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Cost of Electricity for the Home Electric Refrigerator

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Summary

Four home electric refrigerators used an average of 379 kilowatt hours of electricity for one year. At 3 cents per K. W. H. the electricity cost the owners $11.91. Three of these were turned off during the winter.

During the three warmest months of summer the refrigerators averaged 77 K. W. H. of electricity per month. This was the average of eight refrigerators.

The average electricity used by the refrigerators during the five coldest months of the year was 43.6 K. W. H. per month or 219 K. W. H. for the winter. At the 3-cent rate, it cost the Renner Line patrons $6.57 to run their refrigerators all winter.

The average temperature maintained by home electric refrigerators was 42.46 degrees Fahr. This is approximately 10 degrees Fahr. lower than the temperature maintained in ice boxes tested.

Figures taken on four refrigerators to find out how much more electricity was required to maintain a low temperature in the refrigerator over a higher one, did not show uniform results. The figures are given in Table V just as recorded.

When the weather gets warmer the refrigerators use more electricity. An increase of 1 degree Fahr. for a week made the refrigerators use about one-third of a kilowatt hour (.29 KWH) more electricity for the week.

A favorable location for the refrigerator in the house saves some electricity. The most favorably located refrigerator saved 1.2 K. W. H. of electricity per week over the one most unfavorably located. At 3 cents per K. W. H. this would only be $1.87 per year but at 10 cents per K. W. H. it would make a difference of $6.24.

Cost of Electricity for the Home Electric Refrigerator

*RALPH L. PATTY

The use of the home electric refrigerator is increasing rapidly over the country both in the town and in the farm home where electric power is available. On the South Dakota Electric Test Line at Renner, South Dakota, the use of these refrigerators spread very rapidly among the patrons after the first plant had been thoroughly tried out in one of the farm homes. The practice of putting up ice on the farm is fairly expensive as compared to electric refrigeration when a favorable power rate for electricity is offered to the farm.

The actual additional cost of electric energy to the patrons on the Renner Electric Line who installed electric refrigerators is 3 cents per kilowatt hour. This does not include the fixed charge of $7.55 per month for distribution charge but this charge is paid by them any way and must be distributed over all their electric service. The first 30 kilowatt hours of electricity used each month also costs them 5 cents per kilowatt hour, but all of them use a great deal more than 30 K. W. H. The average consumption for the whole line is over 150 K. W. H. per month at the present time and is still increasing. Therefore when one of these patrons adds an electric refrigerator to their load they figure the cost of the electricity at 3 cents which is the actual cost to them.

ELECTRIC ENERGY USED BY HOME REFRIGERATOR

A general study was made of the electric energy used by the home refrigerator on the South Dakota Farm Electric Test Line at Renner, S. Dak. Refrigerators were supplied with separate electric meters and readings of the meters were recorded at regular intervals. These readings were usually taken weekly.

In the spring of 1926 it was determined to make an intensive study of electric refrigerators and not only find out their electric consumption but to study the factors affecting that consumption.

*Field men who greatly aided in collecting data for this bulletin were M. C. Manning and G. A. Rietz.

When cost figures are given in this bulletin for sake of comparison they will be based on an electric rate of 3 cents per kilowatt hour. Readers can easily figure their own costs by multiplying the figures in kilowatt hours as found in the test by the rate which they pay for electricity. In most towns and cities a lower rate (power rate) is offered for electric refrigerators.

Readings were begun on the refrigerators on June 21. A few shifts and additions were made in the set-up before the tests were completely ready to start. One delay was occasioned by having to wait for several days for the automatic door tallies. These were installed for the purpose of recording the number of times the refrigerator door was opened during each interval between readings.

The final test began on July 13 and covered a period of 10 weeks, or 70 days, during the warmest season. Readings were taken three times each day for the period. It was continued later to secure the con-

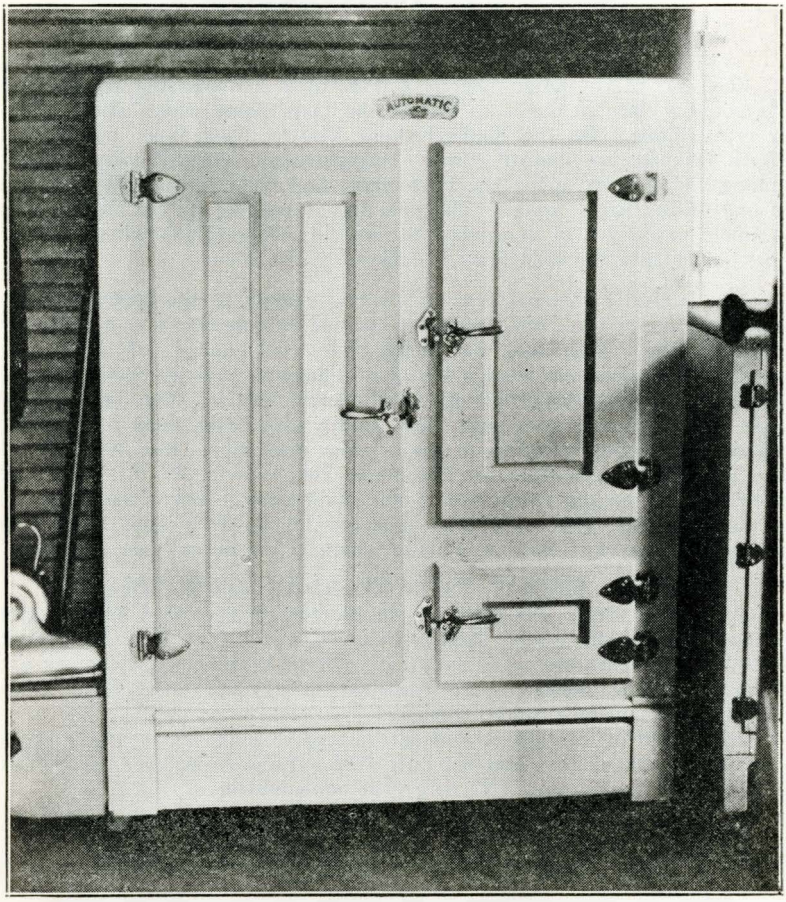

FIG. 1—A TYPICAL SIZE OF REFRIGERATOR TESTED IN THE STUDY ON THE FARM ELECTRIC POWER LINF AT RENNER, S. D.

The total inside capacity is 9½ cubic feet. The average temperature maintained in these home refrigerators was 42.5° Fahr. For the three hottest months of the year they used an average of 77 K.W.H. of electricity each month (See Table I). They used an average of 397 K.W.H. for the entire year.

sumption for the entire year and also to determine the electricity used during the winter months.

In the electrical refrigerator studied in this test a cold temperature is maintained by compressing a liquid, then vaporizing it and taking advantage of the principle known in Physics as "heat of vaporization," for cooling the cabinet. The liquid is then condensed and again pumped around to the compressor. It is thus forced around and around through the system. The power that drives it is a small electric motor that starts and stops automatically. When the temperature in the box gets just so high the motor starts and continues to run until the temperature is reduced to the point at which the thermostat is set for stopping it. It then stops and does not start again until the temperature of the box again rises to the point where the thermostat sets it off.

Equipment and Method Used

The purpose of this study was to test home refrigerators under farm home conditions. The precision of the laboratory was used, but no effort was made to control the factors such as might be controlled in the laboratory. The value of these figures lies in the fact that they are taken from refrigerators in actual home use.

In selecting the refrigerators to be included in the test, a careful study was made of the eight or nine that were available in the homes of the patrons on the test line. (Extension Circular No. 232, South Dakota State College, Brookings, S. Dak., gives a complete history and description of this Farm Electric Test Line.) Five of these were chosen for the intensive study for the following reasons: Their average consumption should be average for a typical installation, they represented different typical conditions of location in the home, three of the boxes were identical, and two different types of refrigerators were included.

At the time of this study, electric refrigerators of home size could be divided into two types. One type has the power unit (electric motor and cooling coils) installed in the basement of the home and the refrigerator box containing the cooling unit separate. The other type has these units all in the same assembly, or unit. This will be referred to in this report as the "single unit type."

Each refrigerator was equipped with a separate individual meter so that the exact amount of electricity used by it could be recorded for any interval of time, no matter how short or how long. The total is always carried on these meters and some of them now carry the record for two years or more.

Fahrenheit thermometers were used in the test. They were standardized and one thermometer was hung in the same relative location inside each box. These were for taking the inside temperature to see how cold a temperature is being maintained in the cooling compartment. Another thermometer was hung near each box in the same position and at a distance of 12 inches from the outside of the box. The purpose of this thermometer was to get a fair temperature surrounding the outside of each box. This temperature will depend upon how favorable the location of the refrigerator may be within the home. The other thermometer was located on the outside of the house in the shade and was for recording the weather temperature.

TABLE I.—ENERGY CONSUMPTION FOR TEN HOTTEST WEEKS OF SUMMER

Week Beginning	Electric Energy Used Per Week				
	Refrigerator A	Refrigerator B	Refrigerator C	Refrigerator D	Refrigerator E
July 13	21.5	15.0	17.2	31.2	26.0
July 20	13.0	11.0	11.2	26.8	22.0
July 27	17.9	13.0	13.5	28.7	20.8
August 3	15.8	12.2	18.3	21.8	18.2
August 10	16.2	11.8	14.6	29.0	27.0
August 17	16.4	12.0	15.8	26.2	18.0
August 24	17.1	12.8	23.7	25.5	23.0
August 31	15.8	11.5	13.6	21.9	22.0
September 7	12.2	9.9	9.5	29.6	17.0
September 14	13.8	10.3	17.2	27.2	20.5
Ave. per week	15.97	11.95	15.46	26.79	21.45

Final average, 18.33 K. W. H. per week.
Final average 77. K. W. H. per month.

Automatic tallies were installed on each refrigerator in such a manner that each time the refrigerator door was opened it was recorded by this tally. These were read three times a day with the rest of the equipment.

The study was divided into five parts and these are reported in this bulletin in their order as follows:

1. To find out "how much electricity is required to run home electric refrigerators."
   (a) First, during the hot summer months (the ice season).
   (b) Second, during the year as used in actual service in farm homes.
   (c) Third, during the five winter months.
2. To find out "what temperatures are maintained in home electric refrigerators as they were found in actual service," and to compare this temperature to that maintained in home ice boxes.
3. To determine "how much more electricity is required to maintain a low temperature in the electric refrigerator than is required for maintaining a higher one."
4. To determine "what effect hot weather temperatures have on the amount of electricity used by electric refrigerators."
5. To find out "how important it is to have the electric refrigerator installed in a cool location in the house from the standpoint of the cost of electricity used by it."

Amount of Energy Used

The average amount of electricity used by five refrigerators in the test was 18.33 kilowatt hours per week. This was for the 10 hottest weeks of the year (see Table I). Figuring this consumption on a basis

of a 30-day month, they averaged 77 K. W. Hrs. per month. A kilowatt hour is the unit of measure for electricity just as the bushel is for grain. Electricity sells for so much per kilowatt hour. This cost may vary all the way from 3c to 12c per kilowatt hour. On the farm test line it cost the patron 3c per K. W. H. (See bulletin No. 239, S. D. Agric. Exper. Sta.)

Table No. I gives the amount of electricity required to run the electric refrigerator during the hottest season of the year. During the cold season the amount is much less, as shown in Table No. III. Most of the owners turned the refrigerators off in the coldest winter season. The exact dates on which they were turned off were not available, but the following table gives the exact total amount of electricity used by the refrigerators for the whole year. The average amount is 397.7 kilowatt hours.

In order to find out how much electricity is used during the five winter months, (November, December, January, February and March), a special test was made during the winter of 1927-1928. Since this is the period when the refrigerators are often turned off, the results will indicate the cost of leaving them turned on all winter. (See Table No. III). The average amount of electricity used during the full 5 months was 219 kilowatt hours. The average amount of electricity used per month was 43 kilowatt hours. Comparing this figure to the 77 kilowatt hours per month, used during the hottest season of the year, shows a difference in consumption of 34 kilowatt hours per month.

The variation of refrigerators was greater in the winter months. The highest one used 346 KWH and the lowest one only 133 KWH for the five months. The power unit and coil of the high consuming refrigerator was located in a heated basement which may have accounted for this.

Figuring the 219 KWH at 3 cents per KWH, it cost $6.57 to run the electric refrigerators during the winter months.

TABLE II.—ENERGY CONSUMPTION FOR THE ENTIRE YEAR

Refrigerator No.	Total Current For The Year in K. W. H.	Time Turned Off
A	436	Left on for entire year
B	319.2	Turned off during winter
C	----	Not used for total year yet
D	411.3	Turned off during winter
E	424.2	Turned off during winter

Average—397.7 K. W. H. per year.

TABLE III.—ENERGY CONSUMPTION FOR FIVE WINTER MONTHS

Owner	Total Electricity used for 5 months	Ave. Electricity used per month	Weather Temperature (Ave. for winter)	Temperature Just out-side the box
S. S. Bliss	151.7 KWH	30.34 KWH	19.2° F.	52.8° F.
G. Peterson	346. KWH	69.4 KWH	19.2° F.	48.85° F.
S. P. Brende	133. KWH	25.9 KWH	19.2° F.	54.30° F.
John Wehde	244.5 KWH	48.9 KWH	19.2° F.	72.30° F.
Average	218.8 KWH	43.6 KWH	19.2° F.	57.° F.

*Members living on the Electric Test Line who aided greatly in taking this data and deserve special mention for this particular study are: S. S. Bliss, Mrs. G. Peterson, S. P. Brende and J. F. Wehde.

FACTORS AFFECTING AMOUNT OF ELECTRICITY USED

In the summer the variation was great but not quite so much as in winter—(See Table No. I.) The lowest plant used an average of only 11.95 K. W. H. per week, while the highest used 26.79 K. W. H. per week. These plants were identical except that plant D was set so as to maintain a much lower temperature and was located in a less favorable position than plant B. Plants A, B, and D were identical. Each of these plants were assembled when bought. The owners bought an ordinary large ice box refrigerator and installed the electric apparatus in it with the power unit in the basement. The plant C was similar but a slightly better cabinet and this plant had the coolest location of any of them. The important factors influencing the electric consumption of one plant as compared to another are:

a. The amount of hot foods placed in the boxes to cool.
b. The temperature maintained in the cooling compartment as regulated by the setting of the thermostat.
c. The size of the refrigerator box.
d. The location of the refrigerator relative to the kitchen range and other sources of heat.
e. The number of times the door of the refrigerator was opened during the day.

The effect of most of these factors on the amount of electricity used by the refrigerators was studied and figured out as closely as the variable factors would permit. Separate reports on them follow.

Temperature Maintained by Electric Refrigerator

This study, to find the average temperature maintained inside home electric refrigerators, was made during the season of 1926. It was made under actual conditions of service. The refrigerators studied were selected from patrons on the Renner test line.

The temperature that is to be maintained in the electric refrigerator can be controlled. The automatic control on the refrigerator can be adjusted when the plant is installed to maintain any temperature that the buyer desires. Often the buyer is satisfied with the adjustment as it is when it comes from the factory. This adjustment was

not the same for refrigerators of the same "make" and the temperatures maintained, as found, are of interest.

For this one result standardized thermometers (Fahr.) were installed in the cooling compartment of each refrigerator in the same relative position. The thermometers were read three times daily for a period of 10 weeks or 70 days. This period extended from the week beginning July 13, 1926 to the week beginning September 21, 1926. Readings were taken at 8 A. M., 1 P. M., and 4 P. M. daily.

Two types of home refrigerators were used in the study. One type has the energy unit (electric motor and cooling coils) located in the basement and the refrigerator box enclosing the cooling unit and the cooling compartments on the first floor. The other type has these units all assembled together in what we will call a "single unit plant." Plant E, listed below, is this type of plant and in this particular manufacturer's make, the energy or power unit is located in the lower compartment of the cabinet.

The average temperature maintained for the five plants was 42.46 degrees Fahr. Plant D maintained the lowest average temperature of 36.16 degrees Fahr., while Plant E maintained the highest average temperature of 49.69 degrees Fahr.

A few readings were taken on ice refrigerators for comparison and the average temperatures maintained in them averaged from 50 degrees to 52 degrees.

TABLE IV.—TEMPERATURE MAINTAINED INSIDE ELECTRIC RFFRIGERATORS

	Refrigerator Temperature in Degrees Fahr.				
Week	Plant A	Plant B	Plant C	Plant D	Plant E
July 13	43.70	39.75	45.69	35.50	51.45
July 20	41.40	39.62	45.00	34.38	50.14
July 27	43.80	40.95	44.00	36.19	51.19
August 3	43.20	39.53	43.30	39.00	50.26
August 10	44.10	39.00	42.86	34.50	49.81
August 17	44.50	39.38	42.62	36.52	49.67
August 24	44.60	40.38	41.33	37.76	48.76
August 31	54.30	39.14	42.86	37.05	50.85
September 7	42.40	37.24	41.33	34.76	46.71
September 14	42.50	40.40	44.73	35.93	48.06
Average for 10 weeks	43.53	39.54	43.41	36.16	49.69

Note—The average temperature maintained for all five plants for the season was 42.46 degrees Fahr.

Table No. IV gives the temperature maintained in each refrigerator, averaged by the week, for the full 70 days time of the test. The slight differences of temperature from week to week seem to vary more or less directly with the changes in the outside temperature.

Relation of Temperature Inside Refrigerator and Electricity Used

It is reasonable to expect that the colder the temperature that is maintained in an electric refrigerator the longer the electric motor will have to run, and the greater the amount of electricity will be required for running it. Electric refrigerators are so designed as to automatically maintain a temperature between two limits. On many plants this adjustment is readily accessible and can be changed at any time. The preceding study showed that the temperature being maintained in the plants in actual use varied from as low as 36 degrees F. in plant D, to as high as 49 degrees F. in plant E. Evidently it would require more electricity to maintain the lower temperature if other factors involved were equal.

This study was made to determine how much more electricity would be required for this purpose. After a study of the problem and before any records were taken, it was decided that there would be some variable factors in the study. These could not be controlled if plants were studied under regular home use. The efficiency of the refrigerator box also enters into this study. However, it was decided that these results would be as valuable in many ways as would figures taken under laboratory conditions where the variable factors would not enter in. The study was therefore continued on plants in regular home service.

Variable Factors Involved.—There were two variable factors involved in making this study that could not be controlled but they are factors that affect any refrigerator in use. One of these is the amount of food and the temperature of the food that is placed in the refrigerator to cool by members of the family. This factor is difficult to measure and it has rather an important effect. It is in fact impossible to measure it under regular usage of the box. The other factor is that of opening the doors of the refrigerator. The number of times the door is opened during the day by members of the family will also affect the amount of electricity used to a limited extent. This was not as much as expected, however. Records taken on the number of times the doors were opened and the effect upon the electricity used as a result of it, indicates that this does not make so much difference.

The set-up for this study included only four plants, because the fifth plant under study was quite different from the others and the figures from it would not be comparable. Three of them were exactly alike and the fourth nearly identical, and thereby one variable factor was almost eliminated. Each plant was separately metered. This gave exactly the amount of electricity that was used by each. The inside temperatures were taken by the use of standardized thermometers hung on the inside of the cooling compartment of each box in the same relative position.

Readings were taken three times daily. The temperatures taken at 8 A. M., 1 P. M., and 4 P. M., were averaged for the daily temperature. The test covered a period of 10 weeks or 70 days.

Results.—The results were not uniform but were generally quite satisfactory as a matter for general information. No effort was made to determine a definite co-efficient for the increase in electric consumption for the plant due to a lowering of the setting of the thermostat. This should be done in the labcratory. The figures in Table V give a good idea of the electricity required for maintaining a lower temperature.

TABLE V.—THE RELATION OF THE TEMPERATURE MAINTAINED INSIDE THE ELECTRIC REFRIGERATOR AND THE ELECTRIC CONSUMPTION

Nearly Identical Plants	Av. Temp. Maintained Inside (Fahr.)	Av, Energy Used Per Week in KWH Corrected for Location	Degrees Below Box A	Electric Energy Per Week Above Box A
[A Used as Av or Check]				
A	43.53	16.13	0	0
B	39.54	12.17	3.99	—3.96
C	43.41	15.96	.12	— .17
D	36.16	26.21	7.37	10.00

Note—The above figures are only representative figures taken under actual usage conditions. There are certain variables that cannot be eliminated or corrected under regular service conditions. Among them are the opening of the refrigerator doors and the amount and temperature of foods stored in the box.

Effect of Weather Temperature on Electricity Used

In hot weather electric refrigerators use more electricity than in cool weather. This is obvious owing to the fact that the motor must run a greater part of the time in hot weather in order to maintain the constant temperature within the box. A study was made to determine just how much more electric energy is required in hot weather. Since the results on each refrigerator are checked against itself, the variable factors of foods cooled and the opening of the refrigerator door, as discussed in the last study, did not interfere with average results. Eight plants were included in the readings, three additional plants being included. The object of using the larger number was to get a slightly more accurate average on the kilowatt hours of energy used each week. From the average energy used and the average weather temperature, the

effect of an increase of one degree of temperature is figured.

The Set-Up.—Eight refrigerators were equipped with separate individual meters for this test and standard Fahrenheit weather thermometers were located on each farm. The weather thermometers were carefully located in the shade on the north side of a building on the farmstead under as nearly uniform conditions as possible.

TABLE VI.—EFFECT OF WEATHER TEMPERATURE ON AMOUNT OF ELECTRICITY USED BY HOME ELECTRIC REFRIGERATORS

Week	Weather Temperature Degrees Fahr. Average for Week	Electric Energy used Average for Week 8 Refrigerators	Deviation in Temp. from Average (Degrees Fahr.)	Deviation in Electricity used. From Average
July 13	88.6°	21.72 KWH	10.76°	4.10 KWH
July 20	79.2	18.14	1.36	0.54
July 27	83.4	18.53	5.56	0.91
August 3	78.1	17.1	0.26	—0.52
August 10	74.7	18.15	—3.14	0.53
August 17	77.7	17.34	—0.14	—0.28
August 24	82.2	19.1	4.36	1.48
August 31	76.6	16.67	—1.24	—0.95
September 7	64.1	15.1	—13.74	—2.52
September 14	73.8	16.7	—4.04	—0.92
Average	77.84°	17.60 KWH	22.30° F. Above Av.	6.51 KWH Above Av.

Note—An increase of 1° Fahr. average for the week caused an increase of energy consumed by .29 kilowatt hours per week. At a rate of 3 cents per KWH this cost the patrons on the line only one cent for each degree of temperature the weather warmed up. For a rate of 10 cents per KWH, it would make quite a little difference.

Readings were taken of the electric meters and weather thermometers three times each day. These were taken at 8 A. M., 1 P. M. and 4 p. m. The three temperatures read were averaged for the day's temperature, while the three meter readings were of course added for the total daily consumption.

Results.—The result showed that an increase of one degree in the average temperature of the air outside (weather temperature) for a week's time causes an increase in the electricity used by .29 kilowatt hours, or approximately one-third kilowatt hour per week for each refrigerator. This figure was obtained by finding the average deviation in the amount of electricity used above the average consumption and the average deviation in temperature causing it. (See Table No. VI.) The average deviation in the amount of electricity used was then divided by the average deviation in degrees of temperature to get the effect of an increase of one degree in the weather temperature on the electricity used by the refrigerator.

Effect of Favorable (Cool) Location of Refrigerator

The purpose of this study was to determine the value of a favorable location for an electric refrigerator. The five original electric refrigerators were used in this study. In choosing them a careful study was made. Their location was one of the factors considered. No two of these refrigerators were similarly located. The extremely favorable location was represented. The extremely unfavorable location was represented. The average locations were represented and the average of all the locations should be representative for home refrigerators in general. All five of the locations were very common and typical for refrigerators. A description of each location is given.

The five refrigerators included in this study were each metered with a separate meter which registered the amount of electric energy consumed by each. Standardized thermometers (Fahr.) were installed just outside each one of these refrigerators for reading the temperature of the air surrounding them. It was the purpose of the study, as stated above, to determine the value of a favorable location for an electric refrigerator. A favorable location would, of course, be one in which the temperature of the air surrounding the box was low. In locating the thermometers care was used to locate them under uniformly similar conditions and far enough from the box so that there would be no possibility of any cooling temperature reaching them from the box itself. They were located 12 inches from the box in all cases.

The readings were taken three times a day, at 8 A. M., 1 P. M., and 4 P. M., and the three temperatures were averaged for the day's temperature. In order to greatly simplify the table, the temperatures were then averaged for the week and the difference in electric consumption figured for a period of a week. This study was started on July 13, and continued for 8 weeks, or 56 days, during the hottest period of summer.

Description of Locations—(See Table VII.)

Refrigerators A, B and D are just alike. Refrigerator A is located in a small room off the living room. It is only 8 feet from the kitchen range, but there is a small pantry, (two walls), between. This refrigerator room is on the south side of the house. Capacity of the refrigerator 9½ cubic feet inside.

Refrigerator B is located in a specially designed nook off the grade landing to the basement. It is located on the opposite side of this landing from the kitchen and on the north side of the house. The distance from the kitchen range is 19 feet. Capacity 9½ cubic feet.

Refrigerator C is the coolest location of the study. The temperature readings showed this location to be 3.831 degrees cooler than that of D which was the least favorable. It is also located in a nook off the

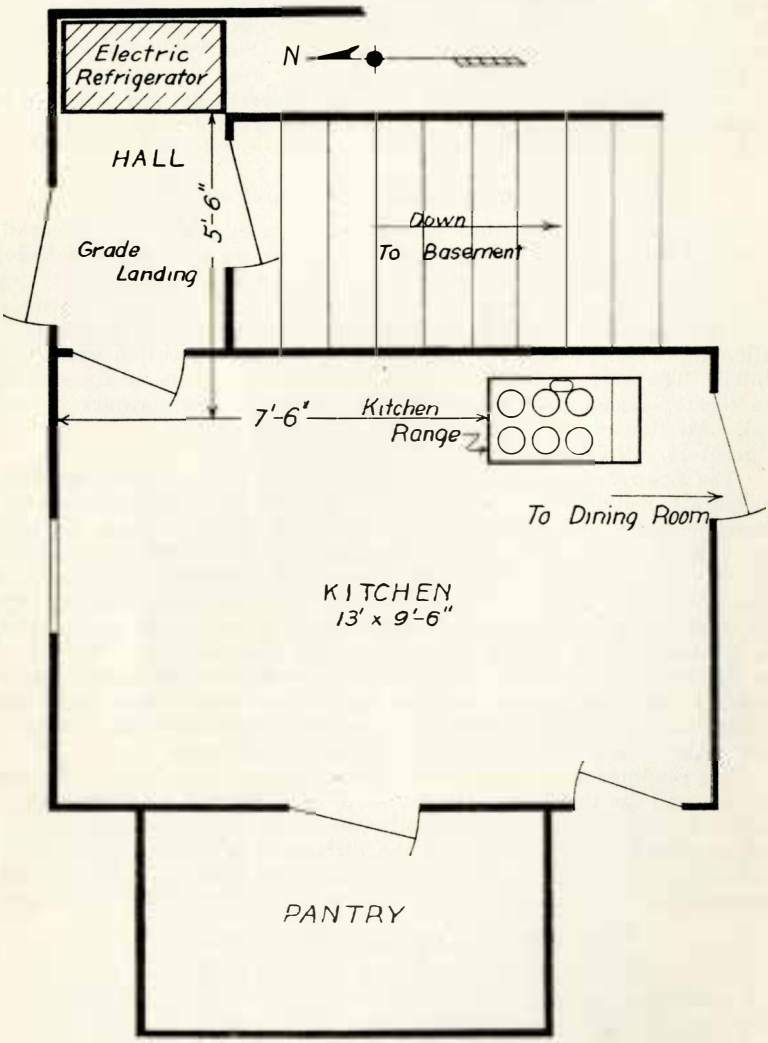

FIG. 2—A GOOD LOCATION FOR THE HOME ELECTRIC REFRIGERATOR

This is a part of the floor plan of the S. P. Brende home on the Renner Electric Test Line in South Dakota. It shows an excellent location for the refrigerator just at the grade leading to the basement. Such a location is both cool and convenient. This refrigerator used the least electricity for the entire year of any that were included in the test.

grade landing to the basement. It is completely isolated from the kitchen range and is on the west side of the house. Capacity 9½ cubic feet.

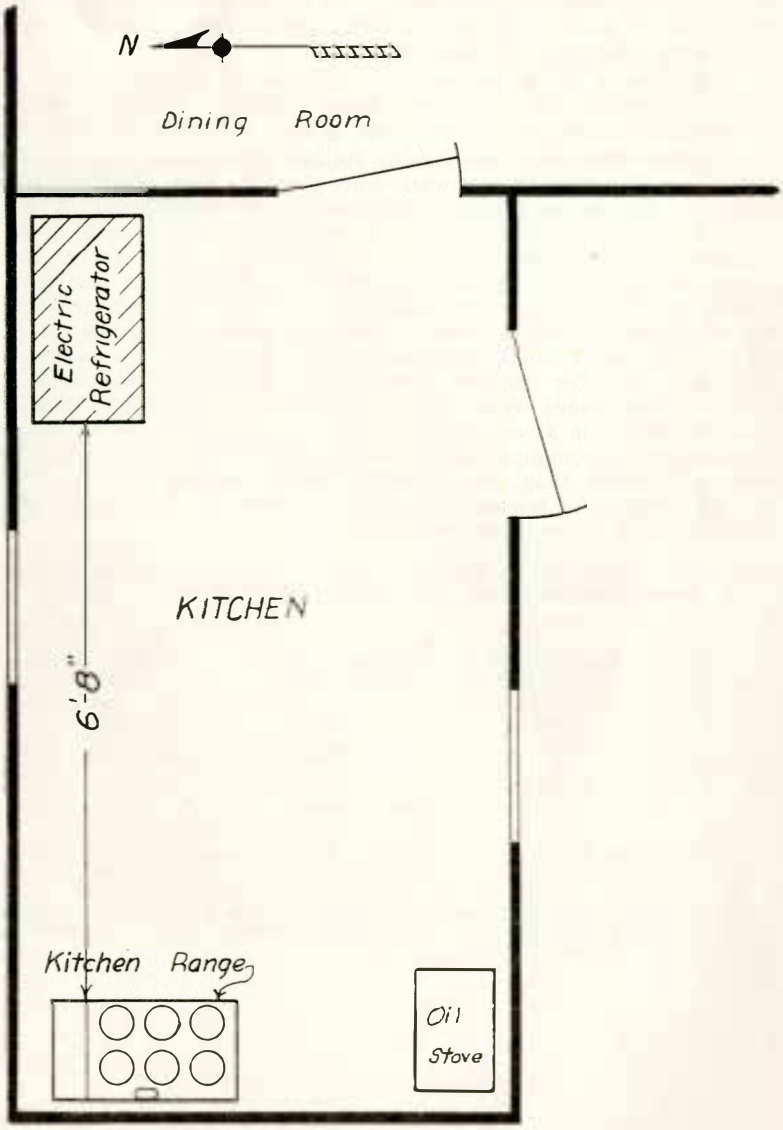

FIG. 3—A POOR LOCATION FOR THE HOME ELECTRIC REFRIGERATOR

This refrigerator was located in the kitchen, 6 feet 8 inches from the kitchen range. Of course the range was not used all of the time during the hot weather. Such a location would make the refrigerator use more electricity in winter as well as in summer.

Refrigerator D is located in the kitchen and is in the same room with the kitchen range. The distance from the range to the refrigerator is 6 feet, 8 inches. The temperature of the air outside D averaged the highest of the study, although the difference was not as great as might be expected. Capacity 9½ cubic feet.

Refrigerator E was located in a small pantry just off the kitchen. A door connected the two rooms directly and the distance from the kitchen range to the refrigerator was 14 feet. Capacity 6½ cubic feet.

Results.—The most unfavorably located refrigerator used 1.2 kilowatt hours of electricity per week more than the most favorably located plant. This is not as much difference as was anticipated. Figured at the 3-cent rate, it would amount to only 15 cents per month, or $1.87 per year. But if it were figured at a city 10-cent power rate, it would amount to 12 cents per week. This would be 48 cents per month, or a penalty of $6.24 per year for additional electricity used on account of the unfavorable location. Where refrigerators are not turned off during the cold winter months this factor of location would be a much more important one. For instance, a refrigerator located in the kitchen directly with the range would use a great deal more electricity in winter than one located in a cool anteroom. The average temperature **(outside temperature)** surrounding box D, the most unfavorable location, was 3.82 degrees F. higher than that of plant C which was the most favorable. This 3.82 degrees of temperature makes a difference of 1.2 K. W. H. of electricity used in the operation of the plants.

TABLE VII.—EFFECT OF FAVORABLE (COOL) LOCATION OF HOME ELECTRIC REFRIGERATOR UPON THE AMOUNT OF ELECTRICITY USED

Refrigerator Number	Av. Temp. just Outside the Box. Degrees Fahr.	Tempt. of Location compared to most favorable location	Extra electricity required due to less favorable location. (Per week)
A	79.037	1.174° F. Higher	.37 K.W.H.
B	78.83	.884° F. Higher	.28 K.W.H.
C	77.946	0 (Most favorable)	0
D	81.767	3.821° F. Higher	1.20 K.W.H.
E	80.57	2.624° F. Higher	.83 K.W.H.

Note—The most favorably located plant (plant C) required 1.2 KWH less electricity each week for its operation, owing to its favorable location. This is compared to the most unfavorably located plant.