

# STORAGE WALLS

HOME ECONOMICS RESEARCH  
DEPARTMENTAL SERIES NO. 1

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AGRICULTURAL EXPERIMENT STATION  
AUBURN UNIVERSITY

E. V. SMITH, *Director*

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# STORAGE WALLS\*

KATHRYN PHILSON  
Home Economist

HAVING enough storage space for the many items owned by families is as important to domestic tranquility as having enough space for living. Indeed, having storage space and using it correctly is the equivalent of adding to the living space of the home.

The need for storage space, especially for built-in rod closets, was brought to light by the Southern Regional Housing Survey of 1948. The report of this survey showed that only one-fourth of the homes studied had as many as one built-in rod closet per bedroom and that more than one-third had no such closets. Recently built homes seemed no better off than older ones (2). After homemakers in the survey had been questioned about special features they would want in a house, they were asked, "What other features would you consider so important you wouldn't want to build a house without them?" To this question 33 per cent of all homemakers, or 70 per cent of those who replied, mentioned storage features (2).

An answer to the problem of storage space was sought by the project reported here. Storage walls were designed at the Auburn University Agricultural Experiment Station in 1952 and 1953. They were placed in a small house and evaluated to find how well they served the needs of families for storage of various kinds, especially that for clothing. This evaluation was carried on from 1953 through 1961.

The idea of having construction features or other aspects of the house evaluated by a succession of families that would live in houses incorporating such features or aspects was suggested at the President's Housing Conference in 1931. At that conference the limitations of surveys were pointed out and the desirability of collecting

data on activities in family life by observing families over extended periods of time was affirmed (5).

In 1948 Maud Wilson, in a paper given at the American Home Economics Association convention, said with regard to research in low-cost housing, "We need some experimental houses for which home economists would do the preliminary planning, based on studies of family needs, and for which engineers would produce plans representing the best possible use of materials and labor. After the houses were built, the home economists would use them as laboratories to study the interrelationship of housing and family living with a succession of carefully selected tenants. This study would show possibilities for modifying the original specifications in the direction of lower costs" (10).

Miss Wilson predicted this method was not likely to be used because of the belief that needs for housing research were urgent and temporary. (She said the needs were urgent but not temporary.) However, a few years later a study was undertaken at the University of Illinois in which resident families were used as subjects for an extended period of time. Helen E. McCullough, associate professor of housing research, was in charge of the home economics aspects of the project.

The technique for this study, devised by the University of Illinois Small Homes Council, was reported by one of its members (4). Families were chosen on the basis of (a) middle class; (b) children (two of opposite sex, one pre-school, and one in school); (c) mother not employed outside the home; and (d) age of parents (in their 30's). The families each lived in a house and tried six floor plans, at first for periods of one month. However, this was found to be too short a period; at least two, preferably three, months were recommended. They expressed their reactions to each plan at the beginning and the end of each period and compared the features of each of the six plans. Five of the plans were those to be tested; the sixth was drawn up by the family. Activity logs were used to show actual room use.

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\* A partial report of a study supported by funds provided by the Hatch Act (1955) and by State Research funds. It is a contributing study to Southern Regional Housing Project S-8. The study was begun under the leadership of Mrs. Gladys Garrow, who was project leader from 1950 to 1952.

The report's conclusions indicate that the technique had its difficulties. Although it permitted the researcher to hold constant such variables as neighborhood, furniture, room sizes, arrangements, and other features, it was costly in time and money. The cost of rearranging the spaces could be greatly reduced by using five or six houses incorporating designs tested, rather than one house in which the various features (including plumbing) were rearranged.

The Illinois study was well underway at the time the evaluation of storage walls was undertaken by the Station at Auburn. Through conference and correspondence, the author learned much that was useful in carrying on the use-testing phase of the storage-wall study. However, because of limitations of this study, it was not possible to take advantage of all the suggestions derived from the space-house experiment.

This publication reports the entire storage-wall project including evaluations by laboratory workers and by non-resident homemakers in addition to evaluations by families

who lived in the laboratory with the units and used them daily.

For practical reasons, numbers of evaluating homemakers and cooperating families were not great enough to be representative of any population group. The use-testing was essentially a series of case studies. One value of such studies is that the results of problem solving may be carried beyond the planning stage so that resulting satisfactions or dissatisfactions may be observed.

Since the total storage problems of these families were not alike, the total solutions were not alike. While some kinds of storage presented similar problems to all of the families, even these problems varied in degree.

It will be well for the reader to bear in mind that the storage-wall units discussed in this report were being evaluated during progress of the study. Photographs and descriptions of units, or parts of units, should not be construed as recommendations unless definite statements are made to that effect.

## The Original Set of Units

The original set of 13 units was designed to provide storage space for the clothing and other household items of a family of four. Overall considerations for their design were:

1. Adaptability for assembly as partitions.
2. Interchangeability of units and of parts, for example shelves.
3. Mobility.
4. Capacity for storing clothing and household items.
5. Visibility and accessibility of stored items.
6. Economy of space.
7. Incorporation of built-in features.

The overall dimensions of the units were to some extent dependent on the house in which they were to be placed. The 8-foot ceiling was a primary limitation to height of units. Also, the length and width of the house, 24 feet  $\times$  38 feet 8 inches, less a corner porch 7 feet 4 inches  $\times$  12 feet, suggested the necessity for keeping dimensions reasonably small. The fact that the units were to be movable further influenced the choice of dimensions.

Pertinent data from the Southern Regional Housing Survey were used to determine the number of each kind of clothing, household textiles, dishes, silver, and the like to be stored (2). The numbers of each kind of item stored were based on the median numbers owned by families of the low and medium low socio-economic groups for which this information was given in Tables 108-111 of the survey report (2). The dimensions of the items to be stored, however, were the primary consideration in planning the units. The space requirements for these items were arrived at in several ways: dimensions from previous studies by others, dimensions given in trade catalogs, and measurements of clothing in a local store.

The units of the original set each had an overall height of 7 feet 8 inches. Each had a top section about 2 feet high partitioned from the rest of the unit by a permanent shelf. Within the top sections were shelf-hanger strips to

support an adjustable shelf. The top sections were closed with swinging doors with the exception of those of the wrap closet and the two dresser units; these moved on glides.

Original facilities of the lower parts of these units were as given below:

Name of unit	Units	Dimen- sions	Sec- tions	Facilities	Door sup- port
	No.	Ft.	No.		
Rod unit, woman	1	2 $\times$ 3	1	Rod	Hinge
Rod unit, man	1	2 $\times$ 3	1	Rod, 2 trays	Hinge
Rod unit, girl	1	2 $\times$ 3	2	Rod, shelf sec.	Hinge
Rod unit, boy	1	2 $\times$ 3	2	Rod, shelf sec., trays	Hinge
Rod unit, wraps	1	2 $\times$ 3	1	Rod	Glides
Clothing, unit C	1	2 $\times$ 3	3	Rod, trays, small shelves	Hinge
Bed clothes	1	2 $\times$ 3	2	Trays or shelves, drawers	Hinge
Bathroom	1	2 $\times$ 3	3	Trays, shelves	Hinge
Cleaning closet, pan storage	1	2 $\times$ 2	2	Shelves, sliding board	Hinge
Dresser	2	1 $\times$ 3	1	Drawers	None
Kitchen-dining rm., unit K	1	1 $\times$ 3	3	Shelves, trays	Hinge
Desk-bookcase	1	1 $\times$ 3	3	Shelves, dropleaf, drawers	None

Except for the open book shelves and the permanent shelves between sections of units, shelves were adjustable and supported by metal clips that hung from vertical strips. Trays were supported by shelves. Most of the trays exactly fitted the units for which they were designed. These were interchangeable among units of like dimensions. Trays for rod units of the man and the boy and trays for napkins and silver for unit K were made to fit into special spaces. They could be placed on other shelves, but fitted only those for which they were designed.

# Overall Plan For Evaluation

The general purposes for evaluating the units were to determine their functional qualities, adequacy, acceptability, and adaptability and to attempt to find means of improving any shortcomings that might be encountered. Another purpose connected with the study was to determine space standards for storage of clothing and to design efficient, low-cost facilities acceptable for this purpose. It was not expected that one set of units could provide adequate storage for clothing at all levels of adequacy. However, it was expected that the study would elucidate some of the practical problems, needs, and choices connected with selection and use of facilities for storing clothing.

The general plan for evaluation consisted of four phases. Some of these were carried out consecutively, but some were done more or less concurrently. In this report each phase is treated separately. The phases are:

1. General evaluation of units by laboratory personnel.
2. Space evaluation of clothing storage units by laboratory personnel.
3. General evaluation of clothing storage units by 20 homemakers.
4. Use-testing of units by: (a) families living in the laboratory house equipped with storage-walls, and (b) families living in their own homes.

## General Evaluation of Units

At the time when an idea has taken concrete form, the concept and the product are ready for comparison. Difficulties not easily visualized in the imaginary product become evident in the real one. At this point a new phase in the development of the original idea can begin. The planning of the original set of units involved bringing together a variety of specifications and considerations. It would be optimistic to expect that a perfect product would emerge at the first attempt.

After the space requirements for the units had been studied and the units had been designed, a change in personnel on the project caused an interruption of the study. During this time the units were constructed, placed in a house referred to as the *storage-wall laboratory*, and were ready for evaluation.

Critical examination of the units and a few practical tests revealed problems that may be experienced generally by persons planning storage units.

The structural parts that seem necessary for adequate support of units may, unless correctly placed, interfere with ease of operation, use, and care of them. The 2×2- and 2×3-inch framing of these units presented this problem. The corner posts necessitated having shelves cut to fit around them. Shelves could not be pulled forward for removing; thus adjusting shelf heights was extremely difficult, and pull-out shelves could not be used.

The trays extended the full depth of the unit and had to fit between the rear corner posts. If a tray was turned slightly off center, it caught on the posts at the rear and prevented closing the door in front. The view of the interference was obscured by the tray, making the situation puzzling, indeed, to users not aware of the cause of the trouble.

To remedy this problem, the sides of the unit were blocked between the corner posts, and the ends of the shelves cut away to make them fit. This permitted easier adjustment of shelves as well as use of pull-out shelves. In the case of using trays, the situation was usually improved, but difficulty was experienced whenever the blocking warped or slipped.

When new units are built, it is advisable either to consider a type of structure without corner framing or to place the sides of the unit inside the framing. The difficulty with trays could be avoided by these methods or by placing them on guides L-shaped in cross-section. Trays could also be made to extend only to the rear corner posts.

Floors, originally placed below the framework, were 3 inches below the threshold of doors of units. Three electric power use studies in the South had indicated only 25, 5.4, and 7.7 per cent of electrified farms had vacuum cleaners (1,3,9). Therefore, it seemed that the rod units and other units with doors at the bottom should have floors that could be swept out easily. Therefore floors were placed on top of the framework of these units.

The units that were 3 feet wide had doors 32 inches wide. These required a great deal of floor space for opening. Also, when a door of this size was standing open, it obstructed traffic and made the unit look unbalanced. Two doors were used on units of this size.

Raised handholds on sliding doors limited openings to a width of 13 inches. Use of recessed handholds increased this width to 15½ inches, which appeared still to be too narrow an opening. The problem was put aside for study during later phases of the evaluation.

Conflicting functions were observed in two rod units. In the man's unit, a tray section under the rod was of such height as to interfere with the hanging of any garments longer than a waist-length jacket. The remaining rod space of 16 inches was insufficient for hanging a man's garments on hangers. Also, space above the tray section was wasted. The tray section was removed.

In the boy's rod unit, the rod was short to give room for a narrow, tall tray section. This use of space would have served a small boy, but for an older boy neither rod length nor tray size would have been large enough for storing his clothing. The tray section was removed and a longer rod was installed.

The last is an instance of failure to consider changing needs of a family member. Another instance was noted in the cases of both boy's and girl's rod closets. These units, designed for use of children under 10 years of age,

each had a permanent shelf at a height that would not permit raising the rod to a level high enough for older children. The permanent shelf was removed and a movable shelf substituted.

When units are designed, it is important that the person who gives specifications to the designer and the designer himself have an understanding of the space requirements of structural parts. It is also important for these people to understand the space requirements of the unit itself in relation to the house where it will be used.

Movable units of ceiling height are usually built in a horizontal position, then raised to a vertical position. Hence, such units must be less than ceiling height. In the case of an 8-foot ceiling, the *diagonal* of the end of the unit cannot exceed 8 feet. Since the largest of the units used were 2 feet deep, the *height* of these units could not exceed 7 feet, 8½ inches.

In such units as those under discussion, the total height of 8 feet from floor to ceiling is not available for storage. For instance, in addition to the loss of 3½ inches for tilting, the height available for storage in a shelf unit is decreased by the following:

1. Thickness of top and bottom of the unit.
2. Thickness of top and bottom of the framing.
3. Width of framing between horizontal divisions of unit.
4. Thickness of the bottom of each horizontal section.
5. Thickness of all shelves and/or bottom of any trays used.

While each of these seems small in itself, the total loss of available height is considerable. The foregoing list could easily account for more than a foot of height.

In the units studied, it appeared that the builder or designer had usually subtracted the amounts from the height of the bottom section of units. In the case of rod units, the effect was minor. The intended use of the bottom section could not always be realized in the case of shelf units.

Likewise, the widths of units are reduced by the thick-

ness of the sides and of any vertical partitions. Also, the widths of door openings are decreased by the width of corner posts. Reduction in width was most evident in the unit intended for use as a combined pan cupboard and cleaning closet. This unit had an outside width of 2 feet. The center partition and lower shelves on the right side were removed. It was then used as a unit for storing cleaning supplies and equipment.

Family members do not plan storage facilities often enough to gain experience. However, they should be able to understand their needs better than anyone else. Persons who are able to design storage units know the requirements for structural parts. From the study it is evident that some discussion and cooperation is needed in planning for space requirements of both the items to be stored and the structural parts of the unit itself. When a homemaker or other member gives dimensions, she should make clear whether allowance has been made for shelf thickness, reach-in space, or other components of each dimension. The designer needs to make sure what allowances are needed for the items stored and what space is available for the entire facility planned.

Materials and finish of the inside of units have an influence on their performance and usefulness. In clothing storage units, roughness or splinters will pick threads of delicate materials. The wipe-off paint used to seal the fir plywood of the units made a nice appearing exterior finish free from glossiness that could cause unpleasant reflections of light. However, the very qualities that were desirable for the exterior finish were undesirable for shelves and interiors of drawers. Interior finishes need the smoothness that is associated with glossiness. Plywood needs to be sanded. Its edges cannot be sanded smooth. Exposed edges need to have strips glued on to prevent roughness. The dresser drawers tended to stick. At first it was believed that there was some fault in their construction. However, sanding the parts that rubbed together and lubricating them with paraffin made them operate satisfactorily. It was believed that the paint caused the sticking.

## Space Adequacy Estimates of Clothing Storage Units

After the clothing storage units had been examined and changes made to improve their functional qualities, they were evaluated by laboratory workers in terms of capacity for storing clothing.

### UNITS

The rod unit for adults and children over 10, Figure 1A, was used for storing garments on hangers, shoes, belts, ties, hats, and men's and boys' folded work pants. The rod was adjustable to three heights. The shoe racks and door racks were removable. The small shelf over the rod was adjustable.

The rod unit for children under 10, Figure 1B, was much like that for adults. The blocks for rod adjustment were set lower. Adjustable shelves, two large and one small, were located above the rod in the lower section. A bin-type shoe rack was provided.

The rod unit for storing wraps other than those for work

and play was much like the rod unit for adults. It had sliding doors but had no shoe rack and no small shelf over the rod.

The dresser unit, Figure 1C, was used for storing folded garments of adults and children. This unit had, in addition to the top section above the mirror, two small drawers with inside dimensions  $10\frac{1}{2} \times 14\frac{1}{4} \times 3\frac{1}{4}$  inches, and three larger drawers  $10\frac{1}{2} \times 30\frac{1}{2} \times 4$  inches.

Unit C, Figure 1D, a multipurpose unit used at some levels of ownership for storage of parents' folded garments, had, in addition to the top section, a mid-section 17 inches high in which shelves  $23 \times 32$  inches or trays of the same size could be used. The bottom section, 43 inches high, was divided into three parts. The two smaller parts, one of which opened to the rear of the unit, had adjustable shelves  $9\frac{1}{2} \times 10\frac{1}{2}$  inches. The larger part, 22 inches wide, could be used alternately with a rod for short garments on hangers or with shelves  $22 \times 23$  inches.



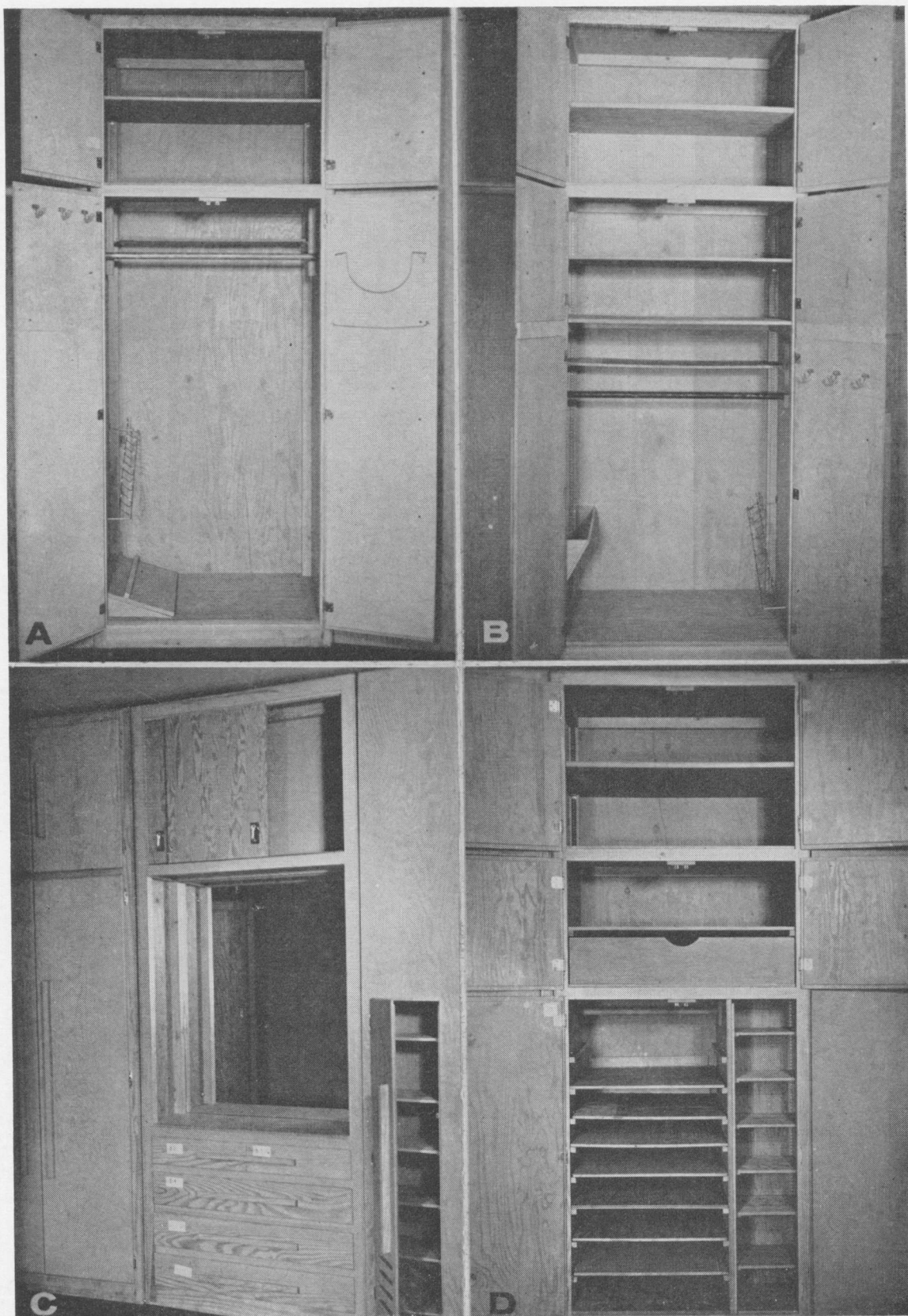


FIGURE 1. Clothing storage units after they were prepared for evaluation of space adequacy: (A) rod unit for adults and

children over 10 years old; (B) rod unit for children 2 to 10 years; (C) dresser and rear shelves of unit C; (D) unit C.



FIGURE 2. In space evaluation by laboratory workers, clothing arrangements for parents are shown here as examples: (A and C) rod closet and dresser for man (age 20 to 39), high and medium high socio-economic group, median level; wraps and boots included, with work pants folded on shelf in closet; gar-

ments in dresser drawer rolled. (B and D) closet and shelves for woman (age 30 to 39), high and medium high socio-economic group; wraps not included, would require 12 more inches of rod space; folded garments if rolled would require more than two dresser drawers.

### METHOD

Space evaluation of these units was made by placing specified sets of garments in them and judging whether the units used were adequate for storing the garments of each set.

### Garments

The garments used were mostly old and discarded ones. A few were borrowed from the currently used wardrobes of laboratory personnel and others. The discarded garments tended to be less crisp and full-bodied than those

regularly in use. Thus, they may have required less space for storing than newer garments. However, if spaces were judged inadequate for these garments, there could be no doubt of the inadequacy.

The numbers of garments of each kind used were based on the inventories of garments owned by 751 owner-operator farm families in the South as reported in the survey of housing needs and preferences in 1948 (2). Sufficient numbers of garments were collected to make arrangements for all age, sex, and socio-economic groups at the median level of ownership. Not enough were available to make arrangements at the third quartile level.<sup>1</sup>

### Placement of Garments

Sets of garments were arranged in the clothing storage units by laboratory workers, who made decisions in each case as to the adequacy of the units for storing the garments.

Some garments, such as coats, men's trousers, women's skirts and dresses, are regularly hung by homemakers, but a choice is made about whether to hang or fold garments, such as men's shirts and work pants and women's sweaters. In some instances, the material of the garment is the factor that determines the method; in others the relative amounts of storage facilities for hanging and for folding determine the method used. When shirts are sent to the laundry, they are usually returned and stored folded. For this part of the study, after arbitrary decisions were made about what items to store folded and what ones to put on hangers, the same division of garments was used for all sets. Some of these decisions were based on the capacities of the units for each type of storage in relation to the larger sets of garments. Men's shirts of all kinds were stored on hangers. Work pants were folded. Coat sweaters were stored on hangers. Pullover sweaters were folded.

Garments for each age, sex, and socio-economic group at the median level of ownership were stored. For men and boys over 10, shirts, suits, extra trousers not used for work, extra jackets, coat sweaters, top coats, and work coats, jackets and raincoats were stored on hangers. Shoes were placed on the rack. The garments on hangers were arranged so that the short ones hung over the shoes. For persons over 10 in the high and medium high socio-economic group, a second rod arrangement without wraps was made, since families of this group would probably have separate closets for wraps.

When arrangements were made, the capacity of rod units was given special study. First, one rod unit was used per person, as this was the basis on which the units were designed. Next, one rod unit was used for two persons of the low and medium low socio-economic group. This was done because the original study had indicated that only one-fourth of the families had as many as one rod closet per bedroom (2). Also one closet per bedroom and 36 inches of rod length per closet had been recommended as a minimum standard. For children's units limitations in numbers of garments available and the number of age combinations made it necessary to extrapolate the

<sup>1</sup> The third quartile level of ownership may be explained as follows: when the numbers of a given kind of garment owned by the individuals of a group are arranged in order, the third quartile level is represented by the number owned by the individual three-fourths of the way from lowest to highest. In such arrangements, *none* is considered a number.

rod length requirements of one person to estimate the requirements of two persons. Also, since it had not been feasible to collect enough garments to make arrangements at the third-quartile level, requirements for rod length for each kind of garment at the median level were extrapolated to give rod requirements at this higher level.

### Evaluations Using One Rod Unit per Person

When arrangements of folded garments were made, it was assumed that for the low and medium low socio-economic group the dresser and two rod units would constitute the entire bedroom storage for all garments for two persons. Since men's work and boys' play pants were too large to store in the dresser drawers, they were stored on the shelf over the rod. The drawer space was very limited; such small garments as underwear were rolled in order to fit the garments of two persons into the three larger dresser drawers. The two small drawers were reserved for items other than clothing.

In spite of these space-saving methods, the dresser was not adequate for storing the folded garments of two parents of the high and medium high socio-economic group. Two arrangements were made. For the first arrangement, the garments of men 20 and older were placed in dresser drawers except for work pants, which were stored on the shelf over the rod, Figure 2A and C, and folded garments of women 20 and older were placed in one dresser drawer and on shelves of Unit C. For the second arrangement, the garments of both parents were placed on the shelves of Unit C. (For example of an arrangement for a woman, see Figure 2B and D.)

For unmarried men and for girls 11 to 19, all arrangements of garments not on hangers were made in dresser drawers, with the exception of the men's work pants, which were stored on the closet shelf. Estimates of adequacy of storage space for folded garments were then made on the basis of whether the dresser would hold the garments of two girls or two boys.

Garments of children under 10 were stored in the rod closet and in dresser drawers. Folded garments for children were stored in small trays and on the small shelf of the rod unit, and an alternate arrangement was made, using dresser drawers and the shelf. Examples of these arrangements are shown in Figure 3.

### Evaluations Using One Rod Unit per Two Persons

Garments on hangers for parents of comparable ages were placed in one rod unit. This was done only for the low and medium low socio-economic group. In each case the garments could be placed in the unit, but they were crowded even though the man's extra trousers and the woman's extra skirts were hung on multiple hangers. Next the work wraps were removed. If the closet was still crowded, as was the case of two age groups, the other wraps were removed. Each time a judgment of adequacy was made and the rod requirement of the wraps removed was estimated.

For estimates of adequacy of the closets for use by two children, the rod lengths required per child were used in calculating rod requirements, using various age combinations. When the calculated requirement was in excess of 34 inches of rod space, the unit was considered inadequate for storing the two sets of garments.



**FIGURE 3.** In evaluation of space by laboratory workers, clothing arrangements for children, high and medium high socio-economic group, median level, are shown here as examples: (A and C) rod closet and dresser drawer for boy (age 6 to 10);

closet contains entire inventory; drawer is an alternate facility for storing garments in trays on closet floor. (B and D) rod closet for girl (age 2 to 10) with play suits and blue jeans on shelf; garments in drawer are rolled.

The space for storage of folded garments was not re-evaluated, since one dresser had already been assigned to two persons in the previous evaluations.

### Extrapolation to the Third Quartile Level

For arrangements in rod closets, the rod space requirement for each kind of garment for each age, sex, and socio-economic group at the median level was measured, and the rod length extrapolated to include the requirements at the third quartile level. These requirements were then assembled to give total rod length requirements. Because shelf and drawer storage requirements are not additive, they could not be handled in this manner. It had also become evident that the lists of folded garments as

determined by the survey were incomplete, and no further estimates of shelf and drawer storage requirements were made at this time.

## RESULTS AND DISCUSSION

### Rod Length

The age and socio-economic groups for which a rod unit was considered adequate for storing garments of an individual family member at median and third quartile levels are given in Table 1. This table also shows how successive exclusion of work wraps and other wraps increased the number of instances in which the unit was judged to be adequate.

TABLE 1. ADEQUACY OF 36-INCH ROD UNITS FOR STORING SPECIFIED SETS OF GARMENTS FOR ONE PERSON<sup>1</sup>

Family member	Age	All garments on hangers				Exclude work wraps				Exclude all wraps			
		Socio-economic group				Socio-economic group				Socio-economic group			
		Low and med. low		High and med. high		Low and med. low		High and med. high		Low and med. low		High and med. high	
		Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
	Median	3rd qrtl.	Median	3rd qrtl.	Median	3rd qrtl.	Median	3rd qrtl.	Median	3rd qrtl.	Median	3rd qrtl.	
Men H <sup>2</sup>	20-39	X	0	X	0	X	X	X	0	X	X	X	0
	40-49	X	X	X	0	X	X	X	X	X	X	X	X
	50-59	X	0	X	0	X	X	X	X	X	X	X	X
	60-	X	X	X	0	X	X	X	0	X	X	X	X
Women	20-29	X	0	0	0	X	0	0	0	X	X	X	0
	30-39	X	0	0	0	X	0	X	0	X	X	X	0
	40-49	X	0	0	0	X	X	X	0	X	X	X	X
	50-	X	0	X	0	X	X	X	0	X	X	X	X
Boys	2-5	X	X	X	0	X	X	X	X	X	X	X	X
	6-10	X	X	X	X	X	X	X	X	X	X	X	X
	11-14	X	X	X	0	X	X	X	0	X	X	X	X
	15-19	X	0	X	0	X	0	X	0	X	X	X	X
Men NH <sup>2</sup>	20-39	X	0	X	0	X	X	X	0	X	X	X	X
Girls	2-5	X	0	X	0	X	X	X	X	X	X	X	X
	6-10	X	X	X	0	X	X	X	0	X	X	X	X
	11-14	X	0	X	0	X	0	X	0	X	X	X	0
	15-19	X	0	0	0	X	0	0	0	X	0	0	0

<sup>1</sup> X indicates that the 34-inch rod space of the unit was considered adequate for storing the specified set of garments for the family member of the age, socio-economic group, and level of ownership designated. 0 indicates that the rod space was not considered adequate.

<sup>2</sup> H indicates head of family; NH indicates not a head of family.

TABLE 2. ADEQUACY OF 36-INCH ROD UNITS FOR STORING SPECIFIED SETS OF GARMENTS FOR TWO PERSONS<sup>1</sup>

Persons using unit	All garments on hangers				Exclude work wraps				Exclude all wraps			
	Socio-economic group				Socio-economic group				Socio-economic group			
	Low and med. low		High and med. high		Low and med. low		High and med. high		Low and med. low		High and med. high	
	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level	Level
	Median	3rd qrtl.	Median	3rd qrtl.	Median	3rd qrtl.	Median	3rd qrtl.	Median	3rd qrtl.	Median	3rd qrtl.
Two Parents.....	0	0	0	0	X <sup>2</sup>	0	0	0	X <sup>3</sup>	0	0	0
Two Boys.....	X <sup>4</sup>	0	0	0	X <sup>5</sup>	0	X <sup>4</sup>	0	X <sup>6</sup>	X <sup>7</sup>	X <sup>8</sup>	X <sup>9</sup>
Two Girls.....	0	0	0	0	X <sup>10</sup>	0	0	0	X <sup>7</sup>	0	X <sup>9</sup>	0

<sup>1</sup> 0 indicates that the 34-inch rod space of the unit was not considered adequate for storing the specified sets of garments for any combination of ages of the socio-economic group and level designated. X indicates that the 34-inch rod space was considered adequate for the combination of ages to which the specific footnotes refer.

<sup>2</sup> Man 40-49, woman 50 or over.

<sup>3</sup> All combinations *except* those with women 20-29.

<sup>4</sup> Two persons 2-10.

<sup>5</sup> All combinations *except* those with both persons over 11.

<sup>6</sup> All combinations *except* those with both persons 15-19 or one 15-19 and one 20-39.

<sup>7</sup> All combinations *except* those with both persons over 11 or one over 14.

<sup>8</sup> All combinations *except* those with both persons over 14 or unlikely combination of 2-5 and 15-39.

<sup>9</sup> Two persons 6-10.

<sup>10</sup> Two persons 2-5.

It may also be noted that, for a given family member within a socio-economic group and level of ownership, the rod unit was considered adequate for some but not all age groups. For example, the rod length was considered adequate for a man of the low and medium low socio-economic group at the third quartile level for only the age groups 40-49 and 60 and over. It is practical that each user have a unit that continues to be adequate for the entire period of its use.

The implications of this idea was the basis of the concept, *lifetime requirements*. That is, rod length and other dimensional requirements for storage should be based on

maximum requirements for the time the person is expected to use the storage facility. The idea of expressing requirements on a lifetime basis saves time and effort, since fewer dimensional standards have to be determined and the statement of requirements is simpler. However, the application of the lifetime requirement standard reduced the number of persons for whom the rod unit was considered adequate.

Adequacy of the 3-foot rod unit for storing the clothing of two persons is indicated in Table 2. When the *lifetime requirement* standard is applied, the unit cannot be considered adequate in any instance.

Since adequacy was dependent in most instances upon the separate storage of wraps, the rod length requirement for storing work wraps and the adequacy of the 3-foot unit for dress wraps should be mentioned. A 3-foot unit was considered adequate for storing the work wraps for a family of four in all instances except for the high and medium high socio-economic group at the third quartile level, for which a 4-foot unit was required. A 3-foot unit was considered adequate for storing dress wraps for a family of four in all instances. However, little or no rod space remained for guests' wraps in a unit of this size.

After the adequacy of the rod space in these units was judged by this method, it became evident that a statement of rod space requirements of family members at various levels of ownership of garments was needed. This statement of space requirements needed to include requirements for storing on hangers items that were folded by some women and hung by others. It also needed to show three-dimensional space requirements rather than rod length only. Such an expression of the space requirements for storing garments on hangers would have a wider application than the statements of adequacy of the units. These more general requirements obviously needed to be determined in an unrestricted space that was not available in the units. However, the work done with the units was useful as a basis for a further study that is reported in a separate publication (7).

### Storage Space for Folded and Rolled Garments

The facilities required for storing folded and rolled garments of two parents or of one child at various ages are given in Table 3. This information is for the median

TABLE 3. FACILITIES REQUIRED FOR STORING FOLDED OR ROLLED GARMENTS OF FAMILY MEMBERS AT THE MEDIAN LEVEL OF OWNERSHIP<sup>1</sup>

Garment	Socio-economic group	
	Low and med. low	High and med. high
2 Parents		
Man's work pants	Shelf over rod	Shelf over rod
Other garments	2¾ Dresser drawers	3 Dresser drawers or Shelves, unit C
1 Boy 2-10		
Outer shorts, jeans	Shelf over rod	Shelf over rod
Other garments	1 Dresser drawer	1 Dresser drawer
1 Boy 11-19		
Jeans, work pants	Shelf over rod	Shelf over rod
Other garments	1 Dresser drawer	1½ Dresser drawers
1 Man 20-39 (nonhead) <sup>2</sup>		
Jeans, work pants	Shelf over rod	Shelf over rod
Other garments	1 Dresser drawer	1½ dresser drawers
1 Girl 2-10		
All garments	1½ Dresser drawers or	1½ dresser drawers or
All garments	1 Small tray and shelf over rod	1 Small tray and shelf over rod
1 Girl 11-19		
All garments	1½ Dresser drawers	2 Dresser drawers

<sup>1</sup> Underwear and sleeping garments rolled; garments such as work pants, slacks, and outer shorts folded.  
<sup>2</sup> Nonhead means not head of family.

level only. From this table it may be inferred that when shelves are used for storing men's and boys' outer shorts, slacks, jeans, and work pants, the three larger drawers of the dresser will hold the rest of the folded garments of two parents or two children with one exception. Two girls 11-19 would require four dresser drawers.

This evaluation of the space for folded garments was predicated on methods that have definite limitations. It was necessary in many instances to roll underwear and sleeping garments in order to store the garments in the spaces provided. Rolling was not known to be a common practice of homemakers nor was there any assurance that it would be an acceptable one. No shirts were stored folded. If they had been, the dresser drawers would not have been considered adequate for parents, or boys over 10, at any level. It was apparent that many items of clothing worn by women and girls had not been included in the check lists of the original survey.

There were no estimates of requirements of this kind of storage at the third quartile level. In view of the lack of standard dimensions for drawers and shelves and the non-additive nature of space requirements of folded and rolled garments, it seemed impossible to extrapolate these requirements to higher levels.

In order to apply the results of this evaluation to the general situation, it is necessary to assume that trays and shelving are available for the storage of folded garments in rod units. Thus, the evaluation is not in all cases of dresser space only but of dresser, shelf, and tray space in the available units.

It was concluded that a method of stating these requirements at various levels of ownership of garments needed to be devised and that this method should not be based on the components of the units. The perspective gained by this attempt at evaluating the space in these units was advantageous in a further study of the problem of space requirements of garments not stored on hangers. This study is reported in a separate publication (6).

### Garments Stored on Racks and Hooks

The wooden slanted shoe racks in the rod units were not wide enough for three pairs of men's shoes of medium width. This inadequacy was the depth of the unit rather than any defect of the racks. Although the racks were not suitable for boots, it is probable that most families would find it undesirable to store boots in the bedroom rod unit. Women and girls usually had more than three pairs of shoes, which was the greatest number that could be stored on one rack. Space for children's shoes depended on the age of the child and the number of pairs owned. However, on the basis of lifetime requirements, one rack accommodated the shoes of a child of the low and medium low socio-economic group at the median level but not one of the high and medium high group.

Men's hats could be stored on shelves. However, it would be necessary to place them on the bottom shelf of the upper section when work pants were stored on the shelf over the rod. Hat racks at the top of the door were acceptable when lower rod levels were used. Use of racks fastened to the ceiling of the lower part of the rod unit interfered with the storage of garments on the shelf over the rod, Figure 2A. Therefore, such location of the rack is not recommended.

Women's and children's hats could be stored on shelves,

but in the case of small children, the hats might have to be stored out of their reach unless hooks on the door were used.

There was room on the door for storing belts, ties, and such clothing as nightwear and undergarments that had

been used and would be used again before laundering. However, when the door was closed, these garments pressed against the garments on the rod. Thus, the door space could be made adequate only by making the unit deeper.

## General Evaluation by Twenty Homemakers

Twenty homemakers were asked to comment on all units but especially to evaluate the clothing storage units in terms of the mean numbers of garments owned by all men and boys over 10, all women and girls over 10, all boys 2-10, and all girls 2-10 as given in the report of the housing survey (2).

Since it had been shown that a rod unit for work wraps was essential to adequate and proper storage of the family's clothing, such a unit was constructed previous to this evaluation. It was located on the back porch because of lack of room in the house. Also there are often objections to storing in the house outer clothing that has been worn in the barn and feed lots.

The space evaluation indicated that the 3-foot rod unit was not long enough for the clothing of one person at higher levels of ownership. A 4-foot unit was planned for this reason, as well as to take advantage of the 4-foot plywood commonly used. Although less than 4 feet of rod length was required for storing work wraps, space was needed for storing toys and tools that are used out-of-doors.

The unit, Figure 4, was designed on the basis of dimensions supplied, and was built by students who had little experience in building and none in cabinet work. The sliding doors, necessary because of the location of the unit with relation to traffic through the porch, moved in wood grooves. This was not a satisfactory installation and the doors were later hung on overhead tracks. The shelf was at first removable. However, the unit needed bracing, so the shelf was securely fastened in the unit to provide stability.

### METHOD

The 20 evaluators came to the storage wall laboratory one at a time. Some were accompanied by a friend who was not participating in the evaluation, but who may have had some influence on the evaluator's decisions. An evaluation required 2 to 3 hours. As soon as the evaluator arrived at the laboratory, she replied to a questionnaire about herself, her family and household, her facilities for storing clothing, methods of storing clothing, locations of stored clothing in her home, and her preferences for methods and locations for storing clothing.

Next, she was shown the various storage units, but her attention was especially directed to the clothing storage units: a rod unit for each family member, as well as one in the living room and one on the back porch; a dresser in each bedroom; and unit C, which faced the parents' bedroom, but had a section of small shelves that opened into the children's bedroom.

She was then asked to store in the units four sets of gar-

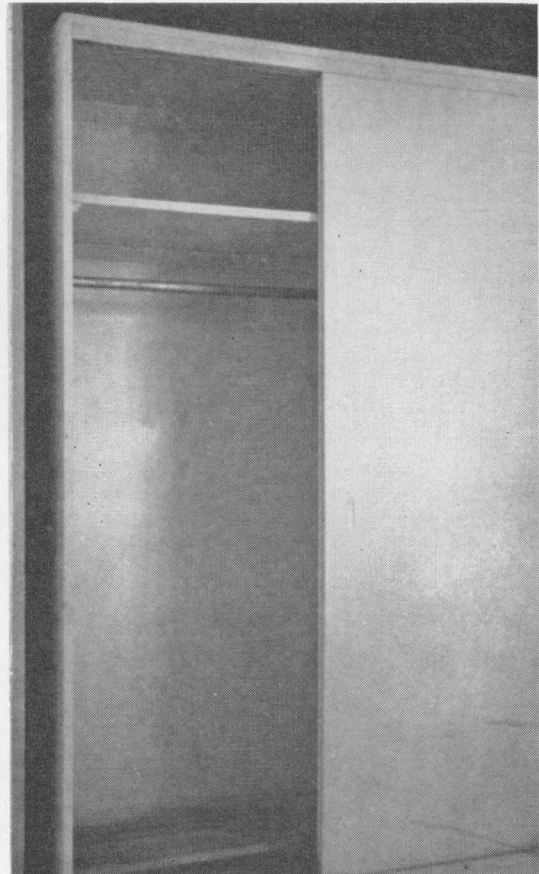
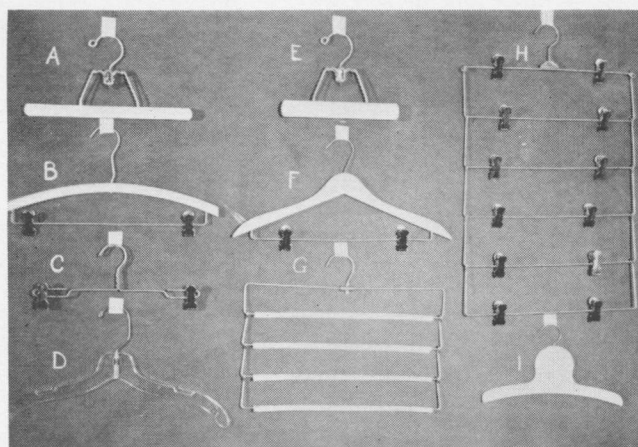


FIGURE 4. Back porch unit planned for storage of wraps worn for chores.

ments, one for each of the following: husband, wife, boy under 10, and girl under 10.<sup>2</sup> The parents' clothing was always stored first. When the evaluator went into the parents' bedroom, the clothing for the man and woman had been placed on the bed and hung on a portable clothes rod. The garments on the bed were not folded. Some of these (e.g., shirts and work pants) were placed unfolded on

<sup>2</sup> The numbers of garments per person was approximately equal to the mean number of garments of (a) all men and boys over 10, (b) all women and girls over 10, (c) all boys 2-10, and (d) all girls 2-10 as reported in Tables 108-111 of the survey report (2). In addition, some items not included in the survey inventory but known to be owned were among the items to be stored. These were combs, brushes, mirror, cosmetics, gloves, scarfs, handkerchiefs, and belts for the parents; hose for the woman; ties for the man; slacks for the girl, and a belt for the boy.



**FIGURE 5. Types of hangers provided for the 20 evaluators to use in storing garments.**

the bed to require her to make a choice between hanging and folding them. Others, (e.g., skirts and trousers) were placed there to require her to choose a hanger. The garments on the portable racks were hung on wire hangers, but a variety of hangers were provided, Figure 5. She was told that she should fold or hang each item as she chose, regardless of whether it was lying on the bed or hung on hangers, and that she might choose from the special hangers provided those that she wished to use for hanging any garment.

When the clothing for the parents had been stored, the evaluator was asked questions to bring out her opinions about the space adequacy and other functional qualities of the storage units in the parents' room. She was also asked to make suggestions about the units.

After a rest period, she was asked to store the children's garments. They were placed as those of the parents. Of the garments that were not hung on the portable rod, the boy's were placed on one bed, the girl's on the other. The locations of the two sets were alternated to avoid any possible influence of position of clothes on choice of rod units for boy and girl.

After the children's garments were stored, the evaluator was asked questions about the functional qualities of the units. In addition, she was asked to state her opinions about certain uses of the children's room that might apply to the situation in the storage wall laboratory.

While the evaluator was placing the garments, a laboratory worker used a check sheet to record the location of each kind of garment, and kept a written record of her comments. However, it was not always possible to record every comment when the evaluator talked rapidly.

After the evaluator left the laboratory, photographs were made of the arrangements of clothing in the bedroom rod units and unit C. The photographs were used to verify the records on the check sheets and to show the distribution of the garments along the rod.

## RESULTS

### Homemaker Evaluators and Their Households

The homemakers who served as evaluators either were at the time or had been home demonstration club members of Chambers and Lee counties. They were so chosen

as to fulfill requirements for inclusion in the Southern Regional Housing Survey.<sup>3</sup> No attempt was made to select a random sample. Since each woman had to come to the laboratory, distance was an important consideration.

Nineteen of the evaluators were married. One of these lived on her father's farm as did the unmarried evaluator. Three of them had part-time employment in addition to homemaking. Of the 18 operator husbands, 16 were general farmers and 2 were dairymen. Seven husbands had an occupation in addition to farming. The husband living on his father-in-law's farm had full employment off the farm.

They were not asked to state their ages, but apparently ages ranged from the 20's to the 60's. Ten had lived on a farm all their lives; 4, most of their lives; and 6, from 3 to 28 years.

Twelve had children at home. Number of children ranged from one to three, but one woman had two children and two grandchildren. Children's ages ranged from 7 months to 24 years. Other household members were: parents of homemaker or husband, sister of homemaker, and men boarders. Household size ranged from 2 to 7. Average size was 3.75.

### Clothing Storage Facilities Owned by Homemaker Evaluators

The number of built-in rod closets per family ranged from 2 to 6, average 3.1. Number of movable rod closets ranged from 0 to 4, average for all families 1.3. Total number of rod closets per family ranged from 2 to 9, average 4.4. Drawer units for clothing ranged from 2 to 9 per family, average 4.45. Thus, on a per-family basis the families of these homemakers were better equipped with clothing storage units than those in the Southern Regional Survey (2). On a per-person basis, over half of the homes represented were as well or better supplied with such facilities as was the storage-wall laboratory, which was planned for a family of four.

### Methods of Storing Garments at Home and Choice of Facilities

The evaluators' practices and preferences for hanging or folding specified garments at home were useful in determining space requirements for storage facilities. These requirements have already been reported (6,7).

Ownership of and preferences for facilities for storing folded garments were pertinent, since as evaluators of the clothing storage units they might be influenced by their experiences at home. All of the homemakers used drawers for storing some kinds of folded garments and nearly all preferred them. Four also used shelves for some kinds of garments. Of these, three preferred using shelves. One used shelves for nearly all folded garments and preferred them.

### Locations for Storing Garments in Evaluators' Homes

The evaluators' answers to questions about locations and their location preferences for storing clothing at home were also used in planning space requirements for storing

<sup>3</sup> To be eligible the family had to own part or all of its farm, and operate the farm; the household had to consist of two or more members, one of whom was a homemaker at least 16 years of age and related to the operator or herself the operator.



TABLE 4. LOCATIONS USED AND PREFERRED FOR STORING GARMENTS AT HOME—NUMBER OF EVALUATORS USING AND PREFERRING EACH LOCATION<sup>1</sup>

Garments	Number reporting	Locations					
		Owner's bedroom	Guest room	Hall	Back porch	Near back door <sup>2</sup>	Other
Dress wraps.....	20 (18)	13 (10)	2 (1)	1 (3)	0 (0)	0 (0)	4 (4)
Man's dress hats.....	18 (15)	13 (11)	2 (1)	1 (1)	0 (0)	0 (0)	2 (2)
Woman's dress hats.....	20 (17)	13 (14)	4 (1)	2 (2)	0 (0)	0 (0)	1 (0)
Work wraps.....	20 (17)	5 (2)	0 (0)	2 (1)	4 (6)	5 (7)	4 (1)
Raincoats.....	19 (15)	7 (4)	0 (0)	0 (0)	5 (7)	3 (2)	4 (2)
Work hats and caps.....	18 (18)	3 (2)	0 (0)	0 (0)	6 (7)	6 (8)	3 (1)
Overshoes and galoshes.....	20 (19)	1 (0)	0 (0)	1 (1)	7 (8)	9 (9)	2 (1)
Boots.....	16 (14)	2 (0)	0 (0)	0 (0)	7 (7)	5 (6)	2 (1)
Man's work shoes.....	20 (15)	9 (7)	0 (0)	1 (1)	2 (1)	2 (3)	6 (3)
Man's work shirts, pants.....	20 (20)	17 (17)	0 (0)	1 (1)	0 (0)	0 (0)	2 (2)
Aprons.....	19 (16)	10 (5)	0 (0)	0 (0)	0 (0)	0 (0)	9 (11) <sup>3</sup>

<sup>1</sup> The first number in each column indicates the number of evaluators using locations; the second number within parenthesis indicates the number preferring locations.

<sup>2</sup> Not on porch or in hall.

<sup>3</sup> Of these five stored in kitchen and eight preferred kitchen.

garments. The evaluators' use and choices of locations for storing selected garments at home are given in Table 4. It was believed that their home practices and their preferences might influence their selection of storage spaces at the laboratory. However, from conversations with the evaluators after the questionnaire was completed, it was evident that in many instances stated preferences for storing items at home were associated with situations existing at home and were not abstract preferences.

### Storage of Garments in Rod Units at the Laboratory

The evaluators' use of the six rod units at the laboratory is given in Tables 5 through 10. In addition to the information in these tables, remarks of the evaluators revealed their reasons for choices of storage units and other information not reported in the tables.

Eighteen evaluators showed a preference for separate bedroom rod units for each person, but one placed the work clothes of both parents in one bedroom rod unit and their good clothes in the other unit. Another one selected separate units for the parents, but said that it would not matter much whether two parents or two children shared a unit or each had a separate unit.

From the remarks recorded, it seemed that the evaluators had the woman's interests in mind when choosing bedroom rod units. Eleven used the rod unit nearer the dresser for the woman's clothing, although there was a tie rack in it that might have influenced them to choose the unit for the man. Several mentioned that the woman should have the unit nearer the dresser, but three said they gave the man the other unit because it was nearer the door and would be handier for him. Fourteen of the 20 evaluators gave the girl the unit nearest the dresser.

TABLE 5. EVALUATORS' USE OF MAN'S ROD UNIT BY GARMENTS AND FACILITIES

Garment	Number placing in unit <sup>1</sup>		Number using for each kind of garment					
	All of each kind	Part of each kind	Rod	Special racks	Top section	Hooks	Floor	Shelf over rod
Suits.....	20	0	20	0	0	0	0	0
Extra jackets.....	20	0	20	0	0	0	0	0
Extra trousers.....	20	0	20	0	0	0	0	0
Ties.....	18	0	1	17	0	0	0	0
Belts.....	18	0	1	5	0	11	0	1
Dress hats.....	16	0	0	2	12	0	1	1
Shoes.....	13	5	0	18	0	0	2	1
Overcoat.....	13	0	13	0	0	0	0	0
Work sweater.....	12	0	12	0	0	0	0	0
Work pants.....	9	0	9	0	0	0	0	0
Dress shirts.....	7	6	13	0	0	0	0	0
Work shirts.....	7	1	7	0	2	0	0	0
Work jackets.....	4	0	4	0	0	0	0	0
Work hats.....	2	3	0	0	4	0	0	1
Boots.....	2	0	0	0	0	0	2	0
Socks.....	1	0	0	0	1	0	0	0
Nightwear.....	1	0	0	0	1	0	0	0
Good dresses, woman.....	1	0	1	0	0	0	0	0
Good coat, woman.....	1	0	1	0	0	0	0	0

<sup>1</sup> The total of these two columns does not equal the total of the next six columns when one or more evaluators stored part of the garments of one kind in one facility and part in another. For example, two evaluators had placed some of the shoes on racks and some on the floor, and one had placed some shoes on the rack and some on the shelf over the rod.

TABLE 6. EVALUATORS' USE OF WOMAN'S ROD UNIT BY GARMENTS AND FACILITIES

Garment	Number placing in unit <sup>1</sup>		Number using for each kind of garment					
	All of each kind	Part of each kind	Rod	Special racks	Top section	Hooks	Shelf over rod	Floor
House dresses.....	20	0	20	0	0	0	0	0
Blouses.....	20	0	20	0	0	0	0	0
Skirts.....	20	0	20	0	0	0	0	0
Suits.....	20	0	20	0	0	0	0	0
Good dresses.....	19	0	19	0	0	0	0	0
Robes.....	19 <sup>2</sup>	0	17	0	0	2	0	0
Belts.....	17	1	7	8	0	4	0	0
Good coats.....	12	3	16	0	0	0	0	0
Work sweater.....	9	0	7	0	1	0	1	0
Shoes.....	7	9	0	16	0	0	2	2
Work coat.....	7	0	7	0	0	0	0	0
Good sweater.....	7	0	7	0	0	0	0	0
Hats.....	5	6	0	0	9	0	2	0
Raincoat.....	4	0	4	0	0	0	0	0
Nightwear.....	1	0	0	0	1	0	0	0
Purse.....	1	0	0	0	1	0	0	0
Work sweater, man.....	1	0	1	0	0	0	0	0
Aprons.....	0	1	1	0	0	0	0	0
Work shirts, man.....	0	1	1	0	0	0	0	0

<sup>1</sup> The total of these two columns does not equal the total of the next six columns when one or more evaluators stored part of the garments of one kind in one facility and part in another. For example, two evaluators had placed some of the belts on hangers with the dresses and some on racks.

<sup>2</sup> In addition one evaluator hung the robe in the bathroom on a hook, but stated she would like a closet in the bathroom.

Six of them said that she should have that particular unit because of nearness to the dresser.

It was probably natural for the evaluator to identify herself with the woman and the girl. This wish for having the dresser and the rod unit near each other has implications about preferences for room arrangement. It may be considered a vote for having centralization of the clothing storage facilities for each person regardless of sex. This is in keeping with management principles.

The data in Table 9 show that few of the 20 evaluators chose to use the living room rod unit for dress wraps. One remarked that she did not like the location of this unit because of tracking mud into the living room. Another said she would like to keep infrequently used clothing in this unit. There was no room for this unit in the hall, but if it could have been there, a greater preference might have been shown for it. Also there was not a large enough number of garments to crowd the bedroom rod units, so

TABLE 7. EVALUATORS' USE OF BOY'S ROD UNIT BY GARMENTS AND FACILITIES

Garment	Number placing in unit <sup>1</sup>		Number using for each kind of garment					
	All of each kind	Part of each kind	Rod	Shelf	Hook	Special racks	Floor	Top section
Good shirts.....	20	0	20	0	0	0	0	0
Trousers.....	20	0	20	0	0	0	0	0
Good jacket.....	20	0	20	0	0	0	0	0
Shoes.....	20	0	0	0	0	19	2	0
Good cap.....	20	0	0	14	0	4	0	2
Play shirt.....	19	1	19	1	0	0	0	0
Overcoat.....	19	0	18	0	1	0	0	0
Blue jeans.....	19	0	11	8	0	0	0	0
Play jacket.....	18	0	17	0	1	0	0	0
Play sweaters.....	17	0	2	13	0	0	1 <sup>2</sup>	1
Belts.....	17	0	3	0	12	2	0	0
Outer shorts.....	15	0	8	7	0	0	0	0
Play cap.....	15	0	0	10	5	0	0	0
Boots.....	13	0	0	0	0	6	7	0
Good sweater.....	12	0	4	8	0	0	0	0
Nightwear.....	10	1	0	10	0	0	0	1
Raincoat.....	9	0	8	0	1	0	0	0
Socks.....	8	0	0	3	0	2 <sup>3</sup>	3 <sup>2</sup>	0
Underwear.....	7	0	0	7	0	0	0	0
Play hat, girl.....	1	0	0	0	0	0	0	1

<sup>1</sup> The total of these two columns does not equal the total of the next six columns when one or more evaluators stored part of the garments of one kind in one facility and part in another. For example, two evaluators had placed some of the shoes on the rack and some on the floor.

<sup>2</sup> The garments were in small trays on the floor.

<sup>3</sup> The bin-type shoe rack was used for socks only.

TABLE 8. EVALUATORS' USE OF GIRL'S ROD UNIT BY GARMENTS AND FACILITIES

Garment	Number placing in unit		Number using for each kind of garment				
	All of each kind	Part of each kind	Rod	Shelf	Hook	Floor	Special racks
Dresses.....	20	0	20	0	0	0	0
Blouses.....	20	0	20	0	0	0	0
Skirt.....	20	0	20	0	0	0	0
Good jacket.....	20	0	20	0	0	0	0
Good coat.....	19	0	19	0	0	0	0
Play jacket.....	19	0	18	0	1	0	0
Shoes <sup>1</sup> .....	19	1	0	1	0	2	19
Slacks.....	15	1	11	5	0	0	0
Play hat.....	15	0	0	12	2	0	1
Good sweater.....	14	0	7	7	0	0	0
Play sweaters.....	10	1	3	8	0	0	0
Raincoat.....	9	0	8	0	1	0	0
Nightwear.....	5	2	0	6	0	1 <sup>2</sup>	0
Socks.....	1	0	0	0	0	1 <sup>2</sup>	0
Underwear.....	1	0	0	1	0	0	0
Underwear, boy.....	1	0	0	1	0	0	0

<sup>1</sup> The total number in the last five columns is greater than 20 because two evaluators each used two facilities in this unit.

<sup>2</sup> These were in a small tray on the floor.

TABLE 9. EVALUATORS' USE OF LIVING ROOM ROD UNIT BY GARMENTS AND FACILITIES

Garment	Evaluators using unit for		Evaluators using facilities		
	All of each kind	Part of each kind	Rod	Hat rack	Top section
Overcoat, man	7	0	7	0	0
Good coat, woman	4	3	7	0	0
Good hat, man	2	0	0	1	1
Raincoat, man	1	0	1	0	0
Raincoat, woman	1	0	1	0	0
Raincoat, boy	1	0	1	0	0
Raincoat, girl	1	0	1	0	0
Overcoat, boy	1	0	1	0	0
Good coat, girl	1	0	1	0	0

that storage of wraps in the bedroom was not a problem in most of the arrangements.

More evaluators used the back porch rod unit than the one in the living room. Results in Table 10 show that there was, in general, a greater tendency to store the man's rather than the woman's work clothes in this unit and adults' garments rather than children's. The evaluators usually expressed approval of the unit for work wraps. One expressed doubt that men would use hangers for work wraps, and suggested that there should be hooks.

Most of the evaluators seemed unaccustomed to using special hangers such as those supplied. From their comments it appeared that they usually used wire hangers for trousers and skirts, either folding them over the horizontal part of the wire hanger, or fastening them to the hanger with pinch clothes pins. The latter method was frequently used at home for skirts. At the laboratory, the evaluators did not always assemble suits on the hangers.

Such practices as folding garments over the hanger and storing parts of suits separately tend to increase the requirement for rod space without providing more satisfactory storage. It may be well to consider whether the extra cost of special hangers is greater than the cost of the space saved by their use. The effect of special hangers on the

garment needs also to be considered; some hangers may be better adapted than others to preserving the neatness of the garment.

### Storage of Folded Garments at Laboratory

The evaluators' use of the dresser unit and unit C for storing the parents' clothing is given in Tables 11 and 12. There was a tendency to use the dresser for the woman's garments rather than the man's and a somewhat less pronounced tendency to use unit C for storing the man's garments rather than the woman's.

The small size of the dresser drawers made them inadequate for storing work pants and barely adequate for storing the man's shirts and pajamas. The choice of unit C for storing these larger items (when they were not stored in the rod unit) was perhaps made on the basis of sizes of the facilities and not because of a preference for shelves for storing men's garments.

In unit C the sliding shelves were used more often than the other facilities. The evaluators had a tendency not to pull the sliding shelves forward, even though they knew they could. Some indicated that it was hard to reach into them and some even removed shelves to make the remaining ones more accessible. During discussions after the arrangements were made, the evaluators usually said these would have been easier to use if they had been pulled forward, but that they were not accustomed to pull-out shelves.

The evaluators had a selection of trays and shelves that they could use in the center section of unit C. Only 10 of them used these. Nine others used the section without trays or shelves, and one did not use this section.

The dresser unit and unit C together had more space than was required for storing the set of parents' folded garments that was given the evaluators. Most of the evaluators had a tendency to spread the garments over a larger area than necessary, although they were told that the object of the study was to determine adequate storage space and that it was not desirable to recommend more space than was needed.

A few evaluators stored some folded garments in the top sections of the rod units. Some of them indicated by their remarks that they did this to get the folded garments of one of the parents near his or her garments on hangers.

The evaluators' use of the children's dresser unit and the small shelves at the rear of unit C is given in Table 13. They had a tendency to store the girl's rather than the boy's folded garments in the dresser. This was less pro-

nounced than their tendency to use the dresser for the woman's garments rather than for the man's.

The small shelves in unit C were used for storing small garments. However, the combination of the dresser unit and these small shelves did not provide sufficient space for storing all of the children's folded garments. The shelving in the rod units was also used for this purpose (Tables 7 and 8). A few evaluators placed some garments in small trays on the floor of the rod unit.

TABLE 10. EVALUATORS' USE OF BACK PORCH ROD UNIT BY GARMENTS AND FACILITIES

Garment	Number placing in unit		Number using for each kind of garment				
	All of each kind	Part of each kind	Rod	Rack	Shelf	Floor	Hook
Galoshes, woman.....	20	0	0	11	1	8	0
Raincoat, man.....	19	0	19	0	0	0	0
Boots, man.....	18	0	0	18	0	0	0
Work jacket, man.....	16	0	16	0	0	0	0
Work hats, man.....	15	2	0	0	16	0	1
Raincoat, woman.....	15	0	15	0	0	0	0
Work coat, woman.....	13	0	13	0	0	0	0
Work hat, woman.....	12	0	0	0	11	0	1
Raincoat, boy.....	10	0	10	0	0	0	0
Raincoat, girl.....	10	0	10	0	0	0	0
Boots, boy.....	7	0	0	5	0	2	0
Work shoes, man.....	6	0	0	5	0	1	0
Shoes, woman.....	0	2	0	0	0	2	0
Work sweater, man.....	4	0	4	0	0	0	0
Play hat, girl.....	4	0	0	0	3	0	1
Play cap, boy.....	3	0	0	0	2	0	1
Work sweater, woman.....	3	0	3	0	0	0	0
Play jacket, boy.....	2	0	2	0	0	0	0
Play jacket, girl.....	1	0	1	0	0	0	0
Play shoes, girl.....	1	0	0	0	0	1	0

TABLE 11. EVALUATORS' USE OF PARENTS' DRESSER UNIT BY ITEMS AND FACILITIES

Item	Number placing in unit <sup>1</sup>		Number using for each kind of item			
	All of each kind	Part of each kind	Small drawers	Large drawers	Surface of dresser	Top section
Cosmetics.....	17	3	19	0	2	0
Brush.....	20	0	13	0	7	0
Mirror (hand).....	20	0	12	0	8	0
Combs.....	19	1	13	0	7	0
Hankerchiefs, woman.....	15	0	6	9	0	0
Scarf, woman.....	13	0	4	9	0	0
Hose, woman.....	13	0	1	12	0	0
Gloves, woman.....	11	0	4	7	0	0
Slips, woman.....	9	0	0	9	0	0
Panties, woman.....	9	0	0	9	0	0
Brassieres, woman.....	9	0	0	9	0	0
Purse, woman.....	8	0	1	5	0	2
Nightwear, woman.....	8	0	0	8	0	0
Good sweater, woman.....	6	0	0	6	0	0
Handkerchiefs, man.....	5	0	1	4	0	0
Socks, man.....	5	0	0	5	0	0
Aprons, woman.....	3	0	0	3	0	0
Nightwear, man.....	3	0	0	3	0	0
Belts, woman.....	2	1	0	3	0	0
Work sweater, woman.....	2	0	0	2	0	0
Underwear, man.....	2	0	0	2	0	0
Ties, man.....	1	0	0	1	0	0
Dress shirts, man.....	0	1	0	1	0	0

<sup>1</sup> The total of these two columns does not equal the total of those next four columns when one or more evaluators stored part of the items of one kind in one facility and part in another. For example, one evaluator placed some cosmetics in a small drawer and some on top of the dresser.

TABLE 12. EVALUATORS' USE OF UNIT C BY GARMENTS AND FACILITIES

Garment	Number placing in unit		Number using for each kind of garment <sup>1</sup>				
	All of each kind	Part of each kind	Sliding shelves	Small shelves	Center section		Top section
					Trays	Shelves	
Underwear, man <sup>1</sup> .....	18	0	12	1	4	2	1
Nightwear, man.....	16	0	11	1	2	2	0
Handkerchiefs, man.....	15	0	1	11	3	0	0
Socks, man.....	14	0	3	9	2	0	0
Work shirts, man.....	12	1	8	0	2	3	0
Slips, woman.....	11	0	10	0	0	1	0
Panties, woman.....	11	0	6	4	0	1	0
Brassieres, woman.....	11	0	6	4	0	1	0
Work pants, man.....	11	0	6	0	0	5	0
Nightwear, woman.....	11	0	10	0	1	0	0
Purse, woman.....	11	0	0	7	1	1	2
Gloves, woman.....	9	0	0	9	0	0	0
Dress hats, woman.....	9	0	0	0	0	5	4
Dress shirts, man.....	7	5	8	0	3	1	0
Hose, woman.....	7	0	2	5	0	0	0
Scarf, woman.....	7	0	0	7	0	0	0
Good sweater, woman.....	6	0	6	0	0	0	0
Handkerchiefs, woman.....	5	0	0	5	0	0	0
Work sweater, woman.....	5	0	0	3	0	1	1
Shoes, woman.....	3	4	1	6	0	0	0
Aprons, woman.....	3	1	3	0	0	1	0
Work sweater, man.....	3	0	2	0	1	0	0
Shoes, man.....	2	0	1	1	0	0	0
Belts, man.....	2	0	0	1	1	0	0
Ties, man.....	1	0	0	0	1	0	0

<sup>1</sup> The total of the last five columns does not equal 18 because one evaluator placed some underwear on the sliding shelves and some on the small shelves, and one placed some in a tray and some in the top section.

TABLE 13. EVALUATORS' USE OF CHILDREN'S DRESSER UNIT AND SMALL SHELVES IN CHILDREN'S ROOM BY GARMENTS AND FACILITIES

Garment	Dresser unit				Small shelves	
	Number placing in drawers		Number using for each kind of garment		Number placing in shelves	
	All of each kind	Part of each kind	Large drawers	Small drawers	All of each kind	Part of each kind
Underwear, girl.....	19	0	16	3	3	1
Socks, girl.....	14	0	6	8	5	0
Nightwear, girl.....	13	2	15	0	0	0
Underwear, boy.....	10	1	7	4	2	0
Play sweaters, girl.....	9	1	10	0	0	0
Nightwear, boy.....	8	1	9	0	2	0
Socks, boy.....	7	0	3	4	5	0
Good sweater, boy.....	7	0	7	0	1	0
Good sweater, girl.....	6	0	6	0	0	0
Slacks, girl.....	4	1	5	0	0	0
Outer shorts, boy.....	4	0	4	0	1	0
Play sweaters, boy.....	3	0	3	0	0	0
Play pants, boy.....	1	1	2	0	0	0
Belts, boy.....	1	0	0	1	1	0
Play shirts, boy.....	0	1	1	0	0	0
Caps, boy.....	0	0	0	0	1	1

### Evaluators' Comments, Opinions, and Suggestions

Evaluators usually expressed surprise at finding so much storage space in so small a house. They seemed favorably impressed with storage walls as a means of providing space for storing possessions of all kinds.

They were asked questions about the clothing storage units in each bedroom after the garments were stored. Their replies to questions, which were phrased to elicit

short answers, were frequently qualified by comments. To questions about adequacy of units for storing the specific sets of garments, most of the replies indicated that the spaces were just right or sufficient. Exceptions were that the dresser and unit C together were judged to provide more space than needed for storing the parents' garments by 11 of the group and to be too small by 8. The comments of the latter favored more drawer space. However, several comments were that this set of garments included

fewer items than most people would own or that one never could have too much storage space.

Similarly, when asked if all the spaces in a unit were filled, some evaluators were reluctant to admit that obviously empty space remained. Some protested: "You would find things to put there." "You would really have more than this." Or, in the case of children's units, "They will eventually need more space." Such comments may have been prompted by personal experience with inadequate storage. Some may have reflected practical attitudes toward future needs of growing children. Comments were unfavorable to the use of shelves and trays in the children's rod units for storing folded garments.

About three-fourths of the evaluators thought the dresser tops were large enough, although several of them indicated that they were of minimum size or that larger ones might be preferable. Others said they were not large enough.

Opinions about space on the closet doors for storing garments that had been used and would be used again before laundering were in the same proportion. About three-fourths thought the space sufficient.

In response to the question, "Are there items for which storage is unsatisfactory," items most frequently mentioned were hose and socks, shoes (especially men's), more drawer space for children's folded garments. The responses to questions about provision of bedrooms in the storage-wall laboratory for two children of opposite sex indicated that in a house of this size no truly satisfactory arrangement could be provided.

## Discussion

As a method of evaluation, that done by the 20 homemakers has certain limitations, but unexpected values accrued from it. The evaluators were faced with a rather difficult situation. They were familiar neither with the units nor with the clothing to be stored. In the course of 2 to 3 hours, each was asked to do a task that was physically and mentally trying.

They were asked to make decisions in a situation that was not a real one to them. They were told before they started that the things they were doing and their opinions about the storage facilities were needed in the evaluation of the units. However, many of them seemed to think they were taking a test. Such remarks as "I don't know whether I can do it right" were common. Whenever an evaluator made such a statement, she was assured that there was no right or wrong way, but it was useful to know how she would use the units and how she preferred to store garments. In spite of this instruction, some of them may have been trying to give the "right" answer.

Many of the unsolicited remarks of these women were very helpful in giving the laboratory workers insight into some of the problems of storage and the methods the homemakers were using to solve them. Because of the value of these remarks, many of which could not be recorded, it was decided to use a tape recorder later in interviewing the mothers of the families who lived in the laboratory.

# Use-Testing

The use-testing phase of the study was expected to have the value of being more intensive than the other phases. The cooperators would have sufficient time to study each facility and to make considered judgments as to the relative values of each. However, the use of so few families as subjects gave a relatively high value to the discrimination and experience of each adult member.

It would be impossible to have a sufficient number of cooperating families to make their judgments representative of those of the population who are interested in using storage walls or other storage units in their own homes. However, acceptance and preference of facilities by these families after having used them would probably be more representative of the attitudes of the general population than the opinions of the workers who were endeavoring to devise acceptable facilities or of people who had not the opportunity of trying them.

Certainly use of the facilities should bring out any defects and positive values. Getting users to be aware of these and to communicate their observations clearly to the workers was anticipated as a difficult task.

## THE LABORATORY

The units were arranged in a house known as the storage-wall laboratory. It had outside dimensions 24 × 38 feet, 8 inches, which included a porch 7 feet, 4 inches × 12 feet. The dimensions of the house and the necessity

for retaining the locations of the bathroom and kitchen placed certain restrictions on arrangement of the units as partitions and on the size and number of pieces of furniture that could be used. However, the storage units were intended to be used instead of such furniture as dressers, chests, buffet, china cupboard, and desk. This was expected to reduce the total space requirement of the house.

## Units

The original set of units<sup>4</sup> was arranged as shown in Figure 6. The wall between the children's bedroom and the living room could be shifted toward the living room for a distance of 1 foot to increase the size of the children's room. Doors to the living-room rod unit and the small shelving at the back of unit C limited the distance of the shift.

The units had been mounted on platform casters to facilitate shifting them. To stabilize them in desired locations, they were mounted on bases that lifted them just off the floor. The bases were made in two L-shaped parts. The short leg of each L fit the end of the unit; the long leg fit the front or back. Because the bases raised the units very little, it was easy to slide the L's under the units. The first piece was slid under the front of the unit by one worker while another tilted the unit slightly toward the back. The second piece was then put in from the back.

<sup>4</sup> For discussion and description of these units see pp. 8-9.

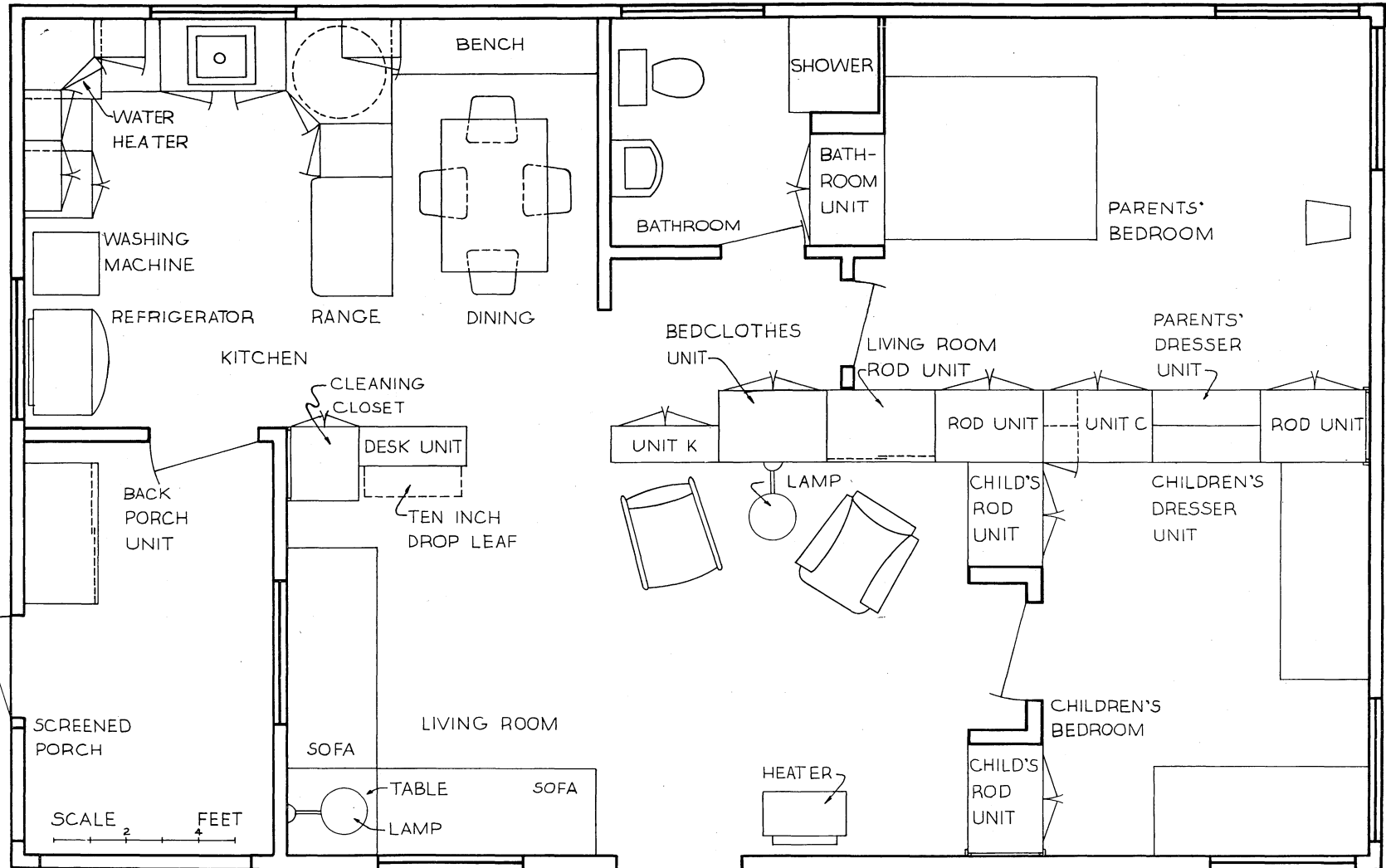


FIGURE 6. Plan of storage-wall laboratory, original arrangement.

Unevenness of the floor required that each unit be leveled with wood wedges.

In setting up a row of units, the first unit was placed against the house wall or other stable part. When it was leveled, the second unit was placed against it and leveled. Next, the two units were fastened together with carriage bolts. The next unit was then put in place and the process continued. Sections containing doors had hollow end pieces, which were fastened to the adjoining units with toggle bolts.

After a row of units had been mounted, leveled, fastened, and straightened and all the walls forming a room were in place, the top of the row of units was finished with a strip of molding to close the gap between the units and the ceiling. Because of the baseboards and moldings at ceiling level on the permanent wall, a vertical molding was used to close the gap between the end of each row of units and the adjoining permanent wall.

Alternate units were designed and constructed to use instead of the parents' rod units, unit C, and the two dresser units. Another unit used instead of the original desk unit had, in addition to desk and book case, some storage space for items used in connection with the kitchen and dining area. Each of the alternate units was constructed on a 2 × 4-foot floor plan except for the three used as dressers and for storing folded items. This group fitted into a 2 × 4-foot floor space; two of them were built with horizontal dimensions 1 × 2 feet, and the third, 1 × 4 feet. Another unit 1 × 2 × 6 feet high was constructed to use as needed for storage of canned food or other items used in connection with kitchen and dining area. The arrangement using the alternate units is shown in Figure 7.

Each alternate unit was built in two separate parts, the lower 6 feet high and the upper section 1 foot 10½ inches high. This was done for two reasons. It made them easier to handle and the necessity of tilting them was avoided, since they could be brought through the door in an upright position. Because of the need for light and ventilation in the kitchen and dining area, no upper section was used on the desk unit at the laboratory.

The alternate units were built with neither corner posts nor framing at top and bottom. However, the rod units each had a fixed shelf above the rod and triangular wood strips glued and nailed along the inside corners where the back and sides met the floor of the unit. These served to brace the unit. This type of structure did not permit attachment of casters. The units were placed directly on the floor.

The alternate units had hinged doors with the exception of one rod unit, the lower part of which had sliding doors hung on overhead tracks. Since there was no skeleton framing, the doors came near the top and ends of the unit. Hence molding could not be used near the ceiling and where the units met the permanent walls, except at the back where there were no doors. When these units were installed, strips of wood were fitted in the front at places where moldings were used with the original set of units.

The shelf units were equipped with wood cleats ¾ inch in cross-section placed at 1½-inch intervals on centers. In the unit used in the parents' room, the side intended for the woman's use had a mirror attached to a shelf about 31 inches above the floor. This shelf could be pulled forward to use as a dressing table. There were shelves above the mirror and below the dressing table.

In the side planned for the man's use, a tilting mirror was mounted on a movable shelf 49 inches above the floor. This shelf was intended for use as a dresser top. Adjustable shelves were placed below this dresser top. Eventually lamps were placed beside the mirrors in these units.

Some of the units had alternate facilities. For example, shelves alternated with trays and two kinds of racks were available for storing the same kind of item. These, with the alternate units, provided the cooperators with choices of facilities among which to express preferences. A listing of the alternate choices is given in the Appendix, page 69.

The kitchen cabinets were not designed for this study but were purchased ready to be assembled. Extra shelves were cut and added to the wall cabinets as needed. To make a cupboard for hanging pans, a shelf was removed from a base unit. A slide-out pot rack was installed at the top, and hooks were added to the sides of this unit. Lid racks were made for the doors. Hooks and racks for spices and for towels were installed at other places in the cabinets. To allow access to the water heater and to give a work surface with knee room, a counter top with no cabinet beneath was placed in front of the water heater. To provide space for storing 25 pounds of flour, a large canister was placed on a caster dolly that was rolled under this counter. For general views of the kitchen see Figure 8A and B.

### Furnishings

The furnishings were simple and in scale with the small size of the house. The dining area was furnished with an oak table and four chairs.

Living-room furniture consisted of two divans, a corner table, and two easy chairs. To save space, wall lamps were used instead of floor and table lamps. A fiber rug was used. Views of one end of the living room are shown in Figure 8C and D.

The parents' room was furnished with a double bed, Figure 9. The children's room had two small cots, Figure 10. Plastic mattress covers, cotton mattress pads, feather pillows, and cotton bedspreads were supplied for the beds. Small cotton chenille throw rugs were furnished for the parents' bedroom and a fiber rug like that in the living room was used for the children's bedroom.

Draperies in all rooms except the kitchen were hand drawn and were used instead of shades.

### Appliances

Kitchen appliances consisted of a standard model electric range, and a 10-cubic-foot refrigerator. Also in a corner of the kitchen was a table-top water heater.

The semi-automatic washing machine was equipped with casters. It was used at the kitchen sink. A hose with faucet adapter was used for filling it. A pump drained it through a hose that hooked over the sink. A tank vacuum cleaner was also supplied.

### Heating Equipment

The propane gas heater was located in the living room in order to effectively distribute the heat in the house. Having it in the living room was not desirable from the standpoint of furniture arrangement, since it interfered with use of other furniture in the corner where it was located.



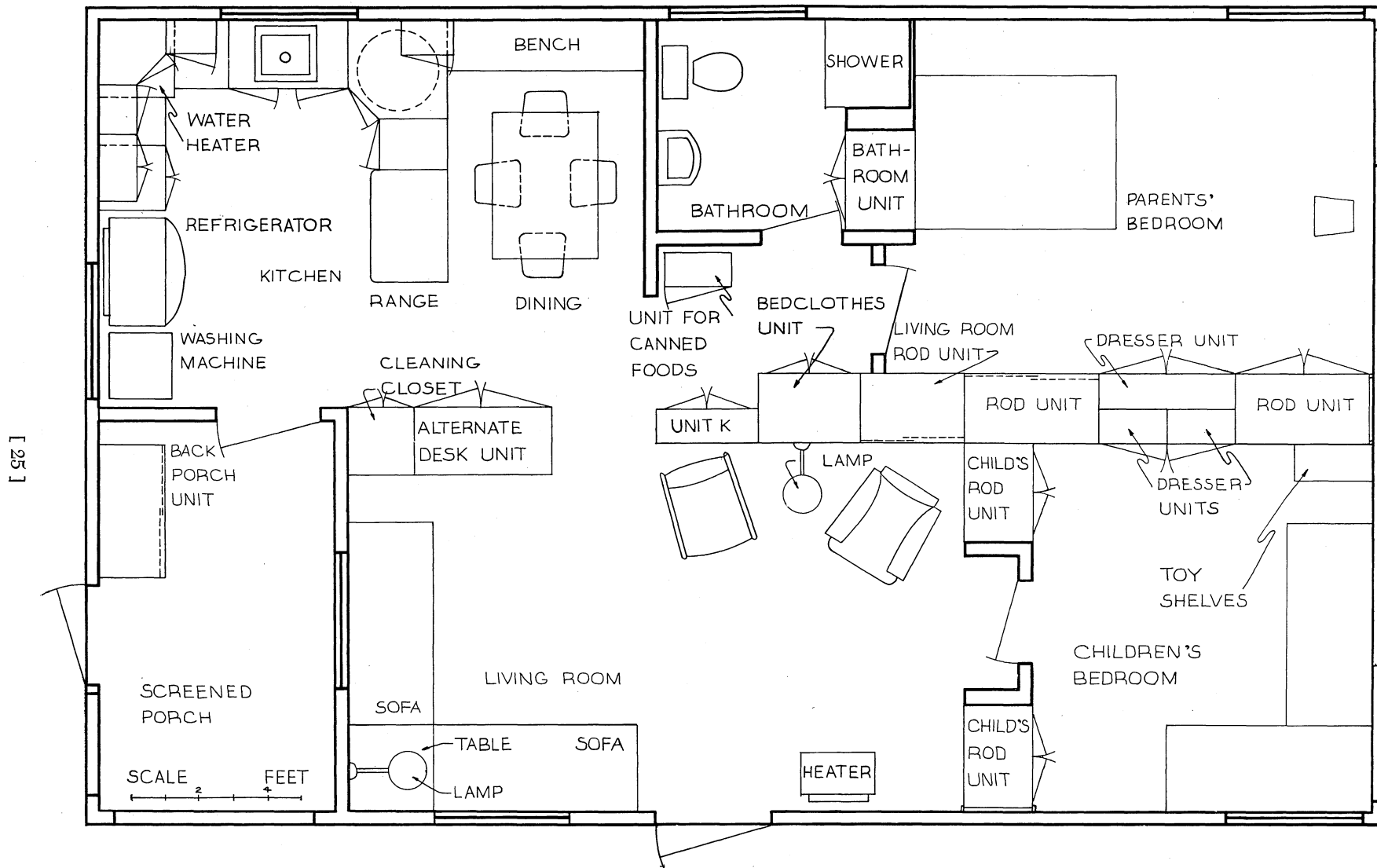


FIGURE 7. Plan of storage-wall laboratory, alternate arrangement.

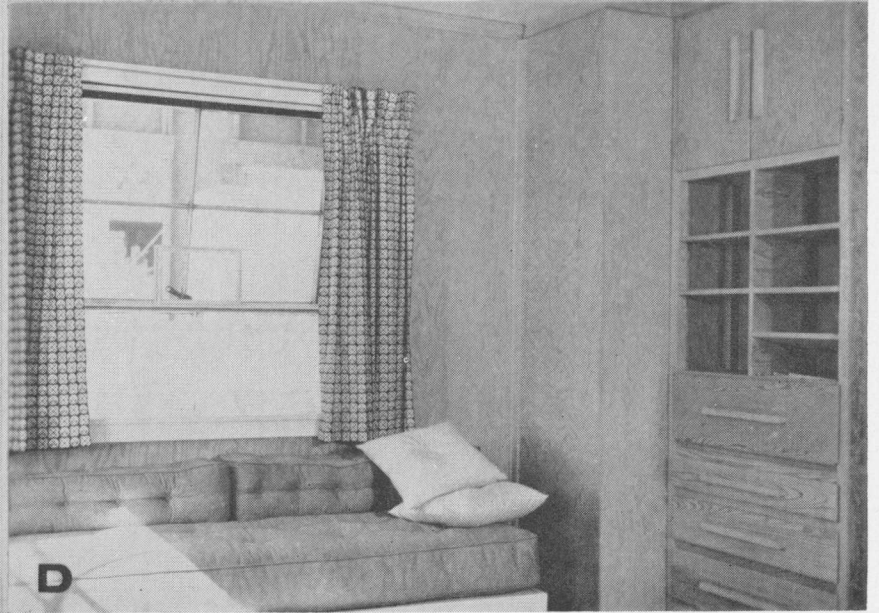
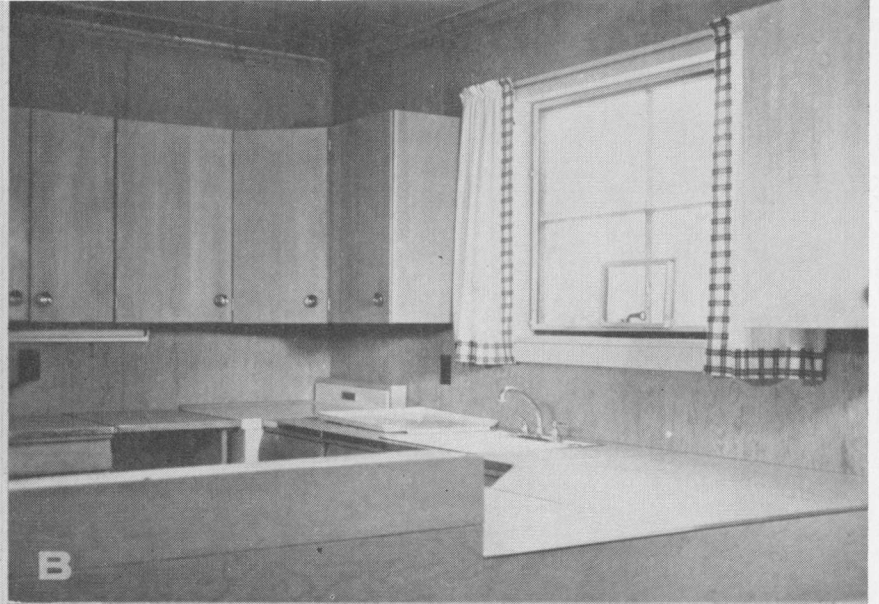


FIGURE 8. Kitchen as seen from dining area: (A) left end of U; (B) center of U, rear of range in the foreground. End

of the living room; (C) the divan corner; and (D) the desk at the right of divans helped to screen kitchen from living room.

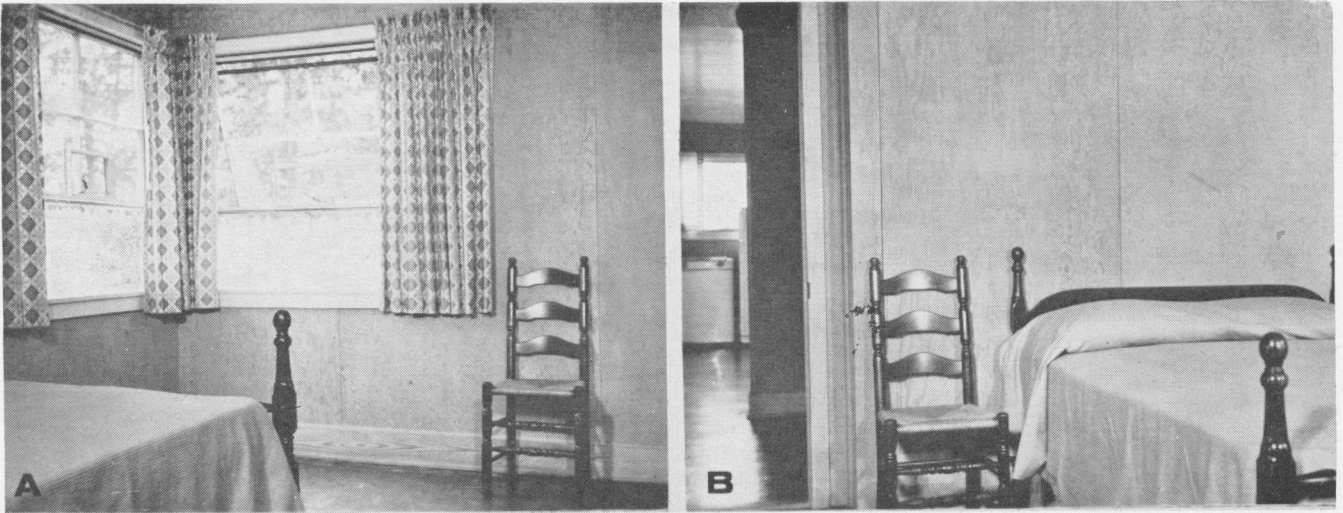


FIGURE 9. General views of parents' bedroom: (A) from door, and (B) toward door to back hall and kitchen.



FIGURE 10. General views of children's bedroom from door: (A) to left, and (B) to right of door.

## PLAN FOR EVALUATION

### Purposes

The general purposes of use-testing were to find how the units functioned in use by a family, and to estimate their acceptability. More specific purposes were to learn:

1. Whether each unit had dimensions suited to the purpose(s) for which it was designed.
2. Acceptance and preference of these families for various facilities for storing items.
3. How well the units and facilities operated mechanically or could be made to operate in daily use.
4. How well the units functioned as substitutes for furniture.
5. How well the units functioned as sound barriers and otherwise as substitutes for walls.
6. Whether units were adaptable to the needs of the family at various stages of the life cycle. (This could be done only to a limited extent.)
7. Whether units were adaptable to seasonal requirements of the families.
8. The values of movability and of modular dimensions.
9. The relation of house design to the functional qualities connected with movability.
10. Any problems connected with movability.
11. What items for which storage was not provided in the units were owned by the families.

### Criteria for Selecting Families

It was considered desirable to have for cooperators families that would fulfill the eligibility requirements used in the regional housing study.<sup>5</sup> However, when families were selected to live in the laboratory, owner-operator farm families were of necessity excluded. Therefore, families in which one or both of the parents had previous farm experience and were Southerners were selected.

In order to evaluate the children's units, it was considered desirable that the families have a boy and a girl. However, there were only two bedrooms. For this reason, and because the children's bedroom was quite small, it was necessary to stipulate that the older child should not be more than 10 years of age, and to seek families with two children of age-sex combinations that would make it possible for them to occupy the same room with a reasonable degree of accord.

Besides the qualifications of residence, farm experience, and family composition, other requirements were inherent in the situation. The family needed to have a car or some means of transportation, since the laboratory was located 8 miles from town and no public transportation other than school bus service was available. They had to be without furniture or to provide some means of storing their furniture and large appliances.<sup>6</sup> They had to be willing to bring all their personal and household items requiring storage to the laboratory. The mother needed to be a full-time homemaker.

When cooperators were selected to use units in their own homes, owner-operator families were not necessarily excluded. On the contrary, they were sought. However,

<sup>5</sup> See footnote, page 16.

<sup>6</sup> They were allowed to bring such items as freezer, sewing machine, and television set to the laboratory.

when a qualified family willing to cooperate in the study was found, their home had to have a large enough space for placing and using the units, and a floor plan that permitted the units to be moved to this space. This requirement was a factor that could and did prevent participation of an otherwise qualified family. Also, distance from the storage wall laboratory was a practical consideration. On the other hand, composition of the family, age of its members, and storage of furniture and appliances were not limiting factors to the extent that they were in the case of selecting families to live in the laboratory.

### Program

Before each family moved into the laboratory, the homemaker was given general information about the purposes of the study and plans for accomplishing them. She was shown the units, told the intended uses of each, and how to adjust the movable parts.

When the family moved in, they were permitted to store their possessions as they chose within the limits of the general plan. The parents' clothing other than wraps was to be stored in the parents' bedroom and children's clothing in the children's bedroom. They were not required to use the living room and back porch rod units for wraps at first unless they wished to do so. It was suggested that they use such units as bed clothes unit, bathroom unit, desk, and cleaning closet for storing the items for which they were intended, plus any other items for which there was no special storage unit.

Soon after the family had moved in, the project leader visited them to help with any problems that might have arisen in connection with orientation to the house, units, and appliances. At that time the homemaker was told what kind of observations she and other family members should make and report about the units.

Alternate facilities or units for storage were available for nearly all items except kitchen and dining room utensils and supplies, and cleaning equipment.<sup>7</sup> When each family moved into the laboratory, a calendar of changes was made by laboratory workers. This calendar was not the same for all families. It was planned to require a minimum of changes in the walls. It also depended on family make-up, since some facilities were used alternately by different family members. The calendar was not always followed to the letter, but it served as a framework for planning.

When trays were being tried for bathroom linens, shelves or drawers might be needed for storing bed linens. When one family member was using a certain shoe rack, it could not be used at the same time by another family member. In order to get a small child to express a choice between shoe racks, two kinds might be made available to the child at the same time.

When the original units were being used in the laboratory, their counterparts in alternate units were sometimes being used in a home and *vice versa*. Working out the calendar was necessary because the exchanges had to be made both within the laboratory and between the laboratory and the home in which the units were being evaluated.

Units were planned as alternates to the desk and to those in the wall between the bedrooms. It was anti-

<sup>7</sup> For a list of alternate units and facilities, see Appendix, page 69.

TABLE 14. CALENDAR OF EVALUATION OF UNITS BY FAMILIES

Original set				Alternate set			
Dates	Family	Location	Units	Dates	Family	Location	Units
1- 7-56 1- 7-57	I	Laboratory	All	3-29-57	I	Home	Rod (adult)
4-15-57 10-26-57				10-26-57			Dresser (adult)
				4-15-58	II	Laboratory	Desk
10-26-57 10- 5-59	II	Laboratory	All	5- 1-58	III	Laboratory	All
10- 5-59 3- 1-60	V	Home	Rod (adult) Rod (child) <sup>1</sup> Desk Dresser (adult)	11- 1-58			
	IV	Laboratory	All	6- 1-59	IV	Laboratory	All
6-22-60 11-30-60	V	Home	Rod (adult) Rod (child)	10- 5-59	V	Home	Rod (adult)
				6-22-60			Dresser (adult)
							Dresser (child)

<sup>1</sup> Added 10-27-58

pated that each set would be used for 6 months by each family. The alternate set was not ready in time to be used in the laboratory by Family I, but this family used three units of that set in their own home. Family III terminated their residence after 6 months, and did not use the units of the original set. Family IV terminated their residence after 9 months, but made their plans known in time to permit the use of the two sets for approximately equal periods. The schedule of use of these units is given in Table 14.

### Obtaining Data

Methods of obtaining data were: (a) interviews and other communications with the homemaker, (b) complete inventories of the items stored in each unit and in the kitchen cabinets, (c) photographs of the units in use, and of other items and situations that had a bearing on use and adequacy of the units, and (d) observations made by laboratory workers.

Interviews were tape recorded. The typed transcriptions served as records of the interviews, which included assignments to the homemaker as well as her reports on the units. In reporting on units, the homemaker gave her own reactions and those of other family members. These included the following:

1. Expressions of approval or disapproval of units, parts of units, or facilities.
2. Expressions of preference between (or among) units or facilities used for the same purpose.
3. Suggestions for improvement of units or facilities.
4. Comments on various general aspects of units such as
  - a. Units as substitutes for furniture,
  - b. Units as substitutes for walls,
  - c. Items for which storage in units was lacking or inadequate.

When interviews were made, the homemaker was first asked to comment on the units and to report comments made by other family members. In the case of children too young to make pertinent comments, the mother was asked to observe how well the unit was serving the needs of the child, whether the child could reach items that the mother wished to have available, and how consistently and well the child put away clothing and other items.

Voluntary comments offered by the homemaker were assumed to be of greater importance to her than those given in response to a question. However, some homemakers seemed more aware than others of functional values of the units, comparative usefulness of facilities, and reactions of other family members. Some of them prepared lists of comments to offer at interviews. Others had to be questioned to evoke their reactions.

After a homemaker had volunteered her comments, she was questioned as necessary to bring out other aspects of the situation. When approval, disapproval, or preference was expressed, the reason for it was always sought. When an evaluation was rather general, such as "My husband likes this unit," the part or attribute that was liked was discovered, if possible. When disapproval was expressed, or when improvements were suggested, an attempt at improvement was made whenever it seemed appropriate and practical. Bases for expressions of preference were provided by having the cooperators use alternate units and alternate facilities. A list of those offered is given in the Appendix, page 69.

Other items discussed at interviews were: (a) relation of each unit to general traffic patterns and to use of other units, (b) method of using units and facilities, and (c) changes in use of units and facilities.

Inventories were taken:

1. As soon as the homemaker considered she had the items in the units arranged to her satisfaction after moving into the laboratory.
2. Before exchanging units.
3. After exchanging units and rearranging items satisfactorily.
4. Just before moving away.
5. At other times when change of season had caused considerable change in arrangement of stored items.

The inventories were considered useful for:

1. Indicating what items the families wanted to store or were willing to store in each location.
2. Indicating what combinations of items were acceptable for storing together.
3. Showing seasonal variations in storage requirements.
4. Indicating how much the families would crowd the various items.

TABLE 15. BACKGROUND INFORMATION ON FAMILIES THAT EVALUATED STORAGE WALLS

Item	Resident families and dates of evaluation				Non-resident family
	I 1/7/56-1/7/57 <sup>1</sup>	II 4/15/57-4/15/58	III 5/1/58-11/1/58	IV 6/1/59-3/1/60	V 10/26/57-11/30/60
<b>Husband</b>					
Birthplace.....	S. Carolina	Alabama	Iowa	Alabama	Alabama
Years in South.....	Lifetime	Lifetime	6	28	Lifetime
Years on farm.....	13	3 <sup>2,3</sup>	18	28	Lifetime
Education.....	High school	Eleventh grade	College	3 yr. college	College
Present occupation.....	Labor dairy dept.	Labor beef unit	ETV Producer-Director	File clerk	Farmer
<b>Wife</b>					
Birthplace.....	See below <sup>4</sup>	Alabama	Alabama	Alabama	Alabama
Years in South.....	12	Lifetime	Lifetime	26	Lifetime
Years on farm.....	5	None <sup>5</sup>	None <sup>5</sup>	26	6
Education.....	2 yr. college	Eleventh grade	College	3½ yr. college	College
Years of homemaking.....	8	12	5	---	8
<b>Child, first</b>					
Age <sup>6</sup> .....	6	10	4	2	6
Sex.....	Male	Female	Female	Female	Female
<b>Child, second</b>					
Age <sup>6</sup> .....	3	3	2½	---	4
Sex.....	Female	Female	Male	---	Female
<b>Previous storage space</b>					
Number closets.....	2	2	6	2	---
Total rod length.....	7	10'	25' 6"	4'	---
Number drawer units.....	2	7	3	1	---
Total number drawers.....	7	---	19	5	---

<sup>1</sup> This family also evaluated a 4-foot rod unit, the 4-foot shelf unit, and the 4-foot desk unit in their own home from 3/29/57 to 10/26/57.

<sup>2</sup> This family had had a cow, chickens, and large garden, which they continued having while living in the laboratory.

<sup>3</sup> Lived on grandfather's farm, and helped with the work but had occupation other than farming.

<sup>4</sup> Father was an engineer connected with the Army. Family lived "all over U.S. and Territories."

<sup>5</sup> Parents always had a cow and chickens, and a large garden once.

<sup>6</sup> At beginning of evaluation period.

<sup>7</sup> Less than that provided at the laboratory.

5. Indicating the quantity of each type of item owned by families.

6. Suggesting problems for discussion at interviews.

Photographs of units in use constituted a record not only of items stored, but of method of storage. They had an advantage over inventories in that they were more qualitative; for example, an inventory of a rod unit might include 10 dresses, but a photograph gave an idea of the style, material, and size of each dress, how crowded they were, and whether they interfered with storage of other clothing. Photographs of rod and shelf units were much more useful than those of drawer units.

Photographs of children using units helped to show how well children of various ages could reach facilities and how size and conformation of garments operated in context with size and reach of the owner of the garments. They also indicated how the children were using the units.

Other photographs were taken to show the general appearance of the units, members of cooperating families, use and appearance of various areas of the house, use of various facilities, and items for which storage was not provided in the units.

Observations were made by laboratory workers when they visited the laboratory to conduct interviews or make photographs. Items noted were problems in use of units, methods of storage, things not stored, and other pertinent details. Occasionally these observations suggested topics for discussion at interviews or served to clarify comments made by the cooperators.

### Analysis of Data

Data were analyzed by storage units and by parts of units. However, in the case of clothing storage, use of space in one unit sometimes released space in another, and use of a unit by one occupant of a room affected the space available to the other occupant. Thus, there were limitations on analysis by units.

For purposes of analyzing, certain categories were used and terms defined. A glossary of these is included in the Appendix, page 69. Data from each cooperator were analyzed as soon as possible after they were obtained. After these analyses were completed, information for each unit or group of units was combined.

### The Families

Five families participated in this phase of the study. As indicated in Table 14, Family I participated both in the laboratory and in their home; Families II, III, and IV participated in the laboratory only; and Family V participated in their home only. General information about the families is given in Table 15. Other information pertinent to this study follows.

Family I had been living in a 2-room apartment. They had kept their possessions to a minimum. Large items brought to the laboratory were: television set, tablet arm chair for boy, and table and chairs for eating on back porch. The table was brought into the bedroom in winter and house plants placed on it. While living at the laboratory, this family planted, cultivated, and harvested a gar-

den, did little food preservation. The mother did some sewing.

Family II had lived in a 6-room house where they used one room for storage. They were inclined to collect things for future use. Large items brought to the laboratory were: television set, large freezer (chest), sewing machine, older daughter's desk, and several large items of play equipment. While living at the laboratory this family raised a large garden, and kept a cow and chickens. The homemaker canned and froze a great deal of food, did a great deal of sewing.

Family III had lived in a house with more storage space than they needed. They were inclined to get rid of items for which they had no immediate use. Large items brought to the laboratory were: large console with controls for television set and record player, upright freezer, sewing machine, several rather large toys and play equipment, table and chairs for outdoor use, and lawn mower. They raised a garden and froze a small amount of food. The mother did some sewing.

Family IV had only one child. The mother was a home economics student. She had agreed to carry a small academic load in order to cooperate in the study, but found this not in keeping with her long-range plans. She had a maid to care for the child for a while, later she put the child in a nursery school during the time she went to classes and library. The University requirements made substantial demands on her time which competed with observations and interviews.

This family had relatively few items for storage as well as only three members. Large items brought to the laboratory included television set, rocking chair, bedside table, and child's bed. During their residence they had a garden. The homemaker did a small amount of food preservation and a little sewing.

Family V evaluated some of the units in their own farm home. The homemaker in this family was a college graduate with a major in home economics. Besides the parents and two daughters who used the rod and dresser units, the family included a boy 5 years of age, a baby, the hus-

band's mother, and a young woman who was living with the family while she attended college.

This family was able to evaluate the units because their home was large enough and so arranged that the units could be moved in easily. They were quite willing to participate in the evaluation because they needed more storage space, and the units helped provide it.

## RESULTS

### Woman's Rod Units

**Rod length.** The most objective evaluation of rod length was that obtained by applying the rod space requirements of individual garments to the inventories of garments on the rod reported by cooperating families, and comparing the estimated requirement with the available rod length in each case. This information is given in Table 16.

As soon as a homemaker became aware of a crowded situation in her bedroom rod unit, she usually began to remove garments that were not often used or were out of season and to store them in less crowded places, usually in the living room rod unit. In spite of this, the 3-foot rod unit was always crowded and the 4-foot unit crowded for about half of the inventories reported stored in it. Also about half of all inventories reported in Table 16 would have crowded the 4-foot rod unit.

The comments of the homemakers reported in Table 16 indicate that they were not especially critical of the rod space. It was evident to laboratory workers that the women often based their estimates of crowdedness on the conditions of their most recent previous storage space; that is, when one moved her garments from a small rod space to a larger one, she tended to say she had plenty of space at least for a while. However, when the move was from a larger to a smaller unit, she was more likely to say that the rod was crowded.

Table 16 reports use of rod units by women only; in addition Homemaker V and her husband used one 3-foot unit together. She reported it as satisfactory for storing their best clothes including wraps in winter. In summer she

TABLE 16. WOMAN'S ROD UNIT—ESTIMATES OF ROD LENGTH REQUIREMENTS OF INVENTORIES REPORTED

Family	Duration of use		Estimated rod length requirement <sup>1</sup>	Excess requirement over length	Comments by homemaker
	Months	Days	Inches	Inches	
<b>Three-foot unit (34-inch rod length)</b>					
I	---	6	57	23	Plenty of space.
I	4	10	45	11	Crowded.
I	11	6	40	6	Crowded.
II	---	10	40	6	No complaints. (Used 15 in. rod length in unit C also.)
II	2	14	62	28	Crowded.
II	6	2	56	22	Still crowded.
IV	3	21	39	5	Winter garments heavy, crowd rod.
IV	4	28	38	4	Full.
<b>Four-foot units (46-inch rod length)</b>					
II	2	4	54	8	Comfortably full, more would crowd it.
II	5	---	46	0	No complaints.
III	---	26	63	15	Might use a little more rod length.
III	3	28	68	22	Somewhat full.
IV	---	18	49	3	Rod space fine, would hold more.
IV	3	16	46	0	Rod length all right.

<sup>1</sup> Based on requirements for individual garments as given in *Rod Closets for Southern Farm Homes*, Table 2, page 44, Auburn University Agr. Expt. Sta. Bul. 325.



FIGURE 11. Three-foot rod units used for storage of woman's garments: (A) Homemaker I, winter; (B) Homemaker II, summer; (C) Homemaker IV, winter.

stored their coats and out-of-season garments elsewhere and said the unit did not seem crowded. After using the 4-foot unit, she said she had not realized the inadequacy of the smaller unit. She stored in the 4-foot unit both Sunday and everyday garments for two, including sport coats but no heavy wraps.

All cooperators who tried both preferred the longer rod length of the 4-foot unit. This includes Homemaker I, who used a 4-foot unit in her home for her husband's clothing and some of her own. Homemaker III used only 4-foot units, but she reported needing more rod space than this, although she said she had used a shorter rod length for her clothing in her own home.

Rod units for storage of the mothers' clothing are shown in Figures 11 and 12.

**Depth of unit.** No variation in depth was planned, because the units had to be joined to make walls. However, sliding door units had slightly less available depth because the doors were contained within the unit.

Family I used the 4-foot unit with sliding doors in their own home just after the unit was completed. The homemaker said the door rubbed against coat sleeves. Investigation showed the rod centered on the depth of the whole unit rather than the depth inside the doors. After the rod was centered properly with reference to the usable inside depth of the unit, the homemaker said the door gave no further trouble.

In discussing use of hooks on hinged doors of the rod unit, Homemaker I said items on the door pressed against clothes on the rod. At another time when she was asked if the 3-foot closet was deep enough, she said she did not know, but it was not long enough. This is an example of an apparent tendency not to discuss problems for which there was no solution. Homemakers *could* adjust the num-

bers of garments to the rod length, and length of unit was commented on a great deal.

Homemaker III said these units were not as deep as she was used to and that the clothing sometimes was caught in the sliding doors. She mentioned at the final evaluation session that she thought the rod units could be a little deeper. Homemaker IV said she would like for the rod units to be a little deeper. In Figure 12C, the petticoat is an example of the need for greater depth.

**Rod height.** The rods were supported by end blocks with notches to provide for three heights. These heights (from the floor of the unit) were, for the 3-foot unit, 55, 58, and 61 inches; for 4-foot unit, 51, 54, and 57 inches. The homemaker was told before moving to the laboratory that she should choose the height that seemed best.

A problem connected with rod height was shoe storage. When floor or wall racks were used, the clothing on the rod had to be so arranged that women's long garments were not above the shoe racks. This situation is shown in Figures 11 and 12. The crowded condition of the rod contributed to the difficulty. There was frequently a problem of finding enough rod length for long garments to be placed so that they were not hanging above the shoe rack. This was more often a problem in the 3-foot units. When Homemaker II tried to relieve crowding of the rod by using a multiple skirt hanger, height of rod became a problem (Figure 11B).

Use of long robes was sometimes the factor that set the height of the rod or caused dissatisfaction when the rod could not be set high enough. An example of the latter is illustrated in Figure 11B. Even when long robes were not owned or used, the homemakers sometimes mentioned them when giving an evaluation of rod height.



**Shoe storage.** Some shoe racks held only three pairs of shoes. The homemakers tended to own more shoes than the other family members, so many in fact that choice of shoe rack seemed to be made on the basis of which was large enough to hold the shoes. The one that held the largest number of shoes (nine pairs) was preferred by three homemakers. This wire loop floor rack stored the shoes more compactly than racks that hold shoes in a more nearly horizontal position.

The small shelves in unit C were preferred for storing shoes by Homemaker II and given second preference by Homemaker I. These shelves were not available to Homemaker III.

**Belt storage.** Storage of belts was recognized as a problem only by Homemaker II, who had a large number. The three hooks on the door, which had provided adequate storage for the belts of Homemaker I, did not begin to provide enough storage for those of Homemaker II. After she had tried hooks, nails, a rod, and a tie rack with swiveling hangers on the door, Homemaker II decided she liked the row of nails best. She also needed a rod about a foot below any of these hangers to prevent the belts near the edge of the door from swinging out and preventing the door from closing. The belts were slipped under the rod. After Homemaker II tried a pull-out tie rack and nails on the end of a unit, she said she preferred storing belts on the door. She did not like the pull-out rack.

To Homemaker III height of storage seemed more important than type of storage. She wanted the belts above the children's reach.

In general, the homemakers preferred some method of hanging belts full length on the door, and all agreed that those near the outer edge of the door needed a rod beneath the hangers to keep the belts in place.

**Shelving.** A narrow adjustable shelf was placed above each rod at the rear of the unit to utilize some of the space that was available when the middle and lowest rod adjustments were used. It was not practical to use when the rod was at the highest adjustment. Thus, it sometimes became a factor in deciding whether to use the high rod adjustment. Sometimes infrequently used items were stored on it even when the high rod adjustment was used. Homemaker II wanted to store underwear on this shelf when the rod was high, but had to give it up. Other items stored on this shelf included purses, hats, pictures, garment hangers, and a gun. At times this shelf was not used.

Also the 4-foot rod units each had a *full-width shelf* 22 inches deep above the rod. It was 62 inches above the floor of the house and 9½ inches below the top of the lower section of the unit. Homemaker I used this shelf for purses and blankets in her own home. Homemaker II used it for such folded garments as jeans, blouses, and hose. At one time she stored on it some dresses, probably out of season. Homemakers III and IV used this shelf for storing purses and hats.

**Doors.** The parents' rod units had hinged doors except one 4-foot unit, which had sliding doors on the lower section. When the 4-foot rod units were being used, the parents exchanged units so that each used the two kinds of doors for approximately equal periods. Thus, they were able to compare doors. Since Family I could use only one rod unit in their home, they were given the sliding-door unit and compared its doors with those of the 3-foot units.

All of the homemakers preferred the hinged doors. They considered the storage facilities of these doors useful. In addition to storing belts on the doors, they used the hooks for storing items that were in use and would be used again before laundering, such as nightwear and slippers. Equally



FIGURE 12. Four-foot rod units used for storage of woman's garments: (A) sliding door unit, Homemaker II, fall; (B) hinged-

door unit, Homemaker III, summer; (C) sliding door unit, Homemaker IV, summer.

important to most of them was the fact that hinged doors made items on the rod more accessible and visible. One, who had a great many garments to store on the rod, declared that the unit with sliding doors did not hold as many garments as the one with swinging doors. Another said that the doors should slide into the wall instead of overlapping when open. Also it was noted by two homemakers that the doors used some of the depth of the unit, making it too shallow for wider garments. One homemaker said that she had a tendency to leave the sliding doors open, because having them open did not interfere with traffic.

It may be that the sliding doors were more of a problem because of limitations of the length and depth of the units. However, the problem of the doors seemed to be extremely important to these women. They recognized the values of sliding doors, but believed that the disadvantages by far surpassed the advantages.

### Man's Rod Units

Since each husband's reactions to this unit were relayed through the homemaker and perhaps some of the husbands were not greatly concerned about the units, there is less to report about the man's unit. Also the opinions of the husband may have been slightly modified by the wife when she reported them to the investigator.

**Rod length.** Rod length requirements as estimated from inventories reported for husbands are given in Table 17. Analysis of the inventories showed that the larger ones included both winter and summer clothing, the smaller did not. Homemakers usually moved out-of-season clothing to the living room rod unit or stored it folded.

However, Husband III did have more clothing stored on hangers than the others, even when his out-of-season garments were stored in other places. One reason for this was that all of his woven shirts, except a few that he never used, were stored on hangers. Also he stored all of his pants and outer shorts on hangers.

Homemaker II said repeatedly that she would like to store more shirts and work pants on hangers. When the 4-foot unit was in use, she did not do this, but she may have thought that there was not enough space to hang all of any one kind. While using the 3-foot units, Homemaker IV kept her husband's short-sleeved sport shirts on the rod all winter because there was room.

All the homemakers except Homemaker IV preferred the 4-foot unit for the man's use. Homemaker III thought her husband needed even more space than that provided by the 4-foot unit. Except for Homemaker III, each indicated that she needed more rod space than her husband.

The 3-foot rod units as used by husbands are shown in Figure 13, the 4-foot rod units in Figure 14.

**Depth of unit.** Not much was said about depth. Husband III hung a great many used garments on the door. It was noted by the homemaker that when the door was closed the garments on the rod were pushed back by the ones on the door. A problem of depth is shown in Figure 14D, where garments are touching the sliding door and the short sleeves of sport shirts are pressed against the next shirt. A similar effect is shown in Figure 13B and C. The garments were often crowded against the doors, but the users seldom mentioned it.

**Rod height.** Essential considerations in determining height for the man's rod were length of robe (if one was owned), whether trousers were hung full length or over the hanger, and length of trousers if hung full length. The problem of a long robe over shoes is shown in Figure 14A. Since long coats (if owned) were stored elsewhere, they did not have to be considered.

Choice was sometimes based on height of rod previously used, most families having had relatively higher rods. Two families had previously stored large boxes of little-used items on the floor under garments on the rod. One seemed to wish to continue this practice even though other storage spaces were available. Often the rod was used at whatever

TABLE 17. MAN'S ROD UNIT—ESTIMATES OF ROD LENGTH REQUIREMENTS OF INVENTORIES REPORTED

Family	Duration of use		Estimated rod length requirement <sup>1</sup>	Excess requirement over length	Comments by homemaker
	Months	Days			
<b>Three-foot unit (34-inch rod length)</b>					
I	---	7	51 <sup>2</sup>	17	Satisfactory.
I	11	6	39	5	Fairly crowded.
II	---	7	41	7	Adequate.
II	2	11	31	---	Had been removing out-of-season garments.
II	5	29	47 <sup>4</sup>	13	Was using multiple hangers for pants.
IV	3	7	48	14	
IV	4	28	46	12	
<b>Four-foot unit (46-inch rod length)</b>					
II	2	4	34	---	
II	5	13	36	---	
III	---	26	95	49	Clothes crammed together; needs more space.
III	3	28	69	23	
IV	---	18	42	---	
IV	3	16	41	---	

<sup>1</sup> Based on requirements for individual garments as given in *Rod Closets for Southern Farm Homes*, Auburn University Agr. Expt. Sta. Bul. 325.

<sup>2</sup> Both winter and summer garments stored. Removal of unused items would reduce to 38 inches.

<sup>3</sup> Rod lacks 3 inches of being full.

<sup>4</sup> Although multiple hangers were in use, requirement is calculated on basis of individual hangers.

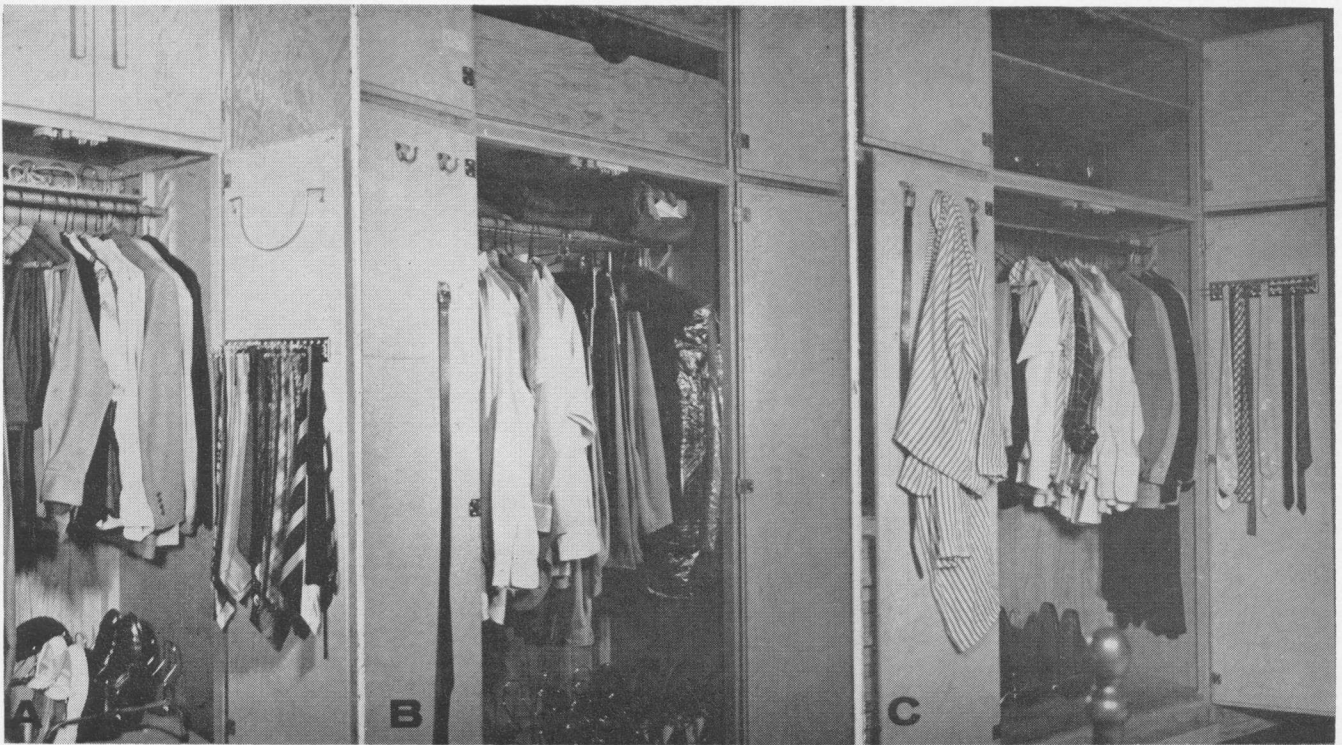


FIGURE 13. Three-foot rod unit used for storage of man's garments: (A) Husband I, winter; (B) Husband II, summer; (C) Husband IV, winter.

height it happened to be until some problem arose. In some instances, the rod was dropped to a lower level in order to take advantage of the small shelf above and behind the rod for storing frequently used folded garments. Usually the lowest adjustment in the 3-foot units or the middle adjustment in the 4-foot units would not have been too low to use for these men's clothing. Higher adjustments were sometimes used. There seemed to be no special preference for height.

**Shoe storage.** The small shelves in unit C were too small for men's shoes and were not evaluated by men. A similar problem existed with relation to the slanted wood rack. It was made to fit against the end of the unit. Because of limitations of the depth of the unit it held  $2\frac{1}{2}$  pairs of men's shoes. One of the men preferred it over wire racks because he did not want to take the trouble to fit the shoes over the wire loops. In fact, it appeared that he would be satisfied with no rack. The other men preferred wire racks. One of them chose the wire rack that fastened to the wall because it took less space and accommodated his three pairs of shoes. The rack that stood on the floor was chosen by two men who thought it easier to reach. They did not need all of the loops since it held 6 pairs. One of the men who found he could not store his high-topped shoes on the wire rack used the wood rack.

**Belt storage.** Storage of belts was not much of a problem as these men did not have many. The greatest number reported was five. Others reported from one to three belts. The most satisfactory method of storage for belts with tongue buckles was to hang them by the buckle on hooks, nails, or on the tie and belt rack. They could not

be folded over a wire rod. These racks, hooks, and nails for belts and ties were located on the inside of hinged doors or in the end of units with sliding doors.

**Tie storage.** The number of ties owned influenced choice of rack. The two men who owned the largest number (32 and 33 ties) liked the purchased rack that was fastened to the closet door. One who had a few (6 or 7 ties) liked the expanding tie rack that was attached to the end of the unit. It held fewer ties, but could be pushed back out of the way. The other man did not express a choice but did complain that his ties fell off the larger rack. A wire rod was placed below the rack so that he could slip the ties under it, but he did not use this rod. One of the men, who later chose the larger rack, used the nails that were put on the door for the woman's belts. He said they were all right for storing ties.

**Shelving over rod.** A great difference was noted among husbands in their use of the shelving over the rod. Most of them used it for emptying pockets and for similar miscellaneous purposes. However, one homemaker who first used the 3-foot rod units was placing her husband's white shirts as they came from the laundry on the small shelf over the rod, Figure 13B. In the top section of the unit, she stored his pajamas, Sunday shirts, work shirts, and work pants as well as some out-of-season clothing. When she was using the 4-foot units and had a great deal of space in the shelf unit, she still used the rod unit shelves for work pants, work jackets, undershirts, work shirts, and white shirts. She said he liked to have all of his clothing in one place. However, she was trying to find shelf space for sewing and mending items and this choice may have



FIGURE 14. Four-foot rod unit for man's garment storage: (A) sliding-door unit, Husband I (few of wife's items at left), fall; (B)

hinged-door unit, Husband II, fall; (C) hinged-door unit, Husband IV, summer; (D) sliding-door unit, Husband III, summer.

been a part of a plan to shift things about to provide such space.

On the whole it seemed that when space was at a premium, the shelving was fully used. When there was plenty of space, the shelving was either unused or used as a sort of catch-all for incidentals, such as extra hangers, clothes brush, items from pockets, and things for which no other place could be found.

**Doors.** Three men preferred hinged doors rather than sliding doors. The fourth preferred sliding doors. His wife thought it was because he objected to so many doors standing open and in the way. Others seemed to recognize the space-saving feature of sliding doors, even though they disliked them because of poor accessibility to the unit.

### Children's Rod Units

The children used only 3-foot rod units. Since the children ranged in ages from 2 to 11 years, the heights of rod and other facilities were adjusted to their needs. These children had all been using rods at adult height. Except for the oldest one, they had not participated in the use of rods for hanging clothes.

**Rod length.** Rod length requirements as estimated from inventories reported for children are given in Table 18.

The two boys required less rod space than the girls. Factors other than sex may have been responsible to some extent for this difference. Rod units used by boys are shown in Figure 15. The mother of the 2½-year-old boy indicated that she did not have very many clothes for him because he was growing rapidly. This family lived at the laboratory from May 1 through November 1. Most of the time the weather was quite warm and the child wore very little. Also it appeared that the mother was placing as few garments as possible on the rod because she thought the child would take them down to play with them. Even though his jackets were stored on the rod, the estimated rod length requirement for this boy ranged from 12 to 15 inches.

The 6-year-old boy required greater rod length. At first he required only 15 inches. However, after his mother found hangers enough to hang his shirts, he used more space, but there was still enough rod space to hang his wraps in this unit. His mother preferred having them there. During the summer, wraps were removed from his unit. In her final evaluation, his mother said she thought a little boy's rod unit should be longer, since many boys would have more clothes.

Rod units in use by preschool girls are shown in Figure 16A, B, and C, those in use by girls of elementary-school age in Figure 16D and E. The rod length in the girls' units needed to be greater than 34 inches. Inventories did not always indicate this because girls' garments were sometimes stored folded because of insufficient rod space, and inventories did not take into account items that were out for laundering. In the case of small children, sometimes a great many garments were out for laundering. Since inventories did not always indicate kinds of dresses, a factor of 2½ inches per dress was used in estimating rod

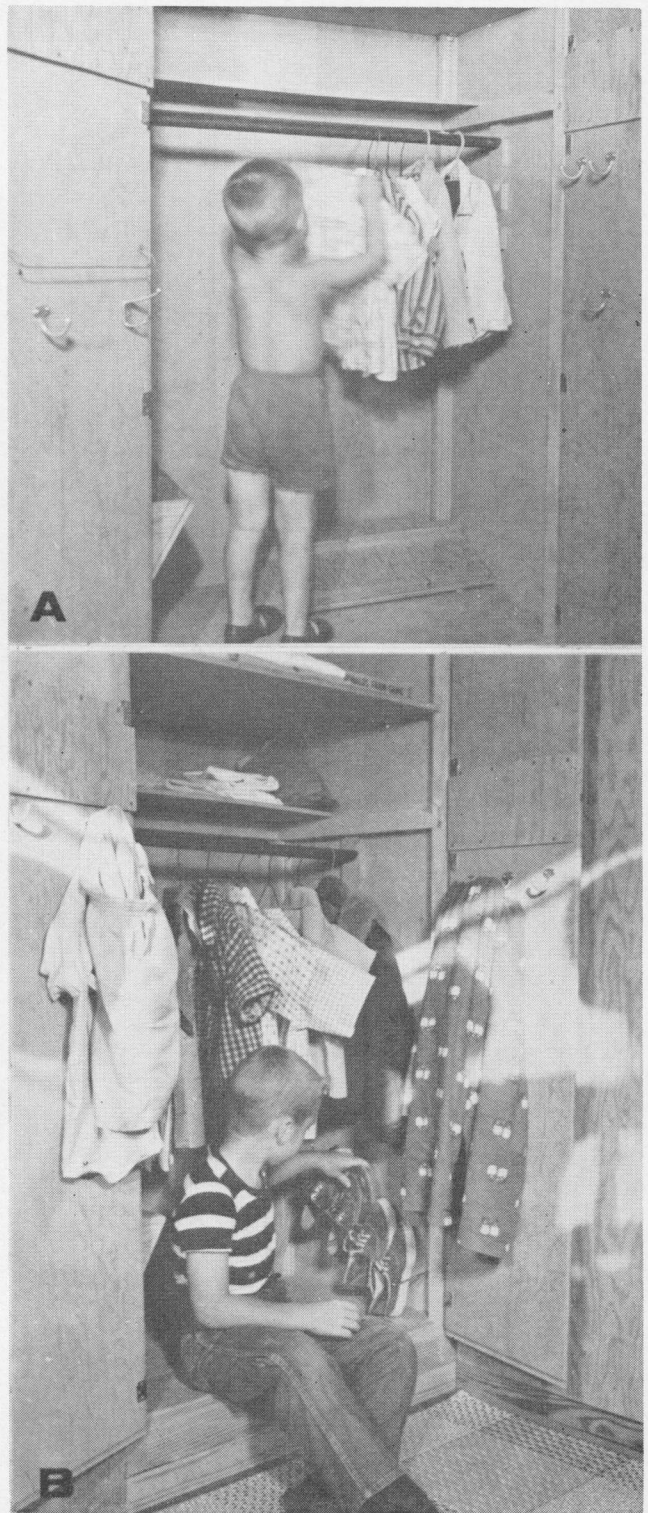


FIGURE 15. Boys' rod units: (A) boy 2½ years old, summer; and (B) boy 6 years old, fall.

TABLE 18. CHILDREN'S ROD UNITS—ESTIMATES OF ROD LENGTH REQUIREMENTS OF INVENTORIES REPORTED

Family	Sex of child	Age of child	Duration of use			Estimated rod length	Excess of req. over 34-in. length	Comments by homemaker
		Years	Months	Days	Inches	Inches		
III	M	2½	---	26	13	(-21)		
III	M	2½	3	28	12	(-22)		
III	M	2½	4	2	15	(-19)		
I	M	6	---	7	15	(-19)		
I	M	7	11	6	30	(-4)	Fairly crowded.	
IV	F	2	---	18	52	18		
IV	F	2½	3	16	51	17		
IV	F	2½	5	11	54	20		
IV	F	2½	9	3	34	0		
I	F	3	---	7	41	7		
I	F	4	11	6	43	9	Crowded.	
II	F	3	---	7	36	2	Rod space fine.	
II	F	3	2	11	41	7	Winter coats removed.	
II	F	3	5	29	46	12		
II	F	4	8	15	47	13		
II	F	4	11	24	56	22		
III	F	4	---	26	47	13	Pretty well filled.	
III	F	4	3	28	50	16		
II	F	10	---	7	48	14	Long enough if winter things removed.	
II	F	10	2	11	46	12	Also garments in living room unit.	
II	F	11	5	29	39	5		
II	F	11	8	15	36	2	No blouses listed.	
II	F	11	11	24	44	10	Satisfactory.	

length requirements for girls. However, it was noted that little girls' starched full dresses seemed to require a greater amount of rod space than adult dresses. Longer dresses are pulled down by the weight that comes from greater length. Hence, they do not stand out and require as much horizontal space.

The mothers wanted to keep small girls' wraps in the bedroom rod units. Even when they said that the rod length was sufficient for a small girl, they usually indicated that it would not be large enough for an older girl.

**Depth of unit.** This dimension needed to be greater. The mother of the 6-year-old boy said that the short sleeves of his starched shirts were pushed in by the door or the garments on the door, Figure 15B. The 11-year-old girl indicated a need for greater depth. Because her rod unit was crowded lengthwise, the garments were pushed out widthwise and the problem of depth was evident. The storage of a great many items on the doors accentuated this problem, Figure 16E. When bouffant slips were stored on hangers, they too were pressed out widthwise.

**Rod height.** The rod was adjustable to any height required by the children. The younger girls who used the unit had sashes sewed to their dresses. These sashes set the rod height requirement, Figure 16A, B, and C. The small girls were able to reach their garments, take the hangers off the rod, and replace them. Even the 2½-year-old girl could do it, Figure 17A. To make room to hang a garment, she cleared a section of the rod by pushing aside the garments already in place. Very young children stepped into the unit. Since the rods were adjusted to suit the needs of the users, problems were caused by length of sashes, which required the rod to be higher than was convenient for the girl. Also higher rod adjustments usually put shelves out of reach of small girls.

**Shoe storage.** Three kinds of shoe storage were available: a wooden bin, a slanted board, and a wire loop rack. It was assumed that the bin would be best and easiest to use for small children and that the slanted board would be easier to use than the wire loop rack. The two youngest children took little interest in shoe racks. One of the 3-year-olds liked the slanted board best, but needed a cleat at the toe section since she had practically no heels to hook over the cleat intended for that purpose. Figure 16A shows the rack with the toe cleat. Without the toe cleat her shoes slid off. The other 3-year-old girl, the 4-year-old girl, and the 6-year-old boy liked the wire racks. The two girls seemed to amuse themselves by fitting the shoes over the loops. It was the 11-year-old girl who preferred the bin. She liked to throw the shoes in. Her mother did not approve of this, and the girl admitted it was hard to find the shoes, yet later gave the bin as her first choice and wire loops second.

**Shelving.** Shelving in the rod unit was usually required for storing part of the folded garments when two children used the room. The 3-foot dresser did not provide sufficient space for storing the folded garments of two children. When the 4-foot shelf-dresser was used, other items requiring shelf space crowded out part of the folded garments.

The usefulness of the rod unit shelving for storing children's garments depended upon the height of the child in relation to the shelf height. Not all of the children used the shelves over the rod. The mother of the 3-year-old boy preferred that he not have access to all of his folded garments. The girl under 3 was the only one storing clothing in the bedroom and did not need these shelves. The children stepped up into the unit in order to reach the shelves when they could not reach them from the floor. The 3- and 4-year-old girls were just able to reach the first shelf over the rod when it was 46 inches



FIGURE 16. Girl's rod units in use: (A) by 2½-year-old girl; (B) by 3-year-old girl; (C) by 4-year-old girl; (D) by two girls 6 and 8 years old; and (E) by 11-year-old girl.



**FIGURE 17. Girls' rod unit:** (A) after stepping into unit, the 2½-year-old girl could place hanger on rod, but her mother had to put dress on hanger; (B) on tiptoe the 3-year-old could

just reach items on shelf 46 inches above unit floor; (C) the 8- and 6-year-old girls, respectively, could reach shelves 51 and 46 inches above unit floor without stepping in.

above the floor of the unit. When Family I raised the rod and placed the shelf 49 inches above the floor of the unit, the 3-year-old girl could scarcely use the shelf, Figure 17B. The 6-year-old boy could not reach the second shelf but was able to reach it by the time he started to school in the fall. The 11-year-old girl used both shelves and even the top section for her folded garments and other items. She had to use a step-stool or other means to reach the top section.

The mothers placed younger children's garments on shelves out of reach when they did not trust the children to have access to them. Full depth shelving was too deep for small children to use, but mothers sometimes placed infrequently used items at the rear. One mother used a large shelf for storing a child's petticoat with hoops.

**Doors.** The doors were hinged. Each unit had clothes hooks on at least one door and sometimes a wire rod on the other. These facilities were adjusted in height to suit the users. It was found that height adjustment was an important factor in teaching younger children to put garments away. Nightwear in use was stored on the door by nearly all the children. Garments used and not laundered were also frequently stored there.

The 11-year-old girl had nails and a wire rod for storing belts. In general she tended to store more garments on the door than the others. This seemed to be typical of the family; her younger sister was a close second to her in this habit.

The racks on the doors served useful purposes, but because of the shallowness of the unit, items on the door interfered with those on the rod.

### Living Room Rod Unit

The living room rod unit was intended for storage of family wraps other than those used for work and play and for guests' wraps. For two reasons the intended use of the unit was not fully realized.

First, the only acceptable place for a television set was the space in front of the door of this unit, Figure 18. The parents did not want the children to use this rod unit for their wraps because they might damage the television set when it was located in front of the door. One family complained that the television cord was across the door to the rod unit, and that the set had to be disconnected in order to use the unit. (They were supplied an extension cord.)

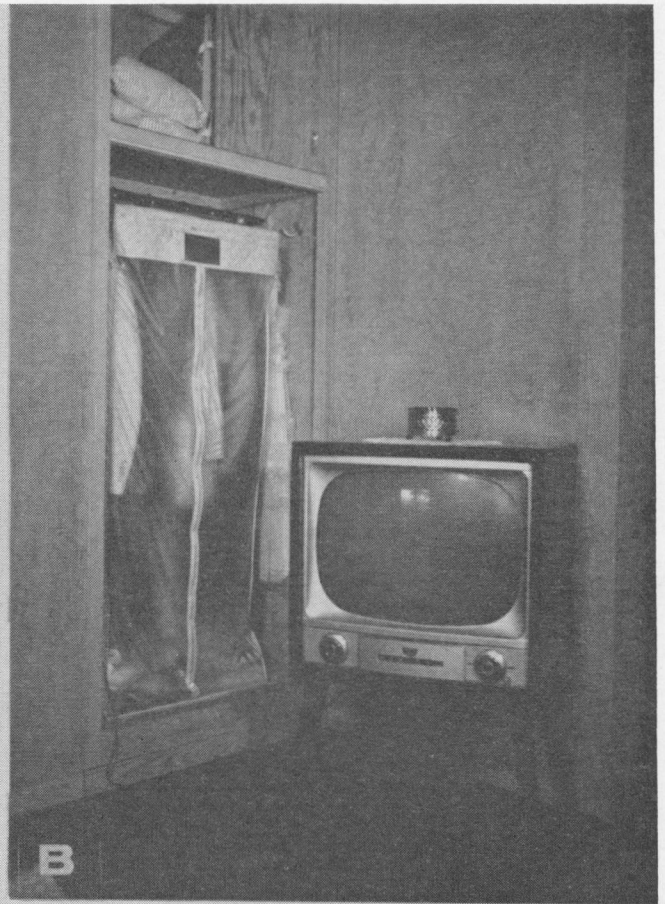
Second, need for rod space in the bedroom units was to some extent compensated by storing out-of-season and infrequently used garments in the living room unit. Thus, space left for wraps was usually sufficient only for those of family members and none remained for guests' wraps.

Only Family III placed the television set to the left of the unit door. The console that contained the television controls was too wide to place along the wall in front of the door. However, a chair was removed to the bedroom to make this arrangement acceptable.

Since Family IV had only one child and she slept in the parents' room, they used the extra closet in the child's room for wraps most of the time. This left the living room rod unit free for storage of out-of-season garments.

**Rod length.** When any of the families was using the living room rod unit for wraps only, the rod requirement did not exceed the capacity of the unit. However, when





**FIGURE 18.** Use of living room rod unit; access limited by placement of television set: (A) Family II, summer; (B) Family IV, used unit for out-of-season storage; (C) Family III, doors

of unit closed, chair was later removed to give access to unit; (D) Family I, winter. Doors were removed in (A) and (B) to show contents of storage unit.

they used the unit for both wraps and out-of-season storage (or for out-of-season storage only by Family IV) the unit was crowded, needing 7 to 22 inches more of rod length than was available. It is probable that the use of this unit relieved the crowding of the bedroom rod units to some extent. However, if this unit had not been available, some of the homemakers might have stored part of the out-of-season garments folded. One mentioned that some people might store some of their out-of-season garments in boxes if they needed rod space.

**Depth.** This rod unit had sliding doors that decreased the usable depth of the unit. As in the case of the 4-foot rod unit with sliding doors, the rod had been centered in the unit without regard to the doors. The homemaker of Family I discovered this, noting that the doors rubbed coats stored on the rod, although there was less crowding at the rear of the unit. Even after the rod was properly centered this unit was evidently too shallow. One husband said his coat sleeve stuck out of the door when it was closed.

**Rod height.** All of the families used this rod at the highest adjustment. Little was said about the height, but when asked the homemakers all said it was all right. Probably storage of boxes of garments on the floor and use of large garment bags on the rod required higher rod adjustment.

In order to make this unit suitable for children's use, a low rod of adjustable height was added before the families occupied the laboratory. The low rod was designed to hook over the adults' rod by means of two metal arms bent into hooks at the upper end. Since it obstructed more than half of the upper rod, the low rod was turned at right angles to the upper one and hooked into screw eyes fastened under the top of the lower section. This allowed more space on the rod for adult garments. However, the mothers did not want the children to use this unit for a wrap closet. The 11-year-old girl was an exception, and she did not need a low rod. Perhaps if the television set had not complicated the situation, the low rod would have been tried. It was not kept hanging in the unit when its use was refused.

**Use for guests' clothing.** When families moved into the laboratory, it required a week or more for each one to arrange their garment storage. They tried to arrange garments other than wraps in bedroom rod units. As they unpacked all of their garments, the bedroom rod units frequently became crowded, and some garments were moved to the living room unit.

When families had an overnight guest, they either stored the guest's clothing in the living room unit or gave the guest space in a bedroom unit. A family member then used the living room rod unit or hooks in the bathroom for currently needed clothing. All would have liked extra space in the living room unit to take care of the occasional requirements of guests. However, all preferred to use the living room unit for out-of-season and infrequently used garments rather than further crowd their bedroom units.

**Doors.** The sliding doors of this unit permitted an opening only 15½ inches wide. Little objection was made to this width, probably because the television was more of a problem than the doors. Homemaker IV used the living room rod unit for out-of-season storage and the extra rod

unit in the child's room for wraps during the summer. With the coming of cold weather she exchanged units. She remarked that the unit with hinged doors was more convenient than the one with sliding doors for storing garments in the large plastic bag.

The sliding doors were grooved at the top and bottom. The bottom grooves were fitted with ball-bearing glides that moved on metal ridges on the floor of the unit. The top grooves fitted over wood guides. Two problems were evident. First, the plywood at the bottom of the door had a tendency to split apart and the glides slipped into the split, with the edge of the door supported by the floor of the unit. This made the doors stick. Second, the doors had a tendency to warp enough to make one door rub against the other.

An advantage of this type of support is that the doors are easily removable. The same kind of support and glide system worked well on doors to top sections. Probably the doors to the rod section were too heavy for recessed glides to be used successfully with plywood.

### Back Porch Rod Unit

The back porch unit was originally intended for storing wraps for work and play. During the residence of Family I, it became evident that storage space for these wraps was less in demand than space for other items. Among the items for which storage space was needed were: window awnings (winter), packing boxes and lockers used in moving, a pup, folding lawn chairs, large tool chest, garden hose, garden tools, pails and foot tubs, laundry basket and tub, cases of empty bottles, feed for ducks, paint, kerosene, and root vegetables. On a farm some of these items would be stored in a shed or other farm building. Other items would be stored in an attic or basement if available.

Awnings, boxes and lockers were stored elsewhere, the pup was given other quarters. Most of the other items were provided with hooks or other supports and stored in as orderly a manner as possible. Before Family I completed their residence, plans were made for dividing this unit below the shelf into two equal parts, one for wraps and one for other items.

During the interim between the residence of Family I and Family II this was done. Pull-out shelves were installed on the right side and a short rod on the left. The garden tools were to be stored between the end of the unit and the wall of the house.

**Use of rod section.** Each of the families used the rod section in a manner quite different from the others. During the residence of Family I, only the husband and the boy stored their wraps in this unit. During the summer they did not have much use for the rod. It was removed to make room for the various other items for which storage was needed. When wraps were needed again, a short rod was put in the unit. In very cold weather the husband brought his coat into the house at night in order to have it warm in the morning. In moderately cold weather, both he and the boy stored coats in the unit even at night. This family did not use rain boots and overshoes.

All members of Family II used the rod section at some time or other, but the husband used it most. He had to work out of doors even in rainy weather and used rain-coats and even rain pants. The latter were hung over the

rod and required a great deal of space. Hooks provided for the pants were used for hanging a saw and an umbrella. Later he decided to leave the rain pants at the barn.

As the cold weather approached, the older daughter did not want to have even a raincoat in this unit because her father's work clothes were so dirty and smelly. The homemaker decided that only the husband's work clothes would be kept there. Besides using the rod for jackets, raincoats, and rain pants, the husband stored his work pants there when he intended to wear them the next day. The homemaker also kept his soiled work clothes there until she washed them. This kept the other soiled clothing from getting dirtier.

As it became colder the husband began placing fewer garments in the unit until only his boots were left there. Sometimes he took the garments to the unit after he had removed them, but finally in the coldest weather he did not. When the weather moderated he again used the unit. Homemaker II said she would want a unit like this if she were building a home of her own.

A boot rack was made of wood slats and placed on the floor of this section. It was used by all the family for boots and shoes that were soiled. So much mud and water fell through this rack that a piece of vinyl plastic floor covering was fitted in this part of the unit to facilitate cleaning. The whole family used the boot rack throughout the year, but used it during the summer more than any other time.

Items other than clothing stored in this part of the unit were: saw, clothespin bag, flowers drying for winter bouquets, small mop, extension cord, fishing pole, and pants stretchers. The pants stretchers were awkward to store until a device was made for this purpose. Four L-hooks were screwed into the partition of the unit and spaced to fit the four corners of the stretchers. When the stretchers were being stored, the hooks were turned outward from the center. To remove the stretchers, two of the L-hooks were turned inward. This device held the stretchers in a very small space and they did not interfere with other uses of this part of the unit.

In the case of Family III, it was difficult to keep the rod section of the unit free for storage of garments. Among items other than clothing stored there at various times were: child's car seat (hung over the rod), pants stretchers, can opener, two TV tables with trays, step stool, clothespin bag, car-carrier bars, saw, broom stick, plunger, level, insulated bag for soft drinks, extra clothes hangers. Only the husband's clothing was stored there. Apparently there was enough rod space for him. However, the homemaker said that there was not enough space for his boots and shoes. Since this family did not live at the laboratory in winter, their use of the unit in cold weather could not be studied.

Homemaker IV decided to put in this unit all of the husband's clothes of the type used for gardening and outdoor work. These included shirts, pants, belts, and coveralls in addition to wraps, boots, and shoes. Nothing but clothing was stored in the rod section. Husband IV would not use hangers for any of these garments. He flung over the rod all garments for which he could find no hooks. Only his clean clothes were on hangers. The homemaker said this unit was not large enough for these garments, but there was plenty of room for shoes. When the weather

became cold, the husband objected to having his clothes outdoors. Homemaker IV said she did not think she could designate any of her clothing as work clothing, since she did not do such work as to require special garments.

On at least two points, the families seemed to agree. None of them wanted to use this unit even for coats in the coldest weather, and all of them were more interested in its use for men's clothing than for women's clothing. Perhaps if the porch had been enclosed, the men would have been willing to store coats there all winter, even if it were not as warm as the rest of the house. Also in a real farm situation, other family members might find more use for it as did the children of Family II in the summer.

### Rod Units in General

Families who lived in the laboratory were not at the peak of their requirement for rod space, since their children were too young to have reached maximum needs. However, the living room rod unit and the one on the back porch were used mostly for parents' clothing. Had those two units been used for parents' clothing only, a total of 124 inches of rod length was available when 3-foot units were used in the master bedroom, and 148 inches were available for parents when 4-foot units were used. When this is compared with the rod length requirement as set forth in *Rod Closets* (7) either set of these units would have provided total rod space for parents at a level between moderate (114 inches) and liberal (159 inches). However, some of the husbands' dress shirts were stored on hangers. When all shirts are stored on hangers, the total rod space requirement for husband and wife becomes 123 inches at the moderate level and 170 inches at the liberal level. In case of hanging all shirts, the 3-foot units would barely provide space for parents at the moderate level and the 4-foot units would meet their requirements at a level about halfway between moderate and liberal.

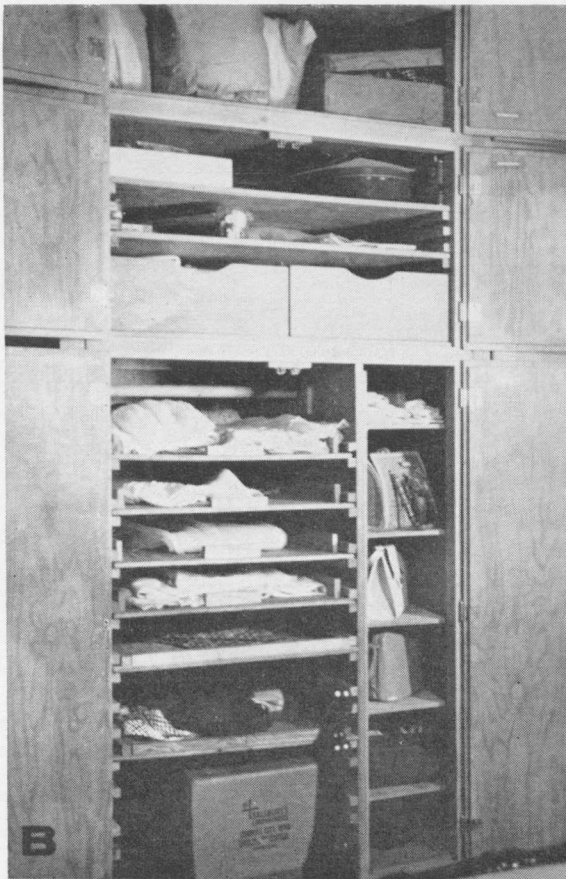
When only the rod requirements of the master bedroom are considered, 3-foot units meet the minimum requirement (66 inches), and the 4-foot units almost meet the moderate requirement (98 inches) when dress shirts or work shirts are stored on the rod. Thus, the shifting of clothing between master bedroom and living room might be expected in the case of families with moderate numbers of garments. It appears likely that future needs of the children would not be met by these units. The children would soon be competing with the parents for use of the units that were planned for coat closets but which were also absorbing the overflow from bedroom rod units. The older daughter of Family II was finding her rod unit too small. Some of her coats and dresses were stored in the living room rod unit, although the parents could have used all of the rod space there.

The parents of Family IV were the only ones who were not using all available rod space. They had the extra rod unit in the child's room.

### Storage for Parents' Folded Garments

When 3-foot units were being used, folded garments for parents were stored in dresser drawers and in unit C. Some of the families also stored folded garments, especially those of men, on shelves in the rod units.

The sliding shelves in the lower section of unit C were used more than the other parts of this unit for storing folded clothing. These had been improved first by using



**FIGURE 19. Unit C in use: (A) Homemaker I folds shirt to store on pull-out tray; (B) Family II used middle, top sections for sewing supplies, lower section for homemaker's garments**

**and accessories; (C) Family IV stored little-used items at top, middle for hats and purses, lower section for husband's garments, except top tray used for homemaker's clothing items.**

two pairs of cleats for each shelf so that they would not tip when pulled forward, and next by adding rails at the sides and back of each shelf. Unit C as used by families is shown in Figure 19.

Plans for the 4-foot dresser unit were developed while Family I was using the 3-foot units. The husband was very enthusiastic about the pull-out shelves in the lower section of unit C. The homemaker liked them, especially for storing his garments. She thought that if a shelf unit were developed, the division should be a vertical one so that neither parent would need to have all low shelves. The 4-foot dresser unit in use by parents is shown in Figure 20.

Only Families I, II, and IV used all three units (3-foot dresser unit, unit C, and 4-foot dresser) for storage of folded garments. The 3-foot dresser and unit C were offered at the same time. Each homemaker placed her husband's folded clothing on the sliding shelves of unit C and her own in dresser drawers unless she was specifically requested to do otherwise. Each resisted storing her husband's clothing in dresser drawers. One placed her husband's work clothing on the shelves of his rod unit or in the top section of it, rather than place them in the drawers, Figure 14B. This was probably because the drawers were not large enough for men's shirts and work pants and because the women wanted the dresser drawers for their own use. In general, the use of sliding shelves in unit C for women's garments was resisted. Also when the 4-foot dresser was offered to Family IV before unit C, the narrower shelves were not liked at first. However, in general, the narrow shelves were first tolerated, next well liked, and sometimes finally preferred.

Preferences for units and facilities for storage of parents' clothing were stated by the homemaker. It was difficult to tell whether the preferences for facilities for storing the man's clothing were made by the man or determined by the woman. The sliding shelves of unit C were the reported preferences of two men, the 4-foot shelf-dresser of one. The two men who reportedly preferred unit C gave the 4-foot dresser as second choice. In the case of the fourth man, it was difficult to tell whether the sliding shelves of unit C or the shelves in the 4-foot rod unit with hinged doors were the true preference. The homemaker once indicated that if the rod unit shelves would pull forward (which would be difficult because of their size) they would be preferred, because using them would enable her to have nearly all of her husband's clothing in his rod unit.

For themselves, two of the three women who used all three units chose the sliding shelves of unit C and one chose the 3-foot dresser. However, the last one said she preferred her own dresser at home to the 3-foot one because the drawers were larger. She also mentioned that the 4-foot shelf-dresser was roomier than the 3-foot dresser. The two who preferred the unit C shelves seemed to like the 4-foot shelf-dresser second best.

Family III had no choice but the 4-foot shelf-dresser for storing their folded garments, except that shelves in the rod unit could have been used. They did not use the latter for folded garment storage. The homemaker reported that her husband liked the 4-foot dresser and was satisfied with shelves. She liked it and liked the shelves.

Family V had only two dressers to compare, and they could compare them with their own dressers. Only the

homemaker used the dresser units. She said the drawers of the 3-foot one were not large enough for her husband's clothing. As to the shelf-dresser, the parents used only a 2-foot one, since there was only a 6-foot section of wall available for rod and dresser units. Only the homemaker used it. She said she liked the shelf unit about as well as the 3-foot dresser. It held more garments than the dresser, but she liked the dresser drawers. The drawers needed to be deeper vertically but she liked the shallow horizontal depth. She said the back row of items in a large drawer was "lost to her."

In general, the choice of unit C shelves seemed to be connected with their size. Such statements as "they allow me to spread out," "I can have the different kinds of clothing separated," and "I did not have to change the way I folded the garments" were evidence of this. The choice of these shelves rather than the drawers of the 3-foot dresser seems also to be connected with size. The women did not want to store men's shirts, jeans, and work pants or women's shorts, slacks, sweaters, and sometimes shirts in the 3-foot dresser. The dresser drawers seemed to be admirably suited in size to women's undergarments, men's summer undergarments, and summer nightwear for men and women. The advantage of the shelves of the 4-foot shelf-dresser seemed to be visibility of garments, greater storage space, and adjustability. However, it was often necessary to teach these homemakers to take advantage of adjustability. Some would say that more space was needed, but they had to be reminded that they could put in more shelves or adjust the spacing of those already in place.

The advantage of more convenient arrangements of garments had to be pointed out to some homemakers. Usually this was in connection with the husband's garments. When frequently used garments were raised to a higher and more convenient level and when garments were sorted as to kind (as dress and work socks), the husbands usually made some remark about the increased convenience of the arrangement. Husbands usually liked the visibility afforded by using shelves. It was probable that the husbands found better visibility especially helpful because the wives stored the garments.

The center section of unit C was used for storage of folded garments, but apparently it was not liked as well as other facilities. It was sometimes used for storage of infrequently used garments or for large folded garments of the woman when she was using the 3-foot dresser. Trays at the higher levels were considered a little harder to use than those at the lower levels. Full-size trays were considered cumbersome by some homemakers, but one said they held so much and she liked them for that reason. Pull-out shelves were preferred to fixed shelves. In the case of Family II, the homemaker wanted this section for storage of sewing materials and equipment. Another family used this section for storing hats and books.

The small shelves in the lower section of unit C were found useful by some homemakers and scarcely used at all by others, Figure 19. Items stored in them included handkerchiefs, men's socks, purses, and women's shoes.

### Parents' Mirrors and Dresser-top Surface

The large mirror of the 3-foot dresser unit was well liked. It was not usually recognized that the large size of



FIGURE 20. Four-foot shelf-dresser as used by homemakers (left side) and husbands (right side): (A) Family I; (B) Family II; (C) Family III, two trays and bottom shelf, left, used for

sewing items; (D) Family IV, husband objected to shelves as arranged on right side, and when items were more conveniently arranged he liked them.

the mirror reduced the space available for storage in this dresser.

The sit-down dressing table shelf of the woman's part of the 4-foot dresser was not used much. Most of the women either had not enough time to sit down or had small children who picked up the items kept on the dresser top. One homemaker said she used this dressing table only while her daughter was asleep. The homemakers usually used the mirror intended for the husband and he used the mirror in the bathroom. When it was established that this was the case, the low mirror shelf was removed and shelves were used in the space thus released, Figure 20. Since the homemaker was then left without a mirror to check her hemline, a long mirror was placed on the wall of the room.

All of the dresser mirrors were recessed. Those in the 4-foot unit were also inside the unit and the door had to be opened to use the mirror. There was some objection to having the mirror recessed because of the lighting. However, there was much greater objection to having it behind closed doors. The homemakers all said that they did not wish to open a door in order to use a mirror. Much use was made of the wall mirror when the 4-foot dresser was in use. When a lamp was placed beside the mirror in the shelf-dresser, Figure 20, the homemakers said it was better, but they still objected to the door.

### Storage of Children's Folded Garments

The combination of the 3-foot dresser and the 4-foot shelf-dresser were available only to the children of Families II and IV. Children of Family I used the 3-foot dresser only, those of Family III the 4-foot shelf-dresser only, and two girls of Family V used a 2-foot shelf-dresser.

The 3-foot dresser unit did not provide adequate space for storing the garments of two children. Homemaker I said it might be adequate for one child, but not for two. She managed to store the children's folded garments in it and on the shelves over their rods. These shelves were not as acceptable as the drawers.

The problem was greater in Family II. The older daughter was a pre-teenager. Jewelry, cosmetics, and items used for personal care were of great interest to her in addition to the dolls and other toys of childhood and the collections and possessions of a teenager. Family II also had a great interest in clothing. Inventories of the two girls were large. Dresser, shelves over the rod, and small shelves at the rear of unit C were not adequate for them. For the one child in Family IV, the dresser provided sufficient space. None of the users would have liked to give up the mirror or the lower part of the mirror in order to have more adequate drawer space.

The drawers were shallow front to back. The children soon learned how far out to pull them. The vertical depth of the drawers was not as great as most of the users and mothers would have liked, yet none of them thought they would like two deeper drawers to replace three shallow ones.

The 4-foot dresser unit in use by children is shown in Figure 21. Evaluation of the shelf-dresser was affected by the need for storage space for other items of Families II and III. In the case of Family II, provision of storage

space for toys helped the situation, but it did not entirely free the dresser space for storage of clothing. Items such as jewelry, cosmetics, dolls, and collections of the older girl still required storage. The children had become accustomed to storing clothing on shelves in the rod unit. Either habit or unwillingness to make the effort to rearrange items seemed to rule out the use of the shelf-dresser unit alone for storing folded clothing. Her mother said, and the inventories indicated, that the older daughter wanted some of each kind of item in both places. If her rod unit had been nearer the dresser, this might not have been the case. The older daughter liked the shelf-dresser because the high shelves could not be reached by the younger daughter. However, the items placed there were purses, cosmetics, jewelry, and other non-clothing items that she wanted to keep out of her sister's reach.

The 3-year-old daughter had begun to play with her clothes, so her mother placed folded garments she did not want her to have high on the shelving of the rod unit. Panties, undershirts, and socks for everyday were placed within her reach. It was noted that her folded garments were at one time stored in two trays, a box on a shelf, and on one shelf. Evidently her mother thought that she needed drawers or something with sides for small items.

The mirror in the dresser unit also complicated the evaluation of the shelves. It was placed on a shelf about 30 inches from the floor and had to be used while sitting. The older daughter of Family II liked to use the mirror with a chair, but did not want to move the chair and shut the door. Since the shelves usually were not tidy, her mother objected to the open door. The children of Family II used both drawers and shelves, but no clear-cut choice was expressed. The large mirror of the 3-foot dresser with drawers was preferred, but the shelves were liked, probably for their height and greater capacity. The combination of small mirror and shelves was not desirable. Evidently the problem of sufficient space for storing clothing and other items must be solved before a choice of facilities is meaningful.

In the case of the girls in Family V, the problem of insufficient space for storing clothing also complicated the evaluation. This family had an even greater problem in that the two girls were using only a 2-foot shelf-dresser with a mirror. They did not have enough space. Their mother said she thought their own dresser drawers were better for them. However, she thought that if they had had more shelf space they might have done better with shelving.

The children of Family III initiated the shelf-dresser by climbing up the shelves. Their mother then removed the bottom shelves and the mirror on one side, and used the lower part of that side for tall toys. Toys were kept on the lower shelves of the other side and clothing above on both sides. At first the clothing was placed out of the reach of the 2½-year-old boy, but the 4-year-old girl's underwear and pajamas were placed within her reach. The girl was given the low shelves when she learned to use them and the boy learned not to pull out clothing left within his reach. There was enough space for both clothing and toys in the shelving, but not enough low shelves for both. The mother liked shelves; she thought they were easier for children to use than drawers.



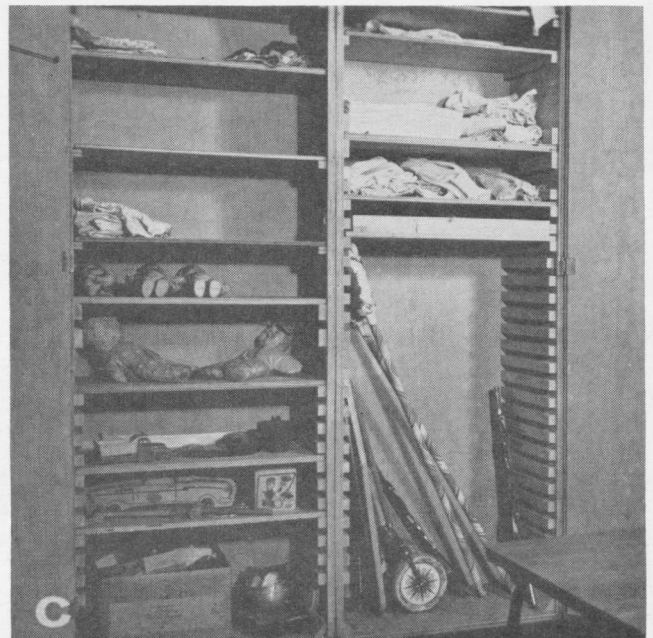
**FIGURE 21.** Four-foot dresser unit as used by children: (A) Family II, the 11-year-old girl stored her cosmetics, accessories, toys, and collections here, and lower trays and shelves at right were used for the 3-year-old girl's clothing; (B) Family IV, the

2½-year-old girl's clothing was stored on the left side only after the mirror was installed on the right; and (C) Homemaker III at first placed the toys rather than clothing within the children's reach.

The child in Family IV used the shelf-dresser for folded clothing only. It was more than adequate for this purpose. The child was able to get out the folded garments that her mother wanted her to wear. She was even able to put away some that had been laundered. Not all of her folded garments were placed within her reach for fear she would play with them.

A mirror had been placed high in this unit because the mother thought the child did not need one. When the child showed interest in her mother's low mirror, she was given a low mirror for her own dresser. She liked this mirror very much. However, as in the case of other children, she did not want to shut the door, which displeased her mother. Even though it was not necessary to have clothing on the exposed shelves, the door interfered with use and care of the room.

Homemaker IV thought shelves were better than drawers for large items of the child's clothing; drawers or trays were better for small things such as panties and socks. She thought larger pull-out shelves such as those in the lower part of unit C would be better. However, since the child had not used these, the mother's statement was not made on the basis of experience.





## Storage for Items Pertaining to Sewing and Mending

Space requirements for storing items pertaining to sewing and mending varied from family to family. Two who owned and one who borrowed a sewing machine kept it in the parents' bedroom and used it there. However, during some very cold weather, Homemaker II sewed in the living room because she did not want to heat the bedroom. The sewing machine was left in the living room during continued cold weather.

Homemaker I tried several ways of storing things used in sewing and mending. First she stored them in the middle section of unit C. She used the shelf (23 × 32 inches) as a tote tray for carrying a cut-out garment to the living room where she was basting it. Later she used a tray (22 × 31 inches) for this purpose and stored it in the center section of the bedclothes unit. Both of these were awkward. She then tried two smaller trays (21 × 15 × 6 inches). She liked these very much, using them as tote trays even to carry sewing with her when visiting, Figure 22. They were easy to carry, and using two helped in keeping her work sorted.

Homemaker II had an unusual interest in sewing and a large variety of materials and supplies. At one time she had 68 dress lengths, 108 patterns, 2 bags and 1 suitcase of scraps in addition to smaller supplies, equipment, and garments to be mended. At first she stored these in various places in her rod unit, unit C, and the bedclothes unit. They interfered with plans for storing clothing and bedclothes, so an attempt was made to collect these items in one place. The top and middle sections of unit C did not provide enough space. Two boxes were placed under the sliding shelves of unit C, Figure 19B. The facilities of unit C were crowded. Homemaker II kept adding to the materials to be made up. During the fall and early winter she made garments for Christmas gifts. A collection of scraps and patterns that could be kept in a less convenient location was placed in the top sections of unit C and a rod unit. This arrangement was the most satisfactory one.

When the 4-foot units were in use, she used the top sections of her rod unit and the dresser unit, the two shelves over the rod to some extent, Figure 22C and D, the bottom of her side of the dresser, Figure 20B, and one drawer in the bedclothes unit. She would not try to concentrate all of the sewing items in the bedclothes unit. She would have had to move some little-used bedding to the space used for sewing items; the bedclothes unit was not as handy as the bedroom units to her sewing machine.

In the evaluation session, she said unit C was better than the top sections of 4-foot units, and that it might have been better to have used the bedclothes unit for sewing items rather than the top sections of the 4-foot units.

Homemaker III had a sewing machine and sewed in the bedroom. At first she kept her materials and equipment in the top section of her rod unit because she wanted them out of the children's reach. After fasteners were placed on the doors, she placed them at the bottom of her side of the dresser. She kept a carton and a sewing box there as well as two trays above them for sewing supplies, Figure 20C. Altogether a space about 20 inches high was used. The trays were taken out as needed. She kept her patterns in a desk drawer in the living room as she had

done in her own home, and did not wish to change. She liked having the other sewing things in one place.

Homemaker IV did not sew a great deal. She used a portable sewing machine in the dining area, and stored it in the bottom of the 2-foot unit by the bathroom door. Her sewing items were stored in one 11 × 32-inch shelf in unit K, which made them convenient to use in the dining area for machine sewing, and in the living room for hand sewing. While she was trying unit K for storage of bed linens, the sewing items were moved to the bedclothes unit, which was a little less convenient and the shelf was deeper than necessary.

Three of these families had no difficulty in finding space for storing sewing items, but one could have made use of a fairly large sewing center. Since this homemaker seemed to enjoy viewing television while sewing, she might like having a sewing center in a family room.

## Bedclothes Unit

The bedclothes unit had at the bottom three drawers, each 10 inches deep vertically, an upper section 25 inches high in which trays or shelves could be used, and the usual top section like all units of the original set. As far as possible, the homemakers were expected to try drawers, trays, and shelves for storing bed linens. In order to try narrower shelves, they were expected to use also the 11-inch-deep shelves of unit K, which stood beside the bedclothes unit.

All of the families used this unit for other items than bedclothes. The kinds and amounts of other items varied among families. All agreed that it was good to have a unit for this purpose, and that, if used only for linens and bedclothes, the unit used would be large enough.

The two homemakers who stored bed linens in unit K liked the shallower shelving better, because the linens were more accessible. However, these shelves needed to be a little deeper than 11 inches. Shelves in general seemed better suited to storage of linens than trays or drawers. Trays were especially disliked at high levels. Drawers were tried only at low levels.

Pillows, blankets, quilts, and comforters were often placed in the top section of the bedclothes unit or other units because of the need for convenient space for other items. The top sections were not liked for this purpose, however. Items that are bulky yet not very heavy are more easily stored in top sections than smaller or heavier items, but drawers and shelves were preferred to the top sections for the large bulky items.

Items other than bedding that were stored by each of two families in the bedclothes unit were kitchen linens, doilies, sewing materials, clothes that were washed but not ironed; one family stored table linens, cleaning rags, curtains, ironing pad, and rug in this unit. Also one homemaker liked to keep one shelf free for temporary storage of items, such as gifts hidden before Christmas and party decorations. She said the house lacked places to put things down and she liked this reserved shelf.

In general, the homemakers needed help in planning arrangements of items in this unit. They recognized that some items were stored in rather inaccessible parts of the unit. However, they had trouble deciding which items were needed more often; once things were placed, they did not like to rearrange them.



**FIGURE 22.** Storage of items pertaining to sewing and mending: (A) Homemaker I kept two trays in the bedclothes unit for such items; (B) she carried them wherever she was mending or sewing; (C) Homemaker II at one time used top sections of

the 4-foot dresser and (D) of the clothes closet for storing sewing items. At the time photos C and D were made, Homemaker II also stored a box of scraps in the lower part of the dresser. (See Figure 20B.)

### Bathroom Unit

The bathroom unit is shown in use in Figure 23. It had, in addition to the top section, three other sections: upper, 13½ inches high; middle, 28 inches high; and lower, 17 inches high.

The upper section was equipped with a step shelf 11 inches deep and 7½ inches high. This section was used

for such items as medicines, cosmetics, bathroom supplies, shaving equipment, materials and equipment for care of the hair, and shoe polishing supplies and equipment.

Also used for storing some of the foregoing items was a small medicine cabinet, 22 × 4 inches and 16 inches high, mounted over the wash basin. This cabinet had a closed section 12 × 3½ × 15 inches behind the mirror with three open shelves on each side. It was used by most

of the families for small bottles and items for dental care. Thus, the upper section of the unit was not the only place available for storing items commonly kept in the bathroom.

Two homemakers thought the upper section should be shallower, and two liked it deep. One said she did not need the step shelf. One who wanted it shallower also wanted a larger cabinet over the wash basin. Her husband placed an open shelf on the wall near the wash basin for bottles that were used there. In addition, this family filled the top of the medicine cabinet with bottles.

The two families that liked the bathroom unit deep may have considered the need for space rather than the possibility of getting the same space by using twice the wall area in shallower shelves. One of these families reported re-organizing this section to make the items more available. The other homemaker indicated that she could not see all of the items stored in the deep shelves.

The middle section was planned for storage of bathroom linens. All of the families emphasized the need of having this section easily accessible to small children. Pull-out shelves were preferred to trays. The trays were large and heavy for children, and the combination of doors and trays was not liked even by the adults. The shelves were not pulled out by one family, and by the others they were more often pulled out for placing than for removing towels and wash cloths.

The depth of the unit was such that it accommodated two stacks of towels one in front of the other. Some of

the families placed towels they did not wish to use regularly at the back. One homemaker expressed a wish to have this part shallower so that she could see all of the linens.

Another use of this section was for storing laundered clothing before it was ironed. Two homemakers did this. One even used it for storing dampened clothing. She was asked to use a plastic bag for this. She reported that mildew had not been a problem with dampened clothes. The other homemaker said her husband sometimes took rough-dried work pants or jeans from this section and wore them unironed. She thought that, if there were room, this would be a good place to store his underwear and work pants; it would be convenient for him.

The bottom section was used for storing soiled clothing. Either baskets or cartons could be used as containers. Cartons were preferred because they fitted the space better, held more clothes, and were easy to slide in and out. One homemaker thought bins might be easier to use than cartons. The homemakers were interested in having this part of the unit available to the smaller children. All of the children except the 2½-year-old boy learned to place soiled clothes in the unit. This was considered very helpful by the mothers.

All of the homemakers considered the bathroom a very good location for storing soiled clothing. Clothing was most often removed there. The size of the space was about right. One homemaker reported that during a long rainy



FIGURE 23. Bathroom in use: (A) Family III; and (B) Family IV.

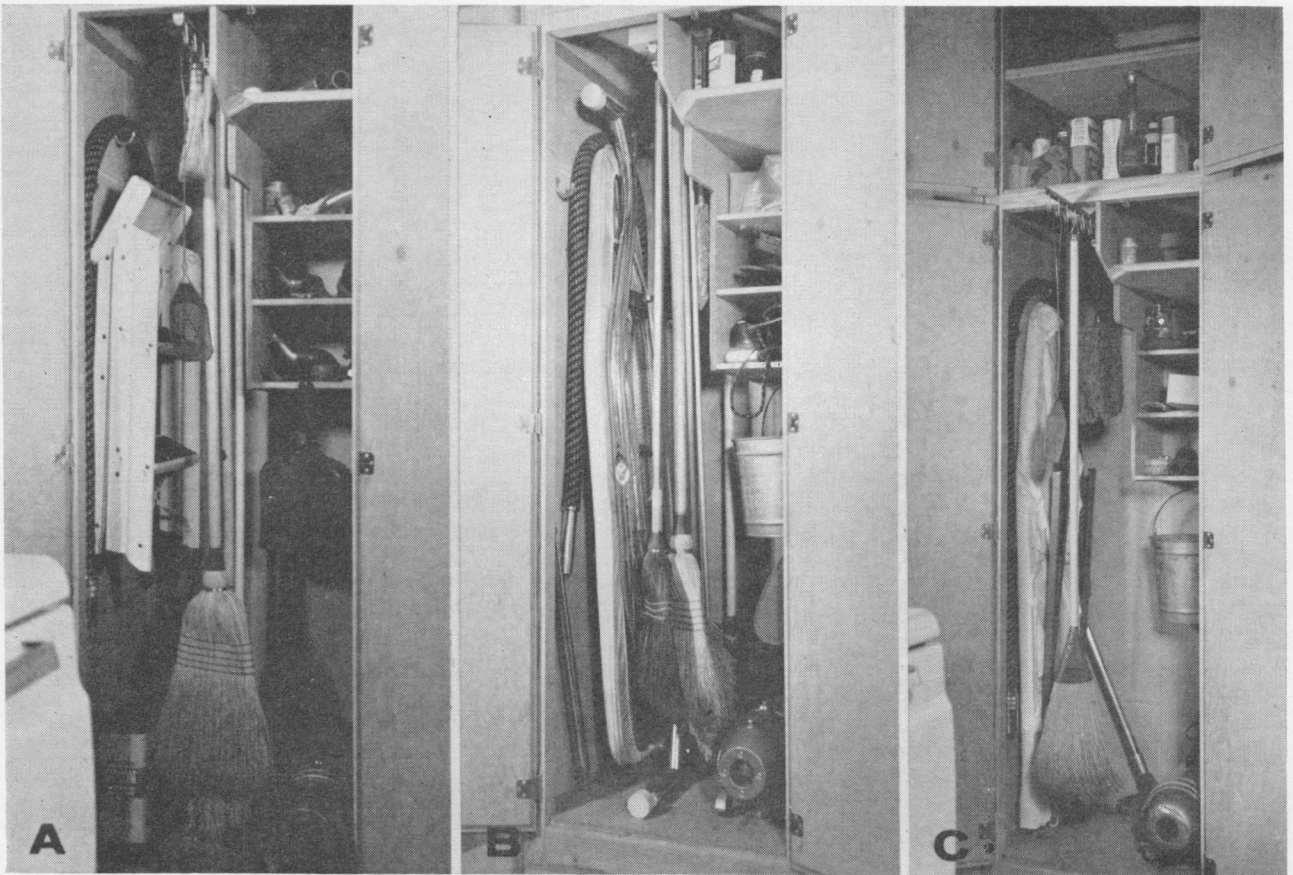


FIGURE 24. Cleaning closet in use: (A) Family I, (B) Family III, and (C) Family IV.

spell this part was temporarily crowded since she had put off washing.

In general, the bathroom unit was liked. All homemakers said they would want such a unit if they were planning a new home.

### Cleaning Closet

The cleaning closet, originally planned to be a combined pan storage unit and cleaning closet, had horizontal dimensions  $2 \times 2$  feet. Thus, the whole unit was about the minimum size practical for a cleaning closet. The center partition and facilities on the left were removed to make the space more accessible. The four shelves on the right were not removed. These were all  $11\frac{1}{2}$  inches wide and spaced 6 inches apart. The top shelf was 23 inches deep and the others  $11\frac{1}{2}$  inches deep. The lower left corner at the front of the top shelf was at such a height and position that a person leaning forward into the unit might strike the top of his head against this corner. Therefore the corner was cut off since the shelves were needed and they were installed in such a way that their removal would likely weaken the structure of the unit, Figure 24.

On the left side of the unit and about 2 inches from the shelving on the right, a pull-out potrack was installed to hold mops and brooms. On the left wall were hooks for storing the vacuum cleaner hose and for hanging the step stool. At first a hook was placed at the front of the bottom shelf for the dust pan; but this interfered with use of the

space under the shelves. This hook was later placed on the right wall and a hook was placed under the bottom shelf to hang the mop pail. The unit was located just inside the door from back porch to kitchen.

A unit tall enough to store long-handled tools is the right height for storing other long items, such as table boards, ironing boards, and step stools. Table boards were not a problem in this house, but a step stool was necessary to reach the top sections of the units. This unit had insufficient space for both step stool and ironing board in addition to cleaning supplies and equipment. However, a unit 3 feet wide and 2 feet deep might accommodate an ironing board, table boards, and step stool. One family that used the step stool as a high seat for the younger child kept it in continuous use. Two families kept it on the porch because they did not use the top sections often. The other family did not use a regular ironing board with legs and did hang the step stool in the unit. All of the families stored their irons in the shelving of this unit. Some of them used shelves in the top section.

Obviously there was not much waste space. Most of the homemakers had to learn to manage the space. All of them liked this unit. They had not had such a storage facility before. All but one seemed to think it was large enough. The one who did not, said that, while the space for each item was just right, the unit as a whole seemed crowded. Successful use of it did require proper storage of each item. One homemaker said she had emptied a gal-

lon of liquid wax; removing the can made the unit seem much less crowded. Actually it might have been difficult to find room for an upright vacuum cleaner or a canister cleaner in this unit. While many farm homes in the South may not have a vacuum cleaner, it is probably wise to include space for storing one in plans for new houses or in remodeling plans that include a cleaning closet.

### Unit K

Horizontal dimensions of unit K were 1 × 3 feet. It was planned for the storage of kitchen and dining room linens; extra china, glassware, and silver; and other kitchen or dining room items for which no other storage was available. In addition to the top section, it had an upper section 17 inches high, a middle section 13 inches high, and a lower section 28½ inches high. All of these sections had movable shelves supported by metal clips fastened in slotted strips. The middle section had two trays 31 × 10½ × 3 inches for storing table cloths, and four trays 15 × 10½ × 2 inches with divisions for storing napkins in two and silver in two. These trays were set on shelves.

The families in this study had needs for space that varied both among families and in the same family at different times. Both the seasons of the year and the space in the kitchen side of the 4-foot desk unit that was used part of the time affected the need for space in this unit. Unit K in use is shown in Figure 25.

One homemaker usually needed this unit entirely for home-canned food, but at one time was able to use two shelves for Sunday dishes. The unit was satisfactory for storing canned food. It held 260 containers<sup>8</sup> at one time by using all sections including the top. When another family used it for dining room and kitchen linens, aprons, and doilies, it was never filled. Another used it most of the time for dining room linens, doilies, and sewing supplies, but did not need all of the space for this purpose. Another tried it for kitchen and table linens and everyday dishes, but decided to store everyday dishes nearer the sink and to store Sunday dishes in their place.

The trays were too small for linens, especially table cloths. When the silver trays were used, they were kept in the kitchen. Shelves rather than trays seemed satisfactory for linens. One homemaker said that the shelves should be deeper for large table cloths.

Two of the homemakers, as previously mentioned, tried this unit for storage of bed linens. Two of them used the lower section for storage of toys for younger children during the period just after Christmas when extra toy space was needed. The location in the back hall was not altogether desirable for toys, but the shelves were satisfactory.

Miscellaneous uses were for hiding things from children,

<sup>8</sup> The containers were: tins—80 No. 2, 56 No. 3; glass jars—18 half-gallon, 78 quarts, 28 pints.



FIGURE 25. Unit K in use: (A) canned food, empty jars and Sunday dishes stored by Family II; (B) bed linens stored by

Family IV; (C) catalogs, items pertaining to sewing, table linens, and toys stored by Family IV.

and storing magazines and other items used in the living room.

### Original Desk Unit

The original desk had horizontal dimensions of 1 × 3 feet. In addition to the top section, it had an upper section with open shelves, a desk section with a dropleaf writing surface, and a lower section with three full-width drawers. It was used at the laboratory by Families I, II, and IV, and used at home of Family V successively by a college girl and two girls in elementary school. The desk in use is shown in Figure 26.

**Shelves.** The shelves above the writing surface of the 3-foot desk had certain disadvantages. The center divider was not liked. It took enough space for one more book, restricted possible arrangements of articles on the shelves, and interfered with artistic arrangements. The divider probably was used in order to have two half-shelves sloped for magazines. These sloping shelves were not liked. Magazines could not be identified readily.

Another difficulty was that when books 8½ inches tall were placed on the top shelf, they caught on the framework above when removed, Figure 26A. The only shelf space well suited to books over 8 inches tall was the left half of the bottom one. Since 8½ inches is ordinary book size, a slight alteration of the shelf spacing would have made these shelves more useful.

The depth of these shelves, 11½ inches, was greater than that required for books, since few of them are wider

than 8 inches. However, some magazines are about 11½ inches from top to bottom of the page.

The shelves were liked and used. More open shelf space would have been useful to some families, since two of them stored books in the top section, where it was difficult to reach and the books were behind closed doors. When school children were using the desk, they placed their books on the shelving as they returned from school.

One homemaker reported that the shelves were "too handy"; people tended to empty their pockets on them and made them unsightly. This was perhaps not a fault of the desk as much as an indication of scarcity of other convenient places to empty pockets.

**Desk section.** The desk section was not large enough for work in which papers had to be spread out. It was not very satisfactory for using a large typewriter. Some users noted the lack of pigeon holes. Most adults complained of lack of knee room. When a writer sat sidewise to allow room for her knees, she faced the corner of the room. (See floor plan, Figure 6.) One writer felt hemmed in. She described it as "a spot-in-the-dark feeling." Not all users felt so cornered, but some mentioned need of a light at the desk. A small wall light placed inside the desk was not satisfactory because of glare. A wall lamp with a large bulb placed near the desk was the solution to the light problem.

Users did not like the combination of a dropleaf writing surface and drawers underneath. The drawers were obviously the place for storing items used at the desk, yet



FIGURE 26. Original desk unit in use: (A) books when removed from shelf were caught by frame above; (B) children

who used it in their home liked it; (C) portable typewriter could be used on it, but there was not enough knee room for comfort.

it was necessary to disarrange the work on the writing surface in order to get items from the drawers. One homemaker thought that one drawer would have been enough, and would have preferred shelves instead of the other two drawers.

Users liked to close the desk to get their work out of sight, but some mentioned that there was not much space inside when it was closed. One family said they were not using the desk much because they did not have a chair there. It developed that they did not want to keep a chair near the desk when it was closed, yet they did not want to leave the desk open.

With all the criticism of the desk, all the families that used it liked the idea of having a place to write and to store books, writing materials, check books, bills, and other business papers that are often used. The comments about the open shelves seemed to be related to the desire for more and better space to display art objects, plants, and flower arrangements. Such space is not incidentally provided by storage walls as often as it is in the case of storage furniture.

### Alternate Desk Unit

The alternate desk unit had horizontal dimensions 2 × 4 feet. It had facilities on both front and back. Drawings of front, back, and a section are given in Figure 27. No top section was used with this unit. It was planned as a kneehole desk. Above the writing surface were shelves for books and other items. Under the writing surface were: right side, an open paper shelf; left side, three drawers each 13 inches wide. One of the drawers was intended to be used as a letter-size file. The desk in use is shown in Figure 28.

This unit was used at the laboratory by Families II, III, and IV. It was used at home by Family I, but they could not use the reverse side of it because it had to be placed against a wall. They used a top section with it.

This desk was well liked. The three families who used both desks preferred the 4-foot one. It had more shelf room above the writing surface. One homemaker found that she tended to bump her head on the top shelf when she stooped from a standing position to pick up an item on the writing surface. Others were questioned about this problem, but none of them reported noticing it.

The writing surface was larger. This surface and the open paper shelf beneath it were not objected to on the basis of appearance, but the two families that had a child less than 3 years of age said that items in either of these two places were not safe from children. The writing surface was large enough for men and the knee room was ample. The surface was satisfactory for typing. The open paper shelf was convenient to use when doing typing.

The homemaker who felt cornered at the 3-foot desk placed the 4-foot desk in her home so that its left end was in a corner, Figure 28A. She did not report having the cornered feeling, yet she did use the desk.

**Drawers.** The drawers at the side were liked better than the ones under the dropleaf of the 3-foot desk. Not all of the families used file folders, but all thought the file drawer would be useful. One homemaker pointed out that there was no support for folders unless the drawer was full. One of the men who used it with folders said that the drawer was not quite wide enough for his fold-

ers and he had to trim them. The drawers had been constructed so that the sides were set in from the sides of the space for drawers. This was not according to the specifications. Later the drawers were rebuilt according to specifications that gave an interior width of 12¾ inches or an inch greater than the length of a letter-file folder.

**Kitchen side.** On the kitchen side were shelves. At the top a large space, 14 inches deep and 21 inches high, had vertical dividers at the right end. This space was intended for storing large kitchen utensils such as preserving kettles, canners, small electric appliances, platters, trays, and large lids. At the bottom were shelves 4 inches deep for storing canned food and small items.

The kitchen side of the desk is shown in Figure 29. The shallow shelves were used because the desk surface did not seem to need to be deeper than 19 inches. The 4-inch shelves offered an opportunity to try this depth for canned food, for which space was insufficient for one family. In other situations it would be possible to design a reverse side to accommodate whatever items might require storage. In the event a reverse side were not needed, shelves on the desk side could be stacked vertically at the rear of the writing surface.

The large shelf was liked for storing the items for which it was planned. Only one of the three families who used this space had a canner. One had a fairly large blancher. The space in this section would usually have been more effectively used if another shelf had been provided.

The vertical dividers were considered useful. None of the homemakers had used this kind of storage facility before. They were used as planned. In addition, one family used them for storing 12-inch phonograph records, Figure 29C. This family had a large number of records and tape recordings. Small record albums and tapes were stored on the large shelf and large recordings were stored between the vertical dividers. This family later tried this section for kitchen and dining room equipment.

The vertical dividers were taller than necessary for items stored between them. Eighteen-inch trays were the tallest items stored. The dividers were 21 inches high but only 14 inches deep. Thus, they would not accommodate 21-inch trays, which are 16 inches wide. However, none of the families owned trays of that size. Round trays of a diameter larger than 14 inches could not be accommodated between these dividers. However, round trays up to 21 inches in diameter could be stored at the back of the large shelf. Although not usually recommended, a tray stored at the back of the shelf was easy to use, when only a few items were stored on this shelf, Figure 29B.

The small shelves were liked and used, not only for canned food, but for decorative items, vases, napkins, facial tissues, and small items used on the table at meals. Homemakers with small children were reluctant to place glass jars of food on these shelves until hooks were placed high on the doors. However, they liked the idea of having cans one row deep. One homemaker said that, while these shelves did not provide enough space for storing all of her canned food, they would make a convenient place for keeping a few jars, both filled and empty. Thus, they would spare many steps to a homemaker whose main supply of canned food was stored in a basement or other distant place.

The top of the desk was used by some families to place

[ 56 ]

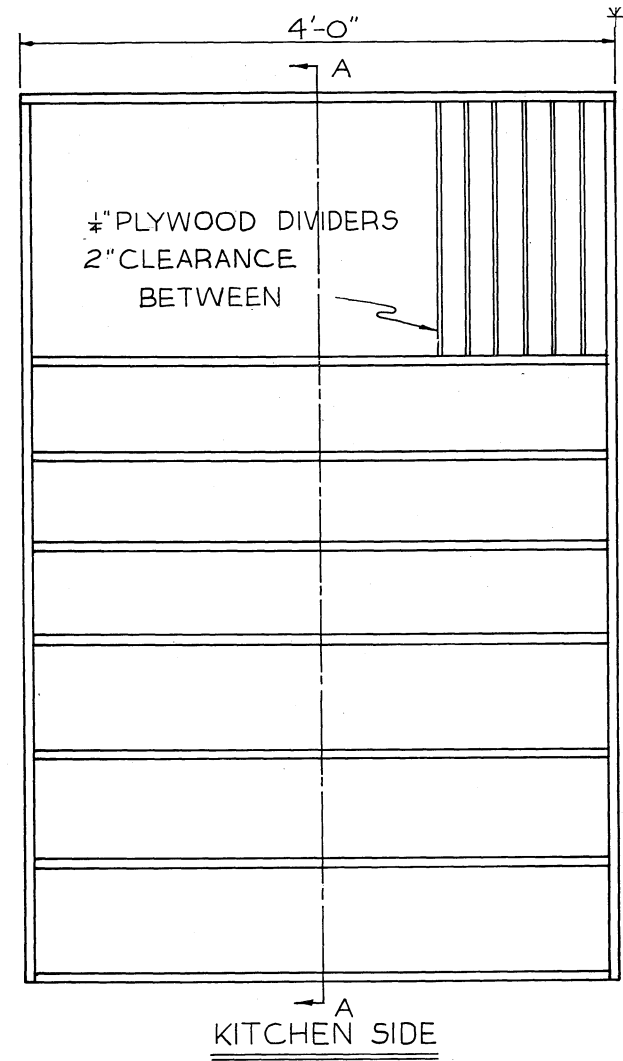
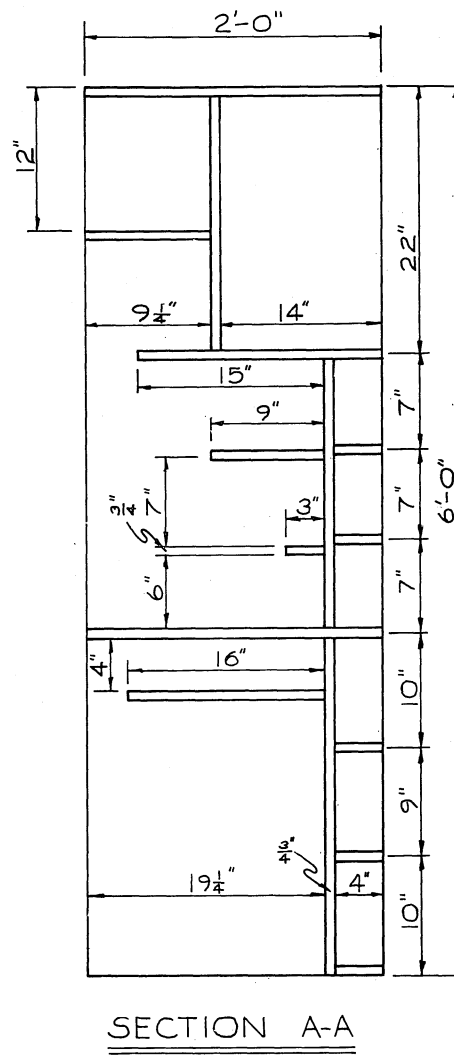
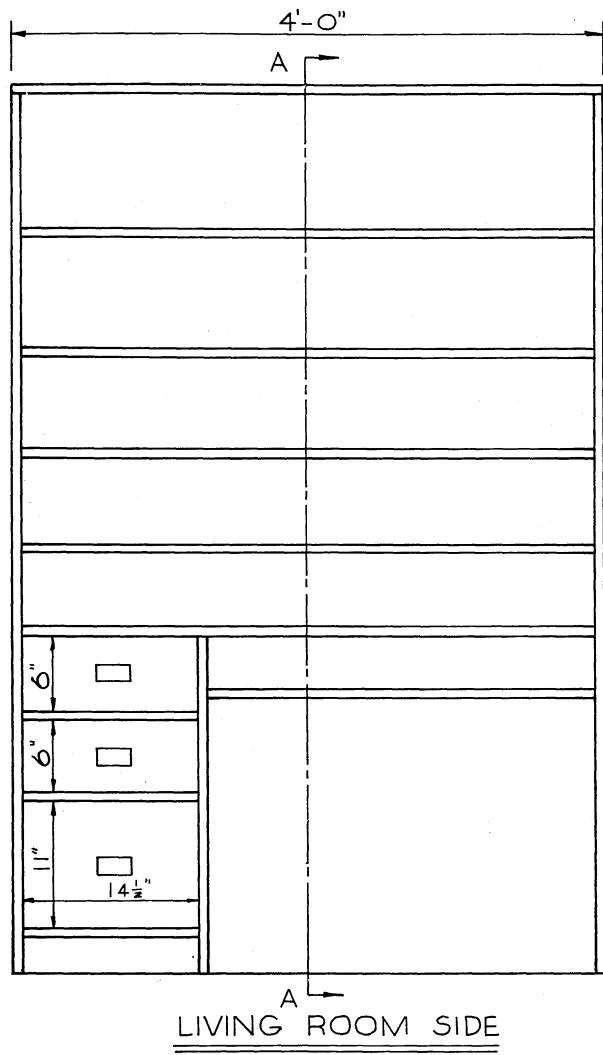


FIGURE 27. View of 4-foot desk unit showing living room and kitchen sides, and vertical section.



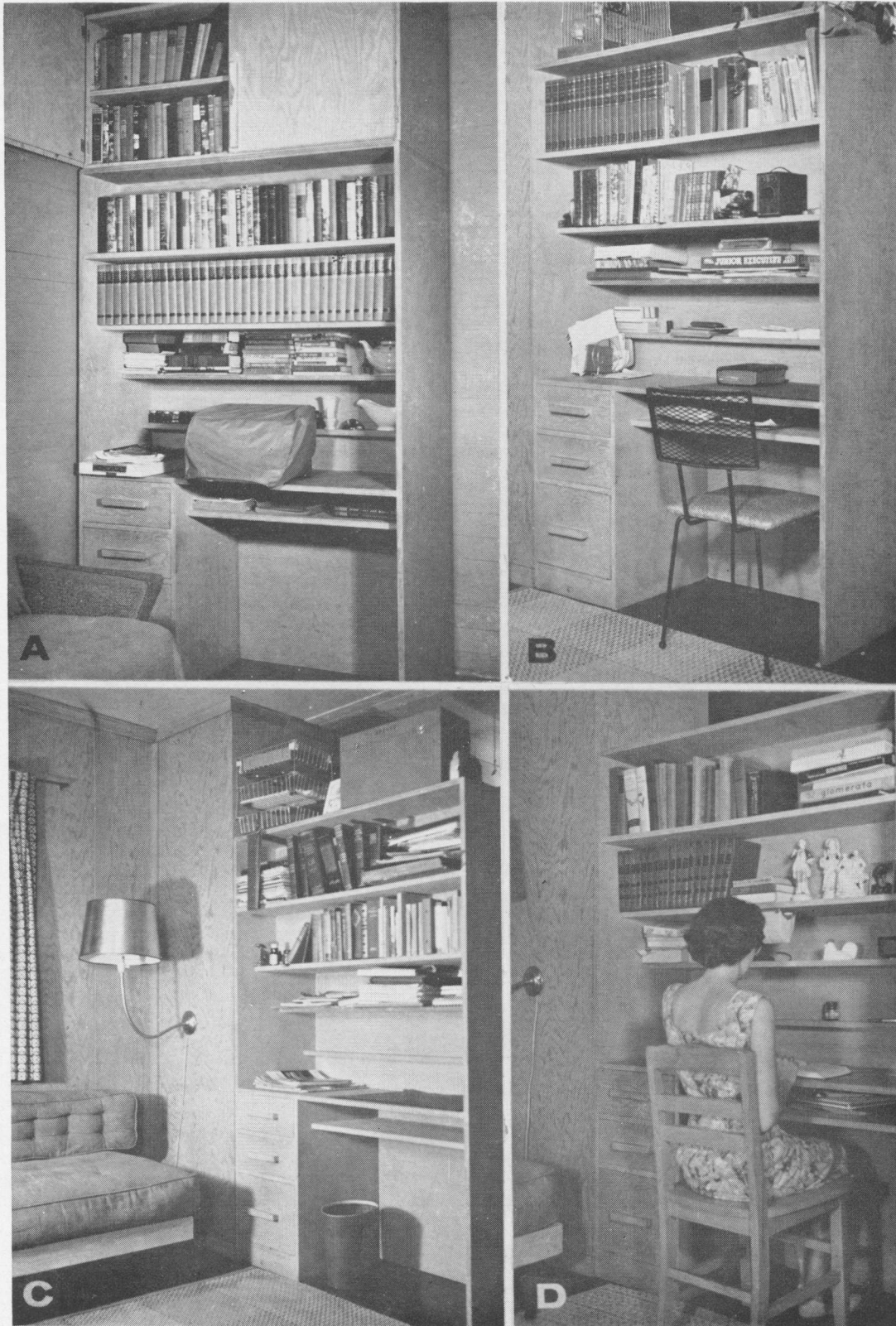
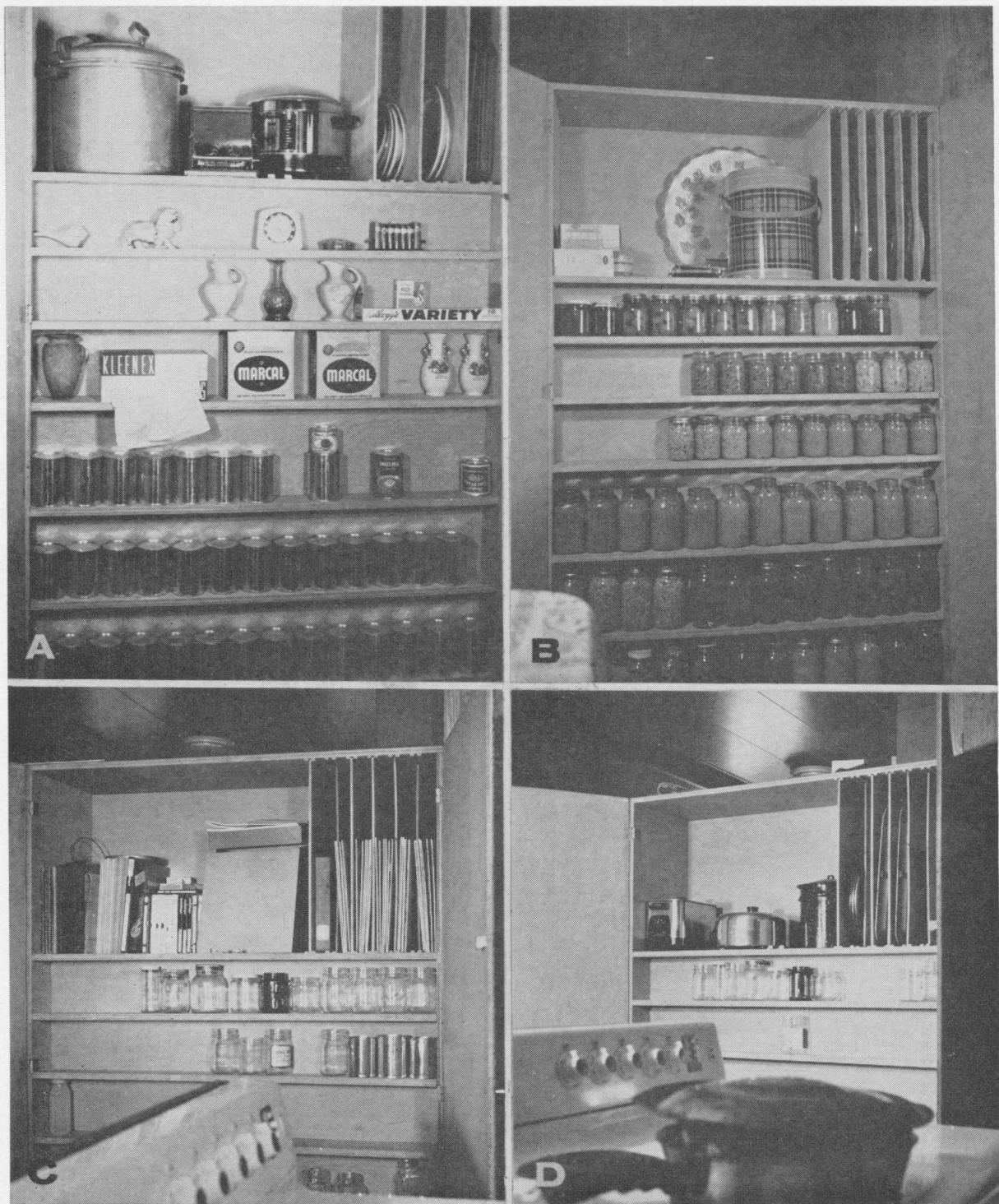


FIGURE 28. Four-foot desk in use: (A) Family I, who used it in their home, needed a top section for books; (B) Family II used it for storage and as a study center; (C) Family III stored

items high enough to be out of reach of the children; and (D) the homemaker of Family IV, who was a student, used the desk as a study center and for preparation of class materials.



**FIGURE 29. Kitchen side of 4-foot desk in use: (A) Family II; (B) Family IV; (C) Family III first used upper part for record**

**albums and tape recordings; (D) later Family II tried it for kitchen items.**

items out of the way of small children. It was used by others for decorative items, plants, and even the parakeet's cage, Figure 28B.

The 4-foot desk required a great deal more floor space than the 3-foot one. Only one of the families who used

both mentioned any negative reactions to the greater size. It was also the only family who used the smaller desk after using the larger one. Although the homemaker liked having more floor space and fewer doors to contend with, she preferred the larger desk.

## Shelves in Back Porch Unit

Shelves were placed in the right half of the back porch unit to meet the expressed need for storage of items that did not seem to belong in the house. They were not available to Family I. They were used by the other families for items that might in a farm house be stored in a kitchen or work room and for items used out of doors, Figure 30. In the case of one family, there was not sufficient space in the house for all their possessions. In the cases of the other two families, these shelves provided space for disposing of items as one entered the house. There was always great demand for space here. The homemakers had to be shown that infrequently used items should not be placed in this convenient location. Even when they were convinced that these items should be placed in the house, some homemakers procrastinated about moving things to make room for other items for which they had stated space was needed in the unit.

The adjustable feature of these shelves was appreciated and used. One homemaker also needed space for storing folding chairs used outside, a folding laundry cart, folding tray-tables, and the step stool, which she did not want in the cleaning closet. Storage for these was provided by removing the bottom shelves and attaching boards at right angles to the back of the unit and to the bottom of the lowest shelf to hold these items in place, Figure 30B. This seemed to be a practical way of storing these items, but it did not leave much shelf room for other items that required storage on the porch.

In a farm situation, tools used in connection with gardening, farming, and yard work would probably be stored in a farm building. However, a few simple tools used around the house might be stored either on the porch or in a kitchen or work room. In a farm situation, baskets and other containers used in collecting (for household use) eggs, vegetables, fruit, and flowers might be stored here as well as items used outside, such as lawn chairs, outdoor grilles, charcoal, and any other items requiring shelter. Items such as empty fruit jars, freezer containers, bottles, and the like might well be stored inside. However, a unit used on a well-sheltered porch might be made of rougher materials than would be accepted in the house. Hence, porch storage might be less costly than storage in the house.

## Top Sections of Units

Since the house had no attic or basement, it was expected that top sections of the units would be used for storing items not often used, or out-of-season items.

Homemakers had the tendency to store in the top sections items that were related to the things in the units beneath. Thus, each person's out-of-season garments that were folded were sometimes stored in the top of his rod unit, books were stored in the top section of the desk, canned food in the top section of unit K when other canned food was stored below.

However, this was not always done. Bed covers and blankets were often stored in the top sections of any unit in the room where they were used, whereas unrelated items were stored in the bedclothes unit. This was perhaps a carry-over from previous practice. In some instances currently used items were stored in the bottom of the top section because space lower in the units was not available.



FIGURE 30. Shelf section of back porch unit in use in summer: (A) Family II, (B) Family III, and (C) Family IV.

When families had plenty of space, the top sections usually were little used. Sometimes space in the top sections was ignored even when a need for convenient storage space was recognized. For example, one homemaker needed storage space for items in the back porch unit. It developed that she had Easter baskets, Christmas tree decorations, and tree holder in that unit. She had not recognized that she could gain space for items frequently used by removing the out-of-season items to a top section.

Top sections were a favorite place for storing luggage, hiding toys before Christmas, and keeping nearly anything that could be packed into boxes. Trays were tried in these sections, but they were too heavy for most women to handle.

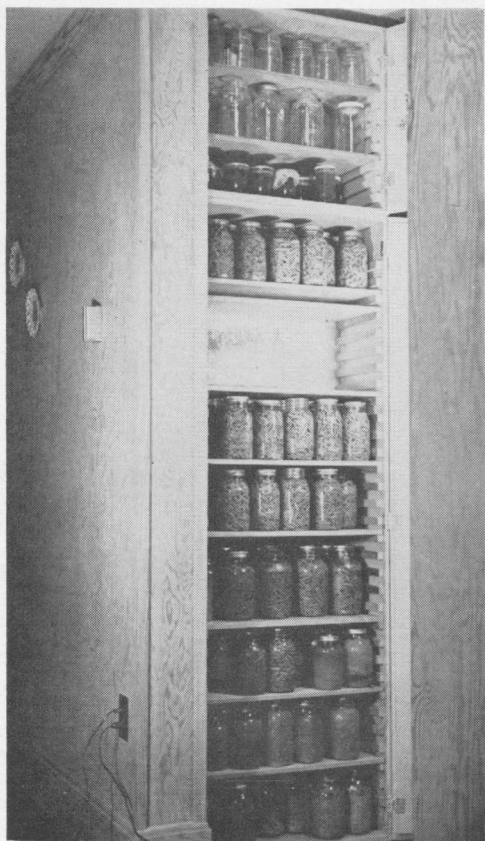
Top sections, however, cannot be expected to replace attics and basements. They are too small for some items, and it is difficult to place heavy items at heights above 6 feet even when a step stool is used. Also some items are too dirty or are otherwise unsuitable for storing in top sections.

## Items for Which Storage Space in Units Was Lacking, Inadequate, or Poorly Situated

As previously stated, finding what items owned by participating families were not accommodated or were poorly accommodated by the units was one of the purposes of this study.

Some of the items families found no satisfactory place for storing were luggage as large as a foot locker, awnings, window screens, door screens, outdoor grill, large tool chest, fishing pole, large supplies of root vegetables, long-handled garden and lawn tools, lawn mower, and garden plow.

The sheving in the back porch unit was built to provide space for items used outside the house. However, it did



**FIGURE 31. Two-foot unit used for canned food.**

not accommodate garden tools, lawn mower, and garden plow, which on a farm would be stored in another building. In rural areas and residential areas of towns and cities, a garage or large outdoor unit would be needed for storing such items.

Storage for canned food was not a problem for three of the families, but the homemakers of two of these families said that for a farm family the available space would not be sufficient. The fourth family had canned food in amounts that probably more nearly represented those of a farm family. This homemaker said she usually used the frozen vegetables and fruit before the canned ones in order to make freezer space available for pork, beef, and chicken. Thus, her canned food tended to pile up as the summer progressed. This homemaker usually canned more than a year's supply of many products to use in case of crop failure in future years. Thus, more than one year's supply was at times present and empty containers were on hand to be stored.

This homemaker had more of other items than any of the others. Hence there was no extra space available in any part of the units. She was supplied with a 1 × 2 × 6-foot unit with a separate top section that extended to the ceiling. This unit had adjustable shelves supported by cleats, Figure 31. It was placed in the hallway near the bathroom. She filled it with 116 empty jars and said she still needed more room. Another unit of this kind, but without a top section, was then placed beside the cleaning closet in the kitchen. The desk was moved

a foot toward the living room to make room for this unit. She put additional empty jars in the bottom shelves, and stored some chinaware, glassware, and trays in the upper shelves. This unit had easily adjustable shelves and was in such a convenient location with reference to the kitchen that she could not be persuaded to use it for canned food and empty jars, but kept finding other uses for it.

Finally it developed that the reason she needed so much room was that she did not want to put empty jars on the same shelf with full jars or two varieties of canned food on the same shelf. This is a common practice when rough shelving in basements or storage rooms is used for storing canned food. This homemaker had been accustomed to storing her cans of food in boxes, since she had not had shelves. In her case, there had been logical reasons for not mixing varieties of food or empty and full cans. She was helped to see that she could not be wasteful of space in this kind of unit. If homemakers are to store canned food in shelf units in the living area of the house where they will be seen and occupy valuable storage space, the units will have to be more compact, more costly, and more attractive. Homemakers then will probably have to accept having more than one variety of food per shelf and replacing emptied jars in the spaces from which they were removed. Such storage will also necessitate close calculation of space requirements for the entire stock of jars.

The same homemaker used freezer containers that were not collapsible and could not be nested. These containers required a great deal of space. In smaller houses, the economy of such containers must be considered in relation to the cost of storage space.

Three of the four families encountered some difficulty in finding space for storage of toys. The other family had few toys to store.

When the need for space for toys became evident on the arrival of Family II at the laboratory, the children were supplied temporarily with two large trays 22 × 31 × 8 inches. These trays were placed on the floor under the children's beds. Next, a separate open shelf unit 12 × 28 × 44 inches high was given them. These shelves were used by the younger girl, Figure 32A, but the homemaker and the children seemed to like the trays better. The homemaker admitted that the trays were at best a makeshift, but she did not want to give them up. It was not until the use of the 4-foot units provided some extra space for toys that the trays were entirely emptied and removed. The younger daughter used most of the space in the toy shelves.

The floor space of the laboratory was so small that the only play area not in traffic lanes was in the children's bedroom. Families II and III used this as the main play area, from which it spilled over into the living room. Family IV used the child's room as a play area in warm weather, Figure 32D, but did not wish to heat it in winter. They moved the toy shelf to the living room during cold weather. Even for one child, the living room did not have wall and floor space properly located for the toy shelf and play area, Figure 32E. Also the homemaker objected to open shelves for toys in the living room. She let the child use a cardboard carton, which was often in the way of traffic.

Two families had a secondary toy storage in the bottom shelves of unit K, Figure 25C. Both used this for storing

toys for a preschool child. In each case some of the toys were those used for "helping" with cooking.

In Family III, the children had a great many toys. Some of them were stored in the toy shelves and some in the shelf units planned for storage of folded garments. To prepare for the use of the 3-foot dresser which they were expected to try later, a second shelf unit, 12 × 24 × 30 inches high, was placed under a window in the children's room. Since two children often played separately, the girl was given this unit and the boy kept the larger shelf unit, Figure 32B and C. The girl's larger toys were grouped around her shelves. There were a chair, a doll carriage, and an ironing board. A bed separated the two children.

These children also carried toys to the parents' bedroom at times, and set up a temporary play area there. It was noted that when only one child was playing there was a greater tendency to follow the mother than when two or more children were playing.

Two of the mothers favored the use of chest-type storage for toys even though they recognized the fact that this was not an orderly way to keep the toys, and that more toys were usually taken out at one time. They said that advantages of boxes and chests were that the toys were easy to put away, and containers of toys could be moved out of sight when desirable. These two mothers did not seem to understand the effect on the child's habit

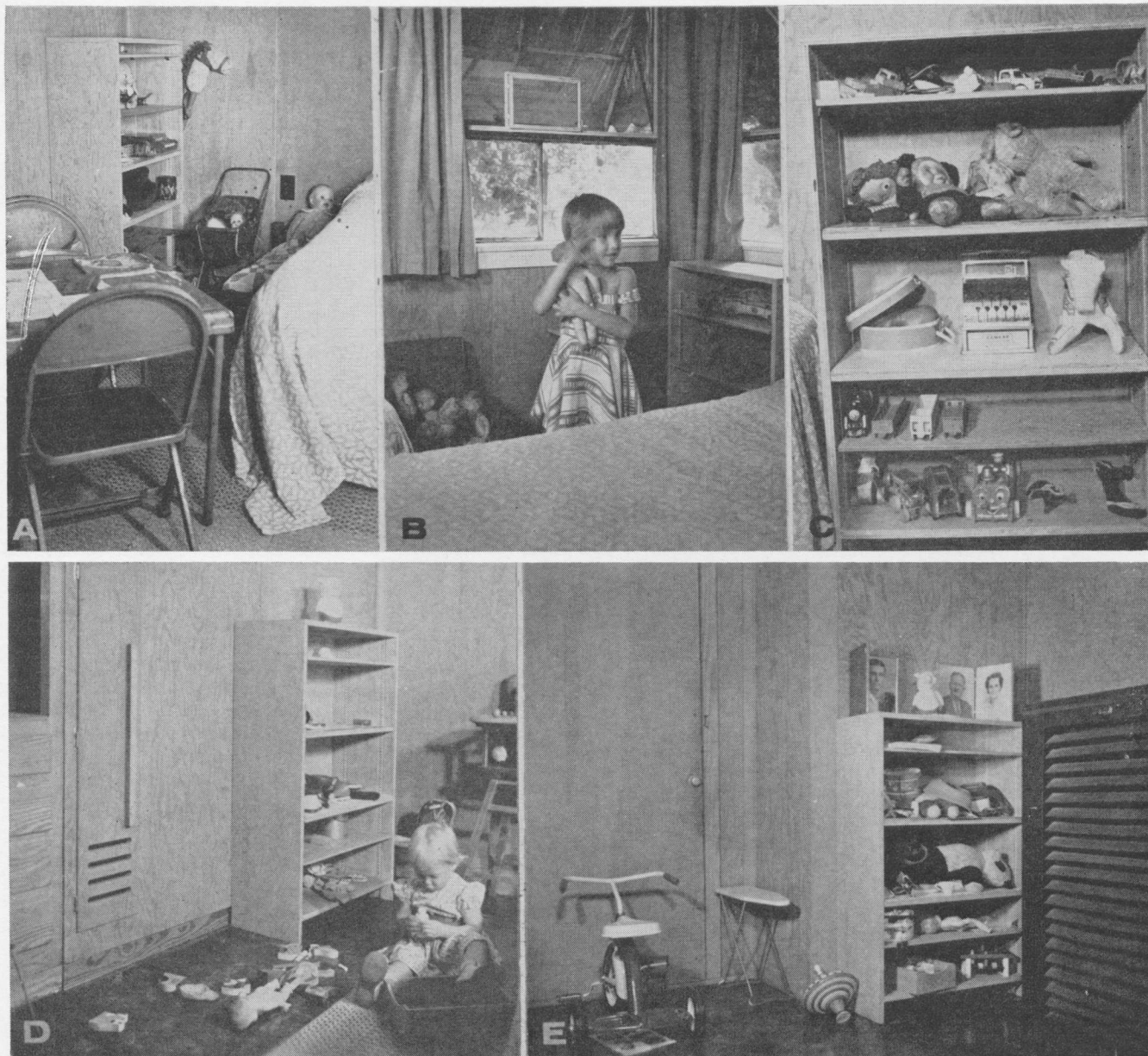


FIGURE 32. Toy storage and play areas: (A) corner used by pre-school girl of Family II; (B) corner used by pre-school girl of Family III; (C) corner used by pre-school boy of Family III;

(D) corner of bedroom used by child of Family IV in summer; (E) in winter child of Family IV was given space by the heater, where she did not like to play.

patterns of the disorderly storage afforded by top-opening storage chests or boxes.

It appears that toy storage requirements vary greatly from family to family. If storage walls are used, toy storage space must be provided to protect other storage space. However, the toy storage should be of a type that may be used for other purposes as the child grows older.

### Units in General

**As walls.** In addition to their storage function, the units had to serve as walls. Thus, they might be expected to form a stable structural barrier between rooms, to provide privacy as needed, to provide part of the space for hanging decorative and useful items, and to serve as covers for wiring and plumbing.

As structural barriers they seemed to serve well most of the time. However, one family used a gate on the door of the children's bedroom to prevent the children from awakening the parents and to keep them in their room without closing the door. These children must have swung on the gate or tried to force it, for it was noted that the wall on which it was fastened moved several inches out of line. It could be pushed back into line, but if older children should engage in rough play, it is assumed that it would be possible to push the walls further out of line or damage them.

Although the units were bolted together, light could sometimes be seen through the joints. No complaint was made about this, and it could have been remedied by batten strips. However, such strips would not have enhanced the decorative aspect of the wall, and their use would have interfered with moving the units.

Nothing much was said about usefulness of the walls as sound barriers. Homemaker I was asked a few times about this and said she hadn't noticed. However, when her parents were visiting, she found that when they talked quietly in the master bedroom, it was possible to hear them quite clearly in the living room. It then became clear that the homemaker and her husband had always retired after everything in the house was quiet. They had always been on the side of the wall where the noise originated and so had not been bothered by it. The sounds of the bathroom were clearly audible in the parents' room. None of the walls made up of units was even a moderately good sound barrier. The fact that these families did not complain of the problem of sound does not indicate that families with older children retiring later than parents would find them satisfactory.

No problem of hanging decorative or other items was encountered.

Mobility caused certain problems in electric wiring. Wall switches could not be used for ceiling lamps in the bedrooms because walls on either side of the doors were movable. Wiring to locations along the movable walls or in the units had to be placed either under the units, on top of them, or in wiring strips outside of them. It was found expedient to place wires on top of these units. Whenever a wall was changed or a lamp added to a unit, it was necessary to do a rewiring job. If units of this kind are to be used as movable ones, each one should be equipped with its own wiring set and each set should be fitted for connection to the set in the next unit or to an overhead wire. However, even if this were done, changing

the orientation of a unit might require the reversal of connectors. It is probable that approval of such wiring would depend on the perfection of the connecting system. These problems would not have existed if the units had been built in.

Because of the permanent nature of plumbing, it is obvious that its inclusion in movable walls is out of the question. With proper planning it might be used in some permanent storage walls.

**Units as substitutes for furniture.** The qualifications of the units to fulfill the functions of dressers, chests, bookcases, desks, and other furniture have been indicated in the discussions of specific units. Homemakers noted also that because the units were arranged in straight lines and extended to the floor and ceiling there was no problem of cleaning around them, under them or on top of them as in the case of furniture. They also commented that the rooms looked larger and neater than if separate items of furniture were used.

The homemakers remarked on how much storage space was available in so small a house. This was because nearly all of the floor space occupied by the units was available for storage from floor to ceiling. In addition to the amount of space, the space was efficiently used or had possibilities for efficient use. Shelves and trays were in several instances more closely spaced than in many purchased storage units, and a number of the trays and shelves were adjustable to the items stored on them. However, there were few exposed surfaces on which to place miscellaneous decorative items and to make artistic arrangements. The lack of such surfaces prompted homemakers to reserve shelving in units, such as the bedclothes unit or unit K to put things until they were needed. It is probably a good idea to keep such items out of sight since this helps to reduce clutter in the house.

The complaint noted by people who had just moved in that there were too many doors was perhaps an expression of their confusion at locating stored objects before they had learned where they were placed. Usually these complaints ceased after the families became oriented.

**Movability.** It was assumed that movability might be a useful feature of storage walls. It should lend flexibility to the shape and arrangement of rooms and thus help to make the house adaptable to the changing needs of the family cycle. Movability would also be necessary to interchanging units. Experience with the units showed that these values were not necessarily inherent to movable storage units.

In the laboratory the only feasible changes in room size were to increase the length of the children's room at the expense of the living room and *vice versa*, and to move the 3-foot desk toward the living room or back toward the kitchen. In both cases the move involved a distance of 1 foot.

One homemaker who wanted to re-plan the layout of the house by moving the units was asked to first make the plan to scale on paper. The plan she made would have placed the children's bedroom at the other end of the living room. The light switches at the front door would then have been behind the end of a unit. The ceiling lamp would have been next to the wall. Other problems of electric wiring have been mentioned.

In attempting to make other plans for change of room shapes and sizes, laboratory workers were confronted with plumbing that was not movable, outside windows and doors, electric lamps, and outlets that also restricted location of partitions. Perhaps in a larger house these permanent architectural features might be less limiting, but there would be restrictions. It is evident that any relocation other than exchange of units must be planned when the house is built. Otherwise relocation of a partition may involve major changes of house structure, plumbing, and wiring. Moving these units was of little help in providing for the increasing needs of the pre-teenage girl. When she needed more space in the bedroom she also needed more space in the living room.

**Interchangeability.** Exchange of units of equal size is possible. However, in the case of the walls studied, moving any unit that included a light fixture or a wall outlet involved a change in wiring. Also, because of the ceiling molding strips and the bolts that held the units together, exchanging units was not a simple task. In the case of the 3-foot units, moving them through a door could not be accomplished with the unit in an upright position.

Because of the specific functions of most of the units, it was not feasible to move them from one room to another. The only feasible changes that could be suggested were exchanging unit C with the 3-foot dressers and exchanging the 3-foot desk with unit K. When two units were used back-to-back, such as the two dressers, or when a unit had facilities on both sides as unit C and the 4-foot desk, any exchange of units was limited by the requirements of not one but two sides. It was noted that the small shelves at the back of unit C interfered with moving the wall between living room and children's room any farther toward the children's room. When unit C was exchanged for the dressers, the same problem was noted, but it was the dresser that limited the movement of the wall.

Problems of interchangeability involved both depth and width of unit. In order to have all units fit into all walls, they had to have a common depth or be made in combinations that would assemble to make such depth. Considering the various uses of these units, it is easy to understand why a common depth may not be at all satisfactory. The 2-foot depth was not deep enough for rod closets or for two dressers, yet it was too deep for bed clothes and bathroom units. One foot was not deep enough for a desk unit, yet 2 feet was deeper than required.

It is undesirable to have one wall of a room made up of units of different depths, yet there is no need to let the depth of one wall set the standard for depths of all the partitions in the house. If the walls are permanently built, it is often possible to use on one side of a wall the space that is not needed on the other. However, if the planner must consider the possibility that a unit of a wall may be moved to another location, he is restricted by this requirement. The result may be that the walls are less useful than they might otherwise be for the original purposes.

The problems of common widths or modular widths are evident. The 3-foot width was not great enough for rod closets for some individuals. However, this width may be greater than is needed for some other purposes. Even limiting width to modules of 1 foot does not neces-

sarily make the best possible use of space. It seems doubtful that the advantages of interchangeability are great enough to warrant the restrictions on widths that are required.

Interchangeability of parts of these units was limited to units of equal width and depth. Such interchangeability had limited value in relation to its disadvantages and costs. If a part is to be moved from unit to unit, there should be an exchange of parts, otherwise space and materials will be wasted. It is doubtful that the advantages from interchangeability of parts are worth the price of restricting units to like dimensions.

## **Kitchen and Dining Area**

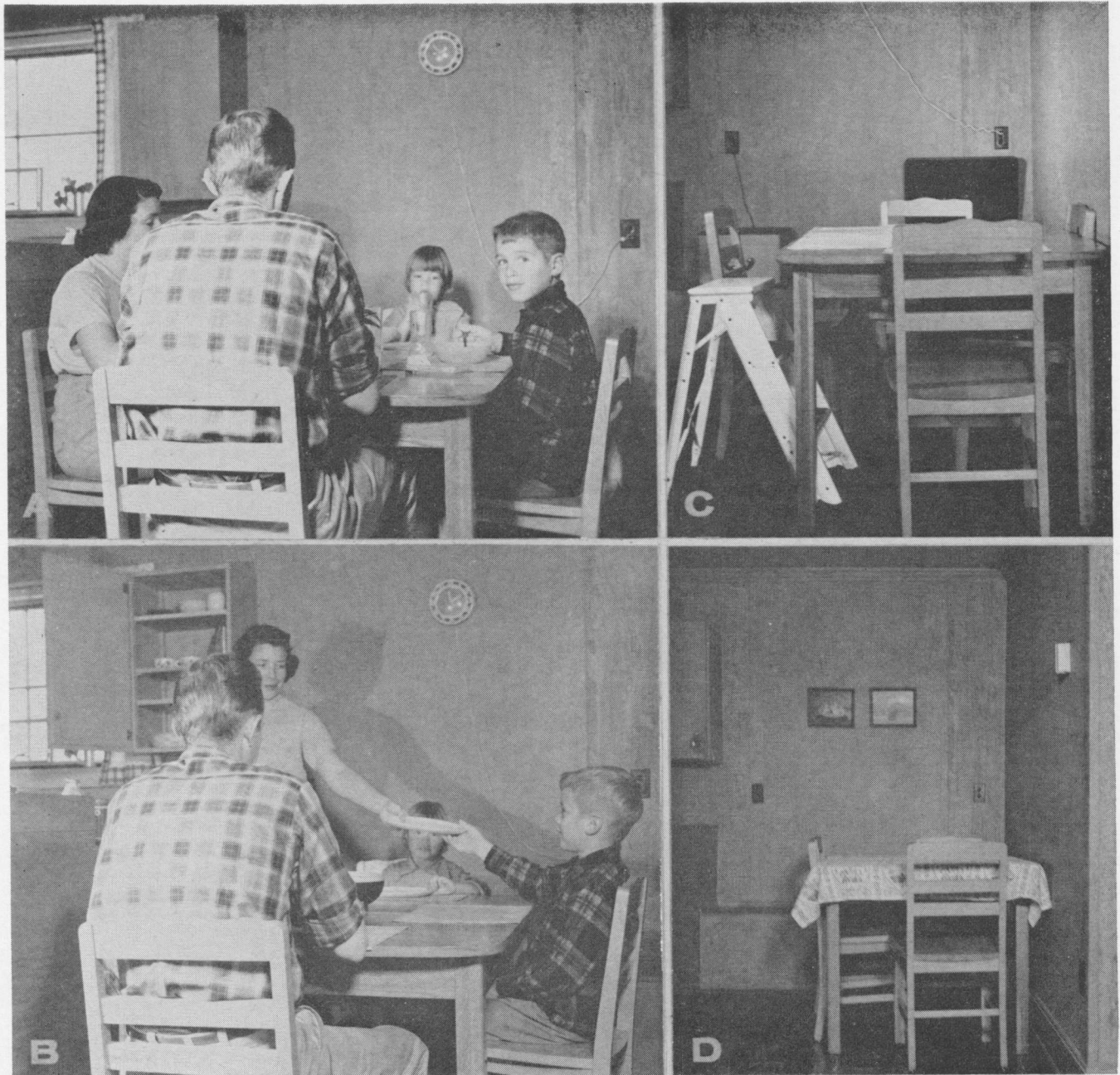
Study of kitchen space was not included in the purposes of the project. However, it seemed advisable to provide an efficiently planned kitchen and one with sufficient storage space so that the demand for kitchen storage would not interfere with the study of the storage wall units.

The kitchen used was supplied with cabinets obtained from a major mail-order company. The floor plan of the kitchen is shown in Figures 6 and 7. This kitchen rated 85 according to the kitchen score sheet published by the Small Homes Council (8). This is considered a *good* rating. The points on which this kitchen was lacking were enough storage space in wall and base cabinets. The scoring of this storage space was based on frontage of the storage cabinets. This kitchen had a lazy susan in the corner base cabinet. Another base cabinet was provided with a row of pull-out pot hooks. The wall cabinets were each provided with extra shelves. None of these was taken into account by the score sheet. Also there was a storage drawer in the range that the score sheet excluded, although two drawers would have added to the score. Thus, the kitchen must have deserved a rating between *good* and *excellent*.

The homemakers often discussed problems related to the kitchen. These were sometimes connected with use of unit K, back porch unit, cleaning closet, shelves at the back of the 4-foot desk, storage of canned food, or of items pertaining to food preservation. At other times the discussions were not related to these things especially, but simply stated as problems or as comments.

As a result of these discussions and the procedures and further discussions that followed them, insight was gained about homemakers' abilities to see their storage problems and to solve them. The problems of the kitchen seemed to be of greater concern to them than those of other areas. Thus, they often wished to do something about them before attacking other problems.

Some problems were not recognized as such. As far as the mixing area was concerned, homemakers might fail to store all of the needed items together or they might store these items on one side of the kitchen and do the mixing on the other. They recognized the values of centralizing the process only after trying it at the suggestion of laboratory workers. One homemaker was keeping her best dishes and glassware between the sink and dining area, and her everyday dishes and glassware in unit K in the back hall. She recognized the fact that she was walking too much because of this. At the suggestion that she reverse the two,



**FIGURE 33. Use of the dining area: (A) homemaker's chair, Family I, is crowded against panel back of range; (B) Homemaker I took advantage of the arrangement in serving family**

**from range, work surface, and wall cabinet; (C) Family II pushed the table against the wall to gain space; and (D) Family IV needed only three sides of the table.**

she at first defended her choice, but voluntarily tried the exchange. She was well pleased with having the situation improved and later said that she wondered why she had failed to solve the problem herself.

The dining area was not large enough. When the table was used in the center of the area, there was barely enough space to sit down and get up from the table, even though the chairs were small. Larger ones could scarcely have been used with the table centered. Some families used the table in the center of the dining area, as shown in Figure 33A. The mother's chair is against the panel

back of the range. This arrangement allows some space behind the boy's chair as a passageway for the girl. How the mother took advantage of the general arrangement for cupboard-to-table and range-to-table service is shown in Figure 33B.

Some families pushed the table against the wall. The seating arrangement used by Family II, in which the younger child liked to use the step stool for a chair, is shown in Figure 33C. The seating arrangement used by Family IV is shown in Figure 33D.

The addition of 1 foot to the width of the dining area



would have made the space more convenient and comfortable. Reduction of 1 foot in width would have made it impossible to use the table if centered in the dining area.

### House in General

The house, exclusive of the storage walls, had some effect on the use of the units and on their evaluation. As previously mentioned, the house had outside measurements of approximately  $24 \times 38$  feet of which a porch about  $12 \times 7\frac{1}{2}$  feet was a part. Thus, the total floor space of the house was about 824 square feet, an area that would ordinarily be considered small for even two-person occupancy. In addition, the gas space-heater had to be located in the living room, and it rendered a large floor area and wall space unusable.

In spite of this, three of the families did not report many difficulties resulting from size of house. When insufficient storage space was reported by them in one area, it was usually possible to supplement it with satisfactory space in another area. One family, however, was always in need of more space. This family had many of the characteristics of a farm family and was the longest established of those who lived at the laboratory. Their oldest child was older than any other in the study. This family seemed to have an unusual talent for stockpiling items for future use.

It is probable that any family tends to accumulate items. Farm families, or at least owner-operator farm families, since they do not usually change their residence, might be expected to accumulate more than mobile families. Perhaps this family had space needs more nearly representative of farm families than the others. When they needed more storage space, the size of the house was a limiting factor that prevented giving them as much storage space as they seemed to require.

They planned to keep their chest-type freezer on the porch. However, food preparation activities in connection with both daily meals and seasonal preservation required a great deal of space on the porch. These and other uses of the porch are suggested by Figure 34. Kitchen linens and a bathing suit are drying on the clothes line. The younger child's game board, toy washing machine, parakeet, and rocking chair are evidence that she used the porch as a secondary play area. The mother used the large rocker when she prepared vegetables. She spread them to cool overnight on the floor where the watermelon is lying. A glass milk jug is sunning at the edge of the porch where the churn was also placed to sun. The child ate snacks here and the family would have liked to eat meals here if there had been room.

To make room for back porch activities, the freezer had been placed in the parents' bedroom for want of more suitable space. This crowded the bedroom since a sewing area was also located there. In addition the older daughter had insisted on bringing her new desk to the laboratory. In order to place toy shelves in the children's room, the desk had to be moved out. It too was placed in the parents' bedroom, which by this time was indeed crowded, Figure 35.

Because of the dimensions of the house and the arrangements of the plumbing and openings, it was not possible to arrange the partitions in a way that would avoid opening one bedroom into the living room. Some of the fam-

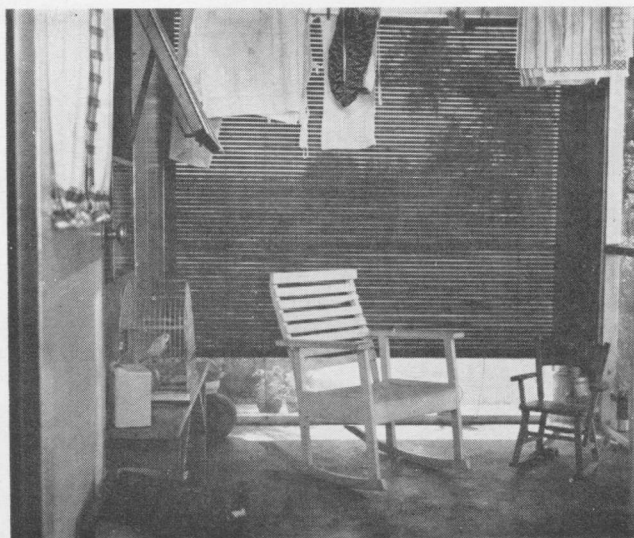


FIGURE 34. Back porch as used by Family II.

ilies expressed the wish to have better access from the parents' room to the children's room. However, they did not express this in terms of not liking children's room to open into the living room. The storage requirements of the parents' room did not permit space for a door between the two bedrooms.

In many ways the small dimensions of the house were evident because of need for more storage space or wall space rather than need for floor space. However, in the children's room, bathroom, and kitchen-dining area, there was evidence of need for more floor space.

The problem of finding space to place toy storage units has been mentioned. While part of the problem was to find wall space or shelf space in units, there was also a need for floor space for play areas adjacent to the toy storage. As long as two preschool children or even the preschool child and the first grader used the children's room, it was relatively easy to fit the toys and play area into the room. However, when the older girl occupied the room with her preschool sister, there was a marked conflict of interests and a demand for floor space by both sisters. Although the mother handled the problem extremely well, the need for both storage space and floor space was never very well satisfied.

The bathroom also needed more space. The entrance door interfered with the swing of the doors to the unit in the bathroom. The door also swung against the wash basin. If the hinges had been placed on the side nearer the unit, the door would have missed the basin, but the storage unit would have been even less accessible. A little more space between the window and the door would have solved this problem. However, it is obvious from the floor plan, Figures 6 and 7, that the width of the house would not permit this increase in bathroom size. It would have been desirable to have a larger hallway than was available.

The fact that the house was usable in spite of its small size may be attributed in part to the large amount of storage space, its efficiency, and its installation in straight lines.

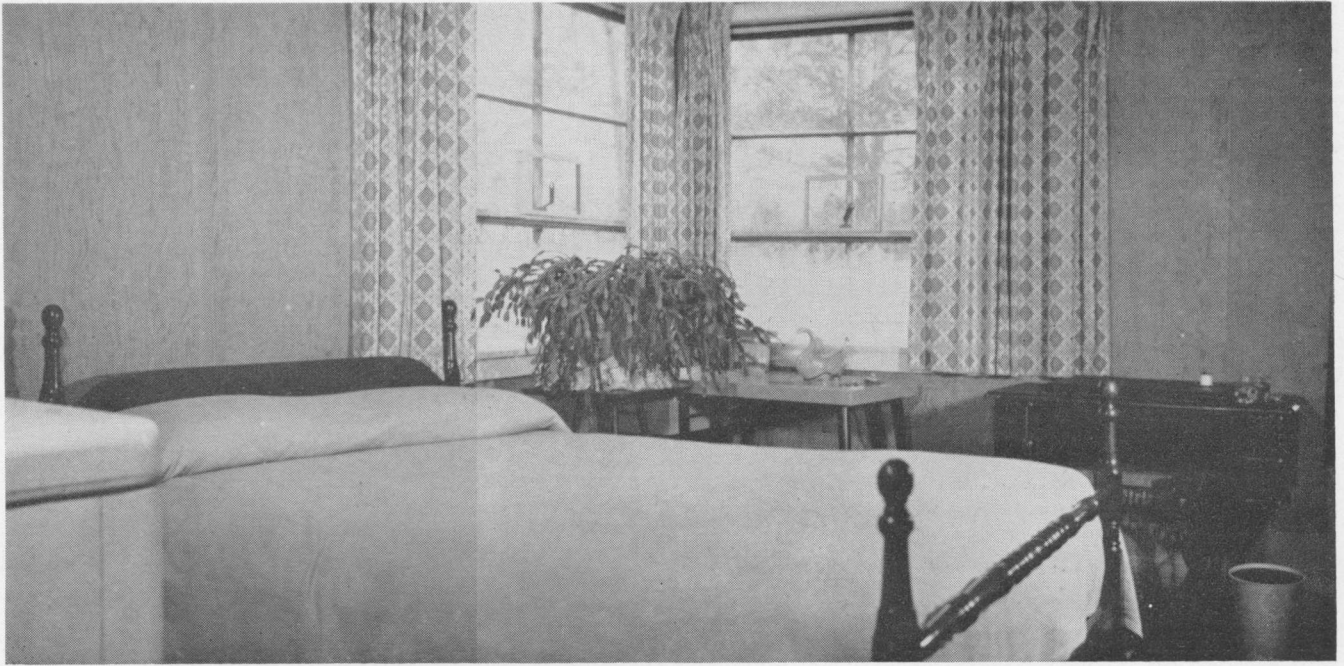


FIGURE 35. Family II used parents' room for many purposes, including sewing and a place for the freezer.

## Summary and Conclusions

The results of this study and the insights acquired have value in several areas. It has been possible to investigate some of the benefits assumed to appertain to storage walls and to mobility of storage walls. Some of the results have implications for design, construction, and use of storage units, and for teaching homemakers how to plan storage. The methods used and their usefulness will be of interest to research workers.

Conclusions about individual units and about space for storing various kinds of items have been stated at appropriate places in this report. More general conclusions are summarized here.

### Usefulness of Storage Walls

Storage walls are compact. When they use all the space from floor to ceiling, they make excellent use of floor space. Because they serve the dual purposes of partitioning and storing, they make double use of space. However, when they must serve as sound barriers, the thickness required may be greater than when there is no need for such a barrier.

Storage walls have certain advantages over portable storage furniture. Linear arrangement of units and construction from floor to ceiling give an appearance of orderliness and reduce cleaning problems. Provision of more than the usual amount of readily available storage space makes it possible for homemakers to keep under cover

many items that might otherwise clutter the house. The 20 evaluators and the 5 cooperating homemakers who used them found them acceptable. They and other women who saw them agreed that the units offered an unusually large amount of storage space for a very small house. The confusion caused by having various items stored behind doors that look alike may be expected to cease as soon as the user becomes oriented to their location.

### Movability of Units

The extra cost of building movable units rather than fixed ones suggests that the values of movability and the undesirable features of it should be carefully considered. Movability of wall units permits changing the size and shape of a room. However, moving the wall can only redistribute space; it cannot create it. The house itself with its floor size and shape, the structural features of the walls, and permanent installations such as plumbing and wiring limit these changes. Thus, most changes would have to be planned before building the house.

Movability is necessary to interchangeability but interchangeability requires more than mere movability. It is doubtful if the values of or need for interchangeability are great enough to balance the restrictions it places on design of units. If a unit is designed for a specific purpose, usually there is not much choice of suitable location for it. Efficient storage should be designed on the basis of

the dimensions and other attributes of the items stored; thus, units designed for one purpose are not usually suited to other purposes and they cannot be advantageously interchanged. Versatility of individual units is greatly limited if interchangeability of the set of units is required.

### **Problems of Movability**

Houses in which movable storage walls are used should have level floors. Slight variations in floor level are emphasized by the height of tall units. Such houses should also be built without baseboards, moldings, or other projections on the walls if it is planned to move the units. Since stability is considered desirable in walls, movable wall units need to be anchored in some way once they are in place. Movable wall units require special electric wiring systems if a source of electricity is needed where they are located.

The movable units used in this study were not good sound barriers. It was believed that sound was easily transmitted because of the thinness of the material and the spaces between the units, which although quite small could not be entirely eliminated.

Movable units are more costly to build than fixed ones. They require considerable duplication of materials. They must have rigidity built into them rather than take advantage of the rigidity of the house.

### **Implications for Design of Storage Units**

Many of the findings of this study are applicable to design of storage units in general, and storage units that fit together, as well as storage walls.

In making specifications for design of storage units, if one expects the completed units to be functional one must allow space for items stored, for reaching-in space, for cleaning space if needed, and for the structural parts of the unit itself. The user, the designer, and the builder need to have a clear understanding of what allowances are included in each set of dimensions.

When units are designed for multiple uses, care should be taken to allow sufficient space to prevent one use to interfere with another.

Storage units should be designed to provide for the future needs of the family for both the short run and the long run. For instance, they should provide for differences in seasonal use and expected future needs of children for greater space for the same kinds of items. If the first use is a temporary one, provision should be made for other possible future uses of the unit. For instance, toy shelves might later become bookcases.

Framework at the ends of a unit should be located with regard to the facilities of the unit. When adjustable shelves or trays are used, corner posts should not be so placed as to interfere with the operation of the shelves or trays. It is recommended that trays move on cleats or other gliders rather than on shelves. This saves materials and prevents unnecessary friction.

### **Methodology**

The various techniques used in this study may be of interest to others doing similar work.

The initial study of the units by laboratory workers made it possible not only to correct some of the obvious

faults of the original set of units but also to pursue possible reasons for the occurrence of these faults. Thus, some positive suggestions for design of units could be made.

Attempts at space evaluation of the clothing storage units showed that the most useful approach was to determine the space requirements per garment and apply the results to the inventory and unit in question. This method has wider application and is on a sounder basis than arranging specified sets of garments in each unit. Also the concept of lifetime requirements is recommended as a basis for dimensions of storage units, especially those for clothing. By this is meant designing on the basis of the period of maximum use.

The evaluation by 20 homemakers was useful in showing what methods of clothing storage are used and preferred by homemakers, and where they like these storage units located in the house. Their choices of facilities at the laboratory were somewhat limited. However, a greater variety of choices might have been confusing. Their choices might have been changed if they had had longer experience with the units. Thus, their validity might be questioned.

The unsolicited remarks made by these evaluators was an unexpected source of information. In thinking aloud as they arranged garments, they revealed the reasons for their choices. Tape recordings of their remarks would have been useful. The use of photographs was considered a good method of recording the 20 evaluators' placement of garments.

Evaluation by resident families was time-consuming and expensive. However, it had the value of allowing evaluators time to test their choices. Initial choices were sometimes changed. Communication was sometimes difficult. Cooperators sometimes talked around the subject, sometimes could not decide what was liked better.

Cooperators chose without regard to cost of facilities. This may have been a good idea in some ways. However, if facilities are made or purchased, cost is usually a factor. Sometimes cooperators refused to consider other costs, such as when one would like deeper drawers but would not like to have fewer in order to have them deeper. A cooperator might express a need for more space, but would be unwilling to adjust shelving to get it.

The use of movable units made it possible to evaluate two assemblies in the bedroom wall and two desk units for the living room. However, because the bedroom units were part of a longer wall, Figures 6 and 7, different depths could not be used in alternate units.

The size, shape, and construction features of the house limited the number and arrangements of the units that could be studied. It would be advantageous in such a study as this if all arrangements necessary for projected evaluations were planned in advance and the house and units constructed accordingly. However, the inventories of resident families cannot be anticipated and it is often profitable to take advantage of discoveries made during the progress of a study. Thus, any advance plans for such a study should have some flexibility.

Evaluation of units in homes had certain disadvantages. The units became a part of the total home storage situation. When other storage for a given kind of item was available in the home, the unit provided for that item might be used for only part of such items. On the other

hand, when storage of a certain kind was scarce in the home, the unit might be used for storing items for a greater number of persons than that for which it was intended. However, in the case of units of the kinds studied, it was useful to find how well they were adapted to use in houses other than the one used as a laboratory. Also the pressures of expanding families on the storage space of the home was made evident in the course of evaluations in homes and in the search for cooperators for such evaluations.

The use of tape recordings was considered good since the project leader was able to analyze the information at a later time. However, transcription of the records was time-consuming. It is believed that a dictating machine might be easier to use than a tape recorder. The latter proved heavy to carry and difficult to start, stop, and reverse when transcribing the records.

Photographs of use of space by resident families make excellent records, since they register many details that might otherwise be unnoticed. Often a question that a

photograph can answer arises long after the photograph has been taken. However, photography in occupied houses is often extremely difficult. Floodlights were used. Perhaps flashbulb photography might have required a less elaborate setup.

### Implications for Teaching

Experience with the cooperators and evaluators in this study suggests that women need help in resolving storage problems, in planning storage of personal and household items in existing facilities, and in designing storage facilities. Because of increased housing costs and resulting tendency toward smaller houses, homemakers perhaps need help in making storage compact yet adequate and in balancing cost of storage facilities against the need for and value of items stored.

This seems to imply that home economics classes in secondary schools and colleges might well emphasize storage principles in their curricula. Study of storage principles might also be emphasized in extension programs.

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## Appendix

### Choices in Facilities and Units

#### Rod Units for Parents

##### Original set (3-foot<sup>9</sup> units)

Shoe racks: Slanted wood, wire loop, wire loop on floor.

Belt storage: Hooks, wire rod, nails with wire rod.

Tie storage: Door rack with swivel hangers, expanding rack on end wall.

Rod storage: Three adjustments for rod.

Small shelf above rod: Usable with the two lower adjustments.

##### Alternate set (4-foot units)

Swinging doors and sliding doors in addition to other facilities as in original set.

#### Storage for Parents' Folded Garments and Other Items

##### Original set (3-foot units)

Dresser (1 foot deep), drawers only.

##### Unit C

Lower section: Rod or pull-out shelves.

Middle section: Trays of various vertical depths and two widths, or shelves.

##### Alternate set

Four-foot shelf unit (1 foot deep)

Adjustable shelves (11 × 22 inches) used with or without pulling out.

Trays of varying vertical depths.

Dressing table with mirror, or shelves in mirror space.

#### Rod Units for Children

##### Three-foot unit

Shoe racks: Slanted wood on floor, bin on wall, wire loop on wall.

Belt storage: Hooks, nails, wire rod.

Rod storage: Three adjustments; also movable supports (attached with screws).

Small shelf above rod: Adjustable.

Large shelves above rod: Adjustable (fewer adjustments for older children).

#### Storage for Children's Folded Garments and Other Items

##### Original set (3-foot units)

Dresser (1 foot deep) drawers only.

Shelves at rear of unit C, adjustable.

##### Alternate set (two 2-foot units)

Shelf units (1 foot deep).

Adjustable shelves (11 × 22 inches) used with or without pulling out.

Trays available in varying vertical depths.

Dressing table with mirror or shelves in mirror space.

#### Living Room Rod Unit

##### Three-foot unit

Rod adjustable.

Low rod for children available.

#### Back Porch Rod Unit

Four-foot rod unit (Originally a rod unit only; this unit was divided vertically into two equal parts below the high shelf between evaluations of Families I and II. Left half was used for rod storage, right half for adjustable pull-out shelves).

Rod adjustable.

Hooks added as needed.

Shelves adjustable, removable.

#### Cleaning Closet

##### Two-foot unit

No alternate choices of facilities.

Step stool or ironing board, not both, could be stored in this unit.

#### Bedclothes Unit

##### Three-foot unit

Upper section: Trays or shelves.

Lower section: Drawers only.

#### Bathroom Unit

##### Three-foot unit

Upper section: Small shelf optional.

Middle section: Trays or shelves.

Lower section: Cartons or basket used for soiled clothes.

<sup>9</sup> Width of unit; unless otherwise stated, depth of all units is 2 feet.





