

Formula showing Calculation of  
Reimbursable Expenses from  
July 1964 through March 1967  
for D.H. Overmyer Company Services  
provided to the Communications Company.

Formula to determine a department's expenses allocated to communications activity during the base period.

$$d = \frac{\sum_{n=1}^N P_n S_n}{\sum_{n=1}^N S_n} E$$

$N$  = number of employees in department

$P$  = percent (as a decimal) of time that a particular employee spent on communications activity during the base period.

$S$  = salary that this employee was paid during the base period.

$E$  = the total expenses of the department during the base period.

note that  $\sum_{n=1}^N S_n$  = the total salary paid to all employees in the department during the base period.

note — the base period was 4 months (September through December 1966).



④ The fraction is the percent (as a decimal) of the total salaries paid to all employees of the department that was allocated to communications activities during the base period.

⑤ Keep in mind that a department's salaries are included in the expenses.

So

$$\sum_{n=1}^N S_n \leq E$$

Overmyer had 8 departments claiming reimbursement  
so:

$$E_T = \sum_{i=1}^8 d_i + T_U$$

where  $T_U$  = expenses for communicators outside of departments during the base period.

$E_T$  = expenses for communications during the base period for all 8 departments +  $T_U$ .

This base period was extended to the July 1964 through March 1967 interval as follows:

$$T_E = \left[ \underbrace{3E_T}_{(a)} + \underbrace{0.75(3E_T)}_{(b)} + \underbrace{0.1(3E_T)}_{(c)} + \underbrace{0.1875(3E_T)}_{(d)} \right] 0.8 + T_L$$

- (a) for all of 1966, base period of 4 months x 3 covers 12 months.
- (b) for all of 1965, 75% of 1966 amount
- (c) for 6 months of 1964, 10% of 1966 amount
- (d) for 3 months of 1967, 18.75% of 1966 amount

0.8 is 80%, reduction to account for communications expenses unrelated to the 5 permits sold.

$T_L$  = Overmyer Leasing Company expenses related to the permits sold.

$T_E$  = reimbursable expenses for non-communications Overmyer companies from July 1964 through March 1967.

department expenses over July 1964 - March 1967

formula:

$$d_T = 3d + (0.75)3d + (0.1)3d + (0.1875)3d$$

$$d_T = 6.113d$$

↑ department expense during base period  
↑ department expenses claimed for entire period July 1964 - March 1967

- 1) President's office      \$ 15,320 × 6.113 = \$ 93,651
- 2) Controller's dept.      \$ 24,292 × 6.113 = \$ 148,497
- 3) Auditing dept.      \$ 3,420 × 6.113 = \$ 20,906
- 4) legal dept.      \$ 8,191 × 6.113 = \$ 50,072
- 5) Treasurer's dept      \$ 4,698 × 6.113 = \$ 28,719
- 6) Advertising and public relations dept.      \$ 15,062 × 6.113 = \$ 92,074
- 7) Finance and development dept - Home Office      \$ 27,921 × 6.113 = \$ 170,682
- 8) Finance and development dept - Regional Offices      \$ 22,421 × 6.113 = \$ 137,060

|  | <u>1964</u> | <u>1965</u> | <u>1966</u> | <u>1967</u> |
|--|-------------|-------------|-------------|-------------|
| 1) President's Office                                | \$ 4596     | \$34,470    | \$ 45,960   | \$ 8618     |
| 2) Controller's dept                                 | \$ 7288     | \$ 54,657   | \$ 72,876   | \$ 13,664   |
| 3) Auditing dept                                     | \$ 1026     | \$ 7695     | \$ 10,260   | \$ 1924     |
| 4) legal dept  | \$ 2457     | \$ 18,430   | \$ 24,573   | \$ 4607     |
| 5) Treasurer's dept                                  | \$ 1409     | \$ 10,571   | \$ 14,094   | \$ 2643     |
| 6) Advertising and<br>public relations dept.         | \$ 4519     | \$ 33,890   | \$ 45,186   | \$ 8472     |
| 7) Finance and developmat<br>dept - Home Office      | \$ 8376     | \$ 62,822   | \$ 83,763   | \$ 15,706   |
| 8) Finance and developmat<br>dept - Regional Offices | \$ 6726     | \$ 50,447   | \$ 67,263   | \$ 12,612   |

d value for each department ( $d_1 \rightarrow d_8$ )  
for base period September - December 1966

- 1) President's office  $d_1 = \$15,320 = 17.4\%$  of  $\$88,044$
  - 2) Controller's dept.  $d_2 = \$24,292 = 6.9\%$  of  $\$352,065$
  - 3) Auditing dept.  $d_3 = \$3,420 = 10.3\%$  of  $\$33,205$
  - 4) legal dept.  $d_4 = \$8,191 = 11.5\%$  of  $\$71,228$
  - 5) Treasurer's dept.  $d_5 = \$4,698 = 12.5\%$  of  $\$37,581$
  - 6) Advertising and public relations dept.  $d_6 = \$15,062 = 17.8\%$  of  $\$84,617$
  - 7) Finance and development  
dept - Home office  $d_7 = \$27,921 = 13.4\%$  of  $\$208,364$
  - 8) Finance and development  
dept - Regional offices  $d_8 = \$22,421 = 14.2\%$  of  $\$157,805$
- 
- $\$121,325$



For the base period (September through December 1966)

$$E_T = \sum_{i=1}^8 d_i + T_U = \$129,281$$

↑  
\$7956

Allocations by year

|                           |                  |            |
|---------------------------|------------------|------------|
| for 1966                  | $3E_T =$         | \$ 387,843 |
| for 1965                  | $(0.75)3E_T =$   | \$ 290,882 |
| for $\frac{1}{2}$ of 1964 | $(0.1)3E_T =$    | \$ 38,784  |
| for 3 months 1967         | $(0.1875)3E_T =$ | \$ 72,720  |
|                           |                  | <hr/>      |
|                           |                  | \$ 790,229 |

Take 80% of total yields \$ 632,183

\$ 34,330

$T_L$  the leasing company  
charge is \$34,330

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\$ 666,513 =  $T_E$

It might be useful to examine how a specific employee contributes to the reimbursable expenses over the period July 1964 - March 1967. The employee's contribution is only measured during the base period but is expanded in a formula for the entire period of reimbursable expenses.

Start with this equation developed earlier:

$$d = \left[ \frac{\sum_{n=1}^N P_n S_n}{\sum_{n=1}^N S_n} \right] E$$

where

$d$  = department expenses allocated to communications activity during the base period.

$E$  = total department expenses during the base period

$S_n$  = salary of employee  $n$  during the base period.

$P_n$  = percent of time (as a decimal) that employee spent on communications work during the base period.

$N$  = number of employees in the department

To find the departments expense allocated to communications, during the base period and attributable to A particular employee do the following.

$$d_n = \left[ \frac{P_n S_n}{\sum_{h=1}^N S_n} \right] E$$

$d_n$  = the departments' expense, during the base period, allocated to communications and attributed to employee  $n$ .

$\sum_{h=1}^N S_n$  = the sum of all of the departments' salaries made employees during the base period.

$P_n$  = the percentage of time (as a decimal) that employee  $n$  spent on communications during the base period.

$S_n$  = employee  $n$ 's salary during the base period.

$E$  = the departments total expenses during the base period.

To extend  $d_n$  to the entire period  
July 1964 - March 1967 simply multiply by  
6.113 A constant derived earlier.

$$d'_n = d_n \cdot 6.113 = \left[ \frac{P_n S_n}{\sum_{n=1}^N S_n} \right] E \cdot 6.113$$

$d'_n$  = the expense contributed by employee  $n$   
for the entire period July 1964 - March 1967.

## Example department

$E = \$8000$  departments' total expenses during the base period

5 employees in the department  $N = 5$

### employees

$$1 \quad P_1 S_1 = 0.25 \times \$1000 = \$250$$

$$* 2 \quad P_2 S_2 = 0.5 \times \$800 = \$400$$

$$3 \quad P_3 S_3 = 0.1 \times \$700 = \$70$$

$$4 \quad P_4 S_4 = 0.2 \times \$750 = \$150$$

$$5 \quad P_5 S_5 = 0.2 \times \$900 = \$180$$

We are interested in employee 2 so  $n=2$

$$\text{so we have } \sum_{h=1}^5 S_h = \$1000 + \$800 + \$700 + \$750 + \$900 \\ = \$4150$$

$$\text{so } d_2 = \left[ \frac{\$400}{\$4150} \right] \times \$8000 = \$771 \\ \text{for employee \#2}$$

9.64%

To find the expense for the whole department attributable to communications, during the base period we have:

$$d = \left[ \frac{\sum_{n=1}^5 P_n S_n}{\$4150} \right] \times \$8000$$

$$\sum_{n=1}^5 P_n S_n = \$250 + \$400 + \$70 + \$150 + \$180 = \$1050$$

$$\text{so } d = \underbrace{\left[ \frac{\$1050}{\$4150} \right]}_{25.3\%} \times \$8000 = \$2024$$

expand the departments expenses, allocatable to communications over the period July 1964 - March 1967.

$$d' = 6.113 \times \$ 2024 = \$ 12,373$$

and employee #2 ( $n=2$ ) contribution over that same period is

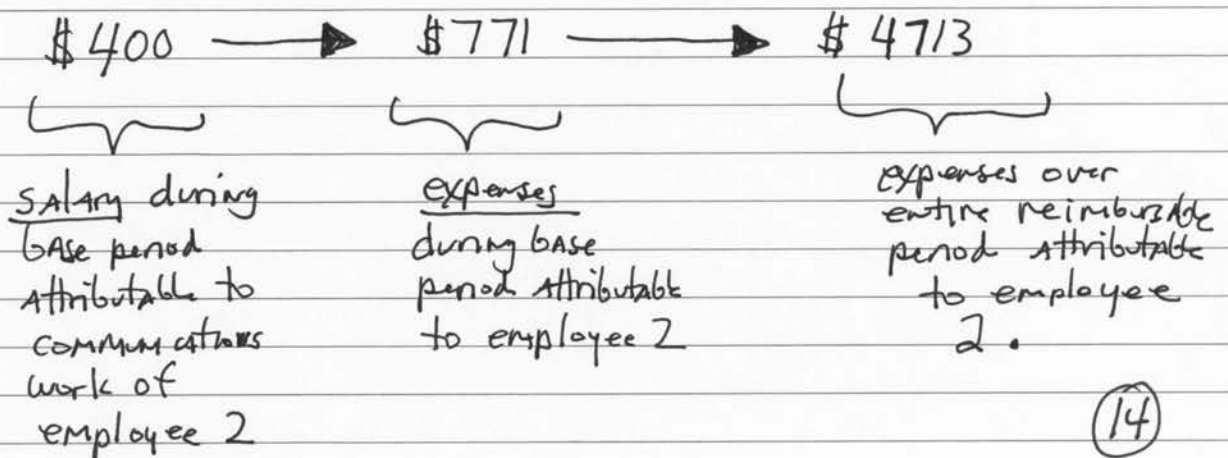
$$d_2' = 6.113 d_2 = 6.113 \cdot \$ 771 = \$ 4713$$

So,

employee 2 made \$800 during the base period, \$400 was attributed to communications activities.

Then \$771 of the departments total expenses were attributable to this employee's efforts during the base period.

This \$771 amount, applicable to the base period for that specific employee was then extrapolated to \$4713 covering the period July 1964 - March 1967.



So the final equation to find the entire reimbursable expenses created by a particular employee is:

$$d'_n = \frac{P_n S_n E \cdot 6.113}{\sum_{n=1}^N S_n}$$

where:

$P_n$  = percentage (AS A decimal) that employee  $n$  spent on communications work during the base period.

$S_n$  = the salary paid to employee  $n$  over the entire base period.

$E$  = the department expenses (where employee  $n$  worked) during the base period.

$\sum_{n=1}^N S_n$  = the sum of all the employee's salaries in the department where employee  $n$  worked paid during the base period. (including employee  $n$ 's salary)