

10—Human Factors Engineering

TABLE 10-A
NUDE-BODY HEIGHT (STANDING) OF MALE CIVILIAN POPULATIONS

Population	Percentiles (in)					Standard Deviation
	1st	5th	50th	95th	99th	
Railroad travelers ¹	62 5*	64 5*	69 0*	73 8*	75 6*	
Truck and bus drivers ²	63 0	64 6	68 4	72 5	74 1	
Airline pilots ³	64 4	66 0	70 0	73 9	75 6	2 40
Industrial workers ⁴	64 4*	66 1*	70 3*	74 4*	76 2*	2 46
College students ⁵	62 5	64 4	68 7	73 1	74 9	2 68
Eastern, 18 yr old ⁶	64 5	66 1	69 9	73 8	75 4	2 38
Eastern, 19 yr old ⁷	65 0	66 5	70 2	74 0	75 5	2 30
Midwest, 18 yr old ⁸	63 2	65 0	69 1	73 3	75 0	2 60
Midwest, 18-22 yr old ⁹	64 2	65 9	70 0	74 1	75 8	2 49
Draft registrants ¹⁰						
18-19 yr old	62 0	63 8	68 0	72 3	74 1	2 61
20-24 yr old	62 1	63 9	68 2	72 4	74 2	2 60
25-29 yr old	61 9	63 7	68 1	72 4	74 2	2 63
30-34 yr old	61 7	63 5	67 8	72 1	73 9	2 66
35-37 yr old	61 3	63 2	67 6	72 0	73 8	2 64
Spanish-American-War veterans	61 1	62 6	66 1	69 7	71 2	2 15
Canadians ¹¹						
18-19 yr old	62 4	64 1	68 2	72 1	73 7	
20-24 yr old	62 0	63 8	68 3	72 5	74 3	
25-29 yr old	60 6	62 9	68 3	74 0	76 2	
30-34 yr old	61 5	63 4	68 1	72 8	74 8	
35-44 yr old	60 5	62 7	67 6	72 6	74 7	
45-54 yr old	59 7	61 8	66 8	72 0	74 1	
55-64 yr old	58 4	60 6	66 0	71 3	73 6	
More than 64 yr old	58 6	60 6	65 1	69 8	71 8	

¹ Hooton, 1945

² McFarland, et al., 1958

³ McCormick, 1947

⁴ Tyroler, 1958

⁵ Diehl, 1933a

⁶ Bowles, 1932

* Including shoes (subtract 1 in. for nude height)

⁷ Heath, 1945

⁸ Damon, 1955

⁹ Elbel, 1954

¹⁰ Karpinos, 1958

¹¹ Pett and Ogilvie, 1957

From C. T. Morgan, et al. Human Engineering Guide to Equipment Design. New York, McGraw-Hill Book Co., 1963. Used with permission of the publisher.

Principle of compatibility. The principle of compatibility holds that the motion of the display should be compatible with (or in the same direction as) the motion of the machine and its control mechanism.

For example, a display increasing in numerical value should indicate that the mechanism being measured is also increasing.

Furthermore, a pointer that moves to the right to show an increase should have its corresponding control mechanism designed so that

a rightward movement of the control will increase the machine value and the corresponding display output value.

Principle of arrangement. As the design of the display is important, so too is its location or arrangement with other displays. A poor arrangement of displays can be the source of error.

Sometimes dials must be arranged in groups on a large control panel. If all the dials must