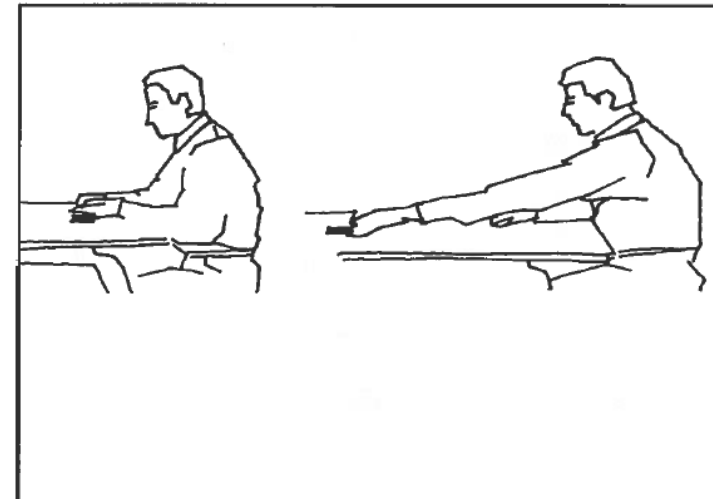
MOVES (Contd.):

M4 ARM MOVEMENT

4. M4 Movement

- Whole arm move; performed with full arm forward, an average distance of 12". Forward, here means that the move is inside an imaginary 45 degree cone, hinging at the shoulder. In order for a move to be awarded M4, the elbow must travel in space.
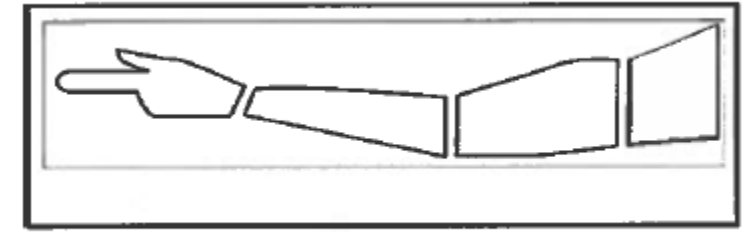

WITHOUT BODY ASSISTANCE - M4P0

WITH BODY ASSISTANCE - M4P0

Reference- MODAPTS The language of work handbook

MOVES (Contd.):

**M5 EXTENDED ARM MOVEMENT**

5. M5 Movement

- Extended arm move; performed with full arm outward an average distance of 18". Outward, here means that the move is outside an imaginary 45 degree cone, this means that the motion is fully up or down or across the body. In order for a move to be awarded M5, the shoulder must travel in space.
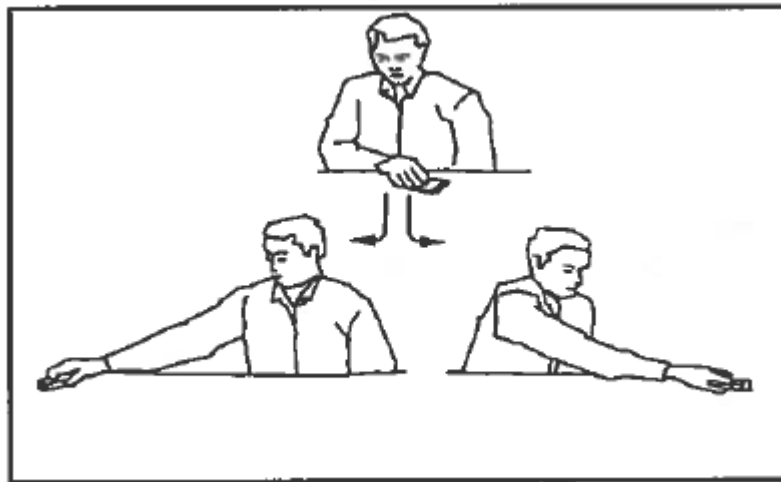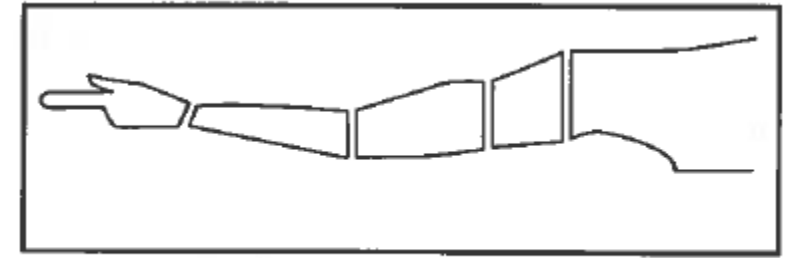

TO RIGHT - M5P0   TO LEFT - M5P0

UPWARD M5P0

15

Reference- MODAPTS The language of work handbook
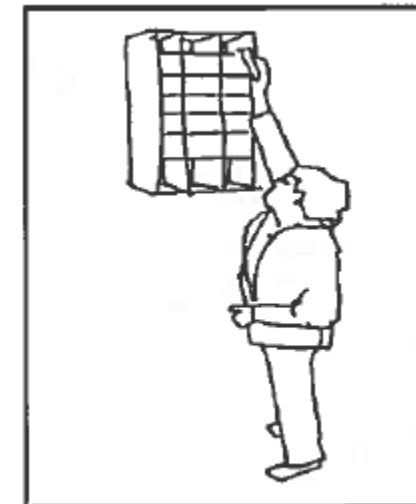
MOVES (Contd.):

M7 ARM AND TRUNK MOVEMENT

6. M7 Movement

- Trunk move; performed with arms and body trunk an average distance of ". This move is similar to M5 except that the distance requires the trunk to move. In order for a move to be awarded M7, the trunk must travel in space.

- The M7 movement is uncommon and awkward. It is expensive in terms of time and energy.

M7 MOVEMENT

Reference- MODAPTS The language of work handbook

MOVEMENT RULES:

- M1, M2 etc. is not in itself a description of an activity. They must be accompanied either with a Get or a Put. For e.g. M3G3 or M4P5.

- Body assistance; it increases the distance of the move but not time awarded to the move as a slight bend can be done simultaneous to the move. Thus a M4 may be awarded for moves in excess of 12" inside 45 degree cone because of body assistance.

- Always award the lowest possible class of motion.

- Highly repetitive tasks such as filing, hammering, sawing etc. are movements without terminal activities and the body is considered as "integrated" with the tool. "USE" and "Crank" may be used for repetitive tasks.

II. TERMINAL ACTIVITIES:

There is two different types of terminal activities "**GET**" and "**PUT**" and it is influenced by:

a) **Muscular control** – Precision required of the muscular action involved in GET or PUT.

b) **Sensory control** – Eye action (can be tactile feedback) necessary to successfully complete certain high control put activities.

c) **Mental control** – The mental decisions made consciously, such as when danger is involved in the GET or PUT activity.

```
G0, G1, P0
LOW
CONSCIOUS CONTROL

P2, P5, G3
HIGH
CONSCIOUS CONTROL
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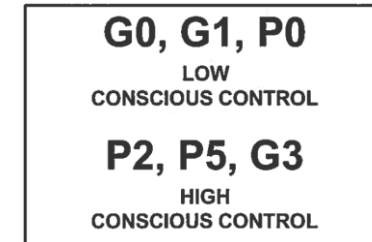
Terminal activities can be classified as:

i)   Low conscious – These activities require little muscular, visual and mental control and no hesitation occurs.

ii)   High conscious – On the contrast, high conscious control activity requires a degree of muscular control to satisfactorily complete the task with visual or sensual assistance.

THE ELEMENT GET:

"GET" is used to obtain control of an object. There are three categories of "GETS":
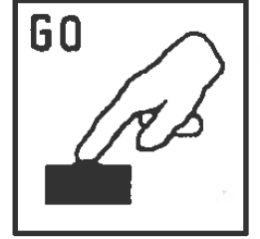
1. G0 (Low conscious control)

Get by contacting an object. The fingers simply touch the object; they don't close around it. It may be performed using the finger(s) or the palm. For e.g. a bank teller counting coins lying on the counter. A finger touches the coin and slides it toward the other hand. Motion can be coded as M1G0 (to get the finger on the coin) and M1P0 (to push the coin towards other hand). As no significant work is involved, no time is awarded but notice that "G0" must be preceded by a move.
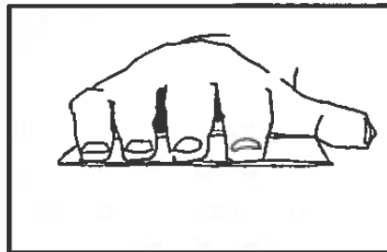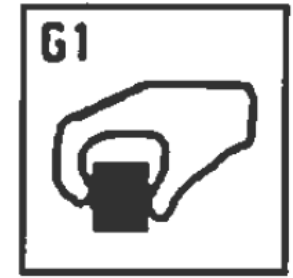
EXAMPLES of G0 GET
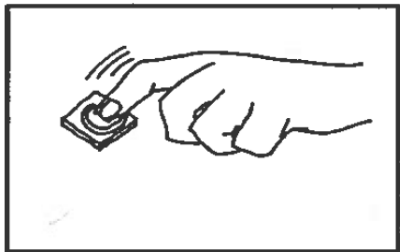
TOUCH A BUTTON
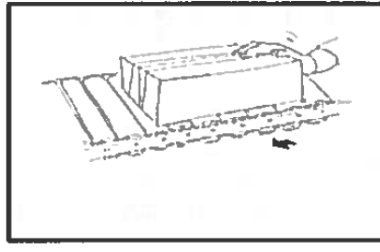
PLACING OPEN HAND ON A BOX

PLACING PALM ON PIECE OF PAPER

Reference- MODAPTS The language of work handbook

2. G1 (Simple grasp GET)

This type of "GET" is a simple closing of the fingers around an object, using minimum sense. The finger must have access to simply close around the object i.e. the object to be picked should be unobstructed. As G1 is a terminal activity, it must be preceded by a "MOVE". G1 is used pre-dominantly for objects that are slightly raised. A rule of thumb is that if an object can be "snatched" it should be awarded a G1.

EXAMPLES OF G1 GET
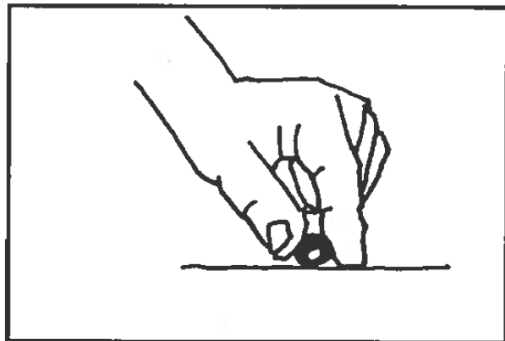
**CLOSE FINGERS AROUND MARBLE**
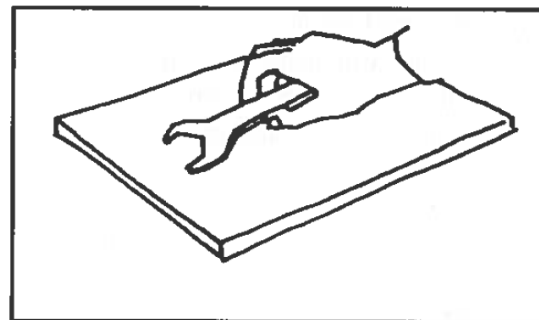
**CLOSE FINGERS ON RAISED WRENCH**

3. G3 (GET with feedback)

"G3" is awarded to objects that fail the "snatch" test. A sensory feedback or a visual feedback is involved in obtaining an object. Parts that are small, jumbled or flat usually qualify for a "G3" get. For e.g. picking up a coin lying flat on a table. "G3" is considered a high conscious activity and therefore operations that qualify for "G3" "GET" cannot be done simultaneously (more detail later in the lecture).
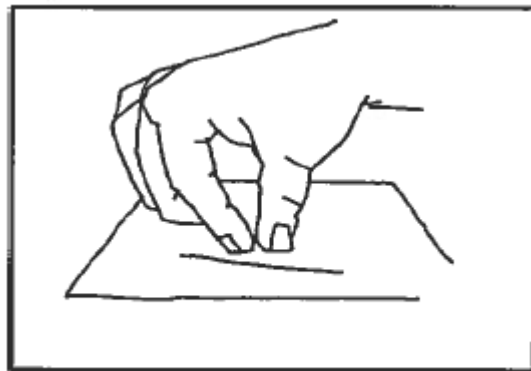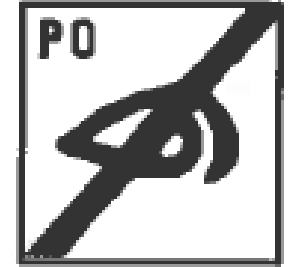
GET SMALL OBJECT
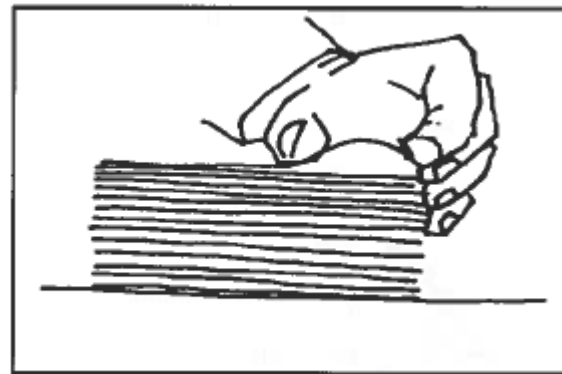
GET FLAT OBJECT
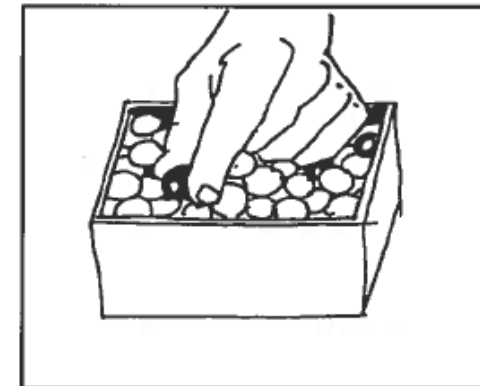
GET OBJECT FROM JUMBLED OBJECTS

THE ELEMENT PUT:

"PUT" is the action of placing an object to a destination. There are three categories of "PUTS":


1. P0 (Simple PUT)

Putting an object to a general location without any requirements of positioning the object is called a "Simple PUT" and is awarded "P0". Placing objects without any sensory feedback qualify for a "P0", no corrective motion should be required.

"P0" is a low conscious activity and it may be done simultaneously with a low or high conscious activity (P0,G0,G1)
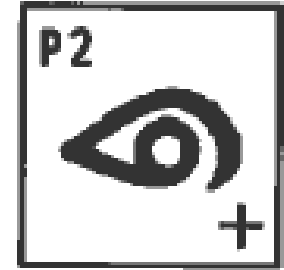

TOSSING OBJECT INTO BOX
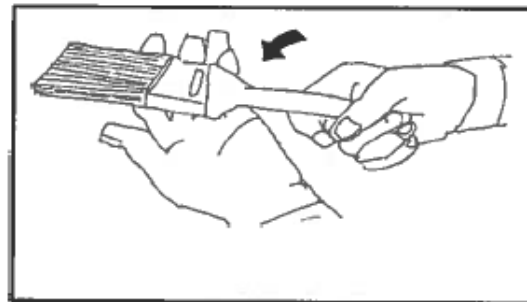
TRANSFER BRUSH TO OPEN HAND

Reference- MODAPTS The language of work handbook

2. P2 (PUT with feedback)

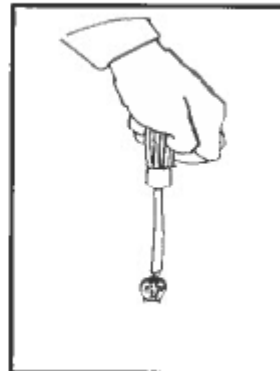"PUT" to a specific location; requires feedback from one or more senses. "P2" is a high conscious activity and hence cannot be done simultaneously to other high conscious activities. "P2" puts involve one correction, one slight hesitation, one change in direction or one repositioning for purpose of alignment etc.
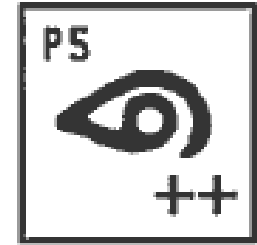
EXAMPLES OF P2 PUT

LOCATE PENCIL TO BEGIN WRITING

LOCATE PHILLIPS
SCREWDRIVER IN SLOT

3. P5 (PUT with more than one feedback)

"P5" is awarded to objects that require careful placement in an exact location. For e.g. placing a pencil to an exact spot where two line intersect. More than one corrective motion is required to place the object to its destination. "P5" is also a high conscious activity and hence cannot be done simultaneous to other high conscious activities.

"PUT" RULES:
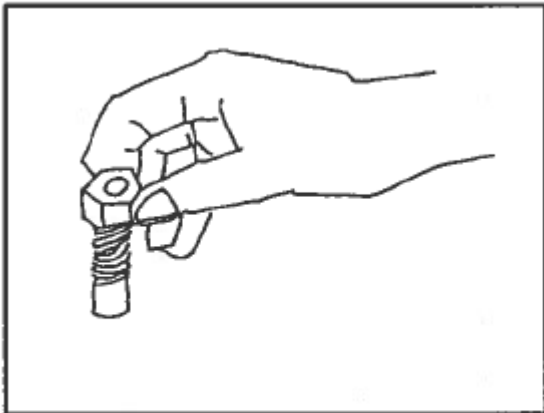
PLACE NUT ON BOLT & THREADS

i)   A P0, P2 or P5 is not in itself a description of an activity, they should be preceded by a move.
ii) A P2 or P5 PUT activity includes an insertion of up to 1" , if insertion greater than 1" is required additional move and put are required.

SIMULTANEOUS MOTIONS:

- Activities that are performed at the same time by different body parts are called simultaneous motions.

- Simultaneous motions may be similar, such as obtaining two fasteners, one in each hand or they may be dis-similar such as one hand picking up a fastener and the other picking up a tool.

- When handling small/light objects, terminal activities (GET and PUT) are usually completed using one hand, the other hand is free to accomplish another activity simultaneously.

- When coding simultaneous motions, it is extremely important to identify high conscious and low conscious activities.

SIMULTANEOUS MOTIONS (contd.):

- **All movements activities can be made simultaneously; these are low conscious control activities**.

- There are certain terminal activities that cannot be performed simultaneously (high conscious activities).

- Simultaneous motions are only in question when handling small/light are being handled. Large/heavy objects are performed with both hands.

- **Low conscious activities are "G0", "G1" and "P0" only.**

- **High conscious activities are "G3", "P2" and "P5".**

Reference- MODAPTS The language of work handbook

SIMULTANEOUS MOTIONS (contd.):

- A qualified operator can be expected to complete one high conscious and one low conscious control activity simultaneously. But, the qualified operator cannot be expected to complete two high conscious activities.

- When two high conscious activities are performed time should be awarded for both activities.

Reference- MODAPTS The language of work handbook

HOW TO CODE SIMULTANEOUS ACTIVITIES:

For e.g. if you want to pick two straight pins about 6" apart at arm's length.

- First, one hand obtains a pin using a 12" reach. (M4G3) During this time interval of 7 MODs, the other hand moves to the general area of other pin.

- Secondly, the other hand obtains the second pin using a movement of approx. 2". (M2G3)

- **The rule is to always use an M2 to precede the second high conscious control activity.**

- The second high conscious activity is always the activity with the greater valued movement.

SIMULTANEOUS RULES:

- **If both activities are low conscious control** allow the highest total MOD value (movement and terminal) and record it.

- **If one activity is low conscious control and the other activity is high conscious control** allow the highest total MOD value.

- **If both activities are high conscious control** allow the total high conscious control activity MOD value for one hand and allow the second as well. Always reduce the highest value move to "M2".

- Two low conscious control activities (G0, G1 and P0) can be performed simultaneously.

- One low conscious and one high conscious can be performed simultaneously. For e.g. (G0 can be performed with a G3 and a P0 can be performed with a P5).

- Two high conscious activities cannot be performed simultaneously. (Two G3s and two P5 cannot be performed simultaneously.

# III. AUXILIARY ACTIVITIES:
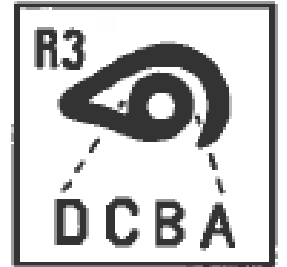
1. The Element Read (R2 & R3)

R2- Read one word in a group of words where the purpose is to get the overall message**.**

R3- Read one word in a group of words where each word has to be registered as in proof reading or verifying.

R3- One R3 is awarded for reading up to 3 digits. 1 R3 for say "6", "67", "673". 2 R3s for "6732", "67325", "673257" and so on.
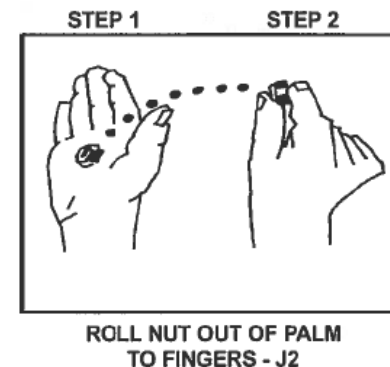
# AUXILIARY ACTIVITIES:

2. JUGGLE (J2)
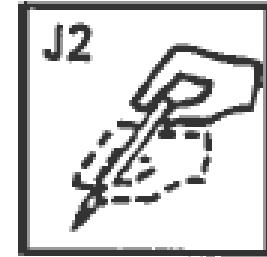
Juggle is a change in the position of a grasp which is accomplished without giving up control of an object. For e.g. re-positioning a pencil in your hand after you pick it up from a table. Juggle happens frequently but is seldom awarded as most juggles are performed internal to other activities, such as move. In order to award time for juggle:

a) The object should already be in control of the operator and better control is required.

b) All other activity must stop.

ROLL NUT OUT OF PALM
TO FINGERS - J2

AUXILIARY ACTIVITIES:
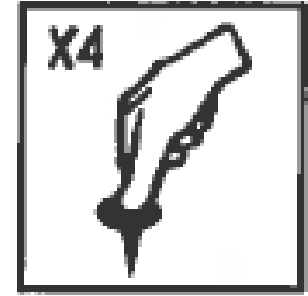
3. Extra Force (X4)

This element is awarded to achieve control over an object, to restrain an object or to overcome resistance in an activity. It is recognized by a noticeable hesitation while pressure is applied. Like Juggle this element is only awarded if all other activity stops.

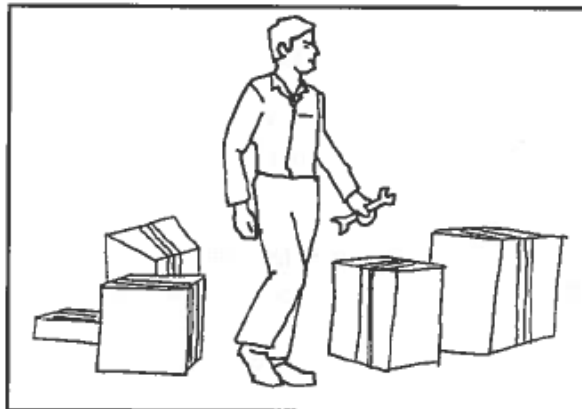**EXAMPLE OF X4 EXTRA FORCE**
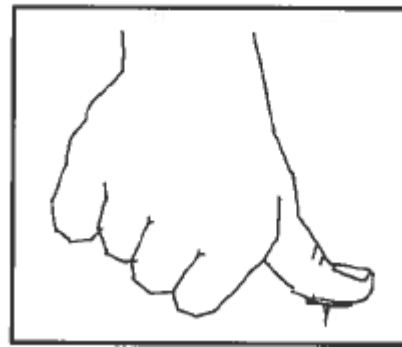
AUXILIARY ACTIVITIES:

4. Walk, restricted area (W5)

W5 is the most commonly used value for walking in office and production settings. Its used for both walking and turning, per pace.

After a W5, for any motion "M2" is awarded as the hand can be in the relative vicinity of the object simultaneous to the walk.

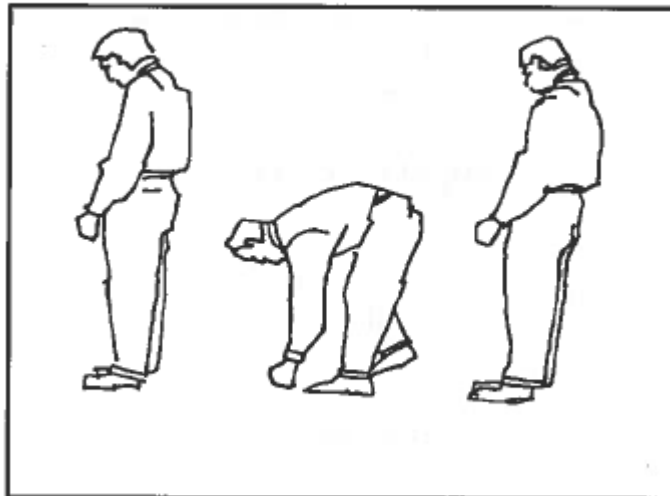**EXAMPLE OF W5 WALK, Restricted Area**

AUXILIARY ACTIVITIES:

5. Bend and Arise (B17)

Bend and arise is a vertical change in the torso. This element includes both the down movement and the up movement. A simple test to award a movement "B17" is whether or not the hand goes below the knee.

EXAMPLE OF B17 BEND and ARISE

BEND TO BELOW KNEE AND ARISE

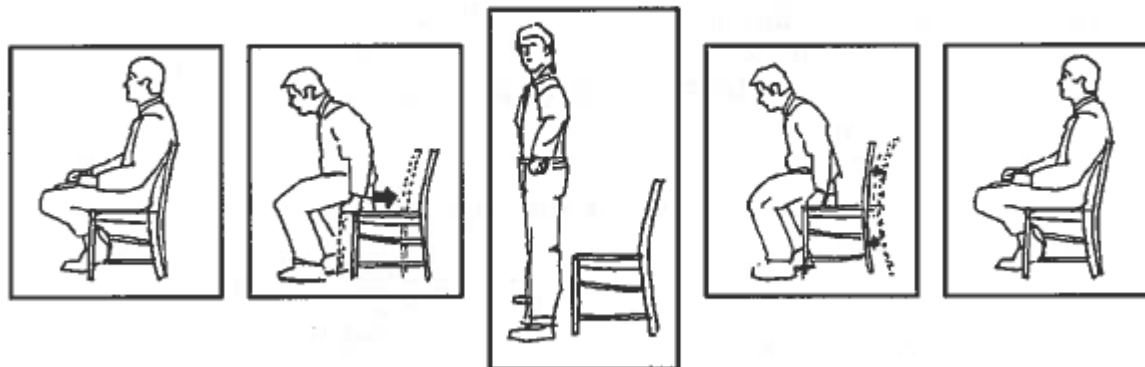Reference- MODAPTS The language of work handbook

AUXILIARY ACTIVITIES:

6. Sit and Stand (S30)

Sit and Stand include both the down movement and the up movement. This activity is recorded as one even if other activities may occur in between. 30 MODs include time for pulling the chair up and pushing it back during stand.

EXAMPLES OF S30 SIT and STAND

SAMPLE QUESTIONS