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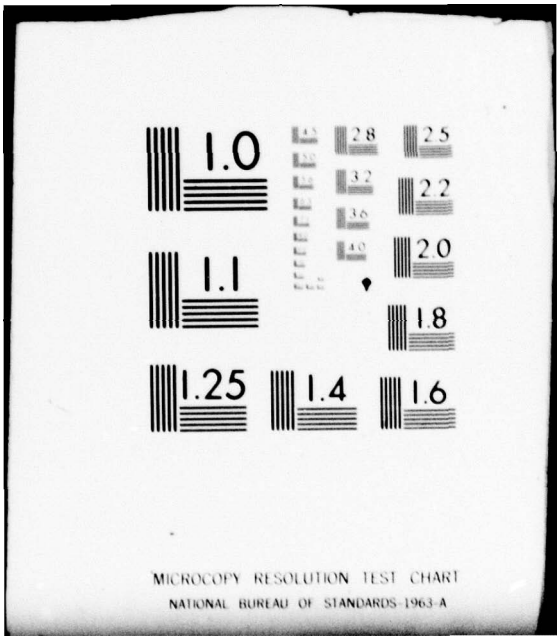
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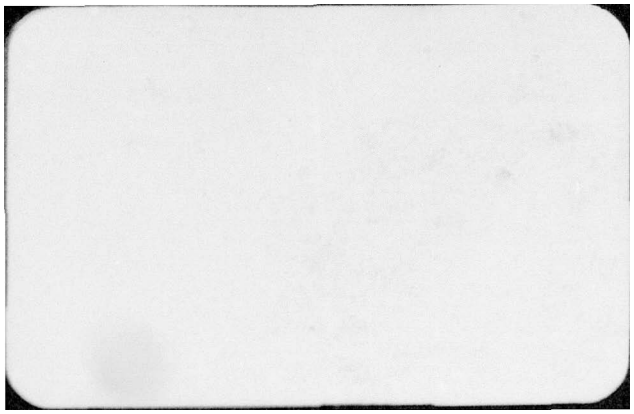

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(6) DEMONSTRATION MODEL SYSTEM.
VOLUME II.

The Naval Electronics Design Cost Model (NEDCOM): Program Manual

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by

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Lynne E. Benner

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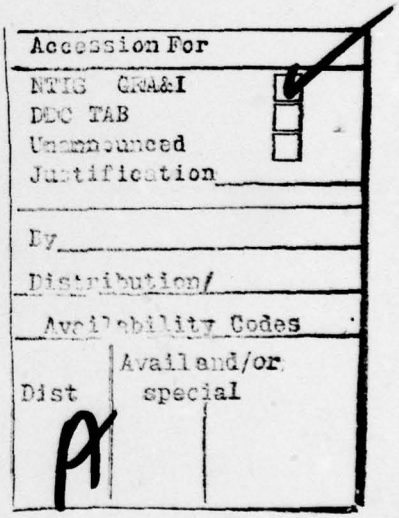


1.0 INTRODUCTION

The Naval Electronics Design Cost Model (NEDCOM) is an interactive computer cost model which estimates the life cycle cost of electronic systems to be deployed in a Navy Shipboard environment. It has been designed to aid the system and component designer in conducting design/cost trade-off analysis, as well as providing a link between the designer and the logistics support specialist.

NEDCOM is implemented on an APPLE II desktop computer system. While far more capable and sophisticated than the programmable calculators used for the Level I Slide-Rule cost models (see Volumes IV and V), the APPLE II is much smaller and less expensive than the full-scale computer systems required for the Level III Model (see Volume I).

Some of the main features of NEDCOM are the following. Life cycle cost for individual Lowest Removable Assemblies (LRA) are computed for four levels of repair postures: repair at a contractor operated depot, repair at a military operated depot, local repair, and discard at failure. The least cost of the four postures is automatically selected and aggregated to system level costs to produce a total system life cycle cost estimate. A sophisticated inventory stockage algorithm computes near optimal values for depot and shipboard spare stockage levels for individual LRA's. This algorithm can be set to either a "fastrun" mode for quicker turnaround time, or a (potentially) more accurate, but less speedy, "slowrun" mode for precise stockage allocation. Complete hardcopy cost

summaries are provided. Finally, NEDCOM provides six different running options. The user can create a new system and LRA data set; add LRA's to an existing data set; alter an existing data set; create a new LRA configuration; run the system with changes; and finally, conduct sensitivity analysis. The last option allows the user to measure the cost impact of changes in system parameters.

Section 2 of this volume presents a brief overview of the NEDCOM system. It includes a summary of the model cost equations, a description of program logic and flow charts. A complete program listing is provided in Section 3. The information provided in Sections 2 and 3 should be sufficient to enable an experienced BASIC programmer to modify NEDCOM, if desired. NEDCOM operating instructions are provided in Volume III.

2.0 SYSTEM DESCRIPTION

NEDCOM is configured as a turnkey system resident on the APPLE II computer system. The APPLE II belongs to the class of machines typically referred to as "personal computers," characterized by small physical size, low cost ($500 - $2,000 for a basic system), and ease of access. This system was selected for NEDCOM development because the personal computer is the next logical step up - in processing power - from the programmable calculators. NEDCOM is fully portable and can operate on hardware costing under $4,500. In our opinion the same forces which acted to produce spectacular price reduction in portable calculators will produce similar reductions in personal computer prices. In this event, personal computers will rapidly become as ubiquitous as programmable calculators.

The APPLE II configuration used to support NEDCOM includes the following:

- Central Processor - The APPLE II mainframe, configured to provide 48,000 bytes (8 bits per byte) of accessible storage to the user. An Hitachi television monitor provides communication to the user.

- Software - The APPLE II is hardwired to provide BASIC, a standard computational language, and - through a plug-in firmware card - APPLESOFT, an extended version of BASIC which provides the capability for scientific computation and more natural instruction formats.

- Peripheral Storage - A small tape cassette deck is available for storage and retrieval of information and programs. Usually, however, NEDCOM uses a disk drive for model storage and storage retrieval of pertinent data. The disk drive uses a "floppy" (non-rigid) disk about six inches in diameter: each interchangeable disk is capable of storing 116,000 bytes of information.

. Printer - We deemed it imperative that NEDCOM furnish printed output to users. The Integral Data Systems (IDS) IP-125 was slected because of price and performance. The IP-125 is capable of printing at several different print densities and character sizes, with a maximum speed of 165 characters per second.

The APPLE II hardware is extremely reliable. Many APPLE users have reported (in private communication) several months of trouble-free operation. In our experience, the IP-125 is not as reliable, although it is relatively easy to repair rapidly. NEDCOM operates under the APPLE II Disk Operating System (DOS). The NEDCOM model is programmed in APPLESOFT II.

The model requires as input 67 system level variables and seven input variables for each LRA. The system variables are divided into four groups: Navy and Environmental Cost Factors, which are independent of the system under consideration; System Operating Environment Variables, which depend upon the type of system, but which probably are not influenced by specific system design; System Manpower and Training Requirements, and System Design Parameters. The last two categories include variables which characterize system design. Complete definitions of the variables are provided in the NEDCOM Users Guide.

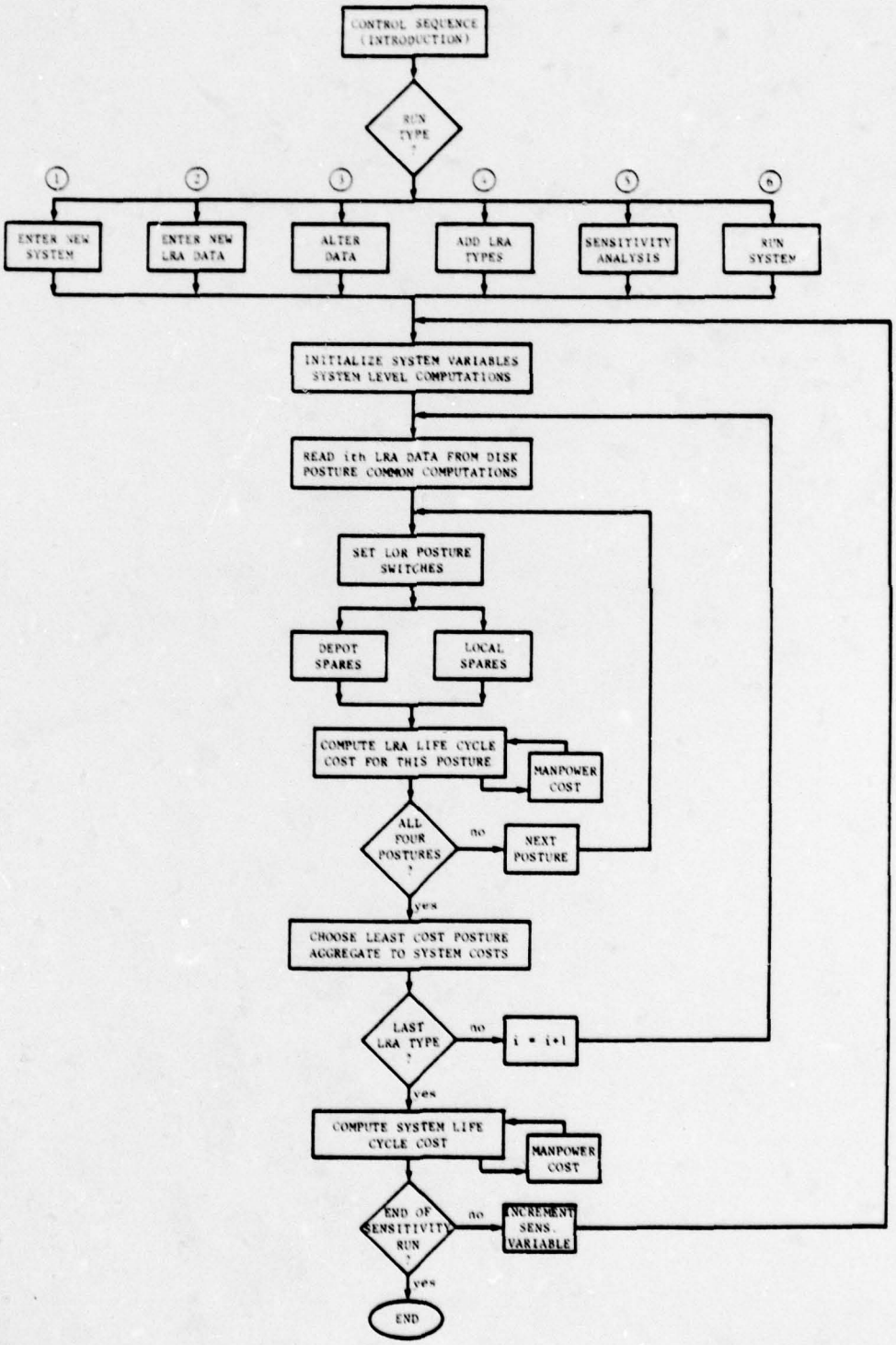
2.1 Program Description

In this section we present a brief description of NEDCOM program logic, and provide flowcharts of important subroutines.

Figure 2.1 is a flowchart of overall program operation. The program is controlled by a central routine, Control Sequence, which organizes the serial execution of the subroutines required to execute a specific NEDCOM run. Control sequence first elecits run information from the user. The user chooses one of six run type options, which perform the input-output "housekeeping" necessary to retrieve prior run data, input new data, set sensitivity run parameters, and so on.

Control Sequence then proceeds to execute the NEDCOM subroutines. First accumulation registers are initialized to zero and system level parameters are computed. Each LRA is then evaluated in turn. The LRA data is read from disk, and parameters common to all four LOR postures are computed. Then the life cycle cost of the LRA is computed and printed for all four postures: repair at a military operated depot, repair at a contractor operated depot, local repair, and discard at failure. The least cost of the four options is then chosen; the costs and manpower requirements of this posture are aggregated at the system level. Then same process is executed for the next LRA, until all LRA's have been processed. The aggregated values of LRA costs and demands are used to compute the system life cycle cost, as well as system MTBF, MTTR and so on, all of which are printed in a system summary.

Figure 2.1 NEDCOM Program Flow



In the remainder of this section we present logic flowcharts of the major NEDCOM subroutines.

Figure 2.2 Control Sequence

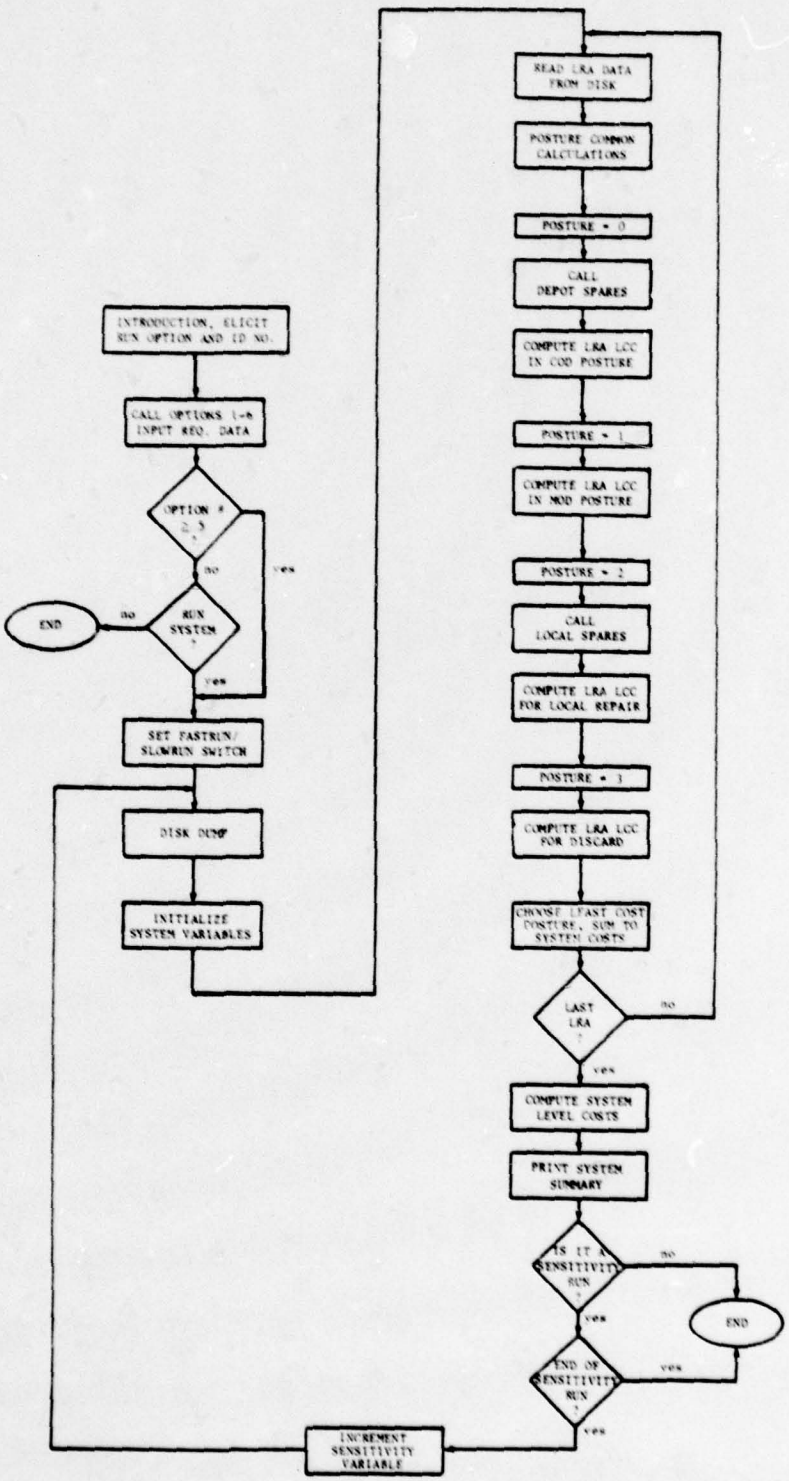
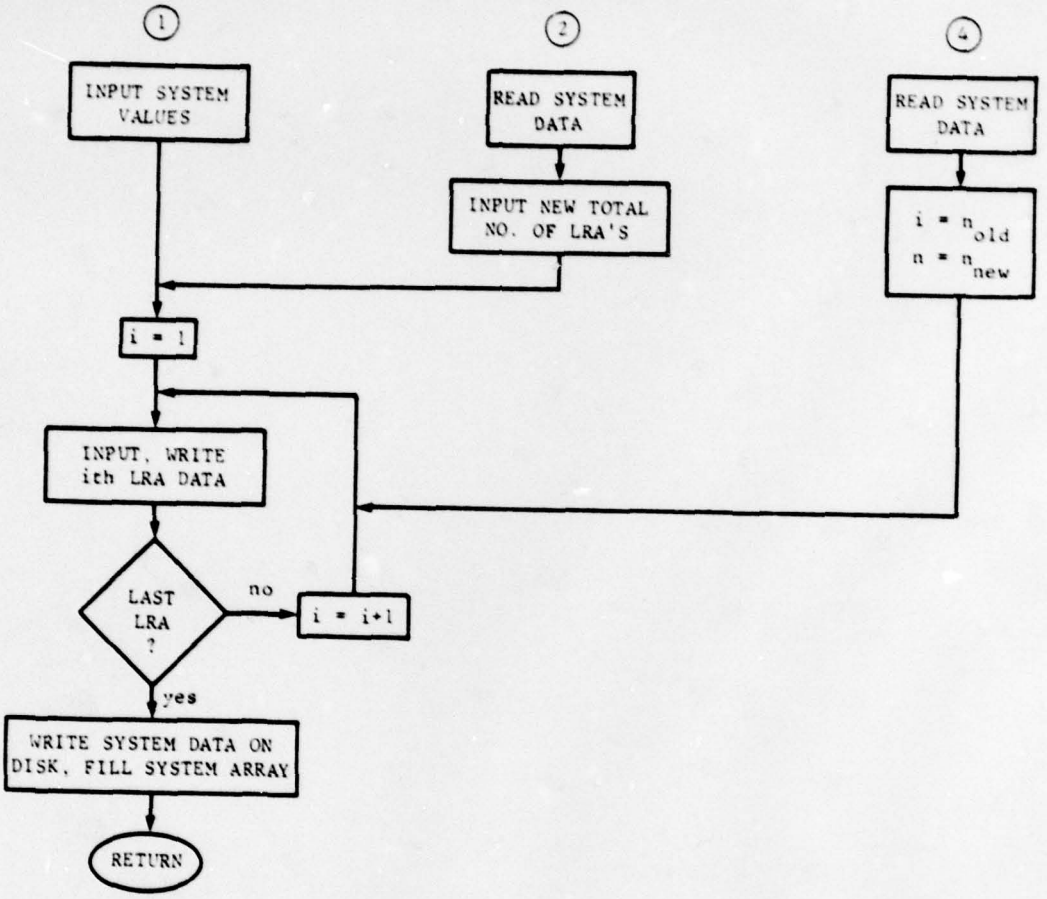
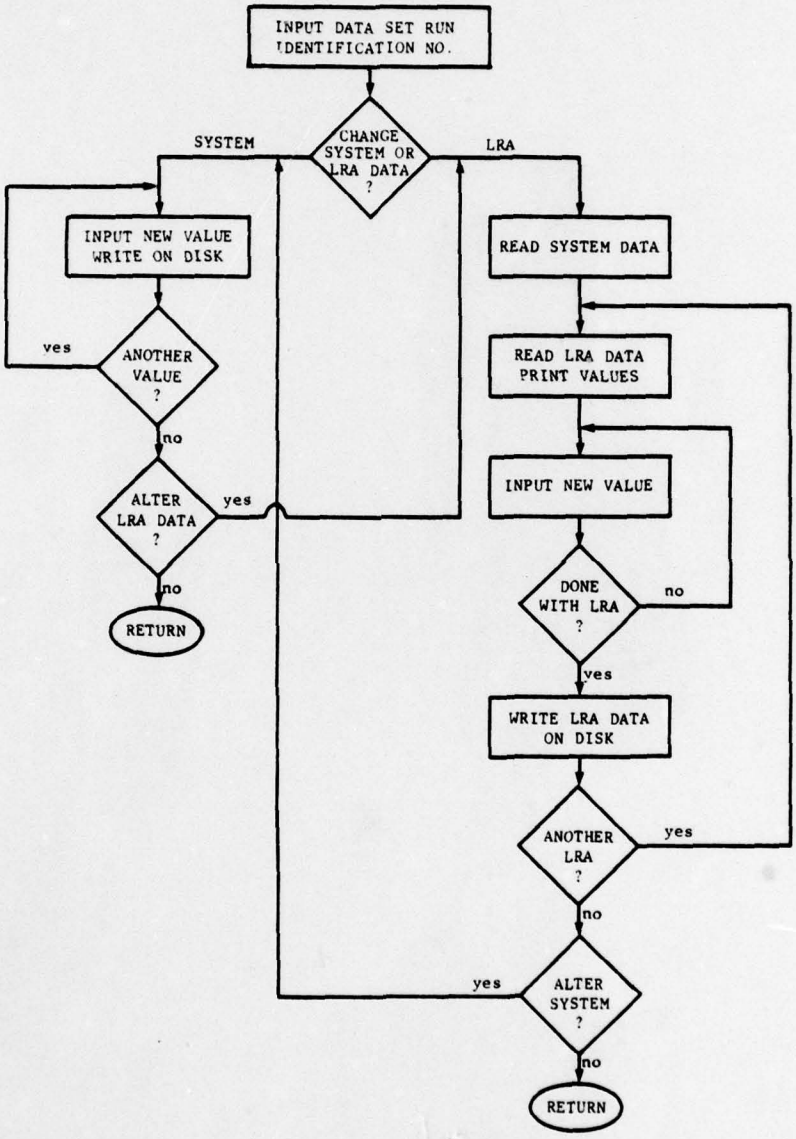


Figure 2.3 Run Options 1, 2 and 4



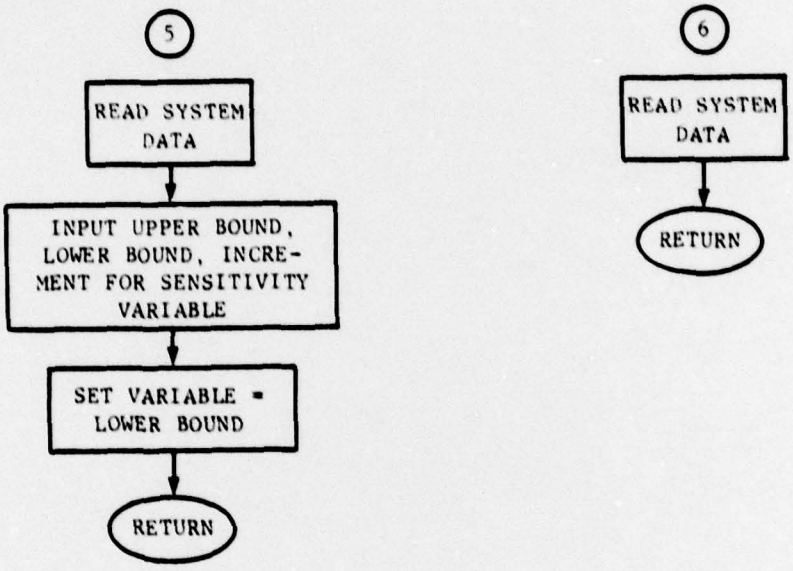
Run Option 1 elicits a new system description and LRA configuration;
Run Option 2 links a new LRA configuration to an existing system description:
Run Option 4 appends additional LRA's to an existing configuration.

Figure 2.4 Run Option 3



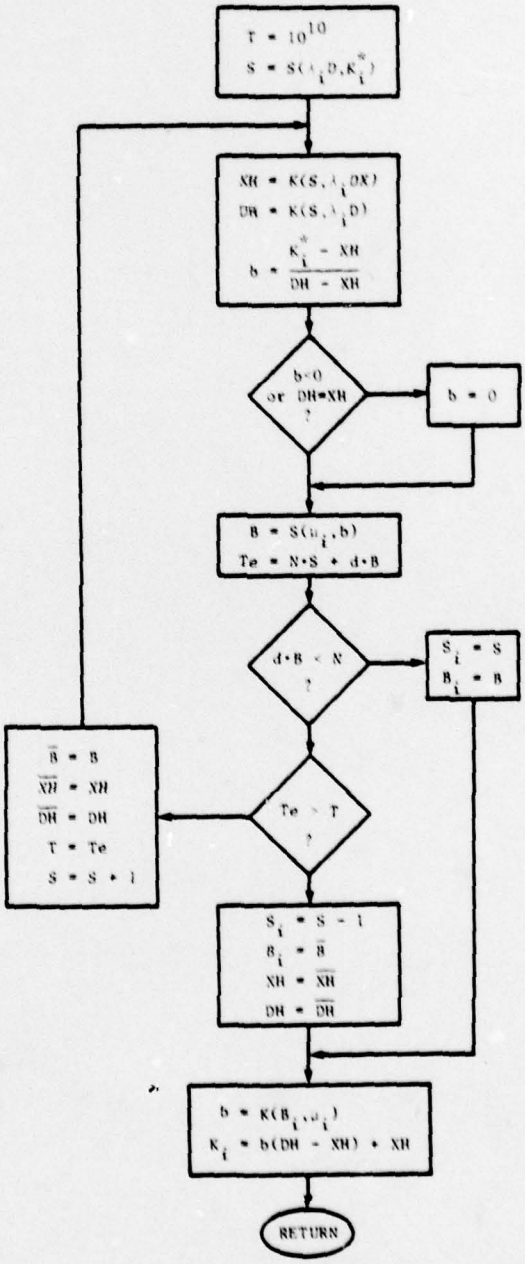
Run Option 3 allows the user to alter existing system and LRA data sets.

Figure 2.5 Run Options 5 and 6



Run Option 5 performs sensitivity analysis on one system variable; Run Option 6 executes a system run using an existing data set.

Figure 2.6 Depot Spares Algorithm



The depot spares subroutine computes the optimal mix of depot and on-board spares for an LRA coded depot repair.

2.2 NEDCOM Cost Equation Summary

In this section we present a summary of the demand and cost equations used in NEDCOM. The numbers to the left of the equations are the equation numbers used in Volume I.

Allocations from Manpower Pools

Utilized portion of AN pool:

$$3.6)\quad A_n(M) = \begin{cases} M & M \le AN \\ AN & M > AN \text{ and } 0 < fp(M) < fp(AN) \\ ip(AN) & \text{Otherwise} \end{cases}$$

Utilized portion of AG pool:

$$3.7)\quad A_g(M) = \begin{cases} M - A_n(M) & M - A_n(M) < AG \\ AG & \text{Otherwise} \end{cases}$$

Utilized portion of AS pool:

$$3.7a)\quad A_g(M) = M - A_n(M) - A_g(M)$$

No. to receive "A" training:

$$3.8)\quad A(M) = \lceil A_g(M) \rceil + \lceil A_s(M) \rceil$$

No. to receive "C" training:

$$3.9)\quad C(M) = \lceil M \rceil$$

Manpower Cost Equations

Personnel Compensation:

$$3.29)\quad C_1 = N \cdot L \cdot \Big[(MO + MM) \cdot BG + A(MO') \cdot (BN_o - BG) + A(MM')(BN_m - BG) + BO \cdot F \Big] + d_r \cdot L \cdot MD \cdot BD$$

Training:

$$3.30)\quad C_2 = N \cdot (1 + TOR_s \cdot L) \cdot \Big[C(MM') \cdot TCM + C(MO')TCO + A(MM') \cdot TA_m + A(MO')TA_o \Big] + d_r \cdot (1 + TOR_d \cdot L) \cdot \lceil MD \rceil \cdot TCD$$

"Other" manpower costs:

$$3.31)\quad C_3 = N \cdot (1 + TOR_s \cdot L) \cdot \Big[\big[C(MM') + C(MO') \big] Z + \big[\lceil A_s(MM') \rceil + \lceil A_s(MO') \rceil \big] Z_s \Big]$$

i^{th} LRA Demand and Training Course Cost Equations

Average and peak maintenance manpower requirement:

$$MM = M_{m,i} = \Big[Q \cdot SM/n + \lambda_i \cdot 7/D \cdot h(MTRR_i + r_{1,i} MTTR_i) \Big] / (U \cdot WH_m)$$

$$MM' = M'_{m,i} = M_{m,i} \cdot PHR \cdot h/AHR$$

Depot manpower requirement:

$$3.22)\quad MD = M_{d,i} = r_{3,i} N \cdot \lambda_i \; MTTR_i \cdot h/(d_r \cdot 52 \cdot U \cdot WH_d)$$

Allocated portion of AN_m pool:

$$3.23)\quad ANM = AN_{m,i} = \frac{\lambda_i MTRR_i}{\sum_{x=i}^{n} \lambda_x MTRR_x} \left[AN_m - \sum_{x=1}^{i-1} A_n(M'_{m,x}) \right]$$

Allocated portion of AG_m pool:

$$3.24)\quad AGM = AG_{m,i} = AG_m - \sum_{x=1}^{i-1} A_g(M'_{m,x})$$

Shipboard maintenance training course cost:

$$3.26)\quad TCM = TC_{m,i} = DC \cdot (TS/n + r_{1,i} \cdot TR)$$

Depot maintenance training course cost:

$$3.27)\quad TCD = TC_{d,i} = r_{3,i} \cdot DC \cdot TR$$

Set $MO = MO' = F = 0$ in Manpower Equations

<u>System Demand and Training Course Cost Equations</u>

Average and peak operator demand:

$$3.18)\quad MO = M_o = Q \cdot AHR \cdot \theta \cdot 7/(D \cdot h \cdot WH_o)$$

$$3.19)\quad MO' = M'_o = M_o \cdot PHR/AHR$$

Ship board maintenance demand:

$$3.20)\quad MM = M_m = \sum_{i=1}^{n} M_{m,i}$$

Peak maintenance demand:

$$3.21)\quad MM' = M'_m = M_m \cdot PHR \cdot h/AHR$$

Depot Maintenance demand:

$$3.22)\quad MD = M_d = \sum_{i=1}^{n} M_{d,i}$$

Portion of AG pool allocated to operators:

$$3.25)\quad AGO = AG_o = AG - \sum_{i=1}^{n} A_g(M'_{m,i})$$

Shipboard maintenance training course:

$$3.26)\quad TCM = TC_m = \sum_{i=1}^{n} TC_{m,i}$$

Depot training course:

$$3.27)\quad TCD = TC_d = \sum_{i=1}^{n} TC_{d,i}$$

Operator training course:

3.28) $TCO = TC_o = DC \cdot OTC$

Set $AGM = AG_m$; $F = OF$; $ANM = AN_m$ in Manpower Equations

Sparing Equations

Average demand:

4.1) $\lambda_i = Q \cdot q_i \cdot S_i \cdot AHR/MTBF_i$

Peak demand:

4.2) $\lambda_i' = \lambda_i PHR/AHR$

Depot demand:

4.3) $\mu_i = r_{2,i}(N \cdot \lambda_i' \cdot DRT)/D \cdot d$

In port period:

$P = (365 - h \cdot D)/h$

# of deployments in lead time if depot stockout:

4.5) $X = \lceil (DRT - P)/(D + P) \rceil + 1$

Replenishment spares:

4.9) $S_i' = \lambda_i [1 - (r_{1,i} + r_{2,i})(1 - COND)]$

Confidence level achieved with S spares, demand lead time λt.

$K(S,\lambda t)$

Poisson:

$$K(S,\lambda t) = \sum_{x=0}^{S} \frac{e^{-\lambda t}(\lambda t)^x}{x!}$$

Normal:

$$K(S,\lambda t) = \begin{cases} Q\left(\frac{\lambda t - S}{\sqrt{\lambda t}}\right) & S \neq 0 \\ e^{-\lambda t} & S = 0 \end{cases}$$

where $Q(x) = \frac{1}{\sqrt{2\pi}} \int_x^\infty e^{-t^2/2} dt$

The following polynomial approximation is used to compute Q(x) for given x:

$$R = \frac{1}{\sqrt{2\pi}} e^{-x^2/2}\left(b_1 t + b_2 t^2 + b_3 t^3 + b_4 t^4 + b_5 t^5\right)$$

$$t = \frac{1}{1 + r|x|} \qquad r = 0.2316419$$

$b_1 = .319381530, \quad b_2 = -.356563782$

$b_3 = 1.781477937, \quad b_4 = -1.821255978$

$b_5 = 1.330274429$

Then $Q(x) = \begin{cases} R & \text{if } x \geq 0 \\ 1-R & \text{if } x < 0 \end{cases}$

# of spares needed to achieve confidence level K with demand lead time λt.

$S(\lambda t, K)$

Poisson:

$$S(\lambda t, K) = \min \left\{ s \geq 0: \sum_{x=0}^{s} \frac{e^{-\lambda t}(\lambda t)^x}{x!} \geq K \right\}$$

Normal:

$$S(\lambda t, K) = \begin{cases} 0 & e^{-\lambda t} \geq K \\ \lceil \lambda t + Z\sqrt{\lambda t} \rceil & \text{Otherwise} \end{cases}$$

where $Z = Q^{-1}(K)$, that is, Z is such that

$$K = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{Z} e^{-t^2/2} dt$$

The following rational approximation is used:

$$\text{Define } y = t - \frac{c_0 + c_1 t + c_2 t^2}{1 + d_1 t + d_2 t^2 + d_3 t^3}$$

$$Q = 1 - K$$

$$t = \begin{cases} \sqrt{\ln(Q)^{-2}} & \text{if } 0 < Q \leq 0.5 \\ \sqrt{\ln(1 - Q)^{-2}} & \text{if } 0.5 < Q < 1 \end{cases}$$

$c_0 = 2.515517$ $\quad d_1 = 1.432788$

$c_1 = 0.802853$ $\quad d_2 = 0.189269$

$c_2 = 0.010328$ $\quad d_3 = 0.001308$

$$\text{Then } Z = \begin{cases} y & \text{if } 0 < Q \leq 0.5 \\ -y & \text{if } 0.5 < Q < 1 \end{cases}$$

Assigned desired confidence level:

$$4.17) \quad K_i^* = \left[\frac{K^*}{\prod_{x=1}^{i-1} K_x} \right]^{\left[UC_i \,/\, \sum_{x=i}^{n} UC_x \right]}$$

Local Repair

On board spares:

$$S_i = S(\lambda_i LRT, K_i^*)$$

$$B_i = 0$$

Depot Repair or Discard

See Figure 2.6 for the calculation of S_i and B_i for the depot repair or discard LOR posture.

Adjusted unit cost:

$$4.10)\quad f(UC_i) = UC_{\ell,i}\left[\frac{N(Qq + S_i + S_i') + dB_i}{\ell}\right]^{[\log RRATE/\log 2]}$$

Discount factor:

$$2.1)\quad L = \sum_{t=1}^{LC}(1+\rho)^{-t}$$

Non-Manpower Cost Equations

$$5.5)\quad C_{4,i} = f(UC_i)\left[N(Qq_i + S_i + S_i'L) + dB_i\right]$$

Production and spares:

$$5.7)\quad C_4 = PT_\ell\left[\frac{N\cdot Q}{\ell}\right]^{[\log RRATE/\log 2]} + \sum_{i=1}^{n} C_{4,i}$$

Installation and checkout:

$$C_5 = N\cdot Q\cdot ICO$$

Support and test equipment:

$$5.11)\quad C_6 = \left[N \cdot FIH + CS + CH\left[N \cdot SGM\left(\sum_{i=1}^{n} r_{1,i}\right) + d_r \cdot SGM\left(\sum_{i=1}^{n} r_{3,i}\right)\right] + \sum_{i=1}^{n} STE_i(r_{1,i} \cdot N + r_{3,i} d_r)\right](1 + mL)$$

Repair:

$$5.15)\quad C_7 = L \cdot N \sum_{i=1}^{n} \lambda_i \left[(r_{1,i} + r_{3,i})RP + r_{2,i}(1 - r_{3,i})COD\right]$$

Item entry and management:

$$5.20)\quad C_8 = n \cdot IEC + IMC \cdot L \cdot \sum_{i=1}^{n} \left[N + r_{3,i} d_r + PP/n(r_{1,i} N + r_{3,i} d_r)\right]$$

Technical documentation:

$$5.25)\quad C_9 = (TDP + ADC \cdot L)\left[P + P_f + P_r \cdot \sum_{i=1}^{n} (r_{1,i} + r_{3,i})\right]$$

Transportation:

$$C_{10} = L \cdot 2 \cdot DIS \cdot CC \cdot N \cdot W \cdot \sum_{i=1}^{n} \lambda_i r_{3,i}$$

Life cycle cost:

$$LCC = \sum_{j=1}^{10} C_j$$

3.0 PROGRAM LISTING

```
1 DIM SYS(80): DIM ID$(100):D$ =  CHR$ (4): PRINT D$;"NOMON C,I,O": PRINT D$;"PR#1": TEXT
    : SPEED= 200: PRINT  CHR$ (31): GOTO 10
2 INPUT QZ: RETURN
3 PRINT QZ: RETURN
4 INPUT QZ$: RETURN
5 PRINT QZ$: RETURN
10 READ G1,G2,G3
20 DATA  .319381530, -.356563782, 1.781477937
30 READ G4,G5,G9,G6
40 DATA      -1.821255978,1.330274429,.2316419,.3989422804
45 READ C0,C1,C2,C3,C4,C5
46 DATA  2.515517,0.802853,0.010328,1.432788,0.189269,0.001308
47 REM  INPUT COEFFICENTS FOR NORMAL APPROX. USED IN SPARES CALCULATION
49 REM  ***************************************************************
50 REM  ********************** CONTROL SEQUENCE ************************
55 REM  ************************
60 REM  **********INTRO**********
70 REM
80 HOME
90 PRINT  TAB( 17)"NEDCOM"
100 VTAB 5
110  PRINT  TAB( 3)"NAVY ELECTRONICS DESIGN COST MODEL"
120 PRINT  TAB( 10)"DEVELOPED FOR OP-122H"
130 PRINT  TAB( 10)"HARDMAN PROJECT OFFICE"
140 PRINT  TAB( 19)"BY"
150 PRINT  TAB( 11)"THE ASSESSMENT GROUP"
160 PRINT  TAB( 9)"SANTA MONICA, CALIFORNIA"
170 PRINT : PRINT : PRINT
180 PRINT "THIS IS AN INTERACTIVE MODEL.  PLEASE"
190 PRINT "ANSWER A FEW QUESTIONS SO WE CAN BEGIN."
200 PRINT
210  PRINT "TO ENTER A NEW DATA SET, TYPE 1"
220 PRINT "TO ENTER NEW A NEW LRA DATA SET, TYPE 2"
230 PRINT "TO ALTER A DATA SET,TYPE 3"
240 PRINT "TO ADD NEW LRA TYPES,TYPE 4"
250 PRINT "SENSITIVITY RUN, OLD DATA: TYPE 5"
255 PRINT "TO RUN SYSTEM, TYPE 6"
260 PRINT " "
270  INPUT "     PLEASE RESPOND WITH CODE NO.:";XOPT
275 IF XOPT < 1 OR XOPT > 6 THEN  PRINT "PLEASE RE-TRY.": GOTO 270
280 PRINT ""
290 HOME
310  PRINT "PLEASE ASSIGN AN ID # TO THIS RUN."
320 PRINT "THE FORMAT MUST BE DDMMYYXX WHERE XX"
330 PRINT "IS A UNIQUE NO. FOR THIS RUN"
340 INPUT "  RUN ID#: ";QQ$:RNO =  VAL (QQ$):RN$ = QQ$: IF  LEN (QQ$) <  > 8 THEN 340
350 VTAB 13: INVERSE : PRINT "PLEASE REMOVE THE PROGRAM DISK AND PLACE": PRINT "YOUR DAT
    A DISK INTO THE DISKETTE READER.": NORMAL
360 PRINT : PRINT "PRESS ANY KEY WHEN READY": GET QQ$
370 ON XOPT GOSUB 1000,3005,3050,3210,3410,3550
371 PRINT : PRINT : IF XOPT > 4 THEN 375
```

```
372 PRINT "DO YOU WANT TO RUN THE SYSTEM?": INPUT "(1=YES,2=NO)  ";XY
373 IF XY <  > 1 THEN  END
374 PRINT
375  INPUT "FASTRUN=0, SLOWRUN=1  ";SW
377 GOSUB 11000: REM  DISK DUMP SUBROUTINE
380 GOSUB 5100: REM  INITIALIZE SYSTEM VARIABLES
390 REM READ LRA VARIABLES INTO ARRAY FROM DISK
400 QQ$ = "A" + STR$ ((XX = 1) * RNO + (XX = 2) * RMO): PRINT D$;"OPEN ";QQ$;",V0,L100":
    PRINT D$;"READ ";QQ$;",R";CTR
410 FOR I = 0 TO 6: GOSUB 2:A(I) = QZ: NEXT : PRINT D$;"CLOSE"
411 PRINT  CHR$(9);"I"
412 HOME : PRINT : PRINT : PRINT "PROCESSING LRA NUMBER ";CTR
413 PRINT  CHR$(9);"N"
414 REM
415 GOSUB 5200: REM  COMPUTE LRA AV., PEAK FAILURE RATE, DESIRED CONFIDENCE LEVEL AND MA
    NPOWER POOL ALLOCATION FACTOR
416 REM
420  GOSUB 4100: REM  PRINT HEADING FOR LRA SUMMARY
423 REM
424 REM
425 REM   * * * CONTRACTOR OPERATED DEPOT * * *
426 REM
428 I = 0: GOSUB 6670: REM  SET COD POSTURE SWITCHES
430 GOSUB 5500: REM  DEPOT SPARES SUBROUTINE
440 GOSUB 6330: REM  COMPUTE AND PRINT LRA COSTS IN COD POSTURE
443 REM
444 REM
445 REM   * * * MILITARY OPERATED DEPOT * * *
446 REM
448 I = 1: GOSUB 6672: REM  SET MOD POSTURE SWITCHES
449 K(1) = K(0):S(1) = S(0):B(1) = B(0): REM  SAME SPARES BUY, ACHIEVED CONF. AS IN COD
455 GOSUB 6330: REM  COMPUTE AND PRINT LRA COSTS IN MOD POSTURE
458 REM
459 REM
460 REM   * * * LOCAL REPAIR * * *
461 REM
465 I = 2: GOSUB 6674: REM  SET LOC. POSTURE SWITCHES
470 GOSUB 6250: REM  LOCAL SPARES SUBROUTINE
480 GOSUB 6330: REM  COMPUTE AND PRINT LRA COSTS IN LOCAL REPAIR POSTURE
483 REM
484 REM
485 REM   * * * DISCARD AT FAILURE * * *
486 REM
490 I = 3: GOSUB 6676: REM  SET DISCARD POSTURE SWITCHES
495 K(3) = K(0):S(3) = S(0):B(3) = B(0): REM  SAME INITIAL SPARES, CONFIDENCE LEVEL AS DE
    POT REPAIR POSTURES
505 GOSUB 6330: REM  COMPUTE AND PRINT LRA COSTS IN DISCARD AT FAILURE POSTURE
510 REM
511 REM
512 GOSUB 6680: REM  6680 CHOOSE LEAST COST POSTURE (I=0,1,2,3) AND SUMS LRA COSTS
513 REM           FOR CHOSEN POSTURE TO TOTAL SYSTEM COST
```

```
514 REM
515 CTR = CTR + 1
516 REM
520 IF CTR < = N THEN 403: REM READ DATA FOR NEXT LRA
525 GOSUB 6925: REM AFTER COSTS OF ALL LRA'S ARE COMPUTED, 6925 COMPUTES SYSTEM LEVEL C
    OSTS
530 GOSUB 4500: REM PRINT SYSTEM LEVEL SUMMARY
540 IF XOPT < > 5 THEN 600
550 SY(F9) = SY(F9) + II: REM INCREMENT SENSITIVITY ANALYSIS VARIABLE
560 IF SY(F9) > EOJCTR THEN 600
570 RNO = RNO + 1: REM INCREMENT RUN NUMBER
580 GOTO 377: REM RUN SYSTEM AGAIN
600 END
680 REM ******************** END OF CONTROL SEQUENCE ********************
690 REM ************************************************************
695 REM ************************
700 REM *****DISK COMMANDS*****
710 REM ***READ SYS DATA***
720 QQ$ = "B" + STR$ ((XX = 1) * RNO + (XX = 2) * RMO)
730 PRINT D$;"OPEN ";QQ$;",V0,L20"
740 FOR I = 0 TO 80: PRINT D$;"READ ";QQ$;",R";I
750 GOSUB 2:SY(I) = QZ: NEXT I: PRINT D$;"CLOSE"
751 IF XOPT = 2 THEN RETURN
752 N = SY(52)
754 QQ$ = "C" + STR$ (RMO)
756 PRINT D$;"OPEN ";QQ$;",V0,L35"
758 FOR I = 0 TO N: PRINT D$;"READ ";QQ$;",R";I
760 GOSUB 4:ID$(I) = QZ$: NEXT I: PRINT D$;"CLOSE"
762 RETURN
765 REM ************************
770 REM ***WRITE SYS DATA***
780 PRINT D$;"OPEN B";RNO;",V0,L20"
790 FOR I = 0 TO 80
800 PRINT D$;"WRITE B";RNO;",R";I
810 QZ = SY(I): GOSUB 3: NEXT I
820 PRINT D$;"CLOSE"
830 REM ***WRITE LRA IDENTIFIERS***
835 QQ$ = "C" + STR$ ((XX = 1) * RNO + (XX = 2) * RMO)
840 PRINT D$;"OPEN ";QQ$;",V0,L35"
850 FOR I = 0 TO N: PRINT D$;"WRITE ";QQ$;",R";I
860 QZ$ = ID$(I): GOSUB 5: NEXT I: PRINT D$;"CLOSE"
870 RETURN
900 REM
990 REM
1000 REM ****************** NEW DATA SET (XOPT=1) **********************************
1005 HOME : PRINT CHR$ (9);"I"
1005 XX = 1: REM XX=1 INDICATES USING NEW DATA SET FOR DISK COMMANDS
1009 PRINT "PLEASE ENTER THE DESIRED"
1010 PRINT "VALUES DESCRIBING THE SYSTEM"
1020 PRINT "AND ITS OPERATING ENVIRONMENT."
1030 PRINT : PRINT
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1040  INVERSE : PRINT "   ***** NAVY ENVIRONMENTAL AND COST FACTORS *****": NORMAL
1050  PRINT : PRINT
1060  INPUT "AVERAGE COST OF TRAINING ($/DAY/STUDENT)                    ";DC
1070  INPUT "COST OF A-SCHOOL, MAINTENANCE TECHNICIAN ($/STUDENT)        ";TB
1080  INPUT "COST OF A-SCHOOL, OPERATOR ($/STUDENT)                      ";TA
1090  INPUT "ANNUAL BILLET COST, MAINTENANCE                             ";B1N
1100  INPUT "ANNUAL BILLET COST, OPERATOR                                ";B2N
1110  INPUT "ANNUAL BILLET COST, UNTRAINED PERSONNEL                     ";BG
1120  INPUT "ANNUAL BILLET COST, MAINTENACE TECH. AT MILITARY DEPOT      ";BD
1130  INPUT "ANNUAL BILLET COST, OFFICER                                 ";BO
1140  INPUT "AVAILABLE WEEKLY WORK HOURS, MAINTENANCE TECHNICIAN         ";W1
1150  INPUT "AVAILABLE WEEKLY WORK HOURS, WATCH STANDER                  ";WHR
1160  INPUT "AVAILABLE WEEKLY WORK HOURS, DEPOT TECH.                    ";W2
1170  INPUT "LABOR UTILIZATION RATE                                      ";U
1180  INPUT "ANNUAL ATTRITION RATE, SHIPBOARD (%/YR)                     ";T2
1190  INPUT "ANNUAL ATTRITION RATE, DEPOT PERSONNEL  (%/YR)              ";T3
1195  INPUT "COST OF PERSONNEL ADDITION TO A PLATFORM ($/PERSON/SHIP)     ";ZS
1200  INPUT "AV. ANNUAL NO. OF DEPLOYMENTS (DEPL/SHIP/YEAR)              ";H
1210  INPUT "AVERAGE DEPLOYMENT PERIOD (DAYS)                            ";D
1220  INPUT "ANNUAL DISCOUNT RATE (%/YEAR)                               ";RD
1230  INPUT "CONDEMNATION RATE                                           ";CN
1240  INPUT "RATIO:  ANNUAL EQUIPMENT SUPPORT COST :: INITIAL PURCHASE COST  ";MR
1250  INPUT "COST OF TECH. DATA DEVELOPMENT ($/PAGE)                     ";TDP
1255  INPUT "ANNUAL TECH. DATA MAINTENANCE RATE ($/PG/YR)                ";T7M
1260  INPUT "COST OF INSURED FREIGHT ($/LB/MILE)                         ";CC
1270  INPUT "ITEM ENTRY COST  ($/ITEM)                                   ";IEC
1280  INPUT "ITEM MANAGEMENT COST ($/ITEM/YEAR)                          ";IMC
1290  PRINT : PRINT
1300  INVERSE : PRINT "   ***** SYSTEM OPERATING ENVIRONMENT *****": NORMAL
1310  PRINT : PRINT
1320  INPUT "AV. NO. AVAILABLE MAINTENANCE PERSONNEL PER SHIP            ";A1N
1330  INPUT "AV. NO. AVAILABLE OPERATORS PER SHIP                        ";A2N
1340  INPUT "AV. NO. AVAILABLE UNTRAINED PERSONNEL PER SHIP              ";AG
1350  INPUT "NO. OF SHIPS ON WHICH SYSTEM IS DEPLOYED                    ";ND
1360  INPUT "NO. OF SYSTEMS PER SHIP                                     ";Q
1370  INPUT "LENGTH OF SYSTEM LIFE-CYCLE (YEARS)                         ";L
1380  INPUT "AV. SYSTEM OPERATING HOURS PER YEAR (HR/YEAR/SYSTEM)        ";AHR
1400  INPUT "PEAK SYSTEM OPERATING HR. PER DEPLOYMENT PERIOD (HR/DPL/SYS)  ";PHR
1410  INPUT "REDUCTION RATE (LEARNING CURVE SLOPE)                       ";RR
1420  INPUT "AVERAGE REPAIR MATERIAL COST, LRA REPAIR                    ";RP
1430  INPUT "NO. OF STOCKAGE DEPOTS                                      ";DEP
1440  INPUT "NO. OF REPAIR DEPOTS                                        ";DP
1450  INPUT "COST OF LRA REPAIR AT CONTRACTOR DEPOT                      ";CDD
1460  INPUT "DEPOT RESPONSE TIME (DAYS)                                  ";DRT
1470  INPUT "SHIP RESPONSE TIME                                          ";SRT
1480  INPUT "DISTANCE BETWEEN REPAIR AND SUPPLY DEPOTS                   ";DIS
1490  PRINT : PRINT
1500  INVERSE : PRINT "   ***** SYSTEM MANPOWER AND TRAINING REQUIREMENTS *****": NORMAL

1510  PRINT : PRINT
1520  INPUT "REQ. NO. OF OPERATORS PER SYSTEM                            ";TH
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1530  INPUT "REQ. NO. OF OFFICERS                                              ";OF
1540  INPUT "OTHER PERSONNEL COSTS (SECURITY CLEAR., ETC.)                     ";Z
1560  INPUT "REQ. DAYS C-SCHOOL OPERATOR TRAINING                              ";OTD
1570  INPUT "REQ. DAYS C-SCHOOL MAINTENANCE TRAINING (SYS. ORIEN. + LRA R&R)   ";TS
1580  INPUT "AV. NO C-SCHOOL TRAINING DAYS TO REPAIR AN LRA                    ";TR
1590  PRINT : PRINT
1600  INVERSE : PRINT "   ***** SYSTEM DESIGN PARAMETERS *****": NORMAL
1610  PRINT : PRINT
1615  INPUT "ICO COST PER SYSTEM                                               ";ICO
1620  INPUT "ESTIMATED SYSTEM PRODUCTION LOT SIZE                              ";LOT
1625  INPUT "SYSTEM ASSEMBLY COST                                              ";SAC
1630  INPUT "DESIRED SYSTEM CONFIDENCE LEVEL AGAINST STOCKOUT                  ";KS
1635  IF KS > = 1 OR KS < = 0 THEN  PRINT "CONFIDENCE LEVEL MUST BE IN": PRINT "RANGE (
      0,1). PLEASE REENTER.": PRINT : GOTO 1630
1650  INPUT "NO. OF DIFFERENT LRA TYPES                                        ";N
1660  INPUT "AVERAGE LRA WEIGHT                                                ";WP
1670  INPUT "NO. OF NEW PIECE PARTS IN SYSTEM                                  ";PP
1675  INPUT "SYSTEM FAULT ISOLATION HARDWARE COST                              ";FIH
1680  INPUT "SYSTEM FAULT ISOLATION SOFTWARE COST                              ";CS
1700  INPUT "COMMON S&TE HARDWARE COST PER SHIP                                ";CH
1710  INPUT "NO. OF PAGES, SYSTEM DESCRIPTION                                  ";PS
1720  INPUT "NO. OF PAGES, LRA FAULT ISOLATION, R&R                            ";PF
1730  INPUT "AV. NO PAGES, LRA REPAIR DOCUMENTATION (PG./LRA)                  ";PR
1740  INPUT "SYSTEM SCHEDULED MAINTENANCE REQUIREMENT (MAN-HR/WEEK/SYSTEM)     ";SM
2860  HOME : PRINT "LRA-SPECIFIC DATA"
2862 UC = 0
2863 GS = 0
2870  PRINT "PLEASE PROVIDE DATA FOR:"
2871  PRINT
2880 CTR = CTR + 1
2910  PRINT "LRA TYPE "CTR" OF "N
2920  PRINT : PRINT : PRINT
2925  INPUT "LRA IDENTIFIER (30 CHARACTER LIMIT)     ";ID$(CTR)
2927  PRINT
2930  PRINT "UNIT COST AT LOT SIZE "LOT;: INPUT "
       ";A(0)
2940  INPUT "NUMBER OF APPEARANCES IN THE SYSTEM                               ";A(1)
2950  INPUT "MEAN TIME TO FAULT ISOLATE, R&R THIS LRA (HR.)                    ";A(2)
2955  INPUT "MEAN TIME TO REPAIR THIS LRA (HR.)                                ";A(3)
2960  INPUT "LRA DUTY CYCLE                                                    ";A(4)
2965  INPUT "LRA MEAN TIME BETWEEN FAILURE                                     ";A(5)
2966  INPUT "SUPPORT AND TEST EQUIPMENT COST SPECIFIC TO THIS LRA               ";A(6)
2970 GL = A(1) * A(4) * A(2) / A(5)
2971 GS = GS + GL
2972 UC = UC + A(0)
2973 QQ$ = "A" + STR$ ((XX = 1) * RNO + (XX = 2) * RMO)
2974  PRINT D$;"OPEN ";QQ$;",V0,L100"
2976  PRINT D$;"WRITE ";QQ$;",R";CTR
2978  FOR I = 0 TO 6: QZ = A(I): GOSUB 3: NEXT I
2980  PRINT D$;"CLOSE"
2982  HOME : IF CTR < N GOTO 2880
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2983 SY(79) = GS:SY(80) = UC: IF XOPT = 4 THEN  RETURN
2984  GOSUB 10000: REM  FILL SYS ARRAY
2985  GOSUB 780: REM   WRITE SYS DATA
2987  PRINT : PRINT
3000  RETURN
3002  REM
3003  REM ** END NEWVAL **
3004  REM
3005  REM ************************** NEW LRA DATA (XOPT=2) **********************
3007  PRINT : PRINT
3010  PRINT "PLEASE TYPE THE ID$ OF THE SYSTEM": INPUT "DATA SET TO BE USED: ";QQ$:RMO =
      VAL(QQ$): IF  LEN(QQ$) < > 8 THEN 3010
3015  PRINT D$;"VERIFY B";RMO;",V0"
3020  PRINT : PRINT
3025  INPUT "HOW MANY LRA'S?  ";N:CTR = 0
3030 XX = 2: GOSUB 720: REM  READ SYS DATA
3031 SY(52) = N
3032  GOSUB 11000: REM  DISK DUMP
3035 XX = 1: REM  CREATE NEW DATA SET OF FILE UNDER NAME OF CURRENT ID$
3040  GOTO 2860: REM  GET NEW LRA DATA
3045  REM  XOPT2 RETURNS TO CSEQ FROM XOPT1
3047  REM
3048  REM
3050  REM ************** CHANGE EXISTING DATA SET (XOPT=3) ********************
3057  PRINT : PRINT
3060  PRINT "PLEASE TYPE ID$ OF THE DATA SET": INPUT "TO BE CHANGED:  ";QQ$:RMO =  VAL(Q
    Q$): IF  LEN(QQ$) < > 8 THEN 3060
3062  PRINT D$;"VERIFY B";RMO;",V0"
3063  PRINT : PRINT
3065  PRINT "TO CHANGE SYSTEM DATA, TYPE 1.": INPUT "TO CHANGE LRA DATA, TYPE 2.  ";XY
3067  IF XY = 2 THEN 3110
3069  PRINT : PRINT
3070  PRINT "TYPE THE VARIABLE SEQUENCE NO.,": PRINT "A COMMA, AND THEN THE NEW VALUE.": INPUT
    "SEQUENCE$, NEW VALUE?  ";I,SY(I)
3072  PRINT D$;"OPEN B";RMO;",V0,L20"
3075  PRINT D$;"WRITE B";RMO;",R";I
3080 QZ = SY(I): GOSUB 3: PRINT D$;"CLOSE"
3082  PRINT
3085  PRINT "DONE WITH SYSTEM DATA CHANGES?": INPUT "(1=YES,2=NO)  ";XY: PRINT : PRINT : IF
    XY = 2 THEN 3070
3090  PRINT "WOULD YOU LIKE TO CHANGE LRA": INPUT "DATA?(1=YES,2=NO)  ";XY
3100 XX = 2: GOSUB 720: REM  READ SYS DATA:SW=1:REM SWITCH INDICATES DATA SET ALREADY REA
    D
3105  IF XY = 2 THEN  RETURN
3110  REM  **** CHANGE LRA DATA ****
3111  IF SW = 1 THEN 3113
3112 XX = 2: GOSUB 720: REM  READ SYS DATA
3113 GS = SY(79):UC = SY(80)
3114  PRINT : PRINT : PRINT "THERE ARE CURRENTLY "SY(52)" LRA TYPES": PRINT "IN THIS SYST
    EM": PRINT : PRINT
3115  INPUT "SEQUENCE$ OF LRA?  ";CTR
```

```
3117  PRINT : PRINT
3118  IF CTR > SY(52) THEN  PRINT "THERE ARE ONLY "SY(52)" IN THIS SYSTEM.": GOTO 3115
3120 QQ$ = "A" + STR$ (RMO)
3125  PRINT D$;"OPEN";QQ$;",V0,L100": PRINT D$;"READ";QQ$;",R";CTR
3130  FOR I = 0 TO 6: INPUT A(I): NEXT : PRINT D$;"CLOSE"
3132 UC = UC - A(0)
3133 GS = GS - A(1) * A(4) * A(2) / A(5)
3135  PRINT "VALUES CURRENTLY IN THIS RECORD": PRINT "ARE:": PRINT "0-UNIT COST="A(0): PRINT
    "1-QIPA="A(1),"4-DUTY CYCLE="A(4): PRINT "2-MTR&R="A(2),"5-MTBF="A(5): PRINT "3-
    MTTR="A(3),"6-S&TE COST="A(6)
3137  PRINT
3140  PRINT "PLEASE TYPE VARIABLE#, A COMMA,": INPUT "AND THE NEW VALUE: "I,A(I): PRINT

3141  INPUT "MORE FOR THIS LRA? (YES=1,NO=2)  "XX: PRINT : PRINT : IF XX = 1 GOTO 3140
3142 UC = UC + A(0)
3143 GS = GS + A(1) * A(4) * A(2) / A(5)
3144  PRINT "THE CURRENT IDENTIFIER IS:": PRINT ID$(CTR): PRINT : PRINT
3147  PRINT "WOULD YOU LIKE TO CHANGE THE": PRINT "IDENTIFIER FOR THIS LRA?": INPUT "(YES
    =1,NO=2)  "XY: PRINT : PRINT : ON XY GOTO 3148,3154
3148  PRINT "NEW LRA IDENTIFIER": INPUT ID$(CTR)
3149 QQ$ = "C" + STR$ (RMO)
3150  PRINT D$;"OPEN "QQ$;",V0,L35"
3151  PRINT D$;"WRITE "QQ$;",R"CTR
3152 QZ$ = ID$(CTR): GOSUB 5
3153  PRINT D$;"CLOSE"
3154 QQ$ = "A" + STR$ (RMO)
3155  PRINT D$;"OPEN "QQ$;",V0,L100"
3160  PRINT D$;"WRITE "QQ$;",R"CTR
3165  FOR I = 0 TO 6:QZ = A(I): GOSUB 3: NEXT I
3170  PRINT D$;"CLOSE"
3172  PRINT : PRINT
3175  INPUT "ANOTHER LRA?(1=YES,2=NO)  "XY: PRINT : PRINT : IF XY = 1 THEN 3115
3176 SY(79) = GS:SY(80) = UC
3177  PRINT D$;"OPEN R"RMO;",V0,L20"
3178  FOR I = 79 TO 80
3179  PRINT D$;"WRITE R"RMO;",R"I:QZ = SY(I): GOSUB 3: NEXT : PRINT D$;"CLOSE"
3180  PRINT "WOULD YOU LIKE TO CHANGE SYSTEM": INPUT "DATA?(1=YES,2=NO)  "XY: IF XY = 1 THEN
    3069
3195  RETURN
3199  REM
3200  REM
3210  REM ********************************** ADD LRA'S (XOPT=4) ********************
3215  PRINT : PRINT
3220  PRINT "PLEASE TYPE ID# OF THE DATA SET": INPUT "TO BE APPENDED:  "QQ$:RMO =  VAL (
    QQ$): IF  LEN (QQ$) < > 8 THEN 3220
3230  PRINT D$;"VERIFY R"RMO;",V0"
3235 XX = 2: REM  USE EXISTING DATA SET
3240  GOSUB 720: REM  READ SYS DATA
3242  PRINT
3245  PRINT "THERE ARE CURRENTLY "SY(52)" LRA'S IN": PRINT "THIS SYSTEM.  PLEASE ENTER
    THE": PRINT "TOTAL NUMBER OF LRA'S DESIRED": INPUT "FOR THE SYSTEM.  "N
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```
3250 L5 = SY(52): REM  HOLD PREVIOUS NO. OF LRA TYPES
3255 SY(52) = N: REM  CHANGE NO. OF LRA TYPES IN SYSTEM
3256  PRINT D$;"OPEN B";RMO;",V0,L20"
3257  PRINT D$;"WRITE B";RMO;",R";52
3258 QZ = SY(52): GOSUB 3: PRINT D$;"CLOSE"
3260 LOT = SY(49)
3266  PRINT : PRINT : PRINT
3270  PRINT "PLEASE PROVIDE DATA FOR THE": PRINT "ADDITIONAL LRA TYPES:"
3275 CTR = L5: PRINT
3280  GOSUB 2880: REM    GET DATA FOR ADDITIONAL LRA TYPES
3290  PRINT D$;"OPEN B";RMO;",V0,L20"
3300  FOR I = 79 TO 80
3310  PRINT D$;"WRITE B";RMO;",R";I:QZ = SY(I): GOSUB 3: NEXT : PRINT D$;"CLOSE"
3320 L5 = L5 + 1: REM  THIS IS THE NUMBER OF THE 1ST ADDITIONAL LRA TYPE
3330  PRINT D$;"OPEN C";RMO;",V0,L35"
3340  FOR I = L5 TO N: PRINT D$;"WRITE C";RMO;",R";I
3350 QZ$ = ID$(I): GOSUB 5: NEXT I: PRINT D$;"CLOSE"
3360  RETURN
3370  REM
3375  REM
3380  REM ************************ SENSITIVITY RUN (XOPT=5) ************************
3407  PRINT : PRINT
3410  PRINT "PLEASE TYPE ID# OF THE DATA SET": INPUT "TO BE USED:  ";QQ$:RMO =  VAL (QQ$)
    : IF  LEN (QQ$) < > 8 THEN 3410
3415  PRINT D$;"VERIFY B";RMO;",V0"
3420 XX = 2: GOSUB 720: REM   READ SYS DATA
3425  PRINT : PRINT
3430  INPUT "SENSITIVITY ANALYSIS VARIABLE NO.?";F9
3435  PRINT "THE CURRENT VALUE OF VARIABLE "F9: PRINT "IS "SY(F9)
3438  PRINT
3440  PRINT "INDICATE THE UPPER BOUND, LOWER": PRINT "BOUND, AND INCREMENT FOR SENSI-": PRINT
    "TIVITY ANALYSIS."
3445  PRINT
3450  INPUT "UPPER BOUND=";EOJCTR
3455  INPUT "LOWER BOUND=";VL
3460  INPUT "INCREMENT=";II
3470 SY(F9) = VL: REM  SET SENSITIVITY ANALYSIS VARIABLE= LOWEST VALUE
3480  RETURN
3530  REM
3540  REM
3550  REM ************************************ RUN SYSTEM (XOPT=6) ******************
3555  PRINT : PRINT
3560  PRINT "PLEASE TYPE THE ID# OF THE DATA": INPUT "SET TO BE USED:  ";QQ$:RMO =  VAL (
    QQ$): IF  LEN (QQ$) <  > 8 THEN 3560
3565  PRINT D$;"VERIFY B";RMO;",V0"
3575 XX = 2: REM  USE EXISTING DATA SET
3580  GOSUB 720: REM  READ SYS DATA
3600  RETURN
4100  REM
4110  REM  ** PRNTLRA HEADING **
4102  REM
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4103  PRINT  CHR$ (9);"N"
4105  PRINT : PRINT : PRINT : PRINT : PRINT
4110  PRINT  SPC( 3);"LRA NUMBER ";CTR; SPC( 40);ID$(CTR)
4120  PRINT
4125  PRINT  SPC( 16);"INPUT DATA:"
4130  PRINT  SPC( 13);"UNIT COST    GIPA     MTR&R      MTTR    DUTY CYC    MTBF    SATE
      COST"
4135 A0$ =  STR$ (A(0))
4140 A1$ =  STR$ (A(1))
4145 A2$ =  STR$ (A(2))
4150 A3$ =  STR$ (A(3))
4151 SP$ = "                "
4155 A4$ =  STR$ (A(4))
4160 A5$ =  STR$ (A(5))
4161 A6$ =  STR$ (A(6))
4165  PRINT  SPC( 13); LEFT$ (SP$,7 -  LEN (A0$)) + A0$; LEFT$ (SP$,7 -  LEN (A1$)) + A1$
      ; LEFT$ (SP$,10 -  LEN (A2$)) + A2$;
4167  PRINT  LEFT$ (SP$,10 -  LEN (A3$)) + A3$; LEFT$ (SP$,10 -  LEN (A4$)) + A4$; LEFT$
      (SP$,11 -  LEN (A5$)) + A5$; LEFT$ (SP$,10 -  LEN (A6$)) + A6$
4170  PRINT : PRINT
4175  PRINT  SPC( 3);"SUPPORT POLICY SUMMARIES:"
4180  PRINT  SPC( 31);"**** THOUSANDS OF DOLLARS ****"; SPC( 20);"** FLEET PERSONNEL REQU
      IREMENT **"
4185  PRINT  SPC( 27);"LCC"; SPC( 10);"MANPWR"; SPC( 9);"PROD"; SPC( 9);"OTHER"; SPC( 13)
      ;"DIRECT"; SPC( 6);"A"; SPC( 8);"C"
4190  PRINT  SPC( 3);"LOR POLICIES";
4195  PRINT  SPC( 11);"COSTS"; SPC( 10);"COST"; SPC( 10);"COST"; SPC( 9);"COSTS"; SPC( 13
      );"LABOR"; SPC( 6);"SCHL"; SPC( 5);"SCHL"
4200  PRINT
4201  RETURN
4499  REM ********************************** SUBROUTINES ********************************
4500  REM
4501  REM *****PRINT SYSTEM SUMMARY*****
4502  REM
4504  PRINT  CHR$ (9);"N"; PRINT : PRINT : PRINT : PRINT
4505  PRINT  SPC( 47);"SYSTEM COST SUMMARY";SP$ = "                    "; PRINT
4510  PRINT " ***************** GENERAL RESULTS *****************"; SPC( 33);"**** RUN INFORM
      ATION ****"
4511  PRINT
4515  PRINT " LIFE CYCLE COST";
4525  PRINT  SPC( 12); LEFT$ (SP$,10 -  LEN (L$)) + L$;"   ($'000)";
4530  PRINT  SPC( 33);"DATE "; MID$ (RN$,3,2);"/"; LEFT$ (RN$,2);"/"; MID$ (RN$,5,2)
4532  PRINT  SPC( 81);"SEQUENCE NO. "; RIGHT$ (RN$,2)
4540  PRINT " SYSTEM RECURRING UNIT COST";
4545  PRINT  LEFT$ (SP$,11 -  LEN (F$)) + F$;"   ($'000)";
4550  PRINT  SPC( 33);"DATA SET ID NO. ";RN$
4554  PRINT
4555  PRINT " SYSTEM MTBF ";
4565  PRINT  LEFT$ (SP$,6 -  LEN (H1$)) + H1$;" HOURS";
4570  PRINT  SPC( 56);"NUMBER OF LRA'S IN THIS"
4580  PRINT " SYSTEM MTTR ";
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4585  PRINT  LEFT$ (SP$,6 -  LEN (MT$)) + MT$;" HOURS";
4586  PRINT  SPC( 56);"CONFIGURATION: ";Z3$
4592  PRINT
4595  PRINT " CONFIDENCE AGAINST STOCKOUT  ";
4600  PRINT  LEFT$ (SP$,6 -  LEN (H9$)) + H9$;" PROBABILITY";
4610  IF XOPT < > 5 THEN 4630
4620  PRINT  SPC( 33);"SENSITIVITY ANALYSIS VARIABLE NO.: ";F9
4625  PRINT  SPC( 81);"CURRENT VALUE FOR THIS VARIABLE=";SY(F9): GOTO 4640
4630  PRINT : PRINT
4640  PRINT " LRA'S SUPPORTED WITH CONTRACTOR DEPOT ";
4645  PRINT  SPC( 1); LEFT$ (SP$,6 -  LEN (H2$)) + H2$;" %"
4655  PRINT " LRA'S SUPPORTED WITH MILITARY DEPOT";
4660  PRINT  SPC( 5); LEFT$ (SP$,5 -  LEN (H3$)) + H3$;" %"
4670  PRINT " LRA'S SUPPORTED THRU LOCAL REPAIR";
4675  PRINT  SPC( 7); LEFT$ (SP$,5 -  LEN (H4$)) + H4$;" %"
4700  PRINT " LRA'S CODED DISCARD AT FAILURE";
4705  PRINT  SPC( 8); LEFT$ (SP$,7 -  LEN (H5$)) + H5$;" %";
4720  PRINT : PRINT : PRINT
4725  PRINT "******** COST ELEMENTS ($'000) ********";
4730  PRINT  SPC( 42);"******* FLEET PERSONNEL REQUIREMENT *******"
4735  PRINT  SPC( 110);"MAINT.   OPER."
4810  PRINT " PRODUCTION AND SPARES";
4815  PRINT  LEFT$ (SP$,17 -  LEN (L1$)) + L1$;
4820  PRINT  SPC( 42);"DIRECT MANNING REQUIRED";
4825  PRINT  SPC( 4); LEFT$ (SP$,7 -  LEN (MM$)) + MM$;
4830  PRINT  LEFT$ (SP$,8 -  LEN (MO$)) + MO$
4835  PRINT " MANPOWER (COMP,TRNG&OTHER)";
4840  PRINT  SPC( 1); LEFT$ (SP$,11 -  LEN (L2$)) + L2$;
4845  PRINT  SPC( 42);"ADDITIONS TO CREW";
4850  PRINT  SPC( 10); LEFT$ (SP$,7 -  LEN (H6$)) + H6$;
4855  PRINT  LEFT$ (SP$,8 -  LEN (H7$)) + H7$
4860  PRINT " SUPPORT AND TEST EQUIPMENT";
4865  PRINT  SPC( 2); LEFT$ (SP$,10 -  LEN (L3$)) + L3$;
4870  PRINT  SPC( 42);"A-SCHOOL ATTENDEES";
4875  PRINT  SPC( 9); LEFT$ (SP$,7 -  LEN (Z6$)) + Z6$;
4880  PRINT  LEFT$ (SP$,8 -  LEN (Z7$)) + Z7$
4885  PRINT " REPAIR (DIRECT COST)";
4890  PRINT  SPC( 9); LEFT$ (SP$,9 -  LEN (L4$)) + L4$;
4895  PRINT  SPC( 42);"C-SCHOOL ATTENDEES";
4900  PRINT  SPC( 9); LEFT$ (SP$,7 -  LEN (Z8$)) + Z8$;
4905  PRINT  LEFT$ (SP$,8 -  LEN (Z9$)) + Z9$
4910  PRINT " ICO,DATA,IEMC,TRANSPORT ";
4915  PRINT  SPC( 4); LEFT$ (SP$,10 -  LEN (L5$)) + L5$;
4920  PRINT  SPC( 42);"C-SCHOOL COST/STUDENT($)";
4922 T1$ =  STR$ ( INT ( VAL (T1$) * 100) / 100)
4924 T2$ =  STR$ ( INT ( VAL (T2$) * 100) / 100)
4925  PRINT  LEFT$ (SP$,10 -  LEN (T1$)) + T1$; LEFT$ (SP$,8 -  LEN (T2$)) + T2$
4930  PRINT : PRINT
4935  PRINT  SPC( 8);"NOTE: ALL COSTS ARE DISCOUNTED TO PRESENT VALUE AT AN ANNUAL"
4936  PRINT  SPC( 14);"DISCOUNT RATE OF ";H8$;"% IN CONCERT WITH OMB CIRCULAR A-76."
4950  RETURN
```

```
4977  REM
4978  REM ** END PRNTSUM **
4979  REM
4980  REM ************************************************************************
4981  REM COMPUTATION STARTS
4982  REM ************************************************************************
5050  REM ROUND-UP SUBROUTINE
5055  IF RU < 0 THEN RU = 0: RETURN
5057  IF RU =  INT (RU) THEN  RETURN
5060 RU =  INT (RU) + 1
5065  RETURN
5100  REM SYSEL SUBROUTINE
5102 KA = 1:Z0 = 0:Z1 = 0:Z2 = 0:Z3 = 0:Z4 = 0:Z5 = 0:Z6 = 0:Z7 = 0:Z8 = 0:Z9 = 0: REM
    INITIALIZE ACCUMULATION REGISTERS
5103 YA = 0:YP = 0:YD = 0:Y3 = 0:Y4 = 0:Y5 = 0:Y6 = 0:Y7 = 0:Y8 = 0:Y9 = 0:Y10 = 0: REM
    INITIALIZE ACCUMULATION REGISTERS
5104 LS = 0
5106 LR = 0
5107 CTR = 1
5110  FOR J2 = 1 TO L
5115 LR = LR + (1 + R0 / 100) ↑ ( - J2)
5120  NEXT J2
5125 P = (365 - H * D) / H
5130 RU = (DRT - P) / (D + P)
5135  GOSUB 5050
5140 X = RU + 1
5146 UI = 0
5147 GZ = 0:U1 = 0:U2 = 0
5150  RETURN
5200  REM PCD SUBROUTINE
5210 LB = Q * A(1) * A(4) * AHR / A(5): REM  AV LRA FAIL/YR/SHIP
5220 LP = LB * PHR / AHR: REM  PEAK LRA FAIL/DEPLOY. PER./SHIP
5230 KIS = (KS / KA) ↑ (A(0) / (UC - UI))
5265 GL = A(1) * A(4) * A(2) / A(5)
5270  RETURN
5495  REM ************************
5496  REM ********DSPARES***********
5497  REM ************************
5500 TTL = 10 ↑ 10: REM  LARGE INIT TOTAL
5502 LX = LP * X
5504 MEW = NO * LP * DRT / (D * DEP)
5510 LIN = LP:KN = KIS
5520  GOSUB 6100: REM  S(LP,KIS)
5530 S = SOUT
5540 LIN = LP:SN = S
5550  GOSUB 6000: REM  K(LP,S)
5551  IF X = 1 THEN S(I) = S:K(I) = 0:K(I) = KOUT: RETURN
5552 DHOLD = KOUT
5554 LIN = LX:SN = S
5556  GOSUB 6000
5560 XHOLD = KOUT
```

```
5570 KN = 0: REM  THIS TO AVOID ROUND OFF ERROR WHEN DHOLD=XHOLD=1
5572  IF (DH < > XH AND XH < KIS) THEN KN = (KIS - XHOLD) / (DHOLD - XHOLD)
5575  REM  KN IS REQUIRED CONFIDENCE LEVEL AT DEPOT
5580 LIN = NEW: REM   DEMANDS AT DEPOT
5590  GOSUB 6100: REM  S(LIN,KN)
5600  REM  SOUT IS NO. OF SPARES AT DEPOT WHEN S SHIP SPARES
5610 TEMP = NO * S + DEP * SOUT
5620  IF NO > SOUT * DEP THEN TTL = TEMP:B = SOUT:KD = DHOLD:KX = XHOLD:S(I) = S: GOTO 56
    40
5630  IF TEMP < TTL THEN TTL = TEMP:S = S + 1:B = SOUT:KD = DHOLD:KX = XHOLD: GOTO 5540
5635 S(I) = S - 1
5640 SN = B:B(I) = B
5650  GOSUB 6000
5660  REM  KOUT IS ACHIEVED DEPOT CONFIDENCE LEVEL
5670 K(I) = KOUT * (KD - KX) + KX
5680  RETURN
5690  REM ***END DSPARES CSEG***
5700  REM  ***POISSON K(L,S)***
5710 KOUT =  EXP ( - LIN): IF SN = 0 THEN  RETURN
5715  IF SN > 3000 THEN 6010
5720 LFAC = 0:LL =  LOG (LIN)
5730  FOR I1 = 1 TO SN:LF = LF +  LOG (I1):KO = KO +  EXP (I1 * LL - LF - LI): NEXT
5740  RETURN
5750  REM ****END K-POIS****
5800  REM ***POISSON S(K,L)***
5820 KP = KN -  EXP ( - LIN):LL =  LOG (LIN)
5830  IF KP <  = 0 THEN SOUT = 0: RETURN
5840 LF = 0:I1 = 3000
5850  FOR SO = 1 TO I1:LF = LF +  LOG (SO):KP = KP -  EXP (SO * LL - LF - LI): IF KP < =
    0 THEN  RETURN
5855  NEXT
5880  GOTO 6110
6000  REM ****SUB K(S,L)****
6001  IF SW = 1 THEN 5700
6005  IF SN = 0 THEN KOUT =  EXP ( - LIN): RETURN
6010 H4 = (LIN - SN) /  SQR (LIN)
6015 A = G6 *  EXP (H4 * H4 /  - 2)
6020 G = 1 / (1 + G9 *  ABS (H4))
6025 KOUT = A * (G1 * G + G2 * G ↑ 2 + G3 * G ↑ 3 + G4 * G ↑ 4 + G5 * G ↑ 5)
6030  IF H4 < 0 THEN KOUT = 1 - KOUT
6035  RETURN
6040  REM **********************
6045  REM ******END K(S,L)******
6100  REM ****SUB S(L,K)****
6101  IF SW = 1 THEN 5800
6105  IF KN <  = EXP ( - LIN) THEN SOUT = 0: RETURN
6110 NM = 1 - KN:A = 1
6115  IF (NM > .5 AND NM < 1) THEN NM = 1 - NM:A =  - 1
6120 G =  SQR ( LOG (NM ↑  - 2))
6125 H4 = A * (G - (C0 + C1 * G + C2 * G ↑ 2) / (1 + C3 * G + C4 * G ↑ 2 + C5 * G ↑ 3))
6130 RU = LIN + H4 *  SQR (LIN)
```

```
6135  GOSUB 5050
6140 SOUT = RU
6145  RETURN
6250  REM  LSPARES SUBROUTINE
6255 KN = KIS:LIN = LP * SRT / D
6260  GOSUB 6100
6265 S(I) = SOUT:B(I) = 0
6270 SN = SOUT
6275  GOSUB 6000
6280 K(I) = KOUT
6285  RETURN
6330  REM  LEVEL OF REPAIR SUBROUTINE
6335 SP(I) = LB * (1 - (R(1) + R(2)) * (1 - CN))
6340 Q1 = (NO * (Q * A(1) + S(I) + SP(I)) + DEP * B(I)) / LOT
6345 F(I) = A(0) * Q1 ↑ ( LOG (RR) /  LOG (2))
6375 C(1) = 0:C(2) = 0:C(3) = 0: REM   INITIALIZE WAGE, TRN, OTHER MANPOWER COSTS
6377 M1 = Q * SM / N * FHR * H / AHR: REM  PEAK SCHEDULED MAINTENANCE REQUIREMENT
6380 MP(I) = (M1 + 7 / D * LP * (A(2) + R(1) * A(3))) / (U * W1)
6385 MA(I) = MP(I) * AHR / (PHR * H): REM   AV. MAIN. MANPOWER REQ.
6389  REM  **INPUTS TO MANPOWER SUBROUTINE**
6390 M1MP = MP(I):M2MA = MA(I):M3TC = DC * (TS / N + R(1) * TR):M4TA = TB:M5BN = BIN:M6AN
     = GL / (GS - GZ) * (A1N - U1N):M7AG = AG - U2G
6395  GOSUB 6500: REM   COMPUTE MAIN. MANPOWER COSTS
6400 UN(I) = UN:UG(I) = UG: REM  #UTILIZED FROM AN AND AG POOLS
6405 MD(I) = R(3) * LB * NO * A(3) / DP / 52 / U / W2
6406 C(1) = C(1) + R(3) * MD(I) * BD * LR * DP
6407 C(2) = C(2) + R(3) * DP *  INT (MD(I) + 1) * DC * TR * (1 + T3 * LR)
6410  REM FOR MOD POSTURE ADD WAGE AND TRAINING COSTS FOR DEPOT TECHNICIANS
6415 CE(I,4) = F(I) * (NO * (Q * A(1) + S(I) + SP(I) * LR) + B(I) * DEP): REM    PRODUCTI
    ON AND SPARES
6420 CE(I,5) = 0
6425 CE(I,6) = A(6) * (NO * R(1) + DP * R(3)) * (1 + SV * LR)
6430 CE(I,7) = LB * NO * LR * ((R(1) + R(3)) * RP + R(2) * (1 - R(3)) * CCD): REM      RE
    PAIR
6435 CE(I,8) = IEC + LR * IMC * (NO + R(3) * DP + PP / N * (R(1) * NO + R(3) * DP)): REM
         ITEM ENTRY AND MANANGEMENT
6440 CE(I,9) = (TDP + T7M * LR) * (PF / N + PR * (R(1) + R(3))): REM     TECH DATA
6445 CE(I,10) = LB * NO * LR * 2 * DIS * CC * WF * R(3): REM  TRANSPORTATION
6450 LCC(I) = C(1) + C(2) + C(3)
6452  FOR K = 4 TO 10:LCC(I) = LCC(I) + CE(I,K): NEXT
6454 O$(1) =  STR$ (  INT (LCC(I) / 100) / 10)
6456 O$(2) =  STR$ (  INT ((C(1) + C(2) + C(3)) / 100) / 10)
6458 O$(3) =  STR$ (  INT (CE(I,4) / 100) / 10)
6460 O$(4) =  STR$ (  INT ((CE(I,5) + CE(I,6) + CE(I,7) + CE(I,8) + CE(I,9) + CE(I,10)) /
    100) / 10)
6462 O$(5) =  STR$ (  INT ((MA(I) * NO + MD(I) * DP) * 100) / 100)
6464 O$(6) =  STR$ (H1 * NO)
6466 O$(7) =  STR$ (M1 * NO + R(3) *  INT (MD(I) + 1) * DP)
6468  PRINT  CHR$ (9);"N"
6480  PRINT N7$;
6490  PRINT  SPC( 2); LEFT$ (SP$,12 -  LEN (O$(1))) + O$(1);
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```
6491  PRINT  SPC( 2);  LEFT$ (SP$,12 -  LEN (O$(2))) + O$(2);
6492  PRINT  SPC( 2);  LEFT$ (SP$,12 -  LEN (O$(3))) + O$(3);
6493  PRINT  SPC( 2);  LEFT$ (SP$,12 -  LEN (O$(4))) + O$(4);
6494  PRINT  SPC( 12);  LEFT$ (SP$,7 -  LEN (O$(5))) + O$(5);
6495  PRINT  LEFT$ (SP$,9 -  LEN (O$(6))) + O$(6);
6496  PRINT  LEFT$ (SP$,10 -  LEN (O$(7))) + O$(7);
6497  PRINT  CHR$ (9);"I"
6498  RETURN
6499  REM
6500  REM *** MANPOWER COST SUBROUTINE ***
6502  REM  6505-6515 DETERMINES UTILIZED PORTION OF THE AN POOL
6505 UN =  INT (M6AN)
6510  IF M1MP <  = M6AN THEN UN = M1MP
6515  IF (M1MP > M6AN) AND ( INT (M1MP) < M1MP) AND (M1MP -  INT (M1MP) < M6AN -  INT (M6
    AN)) THEN UN = M6AN
6517  REM  6520-6525 DETERMINES UTILIZED PORTION OF THE AG POOL
6520 UG = M1MP - UN
6525  IF M7AG < UG THEN UG = M7AG
6530 US = M1MP - UN - UG: REM  UTILIZED PORTION OF AS POOL
6535 RU = UG: GOSUB 5050
6540 H1 = RU
6545 RU = US: GOSUB 5050
6550 H2 = RU: REM  H2 IS # OF NEW ADDITIONS TO EACH SHIP
6555 H1 = H1 + H2: REM  H1 IS # TO RECEIVE A-SCHOOL TRAINING
6560 RU = M1MP: GOSUB 5050
6562 M1 = RU: REM  C-SCHOOL PER SHIP
6565 C(1) = C(1) + NO * LR * (M2MA * BG + H1 * (M5RN - BG)): REM   WAGE
6570 H3 = NO * (1 + T2 * LR)
6575 C(2) = C(2) + H3 * (M1 * M3TC + H1 * M4TA): REM   TRAINING
6580 C(3) = C(3) + H3 * (M1 * Z + H2 * ZS): REM   OTHER PERSONNEL COSTS
6585  RETURN
6670 N7$ = " CONTRACTOR DEPOT":R(1) = 0:R(2) = 1:R(3) = 0: RETURN
6672 N7$ = " MILITARY DEPOT  ":R(1) = 0:R(2) = 1:R(3) = 1: RETURN
6674 N7$ = " LOCAL REPAIR    ":R(1) = 1:R(2) = 0:R(3) = 0: RETURN
6676 N7$ = " DISCARD AT FAIL ":R(1) = 0:R(2) = 0:R(3) = 0: RETURN
6678  REM
6680  REM
6682  REM LEAST COST SUBROUTINE
6685 TT = 10 ↑ 10
6690  FOR J = 0 TO 3
6700  IF LCC(J) < TT THEN TT = LCC(J):I = J
6710  NEXT
6730 J = I + 1
6740  ON J GOSUB 6670,6672,6674,6676
6750  PRINT
6754  PRINT  CHR$ (9);"N"
6755  PRINT "     ***** SUPPORT POSTURE ASSIGNED: ";N7$;" *****"
6757  PRINT  CHR$ (9);"I"
6760  REM  AGGREGATE COSTS AND OTHER FACTORS
6765 YP = YP + MP(I)
6770 YA = YA + MA(I)
```

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6773 YD = YD + MD(I)
6775 Y3 = Y3 + F(I) * A(1): REM  PRODUCTION COST
6780 Y4 = Y4 + CE(I,4): REM  PROD AND SPARES
6785 Y6 = Y6 + CE(I,6)
6790 Y7 = Y7 + CE(I,7)
6795 Y8 = Y8 + CE(I,8)
6800 Y9 = Y9 + CE(I,9)
6805 Y10 = Y10 + CE(I,10)
6810 Z1 = Z1 + R(3): REM  # LRA TYPES CODED MOD
6815 Z2 = Z2 + R(1): REM  # LOCAL REPAIR LRA TYPES
6820 Z3 = Z3 + A(1) / A(5): REM  LRA FAILURE RATE
6825 Z4 = Z4 + A(2) * A(1) / A(5): REM  AGGREGATE SYSTEM MTTR
6830 Z5 = Z5 + A(1): REM  REM TOTAL NUMBER OF LRA'A
6835 Z6 = Z6 + R(2) * (1 - R(3)) * A(1): REM  TOTAL # LRA'S CODED COD
6840 Z7 = Z7 + R(3) * A(1): REM  TOTAL NUMBER OF LRA'A CODED MOD
6845 Z8 = Z8 + R(1) * A(1): REM  TOTAL# OF LRA'S CODED LOCAL REPAIR
6850 Z9 = Z9 + (1 - R(1) - R(2)) * A(1): REM  TOTAL NUMBER OF LRA'A CODED DISCARD
6860 KA = KA * K(I): REM  CONFIDENCE LEVEL ALLOCATION FACTOR
6870 UI = UI + A(0): REM  CONFIDENCE LEVEL COST ALLOCATION FACTOR
6880 U1N = U1N + UN(I): REM  RUNNING SUM OF UTILIZED PART OF AN POOL
6890 U2G = U2G + UG(I): REM  RUNNING SUM OF UTILIZED PART OF AG POOL
6900 GZ = GZ + QL: REM  RUNNING SUM OF MANPOWER POOL ALLOCATION FACTOR
6910  RETURN
6925  HOME
6926  REM
6927  REM
6928  REM  * * * SYSTEM COST SUBROUTINE * * *
6929  REM
6930  REM
6935 C(1)= 0:C(2) = 0:C(3) = 0: REM  INITALIZE MANPOWER COSTS
6940  REM  **INPUTS TO MAINTENANCE MANPOWER SUBROUTINE**
6945 M1MP = YP: REM  PEAK MAIN. MANPOWER REQUIREMENT
6947 M2MA = YA: REM  AV. MAINTENANCE MANPOWER REQUIREMENT
6949 M3TC = DC * (TS + Z2 * TR):TMC = M3TC: REM  C-SCHOOL TRAINING COST
6951 M4TA = TB: REM  A-SCHOOL COST FOR MAINTENANCE TECHNICIANS
6953 M5BN = B1N: REM  ANNUAL BILLET COST FOR MAIN.
6955 M6AN = A1N: REM  AVAILABLE AN POOL
6957 M7AG = AG: REM  AVAILABLE AG POOL
6960  GOSUB 6500: REM  COMPUTE MAINTENANCE MANPOWER COSTS
6970 M6 = M2: REM  # NEW ADDITIONS
6972 D4(0) = M1: REM  # A-SCHOOL PER SHIP
6974 D5(0) = M1: REM  # C-SCHOOL PER SHIP
6977  REM  COMPUTE OPERATOR MANPOWER COSTS
6980 M1MP = TH * Q * PHR * 7 / D / WHR: REM  PEAK OPERATOR REQUIREMENT
6982 M2MA = M1MP * AHR / PHR / H: REM  AV. OPERATOR REQUIREMENT
6984 M3TC = DC * OTC:TCO = M3TC: REM  OPERATOR TRAINING COST
6986 M4TA = TA: REM  OPERATOR A-SCHOOL COST
6988 M5BN = B2N: REM  OPERATOR ANNUAL BILLET COST
6990 M6AN = A2N: REM  AVAILABLE OPERATORS
6992 M7AG = AG - UG: REM  AVAILABLE GENERAL LESS ALREADY USED
6994  GOSUB 6500: REM  OPERATOR MANPOWER COSTS
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7000 H7 = H2: REM  NEW ADDITIONS TO SHIP
7005 D4(1) = M1: REM  A-SCHOOL
7010 D5(1) = M1: REM  C-SCHOOL
7015 C(1) = C(1) + YD * DP * BD * LR: REM  WAGE COST FOR DEPOT TECHNICIANS
7020 RU = YD: GOSUB 5050: REM  # TECH. AT EACH DEPOT TO RECEIVE TRAINING
7025 C(2) = C(2) + RU * DP * DC * Z1 * TR * (1 + T3 * LR): REM  DEPOT TRAINING COST
7030 C(1) = C(1) + NO * OF * BO * LR: REM  OFFICER WAGE COST
7035 F(5) = NO * (SAC / LOT) ↑ ( LOG (RR) /  LOG (2)): REM  SYSTEM ASSEMBLY COST
7040 C(4) = F(5) + Y4: REM  PRODUCTIN AND SPARES
7045 C(5) = NO * Q * ICO: REM  INSTALLATION AND CHECKOUT COST
7050 C(6) = Y6 + (NO * FIH + CS + CH * (NO *  SGN (Z2) + DP *  SGN (Z1))) * (1 + SV * LR)
     : REM  S&TE
7051 C(7) = Y7:C(8) = Y8
7052 C(9) = PS + Y9: REM  TECH.DATA
7053 C(10) = Y10
7055  FOR K = 1 TO 10:LS = LS + C(K): NEXT
7060 L$ = STR$ ( INT (LS / 100) / 10)
7065 H1$ =  STR$ ( INT (1 / Z3)): REM  SYSTEM MTBF
7070 H2$ =  STR$ ( INT ((Z6 / Z5) * 1000) / 10): REM  % LRA'S CODED COD
7075 H3$ =  STR$ ( INT ((Z7 / Z5) * 1000) / 10): REM  % LRA'S CODED MOD
7080 H4$ =  STR$ ( INT ((Z8 / Z5) * 1000) / 10): REM  % LRA'S CODED LOCAL REPAIR
7085 H5$ =  STR$ ( INT ((Z9 / Z5) * 1000) / 10): REM  % LRA'S CODED DISCARD
7090 H8$ =  STR$ ( INT (RO * 10) / 10)
7100 Z3$ =  STR$ (Z5): REM  TOTAL # OF LRA'S
7110 H9$ =  STR$ ( INT (KA * 1E + 4) / 1E + 4): REM  SYSTEM CONF. LEEL
7120 MM$ =  STR$ ( INT ((YA * NO + YD * DP) * 10) / 10): REM  AVG. MANNING PER SHIP
7130 MO$ =  STR$ ( INT (M2MA * NO * 10) / 10): REM  AVG. OPERATOR DEMAND PER SHIP
7140 H6$ =  STR$ (H6 * NO): REM  ADD. TO CREW (MAINTENANCE)
7150 H7$ =  STR$ (H7 * NO): REM  ADD. TO CREW (OPERATION)
7160 Z6$ =  STR$ (D4(0) * NO): REM  # A-SCHOOL (MAINTENANCE)
7170 Z7$ =  STR$ (D4(1) * NO): REM  # A-SCHOOL (OPERATOR)
7180 Z8$ =  STR$ (D5(0) * NO + RU * DP): REM  # C-SCHOOL (MAINTENANCE (SHIP AND DEPOT))
7190 Z9$ =  STR$ (D5(1) * NO): REM  # A-SCHOOL (OPERATOR)
7200 L1$ =  STR$ ( INT (C(4) / 100) / 10)
7205 L2$ =  STR$ ( INT ((C(1) + C(2) + C(3)) / 100) / 10)
7210 L3$ =  STR$ ( INT (C(6) / 100) / 10)
7220 L4$ =  STR$ ( INT (C(7) / 100) / 10)
7225 L5$ =  STR$ ( INT ((C(5) + C(8) + C(9) + C(10)) / 100) / 10): REM  ICO, IEMC, DATA,
     AND TRANSPORTATION
7230 F$ =  STR$ (( INT (F(5) / NO + Y3) / 100) / 10)
7240 MT$ =  STR$ ( INT (Z4 / Z3 * 1000) / 1000)
7250 T1$ =  STR$ ( INT (TMC))
7260 T2$ =  STR$ ( INT (TCO))
7270  RETURN
9997  REM
9998  REM
9999  REM
10000  REM  ***FILL SYSTEM ARRAY SUBROUTINE***
10010 SY(1) = DC:SY(2) = TB:SY(3) = TA:SY(4) = B1N:SY(5) = B2N:SY(6) = BG:SY(7) = BD:SY(8
     ) = BO:SY(9) = W1:SY(10) = WHR
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10020 SY(11) = W2:SY(12) = U:SY(13) = T2:SY(14) = T3:SY(15) = ZS:SY(16) = H:SY(17) = D:SY
    (18) = RO:SY(19) = CN:SY(20) = MR
10030 SY(21) = TDP:SY(22) = T7M:SY(23) = CC:SY(24) = IEC:SY(25) = IMC:SY(26) = A1N:SY(27)
     = A2N:SY(28) = AG:SY(29) = NO:SY(30) = Q
10040 SY(31) = L:SY(32) = AHR:SY(33) = PHR:SY(34) = RR:SY(35) = RP:SY(36) = DEP:SY(37) =
    DP:SY(38) = COD:SY(39) = DRT:SY(40) = SRT
10050 SY(41) = DIS:SY(42) = TH:SY(43) = OF:SY(44) = Z:SY(45) = OTD:SY(46) = TS:SY(47) = T
    R:SY(48) = ICO:SY(49) = LOT:SY(50) = SAC
10060 SY(51) = KS:SY(52) = N:SY(53) = WP:SY(54) = PP:SY(55) = FIH:SY(56) = CS:SY(57) = CH
    :SY(58) = PS:SY(59) = PF:SY(60) = PR
10070 SY(61) = SM:SY(79) = GS:SY(80) = UC
10080  RETURN
10997  REM
10998  REM
10999  REM
11000  REM ***DISK DUMP SUBROUTINE***
11010 DC = SY(1):TB = SY(2):TA = SY(3):B1N = SY(4):B2N = SY(5):BG = SY(6):BD = SY(7):BO =
    SY(8):W1 = SY(9):WHR = SY(10)
11020 W2 = SY(11):U = SY(12):T2 = SY(13):T3 = SY(14):ZS = SY(15):H = SY(16):D = SY(17):RO
     = SY(18):CN = SY(19):MR = SY(20)
11030 TDP = SY(21):T7M = SY(22):CC = SY(23):IEC = SY(24):IMC = SY(25):A1N = SY(26):A2N =
    SY(27):AG = SY(28):NO = SY(29):Q = SY(30)
11040 L = SY(31):AHR = SY(32):PHR = SY(33):RR = SY(34):RP = SY(35):DEP = SY(36):DP = SY(3
    7):COD = SY(38):DRT = SY(39):SRT = SY(40)
11050 DIS = SY(41):TH = SY(42):OF = SY(43):Z = SY(44):OTD = SY(45):TS = SY(46):TR = SY(47
    ):ICO = SY(48):LOT = SY(49):SAC = SY(50)
11060 KS = SY(51):N = SY(52):WP = SY(53):PP = SY(54):FIH = SY(55):CS = SY(56):CH = SY(57)
    :PS = SY(58):PF = SY(59):PR = SY(60)
11070 SM = SY(61):GS = SY(79):UC = SY(80)
11080  RETURN
15001  END
20000  IF  PEEK (222) = 255 THEN  END
20010  IF  PEEK (222) = 5 OR  PEEK (222) = 6 THEN  HOME : PRINT "DISK NAME ERROR. PLEASE
    RETRY.": FOR I = 1 TO 1000: NEXT : CLEAR : GOTO 1
```