## TABLE IX—BODY, LEG, AND FOOT MOTIONS

| DESCRIPTION | SYMBOL | DISTANCE | LEVELED TIME TMU |
|---|---|---|---|
| Foot Motion—Hinged at Ankle. | FM | Up to 4″ | 8.5 |
| With heavy pressure. | FMP | | 19.1 |
| Leg or Foreleg Motion. | LM | Up to 6″ | 7.1 |
| | | Each add'l. inch | 1.2 |
| Sidestep—Case 1—Complete when leading leg contacts floor. | SS-C1 | Less than 12″ | Use REACH or MOVE Time |
| | | 12″ | 17.0 |
| | | Each add'l. inch | .6 |
| Case 2—Lagging leg must contact floor before next motion can be made. | SS-C2 | 12″ | 34.1 |
| | | Each add'l. inch | 1.1 |
| Bend, Stoop, or Kneel on One Knee. | B,S,KOK | | 29.0 |
| Arise. | AB,AS,AKOK | | 31.9 |
| Kneel on Floor—Both Knees. | KBK | | 69.4 |
| Arise. | AKBK | | 76.7 |
| Sit. | SIT | | 34.7 |
| Stand from Sitting Position. | STD | | 43.4 |
| Turn Body 45 to 90 degrees— | | | |
| Case 1—Complete when leading leg contacts floor. | TBC1 | | 18.6 |
| Case 2—Lagging leg must contact floor before next motion can be made. | TBC2 | | 37.2 |
| Walk. | W-FT. | Per Foot | 5.3 |
| Walk. | W-P | Per Pace | 15.0 |

Crank 9C 10-15 R(NT 15.2)
(Rev) (Dem) -(Lbs)

## TABLE X—SIMULTANEOUS MOTIONS

| REACH A, E | REACH B | REACH C, D | MOVE A, Bm | MOVE B | MOVE C | GRASP G1A G2 G5 | GRASP G1B G1C | GRASP G4 | POSITION P1S | POSITION P1SS P2S | POSITION P1NS P2SS P2NS | DISENGAGE D1E D1D | DISENGAGE D2 | CASE | MOTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *W O | *W O | *W O | *W O | | *W O | *W O | **E D | **E D | **E D | | **E D | | |
| E | E | E | E | E | E | E | E | E | E | E | P | P | E | E | A, E | |
| | E | P | E | E | P | D | E | E | P | D | P | P | D | D | E | E | P | B | REACH |
| | | E | P | P | D | P | D | D | D | E | P | D | D | D | D | D | D | D | P | D | D | C, D | |
| | | | E | E | E | E | E | E | E | E | E | E | P | P | E | E | E | A, Bm | |
| | | | | E | E | E | E | E | E | P | D | P | P | D | D | E | E | P | B | MOVE |
| | | | | | P | D | E | P | D | D | D | D | D | D | D | P | D | D | C | |
| | | | | | | E | E | E | E | E | E | E | D | D | E | D | D | G1A, G2, G5 | |
| | | | | | | | D | D | P | D | D | D | D | D | D | D | D | G1B, G1C | GRASP |
| | | | | | | | | D | D | D | D | D | D | D | D | D | D | G4 | |
| | | | | | | | | | P | D | D | D | D | D | D | D | D | P1S | |
| | | | | | | | | | | D | D | D | D | D | D | D | D | P1SS, P2S | POSITION |
| | | | | | | | | | | | D | D | D | D | D | D | D | P1NS, P2SS, P2NS | |
| | | | | | | | | | | | | | E | E | E | E | E | D1E, D1D | DISENGAGE |
| | | | | | | | | | | | | | | | E | E | E | D2 | |

**E = EASY** to perform simultaneously.

**P** = Can be performed simultaneously with **PRACTICE.**

**D = DIFFICULT** to perform simultaneously even after long practice. Allow both times.

**MOTIONS NOT INCLUDED IN ABOVE TABLE**

**TURN**—Normally EASY with all motions except when TURN is controlled or with DISENGAGE.

**APPLY PRESSURE**—May be EASY, PRACTICE, or DIFFICULT. Each case must be analyzed.

**POSITION**—Class 3—Always DIFFICULT.

**DISENGAGE**—Class 3—Normally DIFFICULT.

**RELEASE**—Always EASY.

**DISENGAGE**—Any class may be DIFFICULT if care must be exercised to avoid injury or damage to object.

*W = Within the area of normal vision.
O = Outside the area of normal vision.
**E = EASY to handle.
D = DIFFICULT to handle.

# METHODS-TIME MEASUREMENT APPLICATION DATA

## SIMPLIFIED DATA

(All times on this Simplified Data Table include 15% allowance)

### HAND AND ARM MOTIONS

**REACH or MOVE — TMU**

| | |
|---|---|
| 1″ | 2 |
| 2″ | 4 |
| 3″ to 12″ | 4 + length of motion |
| over 12″ | 3 + length of motion |

(For TYPE 2 REACHES AND MOVES use length of motion only)

**POSITION**

| Fit | Symmetrical | Other |
|---|---|---|
| Loose | 10 | 15 |
| Close | 20 | 25 |
| Exact | 50 | 55 |

**TURN—APPLY PRESSURE**

| | |
|---|---|
| TURN | 6 |
| APPLY PRESSURE | 20 |

**GRASP**

| | |
|---|---|
| Simple | 2 |
| Regrasp or Transfer | 6 |
| Complex | 10 |

**DISENGAGE**

| | |
|---|---|
| Loose | 5 |
| Close | 10 |
| Exact | 30 |

### BODY, LEG, AND EYE MOTIONS

| | TMU |
|---|---|
| Simple foot motion | 10 |
| Foot motion with pressure | 20 |
| Leg motion | 10 |
| Side step case 1 | 20 |
| Side step case 2 | 40 |
| Turn body case 1 | 20 |
| Turn body case 2 | 45 |
| Eye time | 10 |
| Bend, stoop or kneel on one knee | 35 |
| Arise | 35 |
| Kneel on both knees | 80 |
| Arise | 90 |
| Sit | 40 |
| Stand | 50 |
| Walk per pace | 17 |

1 TMU = .00001 hour
= .0006 minute
= .036 second


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## TABLE I—REACH—R

| Distance Moved Inches | Leveled Time TMU | | | | Hand in Motion | |
|---|---|---|---|---|---|---|
| | A | B | C or D | E | A | B |
| 1 | 1.8 | 2.1 | 3.6 | 1.7 | 1.3 | 1.5 |
| 2 | 3.7 | 4.3 | 5.9 | 3.8 | 2.8 | 2.7 |
| 3 | 5.0 | 5.9 | 7.3 | 5.3 | 3.8 | 3.6 |
| 4 | 6.1 | 7.1 | 8.4 | 6.8 | 4.9 | 4.3 |
| 5 | 6.5 | 7.8 | 9.4 | 7.4 | 5.3 | 5.0 |
| 6 | 7.0 | 8.6 | 10.1 | 8.0 | 5.7 | 5.7 |
| 7 | 7.4 | 9.3 | 10.8 | 8.7 | 6.1 | 6.5 |
| 8 | 7.9 | 10.1 | 11.5 | 9.3 | 6.5 | 7.2 |
| 9 | 8.3 | 10.8 | 12.2 | 9.9 | 6.9 | 7.9 |
| 10 | 8.7 | 11.5 | 12.9 | 10.5 | 7.3 | 8.6 |
| 12 | 9.6 | 12.9 | 14.2 | 11.8 | 8.1 | 10.1 |
| 14 | 10.5 | 14.4 | 15.6 | 13.0 | 8.9 | 11.5 |
| 16 | 11.4 | 15.8 | 17.0 | 14.2 | 9.7 | 12.9 |
| 18 | 12.3 | 17.2 | 18.4 | 15.5 | 10.5 | 14.4 |
| 20 | 13.1 | 18.6 | 19.8 | 16.7 | 11.3 | 15.8 |
| 22 | 14.0 | 20.1 | 21.2 | 18.0 | 12.1 | 17.3 |
| 24 | 14.9 | 21.5 | 22.5 | 19.2 | 12.9 | 18.8 |
| 26 | 15.8 | 22.9 | 23.9 | 20.4 | 13.7 | 20.2 |
| 28 | 16.7 | 24.4 | 25.3 | 21.7 | 14.5 | 21.7 |
| 30 | 17.5 | 25.8 | 26.7 | 22.9 | 15.3 | 23.2 |

**CASE AND DESCRIPTION**

- **A** Reach to object in fixed location, or to object in other hand or on which other hand rests.
- **B** Reach to single object in location which may vary slightly from cycle to cycle.
- **C** Reach to object jumbled with other objects in a group so that search and select occur.
- **D** Reach to a very small object or where accurate grasp is required.
- **E** Reach to indefinite location to get hand in position for body balance or next motion or out of way.

## TABLE II—MOVE—M

| Distance Moved Inches | Leveled Time TMU | | | | Multiplying Factor | |
|---|---|---|---|---|---|---|
| | A | B | C | Hand in Motion B | Wt. | Factor |
| 1 | 1.7 | 1.7 | 1.7 | 1.5 | Up to 5# | 1.00 |
| 2 | 3.6 | 4.2 | 4.2 | 2.7 | | |
| 3 | 4.9 | 5.7 | 5.7 | 3.6 | 10# | 1.03 |
| 4 | 6.1 | 6.9 | 7.3 | 4.3 | | |
| 5 | 7.3 | 8.0 | 8.7 | 5.0 | 15# | 1.05 |
| 6 | 8.1 | 8.9 | 9.7 | 5.7 | | |
| 7 | 8.9 | 9.7 | 10.8 | 6.5 | 20# | 1.08 |
| 8 | 9.7 | 10.6 | 11.8 | 7.2 | | |
| 9 | 10.5 | 11.5 | 12.7 | 7.9 | 25# | 1.11 |
| 10 | 11.3 | 12.2 | 13.5 | 8.6 | | |
| 12 | 12.9 | 13.4 | 15.2 | 10.0 | 30# | 1.14 |
| 14 | 14.4 | 14.6 | 16.9 | 11.4 | | |
| 16 | 16.0 | 15.8 | 18.7 | 12.8 | 35# | 1.16 |
| 18 | 17.6 | 17.0 | 20.4 | 14.2 | | |
| 20 | 19.2 | 18.2 | 22.1 | 15.6 | 40# | 1.19 |
| 22 | 20.8 | 19.4 | 23.8 | 17.0 | | |
| 24 | 22.4 | 20.6 | 25.5 | 18.4 | 45# | 1.22 |
| 26 | 24.0 | 21.8 | 27.3 | 19.8 | | |
| 28 | 25.5 | 23.1 | 29.0 | 21.2 | 50# | 1.25 |
| 30 | 27.1 | 24.3 | 30.7 | 22.7 | | |

**CASE AND DESCRIPTION**

- **A** Move object to other hand or against stop.
- **B** Move object to approximate or indefinite location.
- **C** Move object to exact location.

## TABLE III—TURN AND APPLY PRESSURE—T AND AP

| Weight | Leveled Time TMU for Degrees Turned | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 30° | 45° | 60° | 75° | 90° | 105° | 120° | 135° | 150° | 165° | 180° |
| Small— 0 to 2 Pounds | 2.8 | 3.5 | 4.1 | 4.8 | 5.4 | 6.1 | 6.8 | 7.4 | 8.1 | 8.7 | 9.4 |
| Medium—2.1 to 10 Pounds | 4.4 | 5.5 | 6.5 | 7.5 | 8.5 | 9.6 | 10.6 | 11.6 | 12.7 | 13.7 | 14.8 |
| Large— 10.1 to 35 Pounds | 8.4 | 10.5 | 12.3 | 14.4 | 16.2 | 18.3 | 20.4 | 22.2 | 24.3 | 26.1 | 28.2 |

APPLY PRESSURE CASE 1—16.2 TMU. APPLY PRESSURE CASE 2—10.6 TMU

## TABLE IV—GRASP—G

| Case | Leveled Time TMU | DESCRIPTION |
|---|---|---|
| 1A | 1.7 | **Pick Up Grasp**—Small, medium or large object by itself, easily grasped. |
| 1B | 3.5 | Very small object or object lying close against a flat surface. |
| 1C1 | 7.3 | Interference with grasp on bottom and one side of nearly cylindrical object. Diameter larger than ½". |
| 1C2 | 8.7 | Interference with grasp on bottom and one side of nearly cylindrical object. Diameter ¼" to ½". |
| 1C3 | 10.8 | Interference with grasp on bottom and one side of nearly cylindrical object. Diameter less than ¼". |
| 2 | 5.6 | **Regrasp.** |
| 3 | 5.6 | **Transfer Grasp.** |
| 4A | 7.3 | Object jumbled with other objects so search and select occur. Larger than 1" x 1" x 1". |
| 4B | 9.1 | Object jumbled with other objects so search and select occur. ¼" x ¼" x ⅛" to 1" x 1" x 1". |
| 4C | 12.9 | Object jumbled with other objects so search and select occur. Smaller than ¼" x ¼" x ⅛". |
| 5 | 0 | Contact, sliding or hook grasp. |

## TABLE V—POSITION*—P

| HANDLING | CLASS OF FIT | | SYMMETRY | | |
|---|---|---|---|---|---|
| | | | S | SS | NS |
| Easy To Handle | 1—Loose | No pressure required. | 5.6 | 9.1 | 10.4 |
| | 2—Close | Light pressure required. | 16.2 | 19.7 | 21.0 |
| | 3—Exact | Heavy pressure required. | 43.0 | 46.5 | 47.8 |
| Difficult To Handle | 1—Loose | No pressure required. | 11.2 | 14.7 | 16.0 |
| | 2—Close | Light pressure required. | 21.8 | 25.3 | 26.6 |
| | 3—Exact | Heavy pressure required. | 48.6 | 52.1 | 53.4 |

*Distance moved to engage—1" or less.

## TABLE VI—RELEASE—RL

| Case | Leveled Time TMU | DESCRIPTION |
|---|---|---|
| 1 | 1.7 | Normal release performed by opening fingers as independent motion. |
| 2 | 0 | Contact Release. |

## TABLE VII—DISENGAGE—D

| Easy to Handle | Difficult to Handle | CLASS OF FIT |
|---|---|---|
| 4.0 | 5.7 | **1—Loose**—Very slight effort, blends with subsequent move. |
| 7.5 | 11.8 | **2—Close**—Normal effort, slight recoil. |
| 22.9 | 34.7 | **3—Tight**—Considerable effort, hand recoils markedly. |

## TABLE VIII—EYE TRAVEL TIME AND EYE FOCUS—ET AND EF

**Eye Travel Time** $= 15.2 \times \frac{T}{D}$ TMU.

where T = the distance between points from and to which the eye travels.
D = the perpendicular distance from the eye to the line of travel T, with a maximum value of 20 TMU.

**Eye Focus Time** = 7.3 TMU.