Schenectady, October 31, 1949

Mr. E. G. Hopkins, Mgr. Mfg.
Wiring Device Division
BRIDGEPORT WORKS

Herewith is the Value Analysis report on the butter conditioner thermostat.

Because of the short length of time allowed for the study of this device, it was felt that the best job could be done by making an intensive analysis based upon experience with similar parts in other devices. In this way, the knowledge and resources of the entire Value Analysis Division were utilized to the fullest extent without the normal delay encountered by obtaining quotations from outside vendors.

Where actual quotations on similar parts are referred to in this report, the specific vendors involved are named in the accompanying list.

We have enjoyed working with this project and hope that if we may be of further service with this or any other Value Analysis study, you will not hesitate to call upon us.

PURCHASING DEPARTMENT

H. J. Macemon
Value Analysis Division

HJM: AEM
VALUE ANALYSIS REPORT

Butter Conditioner Thermostat
<table>
<thead>
<tr>
<th>Description</th>
<th>Cost/M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present Cost</td>
<td>2.55</td>
</tr>
<tr>
<td>Planned Cost</td>
<td>.93</td>
</tr>
<tr>
<td>Possible savings</td>
<td>1.62</td>
</tr>
</tbody>
</table>

**COMMENTS:**

This same identical part is used in the automatic toaster produced at the Allentown plant. Their supplier quotes at $.93 per thousand.

VALUE ANALYSIS DIVISION
PURCHASING DEPARTMENT
October 31, 1949
Rivets
4199346-2
4191979

<table>
<thead>
<tr>
<th></th>
<th>No/unit</th>
<th>Cost/M</th>
<th>Cost/M units</th>
</tr>
</thead>
<tbody>
<tr>
<td>4199346-2</td>
<td>2</td>
<td>2.00</td>
<td>4.00</td>
</tr>
<tr>
<td>4191979</td>
<td>2</td>
<td>2.00 (est.)</td>
<td>4.00</td>
</tr>
</tbody>
</table>

Planned Cost
Eyelets
4
.30
1.20

Possible Reduction
6.80

COMMENTS:

It is felt that eyelets would serve equally as well as the rivets for this application. The above planned costs are representative of eyelet costs as used on the range timer.

It is interesting to note that the large rivet #5419089 is presently being purchased for $1.46 per thousand while the small rivet #4199346-2 costs $2.00 per thousand even though quantities are twice that of the large rivet.

VALUE ANALYSIS DIVISION
PURCHASING DEPARTMENT
October 31, 1949
Magnet 5416154
1 per unit

<table>
<thead>
<tr>
<th></th>
<th>Cost/M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present Cost</td>
<td>81.00</td>
</tr>
<tr>
<td>Planned Cost</td>
<td>45.00</td>
</tr>
<tr>
<td>Possible Reduction</td>
<td>46.00</td>
</tr>
</tbody>
</table>

COMMENTS:

A similar magnet is used for the same purpose in the automatic blanket control. It is purchased and shipped unmagnetized, then magnetized and checked in the using plant. Cost figures indicate a total of about 4½% for the magnet, magnetization, and checking. This magnet does not have ground surfaces as does the one presently used on the butter conditioner. We are advised that for this type of application "as-cast" tolerances are sufficient so that grinding is unnecessary.

VALUE ANALYSIS DIVISION
PURCHASING DEPARTMENT
October 31, 1949
Support
5416585
1 per unit

<table>
<thead>
<tr>
<th></th>
<th>Mat'l</th>
<th>Labor</th>
<th>Shop Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present Cost</td>
<td>8.20</td>
<td>.09</td>
<td>8.58</td>
</tr>
<tr>
<td>Planned Cost</td>
<td>4.20</td>
<td>.09</td>
<td>4.29</td>
</tr>
</tbody>
</table>

Possible Reduction 4.29

COMMENTS:

This part is presently made from 8% tin phos bronze. A similar part in the automatic blanket control is made from brass and operates satisfactorily with a greater range of flexing than is required in this application. It is felt that the substitution of brass at about 1/2 the material cost would produce a part equally as good as the present one.

VALUE ANALYSIS DIVISION
PURCHASING DEPARTMENT
October 31, 1949

M: M
Condenser
5410494
1 per unit

Present Cost
Cost/M 95.00
Planned Cost
Planned Cost 0
Possible Reduction 95.00

COMMENTS:

We have been advised by Erie that a reasonable doubt exists regarding the necessity of this condenser. Several thousand units are in the field without the condenser and have given no trouble. Extensive laboratory tests fail to give conclusive evidence of its need.

If it is felt that the use of the condenser should be continued, standard radio condensers with solid wire leads are available at about half the present cost. Since insulation tubing is put over the leads during assembly, the need for the present insulated leads is questioned. No flexing of the leads is required except at assembly; therefore, it is felt that solid leads would prove satisfactory.

It was noted that the condenser is fastened to the support by soldering, even though the clamp on the condenser is punched for riveting. It is felt that a riveted joint might be made more quickly and hence more economically than the soldered type of construction. If the condenser were turned around so that the clamp faced the opposite direction, sufficient room would be available for riveting.

VALUE ANALYSIS DIVISION
PURCHASING DEPARTMENT
October 31, 1949

M:M
Lead
$419490
3 per unit

<table>
<thead>
<tr>
<th>Material</th>
<th>Labor</th>
<th>Shop Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present Cost</td>
<td>12.39</td>
<td>5.40</td>
</tr>
<tr>
<td>Planned Cost</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Possible Reduction 20.04 11.04

COMMENTS:

For the refrigerator lamp, a double lead slightly longer than this one is used. This is cut to length, stripped on both ends, and split for half its length automatically on a single machine. The total cost of the finished lead is about $9.00 per thousand. If the same material were used and completely split, either on the machine or during assembly, two single leads would be produced for each machine cycle. Based upon the above price for the double lead, the single leads should cost approximately $4.50 per thousand.

VALUE ANALYSIS DIVISION
PURCHASING DEPARTMENT
October 31, 1949

M.M
Tubing
5416595-3
2 per unit

Cost/M

Present Cost
1.70

COMMENTS:

Transflex tubing is one of the more expensive insulating tubings available. The need for its excellent insulating properties is questioned in this application. It is felt that regular spagetti as is used by the radio industry would adequately do the required job at a reduced cost.

VALUE ANALYSIS DIVISION
PURCHASING DEPARTMENT
October 31, 1949

M:M
<table>
<thead>
<tr>
<th></th>
<th>Cost/M</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Material</td>
</tr>
<tr>
<td>Present Cost</td>
<td>18.10</td>
</tr>
<tr>
<td>Planned Cost</td>
<td>6.10</td>
</tr>
</tbody>
</table>

Possible Reduction 12.00

**COMMENTS:**

If aluminum is used instead of brass for this part, the material cost should be reduced by 60 or 70 per cent. This is based on the fact that brass and aluminum cost nearly the same per pound, while the density of aluminum is only 1/3 that of brass.

VALUE ANALYSIS DIVISION
PURCHASING DEPARTMENT
October 31, 1949
Support
4198767
1 per unit

Cost/M

<table>
<thead>
<tr>
<th></th>
<th>Mat'l</th>
<th>Labor</th>
<th>Shop Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present Cost</td>
<td>16.99</td>
<td>2.24</td>
<td>26.62</td>
</tr>
<tr>
<td>Planned Cost</td>
<td>5.75</td>
<td>2.24</td>
<td>15.38</td>
</tr>
<tr>
<td>Possible Reduction</td>
<td></td>
<td></td>
<td>11.24</td>
</tr>
</tbody>
</table>

COMMENTS:

Substitution of aluminum for the brass presently used would reduce the material cost by 60 - 70% based upon the similarity of material cost per pound and the differences of density. Since aluminum has greater heat conductivity than brass, a more sensitive thermostat with a shorter time lag would result.

VALUE ANALYSIS DIVISION
PURCHASING DEPARTMENT
October 31, 1949

M:M
Bushing 5410325
1 per unit

<table>
<thead>
<tr>
<th>Material</th>
<th>Labor</th>
<th>Shop Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present Cost</td>
<td>5.28</td>
<td>3.16</td>
</tr>
<tr>
<td>Planned Cost</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brass</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aluminum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Possible Reduction</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

COMMENTS:

This bushing is nearly the same size and serves the same function as a similar bushing used on the automatic blanket control. This is purchased for about $13.50 per M. A further saving would be possible by changing to aluminum.

VALUE ANALYSIS DIVISION
PURCHASING DEPARTMENT
October 31, 1949

M: M
Stud Contact
5419087
1 per unit

<table>
<thead>
<tr>
<th></th>
<th>Cost/M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present Cost</td>
<td>27.25</td>
</tr>
<tr>
<td>Planned Cost</td>
<td>13.85</td>
</tr>
<tr>
<td>Possible Reduction</td>
<td>13.40</td>
</tr>
</tbody>
</table>

COMMENTS:

A similar part is used in the same manner on the automatic blanket control in conjunction with the magnet mentioned previously. Cost figures indicate that this part is being purchased for $13.85 per thousand.

VALUE ANALYSIS DIVISION
PURCHASING DEPARTMENT
October 31, 1949

M: M
<table>
<thead>
<tr>
<th>Material</th>
<th>No. used per unit</th>
<th>Cost/M</th>
<th>Cost/M units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mica Washer</td>
<td>2</td>
<td>4.64</td>
<td>9.28</td>
</tr>
<tr>
<td>Insulation</td>
<td>1</td>
<td>17.25</td>
<td>17.25</td>
</tr>
<tr>
<td>Washer</td>
<td>2</td>
<td>2.64</td>
<td>13.12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.92</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.56</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>39.65</td>
</tr>
<tr>
<td>Planned Cost</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step Washer</td>
<td>4</td>
<td>5.00</td>
<td>20.00</td>
</tr>
</tbody>
</table>

Possible Reduction: 19.65

**COMMENTS:**

The mica washer is used in conjunction with the small flamenol washer and large mica insulation to provide electrical insulation between the contact supporting rivets and the brass housing. If a molded plastic stepwasher were used in which the step height were equal to 1/2 the thickness of the brass housing, two such washers on each rivet would eliminate the need for the three separate insulating parts.
### Cost per Washer

<table>
<thead>
<tr>
<th></th>
<th>Mat'l</th>
<th>Labor</th>
<th>Shop Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Present Cost</strong></td>
<td>1.16</td>
<td>.18</td>
<td>1.94</td>
</tr>
<tr>
<td><strong>Planned Cost</strong></td>
<td>0</td>
<td></td>
<td>1.94</td>
</tr>
</tbody>
</table>

**Possible Reduction**

1.94

**COMMENTS:**

The purpose of this washer seems to be to form a surface upon which the rivet may be rolled over. Since the terminal directly underneath would serve just as well as the washer for this purpose, it is suggested that the washer be eliminated and the rivet length adjusted accordingly.

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**VALUE ANALYSIS DIVISION**

**PURCHASING DEPARTMENT**

October 31, 1949
### Hub Assembly
5416964-1
1 per unit

<table>
<thead>
<tr>
<th>Material</th>
<th>Labor</th>
<th>Shop Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stop 5419082</td>
<td>1.20</td>
<td>.09</td>
</tr>
<tr>
<td>Hub 5415916</td>
<td>1.89</td>
<td>1.38</td>
</tr>
<tr>
<td>Solder 5415463</td>
<td>.16</td>
<td>.88</td>
</tr>
<tr>
<td>Assembly</td>
<td>.24</td>
<td>4.34</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Planned Cost**

**Possible Reduction** 20.78

**COMMENTS:**

The use of two separate brass parts soldered together makes this assembly too costly in view of the simple job it performs. A miniature die casting threaded on a dial tapper should produce this part at a cost of less than one cent.

**VALUE ANALYSIS DIVISION**
**PURCHASING DEPARTMENT**
**October 31, 1949**
Terminal
5412273
2 per unit

Present Cost
Planned Cost

Cost/M
2.62

COMMENTS:

This flat terminal is purchased from an outside vendor and then bent during final assembly. It is suggested that a standard bent terminal be purchased for this application.

VALUE ANALYSIS DIVISION
PURCHASING DEPARTMENT
October 31, 1949

M: M
Clamp
4199368-2
1 per unit

<table>
<thead>
<tr>
<th>Material</th>
<th>Labor</th>
<th>Shop Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present Cost</td>
<td>.16</td>
<td>.46</td>
</tr>
<tr>
<td>Planned Cost</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

COMMENTS:

This part is an exact duplicate of the part used in the toaster. Quotations from Allentown are being obtained.

VALUE ANALYSIS DIVISION
PURCHASING DEPARTMENT
October 31, 1949

M: M
Spring
5419025
1 per unit

Present Cost  1.80
Planned Cost  0
Possible Reduction  1.80

COMMENTS:

This spring is evidently intended to maintain sufficient drag on the adjusting screw so that vibration will not cause a change of setting. However, the amount of friction contributed by this spring is so small that it is nearly impossible to determine whether or not the spring is present by manually turning the adjusting screw. Therefore, it is felt that sufficient friction is provided by the spring action of the inner support so that this spring may be eliminated.

If the spring is deemed necessary, a supplier quotes on a similar spring used on the fractional horsepower motor at $.90 per thousand.

VALUE ANALYSIS DIVISION
PURCHASING DEPARTMENT
October 31, 1949

M: M
The following items were investigated and found to represent good value:

**Bimetal Assembly**
- Bimetal 5419081
- Washer 5419084
- Rivet 5419083

**Heater** 5410423-3

**Screw** 5415917

VALUE ANALYSIS DIVISION
PURCHASING DEPARTMENT
October 31, 1949

M: M
If a re-design of this thermostat were undertaken, it is felt that substantial savings might be effected by using a molded plastic part for the housing. This part should cost less than the present brass housing and would also allow elimination of the mica and flamelol insulation pieces presently used. With proper design, the plastic part could be tapped so that the bushing could also be eliminated. It has been estimated that a savings of approximately eight cents per unit could be effected by this change.

It was noted that final assembly direct labor charges amount to over five cents per unit. From experience with similar devices, it has been found that an average of .05 minutes is required for handling each piece during assembly. Approximately thirty parts are used in this complete unit, so that assembly time should not exceed 1½ minutes if the proper jigs and tools are used. At an estimated labor cost of $1.25 per hour, this assembly operation should not cost more than 3½ cents per unit, a reduction of 1½ cents from the present figure.