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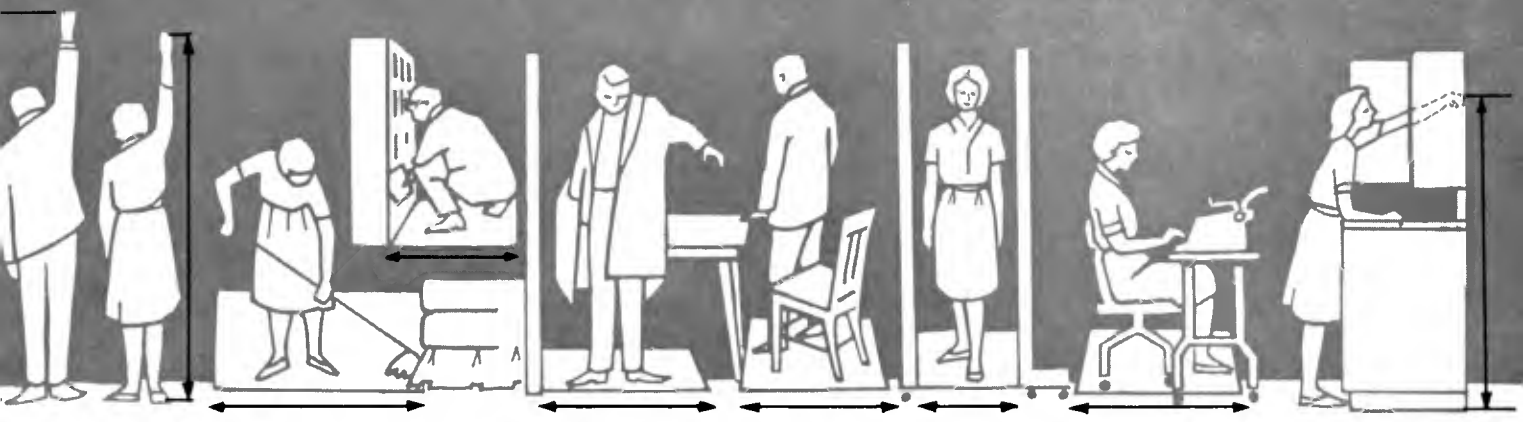


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AT URBANA-CHAMPAIGN AGRICULTURE



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# SPACE STANDARDS FOR HOUSEHOLD ACTIVITIES



Bulletin 686

UNIVERSITY OF ILLINOIS AGRICULTURAL EXPERIMENT STATION

in cooperation with

ALABAMA AGRICULTURAL EXPERIMENT STATION

COLLEGE OF HOME ECONOMICS, PENNSYLVANIA STATE UNIVERSITY

WASHINGTON AGRICULTURAL EXPERIMENT STATIONS

AGRICULTURAL RESEARCH SERVICE, U. S. DEPARTMENT OF AGRICULTURE

The research reported in this publication provides standards for the space needed to use and care for household equipment and furniture. Its purpose is to aid architects, builders, and families in answering the many questions that arise about space use and its relation to convenience and cost in building houses. It answers such questions as: How much space should be left around a bed to permit a woman to make it conveniently? How wide should a hallway be to allow two people to pass with ease? How much space is needed around a dining table to permit comfortable seating and easy serving?

The bulletin is divided into these sections:

<b>How the study was made</b> .....	<b>pages 3, 4, 5</b>
<b>Elemental activities (walking, reaching, kneeling, bending)</b> .....	<b>pages 6, 7</b>
<b>Kitchen activities (using appliances and cabinets)</b> .....	<b>pages 8, 9</b>
<b>Tables and chairs (seating, arising, serving)</b> .....	<b>pages 10, 11</b>
<b>Beds and bedrooms (making a bed, cleaning under it, using dressers and closets)</b> .....	<b>pages 12, 13</b>
<b>Coat closets (putting on coats)</b> .....	<b>page 13</b>
<b>Studio couches (opening and making)</b> .....	<b>page 14</b>
<b>Bed-davenport (opening, making, and cleaning under)</b> .....	<b>page 15</b>
<b>Bookcases (removing a book, cleaning under)</b> .....	<b>page 15</b>
<b>Office or study (using desk, file, and typewriter)</b> .....	<b>page 16</b>

Five different agencies participated in the work reported here. The project leaders included:

Helen E. McCullough, Associate Professor of Home Economics, Illinois Agricultural Experiment Station, Urbana

Avis Woolrich, Housing Specialist, Clothing and Housing Research Division, Agricultural Research Service, U. S. Department of Agriculture, Washington, D.C.

Kathryn Philson, Home Economist, Alabama Agricultural Experiment Station, Auburn University, Auburn

Ruth H. Smith, Research Associate in Housing, College of Home Economics, Pennsylvania State University, University Park (Kathleen A. Johnston, now of Purdue University, was project leader in 1955 and 1956 at Pennsylvania State University)

Anna L. Wood, Associate Home Economist, Washington Agricultural Experiment Stations, Washington State University, Pullman

The report was prepared by Helen E. McCullough.

# SPACE STANDARDS FOR HOUSEHOLD ACTIVITIES

By HELEN E. McCULLOUGH, KATHRYN PHILSON, RUTH H. SMITH, ANNA L. WOOD, and AVIS WOOLRICH

The standards reported here resulted from studies carried on during 1956 and 1957 at four state agricultural experiment stations—Alabama, Illinois, Pennsylvania, and Washington—and at the Clothing and Housing Research Division of the Agricultural Research Service, U. S. Department of Agriculture. They were derived chiefly from detailed measurements of the activities of 230 women. Twenty men were also tested for household activities in which men most commonly participate.

The research started in 1953 with a pilot study at the Illinois Station. This study brought out the fact that work habits may be as important as size, age, weight, or body build in determining how much space an activity requires. For example, a small woman who habitually stands back from equipment as she works may use more space than a larger woman who stands close to it.

The pilot study also identified the part of each activity requiring the most space and therefore made it possible to reduce the number of measurements needed in the cooperative study. For example, to determine the space required to make a bed, several contributing measurements could be taken: space to remove the bedding, to turn the mattress, and to remake the bed with sheets, blankets, spread, and pillows. In the pilot study it was found that unfolding the bottom sheet, spreading it over the mattress, and tucking it in required more space around the bed than doing any other part of the bedmaking activity. In

the cooperative study, putting on the bottom sheet was therefore the only part of the bedmaking activity that was used in determining the space required.

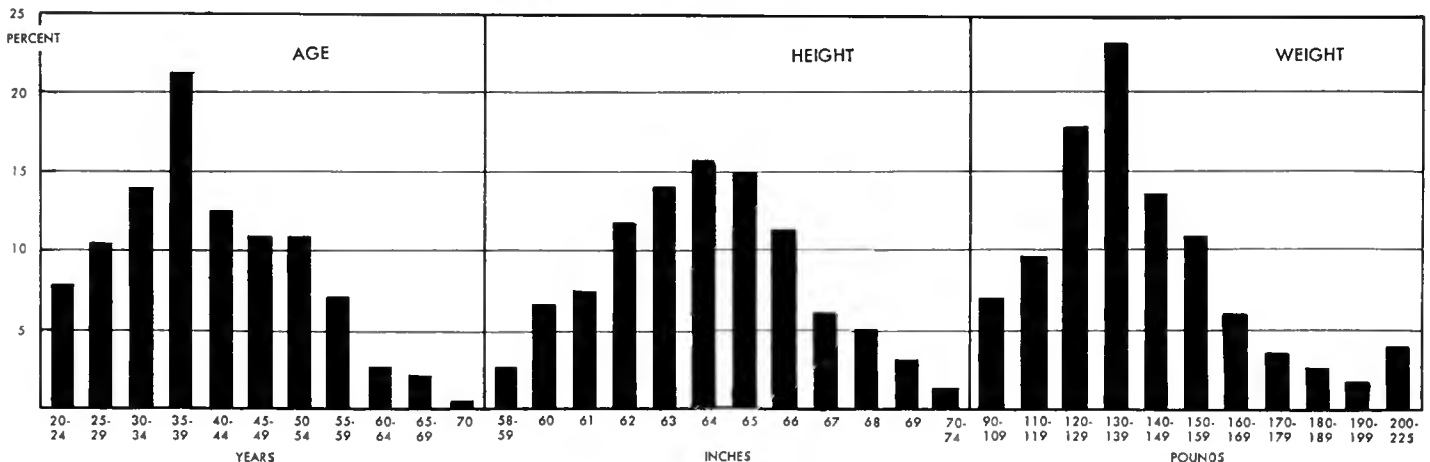
Following the pilot study, each of the five agencies carried on separate but parallel studies testing a total of 250 subjects chosen at random. A workshop was held for the research leaders before starting the tests in order to standardize methods of measurement, equipment, and records of data so that the results could be combined. A specially prepared manual was used to insure uniformity.<sup>1</sup> Report forms were set up that permitted easy transfer of data to punch cards. The five project leaders concurred on the final recommended figures for space use.

The 230 women in the study ranged in age from 20 to 70 years, in height from 58 to 74 inches, and in weight from 90 to 225 pounds, as shown in the chart below. All were physically normal homemakers, accustomed to working under usual home conditions (not in a house trailer, for example).

Two types of measurements were recorded: body measurements and activity measurements. Body measurements were taken in order to obtain a clear picture of the sample and to indicate the range that needs to be considered in planning heights, depths, and widths of work areas. Body measurements for the 230 women and the 20 men in the study are shown in the drawings on the next page and in Table 1.

<sup>1</sup> Single copies of this manual can be obtained from the Clothing and Housing Research Division.

DISTRIBUTION OF WOMEN SUBJECTS IN THE STUDY



The main part of the study determined the amount of floor space needed by the individual to perform household activities. Some of the measurements were of basic movements (called elemental activities), such as walking, reaching, bending, or kneeling, that would be a part of many activities. Other measurements were of specific activities in the home connected with the use and care of equipment and furniture and the use of closets.

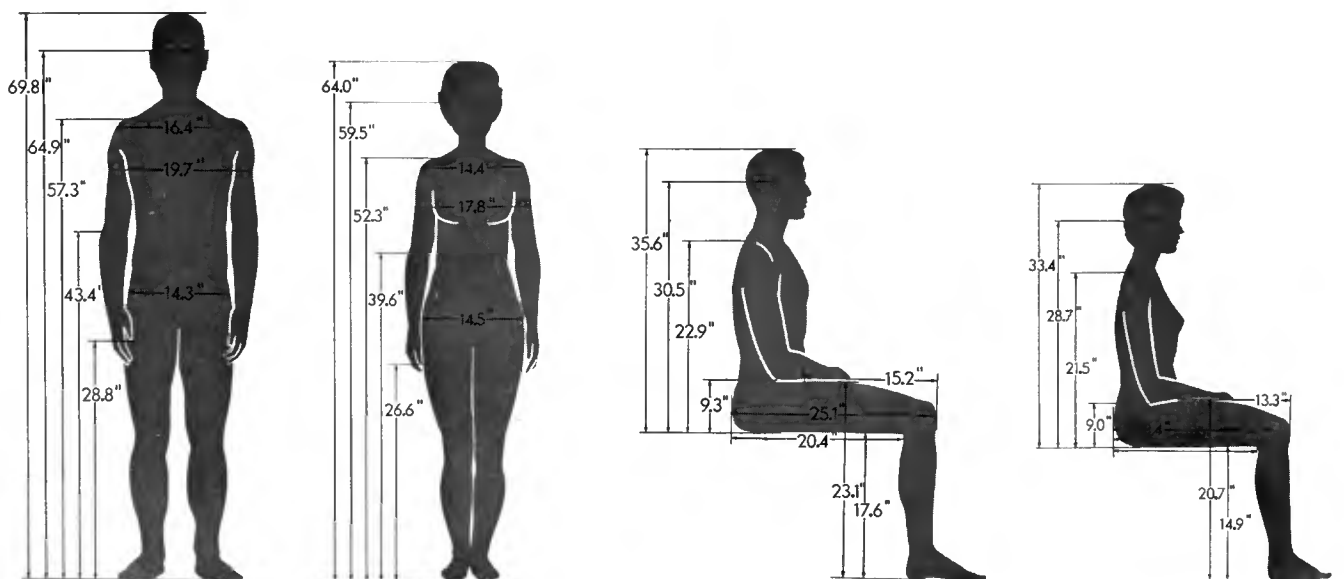
Each subject performed the assigned activities at least three times, doing them as she would have done

them at home and wearing the clothing she usually wore for housework. Movable panels, anthropometers, calipers, and steel tapes were used in obtaining the measurements. A special observational method was developed for a few activities in which both length and width of space were measured, such as in the use of coat closets.

The recommended standards resulting from this study are shown in illustrations on the following pages and in Table 2. These recommendations were determined by taking the average for each activity and

**TABLE 1. — MEAN BODY MEASUREMENTS OF 230 WOMEN AND 20 MEN**

	Women	Men		Women	Men		Women	Men
	inches			inches			inches or pounds	
<b>HEIGHTS, standing</b>			<b>LENGTHS</b>			<b>THICKNESS</b>		
Top of head.....	64.0	69.8	Sitting (buttocks to front of knees).....	23.4	25.1	Maximum body.....	10.9	11.7
Eye.....	59.5	64.9	Seat (buttocks to back of knees).....	19.3	20.4	Lower body.....	10.7	10.9
Shoulder.....	52.3	57.3	Lap (abdomen to front of knees).....	13.3	15.2	<b>GIRTH</b>		
Elbow.....	39.6	43.4	Total arm (acromion to thumb tip).....	25.0	27.0	Bust, Chest.....	36.6	37.4
Palm.....	29.7	31.9	Forearm (olecranon to thumb tip).....	14.7	16.2	Hip.....	39.0	....
Thumb tip.....	26.6	28.8	<b>WIDTHS</b>			<b>BENT AT HIPS</b>		
<b>HEIGHTS, seated</b>			Maximum body.....	18.4	20.6	Arms down, length.....	32.8	33.2
Seat to top of head.....	33.4	35.6	Shoulders.....	14.4	16.4	Reach from bent position (buttocks to thumb tips of arms extended)....	45.0	48.2
Seat to eye.....	28.7	30.5	Upper body.....	17.8	19.7	<b>ONE KNEE KNEEL.....</b>	33.5	....
Seat to shoulder.....	21.5	22.9	Lower body (standing)....	14.5	14.3	<b>WEIGHT, pounds.....</b>	140.5	167.4
Seat to elbow.....	9.0	9.3	Lower body (sitting).....	16.2	16.0			
Floor to under knee.....	14.9	17.6	Elbows extended.....	33.6	37.7			
Floor to top of thigh.....	20.7	23.1						
Floor to top of crossed knee.....	24.7	28.0						





adding one standard deviation, except for activities involving reaches, for which one standard deviation was subtracted. All figures were rounded to the nearest even inch. The standards apply to both men and women, except as indicated otherwise. The illustrations show the part of the activity that requires the most space, as determined by the pilot study.

The use of these recommendations will provide satisfactory activity spaces for most women in the United States and reasonably comfortable spaces for all others. For the subjects in the study, the final recommendations were adequate for a minimum of 82 percent for some activities and up to 100 percent for others.

The standards given for the elemental activities and

for the specific household activities have many applications besides those shown in the following pages. The measurement for the elemental activity of bending, for example, can be used to indicate the space needed to turn on a television set. The required space for sitting at a sewing machine can be judged from the recommendations given here for the use of chairs.

A limited number of floor plans are included to show the relationship of the space required for different items of equipment or furniture grouped in specific rooms or areas, such as in kitchens, dining areas, or bedrooms. No floor plans are shown for living rooms because they are frequently larger than other rooms and have a greater diversity in kind and amount of furniture.

**TABLE 2. — CLEARANCES FOR SATISFACTORY PERFORMANCE OF CERTAIN ACTIVITIES**

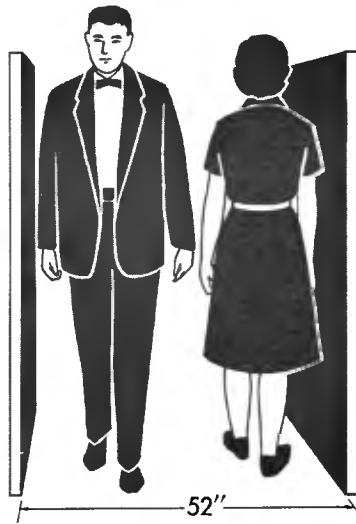
16" Edging past seated person Cleaning ends of furniture*	38" Using range oven* Rising from an armless chair in a confined area
20" Sitting at table, armless chair Foot extension under table	Walking past standing person (12" body thickness plus 26" walking space) Kneeling on one knee*
22" Sitting at table, armchair Foot extension under desk Bedmaking* Space at end for opening and making studio couch or bed-davenport*	40" Walking with elbows extended Using furniture with drawers Rising from an armchair in a confined area
24" Walking past seated person	42" Using coat closet, one person Using file cabinet
26" Walking between wall and table Walking between two walls	44" Serving seated person (20" sitting space plus 24" walking space)
28" Edging past standing person (12" body thickness plus 16" edging space)	48" Cleaning under bed, bookcase, davenport, or studio couch*
30" Sitting relaxed in an armless chair Rising from chair at folding or typewriter table	52" Two people passing
32" Rising from table, armless chair	42" x 44" Using dishwasher* (based on dishwasher 24" wide)
34" Rising from table, armchair Forward bend	42" x 48" Removing equipment from cleaning closet*
36" Using kitchen base cabinet* Using wall oven* Using refrigerator* Using desk Using bookcase Edging past person in armless chair (20" sitting space plus 16" edging space)	46" x 60" Using coat closet, 2 persons 98" x 119" Using and cleaning studio couch* 110" x 112" Using and cleaning bed-davenport*

\* Measurements of these activities were taken of women only. All other measurements were taken of both men and women or were derived from a combination of body measurements and activity measurements.

**ELEMENTAL ACTIVITIES**



Walking between two high walls (space adequate for both men and women)



Two people passing (figure derived; twice the space for one person to walk between two high walls)



Walking between high wall and 30" high table (space adequate for both men and women)



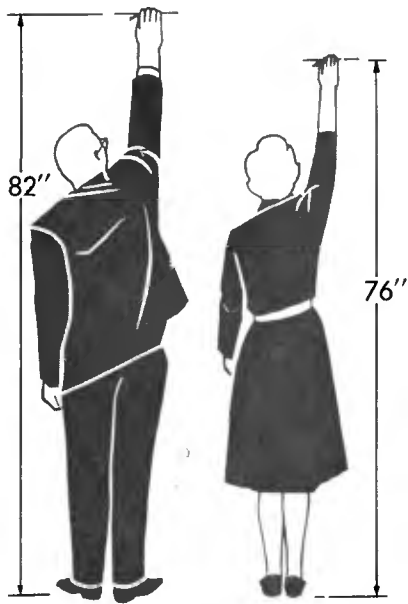
Walking with elbows extended (space adequate for both men and women)



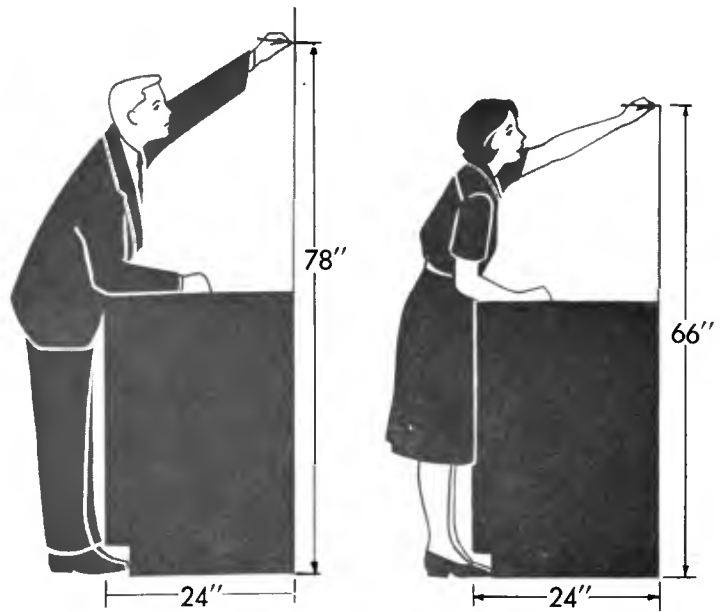
Kneeling on one knee (woman only)



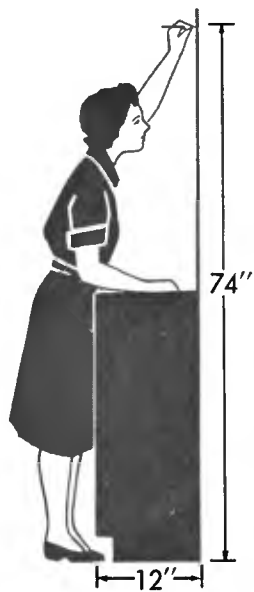
Man bending at a right angle



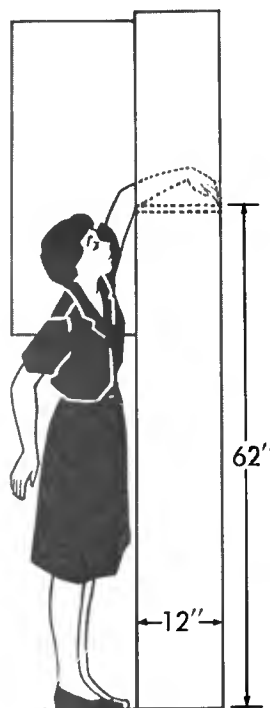
Reaching, maximum height



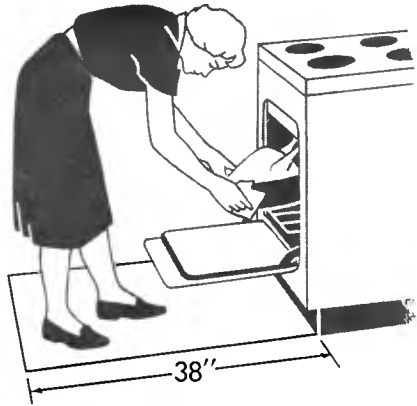
Reaching over obstruction, 24" deep and 36" high



Reaching over obstruction, 12" deep and 36" high (women only)



Maximum reach to back of shelf 12" deep (women only)



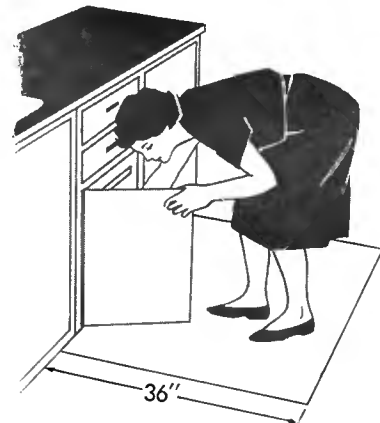
Using a conventional range



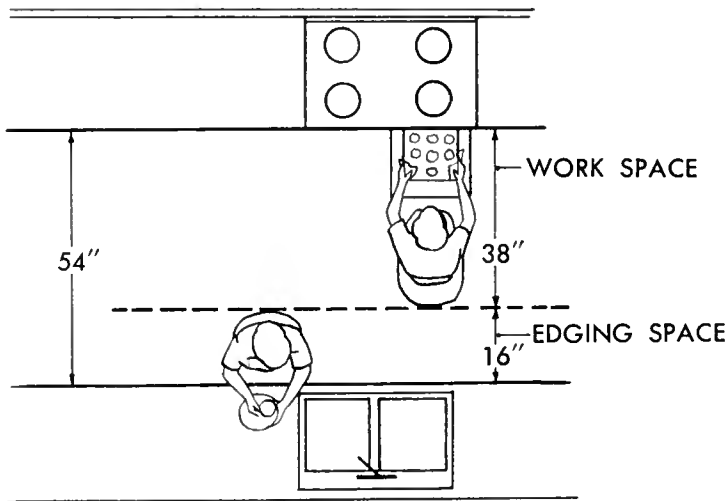
Using a wall oven



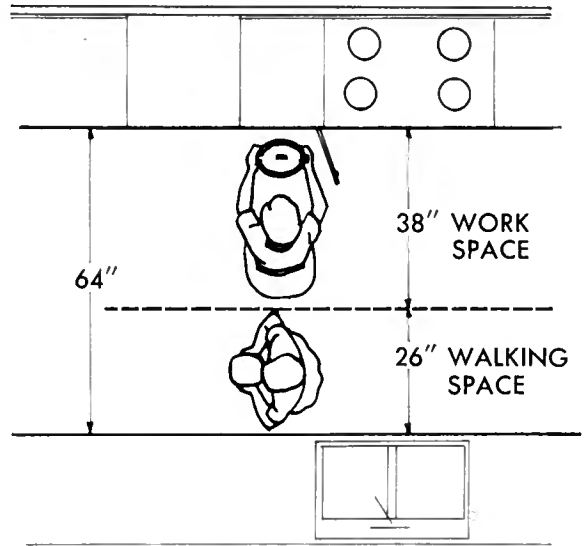
Using a refrigerator



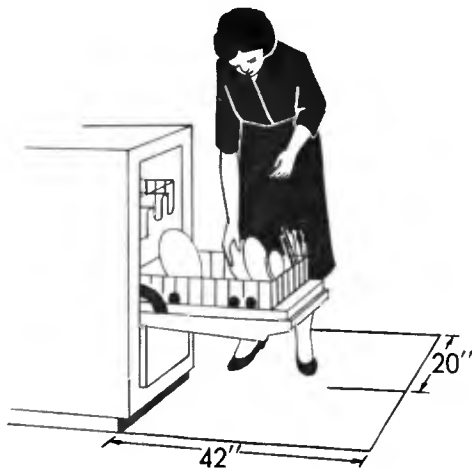
Using a base cabinet



Minimum space (allowing for edging) for two people working at cabinets and appliances opposite each other (except a front-opening dishwasher)



Liberal space (allowing for walking) for two people working at cabinets and appliances opposite each other (except a front-opening dishwasher)

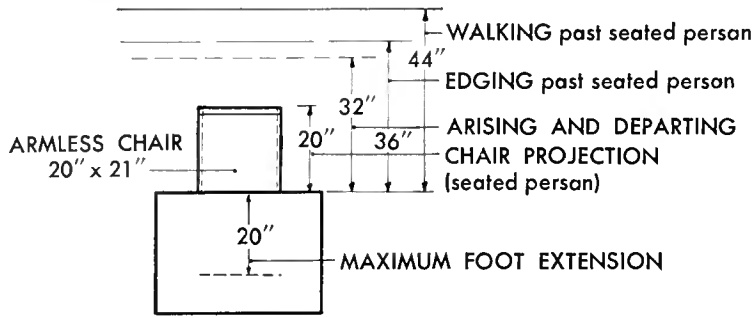


Using a front-opening dishwasher requires 4 inches more space than using other appliances in a kitchen



Using a cleaning closet

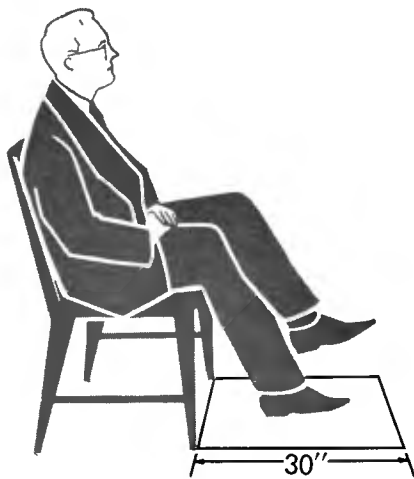
# TABLES AND CHAIRS



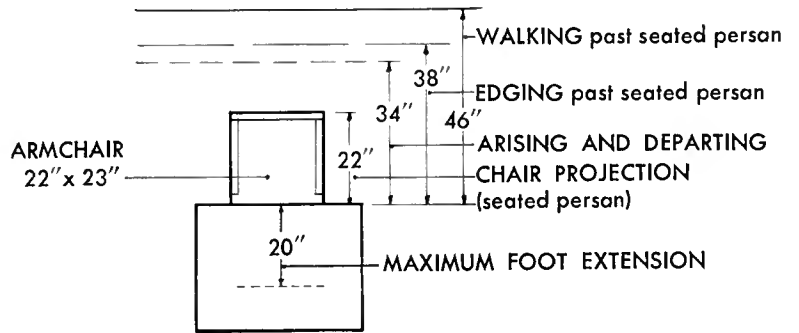
Armless chair in place at table



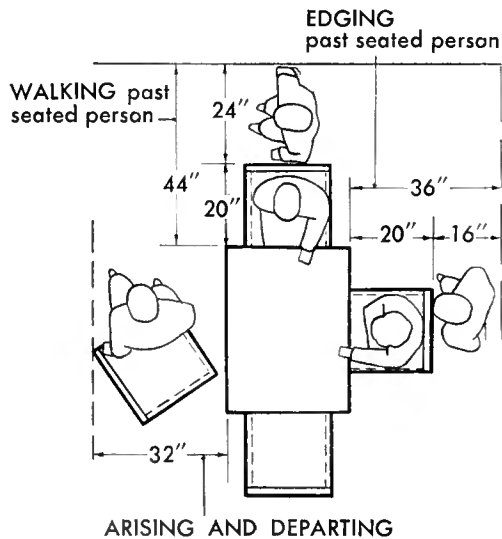
Rising from table, armless chair (armchair 2" more)



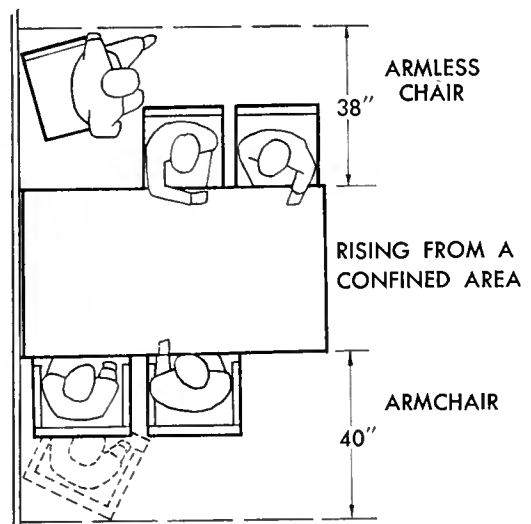
Foot extension, knees crossed, not at table



Armchair in place at table



Using tables and chairs in free area



Using tables and chairs in confined area

Walking past seated person

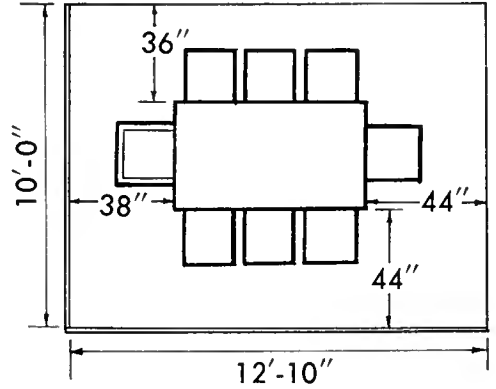


Edging past seated person

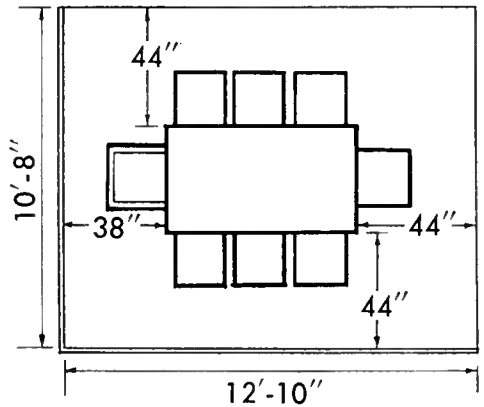
Arising from a card table



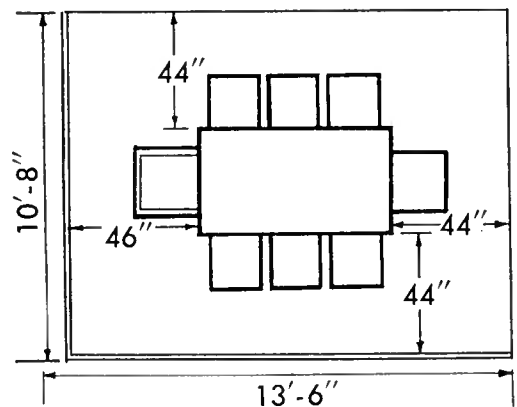
Dining areas for eight persons with free-standing table 72" x 40", one armchair, and seven armless chairs (calculated on basis of edging space on sides where there is not serving space, so that everyone can leave his place without disturbing others)



Serving space on one side and one end

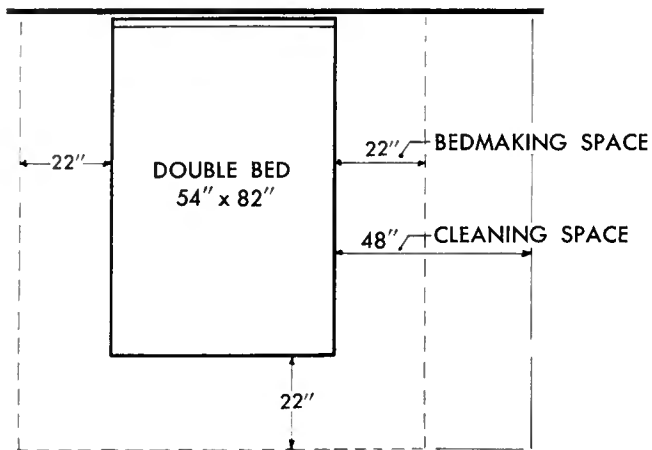


Serving space on two sides and one end

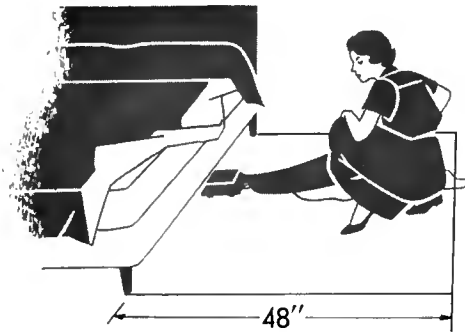


Serving space all around table

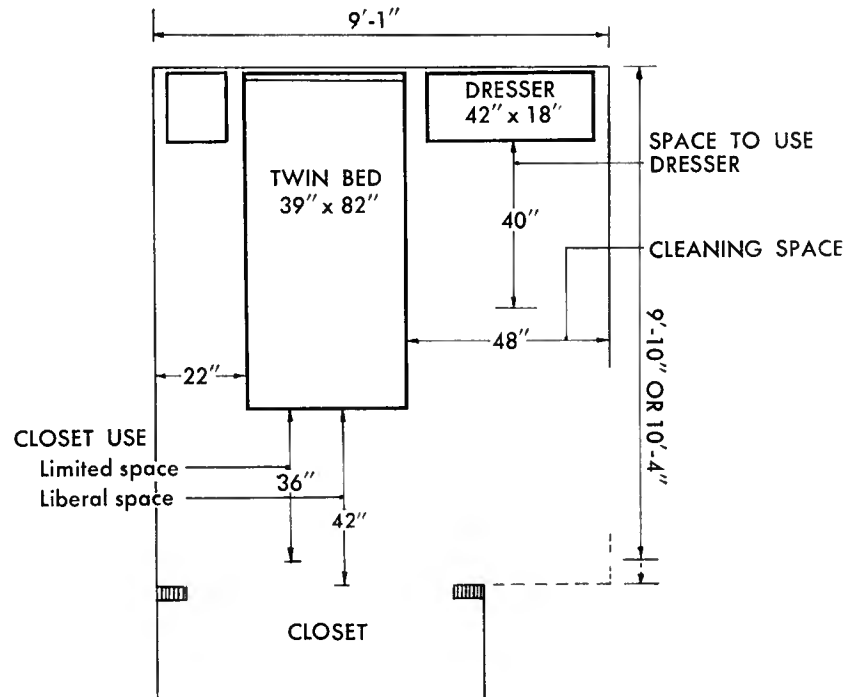
# BEDROOMS



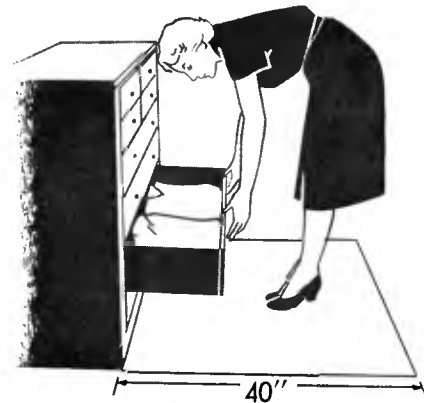
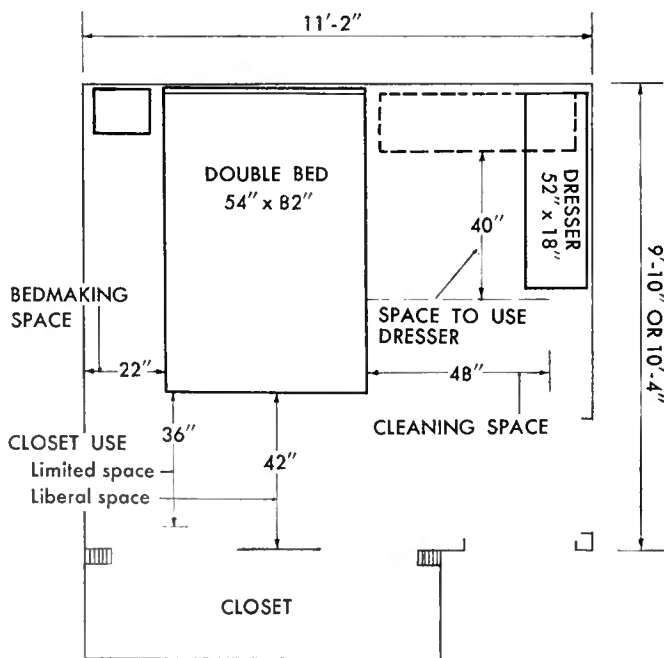
Making bed



Cleaning under bed

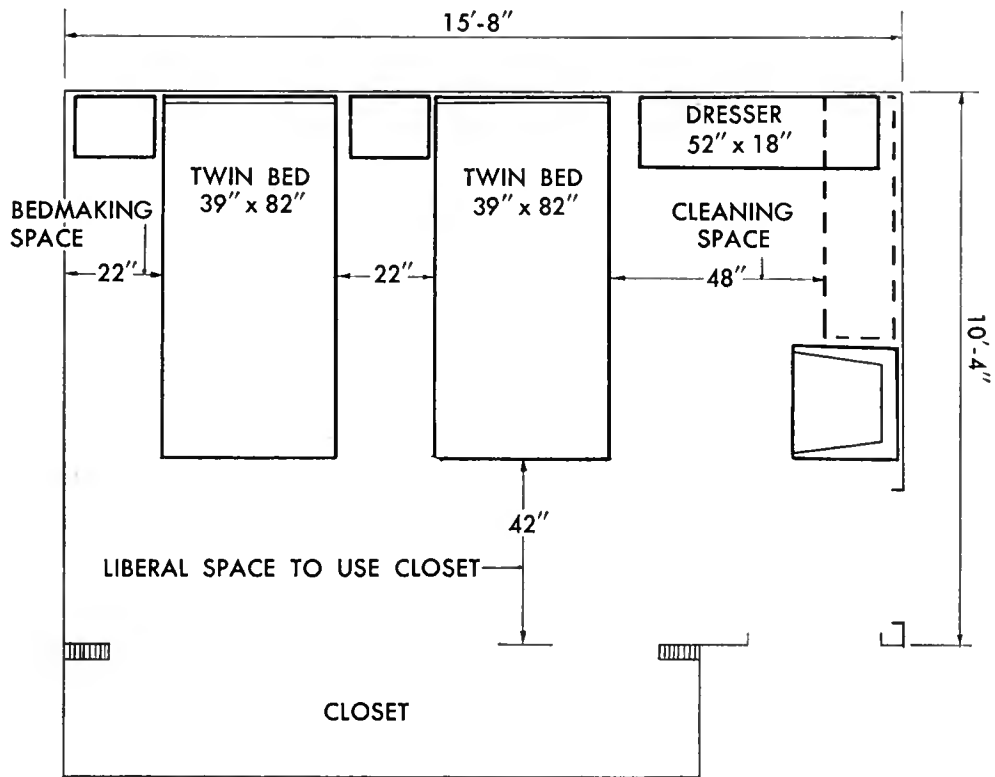


(In the drawings, "limited space" allows space to open closet door and remove garment; "liberal space" allows space to open closet door, remove garment, and put it on)



Using dresser





**COAT CLOSETS**

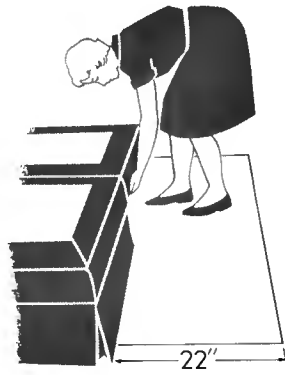


One person using coat closet

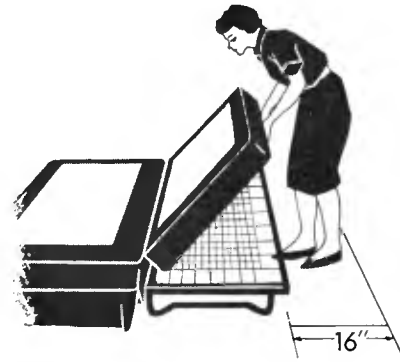


Two persons using coat closet in foyer area with space for one person walking

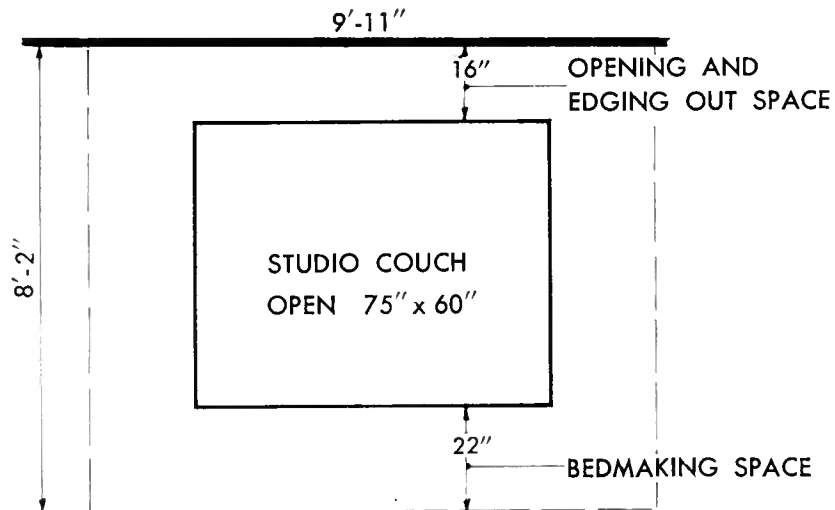
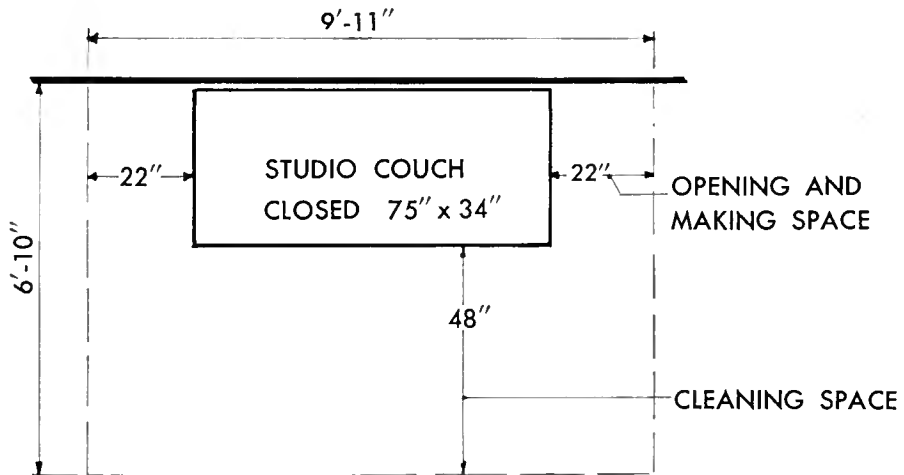
# STUDIO COUCHES



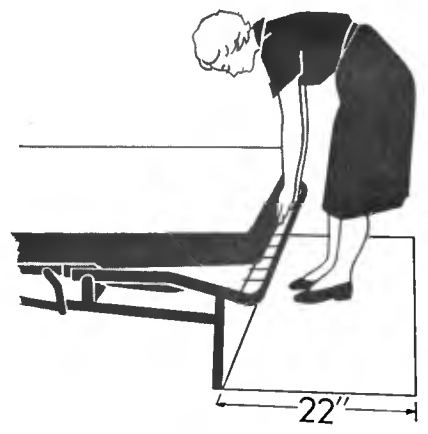
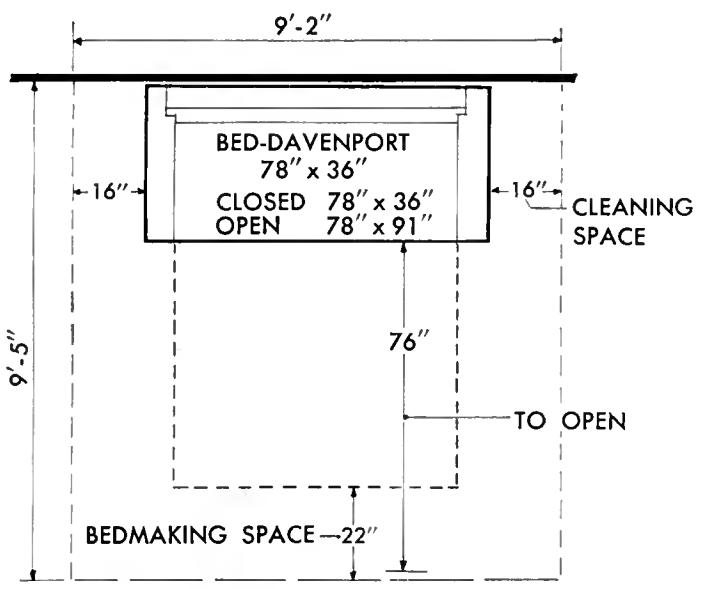
Making studio couch



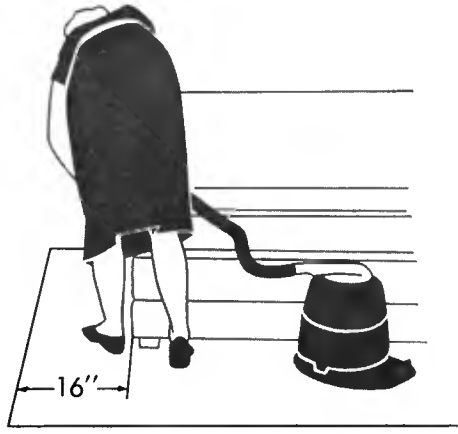
Opening and edging-out space  
(type tested needed to be moved out from wall to be opened; some do not)



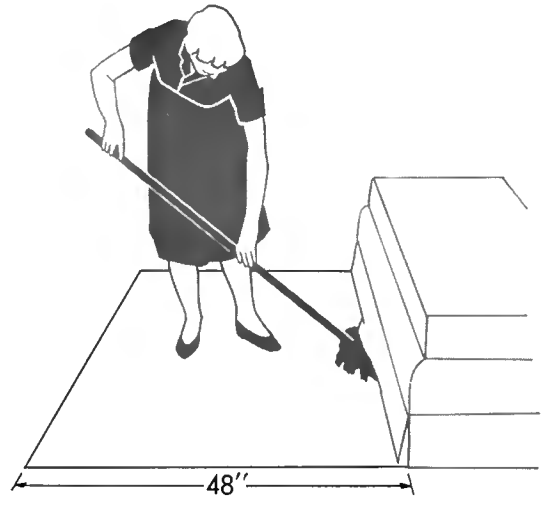
**BED-DAVENPORTS**



Opening or making bed-davenport



Cleaning ends of bed-davenport



Cleaning under bed-davenport or studio couch

**BOOKCASES**

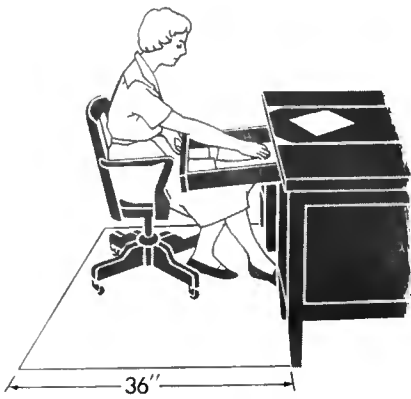


Using bookcase

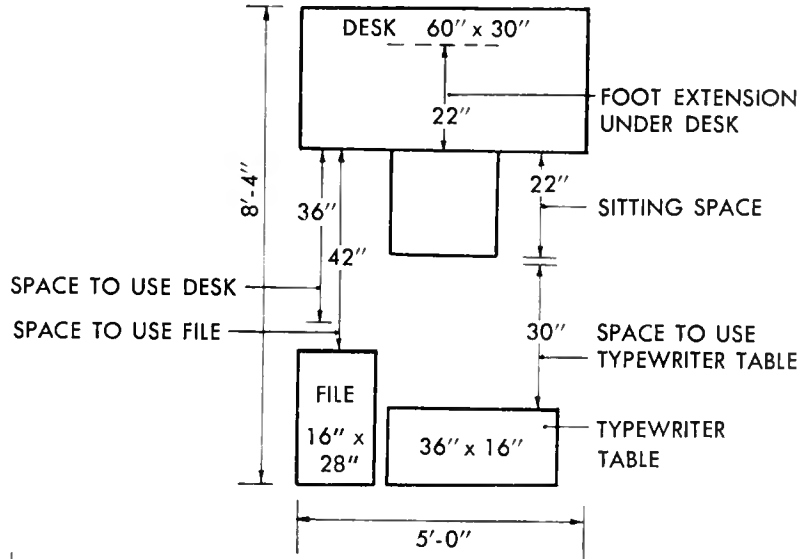


Cleaning under bookcase

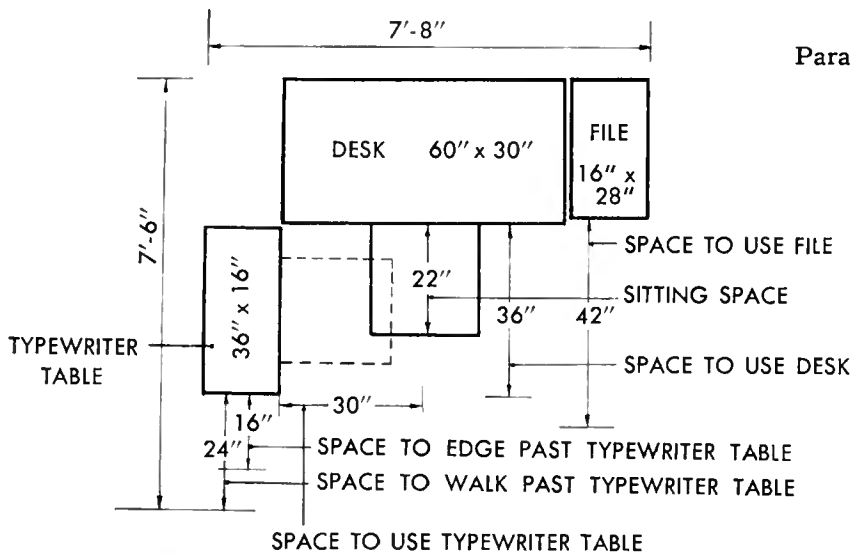
# OFFICE OR STUDY



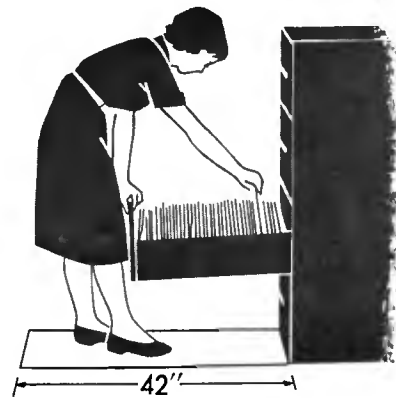
Using office desk



Parallel arrangement of office equipment



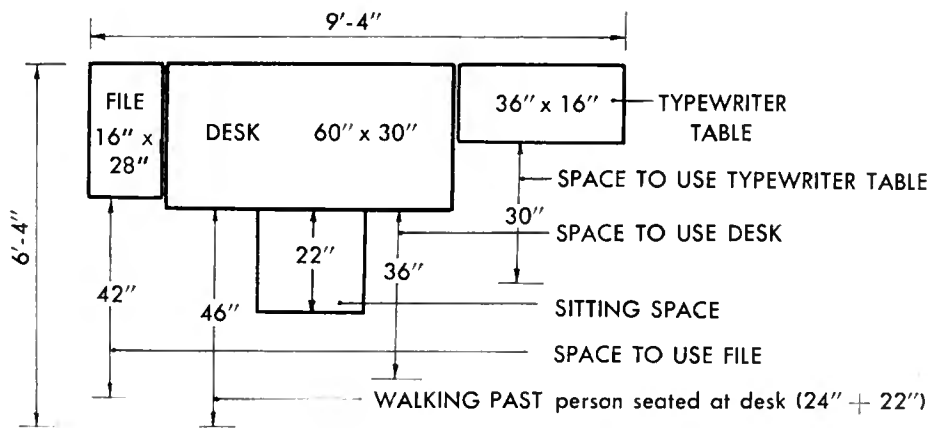
Right-angle arrangement of office equipment



Using file

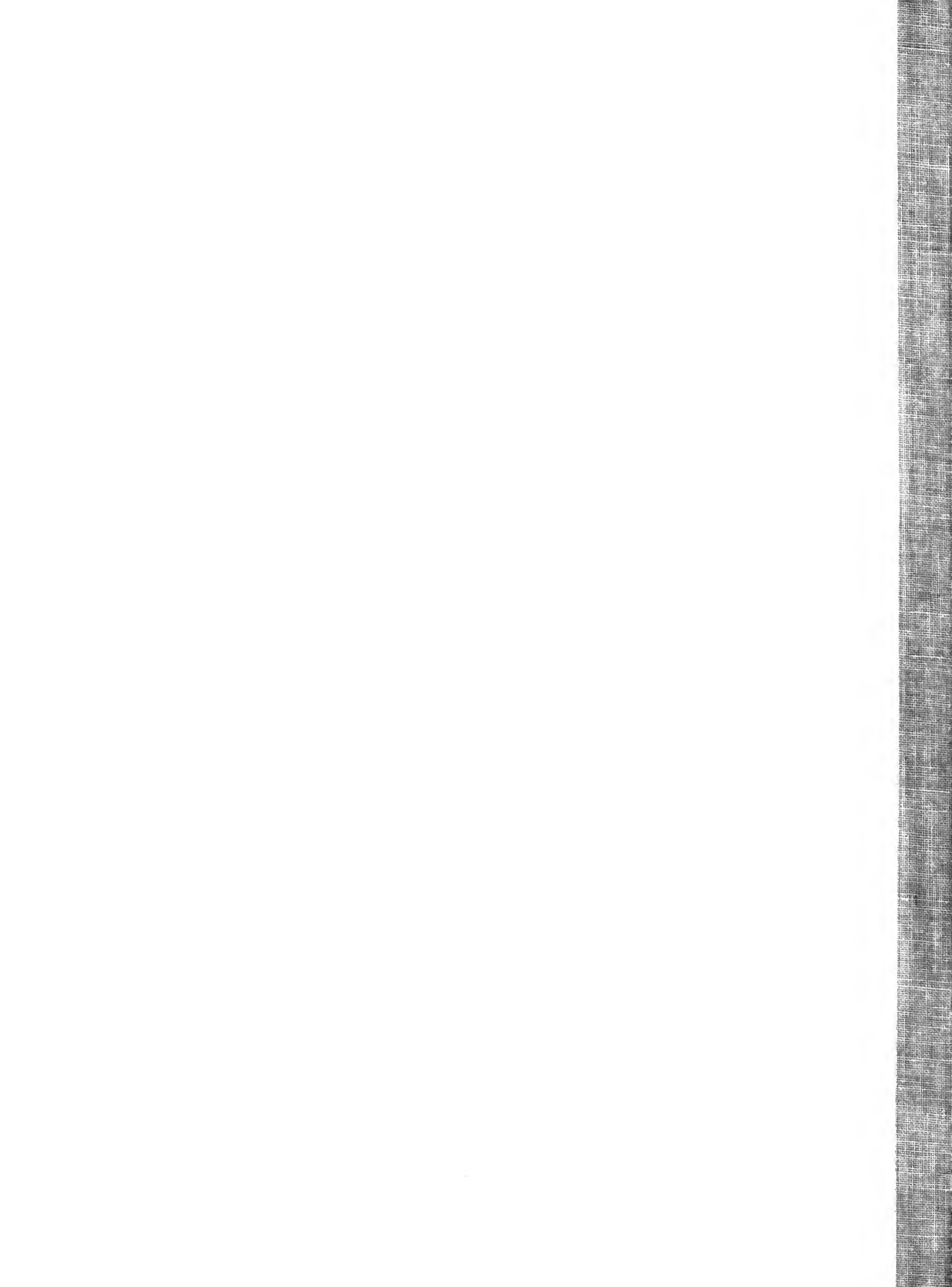


Using and arising from a typewriter



One-wall arrangement of office equipment







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