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LEAP Vis-A-Vis SESAME



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JANUARY 1987

FINAL REPORT

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JANUARY 1987

DR. FRANK FOX

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) It is possible to compute the quantity of spare parts needed for aviation weapons systems by two different models, the Logistics Effectiveness Analysis Process (LEAP), and the Selected Essential-Item Stockage for Availability Method (SESAME). SESAME is detailed, complex, and somewhat difficult to use correctly while LEAP is simplistic and easy to use. It was desired to know how the results of the models differed and a comparison of the two models was performed. (continued) diver		

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20. ABSTRACT (Continued).

Even though both LEAP and SESAME can compute spare parts requirements, they do so with different underlying assumptions. The spare parts computation of each model depends on at least one parameter which is not used in the other model. Using sample data, it was possible to vary those parameters so that the spare parts requirements computed by the models were somewhat similar. However the similarity of the results depends on the manipulation of the parameters, not necessarily a fundamental similarity of the models.

*Keywords: provisioning spares; replenishment spares;
Computations.*

TABLE OF CONTENTS

	<u>PAGE</u>
I. INTRODUCTION	1
II. DESCRIPTION OF THE LEAP MODEL	2
III. DESCRIPTION OF SESAME	6
IV. COMPARISON OF LEAP AND SESAME	11
V. CONCLUSIONS	18
REFERENCES	19

LIST OF TABLES

<u>TABLE</u>		<u>PAGE</u>
1	Comparison of LEAP and SESAME, TAT = 45 days	14&15
2	Comparison of LEAP and SESAME, TAT = 90 days	16&17

LIST OF FIGURES

<u>FIGURE</u>		<u>PAGE</u>
1	LEAP Repair Schema	2
2	SESAME Summary Report	9

I. INTRODUCTION

A. The Selected Essential-Item Stockage for Availability Method (SESAME) is a complex and comprehensive provisioning computer model written and maintained by the U.S. Army Inventory Research Office and approved by AMC for budget computations of provisioning for newly fielded equipment. One of SESAME's attractive features is that it will compute the necessary stockage to achieve a specified operational availability of a weapons system. AMC is enamored with the concept of sparing-to-availability and insists upon that capability in its provisioning models.

B. The Logistic Element Alternatives Process (LEAP) is a very simple model devised by the McDonnell Aircraft Company to quickly analyze the support position of an individual spare part of a weapons system. LEAP does not consider the weapons system as a whole and therefore does not address the operational availability of the weapons system.

C. The Department of Army (DA) is interested in having a comparison made between LEAP and SESAME. Since people at the Army Aviation Systems Command (AVSCOM) had knowledge of both LEAP and SESAME, DA requested through AMC that an analysis of LEAP and SESAME be performed by AVSCOM to identify their similarities and differences.

D. Since DA wanted the results of this comparison for use in the Aviation Spares Round III meeting, there was very little time to perform the analysis. However, it was possible to obtain a description of the LEAP model, develop an understanding of LEAP and make a comparison of it with SESAME.

E. In summary, the findings are that based on their respective assumptions both LEAP and SESAME are valid models of what they purport to model. However, the two models have different purposes and perspectives. Although both model a logistics supply system, they model different aspects of the system with different underlying assumptions. Therefore, the bottom line is that the two models are simple not truly comparable. Keeping that in mind, it is possible to compute stockage amounts for certain representative spare parts by using LEAP in a certain way and to also compute stockage amounts for the same spare parts by using SESAME in a certain way. However, the LEAP computations depend on a LEAP variable, the protection level, which is not used in SESAME; and the SESAME computations depend on several variables and methodologies which do not exist in LEAP. Even though it was possible to manipulate these variables so that the stockage quantities computed by LEAP and SESAME are reasonably close for the very special case considered here, that may be no more than a coincidence and caution should be exercised in drawing broader conclusions.

II. DESCRIPTION OF THE LEAP MODEL

A. Information describing the LEAP model was obtained from reference 1. The Logistic Element Alternatives Process (LEAP) model, written by McDonnell Aircraft Company, is a very simple logistics model consisting of three equations. It is designed to facilitate micro-management of a few specific parts without the complications of using more complex models such as SESAME, for example. LEAP is not intended to replace a model such as SESAME, but to supplement it.

B. LEAP maintenance and supply structure is a one level retail supply structure (presumably at what would correspond to a combination of AVUM and AVIM) and a two level maintenance structure called intermediate and depot. (However, the names are unimportant.) When a part fails it is repaired at either intermediate or depot and returned to the retail stockpoint. The repair cycle time depends upon where the repair is made. The depot provides repair only and no resupply of components (See Figure 1 below).

LEAP REPAIR SCHEMA

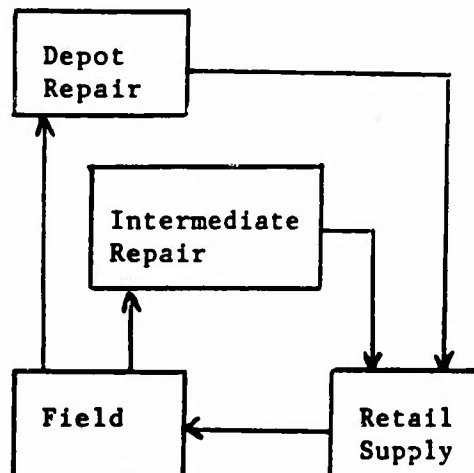


Figure 1

C. LEAP considers no washouts; every part which fails is repaired, and there are no new parts entering the supply system. In particular, new parts are not shipped from depot when that is faster than waiting for the part to be repaired.

D. LEAP treats only one spare part at a time. However, it can be used repetitively for as many spare parts as desired.

E. Even though LEAP does not treat washouts, it can be applied to that portion of failures of a part which are not washed out. For example if 20 percent of the failures of a part are discarded and 80 percent of them are repaired, the LEAP model can be applied to the 80 percent of the failures which are repaired.

F. Description of the LEAP Variables

The following two variables refer to the fleet of aircraft under consideration.

1. AC = the number of aircraft in the fleet.

2. UR = the number of hours flown per aircraft in one day.

The following variables refer to a particular spare part on the aircraft in the fleet.

3. MTBR = the mean time between removal in flying hours for the spare part under study.

4. DTAT = the turn around time for repair at depot (both DTAT and ITAT include the time to send the part to the repair facility, the time to repair the part, and the time to send it back to retail supply.)

5. ITAT = the turn around time for repair at intermediate level.

6. BCM = the fraction of the repairs which must be done at depot.

7. N = the number of spares stocked for the spare part under study.

The following three variables can be computed from the others.

8. TAT = the average turn around time.

9. λ = the expected number of demands for a spare part during a period of time equal to TAT.

10. P = the probability of not running out of spares during the TAT.

G. Description of the LEAP Methodology

1. The simplest way to illustrate how the model works is with an example. Suppose that there is a fleet of 25 aircraft each of which fly an average of two hours a day. Suppose that a particular spare part on that aircraft fails and has to be replaced on the average every 350 flying hours. Further, suppose that when the part fails .25 of the time the repair must be performed at depot (that means the other .75 must be done at the intermediate level). Let the turn around time be 80 days for depot and 20 days for intermediate level.

2. Using the previous notation,

AC = 25 aircraft

UR = 2 hrs/day/aircraft

MTBR = 350 flying hours

DTAT = 80 days

ITAT = 20 days

BCM = .25

3. The average turn around time TAT is a weighted average of DTAT and ITAT, weighted by the percentages at each level. In this case,

$$TAT = .25(80) + .75(20) = 35 \text{ days}$$

4. The average number of demands in one TAT is represented by λ . It can be calculated by determining the total number of flying hours flown during a TAT and dividing by the average flying hours between removals, MTBR.

$$\lambda = \frac{(AC)(UR)(TAT)}{MTBR} = \frac{(25)(2)(35)}{350} = 5$$

5. In other words, the 25 aircraft would need 5 spare parts of that particular kind during a 35 day period on the average. However, the failures do not occur with exact regularity, 5 each 35 days. They occur at random with an average rate of 5 each 35 days. In any given 35 day period fewer than 5, exactly 5, or more than 5 may occur. For a margin of safety, let's assume that 6 spare parts are stocked.

6. A period of time equal to the TAT is considered, 35 days in this example. The TAT is chosen as the time interval to be considered, because on the average at the end of the TAT a repaired part will have become available for use. In this example there are 6 spare parts in stock to cover the demands. There will be sufficient spare parts as long as there are 6 or fewer demands in a TAT.

7. Assuming that the demands for spare parts is a Poisson process (a standard assumption), the probability can be calculated for 0,1,2,3,4,5,6 demands. The sum of those chosen probabilities covers all possible cases in which the spare parts are adequate. That sum P of probabilities is called the protection level. In this case,

$$P = \sum_{x=0}^6 P(x)$$

where $P(x) = \frac{e^{-5} 5^x}{x!}$ is the Poisson probability that x demands will occur.

Using a table to evaluate the probabilities gives

$$P(0) = .0067$$

$$P(1) = .0337$$

$$P(2) = .0842$$

$$P(3) = .1404$$

$$P(4) = .1755$$

$$P(5) = .1755$$

$$P(6) = .1462$$

Therefore $P = .7622 \approx .76$

8. In other words, there is a protection level of 76% that the number of spare parts is adequate. In general, the computational formulas are:

$$TAT = (BCM) (DTAT) + (1-BCM)(ITAT)$$

$$\lambda = \frac{(AC) (UR) (TAT)}{MTBR}$$

$$P = \sum_{x=0}^N \frac{e^{-\lambda} \lambda^x}{x!}$$

9. The LEAP model can be used to compute a protection level for each spare part under consideration. Some value can be chosen as being an adequate protection level. Reference 1 uses a protection level of 80%. The protection level for each spare part can be compared with the standard value, say 80%. Measures can then be taken to bring the protection levels to approximately 80%. For example, increasing N, the number of spares, would increase the protection level; decreasing N would decrease the protection level if it were too high. Other ways of increasing the protection level are reliability improvements to increase MTBR, dedicated transportation and intensive management to decrease TAT, and additional repair capability at the field level to decrease BCM.

10. The preceding paragraph illustrates the chief purpose of LEAP, to allow a logistics manager to focus on one specific spare part and consider changes in a few basic parameters which could improve the support position for that spare part.

III. DESCRIPTION OF SESAME

A. Information about the Selected Essential-Item Stockage for Availability Method (SESAME) was obtained from references 2 and 3. SESAME is a complex and comprehensive computer model written and maintained by the U.S. Army Inventory Research Office (IRO) and approved by AMC for budget computations for provisioning of newly fielded equipment. SESAME is a standardized model utilized by all AMC major subordinate commands (MSC). It conforms to the dictates of DODI 4140.42, and can be used in the sparing-to-availability mode as well as the demand based stockage mode.

B. The use of SESAME at the MSCs and the modifications to SESAME by the IRO are guided by the AMC Requirements Modeling Technical Working Group (RMTWG). Since SESAME is written and maintained by Army personnel under the guidance of AMC, it can be modified as AMC wishes to adhere to whatever changes occur in AMC spares computation policies.

C. Over the years SESAME has evolved to the point that it has many different modes and applications. There isn't time to explore all of its applications here. (See reference 2 for a more complete description of its capabilities.) The focus in this paper will be on using SESAME for aviation systems to determine the stockage to achieve a specified operational availability which is the application which lends itself most readily to a comparison with LEAP.

D. For aviation systems, SESAME has a three level supply system with a corresponding three level maintenance supply system (AVUM, AVIM, and Depot). The list and definition of variables in the following section is indicative of detail and completeness of the SESAME logistics system.

E. Description of SESAME Variables: The following three variables depend on the system being represented by the SESAME run:

1. A_o = the target operational availability, ie. the operational availability which it is desired for the system to achieve.

2. MCTBF = the mean calendar time between failures measured in days for the system.

3. MTTR = the mean calendar time measured in days to repair the system when a failure occurs.

F. The following parameters can be varied, but are usually input with the default values shown for them:

1. Wholesale stock availability, the percent of the time that the wholesale stock system is able to fill a requisition on the first pass = 85%.

2. Conditional delay, the average amount of time that the wholesale stock point takes to satisfy a demand for an out of stock item = 120 days.

3. Maximum supply availability for all parts = 99.999%. Supply availability of a part is the percentage of time there are no backorders for that part.

4. Minimum supply availability for all parts = 85%.

5. The number of demands per year at a retail stockpoint in order for the stockpoint to stock that part. For aviation systems, three demands a year are required.

6. Order ship time, the time in days between initiation of a stock replenishment action and the receipt of the material by the requesting activity. AVUM to AVIM = 2 days and AVIM to Depot = 15 days.

7. Unserviceable returns rate, the percent of items which should be shipped back to the depot which actually arrive at the depot = 85%.

8. Retail operating level/safety level, the number of days worth of stock intended to sustain normal operations during the interval between receipt of replenishment shipment and submission of a subsequent replenishment requisition = 15 days at AVUM, 30 days at AVIM.

G The following variables refer to the deployment of the aircraft and the supply system in the field. There is a separate SESAME run for each year of deployment.

1. Beginning density, the number of fielded aircraft at the start of the year and ending density, the number of fielded aircraft at the end of the year.

2. Claimants, the number of AVUMs and AVIMs deployed that year.

3. Operational units of program, the number of aircraft supported by each AVUM and the number of aircraft supported by each AVIM.

H. The following variables are for the parts data base and all of them must be input for each part in the parts data base.

1. Peacetime failure factor, the number of failures experienced by 100 of the parts in one year (assuming a specified number of flying hours a year.)

2. Washout rate, the percentage of failures which are discarded without repair.

3. Unit price, the price of the spare part.

4. Unit price of the next higher assembly.

5. Replacement task distributions, the percentages of removals of the part which occur at AVUM, AVIM, and Depot.

6. Maintenance task distributions, the percentages of repairs performed at AVUM, AVIM, and Depot.

7. Repair turn around time at AVUM, AVIM, and Depot, the number of days to ship the part to the repair facility plus the time to repair the part.

8. Funding category, designation of the part as funded under PAA or ASF.

9. Essentiality code, a code to indicate whether the part is essential or not.

10. Designation of the part as an LRU or a non-LRU.

I. In the principle application of SESAME, the summary output report gives the dollar value (separated by appropriation fund) of the retail stockage necessary to achieve the target operational availability. It also shows the dollar value (separated by appropriation fund) of the wholesale stockage which is separated into the wholesale pipeline and the wholesale consumption. An example of a summary report is shown in Figure 2. It is also possible to generate a detailed output which shows for each part in the data base the quantity and location of the stockage of that part. It is from this detailed output that the stockage of each individual spare part is determined.

J. Description of the SESAME Methodology: In order to see how SESAME works, assume that the variables 4-11 are given the default values indicated for them, that a deployment schedule exists from which values can be obtained for variables 12-14, and that a parts data base containing all the parts on a weapons system (perhaps 10,000 different parts or a representative subset thereof) has been created such that values exist for variables 15-24 for each part in the data base.

K. At this point the only variables with unassigned values are A_o , MCTBF, and MTTR. Lets suppose that for the weapons system under study its desired to achieve an $A_o = .75$ which is a standard value for aviation systems. Further, suppose that for the weapon system,

MCTBF = 9 days

MTTR = 1 day

The standard formula for operational availability is:

$$(1) A_o = \frac{MCTBF}{MCTBF + MTTR + MLDT}$$

where MLDT = mean logistics delay time, the average number of days the system is out of service while awaiting a part when a failure occurs.

L. When values for variables 1-3 are input into SESAME, equation (1) is solved for the MLDT. Under the given assumptions, the MLDT = 2 days.

AREA = C - CURVE PARAMETER = \$ 10.32

RETAIL

STOCKAGE CODES

ECHELON	CLMETS	NSNS	STK	NSNS	STK	ASF	E	S	A	U	D TOTAL
ORG	1.	36.	29	PAA	47.00	0	29	1	0	0	30
DSU	1.	36.	20		29.00	0		0	0	0	0
GSU	0.	0.	0		0.00	0		0	0	0	0
TOTAL RETAIL \$											
76.00											

THIS RUN HAD 30 LRUS IN THE INPUT DATA.
29 LRUS RECEIVED STOCKAGE GREATER THAN SIP.

MTTR 1.00 MCTBF (INPUT) 9. MCTBF (DERIVED) 46. SUPPLY AVAILABILITY 0.821736 OPERATIONAL AVAILABILITY 0.752986

WHOLESALE BREAKOUT REPAIR PIPELINE CONSUMPTION 0.00 PAA 0.00 ASF 0.00

THESE RESULTS REFLECT THE COST OF PROVISIONING THE CLMETS IN THE AREAS INDICATED ABOVE PLUS THE COST OF \$ 0. AT THE WHOLESALE LEVEL FOR 1.00 YEARS

CURPAR = 10.32
ASF BUDGET = 0.00
PAA BUDGET = 76.00
TOT BUDGET = 76.00

Figure 2

M. By means of a complicated mathematical process, SESAME determines the retail stockage necessary to achieve the calculated MLDT and therefore the indicated Ao. Time doesn't permit going into the mathematical details here. However, an overview will be given to provide the reader with the flavor of the process.

N. SESAME searches for the desired MLDT by means of a curve parameter (CURPAR). The CURPAR represents an artificial daily penalty cost for system downtime. The CURPAR is not a real cost that is incurred in any way; it is merely a device to vary the MLDT. When CURPAR is low, there is little penalty to being out of stock. Hence, stockage is low and the MLDT is high. Conversely if CURPAR is high, there is great penalty to being out of stock. Therefore stockage is high and MLDT is low.

O. For the calculated MLDT, SESAME automatically varies the CURPAR using a searching technique which converges on the target MLDT. During the searching process, SESAME makes computations using various values of CURPAR. For each value of CURPAR tested, SESAME determines the stockage at the retail level which minimizes an objective function consisting of the cost of the total stockage and the total penalty cost of being out of stock. Once the stockage has been determined, a MLDT can be computed for that stockage. Therefore associated with each CURPAR, is a MLDT (and also an Ao) and a cost of retail stockage. A table of such values is part of the SESAME output, and it provides a relationship between the Ao and the cost of the retail stockage for a given deployment.

P. In the comparison with LEAP the quantities stocked of each item will be compared with quantities computed from LEAP.

Q. SESAME also computes a wholesale pipeline and wholesale consumption value. However, those computations are independent of the retail computations, and do not correspond to anything in LEAP.

IV. COMPARISON OF LEAP AND SESAME

A. From the descriptions in sections II and III, it's clear that LEAP and SESAME are quite different. LEAP is a very simplistic model which considers one part at a time and only a few variables. It considers no washouts and no resupply from the depot. It considers sustainment of operations only by means of repair. It gives a simple rule of thumb analysis of the adequacy of stockage of a single part.

B. SESAME involves many more variables than LEAP and many more complex interrelationships. SESAME is concerned with all the parts on a weapons system collectively and involves weapon system parameters which is important since AMC has directed that initial provisioning be done to achieve a specified operational availability. SESAME allows sparing to weapons system operational availability and LEAP does not.

C. Both models are versatile. LEAP's versatility emanates from its simplicity; each of its variables can be solved for if all the others are known. SESAME has grown to a versatile model as new applications have been found for it and modifications made to expand its capability.

D. Both LEAP and SESAME are valid models of what they purport to model. However, they have different purposes and perspectives. Although both model a logistics supply system, they model different aspects of the system with different underlying assumptions. Furthermore, LEAP is not a subset of SESAME; although they do have some common ground.

E. The bottom line is that the models are not truly comparable. Keeping that in mind, it is possible to use each model in a certain way to compute stockage quantities for a given collection of spares and to compare those stockage quantities. However, the LEAP computations depend on a LEAP variable, the protection level, which is not used in SESAME; and the SESAME computations depend on several variables which are not used in LEAP. It's possible to adjust these two separate "control knobs" for LEAP and SESAME so that the stockage quantities are reasonably close. However, this closeness of results is due to the adjustment of the control knobs rather than an inherent similarity of the models.

F. In order to see how the models compared over a range of failure factors, thirty sample parts were constructed with failure factors ranging from 1 to 100. LEAP computations were made for each part separately for three protection levels and two turn around times (6 cases). One SESAME run was made for the collection of thirty parts as a weapons system for the two turn around times (2 cases). The following variables were used in LEAP:

AC = 36 aircraft
UT = .67 flying hrs per day per aircraft

For simplification, the LEAP variables of ITAT, DTAT, and BCM were bypassed, and a value for TAT was input directly. Two values of TAT were used TAT = 45 days and TAT = 90 days.

G. Thirty different values were used for MTBR in LEAP; this represents thirty different parts. The MTBR is computed from the corresponding FF1. The values of FF1 which were used are shown in the tables.

H. Originally a protection level of 80% was used for the LEAP computations since that was the value used in reference 1. However, those stockage quantities were less than the SESAME computations; so LEAP computations were also done for protection levels of 90% and 95%.

I. The LEAP computations were done manually using tables and graphs of the cumulative Poisson distribution. If, for example, the protection level being used was 90%, the number of items stocked was the smallest integer which gave a protection level of at least 90%. Any errors in these computations, should they have occurred, can be attributed to difficulty in reading the graphs.

J. In order to see how failure factor one converts to MTBR, let $FF1 = FF$. That means that 100 items will have FF failures in one year, ie. one item has $FF/100$ failures in one year. The specified flying hour program of 2/3 hrs. per day per aircraft is equivalent to 240 hours a year per aircraft. Failures of parts and removals of parts are taken as synonymous here. Therefore,

$$MTBR = \frac{240 \text{ fly. hrs. per yr.}}{\frac{FF}{100} \text{ failures per yr}} = \frac{24000}{FF} \text{ fly hrs per failure}$$

Substituting this expression for MTBR into the equation for λ gives

$$\lambda = \frac{AC * UT * TAT}{MTBR} = \frac{36 * 2/3 * TAT}{\frac{24000}{FF}} = \frac{FF * TAT}{1000}$$

Therefore $\lambda = \frac{FF * TAT}{1000}$ for the given values of AC and UT.

K. The following variables were used in SESAME to correspond as closely as possible to the LEAP case. Weapons system variables,

Ao = .75
MCTBF = 9 days
MTTR = 1 day

Variables 4-11 have the default values shown earlier (sect. III).

L. Number of aircraft and support structure,

Beginning number of aircraft = 36
Ending number of aircraft = 36

Number of AVUMs = 1
Number of AVIMs = 1
Number of aircraft supported by each AVUM = 36
Number of aircraft supported by each AVIM = 36

M. The parts data base consists of thirty sample parts having the failure factors shown in the tables. For each of the thirty parts, the following variables are the same.

Washout rate = 0
Replacement task distribution = 100% at AVUM
Maintenance task distributions = 100% at AVIM
Turn around time at AVIM = 45 days and 90 days (2 cases)
Essentially code = 1 (item is an essential)
LRU code = L (item is an LRU)

N. The results of the LEAP and SESAME computations are shown in Tables 1 and 2. Table 1 is for a turn-around-time of 45 days and Table 2 is for a turn-around-time of 90 days. The column headed by PL(.8) shows the quantities of items for stockage computed by LEAP for a protection level of 80%. Similarly for PL(.9) and PL(.95). The column headed by SESAME shows the quantities of items for stockage computed by SESAME. SESAME computed stockage at both AVUM and AVIM. Those values were added to get the values in the table. LEAP has only one retail level.

O. Note that the values for LEAP with a protection level of 90% and SESAME are reasonably close for both turn-around-times. However, keep in mind that while LEAP depends on protection level, SESAME depends on several other factors including Ao, MCTBF, MTTR, which mode is used, where the repairs are done, the support structure, OSTs, etc. Therefore, the mere fact that each model can be manipulated so that the stockages are similar in this special case is more an indication of the skill of the analyst than an indication of a fundamental similarity of the models.

TABLE 1. Comparisons of LEAP and SESAME, TAT = 45 days

<u>FF1</u>	<u>λ</u>	<u>PL(.8)</u>	<u>PL(.9)</u>	<u>PL(.95)</u>	<u>SESAME</u>
1	.045	0	0	0	0
2	.090	0	0	1	0
3	.135	0	1	1	1
4	.180	0	1	1	1
5	.225	0	1	1	1
6	.270	1	1	1	1
7	.315	1	1	1	1
8	.360	1	1	1	1
9	.405	1	1	2	2
10	.450	1	1	2	2
11	.495	1	1	2	2
12	.540	1	2	2	2
13	.585	1	2	2	2
14	.630	1	2	2	2
15	.675	1	2	2	2
16	.720	1	2	2	2
17	.765	1	2	2	2
18	.810	1	2	2	2
19	.855	1	2	3	2
20	.900	1	2	3	2
25	1.125	1	3	3	3
30	1.350	1	3	3	3

TABLE 1, (cont'd)

<u>FF1</u>	<u>λ</u>	<u>PL(.8)</u>	<u>PL(.9)</u>	<u>PL(.95)</u>	<u>SESAME</u>
35	1.575	2	3	4	3
40	1.8	2	4	4	4
50	2.25	2	4	5	4
60	2.7	3	5	6	5
70	3.15	4	5	6	5
80	3.6	4	6	7	6
90	4.05	5	7	8	7
100	4.5	5	7	8	7

TABLE 2. Comparison of LEAP and SESAME, TAT = 90 days

<u>FF1</u>	<u>λ</u>	<u>PL(.8)</u>	<u>PL(.9)</u>	<u>PL(.95)</u>	<u>SESAME</u>
1	.09	0	0	0	1
2	.18	0	1	1	1
3	.27	1	1	1	1
4	.36	1	1	2	1
5	.45	1	1	2	2
6	.54	1	2	2	2
7	.63	1	2	2	2
8	.72	1	2	2	2
9	.81	1	2	2	2
10	.90	2	2	3	2
11	.99	2	2	3	2
12	1.08	2	2	3	3
13	1.17	2	3	3	3
14	1.26	2	3	3	3
15	1.35	2	3	3	3
16	1.44	2	3	3	3
17	1.53	2	3	4	3
18	1.62	3	3	4	3
19	1.71	3	3	4	4
20	1.80	3	4	4	4
25	2.25	3	4	5	4
30	2.70	4	4	6	5

TABLE 2, (cont'd)

<u>FF1</u>	<u>λ</u>	<u>PL(.8)</u>	<u>PL(.9)</u>	<u>PL(.95)</u>	<u>SESAME</u>
35	3.15	4	4	6	6
40	3.60	5	6	7	6
50	4.50	6	7	8	7
60	5.40	7	8	9	8
70	6.30	8	10	11	10
80	7.20	9	11	12	11
90	8.10	10	12	13	12
100	9.00	11	13	14	13

V. CONCLUSIONS. Within the scope and timeframe of the comparison, the following is a summary of the conclusions drawn.

A. LEAP and SESAME have more differences than similarities.

B. Both models are valid representations of what they purport to model based on each model's assumptions.

C. LEAP and SESAME differ in the levels of supply and maintenance support modeled.

D. Turn-around-time has a slightly different definition in the two models.

E. LEAP considers only one spare part at a time; while SESAME considers the entire weapons system.

F. LEAP has significantly fewer variables than SESAME and is much more simplistic than SESAME.

G. SESAME takes into account several variables important to logistics considerations which LEAP omits.

H. LEAP is easier to understand and use than SESAME.

I. LEAP can be used for rule-of-thumb analysis of the support position of individual parts.

J. SESAME can be used for sparing-to-availability calculations.

K. SESAME determines a relationship between retail stockage expenditure and operational availability for a given deployment.

L. LEAP is not a subset of SESAME.

M. Under certain special conditions LEAP and SESAME compute similar spare parts requirements.

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