

# **NATIONAL BUREAU OF STANDARDS REPORT**

**5162**

## **TABLES RELATING TO DEGRADATION OF INFORMATION**

**Semi-Annual Progress Report  
July 1 to December 31, 1956**

### **PART I**

**To  
SIGNAL CORPS ENGINEERING LABORATORIES**



**U. S. DEPARTMENT OF COMMERCE  
NATIONAL BUREAU OF STANDARDS**

U. S. DEPARTMENT OF COMMERCE

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NATIONAL BUREAU OF STANDARDS

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# NATIONAL BUREAU OF STANDARDS REPORT

## NBS PROJECT

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## NBS REPORT

5162

### TABLES RELATING TO DEGRADATION OF INFORMATION

Semi-Annual Progress Report  
July 1 to December 31, 1956

### PART I

To  
Evans Signal Laboratory  
Signal Corps Engineering Laboratories  
under the terms of MIPR 55-2175-SC-91

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U. S. DEPARTMENT OF COMMERCE  
NATIONAL BUREAU OF STANDARDS



## Preface

This report presents a set of tables and graphs of probabilities relating to an anti-aircraft defense situation in which the defensive forces receive information on some, but not all, of the attacking aircraft ("targets"). The magnitudes tabulated are defined at the beginning of each table. The tables cover a wide range of parameters; the graphs pertain only to selected values of the parameters.





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TABLE I

Loss in AttritionDue to Degradation of Information

$$d(T,t) = E(T) - E(t) = T[1 - (1 - \frac{1-a}{T})^B] - t[1 - (1 - \frac{1-a}{t})^B]$$

for B = Number of batteries = 10, 20, 30, 40

T = " " targets = 5, 10, 15, 20

t = " " targets on which the defense is informed;  
t/T = .2, .4, .6, .8

a = Probability that a target, if assigned to a battery,  
will survive fire from that battery  
(= engagement survival probability); given by

$$a = (1-p)^{m/B}$$

p = Characteristic (single-shot) kill probability =  
.2, .3, .5, .7, .9

m = Number of shots available to all batteries combined;  
m/B = shots per battery = 1, 2, ..., 8.

The function  $d(T,t)$  measures the following magnitude:  
Assume B batteries opposing T targets, where the batteries have information on only t targets. Each battery is assigned at random to one of the t targets, then stays assigned to it for the duration of the engagement, firing  $m/B$  rounds, each with kill probability p. (Thus a is the survival probability of a target assigned to one battery.) Then d measures the expected loss in attrition due to the degradation of information, i.e., the expected number of targets killed in the case of no degradation, minus the expected number of targets killed in the presence of degradation.

Selected values of this function are presented graphically in Figures 1-6, pp. 28-30.



$$E(T) - E(t)$$

$$E(T) = T[1 - (1 - \frac{1-a}{T})^B]$$

| B  | T  | t  | p  | m/B  |      |      |      |      |      |      |      |
|----|----|----|----|------|------|------|------|------|------|------|------|
|    |    |    |    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
| 10 | 05 | 01 | .2 | 00.8 | 01.6 | 02.2 | 02.6 | 02.8 | 03.0 | 03.1 | 03.2 |
| 10 | 05 | 01 | .3 | 01.3 | 02.3 | 02.8 | 03.0 | 03.2 | 03.3 | 03.3 | 03.4 |
| 10 | 05 | 01 | .5 | 02.3 | 03.0 | 03.3 | 03.4 | 03.4 | 03.4 | 03.5 | 03.5 |
| 10 | 05 | 01 | .7 | 02.9 | 03.3 | 03.4 | 03.5 | 03.5 | 03.5 | 03.5 | 03.5 |
| 10 | 05 | 01 | .9 | 03.3 | 03.4 | 03.5 | 03.5 | 03.5 | 03.5 | 03.5 | 03.5 |
| 10 | 05 | 02 | .2 | 00.4 | 00.9 | 01.3 | 01.6 | 01.9 | 02.0 | 02.1 | 02.2 |
| 10 | 05 | 02 | .3 | 00.7 | 01.4 | 01.8 | 02.1 | 02.2 | 02.3 | 02.3 | 02.4 |
| 10 | 05 | 02 | .5 | 01.4 | 02.0 | 02.3 | 02.4 | 02.4 | 02.4 | 02.5 | 02.5 |
| 10 | 05 | 02 | .7 | 01.9 | 02.3 | 02.4 | 02.5 | 02.5 | 02.5 | 02.5 | 02.5 |
| 10 | 05 | 02 | .9 | 02.3 | 02.5 | 02.5 | 02.5 | 02.5 | 02.5 | 02.5 | 02.5 |
| 10 | 05 | 03 | .2 | 00.2 | 00.5 | 00.7 | 00.9 | 01.1 | 01.2 | 01.2 | 01.3 |
| 10 | 05 | 03 | .3 | 00.4 | 00.8 | 01.0 | 01.2 | 01.3 | 01.4 | 01.4 | 01.4 |
| 10 | 05 | 03 | .5 | 00.7 | 01.2 | 01.4 | 01.4 | 01.5 | 01.5 | 01.5 | 01.5 |
| 10 | 05 | 03 | .7 | 01.1 | 01.4 | 01.5 | 01.5 | 01.5 | 01.5 | 01.5 | 01.5 |
| 10 | 05 | 03 | .9 | 01.4 | 01.5 | 01.5 | 01.5 | 01.5 | 01.5 | 01.5 | 01.5 |
| 10 | 05 | 04 | .2 | 00.1 | 00.2 | 00.3 | 00.4 | 00.5 | 00.5 | 00.5 | 00.6 |
| 10 | 05 | 04 | .3 | 00.1 | 00.3 | 00.4 | 00.5 | 00.6 | 00.6 | 00.6 | 00.7 |
| 10 | 05 | 04 | .5 | 00.3 | 00.5 | 00.6 | 00.6 | 00.7 | 00.7 | 00.7 | 00.7 |
| 10 | 05 | 04 | .7 | 00.5 | 00.6 | 00.7 | 00.7 | 00.7 | 00.7 | 00.7 | 00.7 |
| 10 | 05 | 04 | .9 | 00.6 | 00.7 | 00.7 | 00.7 | 00.7 | 00.7 | 00.7 | 00.7 |
| 10 | 10 | 02 | .2 | 00.5 | 01.3 | 02.1 | 02.6 | 03.0 | 03.4 | 03.6 | 03.8 |
| 10 | 10 | 02 | .3 | 01.0 | 02.2 | 03.0 | 03.5 | 03.8 | 04.0 | 04.2 | 04.3 |
| 10 | 10 | 02 | .5 | 02.1 | 03.4 | 04.0 | 04.3 | 04.4 | 04.5 | 04.5 | 04.5 |
| 10 | 10 | 02 | .7 | 03.2 | 04.2 | 04.4 | 04.5 | 04.5 | 04.5 | 04.5 | 04.5 |
| 10 | 10 | 02 | .9 | 04.1 | 04.5 | 04.5 | 04.5 | 04.5 | 04.5 | 04.5 | 04.5 |
| 10 | 10 | 04 | .2 | 00.2 | 00.6 | 01.0 | 01.4 | 01.6 | 01.9 | 02.1 | 02.2 |
| 10 | 10 | 04 | .3 | 00.5 | 01.1 | 01.6 | 01.9 | 02.2 | 02.4 | 02.5 | 02.6 |
| 10 | 10 | 04 | .5 | 01.1 | 01.9 | 02.3 | 02.5 | 02.6 | 02.7 | 02.7 | 02.7 |
| 10 | 10 | 04 | .7 | 01.7 | 02.5 | 02.7 | 02.7 | 02.7 | 02.7 | 02.7 | 02.7 |
| 10 | 10 | 04 | .9 | 02.4 | 02.7 | 02.7 | 02.7 | 02.7 | 02.7 | 02.7 | 02.7 |
| 10 | 10 | 06 | .2 | 00.1 | 00.3 | 00.5 | 00.7 | 00.8 | 01.0 | 01.1 | 01.2 |
| 10 | 10 | 06 | .3 | 00.2 | 00.5 | 00.8 | 01.0 | 01.2 | 01.3 | 01.3 | 01.4 |
| 10 | 10 | 06 | .5 | 00.5 | 01.0 | 01.2 | 01.4 | 01.4 | 01.5 | 01.5 | 01.5 |
| 10 | 10 | 06 | .7 | 00.9 | 01.3 | 01.4 | 01.5 | 01.5 | 01.5 | 01.5 | 01.5 |
| 10 | 10 | 06 | .9 | 01.3 | 01.5 | 01.5 | 01.5 | 01.5 | 01.5 | 01.5 | 01.5 |
| 10 | 10 | 08 | .2 | 00.0 | 00.1 | 00.2 | 00.3 | 00.3 | 00.4 | 00.4 | 00.5 |
| 10 | 10 | 08 | .3 | 00.1 | 00.2 | 00.3 | 00.4 | 00.5 | 00.5 | 00.5 | 00.6 |
| 10 | 10 | 08 | .5 | 00.2 | 00.4 | 00.5 | 00.6 | 00.6 | 00.6 | 00.6 | 00.6 |
| 10 | 10 | 08 | .7 | 00.4 | 00.5 | 00.6 | 00.6 | 00.6 | 00.6 | 00.6 | 00.6 |
| 10 | 10 | 08 | .9 | 00.5 | 00.6 | 00.6 | 00.6 | 00.6 | 00.6 | 00.6 | 00.6 |





$$\frac{E(T)-E(t)}{E(T)} = T \left[ 1 - \left( 1 - \frac{1-a}{T} \right)^B \right]$$

| B  | T  | t  | p  | $m/B$ |      |      |      |      |      |      |      |
|----|----|----|----|-------|------|------|------|------|------|------|------|
|    |    |    |    | 1     | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
| 10 | 15 | 03 | .2 | 00.4  | 01.1 | 01.7 | 02.3 | 02.8 | 03.1 | 03.4 | 03.6 |
| 10 | 15 | 03 | .3 | 00.8  | 01.9 | 02.7 | 03.2 | 03.6 | 03.9 | 04.1 | 04.2 |
| 10 | 15 | 03 | .5 | 01.8  | 03.2 | 03.9 | 04.2 | 04.4 | 04.4 | 04.5 | 04.5 |
| 10 | 15 | 03 | .7 | 02.9  | 04.1 | 04.4 | 04.5 | 04.5 | 04.5 | 04.5 | 04.5 |
| 10 | 15 | 03 | .9 | 04.0  | 04.5 | 04.5 | 04.5 | 04.5 | 04.5 | 04.5 | 04.5 |
| 10 | 15 | 06 | .2 | 00.2  | 00.5 | 00.8 | 01.1 | 01.3 | 01.6 | 01.7 | 01.9 |
| 10 | 15 | 06 | .3 | 00.3  | 00.9 | 01.3 | 01.6 | 01.9 | 02.0 | 02.2 | 02.2 |
| 10 | 15 | 06 | .5 | 00.8  | 01.6 | 02.0 | 02.2 | 02.3 | 02.4 | 02.4 | 02.4 |
| 10 | 15 | 06 | .7 | 01.4  | 02.1 | 02.4 | 02.4 | 02.4 | 02.4 | 02.4 | 02.4 |
| 10 | 15 | 06 | .9 | 02.1  | 02.4 | 02.4 | 02.4 | 02.4 | 02.4 | 02.4 | 02.4 |
| 10 | 15 | 09 | .2 | 00.1  | 00.2 | 00.4 | 00.5 | 00.7 | 00.8 | 00.9 | 00.9 |
| 10 | 15 | 09 | .3 | 00.2  | 00.4 | 00.6 | 00.8 | 00.9 | 01.0 | 01.1 | 01.1 |
| 10 | 15 | 09 | .5 | 00.4  | 00.8 | 01.0 | 01.1 | 01.2 | 01.2 | 01.2 | 01.2 |
| 10 | 15 | 09 | .7 | 00.7  | 01.1 | 01.2 | 01.2 | 01.2 | 01.2 | 01.2 | 01.2 |
| 10 | 15 | 09 | .9 | 01.1  | 01.2 | 01.2 | 01.2 | 01.2 | 01.2 | 01.2 | 01.2 |
| 10 | 15 | 12 | .2 | 00.0  | 00.1 | 00.1 | 00.2 | 00.3 | 00.3 | 00.3 | 00.4 |
| 10 | 15 | 12 | .3 | 00.1  | 00.2 | 00.2 | 00.3 | 00.4 | 00.4 | 00.4 | 00.5 |
| 10 | 15 | 12 | .5 | 00.2  | 00.3 | 00.4 | 00.5 | 00.5 | 00.5 | 00.5 | 00.5 |
| 10 | 15 | 12 | .7 | 00.3  | 00.4 | 00.5 | 00.5 | 00.5 | 00.5 | 00.5 | 00.5 |
| 10 | 15 | 12 | .9 | 00.4  | 00.5 | 00.5 | 00.5 | 00.5 | 00.5 | 00.5 | 00.5 |
| 10 | 20 | 04 | .2 | 00.3  | 00.9 | 01.5 | 02.0 | 02.4 | 02.8 | 03.1 | 03.3 |
| 10 | 20 | 04 | .3 | 00.6  | 01.6 | 02.3 | 02.9 | 03.3 | 03.6 | 03.8 | 03.9 |
| 10 | 20 | 04 | .5 | 01.5  | 02.9 | 03.6 | 03.9 | 04.1 | 04.2 | 04.2 | 04.2 |
| 10 | 20 | 04 | .7 | 02.6  | 03.7 | 04.1 | 04.2 | 04.2 | 04.2 | 04.2 | 04.3 |
| 10 | 20 | 04 | .9 | 03.7  | 04.2 | 04.2 | 04.2 | 04.3 | 04.3 | 04.3 | 04.3 |
| 10 | 20 | 08 | .2 | 00.1  | 00.4 | 00.6 | 00.9 | 01.1 | 01.3 | 01.5 | 01.6 |
| 10 | 20 | 08 | .3 | 00.3  | 00.7 | 01.1 | 01.4 | 01.6 | 01.7 | 01.9 | 01.9 |
| 10 | 20 | 08 | .5 | 00.7  | 01.3 | 01.7 | 01.9 | 02.0 | 02.1 | 02.1 | 02.1 |
| 10 | 20 | 08 | .7 | 01.2  | 01.8 | 02.0 | 02.1 | 02.1 | 02.1 | 02.1 | 02.1 |
| 10 | 20 | 08 | .9 | 01.8  | 02.1 | 02.1 | 02.1 | 02.1 | 02.1 | 02.1 | 02.1 |
| 10 | 20 | 12 | .2 | 00.1  | 00.2 | 00.3 | 00.4 | 00.5 | 00.6 | 00.7 | 00.8 |
| 10 | 20 | 12 | .3 | 00.1  | 00.3 | 00.5 | 00.7 | 00.8 | 00.9 | 00.9 | 01.0 |
| 10 | 20 | 12 | .5 | 00.3  | 00.6 | 00.8 | 00.9 | 01.0 | 01.0 | 01.0 | 01.0 |
| 10 | 20 | 12 | .7 | 00.6  | 00.9 | 01.0 | 01.0 | 01.0 | 01.1 | 01.1 | 01.1 |
| 10 | 20 | 12 | .9 | 00.9  | 01.0 | 01.1 | 01.1 | 01.1 | 01.1 | 01.1 | 01.1 |
| 10 | 20 | 16 | .2 | 00.0  | 00.1 | 00.1 | 00.2 | 00.2 | 00.2 | 00.3 | 00.3 |
| 10 | 20 | 16 | .3 | 00.0  | 00.1 | 00.2 | 00.3 | 00.3 | 00.3 | 00.4 | 00.4 |
| 10 | 20 | 16 | .5 | 00.1  | 00.3 | 00.3 | 00.4 | 00.4 | 00.4 | 00.4 | 00.4 |
| 10 | 20 | 16 | .7 | 00.2  | 00.4 | 00.4 | 00.4 | 00.4 | 00.4 | 00.4 | 00.4 |
| 10 | 20 | 16 | .9 | 00.3  | 00.4 | 00.4 | 00.4 | 00.4 | 00.4 | 00.4 | 00.4 |





$$E(T) - E(t)$$

$$E(T) = T \left[ 1 - \left( 1 - \frac{1-a}{T} \right)^B \right]$$

| B  | T  | t  | p  | m/B  |      |      |      |      |      |      |      |
|----|----|----|----|------|------|------|------|------|------|------|------|
|    |    |    |    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
| 20 | 05 | 01 | .2 | 01.8 | 02.9 | 03.4 | 03.6 | 03.7 | 03.8 | 03.8 | 03.9 |
| 20 | 05 | 01 | .3 | 02.6 | 03.4 | 03.7 | 03.8 | 03.9 | 03.9 | 03.9 | 03.9 |
| 20 | 05 | 01 | .5 | 03.4 | 03.8 | 03.9 | 03.9 | 03.9 | 03.9 | 03.9 | 03.9 |
| 20 | 05 | 01 | .7 | 03.8 | 03.9 | 03.9 | 03.9 | 03.9 | 03.9 | 03.9 | 03.9 |
| 20 | 05 | 01 | .9 | 03.9 | 03.9 | 03.9 | 03.9 | 03.9 | 03.9 | 03.9 | 03.9 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 20 | 05 | 02 | .2 | 01.0 | 01.9 | 02.4 | 02.6 | 02.7 | 02.8 | 02.8 | 02.9 |
| 20 | 05 | 02 | .3 | 01.6 | 02.4 | 02.7 | 02.8 | 02.9 | 02.9 | 02.9 | 02.9 |
| 20 | 05 | 02 | .5 | 02.4 | 02.8 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 |
| 20 | 05 | 02 | .7 | 02.8 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 |
| 20 | 05 | 02 | .9 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 20 | 05 | 03 | .2 | 00.5 | 01.1 | 01.4 | 01.6 | 01.7 | 01.8 | 01.8 | 01.9 |
| 20 | 05 | 03 | .3 | 00.9 | 01.5 | 01.7 | 01.8 | 01.9 | 01.9 | 01.9 | 01.9 |
| 20 | 05 | 03 | .5 | 01.5 | 01.8 | 01.9 | 01.9 | 01.9 | 01.9 | 01.9 | 01.9 |
| 20 | 05 | 03 | .7 | 01.8 | 01.9 | 01.9 | 01.9 | 01.9 | 01.9 | 01.9 | 01.9 |
| 20 | 05 | 03 | .9 | 01.9 | 01.9 | 01.9 | 01.9 | 01.9 | 01.9 | 01.9 | 01.9 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 20 | 05 | 04 | .2 | 00.2 | 00.5 | 00.7 | 00.8 | 00.8 | 00.9 | 00.9 | 00.9 |
| 20 | 05 | 04 | .3 | 00.4 | 00.7 | 00.8 | 00.9 | 00.9 | 00.9 | 00.9 | 00.9 |
| 20 | 05 | 04 | .5 | 00.7 | 00.9 | 00.9 | 00.9 | 00.9 | 01.0 | 01.0 | 01.0 |
| 20 | 05 | 04 | .7 | 00.8 | 00.9 | 00.9 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 20 | 05 | 04 | .9 | 00.9 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 20 | 10 | 02 | .2 | 01.6 | 03.2 | 04.3 | 05.0 | 05.5 | 05.8 | 06.1 | 06.2 |
| 20 | 10 | 02 | .3 | 02.6 | 04.5 | 05.4 | 05.9 | 06.2 | 06.4 | 06.5 | 06.6 |
| 20 | 10 | 02 | .5 | 04.4 | 05.9 | 06.4 | 06.6 | 06.7 | 06.7 | 06.8 | 06.8 |
| 20 | 10 | 02 | .7 | 05.7 | 06.5 | 06.7 | 06.8 | 06.8 | 06.8 | 06.8 | 06.8 |
| 20 | 10 | 02 | .9 | 06.5 | 06.8 | 06.8 | 06.8 | 06.8 | 06.8 | 06.8 | 06.8 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 20 | 10 | 04 | .2 | 00.8 | 01.8 | 02.6 | 03.2 | 03.6 | 03.9 | 04.1 | 04.3 |
| 20 | 10 | 04 | .3 | 01.4 | 02.8 | 03.5 | 04.0 | 04.3 | 04.5 | 04.6 | 04.6 |
| 20 | 10 | 04 | .5 | 02.7 | 04.0 | 04.4 | 04.6 | 04.7 | 04.8 | 04.8 | 04.8 |
| 20 | 10 | 04 | .7 | 03.7 | 04.5 | 04.7 | 04.8 | 04.8 | 04.8 | 04.8 | 04.8 |
| 20 | 10 | 04 | .9 | 04.5 | 04.8 | 04.8 | 04.8 | 04.8 | 04.8 | 04.8 | 04.8 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 20 | 10 | 06 | .2 | 00.4 | 00.9 | 01.4 | 01.8 | 02.1 | 02.3 | 02.4 | 02.5 |
| 20 | 10 | 06 | .3 | 00.7 | 01.5 | 02.0 | 02.3 | 02.5 | 02.7 | 02.8 | 02.8 |
| 20 | 10 | 06 | .5 | 01.5 | 02.3 | 02.7 | 02.8 | 02.9 | 02.9 | 02.9 | 02.9 |
| 20 | 10 | 06 | .7 | 02.2 | 02.7 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 |
| 20 | 10 | 06 | .9 | 02.7 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 20 | 10 | 08 | .2 | 00.1 | 00.4 | 00.6 | 00.8 | 00.9 | 01.0 | 01.1 | 01.1 |
| 20 | 10 | 08 | .3 | 00.3 | 00.6 | 00.9 | 01.0 | 01.1 | 01.2 | 01.2 | 01.3 |
| 20 | 10 | 08 | .5 | 00.6 | 01.0 | 01.2 | 01.3 | 01.3 | 01.3 | 01.3 | 01.3 |
| 20 | 10 | 08 | .7 | 00.9 | 01.2 | 01.3 | 01.3 | 01.3 | 01.3 | 01.3 | 01.3 |
| 20 | 10 | 08 | .9 | 01.2 | 01.3 | 01.3 | 01.3 | 01.3 | 01.3 | 01.3 | 01.3 |



$$E(T) - E(t)$$

$$E(T) = T[1 - (1 - \frac{1-a}{T})^B]$$

| B  | T  | t  | p  | m/B  |      |      |      |      |      |      |      |
|----|----|----|----|------|------|------|------|------|------|------|------|
|    |    |    |    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
| 20 | 15 | 03 | .2 | 01.3 | 03.0 | 04.3 | 05.3 | 06.0 | 06.5 | 06.9 | 07.2 |
| 20 | 15 | 03 | .3 | 02.4 | 04.6 | 05.9 | 06.7 | 07.2 | 07.5 | 07.8 | 07.9 |
| 20 | 15 | 03 | .5 | 04.5 | 06.6 | 07.5 | 07.9 | 08.1 | 08.1 | 08.2 | 08.2 |
| 20 | 15 | 03 | .7 | 06.2 | 07.7 | 08.1 | 08.2 | 08.2 | 08.2 | 08.2 | 08.2 |
| 20 | 15 | 03 | .9 | 07.7 | 08.2 | 08.2 | 08.2 | 08.2 | 08.2 | 08.2 | 08.2 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 20 | 15 | 06 | .2 | 00.6 | 01.5 | 02.4 | 03.0 | 03.6 | 04.0 | 04.3 | 04.5 |
| 20 | 15 | 06 | .3 | 01.1 | 02.5 | 03.5 | 04.1 | 04.5 | 04.8 | 05.0 | 05.1 |
| 20 | 15 | 06 | .5 | 02.4 | 04.0 | 04.7 | 05.1 | 05.2 | 05.3 | 05.3 | 05.4 |
| 20 | 15 | 06 | .7 | 03.7 | 04.9 | 05.3 | 05.3 | 05.4 | 05.4 | 05.4 | 05.4 |
| 20 | 15 | 06 | .9 | 04.9 | 05.3 | 05.4 | 05.4 | 05.4 | 05.4 | 05.4 | 05.4 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 20 | 15 | 09 | .2 | 00.3 | 00.8 | 01.2 | 01.6 | 01.9 | 02.2 | 02.4 | 02.5 |
| 20 | 15 | 09 | .3 | 00.6 | 01.3 | 01.9 | 02.2 | 02.5 | 02.7 | 02.8 | 02.9 |
| 20 | 15 | 09 | .5 | 01.3 | 02.2 | 02.7 | 02.9 | 03.0 | 03.0 | 03.1 | 03.1 |
| 20 | 15 | 09 | .7 | 02.0 | 02.8 | 03.0 | 03.1 | 03.1 | 03.1 | 03.1 | 03.1 |
| 20 | 15 | 09 | .9 | 02.7 | 03.0 | 03.1 | 03.1 | 03.1 | 03.1 | 03.1 | 03.1 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 20 | 15 | 12 | .2 | 00.1 | 00.3 | 00.5 | 00.7 | 00.8 | 00.9 | 01.0 | 01.1 |
| 20 | 15 | 12 | .3 | 00.2 | 00.5 | 00.8 | 00.9 | 01.1 | 01.1 | 01.2 | 01.2 |
| 20 | 15 | 12 | .5 | 00.5 | 00.9 | 01.1 | 01.2 | 01.3 | 01.3 | 01.3 | 01.3 |
| 20 | 15 | 12 | .7 | 00.8 | 01.2 | 01.3 | 01.3 | 01.3 | 01.3 | 01.3 | 01.3 |
| 20 | 15 | 12 | .9 | 01.2 | 01.3 | 01.3 | 01.3 | 01.3 | 01.3 | 01.3 | 01.3 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 20 | 20 | 04 | .2 | 01.1 | 02.7 | 04.1 | 05.2 | 06.0 | 06.6 | 07.1 | 07.5 |
| 20 | 20 | 04 | .3 | 02.1 | 04.3 | 05.9 | 06.8 | 07.5 | 07.9 | 08.2 | 08.4 |
| 20 | 20 | 04 | .5 | 04.2 | 06.8 | 07.9 | 08.4 | 08.6 | 08.7 | 08.8 | 08.8 |
| 20 | 20 | 04 | .7 | 06.3 | 08.1 | 08.6 | 08.8 | 08.8 | 08.8 | 08.8 | 08.8 |
| 20 | 20 | 04 | .9 | 08.1 | 08.8 | 08.8 | 08.8 | 08.8 | 08.8 | 08.8 | 08.8 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 20 | 20 | 08 | .2 | 00.5 | 01.3 | 02.1 | 02.7 | 03.3 | 03.7 | 04.1 | 04.3 |
| 20 | 20 | 08 | .3 | 00.9 | 02.2 | 03.2 | 03.9 | 04.3 | 04.7 | 04.9 | 05.0 |
| 20 | 20 | 08 | .5 | 02.1 | 03.8 | 04.6 | 05.0 | 05.2 | 05.3 | 05.3 | 05.4 |
| 20 | 20 | 08 | .7 | 03.5 | 04.8 | 05.2 | 05.3 | 05.4 | 05.4 | 05.4 | 05.4 |
| 20 | 20 | 08 | .9 | 04.8 | 05.3 | 05.4 | 05.4 | 05.4 | 05.4 | 05.4 | 05.4 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 20 | 20 | 12 | .2 | 00.2 | 00.6 | 01.0 | 01.4 | 01.7 | 01.9 | 02.1 | 02.3 |
| 20 | 20 | 12 | .3 | 00.4 | 01.1 | 01.6 | 02.0 | 02.3 | 02.5 | 02.6 | 02.7 |
| 20 | 20 | 12 | .5 | 01.1 | 02.0 | 02.5 | 02.7 | 02.8 | 02.9 | 02.9 | 02.9 |
| 20 | 20 | 12 | .7 | 01.8 | 02.6 | 02.8 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 |
| 20 | 20 | 12 | .9 | 02.6 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 20 | 20 | 16 | .2 | 00.1 | 00.2 | 00.4 | 00.6 | 00.7 | 00.8 | 00.9 | 00.9 |
| 20 | 20 | 16 | .3 | 00.2 | 00.4 | 00.7 | 00.8 | 00.9 | 01.0 | 01.1 | 01.1 |
| 20 | 20 | 16 | .5 | 00.4 | 00.8 | 01.0 | 01.1 | 01.2 | 01.2 | 01.2 | 01.2 |
| 20 | 20 | 16 | .7 | 00.7 | 01.1 | 01.2 | 01.2 | 01.2 | 01.2 | 01.2 | 01.2 |
| 20 | 20 | 16 | .9 | 01.1 | 01.2 | 01.2 | 01.2 | 01.2 | 01.2 | 01.2 | 01.2 |





$$E(T) - E(t)$$

$$E(T) = T \left[ 1 - \left( 1 - \frac{1-a}{T} \right)^B \right]$$

| B  | T  | t  | p  | m/B  |      |      |      |      |      |      |      |
|----|----|----|----|------|------|------|------|------|------|------|------|
|    |    |    |    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
| 30 | 05 | 01 | .2 | 02.5 | 03.5 | 03.8 | 03.9 | 03.9 | 04.0 | 04.0 | 04.0 |
| 30 | 05 | 01 | .3 | 03.2 | 03.8 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 30 | 05 | 01 | .5 | 03.8 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 30 | 05 | 01 | .7 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 30 | 05 | 01 | .9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 30 | 05 | 02 | .2 | 01.6 | 02.5 | 02.8 | 02.9 | 02.9 | 03.0 | 03.0 | 03.0 |
| 30 | 05 | 02 | .3 | 02.2 | 02.8 | 02.9 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 30 | 05 | 02 | .5 | 02.8 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 30 | 05 | 02 | .7 | 02.9 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 30 | 05 | 02 | .9 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 30 | 05 | 03 | .2 | 00.9 | 01.5 | 01.8 | 01.9 | 01.9 | 02.0 | 02.0 | 02.0 |
| 30 | 05 | 03 | .3 | 01.3 | 01.8 | 01.9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 30 | 05 | 03 | .5 | 01.8 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 30 | 05 | 03 | .7 | 01.9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 30 | 05 | 03 | .9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 30 | 05 | 04 | .2 | 00.4 | 00.7 | 00.9 | 00.9 | 01.0 | 01.0 | 01.0 | 01.0 |
| 30 | 05 | 04 | .3 | 00.6 | 00.9 | 00.9 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 30 | 05 | 04 | .5 | 00.9 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 30 | 05 | 04 | .7 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 30 | 05 | 04 | .9 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 30 | 10 | 02 | .2 | 02.6 | 04.7 | 05.8 | 06.4 | 06.8 | 07.0 | 07.2 | 07.3 |
| 30 | 10 | 02 | .3 | 04.0 | 05.9 | 06.7 | 07.1 | 07.3 | 07.4 | 07.4 | 07.5 |
| 30 | 10 | 02 | .5 | 05.9 | 07.0 | 07.4 | 07.5 | 07.5 | 07.6 | 07.6 | 07.6 |
| 30 | 10 | 02 | .7 | 06.9 | 07.4 | 07.5 | 07.6 | 07.6 | 07.6 | 07.6 | 07.6 |
| 30 | 10 | 02 | .9 | 07.4 | 07.6 | 07.6 | 07.6 | 07.6 | 07.6 | 07.6 | 07.6 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 30 | 10 | 04 | .2 | 01.4 | 02.9 | 03.9 | 04.4 | 04.8 | 05.0 | 05.2 | 05.3 |
| 30 | 10 | 04 | .3 | 02.4 | 04.0 | 04.7 | 05.1 | 05.3 | 05.4 | 05.4 | 05.5 |
| 30 | 10 | 04 | .5 | 03.9 | 05.0 | 05.4 | 05.5 | 05.5 | 05.6 | 05.6 | 05.6 |
| 30 | 10 | 04 | .7 | 04.9 | 05.4 | 05.5 | 05.6 | 05.6 | 05.6 | 05.6 | 05.6 |
| 30 | 10 | 04 | .9 | 05.4 | 05.6 | 05.6 | 05.6 | 05.6 | 05.6 | 05.6 | 05.6 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 30 | 10 | 06 | .2 | 00.7 | 01.6 | 02.2 | 02.7 | 02.9 | 03.1 | 03.2 | 03.3 |
| 30 | 10 | 06 | .3 | 01.3 | 02.3 | 02.9 | 03.2 | 03.3 | 03.4 | 03.5 | 03.5 |
| 30 | 10 | 06 | .5 | 02.3 | 03.1 | 03.4 | 03.5 | 03.6 | 03.6 | 03.6 | 03.6 |
| 30 | 10 | 06 | .7 | 03.0 | 03.5 | 03.6 | 03.6 | 03.6 | 03.6 | 03.6 | 03.6 |
| 30 | 10 | 06 | .9 | 03.5 | 03.6 | 03.6 | 03.6 | 03.6 | 03.6 | 03.6 | 03.6 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 30 | 10 | 08 | .2 | 00.3 | 00.7 | 01.0 | 01.2 | 01.3 | 01.4 | 01.5 | 01.6 |
| 30 | 10 | 08 | .3 | 00.5 | 01.0 | 01.3 | 01.5 | 01.6 | 01.6 | 01.6 | 01.7 |
| 30 | 10 | 08 | .5 | 01.0 | 01.5 | 01.6 | 01.7 | 01.7 | 01.7 | 01.7 | 01.7 |
| 30 | 10 | 08 | .7 | 01.4 | 01.6 | 01.7 | 01.7 | 01.7 | 01.7 | 01.7 | 01.7 |
| 30 | 10 | 08 | .9 | 01.6 | 01.7 | 01.7 | 01.7 | 01.7 | 01.7 | 01.7 | 01.7 |





$$E(T) - E(t)$$

$$E(T) = T \left[ 1 - \left( 1 - \frac{1-a}{T} \right)^B \right]$$

| B  | T  | 5  | p  | m/B  |      |      |      |      |      |      |      |
|----|----|----|----|------|------|------|------|------|------|------|------|
|    |    |    |    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
| 30 | 15 | 03 | .2 | 02.4 | 04.8 | 06.5 | 07.5 | 08.2 | 08.7 | 09.0 | 09.3 |
| 30 | 15 | 03 | .3 | 03.9 | 06.7 | 08.1 | 08.8 | 09.3 | 09.6 | 09.7 | 09.9 |
| 30 | 15 | 03 | .5 | 06.6 | 08.8 | 09.5 | 09.8 | 10.0 | 10.0 | 10.1 | 10.1 |
| 30 | 15 | 03 | .7 | 08.4 | 09.7 | 10.0 | 10.1 | 10.1 | 10.1 | 10.1 | 10.1 |
| 30 | 15 | 03 | .9 | 09.7 | 10.1 | 10.1 | 10.1 | 10.1 | 10.1 | 10.1 | 10.1 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 30 | 15 | 06 | .2 | 01.1 | 02.7 | 03.9 | 04.8 | 05.4 | 05.8 | 06.1 | 06.4 |
| 30 | 15 | 06 | .3 | 02.1 | 04.1 | 05.3 | 06.0 | 06.4 | 06.6 | 06.8 | 06.9 |
| 30 | 15 | 06 | .5 | 04.0 | 05.9 | 06.6 | 06.9 | 07.0 | 07.1 | 07.1 | 07.1 |
| 30 | 15 | 06 | .7 | 05.6 | 06.7 | 07.0 | 07.1 | 07.1 | 07.1 | 07.1 | 07.1 |
| 30 | 15 | 06 | .9 | 06.7 | 07.1 | 07.1 | 07.1 | 07.1 | 07.1 | 07.1 | 07.1 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 30 | 15 | 09 | .2 | 00.6 | 01.4 | 02.1 | 02.7 | 03.1 | 03.4 | 03.6 | 03.8 |
| 30 | 15 | 09 | .3 | 01.1 | 02.3 | 03.0 | 03.5 | 03.8 | 04.0 | 04.1 | 04.2 |
| 30 | 15 | 09 | .5 | 02.2 | 03.4 | 03.9 | 04.2 | 04.3 | 04.3 | 04.3 | 04.4 |
| 30 | 15 | 09 | .7 | 03.2 | 04.1 | 04.3 | 04.3 | 04.4 | 04.4 | 04.4 | 04.4 |
| 30 | 15 | 09 | .9 | 04.0 | 04.3 | 04.4 | 04.4 | 04.4 | 04.4 | 04.4 | 04.4 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 30 | 15 | 12 | .2 | 00.2 | 00.6 | 00.9 | 01.1 | 01.3 | 01.5 | 01.6 | 01.7 |
| 30 | 15 | 12 | .3 | 00.4 | 00.9 | 01.3 | 01.5 | 01.7 | 01.8 | 01.8 | 01.9 |
| 30 | 15 | 12 | .5 | 00.9 | 01.5 | 01.8 | 01.9 | 01.9 | 02.0 | 02.0 | 02.0 |
| 30 | 15 | 12 | .7 | 01.4 | 01.8 | 01.9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 30 | 15 | 12 | .9 | 01.8 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 30 | 20 | 04 | .2 | 02.1 | 04.6 | 06.5 | 07.9 | 08.8 | 09.5 | 10.0 | 10.4 |
| 30 | 20 | 04 | .3 | 03.7 | 06.9 | 08.7 | 09.8 | 10.4 | 10.8 | 11.1 | 11.3 |
| 30 | 20 | 04 | .5 | 06.7 | 09.7 | 10.8 | 11.3 | 11.5 | 11.6 | 11.7 | 11.7 |
| 30 | 20 | 04 | .7 | 09.1 | 11.1 | 11.5 | 11.7 | 11.7 | 11.7 | 11.7 | 11.7 |
| 30 | 20 | 04 | .9 | 11.0 | 11.6 | 11.7 | 11.7 | 11.7 | 11.7 | 11.7 | 11.7 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 30 | 20 | 08 | .2 | 00.9 | 02.4 | 03.7 | 04.7 | 05.4 | 06.0 | 06.4 | 06.7 |
| 30 | 20 | 08 | .3 | 01.8 | 03.9 | 05.3 | 06.1 | 06.7 | 07.1 | 07.3 | 07.5 |
| 30 | 20 | 08 | .5 | 03.8 | 06.1 | 07.0 | 07.5 | 07.7 | 07.8 | 07.8 | 07.8 |
| 30 | 20 | 08 | .7 | 05.6 | 07.3 | 07.7 | 07.8 | 07.8 | 07.8 | 07.9 | 07.9 |
| 30 | 20 | 08 | .9 | 07.2 | 07.8 | 07.8 | 07.9 | 07.9 | 07.9 | 07.9 | 07.9 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 30 | 20 | 12 | .2 | 00.5 | 01.2 | 01.9 | 02.5 | 03.0 | 03.3 | 03.6 | 03.8 |
| 30 | 20 | 12 | .3 | 00.9 | 02.0 | 02.9 | 03.4 | 03.8 | 04.0 | 04.2 | 04.3 |
| 30 | 20 | 12 | .5 | 02.0 | 03.4 | 04.0 | 04.3 | 04.5 | 04.5 | 04.6 | 04.6 |
| 30 | 20 | 12 | .7 | 03.1 | 04.2 | 04.5 | 04.6 | 04.6 | 04.6 | 04.6 | 04.6 |
| 30 | 20 | 12 | .9 | 04.1 | 04.5 | 04.6 | 04.6 | 04.6 | 04.6 | 04.6 | 04.6 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 30 | 20 | 16 | .2 | 00.2 | 00.5 | 00.8 | 01.0 | 01.2 | 01.4 | 01.5 | 01.6 |
| 30 | 20 | 16 | .3 | 00.4 | 00.8 | 01.2 | 01.5 | 01.6 | 01.8 | 01.8 | 01.9 |
| 30 | 20 | 16 | .5 | 00.8 | 01.4 | 01.7 | 01.9 | 01.9 | 02.0 | 02.0 | 02.0 |
| 30 | 20 | 16 | .7 | 01.3 | 01.8 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 30 | 20 | 16 | .9 | 01.8 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |



$$E(T) - E(t)$$

$$E(T) = T \left[ 1 - \left( 1 - \frac{1-a}{T} \right)^B \right]$$

| B  | T  | t  | p  | m/B  |      |      |      |      |      |      |      |
|----|----|----|----|------|------|------|------|------|------|------|------|
|    |    |    |    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
| 40 | 05 | 01 | .2 | 03.0 | 03.7 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 40 | 05 | 01 | .3 | 03.6 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 40 | 05 | 01 | .5 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 40 | 05 | 01 | .7 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 40 | 05 | 01 | .9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 40 | 05 | 02 | .2 | 02.1 | 02.7 | 02.9 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 40 | 05 | 02 | .3 | 02.6 | 02.9 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 40 | 05 | 02 | .5 | 02.9 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 40 | 05 | 02 | .7 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 40 | 05 | 02 | .9 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 40 | 05 | 03 | .2 | 01.2 | 01.8 | 01.9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 40 | 05 | 03 | .3 | 01.6 | 01.9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 40 | 05 | 03 | .5 | 01.9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 40 | 05 | 03 | .7 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 40 | 05 | 03 | .9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 40 | 05 | 04 | .2 | 00.5 | 00.8 | 00.9 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 40 | 05 | 04 | .3 | 00.8 | 00.9 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 40 | 05 | 04 | .5 | 00.9 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 40 | 05 | 04 | .7 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 40 | 05 | 04 | .9 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 40 | 10 | 02 | .2 | 03.6 | 05.7 | 06.6 | 07.1 | 07.4 | 07.5 | 07.6 | 07.7 |
| 40 | 10 | 02 | .3 | 05.0 | 06.8 | 07.3 | 07.6 | 07.7 | 07.8 | 07.8 | 07.8 |
| 40 | 10 | 02 | .5 | 06.7 | 07.6 | 07.7 | 07.8 | 07.8 | 07.8 | 07.8 | 07.8 |
| 40 | 10 | 02 | .7 | 07.5 | 07.8 | 07.8 | 07.8 | 07.9 | 07.9 | 07.9 | 07.9 |
| 40 | 10 | 02 | .9 | 07.8 | 07.8 | 07.9 | 07.9 | 07.9 | 07.9 | 07.9 | 07.9 |
| 40 | 10 | 04 | .2 | 02.1 | 03.8 | 04.7 | 05.1 | 05.4 | 05.5 | 05.6 | 05.7 |
| 40 | 10 | 04 | .3 | 03.2 | 04.8 | 05.3 | 05.6 | 05.7 | 05.8 | 05.8 | 05.8 |
| 40 | 10 | 04 | .5 | 04.7 | 05.6 | 05.7 | 05.8 | 05.8 | 05.8 | 05.8 | 05.8 |
| 40 | 10 | 04 | .7 | 05.5 | 05.8 | 05.8 | 05.8 | 05.9 | 05.9 | 05.9 | 05.9 |
| 40 | 10 | 04 | .9 | 05.8 | 05.8 | 05.9 | 05.9 | 05.9 | 05.9 | 05.9 | 05.9 |
| 40 | 10 | 06 | .2 | 01.1 | 02.2 | 02.8 | 03.2 | 03.4 | 03.6 | 03.6 | 03.7 |
| 40 | 10 | 06 | .3 | 01.8 | 02.9 | 03.4 | 03.6 | 03.7 | 03.8 | 03.8 | 03.8 |
| 40 | 10 | 06 | .5 | 02.9 | 03.6 | 03.8 | 03.8 | 03.8 | 03.8 | 03.9 | 03.9 |
| 40 | 10 | 06 | .7 | 03.5 | 03.8 | 03.8 | 03.9 | 03.9 | 03.9 | 03.9 | 03.9 |
| 40 | 10 | 06 | .9 | 03.8 | 03.8 | 03.9 | 03.9 | 03.9 | 03.9 | 03.9 | 03.9 |
| 40 | 10 | 08 | .2 | 00.4 | 01.0 | 01.3 | 01.5 | 01.6 | 01.7 | 01.8 | 01.8 |
| 40 | 10 | 08 | .3 | 00.8 | 01.3 | 01.6 | 01.7 | 01.8 | 01.8 | 01.8 | 01.9 |
| 40 | 10 | 08 | .5 | 01.3 | 01.7 | 01.8 | 01.9 | 01.9 | 01.9 | 01.9 | 01.9 |
| 40 | 10 | 08 | .7 | 01.7 | 01.8 | 01.9 | 01.9 | 01.9 | 01.9 | 01.9 | 01.9 |
| 40 | 10 | 08 | .9 | 01.8 | 01.9 | 01.9 | 01.9 | 01.9 | 01.9 | 01.9 | 01.9 |





$$E(T)-E(t)$$

$$E(T) = T[1-(1-\frac{1-a}{T})^B]$$

| B  | T  | t  | p  | m/B  |      |      |      |      |      |      |      |
|----|----|----|----|------|------|------|------|------|------|------|------|
|    |    |    |    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
| 40 | 15 | 03 | .2 | 03.4 | 06.3 | 08.0 | 09.0 | 09.6 | 10.0 | 10.3 | 10.5 |
| 40 | 15 | 03 | .3 | 05.4 | 08.2 | 09.5 | 10.1 | 10.5 | 10.7 | 10.8 | 10.9 |
| 40 | 15 | 03 | .5 | 08.1 | 10.1 | 10.6 | 10.9 | 11.0 | 11.0 | 11.0 | 11.0 |
| 40 | 15 | 03 | .7 | 09.8 | 10.8 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.1 |
| 40 | 15 | 03 | .9 | 10.7 | 11.0 | 11.0 | 11.1 | 11.1 | 11.1 | 11.1 | 11.1 |
| 40 | 15 | 06 | .2 | 01.8 | 03.8 | 05.2 | 06.1 | 06.7 | 07.0 | 07.3 | 07.5 |
| 40 | 15 | 06 | .3 | 03.1 | 05.4 | 06.6 | 07.2 | 07.5 | 07.7 | 07.8 | 07.9 |
| 40 | 15 | 06 | .5 | 05.3 | 07.1 | 07.7 | 07.9 | 08.0 | 08.0 | 08.0 | 08.0 |
| 40 | 15 | 06 | .7 | 06.8 | 07.8 | 08.0 | 08.0 | 08.0 | 08.1 | 08.1 | 08.1 |
| 40 | 15 | 06 | .9 | 07.7 | 08.0 | 08.1 | 08.1 | 08.1 | 08.1 | 08.1 | 08.1 |
| 40 | 15 | 09 | .2 | 00.9 | 02.1 | 03.0 | 03.6 | 04.0 | 04.3 | 04.5 | 04.7 |
| 40 | 15 | 09 | .3 | 01.6 | 03.1 | 03.9 | 04.4 | 04.7 | 04.8 | 04.9 | 05.0 |
| 40 | 15 | 09 | .5 | 03.0 | 04.3 | 04.8 | 05.0 | 05.1 | 05.1 | 05.1 | 05.1 |
| 40 | 15 | 09 | .7 | 04.1 | 04.9 | 05.1 | 05.1 | 05.1 | 05.1 | 05.1 | 05.1 |
| 40 | 15 | 09 | .9 | 04.9 | 05.1 | 05.1 | 05.1 | 05.1 | 05.1 | 05.1 | 05.1 |
| 40 | 15 | 12 | .2 | 00.4 | 00.9 | 01.3 | 01.6 | 01.8 | 02.0 | 02.1 | 02.1 |
| 40 | 15 | 12 | .3 | 00.7 | 01.4 | 01.8 | 02.0 | 02.1 | 02.2 | 02.3 | 02.3 |
| 40 | 15 | 12 | .5 | 01.3 | 02.0 | 02.2 | 02.3 | 02.4 | 02.4 | 02.4 | 02.4 |
| 40 | 15 | 12 | .7 | 01.9 | 02.3 | 02.4 | 02.4 | 02.4 | 02.4 | 02.4 | 02.4 |
| 40 | 15 | 12 | .9 | 02.3 | 02.4 | 02.4 | 02.4 | 02.4 | 02.4 | 02.4 | 02.4 |
| 40 | 20 | 04 | .2 | 03.1 | 06.4 | 08.6 | 10.0 | 10.9 | 11.6 | 12.0 | 12.3 |
| 40 | 20 | 04 | .3 | 05.3 | 08.9 | 10.7 | 11.8 | 12.3 | 12.7 | 12.9 | 13.1 |
| 40 | 20 | 04 | .5 | 08.8 | 11.7 | 12.7 | 13.1 | 13.3 | 13.3 | 13.4 | 13.4 |
| 40 | 20 | 04 | .7 | 11.2 | 12.9 | 13.3 | 13.4 | 13.4 | 13.4 | 13.4 | 13.4 |
| 40 | 20 | 04 | .9 | 12.8 | 13.4 | 13.4 | 13.4 | 13.4 | 13.4 | 13.4 | 13.4 |
| 40 | 20 | 08 | .2 | 01.5 | 03.6 | 05.2 | 06.3 | 07.1 | 07.7 | 08.1 | 08.4 |
| 40 | 20 | 08 | .3 | 02.8 | 05.5 | 07.0 | 07.9 | 08.4 | 08.8 | 09.0 | 09.2 |
| 40 | 20 | 08 | .5 | 05.3 | 07.8 | 08.7 | 09.1 | 09.3 | 09.4 | 09.4 | 09.4 |
| 40 | 20 | 08 | .7 | 07.4 | 09.0 | 09.3 | 09.4 | 09.5 | 09.5 | 09.5 | 09.5 |
| 40 | 20 | 08 | .9 | 08.9 | 09.4 | 09.5 | 09.5 | 09.5 | 09.5 | 09.5 | 09.5 |
| 40 | 20 | 12 | .2 | 00.7 | 01.9 | 02.8 | 03.6 | 04.1 | 04.5 | 04.8 | 05.0 |
| 40 | 20 | 12 | .3 | 01.4 | 03.0 | 04.0 | 04.6 | 05.0 | 05.3 | 05.4 | 05.6 |
| 40 | 20 | 12 | .5 | 02.9 | 04.6 | 05.2 | 05.5 | 05.7 | 05.7 | 05.8 | 05.8 |
| 40 | 20 | 12 | .7 | 04.3 | 05.4 | 05.7 | 05.8 | 05.8 | 05.8 | 05.8 | 05.8 |
| 40 | 20 | 12 | .9 | 05.4 | 05.8 | 05.8 | 05.8 | 05.8 | 05.8 | 05.8 | 05.8 |
| 40 | 20 | 16 | .2 | 00.3 | 00.8 | 01.2 | 01.5 | 01.8 | 02.0 | 02.1 | 02.2 |
| 40 | 20 | 16 | .3 | 00.6 | 01.3 | 01.7 | 02.0 | 02.2 | 02.4 | 02.5 | 02.5 |
| 40 | 20 | 16 | .5 | 01.2 | 02.0 | 02.3 | 02.5 | 02.6 | 02.6 | 02.6 | 02.6 |
| 40 | 20 | 16 | .7 | 01.9 | 02.4 | 02.6 | 02.6 | 02.6 | 02.6 | 02.6 | 02.6 |
| 40 | 20 | 16 | .9 | 02.4 | 02.6 | 02.6 | 02.6 | 02.6 | 02.6 | 02.6 | 02.6 |





## TABLE II

### Remaining Attrition

#### After Degradation of Information

$$E(t) = t[1 - (1 - \frac{1-a}{T})^B]$$

for B = Number of batteries = 10, 20, 30, 40

T = " " targets = 5, 10, 15, 20

t = " " targets on which the defense is informed;

t/T = .2, .4, .6, .8

a = Probability that a target, if assigned to a battery, will survive fire from that battery (= engagement survival probability); given by

$$a = (1-p)^{m/B}$$

p = Characteristic (single-shot) kill probability = .2, .3, .5, .7, .9

m = Number of shots available to all batteries combined;

m/B = shots per battery = 1, 2, ..., 8.

This function E(t) measures the expected number of targets killed, under the same assumptions as those underlying Table I.

Selected values of this function are presented graphically in Figures 7-12, pp. 31-33.



$$E(t) = t \left[ 1 - \left( 1 - \frac{1-a}{t} \right)^B \right]$$

| B  | T  | t  | p  | m/B  |      |      |      |      |      |      |      |
|----|----|----|----|------|------|------|------|------|------|------|------|
|    |    |    |    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
| 10 | 05 | 01 | .2 | 00.9 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 10 | 05 | 01 | .3 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 10 | 05 | 01 | .5 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 10 | 05 | 01 | .7 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 10 | 05 | 01 | .9 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 10 | 05 | 02 | .2 | 01.3 | 01.7 | 01.9 | 01.9 | 02.0 | 02.0 | 02.0 | 02.0 |
| 10 | 05 | 02 | .3 | 01.6 | 01.9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 10 | 05 | 02 | .5 | 01.9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 10 | 05 | 02 | .7 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 10 | 05 | 02 | .9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 10 | 05 | 03 | .2 | 01.5 | 02.2 | 02.5 | 02.7 | 02.8 | 02.8 | 02.9 | 02.9 |
| 10 | 05 | 03 | .3 | 02.0 | 02.5 | 02.7 | 02.8 | 02.9 | 02.9 | 02.9 | 02.9 |
| 10 | 05 | 03 | .5 | 02.5 | 02.8 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 |
| 10 | 05 | 03 | .7 | 02.8 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 |
| 10 | 05 | 03 | .9 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 |
| 10 | 05 | 04 | .2 | 01.6 | 02.4 | 02.9 | 03.2 | 03.4 | 03.5 | 03.6 | 03.6 |
| 10 | 05 | 04 | .3 | 02.2 | 03.0 | 03.3 | 03.5 | 03.6 | 03.7 | 03.7 | 03.7 |
| 10 | 05 | 04 | .5 | 02.9 | 03.5 | 03.7 | 03.7 | 03.8 | 03.8 | 03.8 | 03.8 |
| 10 | 05 | 04 | .7 | 03.4 | 03.7 | 03.8 | 03.8 | 03.8 | 03.8 | 03.8 | 03.8 |
| 10 | 05 | 04 | .9 | 03.7 | 03.8 | 03.8 | 03.8 | 03.8 | 03.8 | 03.8 | 03.8 |
| 10 | 10 | 02 | .2 | 01.3 | 01.7 | 01.9 | 01.9 | 02.0 | 02.0 | 02.0 | 02.0 |
| 10 | 10 | 02 | .3 | 01.6 | 01.9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 10 | 10 | 02 | .5 | 01.9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 10 | 10 | 02 | .7 | 02.0 | 02.0 | 02.0 | 02.8 | 02.0 | 02.0 | 02.0 | 02.8 |
| 10 | 10 | 02 | .9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 10 | 10 | 04 | .2 | 01.6 | 02.4 | 02.9 | 03.2 | 03.4 | 03.5 | 03.6 | 03.6 |
| 10 | 10 | 04 | .3 | 02.2 | 03.0 | 03.3 | 03.5 | 03.6 | 03.7 | 03.7 | 03.7 |
| 10 | 10 | 04 | .5 | 02.9 | 03.5 | 03.7 | 03.7 | 03.8 | 03.8 | 03.8 | 03.8 |
| 10 | 10 | 04 | .7 | 03.4 | 03.7 | 03.8 | 03.8 | 03.8 | 03.8 | 03.8 | 03.8 |
| 10 | 10 | 04 | .9 | 03.7 | 03.8 | 03.8 | 03.8 | 03.8 | 03.8 | 03.8 | 03.8 |
| 10 | 10 | 06 | .2 | 01.7 | 02.8 | 03.4 | 03.9 | 04.2 | 04.4 | 04.5 | 04.7 |
| 10 | 10 | 06 | .3 | 02.4 | 03.5 | 04.1 | 04.5 | 04.7 | 04.8 | 04.9 | 04.9 |
| 10 | 10 | 06 | .5 | 03.5 | 04.4 | 04.8 | 04.9 | 05.0 | 05.0 | 05.0 | 05.0 |
| 10 | 10 | 06 | .7 | 04.3 | 04.8 | 05.0 | 05.0 | 05.0 | 05.0 | 05.0 | 05.0 |
| 10 | 10 | 06 | .9 | 04.8 | 05.0 | 05.0 | 05.0 | 05.0 | 05.0 | 05.0 | 05.0 |
| 10 | 10 | 08 | .2 | 01.8 | 03.0 | 03.7 | 04.3 | 04.7 | 05.0 | 05.2 | 05.3 |
| 10 | 10 | 08 | .3 | 02.5 | 03.9 | 04.6 | 05.1 | 05.3 | 05.5 | 05.6 | 05.7 |
| 10 | 10 | 08 | .5 | 03.8 | 05.0 | 05.5 | 05.7 | 05.8 | 05.8 | 05.9 | 05.9 |
| 10 | 10 | 08 | .7 | 04.8 | 05.6 | 05.8 | 05.9 | 05.9 | 05.9 | 05.9 | 05.9 |
| 10 | 10 | 08 | .9 | 05.6 | 05.9 | 05.9 | 05.9 | 05.9 | 05.9 | 05.9 | 05.9 |





$$E(t) = t \left[ 1 - \left( 1 - \frac{1-a}{t} \right)^B \right]$$

| B  | T  | t  | p  | $m/B$ |      |      |      |      |      |      |      |
|----|----|----|----|-------|------|------|------|------|------|------|------|
|    |    |    |    | 1     | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
| 10 | 15 | 03 | .2 | 01.5  | 02.2 | 02.5 | 02.7 | 02.8 | 02.8 | 02.9 | 02.9 |
| 10 | 15 | 03 | .3 | 02.0  | 02.5 | 02.7 | 02.8 | 02.9 | 02.9 | 02.9 | 02.9 |
| 10 | 15 | 03 | .5 | 02.5  | 02.8 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 |
| 10 | 15 | 03 | .7 | 02.8  | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 |
| 10 | 15 | 03 | .9 | 02.9  | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 |
| 10 | 15 | 06 | .2 | 01.7  | 02.8 | 03.4 | 03.9 | 04.2 | 04.4 | 04.5 | 04.7 |
| 10 | 15 | 06 | .3 | 02.4  | 03.5 | 04.1 | 04.5 | 04.7 | 04.8 | 04.9 | 04.9 |
| 10 | 15 | 06 | .5 | 03.5  | 04.4 | 04.8 | 04.9 | 05.0 | 05.0 | 05.0 | 05.0 |
| 10 | 15 | 06 | .7 | 04.3  | 04.8 | 05.0 | 05.0 | 05.0 | 05.0 | 05.0 | 05.0 |
| 10 | 15 | 06 | .9 | 04.8  | 05.0 | 05.0 | 05.0 | 05.0 | 05.0 | 05.0 | 05.0 |
| 10 | 15 | 09 | .2 | 01.8  | 03.0 | 03.8 | 04.4 | 04.9 | 05.2 | 05.4 | 05.6 |
| 10 | 15 | 09 | .3 | 02.6  | 04.0 | 04.8 | 05.3 | 05.6 | 05.8 | 05.9 | 06.0 |
| 10 | 15 | 09 | .5 | 03.9  | 05.2 | 05.8 | 06.0 | 06.1 | 06.2 | 06.2 | 06.2 |
| 10 | 15 | 09 | .7 | 05.0  | 05.9 | 06.1 | 06.2 | 06.2 | 06.2 | 06.2 | 06.2 |
| 10 | 15 | 09 | .9 | 05.9  | 06.2 | 06.2 | 06.2 | 06.2 | 06.2 | 06.2 | 06.2 |
| 10 | 15 | 12 | .2 | 01.9  | 03.2 | 04.1 | 04.8 | 05.3 | 05.6 | 05.9 | 06.2 |
| 10 | 15 | 12 | .3 | 02.7  | 04.2 | 05.2 | 05.8 | 06.2 | 06.4 | 06.6 | 06.7 |
| 10 | 15 | 12 | .5 | 04.2  | 05.7 | 06.4 | 06.7 | 06.8 | 06.9 | 06.9 | 07.0 |
| 10 | 15 | 12 | .7 | 05.4  | 06.5 | 06.8 | 06.9 | 07.0 | 07.0 | 07.0 | 07.0 |
| 10 | 15 | 12 | .9 | 06.5  | 06.9 | 07.0 | 07.0 | 07.0 | 07.0 | 07.0 | 07.0 |
| 10 | 20 | 04 | .2 | 01.6  | 02.4 | 02.9 | 03.2 | 03.4 | 03.5 | 03.6 | 03.6 |
| 10 | 20 | 04 | .3 | 02.2  | 03.0 | 03.3 | 03.5 | 03.6 | 03.7 | 03.7 | 03.7 |
| 10 | 20 | 04 | .5 | 02.9  | 03.5 | 03.7 | 03.7 | 03.8 | 03.8 | 03.8 | 03.8 |
| 10 | 20 | 04 | .7 | 03.4  | 03.7 | 03.8 | 03.8 | 03.8 | 03.8 | 03.8 | 03.8 |
| 10 | 20 | 04 | .9 | 03.7  | 03.8 | 03.8 | 03.8 | 03.8 | 03.8 | 03.8 | 03.8 |
| 10 | 20 | 08 | .2 | 01.8  | 03.0 | 03.7 | 04.3 | 04.7 | 05.0 | 05.2 | 05.3 |
| 10 | 20 | 08 | .3 | 02.5  | 03.9 | 04.6 | 05.1 | 05.3 | 05.5 | 05.6 | 05.7 |
| 10 | 20 | 08 | .5 | 03.8  | 05.0 | 05.5 | 05.7 | 05.8 | 05.8 | 05.9 | 05.9 |
| 10 | 20 | 08 | .7 | 04.8  | 05.6 | 05.8 | 05.9 | 05.9 | 05.9 | 05.9 | 05.9 |
| 10 | 20 | 08 | .9 | 05.6  | 05.9 | 05.9 | 05.9 | 05.9 | 05.9 | 05.9 | 05.9 |
| 10 | 20 | 12 | .2 | 01.9  | 03.2 | 04.1 | 04.8 | 05.3 | 05.6 | 05.9 | 06.2 |
| 10 | 20 | 12 | .3 | 02.7  | 04.2 | 05.2 | 05.8 | 06.2 | 06.4 | 06.6 | 06.7 |
| 10 | 20 | 12 | .5 | 04.2  | 05.7 | 06.4 | 06.7 | 06.8 | 06.9 | 06.9 | 07.0 |
| 10 | 20 | 12 | .7 | 05.4  | 06.5 | 06.8 | 06.9 | 07.0 | 07.0 | 07.0 | 07.0 |
| 10 | 20 | 12 | .9 | 06.5  | 06.9 | 07.0 | 07.0 | 07.0 | 07.0 | 07.0 | 07.0 |
| 10 | 20 | 16 | .2 | 01.9  | 03.3 | 04.3 | 05.0 | 05.6 | 06.0 | 06.4 | 06.6 |
| 10 | 20 | 16 | .3 | 02.8  | 04.4 | 05.5 | 06.2 | 06.6 | 06.9 | 07.1 | 07.3 |
| 10 | 20 | 16 | .5 | 04.4  | 06.1 | 06.9 | 07.3 | 07.4 | 07.5 | 07.6 | 07.6 |
| 10 | 20 | 16 | .7 | 05.8  | 07.1 | 07.5 | 07.6 | 07.6 | 07.6 | 07.6 | 07.6 |
| 10 | 20 | 16 | .9 | 07.0  | 07.6 | 07.6 | 07.6 | 07.6 | 07.6 | 07.6 | 07.6 |





$$E(t) = t \left[ 1 - \left( 1 - \frac{1-a}{t} \right)^B \right]$$

| B  | T  | t  | p  | m/B  |      |      |      |      |      |      |      |
|----|----|----|----|------|------|------|------|------|------|------|------|
|    |    |    |    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
| 20 | 15 | 03 | .2 | 02.2 | 02.8 | 02.9 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 20 | 15 | 03 | .3 | 02.6 | 02.9 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 20 | 15 | 03 | .5 | 02.9 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 20 | 15 | 03 | .7 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 20 | 15 | 03 | .9 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 20 | 15 | 06 | .2 | 03.0 | 04.3 | 04.9 | 05.2 | 05.4 | 05.6 | 5.6  | 05.7 |
| 20 | 15 | 06 | .3 | 03.8 | 05.0 | 05.4 | 05.6 | 05.7 | 05.8 | 05.8 | 05.8 |
| 20 | 15 | 06 | .5 | 04.9 | 05.6 | 05.7 | 05.8 | 05.8 | 05.8 | 05.8 | 05.8 |
| 20 | 15 | 06 | .7 | 05.5 | 05.8 | 05.8 | 05.8 | 05.8 | 05.8 | 05.8 | 05.8 |
| 20 | 15 | 06 | .9 | 05.8 | 05.8 | 05.8 | 05.8 | 05.8 | 05.8 | 05.8 | 05.8 |
| 20 | 15 | 09 | .2 | 03.3 | 05.0 | 06.0 | 06.7 | 07.1 | 07.4 | 07.6 | 07.7 |
| 20 | 15 | 09 | .3 | 04.4 | 06.2 | 07.0 | 07.5 | 07.7 | 07.9 | 08.0 | 08.0 |
| 20 | 15 | 09 | .5 | 06.1 | 07.4 | 07.8 | 08.0 | 08.1 | 08.1 | 08.1 | 08.1 |
| 20 | 15 | 09 | .7 | 07.2 | 07.9 | 08.1 | 08.1 | 08.1 | 08.1 | 08.1 | 08.1 |
| 20 | 15 | 09 | .9 | 07.9 | 08.1 | 08.1 | 08.1 | 08.1 | 08.1 | 08.1 | 08.1 |
| 20 | 15 | 12 | .2 | 03.4 | 05.5 | 06.8 | 07.6 | 08.2 | 08.6 | 08.9 | 09.1 |
| 20 | 15 | 12 | .3 | 04.8 | 07.0 | 08.1 | 08.8 | 09.1 | 09.4 | 09.6 | 09.7 |
| 20 | 15 | 12 | .5 | 06.9 | 08.7 | 09.4 | 09.6 | 09.8 | 09.8 | 09.9 | 09.9 |
| 20 | 15 | 12 | .7 | 08.4 | 09.5 | 09.8 | 09.9 | 09.9 | 09.9 | 09.9 | 09.9 |
| 20 | 15 | 12 | .9 | 09.5 | 09.9 | 09.9 | 09.9 | 09.9 | 09.9 | 09.9 | 09.9 |
| 20 | 20 | 04 | .2 | 02.6 | 03.4 | 03.7 | 03.8 | 03.9 | 03.9 | 04.0 | 04.0 |
| 20 | 20 | 04 | .3 | 03.2 | 03.7 | 03.9 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 |
| 20 | 20 | 04 | .5 | 03.7 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 20 | 20 | 04 | .7 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 20 | 20 | 04 | .9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 20 | 20 | 08 | .2 | 03.2 | 04.8 | 05.7 | 06.3 | 06.6 | 06.8 | 07.0 | 07.1 |
| 20 | 20 | 08 | .3 | 04.3 | 05.9 | 06.6 | 06.9 | 07.1 | 07.2 | 07.3 | 07.3 |
| 20 | 20 | 08 | .5 | 05.8 | 06.9 | 07.2 | 07.3 | 07.4 | 07.4 | 07.4 | 07.4 |
| 20 | 20 | 08 | .7 | 06.7 | 07.3 | 07.4 | 07.4 | 07.4 | 07.4 | 07.4 | 07.4 |
| 20 | 20 | 08 | .9 | 07.3 | 07.4 | 07.4 | 07.4 | 07.4 | 07.4 | 07.4 | 07.4 |
| 20 | 20 | 12 | .2 | 03.4 | 05.5 | 06.8 | 07.6 | 08.2 | 08.6 | 08.9 | 09.1 |
| 20 | 20 | 12 | .3 | 04.8 | 07.0 | 08.1 | 08.8 | 09.1 | 09.4 | 09.6 | 09.7 |
| 20 | 20 | 12 | .5 | 06.9 | 08.7 | 09.4 | 09.6 | 09.8 | 09.8 | 09.9 | 09.9 |
| 20 | 20 | 12 | .7 | 08.4 | 09.5 | 09.8 | 09.9 | 09.9 | 09.9 | 09.9 | 09.9 |
| 20 | 20 | 12 | .9 | 09.5 | 09.9 | 09.9 | 09.9 | 09.9 | 09.9 | 09.9 | 09.9 |
| 20 | 20 | 16 | .2 | 03.6 | 05.9 | 07.4 | 08.5 | 09.2 | 09.8 | 10.2 | 10.5 |
| 20 | 20 | 16 | .3 | 05.0 | 07.6 | 09.1 | 10.0 | 10.5 | 10.9 | 11.1 | 11.2 |
| 20 | 20 | 16 | .5 | 07.5 | 09.9 | 10.8 | 11.2 | 11.4 | 11.5 | 11.6 | 11.6 |
| 20 | 20 | 16 | .7 | 09.5 | 11.0 | 11.4 | 11.6 | 11.6 | 11.6 | 11.6 | 11.6 |
| 20 | 20 | 16 | .9 | 11.0 | 11.5 | 11.6 | 11.6 | 11.6 | 11.6 | 11.6 | 11.6 |



$$E(t) = t[1 - (1 - \frac{1-a}{t})^B]$$

| B  | T  | t  | p  | m/B  |      |      |      |      |      |      |      |
|----|----|----|----|------|------|------|------|------|------|------|------|
|    |    |    |    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
| 20 | 05 | 01 | .2 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 20 | 05 | 01 | .3 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 20 | 05 | 01 | .5 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 20 | 05 | 01 | .7 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 20 | 05 | 01 | .9 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 20 | 05 | 02 | .2 | 01.8 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 20 | 05 | 02 | .3 | 01.9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 20 | 05 | 02 | .5 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 20 | 05 | 02 | .7 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 20 | 05 | 02 | .9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 20 | 05 | 03 | .2 | 02.2 | 02.8 | 02.9 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 20 | 05 | 03 | .3 | 02.6 | 02.9 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 20 | 05 | 03 | .5 | 02.9 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 20 | 05 | 03 | .7 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 20 | 05 | 03 | .9 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 20 | 05 | 04 | .2 | 02.6 | 03.4 | 03.7 | 03.8 | 03.9 | 03.9 | 04.0 | 04.0 |
| 20 | 05 | 04 | .3 | 03.2 | 03.7 | 03.9 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 |
| 20 | 05 | 04 | .5 | 03.7 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 20 | 05 | 04 | .7 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 20 | 05 | 04 | .9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 20 | 10 | 02 | .2 | 01.8 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 20 | 10 | 02 | .3 | 01.9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 20 | 10 | 02 | .5 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 20 | 10 | 02 | .7 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 20 | 10 | 02 | .9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 20 | 10 | 04 | .2 | 02.6 | 03.4 | 03.7 | 03.8 | 03.9 | 03.9 | 04.0 | 04.0 |
| 20 | 10 | 04 | .3 | 03.2 | 03.7 | 03.9 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 |
| 20 | 10 | 04 | .5 | 03.7 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 20 | 10 | 04 | .7 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 20 | 10 | 04 | .9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 20 | 10 | 06 | .2 | 03.0 | 04.3 | 04.9 | 05.2 | 05.4 | 05.6 | 05.6 | 05.7 |
| 20 | 10 | 06 | .3 | 03.8 | 05.0 | 05.4 | 05.6 | 05.7 | 05.8 | 05.8 | 05.8 |
| 20 | 10 | 06 | .5 | 04.9 | 05.6 | 05.7 | 05.8 | 05.8 | 05.8 | 05.8 | 05.8 |
| 20 | 10 | 06 | .7 | 05.5 | 05.8 | 05.8 | 05.8 | 05.8 | 05.8 | 05.8 | 05.8 |
| 20 | 10 | 06 | .9 | 05.8 | 05.8 | 05.8 | 05.8 | 05.8 | 05.8 | 05.8 | 05.8 |
| 20 | 10 | 08 | .2 | 03.2 | 04.8 | 05.7 | 06.3 | 06.6 | 06.8 | 07.0 | 07.1 |
| 20 | 10 | 08 | .3 | 04.3 | 05.9 | 06.6 | 06.9 | 07.1 | 07.2 | 07.3 | 07.3 |
| 20 | 10 | 08 | .5 | 05.8 | 06.9 | 07.2 | 07.3 | 07.4 | 07.4 | 07.4 | 07.4 |
| 20 | 10 | 08 | .7 | 06.7 | 07.3 | 07.4 | 07.4 | 07.4 | 07.4 | 07.4 | 07.4 |
| 20 | 10 | 08 | .9 | 07.3 | 07.4 | 07.4 | 07.4 | 07.4 | 07.4 | 07.4 | 07.4 |







$$E(t) = t \left[ 1 - \left( 1 - \frac{1-a}{t} \right)^B \right]$$

| B  | T  | t  | p  | m/B  |      |      |      |      |      |      |      |
|----|----|----|----|------|------|------|------|------|------|------|------|
|    |    |    |    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
| 30 | 05 | 01 | .2 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 30 | 05 | 01 | .3 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 30 | 05 | 01 | .5 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 30 | 05 | 01 | .7 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 30 | 05 | 01 | .9 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 30 | 05 | 02 | .2 | 01.9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 30 | 05 | 02 | .3 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 30 | 05 | 02 | .5 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 30 | 05 | 02 | .7 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 30 | 05 | 02 | .9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 30 | 05 | 03 | .2 | 02.6 | 02.9 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 30 | 05 | 03 | .3 | 02.9 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 30 | 05 | 03 | .5 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 30 | 05 | 03 | .7 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 30 | 05 | 03 | .9 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 30 | 05 | 04 | .2 | 03.1 | 03.8 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 30 | 05 | 04 | .3 | 03.6 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 30 | 05 | 04 | .5 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 30 | 05 | 04 | .7 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 30 | 05 | 04 | .9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 30 | 10 | 02 | .2 | 01.9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 30 | 10 | 02 | .3 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 30 | 10 | 02 | .5 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 30 | 10 | 02 | .7 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 30 | 10 | 02 | .9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 30 | 10 | 04 | .2 | 03.1 | 03.8 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 30 | 10 | 04 | .3 | 03.6 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 30 | 10 | 04 | .5 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 30 | 10 | 04 | .7 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 30 | 10 | 04 | .9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 30 | 10 | 06 | .2 | 03.8 | 05.1 | 05.5 | 05.7 | 05.8 | 05.9 | 05.9 | 05.9 |
| 30 | 10 | 06 | .3 | 04.7 | 05.6 | 05.8 | 05.9 | 05.9 | 05.9 | 06.0 | 06.0 |
| 30 | 10 | 06 | .5 | 05.6 | 05.9 | 05.9 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 |
| 30 | 10 | 06 | .7 | 05.9 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 |
| 30 | 10 | 06 | .9 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 |
| 30 | 10 | 08 | .2 | 04.3 | 06.0 | 06.8 | 07.2 | 07.4 | 07.6 | 07.6 | 07.7 |
| 30 | 10 | 08 | .3 | 05.5 | 06.9 | 07.4 | 07.6 | 07.7 | 07.8 | 07.8 | 07.8 |
| 30 | 10 | 08 | .5 | 06.8 | 07.6 | 07.8 | 07.8 | 07.8 | 07.8 | 07.8 | 07.9 |
| 30 | 10 | 08 | .7 | 07.5 | 07.8 | 07.8 | 07.8 | 07.9 | 07.9 | 07.9 | 07.9 |
| 30 | 10 | 08 | .9 | 07.8 | 07.8 | 07.9 | 07.9 | 07.9 | 07.9 | 07.9 | 07.9 |



$$E(t) = t \left[ 1 - \left( 1 - \frac{1-a}{t} \right)^B \right]$$

| B  | T  | t  | p  | m/B  |      |      |      |      |      |      |      |
|----|----|----|----|------|------|------|------|------|------|------|------|
|    |    |    |    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
| 30 | 15 | 03 | .2 | 02.6 | 02.9 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 30 | 15 | 03 | .3 | 02.9 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 30 | 15 | 03 | .5 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 30 | 15 | 03 | .7 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 30 | 15 | 03 | .9 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 30 | 15 | 06 | .2 | 03.8 | 05.1 | 05.5 | 05.7 | 05.8 | 05.9 | 05.9 | 05.9 |
| 30 | 15 | 06 | .3 | 04.7 | 05.6 | 05.8 | 05.9 | 05.9 | 05.9 | 06.0 | 06.0 |
| 30 | 15 | 06 | .5 | 05.6 | 05.9 | 05.9 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 |
| 30 | 15 | 06 | .7 | 05.9 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 |
| 30 | 15 | 06 | .9 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 |
| 30 | 15 | 09 | .2 | 04.4 | 06.4 | 07.3 | 07.8 | 08.1 | 08.3 | 08.4 | 08.5 |
| 30 | 15 | 09 | .3 | 05.7 | 07.4 | 08.1 | 08.4 | 08.5 | 08.6 | 08.6 | 08.7 |
| 30 | 15 | 09 | .5 | 07.4 | 08.3 | 08.6 | 08.7 | 08.7 | 08.7 | 08.7 | 08.7 |
| 30 | 15 | 09 | .7 | 08.2 | 08.6 | 08.7 | 08.7 | 08.7 | 08.7 | 08.7 | 08.7 |
| 30 | 15 | 09 | .9 | 08.6 | 08.7 | 08.7 | 08.7 | 08.7 | 08.7 | 08.7 | 08.7 |
| 30 | 15 | 12 | .2 | 04.8 | 07.2 | 08.5 | 09.4 | 09.9 | 10.2 | 10.4 | 10.6 |
| 30 | 15 | 12 | .3 | 06.4 | 08.7 | 09.8 | 10.3 | 10.6 | 10.8 | 10.9 | 11.0 |
| 30 | 15 | 12 | .5 | 08.7 | 10.3 | 10.8 | 11.0 | 11.0 | 11.1 | 11.1 | 11.1 |
| 30 | 15 | 12 | .7 | 10.0 | 10.9 | 11.1 | 11.1 | 11.1 | 11.1 | 11.1 | 11.1 |
| 30 | 15 | 12 | .9 | 10.8 | 11.1 | 11.1 | 11.1 | 11.1 | 11.1 | 11.1 | 11.1 |
| 30 | 20 | 04 | .2 | 03.1 | 03.8 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 30 | 20 | 04 | .3 | 03.6 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 30 | 20 | 04 | .5 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 30 | 20 | 04 | .7 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 30 | 20 | 04 | .9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 30 | 20 | 08 | .2 | 04.3 | 06.0 | 06.8 | 07.2 | 07.4 | 07.6 | 07.6 | 07.7 |
| 30 | 20 | 08 | .3 | 05.5 | 06.9 | 07.4 | 07.6 | 07.7 | 07.8 | 07.8 | 07.8 |
| 30 | 20 | 08 | .5 | 06.8 | 07.6 | 07.8 | 07.8 | 07.8 | 07.8 | 07.8 | 07.9 |
| 30 | 20 | 08 | .7 | 07.5 | 07.8 | 07.8 | 07.8 | 07.9 | 07.9 | 07.9 | 07.9 |
| 30 | 20 | 08 | .9 | 07.8 | 07.8 | 07.9 | 07.9 | 07.9 | 07.9 | 07.9 | 07.9 |
| 30 | 20 | 12 | .2 | 04.8 | 07.2 | 08.5 | 09.4 | 09.9 | 10.2 | 10.4 | 10.6 |
| 30 | 20 | 12 | .3 | 06.4 | 08.7 | 09.8 | 10.3 | 10.6 | 10.8 | 10.9 | 11.0 |
| 30 | 20 | 12 | .5 | 08.7 | 10.3 | 10.8 | 11.0 | 11.0 | 11.1 | 11.1 | 11.1 |
| 30 | 20 | 12 | .7 | 10.0 | 10.9 | 11.1 | 11.1 | 11.1 | 11.1 | 11.1 | 11.1 |
| 30 | 20 | 12 | .9 | 10.8 | 11.1 | 11.1 | 11.1 | 11.1 | 11.1 | 11.1 | 11.1 |
| 30 | 20 | 16 | .2 | 05.0 | 07.9 | 09.7 | 10.8 | 11.6 | 12.1 | 12.5 | 12.8 |
| 30 | 20 | 16 | .3 | 06.9 | 09.9 | 11.5 | 12.3 | 12.8 | 13.1 | 13.3 | 13.4 |
| 30 | 20 | 16 | .5 | 09.8 | 12.2 | 13.0 | 13.4 | 13.5 | 13.6 | 13.7 | 13.7 |
| 30 | 20 | 16 | .7 | 11.8 | 13.2 | 13.6 | 13.7 | 13.7 | 13.7 | 13.7 | 13.7 |
| 30 | 20 | 16 | .9 | 13.2 | 13.6 | 13.7 | 13.7 | 13.7 | 13.7 | 13.7 | 13.7 |







$$E(t) = t[1 - (1 - \frac{1-a}{t})^B]$$

| B  | T  | t  | p  | m/B  |      |      |      |      |      |      |      |
|----|----|----|----|------|------|------|------|------|------|------|------|
|    |    |    |    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
| 40 | 05 | 01 | .2 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 40 | 05 | 01 | .3 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 40 | 05 | 01 | .5 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 40 | 05 | 01 | .7 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 40 | 05 | 01 | .9 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 40 | 05 | 02 | .2 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 40 | 05 | 02 | .3 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 40 | 05 | 02 | .5 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 40 | 05 | 02 | .7 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 40 | 05 | 02 | .9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 40 | 05 | 03 | .2 | 02.8 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 40 | 05 | 03 | .3 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 40 | 05 | 03 | .5 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 40 | 05 | 03 | .7 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 40 | 05 | 03 | .9 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 40 | 05 | 04 | .2 | 03.5 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 40 | 05 | 04 | .3 | 03.8 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 40 | 05 | 04 | .5 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 40 | 05 | 04 | .7 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 40 | 05 | 04 | .9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 40 | 10 | 02 | .2 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 40 | 10 | 02 | .3 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 40 | 10 | 02 | .5 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 40 | 10 | 02 | .7 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 40 | 10 | 02 | .9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 40 | 10 | 04 | .2 | 03.5 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 40 | 10 | 04 | .3 | 03.8 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 40 | 10 | 04 | .5 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 40 | 10 | 04 | .7 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 40 | 10 | 04 | .9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 40 | 10 | 06 | .2 | 04.5 | 05.5 | 05.8 | 05.9 | 05.9 | 06.0 | 06.0 | 06.0 |
| 40 | 10 | 06 | .3 | 05.2 | 05.8 | 05.9 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 |
| 40 | 10 | 06 | .5 | 05.8 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 |
| 40 | 10 | 06 | .7 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 |
| 40 | 10 | 06 | .9 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 |
| 40 | 10 | 08 | .2 | 05.1 | 06.7 | 07.4 | 07.6 | 07.8 | 07.8 | 07.9 | 07.9 |
| 40 | 10 | 08 | .3 | 06.3 | 07.4 | 07.7 | 07.9 | 07.9 | 07.9 | 07.9 | 07.9 |
| 40 | 10 | 08 | .5 | 07.4 | 07.8 | 07.9 | 07.9 | 08.0 | 08.0 | 08.0 | 08.0 |
| 40 | 10 | 08 | .7 | 07.8 | 07.9 | 08.0 | 08.0 | 08.0 | 08.0 | 08.0 | 08.0 |
| 40 | 10 | 08 | .9 | 07.9 | 08.0 | 08.0 | 08.0 | 08.0 | 08.0 | 08.0 | 08.0 |



$$E(t) = t[1 - (1 - \frac{1-a}{t})^B]$$

| B  | T  | t  | p  | m/B  |      |      |      |      |      |      |      |
|----|----|----|----|------|------|------|------|------|------|------|------|
|    |    |    |    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
| 40 | 15 | 03 | .2 | 02.8 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 40 | 15 | 03 | .3 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 40 | 15 | 03 | .5 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 40 | 15 | 03 | .7 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 40 | 15 | 03 | .9 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 40 | 15 | 06 | .2 | 04.5 | 05.5 | 05.8 | 05.9 | 05.9 | 06.0 | 06.0 | 06.0 |
| 40 | 15 | 06 | .3 | 05.2 | 05.8 | 05.9 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 |
| 40 | 15 | 06 | .5 | 05.8 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 |
| 40 | 15 | 06 | .7 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 |
| 40 | 15 | 06 | .9 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 |
| 40 | 15 | 09 | .2 | 05.3 | 07.2 | 08.0 | 08.4 | 08.6 | 08.7 | 08.8 | 08.8 |
| 40 | 15 | 09 | .3 | 06.7 | 08.1 | 08.6 | 08.7 | 08.8 | 08.9 | 08.9 | 08.9 |
| 40 | 15 | 09 | .5 | 08.1 | 08.7 | 08.8 | 08.9 | 08.9 | 08.9 | 08.9 | 08.9 |
| 40 | 15 | 09 | .7 | 08.6 | 08.9 | 08.9 | 08.9 | 08.9 | 08.9 | 08.9 | 08.9 |
| 40 | 15 | 09 | .9 | 08.9 | 08.9 | 08.9 | 08.9 | 08.9 | 08.9 | 08.9 | 08.9 |
| 40 | 15 | 12 | .2 | 05.9 | 08.5 | 09.7 | 10.4 | 10.8 | 11.1 | 11.2 | 11.3 |
| 40 | 15 | 12 | .3 | 07.6 | 09.9 | 10.7 | 11.1 | 11.3 | 11.4 | 11.5 | 11.5 |
| 40 | 15 | 12 | .5 | 09.8 | 11.1 | 11.4 | 11.5 | 11.6 | 11.6 | 11.6 | 11.6 |
| 40 | 15 | 12 | .7 | 10.9 | 11.5 | 11.6 | 11.6 | 11.6 | 11.6 | 11.6 | 11.6 |
| 40 | 15 | 12 | .9 | 11.5 | 11.6 | 11.6 | 11.6 | 11.6 | 11.6 | 11.6 | 11.6 |
| 40 | 20 | 04 | .2 | 03.5 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 40 | 20 | 04 | .3 | 03.8 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 40 | 20 | 04 | .5 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 40 | 20 | 04 | .7 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 40 | 20 | 04 | .9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 40 | 20 | 08 | .2 | 05.1 | 06.7 | 07.4 | 07.6 | 07.8 | 07.8 | 07.9 | 07.9 |
| 40 | 20 | 08 | .3 | 06.3 | 07.4 | 07.7 | 07.9 | 07.9 | 07.9 | 07.9 | 07.9 |
| 40 | 20 | 08 | .5 | 07.4 | 07.8 | 07.9 | 07.9 | 08.0 | 08.0 | 08.0 | 08.0 |
| 40 | 20 | 08 | .7 | 07.8 | 07.9 | 08.0 | 08.0 | 08.0 | 08.0 | 08.0 | 08.0 |
| 40 | 20 | 08 | .9 | 07.9 | 08.0 | 08.0 | 08.0 | 08.0 | 08.0 | 08.0 | 08.0 |
| 40 | 20 | 12 | .2 | 05.9 | 08.5 | 09.7 | 10.4 | 10.8 | 11.1 | 11.2 | 11.3 |
| 40 | 20 | 12 | .3 | 07.6 | 09.9 | 10.7 | 11.1 | 11.3 | 11.4 | 11.5 | 11.5 |
| 40 | 20 | 12 | .5 | 09.8 | 11.1 | 11.4 | 11.5 | 11.6 | 11.6 | 11.6 | 11.6 |
| 40 | 20 | 12 | .7 | 10.9 | 11.5 | 11.6 | 11.6 | 11.6 | 11.6 | 11.6 | 11.6 |
| 40 | 20 | 12 | .9 | 11.5 | 11.6 | 11.6 | 11.6 | 11.6 | 11.6 | 11.6 | 11.6 |
| 40 | 20 | 16 | .2 | 06.3 | 09.6 | 11.4 | 12.4 | 13.1 | 13.6 | 13.9 | 14.1 |
| 40 | 20 | 16 | .3 | 08.5 | 11.6 | 13.0 | 13.7 | 14.1 | 14.3 | 14.5 | 14.6 |
| 40 | 20 | 16 | .5 | 11.5 | 13.7 | 14.3 | 14.6 | 14.7 | 14.7 | 14.8 | 14.8 |
| 40 | 20 | 16 | .7 | 13.3 | 14.5 | 14.7 | 14.8 | 14.8 | 14.8 | 14.8 | 14.8 |
| 40 | 20 | 16 | .9 | 14.4 | 14.8 | 14.8 | 14.8 | 14.8 | 14.8 | 14.8 | 14.8 |







TABLE III

Remaining AttritionAfter Reserving Batteries to Allow forDegradation of Information

$$D(T,t) = t[1-(1-\frac{1-a}{T})^{Bt/T}]$$

for B = Number of batteries = 10, 20, 30, 40

T = " " targets = 5, 10, 15, 20

t = " " targets on which the defense is informed;

t/T = .2, .4, .6, .8

a = Probability that a target, if assigned to a battery, will survive fire from that battery

(= engagement survival probability); given by

$$a = (1-p)^{m/B}$$

p = Characteristic (single-shot) kill probability = .2, .3, .5, .7, .9

m = Number of shots available to all batteries combined;

m/B = shots per battery = 1, 2, ..., 8.

The function  $D(T,t)$  measures the following magnitude: Assume a situation like that assumed in Table I, with the difference that not all batteries are assigned to targets. The defense, knowing that it has information about only a fraction of all targets, assigns only  $Bt/T$  of its B batteries, holding the remaining batteries in reserve. Then D measures the expected number of targets killed by the  $Bt/T$  assigned batteries.

Selected values of this function are presented graphically in Figures 13-18, pp. 34-36.



$$D(T, t) = t \left[ 1 - \left( 1 - \frac{1-a}{t} \right)^{\frac{Bt}{T}} \right]$$

| B  | T  | t  | p  | m/B  |      |      |      |      |      |      |      |
|----|----|----|----|------|------|------|------|------|------|------|------|
|    |    |    |    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
| 10 | 05 | 01 | .2 | 00.4 | 00.6 | 00.7 | 00.8 | 00.9 | 00.9 | 01.0 | 01.0 |
| 10 | 05 | 01 | .3 | 00.5 | 00.8 | 00.9 | 00.9 | 01.0 | 01.0 | 01.0 | 01.0 |
| 10 | 05 | 01 | .5 | 00.8 | 00.9 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 10 | 05 | 01 | .7 | 00.9 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 10 | 05 | 01 | .9 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 10 | 05 | 02 | .2 | 00.7 | 01.1 | 01.3 | 01.5 | 01.6 | 01.7 | 01.7 | 01.8 |
| 10 | 05 | 02 | .3 | 01.0 | 01.4 | 01.6 | 01.7 | 01.8 | 01.8 | 01.8 | 01.8 |
| 10 | 05 | 02 | .5 | 01.4 | 01.7 | 01.8 | 01.8 | 01.9 | 01.9 | 01.9 | 01.9 |
| 10 | 05 | 02 | .7 | 01.6 | 01.8 | 01.9 | 01.9 | 01.9 | 01.9 | 01.9 | 01.9 |
| 10 | 05 | 02 | .9 | 01.8 | 01.9 | 01.9 | 01.9 | 01.9 | 01.9 | 01.9 | 01.9 |
| 10 | 05 | 03 | .2 | 01.0 | 01.6 | 02.0 | 02.2 | 02.3 | 02.4 | 02.5 | 02.6 |
| 10 | 05 | 03 | .3 | 01.4 | 02.0 | 02.3 | 02.5 | 02.6 | 02.6 | 02.7 | 02.7 |
| 10 | 05 | 03 | .5 | 02.0 | 02.5 | 02.6 | 02.7 | 02.7 | 02.7 | 02.7 | 02.7 |
| 10 | 05 | 03 | .7 | 02.4 | 02.7 | 02.7 | 02.7 | 02.7 | 02.7 | 02.7 | 02.7 |
| 10 | 05 | 03 | .9 | 02.6 | 02.7 | 02.7 | 02.7 | 02.7 | 02.7 | 02.7 | 02.7 |
| 10 | 05 | 04 | .2 | 01.3 | 02.1 | 02.6 | 02.9 | 03.1 | 03.2 | 03.3 | 03.4 |
| 10 | 05 | 04 | .3 | 01.9 | 02.7 | 03.0 | 03.3 | 03.4 | 03.5 | 03.5 | 03.5 |
| 10 | 05 | 04 | .5 | 02.6 | 03.2 | 03.4 | 03.5 | 03.6 | 03.6 | 03.6 | 03.6 |
| 10 | 05 | 04 | .7 | 03.1 | 03.5 | 03.6 | 03.6 | 03.6 | 03.6 | 03.6 | 03.6 |
| 10 | 05 | 04 | .9 | 03.5 | 03.6 | 03.6 | 03.6 | 03.6 | 03.6 | 03.6 | 03.6 |
| 10 | 10 | 02 | .2 | 00.4 | 00.7 | 00.9 | 01.0 | 01.1 | 01.2 | 01.3 | 01.3 |
| 10 | 10 | 02 | .3 | 00.6 | 00.9 | 01.1 | 01.2 | 01.3 | 01.4 | 01.4 | 01.4 |
| 10 | 10 | 02 | .5 | 00.9 | 01.2 | 01.4 | 01.4 | 01.5 | 01.5 | 01.5 | 01.5 |
| 10 | 10 | 02 | .7 | 01.2 | 01.4 | 01.5 | 01.5 | 01.5 | 01.5 | 01.5 | 01.5 |
| 10 | 10 | 02 | .9 | 01.4 | 01.5 | 01.5 | 01.5 | 01.5 | 01.5 | 01.5 | 01.5 |
| 10 | 10 | 04 | .2 | 00.7 | 01.3 | 01.6 | 01.9 | 02.1 | 02.2 | 02.3 | 02.4 |
| 10 | 10 | 04 | .3 | 01.1 | 01.7 | 02.0 | 02.3 | 02.4 | 02.5 | 02.6 | 02.6 |
| 10 | 10 | 04 | .5 | 01.7 | 02.3 | 02.5 | 02.6 | 02.7 | 02.7 | 02.7 | 02.7 |
| 10 | 10 | 04 | .7 | 02.1 | 02.6 | 02.7 | 02.7 | 02.7 | 02.7 | 02.7 | 02.7 |
| 10 | 10 | 04 | .9 | 02.6 | 02.7 | 02.7 | 02.7 | 02.7 | 02.7 | 02.7 | 02.7 |
| 10 | 10 | 06 | .2 | 01.1 | 01.9 | 02.4 | 02.8 | 03.1 | 03.3 | 03.4 | 03.6 |
| 10 | 10 | 06 | .3 | 01.6 | 02.5 | 03.0 | 03.3 | 03.5 | 03.7 | 03.8 | 03.8 |
| 10 | 10 | 06 | .5 | 02.4 | 03.3 | 03.7 | 03.8 | 03.9 | 04.0 | 04.0 | 04.0 |
| 10 | 10 | 06 | .7 | 03.1 | 03.8 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 10 | 10 | 06 | .9 | 03.7 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 10 | 10 | 08 | .2 | 01.5 | 02.5 | 03.2 | 03.7 | 04.0 | 04.3 | 04.5 | 04.7 |
| 10 | 10 | 08 | .3 | 02.1 | 03.3 | 04.0 | 04.4 | 04.7 | 04.9 | 05.0 | 05.1 |
| 10 | 10 | 08 | .5 | 03.2 | 04.4 | 04.8 | 05.0 | 05.2 | 05.2 | 05.2 | 05.2 |
| 10 | 10 | 08 | .7 | 04.2 | 05.0 | 05.2 | 05.2 | 05.2 | 05.2 | 05.3 | 05.3 |
| 10 | 10 | 08 | .9 | 04.9 | 05.2 | 05.2 | 05.3 | 05.3 | 05.3 | 05.3 | 05.3 |





$$D(T, t) = t \left[ 1 - \left( 1 - \frac{1-a}{t} \right)^{\frac{Bt}{T}} \right]$$

| B  | T  | t  | p  | m/B  |      |      |      |      |      |      |      |
|----|----|----|----|------|------|------|------|------|------|------|------|
|    |    |    |    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
| 10 | 15 | 03 | .2 | 00.4 | 00.7 | 00.9 | 01.1 | 01.2 | 01.3 | 01.4 | 01.4 |
| 10 | 15 | 03 | .3 | 00.6 | 00.9 | 01.2 | 01.3 | 01.4 | 01.5 | 01.6 | 01.6 |
| 10 | 15 | 03 | .5 | 00.9 | 01.3 | 01.5 | 01.6 | 01.6 | 01.6 | 01.7 | 01.7 |
| 10 | 15 | 03 | .7 | 01.2 | 01.5 | 01.6 | 01.7 | 01.7 | 01.7 | 01.7 | 01.7 |
| 10 | 15 | 03 | .9 | 01.5 | 01.7 | 01.7 | 01.7 | 01.7 | 01.7 | 01.7 | 01.7 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 10 | 15 | 06 | .2 | 00.8 | 01.3 | 01.7 | 02.0 | 02.3 | 02.5 | 02.6 | 02.7 |
| 10 | 15 | 06 | .3 | 01.1 | 01.8 | 02.2 | 02.5 | 02.7 | 02.8 | 02.9 | 03.0 |
| 10 | 15 | 06 | .5 | 01.8 | 02.5 | 02.8 | 03.0 | 03.0 | 03.1 | 03.1 | 03.1 |
| 10 | 15 | 06 | .7 | 02.3 | 02.9 | 03.0 | 03.1 | 03.1 | 03.1 | 03.1 | 03.1 |
| 10 | 15 | 06 | .9 | 02.9 | 03.1 | 03.1 | 03.1 | 03.1 | 03.1 | 03.1 | 03.1 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 10 | 15 | 09 | .2 | 01.1 | 02.0 | 02.6 | 03.0 | 03.4 | 03.6 | 03.8 | 04.0 |
| 10 | 15 | 09 | .3 | 01.7 | 02.7 | 03.3 | 03.7 | 04.0 | 04.2 | 04.3 | 04.4 |
| 10 | 15 | 09 | .5 | 02.6 | 03.7 | 04.1 | 04.3 | 04.5 | 04.5 | 04.5 | 04.5 |
| 10 | 15 | 09 | .7 | 03.5 | 04.3 | 04.5 | 04.5 | 04.6 | 04.6 | 04.6 | 04.6 |
| 10 | 15 | 09 | .9 | 04.2 | 04.5 | 04.6 | 04.6 | 04.6 | 04.6 | 04.6 | 04.6 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 10 | 15 | 12 | .2 | 01.5 | 02.6 | 03.4 | 04.0 | 04.4 | 04.8 | 05.0 | 05.2 |
| 10 | 15 | 12 | .3 | 02.2 | 03.5 | 04.4 | 04.9 | 05.2 | 05.5 | 05.6 | 05.8 |
| 10 | 15 | 12 | .5 | 03.5 | 04.8 | 05.5 | 05.7 | 05.9 | 05.9 | 06.0 | 06.0 |
| 10 | 15 | 12 | .7 | 04.6 | 05.6 | 05.9 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 |
| 10 | 15 | 12 | .9 | 05.6 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 | 06.0 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 10 | 20 | 04 | .2 | 00.4 | 00.7 | 00.9 | 01.1 | 01.2 | 01.3 | 01.4 | 01.5 |
| 10 | 20 | 04 | .3 | 00.6 | 01.0 | 01.2 | 01.4 | 01.5 | 01.6 | 01.6 | 01.7 |
| 10 | 20 | 04 | .5 | 00.9 | 01.4 | 01.6 | 01.7 | 01.7 | 01.7 | 01.7 | 01.7 |
| 10 | 20 | 04 | .7 | 01.3 | 01.6 | 01.7 | 01.7 | 01.7 | 01.7 | 01.7 | 01.7 |
| 10 | 20 | 04 | .9 | 01.6 | 01.7 | 01.7 | 01.7 | 01.7 | 01.7 | 01.7 | 01.7 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 10 | 20 | 08 | .2 | 00.8 | 01.3 | 01.8 | 02.1 | 02.4 | 02.6 | 02.7 | 02.8 |
| 10 | 20 | 08 | .3 | 01.1 | 01.9 | 02.3 | 02.6 | 02.8 | 03.0 | 03.1 | 03.2 |
| 10 | 20 | 08 | .5 | 01.8 | 02.6 | 03.0 | 03.1 | 03.2 | 03.3 | 03.3 | 03.3 |
| 10 | 20 | 08 | .7 | 02.5 | 03.1 | 03.2 | 03.3 | 03.3 | 03.3 | 03.3 | 03.3 |
| 10 | 20 | 08 | .9 | 03.0 | 03.3 | 03.3 | 03.3 | 03.3 | 03.3 | 03.3 | 03.3 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 10 | 20 | 12 | .2 | 01.2 | 02.0 | 02.6 | 03.1 | 03.5 | 03.8 | 04.0 | 04.2 |
| 10 | 20 | 12 | .3 | 01.7 | 02.8 | 03.4 | 03.9 | 04.2 | 04.4 | 04.6 | 04.7 |
| 10 | 20 | 12 | .5 | 02.7 | 03.9 | 04.4 | 04.6 | 04.8 | 04.8 | 04.9 | 04.9 |
| 10 | 20 | 12 | .7 | 03.6 | 04.5 | 04.8 | 04.8 | 04.9 | 04.9 | 04.9 | 04.9 |
| 10 | 20 | 12 | .9 | 04.5 | 04.8 | 04.9 | 04.9 | 04.9 | 04.9 | 04.9 | 04.9 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 10 | 20 | 16 | .2 | 01.5 | 02.7 | 03.5 | 04.2 | 04.7 | 05.0 | 05.3 | 05.6 |
| 10 | 20 | 16 | .3 | 02.2 | 03.7 | 04.6 | 05.2 | 05.6 | 05.8 | 06.0 | 06.2 |
| 10 | 20 | 16 | .5 | 03.6 | 05.1 | 05.8 | 06.1 | 06.3 | 06.4 | 06.4 | 06.4 |
| 10 | 20 | 16 | .7 | 04.8 | 06.0 | 06.3 | 06.4 | 06.4 | 06.4 | 06.5 | 06.5 |
| 10 | 20 | 16 | .9 | 05.9 | 06.4 | 06.4 | 06.5 | 06.5 | 06.5 | 06.5 | 06.5 |



$$D(T, t) = t \left[ 1 - \left( 1 - \frac{1-a}{t} \right)^{\frac{Bt}{T}} \right]$$

| B  | T  | t  | p  | m/B  |      |      |      |      |      |      |      |
|----|----|----|----|------|------|------|------|------|------|------|------|
|    |    |    |    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
| 20 | 05 | 01 | .2 | 00.6 | 00.8 | 00.9 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 20 | 05 | 01 | .3 | 00.8 | 00.9 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 20 | 05 | 01 | .5 | 00.9 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 20 | 05 | 01 | .7 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 20 | 05 | 01 | .9 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 20 | 05 | 02 | .2 | 01.1 | 01.6 | 01.8 | 01.9 | 01.9 | 01.9 | 02.0 | 02.0 |
| 20 | 05 | 02 | .3 | 01.5 | 01.8 | 01.9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 20 | 05 | 02 | .5 | 01.8 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 20 | 05 | 02 | .7 | 01.9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 20 | 05 | 02 | .9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 20 | 05 | 03 | .2 | 01.7 | 02.4 | 02.6 | 02.8 | 02.9 | 02.9 | 02.9 | 02.9 |
| 20 | 05 | 03 | .3 | 02.2 | 02.7 | 02.8 | 02.9 | 02.9 | 03.0 | 03.0 | 03.0 |
| 20 | 05 | 03 | .5 | 02.7 | 02.9 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 20 | 05 | 03 | .7 | 02.9 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 20 | 05 | 03 | .9 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 20 | 05 | 04 | .2 | 02.2 | 03.1 | 03.5 | 03.7 | 03.8 | 03.8 | 03.9 | 03.9 |
| 20 | 05 | 04 | .3 | 02.9 | 03.5 | 03.8 | 03.9 | 03.9 | 03.9 | 03.9 | 03.9 |
| 20 | 05 | 04 | .5 | 03.5 | 03.9 | 03.9 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 |
| 20 | 05 | 04 | .7 | 03.8 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 20 | 05 | 04 | .9 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 20 | 10 | 02 | .2 | 00.7 | 01.1 | 01.3 | 01.5 | 01.6 | 01.7 | 01.7 | 01.8 |
| 20 | 10 | 02 | .3 | 01.0 | 01.4 | 01.6 | 01.7 | 01.8 | 01.8 | 01.8 | 01.8 |
| 20 | 10 | 02 | .5 | 01.4 | 01.7 | 01.8 | 01.8 | 01.9 | 01.9 | 01.9 | 01.9 |
| 20 | 10 | 02 | .7 | 01.6 | 01.8 | 01.9 | 01.9 | 01.9 | 01.9 | 01.9 | 01.9 |
| 20 | 10 | 02 | .9 | 01.8 | 01.9 | 01.9 | 01.9 | 01.9 | 01.9 | 01.9 | 01.9 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 20 | 10 | 04 | .2 | 01.3 | 02.1 | 02.6 | 02.9 | 03.1 | 03.2 | 03.3 | 03.4 |
| 20 | 10 | 04 | .3 | 01.9 | 02.7 | 03.0 | 03.3 | 03.4 | 03.5 | 03.5 | 03.5 |
| 20 | 10 | 04 | .5 | 02.6 | 03.2 | 03.4 | 03.5 | 03.6 | 03.6 | 03.6 | 03.6 |
| 20 | 10 | 04 | .7 | 03.1 | 03.5 | 03.6 | 03.6 | 03.6 | 03.6 | 03.6 | 03.6 |
| 20 | 10 | 04 | .9 | 03.5 | 03.6 | 03.6 | 03.6 | 03.6 | 03.6 | 03.6 | 03.6 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 20 | 10 | 06 | .2 | 02.0 | 03.1 | 03.8 | 04.3 | 04.6 | 04.8 | 04.9 | 05.0 |
| 20 | 10 | 06 | .3 | 02.8 | 03.9 | 04.5 | 04.8 | 05.0 | 05.1 | 05.2 | 05.2 |
| 20 | 10 | 06 | .5 | 03.9 | 04.8 | 05.1 | 05.2 | 05.3 | 05.3 | 05.3 | 05.3 |
| 20 | 10 | 06 | .7 | 04.6 | 05.2 | 05.3 | 05.3 | 05.3 | 05.3 | 05.3 | 05.3 |
| 20 | 10 | 06 | .9 | 05.1 | 05.3 | 05.3 | 05.3 | 05.3 | 05.3 | 05.3 | 05.3 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 20 | 10 | 08 | .2 | 02.7 | 04.2 | 05.1 | 05.7 | 06.0 | 06.3 | 06.5 | 06.6 |
| 20 | 10 | 08 | .3 | 03.7 | 05.2 | 06.0 | 06.4 | 06.6 | 06.8 | 06.9 | 06.9 |
| 20 | 10 | 08 | .5 | 05.2 | 06.3 | 06.7 | 06.9 | 07.0 | 07.0 | 07.0 | 07.0 |
| 20 | 10 | 08 | .7 | 06.2 | 06.8 | 07.0 | 07.0 | 07.1 | 07.1 | 07.1 | 07.1 |
| 20 | 10 | 08 | .9 | 06.8 | 07.0 | 07.1 | 07.1 | 07.1 | 07.1 | 07.1 | 07.1 |





$$D(T, t) = t \left[ 1 - \left( 1 - \frac{1-a}{t} \right)^{\frac{Bt}{T}} \right]$$

| B  | T  | t  | p  | m/B  |      |      |      |      |      |      |      |
|----|----|----|----|------|------|------|------|------|------|------|------|
|    |    |    |    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
| 20 | 15 | 03 | .2 | 00.7 | 01.2 | 01.5 | 01.8 | 01.9 | 02.0 | 02.1 | 02.2 |
| 20 | 15 | 03 | .3 | 01.0 | 01.6 | 01.9 | 02.1 | 02.2 | 02.3 | 02.3 | 02.3 |
| 20 | 15 | 03 | .5 | 01.6 | 02.1 | 02.2 | 02.3 | 02.4 | 02.4 | 02.4 | 02.4 |
| 20 | 15 | 03 | .7 | 02.0 | 02.3 | 02.4 | 02.4 | 02.4 | 02.4 | 02.4 | 02.4 |
| 20 | 15 | 03 | .9 | 02.3 | 02.4 | 02.4 | 02.4 | 02.4 | 02.4 | 02.4 | 02.4 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 20 | 15 | 06 | .2 | 01.4 | 02.3 | 03.0 | 03.4 | 03.7 | 03.9 | 04.1 | 04.2 |
| 20 | 15 | 06 | .3 | 02.0 | 03.1 | 03.6 | 04.0 | 04.2 | 04.3 | 04.4 | 04.5 |
| 20 | 15 | 06 | .5 | 03.0 | 03.9 | 04.3 | 04.5 | 04.5 | 04.6 | 04.6 | 04.6 |
| 20 | 15 | 06 | .7 | 03.8 | 04.4 | 04.5 | 04.6 | 04.6 | 04.6 | 04.6 | 04.6 |
| 20 | 15 | 06 | .9 | 04.4 | 04.6 | 04.6 | 04.6 | 04.6 | 04.6 | 04.6 | 04.6 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 20 | 15 | 09 | .2 | 02.1 | 03.5 | 04.4 | 05.0 | 05.5 | 05.8 | 06.0 | 06.2 |
| 20 | 15 | 09 | .3 | 03.0 | 04.5 | 05.4 | 05.9 | 06.2 | 06.4 | 06.5 | 06.6 |
| 20 | 15 | 09 | .5 | 04.5 | 05.8 | 06.4 | 06.6 | 06.7 | 06.8 | 06.8 | 06.8 |
| 20 | 15 | 09 | .7 | 05.6 | 06.5 | 06.7 | 06.8 | 06.8 | 06.8 | 06.8 | 06.8 |
| 20 | 15 | 09 | .9 | 06.5 | 06.8 | 06.8 | 06.8 | 06.8 | 06.8 | 06.8 | 06.8 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 20 | 15 | 12 | .2 | 02.8 | 04.6 | 05.8 | 06.6 | 07.2 | 07.7 | 08.0 | 08.2 |
| 20 | 15 | 12 | .3 | 04.0 | 06.0 | 07.1 | 07.8 | 08.2 | 08.5 | 08.6 | 08.8 |
| 20 | 15 | 12 | .5 | 05.9 | 07.7 | 08.4 | 08.7 | 08.9 | 08.9 | 09.0 | 09.0 |
| 20 | 15 | 12 | .7 | 07.4 | 08.6 | 08.9 | 09.0 | 09.0 | 09.0 | 09.0 | 09.0 |
| 20 | 15 | 12 | .9 | 08.6 | 09.0 | 09.0 | 09.0 | 09.0 | 09.0 | 09.0 | 09.0 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 20 | 20 | 04 | .2 | 00.7 | 01.3 | 01.6 | 01.9 | 02.1 | 02.2 | 02.3 | 02.4 |
| 20 | 20 | 04 | .3 | 01.1 | 01.7 | 02.0 | 02.3 | 02.4 | 02.5 | 02.6 | 02.6 |
| 20 | 20 | 04 | .5 | 01.7 | 02.3 | 02.5 | 02.6 | 02.7 | 02.7 | 02.7 | 02.7 |
| 20 | 20 | 04 | .7 | 02.1 | 02.6 | 02.7 | 02.7 | 02.7 | 02.7 | 02.7 | 02.7 |
| 20 | 20 | 04 | .9 | 02.6 | 02.7 | 02.7 | 02.7 | 02.7 | 02.7 | 02.7 | 02.7 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 20 | 20 | 08 | .2 | 01.5 | 02.5 | 03.2 | 03.7 | 04.0 | 04.3 | 04.5 | 04.7 |
| 20 | 20 | 08 | .3 | 02.1 | 03.3 | 04.0 | 04.4 | 04.7 | 04.9 | 05.0 | 05.1 |
| 20 | 20 | 08 | .5 | 03.2 | 04.4 | 04.8 | 05.0 | 05.2 | 05.2 | 05.2 | 05.2 |
| 20 | 20 | 08 | .7 | 04.2 | 05.0 | 05.2 | 05.2 | 05.2 | 05.2 | 05.3 | 05.3 |
| 20 | 20 | 08 | .9 | 04.9 | 05.2 | 05.2 | 05.3 | 05.3 | 05.3 | 05.3 | 05.3 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 20 | 20 | 12 | .2 | 02.2 | 03.7 | 04.7 | 05.4 | 06.0 | 06.4 | 06.7 | 06.9 |
| 20 | 20 | 12 | .3 | 03.1 | 04.9 | 05.9 | 06.5 | 06.9 | 07.2 | 07.4 | 07.5 |
| 20 | 20 | 12 | .5 | 04.8 | 06.5 | 07.2 | 07.5 | 07.6 | 07.7 | 07.7 | 07.8 |
| 20 | 20 | 12 | .7 | 06.2 | 07.3 | 07.6 | 07.7 | 07.8 | 07.8 | 07.8 | 07.8 |
| 20 | 20 | 12 | .9 | 07.3 | 07.7 | 07.8 | 07.8 | 07.8 | 07.8 | 07.8 | 07.8 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 20 | 20 | 16 | .2 | 02.9 | 04.9 | 06.3 | 07.2 | 07.9 | 08.5 | 08.9 | 09.2 |
| 20 | 20 | 16 | .3 | 04.2 | 06.5 | 07.8 | 08.7 | 09.2 | 09.5 | 09.8 | 09.9 |
| 20 | 20 | 16 | .5 | 06.4 | 08.6 | 09.5 | 09.9 | 10.1 | 10.2 | 10.3 | 10.3 |
| 20 | 20 | 16 | .7 | 08.2 | 09.7 | 10.1 | 10.3 | 10.3 | 10.3 | 10.3 | 10.3 |
| 20 | 20 | 16 | .9 | 09.7 | 10.2 | 10.3 | 10.3 | 10.3 | 10.3 | 10.3 | 10.3 |



$$D(T, t) = t \left[ 1 - \left( 1 - \frac{1-a}{t} \right)^{\frac{Bt}{T}} \right]$$

| B  | T  | t  | p  | m/B  |      |      |      |      |      |      |      |
|----|----|----|----|------|------|------|------|------|------|------|------|
|    |    |    |    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
| 30 | 05 | 01 | .2 | 00.7 | 00.9 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 30 | 05 | 01 | .3 | 00.9 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 30 | 05 | 01 | .5 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 30 | 05 | 01 | .7 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 30 | 05 | 01 | .9 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 30 | 05 | 02 | .2 | 01.4 | 01.8 | 01.9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 30 | 05 | 02 | .3 | 01.7 | 01.9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 30 | 05 | 02 | .5 | 01.9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 30 | 05 | 02 | .7 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 30 | 05 | 02 | .9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 30 | 05 | 03 | .2 | 02.1 | 02.7 | 02.9 | 02.9 | 03.0 | 03.0 | 03.0 | 03.0 |
| 30 | 05 | 03 | .3 | 02.5 | 02.9 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 30 | 05 | 03 | .5 | 02.9 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 30 | 05 | 03 | .7 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 30 | 05 | 03 | .9 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 30 | 05 | 04 | .2 | 02.8 | 03.6 | 03.8 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 |
| 30 | 05 | 04 | .3 | 03.4 | 03.8 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 30 | 05 | 04 | .5 | 03.8 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 30 | 05 | 04 | .7 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 30 | 05 | 04 | .9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 30 | 10 | 02 | .2 | 00.9 | 01.4 | 01.6 | 01.8 | 01.8 | 01.9 | 01.9 | 01.9 |
| 30 | 10 | 02 | .3 | 01.2 | 01.7 | 01.8 | 01.9 | 01.9 | 01.9 | 01.9 | 02.0 |
| 30 | 10 | 02 | .5 | 01.6 | 01.9 | 01.9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 30 | 10 | 02 | .7 | 01.8 | 01.9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 30 | 10 | 02 | .9 | 01.9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 30 | 10 | 04 | .2 | 01.8 | 02.7 | 03.2 | 03.4 | 03.6 | 03.7 | 03.7 | 03.8 |
| 30 | 10 | 04 | .3 | 02.4 | 03.2 | 03.5 | 03.7 | 03.8 | 03.8 | 03.8 | 03.8 |
| 30 | 10 | 04 | .5 | 03.2 | 03.7 | 03.8 | 03.8 | 03.9 | 03.9 | 03.9 | 03.9 |
| 30 | 10 | 04 | .7 | 03.6 | 03.8 | 03.9 | 03.9 | 03.9 | 03.9 | 03.9 | 03.9 |
| 30 | 10 | 04 | .9 | 03.8 | 03.9 | 03.9 | 03.9 | 03.9 | 03.9 | 03.9 | 03.9 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 30 | 10 | 06 | .2 | 02.7 | 04.0 | 04.7 | 05.1 | 05.3 | 05.4 | 05.5 | 05.6 |
| 30 | 10 | 06 | .3 | 03.6 | 04.8 | 05.3 | 05.5 | 05.6 | 05.7 | 05.7 | 05.7 |
| 30 | 10 | 06 | .5 | 04.7 | 05.5 | 05.6 | 05.7 | 05.7 | 05.8 | 05.8 | 05.8 |
| 30 | 10 | 06 | .7 | 05.4 | 05.7 | 05.8 | 05.8 | 05.8 | 05.8 | 05.8 | 05.8 |
| 30 | 10 | 06 | .9 | 05.7 | 05.8 | 05.8 | 05.8 | 05.8 | 05.8 | 05.8 | 05.8 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 30 | 10 | 08 | .2 | 03.6 | 05.4 | 06.2 | 06.7 | 07.0 | 07.2 | 07.3 | 07.4 |
| 30 | 10 | 08 | .3 | 04.8 | 06.4 | 07.0 | 07.3 | 07.4 | 07.5 | 07.6 | 07.6 |
| 30 | 10 | 08 | .5 | 06.3 | 07.2 | 07.5 | 07.6 | 07.6 | 07.7 | 07.7 | 07.7 |
| 30 | 10 | 08 | .7 | 07.1 | 07.6 | 07.6 | 07.7 | 07.7 | 07.7 | 07.7 | 07.7 |
| 30 | 10 | 08 | .9 | 07.5 | 07.7 | 07.7 | 07.7 | 07.7 | 07.7 | 07.7 | 07.7 |





$$D(T, t) = t \left[ 1 - \left( 1 - \frac{1-a}{t} \right)^{\frac{Bt}{T}} \right]$$

| B  | T  | t  | p  | m/B  |      |      |      |      |      |      |      |
|----|----|----|----|------|------|------|------|------|------|------|------|
|    |    |    |    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
| 30 | 15 | 03 | .2 | 01.0 | 01.6 | 02.0 | 02.2 | 02.3 | 02.4 | 02.5 | 02.6 |
| 30 | 15 | 03 | .3 | 01.4 | 02.0 | 02.3 | 02.5 | 02.6 | 02.6 | 02.7 | 02.7 |
| 30 | 15 | 03 | .5 | 02.0 | 02.5 | 02.6 | 02.7 | 02.7 | 02.7 | 02.7 | 02.7 |
| 30 | 15 | 03 | .7 | 02.4 | 02.7 | 02.7 | 02.7 | 02.7 | 02.7 | 02.7 | 02.7 |
| 30 | 15 | 03 | .9 | 02.6 | 02.7 | 02.7 | 02.7 | 02.7 | 02.7 | 02.7 | 02.7 |
| 30 | 15 | 06 | .2 | 02.0 | 03.1 | 03.8 | 04.3 | 04.6 | 04.8 | 04.9 | 05.0 |
| 30 | 15 | 06 | .3 | 02.8 | 03.9 | 04.5 | 04.8 | 05.0 | 05.1 | 05.2 | 05.2 |
| 30 | 15 | 06 | .5 | 03.9 | 04.8 | 05.1 | 05.2 | 05.3 | 05.3 | 05.3 | 05.3 |
| 30 | 15 | 06 | .7 | 04.6 | 05.2 | 05.3 | 05.3 | 05.3 | 05.3 | 05.3 | 05.3 |
| 30 | 15 | 06 | .9 | 05.1 | 05.3 | 05.3 | 05.3 | 05.3 | 05.3 | 05.3 | 05.3 |
| 30 | 15 | 09 | .2 | 03.0 | 04.7 | 05.7 | 06.3 | 06.8 | 07.1 | 07.3 | 07.4 |
| 30 | 15 | 09 | .3 | 04.1 | 05.9 | 06.7 | 07.2 | 07.4 | 07.6 | 07.7 | 07.8 |
| 30 | 15 | 09 | .5 | 05.8 | 07.1 | 07.6 | 07.8 | 07.8 | 07.9 | 07.9 | 07.9 |
| 30 | 15 | 09 | .7 | 06.9 | 07.7 | 07.9 | 07.9 | 07.9 | 07.9 | 07.9 | 07.9 |
| 30 | 15 | 09 | .9 | 07.6 | 07.9 | 07.9 | 07.9 | 07.9 | 07.9 | 07.9 | 07.9 |
| 30 | 15 | 12 | .2 | 04.0 | 06.2 | 07.6 | 08.4 | 09.0 | 09.4 | 09.7 | 09.9 |
| 30 | 15 | 12 | .3 | 05.5 | 07.8 | 08.9 | 09.5 | 09.9 | 10.1 | 10.2 | 10.3 |
| 30 | 15 | 12 | .5 | 07.7 | 09.5 | 10.1 | 10.3 | 10.4 | 10.5 | 10.5 | 10.5 |
| 30 | 15 | 12 | .7 | 09.2 | 10.2 | 10.4 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 |
| 30 | 15 | 12 | .9 | 10.2 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 |
| 30 | 20 | 04 | .2 | 01.1 | 01.7 | 02.2 | 02.5 | 02.7 | 02.8 | 02.9 | 03.0 |
| 30 | 20 | 04 | .3 | 01.5 | 02.2 | 02.6 | 02.9 | 03.0 | 03.1 | 03.2 | 03.2 |
| 30 | 20 | 04 | .5 | 02.2 | 02.8 | 03.1 | 03.2 | 03.2 | 03.3 | 03.3 | 03.3 |
| 30 | 20 | 04 | .7 | 02.7 | 03.1 | 03.2 | 03.3 | 03.3 | 03.3 | 03.3 | 03.3 |
| 30 | 20 | 04 | .9 | 03.1 | 03.3 | 03.3 | 03.3 | 03.3 | 03.3 | 03.3 | 03.3 |
| 30 | 20 | 08 | .2 | 02.1 | 03.4 | 04.2 | 04.8 | 05.2 | 05.5 | 05.7 | 05.9 |
| 30 | 20 | 08 | .3 | 02.9 | 04.4 | 05.1 | 05.6 | 05.9 | 06.0 | 06.1 | 06.2 |
| 30 | 20 | 08 | .5 | 04.3 | 05.5 | 06.0 | 06.2 | 06.3 | 06.3 | 06.4 | 06.4 |
| 30 | 20 | 08 | .7 | 05.3 | 06.1 | 06.3 | 06.4 | 06.4 | 06.4 | 06.4 | 06.4 |
| 30 | 20 | 08 | .9 | 06.1 | 06.4 | 06.4 | 06.4 | 06.4 | 06.4 | 06.4 | 06.4 |
| 30 | 20 | 12 | .2 | 03.1 | 05.1 | 06.3 | 07.2 | 07.7 | 08.2 | 08.5 | 08.7 |
| 30 | 20 | 12 | .3 | 04.4 | 06.5 | 07.6 | 08.3 | 08.7 | 09.0 | 09.1 | 09.2 |
| 30 | 20 | 12 | .5 | 06.4 | 08.2 | 08.9 | 09.2 | 09.4 | 09.4 | 09.5 | 09.5 |
| 30 | 20 | 12 | .7 | 07.9 | 09.1 | 09.4 | 09.5 | 09.5 | 09.5 | 09.5 | 09.5 |
| 30 | 20 | 12 | .9 | 09.1 | 09.5 | 09.5 | 09.5 | 09.5 | 09.5 | 09.5 | 09.5 |
| 30 | 20 | 16 | .2 | 04.2 | 06.7 | 08.4 | 09.5 | 10.3 | 10.8 | 11.3 | 11.6 |
| 30 | 20 | 16 | .3 | 05.8 | 08.6 | 10.2 | 11.0 | 11.6 | 11.9 | 12.1 | 12.3 |
| 30 | 20 | 16 | .5 | 08.5 | 10.9 | 11.9 | 12.2 | 12.4 | 12.5 | 12.6 | 12.6 |
| 30 | 20 | 16 | .7 | 10.5 | 12.1 | 12.5 | 12.6 | 12.6 | 12.6 | 12.6 | 12.6 |
| 30 | 20 | 16 | .9 | 12.0 | 12.5 | 12.6 | 12.6 | 12.6 | 12.6 | 12.6 | 12.6 |



$$D(T, t) = t \left[ 1 - \left( 1 - \frac{1-a}{t} \right)^{\frac{Bt}{T}} \right]$$

| B  | T  | t  | p  | m/B  |      |      |      |      |      |      |      |
|----|----|----|----|------|------|------|------|------|------|------|------|
|    |    |    |    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
| 40 | 05 | 01 | .2 | 00.8 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 40 | 05 | 01 | .3 | 00.9 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 40 | 05 | 01 | .5 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 40 | 05 | 01 | .7 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 40 | 05 | 01 | .9 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 | 01.0 |
| 40 | 05 | 02 | .2 | 01.6 | 01.9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 40 | 05 | 02 | .3 | 01.9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 40 | 05 | 02 | .5 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 40 | 05 | 02 | .7 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 40 | 05 | 02 | .9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 40 | 05 | 03 | .2 | 02.4 | 02.9 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 40 | 05 | 03 | .3 | 02.8 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 40 | 05 | 03 | .5 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 40 | 05 | 03 | .7 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 40 | 05 | 03 | .9 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 | 03.0 |
| 40 | 05 | 04 | .2 | 03.2 | 03.8 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 40 | 05 | 04 | .3 | 03.7 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 40 | 05 | 04 | .5 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 40 | 05 | 04 | .7 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 40 | 05 | 04 | .9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 40 | 10 | 02 | .2 | 01.1 | 01.6 | 01.8 | 01.9 | 01.9 | 01.9 | 02.0 | 02.0 |
| 40 | 10 | 02 | .3 | 01.5 | 01.8 | 01.9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 40 | 10 | 02 | .5 | 01.8 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 40 | 10 | 02 | .7 | 01.9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 40 | 10 | 02 | .9 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 | 02.0 |
| 40 | 10 | 04 | .2 | 02.2 | 03.1 | 03.5 | 03.7 | 03.8 | 03.8 | 03.9 | 03.9 |
| 40 | 10 | 04 | .3 | 02.9 | 03.5 | 03.8 | 03.9 | 03.9 | 03.9 | 03.9 | 03.9 |
| 40 | 10 | 04 | .5 | 03.5 | 03.9 | 03.9 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 |
| 40 | 10 | 04 | .7 | 03.8 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 40 | 10 | 04 | .9 | 03.9 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 | 04.0 |
| 40 | 10 | 06 | .2 | 03.3 | 04.6 | 05.2 | 05.5 | 05.7 | 05.7 | 05.8 | 05.8 |
| 40 | 10 | 06 | .3 | 04.2 | 05.3 | 05.6 | 05.8 | 05.8 | 05.9 | 05.9 | 05.9 |
| 40 | 10 | 06 | .5 | 05.3 | 05.8 | 05.9 | 05.9 | 05.9 | 05.9 | 05.9 | 05.9 |
| 40 | 10 | 06 | .7 | 05.7 | 05.9 | 05.9 | 05.9 | 05.9 | 05.9 | 05.9 | 05.9 |
| 40 | 10 | 06 | .9 | 05.9 | 05.9 | 05.9 | 05.9 | 05.9 | 05.9 | 05.9 | 05.9 |
| 40 | 10 | 08 | .2 | 04.4 | 06.2 | 06.9 | 07.3 | 07.5 | 07.6 | 07.7 | 07.8 |
| 40 | 10 | 08 | .3 | 05.6 | 07.0 | 07.5 | 07.7 | 07.8 | 07.8 | 07.8 | 07.9 |
| 40 | 10 | 08 | .5 | 07.0 | 07.7 | 07.8 | 07.9 | 07.9 | 07.9 | 07.9 | 07.9 |
| 40 | 10 | 08 | .7 | 07.6 | 07.8 | 07.9 | 07.9 | 07.9 | 07.9 | 07.9 | 07.9 |
| 40 | 10 | 08 | .9 | 07.8 | 07.9 | 07.9 | 07.9 | 07.9 | 07.9 | 07.9 | 07.9 |





$$D(T, t) = t \left[ 1 - \left( 1 - \frac{1-a}{t} \right)^{\frac{Bt}{T}} \right]$$

| B  | T  | t  | p  | m/B  |      |      |      |      |      |      |      |
|----|----|----|----|------|------|------|------|------|------|------|------|
|    |    |    |    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
| 40 | 15 | 03 | .2 | 01.3 | 01.9 | 02.3 | 02.5 | 02.6 | 02.7 | 02.7 | 02.8 |
| 40 | 15 | 03 | .3 | 01.7 | 02.3 | 02.6 | 02.7 | 02.8 | 02.8 | 02.8 | 02.9 |
| 40 | 15 | 03 | .5 | 02.3 | 02.7 | 02.8 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 |
| 40 | 15 | 03 | .7 | 02.6 | 02.8 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 |
| 40 | 15 | 03 | .9 | 02.8 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 | 02.9 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 40 | 15 | 06 | .2 | 02.5 | 03.8 | 04.5 | 04.9 | 05.1 | 05.3 | 05.4 | 05.4 |
| 40 | 15 | 06 | .3 | 03.4 | 04.6 | 05.1 | 05.3 | 05.4 | 05.5 | 05.6 | 05.6 |
| 40 | 15 | 06 | .5 | 04.5 | 05.3 | 05.5 | 05.6 | 05.6 | 05.7 | 05.7 | 05.7 |
| 40 | 15 | 06 | .7 | 05.2 | 05.6 | 05.6 | 05.7 | 05.7 | 05.7 | 05.7 | 05.7 |
| 40 | 15 | 06 | .9 | 05.6 | 05.7 | 05.7 | 05.7 | 05.7 | 05.7 | 05.7 | 05.7 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 40 | 15 | 09 | .2 | 03.8 | 05.6 | 06.6 | 07.2 | 07.6 | 07.8 | 08.0 | 08.1 |
| 40 | 15 | 09 | .3 | 05.0 | 06.8 | 07.5 | 07.9 | 08.1 | 08.2 | 08.3 | 08.4 |
| 40 | 15 | 09 | .5 | 06.7 | 07.9 | 08.2 | 08.4 | 08.4 | 08.4 | 08.5 | 08.5 |
| 40 | 15 | 09 | .7 | 07.7 | 08.3 | 08.4 | 08.5 | 08.5 | 08.5 | 08.5 | 08.5 |
| 40 | 15 | 09 | .9 | 08.3 | 08.5 | 08.5 | 08.5 | 08.5 | 08.5 | 08.5 | 08.5 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 40 | 15 | 12 | .2 | 05.0 | 07.5 | 08.8 | 09.6 | 10.1 | 10.4 | 10.6 | 10.8 |
| 40 | 15 | 12 | .3 | 06.7 | 09.0 | 10.0 | 10.5 | 10.8 | 11.0 | 11.1 | 11.1 |
| 40 | 15 | 12 | .5 | 08.9 | 10.5 | 10.9 | 11.1 | 11.2 | 11.2 | 11.2 | 11.3 |
| 40 | 15 | 12 | .7 | 10.2 | 11.0 | 11.2 | 11.2 | 11.3 | 11.3 | 11.3 | 11.3 |
| 40 | 15 | 12 | .9 | 11.0 | 11.2 | 11.3 | 11.3 | 11.3 | 11.3 | 11.3 | 11.3 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 40 | 20 | 04 | .2 | 01.3 | 02.1 | 02.6 | 02.9 | 03.1 | 03.2 | 03.3 | 03.4 |
| 40 | 20 | 04 | .3 | 01.9 | 02.7 | 03.0 | 03.3 | 03.4 | 03.5 | 03.5 | 03.5 |
| 40 | 20 | 04 | .5 | 02.6 | 03.2 | 03.4 | 03.5 | 03.6 | 03.6 | 03.6 | 03.6 |
| 40 | 20 | 04 | .7 | 03.1 | 03.5 | 03.6 | 03.6 | 03.6 | 03.6 | 03.6 | 03.6 |
| 40 | 20 | 04 | .9 | 03.5 | 03.6 | 03.6 | 03.6 | 03.6 | 03.6 | 03.6 | 03.6 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 40 | 20 | 08 | .2 | 02.7 | 04.2 | 05.1 | 05.7 | 06.0 | 06.3 | 06.5 | 06.6 |
| 40 | 20 | 08 | .3 | 03.7 | 05.2 | 06.0 | 06.4 | 06.6 | 06.8 | 06.9 | 06.9 |
| 40 | 20 | 08 | .5 | 05.2 | 06.3 | 06.7 | 06.9 | 07.0 | 07.0 | 07.0 | 07.0 |
| 40 | 20 | 08 | .7 | 06.2 | 06.8 | 07.0 | 07.0 | 07.1 | 07.1 | 07.1 | 07.1 |
| 40 | 20 | 08 | .9 | 06.8 | 07.0 | 07.1 | 07.1 | 07.1 | 07.1 | 07.1 | 07.1 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 40 | 20 | 12 | .2 | 04.0 | 06.2 | 07.6 | 08.4 | 09.0 | 09.4 | 09.7 | 09.9 |
| 40 | 20 | 12 | .3 | 05.5 | 07.8 | 08.9 | 09.5 | 09.9 | 10.1 | 10.2 | 10.3 |
| 40 | 20 | 12 | .5 | 07.7 | 09.5 | 10.1 | 10.3 | 10.4 | 10.5 | 10.5 | 10.5 |
| 40 | 20 | 12 | .7 | 09.2 | 10.2 | 10.4 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 |
| 40 | 20 | 12 | .9 | 10.2 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 |
|    |    |    |    |      |      |      |      |      |      |      |      |
| 40 | 20 | 16 | .2 | 05.3 | 08.3 | 10.1 | 11.2 | 11.9 | 12.5 | 12.8 | 13.1 |
| 40 | 20 | 16 | .3 | 07.3 | 10.3 | 11.8 | 12.6 | 13.1 | 13.4 | 13.6 | 13.7 |
| 40 | 20 | 16 | .5 | 10.2 | 12.6 | 13.4 | 13.7 | 13.8 | 13.9 | 13.9 | 14.0 |
| 40 | 20 | 16 | .7 | 12.2 | 13.5 | 13.9 | 13.9 | 14.0 | 14.0 | 14.0 | 14.0 |
| 40 | 20 | 16 | .9 | 13.5 | 13.9 | 14.0 | 14.0 | 14.0 | 14.0 | 14.0 | 14.0 |



Loss in Attrition  
Due to Degradation of Information

as dependent on number of shots per battery ( $m/B$ )  
for different characteristic kill probabilities ( $p$ )

(For definitions see p. 1)

10 Batteries, 5 Targets  
Information on 1 target

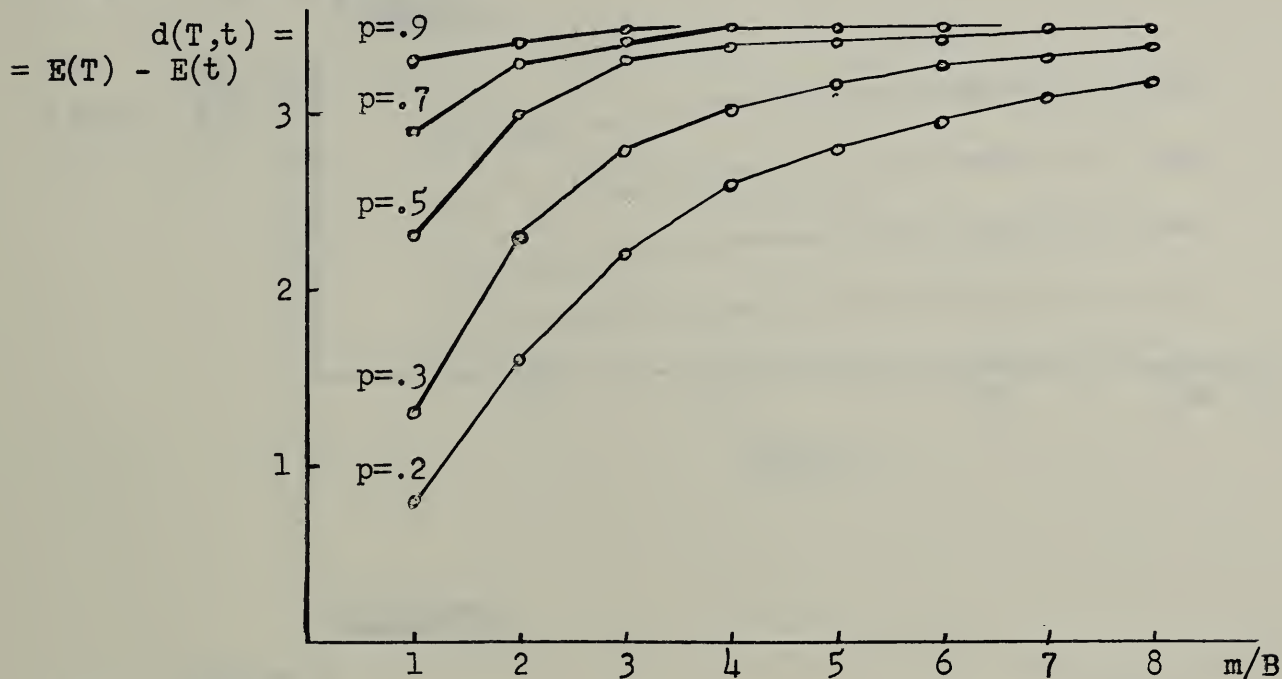


Figure 1

40 Batteries, 20 Targets  
Information on 16 targets

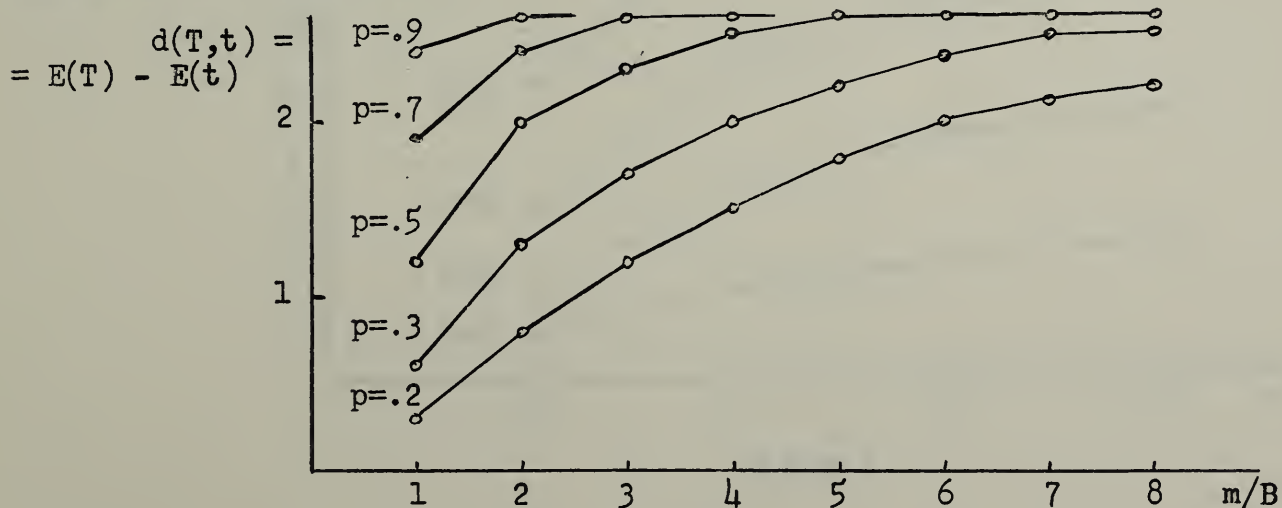


Figure 2





Loss in Attrition  
Due to Degradation of Information

as dependent on number of batteries (B)  
for different numbers of targets on which information is received (t)  
Characteristic Kill Probability  $p = .5$   
Shots per battery  $m/B = 4$ .

(For definitions see p. 1)

5 Targets

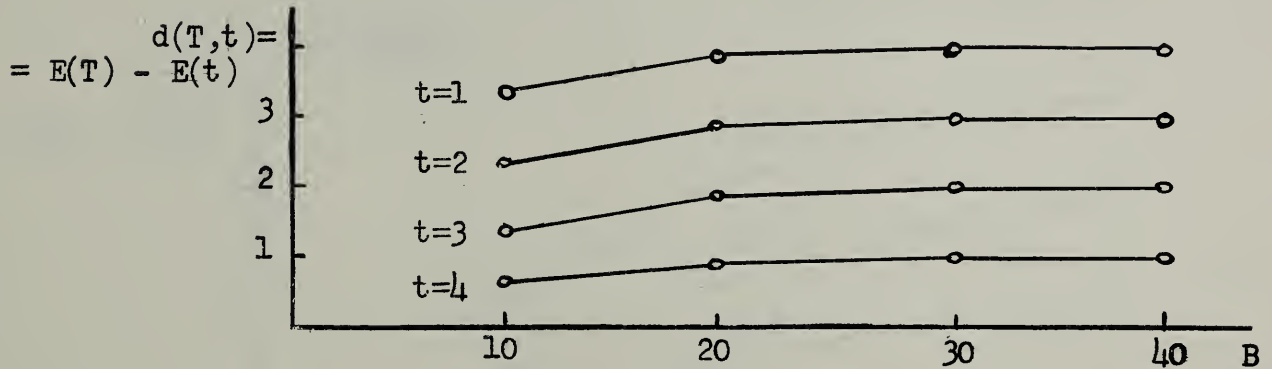


Figure 3

10 Targets

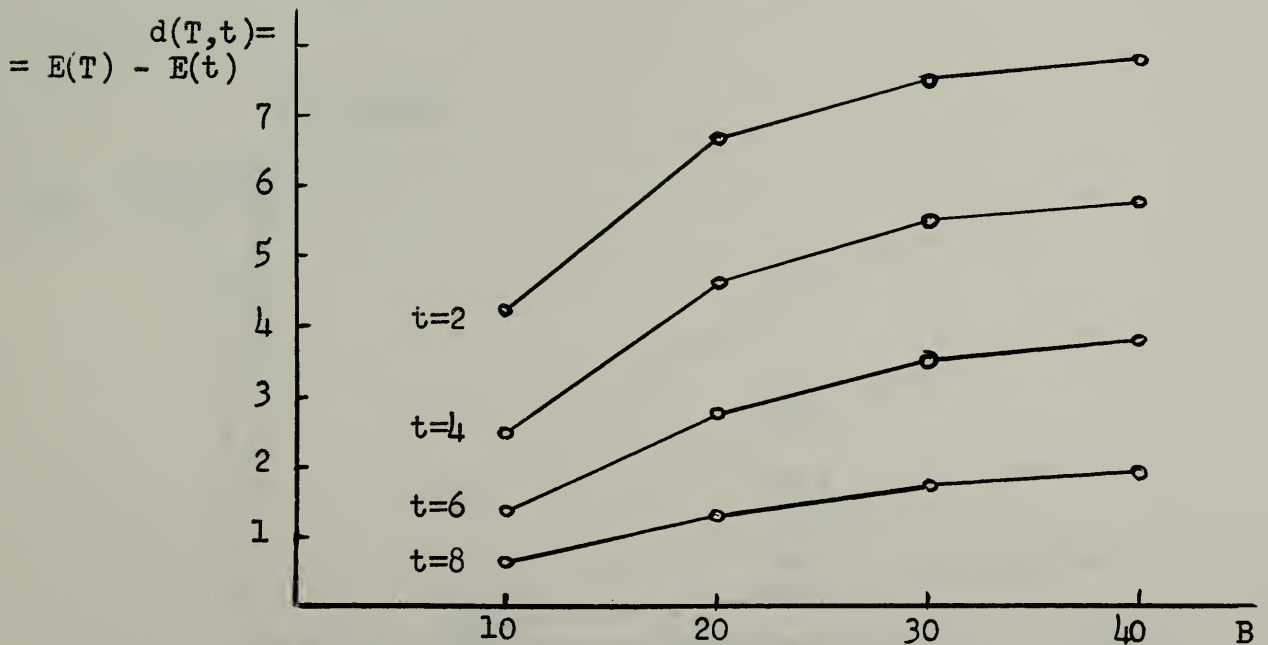


Figure 4



Loss in Attrition  
Due to Degradation of Information

as dependent on number of batteries (B)  
for different numbers of targets on which information is received (t)  
Characteristic Kill Probability  $p = .5$   
Shots per battery  $m/B = 4$ .

(For definitions see p. 1)

15 Targets

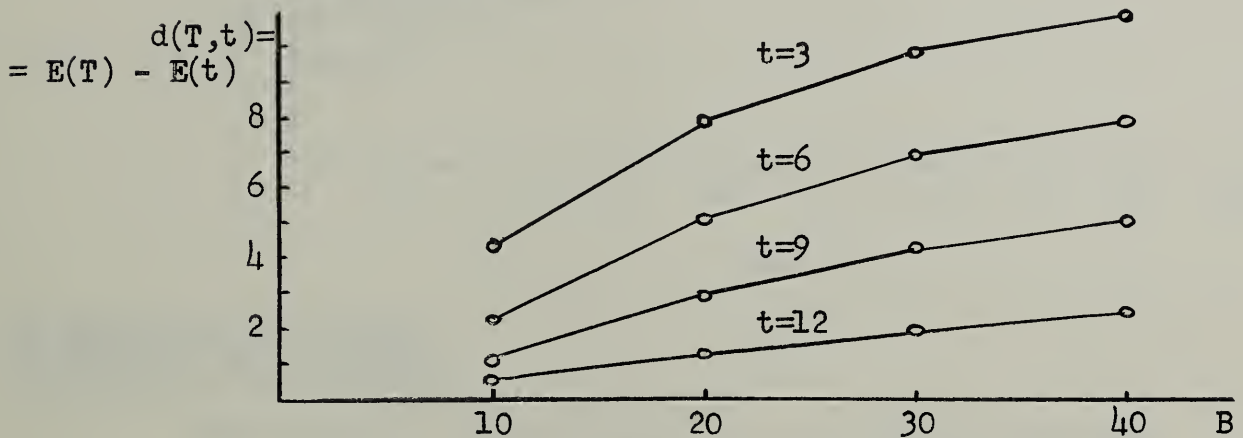


Figure 5

20 Targets

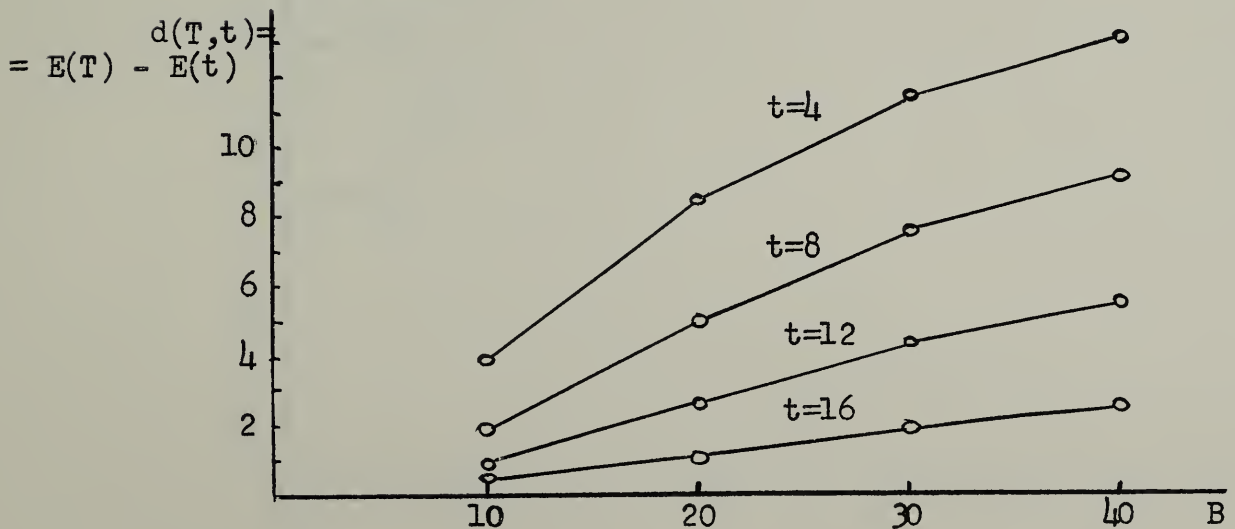


Figure 6





Remaining Attrition  
After Degradation of Information

as dependent on number of shots per battery ( $m/B$ )  
for different characteristic kill probabilities ( $p$ )

(For definitions see p. 10)

10 Batteries, 5 Targets  
Information on 4 targets

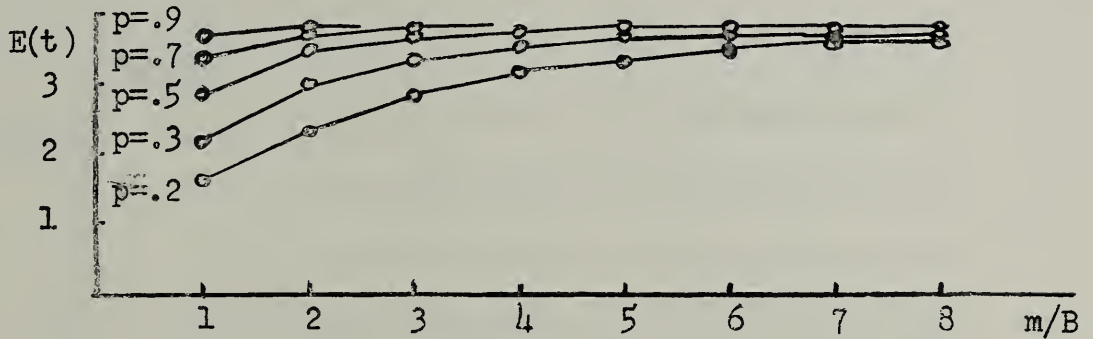


Figure 7

40 Batteries, 20 Targets  
Information on 12 targets

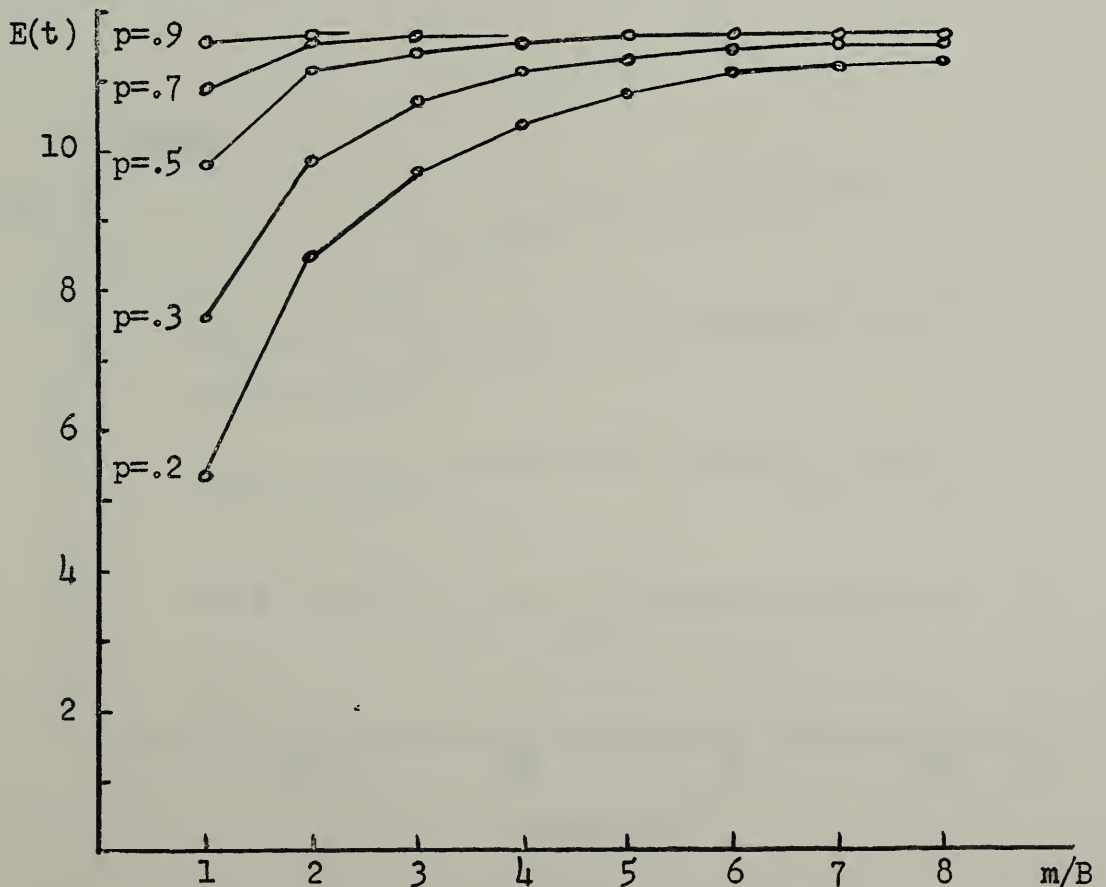


Figure 8



Remaining Attrition  
After Degradation of Information

as dependent on number of batteries (B)  
for different numbers of targets on which information is received (t)  
Characteristic kill probability  $p = .5$   
Shots per battery  $m/B = 4$

(For definitions see p. 10)

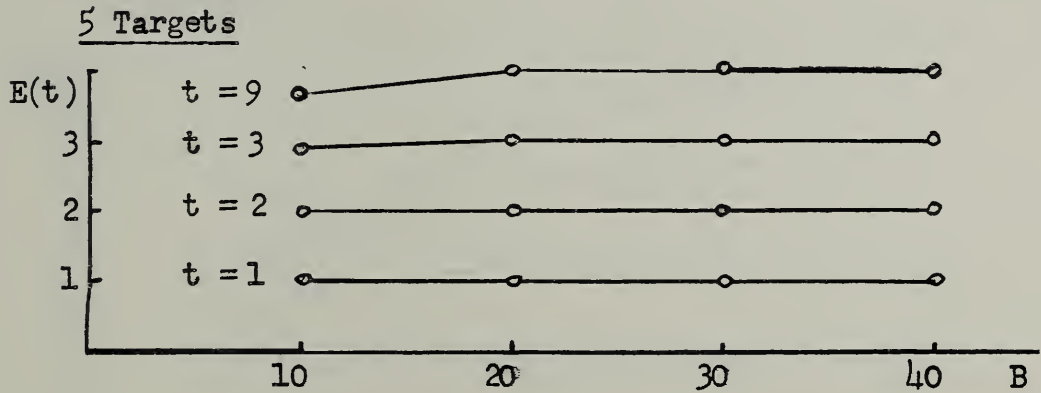


Figure 9

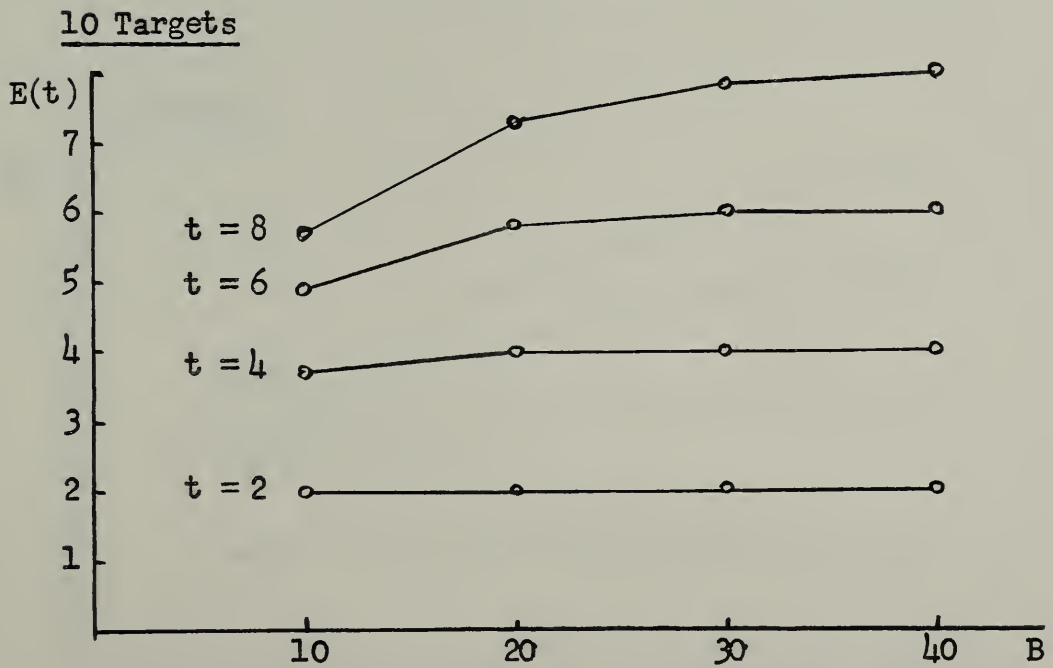


Figure 10





Remaining Attrition  
After Degradation of Information

as dependent on number of batteries (B)  
for different numbers of targets on which information is received (t)  
Characteristic kill probability  $p = .5$   
Shots per battery  $m/B = 4$

(For definitions see p. 10)

15 Targets

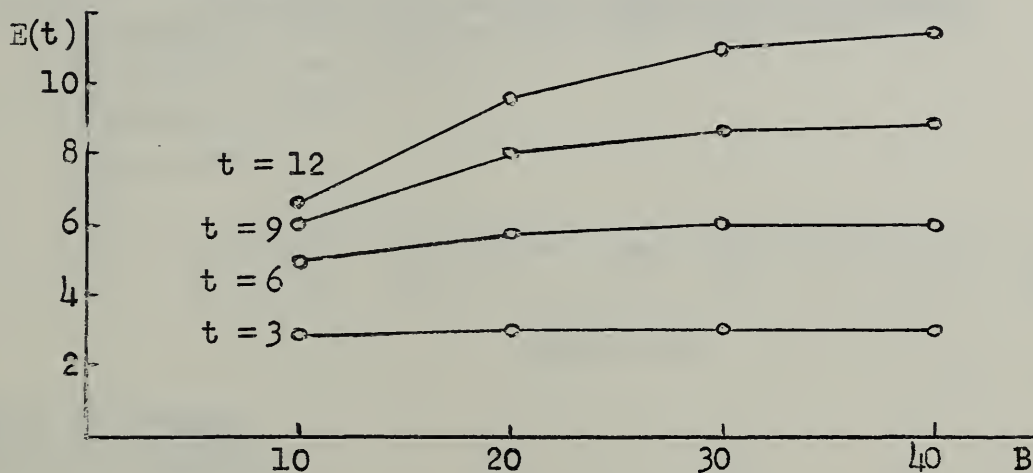


Figure 11

20 Targets

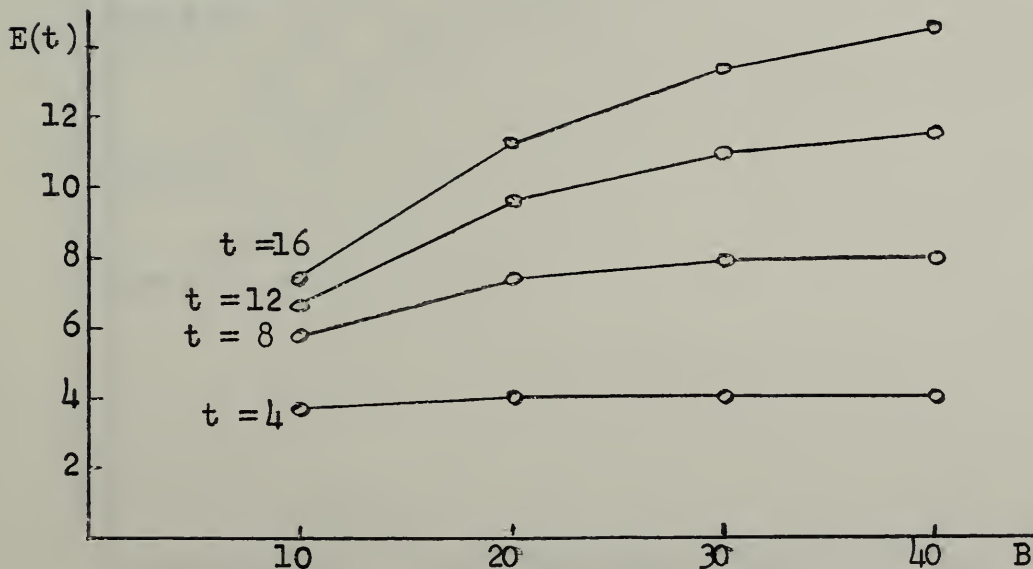


Figure 12



Remaining Attrition  
After Reserving Batteries to Allow for  
Degradation of Information

as dependent on number of shots per battery ( $m/B$ )  
for different characteristic kill probabilities ( $p$ )

(For definitions see p. 19)

10 Batteries, 5 Targets  
Information on 4 targets

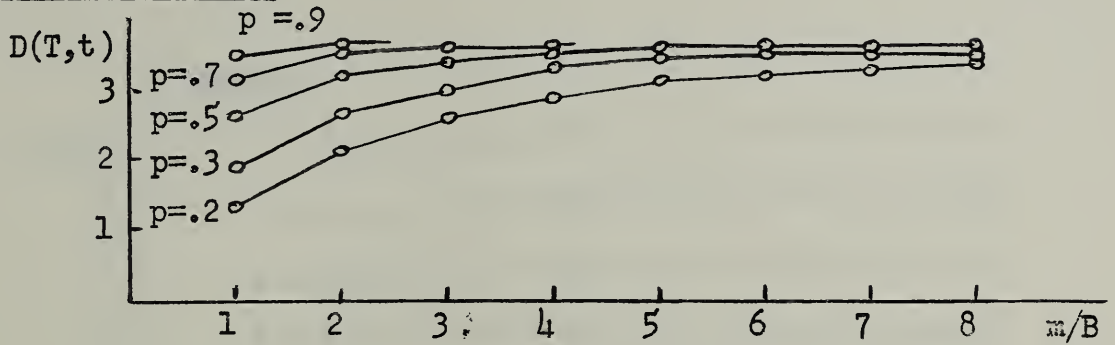


Figure 13

40 Batteries, 20 Targets  
Information on 12 targets

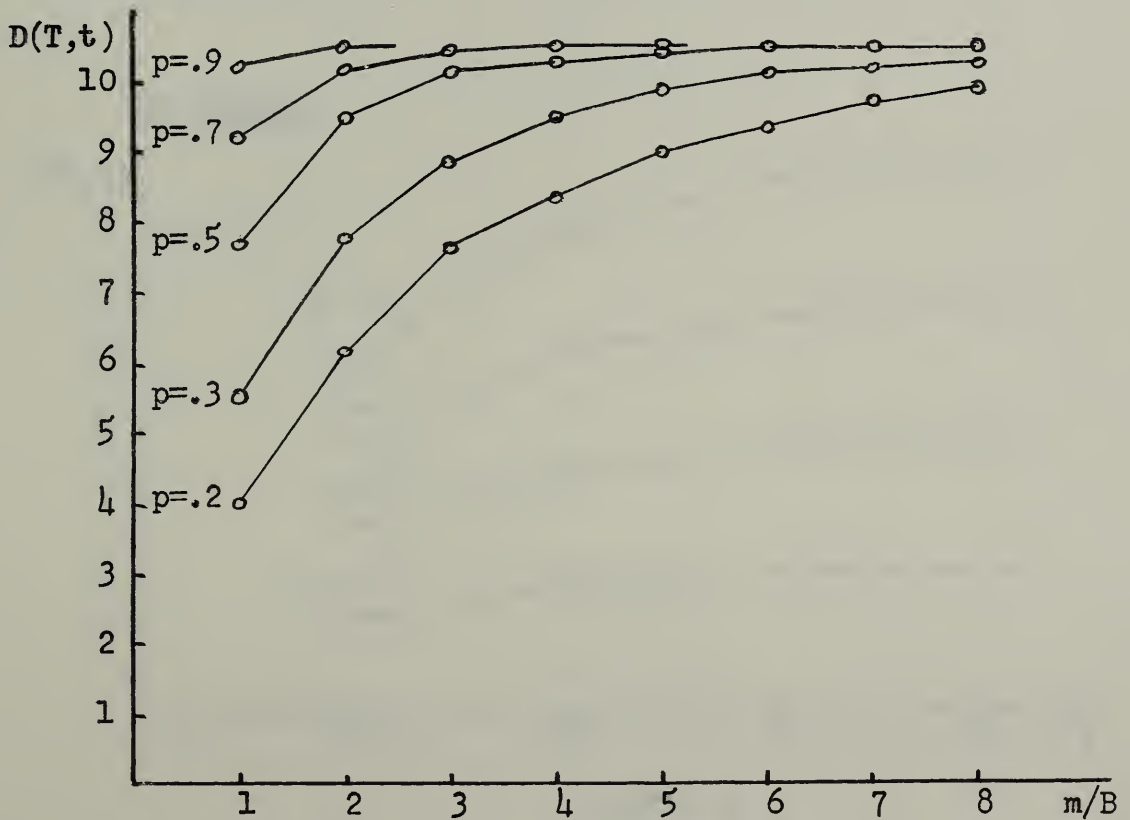


Figure 14





Remaining Attrition  
After Reserving Batteries to Allow for  
Degradation of Information

as dependent on number of batteries (B)  
for different numbers of targets on which information is received (t)  
Characteristic kill probability  $p = .5$   
Shots per battery  $m/B = 4$

(For definitions see p. 19)

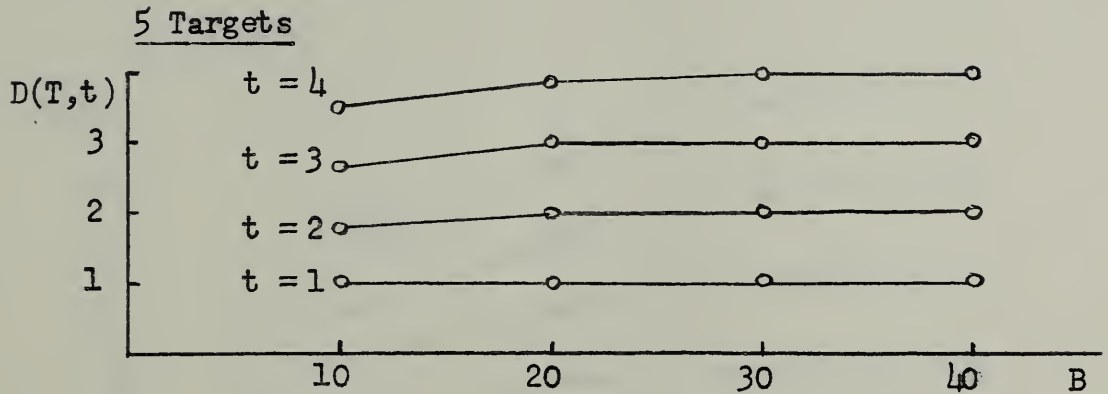


Figure 15

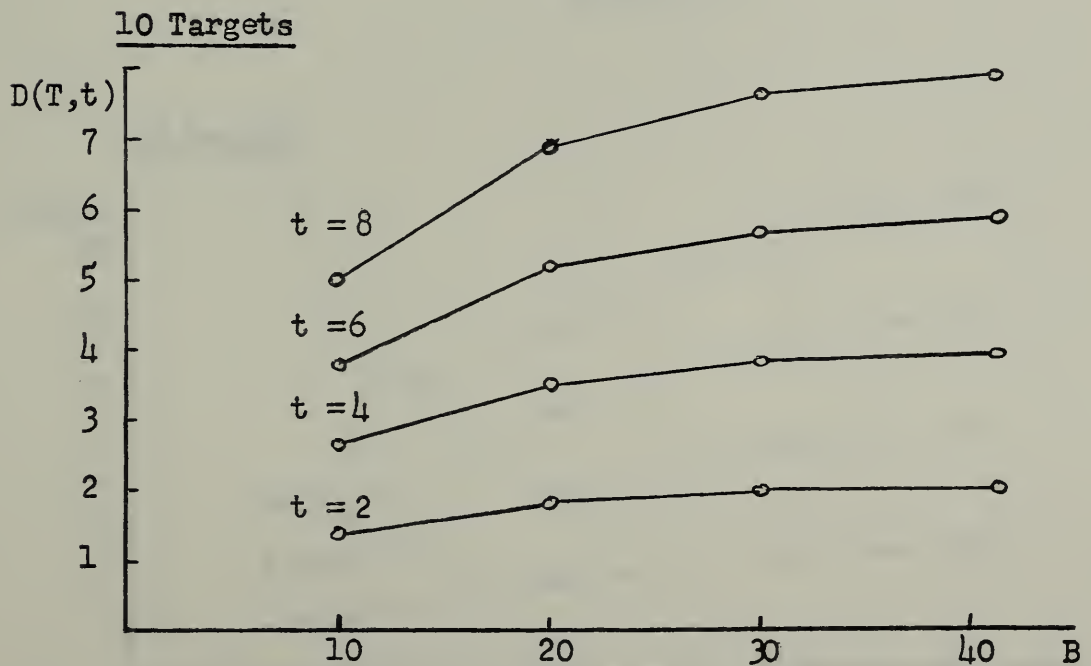


Figure 16



Remaining Attrition  
After Reserving Batteries to Allow for  
Degradation of Information

as dependent on number of batteries (B)  
for different numbers of targets on which information is received (t)  
Characteristic kill probability  $p = .5$   
Shots per battery  $m/B = 4$

(For definitions see p. 19)

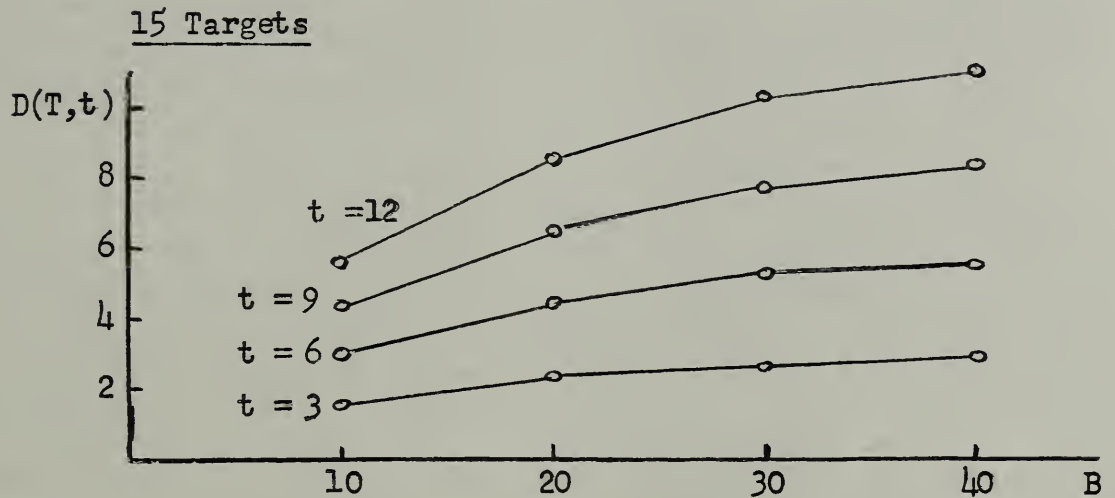


Figure 17

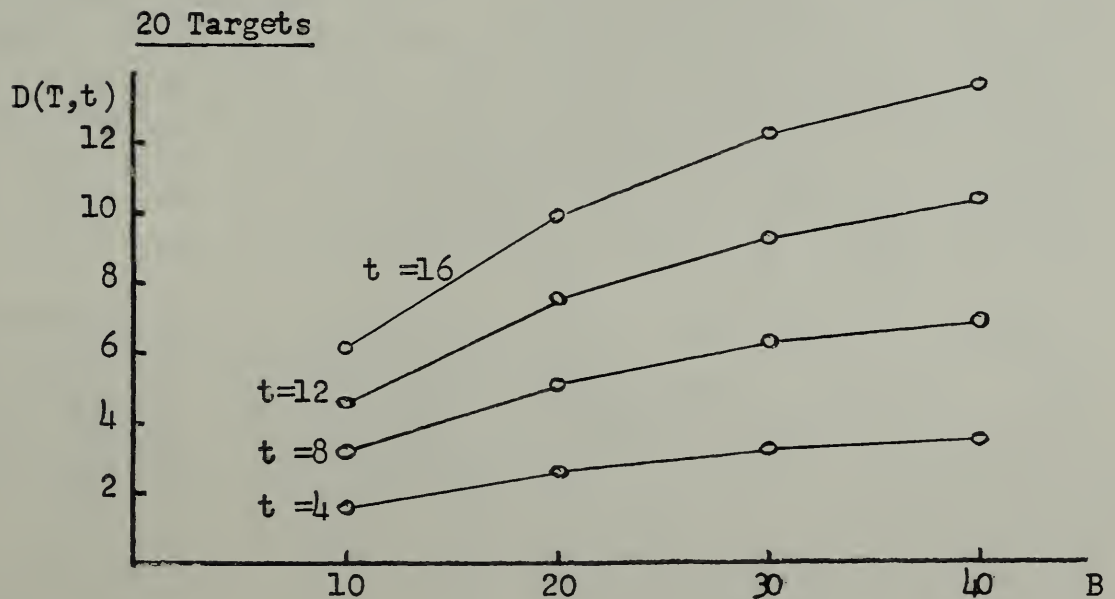


Figure 18





## THE NATIONAL BUREAU OF STANDARDS

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